

# SVARC GAP

SEAWAY VALLEY AMATEUR RADIO CLUB  
P.O. BOX 462, CORNWALL, ONTARIO K6H 5T2

VOLUME 1, NUMBER 5, - NOVEMBER / DECEMBER, 1993

## DUMMY LOAD

Hello again! Last issue contained my premier "Dummy Load" column, and now it's time for the last one of my term. By next issue you will have a new Executive Committee and a new President to write this column. It's been fun!

October is the time we decide who we would like to nominate for the club Executive for the next two years. Nomination night is traditionally not well attended, perhaps out of fear that one might get railroaded.. er.. nominated for a position. For those of you who were not there, the October meeting yielded several nominations for Executive positions, with an addition since. Nominations are accepted right up until the vote at the November meeting. As this is written, we have the following slate of candidates:

President:	Marc Tessier VE3TES
Vice President	Tim Smith VE3HCB
Secretary	Jim Devine VE3ZPT
Treasurer	Andy Rugg VE2EM

A demonstration of Amateur Fast Scan Television (ATV) by Mailes Dier VE3AP was also planned for October. This has been rescheduled for the January meeting.

Last issue's report on the UHF repeater neglected to mention the significant contribution by John Vining VE3XJV. His donation in the form of purchasing our original UHF mobile duplexer helped considerably in paying for the new Sinclair repeater duplexer. Thanks John!

On Saturday October 23, Graham MacDonald VE3IGM, Mel Massia VE3OJN, Bob MacSween VE3KCP and myself traveled to the St. Lawrence Valley Repeater Council meeting in Potsdam, NY. This event is held twice a year and you may recall that we hosted the last meeting in May of this year. It is important that our interests be represented at

these meetings, especially when a repeater is in the implementation stages and not yet on the air (like our 443.650 UHF repeater). VE3IGM gave a very satisfactory status report on the VE3SVC VHF and UHF repeaters on behalf of the club, and also on VE3SDG (147.240) on behalf of its licensee, VE3AP. VE3OJN was there to represent VE3TYF (443.050) located at Moose Creek.

Afterwards, Virginia N2NVF treated us to a tour of the Clarkson University amateur station K2CC. Now there's a station with history! We saw a page from the log dated 1925, and QSL cards from long forgotten countries. The 16 foot long station console had at least five operating positions. Every band and mode was represented, including colour slow scan television (SSTV) and OSCAR satellite gear. Virginia also demonstrated the UHF repeater / VHF remote base by accessing our own 147.18 machine using her UHF portable on the 15 mW power setting (that's 0.015 Watts, folks!). We talked most of the way home on 146.52 simplex using this scheme. Very elegant. In all it was an extremely worthwhile trip.

73, Doug Pearson, VE3HTR

## IN THIS ISSUE

- SVARC Christmas Dinner
- C.L.A.R.A - VE3WGM
- Special Events Station
- Duplexers Explained - VE3KCP
- Packet News

## SVARC CHRISTMAS DINNER

The Seaway Valley Amateur Radio Club Annual Christmas Dinner will be held **Friday December 10**. Thanks to Marc VE3TES and Pat VE3PPB for again organizing this event. Here are the details:

Date: December 10 1993  
Time: 7:00pm cocktails  
7:30pm for dinner  
Place: Royal Canadian Legion Branch 297  
(2nd & Cumberland St., Cornwall, ON)  
Price: \$11.50 per plate

"We ask that if you plan to attend the dinner, would you please pay in advance to any member of the executive prior to December 03 1993."

"The reason for the prepayment is simple. We have to inform the people responsible for the meal preparation in advance, so they can be sure to prepare the correct amount. If you fail to make payment then you will be unable to attend. Also if you make the prepayment and fail to arrive at the dinner then the money is non-refundable because we will be responsible for that place setting on that date."

"Last year we had some 40 people show up for the dinner, lets see if we can surpass this amount. This is an excellent time to meet the amateurs in the area. Your family and friends are more than welcome to attend at the \$11.50 per plate price tag."

"So make plans to attend the Christmas dinner."

"Also the general meeting will be held at the Christmas dinner instead of December 6th 1993 as per usual."

Regards, Marc Tessier VE3TES (613) 938-0132

### C.L.A.R.A.

The **Canadian Ladies Amateur Radio Association** is a non-profit organization supporting the interests of the growing number of female amateur radio operators in a historically male-dominated hobby. Many OM's do support this organization. Gail VE3WGM and Christina VE3YGM are current members but would enjoy having fellow C.L.A.R.A. members in this area.

YL's and/or OM's please contact VE3WGM for more information.

73 & 88 Gail VE3WGM

## SPECIAL EVENT STATION CY3H

To commemorate the 125th anniversary of the founding of the Stormont Dundas and Glengarry Highlanders Regiment (S.D. & G. Highlanders) based here in Cornwall, the club in cooperation with the regiment set up a special event station. The goal was to contact amateurs in as many countries as possible where the Glens had served in past campaigns. Both amateurs and military operators (under amateur supervision) participated. The plan was to use the club HF call VE3VSW, and permission was obtained for all amateurs in the three counties to use the CY3 prefix for the duration of the event, namely Oct. 23 to 24. Thus the call would have been CY3VSW. The Upper Canada Amateur Radio Friends, represented by Rob Fry VE3ARF, put the icing on the cake, so to speak, by obtaining from the ISC (formerly DOC) an extremely unusual 2x1 call for the station. This rare call sign, only in existence for 48 hours, made CY3H a sought after station. The Regiment plans to have a special QSL card produced to mark the occasion, and it will certainly be a "rare one".

Credit for organizing this event goes to Jim Devine VE3ZPT. Radio equipment was provided by Eric Meth VE3EI, Doug Pearson VE3HTR, Hermanna Noorthoek VE3UNV and Transport Canada VE3MTA via Bob MacSween VE3KCP. Thanks are also due to all the people who operated and helped set up or tear down afterwards. Rather than thank a few by name and undoubtedly miss several, I will just say a big Thank You to everyone on behalf of the club. Without the help of everyone, this would not have been the success it was.

## PACKET NEWS

The TCTI station VE3MTA has it's 2 metre rig back on the air, and it is usually left on 145.03. Entering "C TCTI" will normally get you into the KAM TNC's KA-NODE wild node, and this is often the most reliable way to access VE3NUU and other distant stations on that frequency. This is strictly a temporary expedient until something more substantive can be established, like a VHF user port / UHF link to VE3NUU. The station enjoys fairly good range thanks to a Ringo Ranger about 100 feet above the St. Lawrence river. Enjoy!

\* \* \*

**See the announcement on page 5 of this issue for the Packet Seminar Saturday, November 27, 1993.**

# The Basics of Duplexers Explained...Almost.....

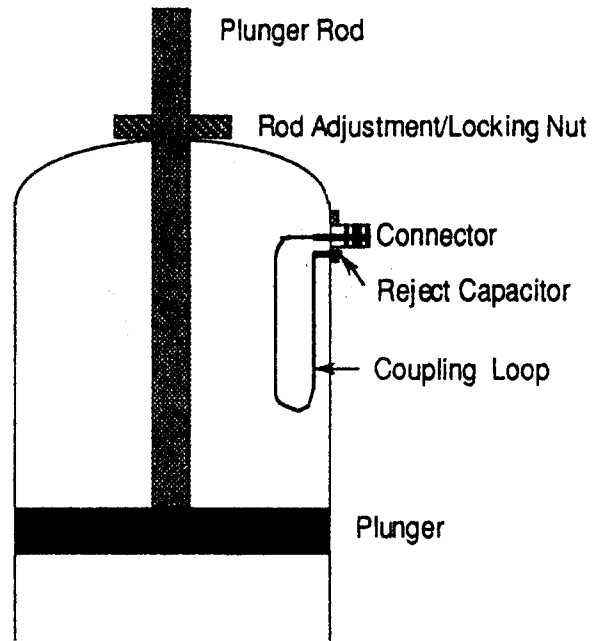
A duplexer is a device which will allow a repeater system to transmit and receive at the same time using a single antenna. Our repeater system receives on 147.78 MHz and transmits on 147.18 MHz. The separation or *split* as it is often referred to is 600KHz. For a UHF repeater the split is 5.0MHz. Our frequency assignment for our new UHF repeater is 443.650 MHz and 448.650 MHz.

On a repeater system we have a receiver and a transmitter which must both operate at the same time using the same antenna. We can not simply attach the receiver and transmitter together and then attach the whole arrangement to an antenna. If we did, the first transmission would ruin the receiver and the transmitter would be damaged.

The construction of a duplexer is relatively simple for a first class machinist. Several tuned cavities are constructed to the correct specifications and connected together. Usually, the receiver has two or three cavities placed in series with the antenna port. The transmitter also has two or three cavities in series with the antenna. Both sets of cavities are placed on the same antenna using a "tee" connector. See the drawing below entitled "Six Cavity Duplexer Interconnections".

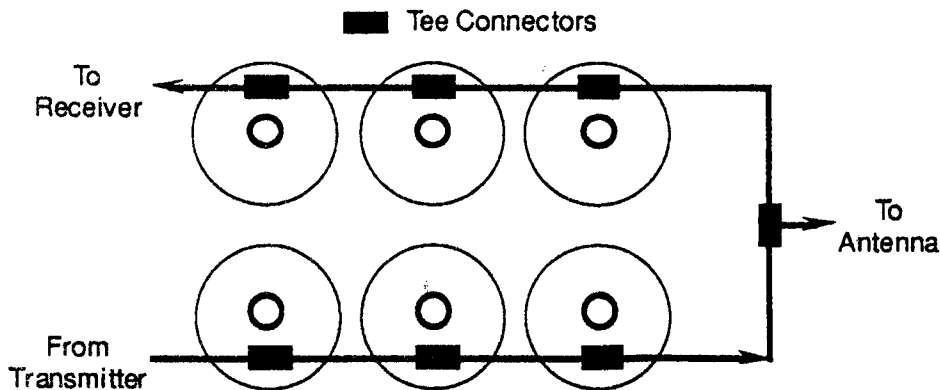
Each cavity has a pass characteristic and a reject characteristic. Power at the pass frequency is drops very little as it passes through the cavity. Power at the reject frequency is attenuated as much as possible. The physical volume of the cavity dictates the pass frequency. There is usually a rod found on each cavity which controls a plunger located inside the cavity.

Movement of the plunger inside the cavity controls the volume of the cavity, and thus determines what the pass frequency will be. The reject frequency can be determined by the impedance characteristics of the coupling loop located directly inside the cavity. Usually there is a trimmer capacitor which can be adjusted to set the reject frequency of the cavity.



## Duplexer Cavity

Some cavities are constructed such that there is a threaded slug/rod which can be adjusted to select the reject frequency. The pass frequency in this situation usually does not have an adjustment.



## Six Cavity Duplexer Interconnection

With most duplexers there is a high pass connection, low pass connection, and an antenna connection. Our VE3SVC repeater transmits on 147.18 MHz and the receive frequency is 600 KHz higher at 147.78 MHz (positive split). In this situation the repeater transmitter is connected to the low pass port on the duplexer. The repeater receiver is connected on the high pass port of the duplexer.

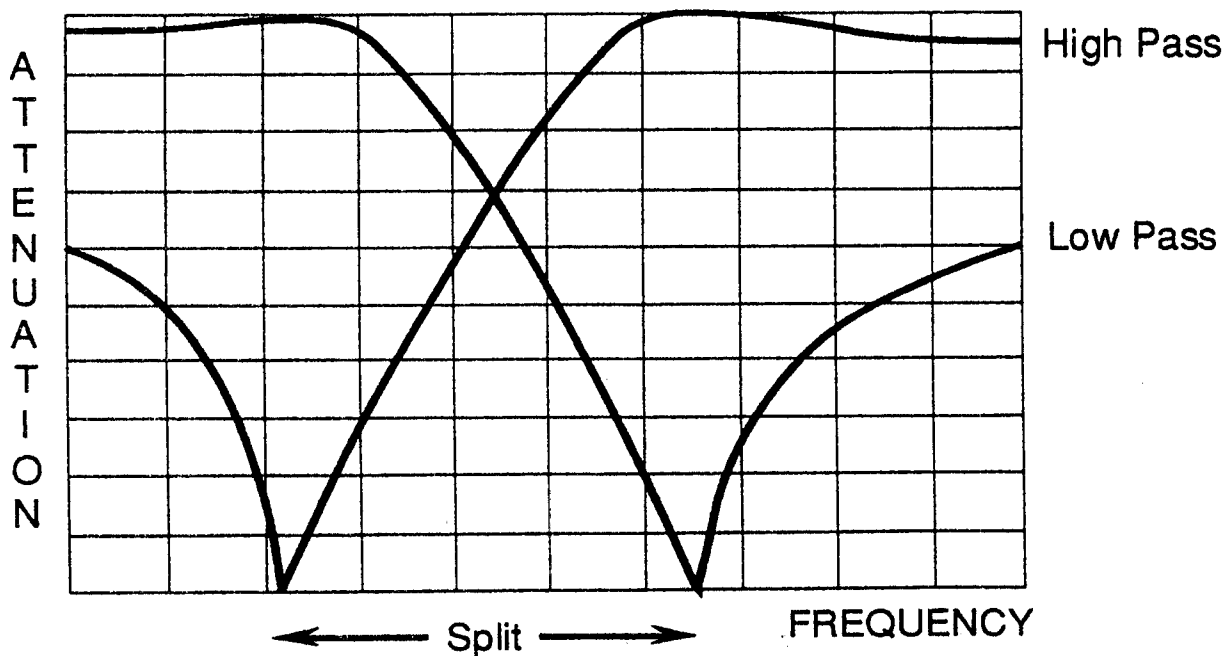
With positive splits, the transmitter is always connected to the low pass port, and with negative splits, the transmitter is connected to the high pass port of the duplexer.

Adjustment of a duplexer usually takes the "Patience of Jobe" combined with a very well stocked test bench. The minimum equipment required to make adjustments is usually a calibrated signal generator and a very sensitive spectrum analyzer. A tracking generator and a compatible spectrum analyzer would be an asset. The pro's use a network analyzer which is in a league of its own. Much attention is paid to the cables and terminations during the adjustment. Double shielded coax and "N" type connectors are the order of the day. Stray RF and leakage from the cables can ruin your testing. If the cavities can be separated then each cavity is adjusted separately and then connected together. Then the cavities are adjusted to achieve their final tuning.

The first characteristic of a duplexer which is necessary for proper repeater operation is called isolation. *Isolation* is the measure of how well the transmitter is separated from the receiver. It is measured in dB. An isolation of 60dB means that any transmitted signal will be attenuated by 60dB, when measured at the input to the receiver. This results in the transmitted power being reduced by a factor of 1,000,000. This means that if a 10W signal from a transmitter were reduced by 60dB of isolation, then there would be 10 $\mu$ W seen at the input of the receiver. This works out to be 22,361 $\mu$ V (at the transmit frequency) assuming a 50 $\Omega$  resistive input to the receiver.

With 60dB of isolation the receiver must have very good selectivity to reject the transmit signal and still process the receive signal typically 25 $\mu$ V or less, especially if there is a narrow split between transmit and receive frequencies.

The higher the isolation figure the better the duplexer. The duplexers which SVARC own have isolation greater than 90dB. With 90dB of isolation, that same 10W transmit signal mentioned above would result in a 10 nW (n=nano=0.000000001 or 1x10<sup>-9</sup>) (or 707 $\mu$ V) signal at the input to the receiver.



**IDEAL DUPLEXER CHARACTERISTICS**

Insertion loss is the second characteristic of a duplexer which is very important. *Insertion loss* is the measure of how well a duplexer is able to connect the high pass port or low pass port to the antenna port. It is measured in dB. If we had a 10W transmitter connected to a duplexer with an insertion loss of 3dB then there would be 5W measured at the antenna port. The lower the insertion loss the better. Note also that there is a separate insertion loss for the high pass and low pass ports on a duplexer. Insertion loss also affects the receiver. An insertion loss of 6dB would take a 3 $\mu$ V signal at the antenna port and reduce it to 1.5 $\mu$ V at the receiver port of the duplexer. In order to reduce insertion loss, manufacturers silver plate all the interior surfaces of the cavity.

Typically insertion losses on commercially available duplexers are below 3dB. The VHF duplexers owned by SVARC have an insertion loss of 1.8dB for both the high pass and low pass ports. The new UHF duplexers made by SINCLABS have an insertion loss of 0.5dB (Incredible!!!).

The choice of a receiver for a repeater has an effect on the quality of the duplexer which is purchased. A sensitive receiver with excellent selectivity could work well on a cheaper duplexer with lower isolation.

Of course this depends on the split. The wider the split, the lower the isolation necessary.

Usually, good commercial receivers are sought out for repeater applications due to their excellent selectivity. These receivers are well designed and you will often hear the pro's refer to the front ends on these receivers to be "Bulletproof". Amateur grade receivers require better duplexer equipment in order to prevent the receiver from losing its sensitivity when the transmitter is in operation. This means that an amateur grade receiver needs a higher isolation figure which is found on better and more expensive duplexers.

UHF mobile duplexers are cheaper to obtain, and can be a problem if a repeater system must run higher powers in order to achieve coverage. These units usually handle less than 40W. Isolation figures on these units are usually around 60dB. Amateur grade receivers need higher isolation figures.

The typical 2.5dB insertion loss found on mobile duplexers can reduce transmit power from 10W to 5.6W. This can have a dramatic effect on the ERP of the repeater and of course, the coverage.

The final 0.5dB insertion loss for our new duplexer allowed a 8.9W signal at the antenna port from our 10W transmitter. The calculated ERP for our UHF repeater should end up to be around 60-70W.

Excellent duplexers can turn an average repeater into an exceptional repeater.

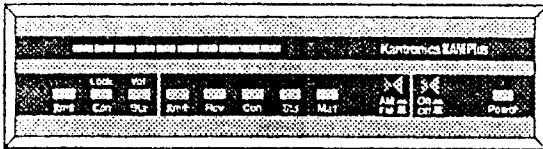
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## NEWS FLASH - PACKET SEMINAR

The Seaway Valley Amateur Radio Club, in cooperation with the Eastern Ontario Packet Group is planning a Packet Symposium / Seminar for prospective and new packeteers. This will take place on Saturday, Nov. 27, 1993 at Transport Canada Training Institute, 1950 Montreal Rd., Cornwall. A very full day is planned. Advance registration is required and is limited to 35 people. Cost was not set at press time but will be in the \$35.00 range, with all proceeds going to expansion of the packet network in our area. Register with VE3EI @ VE3NUU or call (613) 346-2489.

# Great Performers from Kantronics, RF Concepts, & Seaway!

## KAM Plus



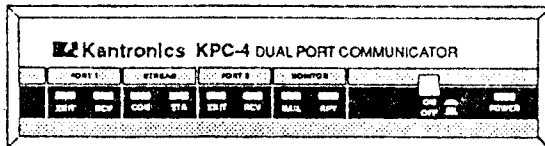
**KAM Plus** – The HF/VHF all-mode TNC. With two radio ports, the Kantronics All Mode Plus (KAM Plus) supports CW, RTTY, ASCII, NAVTEX/AMTEX, AMTOR, (ARQ, FEC, SELFEC, CCIR-476, and 625), Pactor or Packet on HF while running Packet on VHF at the same time! Standard features include 128 K RAM, 1 Megabit EPROM, lithium battery, and on-board clock.

## KPC-3



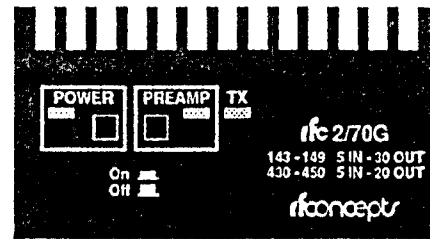
**KPC-3** – The high performance, low power, small-sized TNC. This TNC for both new and experienced users features a dual-level command set with 23 and 130 commands respectively and incorporates the Kantronics full-featured PBBS. Standard features include low power (<15 ma at 6 - 25 VDC), battery-backed RAM, and small size

## KPC-4



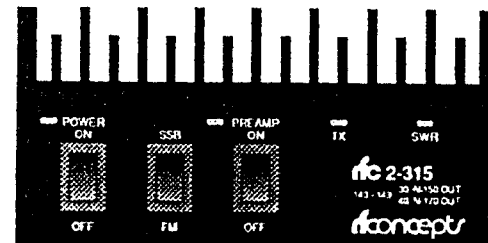
**KPC-4** – The first true dual-port TNC. The KPC-4 contains two built-in 1200 baud modems, 32 K of RAM, and the Kantronics KA-Node networking firmware, making it ideal as a local packet switch. Size: 1-3/4 x 6 x 8 inches (4.5 x 15.3 x 20.3 cm). Weight: 2-1/4 lbs. (1.02 kg). Requires 12 VDC at 200 ma.

## rfc 2/70G



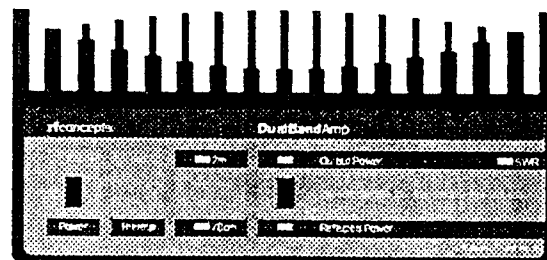
**rfc 2/70G** – The popular dual-band amp for your HT. The rfc 2/70G provides RF amplification for your dual-band HT while transmitting or receiving. With five watts of drive on 2 meters or 70 cm, you'll get 30 watts out on 2 m and 20 watts out on 70 cm. The amp also features two GaAsFETs to amplify received signals on both bands.

## rfc 2-315



**rfc 2-315** – Added Power for your 2-Meter Hamshack Transceiver. This rfconcepts amp boosts typical transceiver output power up to 170 watts. With 30 watts of input, the amp delivers 150 watts; with 40 watts of input, it develops 170 watts. The rfc 2-315 also includes a receive GaAsFET preamp.

## rfc 2/70H



**rfc 2/70H** – The popular high-power dual-band amp for your shack! The rfc 2/70H boosts power from 20 watts to 200 watts output on 2 meters and 125 watts on 70 cm.



**Seaway Communications Co.**

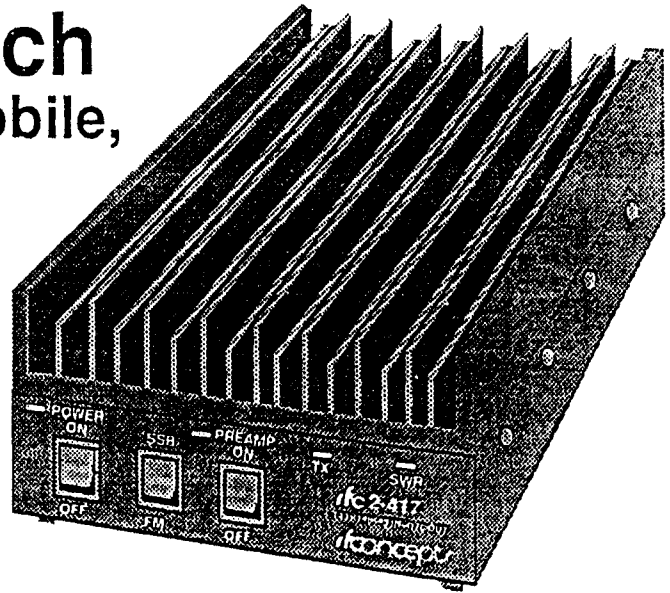
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## Power Amplifiers

### 144 MHz Models

	2-23	VHF1-60	2-315	2-417
Power In:	.2 to 5w	1w to 8w	5 to 50w	.2 to 50w
Power Out:	2w = 30w	1w = 60w	30w = 150w	45w = 170w
Max. Input:	5w	8w	50w	50w
Pre-Amp N.F. dB:	1-2	N/A	1-2	1-2
Gain (typical):	15dB	N/A	18dB	18dB
Current:	5A	14A	22A	22A
Size (in inches):	6.5 x 3.5 x 2	5 x 9 x 2.9	11.5 x 6 x 3	11.5 x 6 x 3
Size (in cm):	16.5 x 8.9 x 5.1	12.7 x 22.9 x 7.4	29.2 x 15.2 x 7.6	29.2 x 15.2 x 7.6

### 450 MHz Models – ATV compatible

	4-32	4-110	4-310
Power In:	.2 to 5w	.2 to 15w	.2 to 40w
Power Out:	3w = 20w	10w = 100w	30w = 100w
Max. Input:	5w	18w	45w
Pre-Amp N.F. dB:	2-3	2-3	2-3
Gain (typical):	12dB	12dB	12dB
Current:	4A	22A	20A
Size (in inches):	6.5 x 3.5 x 2	11.5 x 6 x 3	11.5 x 6 x 3
Size (in cm):	16.5 x 8.9 x 5.1	29.2 x 15.2 x 7.6	29.2 x 15.2 x 7.6

### 220 MHz Models

	3-22	3-211	3-112	3-312
Power In:	.2 to 5w	.2 to 5w	.2 to 15w	.2 to 30w
Power Out:	2w = 20w	2w = 110w	10w = 120w	30w = 120w
Max. Input:	5w	5w	18w	33w
Pre-Amp N.F. dB:	1-2	1-2	1-2	1-2
Gain (typical):	15dB	18dB	18dB	18dB
Current:	4A	22A	22A	20A
Size (in inches):	6.5 x 3.5 x 2	11.5 x 6 x 3	11.5 x 6 x 3	11.5 x 6 x 3
Size (in cm):	16.5 x 8.9 x 5.1	29.2 x 15.4 x 7.6	29.2 x 15.2 x 7.6	29.2 x 15.2 x 7.6

### Dual-Band

2m, 70cm
2/70G
.5 to 7w
5w = 30w, 5w = 20w
7w
1-3, 2-4
15dB, 10dB
6A
3.5 x 2 x 8
8.9 x 5.1 x 20.3

2/70
.5 to 7w
5w = 30w, 5w = 20w
7w
N/A
N/A
6A
3.5 x 2 x 8
8.9 x 5.1 x 20.3

2/70H
20 to 50w
200w, 125w
50w
N/A
N/A
40A
8 x 12 x 4
20.3 x 30.5 x 10.2



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Kantronics KAM Plus Upgrade...	119
Kantronics KPC-3 Vhf Packet.....*	159
Kantronics KPC-2 Vhf/Hf.....*	219
Kantronics KPC-4 Dual Port.....	379
MFJ-1278B All mode w/Pactor...	429

**Power Supplies**

Astron RS-20A.....	179
Astron RS-35A.....	289
Astron RS-35M.....	329
Astron RS-50M.....	449

**Coax Switches**

Daiwa CS-201A - 2 pos cavity....	35
Daiwa CS-401 - 4 pos cavity.....	155
MFJ-1701 - 6 position rectangular	49
MFJ-1702B - 2 position cavity....	35
MFJ-1704 - 4 position cavity.....	89
Ameritron RCS-4 hf remote.....	185
Ameritron RCS-8V hf/vhf remote	205

**Heil Sound**

New "Pro Set" boom headset.....	189
BM-10 boom headset w/HC-4.....	129
BM-10 boom headset w/HC-5.....	129
HC-4 "Dx" mic element.....	45
HC-5 full range mic element.....	45

**Keiver Paddles**

Benecher BY-1 Iambic, black base	*95
Benecher BY-2 Iambic, chrome....*	109
Vibroplex Iambic, grey base.....*	129
Vibroplex Iambic, chrome base...*	159

**HF Antennas**

Cushcraft A3S 3 element Tribander.....*	449
Cushcraft A4S 4 element Tribander.....*	539
Cushcraft AP-8A 8 band Vertical .....	279
Cushcraft R-5 "no-radial" Vertical.....*	369
Cushcraft R-7 "no-radial" Vertical.....*	469
Unadilla 80/40 Trap Dipole kit.....	129
Van Gorden G5RV 10-80m.....	89

**VHF/UHF Base Antennas**

Comet CA-2x4MAX 2m/440.....	259
Comet CA-2x4WX 2m/440.....	199
Cushcraft ARX-2B 2m Vertical.....	79
Cushcraft AR-270 2m/440.....	95
Cushcraft 13B2 13 element 2m.....*	139
Diamond D-130J Discone (Best!).....	129
Diamond X-200 2m/440.....	209
Diamond X-510M 2m/440.....	289

**VHF/UHF Mobile Antennas**

Comet CA-2x4SR.....	79
Comet FL-62S 2m/440.....	99
Comet FL-67S 2m/440.....	129
Diamond SG-7500 2m/440.....	119
Diamond SG-7900 2m/440.....	169
Larsen KG-144 On Glass 2m.....	69
Larsen KG-2/70 On Glass 2m/440.....	99
Larsen NMO 2m 5/8 magmount.....	75
Larsen NMO-2/70 magmount.....	85

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RG-8X 50 Ohm, 95% Braid.....	39
450 Ohm Quality Ladderline.....	25

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MFJ-901B Basic 300w Tuner.....	*79
MFJ-941E 300w Versatuner.....	*139
MFJ-945D 300w Mobile Tuner.....	*119
MFJ-948 Deluxe 300w Tuner.....	*169
MFJ-949E As above, w/Dummy Load..	*189

**Receivers**

Drake R-8 Superb HF Rx, 5 filters.....	1179
Lowe HF-150 ssb/cw/am/am syncro....	*729
Lowe KPAD-1 for HF-150 above.....	95
Sangean ATS-803A - Best Buy!.....	219
Sangean ATS-818CS w/Cassette record	319

**Optoelectronics Frequency Counters**

OE-2300 1MHz-2.3GHz counter.....	189
OE-2210A 10Hz-2.3GHz counter.....	299
OE-M1 10Hz-3GHz LCD Bargraph....	349

**HF/VHF/UHF Amplifiers**

Daiwa LA-2035R 2m 30w.....	189
Daiwa LA-2065R 2m 60w.....	259
RF Concepts 2-23 2m.....	*189
RF Concepts VHF 1-60 2m.....	*329
RF Concepts 2-315 2m 150w.....	*369
RF Concepts 2/70G 2m/440.....	369
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RF Concepts 4-310 440MHz.....	499

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