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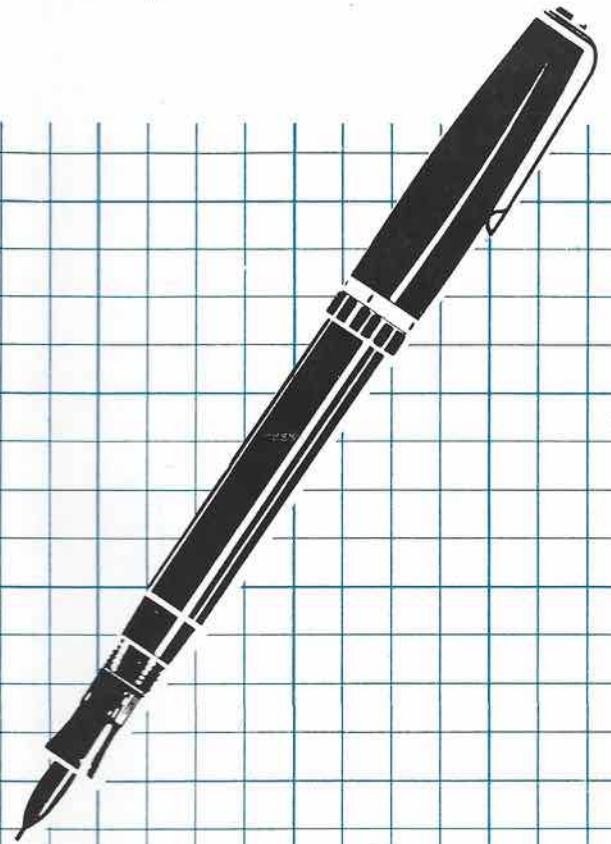
TCA



February 1984

The Canadian Amateur
Radio Magazine

*Technical
Section*



The PIN Diode

The 7th National
Amateur Radio
Symposium

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and much more!

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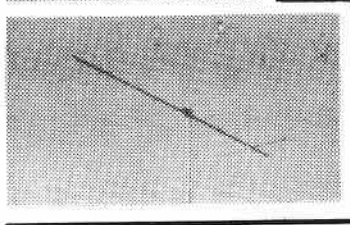
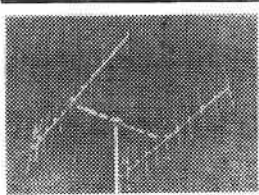
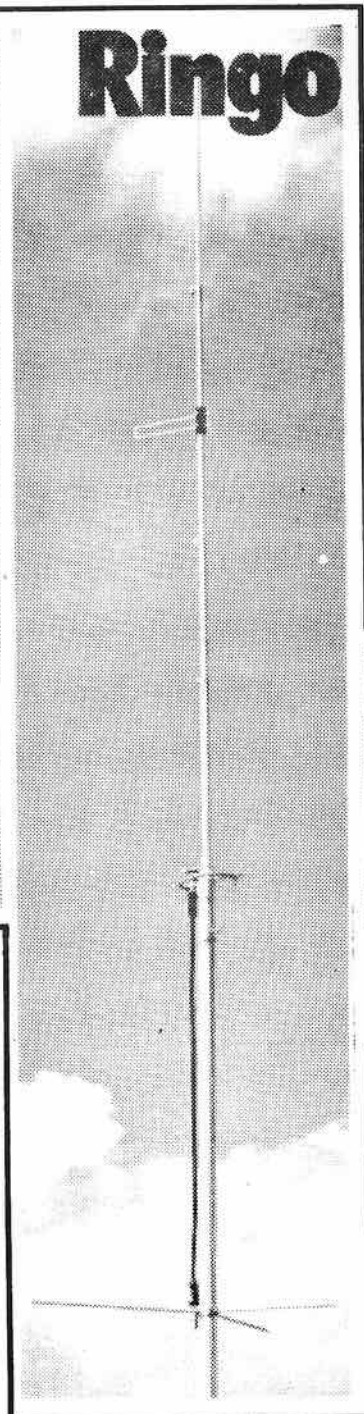
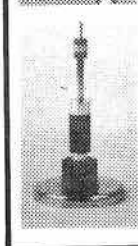
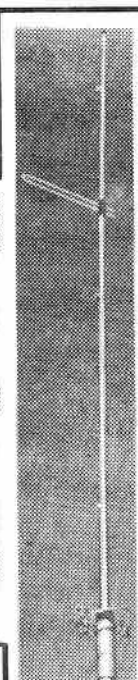
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AR-6	50-54 MHz
AR-2	135-175 MHz
AR-10	28-29.7 MHz
AR-220	220-225 MHz
AR-450	440-460 MHz

MOBILE ANTENNAS

AMS-147	144-148 MHz	Magnetic Mount
ATS-147	144-148 MHz	Trunk Lip Mount
AMS-220	220-225 MHz	Magnetic Mount
ATS-220	220-225 MHz	Trunk Lip Mount

YAGIS

A147-4	145.5-148 MHz	4 Element
A147-11	145.5-148 MHz	11 Element
A147-22	145.5-148 MHz	22 Element
214-FB	145.5-148 MHz	14 Element
A220-7	220-225 MHz	7 Element
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TCA— The Canadian Amateur is published in Canada 11 times per year to provide Radio Amateurs, those interested in radio communications and electronics and the general public with information on matters related to the science of telecommunications.

Unsolicited articles, reviews, features, criticisms, photographs and essays are welcomed. Manuscripts should be legible and include the contributor's name and address. A signed article expresses the view of the author and not necessarily that of C.A.R.F. Publications Limited.

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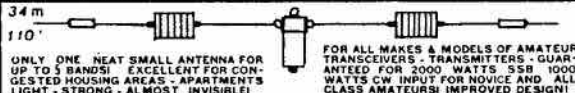
The Canadian Amateur Radio Federation, Inc., is incorporated and operates under a federal charter, with the following objectives:

1. To act as a coordinating body of Amateur radio organizations in Canada;
2. To act as a liaison agency between its members and other Amateur organizations in Canada and other countries;
3. To act as a liaison and advisory agency between its members and the Department of Communications;
4. To promote the interests of Amateur radio operators through a program of technical and general education in Amateur matters.

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153 BAS	3el. monobander for 15m,		\$ 149
105 BAS	Long John, 5el. monobander for 10m,		\$ 229
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14 AVQ/WBS	trap vertical, 10-15-20-40m,		\$ 99
18 AVT/WBS	trap vertical, 10-15-20-40-80m,		\$ 159
14RMQ	roof mounting kit for above verticals		\$ 59
BN-86	ferrite balun for 10 - 80m		\$ 30
V2S	2m colinear gain vertical 138-174 MHz		\$ 65
PGP2A	2m ground plane base antenna, 3dB,		\$ 35
25BS	2m 5el. beam,		\$ 45
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Model HF6V - Completely automatic bandswitching 80 through 10 plus 30 meters. Outperforms all 4- and 5-band "trap" verticals of comparable size. Thousands in use worldwide since December '81! 160 meter option available now; retrofit kits for remaining WARC bands coming soon. Height: 26 ft/7.8 meters; guying not required in most installations.

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HF6V	80-10m+30m vertical	\$ 179
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Filter	-6dB Width	Center Freq. MHz
FL45	500 Hz	9.000
FL53A	270 Hz	9.000
FL44A	2.1 KHz	0.455
FL52A	500 Hz	0.455
FL54	250 Hz	0.455

The IC-745 is the only transceiver today that has such features standard...the number of options and accessories available...and such an affordable price.



IC-745 Shown with IC-PS35 Internal Power Supply.



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The World System

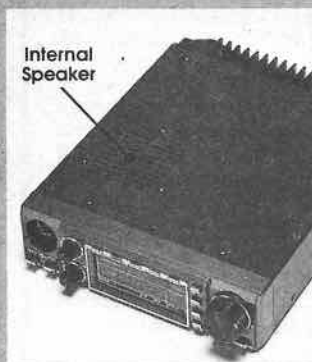
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10 Memories. The IC-27A has 10 tunable memories available to store receive frequency, transmit offset, offset direction, and PL tone.

Memories are backed up by a lithium backup battery, which will store memories for up to seven years.

Speech Synthesizer. As an added plus, the IC-27A features an optional speech synthesizer to verbally announce the receiver frequency of the transceiver through the simple push of a button. This allows the operator to hear what frequency he is operating on without looking at the transceiver.

Scanning. Included with the IC-27A is a scanning system which allows scanning of memories or scanning of the band. Each memory may be scanned between programmable limits.

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THE ICOM 27A is a superior piece of ham equipment engineered and built by ICOM to provide superb performance in the mobile radio environment. See the IC-27A at your local ICOM dealer.



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IMPORTANT: For more surplus items refer to previous issues of "TCA". Very few items listed are stocked in depth, many one of a kind.

Infra red fire mapper scanners, Computing devices FDS3-1, Red fibreglass housing 30x12x8 inches, removable ends. Contains motor driven film magazine, pickup tube, motor driven optical shaft, mirrors, lenses, worm drive motors, etc. Wt 45 lbs. All motors seem to be 27VDC \$25.00

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FP 757 GX Power Supply	215.00
FT 757 Ant Tuner	369.00
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70 cm Board for FT 726	399.00
Satellite Board for FT 726	149.00

HF TRANSCEIVERS

FT 1	2049.00
FT 102	1059.00
FT 980	1649.00
FT 77	649.00

ACCESSORIES FOR FT 77

FT 77 Xtal Calibrator	18.00
FT 77 FM Board	49.00
FC 700 Antenna Tuner	140.00
FP 700 Power Supply	159.00

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SP 980 Speaker	69.00
SP 980 Phone Patch Spkr	159.00

ACCESSORIES FOR 902-101ZD

SP 901 Speaker	38.00
SP 901P Phone Patch Spkr	79.00
FC 902 Antenna Tuner	210.00
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FL 2100Z Linear Amp	639.00
XF 8.9HC CW Filter 600	39.00
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XF 8.9GA AM Filter	39.00
FM 902 FM Board	47.00
KY 901 Keyer Board	39.00
DC 901 DC Power Supply	71.00
DC 101 DC Power Supply	71.00
101ZD AM Board	33.00
101ZD FM Board	59.00

SWL SOLID STATE RECEIVERS

FRG 7700	599.00
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ACCESSORIES FOR 7-7700

7700 Memory	149.00
7700 DC Kit	5.00
FRT 7700 Antenna Tuner	69.00
FF 5 Low Pass Filter	19.00
FRV 7700 VHF Converter "E"	125.00
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QRT 24D Quartz World Clock	55.00

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101ZD	30.00
107	30.00
207R	10.00
707	25.00
208-708	10.00
290-690	TBA
480-680-780	TBA
FRG 7700	15.00

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YS 200 SWR/RMS 200 watts Range 1.8 to 150 MHZ	89.00
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ACCESSORIES FOR 290-690

NC 11B 117V Wall Charger	9.00
CSC 1 Carrying Case	7.00
MMB 11 Mobile Mount	39.00
FL 2010 10W Linear (290)	98.00
FL 2050 50W Linear	179.00
YM 49 Mike	25.00

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FV 102DM Remote VFO	\$309.00
SP 102 P Speaker P/Patch	87.00
FT 102 Speaker w/Filtering	62.00
FC 102 Antenna Tuner	281.00

FILTERS

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XF 8.2 HC	29.00
XF 8.2 HCN	29.00
XF 8.2GA	20.00
XF 455C	69.00
XF 455CN	69.00
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MH 1B8 Hand Mike	24.00
AM/FM Bd	62.00

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XF 8.9KC Wide CW (1st. IF)	28.00
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YM 22	70.00
YM 23	70.00
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YM 40 Scan Mike	23.00
YM 48	70.00
YM 49	28.00
YM 50	70.00

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NC 3A Quick Charger	90.00	
YM 24A Spk/Mike	35.00	
MMB 10 Mobile Rack	11.00	
FNB 2 Nicad Pack	35.00	
FBA 1 Battery Insert	6.00	
NC 9B Battery Charger	9.00	

VHF TRANSCEIVERS

FT 208R 2 Mtr Handy	269.00
FT 290R 2 Mtr	349.00
FT 480R 2 Mtr	449.00
FT 230R 2 Mtr	309.00

ACCESSORIES FOR 208-708

NC 7 Std Charger	47.00
NC 8 Quick Charger	79.00
NC 9B 117AC Wall Charger	9.00
PA 3 DC Car Adaptor	23.00
FBA 2 Battery Sleeve	6.00
FNB 2 Battery Pack	35.00
MMB 10 Mobile Mount	12.00
FL 2010 10W Linear (208)	98.00
YM 24A Speaker/Mike	35.00
FBA 3 Sleeve	10.00

ALL PRICES/SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

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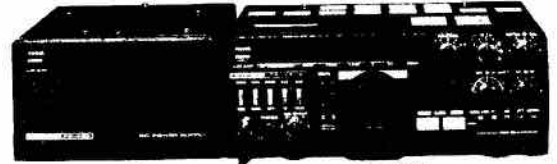
TR2500
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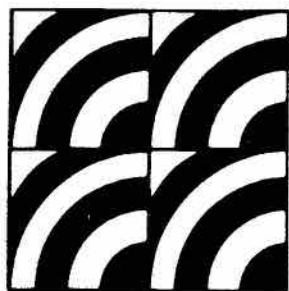
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New

IC-751

HF Transceiver/General Coverage Receiver



\$ 1794

\$ 1999
(incl. p.s.)

- 160-10M
- 100KHz — 30MHz Receiver
- CW/SSB/AM/RTTY/FM
- Microprocessor Controlled
- 12VDC Operation
- Fluorescent Display

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

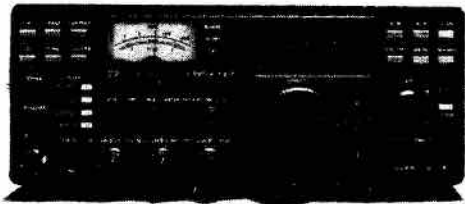
Scanning • Digital I/O For Computer Control • Mode Scan • Full Function Metering • Squelch • FM • Multicolor Fluorescent Display/Options (external)

Options: Voice Frequency Readout, External frequency controller, external PS-15 power supply, internal power supply, high stability reference crystal (less than 100Hz, -10°C to +60°C), HM12 hand mic, desk mic, filter options:

- SSB: FL30
- CWN: FL52A, FL53A
- AM: FL33

IC-271A

2 Meter/FM/CW/SSB



\$ 896

- 25 Watts
- Built in Subaudible Tones
- 32 Memory Channels
- 12VDC
- Internal Power Supply Option
- Fluorescent Display

• 25 Watts • 32 Full Function Memories that hold frequency, offset, offset direction, mode, and subaudible tone. Frequency, tones and offset are selected by rotating the main tuning knob. 7 year lithium memory backup. • Subaudible Tones are selected by rotating the main tuning knob and may be stored into memory. • PLL locked to 10Hz • ICOM's new high visibility, multi-color display gives easy to read at-a-glance display of frequency, mode, offset, VFO in use, memory channel, and RIT offset direction and amount. • Scan Memories, programmable sections of the band, or modes. • Mode-S Scan is a mode scan and can be used to scan memories with a particular mode. • Dual VFOs. ICOM's dual VFO system is now even more versatile with the ability to transfer from memory to VFO. • New Size. Only 11¼" W x 4¾" H x 10¾" D the IC-271A is styled to look good and engineered for ease of operation. • Computer Interface.

ICOM presents the most advanced all mode, two meter base station available today... the IC-271A. 25 watts of power from 12VDC or from 117VAC with the optional internal power supply/32 full function memories/multimodes/subaudible tones/PLL locked to 10Hz/high visibility, multi-color fluorescent display/RIT readout/scanning/dual VFO's new size.

IC-471A

430 — 450MHz/FM/CW/SSB



\$ 1025

- 430 — 450MHz
- Fluorescent Display
- 32 Memories
- PL Tones
- 12 VDC Operation

Full 20MHz coverage 430 — 450MHz. 32 Memories. Each memory holds frequency, mode, offset direction, offset frequency and subaudible tone for easy return to an off used frequency or for remembering a new repeater or simplex frequency. Subaudible Tones. Subaudible tones are selected

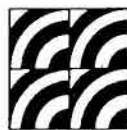
by rotating the main tuning knob. These tones may then be stored into memory along with the frequency, offering ease of operation.

Phase Lock Loop. Extremely low noise and good signal to noise ratio PLL design allows the IC-471A to lock to 10Hz for extreme accuracy.

New Display. ICOM's new easy-to-read two color fluorescent transceiver situation display shows frequency, mode, offset direction, VFO in use, memory channel, and RIT offset direction and amount.

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New Size. Only 11¼" W x 4¾" H x 10¾" D the IC-471A is styled to look good and engineered for ease of operation.



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THE NEW ROBOT MODEL 800C SUPER TERMINAL!



The new Model 800C offers the same fine quality construction, high performance, and outstanding features as the popular Model 800, plus the many new operating features shown above. It is a complete specialty mode communications terminal offering unmatched ease of operation. The 800C is designed expressly for amateur radio and nothing else! By focusing our attention on this simple concept we are able to provide a product that works better, costs less and is easier to operate than systems that try to do "everything" and do nothing very well.

OUTSTANDING BUILT-IN DEMODULATOR

The Model 800C has the same high quality demodulator acclaimed by thousands of users of the Robot Model 800 in daily use world wide, with its ability to copy those weak signals that you usually give up on. The demodulator employs separate active two-tone discriminator filters for optimum demodulation of RTTY signals. It is available with the IARU standard "low tone" frequencies or "high tones" for use on VHF-FM.

BAUDOT/ASCII OPERATION

Split screen display. Autostart. Programmable WRU and SELCAL. On-screen status line and tuning indicator. Programmable narrow shift CW ID.

MORSE CODE OPERATION

Autotrack on receive. Side tone oscillator. Morse code trainer. On-screen speed indication.

SSTV OPERATION

Full color SSTV graphics capability when used with Robot's new color scan converters plus stand alone black and white SSTV graphics transmission. Eight color graphics memories available for CQ, QTH and special messages.*

ATTENTION ROBOT MODEL 800 OWNERS: All of the "new" features found in the Model 800C are available by adding the Model 800C Update Kit to your unit. All necessary parts and hardware are included for an easy single evening installation.

For complete information on all the Robot 800C's features write for literature or visit your Robot dealer.

*The Model 800C does not receive SSTV pictures. A scan converter is necessary for this.



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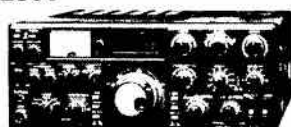
TS-930S



TR-2500



NEW
TR-7950
2 METERS, 45 WATTS,
21 CHANNEL MEMORY

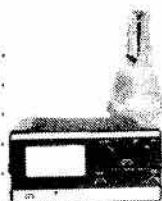


TS-830S

TS-930S Transceiver c/w built in tuner FREE MC-60A.....	2349.00
SP-930 Matching Speaker.....	119.00
MC-60A Desk Mike.....	109.00
TS-830S HF Transceiver.....	1229.00
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TR-7950 2 mtr. mobile FM 45 watt.....	549.00
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SMC-25 Speaker mike for TR-2500.....	45.00
TR-7730 2 mtr. mobile 25 watt.....	449.00
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R-1000 S.W.L. receiver c/w/clock.....	639.00
R-2000 Super deluxe S.W.L. radio.....	795.00
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Yaesu FT-77 HF transceiver introductory offer.....	639.00
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TR-7950

\$549



Outstanding features providing maximum ease of operation include a large, easy-to-read (direct sunlight or dark) LCD display, 21 multi-function memories, automatic offset, programmable priority channel, memory and band scans, built-in lithium battery memory back-up, built-in 16-key autopatch, and a choice of a hefty 45 watts output (TR-7950), or 25 watts output (TR-7930).

TR-7730

\$449

The TR-7730 is an incredibly compact, reasonably priced, 25-watt, 2-meter FM mobile transceiver with five memories, memory scan, automatic band scan, UP/DOWN manual scan from the microphone, and other convenient operating features.



TR-9130

\$719

The TR-9130 is a powerful, yet compact, 25 watt FM/USB/LSB/CW transceiver providing increased versatility of operation on the two meter band. It features six memories, memory scan, memory back-up capability, automatic band scan, all-mode squelch, CW semi break-in, and incorporates microprocessor technology.



TR-8400

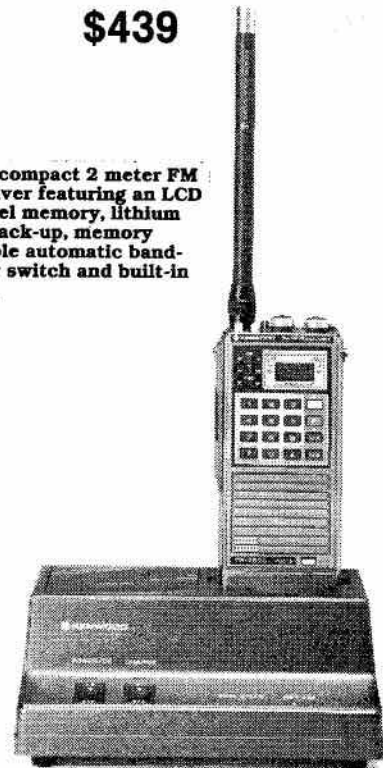
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Synthesized operation on the 440 MHz amateur band now is available with KENWOOD's TR-8400 70 cm FM mobile transceiver. This extremely compact, full-featured rig covers 440-445 MHz, in 25 kHz steps and includes five memories, memory scan, automatic band scan, UP/DOWN manual scan, and two VFOs.

TR-2500

\$439

The TR-2500 is a compact 2 meter FM handheld transceiver featuring an LCD readout, 10 channel memory, lithium battery memory back-up, memory scan, programmable automatic band-scan, Hi/Lo power switch and built-in sub-tone encoder.



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Most of our work is with repeat customers, for whom our regular delivery is 2 - 3 weeks on average, for custom crystals. There is no premium for rush orders, and crystals in stock are sent out immediately.

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 and/or model Additional data
1		T	146.34	INOUE IC22
1		R	146.94	"
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 made up and shipped on receipt of your payment.

In the example, the amateur band crystals are \$8.00 each, and the custom or commercial crystals are \$9.50 each. The total is \$73.00 plus \$1.00 = \$74.00. Ontario residents add 7% sales tax.

1983 PRICES

	HC-6/U	HC-25/U
<u>AMATEUR</u>		
Amateur bands	8.00	8.00

CUSTOM

6 - 55Mhz	9.50	9.50
5 - 5.9	10.55	12.75
4 - 4.9	11.60	16.95
3 - 3.9	12.75	16.95
Below 3	16.95	-
55 - 100	12.75	12.75

MODULES

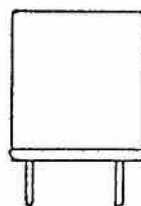
Mocom 70	31.75
Mocom 35	24.85

<u>REWORK MODULES</u> to new frequency	
Generally	19.95
More difficult	
MT500, MX, Wabco	29.95

COMMON HOLDERS

MIL Designations

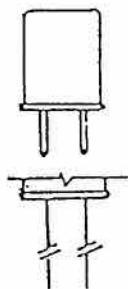
3/4 x 3/4 x 5/16
approximately
HC-6/U 050 pins



HC-17/U .093 pins

HC-33/U wire leads

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



HC-18/U wire leads

The above holders accommodate the majority of requirements. We list requirements for most sets.

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THE LOW COST 2 METER HANDIE TRANSCEIVER

AVAILABLE NOW

FT-203R



- **COMPACT AND LIGHTWEIGHT**
Using a high impact plastic case
- **EASY OPERATION**
Three-digit thumbwheel frequency selection switches, with simplex or standard repeater shift selection on rear panel
- **VOX OPERATION**
When using optional external YH-2 headset the FT-203R provides voice-actuated transmit/receive switching allowing hands free operation
- **"S" METER**
Allows monitoring of relative power output during transmissions and relative signal while receiving
- **TONE SYSTEMS**
Optional FTS-7 32 tone programmable CTSS unit or FTE-2 1750 Hz tone burst generator may be installed
- **DTMF KEYPAD**
Available as an option

Available from your authorized Yaesu Dealer.

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A compact amp at a compact price
Only \$99.95 Suggested Retail.

This amplifier is designed for use with hand-held transceivers in either mobile or fixed station configurations. Because of its light weight and compact size, the LA-2035 can be mounted under the dash, under the seat, or in any other convenient location. The LA-2035 is equipped with RF activated stand by circuitry. Easy operation. Simply connect your antenna and your hand-held to the LA-2035. Connect the LA-2035 to a suitable power supply and go.



\$99.95

Specifications
Band: 144-148 MHz
Mode: FM/CW/SSB
Input power: 1-3 watts
Maximum output power: 30 watts plus.
Power consumption: 13.8VDC at 5A. Max.
Dimensions: 100W x 35H x 125Dmm
Weight: 500 grams
Coaxial input cable supplied with a BNC connector
Output connector: SO-239



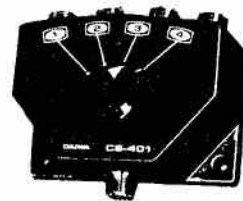
CN-720(B) N.A. 149.95 TBA N.A. 239.95

	CN-610	CN-620 (B)	CN-630 (N)	CN-650	CN-720 (B)
FREQUENCY	1.8-150MHz	1.8-150MHz	140-450MHz	1.2-2.5GHz	1.8-150MHz
INPUT/OUTPUT IMPEDANCE	50 ohm				
POWER FWD	20/200W	20/200. (2kW)	20/200W	2.20W	20/200. (2kW)
REF	4/40W	4/40. (400W)	4/40W	0.4/4W	4/40. (400W)
SWR DETECTION SENSITIVITY	4W min			0.4W min	4W min
TOLERANCE (full scale)	± 10%			± 15%	± 10%
CONNECTORS	SO-239		SO-239 (N type)	N type	SO-239
DIMENSIONS (W x H x D mm)	180 x 85 x 120		180 x 85 x 120		180 x 120 x 130

CN-620B (1165W x 75H x 97D mm), CN-720B Can only

CAVITY COAXIAL SWITCHES

	CS-201	CS-401
FREQUENCY	600MHz	800MHz
VSWR	below 1 : 1.2	
POWER RATING	2.5kW PEP 1kW CW	
IMPEDANCE	50 ohm	
INSERTION LOSS	Less than 0.2dB	
ISOLATION	better than 50dB at 300MHz better than 45dB at 450MHz adjacent terminal.	
CONNECTORS	SO-239	SO-239
OUTPUT PORT	2	4
	Unused terminals grounded	

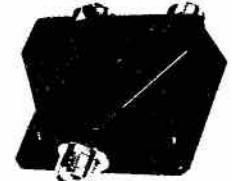


CS-401
\$119

CS-201
\$35

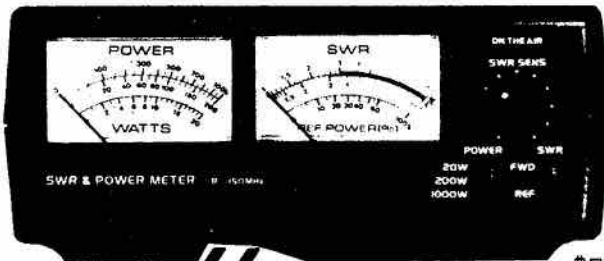


DK-200
\$99.95
DK-210
\$119.95



	DK-210	DK-200
SPEED	8 WPM - 50 WPM	
SIDE-TONE OSCILLATOR FREQUENCY	500 - 3000 Hz	
KEYING OUTPUT CIRCUITRY	GRID BLOCK - 100 V 10 mA max. DIRECT + 300 V 100mA max.	
POWER CONSUMPTION	13.8 V DC (19-15 V) approx. 100 mA (DK-200) 200 mA (DK-210) (or 9 volt battery can be installed inside cabinet)	
DIMENSIONS (W x H x D mm)	150 x 62 x 150	
LED SPEED INDICATOR	DK-210 only.	

SWR and POWER METER



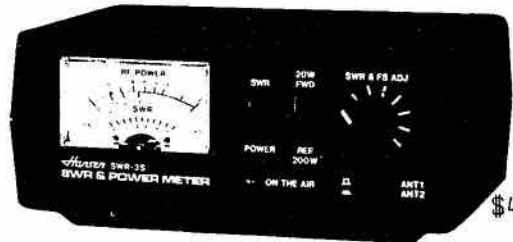
\$79.95

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HANSEN FS-55 SWR/POWER METER

DIMENSIONS: 180W 75H 90D mm 800g
BOTH FS-55 & SWR-3S HAVE LIGHTED METERS.



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HANSEN SWR-3S SWR/POWER/FS METER

FREQUENCY RANGE: 3.5-150MHz
POWER RANGE: 0-20, 200 Watts, 2 Ranges ±10%
METER SENSITIVITY: 100uA F.S.D.
DIMENSION: 150W 65H 70D mm WEIGHT: 400g
COMES WITH 2 POSITION ANTENNA SWITCH & F.S. Ant

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LETTERS:

Editor Cary Honeywell is in drydock for a few weeks and asked me to put this edition of 'TCA' together for him. It was with some relish that I dusted off my long-unused editor's blue pencil and typewriter and tackled the 'Letters to the Editor' feature first. So here goes...

Doug Burrill VE3CDC

THAT GRAND NEW FLAG

With reference to the cover of the November issue, I wonder if the flags shown were intended to be those used when the province joined Confederation or the one currently in use? The provincial flag for Newfoundland and Labrador was changed in the late 70's from the Union Jack (as depicted on your cover) to one of a new design by a noted Newfoundland artist.

Also, the name of the province is the "Province of Newfoundland and Labrador." Hopefully there will be other VO1's and VO2's who will confirm these points for the record.

Darroch R. Fagan VO1RE
Halifax, N.S.

I have been persuaded by your November issue to renew my lapsed membership, despite your slight against our region. I refer to your

cover of provincial and territorial flags. Newfoundland and Labrador did retain the Union Jack as a provincial flag for many years. However, for at least 2 or 3 years they have had their own unique flag, and approved by the legislature and is therefore official. I suggest you print a copy in a future edition of TCA.

Jim Lacey VE1AWX
Halifax, N.S.

Re November front cover— for penance, drink one Newfie Screech for every card and letter you receive from VO1s and VO2s.

HamNeill VE3EAW
Ottawa

Thanks Darroch, Jim and Ham. The November cover was made up from a stamp issue of the late 70's, which depicted the flags at the time the various provinces first joined Confederation. News of the present flag and provincial name has been slow in reaching my part of Blunderland-on-the-Ottawa here in Upper Canada. Unfortunately, due to a misspent youth I can no longer quaff the cup (Ah, Black Diamond rum... that almost beats screech!) and instead I will punish myself, as a former Atlantic shore dweller and native (ex-

VE1FV), by foregoing my daily cod and herring pie.

Thanks to Ham, here is the new flag. (The triangles on the left are in blue, those on the right are red and the arrow is in gold.)

SABLE & ST. PAUL ISLANDS

Having received and read your widely circulated November issue, I am pleased to report that I very much enjoyed it.

With regard to the article by Doug Burrill VE3CDC on Sable and St. Paul Islands, it would appear that Doug has either been in hibernation for the past 8 years or he is completely unaware of the goings on in the DX world.

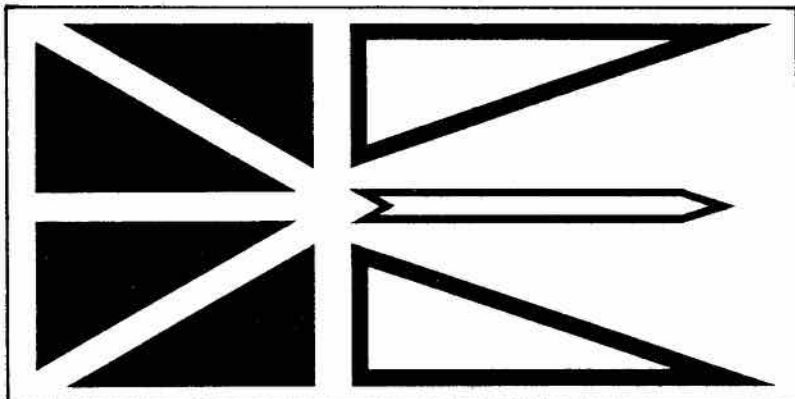
The 'news' he refers to in that the two Islands are now separate countries on the ARRL DXCC Country List occurred in October, 1978. They were accepted as separate entities for Canada after proof was submitted and verified by the League's Canadian Legal Counsel, that the Islands were under the Federal Government, not the Province of Nova Scotia, as set out by a little piece of legislation called the Canada Shipping Act. The Minister of Transport is the last word on who sets foot on the Islands and the rules and regulations one abides by while there.

In as much as the peculiarity met the ARRL DXCC criteria of that period, Sable and St. Paul Islands were accepted as separate listings and remain so today. No, there will not be other islands belonging to Canada eligible for country status, as Doug suggests. It was part of the bargain for acceptance that assurances be given that only these two islands were singled out in the Canada Shipping Act, and no other islands had similar status.

The only 'new' occurrence that has come about is that the DOC has

PROVINCIAL FLAG of NEWFOUNDLAND & LABRADOR

Adopted in 1980. The white represents the snow and ice; blue—sea; red—human effort; gold—the people's self confidence. The blue triangles represent British heritage; the red triangles—Newfoundland and Labrador reaching forward together; the gold arrow—a bright future.



seen fit to assign a permanent prefix and suffix for the Islands. After much urging the DOC has come through but the permanent suffix would be fine for a permanent station but unwieldy for visiting expeditions. There will be no way to distinguish between the different expeditions that will operate from the Islands, so for this reason a variable suffix is needed.

I believe I am qualified to speak on this matter as I was instrumental in 'inventing' these two 'new countries' and I was a member of the First DX-pedition to activate the two Islands after acceptance. We operated with the call signs VX9A and VY0A for Sable and St. Paul Islands respectively. The prefixes and the single letter suffixes were unique and received world-wide acceptance; but despite many appeals, we were unable to convince the DOC to continue this precedent.

Now that I've got the matter off my chest, I am pleased to enclose my cheque. Please enroll me as a new member of CARF and keep TCA coming.
Morton J. Wolfson VE3MJ
Toronto

As Morton not too subtly suggests, DXing is a facet of Amateur radio which I leave to the DX columnists and enthusiasts. I have really not been hibernating but have been so engaged, along with a handful of other believers, in struggling in the past 12 years to set up a Canadian Amateur organization that I have been on the air very little in that time. I can, however, recall when I first got my ticket (1947) that DXing was an interesting exercise in technical expertise and experimental communications. Now, however, what with fake and fraudulent exotic calls, money-for-cards, fatal results like Spratly and the mushrooming of new 'countries', numbers of which consist of a few acres of mud, a grass hut or two and a herd of goats, I must admit that hibernation has a certain attraction for me in so far as DXing is concerned.

As for the two 'new countries' which Morton owns up to 'inventing', the legal counsel quoted by him is at

some odds with sources we've talked to in Ottawa. One must admit however, that the bureaucratic gobbledygook here in Disneyland North is confusing to the natives, let alone a legal beagle for a U.S. outfit. As it turns out, according to a Privy Council lawyer and a Ministry of Transport official, the islands are Nova Scotia territory BUT they are subject to certain federal legislative action and controls; the closest comparison to the island's status is that of a federal national park area on land belonging to one of the provinces.

Anyway, one of the islands, with minor adjustments, has the prerequisites of my definition of new country; acres of sand instead of mud, wooden instead of grass huts and the required herd of livestock... but ponies instead of goats!

Good hunting, OM. Hey! Why not try Bear Island?

GIVE OLD RIGS A CHANCE!

Once in a while I get the urge to check into the Aurora Net on 40, but since my old Swan isn't graced with selectable side band, I only receive 80-40 on the lower side band.

What ever happened to the gentlemen's agreement on these modes? Seems as if there is enough QRM without creating more. How about it fellas, lets quit driving on the left side of the road and give us guys with 'older' rigs a chance to talk to you!

Please accept my cheque for continuation of my subscription. TCA gets better with every issue.
Joe Fertich VE7BPN
Montrose, B.C.

WORKING SHORTY

Enclosed please find my cheque for my first year membership in C.A.R.F.

I have been an active Amateur operator for 34 years, and the receipt of the Nov. issue of TCA to-day is my first exposure of any kind to the Federation. I enjoyed particularly VE3CDC's "Phone Patch Champ" article about 'Shorty' VE7AZ. I have listened in on Shorty's phone patching activi-

ties often, and have worked him a few times, but never met him and did not know what he looked like, until I saw the photographs of him in Doug's article. I am sure many other hams were in the same boat as I, and are now much better informed. Well done.

Sending the Nov. issue to all Canadian hams was a great idea, and will surely result in a big boost in membership.

David W. McLaughlin VE3WC
Haileybury, Ont.

2-METRE PROCEDURE

The recently received TCA is much appreciated and for one, it had the desired effect, that is, get with it and subscribe again. There may be some record, some time back, when I was a member however, I do have a copy of an article in the Feb. issue of 1978 page 7. It was submitted by me on the subject of procedure relating to two-metre operating.

At this time I like to think it had the desired effect however, since that time there have been a lot of new Amateurs coming on stream and possibly some of the older ones never saw the article. As a suggestion, and with your approval, it might be of some benefit to publish the article again.

R.A. Freeman
Truro, N.S.

I wrote one for the Ottawa Club away back in 1972. It was widely copied but I noticed no great improvement. A few acid comments on the air seems to have a better effect on the poor procedures. They could well form the subject of Amateur classes for an evening.

ACTIVE CLUB

Our club is going great with 10 people taking our code and theory class.

We got our repeater antenna up last week on top of a 5 story St. Clair Grain & Feeds factory (VE3WAL) 146.985/146.385 and hope to have it operational in the very near future.

The display in the County fair

Mall was a huge success and got in all the local papers.

Glenn A. Crowe VE3BSM
Wallaceburg, Ont.

NEW HAMS

I enjoy my TCA but wish there was a section for new hams, there is so much to find out— equipment, antennas (home-brew), starting to DX, etc.

Lloyd Pyke VE3NNI

These topics are covered in the separate sections of the CARF Study Guide. See the ad in the back pages of most issues of TCA.

OPERATING PROCEDURES

Congratulations on the November '83 issue of TCA. I was pleased to see the revisions to TRC-24; from past experience the previous issues were somewhat vague. The re-instatement of code sending tests will be most welcome to those who appreciate good CW sending. For those of you who feel the Amateur exams are approaching the level of the commercial exams, I can only agree with Walter Stubbe VE7EGR's comments; having both certificates there is a definite difference.

In response to the questions raised by Bill VE3JBW regarding emergency frequency monitoring and alarms, I know of no official frequencies in the Amateur bands. The international distress frequencies as dictated by the ITU (apart from those listed in Nov. '83 TCA page 50) are:

Radiotelegraphy— 500KHz;
The alarm signal consists of a series of twelve dashes sent in one minute, the duration of each dash being four (4) seconds and the duration of the interval between consecutive dashes being one second.

Radiotelephone- 2182 KHz;
The alarm signal consists of two substantially sinusoidal audio frequency tones transmitted alternately. One tone shall have a frequency of 2200 Hz and the other 1300 Hz, the duration of each tone being 250 milliseconds. To be sent

for not less than 30 seconds or more than one minute.

(The above are extracts from ITU Radio Regulations Article 41)

The added advantages on these frequencies are the mandatory silence periods specifically for listening for distress traffic. I think you would agree that trying to obtain a similar silence period on Amateur frequencies fall just short of wishful thinking. The regulations also point out that when all else fails, use any frequency or mode that will attract attention. Please note that if you use a mode of frequency for which you are not authorized, it is your responsibility to notify the D.O.C. and explain why you did so. Be absolutely sure that it is a distress situation!

Continuing on regarding operation procedures, the number of poor quality signals seem to be on the increase. It would not be fair to list the calls of those stations recently monitored whose equipment appears to be out of adjustment. I am sure that all of us (myself included) have at one time or another put a signal on the air that did not conform to accepted standards; eg. mic gain too high or final stage out of neutralization. In most cases when informed of such happenings we accept the reporting station's comments and correct the problem. Recently I have heard comments made that it is "your poor receiver," "you are too close to my frequency" (please no closer than 50 KHz!!) etc. Other interesting comments heard- "if you disconnect the ALC you'll really drive that amplifier, yes sir that's what I did" and so now we have broadband amplifiers: from DC to GHz. Perhaps it is time for all of us to review our stations and procedures. We are called Amateur Radio operators

"We are called Amateur Radio operators but that doesn't mean there isn't room for a little professionalism..."

but that doesn't mean there isn't room for a little professionalism, particularly in these days of crowded bands.

The time has come to climb down from the soapbox, any comments are welcome and appreciated. Even negative ones.

Gord Cotton VE1AVQ
Notre Dame, N.B.

THAT'S A GOOD SIGN!

Thank you very much for your efforts which are put into the TCA each and every month, I enjoy the magazine very much. To get straight to the point, here is something which I came across on my travels, which I wish was done more often.

While traveling in W8 land I happened to enter the town of Marietta, Ohio, and along with all the service club signs there was a sign which said "Marietta Amateur Radio Club W8HH", with the repeater frequency.

It was sure nice to see the sign and what the repeater frequency was without a call book. If more clubs would sponsor this type of sign, it sure would be a lot more enjoyable for travellers and maybe more useful information would be given over the repeater.

Carl Okimi
Smithville, Ont.

All clubs please note. Tourism is big business and this sort of action builds goodwill.

A LITTLE NIT-PICKING

I received my October copy of TCA on Nov. 17, and must say that I am disappointed in the late delivery. I notice that, according to some other letters to the editor, that this is not a new problem.

Also, a couple of other comments— The front cover of your October issue has a photograph with the caption "DARC SUPER EX". Maybe this has something to do with "RAQI conference", but am not sure about this. Anyway, what is DARC? or, where is it? Sorry about my ignorance, but I guess we are so far West that we are out of touch!

To nit-pick further, on page 32

of your October issue, the interesting photo of an antenna base somewhere in B.C. is not identified. Maybe the accompanying article was omitted.

My French is not equal to understanding the article on page 33. Perhaps in succeeding articles of this nature, you might provide a translation.

Charles Whittaker VE7DGI
Nanaimo, B.C.

Dear Nit-picker:

Late appearance indeed has been a problem which we hope is being overcome; however, readers should know that unlike '73' or 'QST' we are not backed by multi-million dollar companies with a full-time, paid staff... believe it or not, putting 'TCA' together is all volunteer work. Those of you out there in radioland who are among the 'do-ers' in local clubs know how much time is involved in club matters, like putting a bulletin out. Put that on a national scale, throw in a new house, exacting job and a family, indifferent printers (our contracts are small potatoes) and last but not least, 'Canada Post' and you will understand if we offer no excuses for late delivery at times!

As for the front cover on the October issue, it offers a fair example of why we have once again changed printers. The 'DARC' and the 'Super X' are not, respectively, the Deutschland Amateur Radio Club and a type of camera film, but were supposed to be the Ottawa Amateur Radio Club (OARC) booth at the Central Canada Exhibition which was billed by their public relations people as the 'Super-Ex'.

The picture of the unidentified antenna base is a complete mystery to your pro-tem editor. It apparently is a repeater site and if any busy beavers in the photo will let us know who they are and where the site is we'll gladly enlighten Charles and the rest of our puzzled readers in a future issue.

There is no translation of the article on the RAQI convention as most of its members are bilingual or French-speaking and its business is conducted in that language. A short resume of it is that they discussed a lot of Amateur

problems and according to CARF officials who attended, everybody had a helluva good time.

THE AMATEUR FAMILY

What a pleasant surprise to receive the Dec. & Jan. issues of TCA yesterday. They are excellent and have lots of reading for the holidays.

The articles from across the country are a good way to make us feel part of the same family. Let's have more please. Glad to see Steve Campbell of Bloomfield back with TCA production.

Best wishes to you and all the CARF staff for '84, and thanks for all the long hours of work you put

in for the Amateurs of Canada.
Bernie Burdsall VE3NB

NEW FORMAT

Just a few lines to express my opinion on the January issue of 'TCA'. I like the larger type printing, also the new format. This issue is more like a reader of Amateur news wants, with info on new rigs, with prices. F.B.!

Reg Argyle VE3DTU
Minden, Ont.

After all the bricks, it's nice to get bouquets. For Cary, the Editor, Steve Campbell, the producer, and myself... Reg and Bernie, you guys made our day!

Doug Burrill, VE3CDC

News Briefs

No Type Approval for Amateur Gear

Recently, a British Columbia Radio 'ham' who wanted to import a linear amplifier, was told by a Canadian Customs Officer that to bring such Radio Amateur equipment in Canada, it had to be a model certified as 'Approved' by DOC.

This is not so; if you are involved in a similar situation, request the Canadian Custom Officer to refer to note 'D 19-4-2', dated July 1 1982, issued by Revenue Canada, Custom & Excise Department.

The note states clearly at section 8 that Amateur Radio equipment does not have to be certified 'Approved' by DOC for use in Canada.

VE2BP via VE2OU

CRTB Adopts New Charter & Name

The annual meeting of the Canadian Radio Technical Planning Board, which is an advisory body to the government, was held in Ottawa on Dec. 15. The member organizations voted to change the name to the Radio Advisory Board

of Canada. Bill Wilson VE3NR, CARF past-president, was re-elected vice-president. Senior officials from DOC attended this session, which adopted a new constitution and a new formula for better co-operation with the Department. CARF was represented by Art Stark VE3ZS, a former senior DOC official and CARF DOC Liaison officer.

CARF News Service

U.S. Cable Company Fined For QRM

After two years from the original complaint about interfering with the Amateur Service on 145.250 MHz, channel E, a California company has had a fine of \$6,000 confirmed by the FCC. The company, fined under the FCC administrative process, is taking the matter to court, and will not pay unless it loses its court case.

The FCC pointed out that the cable company "failed to recognize that cable systems are not meant to share the radio spectrum but used closed cable systems which are intended to radiate frequencies over the air".

CARF News Service

More on Morse

Chuck Hooker VE3CQH/W4

Since I was engaged in the Canadian Army's last review (in 1980) of the need for international morse code (CW), may I be permitted to contribute to the debate begun by Bill Rook VE3MBF ("Morse Code in the 1980's," TCA Sept. 1983).

The Canadian Land Signals view is that morse operating skill must be retained until something better—presumably based on new technology—comes along. The advantages of morse code become apparent under marginal conditions when voice, teletype and other forms of data deteriorate beyond acceptable limits. I say marginal because, as conditions worsen, morse becomes bad also, but it degrades gracefully. The military cannot afford the luxury available to the ham, of waiting for better conditions; most Army messages are time-dependant and lose their value as time passes. We therefore plan communications for worst-case situations.

For those unfamiliar with CE Shannon's Information Theories, the accuracy of a received message varies directly as the signal-to-noise (S/N) ratio and inversely as the speed of transmission. The S/N can obviously be improved by increasing signal output power or by reducing noise level. Morse permits us to concentrate our transmitter power in a bandwidth about one-tenth as wide as a voice signal, and to reduce the total received noise by narrowing the bandwidth of the receiver. Finally, the reception resolves itself to a simple binary problem: determining whether the transmitter carrier is on or off.

You will argue that RTTY or ASCII code will produce the same result, and you will be right. But morse has one ultimate advantage over machine codes: it is read by the human ear, which remains the best filter found to date. Assuming, then, that the transmitter can be

keyed in morse, that the receiver's bandwidth can be narrowed to about 300 Hz and that the system operators are experienced in morse, our most primitive mode of Amateur communications remains the most reliable. The Army is concerned about the expense to the taxpayer of the CW training, but is convinced that necessity must override cost.

A few additional personal observations, from a ham's point of view. First, the simplicity of a morse transmitter encourages all of us to rise to the real challenge of what was once called an Amateur Experimenter Certificate: building our own rig. Many have done so, but few have the courage or skill to tackle an SSB exciter, even in kit form.

Secondly, in the era of the General Radio Service, it is refreshing, I think, to boast a unique skill in addition to the comparatively easy operating ability required by most modern radios. It separates us from the 'CBers' and less legal operators and, as Bill says, represent a measurable standard of achievement.

I disagree with the speed of transmission comparison offered by

VE3MBF. A digital system may be able to transmit at a 1kb/s rate, but I doubt that the emergency traffic normally to be expected by an Amateur at a given location will ever approach this rate; nor could we distribute that rate of data at most Amateur receiving stations. Bill quotes a claim that equivalent traffic in morse would occupy "100 channels on CW," but he forgets that each of those CW channels will be one-hundredth of the data channel bandwidth, as Shannon can prove. Packet radio interests me very much and may one day become the prime mode, but at present its capacity in Amateur hands probably does not exceed that of morse, and furthermore it cannot function in real time.

In conclusion, I will shortly reinforce my position by putting my money where my mouth is. As soon as I have the necessary means, I intend to buy a quality ham receiver capable of doing justice to CW; then I'll learn to copy righthanded and key lefthanded with whatever homebrew transmitter I can throw together.

Hpe cu sn on lo end of band.

More Tower Problems

Two more jurisdictional hassles over Amateur radio towers have surfaced recently. In St. Catharine's, Ont., a 75-foot structure has embroiled even the local member of Parliament. In Saskatoon, according to recent reports, a 125-foot tower has drawn the ire of residents and the city council, which is considering a by-law to limit and control radio towers. All of this, despite the fact that the federal jurisdiction over radio stations, including towers, has been on record a number of times. Apparently, however, municipalities don't know about it.

To be fair, there are grey areas in

this matter, such as the matter of safety in the construction and erection of radio towers, in which municipalities may well have a justified interest. In order to clear up the matter once and for all, the DOC is currently studying the question. The results will be looked at by DOC management prior to the publication of any proposed amendments to the regulations for public comment. Don't expect any results on this in the way of definite areas of jurisdiction being written into regulations for about a year or maybe more.

CARF News Service

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New HM14 Microphone. Smaller and lighter... the HM14 microphone provides a 16 button touchtone pad as well as up and down scan buttons adding easy frequency control of the radio and additional tones for repeater control.

NOR/REV Capability. Use of this button in the duplex mode allows one touch monitoring of the repeater input frequency. If simplex operation is possible you will know instantly.

Scanning. Pushing the S/S button initiates the scan circuitry. With the mode switch in a memory position the unit will scan all 5 memories plus the 2 VFO frequencies. With the mode switch in a VFO position, the unit will scan the entire band or the portion of the band defined by memories 1 and 2. Full band scan or program band scan is selected from the front panel and internally switched scanning choices of adjustable delay period after a carrier is received then resume scan, or resume on carrier drop, are standard.

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MORE! • Remote Stepping From Microphone • Remote Memory Selection • Computer Programmable Call Channel • Bank Scan • Memory Scan • Repeater Reverse Button • NiCd Battery Memory Back-up • Pluggable Initialize Module allows wide band operation (143-149.995MHz) for MARS • Touchtone microphone included • CTCSS Encoder included (Tunable) • Small Size (55H x 162W x 182D) • 2 Speed Dialling (100kHz/5kHz) •

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FREQUENCY COVERAGE OF KT-200ET CAN BE CHANGED TO 150-160 OR 160-170
BY CHANGING THE REFERENCE CRYSTAL.....

7th Annual CARF Symposium Proceedings

In the December issue we printed a summary of the proceedings of the 7th annual CARF National Amateur Radio Symposium but due to a number of inquiries about details of the discussions we are publishing the official record of the four workshops and the plenary session, compiled by Leigh Hawkes VE1ZN. The event, sponsored by the Nova Scotia A.R.A., was held Oct. 15 last year in Halifax.

Successful Symposia seldom are the beginning nor the end of any topic of discussion. There are both moments of extreme satisfaction in seeing a favoured proposal adopted and moments of disappointment when they are not. With this in mind, it can truly be said that the 7th National Amateur Radio Symposium was an undisputable success.

Detailed minutes of the conclusions and resolutions from each workshop session are herein presented as are the minutes of the plenary session. The value of the plenary was never more evident than at this symposium where a comparison of the minutes will reveal a startling number of reversals of workshop recommendations. The plenary minutes represents the final synopsis, conclusions, and recommendations of the symposium.

My personal thanks to each and everyone who participated in this symposium. To the planners, the organizers, the clubs and individuals across the nation who made submissions and representation, those who ran booths, the moderators, the recording secretaries, the DOC, the NSARA, the CRRL, all those who worked quietly behind the

scenes, and all those who took the time and interest to attend and participate.

73, Leigh Hawkes, VE1ZN
CARF Atlantic Regional Director

The working group moderators were: No. 1, Mike Pothier VE1UG; No. 2, Bernie Bonnar VE1UT; No. 3, Jim Shand VE1ASN and No. 4, Don Bower VE1AMC.

Conclusions— Workshop #1 Amateur Examinations and Recruitment

TRC-24: The DOC provided the symposium delegates with copies of the latest TRC-24 bearing an amended date of Sept. 1, 1983 and a scheduled effective date of Feb. 1, 1984. Despite the relatively short time period to review the document, the participants present felt it was much improved and there were no strong objections to its amended format. The workshop did however suggest that the implementation date be extended until June 1984, to take into account those currently studying under the existing TRC-24 syllabus.

DOC advised this TRC-24 is expected to be in force for at least two years. Both D.O.C. and CARF will welcome any comment or input on the new TRC-24.

Questions on all future examinations will be geared to the revised edition. Concern was expressed that some consideration should or could be given in future revisions to quantifying the actual depth of knowledge required by the applicant rather than just stating the subjects.

Training: Workshop participants concluded that this is the responsibility of Amateurs more than DOC. It was further recom-

mended that a text be developed to assure commonality on a national basis. It was suggested that a correspondence course be made available to those unable to attend regular classes.

'No Code Certificate' workshop participants concluded that the existing 10 WPM requirement does not seriously impede candidates from obtaining a certificate and that the code requirement in conjunction with the balance of the prerequisites in TRC-24 help to insure the high caliber of individuals admitted to the ranks.

SWL Period: The workshop concluded that time should be allocated during training courses to introduce applicants to the operational aspects of Amateur Radio but that this should be the responsibility of the Amateur fraternity and not be regulated by the D.O.C.

Experimental Status: According to I.T.U. definitions, experimental and Amateur service are two separate entities. Amateurs are still free to experiment within Amateur frequencies and experimentation outside Amateur frequencies may take place by applying for an experimental licence (e.g. VE9).

D.O.C. advised there is no intention to re-instate 'Experimental' on Amateur licences.

Examination Fees: The workshop participants concluded that examination fees should be reinstated. They should be nominal and non-compensatory. There was also some discussion relative to prorating the fee structure for applicants not writing the entire examination.

Conclusions— Workshop #2 Spectrum Planning and Management

To set the tone of the workshop and establish the atmosphere it was decided to deviate from the subjects listed and begin with a discussion of the banned countries list. This was thought to be a light subject and could be disposed of in short time. That proved to be an inaccurate judgment and consumed the workshop time until coffee break period. It drew comments from every member and served its purpose well. Discussion generally centered on two aspects: 1. The difficulty of every Amateur being made aware of the current list. 2. The prospects of softening the regulations to eliminate the threat of prosecution.

It was pointed out that CARF publishes the current list every month as a regular feature in TCA magazine, however that reaches approximately 5000 or so of the 23000 licensed Amateurs. Further, the Canada Gazette contains all changes in radio regulations.

Technically, it is incumbent on the Amateur to provide himself with up-to-date regulations. One suggestion was that D.O.C. distribute the banned countries list with licence renewals each year, but this was not made a recommendation of the workshop.

Prosecutions: It was pointed out that Canada is a signatory to an international convention regarding banned communications, and as such is obligated politically to include this as a regulation rather than a guideline or policy. However, it was further pointed out that no known prosecution has ever been initiated by the DOC. The workshop was heavily in favour that a statement only be forwarded to DOC expressing Amateur Radio Operators' concern at the present situation. No recommendations forthcoming.

From the above subject, the workshop next discussed **Six Metres for Linking**. It appears there is no DOC restriction by way of regulation to prevent linking on

50-54 MHz. The only regulation pertaining to the use of these frequencies makes it mandatory to identify the transmissions. There was a policy guideline issued in 1971 at the Amateurs' request that those frequencies not be used. It is the consensus of this workshop that there be no recommendation for change. The workshop would point out the disruptive nature of E-layer propagation occurring on this band during the summer months, and recommend that Amateur repeater linking be done on higher frequencies where those effects are minimal and where identification of the link transmissions are not required.

Call Signs: The opening of new call signs and changes in the present assignment were discussed under the general heading of: 1. The reasons why Amateurs think it should change. 2. The need or perceived need for change. The workshop was read several letters from individuals who had responded to the call for input. It was pointed out by the DOC representative present that a survey taken by the department in Ottawa relative to the future needs in the province of Ontario found that at least 10 years will pass before there is a need to make any change. There is a recognition that while all

two letter calls might be desirable, it means changing a lot of existing calls over the objections of many Amateurs who feel an attachment to their issued call letters. It came to our attention that present DOC policy allows an Amateur to retain his call for a two-year period in the event of a move to another area. (Not withstanding the requirement to obtain a new call in the area to which he has moved.) The consensus of the workshop was to let the present situation continue as it is. There is no necessity of a change for at least 10 years and to face the problem at that time. No recommendations to D.O.C.

U.S Phone Band Expansion; Gentlemen's Agreements: These were both discussed as if they were one subject because of the interaction. The reason for legislated sub-bands for phone and CW apparently goes back to the 1920's where it was desirable to provide some guard bands between Amateur phone operation and that the commercial frequencies adjacent to the allocations for Amateurs. Somewhere over the years, the idea of the guard bands at the top end of the bands was dropped and by conven-

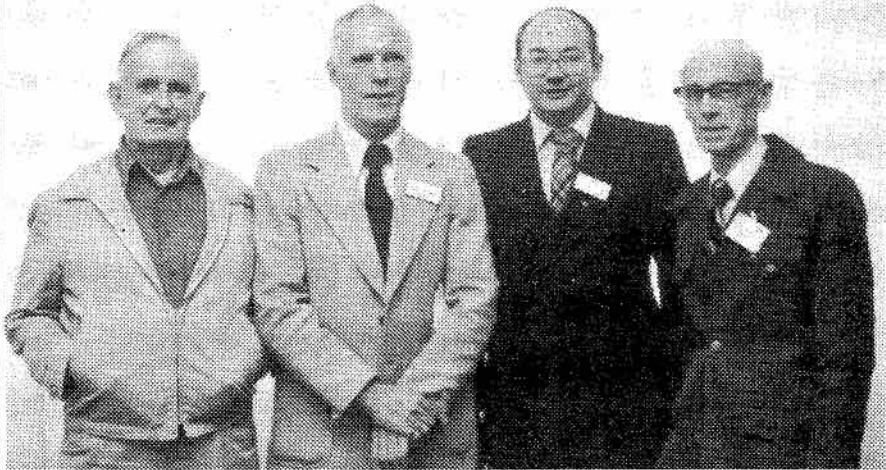


Left to right: DOC observers. George Richard VE1JJ, Jim Cullen VE1RJ, convenor Leigh Hawkes VE1ZN and DOC HQ official Larry Greetham VE3OJK.

tion CW migrated towards the bottom end and phone to the top of each Amateur allocation. With today's technology that guard band approach is no longer a requirement. Canada and the United States of America are the only countries in the world who do legislate the sub-bands. Opinion generally points toward the fact that only 20,40 and 80 metres are real areas of concern.

A background position was outlined showing the various moves downward by USA phone stations and the responses of the VE Amateurs in the past. Several options were outlined in the event of the next downward expansion by the U.S.A. phone stations. Those include a status quo, another request through proper channels that FCC in the USA consider moving the 80 metre novice allocation downward by 25 kHz to 3675-3725 kHz or 50 kHz to 3650-3700 to allow for Canadian expansion to 3700 maintaining 50 kHz relatively free from CW. (It being pointed out that initially the US novice allocation was made from 3700-3750 at the same time as the US phone band was expanded downward from 3850-3800 kHz. Novices were restricted to crystal control and 75 watts of power. Since that time, the crystal and power restriction has been removed and replaced with permission to run 250 watts of power and VFO control so that moving the area of operation no longer constitutes a hardship on novices.) Removal of all sub-bands restrictions which would allow operation of any mode on any frequency was also considered.

Unofficially the workshop got the impression that the DOC would be more receptive to the latter recommendation at this time. De-regulation would follow similar directions as is being undertaken in the US and is in keeping with a DOC desire to lessen their administrative load. It is recognized that objections within Canada would come from CW operators who would see their perceived rights to protected frequencies abused. With



Carf officials: Art Stark VE3ZS, DOC liaison; president Don Slater VE3BID, v.p.s. Ron Walsh VE3IDW and Doug Burrill VE3CDC.

today's technology in receivers with narrow band highly selective filters, more QSO's per kHz are possible than ever before. The other area of objection is going to come from the USA operators who are likely to show some signs of jealousy at such a Canadian move, and would no doubt petition the FCC for similar privileges within a short period of time. Complete de-regulation will become a reality sooner or later as we are effectively getting there piece by piece, with the resultant trauma every few years. It may be time to take the bull by the horns and get it over with. If and when all of North America has the same allocations and the reshuffling subsides, there should be more harmony between Canadian and American hams. Despite the desirability of some separate phone frequencies from a QRM standpoint, one must question the justification for same.

This workshop therefore would propose that all sub-band restrictions be removed. (There may be a case for certain areas being restricted for special communications.) For the most part, band usage should be subject to gentlemen's agreements, not regulation.

**Bandwidth Limitations—
Computer communications on
H.F. Bands:** These two subjects

were dealt with as a single item. The nature of spread spectrum transmissions and packet radio bandwidth requirements were put before the workshop. In view of the fact that this workshop did not have anyone who was actively engaged in either mode, and after discussion it was the decision of the workshop not to recommend any specific proposals for bandwidth limitations but rather express a concern that spread spectrum techniques should be perfected at VHF frequencies where possible interference to great numbers of Amateurs is minimal and that it should only be introduced into the HF bands after it has proven to be a practical mode of communication for Amateurs and proven that it does not unduly disrupt the present operating techniques.

Conclusions— Workshop #3 Interference and Regulations

Enforcement of Regulations: A limited budget and manpower situation were again cited by DOC as being a significant contributing factor limiting more aggressive enforcement. In addition, the allocation of authority to prosecute under the Radio Act is tightly controlled and requires ministerial level approval before DOC can proceed with court action. Those fac-

tors, coupled with a Radio Act that is "A little out of date" and municipal government attempts to regulate antenna structures were identified as problem sources and formed the basis of discussion, resulting in the following workshop recommendations:

1. Publicity of DOC regulation enforcement activities to be increased.
2. Amateur Radio Clubs be put on distribution lists for press releases and other information with regards to DOC activity or planned activity.
3. Review the delegation of decision making powers to the regional offices of DOC.
4. Increase efforts to bring the Radio Act up-to-date with current technology.
5. Clubs should where possible avail themselves of The Canada Gazette so as to be aware of changes in laws and regulations.
6. The official observer (O.O.) program might be modified to include sending a copy of the report to the regional office of the DOC nearest to the offending station.
7. Amateurs should try to involve themselves more fully into the municipal by-law making process so as to avoid restrictive and non-enforceable by-laws such as antenna supporting structures.
8. Amateurs should be cautious of signing restrictive covenants when purchasing property. They may prohibit antennas or supporting structures. Except for this, municipalities have no authority over a federally licensed activity.

Cable television: CATV operators and technical staff inexperienced in ingress/egress, its potential effects and causes, particularly in non broadcast spectrum (Mid-band) as well as the cost of cures both in capital expenditure and maintenance were identified as major problems.

DOC advised that industry associations have been formed and are now sharing technical information and upgrading knowledge within their circles. They are advising cable management of and on

problems and cures and where to spend money most effectively. DOC advised that cooperation between CATV operators and the department is improved and that the operators are becoming more responsive to problems.

D.O.C. continued to stress that more patience and cooperation between CATV operators and Amateurs is necessary and that we should learn to co-exist. Suggested methods included minimizing power output necessary to communicate and the locating of antennas as far from cable facilities as possible.

In response to a written submission, DOC advised that while CATV operators avoidance of channel 'E' is not an ideal solution, for the time being and until a more effective solution can be worked out, it will serve as a temporary answer. DOC did advise that if the CATV company does meet BP-23 standards, then the Amateur operator is responsible. Meanwhile, the DOC will encourage CATV operators to improve their equipment, maintenance and installation practices and expertise.

There were no workshop recommendations concerning tightening up of BP-23 specifications. This matter will require more consideration and study before possible submission at a later date.

Industrial Noise: DOC policy is guided by the principle "Thou shalt not interfere". Problems that do occur are solved in cooperation with the firm or industry involved. However, DOC must be made aware of a problem in order to act. DOC advised the workshop that new proposals in regard to power line interference have been published. Referring to Electro-Magnetic Compatibility Advisory Bulletin 1, or EMCAB 1, among the many new devices identified as possible sources of interference to/from were: **Cordless Telephones, Home Computers, Video Cassettes.**

The problem is being tackled on

an electronic industry-wide basis. DOC's EMCAB 1 attempts to advise designers and developers of the nature of the electro-magnetic environment they should expect their products to operate in. It also suggested guidelines for the emission levels generated by such products.

The workshop was advised that DOC are developing more restrictive guidelines for the operation of cordless telephones and that they are attempting to get industry more aware of and solve EMI problems before products are marketed.

DOC encouraged the operation of club TVI committees in resolving cases of interference concerning Amateur activities, and further urged Amateurs to exhaust all efforts in resolving interference cases before turning to them.

**Conclusions— Workshop #4
Emergency Communications
Communications at the Community Level:** What constitutes an emergency situation and what constitutes an emergency communication? How in fact is an emergency declared? What are Amateurs' obligations, if any, in an emergency situation?

What is the Amateur Radio Operator's role with regard to public service and how it should be established?

What are and how are commercial versus public or community services differentiated?

Following a lengthy and vigorous discussion of the above, the workshop recommended the following:

That CARF diplomatically and tactfully (in view of the obvious sensitivity of the matter) review the current regulations affecting public service type communications with DOC. The intent would be to explore the possibility of having current regulations altered to reflect the actual and desired situation.

Training (Note: Training in this context had to do with the training of Amateurs with respect to handling emergency communi-

cations.)

A lengthy discussion ensued as to what would be an acceptable standard message form. Standard frequencies, nets, procedures and related items came in for considerable discussion. The interface with the user emergency agency, organization was deemed to be a very real problem.

Resulting from these discussions were the following workshop recommendations:

That CARF in conjunction with Emergency Planning Canada and where necessary the DOC establish national standards or recommendations with regard to frequencies to be used, message procedures, modes of operation and if practical, assist in interface definition with agencies being assisted in an emergency situation. Typically this would involve the establishment of HF net frequencies and times, modes of operation (CW, SSB, RTTY or DATA), standard message forms (i.e. the DND example). Assistance would also be sought in 'writing' Amateur Radio into the emergency plans of federal agencies. NOTE: This has been done in a couple of occasions in the Maritimes.

Tone Alert: The mechanics of various tone alerting systems were discussed and examined. The when and why of tone alerting systems was thoroughly explored.

The Workshop recommended: That CARF through its national organization should institute such proceedings as it is able in order to establish a national tone alerting standard. This would allow today's highly mobile Amateur the methodology of being accessed by or accessing the local tone alerting system. It was noted that the setting of a national standard for a tone alert system was not an easy task and that some of our national research agencies could probably make a significant contribution in this regard.

In-Band Repeater Linking: The methodology of in-band that: repeater linking was discussed. The advantages and need for such an approach was fully explored.

The workshop recommended that: the DOC alter the regulations to allow inband or lower frequency linking of repeaters in a declared emergency situation. NOTE: As it turned out this does not appear to be a problem.

Secal or Selective Calling Systems:

Selective or Secal Calling Systems were explained and discussed. The obvious usefulness of such systems were noted. The mechanics of a national numbering system were explored and the difficulties rapidly became apparent.

The Workshop recommended that: CARF should initiate and coordinate a study to analyze the possible establishment of a National Selective Calling System. Essentially what is really required is the writing of a viable set of standards for such a system. While at first it might seem quite simple, the problem is full of technical traps, but it is eminently suitable for numerous and quite elegant technical solutions.

Disemination of Information:

The transmission of information and lessons learned from one group to another came in for considerable discussion. Indeed a great deal of very valuable information was exchanged within the workshop itself.

It was noted that the experiences of various local and regional groups as to the techniques and skills they derived from their involvements in real and exercise situations did not have a good medium for disemination to others. Essentially everything from message forms to net control to how to mount a radio on a pack frame was covered.

The Workshop strongly recommended: That CARF institute an emergency communications column in TCA publication. It is also noted that the EPC Digest might be contacted with a view to exchanging information.

The Plenary Session

Moderator: Don Slater VE3BID,
President CARF.

Format: Following lunch break, symposium participants from all workshops gathered in common to hear and give final recommendations on the reports of conclusions reached in each of the morning sessions. These reports were each given in turn by the individual workshop chairman.

Amateur Examinations and Recruitment

(A) The symposium endorses the workshop conclusions on the TRC-24 and expresses its support to the re-introduction of the code sending test requirement.

(B) The symposium endorses the workshop conclusions regarding training syllabus, adding that both CARF and CRRL have study guides currently available.

(C) The symposium endorses the workshop conclusions regarding a 'no code above 30 MHz' licence.

(D) The symposium endorses the workshop conclusions regarding a mandatory SWL period.

(E) The symposium endorses the workshop conclusions regarding experimental status.

(F) The symposium rejects the workshop conclusion on the re-establishment of examination fees. DOC expressed concern that it could end up costing more to handle the fee (\$10 to \$20 had been the figures discussed) than the actual fee itself. If pressed to become fully cost-recoverable, the examination fee could very well become a very considerable amount. If so, this

could be a deterrent to potential new Amateurs.

Spectrum Planning and Management

(A&B) The symposium endorses the workshop recommendation to remove phone sub-bands and have them replaced by Amateur administered gentlemen's agreements.

(C) The symposium rejected the workshop recommendation of forwarding a statement of concern to DOC in regards to the current status of banned countries list. The symposium was advised of the reason why Canada supports the list. Canada agreed to it as part of its ITU commitment, largely as a political gesture in order to gain concessions from other countries on far more important issues. (Each ITU country has an equal vote. There are no superpowers.) DOC advised that there have not been enforcement actions taken against Amateurs for violation of the list, but if they did receive an infringement notice from another country, they would be obliged to take action.

In appreciation and realization of its political advantages, the symposium recommends no request for any action on this subject.

(D) The symposium endorses the workshop recommendations concerning call signs.

(F) The symposium endorses the workshop recommendations concerning spread spectrum communications and bandwidth limitations.

(G) The symposium endorses the workshop recommendation in regards to the use of 6 metres for linking.

Interference and Regulations:

The symposium endorses the entire recommendations of the workshop report, and further passed a resolution that "CATV companies be forbidden to use any Amateur band frequency for distribution of signals within their cable system."

DOC will be requested to implement this as part of BP-23 regulations covering CATV systems.

The symposium also recommends that DOC push for early

adoption of the EMCAB-1 Guideline into actual regulatory status. This will prevent dumping of sub-standard equipment into the market place that will take many years to get rid of.

Emergency Communications:

The symposium rejected the workshop recommendation that CARF review current regulations affecting public service type communications with DOC. It was pointed out that existing regulations already permits federal

government take over and access to any radio station and there was no need to have public service specifically written into our regulations. The symposium voted to leave the situation as is.

There was considerable discussion on all other workshop recommendations which were essentially to further study ideas and formulate a standard nationalized operation. The symposium endorses all the remaining workshop recommendations.

Compte rendu de VE2

Robert Sondack VE2ASL
Directeur pour le Québec

C'est avec plaisir que je profite de cette nouvelle année 1984, pour vous présenter, au nom de notre association nationale, CARF-FRAC, tous nos vœux de succès dans ce merveilleux passe-temps qu'est la radio-amateur.

En ayant choisi de travailler pour vous au niveau national, c'est dans un esprit de coopération et d'actions positives que nous aurons à progresser ensemble.

Ainsi, nous progresserons ensemble à partir de vos critiques, remarques, et suggestions. Que désirez-vous de FRAC au Québec? Que faut-il améliorer? De quelles façons nous suggérez-vous de nous y prendre? Bien sûr, des critiques ne sont pas toujours faciles à accepter, mais une association qui respecte ses membres est à leur écoute et si vous prenez le temps de formuler des critiques sur le rôle de FRAC au Québec, donnez-nous aussi des pistes de travail. Seul on ne peut penser à tout!

Vous avez des remarques, des suggestions, de bonnes idées, prenez un bout de papier, écrivez-les, envoyez-nous les! Soyez-en sûr elles seront prises en considération.

Une autre dimension très

importante pour une association, c'est évidemment d'avoir des membres. Vous êtes membre de FRAC, pourquoi? Quels sont les motifs qui vous y ont fait adhérer? Ce n'est sûrement pas par hasard que vous avez crû à l'existence d'une association nationale pour vous représenter par des radioamateurs de votre province dans un contexte plus élargi de bonnes relations humaines.

Mais que faites-vous pour faire connaître FRAC? En parlez-vous autour de vous? Expliquez-vous les services rendus par votre association nationale? Rencontrez-vous de nouveaux membres? Ce n'est trahir personne que de travailler en collaboration et complémentarité avec d'autres associations de radio-amateur. D'actions concertées naît le progrès, c'est vrai aussi pour les radioamateurs.

C'est dans cet esprit de collaboration que j'aimerais entreprendre cette nouvelle année, et, comme le mot le dit, collaborer c'est "travailler avec une ou plusieurs personnes à une oeuvre commune".

Alors, j'attends vos suggestions et critiques, mais attention, rien de gratuit, des pistes concrètes de travail, un esprit positif!

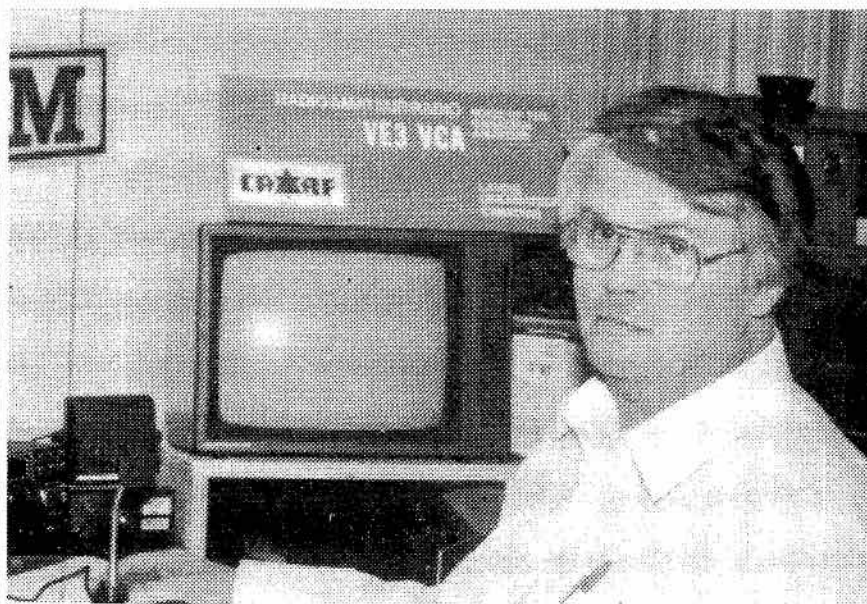
Shuttle Aftermath

The great Amateur space station event is over and has been judged a tremendous success in the public relations field as well in Amateur circles. The event attracted the usual assortment of nuts and turkeys, including at least one mean practical joker who pretended he was W5LFL, Owen Garrriott, the space Amateur, leading one Canadian operator to believe he was the first to contact Owen.

In a call to Chuck Biggs, KC5RG, the public relations chief at NASA in Houston, CARF News Service was told that he had reviewed the tapes and that no such contact had taken place. He said that the first one was made on day three of the flight, with WAIJXN in Montana. Despite elaborate preparations and equipment set up in Ottawa for the CARF HQ station, VE3VCA, its receivers were often blocked by intermodulation QRM from nearby VHF public service stations, Owen was heard only once. There is a chance that VE3-

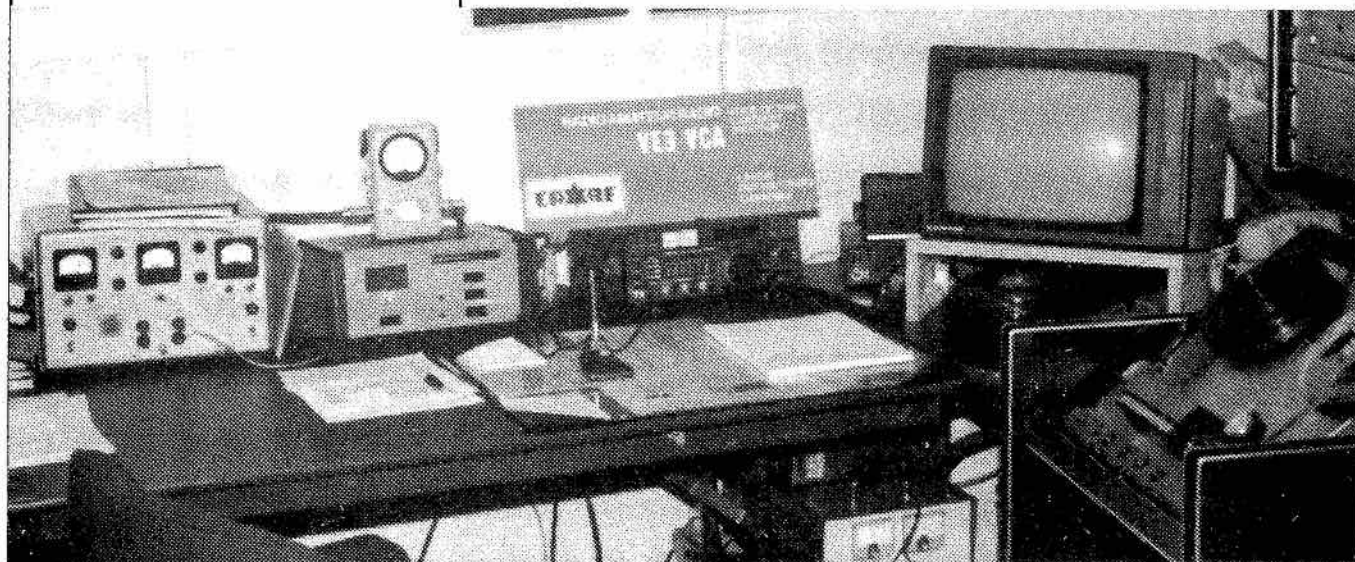
VCA's transmissions were heard. QSL cards for those who made it into Owen's log will not be available for several weeks. All QSL and

SWL cards should go to 'Ham in Space QSL Bureau', ARRL HQ, 225 Main St., Newington, Connecticut, USA 06111.



Mailes Dier VE3BCO, an Assistant Ontario Director for CARF, spent a month planning VE3VCA as a Shuttle station and building a special antenna. Unfortunately, local intermodulation QRM spoiled reception of the Columbia signals. Despite the disappointment, Mailes hopes that maybe some of his transmissions were picked up by W5LFL on his passes over Ottawa. (Photo: VE3ZS)

Some of the equipment assembled by Mailes included a computer, special recorders, HF and VHF transceivers, much of it loaned by ICOM. (Photo: VE3ZS)



future and plan to better utilize the bandwidth we now have.

In the end, of course, it comes down to individuals and applied technology, with the individuals being the far more important parameter. We simply need more Amateurs, preferably "doers, movers and shakers!" If everyone who receives a copy of this newsletter in the next year could assist in the licensing of one new Amateur or reactivation of an existing but inactive Amateur we could double the number of Amateurs on the air. If each reader could explore a new mode of operation previously untried (RTTY, satellite, etc.) during the next year we would have more personal, technological development than has been the case for the previous five years. (Note—there are those who would suggest I should, in my case, try CW!) If each of us were to participate in at least one public service event in the coming year we would have a ten-fold increase in public awareness of Amateur Radio. Only we as individuals can collectively make any of this happen.

So far this has been a pretty negative affair. Certainly Amateur Radio operators in this province have a great deal to be proud of. Amateur Radio operators assisting ground search and rescue teams have contributed fundamentally and directly to the rescue of over 80 lost or injured persons. In several instances the actual saving of a human life was involved under circumstances that makes TV dramas pale by comparison. Other public service activities include communications for road rallies, foot races, international and national sports events as well as Little League baseball tournaments and other sports events.

Members of the Nova Scotian Amateur radio operator fraternity have participated in a very successful manner in the negotiation and reconciliation of difficulties involving use of the radio spectrum in this area. Successful interventions at CRTC

hearings with respect to cable TV interference attest to that. In addition, a number of other matters regarding certain forms of interference and licensing of handicapped Amateurs have been satisfactorily resolved.

The past couple of years has also seen the very successful marriage of Amateur Radio and computer technology. It is probably in this area that the future of Amateur Radio likely lies and should be most aggressively pursued. Many of the younger people that are excellent candidates as potential Amateur Radio operators have in fact been, momentarily at least, sidetracked into the world of personal computers. If we could attract these people to our area of interest as well, offering a very powerful communications medium, the future of Amateur Radio would probably be well assured. Your thoughts and ideas with regard to this concept would be appreciated.

The answer to the four questions asked earlier in this editorial can be best summed up in one word: 'understanding'. The reason most people complain about things is that they do not take the time to understand or figure out why they existed that way in the first place. If they took the time to understand the situation, rather than complain about it they could offer suggestions as to how to resolve the matter, or heaven forbid, actually assist in the resolution of the situation itself. Truly, in some cases, ignorance is bliss!

The expression of a complaint about a particular situation is at least an indication of interest. This can be pursued to the point where the individual concerned is prepared to offer suggestions, ideas or actually assist, or he advises he is not prepared to do any of these things. Quite simply if he is prepared to help, his opinions count; if he is not, they don't. There is one Amateur Radio Club in this province who saw its membership increase by 800% and active projects go from 0 to 11 when a new

club executive adopted this approach.

There is an old expression, "You get the kind of politician you deserve!" This applies equally well to your Amateur Radio organizations. If you are not prepared to at least participate in some degree in the organization, do not expect it to live up to your expectations. A case in point is the NSARA. To date I have not personally had a single inquiry, complaint or comment as to how the NSARA is run or what it does or does not do. However I do know that a fair number of its members have expressed negative opinions on everything from the cancellation of the weekly meetings to what their membership fee buys them in the first place. This is good, at least there is an expression of interest. The trick of course is to do something positive with it. At the (CARF National Amateur Symposium) in Halifax, you or your proxy will have an opportunity to do just that. Be there, one way or the other!

Finally I will leave you with some questions to dwell upon:

—Who pays for the gas of the Amateur who maintains that repeater you use regularly?

—Why were you complaining about buying \$18 worth of Canadian crystals for the repeater frequency change when you just finished paying \$1500 for a Japanese transceiver you purchased in the States?

—Why did you not offer yourself for one of the executive positions at your last club election?

—Considering all Amateur Radio has given you, and all you have taken from it, when was the last time you really did something for Canadian Amateur Radio in Nova Scotia? And no, membership fees of any type do not count. They do not even constitute a down payment on what you are receiving. We all can use your ideas, thoughts, involvement and assistance now.

Please help. Think about it!

Don Bower, VE1 AMC
President, NSARA

Guest Editorial

This editorial is by Don Bowen, VE1AMC, president of the Nova Scotia Amateur Radio Association. It originally appeared in the NSARA Bulletin but we thought it deserved a wider audience...Euitor.

"It Is Time For A Slogan Revived and Revised"

I have just finished watching Alvin Toffler's *The Third Wave* on television. A great deal of what was said in the program applies to our situation in Amateur Radio today. We as Amateurs must appreciate and understand what is going on around us and alter our approach to the use of the spectrum accordingly. Failure to do so can only lead to the eventual disappearance of Amateur Radio. On the other hand, there is virtually unlimited growth potential for those Amateurs who wish to pursue the opportunities presented to them.

Recently I had occasion to "read the mail" as a group of Amateurs discussed in detail all of the things that were wrong with a project being undertaken in their area. Phrases such as "never worked right", "it is taking a long time" and "another project down the tube" were used on occasion. Sometime later one of the principals with the project came on the air and asked for some minor assistance regarding the project. Even though I knew that any of those present could have assisted, they chose not to. This type of situation, an all too frequent occurrence in Amateur Radio circles, raises a number of questions:

Why does this type of attitudinal problem exist?

Are the opinions of these kinds of complainers important?

Is this malaise just a symptom of a far more serious problem?

What can you do and I do about it?

The answers to the above questions (and there are answers) provide an interesting insight into the future of Amateur Radio. Today an Amateur Radio operator is faced with unlimited opportunity to develop his skills and abilities coupled with the virtual certainty that, unless he does, he will lose it all. Lets face the facts. Today's active Amateurs are older (average age), fewer in number (as a percentage of the population), less technically inclined (did you build all or any of your current station) and less involved in the public domain (public service, etc.) than has previously been the case. If we are to turn this situation around, all of us must get more involved in Amateur Radio.

The Halifax Amateur Radio Club in its initial issue of the VE1 Callbook had the editorial theme: "What Have You Done For Amateur Radio Today?" That is still an excellent question, and I sincerely hope you have a satisfactory answer to it! The problem today is considerably more serious. We are fighting a spectrum battle that we continue to lose. Even though we got "new" bands (and only of marginal consequence) at WARC '79 we as Canadian Amateurs lost over 10MHz of

bandwidth (420 to 430 MHz)¹ that in the future would have been vitally important. Consequently I am suggesting a somewhat revised theme for this editorial (with apologies to a former U.S. president): "Ask not what Amateur Radio can do for you, but rather what you can do for Amateur Radio!"

An examination of your current Amateur Radio licence will reveal that the word "experiment" has been dropped from the licence description and title.² Are we in fact a group considered by the authorities to be little better than glorified CB'ers? We certainly are all to a large extent using factory-built ricebox radios like the GRS crowd (appreciating that in 'most' cases the power levels are different) and listening to various HF and VHF frequencies the language and procedures differ little from the group on 27MHz or thereabouts. I feel, we are in fact, "different" by virtue of training, learned and acquired skills and attitude toward and understanding of the spectrum we occupy. If we are to retain this spectrum we had better look to the

¹ The WARC '79 left 420-450 MHz Amateur but DOC assigned 426-430 MHz to another service, as it did with 3890-4000 MHz.

² To conform with ITU agreements.

CARF takes action on Cable TV QRM

Cable television interference affects not only the Amateur Service but other VHF and UHF radio users as well. In view of this, CARF, as a member of the Radio Advisory Board of Canada (formerly the Canadian Radio Technical Planning Board) has asked the Board to investigate the problem. Remembering that the Board is an advisory organization to DOC, it is hoped that more weight will be carried by its recommendations than if CARF approached the regulatory authorities as representing one group of users only.

Here is the text of the letter, which was accepted by the Board at its annual meeting in December.

"Amateur radio operators across Canada are concerned with a problem which has serious implications for both commercial and Amateur users of the VHF and UHF spectrum and cable television (CATV) systems due to the 'leakage' of radio frequencies out of and into the cable systems, and the consequences of this interaction.

"This interference problem is of such significance, extent and growing magnitude that the Canadian Amateur Radio Federation, on behalf of Amateur licensees as one of the affected user groups, requests that the matter be reviewed by the Board.

"Interference to the Amateur Service in the 144-148 MHz and 220-225 MHz bands occurs across Canada where leaky CATV systems utilize mid-band and super-band TV channels 18(E), and 23(J), and 24(K) for program distribution. Other radio services, primarily the land mobile service, operating in the 120-174 MHz and 216-470 MHz bands may also be experiencing this type of interference due to CATV system 'leaks'...

"Each of the mid-band and super-band TV channel picture carriers being distributed creates a major problem when it radiates from a leaky cable system and then

each picture channel is equivalent to a high power transmitter emitting continuous wide-band noise. Each one effectively interferes with its licensed radio co-channel and some adjacent radio channels on either side. Due to the extent of cable networks, where the system leaks badly, the interference is spread over wide urban area and it is practically impossible for a mobile unit to drive out of the interference zone.

"Although the Department of Communications has set a standard governing maximum permissible radiation from CATV systems, it appears that these are not being widely observed by the CATV industry.

"CATV companies are beginning to provide a wide variety of non-TV sophisticated services such as fire and burglary alarms, computer programming, telephone and data communications. If these sophisticated services are implemented utilizing cable systems which are leaky, VHF and UHF spectrum users may bear the brunt of undeserved criticism and blame for disruption to these cable customer services, caused by radio users' legal transmissions.

"The Canadian Cable Television Association has realized the consequences of leaky systems and the importance of the mid-band and super-band channels to the public and the industry. It has emphasized the need for action to meet the problem and provide technical assistance and guidance to its members in methods of evaluating leakage and taking corrective action.

"On the other side of the coin, Amateurs in some cities have taken the initiative to obtain the co-operation of cable companies in eliminating the interference. Where the companies have been un-cooperative, Amateurs have appeared as well-prepared and successful intervenors in CRTC hearings at which the companies have

been applying for licence changes and renewals. They have requested that the cable operators delete the offending cable channels until their leakage is reduced to the level where it meets DOC Standard BP-23.

"In the United States, among other Amateur actions concerning cable interference, the largest national Amateur organization is petitioning the Federal Communications Commission to have the offending channels deleted from cable systems.

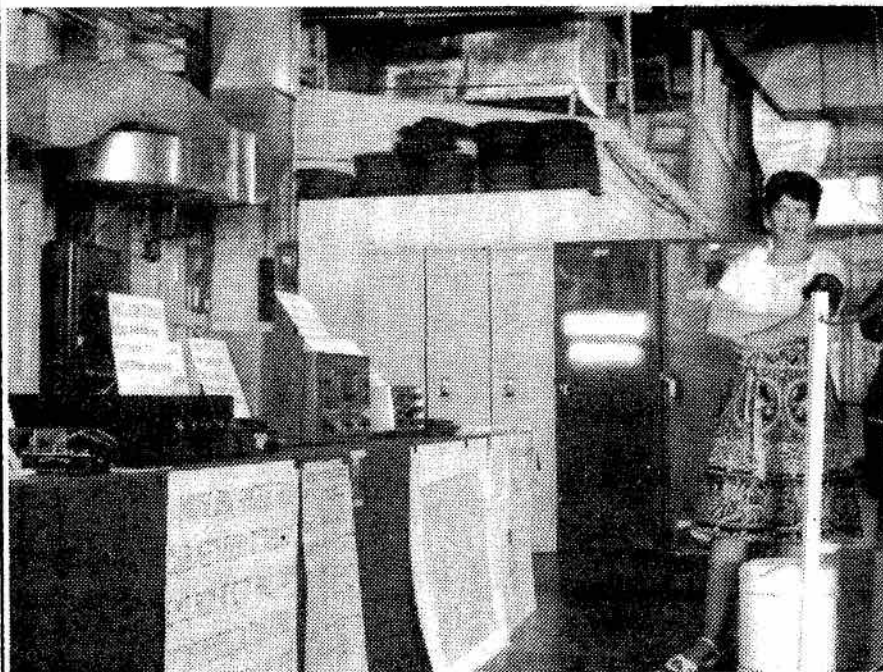
"While these various and seemingly un-coordinated actions may be considered as partial remedies for alleviating the situation for the moment, the Federation is concerned that the problem may mushroom to unmanageable proportions affecting all radio users, if more and effective steps are not taken now to deal with it.

"In view of the importance and complexity of the matter, the Federation asks the Board to consider undertaking action with the objective of resolving this mutual problem in an orderly and satisfactory manner.

"The appropriate committees could undertake to:

- (a) Identify the radio services which may be or are already affected by cable TV interference;
- (b) Review the present DOC standard for permissible maximum radiation from cable systems with a view to recommending to the Department that it be reduced;
- (c) Identify the nature of the cable interference so that radio user services can recognize it;
- (d) Seek the co-operation of the Canadian Cable Television Association and cable companies in working out procedures to make them aware of the areas and radio services affected by CATV interference and its reciprocally undesirable effects, and
- (e) Recommend to the appropriate federal authorities the necessary measures required to realize the objective stated above."

Saskatchewan Air Show '83



Val VE5ACJ manning the display at the Saskatchewan Air Show.

The Moose Jaw Amateur Radio Club volunteered to provide communications for SAS '83—the Saskatchewan Air Show—held last June. With the assistance of some members of the Regina Amateur Radio Association, MJARC supported the Air Show organizers (Canadian Forces Base Moose Jaw) by providing direct communications with various hospitals in Moose Jaw and Regina in case of emergency. We were also prepared to work under the Emergency Measures Organization in the event of a massive med-evac situation, and to provide mobile 2-metre stations to cover Moose Jaw parking areas if a wet weather program was substituted.

Net Control was stationed at MJARC (VE5MA), controlling four hospitals, a Medical Officer and mobile stations on four frequencies (two repeaters and two Simplex).

We also took advantage of the event by setting up an Amateur Radio display in one of the hangars at the air base. An operational HF station was included.

Bob Shehyn, VE5AFA
SAS '83 Comms Coord, MJARC

New CRAG Columnist

Craig Howey, former CARF Ontario director, has taken over the CRAG column for Hugh Lines VE3DWL. Craig, now located in Calgary, has a new call: VE6DT. His postal address is Box 6947, Station 'D', Calgary, Alberta T2P 2G2.

Changes and additions to the repeater directory should now be addressed to him. Our thanks to Hugh for keeping the Canadian Repeater Directory and for making it available for publication in 'TCA' over the past few years.

ANARC Club List

Most people know very little, if anything, about the radio listening hobby. And there are some who listen to foreign, distant or utility broadcasts that don't know others do the same. Increasing the enjoyment of the radio listening hobbyist is the job of the Association of North American Radio Club's 19 member clubs. Covering all radio listening from shortwave, medium wave, UHF-VHF, longwave, FM, and TV DXing, ANARC has a club that's right for just about any listener. In a typical club's bulletin, a radio listening enthusiast will find listings of stations being received by others, articles on the technical side of the hobby, and interesting news about what's going on in the field of broadcasting.

ANARC has published a list of its member clubs, what areas they cover, a brief description of their bulletin, and how to obtain a sample copy. To get a copy of ANARC's club list, send 25¢ and a business sized self-addressed, stamped envelope to ANARC CLUB LIST, 1500 Bunbury Drive, Whittier, California, 90601, USA. In Canada, send 50¢ and a SASE and if you're overseas, send 3 IRCs.

UK Speeds Up Visitors' Licences

If you are going to the U.K. for a visit, you will be glad to know that reciprocal licensing arrangements will now take only a few days from receipt of a request. The speed-up results from the procedures being returned to the Post Office from the U.K. Department of Communications, which used to take weeks to process the papers.

3rd Party and Reciprocal Agreement With Antigua

Canadians wintering in the Caribbean country of Antigua will be happy to know that third party traffic and reciprocal operating agreements with that country became effective last Nov. 15.

FCC kills No-Code Ticket

"We will never again see a no-code Amateur proposal in our lifetime. This issue is over—once and for all," declared FCC Special Services Division Ray Kowalski after the five Commissioners of the FCC unanimously voted on Dec. 14 to retain the five words per minute code requirement for entry into the Amateur Service.

The public comments against the code-free ticket ran 20 to 1 and the unusual hearing before the full Commission heard a great deal of testimony in the case, just about all of it in favor of retaining the code.

The Chairman, Mark Fowler, echoed Kowalski's comments. "I think this is the right decision. We should put this to rest, once and for all... the code is useful and I think in some cases it could be essential. It is

a useful discipline. I don't think that there is anything wrong with having 'entry fees' required into entering something which is regarded in some respects as a 'profession'."

These comments are from a video tape of the meeting. The U.S. freedom of information laws really work. The meetings are on public business and the tapes are available to the public for a fee. (How about that, DOC?)

Reference was made to our no-code digital licence but it was felt that it was not suitable for the U.S. and besides most of the very few Digital Certificate holders are already Amateurs and have their code.

(Thanks to W5YI Report for the details)

Fee Increases Coming?

In December 1982, on the basis of an assistant deputy minister's remarks, we reported that Amateur Licence fees would be increased by 6%. Fortunately for Amateurs, DOC was unable to get the necessary approvals in time and the increase never materialized. This year, as a result of criticism and prodding by the Auditor General, DOC will very likely have the needed authority in time. The '6 and 5' policy inflation restraint prevents the DOC collecting both increases this year but the 5% increase can be expected this April.

The Auditor General has also been very critical of the Department of Communication for failing to recover the total cost of radio regulatory services from Canadian radio licence holders. The Department is now studying ways and means for accomplishing this and will be making proposals in 1984 to take effect on April 1, 1985. Amateurs can thus probably expect a significant additional fee increase in 1985; also, if another recommendation of the Auditor General is implemented, fee increases can be expected every other year, at least.

ANARC Jamming resolution

The crowded conditions on today's international broadcast bands make it hard for broadcasters and listeners. Add the fact that many countries are intentionally jamming the signals of other broadcasters and the problem is even worse. With 1983 being named World Communications Year, the Association of North American Amateur Radio Clubs has gone on record to protest the intentional jamming of radio signals being performed by many countries. Here's an excerpt from the resolution passed at ANARC's annual convention in Washington, D.C.

"... be it resolved that the members of (ANARC)... do hereby restate their condemnation of intentional harmful interference to international broadcasting. Further, each member agrees to take some concrete action to protest such interference. Such action may include a decision not to publish

information about countries which carry out jamming and the recommendation that club members not send reception reports to stations run by administrations which practice international jamming."

Still No Amendments

Every six months DOC, along with other departments, is publishing an outline or agenda detailing the regulations changes for the next half-year. The May 1983 agenda noted all of the amendments originally up for public comment a year or more ago but other than one on deleting most requirements for logging, they are still in the November issue of the agenda as unfinished business. They still have not, even after nearly a year, received approval from the Privy Council. There is one new item and that is the proposed action on towers noted in another item.

New Membership Rates

If you are just joining CARF or renewing your membership, note that the new annual fee is \$20 for one year. For multiple years, life memberships, etc. look in the back pages of TCA.

TCA is still getting membership renewals and letters concerning delivery of the magazine. *Please send them to: CARF Inc., Box 356, Kingston, Ont. K7L 4W2*

The Kingston office phone is on 24 hours: (613) 544-6161.

Do not send them to the editors in Ottawa as all the administration for TCA and CARF is done at the Kingston office.

'Cause he's a Ham

from The Guywire.

He used to talk of many things
When we at first were married,
On any subject that came up
His interests— they were varied.
But that was before...

He listened very carefully
To all I had to say,
And remembered to do the errands
That had to be done that day.
But that was before...

He often helped with shopping
and piled the grocery cart high,
He even did it cheerfully
Without a groan or sigh.
But that was before...

He used to be ready for meals
While they were piping hot
And say how much he enjoyed
them
Whether they tasted good or not.
But that was before...

He spent time with the children
And questioned them each night
About the things they did that day
And why they had a fight.
But that was before...

I used to understand him
He spoke the same to me,
He used ordinary words like
location
And wife and frequency.
But that was before...

We used to buy nice clothes
When we were in the mood,
And other silly little things
Like furniture and food.
But that was before...

Then after many weeks of listening
To dah-di-dah-dit-dah,
He gradually began to change
Now this is how things are.
You guessed it— he's a ham!

His conversation, now of course,
Is on one topic only,
And I have to chat about it
Or else become very lonely.
'Cause he's a ham!

Now what I say goes in one ear
And quickly out the other,
And errands— well- they'll get
done
One day or another.
'Cause he's a ham!

The shopping- it still gets done
But now of course it's me
Who pushes the old shopping cart,
He has no time you see.
'Cause he's a ham!

And now when supper's ready
And the table is all set
He says "I'll eat it later- cold,
I should check into net!"
'Cause he's a ham!

His time he spends with the
children
Is used in a different way,
They listen politely to him
As he says "dit dah is A"
'Cause he's a ham!

FCC Nixes New 10M Repeater Freqs

Satellite operators will be happy to know that the FCC has turned thumbs down on a proposal to let repeaters operate in the ten-metre band between 29.0 and 29.5 megs... Not so good news is that U.S. phone band expansion is pending. Another move which would make both Canadian and U.S. Amateurs very unhappy is the current FCC investigation into the feasibility of booting U.S. operators out of the 220-223 MHz band and replacing them with the land mobile service, using a new-fangled mode of emission called 'amplitude companded SSB.' If it comes to pass that this idea is carried out then it's time for the old cry the last time 220 was threatened... "to the barricades!"... with some overtones of 1812, as Canadian ops would get it in the ear as well.

And when our paychecks arrive
Immediately I know
That all our hard earned cash
Into radio equipment will go!
'Cause he's a ham!

Do I exaggerate?
Well.. maybe a bit,
It's really a good hobby
I have to admit,
So I guess I'll let him stay around
In spite of what he does
And if you wonder why
Well it simply is because
He's still the same old ham!

Linda Brown
XYL of VE5 ACP

U.S. Forces Pushing Morse

The FCC's December 14 final turn-down on a no-code Amateur licence for the U.S. owed part of the decision to the U.S. armed forces where there is now, according to W5Y1 Report, "a major effort was underway to re-train their radio operators 'to be proficient in the Morse code' after a period of 'de-emphasizing' it as a communications method. The CIA prefers its operatives to have a 12 word per minute ability.

VK Phone Patches OK'd

Phone patches are now legal for Australian Amateurs if the equipment is installed by the government telephone authority. That country was the scene of a demonstration of just how Amateur radio in a space craft could be a back-up emergency link. Garriott used his hand-held to transmit from the Columbia to an Australian space terminal which set up a link with NASA ground control in Houston. This demonstrated how useful the gadget could be if all of the elaborate communications equipment packed up during a space flight.

Technical Section

Introducing: The PIN!

By Craig Howey VE6DT

One of the most useful and simple methods of controlling, attenuating, and switching RF energy is by the use of **PIN diodes**. Consultation with the well-known *Radio Amateurs Handbook* shows little practical information on these devices.

In a nutshell, for frequencies above about 10 MHz the PIN diode becomes essentially a variable resistance when forward biased, with a lower resistance limit of about one ohm or less when saturated with several milliamperes of current. When reversed biased or not biased at all it appears like a one picofarad or less capacitor.

At frequencies well below 2 MHz it begins to appear like a regular PN diode whose bias can be directly affected by a low frequency signal such as voice.

By varying the bias through a PIN diode in a suitable network, attenuation, phase shift, switching and modulation functions can be performed. In this article I will consider the PIN diode as used as a saturated switch.

As a PIN diode does not suffer from severe parasitic elements and resonances below 2 GHz it is ideal for broadband RF signal control over its intermediate range (Approx 10 MHz to 1.8 GHz). For

microwave work, the parasitic parameters of a PIN diode's packages are sometimes utilized to extend their range well above 24 GHz by tuning the parasitic values in resonance circuits.

Some PIN diodes are designed for HF through UHF operation while others are optimized for microwave only. PIN diodes designed primarily for attenuators exhibit different parameters than their saturated switch counterparts.

Device Physics

A PIN diode consists of P and N type semiconductor material sandwiching a layer of high resistance intrinsic material (thus 'PIN'). When forward biased, charge injected into the intrinsic region effectively varies the resistance between the terminals of the device permitting bi-directional signal flow. This charge of holes and electrons has a finite lifetime before recombination denoted as τ (tau) on most data sheets and determines the approximate low frequency limit of application by the formula:

$$f_0 = \frac{1}{2\pi\tau}$$

Equation (1)

τ varies between 5 nanoseconds and 3 microseconds depending on

device design. By the above formula, a 3 microsecond lifetime has an approximate low frequency limit of 50 kHz. Above this point the charge response drops at 6dB/octave so that at frequencies beyond a few MHz we essentially have a linear response where the diode will not rectify its lower frequency modulating signal.

The lower frequency limit of some microwave diodes for pulse application can be as high as 100 MHz or more as their τ is optimized to be very short.

At low frequencies the PIN diode will function as an ordinary diode. This low frequency limitation is a result of there being sufficient reverse recovery time (i.e. holes meet electrons or visa versa) for the diode to have the signal to be controlled affect its bias. Note that 50 MHz is a 20 nanosecond cycle time, so for VHF and above we are well away from the low frequency concerns. This reverse recovery time can be sped up to increase OFF state switching time by applying a reverse bias to the diode. A reverse bias also reduces the off state capacitance by about 0.5 picofarads or less. This could be used to advantage as an at carrier frequency modulator at 10 GHz when used as a pseudovaractor like this.

PIN diodes don't generally need

reverse biasing unless exotic pulse modulation and control schemes are designed. The PIN diode does not need to be reversed biased in a typical TR switch since received power levels will not affect the switch. In the majority of radios, the transistor controlling the transmit function will be orders of magnitude slower than the switching speed of the PIN diode. Switching speed is also affected by the choice of biasing network component values.

As a PIN diode is, after all, a diode, it still exhibits a knee voltage, breakdown voltage, maximum power dissipation limit, and the requirement for a certain amount of bias to drive the device into saturation. An order of magnitude of 10 milliamperes is a typical forward bias value to get beyond knee effects.

Basic Switches

The basic SERIES switch is

shown in Figure 1. With a one ohm series resistance we have an insertion loss of about 0.15 dB. The capacitors and inductors serve to bias the device properly and block the bias from the source and destination. Low series inductance capacitors are called for. This switch is very broad band, being limited only by the choice of the values for the inductors and capacitors. Diodes can be placed in parallel to further reduce the series resistance and increase the power handling capability for the biased-on switch, or added in series to increase the rejection power handling capability if utilized for high level signal control while not biased. Note that a one picofarad capacitor has a reactance of 723 ohms and provides isolation of about 18 dB at 220 MHz thus both a low series on resistance and low off state capacitance is desired in a series switch.

The basic SHUNT switch is shown in Fig. 2. Here we can have

one end of the PIN at ground potential which is useful for microwave designs involving waveguides and striplines. By itself this too is a broad band switch. The equivalent circuit is shown in Fig. 2b. Note that we are actually shorting the transmission line. This circuit has an attenuation of about 30 dB with the device biased on. This attenuation can be increased by adding other diodes in parallel at the expense of increasing the off-state shunt capacitance which will reduce the maximum frequency of operation by increasing insertion loss.

By recalling that a shorted quarter-wave transmission line reflects a high impedance at its input, we can introduce the concept of reflective mode attenuators and switches. If we introduce another PIN diode $\frac{1}{4}$ wavelength away, which is where we could have a voltage peak as shown in Fig. 3, we will have more than doubled the attenuation with minimal increase in

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insertion loss at the expense of bandwidth limiting the switch. This iterative switch could be taken one more iteration for an attenuation well beyond 100 dB. Insertion loss in the shunt switch is primarily a function of the diode capacitance and signal frequency. Thus a low capacitance is necessary for a shunt switch.

A more common use of the shunt switch is shown in Fig. 4a. Here by biasing on one diode or the other, signal flow is switched to or from the other mode because we effectively isolate the switched node by the $\frac{1}{4}$ wavelength line. We apply bias to the side we *don't* want signal to flow through.

A reflective mode shunt switch can be broadbanded by using the configuration of Fig. 4b. Using 35 ohm $\frac{1}{4}$ -wave sections, a SWR of less than 1.2:1 can be maintained over a frequency ratio range f_1/f_0 of $\pm 50\%$ where f_0 is the center frequency and f_1 the extremity frequency. For comparison, 50 ohm sections would maintain the same SWR for only a $\pm 10\%$ change in frequency. The analysis of the above is left to Reference 1a.

Switch Performance Parameters

Insertion loss is the loss in the signal pass mode of a switch which is a result of the PIN diode not being an ideal device. Low insertion loss results with low resistance in a series switch and low capacitance in the shunt switch. For a series switch (ref. Fig. 1b) this is approximated by the formula:

$IL = 20 \text{ Log } (1 + R/2Z_0)$
 where Z_0 is the impedance of the load or transmission line and R is the biased on resistance of the diode.

For a shunt circuit, the reactance of the OFF state capacitance at the signal frequency must be compared to the load impedance as per Fig. 2b. This loss is approximated by

$IL = 10 \text{ Log } (1 + (Z_0/2X_c)^2)$
 where X_c is the capacitive reactance; $X_c = 1 / (2 \pi fC)$. Note that the insertion loss is negligible below

1 GHz for the shunt switch for a 1 picofarad capacitor.

Isolation, the measure of signal attenuation, occurs due to low capacitance in an unbiased series switch and low resistance in a biased ON shunt switch. For a series switch this is approximated by

$$ISOL = 10 \text{ log } (1 + (X_c / 2Z_0)^2)$$

and the shunt switch as

$$ISOL = 20 \text{ Log } (1 + Z_0 / 2R_s)$$

For one picofarad and 1 ohm at 220 MHz this yields values of 18 dB and 28 dB respectively.

Some diodes have a maximum SWR specified for them. This is the SWR attributed to the PIN diode's package usually referenced to a 50 ohm system.

The maximum signal voltage that a non-forward-biased PIN diode can handle is V_{BR} , the breakdown voltage of the diode. This determines the Breakdown Voltage Power Limit. An analysis of this parameter is warranted.

Fig. 5b shows the analyzed circuit and Fig. 5a shows the effective maximum signal that can be applied for a series diode. For a V_{BR} of 35 Volts we find that only 3 watts can be handled before breakdown is reached.

Fig. 6 shows the shunt case

where we find that 4 times the power can be handled because V_{max} can be as high as twice the peak to peak signal. Adding a reverse bias reduces the breakdown Voltage Power handling capabilities.

Notice that this power is the power handling capability with the diode UNBIASED, that is in the normal diode OFF condition.

Thus if the diode is used in an unbiased condition for high level signal control the power handling capability seems quite low.

Maximum Power Capability By Dissipation

To calculate the amount of power that the diode can handle we again consider figure (1b) for the series case. We essentially have a one ohm series resistance compared to our 50 ohm source and load and thus by mere inspection we see that more power can be passed. Maximum power is determined by junction temperature and consequently a parameter P_{DISS} , the device maximum power dissipation, appears in data sheets. Power handling capability is determined by this value multiplied by a Power Multiplier which is determined by the impedances of the diode and the load. The equations for these multipliers are given in the equation summary

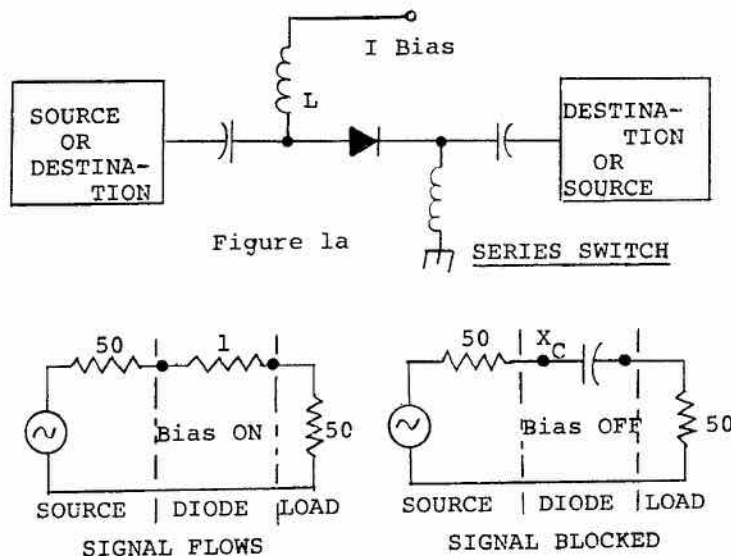


Figure 1b

(I won't derive them here).

Obviously in the case of a series switch diode, if 400 mW is dissipated in 1 ohm, by ohms law for power then:

$$I = \sqrt{P/R} = \sqrt{.4/50} = 632 \text{ mA.}$$

$P = I^2R = (0.632)^2 50 = 20 \text{ Watts.}$ We can expect 20 Watts to be deliverable to the load. Of course for reliable operation we NEVER design to worst case values thus we would limit the above switch to about 12 Watts.

The Power Multipliers are thus essentially unitless formulas based on circuit impedances. By inspection of the summarized formulas, we can guess what the various values would be for a 75 ohm system. Notice that all parameters are better in a higher impedance system!

Analysis Of A Common Pin Diode

The Motorola MPN3401 PIN diode is a commonly available device that has been around for about 10 years or more with the following specifications:

$V_{BR} = 35 \text{ Volts (@10microA)}$ —
Breakdown Voltage.

$P_{DISS} = 400 \text{ milliWatts}$ —
Maximum device power dissipation

$C_T = 1 \text{ pf OFF state}$
(Unbiased) Capacitance

$R_S = 0.7 \text{ ohm}$ — ON state series resistance (the saturated switch value) (Note that 0.34 ohms is specified as typical)

$I_r = 0.1 \text{ microAmpere}$ —
Reverse leakage current

$L_S = 3 \text{ nanoHenry}$ —
case series inductance

$C_C = 0.1 \text{ picoFarad}$ —
case stray capacitance.

L_S and C_C are two parasitic parameters as far as we are concerned.

Let's look at the MPN 3401 for a 50 ohm system using the equations in the Equation summary at 220 MHz.

Series Circuit;
Power Capability = 400 mW
(Power Multiplier) = .4(72)
= 29 Watts (eq. 4,12)
Insertion Loss = 0.06 dB
(equation 2)

Isolation = 17.3 dB (equation 3)
Breakdown Voltage Limit =
3 Watts (equation 5)
Shunt Circuit;
Power Capability = 0.4 (18.87)
= 7.5 Watts (equation 9,12)

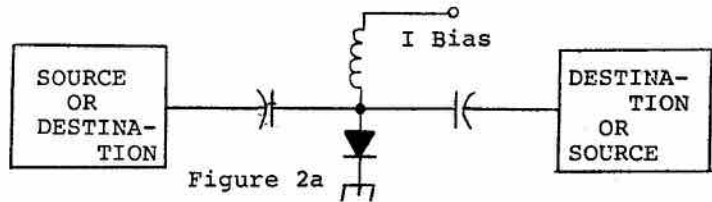


Figure 2a

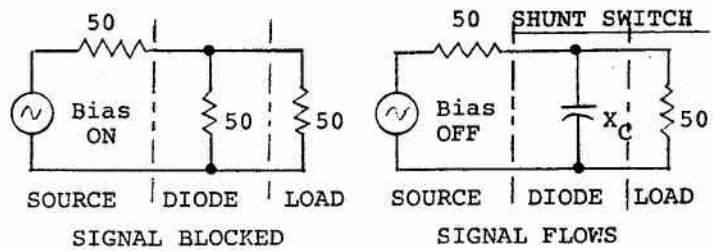


Figure 2b

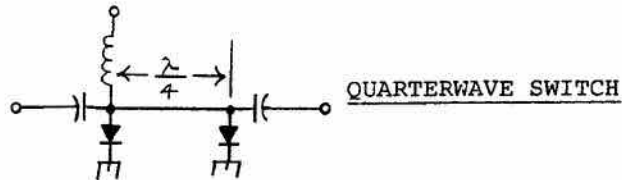


Figure 3

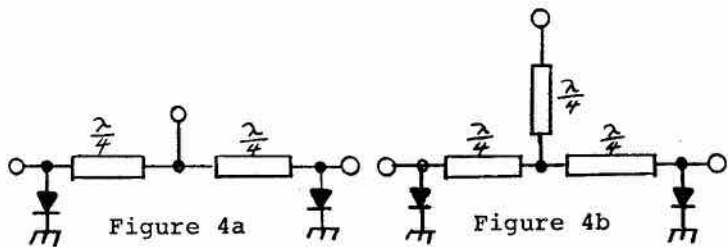
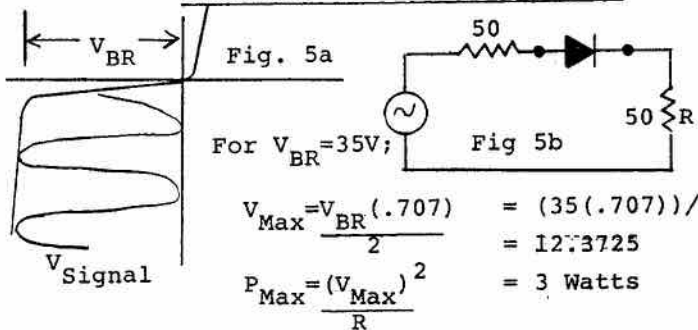


Figure 4a

Figure 4b

BREAKDOWN VOLTAGE POWER LIMIT



Insertion Loss = 0.005 dB
(equation 7)

Isolation = 31 dB (equation 8)

Breakdown Voltage Limit =
12.25 Watts (equation 10)

Again the above Breakdown Voltage Power Levels are the unbiased diode ($V_R = 0$). Notice that in the shunt case this is the power handling ability of the diode essentially shorting the transmission line and thus the generator.

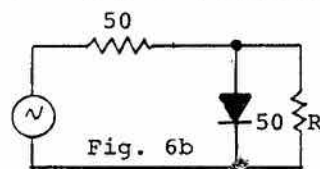
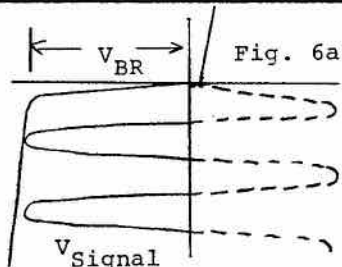
A different situation exists with a shorted quarter wavelength separating the signal source (recall figures 4a, 4b) as shown in figure 7. Here the biased shunt diode exhibits the characteristics of the series case. When we short a quarter wavelength from the signal junction, we short at a maximum current node (with corresponding minimum voltage) thus the diode dissipation becomes the series case. Saying it differently, by using the quarter wavelength section we can handle 4 times the normal shunt power.

Thus for a MPN3401 the quarter wave switch shunt power capability is $4(7.5) = 30$ watts or in other words it's the same as the series case.

Some Practical Circuits

From the above discussion we have seen that the PIN diode can handle more power when biased ON than OFF. For TR (Transmit-Receive) switching then we would like to control the transmitter RF through a biased ON diode. The PIN diode will always turn on faster than the transmitter as explained earlier. Since received power levels are negligible there is no concern of them affecting the switch.

Figure 10 shows a practical series mode switch and figure 11 shows a shunt mode switch. Note that most practical shunt mode switches are necessarily bandwidth limited by the quarter wavelength lines. Both of these switches require bias to be applied to permit either TX or RX signal flow. As this means that 10 mA or more is being wasted during receive conditions, the circuit of



$$V_{Max} = V_{BR} (.707) = 24.745$$

$$P_{Max} = (V_{Max})^2 / R = (24.745)^2 / 50 = 12.25 \text{ W}$$

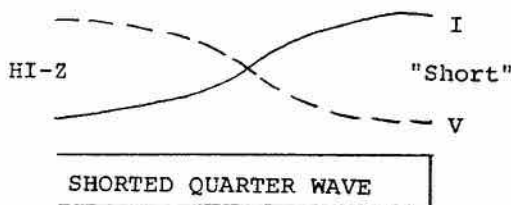


Figure 7

50 OHM TRANSMISSION PATH PIN DIODE EQUATIONS

LOWER FREQUENCY LIMIT $f_0 = \frac{1}{2\pi L}$ Equation (1)

SERIES SWITCH

SHUNT SWITCH

INSERTION LOSS $IL = 20 \log \left(1 + \frac{R}{100} \right)$ (2) $IL = 10 \log \left(1 + (50 \sqrt{IC})^2 \right)$ (7)

ISOLATION $ISOL = 10 \log \left(1 + \left(\frac{I}{200 \sqrt{IC}} \right)^2 \right)$ (3) $ISOL = 20 \log \left(1 + \frac{25}{R} \right)$ (8)

POWER MULTIPLIER $\frac{P_A}{P_R} = \frac{(100 + R)^2}{200R}$ (4) $\frac{P_A}{P_R} = \frac{(25 + R)^2}{50R}$ (9)

BREAKDOWN VOLTAGE POWER LIMIT $P_{A(Max)} = \frac{(V_{BR} - V_R)^2}{400}$ (5) $P_{A(Max)} = \frac{(V_{BR} - V_R)^2}{100}$ (10)

ATTENUATION $A(\text{dB}) = 20 \log \left(1 + \frac{R}{100} \right)$ (6) $A(\text{dB}) = 20 \log \left(1 + \frac{25}{R} \right)$ (11)

CW POWER DISSIPATION = $P_{Diss(Max)} \times (\text{POWER MULTIPLIER})$ WATTS (12)

CW POWER CAPACITY of $\frac{\lambda}{4}$ Switch = 4 X (Equation 12 (Shunt Eq 9)) (13)

(Note: Equation 6 is equation 2 and equation 11 is equation 8)

V_R = REVERSE BIAS, P_A = TRANSMISSION POWER, P_R = POWER DISS. IN DIODE

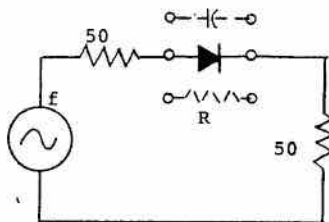


Figure 8

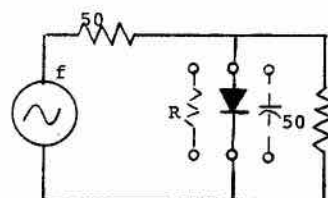


Figure 9

figure 12 is devised as a combination series shunt circuit utilizing the best features of both switches although by necessity bandwidth limited. The capacitor to ground would have to be a very low series inductance UNELCO type or equivalent.

Note that for all these switches to increase power handling capability is a mere matter of paralleling other diodes or adding in series to meet breakdown voltage power concerns. Using single MPN3401s in figure 12 results in a switch that can easily handle 15 Watts.

All of the circuits can be keyed to ground or to potential by using the diode in the correct polarity since once biased ON, RF signal flow is bidirectional. The circuit in figure 12 exists with slight modification in quite a few current generation VHF/UHF FM two way radios usually with 2 to 4 diodes paralleled.

Both the basic series and quarter wave shunt can be extended to make multiple node switches as shown in figures 13 and 14. This arrangement is used in doppler shift and electronically steerable direction finding antennas.

Lastly a multiple pole series shunt switch is shown in figure 15 which provides more isolation between ports B and C than any of the others. This circuit appears in reference (3) where it is used as a game/TV switch for video games or computers.

Craig Howey VE6DT
P.O. Box 6947 Sta. D.
Calgary, Alta. T2P 2G2

References

- (1) Hewlett Packard Application Note 922 "Applications of PIN diodes" Also of interest Ap. Notes 957 and 929. Available through HP offices or their distributors (Zen-tronics). Excerpts appear in the HP Discrete Device Data Book.
- (2) "PIN Diode Designer's Guide" Microwave Associates 6547 Mississauga Rd. Mississauga, Ontario L5N 1A6
- (3) MPN3401 Data Sheet, Motorola Semiconductor Data Library Vol. III.

PRACTICAL PIN DIODE TR SWITCHES

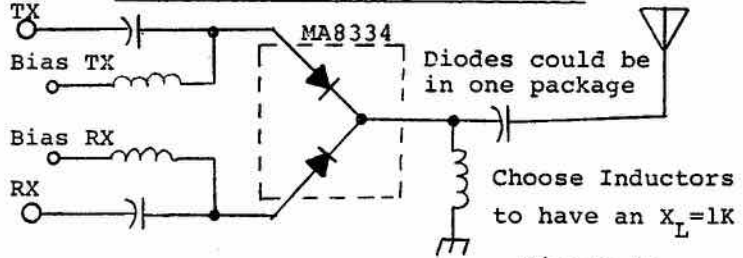


Figure 10

SIMPLE SERIES TR SWITCH

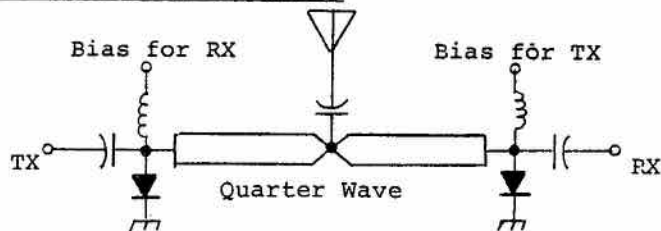


Figure 11

SIMPLE SHUNT TR SWITCH

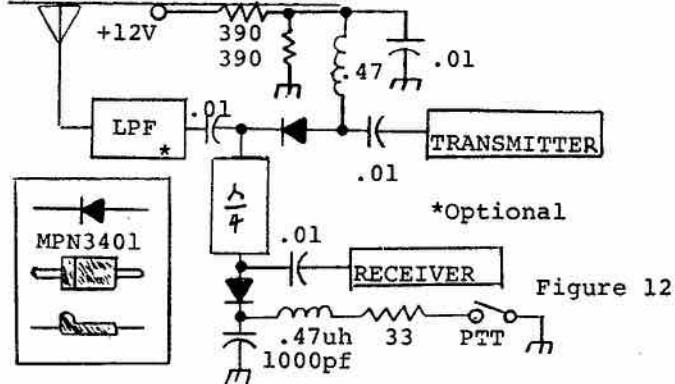


Figure 12

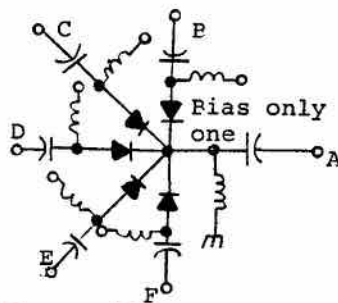


Figure 13

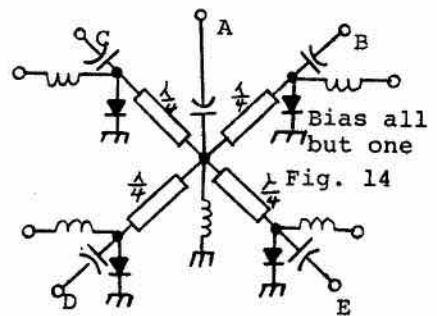


Fig. 14

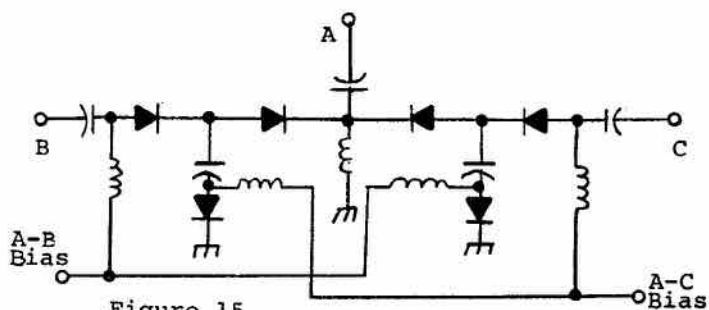


Figure 15

ANARC Computer Committee

We don't need to tell you how computers are turning up everywhere. Because of this, the Association of North American Radio Clubs has formed a committee to help the radio listening enthusiasts use their computers in their hobby. Under the direction of Bill Krause, the committee is providing the non-copyrighted computer programs in printed form or on cassette. Pro-

grams include 'Shortwave Logsort', 'BCB Search', 'Daylight-Darkness', 'Propagation Prediction' and many others.

The committee's goals are to compile a registry of those using computers with the radio listening hobby, form an ANARC Special Interest Group on Compuserve, disseminate computer programs related to the listening and DX

hobby, and bring those together who have new ideas on using computers in the hobby.

A listing of the programs is available for a self-addressed, stamped envelope to Bill Krause, 6700 153rd Lane Northwest, Anoka, Minnesota, 55303, USA. The programs themselves are available in printed form for one IRC per program and 3 IRCs in ready-to-run cassette form.

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FOR SALE: Yaesu 101ZD c/w 101Z ext. VFO. Less than 20 contacts on this rig. What offers? VE5BBN Prince Albert Tel. (306) 764-6336.

The St. Joseph Island Repeater Association is looking for 450 MHz solid state gear to establish a repeater-link system along the north shore of Lake Huron. Receivers and low power transmitters are needed. Will accept donations but am willing to purchase also at reasonable cost. Contact Gord Woroshelo VE3EYW, (Custodian), P.O. Box 57, Manitowadge, Ontario P0T 2Co.

FOR SALE: ATV Equipment. Tektronix 525 Television Waveform monitor; Tektronix 526 Vectorscope; Sony B&W Camera (4"x4"x10") Offers. M. Matheson VE6GE, 7943-92 Ave., Edmonton Alta T6C 1R6.

FOR SALE: Heathkit SB-104 Transceiver, less than 3 yrs old, asking \$690.00 Also Keyer HD-1410; Phonepatch HD-15; Power Supply Yaesu FP-107E and MFJ Tuner 941B. A Lenz, Toronto, 416-499-4713.

FOR SALE: SB220 \$525, Yaesu FL2100 F \$325, Dentron MLA2500B \$625, Collins 312B4 \$215, KWM2 & 516F2 Round emblem \$730, Spectronics DDIC \$100, AutekQF1A \$65, New Kenwood MC50, Drake TR7 \$890, PS7 \$225, New Cushcraft Ringo Ranger \$45, New Icom 720A \$1115, ICOM 551 \$395, Metron MA1000B Mobile Linear \$915 plus other items. Dan VE3MZZ, 34 Park Trail, Midhurst, Ont. L0L 1X0.

FOR SALE: Model HF5V III Butternut Antenna, supporting TV mast, 6 copper resonant guy wires, match up 75 ohm coax, insulators, nylon rope, pulleys. Pick up on your holiday to B.C. \$100 cash. R.A. Doran VE7ESB, RR 1 Boswell, B.C. V0B 1A0.

WANTED: Thermal printhead assy. for Texas Instruments Data Terminal 700 series Model 742 or 743. T.I. Part No. 95422-0001 Mike Holley VE7AVM, 6586-196th Street, Langley, B.C. V3A 4P7 (604) 534-6466.

FOR SALE: ICOM 551D 6M transceiver plus matching PS-20 power supply, mint condition, 80W output. \$800.00. Allan Stuart, 604 Hopkins St., Apt. 5, Saskatoon, Sask. S7J 0N2 (306) 343-6737.

Appreciate Schematics and any info on these units: Antenna Matching Unit Part No. MX-2799 Stk. No. 5820 Bendix Type RG9A Rcvr Serial No. R206. VE1HT Hec MacKinnon, Box 22, Iona, N.S. B0A 1L0.

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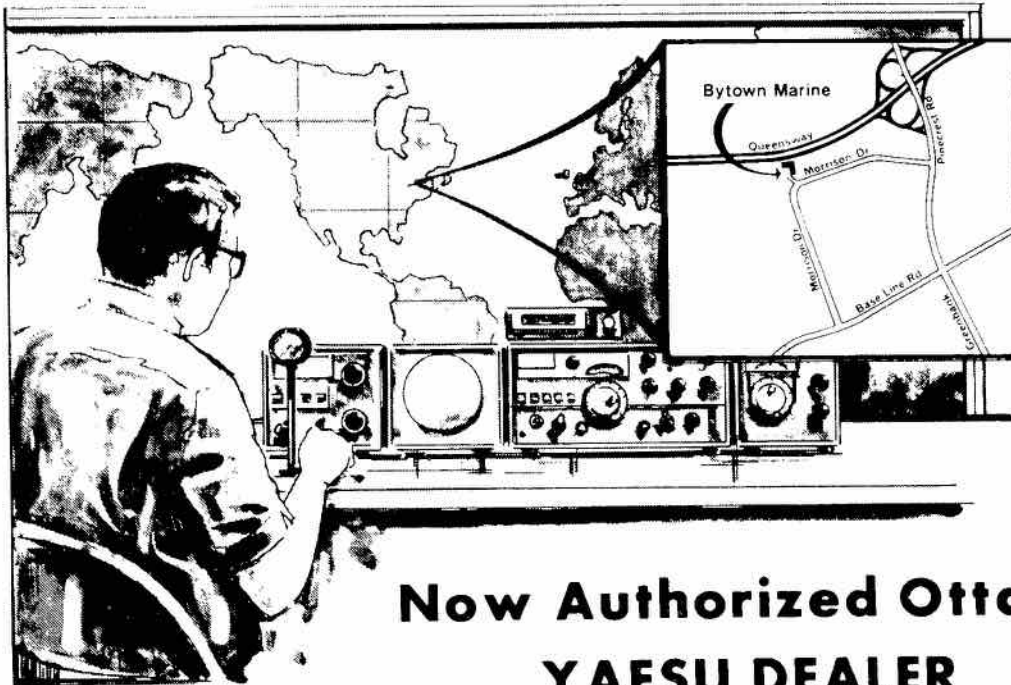
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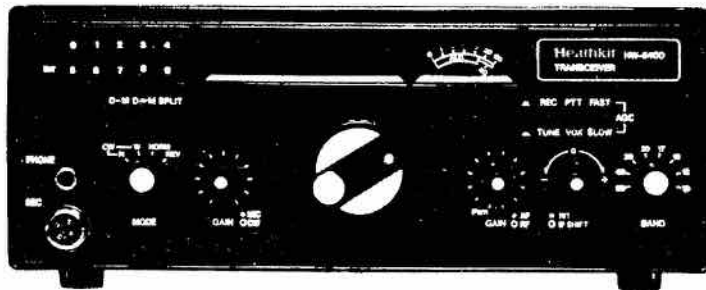
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