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The Ontario Amateur

Official Journal of Radio Society of Ontario Inc.

Season's Greetings

See the
D.O.C. Discussion
Paper Extract
on page 18.



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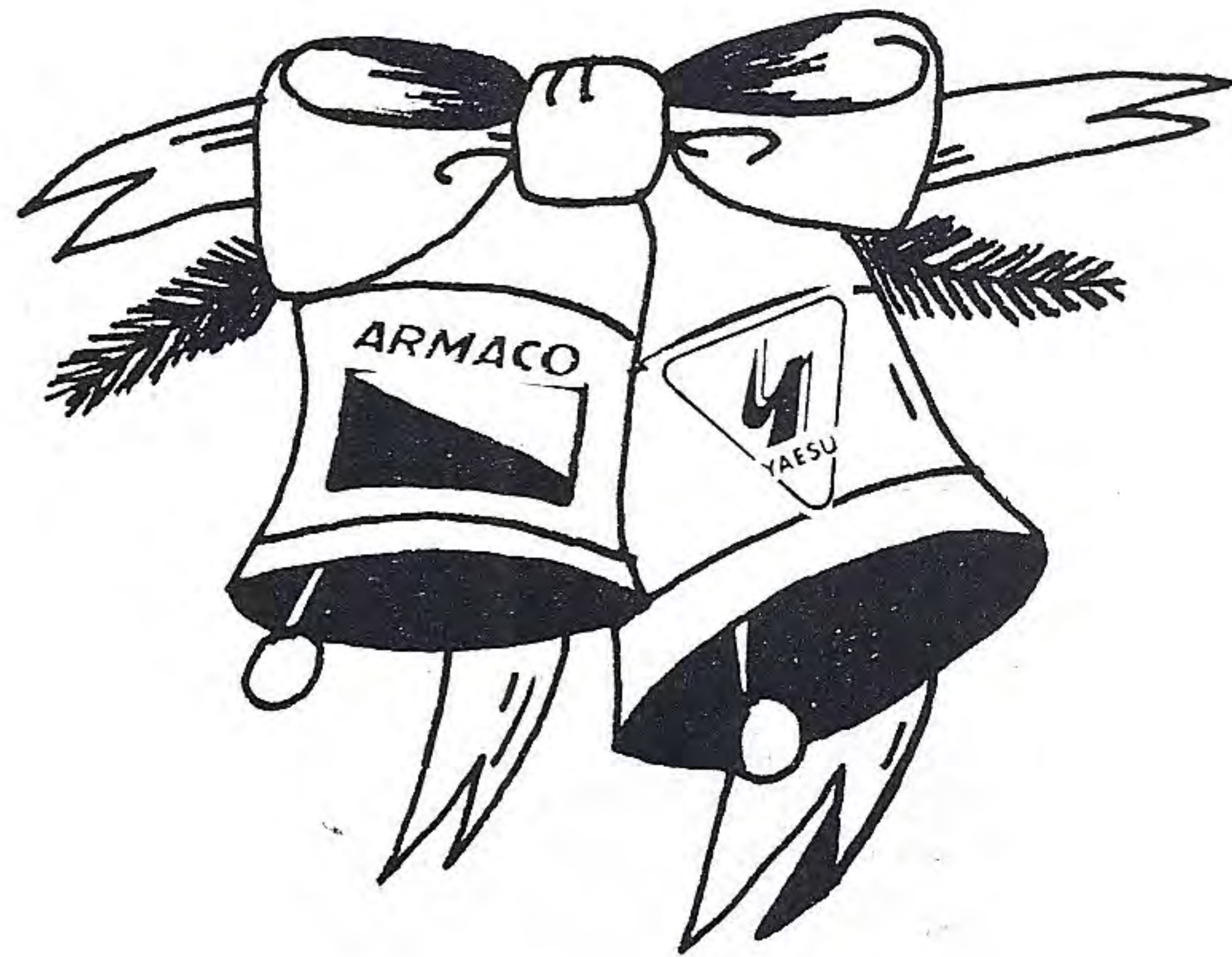


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Radio Society Of Ontario Inc.

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The
Message?**

**Radio
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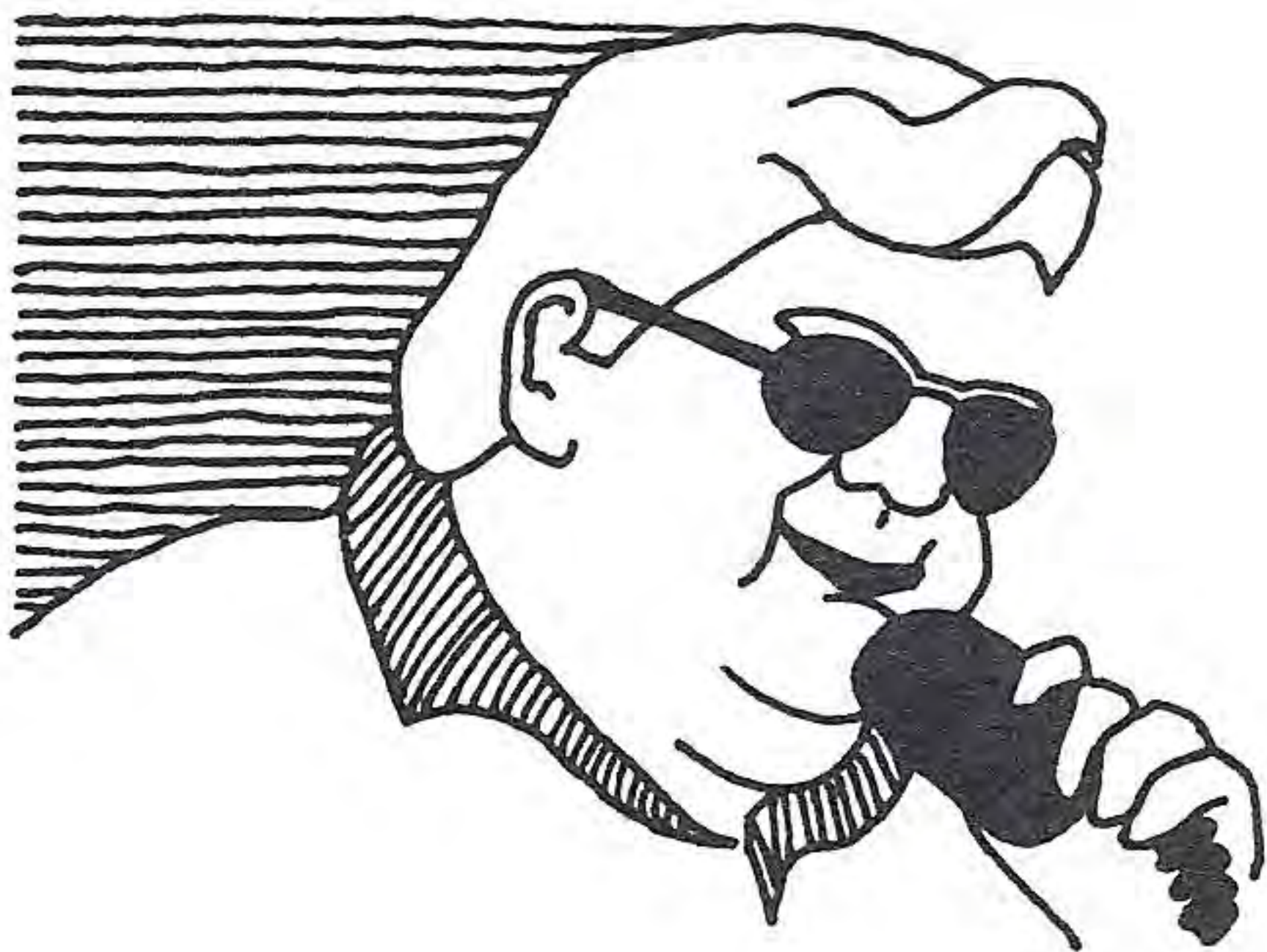
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FUTURE OF AMATEUR RADIO

The following has been taken from the March 1985 issue of RADIO-SPORTING. We agree that John Q. Public needs to be made more aware of the importance of amateur radio especially in times of emergency. The publicity given by the media to the work done by radio amateurs at the time of the disastrous tornadoes was very little when we consider the value of the services rendered to the authorities and the relatives of the victims. Read on and then let us have your ideas about our needs as you see them.

Future of Amateur Radio

"AMATEUR RADIO: ITS FUTURE AND HOW TO ASSURE IT HAS ONE" was the topic of an all day meeting held in Miami, Florida on January 31. During the six hour meeting, about 40 industry representatives, including the ARRL and every major amateur radio publication, engaged in an "off the record, free wheeling and open discussion" of the future of our radio service.

There was universal agreement at the meeting that amateur radio is in trouble due to both a lack of growth and a falling off of activities. Two parallel efforts were considered: first, to find new people to enter the service, and second, to revitalize hams who are presently inactive. There were many short term and long term proposals made during the meeting, for example:

1. Make active promotions to junior high school aged children through their science teachers.

2. More aggressively promote amateur radio to the general public, as a method of attracting future amateurs.

3. Establish contact with Citizens Radio and scanner groups to encourage their members to upgrade to amateur radio.

4. Make hamfests and amateur radio conventions more attractive to non-amateurs by offering free or discounted tickets to families with school aged children: this could possibly be done through local schools.

5. Construct an "Introduction to Ham Radio" booth which would make the rounds to hamfests and similar gatherings in order to provide "hands on" experience with amateur radio.

6. Develop new forms of amateur radio promotional material, such as an amateur radio comic book which would be distributed to younger people who seem to be potential candidates for amateur licences.

7. Promote the fun aspects of amateur radio, since the service is essentially a hobby or leisure time activity to most.

8. Make the entry level licence more attractive by researching the possibility of granting Novice limited digital or VHF radiotelephone privileges.

There were more ideas expressed, including having equipment dealers take a more active role in the service by promoting and hosting training classes, ham radio club meetings, introductory meetings to acquaint the non-amateur with the service, and acting as distribution points for promotional material in addition to regular publications and ham gear.

Some of these programs could begin within the next 30 to 60 days, but the longer term ideas are scheduled to be reviewed at a follow-up industry meeting scheduled to coincide with the 1985 Dayton Hamvention. All who attended the gathering came away indicating that they felt very encouraged by its results and optimistic about the future of amateur radio and the industry it supports.

Mike Lamb, N7ML, of Advanced Electronic Applications, Inc. was in large part responsible for organizing the participants. Joe Schroeder, a marketing specialist and former editor of this newsletter acted as moderator. None who attended were just observers; they all participated.

(Story by Joe Schroeder, V9JUV; and Bill Pasternak, WA6ITF. Westlink Report.)

LETTERS TO THE EDITOR

Dear Ray

Just a note for the T.O.A. wishing all O.N.T.A.R.S. Controllers and helpers a very Happy Christmas and all the best for 1986.

Also compliments of the season to all the check-ins who make Ontars possible. May it continue to grow.

Bill VE3FQV
Net Mgr
ONTARS

APPRECIATION

I would like to congratulate all the new hams (mostly white caners) who did such a splendid job of keeping the ONTARS NET very much alive this past summer.

Their efforts were much appreciated by myself and all the check-in people who make this net possible.

Special mention should be made of VE3OQD, VE3OUZ, VE3ONA, VE3NQD, and VE3ONF. They are a credit to the Amateur Radio fraternity, and I hope there are more to come into our ranks from the W. Ross McDonald School. I am not forgetting the regular controllers who keep the ONTARS NET going each day; I am very grateful to them for their dedication.

I hope all those connected with ONTARS, whether they be controllers or those who check in, have had a wonderful summer.

73,

Bill Birchall, VE3FQV
Net Manager

IMPROVING THE AZDEN PCS-3000 MOBILE

Make your PCS3000 much easier and safer to use while mobile.

In our area there are more than 40 PCS3000's which have for the most part been serving their owners very well. The manufacturer was one of the first to introduce the microprocessor into a low cost 2 metre rig with the PCS-2000 followed shortly by the 3000 and now the 4000. In an attempt to make the PCS series of radios more "USER FRIENDLY", they saw fit to add a great number of functions into the microphone. This meant a dozen wires were required in the coil cord.

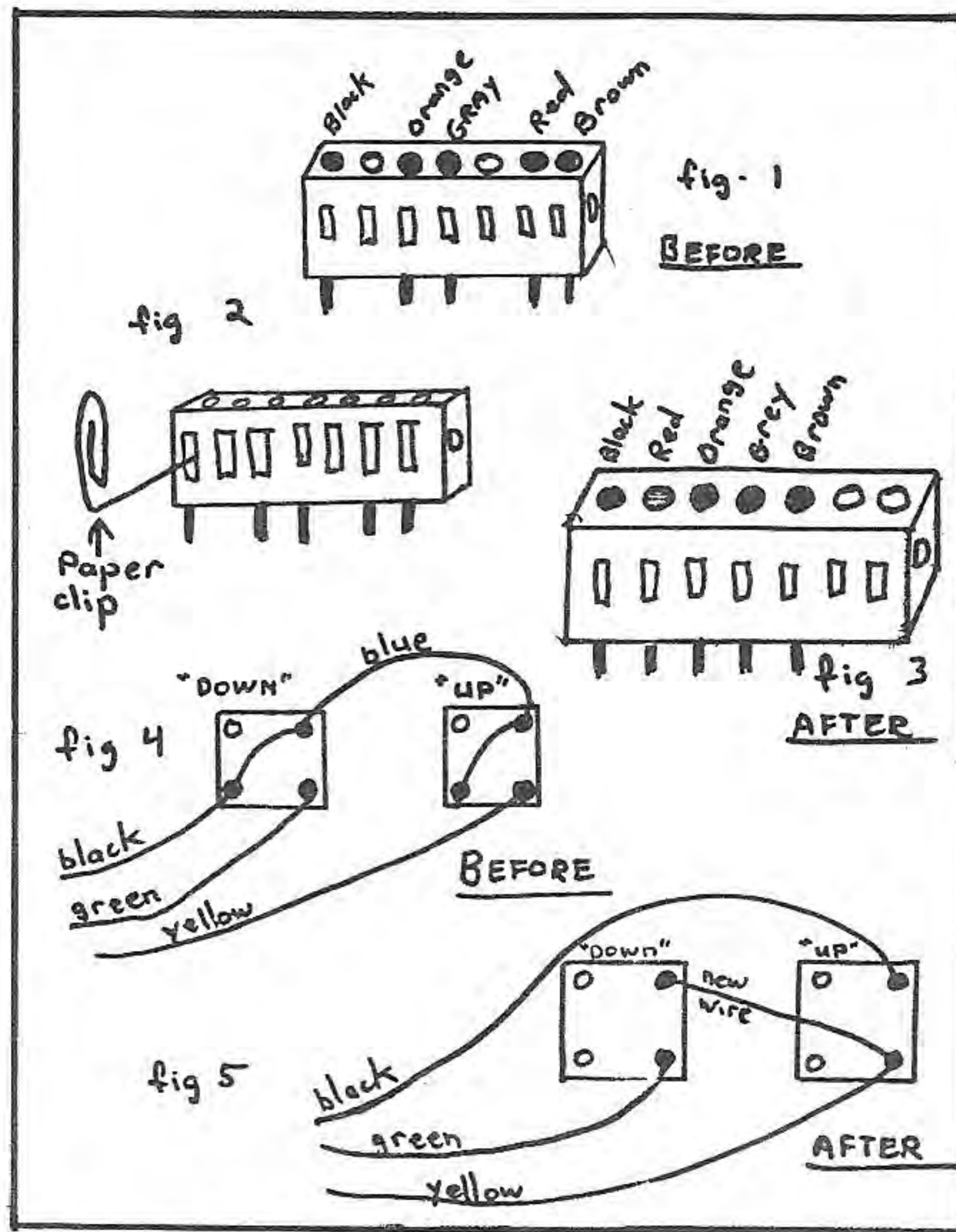
For the most part these functions appear very useful; however, a feature that is provided and gets very little use on the rig is the 5Khz UP/DOWN buttons on top of the microphone. Since you cannot see the display very well while driving in daylight, together with the fact you cannot scan through the MHZ range, the usefulness is very limited.

On top of these problems, most of us find that while driving we risk our neck to start the MEM SCAN or step through the MEM ADDRESS. Since these are the most commonly used keys on the radio, why not electrically move them to replace the UP/DOWN Keys on top of the microphone.

After studying the keyboard matrix and the lines that run the microphone, I have come up with the following procedure that requires NO soldering inside the radio and very minor changes in the microphone.

Instructions for Modifications

- A) Making sure the radio is removed from power, disconnect the control head from the radio.
- B) Remove the top and bottom covers from the control head.
- C) Locate and unplug the four pin plug with the wire loop located at right rear on top of the head. This disconnects the internal back-up battery.



D) Remove the four screws holding the rear panel of the head. Slowly remove this panel and remove the four pin plug that disconnects the external speaker jack and beeper transducer.

E) Locate the seven pin MOLEX style plug marked "D". There are 5 wires going from this plug to the microphone jack. The plug should be configured as in Figure 1.

F) Remove this plug and use a fine point such as a bent paper clip to remove the brown and red wires. This is done by pressing down lightly on the exposed clip to allow the metal plug to slide out. (see figure 2)

G) Plug the red wire into the empty hole between the Black and Orange wire and the Brown wire into the empty hole beside the Gray wire. This should now leave 2 empty holes on the end of the plug assembly as indicated in Figure 3.

H) Re-assemble the radio in reverse order. Don't forget to plug in the battery jumper plug. You will now have to re-program your memories since this plug supplies the battery backup to the microprocessor RAM, (*Random Access Memory*).

I) Plug in the microphone and determine if the UP button will start the MEM. SCAN when depressed. If it does, continue; if it doesn't, recheck the modifications.

J) Disconnect the microphone from the radio and remove its back cover by removing the four screws. Note the location of the PTT bar so you can properly re-assemble it later.

K) The UP/DOWN buttons should be wired as indicated in Figure 4. This is included in case you want to re-instate the original UP/DOWN feature.

L) Locate the Black and Blue wires running to the top of the Down button. Desolder these two wires.

M) Install a jumper from this pin of the DOWN button to the pin with the YELLOW wire on the bottom of the UP button.

N) Locate the single BLACK wire that comes from the main cord and is connected to the bottom left of the DOWN button. Carefully remove all of the other BLACK and BLUE jumpers interconnecting both buttons. Reconnect the main single BLACK wire from the DOWN button and re-solder it to the top right of the UP button.

O) The buttons should now be wired as indicated in Figure 5.

P) Re-assemble the microphone making sure the plastic PTT bar is seated between the slide PTT switch and the mic. case and that the pin on the top of the PTT bar is seated properly.

This completes the modification which should now make the UP button start the MEM. SCAN and the DOWN button step you through the MEM. ADDRESS each time it is depressed.

Azden Service Tips

Here are a few more hints that may help someone who has been fighting a problem with their PCS-3000.

About the time that you discover that the UP/DOWN buttons have very little use, you may be one of the many owners who lose their mike audio. This is a very common fault which is best cured with a new microphone cord or complete microphone. They are cheap. If you want to make a patch style cure until the cord or microphone arrives the following tips are worth trying.

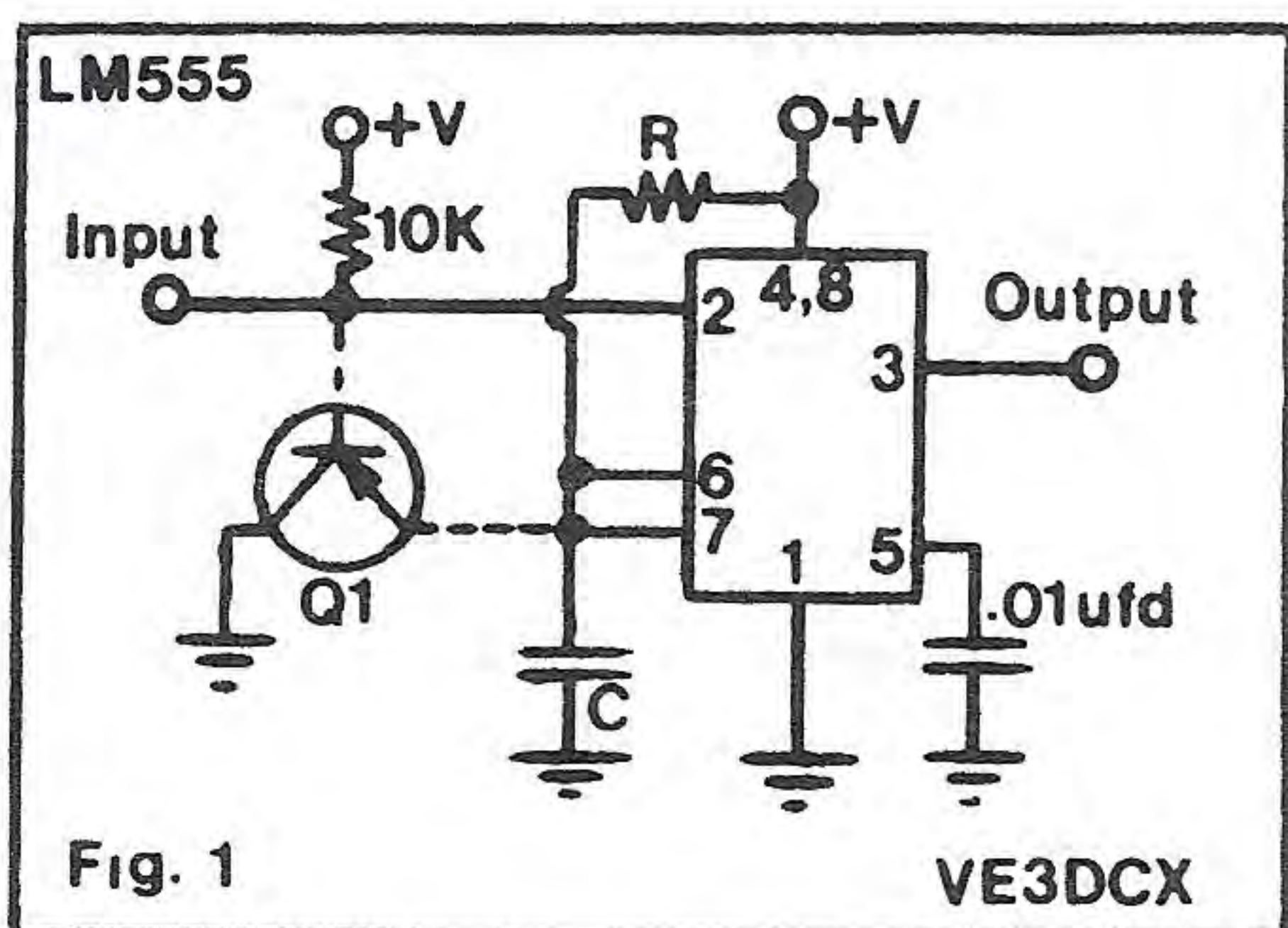


Fig. 1

VE3DCX

Try and locate the location of the break. It is usually at the microphone end but not always. Tie a knot in the mic cord at the mic end. If the knot trick doesn't work, and the break is within a few inches of the microphone, perform the following.

Open the microphone and carefully remove the cable from the restraint. Trim back the coil cord insulation exposing the wire(s) BELOW the problem and reconnect the good wires back to their respective locations on the microphone. Discard the faulty lengths.

Now rather than shorten all of the other wires do the following. Cut a piece of your QSL card to fit as an insulator on top of the microphone cartridge to keep the audio pair shield from touching it. Carefully loop the excess wires on top of the cartridge. Of course there is no reason why, if you wish, to shorten all of the wires.

PLL UNLOCKS

Some AZDENS including mine have had the PLL go out of lock. This problem is indicated by the presence of a (:) between the center two digits of the display. EQ (6.9.70)

The following are two cases that I can document and are both worth checking out if you have a similar problem.

The pot style trimmer beside the 10.24Mhz xtal marked as VC401 was dirty and caused the loop to go out of lock intermitently. I simply gave the trimmer a light spray with NUTROL and twisted it back and forth a few times being carefull to return it to the exact starting location. (This trimmer sets the frequency of the rigs master oscillator.) This cured the problem.

The other documented case was a defective 1uF capacitor marked as C406.

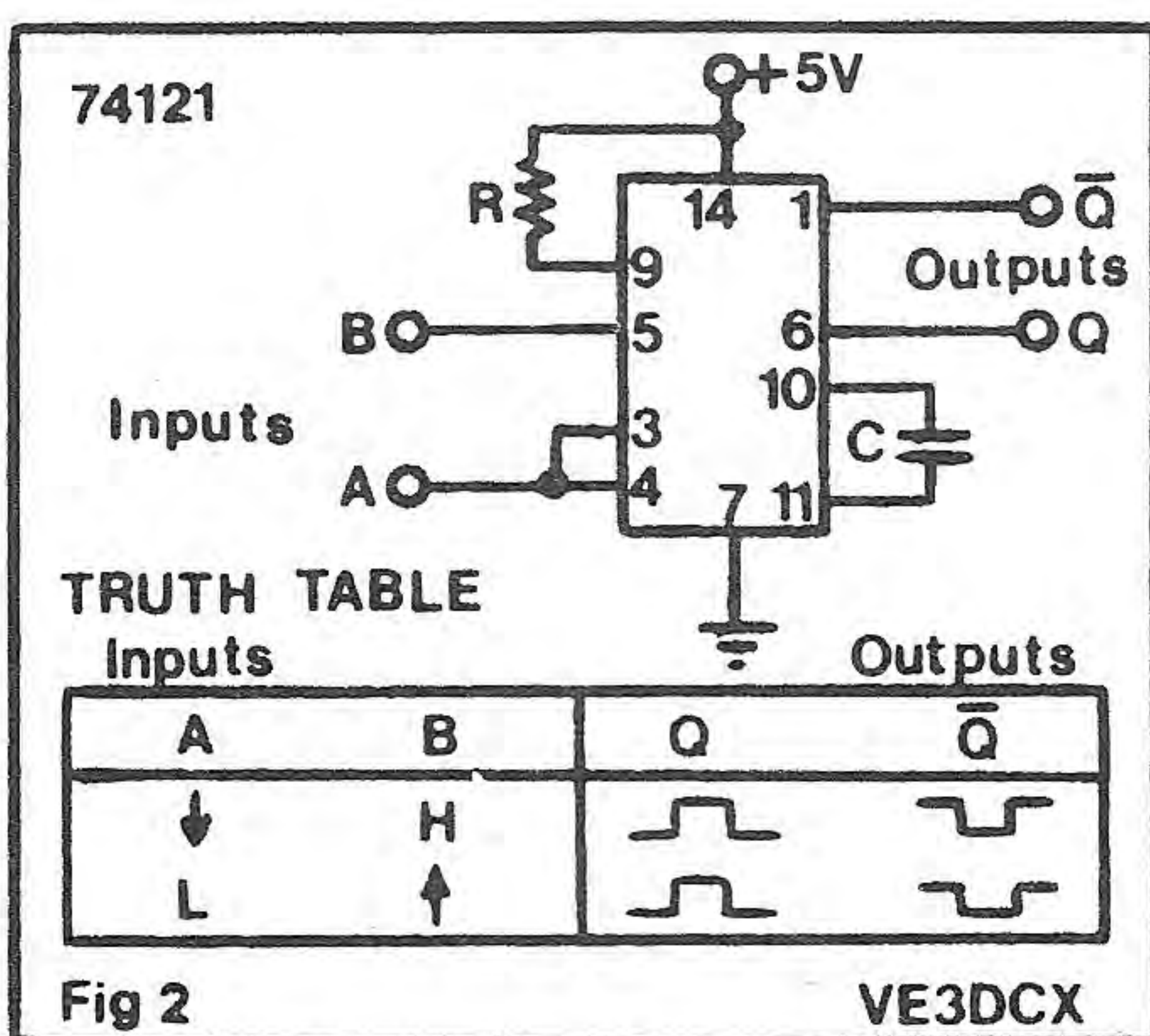


Fig 2

VE3DCX

Digital Display has strange Readout . And/Or TX Appears To Malfunction

In most cases people are quick to blame the micro-processor rather than their fingers. Almost every case of this happening has been the removal of the control head from the radio while power was applied. When this occurs the micro may get lost and go off into a infinite loop somewhere in memory thus not being able to control the radio. The only way to reset the micro is to remove the control head and take off the top cover. Locate the four pin plug on the right side which contains a single jumper wire. Making sure there is NO POWER connected to the radio remove this plug for a few seconds and then plug it back in. This disconnects the backup memory battery from the micro causing the micro to reset on power up when the plug is reconnected.

If the problem still persists try operating the radio with battery disconnected. If it works with the plug out but not in, the battery may need charging or may be defective. See page 12 of the owners manual for more information on this procedure.

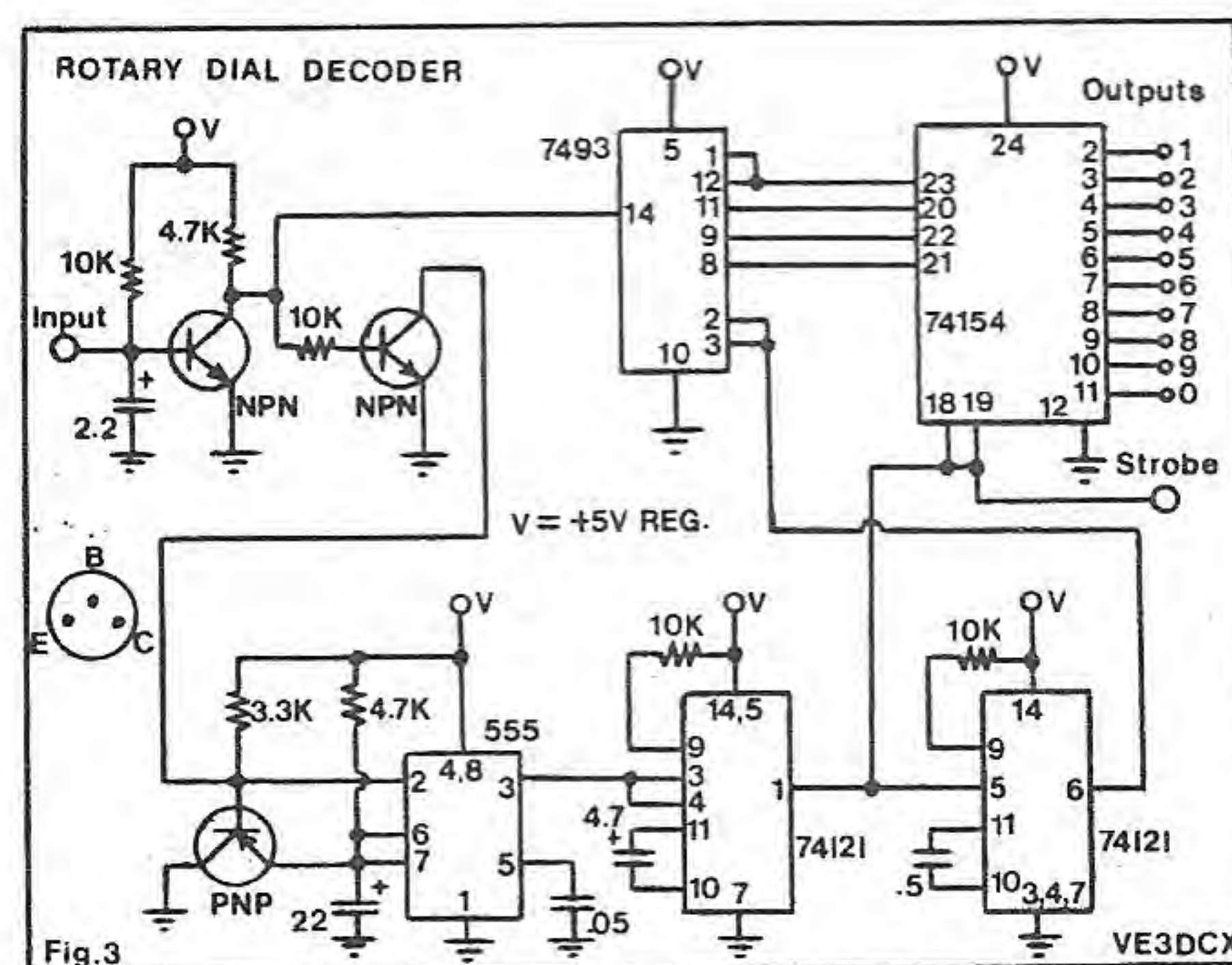
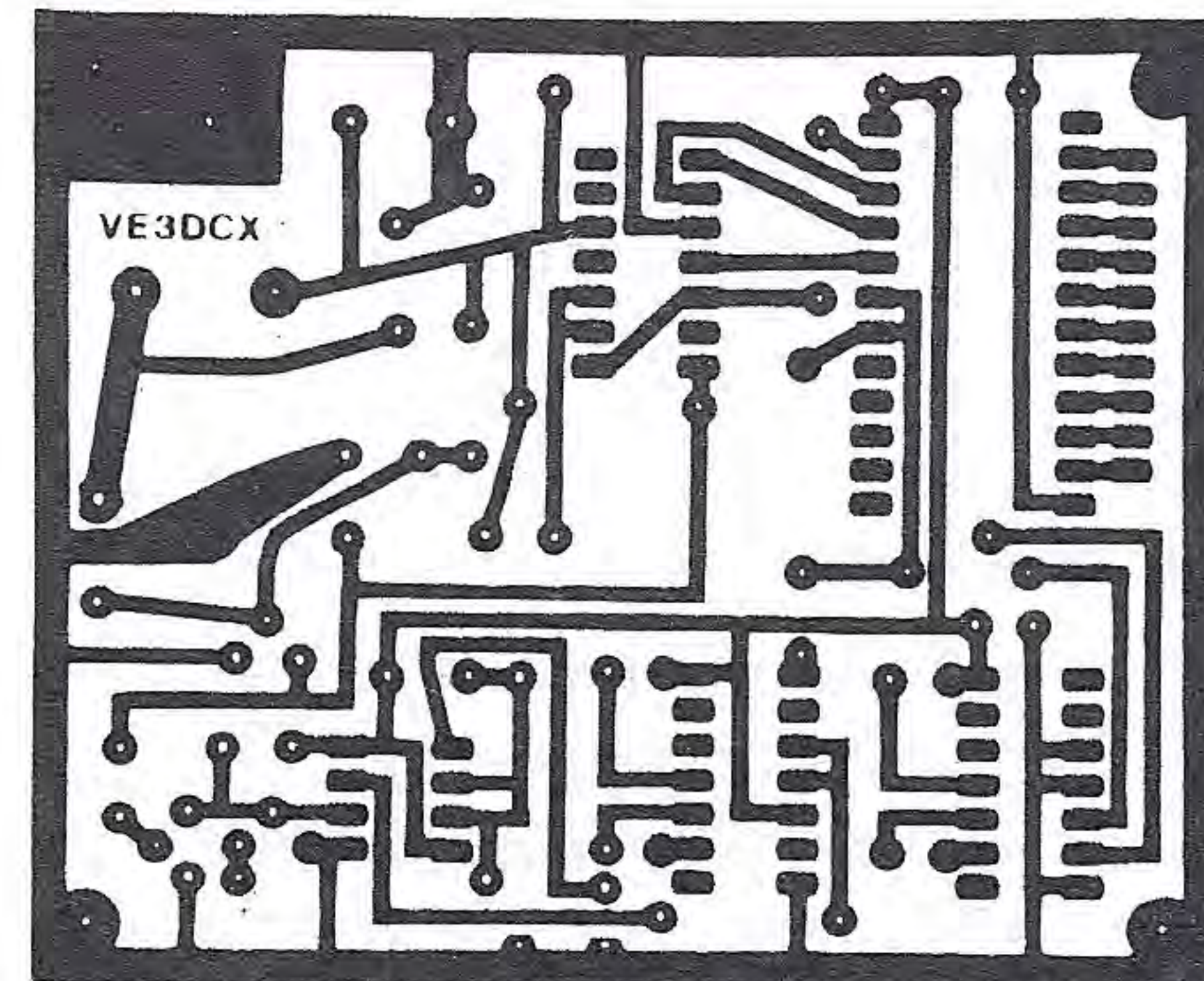


Fig.3

VE3DCX



Touch Tone Kit Installation

When cutting the recommended hole to contain the TT pad use a exact-o knife that has been highly heated. I used a candle which allows the blade to cut the plastic like butter. This will require many trips to the candle. Make the hole slightly undersized and then file or trim out to exact size for a snug fit. You can hold the pad in place with 5 minute epoxy or as in my case I used a soldering pencil to melt the plastic of the TT frame together with the plastic case. **BE VERY CAREFULL NOT TO GET THE SOLDERING TIP NEAR THE FLEXIBLE PC BOARD OR YOU WILL RUIN ONE OR MORE TRACES.**

Conclusion

I have had dozens of pleasurable hours mobiling with the AZDEN and there is no doubt that this modification is a must for all PCS-3000 owners. For you PCS-2000 owners, check the inside of your control head. It should be identical as far as the MATRIX wiring is concerned however I would suggest comparing schematics before attempting any modifications. The PCS 4000 has these changes already incorporated in the design.

PAUL CASSEL
VE3SY

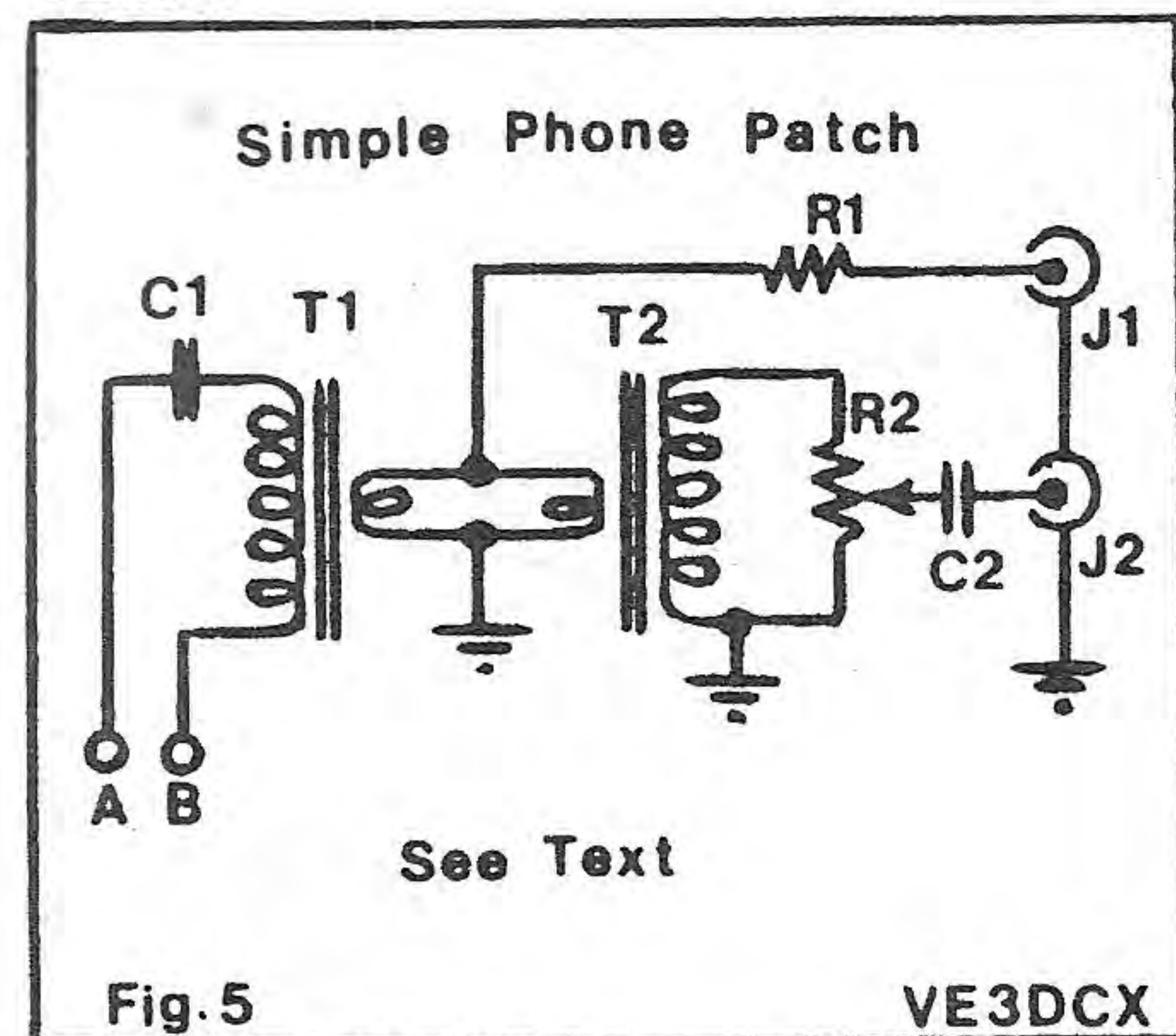


Fig.5

VE3DCX

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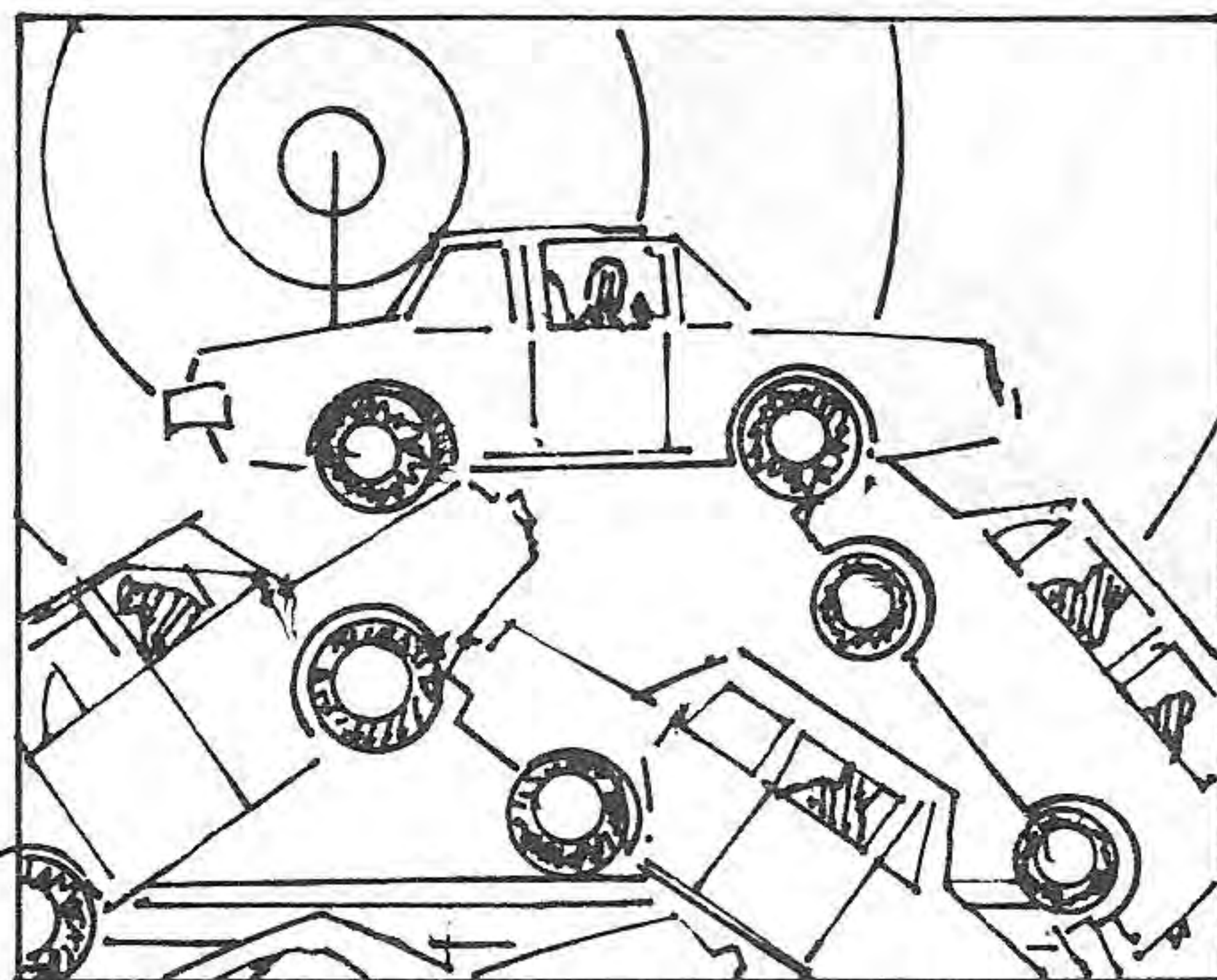
Al Taylor, VE3WV

GBSSN GBSSN GBSSN DE VE3DPO
GREY BRUCE SLOW SPEED NET
QND PSE QNZ DE VE3DPO GBSSN
GBSSN GBSSN DE VE3DPO QTC?
QNIK

Does the above look strange, especially those QN signals? These are the QN signals used by the CW traffic nets in the U.S.A. and Canada. They are only used in CW net operation and speed the operation of the net and handling of message traffic which is the purpose of the net. VE3DPO, Reg. Gibbs in Hanover, is the net manager and in the case shown above he is acting as the net control station. The Grey Bruce Slow Speed Net is a training net and handles message traffic on CW. It operates at 6:15 p.m. local time every day. At 6:30 it is followed by the GBN, or simply the Grey Bruce Net. There is a later session at 10:00 p.m. The net operates at 3645 Khz.

Now taking the above from the start, you can see that the GBSSN is being called by the net control station. QND. This is likely a new one to you. It means 'This is a directed net'. On a directed net, once you have checked in and been acknowledged, you do not transmit unless directed by the net control station. This avoids confusion and interference with each other. PSE QNZ means please zero beat the net control station. This way, all net stations will be able to hear each other if they are within range. QTC? of course is one of the International Q signals, the question asking if you have traffic, and how much, also where to. QNI means to check into the net and is followed by the letter K, the invitation to transmit.

To check into the net, all that is necessary is to send a letter or two of your call sign. Suppose your call is VE3ABC, any of the letters ABC are suitable. The net control station will acknowledge that you were heard by sending the letter you have just sent. You then continue with DE VE3ABC GE REG QNI QRU AR. (AR sent as one letter-Ed.) If you have no traffic and are just checking in, QNI is followed by QRU and AR.



Let's suppose you have one message for Hanover. It goes like this: DE VE3ABC GE REG QNI QTC HANOVER 1 AR. The net control station comes back with your call sign DE his own call sign with the AS stand by or wait signal. If this is the first time you have checked into the net he will ask for your name and QTH. Otherwise, you do not transmit again till the net control station (NCS) calls you. The net control will continue calling QNI K or GBSSN DE VE3DPO QNI K until there are no more stations calling in with traffic. He makes a list of all stations with traffic and where it is going. If it is a busy session, some stations will be directed to transmit their traffic up or down 5 or 10 Khz from the net frequency. In this particular case NCS will call you when he has a bit of time and indicate he is ready to take the Hanover traffic. As mentioned in this article Reg's QTH is Hanover. He is acting as net control. Net control stations do not leave the frequency: they must remain there so others know where they are. So he will call VE3ABC DE VE3DPO QNK HANOVER HR QRV. QNK means to transmit your traffic and QRV is a regular Q signal stating he is ready to copy. You do not have to call the net control station as you have already done this at the beginning when you checked in so - - HR NR 1 R VE3ABC CK UR QTH DATE followed by the address of the person to whom it is going followed by the text of the message and signature AR N.

If conditions have been ideal, Reg. will come back with QSL NR 1. However he may have been QRM'd by someone close by or QRN'd with atmospherics and for example may have missed your word count or

check. He will come back with WA VE3ABC which means repeat the word after VE3ABC. After sending your message and having it acknowledged, you remain on frequency until you are excused by the net control. If he has no traffic coming in your direction he will say VE3ABC QRU QNX TU. This means VE3ABC since you have no more traffic and the net has no traffic for you, you are excused. QNX used as above means you are excused and TU of course is thank you.

Before your first time checking into a net, you should listen to the net and see how it operates. Also, read up on proper message format and the way of counting the words in the text only. You can obtain a convenient operating aid from CRRL by requesting Operating Aid CD218. This has the outline of the message form, description of the message parts, and the QN signals and common Q signals as they are applied to amateur use.

Al Taylor VE3WV

RADIO LINKS PROVIDED BY AMATEURS

The terrible disaster in Mexico in September created an almost complete shutdown of communications.

Amateur radio operators in the U.S.A., Mexico, Canada and elsewhere were quick to provide communications and information concerning the whereabouts of relatives and friends in the stricken areas. Due acknowledgement of the role played by amateurs was given both on radio and television.

Boyd, VE3PK reports that the London Free Press publicized the efforts of the Lambton County Amateur Radio Club during the World Soling Championships held at Point Edward in September.

The members of the radio club provided race results on 80 metres, and call-home facilities on 20 metres for the contestants. VHF equipment was used at several places along the race route to provide progress reports and keep an eye on boating safety.

Safety Leaflet

1. The Radio Society of Ontario Inc., is made up of radio amateur enthusiasts who by means of their radio equipment and radio expertise are often in a position to offer emergency communications and provide that necessary call for help, or report an accident when the circumstance arises. It is to these public spirited radio amateurs that this safety leaflet is directed to offer an outline of suggestions and facts, and thus be a helpful guide.

2. The Canadian Red Cross Society defines first aid thusly: "First Aid is the immediate assistance provided to a person in physical distress to maintain vital functions until qualified aid can be obtained." - League of Red Cross Societies.

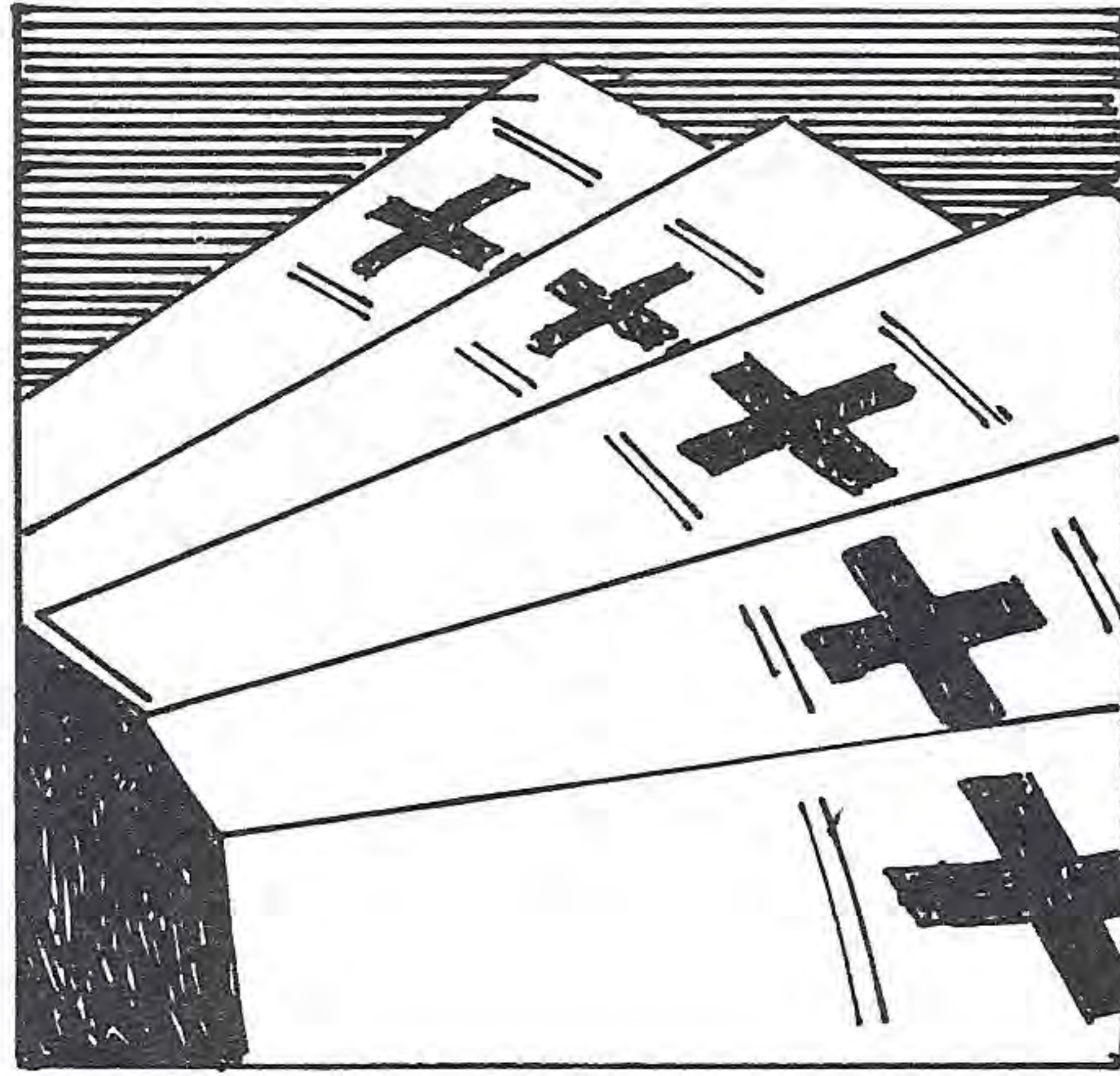
3. Remember this question: "May I help you?" Remember that your radio licence, and your status as a radio amateur gives you only limited radio privileges and does not give any other. Ask first, you may be saved from later grief.

4. Here are the standard police requirements when reporting an accident. (i) Location, (ii) What's involved ie: details of the accident. (iii) Any injuries. Also be prepared to give your name and amateur radio call sign.

5. The first rule in safety assistance is, "Get medical attention for the victim as soon as possible." This is where you as a radio amateur can really be of the greatest assistance. Your ability to contact ambulance, police, or fire departments quickly may be your greatest contribution in an emergency. Keep in mind, when contacting a base station or a novice, the telephone "0" in areas that do not have the "911" hot-line. Also keep in mind that other radio which you may have handy ie: CB channel 9.

6. Here are some common sense emergency measures. Severe bleeding must be controlled quickly. Breath is life. Do what you can to provide for breathing. Shock . . . following an accident . . . its greatest problem is blood circulation. Keep body temperature up.

An unconscious person should be watched continuously, and not unnecessarily moved.



7. A word on poison, "Prevention," please. It is better than any following first aid. All poison victims should be seen by a Doctor. Retain the poison container if possible for reference, and follow the instructions for poisoning.

8. "Medic Alert," . . . Check for those tags. Also get identification if someone is in severe distress. Relatives may know of a particular course of action or medication.

9. For choking, remember the old slap on the back and base of the neck. If that does not help, try raising the arms. Various methods of applying pressure on the diaphragm may also be helpful. The bear hug method, using quick jerks may be successful, or quick slapping of a fist at the base of the rib cage.

10. In the case of injuries, keep the person still if possible. Do not try to remove impaled objects. Again remember: 'Get medical attention.'

11. Here are some tips for your own Safety:

Don't let a throw rug throw you. Use non-skid underpads or tack it down.

Don't grope around in the dark. Turn the light on. 80% of all fatal falls happen at home.

Is the next trip really necessary? A handrail, or a movement of a certain hassock or other catch-point might save some pain. Ice is slippery and so is frost . . . electricity is tricky and ladders can rot. . . be safety conscious; and, be fire conscious too.

12. In the shack, kill all power circuits completely before touching anything behind the panel or inside

the chassis or enclosure. Never allow anyone else to switch the power on and off for you while you're working on equipment. Don't trouble shoot in a transmitter when you're tired or sleepy. Watch out for those capacitors, are they really discharged? Avoid contact with grounded metal or damp floors when working on a transmitter. One hand in the pocket rule, has long been revered by hams. Instruct members of your household how to turn the power off. Resuscitation is often required following an incidence of electric shock. Every "ham" should be aware of some means to do this. The mouth to mouth method is the most popular today. The ARRL has a training aids film showing this method of resuscitation. Contact the American Radio Relay League, Newington, Connecticut, U.S.A. 06111.

13. Lightning, what a shocker! Merely grounding everything is not adequate protection from direct lightning strikes or static build-up. Lightning has devious methods of going where it is not wanted. There is only one way to protect your radio from lightning, and that is to disconnect everything completely. (I bet you forgot the rotor control box.) A loop or two in the incoming coax is a good idea. The reactance thus provided may be just enough, as lightning likes a straight unimpeded path to ground.

14. It has been said, "The lowly 110-115 volts has caused more electrocutions than any other."

15. Finally, the most important piece of equipment at the scene of an accident is the human brain. . . with training it can react. . . with imagination it can invent. . . with its compassion it wants to help.

RSO TECHNICAL LIBRARY

This library is for you. Please make use of it and the help that has been offered by our Technical Editor, Jim Eadie, VE3DCX, R.R. 2, Tweed, Ontario K0K 3J0.

Requests for technical information as well as donations to help with the costs of stationery and stamps will be welcome.

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 XF8.9HCN 300Hz CW-----\$59
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 XF455.8MCN 300Hz 2nd IF (980)--\$95

Filters: FT-102 & Remote Switch.
 XF8.2HSN 1.8kHz SSB-----\$50
 XF8.2HC 600Hz CW-----\$50
 XF8.2HCN 300Hz CW-----\$50
 XF8.2GA 6kHz AM-----\$45
 XF455C 500Hz 2nd IF CW-----\$99
 XF455CN 270Hz 2nd IF CW-----\$99
 AM/FM Board-----\$99
 FAS1-4R Remote Antenna Switch--\$99

Filters: FT-ONE° FT-77*
 XF8.9KC 600Hz CW*°-----\$40
 XF8.9KCN 300Hz CW*°-----\$40
 XF8.9KA 6kHz AM°-----\$40
 XF10.7KC 2nd IF CW°-----\$35
 Extender Board Set°-----\$145
 Keyer Board 901 902 980 ONE----\$60

FT-207* 208/708° Accessories
 NC-8A Deluxe Desk Charger°----\$110
 NC-7 Standard Desk Charger°----\$55
 FBA-2 Sleeve charges FNB2 in NC\$12
 FNB-2 Nicad Pack°*-----\$45
 NC-9B 115V wall charger°*-----\$15
 NC-9C 220V wall charger°*-----\$20
 MMB-10 Car hanger°*-----\$16
 PA-3 DC-DC adaptor°-----\$39
 YM-24A Speaker Mike°*-----\$45
 LC-208 Leather Case-----\$49

OTHER CLEARANCE
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 FM Board FT-901/2-----\$49
 FT-77 Marker Board-----\$15
 MMB-15 Mobile Bracket FT-230's-\$15
 MMB-11 Slide in Bracket FT-290-\$59
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 FTC-1903 Marine Handie (demo)-\$349
 YM-44 Speaker Mike for 1903----\$49
 FTC-1525 25W Commercial 6 chan\$399

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 FT-707 107-----\$39
 FT-207 208 708 102 757 726 980-\$25

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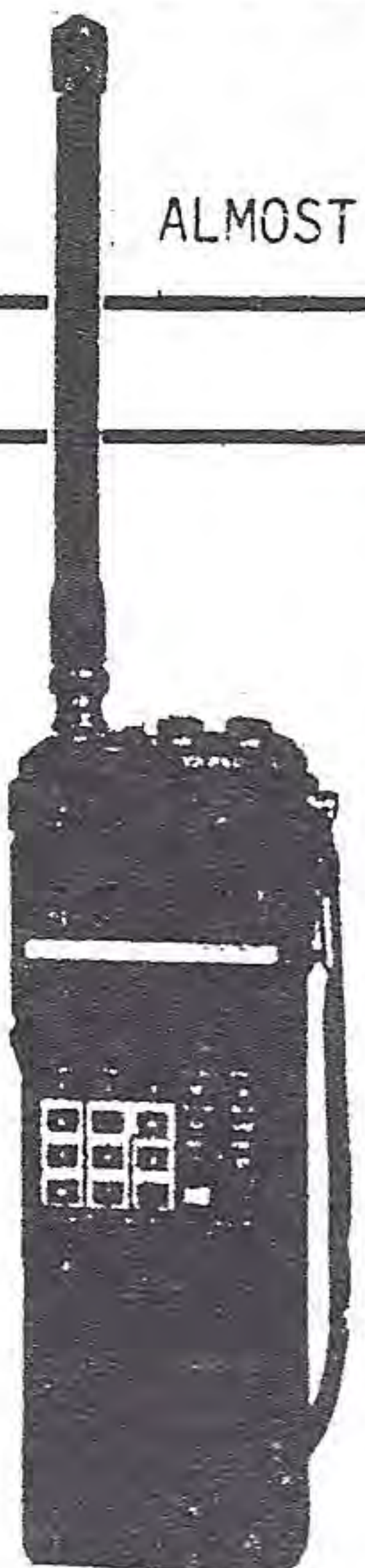
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 FDK 750X 2M All Mode Mobile-----\$349
 YAESU FT-270RH 45W 2M FM Mobile\$449
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 YAESU SP-102P Speaker/Patch-----\$79
 YAESU FRA-7700 Active Antenna Rx\$89
 YAESU MD188 Deluxe Desk Mike-----\$99
 TenTec Tuner for Century 21-----\$75
 TenTec KR-1A Iamc Paddle-----\$39
 DAIWA LA-2035R 5w-30w 2M Amp-----\$99
 MFJ-1024 Outdoor Active Antenna\$179
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VHF/UHF



FT-209RH comes with FNB-4 Nicad For 5 W Out.

FT-709R comes with FNB-4 Nicad for 4 1/2 W Out.

FT 209RH
2m Handheld

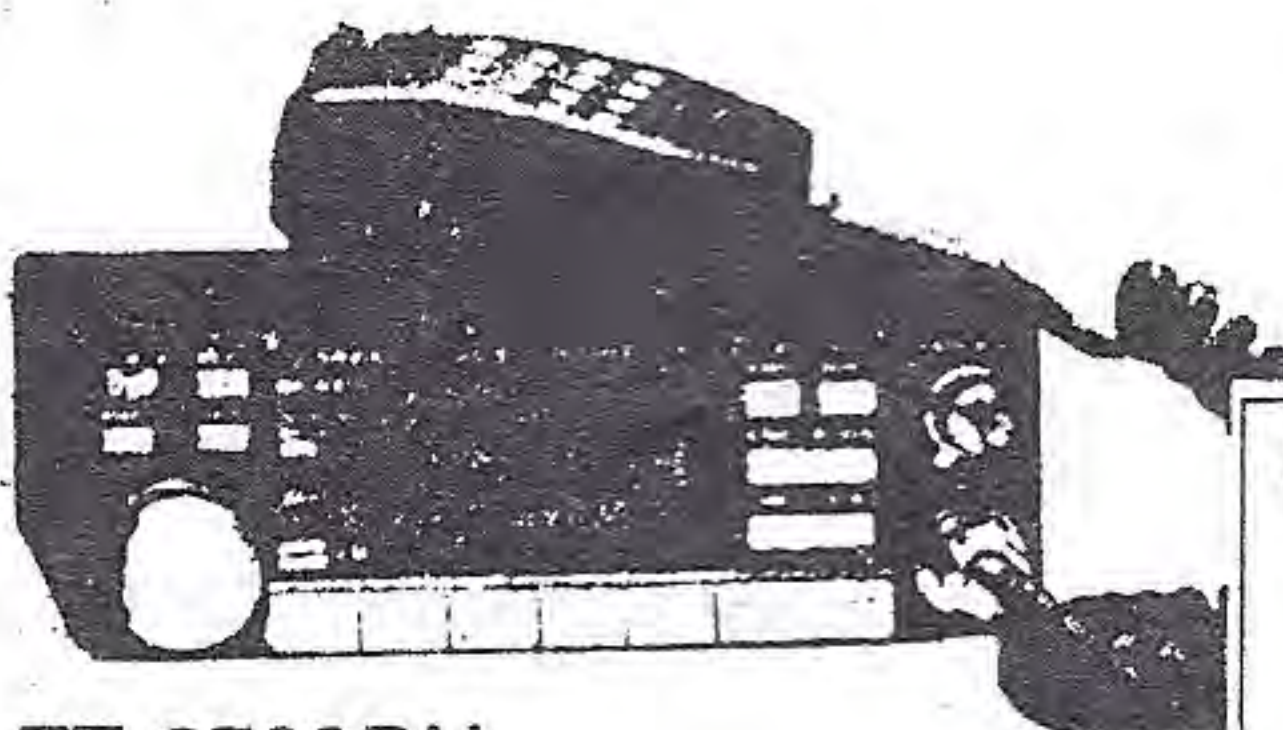
FT 709R
440 MHz Handheld

Accessories:
 YH-2 Headset
 MH-12A2B Speaker/Microphone
 FTS-6 Programmable Tone Squelch
 PA-3 DC/DC Car Adapter/Trickle Charger
 MMB-21 Mobile Hanger Bracket
 NC-15 Quick Charger/DC Adapter
 FBA-5 Battery Case for 6xAA
 FNB-3 10.8V, 425 mAh Ni-Cd pack
 FNB-4 12V, 500 mAh Ni-Cd pack
 NC-18B 115VAC Charger°
 NC-18C 220VAC Charger°

FT 726R

Especially good for Oscar

Accessories:
 6m-726 6-meter module
 430-726 430-440 unit for Oscar
 440-726 440-450 FM unit
 HF-726 10-12-15 meter unit
 SU-726 Satellite Duplex module
 XF 455 MC 600 Hz CW Filter



FT 2700RH
Duo-band 2m/440 Mobile Radio

FT 270RH
Compact 45 Watt 2m FM Mobile

Accessories:
 FTS-8 Programmable Tone Squelch Unit
 FVS-1 Voice Synthesizer Unit

SHORTWAVE LISTENING

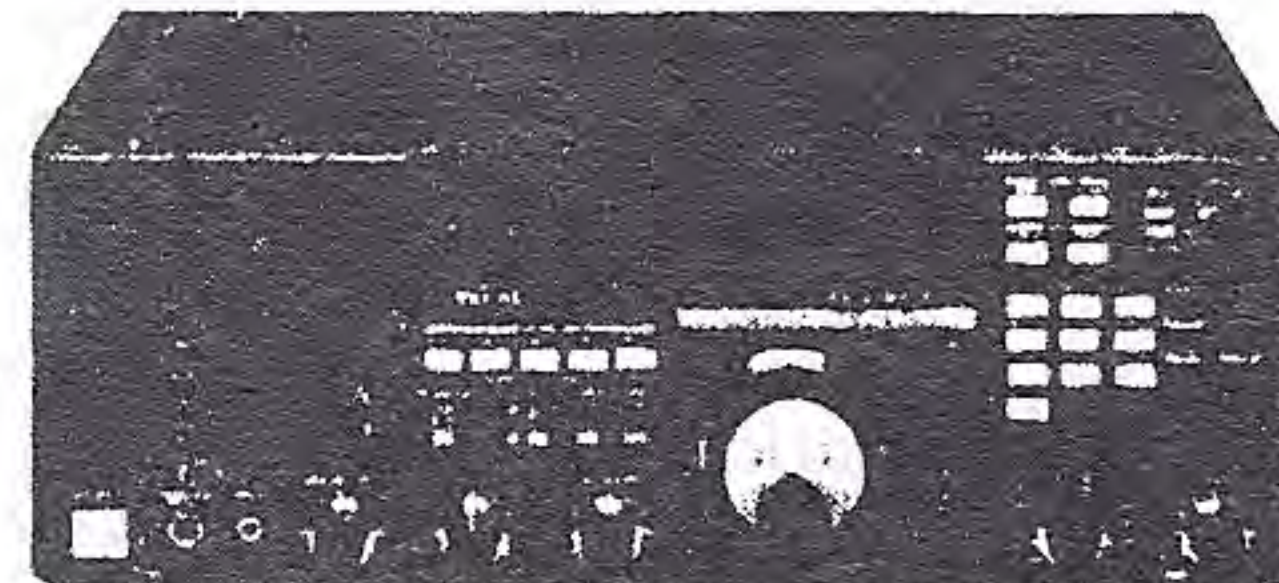


FRG 9600

Scanning Receiver for 80-905 MHz FM/AM/SSB, 100 memories

Accessories:
 PA-4B/PA-4C AC-DC Wall Adapter
 SP-55 External Speaker
 NTSC Video Unit

Coming soon: Software to extend the range of the 9600.

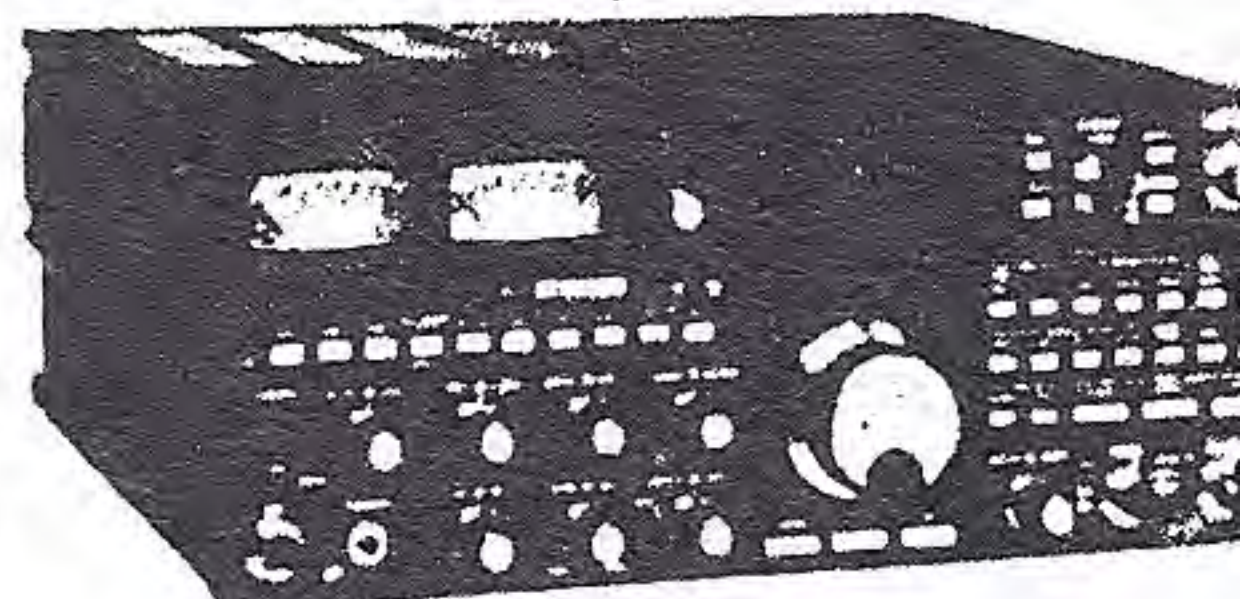


FRG 8800

General Coverage Receiver All-band, all-mode AM/SSB/CW/IFM, 150kHz-30MHz

Accessories:
 FRV-8800 Converter for 118-174 MHz
 FRA-7700 Active Ant for 150kHz-30MHz
 FRT-7700 Antenna Tuner
 DC-8800 12-volt kit
 SP-102 Speaker with filters

HF TRANSCEIVERS

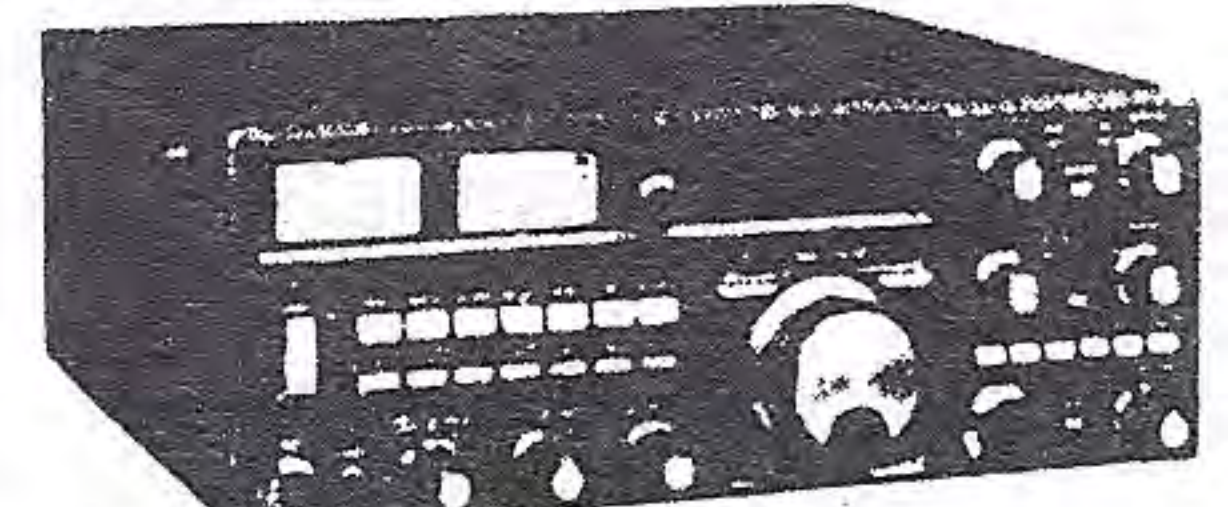


FT 757GX

Mobile Transceiver, SSB/CW/AM/FM General Coverage Receiver Receives 500kHz-30MHz

Accessories:

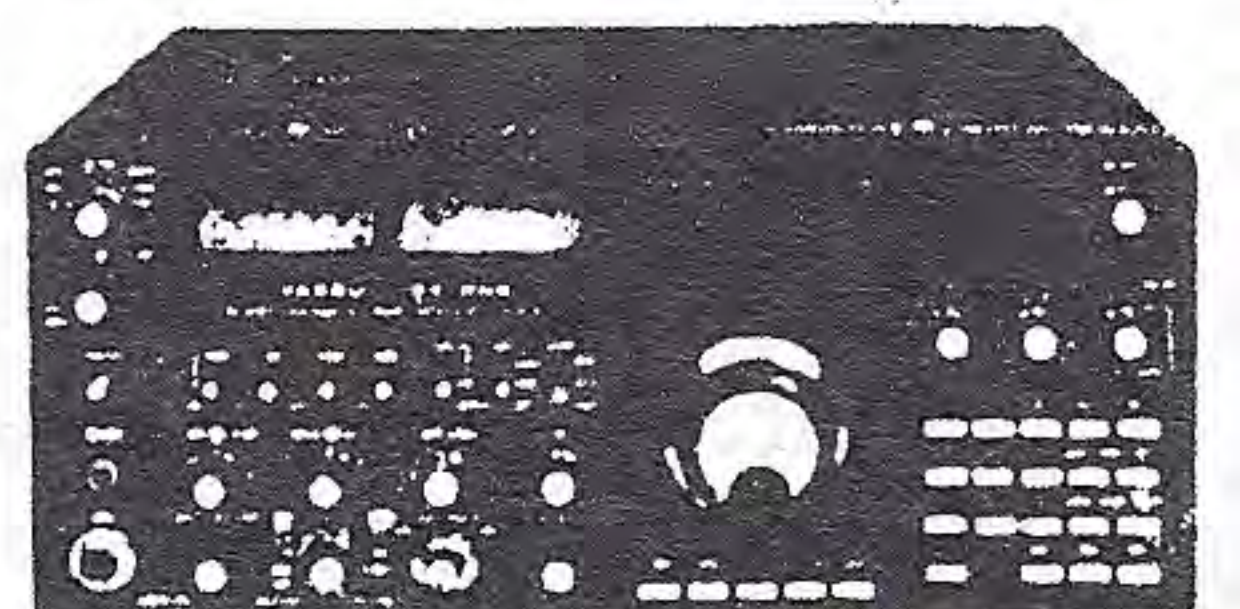
FP-757HD Heavy Duty Power Supply
 FC-757AT Automatic Antenna Tuner
 FAS-1-4R Remote Antenna Selector
 SP-102 Speaker
 SP-102P Speaker Patch
 MMB-20 Mobile Mounting Bracket
 FRB-757 Relay Box
 MD-188 Desk Microphone



FT 980 CAT

Computer Controlled Transceiver

Accessories:
 GEN-980 General Coverage Kit
 XF 8.9 HC 600 Hz CW Filter
 XF 455.8 MCN 300 Hz CW Filter
 SP-980 Speaker
 SP-98P Speaker Patch
 MD-188 Desk Microphone



FT ONE

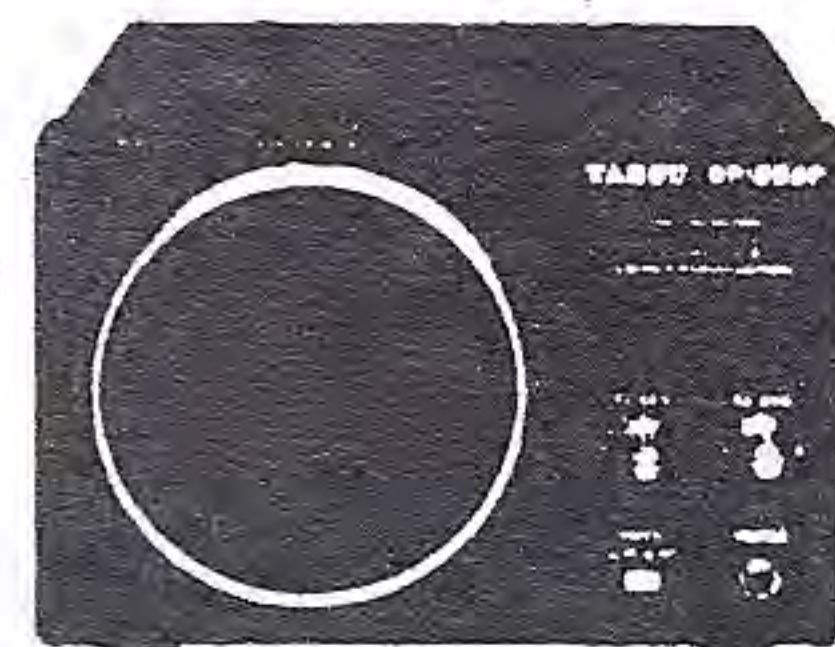
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 SP-980 Speaker with Filters\$99.

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 SP-980P Speaker/Phone Patch\$129.

SP-980 was \$139 Now \$99.95



SP-980P was \$179 Now \$129.95

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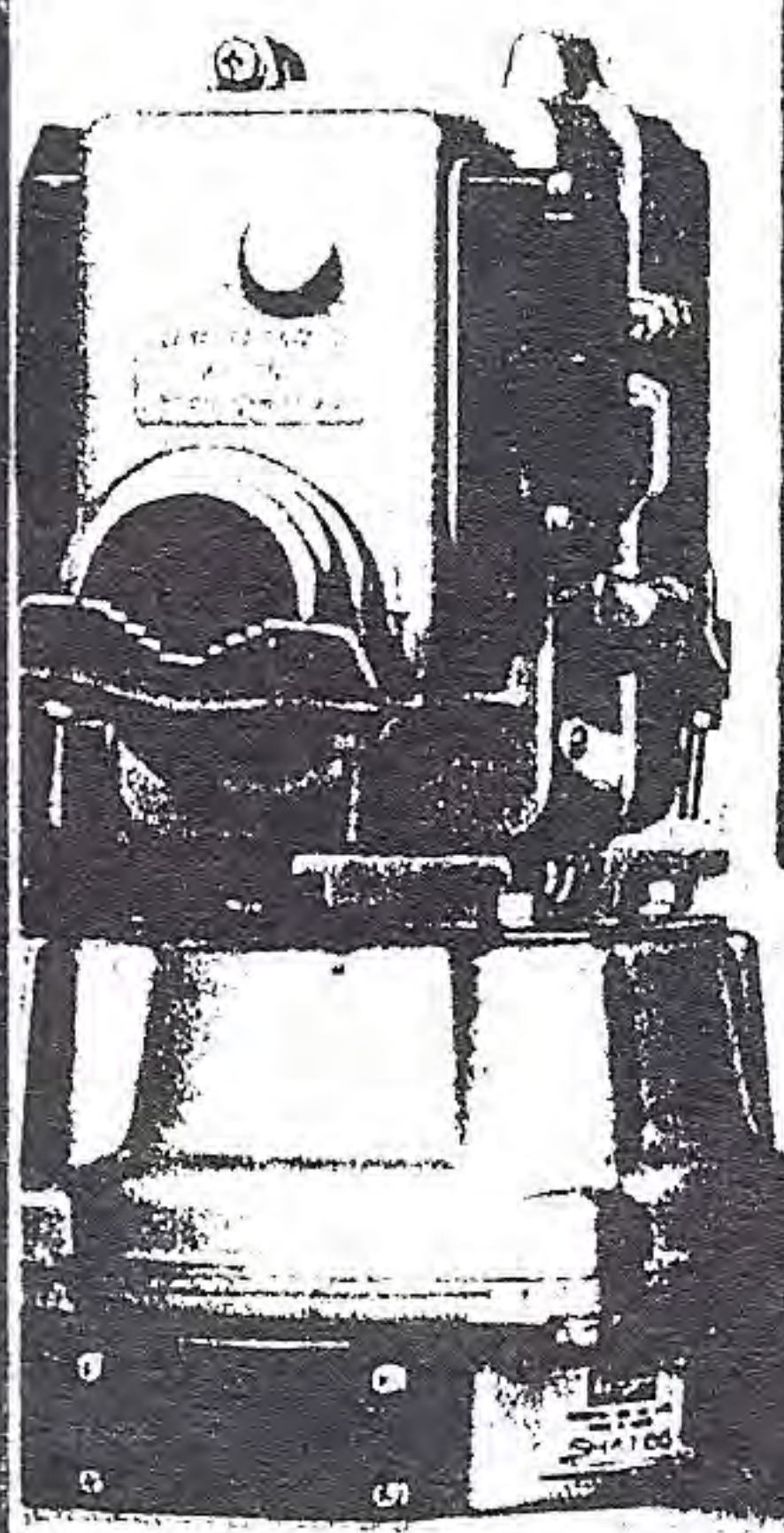
North American Callbook-\$30
 International Callbook--\$29
 Both Callbooks-----\$55
 Callbook Map Library-----\$12
 ARRL 1986 Handbook-----\$26
 Clothbound 86 Handbook--\$40
 ARRL Antenna Book-----\$12
 Clothbound Antenna Book--\$20
 Satellite Handbook-----\$15
 FM & Repeater Book-----\$ 8
 Repeater Directory-----\$ 5
 Haruteq Ontario Scanner Freq\$14
 Zbarsky Study Guide-----\$19
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 Radio Database TBE 2.25-5.7MHz 7
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MULTI TORQUE ROTATOR
MODEL **MR-750E**
DAIWA **MR-750PE**

		MR-750E/PE	
Rotation time		60 Hz	58 seconds (60 Hz input)
		50 Hz	70 seconds (50 Hz input)
Output torque		1 motor	\$399 610 lbs/inch
Brake power			5,200 lbs/inch
MR-750U Motor \$129.00	2 motor	\$528	1,200 lbs/inch 9,600 lbs/inch
	3 motor	\$657	1,800 lbs/inch 13,900 lbs/inch
	4 motor	\$786	2,400 lbs/inch 18,300 lbs/inch

Rotation angle	375 degrees
Permissible mast size	1 1/2 - 2 1/2 inch (38 - 63 mm) < diameter >
Control cable	6-wire cable 0.5sq-1.25sq (AWG16/18/20 etc.)
Continuous running	5 minutes Max. permissible
Dimensions	15.6" H x 8.43" W x 8.43" D (397 mm x 214 mm x 214 mm)
Unit weight	16.5 lbs (7.5 kg) < with 1 motor unit fitted >

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PATCH

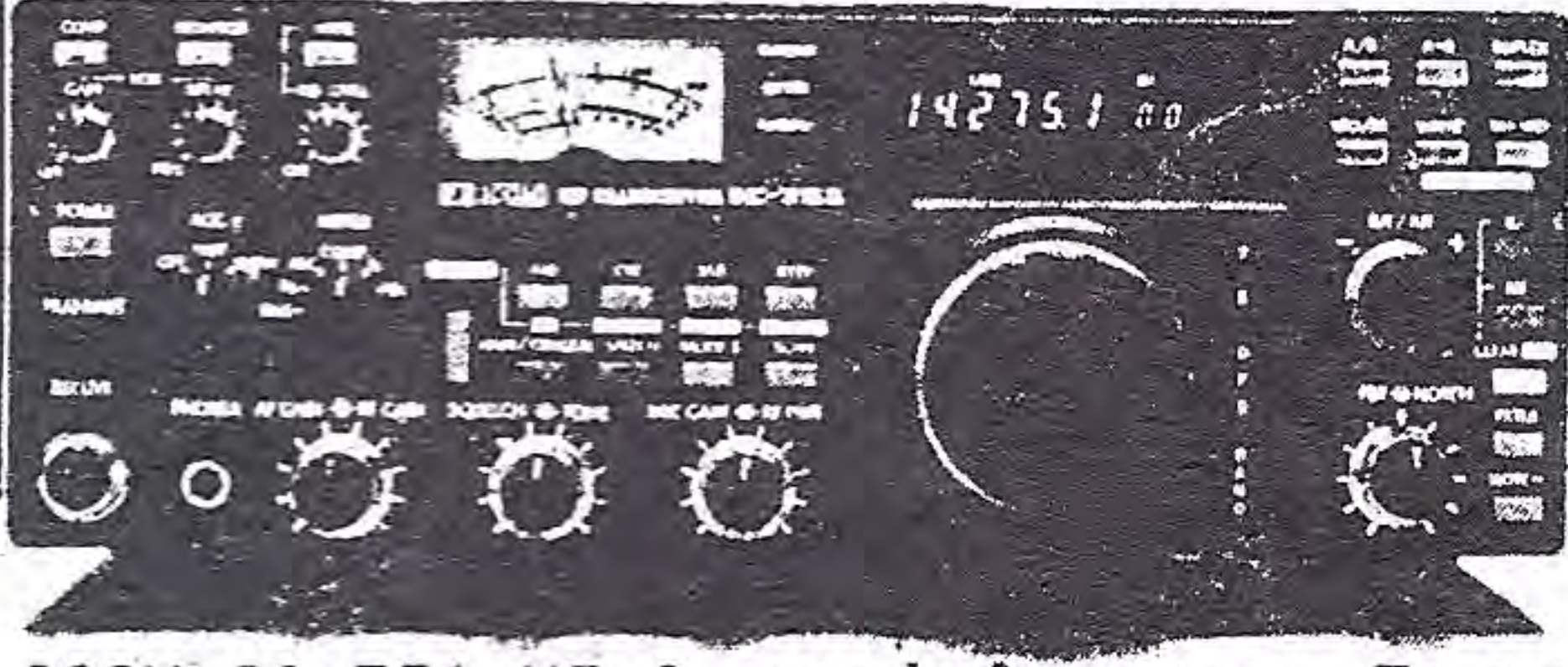
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Includes PS15
External
POWER SUPPLY.

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 - CW/SSB/AM/RTTY/FM
 - Microprocessor Controlled
 - 12VDC Operation
 - Fluorescent Display
- List Prices:
IC-751 \$1899
PS-35 \$219
PS-15 \$189

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ICOM IC-751 HF General Coverage Transceiver

SPECIAL SALE PRICES

ICOM is proud to announce the most advanced amateur transceiver in communications history. Based on ICOM's proven high technology and wide dynamic range HF receiver designs, the IC-751 is a competition grade ham receiver, a 100KHz to 30 MHz continuous tuning general coverage receiver, and a full featured all-mode, solid state ham band transmitter, that covers all the new WARC bands. And with the optional internal AC power supply, it becomes one compact, portable/field day package.

- 105dB Dynamic Range
- 70.4515MHz First IF
- Deep IF Notch
- RIT With Separate Readout
- Low Noise Preamp
- Low IMD Transmitter
- 100% Duty Cycle
- 12VDC Operation
- Quiet Relay Selection of LPFs
- Monitor Circuit
- Full QSK
- Dual VFO With Data Transfer
- 32 Tunable Memories
- Internal Memory Backup
- Scanning
- Digital I/O For Computer Control
- Mode

- Scan
- Full Function Metering
- Squelch
- FM
- Multicolor Fluorescent Display.

Options: Voice Frequency Readout, External frequency controller, external PS15 power supply, internal power supply, high stability reference crystal (less than ±10Hz after 1 hr.), HM12 hand mic, desk mic filter options:

- SSB: FL70
- CWN: FL52A, FL53A, FL32, FL63
- AM: FL33

Some Specifications:

- Frequency Coverage (Ham Band): 1.8MHz - 2.0MHz, 3.45MHz - 4.1MHz, 6.95MHz - 7.5MHz, 9.95MHz - 10.5MHz, 13.95MHz - 14.5MHz, 17.95MHz - 18.5MHz, 20.95MHz - 21.5MHz, 24.45MHz - 25.1MHz, 27.95MHz - 30.0MHz (General Cover (Receive Only), 0.1MHz - 30.0MHz, Thirty 1 MHz Segments)
- Frequency Control: CPU based 10Hz step digital PLL synthesizer. Independent transmit/receive frequency available.
- Frequency Readout: 6 digit 100Hz fluorescent readout, with RIT readout.

Frequency Stability: Less than ±200Hz after switch on 1 min., to 60 mins, and less than 30Hz after 1 hour. Less than 500KHz in the range of -0°C to +50°C. (Optional high stability crystal).

Power Supply Requirements: DC 13.8V ±15% negative ground current drain 20A max. (at 200W input) internal or external AC power supply is available for AC operation.

Antenna Impedance: 50 ohm unbalanced

Dimensions: 115mm(H) x 306mm(W) x 349mm(D)

Transmitter RF Power: SSB (A3) - 200 watts PEP input, CW (A1) RTTY (F1) - 200 watts input. Continuously adjustable output power - 10 watts Max. AM (A3) - 40 watts output, FM (F3) - 100 watts.

Microphone: Impedance 600 ohm

Receiving Mode: A1 A3J (USB, LSB), F1 (output FSK audio signal), A3, FM

IF

Frequencies: 1st: 70.4515MHz, 2nd: 9.0115MHz, 3rd: 455KHz, 4th: 350KHz, with continuous bandwidth control

Sensitivity: Less than 0.15uV for 10dB S+N/N (Preamp On)

Selectivity: SSB CW, RTTY 2.3KHz or -6dB (Adjustable to 0.8KHz min); 4.0KHz or -60dB

Audio Output: 3 watts

Audio Output Impedance: 4 - 16 ohms

RIT Variable Range: ±9.9KHz

ICOM IC-R71A

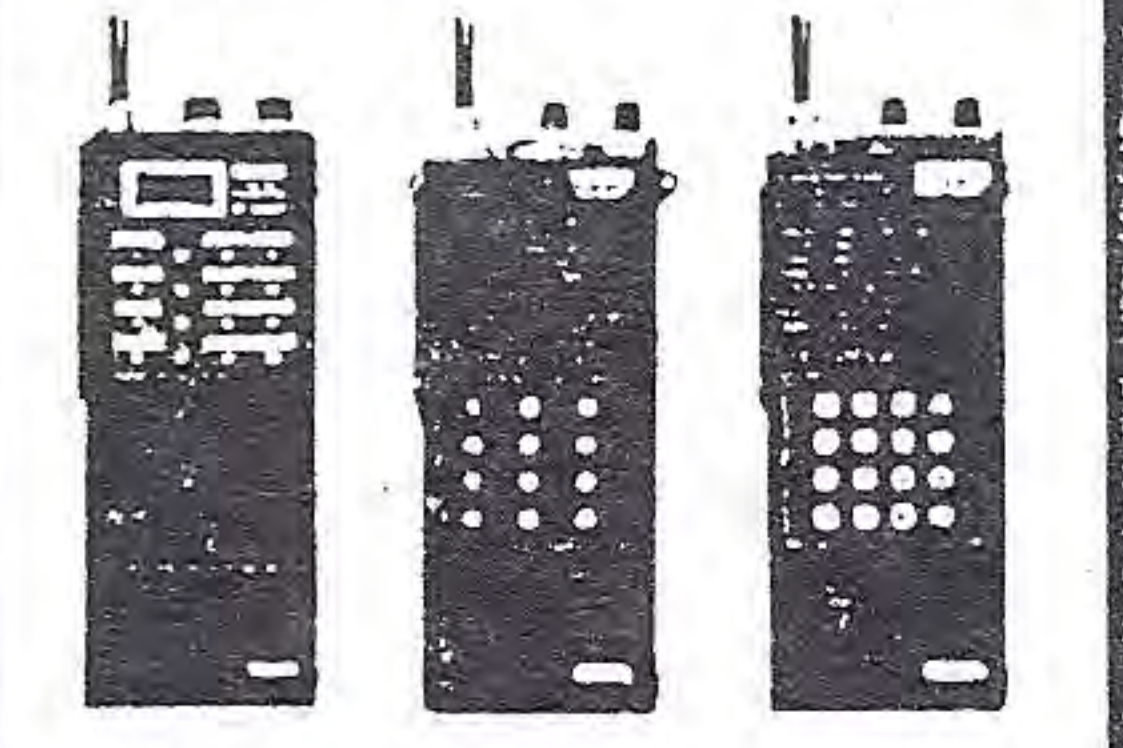
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ICOM HAND-HELDS



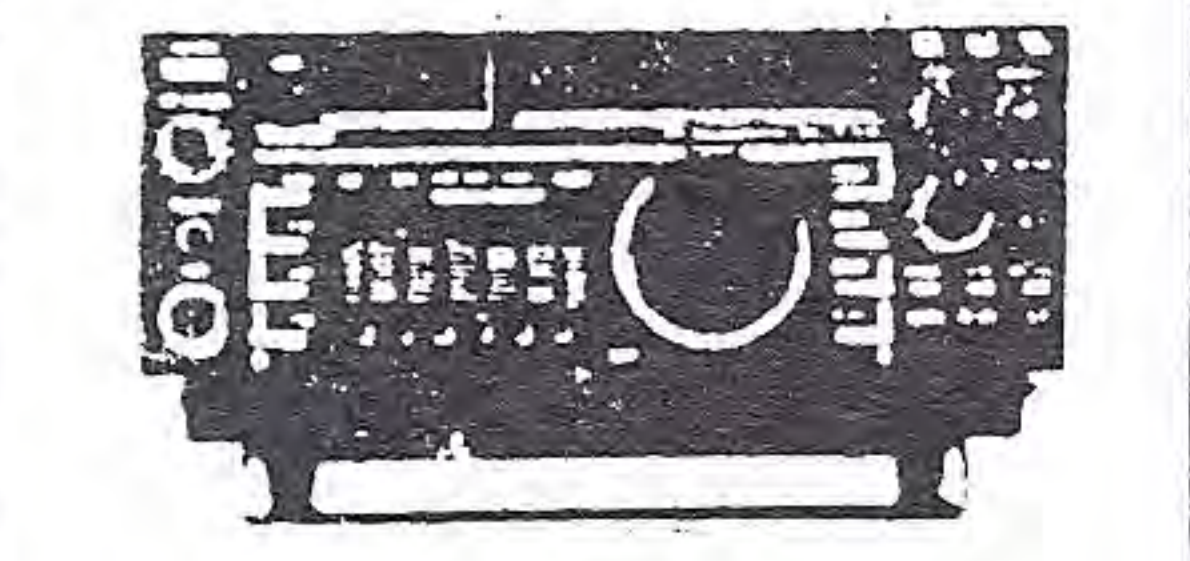
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IC-04AT IC-4AT

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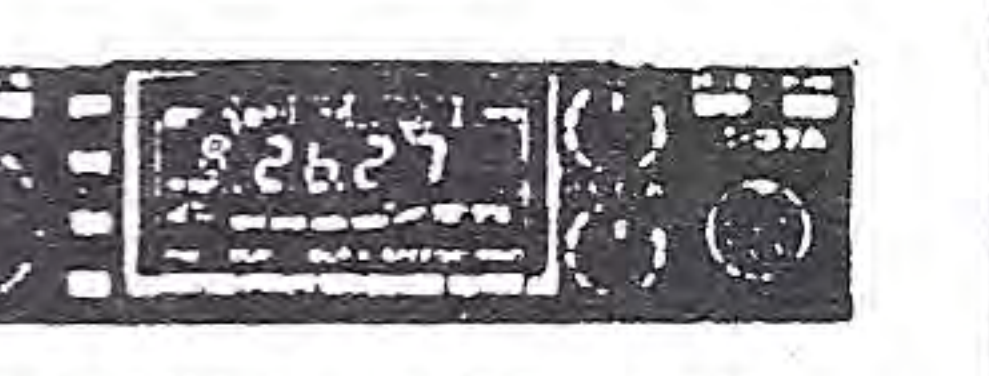
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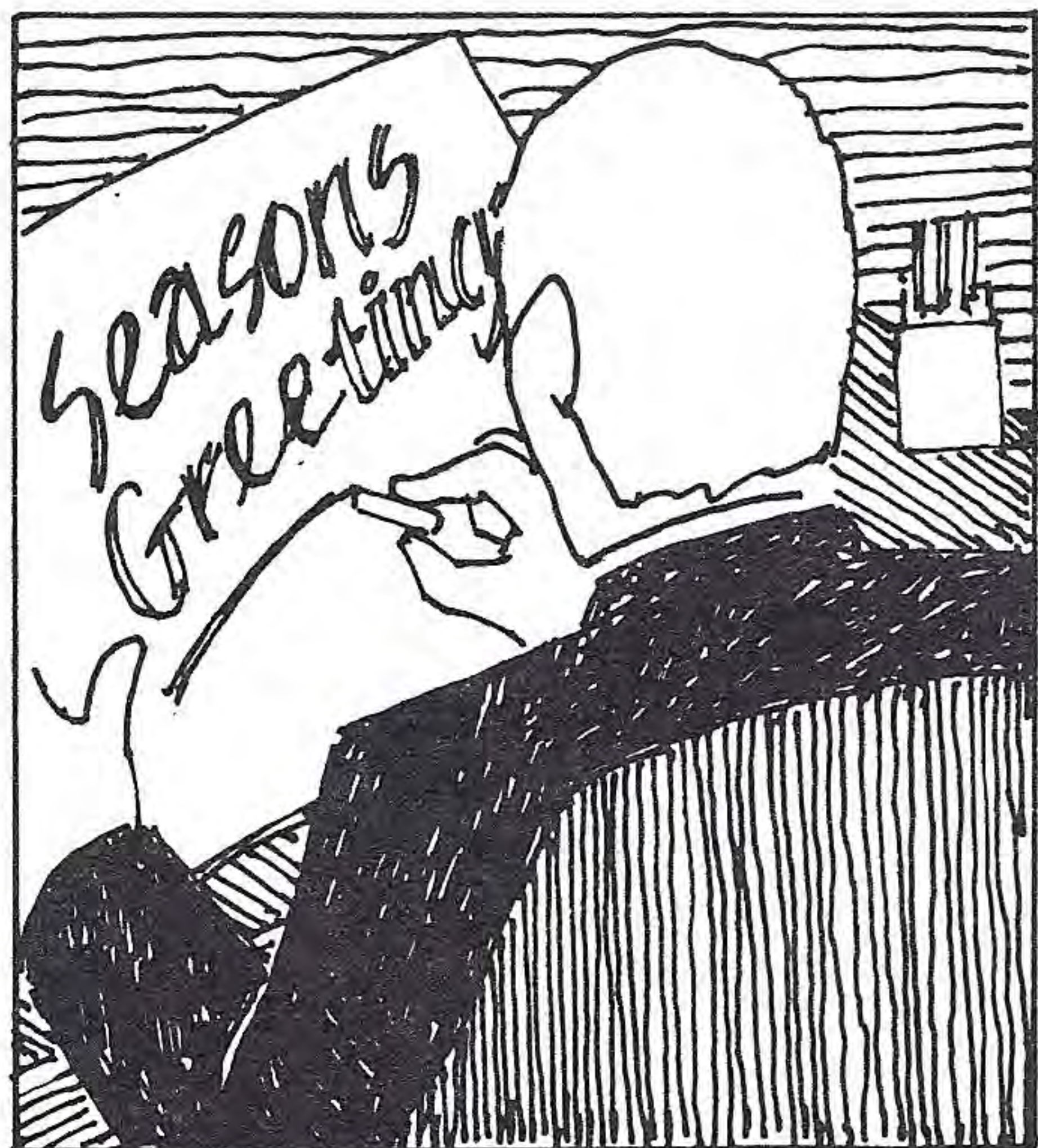
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Power source	117 V AC (50/60 Hz)		1 Motor 16.1 sq ft
Power consumption	200 W (with 4 drive motors)		2 Motors 21.5 sq ft
Motor running voltage	24 V AC		3 Motors 26.4 sq ft
Dimensions	4.9" H x 7.1" W x 6.9" D (125 mm x 180 mm x 175 mm)		4 Motors 30.0 sq ft
Weight	9 lbs (4 kg)		
Operation	Manual	Manual/Pre-set	

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PRESIDENTS MESSAGE

MAKE NO MISTAKE!!!!

This is not a national association. We are not another CARF or CRRL and we are not competing with them.

We ARE an association of ONTARIO HAMS — serving Ontario and ONTARIO HAMS!

It is an honour to be President of this society and I will do my best to be a good one. For a while this society was not so useful for Ontario hams but in recent years this has changed.

Each of the last 2 years has seen some big achievements. For instance a big reduction in the cost of 'call sign' licence plates was obtained — and this magazine has received a 'face lift'; in appearance and financially.

A number of major projects are in the works'. Hopefully at least one will be accomplished in this term. Certainly there is a great team working on them.

Do not forget — these projects are for the BENEFIT of Ontario and ONTARIO HAMS. So please tell your friends — ask them to be part of it by joining the amateur Radio Society of Ontario. Do you know that the saving on licence plate fees alone, obtained by the Society, will pay for 4 years membership — with money left over???

Sure there are many worth-while organizations to join. But there is only one association serving Ontario and Ontario hams. We are strong now. Imagine what we could achieve if each member obtained at least one new member.

This should be a great year. TALK UP The Amateur Radio Society of Ontario, and thank you for letting me be involved with such a great team.

In closing, I extend to you and your loved ones Season's Greetings and wish you a happy, healthy 1986.

73 Evan VE3IAD

SILENT KEYS

We regret to report the passing of the following amateurs:

VE3AAL Horance Slater, Hamilton.

VE3ABO Oram Cochrane, Waterford.

VE3BFW Fred Cable, Toronto.

VE3YM George Very, Oakville.

VE3WK Frank Kelly, London.

VE3CWW Edward (Ted) White, Ottawa

VE3FAP Les Pay, Stroud.

VE3LRI Doug Gerrard, London.

VE3IX Dave Gwinn, Manotick.

VE3CXX Geroge Pringle, Windsor.

VE3CTH Gerrard Adolph, Hamilton.

VE3UW Russ Buckley, Toronto.

Our sincere condolences to their families.

NEW HORIZONS

We have been hearing some scuttlebutt about the "low power" of the Argosy compared with the HW12/32. The HW12/32 is rated at 200 watts input, and the Argosy at 100 watts. Hence, it is true - the Argosy has only half the power of the HW rigs.

But, what does this mean in actual operation? Power ratios are most

conveniently expressed in decibels. A power ratio of 2 represents 3 decibels. While there has been no standardization of S meter calibrations, which are voltage and not power, the most common scale is that 1 S unit represents 6 decibels in voltage. Now, 6 decibels in voltage is 3 decibels in power. Hence, it is fair to say that in most cases, a power reduction of 3 decibels would result in 1 S unit lower reading on a receiver. For practical purposes then, using the same set up except changing the rig from an HW to an Argosy would produce a signal 1S unit less.

Is this noticeable? In most cases, no. Try listening to an S8 and then an S9 signal and see if you can tell any difference without looking at the S meter. The difference might be detectable if the signal is just on the verge of being readable - but just might be. Even under these adverse conditions it is highly unlikely to make a noticeable difference.

One of the members of our Administrative Board, Bill Loucks, VE3AR, used an Argosy from July 10 to August 17, 1984, as part of our evaluation program. During this time he made 707 QSOs on it, using the four low bands (10 and 15 were not open). Contacts were made with 40 countries on 4 continents. Signal reports were just as good as had been received using his Collins KWM 380. In most cases, the received signal report was at least as good as the report given.

We are convinced the Argosy is a good rig for the whitecaner. We were well aware that its power is 3 decibels less than that of the HW rigs, but we also were aware that this difference is seldom significant in actual operation. Therefore, we had no hesitation in adopting the Argosy as our current standard rig.

Prepared by

Bill Loucks, B.E. P.Eng.
VE3AR

Fred Roberts, VE3AFA
CNIB
Amateur Radio Program

Look Us Over.

RADIO SOCIETY OF ONTARIO INC.

The Ontario Amateur has a new look and with this copy of TOA we invite you to consider the benefits of membership in the Radio Society of Ontario Inc.

It may be your membership has lapsed, or you feel you belong to enough clubs now, or perhaps you have never considered joining RSO . . . until now!

A strong provincial society offers many services to Ontario's Radio Amateurs. A prime example was the recent reduction of licence plate fees from \$100.00 to \$25.00, obtained by RSO.

The R.S.O. like the Ontario Amateur brings a host of benefits to it's members so, if you want to benefit - join us now by simply filling in the form below.

MEMBERSHIP APPLICATION

Please type or print clearly . . . thank you.

New Member

Former Member

NAME

ADDRESS

CALL

POSTAL CODE

ENCLOSED please find my remittance for membership in the class checked:

- FULL MEMBERSHIP - Must be a VE3 - **\$18.00**
- SR. MEMBERSHIP - 65 or over - **\$15.00**
- ASSOCIATE MEMBER - Non-licensed or out of Ontario - **\$18.00**
- FAMILY MEMBERSHIP - Full Member fee plus **\$3/person**
- LIFE MEMBERSHIP - **\$250.00** Conditional Life Membership,
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DATE

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Century 21 Communications has an on-premises service facility for service of amateur, commercial, cellular and marine communications equipment. We are an authorized dealer and service centre for most major lines. We also have drive-in installation bays for in-vehicle installations. We service what we sell! And we do it well!

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We believe in the quality and reliability of the equipment we sell. We provide a no-cost extended warranty on all amateur equipment which covers needed repairs long after the manufacturer's warranty expires. And if your equipment legitimately needs service more than three times under warranty we will gladly replace it with a new piece of equipment, free of charge! You can buy with confidence at Century 21 Communications!

Before You Pick Your Rig— Pick Our Brains!

We are all radio amateurs — some with 20 years of experience. All of us keep up with the latest technology and we enjoy talking about it! So, whether you are an experienced amateur, or just a beginner, you'll find that we will be happy to take the time to explain anything you want to know. **AND**, since we carry **ALL** major lines of amateur radio equipment you will get an unbiased opinion! Pick our brains before you pick your rig!

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THE CARE AND FEEDING OF NICKEL-CADMIUM BATTERIES

Larry Bradley VE3CRX

1. Introduction:

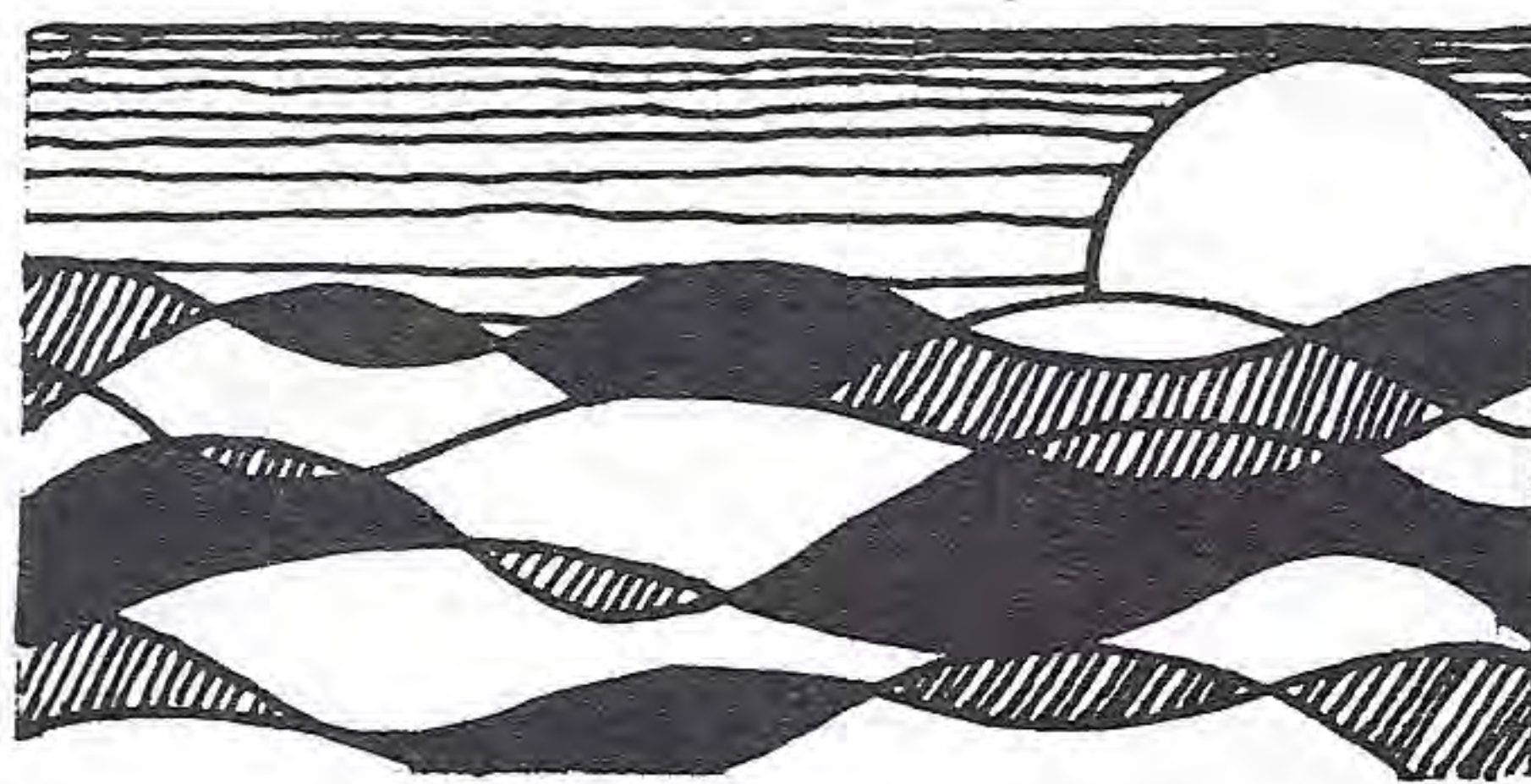
The increasing popularity of hand-held transceivers has brought more and more amateurs into contact with sealed nickel-cadmium batteries (Nicads). Most amateurs know very little about such batteries; this article will try to rectify the situation. We shall discuss Nicads under four headings — What they do and how they work — How they behave under load — How they behave under charge, and — A few words on maintenance

2. A description of Nickel-Cadmium Cells:

The Nicads we use are composed of "sealed" cells that generate about 1.25 volts each. Most cells are not really sealed, but have a vent which can open at high pressures to allow gas to escape, rather than having the cell explode. The vent closes afterward to prevent loss of electrolyte. Some cells have a one-time vent which prevents a cell from exploding but may allow the cell to deteriorate quickly after venting.

The positive electrode of a nicad cell is nickel hydroxide and the negative one is cadmium metal. These are in an electrolyte of potassium hydroxide. During discharge, the cadmium is oxidized to cadmium hydroxide, releasing electrons to the load. During charge, the current flow reduces the cadmium hydroxide back to cadmium metal. Unlike lead-acid cells, no gas is produced during the charging process. If the cell is overcharged, oxygen is produced at the positive electrode. If the rate of overcharge is low enough, the oxygen can be used up at the negative electrode as fast as it is produced; if too high, pressure builds up in the cell.

Nicad cells come in many shapes and sizes, the most common being the AA, C and D sizes of normal flashlight cells. Cells are rated by their capacity in ampere-hours (AH). This is the current that a fully charged cell can deliver for one hour



before its voltage drops below 1.0 volt. An AA size is usually rated at 0.45 AH, while D cells come in 1.5 and 3.5 or 4.0 AH capacities.

3. Discharge Characteristics

The term "C" is used to indicate a charge or discharge rate which is equal to the amp-hour capacity of the cell. Thus an AA size cell being discharged at a rate of 1C would deliver 0.45 amps for one hour. If a cell is discharged at a rate greater than C, its effective capacity decreases, while if used at a rate lower than C, the effective capacity increases. Thus an AA cell can deliver 45 milliamps for more than 10 hours but it could not deliver 4.5 amps for 1/10th hour (6 minutes). A freshly charged cell will show a no-load voltage of nearly 1.5 volts which will drop under load after a few minutes to about 1.25 volts; it will remain at this voltage until the cell is nearly exhausted, when the voltage will drop quickly to 1 volt or lower. At low temperature the effective capacity of the cell decreases. At -20°C the capacity is only 76% and at -30°C it is only 50%. The no-load voltage decreases somewhat at low temperature, while the internal resistance increases and may double at -20°C.

Nicads will self-discharge when not in use; the rate depends on the individual cell, its history of charge/discharge cycles and the temperature. However at room temperature, one could expect a cell to lose half its charge in six weeks. This can be avoided by keeping the cell under refrigeration, or on a trickle charge.

Since individual cells in a battery are unlikely to be identical, as the battery is discharged through a load some cells are likely to become fully discharged before the others. If one cell is completely discharged while the others are still delivering current, that cell will get charged in the reverse direction. This will cause gas

buildup, and eventual cell failure if it happens frequently. To avoid cell reversal the battery voltage should not be allowed to go below $N-1$ volts, where N is the number of cells in the battery. For a typical 10 cell battery (12.5 volts nominal), the battery should not be used once the voltage drops to 9 volts.

4. Charging Characteristics

A fully discharged cell when put on charge will quickly rise to about 1.4 volts and will remain there until the cell is nearly charged.

At this point the voltage will rise slowly and then decrease as the cell gets more and more overcharged. The cell voltage under charging conditions is temperature sensitive and decreases as temperature increases. As the cell approaches full charge, its temperature increases, and increases more rapidly once into overcharge. Cell pressure also increases rapidly in the overcharge region. How much the temperature and pressure increase depends on the rate of overcharge. If a cell is overcharged at too high a rate the increase in temperature will quickly destroy the cell.

Because of this nicads should not be charged by a constant voltage method, since cell voltage will decrease with increasing temperature causing more current to flow which will raise the temperature even more, resulting in eventual cell destruction. Instead one uses a constant current charger where the charging current is independent of the cell voltage.

Most cells are designed to withstand a continuous overcharge rate of 0.1C. That is, an AA cell can be left on charge at 45 milliamps continuously without damage. At this rate, it will take about 14 hours to recharge a dead cell, since charging efficiency is only about 75% at the 0.1C rate. Charging at a rate higher than this risks cell damage if overcharging is allowed to occur, an event that is almost inevitable, since there is no easy method of determining if the cell is fully charged. Some cells can be charged at a rate of 0.3C but unless one knows that a cell is of this type, it would be unwise to attempt it.

It is possible to fast charge nicads at very high rates; full charge in 15 minutes is not unreasonable, provided the charging is stopped before the cell goes into overcharge. However it is very difficult to determine state of charge; using the fact that the voltage rises at the end of the charging is risky, since this is a temperature dependent phenomenon. It is possible to measure both voltage and cell temperature and terminate charging when either exceeds certain limits.

A safer way to fast charge is to first discharge the cell, and then apply a constant charging current (e.g. 4C) for a fixed time (e.g. 15 min). With a battery of cells this is harder since the cells are not matched and each one is likely in a different state of charge. Once a battery is charged it is possible to put it on a "trickle charge" of 0.02C or lower to counteract the self discharge characteristic.

If a cell is continuously overcharged (e.g. at 0.1C) and is not discharged deeply during use cycles, the cell can lose some of its capacity - the so called "memory" effect. A deep discharge followed by a complete recharge will "erase" the "memory". One should discharge a battery deeply through normal use; if this is not possible, then at least the battery should be deeply discharged at regular intervals.

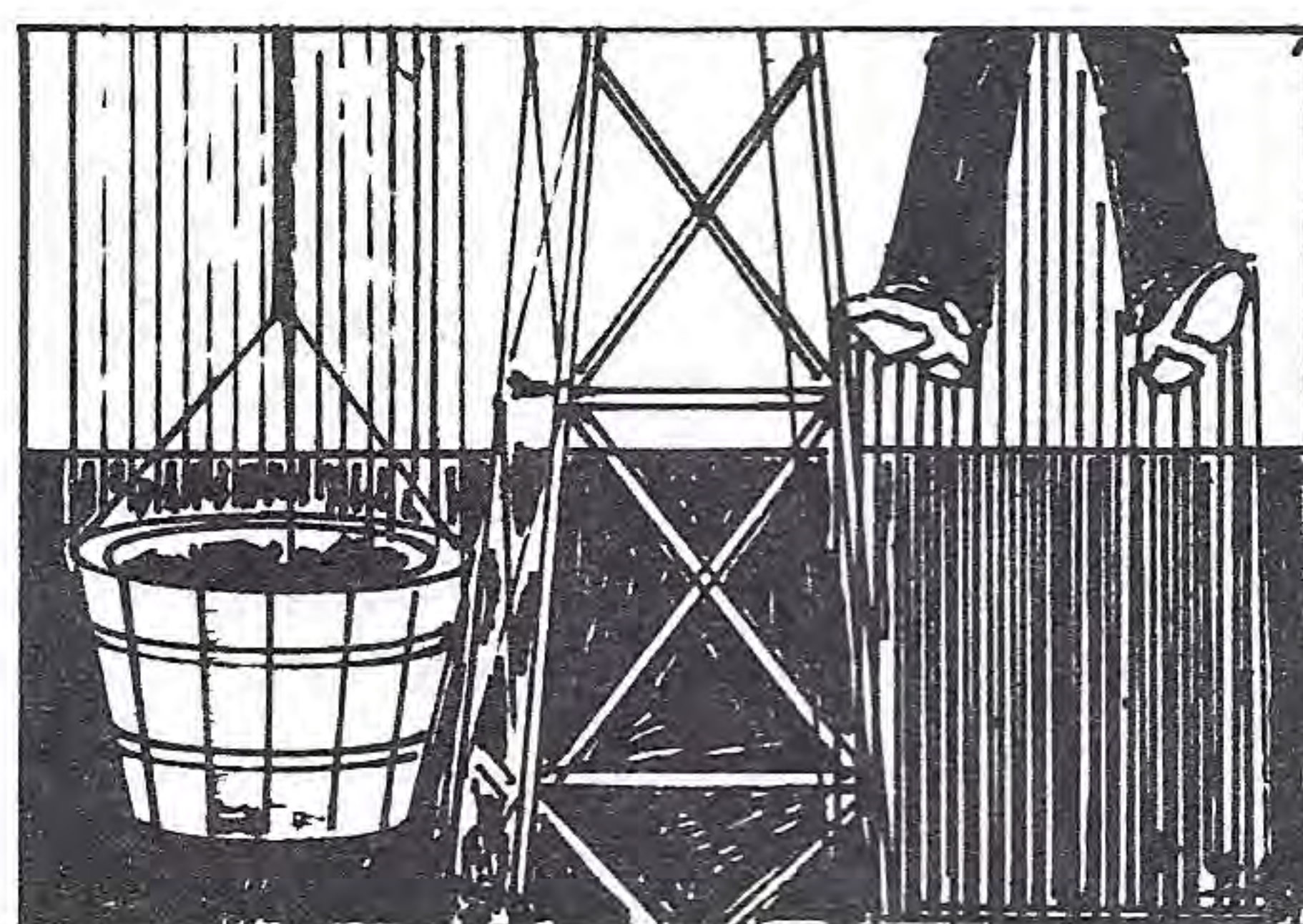
5. Maintenance of Nicads

Good quality nickel-cadmium cells have a very long life expectancy. General Electric claims their cells are typically good for 500 charge/discharge cycles and usually many more. To achieve this long life only a few precautions need be observed. Do not overcharge at a rate higher than specified by the manufacturer for the cell (typically 0.1C). Do not let a battery discharge to less than N-1 volts, where N is the number of cells in the battery. Do not overcharge cells at a temperature below 5°C. At -10°C the safe overcharge rate is only 0.05C, while at -25°C an overcharge is unsafe.

A note of caution - because of their low internal resistance (.03 ohm for an AA cell), nicads can generate very high currents into a short circuit. An

AA cell can deliver 40 amps for a short time. Care should be taken not to short out a charged cell. Do not carry one in a pocket where a key or coin could short it out. You could be in for a severe burn. With reasonable care, a set of nickel-cadium cells should power your equipment for several years.

de Larry VE3CRX
(from The Groundwave,
March, 1980 Edition)



HAM OPERATOR'S ACCIDENT

A letter from a ham to his insurance company explaining a recent misfortune. . . .

I am writing in response to your request for additional information in block #3 of your accident reporting form. I submitted that poor planning caused the accident. You say in your letter to explain in more detail. I trust the following information will prove to be sufficient.

I am an amateur radio operator and on the day of the accident I was at work on the top section of my 100 foot tower. When I had completed my work, I discovered that over the course of many trips up and down the tower, I had brought up about 300 lbs. of tools and spare hardware. Rather than carry the now-unneeded tools down by hand, I decided to lower them using a small barrel and my gin poll still attached to the top of the tower.

Securing the rope at ground level, I went up the tower and filled the barrel. I then went back to ground level and untied the rope, holding it tightly to ensure a slow descent of the 300 lb. load. You will notice in block #11 that I had given my weight as 150 lbs.

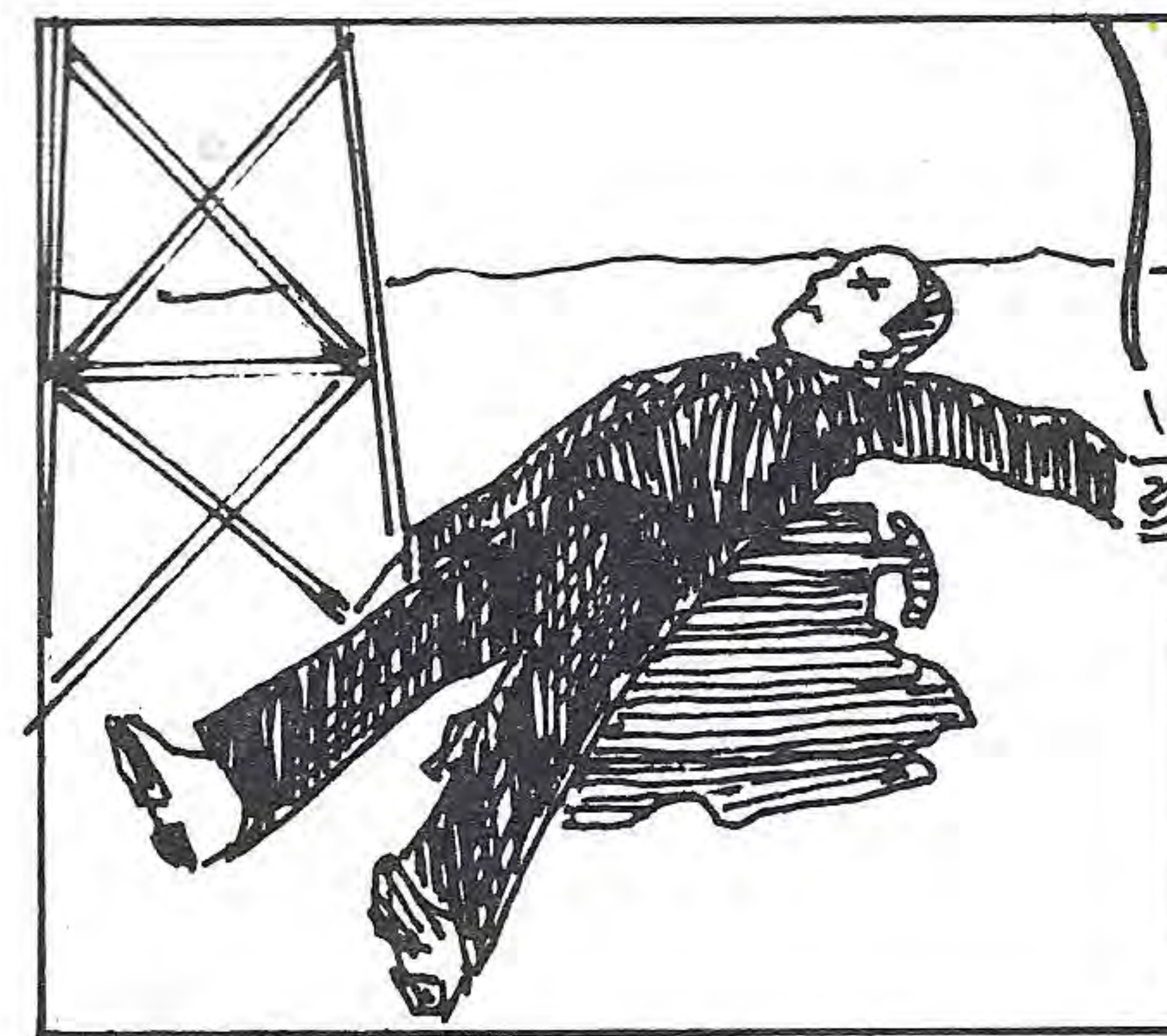
Due to my surprise at being suddenly jerked off the ground at such a rapid rate, I momentarily lost my presence of mind and forgot to let go of the rope. Needless to say, I proceeded at a rather rapid rate up the side of the tower. In the vicinity of the 50 foot level, I met the swiftly descending barrel. This explains my fractured collar bone. After momentarily slowing, I resumed my rapid ascent, not stopping until my hands were three knuckles deep in the pulley on the gin pole atop the tower.

Fortunately, by this time, I had regained my composure and managed to hold onto the rope despite the excruciating pain. At about this time, however, the loaded barrel hit the ground and the bottom fell out of the barrel. The barrel only weighed about 15 lbs. I refer you again to my weight in block #11. As you might imagine, I began a swift plunge down the side of the tower. Again, at about the 50 ft. level, I met the barrel coming up. This accounts for my two fractured ankles and the lacerations on my legs, thighs, and lower body.

The barrel encounter slowed me enough to lessen my impact with the pile of tools and hardware and I was extremely fortunate to escape with only a fractured coccyx and three crushed vertebrae.

I regret to report, however, that as I lay there on the pile of tools in excruciating pain, unable to stand, and watching the empty barrel, 100 feet above me, that I again let go of the rope.!

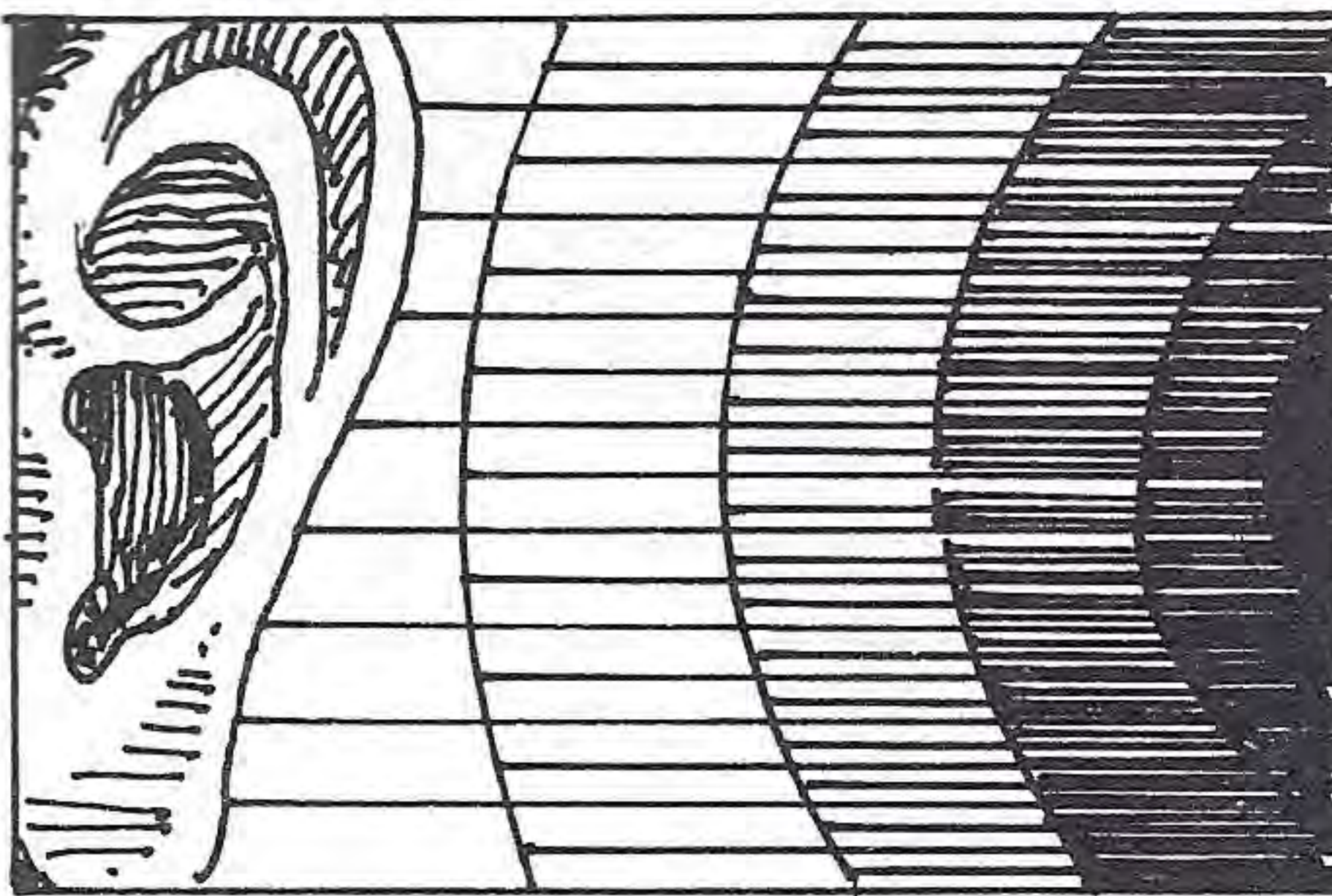
Author Unkown
from Peterborough
Amateur Radio Club News.



Coherent Signaling Techniques

When sending a radio message using CW, RTTY or Packet modes, the data recovery may be improved by synchronizing both stations and using digital processing at the receiver to enhance the signal, similar to the way in which pictures from space are computer-enhanced before viewing. Earlier experimenters using CW have coined the term "coherent CW" or CCW. Normally the ear recognizes a CW note by its pitch and is able to discern when it starts and stops in time well enough to enable the operator to copy the message. However, when the signal is very weak, it is not easily copied by ear - it is still there, of course, but it is masked by the noise. The amount of background noise getting through to the headphones is determined by receiver bandwidth, so the first step is to reduce our bandwidth drastically. It can be shown that the optimum bandwidth for recovering a 12 WPM CW signal is a mere 10 Hz. In general, we can improve the S/N as needed by reducing the sending rate. A further gain results if the receiver "knows" when the signal can change (turn on or off). Achieving these narrow bandwidth with analog filters is impractical, due to ringing. However, if the receiver can be synchronized with the signal, it is possible to design a digital sampling filter (DSF) to do the job. The audio waveform is sampled at a very rapid rate, the instantaneous voltage levels being converted to digital values which are stored in a computer's memory. We can number-crunch these readings to calculate the amplitude response of an "ideal" filter, and use this result to control a sidetone oscillator at the receiver. Now what is heard in the phones is a pure, crisp CW signal which follows the original keying, although it is delayed by one bit time since the CPU waits until the end of each interval before deciding whether the key was up or down at the transmitter during that period. The DSF may be used to copy non-coherent signals on the band, but it does not produce the superb results which are possible with true CCW signals.

To put a CCW station on the air, we need three (3) components:



1) An accurate clock or frequency standard. With some care an oven-stabilized crystal oscillator will stay on frequency within a part per hundred million over a typical QSO (one hour). This standard is either periodically recalibrated or continuously phase-locked to WWV's 60 KHz carrier from Fort Collins, CO. It is also possible to derive our standard from the VLF Omega or Loran-C transmitters, which are controlled by atomic clocks. Our standard has two purposes: to ensure that once synchronized, the clocks at both stations will continue to show the same time for at least an hour, and to stabilize the local oscillators in our transceivers. Modern synthesized rigs are very good, but still we must take steps to stop them from drifting apart during the QSO. You say your rig doesn't drift. Want to bet? If we are using a bandwidth of 10 Hz, a combined relative drift of only 5 Hz will seriously degrade the signal, and a drift of 10 Hz would be catastrophic. In CCW work we try to keep the signal tuned in to a tolerance of \pm one hertz.

2) We need a means to generate CCW at the transmitter. I use a keyboard with a CMOS microprocessor chip, obtaining accurate timing pulses from the frequency standard. There is a switch to permit "ordinary" or "coherent" CW generation, which allows the same unit to be pressed into service without the external timebase. The CPU can also generate the "known pattern" preamble (a long string of dots) which is used for CCW synchronization.

3) We need a DSF at the receiver to enhance and recover the weak signal. This is the most sophisticated part of the system. I use a dedicated 8085 CPU, with multiply/

divide hardware, a sample and hold circuit, fast 8-bit analog-to-digital converter (ADC) a digital-to-analog converter (DAC) for the output, and a sample strobe synthesizer which can resolve down to a hundredth of a hertz. (The samples must remain phase-coherent over many consecutive cycles of the input waveform.) The "filter" can operate on any frequency between 100 Hz and 1 KHz tunable in 1-Hz steps, crystal-controlled. Bandwidths down to 1 Hz are available. To perform the rapid sampling and carry out the filter computations in real-time, machine-language programming is mandatory. The DAC latches are updated after each cycle of the input waveform (e.g. 800 times per second) driving an analog meter to show the filter response (the computed amplitude of our 800 Hz tone averaged over the last 80 cycles). Headphones may be plugged in for audio output. The STO signal is synthesized as a sine wave at the same pitch as the signal we are trying to copy. It is amplitude-modulated by either the DAC voltage (which varies with the strength of the incoming signal) or by a digital line from the CPU which simply turns it on or off. Either way, there is absolutely no noise on this signal, regardless of the amount of noise present at the input to the filter. Incoming raw audio may be mixed in if desired for monitoring.

The station transceiver must be modified to improve its frequency stability both on receive and transmit. I use a TS-430-S whose master oscillator is phase-locked to my frequency standard. This involves a minor mod inside the rig and an external box containing two PLL's. One loop keeps the 36 MHz master oscillator on frequency, the other is used to digitally synthesize the 800 Hz CW shift on transmit. The 430 readout shows operating frequency to 10 Hz resolution. In this case the readout is accurate to well within one Hertz over the entire HF range. There is no warm-up period, as the frequency standard is never turned off. The mods to the 430 were done so as to let the rig revert to normal stand-alone operation when the PLL box is disconnected.

continued on page 18.

STOP PRESS D.O.C. DISCUSSION PAPER EXTRACT

The following is an extract from the recent DOC "Discussion paper on a possible restructuring of The Amateur Radio Service."

Written comments are being requested by the DOC and we ask that readers of TOA send their written submissions in duplicate if possible, to TOA. They will be forwarded as one unit to the DOC.

Please give this matter your careful consideration:

5.1 DETAILED PROPOSALS

The examination to certify a candidate for the operation of a basic, modern amateur station (Certificate "A") would consist of:

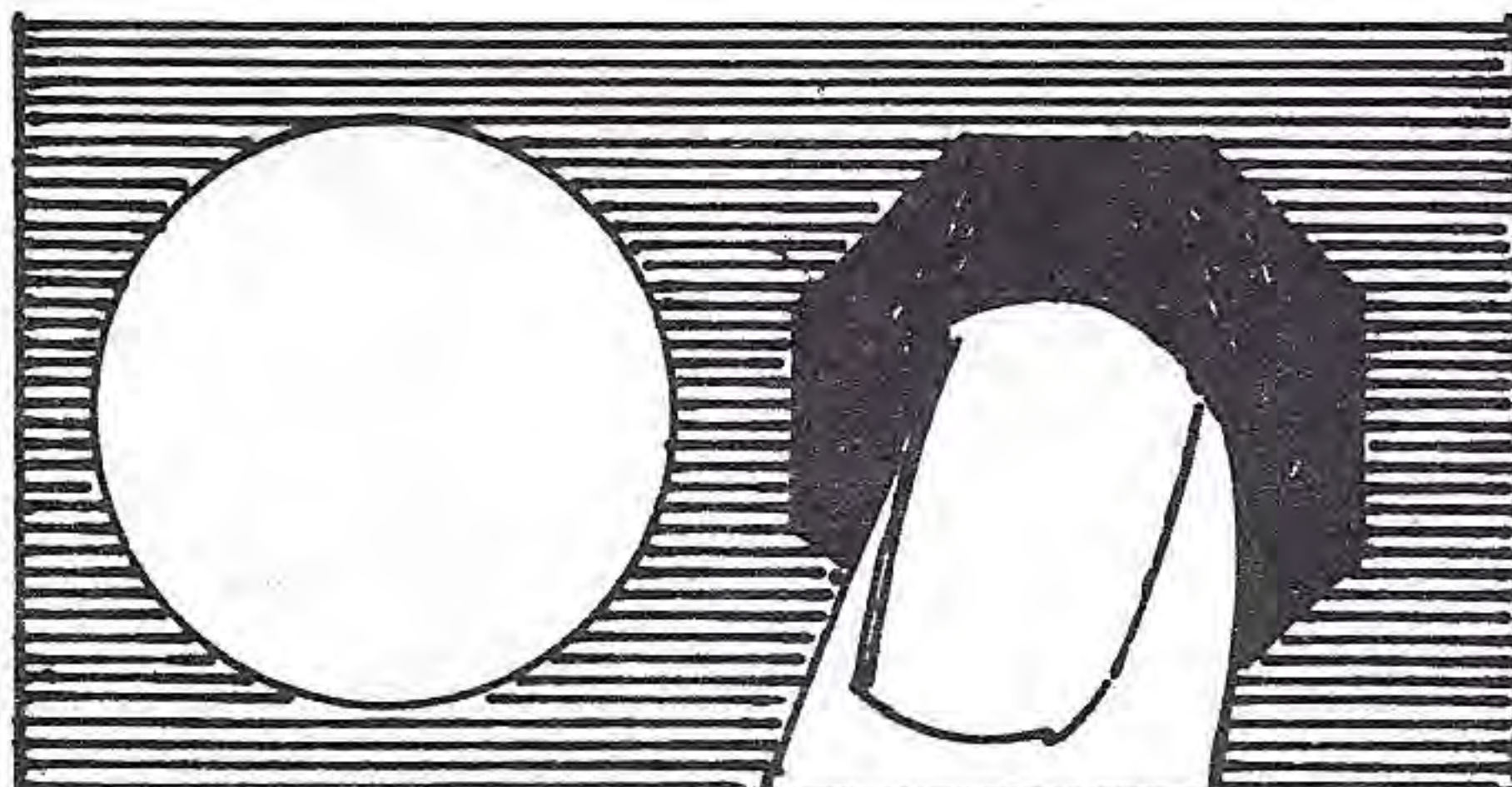
1) installation and operation of modern amateur stations; including proper interpretation of meter readings such as Automatic Limiter Circuit (ALC) and Standing Wave Ratio (SWR) and the adjustments necessary to prevent interference; proper grounding techniques; and correct installation practices from transceiver to antenna, including auxiliary devices such as low-pass filters and antenna tuners;

2) basic electronic theory, safety practices when working with simple circuits; tracing and correcting interference problems such as audio rectification and receiver front-end overload;

3) antenna and propagation theory, including types of antennas, feedlines and characteristics of propagation phenomena; and

4) international and domestic regulations applicable to the amateur service.

It is estimated that approximately 40 hours of instruction would be required to obtain the basic knowledge necessary to pass this examination. Successful candidates would be issued Amateur Certificate "A" and would have the following privileges and restrictions:



1) the transmitter portion of the station, from the microphone or keying input of the transmitter to the final output, would have to be commercially built and marketed specifically for use on the amateur frequencies. All other components of the station, such as the receiver, filters, antennas, computer interfaces, etc., could be home-built;

2) no emissions would be permitted below 30 MHz, but all would be permitted above 30 MHz;

3) stations would be limited to a maximum power input of 250 watts d.c.: and

4) licences would be limited to operating stations under their physical control, but not repeaters or remote base stations.

The examination to certify a candidate for operation in the spectrum below 30 MHz (Certificate "B") would consist of a Morse code examination at a speed of 12 words per minute.

Successful candidates would receive Amateur Certificate "B" and, providing they held Certificate "A", would operate under the same conditions as those granted by that certificate, except that they would be allowed all types of emission on any amateur band.

Existing amateurs holding either an Amateur Radio Operator's Certificate or Amateur Radio Operator's Advanced Certificate would be deemed by regulation to have all the privileges of the three proposed certificates, and those holding the Amateur Digital Radio Operator's Certificate would be deemed to have all the privileges for Amateur Certificates "A" and "C".

This would accommodate the many amateurs who are more technically oriented and wish to construct their own stations. Successful

candidates would be given Amateur Certificate "C" and, provided they held Certificate(s) "A", or "A" and "B", would be permitted to:

- 1) construct their entire stations;
- 2) sponsor and operate repeaters and remote base stations; and
- 3) operate their stations with a maximum of 1000 watts d.c. input.

5.2 IMPLEMENTATION

Candidates writing examinations under the above-proposed structure would be allowed to write any or all of them at one sitting. However, the minimum qualification for a station licence would be Amateur Certificate "A".

Coherent Signalling Techniques continued

CCW experiments to date have used low power (QRP) transmitters to dramatize the spectacular advantages of this mode. I am told contacts between Japan and the U.S. west coast have been made with as little as 100 mW.

In order for a CCW QSO to take place, both stations must agree in advance on: 1) the frequency to be used, 2) the keying rate (usually 10 baud or 12 WPM), 3) the exact time the QSO is to start. It is impractical to just "tune around" looking for a CCW signal. With 100 discrete frequencies to check in each KHz of spectrum, the task would be formidable. On the other hand, the system is very useful for keeping reliable skeds. There is also the advantage that the system is virtually immune to QRM. Most amateur stations couldn't QRM a CCW transmission even if they wanted to!

Coherent signaling takes us a big step forward in being able to achieve reliable copy of very weak signals even under the most adverse conditions. It has great promise for improved RTTY demodulators and packet receivers as well. Let's get busy and put more stations on the air.

Bill de Carle
VE3OBE

QUARTZ CRYSTALS

INTRODUCTION

Since its incorporation in 1973, LESMITH has been known for its extensive knowledge of crystal requirements for amateur, commercial, and military equipment. We maintain data on old and new models, and we are willing to work with you on any requirement, commercial or experimental.

Most of our work is with repeat customers, for whom our regular delivery is 2 weeks on average for custom crystals. We offer a rush service to our regular customers at no extra charge. However, where delivery is requested in just a few days, and very special attention is needed, we may request a premium price.

HOW TO ORDER

Give us at least the information suggested in the sample order below. If we need more information, we will request it. In most cases, this is enough to proceed.

QTY.	XTAL FREQ.	T/R	CARRIER	MAKE & MODEL Additional data
1		T	146.340	INOUÉ IC22
1		R	146.940	"
3		T	157.845	GE Royal Exec
3		R	152.585	"

PRICING

If the pricing is obvious, total the amount, add \$1.00 for First Class mail, and send in your money order, or cheque, with the order. If there is any doubt about the formula and or price, send in the order without the money. We will price the order and inform you by return mail. In the meantime, your order will be processed and shipped on receipt of your payment.

In the example, the amateur band crystals are \$8.25 each, and the custom or commercial crystals are \$9.85 each. The total is \$75.60 plus \$1.00 = \$76.60. Ontario residents add 7% Ontario sales tax.

1985 PRICES

	HC6/U	HC25/U
AMATEUR		
Amateur bands	8.25	8.25
CUSTOM		
6 - 55 MHZ	9.85	9.85
5 - 5.9	10.90	13.15
4 - 4.9	12.00	17.50
3 - 3.9	13.15	17.50
1 - 2.9	17.50	—
55 - 100 (fifth)	13.15	13.15
Temp. Compensated Crystals		13.15
MPI Crystals		12.00

Below 1 MHZ, and above 100 MHZ, price available on request.

MODULES

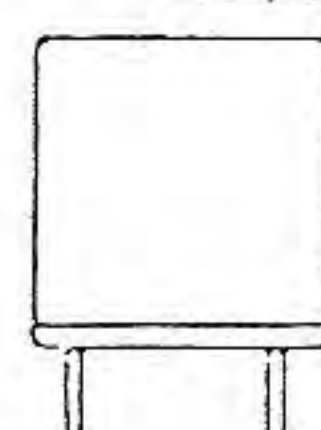
Mocom 70	25.80
Mocom 35	22.70

REWORK MODULES to new frequency

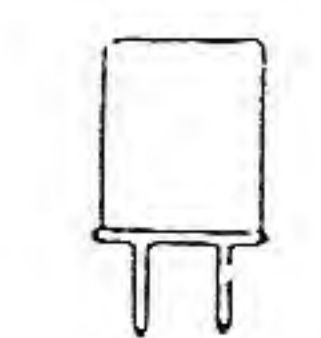
General	20.65
Hybrids (MT500, MX300)	35.50

COMMON HOLDERS MIL Designations

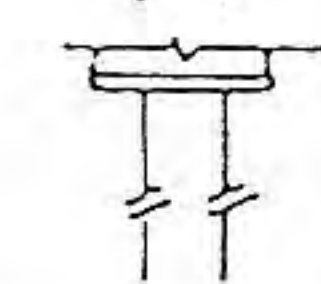
These holders accommodate the majority of requirements.



Approximately
3/4 x 3/4 x 5/16
HC-6/U .050 pins



HC-17/U .093 pins



HC-33/U wire leads

Approximately
1/2 x 3/8 x 1/8
HC-25/U .040 pins

HC-18/U wire leads

The above holders accommodate the majority of requirements.

Commercial customers should call for volume prices.

Lesmith Crystals

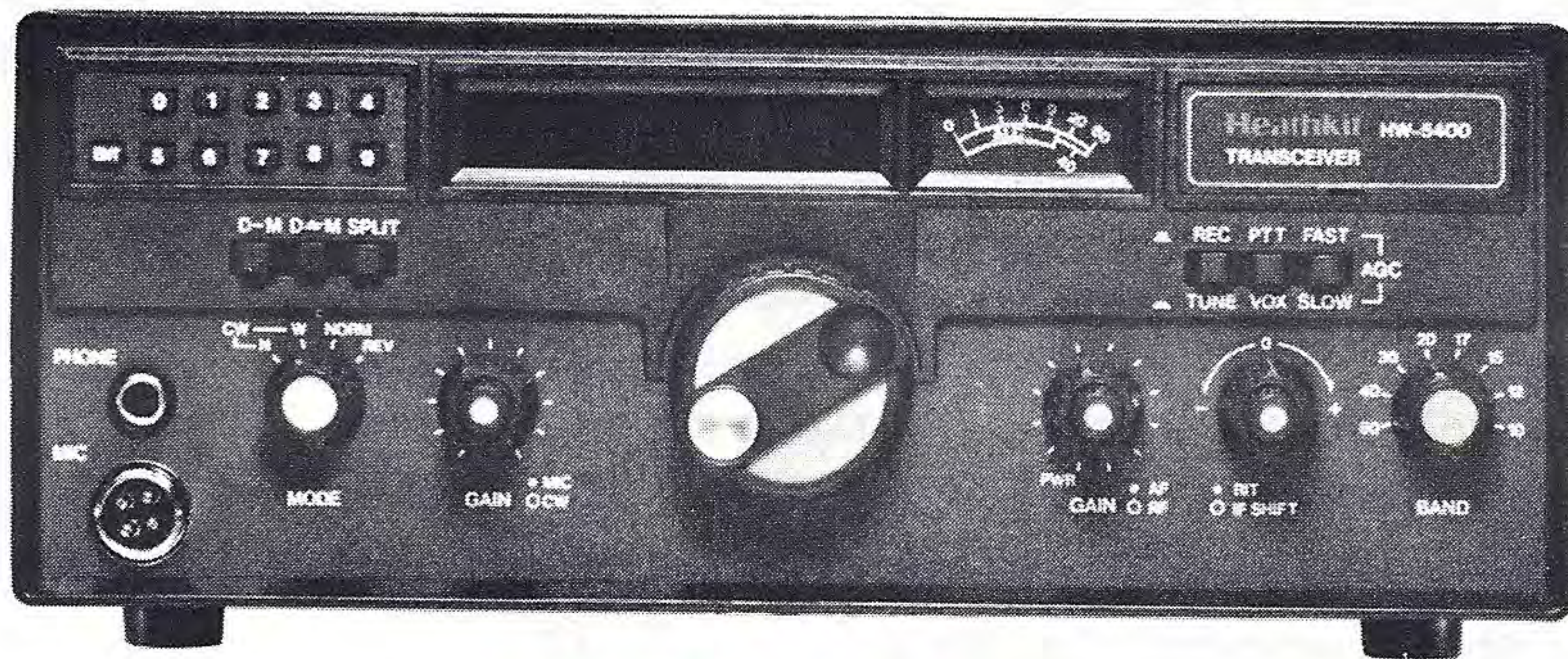
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More kit quality

A triumph of price and performance — Heath's new HW-5400 Synthesized HF SSB Transceiver kit makes high technology affordable. With more versatile, far-reaching capabilities, it puts the original skill and adventure back into Amateur Radio ...



HW-5400 Transceiver

control when used with the Split Memory function. The matching HWA-5400-1 Power Supply/Speaker & Digital Clock (not shown) provides a double-fused source of 13.8 VDC from 120 or 240 VAC.

Heath breaks the price barrier on sophisticated transceivers, offering the highest value for your hamshack dollar. The slim, new HW-5400 is a marvel of kit-form engineering that performs like a dream on 80-10 meters.

MORE ADVANCED IDEAS

Solid state and broadbanded, the HW-5400 incorporates more performance-improving features at a lower price than any comparable transceiver. It's fully synthesized for crystal stability and accuracy. Operating in USB, LSB and CW with automatic sideband selection, it has full break-in (QSK) for proficient keyers, two memories per band, power supply activation at the Transceiver, defeatable amplifier relay, reverse and over voltage protection as well as high VSWR forward power cut-back circuitry for the finals.

A custom microprocessor yields flexible, fingertip control over all phases of T/R operation.

MORE CONVENIENCE

This perfection-packed kit has many benefits. A unique dual-speed tuning system can extract new QSOs or fly through a band in 1 kHz increments with 50 Hz resolution! *Split-Memory Access* lets you review and change the transmit frequency while in receive, without missing a single word or fragment of code. With it, you can beat the QRM every time. Essential vox and sidetone controls are located behind the front panel nameplate. Seven mode and function symbols confirm transceiver status at a glance.

The HW-5400's Frequency Entry Keypad option allows directly-synthesized QSY to any point in the band, and permits fast DX

MORE ENJOYMENT

Novice or active pro, the HW-5400 is perfect for operators who want a Transceiver that's second to none, plus the pride, knowledge and satisfaction that come from building it yourself with our world famous step-by-step manuals. You may find it to be the first microprocessor-controlled rig with enough potential to match the level of professionalism in every radio amateur!

MORE DETAILS IN CATALOG

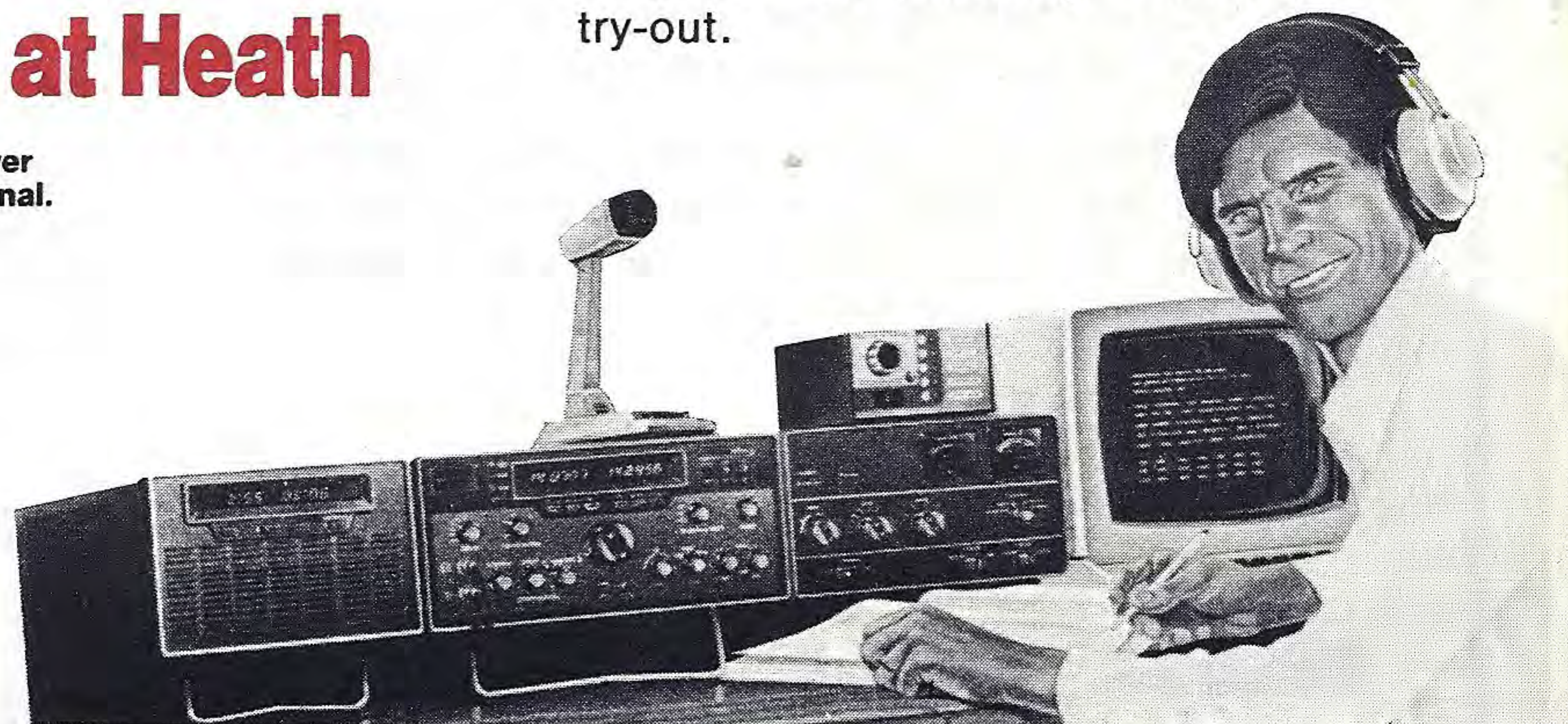
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