

the canadian amateur

Volume Three

April 1975

Number Four

DOC announces licence fee increase


Annual licence fees for all classes of non-broadcast radio stations will be increased effective April 1, according to a release from the Department of Communications.

The increasing number of services offered to users of the radio frequency spectrum and the consequent rising administrative and operational costs associated with the management of these services, up 200 per cent since the last fee increases in 1968 according to the Department, have far outstripped growth in licence fee revenues during the same period.

About 150,000 individual licencees are affected by the increase, notices of which are now being mailed out with licence renewal invoices. The increase is applied uniformly to an existing scale of fees that varies with the class of the licence involved. The increases will range from \$2.50 to \$45.00, depending on the class of the licence. Radio users are assessed according to such factors as the complexity and cost of the service provided by DOC and the financial benefits derived from the licences.

Canadians have more than tripled their demands on the radio spectrum during the last decade, DOC said. The Department budget for spectrum management, which includes processing about 52,000 applications and 70,000 licence amendments per year, inspections, interference investigations maintenance of 41 field offices, 10 monitoring stations and an increasing quantity of electronic equipment, has risen from 4.8 million dollars in 1968-69 to an estimated 15.9 million dollars during the current fiscal year.

According to the DOC, there were 334,571 radio station licences in force in March of last year, of which about 285,000 were subject to licence fees. Spectrum usage has been expanding at an annual rate of about 12 per cent.



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SPECIAL CALL SIGN PREFIXES AUTHORIZED

The Department of Communications has granted the joint request of the Federation and the ARRL to permit Canadian Amateurs the use of special prefixes during Olympic Year.

The special prefix "XJ" may be used in place of "VO", and "XO" in place of "VE". Amateurs are not obliged to use these prefixes and do not have to seek further permission for their use.

Amateurs wishing special QSL Cards are reminded that these can be obtained through the CARF QSL Card Service (sample packets 25 cents) from Box 356, Kingston, Ontario K7L 4W2.

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- Amateur Radio League of Manitoba
- Saskatchewan Amateur Radio League

From the Front Office

Preceding issues of THE CANADIAN AMATEUR have cited the new policy of your national Federation and the scheduled change to individual voting membership. Both of these will require substantial amendment to the present organization and administration of CARF and increased support by the Amateurs of Canada.

Many services have been requested in the past few weeks, many more are anticipated as news of our resolve is spread, and all will be investigated for feasibility and implementation. Two factors will play a major role in this development -- finances and personnel.

A preliminary estimate indicates that your national Federation will require 5,000 individual members to gain the finances necessary for full development of the many, diverse services that you want your national society to provide. CARF's goal is set higher than this figure - a majority of Amateurs as members (there are 14,500 licenced Amateurs at latest count) and the Board of Directors can see no reason why this goal can not be attained. It is the old circle.....the more members, the more services provided; the more services, the greater the membership support.

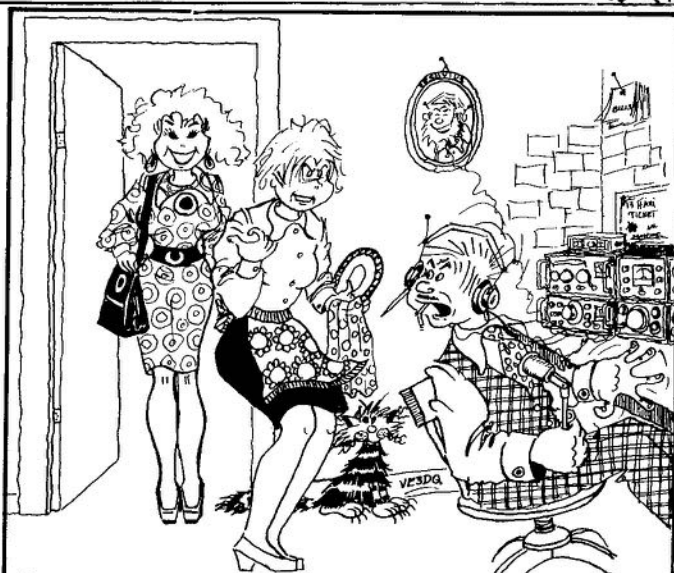
Your national Federation NOW requires an indication of what services, essential and beneficial, that your national society should provide. And comment how the present administration/organization should be altered to give YOU a voice in national affairs.

The present organization is that of an alliance of the provincial Amateur societies with the member-societies nominating and electing the Board of Directors. The members of this Board annually elect the President and appoint the normal complement of other Officers, the Chairmen of the Standing Committees and the national Executive. The Board is responsible for the management of the affairs of the corporation, functions under the terms of the Canada Corporations Act, and is responsible to the member-societies. The national Executive is responsible for the day-to-day management of activity and is responsible to the Board. The President is the spokesman for the Board and is directed by, and responsible to, its members.

A majority of the amended Board of Directors will be Area Directors, nominated and elected by, and responsible to, the Amateur members of the Area. NOW is the time for Amateurs of each area - Atlantic, Quebec, Ontario, Mid-Western and Pacific - to start seriously considering who should be nominated for these positions. Minimum qualifications would be: an individual member of the Federation; a licenced Amateur resident in the area; nomination acceptance by the nominee; and ability to travel and work on behalf of the Amateurs. These Area Directors will be your chosen representative to the national organization and their selection will have far-reaching results on its progress and development.

While present growth of individual support is double that of the growth during the first three months of 1974, a much greater influx of members is vital for your national Federation to gain the finances necessary for full development. Speak about the Federation's policy of service and the change to individual control at your club meetings, discuss the range and extent of services that

SHORT-CIRCUITS



"SOMEBODY HERE CALLED VICTOR EASY ONE YOUNG BEAUTIFUL SEXY SAYS SHE JUST HAD TO DROP BY AND SEE THE SO FRIENDLY MAN'S SHACK, SPORT?"

CARF should provide, consider candidates for office.....and forward a resume to Box 356, Kingston, Ontario K7L 4W2.

Canada needs a responsible, active national organization, supported and controlled, by the majority of Amateurs and geared to providing of service and information. Your national Federation is determined to develop into this national body and is striding ahead with purpose.



World Scout Jamboree

The special call sign LC1J has been allotted to the 14th World Jamboree by the Norwegian telecommunication Administration.

Several individual LC1J stations will be in operation on SSB, CW, RTTY, SSTV and VHF FM throughout the entire Jamboree period, July 29 to August 7, 1975. Frequencies to be used will be near the International Scout Frequencies:

	80 m	40 m	20 m	15 m	10 m
SSB	3740	7090	14290	21360	28990
CW	3590	7030	14070	21140	28190 kHz

LC1J will probably also be able to communicate through amateur radio satellites such as Oscar 6 and 7. A special Jamboree QSL card will be issued to all stations making contacts with LC1J or submitting a listener's report of such contacts.

Licensed Scout Amateurs among the participants may like to bring their own portable low-powered (QRP) amateur equipment both for HF and VHF to be able to contact other radio Amateurs during the Jamboree or during their stay in Norway. A temporary Norwegian licence is necessary for such operation.

EDITORIAL

There are times when even the most charitably disposed people get to the point where they begin to question the system. For example, the federal Treasury Board decided that because of costs in DOC operation there would be an increase in the station license fees for radio stations.

The justification was as follows: "The increase is applied uniformly to an existing scale of fees that varies with the class of license involved ... Radio users are assessed according to such factors as the complexity and cost of the service provided by DOC and the financial benefits derived from licenses."

Then, may we ask, why does the GRS(CB), which unlike the Amateur Experimental Service can be financially profitable and one which deserves administration, get away with an 83 cents per year increase, while the non-profit, uncomplicated, self-policing Amateur Experimental Service gets nailed with three bucks; an increase of 30 per cent?

This seems to be a short-sighted and ungrateful attitude for a government to take towards a service which has been recognized as a back-up service for its emergency measures communications and the defence department. It has come to the aid of far northern outposts; it has provided a free morale building service for our peace-keeping forces; and it was even recognized as a valuable back-up for the Mid-Canada radar line where each station was equipped with a complete amateur station.

As an added annoyance, the DOC press release announcing the increase, states that there are 334,000 stations licences in force of which only 285,000 pay for their licences!

Who are the 49,000 free-loaders for which the non-profit amateur hobbyists pick up a part of the tab? If they are owned by other departments such as National Defence and if the government is pressing DOC and other departments to work on a cost recovery basis, then why doesn't DOC charge these people for the management of the spectrum which they occupy?

QSL Bureau service expanded

Effective now the services of CARF National QSL Bureau are expanded to include the following for Associate Members:

1) Cards for countries (other than USA) may now be sent in bulk to CARF National QSL Bureau, P.O. Box 66 Islington Ontario M9A 4X1. They will be forwarded free of charge to the world bureaus. Please arrange alphabetically when mailing to us.

2) VE's--VO's--VE's--may now exchange cards with each other inside Canada through this bureau--no charge, but s.a.s.e. must be on hand to receive cards from this bureau. Cards may be mailed in bulk to the bureau. Please arrange by district when mailing to us.

3) This bureau will now accept s.a.s.e. for mailing cards to amateurs. Any DX or Canadian cards at this bureau will be sent out in them.

4) Amateurs expecting overseas DX cards are advised to also keep s.a.s.e. at the ARRL district bureau. The CARF bureau supplements but does not replace ARRL bureau service--for incoming DX cards.

This CARF National QSL Bureau is very pleased to be able to broaden the service for Canadian amateurs. Members are invited to make full use of the facilities.



Canadian Repeater Advisory
Group

VE3CDC

A revised repeater list is in the process of being compiled. It is now on a computer print-out which will facilitate amendments and printing. Plans at present are to print it in the May column.

REPEATER UPDATE: Camille Roch, VE2SO, writes in to advise us that VE2UD and VE2UZ, Charlesbourg are not on the air; VE2SP is now sited at Mont Archambault and serves the Saguenay-Lac St. Jean area (delete the name "Alma"); VE2IU, Chicoutimi, will soon have an autopatch and a new repeater in Montreal, VEZVS (Laval) is on 146.25 - 146.85. There are a number of repeaters proposed. Mont Tremblant on 146.13 - 146.73, Mont Bleu (Riviere-du-Loup) 146.19 - 146.79; Pic Champlain (Rimouski) 146.22 - 146.82; Val d'Irene (Matapedia) 146.28 - 146.88; Mont Logan (Gaspé) 146.16 - 146.76; two in Laurentian Park, 146.46 - 146.06 and 146.19 - 146.79 and one for Alma-Lac St. Jean on 146.46 - 147.06. In Montreal VE2RM will have two outputs, 147.00 and 146.18 until June 1, when the 146.18 will be dropped. It will be picked up by Cornwall which will go in on 146.78.

From Saskatchewan comes an equally ambitious look to the future. Doug Appleton, Chairman of the SARL VHF Committee says that repeater pairs are being assigned to various geographical areas in the province, as was done in Manitoba. The channels allotted are; Melville 146.28-146.88, Prince Albert 146.46 - 147.06, Swift Current 146.28-146.88, Carlyle 146.22 - 146.82, Last Mountain 146.16 - 146.76, Rosetown-Kindersley 146.22 - 146.82, North Battleford 146.28 - 146.88 and Lloydminster 146.34 - 146.94. Prince Albert, Carlyle, Jansen (temporary site) and Melville should be operational this summer, bringing the total in Saskatchewan to seven by the end of this year. Links are being planned on 220 or 440 for some repeaters, plus a linear repeater some time in the future.

Repeater owners, councils and CRAG correspondents are urged to send in changes and additions as they occur so that they can be fed in the CRAG computer updating program.

LOOKING AT THE LOG DOUG VE3CDC

The recent retirement of Walt Wooding, VE3CLJ, from the Public Service in Ottawa, brought out an interesting anecdote recounted in QST of July, 1936, resurrected by Hal Parsons, VE3QA.

Walt is well-known in the Maritimes where he has MC-ed convention banquets with great success and he is now having a ball working DX all day.

If you happen to remember this particular event, then you qualify for the old-timers' club. Way back in 1936 there was a cave-in in an obscure gold mine in Moose River, Nova Scotia in which three men were trapped. The resulting cliff-hanger of a rescue operation was described on one of the first live event network broadcasts. It made radio history in Canada and the fame of two now well-known names in Canadian broadcasting, Frank Willis and Lorne Green. It was even enshrined in folk songs.

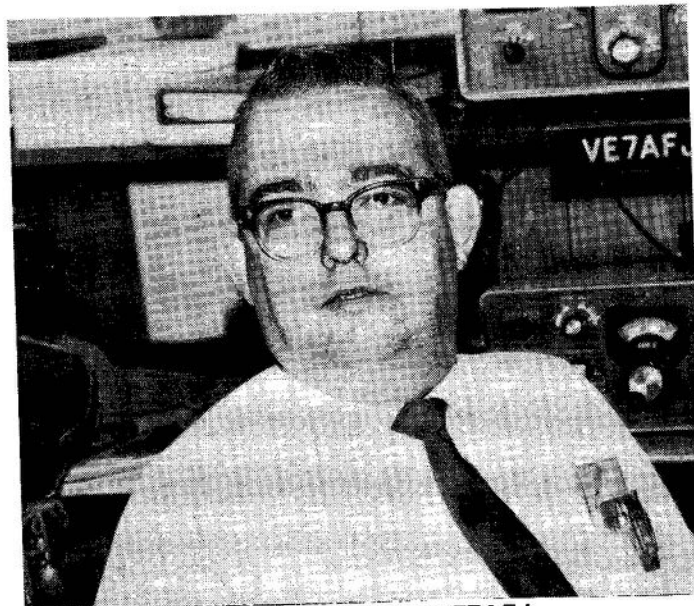
During the rescue work, the press, not to be outdone by the radio boys, were hot on the scene but the radio lads had the only phone to the outside tied up tight so the

Canadian Press reporters organized an Amateur group to relay their deathless prose to the waiting country.

To quote the article "...for a period of over 90 hours, VE1DQ and VE1AW were in communication; thousands of words of copy were handled. All work was on 3.5 mc. CW. Practically all of the operating at VE1AW was by Walter Wooding, VE1ET, an excellent operator..."

The article was written for QST by John Morton, then VE1JM, now VE3ALK, who recently retired from a teaching career at Carleton University, Ottawa.

Your National Executive



FRANK MERRITT, VE7AFJ

VE7AFJ's interest in Amateur Radio began in 1940. After years of experience in communications electronics, Frank was finally licenced in 1957 as K6YCX. Building equipment, mainly receivers, has been a passion of long years standing.

After a tour of duty in the Army occupied in communications electronics, the next 17 years were spent in many areas in the aero-space industry. Since moving to Canada in 1968, he has operated a radio and TV sales and service business on Vancouver Island.

A recent move has resulted in a 270 ft. center-fed zepp antenna that is used on all bands from 160 meters to 10 meters. As usual, he has a number of projects in progress including a FET-ized HRO receiver.

THE 220 CB GRAB COMES ALIVE AGAIN

Word gleaned from 73 Hotline is that the FCC is being pushed by the US President's Office of Telecommunications Policy to again snatch 224-225 MHz for the US Citizens' Band. Originally the US military balked at this because of telemetry and control on missile testing but it seems that they have now knuckled under. "There is no word of how the Canadian and Mexican strong objections would be handled--unless they would just be ignored", says the article. If the grab is successful, then the CB use of these frequencies in border areas must be "co-ordinated" with Canada and Mexico in order to prevent harmful interference with the Amateur Experimental Service, as such a re-allocation is a derogation of present international agreements.

The story states that "REACT, which has very close

connection ties with the Electronics Industry Association and Johnson Company, the largest manufacturers of CB gear in the US is pushing hard for this frequency snatch from the Amateurs."

The 1973 FCC proposals for this 224-225 MHz re-allocation noted that "it is possible that objections from Canada and Mexico may require a prohibition against any other operations in some border areas. Pending resolution of that matter, mobile stations would be constrained from operations within 10 miles of the border and base stations within 25 miles of the border. If suitable arrangements with Canada and Mexico can be effected, this prohibition may be modified to conform to the nature of the agreement."

Cold comfort can be taken from these words, if the same philosophy applies today. The US Electronics Industry Association has estimated that this band would produce 10 million licences!! With sorry record of policing and the rampant illegal operation of the US Citizens' band, there is little hope that the FCC will be able to control this monster if it is ever let loose. It would be rough for Canadian and Mexican operators in border areas, both on 220 and 450, with straight interference from thousands of US CB sets on the first band and from the harmonics falling in the second.

Youth and Amateur Radio

The results of the 1973 DOC Referendum leave little doubt that the youth of Canada (under 25 years of age) are not attracted to Amateur Radio. For this article we will concentrate on those who are furthering their education in Electronics and Communications either at the Secondary School, Community College or University level.

The training of these individuals is not directed to HF communications but to VHF, UHF and above. This is the present and future realm of commercial communications utilising repeaters, scatter propagation, satellites, etc. Every year sees more change of the former 'point-to-point' commercial HF systems to cable, microwave and satellite systems with HF systems relegated to a secondary back-up function.

It is apparent that, to the youth of Canada, Amateur radio, with its concentration on HF communications, is an out-moded form of communication. They quickly realize that any Amateur, with 'commercial' Amateur equipment, finds little difficulty, or challenge, in working other Amateur stations. The attractive field, to them, is the radio spectrum above 144 MHz.

If their thoughts turn to Amateur radio as a practical means of trying out what they have been taught, they find that the requirements for a station licence include "Ability to send and receive the Morse Code at a speed of 10 words per minute". And that the theoretical and practical knowledge required is almost completely geared to HF communications.

A proposal has been made by Earl Andrews, VE3ECJ, that your national Federation consider making a submission to the Department of Communications to add a new class of Amateur (VHF Experimenter) to the present Amateur and Advanced Amateur classes. Requirements for this class would include theoretical and practical knowledge at the same level as the Amateur class with emphasis on VHF techniques and equipments but with no code requirement.

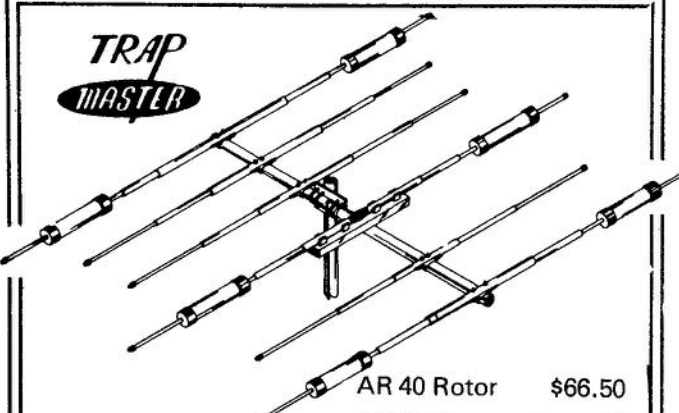
There are many positive aspects to this proposal. We do require much more use to be made of the Amateur spectrum above 144 MHz, we do need to encourage Amateur experimenting, to attract Amateurs into the Canadian service with a technical and theoretical background, and to increase the overall number of Amateurs. Another consideration must be the old adage--"if you don't use them, you'll lose them".

Earl makes other points:

1. A special class of Amateur in the VHF spectrum would support the concept of Amateur radio - "one of self-training, intercommunications and technical investigation".
2. Morse code is not extensively used above 30 MHz.
3. The increasing interest in local communications and the increasing number of Amateurs who are using VHF for local and mobile operations.
4. More Amateurs would be available to handle public service and emergency communications.
5. Similar classes have been granted in other countries with good results.
6. A VHF Experimenter class Amateur could readily progress to Amateur class by merely passing the Morse Code requirement.

Your national Federation advocated such a class several years ago. The proposal made then became bogged down with many restrictions and the final result was not a realistic solution and never reached fulfillment.

Comments from the Amateurs of Canada are requested on Mr. Andrews proposal. Please forward to CARF, Box 356, Kingston, Ontario, K7L 4W2.



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canadian capsule comment

DOC NEWS

As of April 21, the Department of Communications headquarters in Ottawa will be consolidated in a new building in downtown Ottawa.

The Department's new address will be: 300 Slater Street, Journal North Building, Ottawa, Ontario K1A 0C8. Most departmental telephone numbers remain unchanged.

SPECIAL PREFIXES

1975 has presented us with another crop of new special prefixes, celebrating one thing or another across the country. North Bay hams will be using the XO3 prefix to celebrate this city's 50th anniversary as a city. Calgary is celebrating its centennial with the CY5 prefix; and Truro, Nova Scotia will be using CH1.

WHEELCHAIR ROUNDUP

BY RICK HEDGES VE3GJI

We have a new member to the WCRU. His name is Chuck Webster and his call is VE3BVU. Chuck has just recently received his call and is doing a F.B. job on the air. The WCRU would like to wish him many happy years of hamming.

In the last article I mentioned that Bill McElroy was awaiting his call. His call is VE3HPM. Bill has had his call for a few months. He has been very active on the air and has just recently built his own HW-202.

CLARA NEWS

SOS MAY DAY SOS MAY DAY SOS MAY DAY SOS

In other words, I need HELP PLEASE!!!!

I am writing a book on the history of Canadian YLs and Amateur Radio, and would appreciate any info you might have on this subject. I am especially interested in the "old stuff", pioneers in the different facets of amateur radio. The "firsts" for YLs, the youngest, the oldest. Those that were radio ops in the service, ships, public service, traffic. Canadian YLs (hams) that have been well known in other fields. Any info you might have, I will try to follow up. Your help will be most appreciated.

All Bulletins Please copy. I'll be looking forward to hearing from you. Thanks in advance. 73/33/88 as the case may be

Cathy Hrishchenko VE3GJH, 30 Lisburn Crescent, Willowdale, Ontario, M2J 2Z5

VE2 NEWS

MARCOGRAM

VE2BKA, Louis Almassy did a good piece of Public Service on the last day of January when he relayed many messages and supplied phone-patches to some Quebecers who were involved in the Santa Domingo plane crash.

Louis was the means of connecting the survivors with their families in Quebec, as the regular communication service had long delays on it. We congratulate Louis on the fine job done. He was backed all the way by Walter Dolphin, VE2TD, and Barney O'Brien, VE2WH, who stood by ready to assist.

The PL Net has been pleased to welcome a new member VE3AWR, Charlie, from Martintown, who is a blind radio operator coached and sponsored by VE3AGR, Howard Rose, Congratulations to both Sponsor and Pupil.

VE4 NEWS

VE4AI

Rumor has it that Dr. Jim Henry VE7DEP will be signing a VE4 call sometime in the summer. Wonder if it will be VE4DQ? Just couldn't stay away from those VE4 plates eh Jim? Wait till he tries the Manitoba winter again.

There are still a few copies of the ARLM callbook available at \$1.00 per copy. Better still join the ARLM for \$3.00 per year and get the Manitoba Amateur for a year plus the callbook. Just send the cheque to PO Box 475, Winnipeg, Man. R3C 2J3.

VE4OW is now VE0MAJ and at last report was on his way from Baton Rouge La. to Brazilia. John's trusty TS 520 is doing a good job on 20 SSB.

The MEPN meets daily at 0100Z on 3765 Khz with between 30 and 70 stations QNI. For full information contact VE4CR, VE4JA, VE4NE, VE4JP, or VE4HE. The Brandon Amateur Radio Club had a dinner meeting on 01 April 75, and judging from all reports it was a resounding success. VE4XN seemed to sparkplug the deal on 75 phone but all BARC members are to be commended for the fine turnout of OMs and XYLs. Lets have more of these social gatherings.

Those dyed in the wool 20 M men from Winnipeg can be found at any time of the day and night.

Had a report from a roving VE3 (or was it 2?) who blew into Winnipeg at about 0300 hrs. Seems he called on the local repeater for help in locating himself and yep you guessed it Jimmy VE4VJ turned up and did the honors. Guess that was one time VE4HE had the rig turned off. (Maybe the xyl did it when he wasn't looking??)

Congratulations to Ves Hooper now VE4MQ, Bob Roos VE4LY, Martin Cyr VE4MS and to Delores Stetski, Bill Wilson, Frank Grant, Dale Spelchuk, Gerald Neufeldt, Ken Bjornsson, Norman Beaudette all with their Amateur ticket.

VE8 NEWS

VE8BL--Bill moved from Clinton Creek, Yukon to PEI.

VE8CF - George - congrats - has advanced licence now.

VE8MTD - Coral Harbour - active again on 20 m.

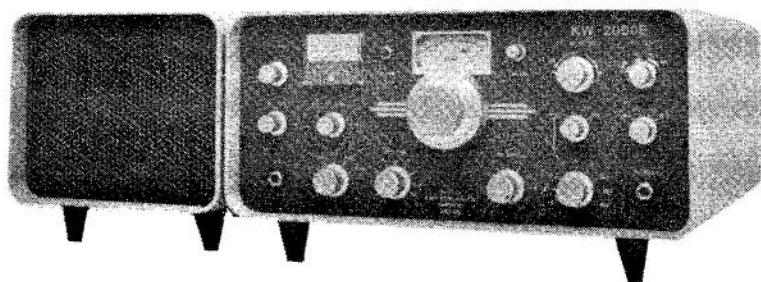
THE CARTG MERIT AWARD

The original CARTG Merit Award was created in 1967 to be presented to the amateur chosen for his outstanding contribution to the art of amateur radio teletype communications. It need not necessarily be confined to technical contributions but recognition of any outstanding achievement world-wide: RTTY experimental work, RTTY technical articles, Traffic handling or organized net operation - RTTY, DX for world-wide good will, Assistance to the blind or handicapped in RTTY, Or for any other outstanding RTTY achievement.

A plaque has been offered for this award, complete with engraving and the CARTG is pleased to request the names of suggested qualifiers be sent in for consideration. Recommendations and qualifications should be sent to 85 Fifeshire Road, Willowdale, Ontario M2L 2G9. or the Alan Venning V7LL, 6171 Brantford Avenue, Burnaby 1, British Columbia, V5E 2T8.

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KW 204

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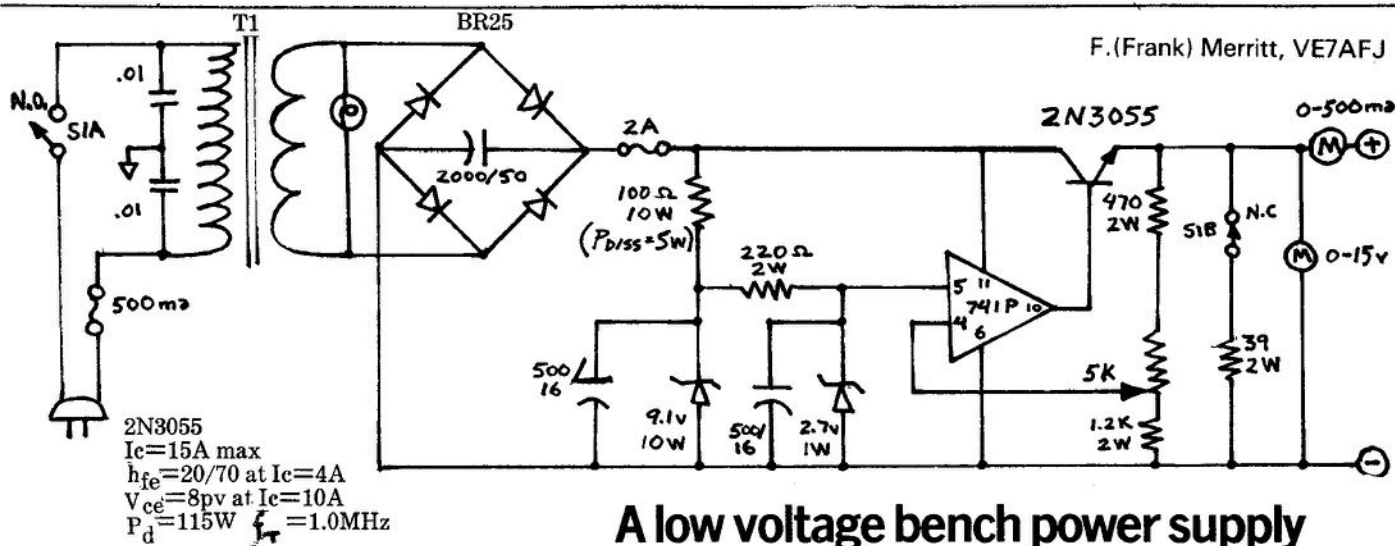
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Electronics experimenters in all eras have needed a practical power supply for bench use. Way back in the days of tubes, it was quite common for the experimenter to rob power from an operational unit such as an amplifier or receiver. The era of the transistor imposes restrictions that limit the use of simple power sources. Most experimenters have used the lead-acid battery as a power source at one time or another. Unfortunately, this power source is not continuously variable and the lead-acid battery presents problems. For instance, when checking out the new five-watt transmitter, the power output is found to be low. That was the battery that was removed from the family auto as "no longer fit for service".

After a few fiascos like that, the need for a continuously variable bench power supply becomes obvious. At first blush, it would seem that the design should be able to be restricted to a SIMPLE concept. As with most things in life, experience indicates the advantage of some sophistications.

A good place to start is with a list of the design goals of the power supply. The requirement for a continuously variable output voltage is obvious so as to enable the experimenter to work with circuits from RTL logic to auto circuits.

This means a minimum voltage of 3 vdc and a maximum of 12 vdc. In this case, the maximum is limited to 15 vdc. A current capability of 500 ma will handle all modern "citizen's band" rigs and most modest ham rigs.

A must is good regulation. For the voltage range specified, a load regulation of 0.5 per cent or better should be adequate. The worst possible ripple on the output voltage should be better than 0.1 per cent. The output voltage and current should both be metered for experimentation convenience. The output should be fused at 500 ma. The regulator input should be fused at about four times the current of the maximum regulator output. In addition, the power supply input must be fused for safety. A convenience would be a power-supply-off load resistor to quickly bleed the output voltage to zero.

A transformer was selected to provide 25 vac at 1 amp. The pilot lamp selected was an 1829 which is rated at 28 v at 70 ma. This provides the first load on the transformer secondary of 70 ma. Discrete diodes or a bridge assembly may be used for the rectifier element. The minimum acceptable Peak Inverse Voltage, PIV, is 100 v and a

current rating of 2 amps is satisfactory as long as the single-cycle-surge-current rating is considerably higher. With a winding resistance of between 2 and 5 ohms, the maximum current that could be realized during the capacitor charge cycle is a little over 15 amps. A basic filter capacitor, across the output of the bridge rectifier, was selected to be 2000 uf at 50 vdc. This reduces the ripple of the regulator input to an acceptable level.

The regulator pass transistor selected is the 2N3055. This transistor is rated generously for this service and is priced reasonably. Of major significance is the power rating of the pass transistor. In this case, the maximum power dissipation is 115 watts when properly heat sunk. One of the first things that an experimenter may try to do is economize by reducing the size and quality of the pass transistor heat sink. In this case, the MINIMUM heat sink area that is acceptable is 46 square inches with the transistor collector electrically connected to the heat sink. That means that NO insulator is used between the case of the transistor and the heat sink. A direct connection is used to achieve the highest possible heat transfer from the pass transistor to the heat sink. On the other side of the coin, the heat sink must be insulated from the case or the cabinet of the power supply unit.

The regulator element of the power supply must sense a voltage change in the output of the power supply, amplify this change and apply the amplified error voltage to the base of the pass transistor.

In this particular case, an operational amplifier was selected as the regulator amplifier. An operational amplifier is a very high-gain amplifier that is usually used in special mathematical operations. In this case, the operational amplifier is used to compare the input from the voltage divider across the power supply output against a highly-regulated voltage and the differential is amplified by a factor of about 10,000. The output of the operational amplifier is directly connected to the base of the pass transistor. It has been repeatedly demonstrated that the regulation of the average low-voltage zener diode regulator is not at all impressive. It was found that when a single stage zener regulator was used, the output voltage regulation was completely unacceptable. A two-stage zener regulator was developed that provides a greatly improved stable source of 2.7 vdc. The first zener diode is a 10-watt unit rated at 9.1 v. The voltage dropping resistor

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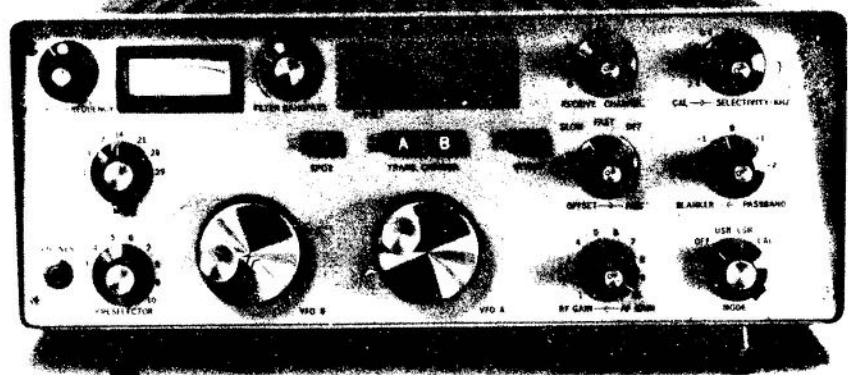
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provides about 200 ma for the 9.1 v zener. This places a static load on the power supply to provide some pre-regulator regulation. A second voltage dropping resistor (from the first zener diode) provides about 30 ma to the second zener diode which provides a very stable voltage source of 2.7 vdc. Each zener diode is bypassed by 500 uf to reduce the source impedances.

It will be noted that the voltage control potentiometer is not connected directly across the output voltage. The resistor from the pass transistor emitter establishes the minimum output voltage and the resistor on the bottom of the network establishes the maximum output voltage.

It will be noted that the farther the arm of the potentiometer is in the direction of the negative output, the greater will be the resistance ratio and hence the higher voltage at the power supply output to match the reference voltage of 2.7 v. There is no filtering of the voltage on the feedback loop. As it turns out, filtering this feedback loop reduces the transient response of the regulator. This sounds rather backwards, but it is logical when it is considered that the error voltage cannot vary with the output voltage when it is filtered.

The 39-ohm resistor is connected across the output of the power supply when the power switch is off. This quickly reduces the output to zero.

The output voltage of the completed power supply varies by about 0.25 per cent from no load to full load. The worst case ripple was measured, at 15 v and 500 ma output, to be 2 mv which is 0.013 per cent.

Measurements were made of pass transistor dissipation to verify the adequacy of the design. At an output voltage of 3 v and 500 ma, the power dissipated by the pass transistor is 14 watts. At 12 volts output and 500 ma, the power dissipated by the pass transistor is 9.5 watts. In this case, the proof of the pudding, as far as the heat sink is concerned, is that after about five minutes of operation at 3 vdc output and a current of 500 ma, the pass transistor was still just warm to the touch.

The output current of the power supply could be increased by generously increasing the involved parameters. As the power dissipated by the pass transistor increases, the size of the heat sink must increase. The resultant power supply (as described) will provide years of reliable service on the experimenters bench.

Radio Conditions

"LONG SKIP" (CANA DX)
W. ANDERSON VE3AAZ

It's not unusual to tune across the band and hear someone praise conditions as "good", and then to hear someone else condemn, equally firmly, conditions as "bad". For a more objective assessment of the current situation you could turn to the broadcasts, at 14 and 18 minutes past each hour, from WWV, simultaneously on 2.5, 5, 10, 15, 20 and 25 Mhz.

Just as a forecast of cool weather means something quite different in February than in July, it is necessary to grasp certain basic assumptions when listening to these ionospheric commentaries.

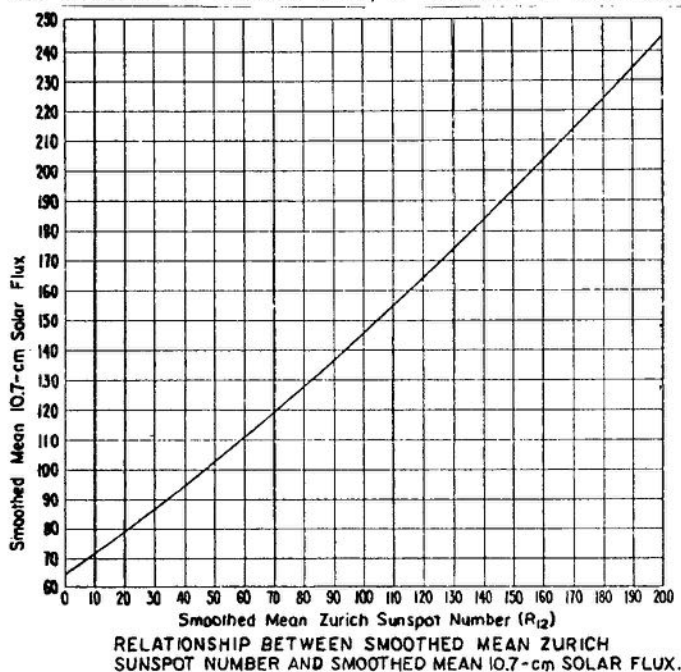
"Normal" and "Undisturbed" conditions mean that the earth is enveloped by a quiet ionosphere whose general characteristics are determined by where we are in the current sunspot cycle--this ideal ionosphere is different in those regions where it is sunlit than in those regions that are dark; it is different for winter regions (sunlit for less than 12 hours per day) than summer regions (sunlit for more than 12 hours per day); it is different over the poles than over the equator, and so forth. For instance, it is normal for the 14 Mhz band to be open VE3ZL all through our summer nights during sunspot maxima but it is abnormal for this to be the case in winter.

Various forms of disturbances in the ionosphere result from various kinds of solar radiations (some are waves, some particles) with an extremely large number of possible combinations. The whole ionosphere is considered to be more or less involved when there is a solar outbreak with the bad effects most pronounced over the two geomagnetic poles in what are called the "auroral zones". (VE3DAM shows the north auroral zone as a dotted ring on the forecasts published in Long Skip--the south auroral zone lies over Antarctica.) Consequently a slight degree of disturbance will likely upset paths through or close to these zones. (e.g. VE3VU and VE3ZL5) while, on the other hand,

fairly long paths that avoid these zones may get away almost unscathed (e.g. VE33B8).

A particular disturbance may affect the ionosphere in one or the other or both of these ways: (a) The ionosphere has more loss and therefore signals are weaker (b) The layer frequencies are disturbed and so the band openings are abnormal. For instance, on the basis of normal conditions, there is never a path VE39M2 on 21 Mhz in summer months. When such a path opens up, an abnormality has occurred which has driven the layer frequencies higher without driving the losses too high.

WWV's 18 minute after the hour broadcasts is updated once each day at 0400Z and contains a short summary of the situation at forecast time, a forecast for the next



twenty-four hours, and two numbers for the day just past--the solar flux and the A index. Bulletins are sometimes introduced during the day when outstanding events warrant it.

(All broadcasts from this station are in English, not in code). The solar flux is a measurement of the 2800 Mhz component of the sun's radiation and is supplied to WWV, so I understand, by the NRC solar observatory in Algonquin Park. This number is related to the effective sunspot number according to the accompanying graph. It's a good idea to keep a log of these numbers to acquire a feel for the numbers themselves and particularly for their VARIATION since the variation particularly if sudden and large, is generally bad news. In any event a higher flux number generally means higher layer frequencies and thus possible openings on higher frequency bands. Here are some SUNSPOT numbers as FORECAST for the next few months:

Apr./75--18, May/75--17, June/75--16, July/75--15, Aug/75--14.

These are, of course, smoothed numbers with all the day-to-day variations ironed out. W3ASK's column in CQ magazine gives both the current forecast numbers and the final numbers for several months back (if you want to see how good the forecasts were.)

The other number is the A index which is a figure for the magnetic status of the earth. These numbers vary from about 1 to over 160. Any number above about 12 or so (particularly if the flux numbers are also high) signifies disturbed and most likely below-average conditions.

The 14 minute after the hour broadcast is updated four times a day at 0100Z, 0700Z, 1300Z and 1900Z. It reports on the path East Coast USA-Western Europe. This path runs by the north auroral zone and so is a good index of general conditions. By the same token, the signals from LA/SM/OH tell a good deal, since they are most likely to drop out under touchy conditions. There is a code used which is based on a set of nine number grades and three related letter grades, as follows:

	1. useless;
	2. very poor;
W (disturbed)	3. poor;
	4. poor-fair;
U (unsettled)	5. fair;
	6. fair-good;
	7. good;
N (normal)	8. very good;
	9. excellent

It should be noted that grades 1, 2, 8, and 9 are used very, very sparingly--you could say that the scale is confined to 3 to 7 inclusive, in practice.

After some plain language comments, a coded propagation forecast is given. For instance: Whiskey 6. This means that, at the time of making the forecast (one of the four times given above) the conditions were disturbed (grade 4 or below) and in the next six hours the conditions are forecast to improve to fair-to-good (grade 6). If you are listening close to the beginning of the forecast period then the latter is more directly applicable, while toward the end of the period the number has more meaning provided, of course, that the forecaster was right!

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