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radio amateur

APRIL
1947
Vol. 9 No. 4

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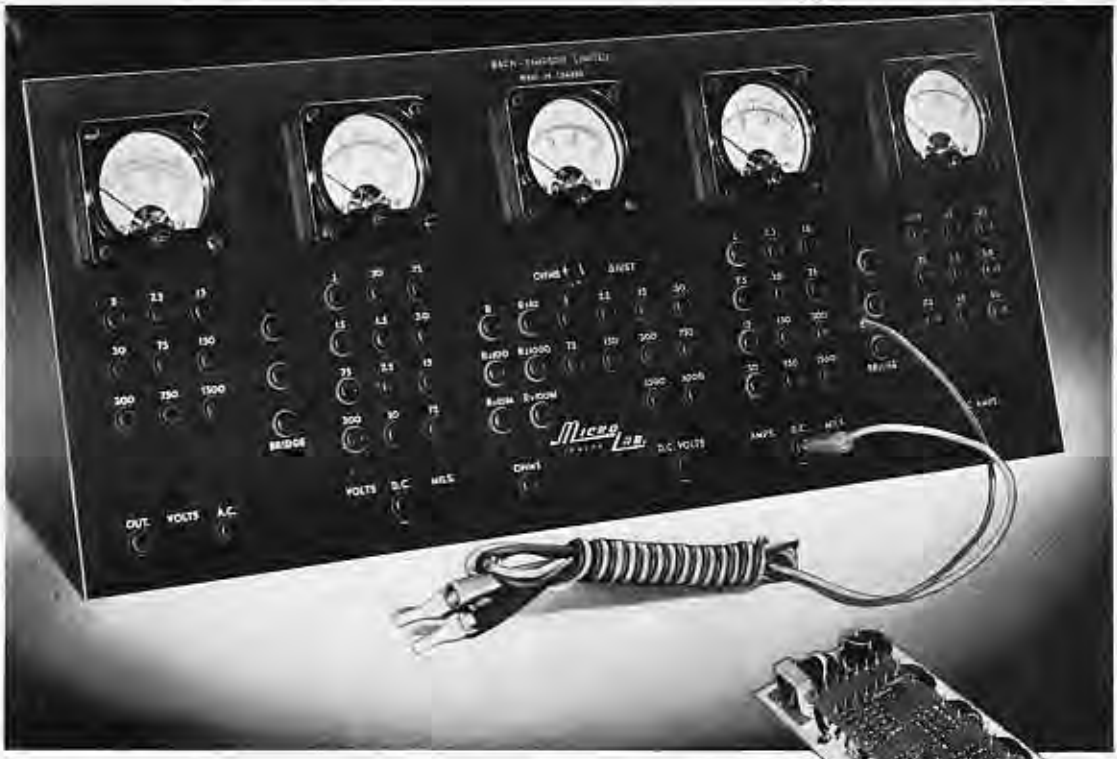

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HILITES

Tommy Bilesko's little 7 year old daughter "Timmie" tunes the OM's receiver on this month's cover. Tommy gave many 10 meterites their first Ve8 contact from Ve8AR in Yukon Territories. Back in Ontario again he now signs Ve3AGB at Jordan Station.

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

EDITORIAL

. . . HIGH vs. LOW . . .

THE fact that there are two major modes of emission available is responsible for a minor split in amateur ranks. Fortunately, both CW and phone operators are usually tolerant of each others' tastes—except, of course, when one group thinks it has reason to suspect the other of putting the snatch on more than its share of frequencies. Of late, however, another battle seems to be shaping up, and both factions involved look to be ready to arm themselves to the teeth in the effort to resist defeat. We refer to the current efforts of many responsible amateurs on both sides of the 49th parallel to lower the maximum power limit which restricts output to 500 watts in Canada and input to 1000 watts in the States. We have received many letters suggesting that 250 watts or even 100 watts would be a more suitable figure, and while the proponents of such action may be in the minority, it must be admitted that they are more prolific letter-writers than those in the other camp. Be that as it may, we feel impelled to go out on the well-known limb in an effort to mediate in this dispute—although we do it with considerable trepidation.

While we don't intend to review the innumerable arguments which both sides have brought forth in the past, we shall attempt to list several more or less axiomatic generalities. The first of these is that Canadians would be committing electronic suicide to voluntarily restrict power unless other countries, particularly the United States, were willing to follow suit. In the second place, it is safe to assume that the "kilowatters" could marshal enough arguments, including financial loss, to have the decision indefinitely postponed, and they would be able to count on the support of a large section of the manufacturing gentry. To summarize, we can't see any possibility of the status quo being altered, the limits on human ingenuity being what they are. We are too deep in the stream to change horses, and we might as well resign ourselves to rallying behind the decision of the anonymous individuals responsible for setting the present limits in the first place. This conclusion will be distasteful to many, but we might as well face facts.

We do admit that certain proposals have been brought forward which might be acceptable as partial solutions to the problem. In the case of CW it might be feasible to reserve a portion of each band for stations using 100 watts input or less. The width of this sub-band would have to be determined by survey, with its potential population being the deciding factor. This procedure, however, although it would offer a premium to low power stations, would not place any restrictions on high power, and the number of operators taking advantage of the privilege might vary from time to time. Thus a 100 kc. sub-band might be justified in 1947, but only 50 kc. in 1948. This would require constant review of conditions—not an easy job. And of course such a scheme would require a propaganda campaign to convince other countries of its advantages. For these reasons, we can't hold out any immediate hopes, although the idea shouldn't be entirely discarded by any means.

On the other hand, it is doubtful whether this principle could be effectively applied to phone. A given portion of the spectrum can accommodate many times as many CW stations as phones, simply because much greater bandwidth is necessary to transmit intelligence by voice, and our phone bands have reached, and in some cases passed, the saturation point already. Subdividing these allocations would undoubtedly create as many problems as would be solved. At least, that is the obvious argument, and in the U.S. it holds water. But, we wonder, couldn't this idea be made to work in Canada? Well, at first glance, maybe it could. On second glance, it still could, and quite possibly might result in less inconvenience than any other plan yet devised. We shall carry the investigation further for your consideration.

To begin with, Canadian phone stations are assigned frequencies which correspond to those issued to W stations. In addition, they are permitted to use voice within certain bands outside the U.S. limits. These "extra privileges" are treasured as much by the phone fraternity as they are resented by the CW boys, and the reasons are obvious. First, U.S. QRM is eliminated, second, communication between Canadian stations is facilitated, third, we are expressing our independence, and fourth, Canadian stations require separate allocations because they use, on the average, lower power than W's due to the higher cost enter the American phone bands due to reason of equipment, etc. In practice, VE's rarely enter the American phone bands due to reason

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Modifying the R1155

By R. B. Lumsden, VE3ADB*

WITH numerous types of armed forces radio equipment appearing on the market, this article is offered to assist mainly in the understanding of the circuit features of the R1155, 1155A and 1155B receivers used in aircraft during the war.

This unit was used as a communication and D/F receiver in conjunction with the T1154 transmitters, and color schemes used on the various front panel components agree with associated apparatus on the transmitter. The R1155 receiver uses a superheterodyne circuit and during field trials several small modifications and refinements were added. The 1155A receiver was turned out at the factory incorporating the above modifications and refinements. These changes were in the form of radio frequency chokes to suppress RF interference. The R1155B has six RF choke coils introduced at points shown on the schematic diagram and tend to suppress unwanted frequencies from transmitters using VHF.

The male portion of a Jones plug located in the lower right-hand corner contains all the connections needed to operate the receiver for communication purposes only. The power supply is not included with the receiver and can be constructed by the amateur to supply the following: A high voltage (well filtered) of approximately 225 volts at 110 mils; a 6.3-volt AC filament winding of 4 amperes capacity. It is important that the high voltage negative be insulated from ground and connected to terminal 8 of P1. The positive high voltage should be connected to terminal 5. Terminal 7 will not be used in the communications receiver. Terminals 6 and 4 are the output having an impedance of 5,000 ohms, and a maximum output of 100 milliwatts. Terminal 4 also is used as one side of the 6.3-volt heaters and chassis ground. Terminal 3 is the other side of the 6.3-volt heater. Terminal numbered 1 is used on Ranges 1 and 2 with an antenna approximately 45 feet long. Terminal 2 used on ranges 3, 4 and 5 with an antenna approximately 200 feet long. It is quite necessary to switch antennas whether of the length mentioned or any other available length to the terminal associated with the range being used.

*332 Hale St., London, Ont.

The tuning dial movement on some receivers is a little rough. This can be corrected by removing the set screw from the smaller knob, and taking the screen itself out of the knob while keeping an inward tension on the larger knob. Note the position (when the smaller knob is removed from the shaft) of a washer and tension spring so that it can be replaced without improper operation of the vernier. With a cloth under the receiver, gently remove the large knob by pulling it off the shaft. You will notice three conical shaped cylinders which should have a thin coating of lubricant, after being cleaned with tetrachloride or some other cleaning fluid. Clean and apply to the metal disc mounted upon the shaft a thin layer of lubricant. Tip chassis forward and replace large knob, tension spring, washer, and small knob. Set screw has a tapered point and it is by this taper that tension can be adjusted for smooth operation of the vernier.

The tubes used in this receiver are as follows:

V1-V2-V4	VR99	6K8G
V3-V5-V6	VR100	6K7G
V7-V8	VR101	6R7G
V9	VR102	6F8G
V10	VI102	6U5

The Canadian tubes listed to the right are directly interchangeable with the English type, and no tuning adjustments are necessary. It is not intended to discuss in this article the direction finding circuit and characteristics of the receiver, but the writer would be pleased to forward any information required upon request.

The circuit itself consists of a RF amplifier tube V3, a combined first detector and oscillator tube V4, two iron core IF stages tubes V5 and V6, a combined second detector and audio output tube V8, a combined beat frequency oscillator and AVC tube V7, and a tuning indicator V10. V1, 2 and 9 are not used in the communications portion of the receiver and can be removed, the space being used at the discretion of the owner to incorporate an output stage or other circuits. All sockets are octal wafer type. Each stage has its own decoupling circuits. The IF frequency is 560 kc. and the high frequency oscillator is 560 kc. higher than the signal frequency.

Very little mutual inductive coupling exists between the tuned circuits of the IF's, the coupling being effected by small condensers C97, C98 and C101. Dust iron cores are used to tune the IF's, there being no adjustable capacitance across them. The output of the last IF stage is taken to one diode of V8, thence through the diode load to the grid of V8. The audio frequency passes through a network composed of R67 and two series condensers C8 and C9 to a potentiometer R8 (2), the variable contact of which is connected to the grid of V8. There is a LF filter "T" network composed of condensers C8, 9 and 10 to an AF choke coil L29 and ground.

Switch MS chooses five positions namely, (1) OMNI or manual gain control, (2) AVC, (3) Balance, (4) Visual, (5) Polar.

The positions 3, 4 and 5 will not be used, as they apply to DF measurements. The first position straps the AVC diodes of V7 together and are connected through the load resistance R9 to a point 3.6 volts negative along the resistances R3 and R4, the rectified voltage across R9 operating the tuning indicator V10.

The chassis is approximately 30 volts positive with respect to the high voltage negative depending upon the supply voltage. This 30 volts must be maintained at all times and is the voltage drop across R1. This resistor is located directly under the tuning eye between terminals of C1. Any changes in the set that will change the current through R1 necessitates the value of R1 being changed to maintain the 30 volt drop. Two 6V6 tubes were added as an output stage and V9 rewired as a phase inverter. This required R1 to be changed to 375 ohms, instead of its present value of 2000 ohms, and its wattage rating raised to 20 watts.

The resistance R1 has, at a minimum, R3 plus R4 in parallel with it and these form a voltage divider so that 26.4 volts are across R3 and 3.6 volts across R4. The manual volume control R80 is connected across R3, thus any voltage between —3.6 and —30 can be applied to V4 and V5. A fixed potentiometer R10-11-12 supplies bias for V3 and 6.

The second position of the M.S. switch designated AVC places automatic volume control on tubes V3, 4, 5 and 6, and manual control of the audio tube V8 is provided by potentiometer R8 (2). R8 (1) and R8 (2) is a dual control of 50,000 and 500,000 ohms, and is labelled Volume Control. The position of the M.S. determines which of the potentiometers is operative—OMNI for R8 (1), AVC for R8 (2).

When in the AVC position the slider of R8 (1) is disconnected and a fixed network R10-11-12 across R9, and AVC diode V7 load which has a delay of 3.6 volts due to the drop across R4 in series with R3. On ranges 1 and 2 the voltage is reduced to 2.4 volts by switching R64 across R4. The rectified current flows through R10-11-12 with R9 in parallel back to the cathode via R4. The voltage developed across R9 and the network R10-11-12 is divided and applied to V3 and V6. There is a voltage delay of 13 volts on the AVC position and means 13 volts must be overcome by the strength of the incoming signal which starts AVC action. A change in signal of 80 db results in a change of output of approximately 8 db.

The beat frequency oscillator is of the Colpitts variety, the anode and grid circuits capacity couple using the triode portion of V7. The frequency is 280 kc. and the second harmonic is used. The use of the second harmonic prevents pulling of the oscillations into synchronism with the incoming IF frequency. A peak voltage of 42 volts is produced and is connected through C11 to the signal diode of V8.

In removing the DF equipment from the receiver the following parts can be removed and space provided to install the necessary additional parts: Tubes, V1, V2 and V9; L24, 2 air core inductances and condensers in metal cans between V1 and V2; Micarta panel holding resistances and condensers: shield cans and bases V1-V2.

Grid caps V1-V2 cut at variable condenser just inside front panel. Output transformer can be mounted just under tuning condenser with self-tapping screws.

The output of this receiver, that is, terminals 4 and 6 on P1, can be connected to any amplifier with sufficient level (approx. 100 milliwatts) to give good loud-speaker reception.

I hope the above information has been of some assistance to the owners and would-be owners of the R1155A receivers. One is now in use at VE3ADB on 20 and 75 and works very satisfactorily.

FURTHER ADVENTURES WITH R1155
By H. Reid, VE3ADR

My R1155 receiver dial did not track on waveband 2, so I adjusted the iron core in the HF oscillator coil until I got perfect tracking. This might apply to any band. The way to get at the cores is from the front, and if you cannot get a tool or knife blade into the core slot you can remove the front dial panel and use a screwdriver. The antenna connections at pins 1 and 2 are unusual. Pin 1 for the

The only diagram available would not reproduce. Blueprints of schematics are available at your local dealers.

QSY to page 28

A Rotary Beam for 28 mc.

By Peter W. Posnikoff, VE3BBN*

THIS article is written for the average ham who desires a beam that he can build himself without having to go over pages and pages of technical matter on how to feed it properly and make it work. We all know that the impedance of a multi-element antenna is very low and consequently presents quite a problem in feeding. However, we are not going to delve into a high-sounding technical explanation on how and why we feed our array the way we do. We will say this, that with our method of feed we used ordinary Amphenol receiving 72-ohm transmission line (.03c per foot) for four months during the hot summer to a three-element beam from a push-pull 813 final and we couldn't find a hot spot on it. Naturally it got a little warm with the heavy current flowing through it, but this was evenly distributed throughout the length of the line and not caused by standing waves. Furthermore, this transmission line was as good as new when we changed over to the kilowatt-rated 72-ohm line in the autumn. For all-round use and extreme temperatures, the kilowatt-rated line is recommended. A word of warning, however: Do not use a spliced transmission line, and do not use a closely-spaced antenna change-over relay or a transmission line commutator. Link-coupling of the transmission line to the final tank at a low impedance point must be used.

The following paragraphs and accompanying diagrams provide constructional data on either the five or three-element beam, whichever you prefer. Naturally, it is much easier to construct the three-element beam, and the performance of it should not be sneezed at. We worked over thirty countries in three months (July, August, September), using only three elements, on 28 mc. phone. We see no reason why the constructor's own ideas on element mounting and rotation should not be used. Therefore, we do not discuss the method of rotation in this article, nor do we insist that you use our method of mounting.

Material Required For Each Parasitic Element

1 6'6" length of Dural Tube ¾" dia. (Fig. 1—"A")

2 6'6" lengths of Dural Tube ⅝" dia. (Fig. 1—"B")

2 Standoff Insulators (Fig. 3)

NOTE:—We used four insulators on each element "A" on our antenna.

1 piece of bakelite for insulator mounting (See Diag. 3.)

Hardware

Material Required for the Radiator Element

1 6'6" length of Dural Tube ¾" dia., cut in two (Fig. 4)

2 6'6" lengths of Dural Tube ⅝" dia. to fit inside diameter of ¾" section. (Fig. 2)

4 Standoff Insulators for element mounting (Fig. 4)

1 piece of bakelite or other durable material for insulator mounting (Fig. 4)

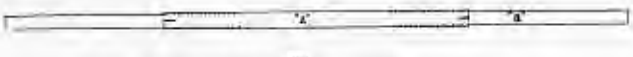


FIG 1

VIEW SHOWING MAIN SECTION AND TELESCOPING ENDS OF PARASITIC ELEMENTS

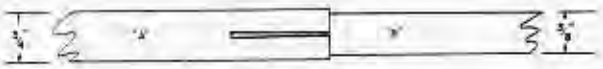


FIG 2

SHOWING MAIN SECTION SLOTTED TO PROVIDE SNUG FIT FOR ADJUSTABLE SLIDERS

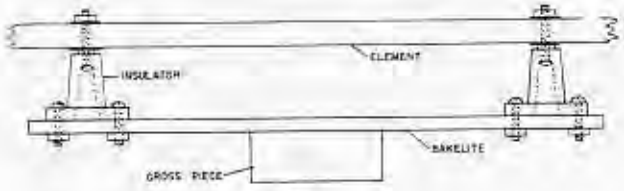


FIG 3

SHOWING SUPPORT OF PARASITIC ELEMENTS

*Radio Mfg. Division, Moffatts Ltd.

1 3" or 4" length of ⅜" bakelite or Polystyrene rod. (Fig. 4—"C")
1 16' length of good high grade 2" x 4" lumber.

Attaching Transmission Line

Fig. 4 indicates a spacing of 1" at the centre of the radiator element, at which point the feeders are attached to two lugs. (Fig. 4—"D"). It is very important that the "V" of the transmission line at this point be as small as possible. Allow enough extra length on your transmission line to permit 359° rotation without introducing any sharp bends or strain on any of its length. It should be clamped to the crosspiece near the radiator to prevent application of tension to the radiator element by virtue of its weight.

Element Lengths Before Tuning

Due to the fact that the exact length of each element can be found only by careful adjustment as covered under "Tuning," nevertheless an approximate length for each operating frequency must be calculated from the following formulas in order to obtain working lengths for tuning purposes.

Director Length in feet =

$$\frac{450}{\text{freq. in (mc.)}} = \frac{450{,}000}{\text{freq. in kilocycles}}$$

Reflector Length in feet =

$$\frac{492}{\text{freq. in (mc.)}} = \frac{492{,}000}{\text{freq. in kilocycles}}$$

.1 wavelength spacing between elements =

$$\frac{1}{10} \times \frac{492}{\text{freq. (mc.)}} \times 2$$

.15 wavelength spacing between elements =

$$\frac{15}{100} \times \frac{492}{\text{freq. in (mc.)}} \times 2$$

We found that the spacing of 3.2' between radiator and directors and 4.9' between reflector and radiator gave us the most gain in our antenna. However, this will vary slightly with different frequencies.

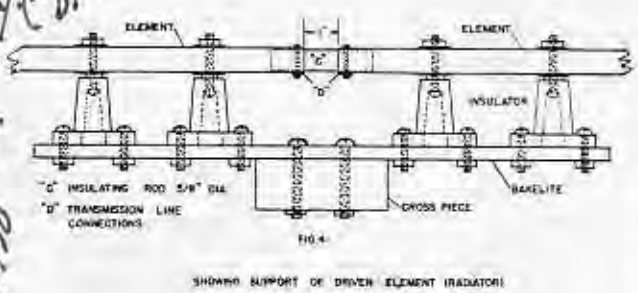


FIG. 4

SHOWING SUPPORT OF DRIVEN ELEMENT (RADIATOR)

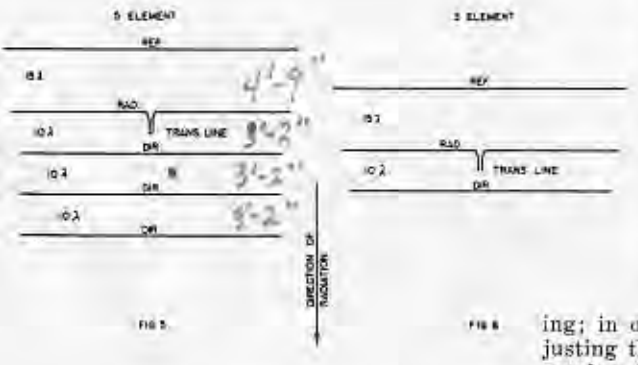


FIG. 5 FIG. 6

Radiator Length in feet =

$$\frac{468}{\text{freq. in megacycles}} = \frac{468{,}000}{\text{freq. in kilocycles}}$$

Tuning the Radiator at Operating Height

First adjust the director, radiator and reflector lengths according to formula. Then couple the 72-ohm transmission line to the coupling link on your final tank. Observe the final tank plate current and let us assume that the current is 200 ma. Now, if you are using grid leak bias to the final, tune the tank off resonance momentarily and observe the final plate current, without touching the coupling. We find that it is now 400 ma. We observe from this a difference of 200 ma. between the two readings. This means, that if we neglected losses and our antenna loaded perfectly, we would have a current of 400 ma. However, the co-efficient of cupling between link and the final is always less than unity, therefore we must accept a loss and probably the best we will be able to get out of our antenna will be about 355 or 360 ma. (It is well to have another ham to assist with the tuning; in other words, one man on the roof adjusting the element lengths, the other man observing the final plate current meter and retuning the tank to resonance after every adjustment.) First of all, we don't know if we will require more or less radiator length to hit

QSY to page 32

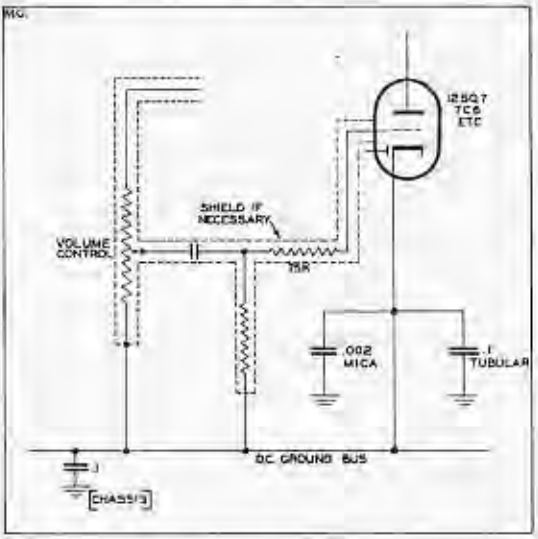
BCI
cause and cure

By L. H. Nixon, VE3ACL*

JUDGING from the first year's production of radio receivers, which was devoted almost exclusively to mantel models of the AC/DC variety, Canadian hams are threatened with roughly fifty thousand potential cases of severe BCI. This inexpensive type of set has in the past few years replaced the "batteryless" jobs of the late twenties as the greatest source of annoyance to both phone and CW operators. Of course, almost any receiver will bring in signals from a nearby amateur transmitter which represent beats between harmonics of the receiver's HF oscillator and the fundamental output of the transmitter (direct images, fortunately, went out the window with 160 meters), but the AC/DC design more often than not surprises the owner with a faithful reproduction of the neighbouring ham's signal extending from 550 to 1600 kc. without a break — and local broadcasting stations, if not entirely drowned out, at least suffer stiff competition. As is well known, this results when poor shielding and other design characteristics peculiar to the AC/DC set permit amplitude-modulated RF to get onto the grid of the second detector. Luckily, most models submit fairly readily to skilled treatment, and this article will attempt to outline some of the methods used to combat this particular type of interference. Most of the devices to be mentioned are not new, but the time seems ripe for a summation.

In Canada, CSA regulations prohibit the connection of one side of the AC line to the chassis, since this might (depending on the polarity of the plug in the wall outlet) communicate to the person touching it a lethal dose of amperes. Since one side of the line is always ground in this circuit, the DC ground bus is isolated from the chassis, with a .1 mfd. condenser serving to join the two together as a common ground for RF. This condenser functions as intended in the broadcast band, but when a 10-meter signal is introduced (against everybody's will) the .1 tubular develops appreciable inductance, and the RF potential built up across it is applied to the second detector in the manner of cathode injection. Many hams (including the writer) can testify from experience that this trouble can arise as the result of a nearby transmitter operated on as low a frequency as 3.9 mc., so that it should not be considered as an exclusively UHF phenomenon.

To test for this condition, remove all con-



nections from the grid of the second detector except the grid leak resistor, and short the grid of the preceding IF stage to ground. If the transmitter signal can still be heard in the speaker under these circumstance, faulty by-passing is indicated; double-check by temporarily shorting the second detector cathode to chassis (but don't stand on a damp concrete floor while doing it!) which should eliminate the offending RF. A permanent cure can then be effected by one or more of the following methods: (a) Moving the original .1 mfd. condenser so that one lead is connected directly to the cathode terminal on the second detector socket; (b) adding more capacity from the socket terminal to chassis, value to be determined by experiment; (c) by-passing the above tubular condensers with an .002 mfd. mica. In all cases short leads are imperative. Expedient (c) will probably be found to be 100% effective at 28 mc and higher frequencies but not so much so on 20 and 75 meters; on the latter bands (a) and/or (b) will in all likelihood do the job.

The coupling condenser from the volume control should then be reconnected to the grid, and if this re-introduces the signal the condenser and all associated leads in this circuit right back to the IF transformer must be shielded, with the shield connected to the DC bus. Check also that the shaft of the volume control is grounded, and that the IF transformer itself is adequately shielded. Alternately, a 75,000-ohm ¼ or ½-watt resistor can be connected in series with the grid right at the socket terminal, with the grid leak and the coupling condenser tied on to the input end of this resistor. In extreme cases it may also be advantageous to by-pass the grid to chassis using as large a condenser as possible without adversely affecting frequency response.

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*143 Royal York Rd. N., Toronto, Ont.

DX'ers of THE MONTH

Ve4RO
57
countries

Call	Feb. Total	Post-War Total
VE4RO	57	.....
VE4XO	40	72
VE7EB	39	.....
VE3ACS	36	65
VE3AHV	32	.....
VE3QB	26	.....
VE7EH	21	38
VE8AS	18	.....
VE8NG	18	34
VE2GA	18	.....
VE7YT	17	37
VE3LZ	16	69
VE3ADM	14	.....
VE3BBY	12	23
VE3AJS	12	.....
VE6FZ	11	.....
VE1PQ	10	65
VE2FG	10	16

★

IT'S that man again! 57 this time looks a record of some sort . . . No Ve5's in the February race . . . mebbee George's towers are too high for sigs to get past 'em into Saskatchewan! . . . surprised that the Ve1 gang haven't been after his hide before this . . . the Atlantic hop should be a cinch for a flock of countries . . . We hope to have a new system of reporting this column next month. Several good suggestions are under consideration. We'll do our best to wangle a little more space from the boss. By the way, please total countries worked in the post-war period when reporting monthly. In fact we'd be very happy if, besides giving us all the gen, and little tips, if any, you would list at the top of your page the following: (1) your call, (2) number of countries worked for the month, (3) number of countries worked post-war, (4) your name.

Call	Countries Worked in Month
VE4RO	—OA, UN1, PA, G, KH6, UA3, OZ, EI, FS, YO, HA, I, CR9, HB, VK, TI, ZS, ZL, TF, VU, CO, PY, LU, FP8, FA, NY4, YR, GM, VP5, KP4, KP6, KG6, KW6, J, KL7, LA, LA4 (Spitzbergen), SM, ON, XU, VO, ZK1, GW, XE, OK, GI, CE, CT2, OH, VP6, TG9, ZE1, VP4, CX, KA1, PZ, HH.
VE4XO	—GI, GM, GW, G, KL, KP4, KH6, KW6, KZ5, NY4, UA, UN, F, ON, HA, SM, OK, XAFD (Austria), HB, PA, I, OZ, LA, OX, XE, CE, CX, LU, HH, PY, HC, VK, ZL, HZ, ZS, VO, CM, XU, J2, CR9.
VE3ACS	—7 Mc.—G, FS, TI, SM, HB, GM, I, XE, EI. 14 Mc.—HK, ON4, D, LA, ZS, OZ, ZL, UA, VK, C7, BO, YR, KW6, UB5, KL7, KP4, HA, PA, NY4, UA, CM, GW, KZ5, FA8, OE, GI, OK.
VE3AHV	—VS7, VP5, OK, KH6, CR9, XU, CT2, OA, ZK1, ZS6, XAA (Italy) OZ, TG9, TI, VK, CN, HK, D4, PZ, OQ, J9, CE, YV, FA8 VP6, YN, PA, SM, VP9, HC, CX, KW6.
VE3QB	—VO6, GM, XE, G, CO, ZL, HK, ZD4, GW, PZ, VP4, TI, VP5, VK, F9, OZ, CE, TG9, YV, VP9, VP6, ZS, OA, VO2, ON.
VE7EH	—CM, EI, FS, FA8, G, GI, GM, GW, HB, KH6, KL7, LU, OQ, PA, PY, VK, VS1, XE, XU, ZL, ZS.
VE8AS	—KL7, XE, GM, ZS, D2, G, SM, OZ, VK, KH, J2, F8, LA, ZL, OK, HB, UB5, XU.
VE8NG	—CM2, LA4, UA, OZ5, J2, KH6, KL7, G6, ON4, VK2, HB9, GI6, GW3, GM3, SM7, F3, D2, TF3.
VE2GA	—G2, PA, HB9, F8, FA8, CM7, VO4, XE1, TG9, D5, GM5, CN8, VK3, ZI3, I1, KP4, LU9, HC1.
VE7YT	—GW, VP9, LU, G, HH, PY, CR, KL, VO, KH, W6BWS/KG6, W2CDJ/J2, FS, GI, VK, HB, KP.
VE3LZ	—VK, ZL, KL7, KP6, G, F, XE, UA, W8QZE/KW6, K6, PA8JH, LU, SM, VR2AO (on 20, QRA Nandi Airbase Fiji Is.), LA.
VE3ADM	—UA, CM, HC, KP, KL7, F3, VK, ZL, ZS, SM, OK, G, W6KE/KW6 (Wake Island) W4EGL/KH6.
VE3BBY	—ZS, G, CX, ZL, GI, HB, KH, I, XE, PZ, FS, VK.
VE3AJS	—XE, G, VP9, ZL, F8, ZS, GM, HB, OZ, ON, LX, I.
VE6FZ	—OK, D, ON, UA1, HB, KH, VK, G, GM, PA, ZL.
VE1PQ	—KL, VQ, G, HB9, D, HA, VO, J, VK, VP1.
VE2FG	—D, G, F3, HB, PA, VO, ON, CO, CN, SM.

Michigan
HAMFEST

THE Annual Hamfest of the Detroit Amateur Radio Association is being held this year on Sunday, May 18th, 1947. The location is the National Guard Armoury at Ypsilanti, Michigan, three-quarters of an hour out of Detroit on U.S. 12 and 112. The QTH will be well route-marked. Prizes (DARA are famous for prizes) talks, (short ones) meetings of groups of Traffic Men and DXers, Special prizes and activities for the YFs and YLs. Registration fee, $1.00 for hams and Ladies' Association charges 25c for YFs and YLs. Admission FREE.

HEADQUARTERS HAPPENINGS

GOING UP. —As of February 28, the number of licensed amateurs in Canada was 4,167. While we are not certain, we believe that this is the first time that the number of Canadian hams has exceeded the four thousand mark. This places us third, right after the United States and Great Britain, according to available figures . . . Further investigation reveals that in the U.S. there is one ham for each 1800 population (approximately) while in Canada there is only one for every 3000 BCL's. The explanation, if one is needed, eludes us for the moment . . . the figures for the U.S. and Great Britain respectively are 75,000 and 4,500 according to QST.

NEW MEMBERS. We at headquarters feel that the Association has reached a milestone. We now can claim to have fifty percent of Canada's licensed hams as members—plus a large number of Associate Members, who either don't hold calls or who live outside the country. By virtue of their support, we have made encouraging progress. We have a modest office, a Headquarters station on the air, a full-time staff of two, and XTAL is appearing twelve times a year, with more in it than ever before. Far from being smugly satisfied, however, we regard our progress to date as merely an indication of how far we can go in the future. We firmly believe that CAROA can become increasingly useful to its members, but we must continue to grow—and in this you can help. Every new member you induce to join your Association is a step forward—so if you know some of that fifty percent who aren't members, do your part to show them the advantages of having a Canadian amateur organization. Increased membership is vital for several reasons: First, the revenue from dues. This is a major source of our income, and you will shortly have an opportunity to ratify an increase along with other revisions to the Constitution. The second factor is even more important; the effect of membership on XTAL. The magazine is, and will always be, our main pillar of support by virtue of advertising revenue. More members means more subscribers, more subscribers means more advertising. And don't forget that more advertising will bring about more technical articles and other features, so that it can't help but work out to your advantage. So let's each one of you undertake a personal membership campaign—there is no more active way that you can build a Canadian amateur Association

WARNING. —D. of T. monitoring stations have been reporting numerous instances of off-frequency operation. Most of the offenders have their fundamental well within the band but overlook the possibility that their harmonics may not be. A harmonic is frowned on under any circumstances, but if it happens to be heard outside the recognized amateur bands it is cause for the suspension of transmitting privileges . . . D. of T. and FCC monitoring stations will be only too happy to check on your harmonics for you, but it might prove less embarrassing if you checked up yourself first . . .Users of 813's and 807's and other tetrodes and pentodes which are good generators of parasitics would be well advised to listen for spurious radiations on frequencies other than harmonic multiples of the fundamental. A modulated parasitic in particular is not pretty to listen to.

LAPEL BUTTONS

At long last delivery of CAROA Emblems has been ours to cheer about! We can take your order and ship same day now. They are very attractive in their sparkling Sterling Silver splendour, measure only ⅝ of an inch across, and colour motif is red on a silver field. Avoid sending cash in an envelope when it is so simple to pick up a postal note for 75c. The Hamfest season is stealing upon us, get yours now and identify yourself as a member of your Association.

A VE Transmitter

By VAL GALKA, VE3ATE*

THE average Canadian ham in trying to duplicate a receiver or transmitter described in American publications runs up against the old problem of being unable to secure some component manufactured in the States and unavailable in this country. The rig about to be described, though not built entirely of parts manufactured in Canada, can be duplicated, as all parts are readily available.

This rig, though small in size and running a limited amount of power, should appeal to the beginner with limited finances or to the old-timer who wants to keep his finger in the game.

The RF section consists of a 6F6 oscillator, 6L6 multiplier and an 807 final amplifier. The oscillator shown, though not original, is not commonly used. Very high bias is used on the 6F6, while the plate tank is coupled directly to the 6L6 grid. In this fashion, it is possible to tune the plate of the 6L6 multiplier to the fourth harmonic and still provide adequate drive for the 807 final. This arrangement was found preferable to employing a tri-tet circuit, not only eliminating a coil and condenser but preventing the danger of fracturing the crystal, which runs cold at all times.

How well this set-up works is demonstrated by the fact that the transmitter is at present being used on 10 meters, with a 40-meter crystal in the oscillator. Even so, four mils of drive are available at the 807 grid. No other band has been worked to date, but there is no reason why, with the large tank capacities employed, 75 or 20 could not be worked also. Although in operation only a short time, and using a very poor antenna, excellent reports have been obtained from Newfoundland and all over the U.S. and Canada. A multi-element rotary beam should make real dx easily obtained.

Four meter jacks are employed, three in the cathode circuits of the tubes, while the fourth is in the grid circuit of the 807. Placing the closed-circuit jacks in the cathode circuit eliminates the necessity of insulating them from the chassis. This, of course, does not apply to the 807 grid jack, which obviously must be insulated in order that the meter give a positive reading.

Ready-made air wound coils were employed in preference to winding our own. For when the necessity for buying isolantite forms, wire and work involved is taken into consideration, commercially available coils are cheaper in the long run. Use solid bus wire for wiring the RF section. This not only adds to the stability but to the neatness of the unit.

Tuning the transmitter, though not difficult, may be confusing to the beginner. The static cathode current of the oscillator is about 10 ma. When the plate tuning condenser is swung

*56 Manning Avenue, Toronto, Ontario.

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Top view of RF section. Isolantite insulation is used throughout.

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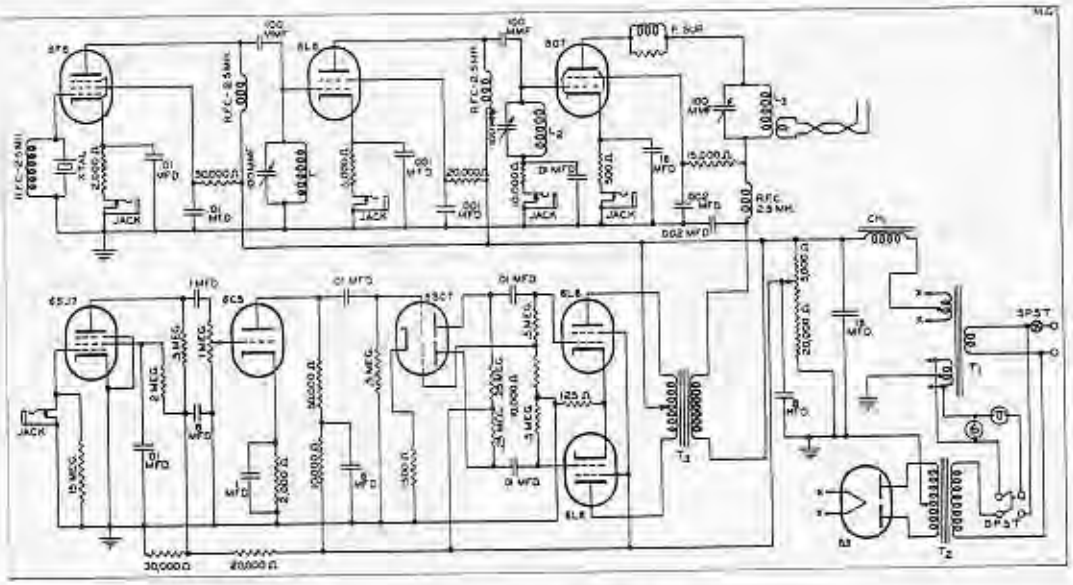

HAMMOND
1 T1-Type 267—5V 3A c.t. 6.3V 6A c.t. Filament Transformer.
1 T2-Type 715—510 0-510 300 ma. Plate Transformer.
1 T3-Type 2030 Modulation Transformer.
1 CH1-Type 30-200X—30 henry 200 ma. Filter Choke.
4 RFC-Type 1504 2.5 ma. RF Chokes.
1 Variable Condenser-Type 7110—100 mmfd.
2 Chassis-Type 1446—16" x 17" x 3".
2 Panels-Type 1485—19" x 8¾".
4 End Panels-Type 1495—8¾" x 11".
1 Top Cover-Type 1491—19" x 11".

I.R.C.
1 2000 ohm 10 w.
1 5000 ohm 10 w.
1 450 ohm 10 w.
1 15000 ohm 10 w.
1 125 ohm 10 w.
1 25000 ohm 50 w.
1 25000 ohm 50 w. (Bleeder with Slider)
1 1 Meg Gain Control.
FOLLOWING ARE ALL ½ WATT
2 50000 ohm; 2 20000 ohm
3 10000 ohm; 1 15 Meg
1 2 Meg; 1 30000 ohm
4 500,000 ohm; 1 2000 ohm
1 1500 ohm; 2 250,000 ohm

SIMPSON
1 0-150 ma Meter

AEROVOX
2 .002 mfd 1250 V (War Assets)

SOLAR
1 16 mfd 600 V Electrolytics
1 16 mfd 150 V Minicap
3 8 mfd 450 V Minicap
2 100 mmf Fixed
2 .001 mmf Fixed
7 .01 mfd 600 V Tubular
1 .1 mfd 600 V Tubular
1 1 mfd 600 V Tubular

HAMMARLUND
2 APC 100 mmf Variable Condensers fitted with shafts (War Assets)

BARKER-WILLIAMSON
L1—"Baby" Air Inductor Type 10 MC (short out 6 turns)
L2—"Baby" Air Inductor Type 10 MC (short out 3 turns)
L3—Junior Coil Type 10 JEL (short out 3 turns)

NOTE:—These specifications apply to 10 meter operation when using a 40-meter crystal.

through resonance there is a sharp increase to 20 ma. When tuning the multiplier it is preferable to employ a neon bulb or a pickup loop and bulb. The decrease in plate current is negligible and hence makes reading of a meter difficult. The cathode current off resonance is 35 ma and a few mils less at resonance. A word of warning at this point: When tuning the transmitter for the first time it is desirable to use a calibrated absorption wavemeter, as it is entirely possible to tune the 6L6 plate to the third instead of the second or fourth harmonic and so cause unlawful interference. The final is tuned and loaded in the conventional manner to 80 ma. A small parasitic suppressor was used in the 807 plate circuit and all traces of instability disappeared.

A pair of 6L6s in Class "A" are used as modulators, having more than sufficient power to modulate the rig 100%. A 6SC7 is used as a phase inverter instead of the conventional input transformer. This was done for two reasons: Firstly, to conserve space, and secondly, to get away from the possibility of hum, the modulator and power supply being on the same chassis. A 6C5 and a 6SJ7 complete the speech lineup. It may be found that it is possible to eliminate the 6C5 if a high-gain mike and close talking are used. Being a high-gain circuit, care should be exercised in making all leads as short and direct as possible, and shielding grid and plate leads if necessary.

The power supply uses Canadian transformers and employs an 83 mercury vapor tube. The on-off switches are so wired that it is

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VHF IN CANADA

Conducted by GORDON COLEMAN, VE3ANY

WE have been asked on several occasions to print circuits of v.h.f. equipment in this column. Obviously a circuit of a receiver or a transmitter with the attendant description of same would take at least one page in itself, so that this is out of the question. However, if any v.h.f'ers would like to write up their own "pet" circuit we would be glad to foster it through this column and submit it to the editors as a true article.

Regarding equipment for v.h.f. work. The excellent circuits in the A.R.R.L. and "Radio" handbooks can hardly be improved upon. Until recently the only drawback to Canadian v.h.f. has been the lack of some of the tubes and other equipment called for. Happily this is not now the case, and it is to those circuits that we would call your attention.

As the dx season on 50-54 mc approaches, it is timely to start our "Dx Derby" mentioned in last month's column. Unfortunately again, however, the list is incomplete in that VE7, VE6, VE5 and VE1 districts are not represented. You must be doing v.h.f. work there, fellows, so let's hear about it so that we can let the rest of Canada hear about it also.

Here's the list so far. The list is far from complete, as VE7's at least are known to have worked dx but we have not heard about it. VE2's, while in there pitching, have not as yet worked any. Our deadline date is 15th of month so get your reports in early so as to see your records posted! Remember, **only** dx contacts by temperature inversion or E layer skip are to be counted. We would like very much to hear of local activity but will not be reporting same in the dx category except where the frequency is above 148 mc.

Canadian DX Records

50-54 mcs—VE4DG (Winnipeg, Man.)—W8QYD (Dayton, Ohio)—approx. 1200 miles—July 1st, 1946.

420 mc—VE3BFF (Hamilton, Ont.)—VE3AND (Hamilton, Ont.)—1½ miles—March 19th, 1947.

50-54 mc News

VE4DG has new 9002-956 converter into his R1155-A. VE4XH is xtal controlled now at 50.024 kc. with an 807 in final. The Oshawa, Ontario, v.h.f.'ers are really going to town. VE3BIE has 815 f.m.-a.m. rig and S36 Hallicrafters with Pan-oscillo and four-element close-spaced array. VE3BAD will be on soon with PP812's. VE3AZV has a swell rig ending in 829B and is going to drive PP100TH's with this soon! VE3AZS and VE3AIY have 807's on 6. VE3JV has 815 portable rig. The Oshawa group are getting f.m. hug. VE3DJ, Toronto, still using f.m. with good results. VE2FO, Montreal, has heard six stations recently in W8 and W2 area. VE2KH is xtal on 50.525, VE2GT on 51.760 and VE2FK on 50.200, both xtal. VE2KH has superhet converter now and reports VE2BG in Valois up from S5 to S8 to 9. Those converters sure do the trick, eh, John? Monday night is still their round table night in Montreal, so keep listening, VE3's and VE4's! VE3ANY has new antenna 51 feet up, and new 6F6, RK39, 829B final. VE3BNQ, Hamilton, putting S9 sig into Lakeview and S7 into Toronto. Al reports London, Ontario, group interested in starting a v.h.f. net across Ontario. It can be done! Kingston, Ontario, and Belleville and Brockville getting interested in a Quinte net.

144-148 mc News

VE2AX is frantically rebuilding and will soon be on 2 with new rig and 36 element beam pointed at Boston, Mass. VE3AZV, Oshawa, planning PP826's for 2. VE3AID and VE3ZE, Willowdale, on 2 and going higher. VE3AZG, Oshawa, planning P.P. VT127's on 2 with a converter into HRO. VE3ZI working out fb from Toronto. VE3ADO still skedding W2's.

420 mc

VE3BFF and VE3AND, Hamilton, have had their first contact on 420. The equipment consists of two identical transmitters and receivers. The transmitters are P.P. 6C4's, long lines. Receivers are 955 super-regens with flat strip tank circuit. Antennas are four-element horizontal beams built on the transmitter chassis. They found that running feed lines reduced efficiency considerably since they only have 3 watts output. Their best dx is 1½ miles so far, but the next step is Lakeview from Hamilton. Nice going, boys! What about more activity on the band?

V.H.F. Wrinkles

Numerous complaints about 300-ohm feedline have been heard throughout the country, and all have mentioned water absorption as the main disadvantage to its use as transmitting feeders to folded-dipole antennas.

It is our contention that, since the polythelyne used as insulation has one of the lowest water absorptions of any present plastic, the trouble lies not in the material but in improper usage. We have observed coloured water soak up about two feet into the stranded conductor of a freshly cut piece of cable, by capillary action. It is therefore necessary to seal the

cut ends so that this condition cannot occur. There are several methods of doing this. One method is to cut strips of the plastic material, place it over the joint and melt and mould it into a seal by a heated knife. Care should be exerted to prevent charring due to excessive heat. Another method is to use polystyrene cement or "Q" dope which will dissolve the plastic and thereby affect a proper seal. Beeswax has also been used to good advantage but requires replacing frequently, due to flaking off. Red Glyptal varnish, while not recommended for high frequency use, will provide a good seal with no losses up to 30 megacycles. Whichever method is used, the seal, to be good, must be watertight, so pile it on! Attempts have been made to "waterproof" the cable by wax or Simoniz, but we believe this is unnecessary, due to the excellent water repellant properties inherent to polyethylene.

6 M Dx Derby

Call	No. of Dx Contacts
VE4DG	3
VE4AP	1
VE3KM	5
VE3AVW	5
VE3AEU	4
VE3AZV	3
VE3ATB	2
VE3NH	2
VE3BFF	1
VE3AND	1
VE3ANY	6

2 M Dx Derby

Who has worked dx on 2?

(Probably there are plenty more dx contacts. If your call does not appear in this regular column, give us a proper lashing in a letter and we'll see that your record is posted, with apologies. Hi.)

One answer to lack of Canadian temperature inversion dx may be in antenna polarization. A good policy would be to monitor the f.m. broadcast bands for signs of activity and then listen on 6 and 2 alternately using horizontal and vertical antennas. For best results, transmitter and receiver should have the same polarization, but the hot question of which is the best, is one we are not, as yet, prepared to answer. Considerable experimentation along this line has proven little advantage for either mode, with plenty of disadvantages to each.

HAMFEST

The Thousand Islands Amateur Club will hold a hamfest on July 5 and 6 at Brockville. Write H. Fairbourn, Ve3wg for particulars.

BCI—from page 11

In the above manner "blanketing" can usually be cleared up to everybody's satisfaction. In any case, even if your efforts are not successful, you probably won't have any trouble with the RI if you can assure him that you have made an honest attempt as outlined above, but he knows that in most instances interference with AC/DC sets can be reduced to a minimum, so don't just tell the BCL that they're hopeless and let it go at that. Of course, even with the blanketing taken care of, the beat between an oscillator harmonic and your signal may fall on a local broadcast station, and this calls for further remedies, such as installing a wave-trap in the receiver antenna or changing transmitter frequency. This, of course, is a fairly common fault even with comparatively well-designed sets, and fortunately doesn't present the same problem.

So much for cures. The cause of the trouble, as far as AC/DC sets are concerned, is inadequacy of design which is the result of mass production and competitive merchandising. It is our hope that the manufacturers can be made to realize the advantages of incorporating the simple circuit changes detailed above, which would cost only a few cents and which would render their otherwise meritorious products less susceptible to extraneous interference. The first concrete step in this direction has been taken by Moffats Limited, Canadian manufacturers of Crosley radios, who have announced that AC/DC sets turned out in future will include a 75,000 ohm resistor in the grid circuit of the second detector stage. Our sincere thanks go to Moffats — let's hope that more manufacturers can be persuaded to follow suit. In the meantime, we feel that the amateur is justified in informing BCL's that interference of this ort is the result of inferior design in his receiver and is not the fault of the transmitter — but make sure that the latter isn't over-modulated when you make that statement!

C A R O A
NATIONAL REPORT

VE1

Ron J. Hesler, VE1KS, Sackville, N.B.

RP after 20 years of pounding brass for the Royal Canadian Navy still finds ham radio exactly what the doctor ordered as he raises CR9AG and VP5AD with his new rig of PP 809's. FB and ET slugged it out on fone during first round of fone dx contest; second round will tell the tale. AX is reported selling out again; this is not an advertisement. FN is still dragging them in with a J, K6 and ZK. KS enjoys his new HQ120X receiver. PV and FB enjoyed visit to Moncton and Lakeburn Amateur Radio Clubs. WJ, one of the YL operators, is active on 80 c.w. EP is burning with the shame of it! With 125 countries to his credit he hears HJ's first sojourn to the dx realms of 20 metres nets him VU2WS and on a crowded Sunday afternoon at that. RR raised VS7EV the same afternoon and found an old navy friend and a visitor to Halifax in 1939. FB wants to trade VK's for anything; poor chap works six VK's in two hours (6 to 8 a.m.). DQ handled traffic on 20-metre fone for W2MMO/PM while the ship was in the English Channel. Halifax amateurs should start talking about their city's 200th anniversary. QZ and BC made R.C.C. on 144 mcs. the other day. Is this the first around this neck of the woods? PQ worked a J and feels very pleased with himself. RH, QZ, EP and KQ are going to be burning the midnight oil from now on as junior operators arrived on sked. FQ made the headlines of daily papers with full photo of his station as he handled traffic during breakdown due to bad storm. Others who assisted were DQ and BC. In New Brunswick during the storm, IE and HB handled Canadian Press very efficiently. RE is unveiling new deluxe 813 rig—front room stuff. GD is now active on 10 metres. QS is in the 120-watt bracket and is still on 10 trying for a good beam. PA is the acting AFARS Flight Leader on the phone net while TN is away on temporary duty in Winnipeg. Maritime AFARS phone net now consists of the following: CX, FL, GD, HB, IE, KN, KR, KQ, KS, LH, PA and TN. QV is a newcomer to Dogpatch (for the uninitiated, Dogpatch is the T.C.A. location at Lakeburn?. IU, who is fussy with Q, is working on a fb v.f.o. BF still dxing with his semi-vertical. ST deserted Dogpatch for Lethbridge. LO on 80 and 40 as well as 6. QT was off for a few days installing his new 813 final. The Lakeburn Amateur Radio Club is very busy these days preparing for the next field day. AQ now on 10 and works dx very fb. ES passed his ticket and can be heard on 3660 kc c.w. It drops along a newsy letter about the boys in Cape Breton. EC has a fb scope he recently built himself. GO has a scope now under construction. CR has his new ½ k.w. rig ready to hit the ether with a Panadaptor to top it off; his shack is worth paying a visit. IT is planning a new fone—c.w. rig of 150 watts.

The Truro Amateur Radio Club was formed during the latter part of February with the following officers for the year: President, EQ; vice-president, QK, and secretary-treasurer, IB. MA has new medium-power rig active on 75 fone and rounds very fb. FG is knocking them off on 10-metre fone and rotary beam antenna.

VE2

C. W. Skarstedt, VE2DR, Montreal, Que.

XR sends interesting report and mentions he worked a G on 7 mc with his 25-watter; also supplies the following information: That DL was rudely disturbed at 3 a.m. by irate neighbour when DL's pole crashed; that GE is plowing through the mud at new Lake Shore QTH searching for a good spot for the beam; that WK and WY are new Montreal calls in NDG; that SD is heard occasionally on 7 mc, the XYL permitting; that LY has forsaken 6 and is now modulating his 10 fone at 60 cycles, and finally that KH now uses new rotary swishing around on 10.

KN, our Air Cadet instructor, proudly informs that the boys now have their station on the air, under call WE. This is believed to be the first station of this kind in Canada.

AN appeared on 20 with a very stylish sig. HF fixed the slip rings on his beam and reports very good results. BG got his picture in the newspaper handling emergency traffic during heavy blizzard in VE1. SU organized and OG assisted nobly. CA's melodious voice booms out on 14 mc and EM puts out a husky fone sig too. JO, DO, and GA continue picking up dx contacts.

With this issue your informer is departing from the reporting field. It is sincerely hoped that you will assist the new DCM (or whatever the title will be) and supply him with frequent reports. It has been a real pleasure to serve as DCM and it is with regrets that I am forced to withdraw from this office. The office of the QSL manager will also shortly change hands. Full details will be published in an early issue.

VE3

R. C. Hunt, VE3WX, London, Ont.

BFX—Airforce Headquarters Amateur Radio Club reports into Beaver Net via DN. AMC—Georgette reports via her pop that she has a new HQ 129x and is after 20-metre dx. Running 70 watts to a pair of RK 20's and has worked XS and VK. BCU reports for the Kingston gang. They are forming an amateur club and would like to hear from all interested. At present the club includes GO, AOU, AYP, FS, GI (ex-2DP), BCU. The Kingston boys line up as follows: 80 fone—AOU, GO; 40 c.w., ASM; 20 fone—AOU, GO, AXR, BQN; 20 c.w., AYG, FS, BCU; 10 c.w., BBY, BCU. All we need is one of these boys to try 80 c.w. and tie into the Beaver Net on 3535. The Beaver Net is now operating on 3535 kc at 7 p.m. each night in the week, and to date includes the following: TM, OI, ATR, BCS 8ME, AWJ, BFX, QU, XO, DU, AX, WY, 8MPG. A lot of traffic is being handled, and an invitation is extended to anyone interested to QSO 3TM re crystals for this frequency. Through VE8AI I have received the January issue of the VE8 Drift, published in Teslin, Y.T. Editor VE8AL, assistant editor 8AI, draftsman, C. Owens. A paper anyone could be proud to publish. Contributors include 8AL, 8AI, 8BLZ/G2IS, 8AK, 8AU, 8AM, 8AO. Some of the boys are on 80 c.w. and should be good dx for this band. NX has a junior op, female, to add to the QRM on 3815 kc. GV rebuilding. ABZ spends most of his time on 10 metres. KM running 304TH in final—"WOW". LA on 40 c.w. but maybe can make his 6L6 work on 80 and handle

- FLASH -

Frequency modulated transmission (A1A3) is permitted in the following frequency bands only:

27,395— 27,455 mc/s	235.0— 240.0 mc/s
29,500— 29.700 mc/s	420.0— 450.0 mc/s
52.500— 54.000 mc/s	1215.0—1295.0 mc/s
144.000—148.000 mc/s	2300.0—2450.0 mc/s
3300.0— 3500.0 mc/s	
5650.0— 5850.0 mc/s	
10000.0—10500.0 mc/s	
21000.0—22000.0 mc/s	

BULLETIN

To Merchants

OF

SPECIAL INTEREST

TO AMATEUR RADIO OPERATORS AND ALL OTHERS USING RADIO EQUIPMENT

On the following three pages are listed various types of radio equipment, including Transmitters, Receivers, Kits, Component Parts, Etc.

All of it is

WAR SURPLUS

AMATEUR RADIO OPERATORS AND OTHERS ARE URGED TO CHECK THEIR DEALERS

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(Continued on next three pages)

Wireless Set Canadian No. 19 Mk. III

Complete Station with Unit Spares. Packed ready for shipping. Tropicalized. New. To be released at FRACTION OF COST!

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For telephone and telegraph includes:

6 tube superheterodyne receiver and

6 tube MOPA transmitter with 807 final amplifier.

Grid modulated for telephone. Specialized circuits make this set ideal for network operations. The frequency range of 2 to 8 megacycles includes the 80 meter amateur bands.

SET B

Consists of 235 megacycle transceiver that can be shifted to the 144 megacycle amateur bands.

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A complete inter-communication system using 3 control boxes and 3 combination headphones — push-to-talk microphones, providing inter-communication or remote control operation in an extremely flexible arrangement in 3 different locations.

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This unit, including dynamotor, operates from a 12 Volt storage battery. These sets are ideal for mobile or marine installations. 3 Antennas, 1 Variometer Resonator, Spare Set Tubes, Generator, Set of Spare Parts, 3 Microphone and Receiver Headgear Assembly No. 1 (Canadian).

Address all enquiries to any War Assets Corporation Radio & Radar Sales Division, Branch Sales Office at Halifax, Montreal, Toronto, Winnipeg, Calgary and Vancouver.

Microphones

New Microphones, Type O 3A, Magnetic type, for use with Oxygen Assembly. Bakelite construction 3 points 6 way output leads, circular shape 1¼" in diameter.

Address all enquiries to:

Branch Sales Manager,
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Receivers, Radar Type RC 3039. Contained in metal case 18" x 8½" x 8" high. A twelve tube receiver having the following tubes:

One 83 Y One 2 x 2 One 6AG7 Four 6AC7 One 6H6
Three No. 956 One No. 955

This receiver is suitable for use with slight modification in the 50 - 54 or 144 - 148 Mc bands. Companion transmitters for this set are also available and are known as type TC 3040.

RADIO RECEIVERS TYPE A.R. 6

24 Volt, 7 Tube Superheterodyne with side tone and separate Inter-Com. Amplifier, Used.
Tubes Used: 2 SK7's 1 6K8 1 6SQ7 1 6J5 2 6K6G's.
Self contained Power unit (Dynamotor).
The above sets may be quite easily converted for A.C. operation and would make a first class general purpose receiver
Weight: 35.4 lbs. Dimensions: 13-5/16" x 10¼" x 15"
Less loops, junction boxes and remote control, as used in aircraft.

TRANSMITTERS TYPE A.T. 7

24 Volt.

Electrical Characteristics
Frequency Range—375 Kc to 500 Kc
1.5 Mc to 20 Mc
Two channels A & B.

Type of Circuit
Transmitter RF Section Master Oscillator—1—RK39 Crystal or M.O.
Power Amplifier—1—RK39

Modulation
Screen Grid

Audio Amplifier
1—6J5—Driver
1—RK39 Power Amplifier

Weight: 38 3/4 lbs. Dimensions: 13 5/16" x 10 1/4" x 14 3/4"
Self contained Power Unit (Dynamotor)
Less loops, junction boxes, remote control, as used in aircraft.

RADAR

New aircraft airborne radar equipment installations, ASB-8. Manufactured by: R.C.A. Mfg. Co. Inc., Camden, N.J. Consisting of the following:

ea. 1—Radar Transmitter—CVR—52 AAX
ea. 1—Rectifier power unit, CRV—20 ABL
ea. 1—Range Indicator CRV—55ABO-1
ea. 1—Antenna switching unit, CRV—55ABO-1
ea. 1—Power control unit CRV—23 ACB
ea. 1—Radar Receiver CAY 46 ACE

Each component having a base and shock mounting.

ANTENNAE

New right hand and left hand antennae, ASDB System double stack, Part No. 5118-2001. Used for aircraft Radar transmitters and receivers, complete with Hydraulic positioning transmitter and receiver.

Address all enquiries to: **Branch Sales Manager,**
WAR ASSETS CORPORATION,
Old Belcher Hospital, Calgary, Alta.

Wire

Nickel "A", manufactured by Driver Harris Company.

.040" dia. approx. .037 ohms per ft.
.030" dia. approx. .067 ohms per ft.
.025" dia. approx. .097 ohms per ft.

This wire is unused and in good condition, wound on wooden spools.

Transmitting Rack Frame Assemblies

New Rack Frame Assemblies, made of angle iron, flush welded, blue-grey finish in the following sizes:

40" high, 21" wide, 20" deep
50" high, 20½" wide, 27" deep
30½" high, 19½" wide, 19¼" deep
56" high, 34" wide, 20" deep

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Branch Sales Manager,
WAR ASSETS CORPORATION,
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GENERATORS

Unused Generators SELSYN Model 2J1F1 115/57.5 Volt 400 cycle. This equipment was intended for remote signalling and may be used for intermittent service in its present form on a frequency of 60 cycles if the exciting voltage is reduced to 18 Volts maximum.

INSTALLATION KITS

A large quantity of new installation kits for the Canadian No. 19 MK II and MK III Wireless Sets. While these installation kits were designed for armoured cars, etc., they can be readily adapted for almost any use.

RADIO COMPONENT PARTS

A very large assortment of newer radio component parts including the following in numerous types and sizes:

Condensers Resistors Hook up wire Plugs Sockets Knobs etc.

Address all enquiries to:

your nearest War Assets Corporation Branch Sales Office. Branches located at: Charlottetown, Halifax, Moncton, Quebec, Montreal, Ottawa, Toronto, London, Winnipeg, Regina, Calgary, Vancouver.

Articles such as these are directed to the public through regular wholesale and retail outlets and are subject to priorities

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WATCH FOR FURTHER ANNOUNCEMENTS

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WAR ASSETS CORPORATION

100

more traffic. AQB new president of Kent County Radio Club.

The Frontier Radio Club has elected new officers as follows: CP, past president; ADN, president; AEP, vice-president; MY, treasurer; AWJ, secretary. ATR finally dug himself out of the snow and visited WX in London. AWJ had a visit from CP and WX. Puts a nice signal into London. TM still having receiver trouble as far as WX signals are concerned. OI offered to look over his receiver and find the trouble.

Traffic as follows: CP69, FP6, BCS66, BME50, XO91, ATR151, TM62, BLE1, HP134, QK36, BDX27, UT8, GT4, OJ8, WX168.

VE5

Bill Gordon, VE5MW, Oxbow, Sask.

5YR at Togo has deserted Saskatchewan and is now 4YR at The Pas. 5MH is on 40 at Biggar. The present 75-metre gang are as follows: 5BG at Regina; 5IC at Nipawin; 5FA at Nokomis; 5DW at PA; 5LU at Rowatt; 5NH at Simpson; 5WG at Wilkie; 5CE at Leask; 5XU at Parkside; 5EN at Kyle; 5AQ at Star City; 5GU at Mazenrod; 5GA at Regina Beach (poppa skunk); 5JS at MJ; 5QT at Eyebrow; 5RB at Windthorst; 5RD at Spy Hill (who, by the way, has practically deserted 75 for 10); 5HH at Watrous; 5JC at Swift Current; 5QL at Roymore; 5CM and 5LM at Regina. 80 metre c.w. is also represented with 5DK; 5KJ; 5LD; 5LB; 5GW; 5MW; 5BT. 5BT paid a visit to VE4-land and while there he visited the gang in Brandon and Winnipeg. He purchased a new WRI, Globe Trotter transmitter while there and is now going at it pretty strong on 10-metre fone. 5MW has finally got his 10-metre beam up and going.

Moose Jaw has quite an active radio club and they are planning an XYL's night in the very near future. They meet once a month at the members' homes to discuss radio activities, always ending up with lunch. Knowing the Moose Jaw gang like we do, we will lay you 100 to 1 that all the fellas at Moose Jaw are right there when lunch is served. 5OP, our QSL manager, wants those stamped, self-addressed envelopes for those dx cards. A reminder here also that there are quite a few W cards there for you fellows, too, so get those envelopes in to Fred Ward, 899 Connaught Ave., Moose Jaw. 5MW has OBS appointment.

Please, fellows, send in any news that you may have. The above was gleaned from the ether and from some dope so kindly sent in by 5OP.

VE6

W. R. Savage, VE6EO, Lethbridge, Alta.

EL has invented a new ECO—you push the panel to change frequency. We have heard of rubber xtals and am wondering if this is a rubber panel. AC says he has some terrible-looking antennas but they work O.K. RH is having an ECO built up by EL. MP wants to work a sked with Denmark. OD is busy with field strength metres. GK in Olds is on the air. SZ is looking around on 20 for diapers. WC comes up on 75 for fresh air now and then. US is busy on 80 c.w. now the canning season is quiet. OF got his rig going on 75 fone. ZW is going fb on 75 fone. BC is active on 20 fone and c.w. IP sports himself to a C2 frequency meter. LG is working 20-meter fone. IC is getting quite a collection of equipment. We expect to hear a terrible wallop on the air one of these days. OG has his rig in the basement but operates it from the livingroom chesterfield—pretty soft. SR is keeping track of the **Waterton Glacier Hamfest for July**, and a 6-stge RF pre-selector to put ahead of his receiver. MN is now on 20 fone; he must have got tired of working dx on 20. KW visits us while in the city and informs us he has a new call, VE7OX. WZ has his 75

fone rig going now and is putting out a very nice signal. DR is still busy looking around for new War Assets receivers. DA is on 75 fone with fb quality. EB is busy remodelling 6000 V tank condensers. HW has his scope so close to the stove he can read heat waves on it. EV is going to QRT during summer months and rebuild. Rather short of news from the northern part of the province this month. Guess the boys have been frozen up during the cold wx. Come on, fellows, keep the ball rolling. EO hopes that the other boys did well in the dx contest. I ran into plenty of trouble. GD, TM and AO seem to be doing O.K. for themselves by working lots of dx.

VE8

Jack Spall, VE8AS, Whitehorse, Y.T.

AY got his PP 813's going but had to put in a bigger tank condenser to stop the plates from arcing, and is now busy with a v.f.o. AG increasing power from push-pull 807's to 804's. AN busy gathering parts for push-pull 812's. BB says it won't be long now before he adds to the QRM. BH is expecting to move to Alaska shortly. AK is fed up with the present poor conditions. AW has 72 countries post-war; good going, Lyle! AJ is considering a 20-metre beam to help keep skeds with his dad, 6HQ. AS is busy figuring on 10 and 20 beams and a v.f.o. Aklavik, N.W.T., now has lots of QRM from NM, NR, MZ and NG. NG says he has been busy and not on the air much, despite his list of 18 countries worked during February. NR has 75 watts on 20-metre c.w. AO, Lac LeBarge, Y.T., is putting consistent signal into Whitehorse now on 20 metres due to a change of antennas and is very proud of his 75-metre fone dx, a KH! BC, Old Crow, Y.T., has to stay on c.w. till new filter condenser arrives for his modulator. BD is on at Fort Norman, N.W.T. AT, Selkirk, still working the boys on 75 fone with his 3½ watts. AV and BE will be on soon from Watson Lake, Y.T. AI at Teslin has over 54 countries now. AL doing fb job with his VE8 Drift. BM is seriously considering a HQ129c.

Traffic NG4, AS6, AG3, AO10.

NEW Low Price on No. 19 Tank Sets NOW

Here is what you get!

Quantity	Item
1	Sender/Receiver (Canadian) Mk. III, complete with valves
1	Supply Unit No. 2 (Canadian)
1	Variometer Unit Mk. II
1	Connector 12-Point No. 23A (Canadian)
4	Pads, Mounting (Resilient Seating)
1	Carrier No. 1
1	Cover, Waterproof No. 1
1	Case, Spare Parts No. 5C
1	Key and Plug Assembly No. 9 (Canadian)
6	Bulbs, 12V
2	Connector Pigtail No. 1
2	Connector Pigtail No. 2
4	Brushes, Dyn/Motor No. 4 (H.T.)
4	Brushes, Dyn/Motor No. 18 (L.T.)
12	Fuses, ½ Amp.
12	Fuses, 10 Amp.
2	Holders, No. 1 Caps
1	Microphone Capsule
6	Clamping Screws
3	Plug, Single, No. 26, Spring Retaining
2	Plug, 6 Pt. No. 4, Spring Retaining
5	Plug, 12 Pt. No. 1, Spring Retaining
2	Sockets, 6 Pt. No. 5, Clip Spring
5	Sockets, 12 Pt. No. 1, Clip Spring
6	Blind Grommet
1	Case, Spare Valves
6	Valves 6K7G
1	Valves 6B8G
2	Valves 6K8G
1	Valves 807
1	Valves 6H6
1	Valves EF-50
2	Valves 6V6G
1	Valves E1148
1	Satchel, Signals
3	Microphone and Rec. Headgear Assem. No. 1 (Canadian)
1	Aerial Base No. 8
1	Aerial Base No. 9
1	Leads, Aerial No. 1
4	Aerial Rod "F" Section No. 3 (Canadian)
4	Aerial Rod "F" Section No. 2 (Canadian)
4	Aerial Rod "F" Section No. 1 (Canadian)
3	Aerial Rods "G"
1	Working Instructions Wireless Set (Canadian) No. 19, Mk. III
2	Grommets
1	Dummy Aerial
1	Aerial Base No. 8, Adaptor "V" (Laport)
1	Lamps, Operator No. 6 (Canadian)
1	Fixing Strap Assy. No. 2
1	Fixing Strap Assy. No. 1
1	Hydrometers, Secondary Cell, Portable Mk. I (Canadian Patt)

60 Cycle 110 Volt AC Supply for above set is also available to augment the 12 Volt portable supply furnished with the 19 set.
WHILE THEY LAST! **$19.95**

$69.95

Cash with Order.
ACT NOW!

WRITE or WIRE

EDWARDS SUPPLY HOUSE
584 Mt. Pleasant Rd.
TORONTO, ONT.
TELEPHONE MA. 8811

VE RIG—from page 15

impossible to turn on the plate transformer without turning the filament switch on. Sixteen mfds. of filter were found sufficient, even in a 25-cycle area where the transmitter is used. The usual warm-up period must be allowed for the 83 tube as with all mercury vapor tubes.

It will be noted that the transmitter was primarily designed for phone work. However, any of the conventional methods of keying may be employed, making the rig ideal for CW operation.

The entire rig is housed in a Hammond rack standing 17½ inches high, 19 inches wide and 11 inches deep, and is rated at about 30 watts input.

R1155—from page 8

two short-wave bands gives you a proper primary coil, while pin 2 for wavebands 3, 4 and 5 taps the antenna on the RF grid coil. This is quite satisfactory, however. If doublet antenna connections are required it is necessary to locate the leads from the separate primary normally used for DF. This will give a doublet antenna on wavebands 2, 3, 4 and 6. There is no doublet connection possible for waveband 1. You can connect a doublet antenna to terminals 15 and 16, where a loop would go, and turn the MS switch to position Visual. This connects your doublet antenna right through and the receiver then operates in AVC On only. I tried it with good results. According to the circuit, there is a Faraday shield between these centre-tapped primary windings and the grid coil secondary of the RF which is a useful feature. The AF filter is a high-pass filter cutting off below 300 cycles. Further modifications of this receiver for ham use should involve a separate RF and audio gain control, as they are now ganged to the same shaft, and with the receiver in Manual the audio is full on all the time and only the RF gain is controlled. In AVC On it's vice-versa. A B plus on-off switch is necessary. A tuning meter of 0.7 ma. range connected in the first IF plate circuit works very well. It requires a meter having a zero position at the right-hand side, otherwise it will read backwards. The meter should be shunted with a variable shunt to set the pointer to zero with no signal input. Strong signals reduce the first IF plate current to less than one milliampere. A reasonably good antenna is required to take advantage of the sensitivity and selectivity available. Forty feet of wire outdoors will do nicely. Detuning the BFO produces a single signal effect that is quite good. One thing to guard against is using a power supply having one side of the 6.3 heater grounded and the B minus grounded to chassis. This will short out the bias voltage developed across R1 and network, resulting in distorted output. Also the B minus should be off chassis in the power supply, otherwise there will be a difference in potential of about 30 volts between the receiver chassis and the power supply chassis. In other words, leave the B minus floating in your power supply. If an audio stage is added to the receiver, I would suggest returning the B negative of that audio stage direct to the B negative terminal, and not chassis. This will eliminate the need of changing the resistance of R1 and leave the current through it unchanged.

A & A selected surplus

Shure T-178 Hand Mike—switch in handle, heavy duty cable and plug. A 6 meter scoop **$3.95**

Read our advertisements—real values and selected surplus material—reasonably priced—honestly described. You don't take a chance when you buy from A. & A.

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Handset—press-to-talk—2000 ohm—Mike and Recvr. A gem for mobile rigs $5.50

4 Mfd 600 Volt Oil Filled Cond. 1.98
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Keying Relays—Operate on 10 Ma. from 4½ Volt C Battery—S.P.D.T. 3.50

Ceramic Coil Forms 2" OD x 5½" Threaded ..... .75

7" Insulators, heavy duty ..... .70
7" Insulators, light duty ..... .50

NOW IN—Jas. Knights Impedacouplers 4.90
Crystal Holder Adapters for ¾" to small type . .45

CATALOG **A and A** **CATALOG**

Please rush your new 1947 Catalog to the following address:

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EDITORIAL—from page 6

Number One, while defending the need for extra frequencies with reason Number Four. Since the war, however, release of surplus equipment has resulted in a trend to higher power, and it is becoming increasingly difficult to prove that we are handicapped in this regard compared with our neighbours to the south. We might, therefore, be justified in restricting the use of our exclusive phone frequencies or "extra privileges" to stations with a final plate input of 100 watts or less. A regulation to this effect might achieve several things: (a) it would be a break for those operators who, by reason of lack of AC power, or of finances, or of space, or of the urge, can't or don't wish to use over 100 watts; (b) by the same token, it would justify the retention of our exclusive phone assignments on the basis of low power operation; (c) it would promote use of the American bands by the Canadian stations who are best equipped to compete with the QRM; (d) it would result in more VE/W QSO's which are a comparative rarity on some bands, according to the complaints of American phone men; (e) high power stations would find it necessary to develop more efficient transmitters and antennas, instead of relying on their half-kilowatts to get them through; (f) the change would be welcomed by U.S. hams, who last May voted unanimously (through their ARRL Directors) to ask the CGM to have our phone bands altered to coincide with theirs. There would also be some disadvantages: stations forced to move would in most cases find it necessary to re-adjust their antenna systems; the regulation might be difficult to enforce, although probably not more so than the present 500 watt output limit; and our colleagues in the States might object to the increased occupancy of their already crowded bands. The latter point might well be overlooked in view of the lessened interference with DX caused by Canadian stations in the 10 and 20-meter bands.

The above suggestion is put forward objectively for your approval or disapproval, as the case may be. It just happens to be the only feasible way to lower the power limit without undue hardship, since little or no equipment would have to be scrapped and similar action would not be required of any other country. The sub-division of our bands makes it possible to work out such a scheme for phone but not for CW, although requests for such action come from both factions

This outline has been prepared without any prejudice in favour of CW or phone, low power or high; we are merely interested in the national good, and not in the convenience of the individual. We suggest that this thought be your guide in coming to any decisions.

QSY WITH PRs

The old refrain on phone bands these days: "Sorry, old man, an S9 plussity-plus from Barbwire, Nebraska, is kicking you all over the place. Can you move a few kay-cees lower?" The answer to that is: "Sure can!" You will enjoy *all* the advantages of having "your spot" with crystal control, and yet dodge QRM if you buy *three PRs*. Spot your main frequency . . . get PR Precision CRYSTALS, say 7 kcs. each side of your spot. Your QSO will not lose you when you move. You will know where you are, and your friends will too! You can get PRs for the EXACT FREQUENCY YOU WANT (INTEGRAL KILOCYCLE) WITHIN AMATEUR BANDS, AT NO EXTRA COST. See your jobber! All PRs are unconditionally guaranteed. — Petersen Radio Company, Inc., 2800 West Broadway, Council Bluffs, Iowa. (Telephone 2760).

SINCE 1934

PR *Precision* **CRYSTALS**

10 METERS PR Type Z-5.	Harmonic oscillator. Ideal for "straight through" mobile operation. High activity. Heavy drive without damage in our special circuit ——— $6.75
20 METERS PR Type Z-3.	Harmonic oscillator. Low drift. High activity. Can be keyed in most circuits. High power output. Just as stable as fundamental oscillators ——— $4.75
40 & 80 METERS PR Type Z-2.	Rugged, low drift fundamental oscillators. High activity and power output with maximum crystal currents. Accurate calibration $3.60

HAM-ADS

WANTED—Ex-serviceman, preferably a ham, to maintain police and fire department radio and act as fireman. Must meet fire department standards (physical) age 21-30 yrs., 150 lbs., etc. Salary $2000 per year to start. For interview write or phone Chief Fraser, Forest Hill Village, Ontario—MO. 1143.

FOR SALE—Five foot cabinet rack, ACR 175 receiver, various used tubes and parts cheap. Phone OR. 4588, F. E. Holme, 282 Glen Park Avenue, Toronto 10, Ont.

SELL—3, 1000-0-1000 Volt Plate Transformers 160 cycle! 200 Ma. 1, 500 Ma. 20 hy. choke. —A. Horwill, 81 Monant Park, Toronto, phone GL. 4910.

SELL—Amplex two element 20 meter rotary beam complete with automatic direction indicator, ¾ r.p.m. rotating mechanism and approximately 100 feet Bassett 28 ohm concentric transmission line. Has been in use only 10 months. Best offer over $70.00 takes it.—Ron Hesler, Ve1KS, Sackville, N.B.

SELL—6L6 Tri-tet oscillator, 807 final, National SW3 Receiver, Plug-in Coils, complete with power supply, Marconi Freq Meter.—Sol Silverman, 589 Euclid Avenue, Toronto, ME. 3337, after six.

MUST SELL—Slightly used S-40 and 6L6 - prl rig with 450 volt power supply. Neat job on one chassis 3 crystals. What offers?—Peter Kushnir, Ve4PK. 293 Mountain Ave., Winnipeg, Man.

SELL—Sparton XI 8-band receiver, complete coverage .54 to 31 Mc., 11 tubes, acorn 956 RF, 954 mixer, 955 oscillator, 3 stage variable coupling IF, S-Meter and noise limiter, $160.00. BC 348Q receiver, built-in power supply (AC) Crystal filter, S-Meter, noise limiter, 2 stages RF, 3 stages IF, $100.00. Webber, model 40 oscillator, 90 Kc to 4 Mc., battery operated, $30.00. Triplett multimeter in oak case, 1000 ohms per volt, $20.00.—Write Ve3BFV, Jim Harron, Quarries, Ontario.

NATIONAL 1-10A—Complete with home-built power supply and speaker in case. Hardly used, reason for selling, have another receiver. $70.00 takes it.—Ve3BBA, Box 245, Fort William, Ont.

SELL—Surplus SCR-274 Command Sets, consisting of 3 six-tube super-het receivers 190-550 Kc., 3-6 Mc., 6-9.1 Mc.—2 transmitters 3-4 Mc., 5.3-7 Mc., 4 dynamotors, 1 Modulator. 2 tuning control units, Mounting racks included. 29 tubes in all. See advertisements in Feb. QST, $45.00 FOB my QTH.—L. H. Claydon, Ve4NT, 510 Sprague St., Winnipeg, Man.

FOR SALE—R1155 Receiver with power unit, excellent condition changed over for use with speaker and phones. Best offer near $100.00 takes it.—Mark Bell, 1383 Bathurst St., Toronto, KE. 6588.

SELL—21 tube communication receiver — 2 RF stages, noise filter, variable selectivity, crystal calibrator, 110 volt 25/60 cycle power supply, audio amplifier and speaker, 550 Kc to 18 Mc. NEW! Made by well-known Canadian radio manufacturer, $150.00.—Ve3AMR, Roy L. Adams, 130 Glebholme Blvd., Toronto, HA. 0590.

BEAM—from page 32

sonance, therefore as an experimental move we shorten the radiator length one inch on each side. Returning our tank to resonance, we find that our final plate current drops down to 190 ma. Therefore, our radiator requires more length, so we add inch after inch, keeping both sides balanced in respect to length, our coupling fixed, and retuning our final after each adjustment, until we observe our final tank current reads 350 ma. before it starts decreasing. At this point our radiator draws maximum current, indicating that it is operating at maximum efficiency. But our tube manual or handbook indicates that the tube in the final should draw only 300 ma. maximum, so we decrease our coupling to the final tank until the plate current milliameter reads 300 ma. Now we won't overload that final tube, but we have a long way to go in order to complete the tuning of the antenna.

Tuning the Parasitic Elements at Operating Height

In tuning parasitic elements the use of a field strength meter is not recommended, because too much error and instability is introduced by body capacity. We found that the most satisfactory method is to stretch a center-fed ½ wave antenna horizontally in the back yard, 50 feet or so away from the antenna, depending on transmitter power, and run a long 72-ohm Amphenol receiving type transmission line from this small antenna to the vicinity of the beam antenna. An RF ammeter or milliameter with variable shunts is hooked across the transmission line of the pickup antenna, and placed in a position where it may be easily read while adjustments are being made to the parasitic elements. Now the services of another ham will be necessary to adjust the final input loading to keep the final current always at 300 ma. while the parasitic lengths are varied for maximum forward gain. Maximum forward gain will be indicated by maximum reading of the RF milliameter or ammeter. Front-to-back ratio adjustments may also be made by pointing the reflector at the pickup antenna and adjusting for minimum current. However, we still are not completely finished because any variations of parasitic element lengths will be reflected to the radiator and hence slight adjustment of the antenna length will be necessary to make it draw the original current. When this is done, your beam antenna will be on the nose.

Note:—Tuning beam antennas at any other but operating height is definitely not recommended.

NUMBER ONE

You fellows have **read** a lot about Hammarlund's famous Communication Receivers, the HQ-129-X and the Super-Pro. And if you've been active in communications, or just listening on the bands, you'll have **heard** a lot about both receivers.

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