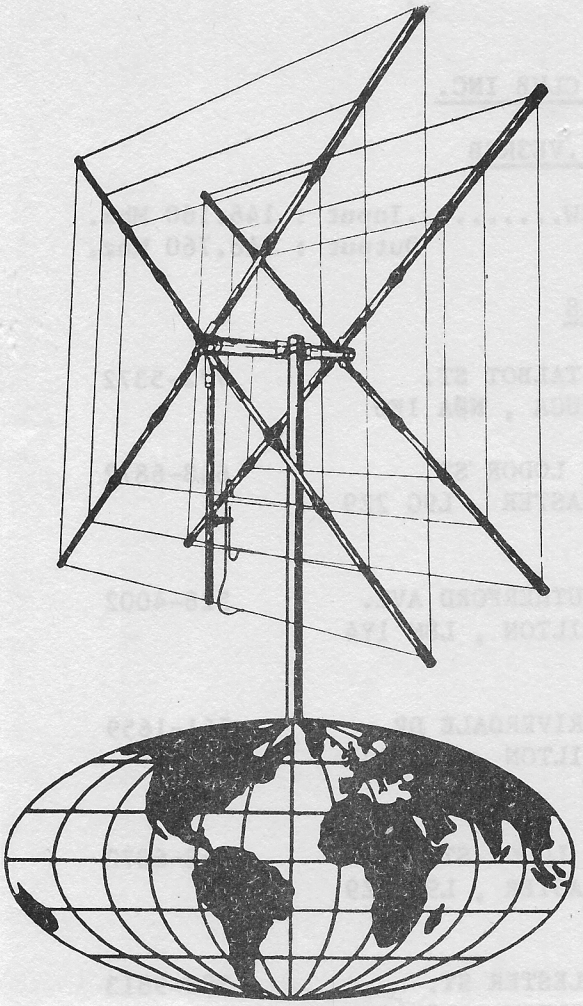

THE HAMILTON AMATEUR

HAMILTON AMATEUR RADIO CLUB INC.
P.O. BOX 253
HAMILTON, ONTARIO
L8N 3T8

FIRST CLASS

Gerry Goldberg VE3HLI
17 Cottrill
Hamilton, Ont. L8S 3L5

THIS IS YOUR LAST BULLETIN
IF YOU HAVE NOT PAID THIS YEARS MEMBERSHIP.

THE HAMILTON AMATEUR RADIO CLUB INC.

Club Station .....VE3DC...VE3RCB

2 Meter Repeater....VE3DRW.....Input : 146.160 Mhz.
Output : 146.760 Mhz.

1977 OFFICERS and DIRECTORS

PRESIDENT	JOHN DYKSTRA VE3BOY	14 TALBOT ST. CAYUGA , NØA 1EØ	772-5372
PAST PRESIDENT	DAVE. E. WALTON VE3FLZ	421 LODOR ST. ANCASTER , L9G 2Z9	648-6872
VICE-PRESIDENT & PROGRAM DIRECTOR	STAN. BOLIBRUCH VE3GFE	8 RUTHERFORD AVE. HAMILTON , L8M 1Y4	528-4002
SECRETARY	PETER GOODSON VE3DOU	28 RIVERDALE DR. HAMILTON , L8E 1J8	561-1659
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PUBLISHER	GERRY GOLDBERG VE3HLI	17 COTTRILL ST. HAMILTON , L8S 3L5	528-7688

COMMITTEE CHAIRMEN

Club Station Licencee	(VE3DC)	VE3BKM	VERN. HUCKLE	388-6989
Red Cross Station Licencee	(VE3RCB)	VE3FHQ	Glenn A. Gibson	385-2786
Repeater Licencee	(VE3DRW)	VE3CFM	Bob. Miller	529-2950
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Technical		VE3DVV	John VanDenBerg	692-3221
Refreshments		VE3ARX	Bill. McCaslin	634-5190
Refreshments		VE3AHB	Irwin Merritt	634-3197

Membership Year.....January 1st to the following December 31st each year.

Membership Fees.....$6.00 per year (all classifications.)

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PLEASE ADDRESS ALL CORRESPONDENCE TO : THE SECRETARY
HAMILTON AMATEUR RADIO CLUB Inc.
P.O. BOX 253
HAMILTON , ONTARIO
L8N 3C8

********** JANUARY MEETING PROGRAM **********

Date: January 19, 1977

Time: 8:00 P.M.

Place: Chedoke Continuing Care Centre

Speaker: Tom Higgins VE3GEQ

Topic: C.S.A. - What it is and What they do.

****

Editor's Editions

Well, here I sit again, pen in hand, or is it typewriter, attempting to fabricate this bulletin from local talent and other credited sources.

I accepted this position, again, under two conditions - (1) I get some help with the typing (2) I get some original articles from local talent. As is indicated by this bulletin, local talent does lurk in the cobwebs of our finals and I sincerely appreciate it. I do get tired of taking articles from elsewhere, lets all pitch in and give the exchange clubs some terrific articles to take from OUR bulletin!

As I look around, I see the St. Catherines ARC have elected a new slate of officers and thier bulletin looks good after going through some rough times. Heres hoping 1977 proves to be a good year.

It seems that John Card, VE3RW, his daughter Mary, Son Bob and XYL, all have thier Amateur Tickets. Are there any more all HAM familys in the Hamilton area?

Congratulations are in order to Fred Hammand VE3HC, who has recently been awarded "Amateur of the Year". A fine tribute to a man who does more for Amateur Radio and helping out Amateurs around the world than just making a fine transformer.

I still have a quantity of Computer Print-out sheets of Beam Headings centered on Hamilton. Same price as last year. 0.25¢ each proceeds to HARC coffee fund.

It is with great satisfaction that I note, that the pre-paid membership is up 30% over last year at the same time. I also expect many prefer to wait until the January meeting to pay, but perhaps I might suggest that you mail the $6.00 in, rather than pay at the meeting. Nothing against personal service, but have you ever tryed to take money from 10 people at once, enter it into a book, write up membership cards, distribute them, all in one night and stay calm! I'm sure our treasurer would like to receive the memberships and process them at a leisurely pace, distributing the membership cards at the next meeting or by mail. The choice is yours, just an idea.

73's

Norm Freidin VE3CZI
Editor

SPECIAL NOTICE

All members are asked to attend this months meeting to vote on an APPROVAL for $300.00 to be set aside for repeater improvement, ie. purchasing new or used equipment, to update VE3DRW. If you have any comments regarding this, please raise them during the meeting.

SPECIAL H.A.R.C. NEWS BULLETIN

As we go to press, letters of invitation are being mailed to approximately twenty Past Presidents, to join with us to receive the "Order of the Gavel". History is in the making, as for the first time, proper and permanent recognition is being given to these former club leaders, who through the years, gave of their best to guide the affairs of the club with dignity and integrity.

We are of course very proud of these men, and in gratitude, we, the membership, seek to honour them by establishment of the "Order of the Gavel" award to each Past President, as a permanent record of a job well done!

On January 19th. 1977, our first meeting of the New Year will usher in this first of an annual event. You will have the pleasure of meeting these men whose term of office reach back in history to the incorporation of the Club in 1956. We are very much looking forward to hearing first hand accounts of by-gone club activities from these veterans and their experiences.

As knowledge of our history increases, we expect to fill in the blanks in our records, in order to honour presidents whose term of office dates back to the beginning of H.A.R.C. in 1933.

I believe the "Order of the Gavel", will prove to be one of the club's greatest resources for future H.A.R.C. activities. This night could very well become one of your fondest memories, as you recall H.A.R.C. brotherhood at its best. Be sure you don't miss it!

"73"

Bill McCaslin VE3ARX

The President's Page

Now that the New Year has started and the schedules are normal again, we will put our best foot forward in all club activities.

Hoping you all had a nice time to relax and have been working the bands with that new toy you received for Christmas.

20 Meters has been open to Europe, but the bands still suffer , on and off, from the radar pulses, let's hope they also will put out thier best foot to clean the air in 1977.

As the club is growing in numbers, please use your name badges at all club meetings. I feel embarressed and so do others, when we cannot put the name or Call to the person that we are talking to, or sitting next to at the club meetings, yet the voice sounds familiar! If you do not have a name badge, see Verne VE3BKM

VE3DRW, our repeater, is again working up to its usual fine standards, thanks to the Technical Committee and a big hand goes out to them for their combined efforts to repair and re-install the gain antenna on the coldest day of the year.

See you all on Wednesday evening.

73's
John Dykstra VE3BOY
President

A.R.E.C. News

On January 29, 1977 we will be holding the annual Simulated Emergency Test (S.E.T.). As you well know, this exercise is held to help keep us in condition as to message handling, passing traffic and generally trying to keep cool in an otherwise, confused situation.

It is urged that as many as possible of the local Hamilton AREC membership try and get involved in this SET in order to be in the know as to what to do incase of a real emergency.

If ycu become aware of an emergency situation, contact, immediately, at least two of the assistant Emergency Co-Ordinators or myself with as much information as possible.

Best of Luck to all during 1977.

73's
Glenn Gibson VE3FHQ
Emergency Co-ordinator (Hamilton)

Here & There

- London ARC are having thier 1st Annual Swap N' Shop on Sat. January 22, 1977 at the Scout Headquarters, 531 Windemere Road, London, Ont. Time: 10 AM - 2PM for Flea Market, Auction starts at 12 Noon Sharp. Admission: 0.50¢ each or $1.00 if you plan to sell. A 20% commission will be charged on all items wold by auction.

- Auction at Lockport, N.Y. will be held at the Niagra Country Co-Operative Extansion Fair grounds(Farm & Home Centre) Time: Sat. January 29, 1977 at 7:30 PM. Directions: Take Route 104 out of Lewiston, N.Y., then south on Route 78. The Fair grounds are just outside the City of Lockport. Tak-in on WR2ACJ 22/82. Commission will be 10% of final sale. There will be several Door Prizes awarded, and the auctioneer will be Tom Ball WA2THS. Possibly some eqpt. dealers will be displaying thier wares. Doors open 6 PM to accept eqpt, Auction begins at 7:30 PM

- Another newly formed club has been started to serve the Ajax, Pickering, Whitby and surrounding areas. Called the South Pickering A.R.C., they appear to be primarily interested in the technical side of Ham Radio. The aim is for a unique, self contained group with some expertise in all aspects of Ham Radio. They have already got operating, a 2 meter repeater, VE3IL on 146.07 in, 146.67 out. It is open to all who wish to use it.

- Collins Radio have upped the prices on ham gear by 50% (in the U.S.) (H.R. Report)

- The following Board of Directors were elected at the recent R.S.O. convention in Toronto, for the year 1976-77.

President: Tom Atkins VE3CDM 1st V.P. Marv Nash VE3FON
2nd V.P.: Dan Robertson VE3FOV Secretary: Eric Ilott VE3XE
Treasurer: Banner Edwards VE3SU

Other Directors elected were:

Les Brownlee	VE3BLZ	Whitefish
Bruce Carveth	VE3BC	Toronto
Tom McKee	VE3ETM	Windsor
Croft Taylor	VE3OR	Ottawa
Roy Tuttle	VE3BNV	Scarborough

Here & There Cont'd

- OSCAR 6's Birthday was October 15th and AMSAT's longest lived bird is now four years OLD and STILL going strong! As the launch anniversary ended, OSCAR 6 began its 18,300 orbit, a lot of miles and many thousands of contacts to its credit. OSCAR 7 celebrated its 2nd birthday on November 15th. (Credit: HR Report)

- Canadian CB will expand to 40 channels following the US's lead, but the G.R.S. operators won't be able to use their new channels until April 1st. 40 channel radios for the Canadian market must be tested to tighter specs, but they can't be submitted for testing until after January 1st. Commercial users presently operating on the new GRS frequencies have the option of staying put or applying for a new frequency assignment. Whether a US CBer entering Canada with a shiny new 40 channel radio, before April 1st, would have problems, remains to be seen. (Credit: HR Report via CRRL Newsletter)

- New Ham News is a new quarterly ARRL publication that will be sent free to every newly licensed amateur. Each newcomer will receive two free issues, and any who join the League will continue to receive it for his first two years as an Amateur. It will also be distributed to students in the ARRL Training Course. Vol. 1 Number 1 consists of eight pages of news items of particular interest to newcomers, reprints of several appropriate short QST articles, etc. (Credit: CRRL Newsltr)

- To encourage awareness of and to otherwise publicize the 1977 ARRL National Convention, the Scarborough Amateur Radio Club has introduced a contest open to any amateur. The requirement is simple. That is, that one suffix letter from each of the 38 Ontario contacts be used to spell out the slogan "The ARRL National Convention Toronto Canada." Either CW or phone contacts may be used, with the contest period from March 1st, 1976 to May 31, 1977. Entried to be mailed to: Scarboro A.R.C., P.O. Box 1011, Stn. "C", Scarbourgh, Ont, M1H 1A0. Entries should be accompanied by extract from the station log. A very attractive piece of "wallpaper" will be awarded to each participant who qualifies. (Credit: CRRL Newsletter)

- Code Practise is now available on the following VHF repeaters, to my present knowledge: VE3KSR 146.97 MHz o/p 7-8 PM nightly starting at 5 wpm VE3TTY 146.70 MHz o/p 7-7:30 PM nightly 5-10-15 wpm

SELECTING AN RF POWER AMPLIFIER

With the introduction of low-powered radios and hand-held portables, a new and useful accessory, the RF power amplifier appeared on the communications market. The concept of an amplifier is as old as radio itself. Progress in semiconductors has now made amplifiers for UHF and VHF FM applications an economical and reasonable approach to high power.

- What is an Amplifier?-

Basically an RF power amplifier is just what its name implies. It is connected between the trnasceiver and antenna to amplify the transmitter output. The RF amplifier commonly in use today has automatic switching that allows received signals to pass in reverse through the amplifier with no attenuation; the amplifier is automatically switched to the power-amplifing mode when the transmitter is keyed. The majority of amplifiers on the market are Class C; that is, they are not linear. These amplifiers are ideal for FM applications but are not recommended for AM & SSB because they can cause severe interference to adjacent channels and other services.

- What do I look for when I buy an Amplifier?-

If you believe an amplifier will improve your communications capability (and it usually will), then the following considerations should be considered before purchasing one.

* Buy an amplifier that will show a noticeable increase in coverage. Do not settle for a power gain of less than 6 DB. For example, if your present radio puts out 10 watts, the amplifier should increase it to at least 40 watts, or four times your present transmitter o/p.

* Buy from a manufacturer who is a specialist in amplifiers. Many individuals are now making amplifiers as a sideline. Beware of these manufacturers because they will not be around when the fad appeal wears off.

* The following technical requirements should be considered when selecting an amplifier. (1) The amplifier should have a flat 50 ohm input impedance not affected by the length of cable between the amplifier and transceiver. (2) The amplifier should incorporate a nontunable low pass filter at its output. (3) The amplifier should not generate spurious signals when over-driven, under-driven, detuned, or operated at high or low voltage. (4) The amplifier should exhibit a low insertion loss on receive. (5) The most reliable designs usually incorporate several medium power transistors instead of one high power transistor. (6) Look at the data sheets and at the amplifier, physically if possible, to determine just what the workmanship is like. If the amplifier is professional looking, then chances are the amplifier will perform professionally.

* Find out if the manufacturer is a professional in communications, or just someone building amplifiers while he imports and sells Ham, CB, television and stereo equipment. An amplifier is just as critical to manufacture and test as a radio, even though it may look more simple and have fewer parts.

POWER AMPLIFIERS...CONT'D

* The amplifier concept is still new and the engineering support required from the manufacturer to assure continued reliability is costly; you get what you pay for.

* If still in question, ask the manufacturer to send you a service/maintenance manual. It may cost a few dollars, but the information it contains will be indicative of the amplifier's quality and serviceability.

- Linears Versus FM-

If the need arises for a legitimate application of an amplifier in AM or SSB service, then the following rules should be followed.

If the application is AM, realize that for full talk power and effectiveness the amplifier must be capable of a peak power four times that of its carrier power. Do not buy an amplifier with a carrier of 100 watts and peak of 150 watts. This will only produce splatter and wasted carrier power. If the amplifier has a peak of 150 watts, then the carrier power, for maximum talk power and range, should be ¼ of 150 watts or 37.5 watts. Any more than this latter power level will result in splatter and reduced talk power.

An AM/SSB amplifier should also be biased on, only during transmit with a low-impedance regulated source. Failure to use such a source will result in distortion and adjacent channel interference (splatter)

- Selection of RF Power Amplifiers-

Several manufacturers are presently offering a wide selection of RF power amplifier:

Freq.	Power In	Power Out
35-50 MHz	1-4 W	30-50 W
"	5-15 W	50-90 W
"	5-15 W	80-120 W
136 - 175 MHz	1-4W	25-30 W
"	1-4 W	35-45 W
"	1-4W	60-80 W
"	5-15 W	25-45 W
"	2-10 W	50-80 W
"	5-15 W	80-100 W
"	1-4W	80-100 W
"	20-40 W	80-110 W
400-512 MHz	1-4 W	25-40 W
"	1-4W	70-80 W
"	5-15 W	25-40W
"	5-15 W	70-80 W

--- Good Luck & Good DX.... Norm VE3CZI (edited from Communications News)

WE ARE ALWAYS IN A HURRY! But don't hurry too fast. Take time to WORK.. It is the price of success; Take time to THINK.. It is the source of power; Take time to PLAY.. It is the secret of youth; Take time to READ.. It is the foundation of knowledge; Take time to LAUGH.. It helps with life's problems and heartaches; Take time to LOVE.. It is the gift closest to God; Take time to DREAM.. It hitches your sould to the stars; Take time to SING.. It helps to carry life's load; AND ABOVE ALL ELSE.. Take time to PLAN.. It is the secret of being able to have the time for the other nine points!

(credit: Morris L. Finneburgh Sr. in Electronic Technician 07/72 via Ottawa Groundwave)

It has been heard that:

- VE3GVG, Cameron has future plans to attend Fanshaw College in London looking into a carreer of Audio Engineering.
- VE3APG, Don, now a proud grandfather, will be looking forward to enrolling him in his Amateur Radio Class.
- VE3GCP, Fred has been trying to do his thing by dropping rotators from the top of towers!!
- VE3ISX, Barry, our newest ham in the area, who attended VE3DSP's classes, but just could not wait until Spring to write for his ticket. Congratulations Barry.
- VE3HZA, Ernie is looking up higher to see his beam, now atop a new 60 foot tower.

DID YOU KNOW:

Did you know that upon showing proof that you are a Hamilton A.R.C. member, you can borrow club test equipment for a fixed period of time. Equipment available: V.T.V.M., Signal Tracer, Grid Dip meter, Oscilliscope Model IO-10, V.H.F. SWR Bridge, Electric Engraving Tool, Safty Belts.

Also, as an added bonus, HARC club members can participate in our group purchases on Antenna cable, such as: RG-174/U 8¢ per ft.; RG-58/U 8¢ per ftt; RG-8/U 18¢ per ft.; solid copper 12 Ga. coated Antenna wire (for dipoles) 12¢ per ft.

Now, aren't you glad your an HARC member!

Following are the countries with which Canada has completed reciprocal licensing arragnements:

Austria	Ecuador	Isreal	Portugal
Barbados	France	Luxemburg	Senegal
Belguim	Finland	Netherlands	Sweden
Bermuda	Germany	Nicaragua	Switzerland
Brazil	Guatemala	Norway	United Kingdom
Denmark	Iceland	Panama	Uruguay
Dominica	India	Peru	U.S.A.
Dominican Republic	Indonesia	Philippines	Venezuela

Mailing addresses for each of the above countries are available from CRRL Headquarters at any time. (Credit: CRRL Newsletter)

DX HINTS AND TIPS

These are mainly common-sense bits of advice which were prepared by CANAD-X, a Canadian DX association.

- One main piece of advice for DXers is to 'listen'. This can open all the doors. If you know exactly who you are calling and where he is located, your call can be much more successful. A DX station may give instructions as to where he is listening and he may be calling only certain areas. Don't barge in like a bull in a china shop!
- If you hear a pile-up calling a DX station, listen to those calling him as this can often tell you what to expect. If VE7s are giving 5/9 reports and you are on the East coast, you possibly will not hear him. Also, he may be transmitting in the foreign phone band (below 14.200) and listening on a certain frequency, or frequencies about 14.200. If he is not on the frequency of the calling stations, look for him just below 14.200 or just above 14.100. The key to working him is to listen carefully.
- Use established phonetics and don't change them in the middle of your call.
- Keep your transmissions short until you establish whether the DX station wants to ragchew or if he know more than a few stock English phrases.
- If you hear a DX station working a pile-up, listen to his response. If he works rapidly, trying to handle as many stations as possible, keep your transmissions short. A signal report and 73 are quite sufficient.
- Don't repeat the DX station's call more than once but give your own several times. He is interested in your call, not his own.
- Use VOX if at all possible. Push-to-talk is fine for mobile but the conversational-type of QSO is the thing these days. Questions can be answered immediately and you can determine if the frequency stays clear. If signals fade or QRM interferes, the other station can interrupt to point this out immediately.
- 'Breaking' on the DX bands can lose you a lot of friends. Generally speaking, unless you know the stations involved, don't break but go and find your own DX station to work. If you must break, just announce your call, don't call 'break-break'.
- Use a 'countries' list in order to determine in advance what country the station is in. Don't ask him what country he is in.
- Generally speaking, if a DX station advises you to QSL via his manager, that manager expects your QSL to arrive with a self-addressed envelope plus sufficient postage of his country or sufficient IRCs. Don't expect miracles of a QSL manager, he must wait until he receives the logs from the DX station and this may involve a period of several months. If you are not in a hurry and are a member of CANAD-X, you can use the CANAD-X OUTGOING QSL BUREAU at no cost but don't forget to keep a S.A.S.E. at your local incoming bureau.

(Credit DX Hints and Tips from CANAD-X)
via Ottawa Groundwave

CIRCUIT BOARD PRODUCTION FOR THE AMATEUR

BY WALT DOUGHERTY VE3E1A

The present trend of Amateur involvement in complex, sophiticated, electronic systems, has placed an increasing demand on the need of the Amateur to develop skills and equipment to produce his own boards. This article is dedicated to the achievement of those objectives at minimal cost.

The modern circuit board consists of a suitable substrate of insulating material coated on one or both sides by a layer of copper. The thickness of the copper is uaually specified in ounces per square foot. One or two ounce board is suitable for most applications and the choice of substrate is frequently determined by what is available and at what price.

The basic process consists of subjecting the board to a solution called an etchant, usually ferric chloride or ammonium persulphate which dissolves the copper into solution. The copper required to remain is protected by a substance known as resist, which is not soluble in the etchant. After etching, the resist is removed to allow plating, if desired, and to enhance soldering of component leads to the copper conductores.

There are several methods of applying resist to the board. These include silk screen, hand painting, and photo resist. Only the latter is currently practical, since the former is prohibitively expensive and hand painting is not suitable for duplication.

The photo resist method of etchant control is simple, flexible and inexpensive. Basically, the process consists of coating the thoroughly cleaned copper surface with a layer of special plastic suspended in a suitable solvent. The author has enjoyed excellent results using the Kodak process known as K.P.R. A brief period of air drying (in the order of 10 minutes) with the surface level, followed by a 10 minute baking at 140°F produces a tack free surface ready for processing. A 600 W hair dryer or forced air room heater will serve very well. The coating and drying must be conducted under safe-light conditions.

A 40W yellow bug lamp works very well. Areas of the KPR exposed to sultr-violet light for a suitable length of time, undergo a change similar to polymerization. Following exposure, the board is placed in KPR developer. Within 5 minutes or less, the unexposed areas will be dissolved into solution while the exposed areas remain virtually unaffected. The board may now be rinsed under a gentle stream of water. The remaining emulsion is soft at this stage and insensitive to light. It should now be baked as done previously. The board is now ready for etching and further processing.

Copper surfaces which have not been thoroughly cleaned will not accept a uniform coating of resist. Probably the simplest approach is to emmerse the board with the fail up, in a shallow tray. Cover the board with a strong household detergent solution. Scrub the board thoroughly with pumice or 400 to 600 grit water paper. A sponge rubber backed sanding block may be

Circuit Board Production- Cont'd

convenient for large areas. A small border may remain and this can be removed with a bit of water paper held in the fingers. Rinse the board thoroughly under running water and dry with a freshly laundered towel. Do not touch the side of the towel contacting the board. The aerosal packaged KPR can be used following instructions on the container. Spray application seems to be more prone to breaks in the coating than KPR applied in liquid form. If a puddle of resist is poured onto the centre of a board, the board may be tilted to encourage the resist to cover all areas of the board. Allow the surplus to drip into the container by holding the board certical with one corner pointed down. When dripping ceases, place the board on a level surface and dry as above. A wide, soft, camel hair artists brush is also very useful. Move the brush slowly and brush in both directions. Watch for loose bristles and brush marks. Wash the brush in acetone or lacquer thinners and protect from dust.

The location and shape of the areas to be etched away are controlled by a mask frequently in the form of a photographic negative. If a sensitized board is exposed through a mask made of tape and conventional opaque symbols on a clear substrate, the etched board will be the opposite of what is required. The preferred method of reversal is to contact print the original mask onto lithographic film and use the film as a mask. Now that the basics are understood, we can consider the options of mask production and process details.

The methods of mask production can be as simple or complex as the producer chooses, always subject to consideration of available equipment, cost, and time. This article will describe two basci methods, the first using a simple printing frame with art work at a scale of 1:1 and the second requiring a photographic enlarger permitting art work at any preferred scale, subject only to the design of the enlarger.

Method 1 consists simply of producing a full scale layout of the circuit on a transparent plastic film. Conventional transparent stick-on decals and black crepe tape may be used. Alternately the circuit can be drawn with opaque black ink using the Staedtler Mars 500 pens and Mars 747T ink. Suitable templates can easily be made of 1/16" plexiglass fitted with 1/16" rails to hold the template above the surface and prevent smearing of the ink. Go over each line twice to ensure an opaque line when the ink has dried. A cotton swab moistened with chlorothene nu will permit controlled removal of any unwanted lines or smears. When the work is finished to your satisfaction, a contact print on lithographic film will be required. This process will be described in a following chapter on processing procedures. The finished litho negative will be used to control the exposure of the KPR coated board.

Method 2 is more complex in that it requires the use of a photographic enlarger preferrably with a 2 1/4 square or larger negative format and allows circuit layout at greater than unity scale with attendant increase in detail and ease of drawing.

..... To Be Continued

The clear film approach described in method 1 may be used with

Hamilton A.R.C. Swap Shop

ANTENNA EQUIPMENT

VE3CZI Norm 388-9813
- Hy-Gain Balun Model BN-12 $5.00

VE3BOY John 772-5372
- 2 meter "Plumbers Delight" copied from Antenna Handbook 5/8 wave $10.00

VE3HJU Peter 533-9954 Toronto
-Light Duty Rotator $50.00

VE3BKQ Ed 262-5087
- Tower section, 25-30 ft. long, one piece, heavily reinforced, self-supporting, more sections can be added. Price Neg.

MEASURING & TEST EQUIPMENT

VE3CZI Norm 388-9813
- TS-89/AP Voltage Divider, portable Test Unit used to measure in conjunction with a scope, video pulses between 200 & 20K volts in Hi-Z circuits. c/w manual $10.00

V.H.F. EQUIPMENT

VE3ABG Joe 884-7388 T.O.
- Motorola Micor Tx & Rx strips, with 45 watt Power Board $75.00

VE3GTE John 753-0536 Brantford
- Qty of 10 "Tail End Charlies", UHF, 1 watt Tx, usable for ATV $15

VE3HBA Barry 637-7521
- G.E. TPL transistorized xcvr. 2 channels c/w 3DRW & .52 Sx, sell or swap for HF eqpt. $100

VE3HBX Steve 648-6078
- H23AAC Motorola Handi-talkie c/w nicad batterys (new), spare rig for parts plus set of tubes and various crystals $90

VE3DHJ Bill 689-5239
- Heathkit HW-202 c/w 202A tone burst encoder, 5/8 wave trunk mount antenna, crystalled up for 3TOR, 3DRW, 3NRS, .52Sx, 21/81, .94Sx, .06/.66 $475

VE3FAE Jack 537-5056 T.O.
- Collins VHF AM receiver Model 51MB $60

VE3HOD Bill 945-9468 Grimsby
- Marconi DT-65 mobile xcvr, 1 chan unit, c/w xtals for DRW & RSB $40

VE3CJW Bob 662-7631
-Syscom Commander II, 4 chan unit, c/w DRW & RSB $75

VE3WT Howard 934-6461 St. Cath.
- IC-230 2 meter xcvr $425

H.F. EQUIPMENT

VE3EFD Bob 935-0907 St. Cath.
- RTTY Demodulator (tube) $15

VE3HWY Ray 634-1712
- Model 14 Tape reader $25

Swap Shop Cont'd. HF Eqpt.

VE3BNW Red 635-5398 Welland
- SB-220 Heathkit Linear 1 yr old $575
- Robot Model 61 SSTV Monitor $200
- SSTV Keyboard, NEW, $400

VE3IDC Bill 845-0265
- Marconi Radar set, marine, Model LN-47 $400 or trade for 2 meter SSB rig.
- Two facsimilie recorders & transmit units. in wrking condx wid 1 extra, good for parts. ~~Wxwx~~ offers ??

VE3FAE Jack 537-5056 T.O.
- DX-60 Transmitter c/w VFO $120

VE3HOD Bill 945-9468 Grimbsy
- Gonset G-76 Low Band XCVR 90 watt AM, 120 watt CW $60

VE3EKG George 844-1316 Oakville
- HW-101 ~~X~~CVR $400 Power Supply $60

SWL John Rogers 561-3121
- Hammurland HQ-129X Gen Cov. Receiver $125

VE3EEL Frank 639-7175
- 10 meter xcvr, Lafayette Model HA-410 $50

VE3IEI Terry 634-0959
- Heathkit Model HW-7 Tri-Band QRP xcvr $75

ACCESSORIES

VE3DUF Bob 637-6427
- Touch Tone Pad $12

VE3FAE Jack 537-5056 T.O.
- N.E. Touch Tone Pad c/w interface unit $25

VE3DOU Peter 561-1659
- Turner Plus-3 Microphone $35

WANTS
- Jeff VE3DJF wants a 28 ASR
- Pete VE3DSW wants a 60 watt GE Prog-Line Tx Strip
- Don VE3HXY 639-9067: Heathkit SB-610 Monitor Scope
- Ron VE3AHK 662-4372: Hethkit HF SWR/Power Meter
- " " " : Manual for "Labratory for Electronics" Scope Model 104
- Phil VE3BAL: Bendix Tx Model TA-12 ~~3x5~~ 354-3730 Niagra Falls
- Barry VE3BXY 892-5680 Fonthill: Walters Compre-Amp
- Cameron VE3GVG 628-6125: 10 pf capacitor with variable screw adj.
- Dennis VE3ISH 659-7402: wants capacitors for a Transmatch; one dual section, air variable 200 pf/section; single section air variable 350 pf cap. also wants a counter type dial for a roller inductor.

SPECIAL ADDITION TO SWAP SHOP FROM ESTATE OF LATE VE3GSG

For further info on these items or purchasing, please contact: Tut VE3ACH, 134 Rutherford Ave., Aylmer West, Ontario 519-773-2173

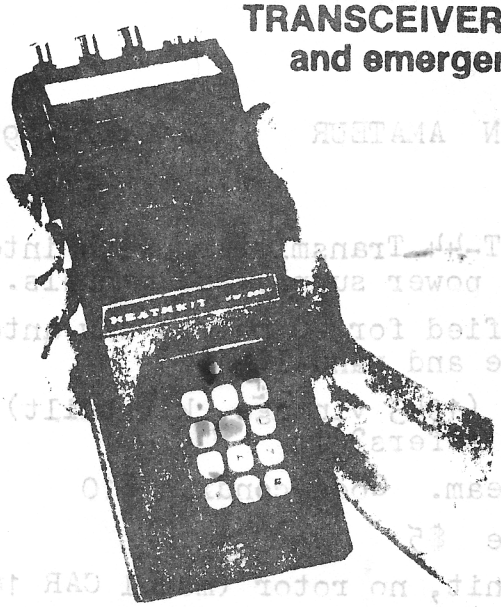
- Heathkit DX-100 AM phone & CW transmitter c/w mic. $75

ESTATE OF VE3GSG CONT'D

- Hallicrafters SX-117 Rcvr & HT-44 Transmitter, with interconnecting cables for transceive. c/w mic, power supply and manuals. $500
- Ten Tec PM-3 Power Mite, modified for 80 meters c/w antenna tuner (modified), wooden carrying case and manual. $75
- Maissner all band AM receiver (1943 vintage, kit built) c/w manual. Poor condx, needs repair. What offers?
- Cushcraft 4 element 2 meter beam. Good condx. $10
- Hmebrew two meter ground plane $5
- Crown antenna rotor control unit, no rotor (model CAR 10) offers?
- Heathkit Q-Multiplier Model QF-1 c/w manual $10
- K.W. E-Z Match 400 watt Antenna Tuner $40
- Heathkit Model HD-10 Electronic Keyer c/w manual $40
- Turner SB+2 Microphone with transistorized pre-amp $30
- Microphone: Midland Model 21324 Headset and boom mike, wired for use with Yaseau FT-2F two meter xcvr $15
- Power supply, 3-12 volts variable, 400 ma. Davco $10
- 110 vac squirrel case fan $5
- Capacitor Checker, Heath IT-22 c/w manual $25
- Resistance Substitution Box, Heath IN-12 $5
- Capacitance Substitution Box, Heath IN-22 $5
- Service Bench VTVM, Heath IM-13 c/w manual $35
- C.B. Checker (SWR/Field Strengh, etc) Knight Ten-2, No manual $35
- Tube Tester, Heath IT-21, with manual & wooden carrying case $20
- 3" oscilloscope, Cossor Model 1039 c/w manual $50
- Multimeter, Eico Model 556 (kit built) c/w manual $25
- Multimeter, Kew Model TK-70A c/w manual and wood carrying $30
- A.C. Amptmeter, in beautiful wood case, 5 ranges to 5 amps. $10
- Frequency meter, military surplus Model C-7 $10

NOTE: All proceeds of the sale of this equipment will go to the C.N.I.B. Amateur Radio Club.

NEW HEATHKIT HW-2021 HANDHELD TWO-METER TRANSCEIVER—a great value in personal and emergency communication gear



Compare the HW-2021 with any other handheld two-meter transceiver. In value and performance, we think you'll agree it's unsurpassed.

A top-mounted knob selects any of five crystal-controlled channels—we even include a crystal for 146.94 to get you on the air fast. And, to save money, a single crystal controls both transmit and receive! A simplex offset switch and the 600 kHz crystal actually give two transmit frequencies for every crystal you buy—just like having a 10 channel transmitter!

The transmitter output is one watt minimum with 0.005% (or better) stability. Frequency modulation and a separate built-in mike provide a better signal. The receiver features 0.5 μV sensitivity for 12 dB SINAD and a squelch threshold of 0.3 μV or less.

The HW-2021 comes with built-in nickel-cadmium batteries and a separate AC charger. The battery-saver circuit uses a pulsing technique to extend the battery life by 75% in the standby/receive mode.

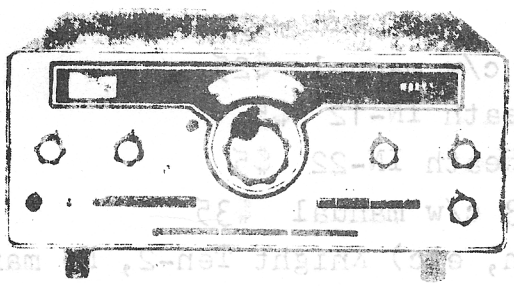
To make the HW-2021 an even better value, we've included accessories worth up to $60—a crystal for 146.94 MHz, a −600 kHz offset crystal, a flexible "rubber duckie" antenna plus an output for an external antenna, a built-in nickel cadmium battery pack and a separate AC charger. And you get them all at no extra cost when you buy the HW-2021.

For personal and emergency communication, the optional HWA-2021-3 Auto-Patch Encoder accesses telephone lines through repeaters with touch-tone input. The 12 digit keyboard and keying light mount directly on the front of the transceiver. You can add the encoder when you build the transceiver or later.

The HW-2021 is both compact and lightweight—it weighs just two pounds, including batteries! The HW-2021 and HWA-2021-3 are not difficult to build, but, due to compactness, some soldering experience would be helpful. Alignment requires only a VOM or VTVM.

Kit HW-2021, Handheld Transceiver	239.95
Kit HWA-2021-3, Auto-Patch Encoder	54.50
HWA-2021-2, Carrying Case	17.50

NEW HEATHKIT HW-104 CW/SSB TRANSCEIVER—



The same basic circuitry as our top-of-the-line SB-104. The new HW-104 is 100% solid state—cool and quiet—with an output you can instantly switch from 100 watts to 1 watt. Its coverage extends from 3.5 to 29.0 MHz. And, if you need the top end of 10 meters, add the optional HWA-104-1 accessory. Its coils and filters fit onto the "104's" existing circuit boards and take you up to 29.7 MHz.

The HW-104's performance is superlative. Transmissions are clean and crisp—at 100 watts third order distortion is 30 dB down and unwanted sideband suppression is 55 dB. In the receiver, broadband design virtually eliminates adjacent signal overload, yet sensitivity is less than 1 μV. And because cross-modulation and intermodulation have been dramatically reduced, signals seem to "pop out" of a quiet background.

[illegible] CW positions on the bandswitch, a 5 kHz [illegible] other 5 kHz markings on the circular dial, 100 kHz calibrator for accuracy to 2 kHz, 12 VDC powered [illegible] optional noise blanker provides up to 50 dB effective blanking. For base use, [illegible] optional HP-1144 AC Power Supply. Plug-in [illegible] circuit board [illegible] and two wiring harnesses [illegible] supply construction. Alignment requires only a VTVM, [illegible] and dummy load.

Kit HW-104, Transceiver	799.95
Kit HWA-104-1, 10-M Accessory	27.50
Kit HP-1144, AC Power Supply	139.95
Kit HS-1661, Matching Speaker	29.95
Kit SBA-104-1, Noise Blanker	34.50
Kit SBA-104-2, Mobile Mount	47.50
Kit SBA-104-3, 400 Hz CW Crystal Filter	66.50

MONTREAL, QUEBEC H2M 1H1
795 Legendre St. E. Phone 514-384-91

OTTAWA, ONTARIO K1Z 5Z6
866 Merivale Rd. Phone 613-728-3731

HEATH
Schlumberger

MISSISSAUGA, ONTARIO L4X 2R7
1480 DUNDAS HIGHWAY E., 416-277-3191

EDMONTON, ALBERTA T5E 4C2
12863-97th Street Phone 403-475-9331

VANCOUVER, B.C. V5R 5J7
3058 Kingsway Phone 604-437-7626