QEX March 37 1985 $1

The ARRL Experimenters' Exchange

Packeteers to Meet in GaAs Valley

By now, "packeteer" is a household word, but what is "GaAs Valley"? The electronics trade journals are predicting that "Silicon Valley" will become GaAs Valley any day now. It's nice to be out in front of the pack on technological change, so let's assume that the name change occurs before March 30. That is the date for the Fourth ARRL Amateur Radio Computer Networking Conference being held in Moscone Convention Center, in downtown San Francisco. The Conference is co-sponsored by the ARRL and the Pacific Packet Radio Society in conjunction with the Tenth West Coast Computer Faire, which runs from March 30 through April 2. The Faire has been the premier computer-industry trade show, and this one will be jam-packed with sessions and exhibits on personal computing.

To preregister, send a $20 check payable to H. Magnuski and an s.a.s.e. to be received by Hank no later than March 16. Hank's address is 311 Stanford Ave, Menlo Park, CA 94025, tel. 415-854-1927. The $20 covers the $15 4-day Faire preregistration and a copy of the ARRL computer-networking conference proceedings. Registration at the door will be $15 for 4 days, $12 for only one day. Registration for the Faire will also admit you without extra charge to the computer-networking conference. However, copies of the proceedings will also be sold for $10.

The conference will run from 10 A.M. to 6 P.M. on March 30. Papers will be presented by Pete Eaton, WB9FLW, Phil Karn, KA9Q, Steve Goode, K9NG, Joel Kandell, KI4T, Bob Richardson, W4UCH, Bob Bruninga, WB4APR, and others.

Some packeteers have rooms at the Hotel Union Square, 114 Powell St, San Francisco, CA 94102, tel. 415-397-3000. From SFO, take the Airporter Bus (about $6) to the downtown terminal. The hotel is 2 blocks away from the terminal and 3 blocks from the Moscone Center. Prices are in the $60-70 range. A group rate may still be possible if you book through Hank Magnuski immediately.

Eleventh Annual Eastern VHF/UHF Conference

The 11th Annual Eastern VHF/UHF Conference will be held May 17-19, 1985 at Rivier College, Nashua, NH. The program features a Friday night hospitality, technical talks by well-known VHFers on Saturday, discussions on various VHF/UHF bands, noise-figure measurements and antenna-gain tests.

To preregister, send $13.50 to David Knight, KA1DT, 15 Oakdale Ave., Nashua, NH 03062 before May 5. Registration at the door is $20.00. The Saturday night banquet is $14.00, also payable before May 5.

Dormatory rooms will be available at the college. The fee of $16.50 per night (single), $28.00 (double), includes a buffet breakfast. Those wishing dormatory accommodations must include payment at the time of preregistration. Make all checks payable to "Eastern VHF/UHF Conference." For those wishing to make their own housing arrangements, there are numerous hotels and motels nearby.

For more information, contact:

Lewis D. Collins, W1GXT
10 Marshall Terrace
Wayland, MA 01778
617-358-2854 (6-10 P.M.)

Are You into SM?

I mean "surface mounting." ARRL Hq lab engineer, Jonathan Towle, WB1DNL, is experimenting with surface-mounted construction techniques using extremely small PC boards and chip components. This technique may not be for the average amateur, but is suitable for experimenters needing to build very small devices or for VHF/microwave work where lead lengths are critical. Hybrid microelectronics using SM components was the topic of Pat Hawker's Technical Topics column in the March 1985 issue of RSGB's Radio Communication. Japan is gearing up for SM production. Any ideas? — W4RI

Correspondence

Circuit for a Very Stable Crystal Oscillator

I am building a high accuracy 5.00-MHz crystal oscillator. It will be temperature compensated, temperature controlled to within 0.1° C, and will use a selected temperature at a point on the frequency-temperature curve that is relatively flat in the vicinity of 40 to 50° C. The oscillator will be powered by a well regulated supply, backed up by Nicads to eliminate outage if a power failure should occur. The unit is encapsulated in about 10^{11} cubed styrofoam.

When this project is finished, I will be checking it against the color-burst frequency of the master network programs. According to the Bureau of Standards, their accuracy is within one part in 10^{11}. I doubt that I will make that kind of accuracy, but hope to come close.

For me to check my unit against the network color-burst frequency, I will need to divide by 8, using an INTERSIL ICM 7209 CMOS oscillator, which outputs both X1 and ÷ 8 (0.625 MHz). Does anyone know of a circuit that will multiply 63 (PLL) and divide by 11? This will get me to 3.579,545+ MHz, the color-burst frequency. — John R. True, N4BA, 10322 Georgetown Pike, Great Falls, VA 22066.

Frequency Mobility for your ACSSB^{R} Board

I have just received the set of STI ACSB boards and studied the supporting documents. The suggested replacement for the TCXO can be enhanced a bit to make use of the voltage frequency control on the RF board. Such a VVXCO is documented in the 1985 ARRL Handbook, and my version is illustrated in Fig. 1.

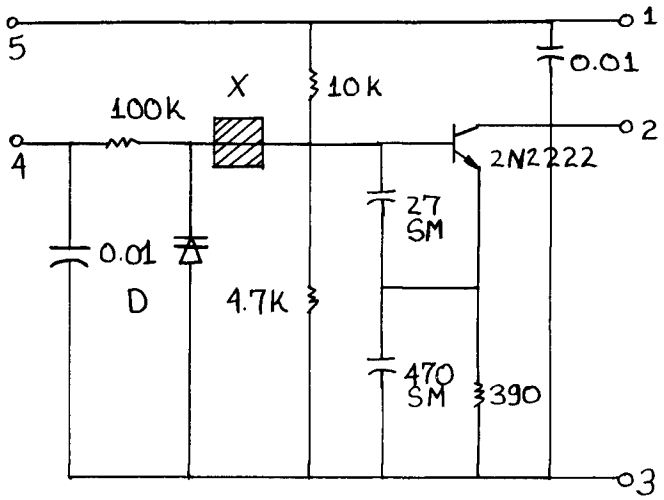
The real heart of a VVXCO is a high Q reactance diode. I have found that the TRW "Varicap" diodes, which are no longer manufactured, are somewhat more responsive than the Motorola diodes, which are available. The amount of variation that can be obtained, without resorting to the use of inductive reactances, is adjustable through various values of the feedback capacitors in the base-emitter circuitry. The values shown, along with a TRW V910 diode, provide up to 5-kHz frequency shift at the 13-MHz crystal, or 45 kHz at the signal frequency. Outputs in the range of ØdBm were observed, but by lowering the 470 pF capacitor to 120 pF, the output can be increased to 5 dBm, sacrificing some of the range of voltage variability down to 15 kHz.

This circuit would permit a front panel control of frequency with a potentiometer. That control could also be used with several VVXCOs through the channel switch, opening up multiband frequency control possibilities.

Study of the documentation leads me to the conclusion that one really neat application of ACSB would be for longer distance Packet operations. The AFC features of the ACSB unit would compensate for small frequency differences that would otherwise preclude a proper decoding of tones. This possibility would remove the restrictions of the high signal to noise requirements needed for satisfactory FM Packet communications now being used, possibly to even compensate for doppler of satellite and meteor scatter modes.

One apparent restriction of the STI ACSB hardware is that it will operate only in simplex and half-duplex modes, but not in the full duplex commonly used for satellite communications. This problem is not with the audio board, but with the use of the single 8-pole bandpass filter at the 5-MHz IF on the RF board. Proper full duplex would need a separate IF and filter for the transmit (or receive) and thus would need portions of a second ACSB RF board. Caution must be used here as both IFs, being at 5 MHz, could cause mutual interference; it would be better to have a second IF frequency. Please reference the techniques used by Yaesu in their FT-726R transceiver. Suggestions for beating this problem would be appreciated. — Dick Jansson, WD4FAB, 1130 Willowbrook Trail, Maitland, FL 32751.

VXCO for ACSSB Transceiver Fig. 1



Control capability: approx. 25 to 45 kHz at f_x x 9 at 144 to 148 MHz.

X = 13+ MHz fundamental crystal, parallal mode 30 pF shunt cap.

D = varactor diode, 30 pF at Ø volts (TRW "Varicap" performs best — V910).

(Correspondence continued on page 10.)

TI 99/4A Contest Dupe Program

By David Arbogast,* NV4G

Without a disk drive it is difficult to store and access large amounts of data quickly. This program was developed for the contester, with an unexpanded TI 99/4A (16k RAM) and no disk drive. It allows the user to continuously store and analyze calls that will assist in eliminating duplicate contacts.

The program is written in extended BASIC for extra test commands, program efficiency, and execution speed. It will store between 900 and 1000 calls, depending on the lengths of the call signs stored. It also performs the following functions continuously during a contest:

* store call signs per band (10 unit call sign limit)
* erase call signs per band
* indicate QSO number/total
* modify QSO number/total
* search call sign bank and indicate result

Program Execution

After the program is in the RAM and "run" is entered, the computer will ask for an input indicating the band you wish to work. Type in 10, 15, 20, 40, or 80, and press enter. The program will store all contacts made by band, therefore, the program must be notified immediately of a band change. The band currently being worked is continuously displayed on the screen.

A three item main menu will now be displayed allowing: (1) change of band; (2) entry of a callsign; and (3) change of contact number or QSO total (whichever you choose to keep track of).

Function no. 1 is executed by simply entering the band you will be operating, then press enter. To enter a call sign for memory search, type in the call and press enter. The computer will review its bank of previously stored calls for the band in use and advise you of the search result in the following manner.

If the call is not already stored, a two item menu is displayed. Option "0" stores the call sign and returns you to the main menu. Option "1" returns to the main menu with no action taken.

If the call is already stored, a two item menu is again displayed. Option "1" returns you to the main menu, and Option "2" erases the call sign for the band being worked, and returns to the main menu.

The last item on the main menu is "NR." It stands for number change and is a useful feature to accommodate mistakes in serial number or contact totals. When you type NR and press enter, an input prompt appears, asking for a new number. Once the number is entered, all new contacts are automatically increment from the new total. The program now returns to the main menu.

The program contains a safety feature to prevent the program from crashing should you exceed the memory limits of the 16k RAM. If you are adding call signs and the next call to be entered goes beyond the available memory, the statement, "Call sign storage band full" is displayed and the program will return to the main menu. At this point, the program will not accept other data, but it can be used for duping purposes.

This program has been tested and used successfully in a major contest. The group's total was 380 contacts with no noticeable search time. One result from the contest experience was the addition of the call erase and renumber routine. I hope this program will add to your enjoyment of both computing and contesting.

PROGRAM LISTING

```
1 CALL CLEAR :: DIM L$(11ØØ) ::
B,D,F,H,J=1 :: DISPLAY AT(5,1):"
CONTACTS-Ø" :: DISPLAY AT(1Ø,6):
"BAND?" :: GOTO 4 :: O,A,C,E,G,I
=Ø
2 DISPLAY AT(3,1):"BAND-";B$;"M"
3 GOSUB 23 :: DISPLAY AT(1Ø,1):"
ENTER :": :"> STATION CALL": :">
 BAND IN USE": :"> NR--TO CHANGE
 CONTACT #"
4 ACCEPT AT(2Ø,3)BEEP:B$ :: ON E
RROR 26
5 IF B$="1Ø" THEN C$="1" :: GOTO
 2 ELSE IF B$="15" THEN C$="2" :
: GOTO 2 ELSE IF B$="2Ø" THEN C$
="" :: GOTO 2 ELSE IF B$="4Ø" TH
EN C$="4" :: GOTO 2
6 IF B$="8Ø" THEN C$="5" :: GOTO
 2 ELSE IF B$="NR" THEN 25
7 A$=B$&C$ :: IF B$="" THEN 3 EL
SE K=ASC(SEG$(A$,1,1))
8 IF K<58 THEN P=A :: M=B :: GOT
O 1Ø ELSE IF K<71 THEN P=C :: M=
D :: GOTO 1Ø ELSE IF K<78 THEN P
=E :: M=F :: GOTO 1Ø
9 IF K<85 THEN P=G :: M=H :: GOT
O 1Ø ELSE P=I :: M=J
```

(Continued on page 15.)

*Rt. #6, Box 325, Seymour, TN 37865

Product Review Index: 1976 to 1984

Here is a list of most of the Product Review items from 1976 to 1984 that appeared in QST. Small items such as speakers, transistors, book reviews and so on, do not appear here. Those items now fall under the New Products and New Books headings.

Manufacturer	Item	Date	Reviewer
A.E.A.	AMT-1 AMTOR Terminal Unit	NOV 83	Chuck Bender, W1WPR
A.E.A.	Hot Rod Antenna For 2-M	NOV 83	Pete O'Dell, KB1N
A.E.A.	KT-2 Keyer/Trainer	DEC 83	Steve Place, WB1EYI
A.E.A.	Doctor DX C64 Morse Trainer	DEC 84	Jeff Ward, K8KA
A.E.A.	CP-1 Computer Patch Interface	APR 84	Paul K. Pagel, N1FB
A.E.A.	AD-1 Auto Dialer	MAY 79	George Barker, WB8PBC
A.E.A.	Isopole 2-M Antenna	APR 80	Lee Aurick, W1SE
A.E.A.	BT-1P Code Trainer	FEB 83	Marian Anderson, WB1FSB
A.E.A.	Isopole 220-MHz Vertical Gain Antennas	JUN 82	Pete O'Dell, KB1N
A.E.A.	KT-1 Keyer	JAN 81	Pete O'Dell, KB1N
A.E.A.	MBA-RC Code Reader	AUG 83	Doug DeMaw, W1FB
A.E.A.	MBA RO Code Reader	AUG 83	Paul K. Pagel, N1FB
A.E.A.	Morsematic MM1	OCT 80	George Collins, KC1V
A.E.A.	MK-1 Memory Keyer	OCT 80	George Collins, KC1V
Accu-Circuits	Accu-Memory II keyer	JUL 79	Jim Westbrook, K1FD
Advanced Computer Controls	RC-850 Repeater Controller	FEB 84	Pete O'Dell, KB1N
Alda	103 Transceiver	DEC 78	Sandy Gerli, AC1Y
Alliance	HD-73 Heavy-Duty Rotator	DEC 80	Sandy Gerli, AC1Y
AMCOMM	S225 2-M Transceiver	JAN 78	Jim Kearman, KR1S
Amperex	110 2-M Amplifier	MAR 79	Chuck Bender, W1WPR
Angle Linear	VHF/UHF Receiving Preamplifiers	AUG 78	Jim Kearman, KR1S
Antenna Specialists	HM-224 220-MHz Mobile Antenna	APR 77	Unknown
Antenna, Inc.	Model 10043 Power/SWR Meter	NOV 76	Jerry Hall, K1TD
Apollo (Village Twig)	2000X-2 Antenna Tuner	MAY 80	Paul K. Pagel, N1FB
ARCOS	432-MHz Trans. Conv./Amps.	AUG 76	Tom McMullen, W1SL
Astrolite	436B Headset	JAN 79	Lee Aurick, W1SE
Austin	OMNI 2-M Antenna	DEC 83	Ed Tilton, W1HDQ
Autek Research	QF-1A Audio Filter	JUL 80	Doug DeMaw, W1FB
Autek Research	MK-1 Keyer	JUN 77	Doug DeMaw, W1FB
Autek Research	QF-1 RC Active Filter	MAR 77	Doug DeMaw, W1FB
Avanti	AH 151.36 Window-Mount Antenna	DEC 79	John Lindholm, W1XX
Avatar Magnetics	Transformers	NOV 82	George Woodward, W1RN
Azden	PCS-300 2-M Hand-Held	SEP 82	Carol Colvin, AJ2I
Azden	PCS 2000 2-M FM Transceiver	AUG 80	Joel Kleinman, N1BKE
B & K	Model 1820 Frequency Counter	NOV 78	Jim Kearman, KR1S
B & W	RF Clipper	OCT 79	Bob Halprin, K1XA
Barlow-Wadley	XCR-30 Receiver	JAN 77	Lew McCoy, W1ICP
Bearcat	Model 100 Scanner	MAR 83	Hal Steinman, K1ET
Bearcat	Model 210 Scanner	JUL 78	Dave Karpiej, K1THP
Bencher	Paddle	MAY 78	Jim Cain, K1TN
Bencher	Paddle (Improved model)	DEC 80	John Pelham, W1JA
Bencher	ZA-1 and ZA-2 Baluns	OCT 80	Doug DeMaw, W1FB
Berk-Tek	RG-8X Coaxial Cable	DEC 79	George Woodward, W1RN
Bird	Model 4410 Thruline Wattmeter	OCT 83	Mark Wilson, AA2Z
Bird	4360 and 4362 Ham-Mate Wattmeters	AUG 79	John Nelson, W1GNC
Bird	Model 4381 Power Analyst	JUL 80	George Collins, KC1V
Blacksburg Group	Fist Fighter Keyer	JAN 83	Paul K. Pagel, N1FB
Brown & Simpson Eng.	MK-75 Electronic Keyer	AUG 76	Charles J. Carrol, W1GQD
Bunker Ramo	Solderless Coaxial-Cable Connectors	MAR 77	Chuck Watts, WA6GVC
Butternut	HF5V-II Multiband Vertical	MAY 79	J. Craig Clark, Jr., N1ACH
CES	Model 510SA Smart Patch	APR 84	Jerry Hall, K1TD
Clegg	AB-144 All-Bander Receiving Converter	OCT 80	Bernie Glassmeyer, W9KOR
Clegg	FM-28 2-M FM Transceiver	JUN 78	Bryan Leipper, K1CD
Clegg	FM-DX 2-M FM Transceiver	SEP 76	Lew McCoy, W1ICP
Collins	Low-Cost Mechanical Filter	JUN 78	Doug DeMaw, W1FB
Collins	KWM-380 HF Transceiver	OCT 82	George Collins, KC1V

Manufacturer	Item	Date	Reviewer
Communications Elec. Spec.	CES 200 & CES 210 Tone Pads	FEB 76	Chuck Watts, WA6GVC
Communications Elec. Spec.	Model 100 Digital Display	APR 76	Jerry Hall, K1TD
Communications Power	WM-7000 Wattmeter	SEP 78	Sandy Gerli, AC1Y
Communications Specialists	TE-64 Tone Encoder	SEP 80	Pete O'Dell, KB1N
Communications Specialists	SS-32 M CTCSS Encoder	MAR 83	Pete O'Dell, KB1N
Computer Warehouse Store	Video Monitor	APR 77	Lew McCoy, W1ICP
Comtronix	FM-80 10-M FM Transceiver	DEC 80	Pete O'Dell, KB1N
Crosby, Jerry	LOGBOOK Software (TRS-80)	DEC 83	Stan Horzepa, WA1LOU
Cubic	Astro 102 BXA HF Transceiver	DEC 81	John Pelham, W1JA
Curtis	EK430 keyer & 8044-2 Kit	FEB 76	Doug DeMaw, W1FB
Curtis	IK-440 Instructokeyer	MAR 76	Doug DeMaw, W1FB
Curtis	EK-480M CMOS Deluxe Keyer	JUN 80	Paul K. Pagel, N1FB
Cushcraft	2-M Collinear Array	FEB 78	Doug DeMaw, W1FB
Cushcraft	A4 Yagi Antenna	JAN 83	Doug DeMaw, W1FB
Cushcraft	ATB-34 Tribander	JUN 79	Lew McCoy, W1ICP
Cushcraft	32-19 Boomer & 324K Stacking Kit	NOV 80	Dave Sumner, K1ZZ
Cushcraft	R3 3-Band Vertical	MAR 83	Larry Wolfgang, WA3VIL
Cushcraft	220B 220-MHz Boomer	AUG 83	Mark Wilson, AA2Z
Cushcraft	40-2CD 40-M Skywalker Yagi	JUL 83	Mark Wilson, AA2Z
Cushcraft	617-6B Boomer 6-M Yagi	SEP 82	Gerry Hull, AK4L
Daiwa	AF-606K Audio Filter	JAN 83	Doug DeMaw, W1FB
Daiwa	CN-720 SWR and Power Meter	JAN 79	Lee Aurick, W1SE
Daiwa	RF 440 RF Speech Processor	APR 79	Jim Bartlett, K1TX
Daiwa	CS-201 and CS-401 Coaxial Switches	MAY 79	Gary Bartels, WB1CPM
Data Precision	Model 938 Digital Capacitance Meter	NOV 79	Doug DeMaw, W1FB
Datong Electronics Ltd.	Datest 1 IC/Transistor Tester	APR 77	Unknown
Datong Electronics Ltd.	FL1 Audio Filter	AUG 79	Gary Bartels, WB1CPM
Datong Electronics Ltd.	PC1 General-Coverage Receiving Adaptor	APR 83	Bernie Glassmeyer, W9KDR
Davis	CTR-2-500 Frequency Counter	APR 78	Stu Leland, W1JEC
Daytronics	Mimic Programmable-Memory Keyer	DEC 78	Jim Bartlett, K1TX
Decibel Products	DB-702/DB-702T Antennas	OCT 76	Chuck Watts, WA6GVC
Decibel Products, Inc.	Vapor-Bloc Coaxial Cable	NOV 78	Doug DeMaw, W1FB
Dentron	160-V Skyclaw Antenna	NOV 76	Larry E. Price, W4RA
Dentron	MLA 2500 Amplifier	MAR 78	Jay Rusgrove, W1VD
DGM Electronics, Inc.	SRT 3000 Terminal	DEC 83	Leo D. Kluger, WB2TRN
Dielectric Communications	Model 1000A RF Wattmeter	DEC 79	Bernie Glassmeyer, W9KDR
Direct Conversion Technique	DC-10A Receiver Module and VV-10 VFO	JAN 79	Jim Bartlett, K1TX
Drake	RCS-4 Remote Coax Switch	DEC 76	Jim Cain, K1TN
Drake	TR-7 HF Transceiver	MAY 79	Dave Sumner, K1ZZ
Drake	R-7 Receiver	JAN 80	Doug DeMaw, W1FB
Drake	UV-3 VHF FM System	AUG 78	Jim Kearman, KR1S
DSI Instruments	3600A Frequency Counter	FEB 79	Jim Kearman, KR1S
E-Tek	FR4TR Frequency Counter	OCT 80	Robert Halprin, K1XA
Egbert	RTTY Program	JUN 82	Mike Kaczynski, W1OD
Electronic Signal Products	VHF 144-5A 2-M FM Receiver Kit	NOV 79	Jim Bartlett, K1TX
Electrospace Systems	HV-580 10-M Dual-Mode Antenna	MAR 79	Jim Bartlett, K1TX
Electrospace Systems	HP-2 160-M Matching Network	MAR 79	Jim Bartlett, K1TX
ETO	Alpha 76 Linear Amplifier	JAN 78	Jim Cain, K1TN
Flesher	TR-128 Baud-Rate Converter	APR 80	Stan Horzepa, WA1LOU
Flesher	TU-170 RTTY Terminal	MAR 79	Stan Horzepa, WA1LOU
Flesher	TU-300 & TU-400 RTTY Modem	JUN 83	Paul K. Pagel, N1FB
Flesher	TU-400 & TU-300 RTTY Modem	JUN 83	Paul K. Pagel, N1FB
Fluke	8020A Multimeter	SEP 78	Clarke Greene, K1JX
Fox-Tango	2.1-kHz TS-830 Filter	SEP 83	Michael B. Kaczynski, W1OD
Fox-Tango	YF-90H1.8 Crystal Filter	APR 82	George Woodward, W1RN
GEM	Quad Antenna	JAN 78	Lee Aurick, W1SE
Genave	GTX-1 2-M Handheld Transceiver	DEC 76	Ed Tilton, W1HDQ
Genave	GTX-100 220-MHz Transceiver	MAY 76	Charles J. Carroll, W1GQO
Genave	GTX-800 2-M FM Transceiver	NOV 78	Jim LaPorta, N1CC
HAL	CWR 6850 Telereader RTTY/CW Terminal	MAY 83	Gerry Hull, VE1CER
HAL	DS-3000 Video Display Terminal	MAY 77	Alan R. Bloom, WA3JSU
HAL	DS-3100 ASR Video Display Terminal	APR 80	Paul K. Pagel, N1FB
HAL	ST-6000 Demodulator	MAY 77	Alan R. Bloom, WA3JSU
HAL	MCEM-8080 Microcomputer	DEC 76	Chuck Watts, WA6GVC
HAL	FYO Key	DEC 76	Jim Cain, K1TN
Ham Radio Center, Inc.	Adjustable key	JUL 76	Jay Rusgrove, W1VD
Hamco	Scotia Paddle	DEC 78	Jim Bartlett, K1TX
Hamlog/Applecoder	Apple II Software	JAN 83	Hal Steinman, K1ET

Manufacturer	Item	Date	Reviewer
Hamtronics	432-435 MHz Converter Kits	JUL 78	Chod Harris, WB2CHO
Hamtronics	P8 VHF Preamplifier	MAY 77	Jim Kearman, KR1S
Hamtronics	XV-4 Transmitting Converter	JAN 82	Steve Place, WB1EYI
Harp, H. Alan	CW Sendin' Machine	JUL 76	Jim Kearman, KR1S
Heath	ETS-3401 Microcomputer Training System	SEP 82	Pete O'Dell, KB1N
Heath	SS-9000 HF Transceiver	FEB 84	Ed Raso, WA2FTC
Heath	HD-1418 Active Audio Filter	MAR 84	Larry Wolfgang, WA3VIL
Heath	HD-1250 Dip Meter	JAN 76	Doug DeMaw, W1FB
Heath	SB-230 HF Amplifier	FEB 76	Bob Meyers, W1XT
Heath	HW-8 QRP Transceiver	APR 76	Doug DeMaw, W1FB
Heath	SB-614 Monitorscope	JUN 76	Jay Rusgrove, W1VD
Heath	IC-2100 Elec. Slide Rule	AUG 76	Lew McCoy, W1ICP
Heath	HD-1982 Micoder Microphone	NOV 76	Bob Margolin, K1BM
Heath	HW-104 HF Transceiver	DEC 76	Tom McMullen, W1SL
Heath	HD-8999 Ultra Pro CW Keyboard	APR 84	Mike Kaczynski, W1OD
Heath	HN-31A Cantenna	MAY 84	Chuck Hutchinson, K8CH
Heath	EE-3404 6809 uP Course	JUL 84	Pete O'Dell, KB1N
Heath	HFT-9 Antenna Tuner	JUL 84	Mark Wilson, AA2Z
Heath	HW-5400 HF Transceiver	OCT 84	Larry Wolfgang, WA3VIL
Heath	GU-1820 AC Power System	DEC 82	Doug DeMaw, W1FB
Heath	HM-2140 Dual HF Wattmeter	FEB 80	Stu Leland, W1JEC
Heath	HD-1410 Electronic Keyer	MAR 78	Stu Leland, W1JEC
Heath	HM-2141 VHF Wattmeter	SEP 80	John Pelham, W1JA
Heath	HR-1680 Receiver	JAN 77	Jim Kearman, KR1S
Heath	HW-2021 2-M FM Hand-Held Trans.	JAN 77	Lew McCoy, W1ICP
Heath	HX-1681 CW Transmitter	MAR 81	Gerry Hull, AK4L
Heath	IB-5281 RLC Bridge	DEC 80	Paul K. Pagel, N1FB
Heath	IM-2215 Digital Multimeter	JUN 80	Paul K. Pagel, N1FB
Heath	IP-2715 Battery Eliminator	JUN 77	Chuck Watts, WA6GVC
Heath	IP-2718 Tri-Power Supply	MAY 77	Jerry Hall, K1TD
Heath	SA-1480 Remote Antenna Switch	JUL 80	Tom Frenaye, K1KI
Heath	SA-2040 Antenna Tuner	NOV 80	Paul K. Pagel, N1FB
Heath	SA-2060 Transmatch	JUL 82	George Collins, KC1V
Heath	uMatic Memory Keyer SA-5010	MAY 82	Pete O'Dell, KB1N
Heath	SA-7010 HF Tribander	AUG 80	Doug DeMaw, W1FB
Heath	SB-104A HF Transceiver	OCT 75	Unknown
Heath	SB-220 Linear Amplifier	AUG 70	Doug Blakeslee, N1RM & Gus Wilson, W1NPB
Heath	SB-221 Linear Amplifier	MAR 80	Doug DeMaw, W1FB
Heath	VF-2031 2-M FM Hand-Held Transceiver	OCT 79	Jim Bartlett, K1TX
Heath	VF-7401 2-M Transceiver	NOV 81	Sally O'Dell, KB1O
Heath	VL-1180 2-M Mobile Amplifier	MAY 82	Paul K. Pagel, N1FB
Heath	VL-2280 2-M Base Station Amplifier	JUN 82	Gerry Hull, AK4L
Heath	HL-2200 Amplifier	NOV 83	Paul K. Pagel, N1FB
Heil Sound, Ltd.	HM-5 Microphone	APR 84	Doug DeMaw, W1FB
Hewlett-Packard	HP-25 Programmable Calculator	OCT 76	Jerry Hall, K1TD
Hewlett-Packard	3476A Digital Multimeter	APR 77	Jerry Hall, K1TD
Horizon	Model 15-147 Vertical Antenna	JAN 79	Jerry Hall, K1TD
Horizon	10-FM 2-M Vertical Antenna	JAN 79	Jerry Hall, K1TD
Hustler	6-BTV Vertical Antenna	JAN 84	Bob Schetgen, KU7G
Hy-Gain	Model 214 2-M Yagi	OCT 78	Dave Sumner, K1ZZ
Hy-Gain	V-2 2-M Antenna	MAY 82	Dennis Lusis, W1LJ
ICOM	IC-2A 2-M FM Hand-Held Transceiver	JAN 81	Dale Clift, WA3NLO
ICOM	IC-3AT 220-MHz FM Transceiver	FEB 83	Pete O'Dell, KB1N
ICOM	IC-22S 2-M FM Transceiver	DEC 77	Pete O'Dell, KB1N
ICOM	IC-740 HF Transceiver	SEP 83	Gerry Hull, AK4L
ICOM	IC-25A 2-M Transceiver	JUL 82	Phil Accardi, AJ1N
ICOM	IC-211 Multimode 2-M Transceiver	DEC 78	Dave Sumner, K1ZZ
ICOM	IC-245 2-M Transceiver	SEP 77	Doug DeMaw, W1FB
ICOM	IC-290H 2-M All-Mode Transceiver	MAY 83	Joel Kleinman, N1BKE
ICOM	IC-551 6-M Multimode Transceiver	JUN 81	Gerry Hull, AK4L
ICOM	IC-701 HF Transceiver	APR 79	Jay Rusgrove, W1VD
ICOM	IC-720A HF Transceiver	AUG 82	Mark Wilson, AA2Z
ICOM	IC-730 HF Transceiver	DEC 82	Larry Wolfgang, WA3VIL
ICOM	R-70 General-Coverage Receiver	JUN 83	Doug DeMaw, W1FB
ICOM	IC-45A 450-MHz FM Transceiver	NOV 83	Rick Palm, K1CE
Info-Tech	M-150 and M-75 RTTY Units	APR 78	Jim Bartlett, K1TX
Info-Tech	Model 30C CW-To-Video Converter	NOV 78	Jim Bartlett, K1TX
Info-Tech	Model 300 Keyboard	APR 79	Stan Gibilisco, W1GV
Inline Instruments	Coaxial Relays and Couplers	APR 76	Tom McMullen, W1SL
Instant Software	Electronic Breadboard	DEC 82	Chuck Hutchinson, K8CH

(Continued on page 11.)

Bits

The Asymmetrical Folded Half-Dipole and Linear Extension Antenna Array

Each week Bill Conwell, K2PO, reviews newly issued electrical patents. In the process, he sometimes finds a patent with a direct application toward Amateur Radio. Although these precise inventions may not be practiced without a license from the inventor, the ideas they embody might inspire an extension of the technology by the ham community. As the courts have noted, the purpose of the 17-year patent monopoly is to encourage inventors to disclose their inventions to the public and thereby "promote the progress of science and the useful arts."

Patent Summary

A variation on the Yagi antenna array was recently the subject of U.S. Patent No. 4,468,674 granted to Isaac Blonder (of Blonder-Tongue Laboratories) and entitled, "Asymmetrical Folded Half-Dipole and Linear Extension Antenna Array." The antenna features a single boom, simple feed circuitry and broad bandwidth.

The invention derives its title from the configuration of its driven elements. As can be seen from the illustration, each driven element consists of one half of a folded dipole, in which the free element end is extended linearly beyond the boom. This linear extension is approximately 15% longer than the half folded dipole side of the element, making each driven element asymmetrical. The inventor claims that these elements, unlike typical folded dipole elements, may be driven by an unbalanced coaxial line without degrading the impedance characteristics or radiation pattern of the antenna.

The antenna's feed system consists of a single metal strip, insulated from the boom, to which the ends of the driven elements are connected. Successive driven elements extend out from opposite sides of this driving strip. (There may be two, three or more driven elements.) The antenna is fed by a coaxial cable having its center conductor connected to the driving strip at the first driven element, and having its shield connected to the boom.

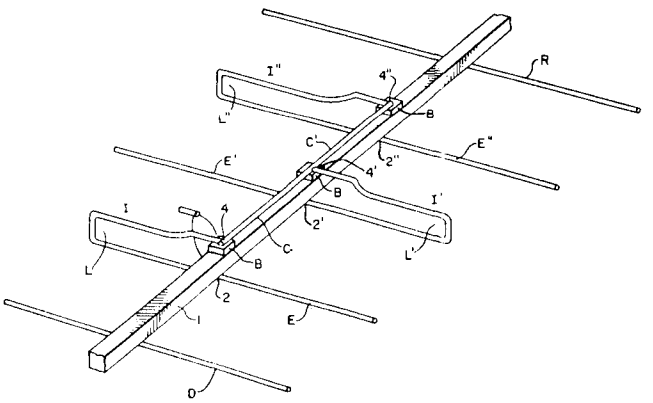
Parasitic elements may be added to either end of the antenna to improve its radiation pattern.

The text of the patent does not disclose any theory of operation or design considerations. The technical discussion is limited to merely giving the dimensions of a TV channel 7-13 antenna (reprinted here with the illustration) and specifying that the element spacing may be approximately 0.05 wavelength. No mention is made of the antenna's radiation pattern or impedance characteristics.

Copies of this patent are available from the Commissioner of Patents, United States Patent and Trademark Office, Washington, D.C. 20231 for $1 (approximately four weeks for delivery).

Caveat: "Whoever without authority makes, uses or sells any patented invention, within the United States during the term of the patent therefor, infringes the patent." 35 U.S.C. 271.

Information on this patented invention is printed here in accord with QEX's stated purposes of (1) providing a medium for the exchange of ideas and information; (2) documenting advanced technical work in the Amateur Radio field; and (3) supporting efforts to advance the state of the Amateur Radio art. This particular invention may not be practiced, without a license from Blonder-Tongue Laboratories, Inc., until August 28, 2001. Nonetheless, it is believed that publicity of such advances in the state of the art will broaden the perspective of amateur experimenters and promote future technical advances within the amateur community. — Bill Conwell, K2PO, 16th Floor Willamette Center, 121 S. W. Salmon St., Portland, OR 97204.



LENGTH OF FOLDED HALF-DIPOLE	LENGTH OF LINEAR EXTENSION
L 12.50"	L 14.375"
L' 13.00"	E' 15.50"
L" 13.75"	L" 16.00"

AMRAD Beacon Given STA FCC Approval

On January 10, 1985, at 8 P. M., the Amateur Radio Research and Development Corp. (AMRAD) activated its experimental 2-meter spread-spectrum beacon under Special Temporary Authority of the FCC. The beacon, which uses the call sign K4RS, has a power output of 80 W and is located in Vienna, Virginia. The purposes of this beacon are to: (a) give experimenters a signal to receive; (b) give the FCC/Field Operations Bureau a spread-spectrum signal for detection and direction-finding exercises; and (c) assess the interference to other uses of the 2-meter band.

Those wishing to hear the spread-spectrum signal should first listen to the WD4IWG repeater output on 147.21 MHz. Every five minutes, the repeater gives the Morse ID, "K4RS FH BEACON V1.2," followed by a five-second tone. If someone is using the repeater, the Morse ID will be delayed until the repeater carrier disappears. When the tone drops, the K4RS beacon starts hopping over the entire 2-m band in one of two modes. The purpose of the tone is to let listeners know when the spread-spectrum beacon signal is coming on the air so they can prepare for it.

Mode 1 is a linear sweep from the bottom to the top of the 2-m band. Each chip (transmission on a particular frequency) has a duration of 1 ms. Channel spacing is 10 kHz. It takes about four seconds to complete one sweep. There are to be 50 sweeps per transmission.

Mode 2 uses a pseudorandom frequency sequence according to a "channel table." There are about 380 frequencies in the channel table with local repeater channels removed. In this mode, the beacon goes to 145.360 MHz, transmits a longer Morse code message, in narrow-band FM, which gives additional details of the operation -- such as what mode of operation, the fact that it is operating under an FCC STA, and the telephone number for reporting any interference. -- Hal Feinstein, WB3KDU, Spread-Spectrum Group Leader for AMRAD, Washington, DC.

Report on the Unattended Use of the Teleprinter Code

Introduction

This report outlines the **unattended** use of the teleprinter code described by CCIR Recommendation 476-3, also known as AMTOR, by Amateur Radio station AD7I, during the period from December 1982 to December 1984. This report is a repetition of the one written for the FCC in December of 1983. A vast amount of new information has not developed, and hence, few changes have been made to the original text. However, with another year yielding the same data, I am more convinced that the conclusions drawn originally are correct. Experiments showed that unattended operation did not adversely affect other users of the spectrum. It also showed that unattended operation may be used to facilitate communications between the unattended station and other stations.

Discussion

This report describes the use of the error correcting protocol described by CCIR Recommendation 476-3 (known to Amateur Radio operators as AMTOR) at my Amateur Radio station, AD7I, during the period of December 1982 to December 1984.

AMTOR provides selective calling and automatic control of radio transmitting equipment when operated in mode-A (ARQ). When operating with the ARQ mode, only two stations can actively participate in the communications. (Others can monitor, but they do not receive the benefit of error control.) For ARQ communication, the calling station, or the station that initiates the communication, is known as the master station; the responding station, or the station that responds to the initial call, is known as the slave station. The unattended station that I operated functioned only as a slave station. Because it was prohibited from acting as a master station, it could not initiate contact with other stations. (Unattended stations can be operated in the **master** mode if there is a computer to take the place of the operator.) Unattended operation of an AMTOR station is much the same as the operation of an unattended wire-line TELEX terminal in a business, after hours. Any station wishing to leave a message may do so by calling that terminal. The terminal will print the message it receives onto paper and may respond to certain reserved signals (such as a figures case "D") by sending short messages such as terminal identification or answer-back.

The AD7I unattended station operated in the above manner. However, rather than relying on mechanical equipment to detect the reserved signals (or commands), a small microcomputer was used for this function. This computer would also respond with brief messages to identify the station to meet the Commission's requirements and to inform calling stations, with short messages of explanation, about the purpose of the unattended station. It is important to note that the external computer was **not** used to allow operation of the unattended station as a master ARQ station.

Station AD7I (and many others administered by foreign nations) were operated unattended during the experimental period on 14.075 MHz. Only twice was abnormal operation noted on that frequency. Both were from an **unattended** station where the

operator had sent a lengthy broadcast message (CQ) and then forgot to disengage the transmitter. This abnormal operation was obviously caused by "operator," rather than "equipment," error. At no time did I detect misoperation of my unattended station; neither did other amateurs who made common use of that frequency. I had specifically asked several amateurs active on that frequency to advise me of any misoperation of any station on that frequency. It is interesting to note that the only observed or recorded misoperation took place when a "live" human operator was in control of the station.

Recommendations

One year ago, I recommended to the Commission that up to twelve months should pass before Radio Amateurs be allowed to operate unattended stations on a regular basis. The purpose of this time delay was to allow operators to become familiar with the operation and allow equipment manufacturers to locate and remove any bugs that might be hiding in their systems. Twelve months have passed, and I think the Amateur Radio service is ready for unattended operation on all frequencies.

The Commission has before it a petition from the ARRL to allow unattended operation above 30 MHz. I support that petition, but I also recommend that the restriction prohibiting unattended operation below 30 MHz be removed. I hope that the Commission will act favorably and will act soon.

Conclusion

Because of the results of experiments conducted by Amateur Radio station AD7I, I recommend that the Commission change its rules to allow unattended operation of Amateur Radio stations on **all frequencies** where it may facilitate communications. As a first step in this process, I recommend that the FCC act favorably on the ARRL's petition to allow unattended operation of Amateur Radio stations. -- Paul Newland, AD7I, Thirty Victoria Place, Red Bank, NJ 07701.

(Correspondence continued from page 2.)

Power Supply Schematic

Regarding your power supply schematic in the January 1985 QEX (p. 11), the basic idea will definitely work if the transformers are of similar construction. If they are different, their internal impedances could be quite different, even if the voltage and current ratings are the same. This would make it more difficult to get a current balance, but don't hesitate to give it a try.

The Variac is actually an autotransformer and must be connected as shown in my schematic, Fig. 2. Though it wasn't said, I'm sure you know that the transformers must be connected with the correct phasing.

Fig. 2 shows how a single bridge rectifier with at least a 14-A current rating and a single capacitor can be used. When choosing values for the load balancing resistors, you will have to experiment a bit. Resistance values should be as small as possible while maintaining a reasonable balance; otherwise load regulation of the power supply will be poor. For example, a 1-ohm resistor at 7 amps will have a 7-V drop, which is much too large — so we're dealing with resistances of a fraction of an ohm.

I suggest connecting the balancing resistors in series with the transformer primaries. Required resistances will then be increased by approximately the square of the voltage ratio, or $(120/16)^2 \approx 55$ times, for the same load regulation. Then you're dealing with resistors that are (probably) in the 1 to 10 ohm range, and probably much easier to find in the parts store.

If you have a clamp-on ammeter, the secondary currents can be measured with the power supply under load for an instant balance check. A practical test that requires no more test equipment than your finger is to run the power supply for an hour or so under load. Then check to see if one transformer is noticeably hotter than the other. — Scott Hofer, N7DFR, 31124 - 50th Pl. S. W., Federal Way, WA 98023.

Another Solution

Re QEX January 1985, p. 2: The transformer secondaries connected in series, center tapped with each supplying half the load, should be able to supply 14 amps since each is operating at 50% duty cycle.

Reference Fig. 3. Try it and check the temperature rise. Forty degrees Centrigrade above ambient will not damage a good transformer. A swinging choke in the output will also reduce the load on the transformer. The fuse in the autotransformer secondary, F1, is vital to its good health. — Rick Shepard, AI5H, 130 Devonshire, San Antonio, TX 78209.

Collins KWM-2 1750-Hz Offset Problem

In the January 1985 issue, p. 2, Hollis Nuttall, W1COI was searching for a solution to the Collins KWM-2 offset problem. One of the ARRL staff member's recalls seeing an article in the December 1978 Ham Radio concerning this subject. Entitled, "Updating the Collins 32S-1," reference the paragraph under BFO CW generation.

This staffer doesn't have access to a KWM-2 schematic diagram, but is willing to bet that it generates a CW note in the same manner as the old 32S-1. If this is the case, W1COI may be stuck with the 1750-Hz CW offset problem.

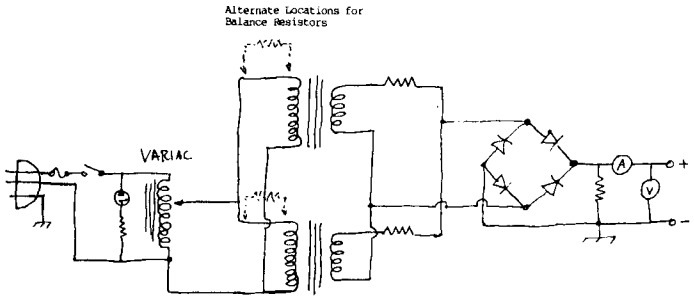
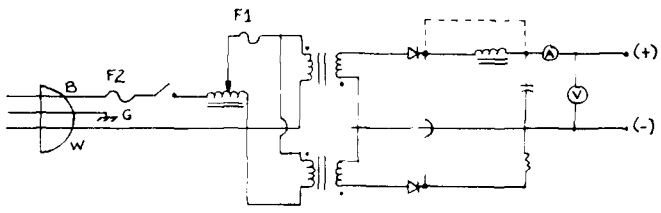


Fig. 2



(Continued from page 6.)

Manufacturer	Item	Date	Reviewer
International Instrumentation,	Digital Capacitance Converter	MAR 79	Stan Gibilisco, W1GV
IRL	FSK-1000 RTTY Demodulator	JUN 80	Chris Schenck, W1EH
J.W. Miller	TVI Filters	JAN 78	Tony Dorbuck, K1FM
JRC	NRD 515 All-Wave Receiver	NOV 81	Gerry Hull, AK4L
JRC	NSD 515 HF Transmitter	NOV 82	Gerry Hull, AK4L
JRC	NSD 515 HF Transmitter	NOV 82	Gerry Hull, AK4L
Kampp Electronics	Autobrak Kits	AUG 78	Lee Aurick, W1SE
Kantronics	Interface I & Software	FEB 84	Dale Clift, WA3NLO
Kantronics	Interface II & Software	SEP 84	Paul K. Pagel, N1FB
Kantronics	CW Training System	MAR 83	Mike Kaczynski, W1OD
Kantronics	8040-B Receiver	JUN 78	Jim Bartlett, K1TX
KDK	FM-2051 2-M Transceiver	OCT 78	Pete O'Dell, KB1N
Kenwood	TR2200A 2-M FM Transceiver	NOV 76	Tom McMullen, W1SL
Kenwood	TS-700A 2-M Transceiver	MAR 76	Tom McMullen, W1SL
Kenwood	TS-820 HF Transceiver	SEP 76	Doug DeMaw, W1FB
Kenwood	TS-430S HF Transceiver	MAR 84	Leo Kluger, WB2TRN
Kenwood	TW-4000A 2-M/70-CM FM Dual Bander	AUG 84	Wayne T. Yoshida, KH6WZ
Kenwood	DM-81 Dip Meter	DEC 80	Doug DeMaw, W1FB
Kenwood	R-820 Receiver	JUL 79	Jay Rusgrove, W1VD
Kenwood	R-1000 General-Coverage Receiver	DEC 80	Jay Rusgrove, W1VD
Kenwood	TL-922A Linear Amplifier	SEP 80	John Pelham, W1JA
Kenwood	TS-930S HF Transceiver	JAN 84	Mark Wilson, AA2Z
Kenwood	TR-2400 2-M FM Transceiver	APR 81	Steve Place, WB1EYI
Kenwood	TR7400A 2-M Transceiver	SEP 77	Max Arnold, W4WHN
Kenwood	TR-7730 2-M FM Transceiver	MAY 82	Doug DeMaw, W1FB
Kenwood	TR-7800 2-M FM Transceiver	SEP 81	Rick Palm, K1CE
Kenwood	TR-9000 2-M Multimode Transceiver	DEC 81	Dave Sumner, K1ZZ
Kenwood	TS-120S HF Transceiver	FEB 80	Paul K. Pagel, N1FB
Kenwood	TS-130S HF Transceiver	JUL 81	Pete O'Dell, KB1N
Kenwood	TS-180S HF Transceiver	MAY 80	Doug DeMaw, W1FB
Kenwood	TS-520S HF Transceiver	MAY 78	Doug DeMaw, W1FB
Kenwood	TS-530S HF Transceiver	MAR 82	Gerry Hull, AK4L
Kenwood	TS-700S 2-M Transceiver	FEB 78	Doug DeMaw, W1FB
Kenwood	TS-820 HF Transceiver	SEP 76	Doug DeMaw, W1FB
Kenwood	TS-830 HF Transceiver	MAY 81	Paul K. Pagel, N1FB
Kenwood	TS-8400 UHF FM Transceiver	JAN 82	Pete O'Dell, KB1N & Gerry Hull, AK4L
Kenwood	TV-502 2-M Transverter	AUG 77	Jay Rusgrove, W1VD
Klitzing	SSB-1 Squelch Board	JUN 79	Jim Bartlett, K1TX
Klitzing	70CM10W60 UHF Amplifier	JUN 79	Jim Bartlett, K1TX
KLM	AP-144DIII Base Stn. Antenna	SEP 83	Sandy Gerli, AC1Y
KLM	21.0-21.5-6A Big Sticker Antenna	DEC 83	Mark Wilson, AA2Z
KLM	PA 15-80BL 2-M Linear Amplifier	SEP 79	Bernie Glassmeyer, W9KDR
KLM	7.2-2 40-M Yagi	JUL 84	Michael B. Kaczynski, W1OD
KLM	40-M Yagi	NOV 77	Jim Cain, K1TN
KLM Electronics	16-Element 2-M Yagi	AUG 79	Jim Kearman, KR1S
Kronotek	RT-1 RF-Actuated Timer	JAN 77	Chuck Watts, WA6GVC
L-Tronics	Little L-Per VHF Direction Finder	APR 78	Jim Kearman, KR1S
Lafayette	HA-146 2-M FM Transceiver	JUL 76	Perry Williams, W1UED
Lambda	Coaxial Portal Unit	NOV 82	George Collins, KC1V
Lance Johnson Engineering	D-Lay-5 Rotator Control	APR 83	Paul K. Pagel, N1FB
Larsen	JM Mobile Antenna Mount	APR 76	Chuck Watts, WA6GVC
Layfayette	BCR-101 Communications Receiver	JAN 79	Stan Gibilisco, W1GV
Leader	LAC-895 Antenna Coupler	JUL 76	Doug DeMaw, W1FB
M & M Electronics	Model MSB-1 Audio Filter	JUN 82	Mike Kaczynski, W1OD
Macrotronics	Code Class	MAR 83	Stan Horzepa, WA1LOU
Macrotronics	Ritty Riter	DEC 80	Stan Horzepa, WA1LOU
Macrotronics	MBOO RTTY System	NOV 79	Stan Horzepa, WA1LOU
Macrotronics	Terminal1 RTTY Modem	JUN 82	Stan Horzepa, WA1LOU
Macrotronics	RM1000 Modem	JUN 84	Paul K. Pagel, N1FB
Maggiore Elec. Lab.	Hi Pro MK I 2-M Repeater	AUG 84	Michael Kaczynski, W1OD
Maggiore Electronics Labs	Hi Pro MK1 220-MHz Repeater	FEB 82	Mike Kaczynski, W1OD
MAXCOM	Antenna Matcher & Dipole	NOV 84	Jerry Hall, K1TD
McKay Dymek	DR33C All-Wave Receiver	SEP 79	Jay Rusgrove, W1VD
MFJ	CMOS-440RS Electronic Keyer	—MAY 76	Morgan W. Godwin, W4WFL
MFJ	MFJ 484 Grandmaster Keyer	—AUG 80	Doug DeMaw, W1FB
MFJ	MJF 496 Keyboard	JUL 82	Gerry Hull, AK4L
Micro Pro Systems	MPS CW Machine II	—JUL 84	Jonathan Towle, WB1DNL
Micro-80, Inc.	Morse Code Trainer II	—OCT 83	Steve Place, WB1EYI
Microcomm	UHF Modules	AUG 76	Tom McMullen, W1SL

Manufacturer	Item	Date	Reviewer
Microcraft	Code*Star Reader Kit	JUL 83	Pete O'Dell, KB1N
Microtronics	M-80 Ham Interface	MAY 79	Stan Horzepa, WA1LOU
Microwave Associates	89127 10-GHz Transceiver	SEP 77	Jim Kearman, KR1S
Microwave Modules	MMD050 Counter	NOV 76	Tom McMullen, W1SL
Microwave Modules	MMD500P Prescaler	NOV 76	Tom McMullen, W1SL
Microwave Modules	MMT432 Transverters	SEP 77	Jim Kearman, KR1S
Microwave Modules	MMV 1296 Varactor Tripler	DEC 77	Jim Kearman, KR1S
Microwave Modules	MMC 1296 Receiving Converter	DEC 77	Jim Kearman, KR1S
Microwave Modules, Ltd.	MMS1 & MMS2 Code Trainers	JUN 84	Steve Place, WB1EYI
Midland	13-509 220-MHz Transceiver	OCT 77	Sandy Gerli, AC1Y
Mirage	B-108 2-M Amplifier	MAY 79	Jim LaPorta, N1CC
Mirage	D1010 430-450-MHz Amplifier	JAN 84	Bernie Glassmeyer, W9KDR
Mirage	A1015 6-M Amplifier	AUG 84	Mark Wilson, AA2Z
Mirage	C22 All-Mode 220-MHz Amplifier	MAR 83	Pete O'Dell, KB1N
Mirage	C106 All-Mode 220-MHz Amplifier	MAR 83	Pete O'Dell, KB1N
Mirage	Mp2 VHF Wattmeter	AUG 79	Jim LaPorta, N1CC
Mity-Time	LCD Clock	DEC 80	Sandy Gerli, AC1Y
Motorola	MEK6800D2 Evaluation Kit	NOV 77	Jerry Hall, K1TD
MSL	Digital QSK Kit	OCT 80	Paul K. Pagel, N1FB
Murch	UT-2000-B Transmatch	APR 82	Doug DeMaw, W1FB
N9CR	Contest Radio Operating System	AUG 83	Mike Kaczynski, W1OD
National Semiconductor	SC/MP Microprocessor	JAN 77	Jay Rusgrove, W1VD
NDI	HC-1400 2-M FM Transceiver	NOV 79	Paul K. Pagel, N1FB
Omega	T-2000C Beam Steering Combiner	MAR 77	Jerry Hall, K1TD
Optoelectronics	850-4 Clock & TB-1 Time Base	JUL 77	Jerry Hall, K1TD
Optoelectronics	PDT-590 Digital Thermometer	APR 80	Doug DeMaw, W1FB
Optoelectronics	TRMS 5000 DMM/Thermometer	NOV 80	George Woodward, W1RN
Optoelectronics	8000.1 Frequency Counter	JAN 79	Jim Bartlett, K1TX
Optoelectronics	8010 Frequency Counter	MAY 80	George Collins, KC1V
Palomar Engineers	R-X Noise Bridge	JAN 77	Jay Rusgrove, W1VD
Palomar Engineers	VLF Converter	AUG 78	Jim Kearman, KR1S
Penniman-Rasmussen	TVI Filters	MAY 76	Lew McCoy, W1ICP
PIPO Communications	PP-1 & PP-2 Tone Encoders	FEB 77	Chuck Watts, WA6GVC
Processor Technology	SOL-20 uComputer	JUL 77	Chuck Watts, WA6GVC
Processor Technology	VDM-1 Video Display Module	MAR 77	Chuck Watts, WA6GVC
Processor Technology	8KRA Static Memory Module	MAY 77	Chuck Watts, WA6GVC
Propagation Products	Insulators and Quad Kit	MAR 78	Lew McCoy, W1ICP
QM70 Products	FMT-440 Transverter	NOV 77	Jim Kearman, KR1S
Radio Shack	DX-302 Communications Receiver	AUG 81	Bruce Kampe, WA1PDI
Radio Shack	TRS-80 Microcomputer	JUN 78	Pete O'Dell, KB1N
Radio Shack	RG-8M Coaxial Cable	DEC 80	Jerry Hall, K1TD
RCA	COSMAC VIP Microcomputer	FEB 79	Steve Place, WB1EYI
RF Products	5/8-Wave 220-MHz & 450-MHz Antennas	AUG 83	Pete O'Dell, KB1N
RIW	432-19 19-Element 432-MHz Yagi	DEC 78	Jim Bartlett, K1TX
Robot	Robot 800 Terminal	APR 82	Paul K. Pagel, N1FB
Sabtronics	2000 Digital Multimeter	FEB 79	Jim Bartlett, K1TX
SAY	SPS-20M Power Supply	OCT 78	Chod Harris, WB2CHO
Sem Con	HA-2 2-M Mobile Antenna	MAY 79	Sandy Gerli, AC1Y
Sherwood	SE-1 Microphone Equalizer	JAN 83	Pete O'Dell, KB1N
Sherwood Engineering	Crystal Filter	FEB 77	Bob Myers, W1XT
Sinclair	DO236H 2-M Antenna	APR 77	Lew McCoy, W1ICP
Solar Power Corp.	Series E Solar Electric Generator	AUG 77	Doug DeMaw, W1FB
Solid State Sales	CCD Camera Kit	FEB 77	Chuck Watts, WA6GVC
Soundpower	SP1x0 Audio Processor	JAN 80	Tom Frenaye, K1KI
Southwest Technical Prod. Corp.	AC-30 & MF-68 Interface & Disc System	AUG 78	Lew McCoy, W1ICP
Southwest Technical Prod. Corp.	CT-1024 Terminal Systems Kit	MAR 77	Lew McCoy, W1ICP
Southwest Technical Prod. Corp.	6800 Computer System	APR 77	Lew McCoy, W1ICP
Spectrum Communications	SCR 1000 2-M FM Repeater	JUL 83	Pete O'Dell, KB1N
Spectrum International	MF 432 & MF 1296 UHF Filters	APR 76	Tom McMullen, W1SL
Spectrum International	1296-MHz Loop Yagi	MAY 78	Jim Kearman, KR1S
Swan	Astro 150 HF Transceiver	JUL 80	John Pelham, W1JA
Swan	100 MX HF Transceiver & Acc.	JUN 79	George Woodward, W1RN
Swan	Astro 102 BXA	DEC 81	Doug DeMaw, W1FB
Technico	TEC-9900-SS Computer Kit	JUL 78	James R. Schueckler, WB2YZL
TEDCO	Model 1 QRP Transceiver	NOV 80	Paul K. Pagel, N1FB
Tektronix	T922 Dual-Trace Scope	NOV 76	James F. McGivern III, WA1QZH
TELCO	125 2-M Class-C Amplifier	MAR 78	Pete O'Dell, KB1N
Telex Hy-Gain	TH7DX Antenna	FEB 83	Pete O'Dell, KB1N
Tempo	S1 2-M FM Transceiver	JUN 79	Doug DeMaw, W1FB
Tempo	K6FZ 20-M Loop Antenna	SEP 79	Stan Horzepa, WA1LOU

Manufacturer	Item	Date	Reviewer
Ten-Tec	544 HF Transceiver	JUL 79	Doug DeMaw, W1FB
Ten-Tec	Argosy HF Transceiver	OCT 82	Chuck Hutchinson, K8CH
Ten-Tec	Century 21 HF Transceiver	DEC 77	Jim Bartlett, K1TX
Ten-Tec	OMNI D HF Transceiver	JAN 80	Paul K. Pagel, N1FB
Ten-Tec	247 & 277 Antenna Tuners	APR 80	Stu Leland, W1JEC
TET	HB-35 Triband Antenna	DEC 82	Lee Aurick, W1SE
TET	3F35DX Triband Antenna	APR 80	Lee Aurick, W1SE
Tokyo Hy-Power Labs	HC-200 Transmatch	MAY 83	Chuck Hutchinson, K8CH
Tonna	F9FT 144/16 2-M Yagi	JUL 79	Dave Sumner, K1ZZ
TUCH-COM	1215 Tone Encoder Microphone	FEB 79	Jim Morris, K1UJ
Twin Oaks	Morse Code Training Program	AUG 83	Carol Colvin, AJ2I
Universal Software, Inc.	Super-RATT RTTY/CW Software	NOV 83	Paul K. Pagel, N1FB
VHF Engineering	CW Identifier Kit	JUL 76	Jim Kearman, KR1S
VHF Engineering	RPT 220 220-MHz Repeater	NOV 76	Tom McMullen, W1SL
VHF Engineering	Blue Line RF Power Amplifiers	SEP 78	Dave Sumner, K1ZZ
VHF Engineering	Synthesizer II	FEB 78	Jim Morris, K1UJ
Vibroplex	Brass Racer Key	JUL 83	Gerry Hull, AK4L
Vibroplex	EK-1 Keyer	JUL 83	Paul K. Pagel, N1FB
Viewstar	VS 1500A Transmatch	OCT 83	Lee Aurick, W1SE
Viewstar	PT-2000A HF Linear Amplifier	JAN 84	Gerry Hull, VE1CER
VOMAX	Speech Processor	AUG 77	Stu Leland, W1JEC
West Jersey Comm. Prod.	80-M "BN CAGE" Antenna	SEP 83	Larry Wolfgang, WA3VIL
Western Electronics	998BUA Trap Dipole	NOV 82	Doug DeMaw, W1FB
Weston	6000 Digital Multimeter	MAY 77	Doug DeMaw, W1FB
William Nye Co.	SSK-3 Keyer/Paddle	APR 76	Chuck Watts, WA6GVC
Wilson	System 3 Tribander	AUG 79	Jim Westbrook, K1FD
Wilson	2202 SM Transceiver	DEC 77	David Klemp, WB1ANP
Wilson Electronics	System One 4-Element Tribander	SEP 78	Lee Aurick, W1SE
Wilson Systems, Inc.	System 40 Tribander	APR 82	Doug DeMaw, W1FB
Yaesu	FT-101E HF Transceiver	SEP 76	Doug DeMaw, W1FB
Yaesu	FT-730R 440-MHz FM Transceiver	SEP 83	Jerry Hall, K1TD
Yaesu	FT-102 HF Transceiver	OCT 83	Doug DeMaw, W1FB
Yaesu	FT-77 HF Transceiver	NOV 83	Bob Schetgen, KU7G
Yaesu	FT-980 HF Transceiver	NOV 84	Jeff Ward, K8KA
Yaesu	FT-757-GX HF Transceiver	DEC 84	Leo Kluger, WB2TRN
Yaesu	CPU-2500 RK 2-M FM Transceiver	SEP 79	Jim Bartlett, K1TX
Yaesu	FRG-7700 Communications Receiver	AUG 81	Paul K. Pagel, N1FB
Yaesu	FT-ONE HF Transceiver	AUG 83	Chuck Hutchinson, K8CH
Yaesu	FT-7B HF Transceiver	MAR 80	George Woodward, W1RN
Yaesu	YC-7 Frequency Display	MAR 80	George Woodward, W1RN
Yaesu	FT-101ZD HF Transceiver	DEC 79	Doug DeMaw, W1FB
Yaesu	FT-107M HF Transceiver	APR 81	Doug DeMaw, W1FB
Yaesu	FT-127 RA 220-MHz Transceiver	AUG 79	Dave Sumner, K1ZZ
Yaesu	FT-127 220-MHz FM Transceiver	JAN 82	Bill Jennings, K1WJ
Yaesu	FT-207 R 2-M FM Transceiver	APR 80	Sandy Gerli, AC1Y
Yaesu	FT-221 Multimode 2-M Transceiver	JUL 77	Jim Kearman, KR1S
Yaesu	FT-230R 2-M FM Transceiver	JUN 83	Leo Kluger, WB2TRN
Yaesu	FT-301D HF Transceiver	OCT 77	Doug DeMaw, W1FB
Yaesu	FT-480 R 2-M Multimode Transceiver	OCT 81	Mark Wilson, AA2Z
Yaesu	FT-680 R 6-M Multimode Transceiver	AUG 82	Gerry Hull, AK4L
Yaesu	FT-707 HF Transceiver	JUN 81	Doug DeMaw, W1FB
Yaesu	FT-708 R 450-MHz FM Transceiver	APR 83	Rick Palm, K1CE
Yaesu	FT-726R VHF/UHF Transceiver	MAY 84	Mark Wilson, AA2Z
Yaesu	FT-901DM HF Transceiver	NOV 78	Doug DeMaw, W1FB
Yaesu	FTV-901 R Transverter	FEB 83	Dave Sumner, K1ZZ
Z.R.C.	Cold Galvanizing Compound	OCT 80	Doug DeMaw, W1FB

New VHF Conference Format at Dayton

The Dayton Hamvention's International VHF/UHF Conference will have a new improved format for 1985. The dates this year are April 26, 27 and 28.

* There are no VHF Conference forums scheduled on Friday this year so that attendees are free to explore the giant flea market and exhibits during the day.

* The unique Noise Figure Contest will be held at Hara Arena beginning at 1800 on Friday. The Arena will be closed to all other Hamvention activities so that the potential RF interference is eliminated. Prizes will be awarded to winners in the Homebrew category for 144-2304 MHz.

* Technical forums begin at 0900 on Saturday with topics covering antennas, propagation, contesting, dynamic range measurements, and much more.

* The antenna gain measurements begin at 0900 on Sunday behind the Arena. Check the program for the new location of the improved range. Certificates will be awarded for highest gain and best figure of merit, and prizes for winners in the homebrew category. Bands covered are 144, 220, 432 and 1296 MHz.

* There are no VHF Conference activities at the Imperial House this year.

For further information, contact Jim Stitt, WA8ONQ, VHF/UHF Conference Moderator, 311 N. Marshall Road, Middletown, OH 45042.

54F/74F402 Expandable Cyclic Generator/Checker

The 'F402 expandable Cyclic Redundancy Check (CRC) generator/checker provides an advanced tool for the implementation of the most widely used error detection scheme in serial digital handling systems. A 4-bit control input selects one of six generator polynomials. The list of polynomials includes CRC-16, CRC-CCITT and Ethernet, as well as three other standard polynomials (56th order, 48th order, 32nd order). Individual clear and preset inputs are provided for floppy disk and other applications. The Error output indicates whether or not a transmission error has occurred. The CWG Control input inhibits feedback during check word transmission. The 'F402 is compatible with Fairchild Advanced Schottky TTL (FAST) devices and is fully compatible with all TTL families.

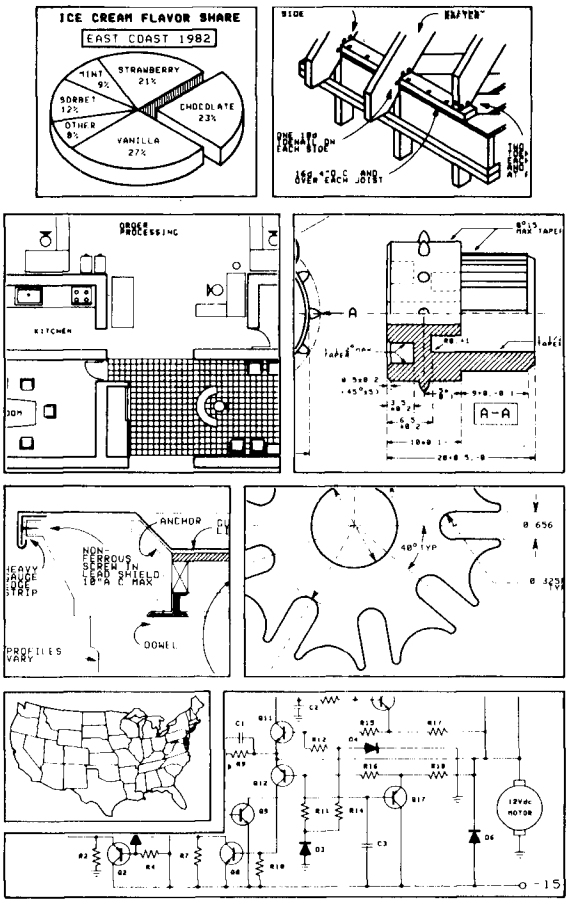
For further information on the 'F402, contact your nearest Fairchild distributor or write Fairchild, 333 Western Avenue, South Portland, ME, 04106, tel. (207) 775-8100. This device is available as of March 1985, and can also be obtained from Hamilton Avnet, Schweber and Arrow Electronics. The price range depends on the quantity ordered, of course, but to give you an idea of what to expect, I was quoted a cost of $1.07 for a quantity of 610.

Graphics Programs for your Apple

If you use your Apple II+ or //e computer professionally, especially where graphics are concerned, you might be interested in the Robo CAD products. CAD-1 and CAD-2 are complete systems bringing unprecedented drafting and graphics capabilities to your computer. The systems include the drawing instrument (a precision joystick controller), tutorial manual, interface module and system software, with an introductory library disk of pre-drawn material.

Robo CAD is installed into the games port on your Apple. The software is loaded from a single disk. Step-by-step tutorials can have you drawing within minutes. Both systems are fast, user friendly and practical.

CAD-1 is used for schematics, flow diagrams, printed circuit artwork and simple scale drawing. For rapid, complex scale drawing, CAD-2 includes automatic dimensioning and measurement features. Prices are $1,095 and $1,790, respectively. The CAD-2 systems also includes a 128K RAM board. A precision drafting plotter, such as the Robo Model 1 (A/B paper sizes), is available at $1,395 for professional-quality hard copy. It comes complete with all interfacing hardware and software. For more information on these systems contact Chessell-Robocom Corporation, 111 Pheasant Run, Newtown, PA 18940, tel. (215) 968-4422.



Draw like this with your Apple!

(Continued from page 3.)

```
1Ø FOR N=M TO M+P-1 :: IF A$=L$(
N) THEN 12
11 NEXT N :: GOTO 14
12 GOSUB 23 :: DISPLAY AT(1Ø,1):
"CALL ";B$;" IS LOGGED": : : :"E
NTER :": :"> 1--TO CONTINUE": :"
> 2--TO ERASE CALL"
13 CALL KEY(Ø,U,V):: IF V=Ø THEN
 13 ELSE IF U=49 THEN 3 ELSE IF
U=5Ø THEN 24 ELSE 13
14 GOSUB 23 :: DISPLAY AT(1Ø,1):
"CALL ";B$;" IS NOT LOGGED": : :
 :"ENTER :": :"> Ø--TO STORE CAL
L": :"> 1--TO CONTINUE"
15 CALL KEY (Ø,M,N):: IF M<48 OR
 M>49 THEN 15 ELSE IF M=49 THEN
GOSUB 23 :: GOTO 3
16 GOSUB 23 :: O=O+1 :: DISPLAY
AT (5,1Ø):STR$(O)
17 IF K>84 THEN L$(J+I)=A$ :: I=
I+1 :: GOTO 3
18 IF K>77 THEN L$(J+I)=L$(J) ::
 L$(H+G)=L$(H) :: L$(H)=A$ :: J=
J+1 :: G=G+1 :: GOTO 3
19 IF K>7Ø THEN L$(J+I)=L$(J) ::
 L$(H+G)=L$(H) :: L$(E+F)=L$(F)
:: L$(F)=A$ :: J=J+1 :: H=H+1 ::
 E=E+1 :: GOTO 3
2Ø IF K>64 THEN L$(J+I)=L$(J) ::
 L$(H+G)=L$(H) :: L$(E+F)=L$(F)
:: L$(C+D)=L$(D) :: L$(D)=A$ ::
J=J+1 :: C=C+1 :: H=H+1 :: F=F+1
 :: GOTO 3
21 IF K>47 THEN L$(J+I)=L$(J) ::
 L$(H+G)=L$(H) :: L$(E+F)=L$(F)
:: L$(C+D)=L$(D) :: L$(A+B)=L$(B
) :: L$(B)=A$
22 J=J+1 :: H=H+1 :: F=F+1 :: D=
D+1 :: A=A+1 :: GOTO 3
23 CALL HCHAR(1Ø,1,32,448):: RET
URN
24 GOSUB 23 :: L$(N)="" :: GOTO
3
25 GOSUB 23 :: DISPLAY AT(1Ø,1):
"ENTER NEW CONTACT NUMBER" :: AC
CEPT AT(13,3):O :: DISPLAY AT(5,
1Ø):STR$(O):: GOTO 3
26 GOSUB 23 :: O=O-1 :: DISPLAY
AT(5,1Ø):O :: DISPLAY AT(1Ø,1):"
CALLSIGN STORAGE BANK FULL" :: F
OR I=1 TO 6ØØ :: NEXT I :: GOTO
3
```

Vehicular Electronics Conference to be Held in Boulder, Colorado

The 1985 IEEE Vehicular Technology Conference will be held in Boulder, CO on May 21-23. The international conference will present technical papers describing state-of-the-art technology for vehicular electronics, including the latest developments in cellular mobile radio and related systems. For information, contact John Murray, Chairman, VTC85, John Murray Associates, 1823 Folsom Street, Boulder, CO 80302, tel. (303) 444-4871.

QEX: The ARRL Experimenter's Exchange is published by the

American Radio Relay League
225 Main Street
Newington, CT 06111 USA
telephone 203-666-1541

Larry E. Price, W4RA
President

David Sumner, K1ZZ
Executive Vice President

Paul L. Rinaldo, W4RI
Editor

Maureen Thompson, KA1DYZ
Assistant Editor

Geoffrey H. Krauss, WA2GFP (VHF+ Technology)
Associate Editor

Debbie Chapor
QEX Circulation Manager

The purposes of QEX are to:

1) provide a medium for the exchange of ideas and information between Amateur Radio experimenters,

2) document advanced technical work in the Amateur Radio field, and

3) support efforts to advance the state of the Amateur Radio art.

Subscriptions are available to ARRL members and non-members at the rates shown on the QEX Subscription Order Card inside this issue.

All correspondence concerning QEX should be addressed to the American Radio Relay League, 225 Main Street, Newington, CT USA 06111. Envelopes containing manuscripts and correspondence for publication in QEX should be marked: Editor, QEX. QEX subscription orders, changes of address, and reports of missing or damaged copies may be marked: QEX Circulation. Members are asked to include their membership control number or a label from their QST wrapper when applying.

Both theoretical and practical technical articles are welcomed. Manuscripts should be typed and double spaced. Please use the standard ARRL abbreviations found in the January 1984 edition of QST. Authors should supply their own artwork using black ink on white paper. When essential to the article, photographs may be included. Photos should be glossy, black-and-white positive prints of good definition and contrast, and should be the same size or larger than the size it will be when printed in QEX.

QEX: The ARRL
Experimenters' Exchange
American Radio Relay League
225 Main Street
Newington, CT USA 06111

Nonprofit Organization
U.S. Postage
PAID
Hartford, Conn.
Permit No. 2929