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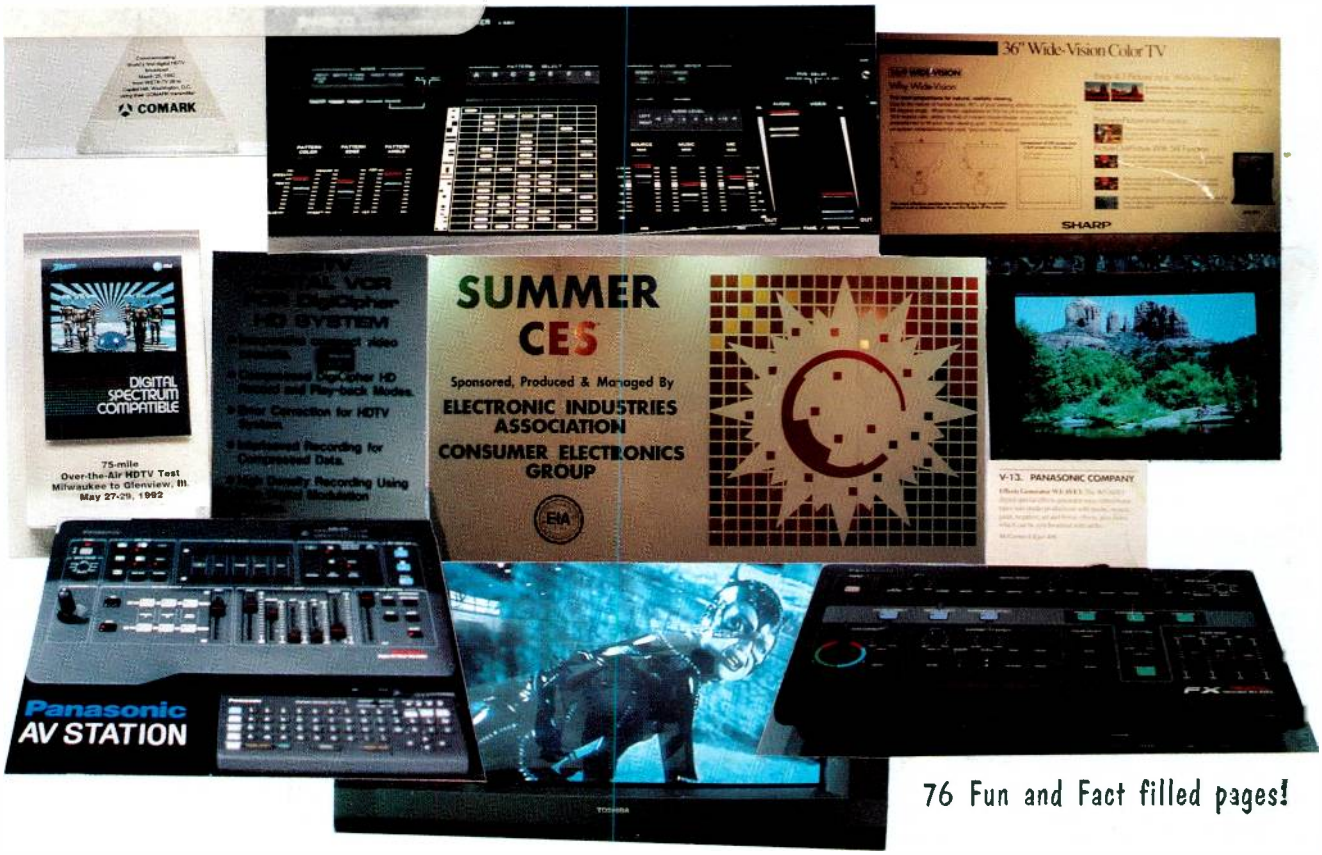

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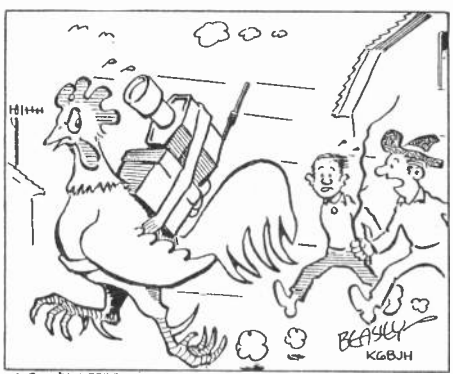
PUBLISHER: Bill Brown WB8ELK
EDITOR: Henry Ruh KB9FO
STAFF, CONTRIBUTERS:
too numerous to list!



I CAN'T AFFORD A ROCKET OR A BALLOON LAUNCH, SO I'M TRYING TO GET HECTOR TO FLY A COUPLE OF CIR-CUITS AROUND THE BARNYARD

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Dayton Hamvention '92

ATV was well-represented at this year's Dayton Hamvention. The ATVQ ATV party was held once again Friday evening in the grand banquet room of the Holiday Inn North. Over 300 ATVers from around the world were in attendance during the 5 hour meeting. Talks and demonstrations included the latest offerings from AEA and PC Electronics.

Mike Collis WA6SVT gave us all a tour through the extensive ATN network (Amateur Television Network) of southern California. John Champa K8OCL showed us the future of compressed digital vision and its possible application to ATV in the near future. John's demo also included a video tape demonstration of the new AT&T video phone.

Chuck Crist WB9IHS told us of the amazing efforts of the Franklin High School (Franklin, Indiana) aerospace engineering class and their many high-altitude balloon experi-ments. He topped off his talk with an impressive display of the latest photographs from their last flight to the edge of space using special infrared film.

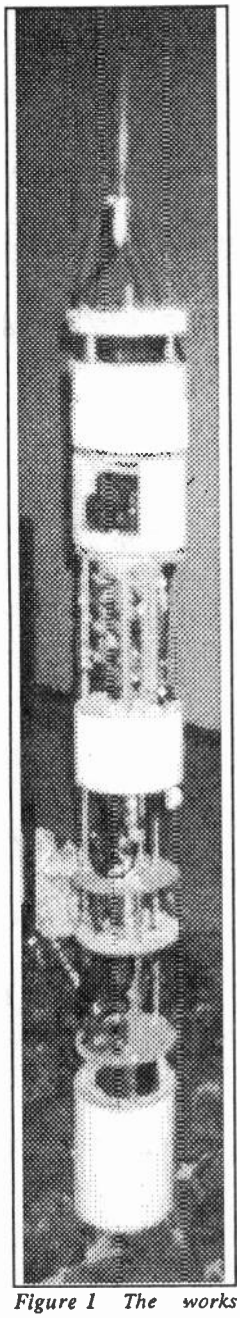


Figure 1 The works inside the Rockoon.

Figure 3 Damian Schumacher N5FVM and the BLT-6 balloon package

Several balloon groups, the Houston, Texas Balloon Launch Team, the Wisconsin ATV payload and the Southern California Eclipse group all had balloon payloads on display during the forum.

Bob Rau N8IYD and Jud Nichols N8RXT of High Technology Flight had a live demonstration of the GPS (Global Positioning Satellite) interface system which overlays the position and altitude telemetry directly over the live camera video. He also had his new GVID video overlay board on display.

The Southeastern Community College team actually brought their ATV Rockoon (Rocket Balloon) payload and showed everyone the inner workings of this incredible experiment that will literally launch ATV into space.

The $100 homebrew prize was given jointly to Chuck Crist

Figure 4 And the winners! Remember to bring your homebrew entry next year and YOU may win the $100 cash prize!!

WB9IHS of the Franklin HS group and to Ben Frink KD4BFG and David Couvillon KC4WDW of the SCC Rockoon group.

The Saturday ATV forum at the Hamvention was chaired by Tom O'Hara W6ORG (who also talked about ATV spectrum management) and also drew over 300 interested hams. Bill Parker W8DMR did a very entertaining slide show and talk about getting started in ATV.

The Huntsville, Alabama.group presented us with a view of activity in their area, an ATV hanglider flight and how school groups are using ATV. Bob Rau N8IYD and Jud Nichols N8RXT showed off their ATV rocket complete with a live demo. Bob G8OZP talked about ATV in Great Britain and brought along some of the latest modules from their group. Bill WB8ELK described the latest balloon ATV experiments performed the last year by various groups across the country.

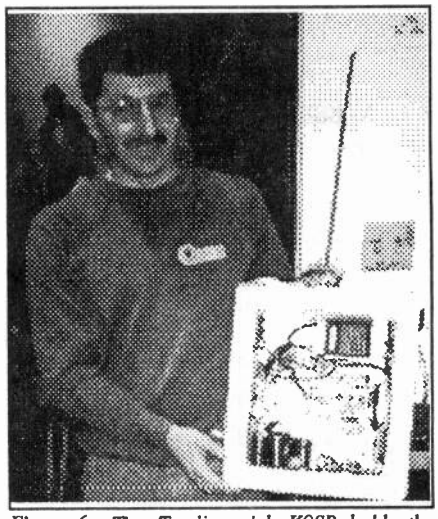


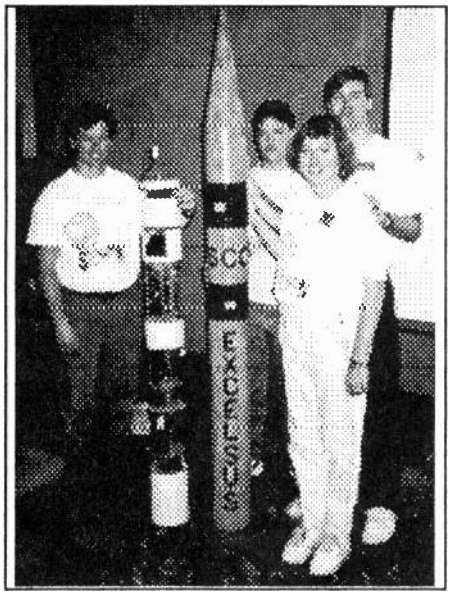
Figure 6 Tim Tomljanovich K9SB holds the Wisconsin balloon package.

As part of the forum, a shootout contest of various intriguing versions of Handie Lookies were judged by the audience. The winner of the prize from PC Electronics was the

Dayton 1992

"HAT-CAM" designed by Dave Pelaez AH2AR/8 and Jeff Brown KA8WLV (now N8UEJ). Attached to the bill of a baseball cap was a miniature B/W TV camera (the new MVP series V by Micro Video Products. The handie-lookie transmitter designed by AH2AR/8 was clipped to the back of the cap. Everything ran off of two 9-volt batteries and had a lifetime of nearly 1 hour. The view as KA8WLV wandered about the room was certainly entertaining. Even though the flea market was a bit on the damp side, we hope all had a great time at the get together and the forum and look forward to seeing you all next year at Dayton.

Chuck Cris WB9IHS with the Franklin HS balloon package.



The group from Southern Community College, Whiteville, NC and the Rockoon experiment.

A special thanks to all from Henry who missed most of the weekend! Henry got a serious flu bug and was in the motel room form Friday afternoon to Sunday afternoon. Thanks to those who helped in the ATVQ booth especially Mike Collis, Dave Rau, Andy Emmerson, and to those who waited while the Holiday Inn got the room ready while Bill put together the friday night program to fill in for Henry.

All speakers at the Friday night ATVQ ATV Party received an Indian Head Test Pattern coffee Mug from ATVQ for their efforts. NEXT YEAR: BE THERE OR BE SQUARE! Three Hundred plus ATV'ers can't be wrong!

Before the
Federal Communications Commission
Washington, D.C. 20554

PR Docket No. 92-136

In the Matter of

Amendment of Part 97 of the	RM-7849
Commission's Rules to Relax	RM-7895
Restrictions on the Scope of	RM-7896
Permissible Communications in the Amateur Service.	

NOTICE OF PROPOSED RULE MAKING

Adopted: June 18, 1992; Released: July 2, 1992

Comment Date: October 1, 1992
Reply Comment Date: December 1, 1992

By the Commission:

I. INTRODUCTION

In this *Notice of Proposed Rule Making* (*Notice*), we propose to amend the rules for the amateur service by lessening restrictions on the scope of the permissible communications that amateur stations may transmit. This proceeding was initiated by two petitions and a letter requesting rule making relating to this issue.[1]

II. DISCUSSION

2. The petitioners generally seek greater flexibility for amateur stations to transmit communications for public service projects and personal matters. They want to eliminate rules that bar amateur stations from transmitting occasionally messages that could indirectly facilitate the business or commercial affairs of some party and messages that could be transmitted in other radio services. They ask, therefore, for amendment of Section 97.113 of the Commission's Rules, 47 C.F.R. § 97.113. The petitioners indicate this rule needs to be reviewed in light of contemporary communication demands and the operational capabilities of licensees in the amateur service. The petitioners argue that the prohibition against using the amateur service as an alternative to other authorized radio services, except as necessary for emergency communications, may unnecessarily restrict amateur operators from participating in many public service activities and from satisfying their personal communications requirements.

3. The current Section 97.113 is intended to help maintain the non-commercial character of the service by prohibiting certain types of transmissions by amateur stations.[2] We do not, however, want to inhibit amateur operators from using the service frequencies in the manner they believe best suited to their purposes. The objective of this proceeding, therefore, is to determine if the prohibitions in Section 97.113 should be relaxed, and, if so, how Section 97.113 should be revised to accommodate the uses of the service frequencies that amateur operators desire.

4. The League contends that restrictions on the content of amateur station transmissions should be based on the principle that any amateur-to-amateur communication is permitted unless specifically prohibited.[3] The League, therefore, seeks to allow amateur stations to transmit occasionally certain types of communications that are now prohibited so that the amateur service community can better meet public service communications needs.[4] The League states that its suggested amendment would not subject the service to exploitation because the self-regulating character of the service would provide the proper checks and balances.[5] It also argues that each licensee can best determine for himself or herself whether a particular public service project, such as providing communications at spectator events,[6] is a reasonable use of the amateur service frequencies.[7] The League also seeks to allow an amateur station control operator to accept compensation when using the station as part of classroom instruction at an educational institution.[8]

5. Reynolds and Ruh ask that amateur stations be authorized to fill communications voids in other radio services.[9] They suggest eliminating the prohibition on amateur stations retransmitting the broadcasts of stations in other radio services, such as government time and weather stations.[10] They also request that amateur stations

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[1] Petitions were received from Michael R. Reynolds (RM-7849), and Henry B. Ruh on behalf of Amateur Television Quarterly Magazine (RM-7896). The letter was received from the American Radio Relay League, Inc. (League). Because of the detail it contains, it is treated as a petition (RM-7895).

[2] Section 97.113 prohibits amateur stations from transmitting any communications the purpose of which is to facilitate the business or commercial affairs of any party. It prohibits amateur stations from transmitting communications as an alternative to other authorized radio services. It also prohibits the transmission of music; communications in connection with any activity that is contrary to law; encrypted messages; words, language or meaning that is obscene, indecent, or profane; and false or deceptive messages or signals. This rule provides, however, exceptions for providing emergency communications, facilitating the public's safe observation of public gatherings, selling amateur station apparatus, and conveying news information.

[3] RM-7895 at 2.

[4] *Id.* at 1.

[5] *Id.* at 11.

[6] *Id.* at 10.

[7] *Id.* at 10-11. The League's proposed revision is based upon the principles that (a) amateur operators should not conduct communications in exchange for compensation or for the benefit of their employers, (b) amateur operators should not transmit communications in which the operator has a pecuniary interest, and (c) amateur operators should not use amateur service frequencies regularly as a substitute for other licensed radio services. The yardstick the amateur operators would use for determining pecuniary interest would be the business implication of the licensee initiating the communication, not the recipient.

[8] *Id.* (Attachment) at 1.

[9] RM-7849 at 3 and RM-7896 at 1.

[10] RM-7849 at 1, 3, and RM-7896 at 2. The League also proposes eliminating this prohibition. *See* RM-7895 at 14.

be allowed to retransmit music included in space shuttle communications.[11] Ruh further requests that amateur stations be allowed to retransmit video obtained from government and private radar stations.[12]

6. Periodicals serving the amateur service community have indicated that there is already widespread use of amateur service frequencies by amateur operators to bolster governmental functions. These periodicals routinely commend and laud amateur operators for providing communications for police and fire departments.[13] and for reporting data to the National Weather Service.[14] Correspondence from amateur operators also suggests that they want to communicate messages relating to their personal, business such as ordering goods and services.[15] Some commenters, however, oppose any change to Section 97.113. One group states that to relax the prohibited transmission rule would undermine the basic principle of noncommercial communications upon which the amateur service is founded and for which the frequencies are allocated.[16] Other commenters express the view that allowing any business-related communications on amateur service frequencies would be disruptive[17] and that any relaxation of the prohibited communication rule would mark the end of the amateur service.[18]

III. PROPOSAL

7. It appears clear from the petitions and comments discussed above that much of the amateur community strongly supports relaxing a number of the existing restrictions on the scope of amateur services communications. Further, it appears that the amateur community appreciates both the benefits and the burdens of relaxing these existing restrictions. The restrictions on permissible communications in the rules were designed to protect the essential character of the amateur service as a reservoir of volunteer communicators, technicians and electronics experts dedicated to advancing the radio art, to provide public service communications particularly in times of emergencies, and to enhance international goodwill. While eliminating some of the existing restrictions would provide the flexibility to expand public service activities and satisfy the personal communications interests, the potential for commercial exploitation and abuse of the amateur service's allocated frequencies could increase.

8. After careful consideration, we propose to relax the restrictions on the scope of permissible amateur communication. Specifically, we propose the revision suggested by the League. Our decision is based on the following factors. First, the League's suggested proposal appears to best consolidate the views of the amateur community. Second, relaxing the restriction on permissible communications would permit the amateur community to increase its public service activities. Third, as noted by the League, the amateur community has a long tradition of self-regulation and a strong commitment to maintaining the unclouded distinction between the amateur service and other radio services.

9. The proposed rule amendments would expand the scope of public service communications and personal communications permitted in the amateur service. More specifically, we propose to relax the prohibition against amateur stations transmitting any communications that could be furnished via other radio services. Our intent is to allow amateur operators who so desire to increase their public service activities in support of parades, races, and other public gatherings. We also propose to remove the outright bar on amateur stations transmitting communications that could facilitate the business affairs of any party. This change would allow amateur stations to transmit, for example, communications relating to amateur radio club business activities. Amateur stations could also transmit communications, such as ordering food, lodging, and transportation, that incidentally facilitated the commercial activities of some party. We further propose to permit control operators to accept compensation as an incident of a teaching position during periods of time when the station is used for classroom instruction. The general prohibition against amateur operators transmitting messages for hire or for material compensation, direct or indirect, however, would remain in the rules.

10. These proposals are not intended to alter in any way the nature and purpose of the amateur service. Rather, they are intended to give amateur operators more flexibility to serve the public as well as to enhance their personal communication capabilities. These proposed changes, however, also would increase the amateur community's responsibilities for selfregulation and cooperation in the use of their allocated frequencies. We request comments, therefore, on the proposed amendments to the Amateur Radio Services Rules set forth in the attached Appendix. We are not proposing to allow amateur stations to transmit music as suggested by Ruh. We believe this proposal could alter the nature and purpose of the service and is well beyond our goal of providing greater flexibility for amateur stations to transmit communications for public service gatherings and personal matters. Interested parties, however, may comment regarding whether transmission of music should be allowed.

IV. PROCEDURAL MATTERS

Ex Parte Rules - Non-Restricted Proceeding

11. This is a non-restricted notice and comment rule making proceeding. *Ex parte* presentations are permitted, except during the Sunshine Agenda period, provided they are disclosed as provided in Commission rules. *See generally* 47 C.F.R. §§ 1.1202, 1.1203, and 1.1206(a).

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[11] RM-7849 at 2, RM-7896 at 2.

[12] RM-7896 at 1-2.

[13] *See* The National Amateur Radio Association's *The Amateur Radio Communicator,* October, 1991, 18-20; comment of Gay James at 3, *Worldradio* January, 1992, 1, 3; *QST* February, 1992, 23; *QST* May, 1991, 14.

[14] *See* The National Amateur Radio Association's *The Amateur Radio Communicator,* November, 1991, 22-24, *Worldradio,* March, 1992, 26-27, *QST,* July, 1991, 69.

[15] Letter from Mr. C. Murray Robinson to Chief, Personal Radio Branch (September 10, 1991).

[16] Comment of Hood County Amateur Radio Club at 2.

[17] Comment of A. Prose Walker at 1, Comments of American Amateur Radio Council (AARC) at 5. The late filed AARC Comments were accompanied by a request for acceptance. We have accepted and considered AARC's Comments in the interest of developing as complete a record as possible on this issue.

[18] Comment of Steve Lund at 1, Jon Book at 1, Southeast Louisiana Amateur Radio Club at 1.

Regulatory Flexibility Act

12. We certify that the Regulatory Flexibility Act of 1980 does not apply to this rule making proceeding because, if the proposed rule amendments are promulgated, there will not be any significant economic impact on small business entities, as defined by Section 601(3) of the Regulatory Flexibility Act. The amateur service may not be used to transmit business communications on a regular basis. *See* 47 C.F.R. § 97.113(a). The Secretary shall send a copy of this Notice of Proposed Rule Making, including the certification, to the Chief Counsel for Advocacy of the Small Business Administration in accordance with paragraph 605(b) of the Regulatory Flexibility Act. Pub. L. No. 96-354, 94 Stat. 1164, 5 U.S.C. §§ 601-612 (1981).

Comment Dates

13. Pursuant to applicable procedures set forth in §§ 1.415 and 1.419 of the Commission's Rules, 47 C.F.R. §§ 1.415 and 1.419, interested parties may file comments on or before **October 1, 1992,** and reply comments on or before **December 1, 1992.** To file formally in this proceeding, you must file an original and five copies of all comments, and reply comments. If you want each Commissioner to receive a personal copy of your comments, you must file an original plus nine copies. To file informally, you must file an original and one copy of your comments, provided only that the Docket Number is specified in the heading. You should send comments and reply comments to Office of the Secretary, Federal Communications Commission, Washington, D.C. 20554. Comments and reply comments will be available for public inspection during regular business hours in the Dockets Reference Room of the Federal Communications Commission, 1919 M Street, N.W., Washington, D.C. 20554.

14. For further information, contact William T. Cross, Personal Radio Branch, Private Radio Bureau, (202) 632-4964.

FEDERAL COMMUNICATIONS COMMISSION

Donna R. Searcy
Secretary

APPENDIX

Part 97 of Chapter I of Title 47 of the Code of Federal Regulations is proposed to be amended as follows:

1. The authority citation for Part 97 would continue to read as follows:

Authority citation: 48 Stat. 1066, 1082, as amended; 47 U.S.C. §§ 154, 303. Interpret or apply 48 Stat. 1064-1068, 1081-1105, as amended; 47 U.S.C. §§ 151-155, 301, 609, unless otherwise noted.

2. Section 97.113 would be revised to read as follows:

§ 97.113 Prohibited transmissions.

(a) No amateur station shall transmit:

(1) Communications for hire or for material compensation, direct or indirect, paid or promised, except as otherwise provided in these rules;

(2) Communications in which the station licensee or control operator have a pecuniary interest, including communications on behalf of an employer. Amateur operators may, however, notify other amateurs of the availability for sale or trade, of apparatus normally used in an amateur station, provided that such activity is not conducted on a regular basis;

(3) Music; Communications intended to facilitate a criminal act; Messages in codes or ciphers intended to obscure the meaning thereof, except as otherwise provided herein; Obscene, indecent, or profane words or language; or false or deceptive messages, signals or identification;

(4) Communications, on a regular basis, which could reasonably be furnished alternatively through other radio services.

(b) An amateur station shall not engage in any form of broadcasting, nor may an amateur station transmit one-way communications except as specifically provided in these rules; nor shall an amateur station engage in any activity related to program production or newsgathering for broadcasting purposes, except that communications directly related to the immediate safety of human life or the protection of property may be provided by amateur stations to broadcasters for dissemination to the public where no other means of communication is reasonably available before or at the time of the event.

(c) A control operator may accept compensation as an incident of a teaching position during periods of time when an amateur station is used by that teacher as a part of classroom instruction at an educational institution.

(d) The control operator of a club station may accept compensation for the periods of time when the station is transmitting telegraphy practice or information bulletins, provided that the station transmits such telegraphy practice and bulletins for at least 40 hours per week; schedules operations on at least six amateur service MF and HF bands using reasonable measures to maximize coverage; where the schedule of normal operating times and frequencies is published at least 30 days in advance of the actual transmissions; and where the control operator does not accept any direct or indirect compensation for any other service as a control operator.

(e) No station shall retransmit programs or signals emanating from any type of radio station other than an amateur station, except propagation and weather forecast information originating from United States Government stations, and communications originating on United States Government frequencies between a space shuttle and its associated Earth stations. Prior approval for such retransmissions must be obtained from the National Aeronautics and Space Administration. Such retransmissions must be for the exclusive use of amateur operators. Propagation, weather forecasts, and shuttle retransmissions may not be conducted on a regular basis, but only occasionally, as an incident of normal amateur radio communications.

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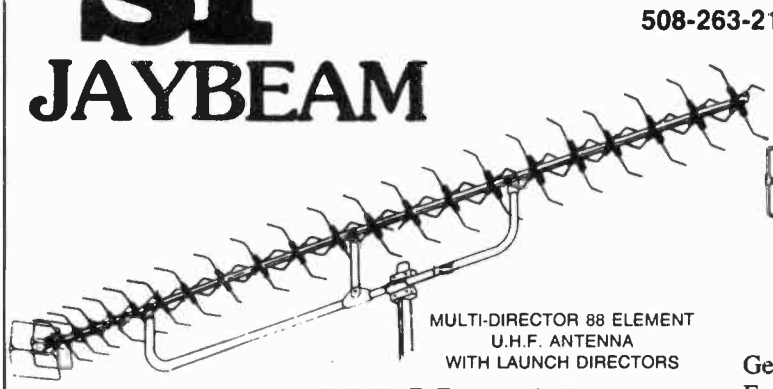

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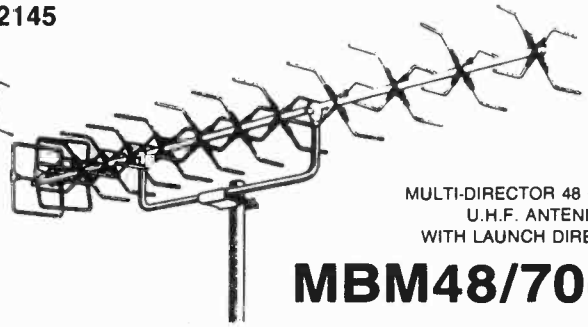

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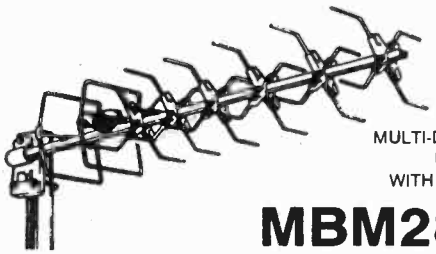
U.H.F. ANTENNA
WITH LAUNCH DIRECTORS

MBM48/70cm



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The W5YI Group in cooperation with several very experienced and outstanding producers and production companies is embarking on a landmark project which will imminently give national public exposure and prestige to amateur radio!

The objective and basic concept of the program is as follows: To produce a high quality, fast-paced, entertaining, educational, and informational 30 minute weekly television series that focuses on all aspects of the radio hobby - including some non-amateur activities of the Civil Air Patrol, Short-Wave Listener, Scanner enthusiast and Citizens Band Radio operator.

The program, by design, will not focus on topics such as technical equipment specifications, but on the contrary will, through stories of general human interest, drama, and humor, attempt to de-mystify our hobby. The programs will target a broad audience from ages 10 to 90, with specific segments geared to the young and old. Drawing upon some of the strongest elements of programs like, Mr. Wizard, Real People, Beyond 2000, and America's Funniest Home Videos, the producers will mix an abundance of edited Amateur Videos with high quality professionally produced studio and remote location segments.

The program will utilize the talents of numerous well known Amateurs, celebrities and outstanding personalities as they relate their experiences, interests, commentary and expertise, in featured vignettes and regular program segments.

Various segments of RADIO FRIENDS will feature:

• RADIO FRIENDS	Interviews with Hams & Hobbyists as "Real People"
• RADIO FUNNIES	Stories and dramatic reenactments of humorous happenings & situations
• RADIO FIRSTS	Historical vignettes tracing milestones of great radio pioneers such as, Guglielmo Marconi, Thomas Edison, etc.
• RADIO FANATICS	(Need we say more?)
• RADIO FUNDAMENTALS	A non-technical primer on basic concepts of radio that can be understood by everyone. (such as how do repeaters work?)
• RADIO FEATURES	A non-technical product review
• RADIO FUTURE	A "Beyond 2000" look at the state of the art and a peek into the future of radio technology and things to come
• RADIO FLASHBACKS	A glance back at the historic development of radio
• RADIO FREQUENCIES	For SWL enthusiasts to monitor
• RADIO FOCUS	An editorial comment on relevant current issues relating to hobby radio.

These represent only a few of the many interesting, informational and educational segments that are currently being developed by the producers.

The success of a program of this magnitude will no doubt cause a tremendous interest in Amateur Radio and produce heretofore unprecedented opportunities for public service, public relations, and recruitment, not to mention the commercial advertising incentive to dealers, manufacturers, retailers, and publishers that has never existed for them on this scale.

The producers are actively seeking radio enthusiasts and amateurs, who are genuinely interested in promoting the hobby, that are willing to participate or otherwise provide needed resources, such as talents and services. We are looking for: attorneys, TV production technicians, independent producers, production facilities, researchers, writers, volunteers, access to film and video tape archives as well as fund raisers ...and individuals and organizations interested helping financially. RADIO FRIENDS is seeking non-profit educational status under the U.S. Internal Revenue Service code.

FOR INFORMATION, PLEASE CONTACT:

THE W5YI GROUP, INC.

2000 E. Randol Mill Road, Suite 608-A; Arlington, Texas 76011
Tel. 817-461-6443
(Mail address: P. O. Box 565206, Dallas, Texas 75356)
MCI mail users contact: FMAIA or BBRAUN
Voice Mail Telephone number: 804-239-3752
FAX 804-239-4740 or 817-548-9594

RADIO FRIENDS

De Todo Un Poco
(A little bit of everything)

Heru Walmsley, W3WVV

On Bill Pasternak's letter:

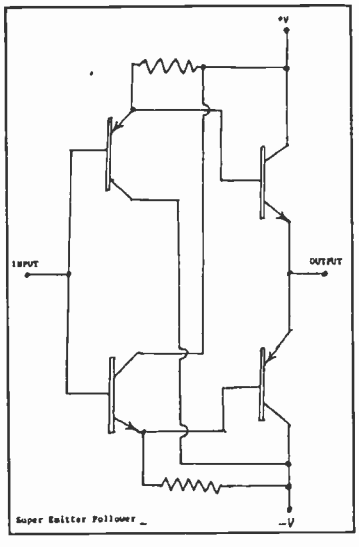
I have been putting off writing to you for some time now, but Bill Pasternak's letter provided the spark.

As I understand the rules, Amateur Radio (all modes including TV) exists to allow people to further their understanding of technology and communication modes but under no conditions were amateurs to provide entertainment for the listeners. Under all but a few very specific conditions all communication was supposed to be two way. The prohibition of music is part of this rule. Now what Bill is proposing sounds to me like trying to compete with the broadcast channels and if it is, it is forbidden! As I understand it, you can explain something to another amateur operator over the air if you are in two way contact but you cannot put on a program explaining whatever to the general public as this is broadcasting. In other words, the media is the message. Over the Baltimore repeater, people have played Pong, chess, etc., as well as many long conversations about a large variety of subjects. But produce an entertainment program?

A use that we are trying to develop is to help in one of our nets on the two meter repeater. W3WCQ and myself (W3WVV) run a technical question and answer net on Saturday afternoons on the BRATS 147.03+ repeater. It seems to us that a picture should help us give understandable answers, but we have not yet found a good way to arrange this. One problem is so few people have receive capability for ATV. I don't know how many hams listen to the net but our club, the BRATS, has approximately 250 members with 10% able to receive ATV. Maybe you have some ideas on the subject.

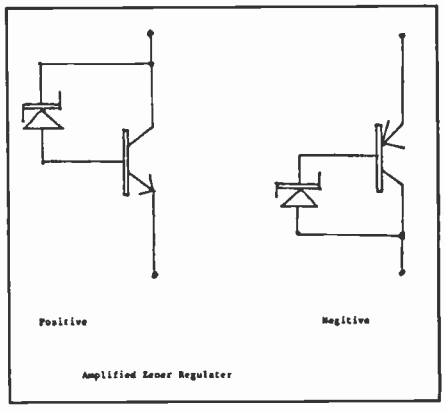
Hints and Kinks:

Next, I will offer a couple of my hints and kinks. First - an emitter follower for driving a low impedance. I use it to drive the grid of the final 2C39 in my T44 ATV transmitter. If you use the standard totem pole emitter follower you wind up driving two bases that are 1.4 volts apart (.7v transistor). A way to fix that is to drive each one from its complimentary transistor emitter follower, thereby having the .7 volts of the drive transistor cancel out the .7 of the output transistor so that the input bases can be tied together. See diagram. This circuit has the additional advantage of having a very high input impedance due to darlington connection. This allows DC restoration at the input with very little leakage. A driven clamp can work quite well clamping to the back porch.



Super Emitter Follower

Second - you need a 5 or 10 watt Zener and all you have is a ¼ or ½ watt device? Don't despair, all is not lost if you have a power transistor of the proper polarity. By using the circuit shown you can increase the current by the beta of the transistor, assuming you have chosen a transistor that can handle the power.



Amplified Zener Regulater

Either polarity of transistor can be used depending on your needs. Another advantage is that if you need tight regulation from a Zener this circuit can reduce the current change in the Zener by the beta of the transistor used.

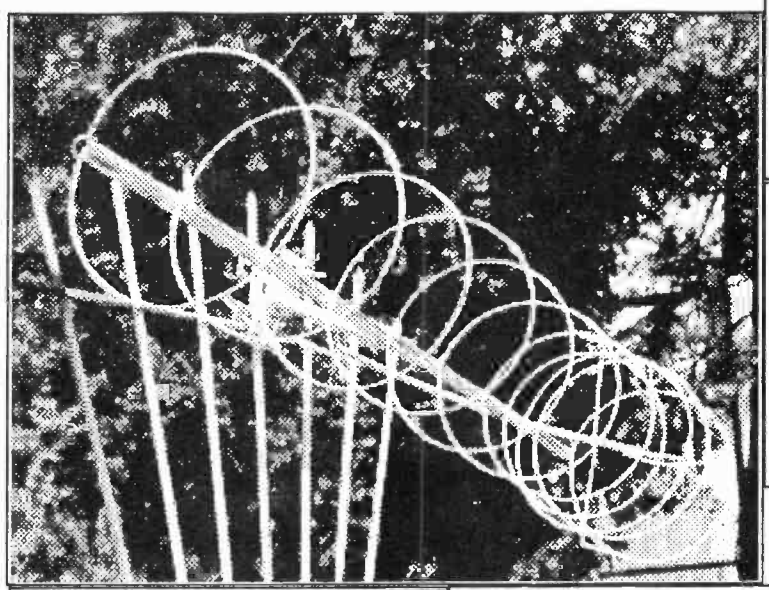
Third - the lightning protection of our antenna is something we all need to worry about. Since the higher an ATV antenna is, the better the received signal and we all try to get as much height as possible. This also makes lightning look more closely at your antenna and start getting a real thing for that piece of metal stuck way up there in the sky.

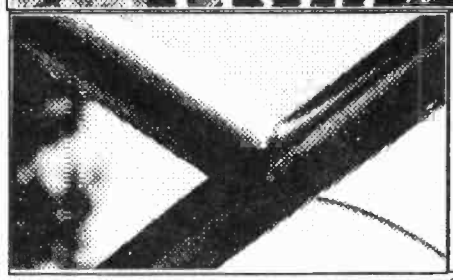
Real lightning rods intended to survive a full hit use 4 ought welding cable for grounding, at dollars per foot. If your antenna is on the roof with a wire running over to the edge and then down to a ground rod you can be in real trouble even with a nearby strike. The usual wire is #8 aluminum wire run whatever way looks pretty with sharp corners and all. What I want to suggest is to use copper pipe and then run the copper pipe over and down to the ground rod. Now you must use gentle bends in the copper pipe (sharp bends cause the lightning to jump off because it is going too fast to take a tight turn!).

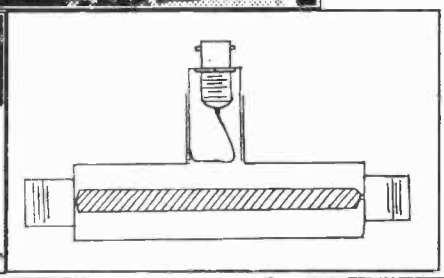
I used a conduit bender and the pipe has a tendency to crinkle on the inside of the bend; just make sure that the outside of the bend is smooth. Copper pipe will carry the current almost as well as heavy cable since lightning has a lot of RF component and

skin effect makes a tube work almost as well as a solid conductor. Copper pipe is relatively cheap ($3 - $4 per 10 ft.). Compared to heavy cable, it isn't even that much more expensive than Radio Shack 8 gauge aluminum ground wire ($3.59 per 40 ft.). Just one more thing, all joints are soldered but the currents involved could soften the solder, so a self-tapping screw should be screwed into all joints to make sure they don't come apart under a high current surge.

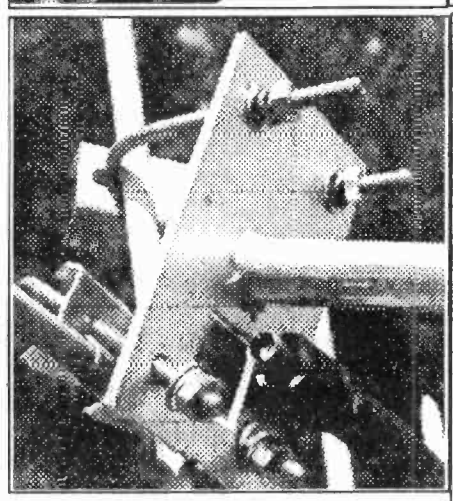
Fourth - there is a good use for Radio Shack 8 gauge aluminum wire. Make antenna with it. Most hardware stores carry aluminum solder for use with a Bernz-o-matic torch or similar propane torch. A piece of ½" or ⅝" aluminum tubing, a roll of RS #8 wire, and a piece of aluminum hard line with a connector on it, and you can make a real nice loop Yagi antenna. I will not include a design for an antenna so that you can undertake to build your favorite out of aluminum instead of copper and wood. I do, however, suggest that you practice using the aluminum solder before you attempt to build something that you want because it takes a little technique to use. See photos.

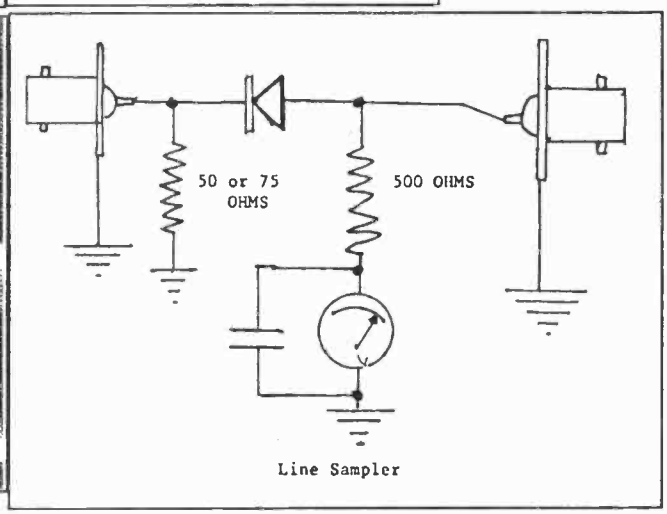






Fifth - a simple line sampler. A copper pipe tee made into a co-ax line sampler is a neat way to monitor your transmitted signal. I used a ¾" copper tee that had a ½" tap. I turned type "N" connectors to fit the ends and used a piece of ⅜" tubing for a center conductor. A BNC fitted into a short section of ½" pipe with a loop, stuffed into the sidearm of the tee provides the tap. Co-ax then carries the signal over to where it is detected and displayed. For a detector I used a small Pamona box with a resistor to terminate the line and a suitable diode to detect the signal. (This is a modification on the one in the '78 handbook.) See photos and diagram.

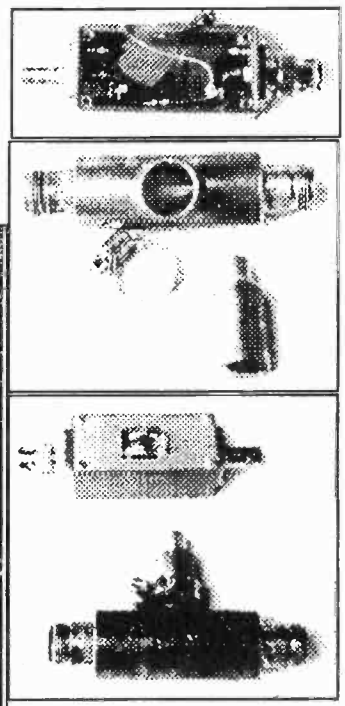




Line Sampler

Sixth - if you want nice flat lighting for your TV cameras, get a circline fluorescent fixture and have the camera look through the center.

Now, some comments and questions about some of the things advertised in ATVQ. There is a vestigial sideband filter that I have questions about. On low power or receive it should work fine, but I wonder about high power? If it is a true TV type vestigial sideband filter it is stopping half of the power of a full double sideband signal from getting to the antenna if used in a transmitter output line. What happens to this power? If it is just returned to the transmitter, it could contribute to the inefficiencies of the output stage, making it



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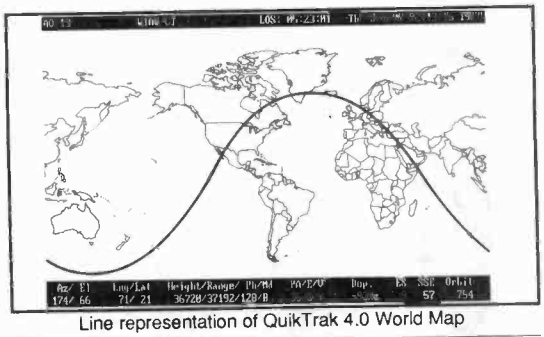

Line representation of QuikTrak 4.0 World Map

QuikTrak 4.0

Whether you want to identify the next time Oscar 13 will provide communications between two cities or if you just want to know the next time you can visually sight the Soviet space station MIR, QuikTrak will let you plug in the latest Keplerian elements for up to 100 satellites using a new full screen editor. QuikTrak also supports autotracking. *Hardware requirements*, IBM PC, AT, PS/2, or clone with a minimum 512K memory. CGA or EGA graphics required. Numeric coprocessor not required but recommended.

InstantTrack 1.0

For those concerned with greater speed and capability, InstantTrack offers all of QuikTrak's features plus instant visibility for your "favorite" satellites before you issue the first keystroke. More than 200 satellites and 1754 cities are on the menu and will be in full-color high-resolution EGA or VGA modes. *Hardware requirements:* IBM PC, AT, PS2 or clone with at least 512K memory. EGA or VGA graphics required. Numeric coprocessor not required but recommended. Mouse not required but can be used on the map screens.

These are only a few of the features of QuikTrak and InstantTrack. The figures below reflect suggested donations to defray production expenses and benefit AMSAT's non-profit, educational activities.

Recommended Donations:	Member	Non-Member
QuikTrak 4.0 5 -1/4"	$55	$75
InstantTrack 1.0 5 -1/4"	$50	$70

AMSAT membership $30/yr U.S.; $36/yr Canada & Mexico; $45/yr Foreign

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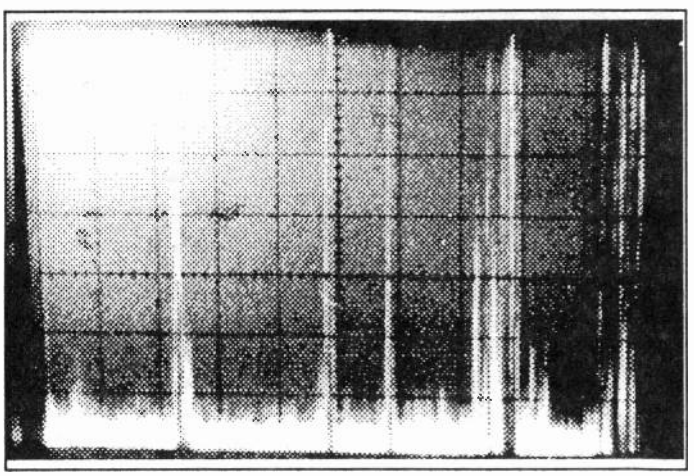
overheat or overvoltage breakdown. Nowhere is the maximum power stated. I know it is an extreme case, but when I went up to the local channel 13 to see my friend (who at the time was chief engineer), he gave me a tour of the place. One major part was the vestigial sideband filter in the basement. Now, we are talking 50KW up the pipe to the antenna, but the filter was after the final and it was in effect a splitter with the undesired power being dumped into a dummy water-cooled load. They even used the heat in the winter to help heat the building. Should not that filter in the ad have one input and two outputs, one upper and one lower sideband?

EDITORIAL COMMENT:

Go back and read the article on "The Truth About VSB" You do NOT reduce the signal by HALF. VSB preserves a portion of the lower sideband, up to 1.5 MHz. wide. The filter does appear as a high VSWR at frequencies outside of its passband but the power at these frequencies in amateur service is minuscule, on the order of milliwatts and microwatts. Even if you run HIGH POWER (over 100 watts) the return is at best only a few watts. The returned power is mostly from the lower side sound subcarrier, which is about 3% of your total power, and the lower side color sidebands (there is no 3.58 Carrier) which again is about 3 to 5 % of your total power. Add in all the low level video sidebands (typically -50 dB each) and you have about 10% of your total power which is removed by the filter. Note: This does not reduce your PEAK POWER, except **Pictured:**



display from the authors spectrum analyzer.

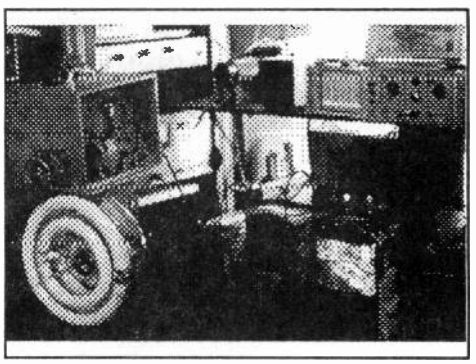
for pass through losses, only the portion of the power in the filtered (removed) sideband products.

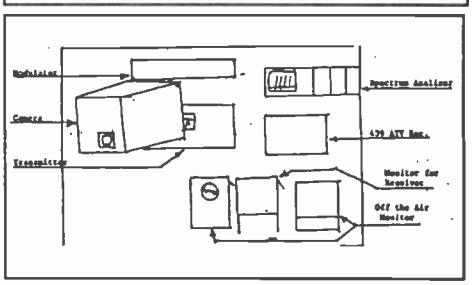
The portion of the signal which is not allowed to pass is dissipated in the filter, in the coax between the filter and the transmitter and in the transmitter final components. If this power is large, as in the case of the broadcast transmitter, and you are also concerned about reflections causing ghosts, then a circulator is placed between the transmitter and the filter, or incorporated into the filter design to send the undesired signal energy into a reject load The reject load dissipates the power rejected by the filter. It is not harmful in amateur equipment. I have run as much as 70% reject when I tested a filter which was not properly tuned (it was not passing the main video carrier!) without damage to either my old Henry 2004A, Mirage D100N-ATV, or various exciters. You only run a risk if you are going to exceed the dissipation rating of the power device used to drive the RF into the filter. But a good question none the less! de KB9FO

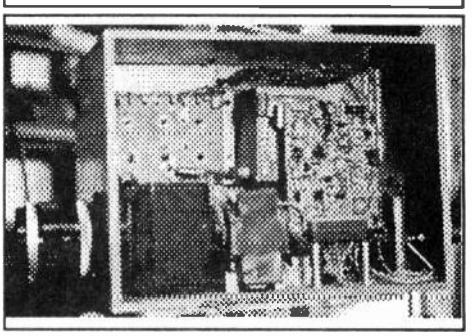
The small video camera for right at $230 seems greatly over priced. For not much more than twice that you can get a camcorder that, if you take it apart, you can get a COLOR video camera with auto iris and zoom lens that has auto focus and a small battery operated video tape recorder. I will admit that back in the late '70's we at work paid a lot more than that for a black and white CCD camera to take apart and see if we could make it do what we wanted. Nowadays, $230 ought to be the price of a color camera.

EDITORIAL COMMENT:

You can cut up a camcorder, but for small or light weight uses the lens alone will out weight the micro cam, and would still be many times bigger. If you want to be cheap and just get a color CCD camera go ahead and cut up the camcorder! It may be difficult though as portions of the record servo system and camera scanning system are often tied together in such a way that you cannot easily cut the PC board apart to get only the stuff you want. For R/C models and balloon or rocket or lookie-talkie use, the micro cam comes in as champ for size, battery power consumption and weight. de KB9FO

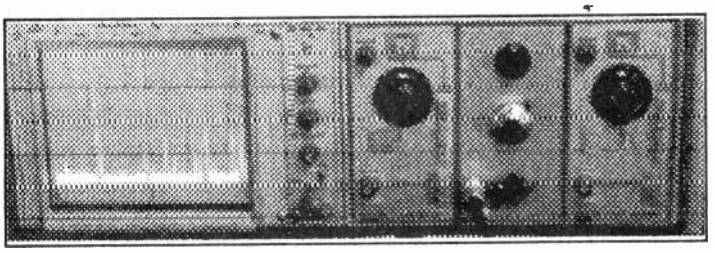






Pictured: the W3WVV hamshack and equipment key and his home made TV camera.

W3WVV...



There is a line sampler in the adz that has several stages that require power. I don't see why you need external power when a small amount of power from the RF line would never be missed (one to 10 mw of power diverted from even a 100 mw transmitter would not be noticed.) See my version of a line sampler in the earlier part of this letter. This also allows you to put the monitor part where you can use it. Also, my sampler has no physical connection to the center conductor to short out and cause problems. Most of the things advertised in your magazine are OK, but I just had to ask the above questions.

EDITORIAL COMMENT:

In the beginning all TV demodulator were the simple diode type. The problem is they are not good detectors because they do not compensate for the VSB difference in sideband amplitudes (your TV set has a compensating passband to equalize the lower and higher sidebands) and the square law detection of the diode introduces other errors in measurements. The amplified systems provide a good video output, with proper filtering, and a level to match into a 1 volt 75 ohm video system which a bare diode does not. The bare diode is good for measuring zero carrier level to adjust white level but does not have DC restoration to compensate for varying average picture level (APL) which makes the video display not a good reference.

Some comments on the magazine. I like the way you have so many construction articles. I have for many years loudly preached that 'if you can't build it, you don't need it'. This does not mean that you should build everything you have, but you should be able to understand generally how it works. If you have no idea how something works, you cannot use it to the best advantage.

The major ham club does a good job lobbying for and promoting ham radio, but their house organ leaves much to be desired. Page after page after page of lists of contest standings along with other trivia makes us forget that one of the reasons for ham radio's existence is to advance the technology. The major ham club's house organ even stopped a one page feature, 'The New Frontier' quote 'for lack of space' unquote.

We are to a large extent the technocrats that Bill Pasternak deplores. Keep up the 'how-to' articles and what is happening in ATV.

I could ramble on for a long time yet, but I guess I had better close soon. Many other things could be said (such as how to make an easy spectrum analyzer), but I will save them for another letter.

Jim White, WDØE

I read with interest 'The ATVQ suggested band plan' for 70 cm in your Spring 1992 issue. As both an active satellite use and ATV enthusiast, I felt compelled to respond. The requirement that satellite operations in 435-438 Mhz must us antennas with an elevation control and that no operation take place below 10 degrees elevation is problematic for several reasons.

(1) - AMSAT is actively trying to make satellites available to more hams. One way we are doing that is to make the satellites powerful enough that stearable antennas are not needed. This has been partially accomplished with the current flock of microsats with many stations are successfully using omnidirectional antennas. Three more microsats are in queue for launch in the next 18 months or so, bringing the total to 8 satellites using 70 cm down links and for which omni antennas are encouraged. The ideal omni antenna for these satellites has high gain at the horizon where path loss is greatest.

(2) - The 435-438 Mhz segment is the most heavily populated Amateur Satellite Service band segment other than 145.8 to 146 Mhz. Future satellites now under construction or being planned will also use this segment.

(3) - Low earth orbit satellites (7 of the 9 currently using 70 cm) spend 52% of their time below 10 degrees. To 'prohibit' operation below 10 degrees would remove more than half of all satellite operating time for any given ground station.

(4) - Further, it seems likely, no matter how cooperative satellite operators may be, that operation below 10 degrees would take place anyway - even if inadvertent.

(5) - Most satellite operator's directional antennas for 70 cm have a half power beam width of about 20 degrees. To successfully avoid interference with terrestrial users the 'don't go below' elevation would need to be something more like 15 to 20 degrees. This compounds problems 3 and 4. In fact, these satellites spend 76% of their time below 20 degrees.

(6) - The Amateur Satellite Service is defined in the ITU and FCC regulations as a distinct service within the Amateur Radio Service. Operation is restricted to specific subbands within the larger amateur allocations. Therefore, the Amateur Satellite Service has much less flexibility in choosing frequencies. Also, once a satellite is built and launched (and there are currently 11 operational amateur satellites) it is somewhat more difficult to change their operating frequency than any terrestrial service ('somewhat more difficult' may be a bit of an understatement).

Sharing of our bands between various modes and interests is essential. Your plan, which proposes unrealistic constraints on satellite operation in the only 70 cm segment available to the Amateur Satellite Service, seems to me to be inoperable. I believe ALL users of weak signal and wide band modes need to move up in frequency, both to obtain the desired bandwidth and populate those bands so we don't lose them.

Rather than looking for more or different ways to share 70 cm between satellite and ATV operation, both groups should be moving up. The international satellite community is doing just that with the Phase IIId bird now being planned. While this

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from the publishers of ATVQ

GET RID OF FM REPEATER INTERFERENCE ON ATV

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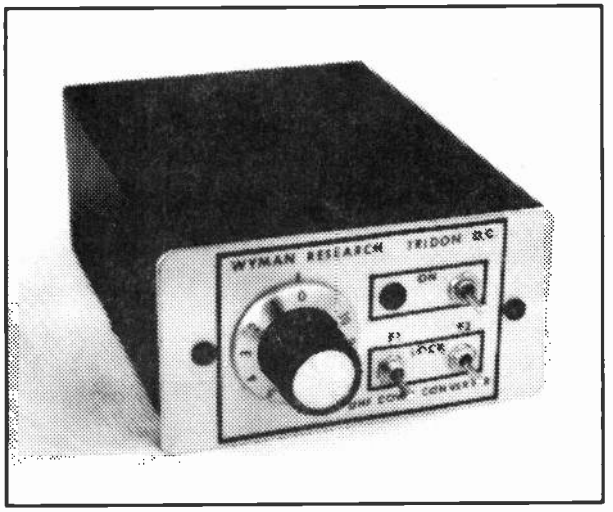

NEW! IMPROVED ATV RECEPTION

The new Wyman Research DC-2 downconverter makes it possible to receive the interference-free lower sideband of ATV transmissions. The unit eliminates the interference from FM repeaters which operate in the ATV upper sideband. The design principles are described in *73* magazine, March 1992. The many features of this new development are:

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Don and Sue Miller
W9NTP W9YL

AMSAT continued...
satellite will be capable of operation on 2 meters and 70 cm, it is expected that a great deal of operation will take place above 1.2 Ghz. In Colorado the ATV groups are also moving up to 902 Mhz and 1.2 Ghz while continuing to occupy the only 70 cm segment that does not present interference problems locally, 426.25.

EDITORIAL COMMENT:

I applaud the efforts of AMSAT to bring new vistas to ham radio. Unfortunately, when the satellite bands were created, there was no effort to make a new place for ATV, nor other displaced users. ATV and satellite have peacefully co-existed without problems for nearly 20 years, sharing the same frequency bands (for 434 MHz ATV and the lower sidebands of 439 MHz ATV).

Satellite communications rely solely on line of sight communication. The use of a ground plane rather than a directional antenna in my opinion is poor amateur practice as it introduces interference to terrestrial users when it could be easily avoided.

There is always the comment, well move ATV to the higher bands. This overlooks that the ATV operator is a terrestrial operator and depends upon propagation for contacts. This propagation is usually just ground wave, but for DX is sporadic E, tropo and similar propagation mechanisms. These are largely NOT present at 900 and 1240 which is why these bands are used for Cellular telephone and other SHORT RANGE communications systems.

Foliage is also a concern to the terrestrial communicator which is not a concern to the satellite communicator. Foliage absorbs RF faster in quantum leaps at 900 and 1200 than it does at 440. The plan as printed was developed by Tom O'Hara, technical advisor to the ARRL. Until AMSAT and others display a desire to co-exist with ATV, and share the bands with other users, I feel their elitist attitude will gain them no quarter. We would like to avoid unnecessary interference, which the use of directional antennas and in the case of space communication, elevated antennas should the be the norm.

Fred Lehmann, WAØPBL

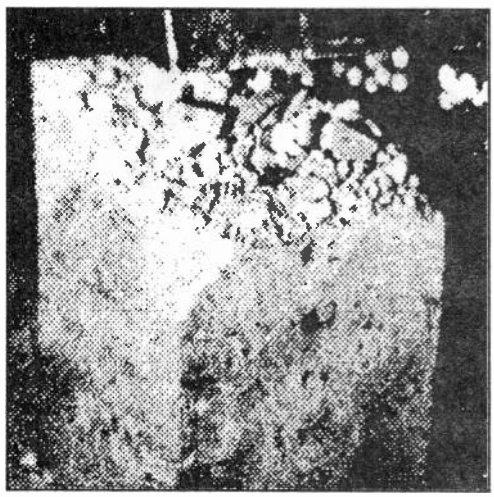
Here is what we did to demonstrate ATV to the people n Sioux Falls, South Dakota: The Sioux Empire ARC set up a ham radio booth at the Senior Citizen's Hobby & Craft Show, March 20 and 21. Besides sending traffic for the public, NØHCR, WVØK and WAØPBL set up 2 way ATV on 427.25. Members of the public enjoyed seeing Phil, WVØK on a color monitor. Audio communication was by a handheld on 144.9.

The highlight of the ATV demo was when a deaf woman talked to Phil by sign language and he, in return, signed back to her. Roger, NØHCR said he wished he had a still camera so he could send a photo of it to QST.

It seems to me that the full potential of ATV for the deaf is yet to be realized. I'm sure many deaf would enjoy ATV. Also, a local station, KELO, Channel 11, had a four minute piece on the news about ATV. KELO started its piece by saying 'It looks like something out of the Jetson's, but ½ dozen Sioux Falls people can see each other'. Both Fred & Phil used PC 10 watt ATV transmitters and cable 58 VCRs. Since Phil lives five blocks away, P5 was possible without elaborate antennas.

EDITORIAL COMMENT:

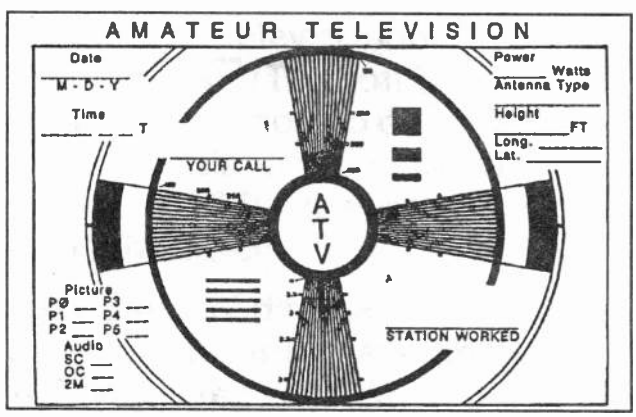
Others interested in signing for the deaf should contact John Ruckert WB6ZPN 986 S. Arapahoe #5, Los Angeles. John heads a group of TV Signers in the LA area.



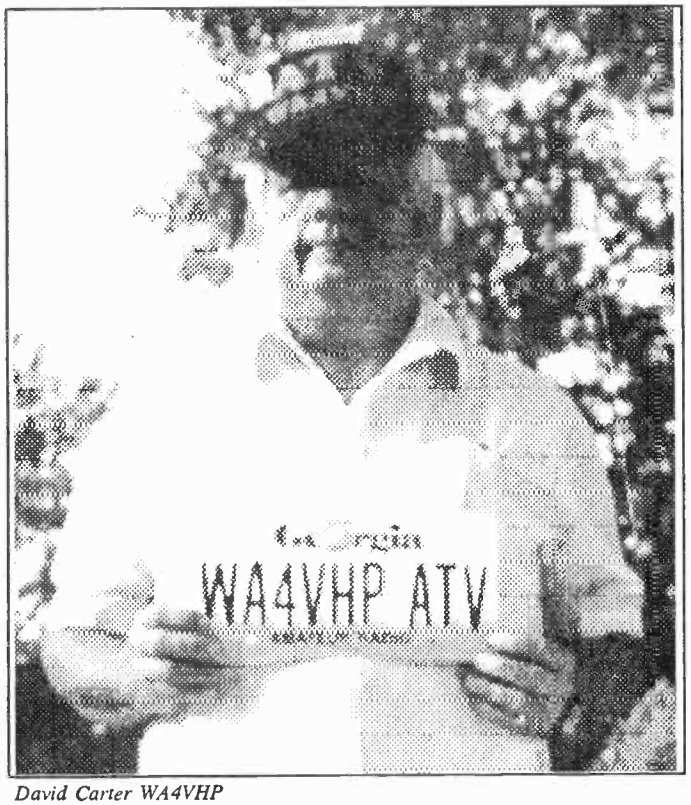
For those who insist we move to higher frequencies,

Here is what happened to a solid block of concrete that was exposed to 30 KW of 915 MHz. RF! It only took 6 minutes. The experiment was done by the Japanese National Railway's Railway Technical Research Institute in 1972, to see if RF could be used as a rock cutting tool to help build tunnels. From: Microwaves and RF, May 1992.

Need a video QSL? These are available from Don Miller, W9NTP, also known as Wyman Research.

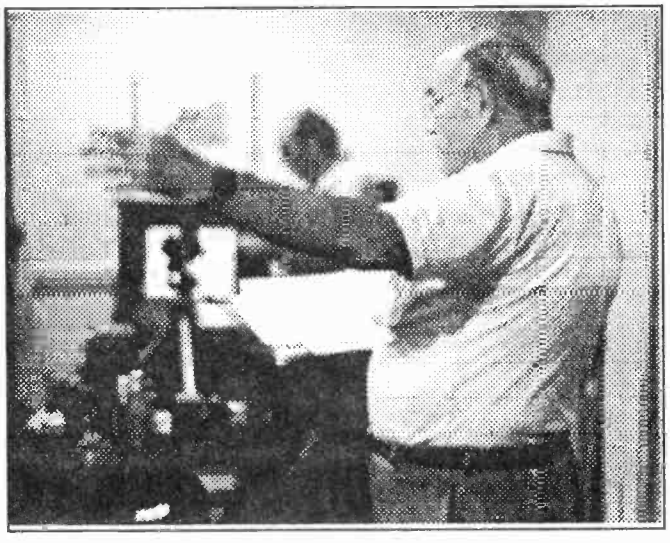


SAVANNAH, GA ATV

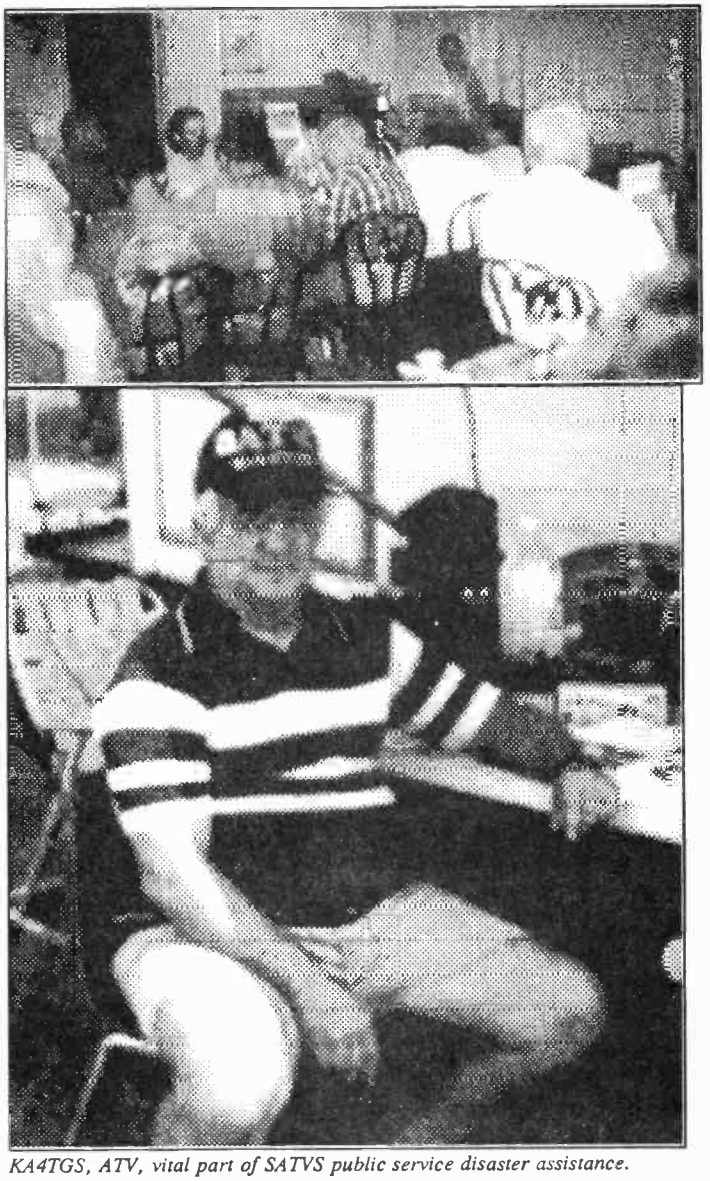


David Carter WA4VHP

The Savannah ATV Society was at the Stateboro Georgia club meeting and put on a program about ATV. As a result, the Savannah ATV group was invited to the Statesboro hamfest (see events this issue) and will provide an ATV demo there. The hamfest is Sept 12. The Savannah group would like to invite all ATV'ers to the hamfest to meet and exchange operating information and begin a state wide or area wide social ATV group and find those elusive ATVers in the hinterlands! Call 912 927 2020, ask for David.



The Savannah ATVS retransmits NASA select fromtheir own downlink via their repeater which has an output on 426.25 MHz. David WA4VHP is an avid DX'er with arrays on 430, 923 and says he copies Charleston, SC every night (150 miles) with P3-P4 exchanges. Two stations in Savannah work the N4CNN TV repeater in Charleston on a regular basis.



KA4TGS, ATV, vital part of SATVS public service disaster assistance.

HEY FOLKS! *The photos and diagrams in this issue represent our latest efforts to make ATVQ even better. We are now using an HP Scan Jet image scanner to process photos and diagrams and using Word Perfect for Windows to do layout. It is a LOT more work to do the issue this way but if you like the results we will contiue. This is also the method we have been using to do ATV SECRETS VOL II, for ADVANCED ATV'ers. Because this is a lot slower than "cut and paste" but produces better results, the book effort has been slowed. Also Sylvia Ruh, had surgury on both hands for Carpel Tunnel which prevented he from doing much for 17 weeks this year. She is better now and back to work part time. Thanks. Also, because we were unable to get the book done in the time period we thought, we sent a complimentary ATVQ coffee mug to everyone who ordered before July 1, 1992. We are continuing to work on the book and have about 20 % to go. Thanks for waiting.*

BRATS FSATV
for
SUPER CITIES WALKATHON

On April 5th the Brats (Baltimore Radio Amateur Television Society) used FSATV to provide health and welfare information to the Baltimore County Police. The weather for the event was quite cold com-pared to the previous year. The winter season seemed to extend itself into the spring of the year much more than usual.

The wind started to pickup by about noon and threatened to blow over my antenna. Winter coats were the fashion for the 1992 Walkathon. All of the ATV operators decided that it would be wise to conduct some preliminary path tests to make the event go more smoothly. We chose Sunday March 15th as our day for some tests. Ellis N3IDV, Maurice KA3EJJ, Heru W3WVV and Fred K3TAZ all checked to see that the three rest stops would have usable pictures on the day of the MS Walkathon. Heru had some problems getting his Gunplexer (10 Gigahertz) system operating correctly. We all experienced interference from the paging transmitters which seemed to be quite busy in Towson, Md. even on a Sunday afternoon. To help reduce that interference we decided to use horizontal polarization and high gain antennas.

Figure 1 *Bob Bennett, W3WCQ*

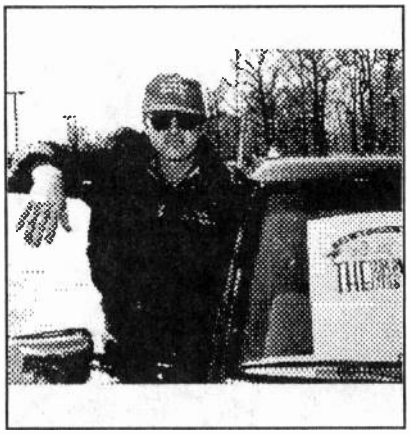


Figure 3 *Maurice Cahill KA3EJJ*

On the day of the event we met at 7:00 AM in order to have plenty of time to set up our equipment. Our coverage plan consisted of three transmit stations operating on 439.25 Mhz. Each of the three rest stops was established with an ATV transmitter. All signals were sent to the Baltimore County Police command post located at the Towson Center. All voice coordination was done on 144.95 Mhz simplex. Heru was positioned at Rest Stop #1 which is Sheppard Pratt Hospital. Originally this short path was going to be the 10 Ghz Gunplexer but last minute difficulties with the system caused a change of plans. Heru used a P.C Electronics transmitter and a 10 watt power amplifier. His antenna was a home brew 11 element yagi.

Ellis was stationed at the Board of Education rest stop #2. He used a K1FO antenna, Kreepie Peepie and Mitsubishi M67728 power brick with a output of about 25 watts. Maurice was located at the Towson Courthouse which was the last rest stop of the Walkathon. He used an 11 element KLM antenna, Kreepie Peep-ie exciter and a D1010 power amplifier with a output of about 10 w. Maurice used a Panasonic PK957 color camera. Throughout the morning each site would transmit for about 5 to 10 minutes and then pass the frequency on to the next station. The command post was able to keep tabs on the number of people passing by the rest stop. Fortunately there were no emergencies that required police intervention. Our coordinator for the event was Bob Bennett W3WCQ. Bob served as a member of the Walk Committee, which worked on the details of planning such a large event. On the day of the walk he was in charge of Communications and Safety for the walkathon.

Figure 2 *Heru Walmsley W3WVV, note antenna described elsewhere in this issue.*

This year Heru made use of an all aluminum antenna that he had constructed. It is an 11 element loop yagi as shown in the photograph. Easily available aluminum parts were used exclusively in this design.

As with any event there is always room for improvement. I feel it would be nice to get equipment operating above 1 Ghz FM in order to be above the majority of the interfering signals. The use of FM video would eliminate problems caused by impulse noise. More preliminary checkout on my part would have cut our set up time in half. The receive system that I chose had several intermittent problems that originally appeared to be cau-sed at the transmitting sites. Next year we are all hop-ing for some warmer temperatures and for Murphy to visit another qth. 73's Fred K3TAZ

Figure 4 *Ellis Eisen, N3IOV, ATV Mobile.*

ATV SUPPORTS SPACE SIMULATION

Bill Parker, W8DMR

Two school buses were modified to resemble two space shuttles. Two teams of 15 students each, all dressed in white coveralls, began conducting experiments aboard the moving buses. Meanwhile at Mission Control, another 30 students began recording data as the experiments aboard the buses progressed.

The 5th Grade Class of Conrad Elementary School, Newark, Ohio were in orbit. Teams of two pupils each, utilizing computers in the computer lab, entered the incoming data for processing.

This far reaching simulation was the result of Gail Klink, a District Aerospace Resource Specialist for the Newark School System. Computer Lab teacher, Pat Murray, teamed with Gail.

The Newark Amateur Radio Assn. provided the communications to coordinate this community sponsored event. Lee Hubbell, K8MZH organized the amateur radio operators accordingly.

Buses	N8LEJ, Trevor	KB8HEL, James
Mission C	W8∅UW, Bruce	WD8TXD, Bob
Packet	KB8GVW, Tom	
Repeater	WD8RVK, John	KA8RBQ, Rick
Television	KB8GLG, Shawn	W8DMR, Bill

To provide video communication, a downconverter, TV set and VCR were located at mission control. The ATV transmitter was placed at Horn's Hill overlooking Newark, Ohio. A frequency of 439.25 Mhz along with 4.5 Mhz subcarrier audio was used to link the students at mission control with the shuttle teams completing the many experiments. The 6 mile path yielded P5 pictures and noise free sound to the delight of the students.

Video tape from the amateur television transmissions presented during the debriefing thrilled the young and old alike. James Gano, teacher of the 5th grade class, and the Newark School System provided a first class space shuttle simulation.

If only the crew of the Endeavor could be as fortunate As the 5th Grade Class of Conrad Elementary. The maiden flight of the Endeavor was May 7th, the evening before the Newark simulation. This being the case, the Endeavor crew should experience little difficulty repairing the faulty satellite in orbit.

CORRECTION

The 440 MHz. filter project in the winter 1991 (Vol 5 #1) issue had a typo. The single filter will provide 12-14 dB of rejection. They can be cascaded to increase the notch as needed.

FEQUENCY MODULATED AMATEUR TELEVISION (ATV)

Josef Grimm, DJ6PI

Amateur television (ATV) was, until a few years ago, almost exclusively carried out in the 70 cm band. There was then sufficient room for an amplitude modulated color television signal using commercial transmission standards.

As the 70 cm band grew increasingly busy with FM transponders, direct FM, satellite communication and commercial space safety installations, ATV signals were interfered with more often. Since this inconvenient eventuality cannot now be changed, many ATV amateurs are leaving the 70 cm band and are using frequency modulated signals in the SHF bands.

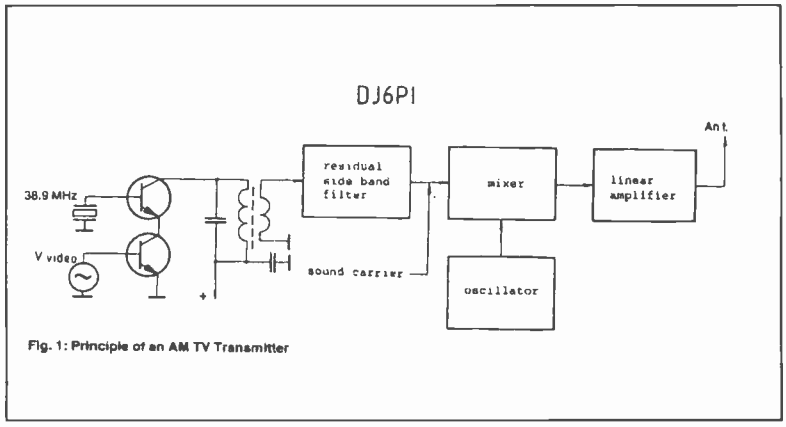


Fig. 1: Principle of an AM TV Transmitter

The advantage of FM will be compared with the previously universally employed amplitude modulation. This report is a compendium of articles published in radio amateur literature and of the author's experience with FM ATV. The latest components from satellite technology, which are employed in ATV, will also be mentioned. In forthcoming issues of VHF Communications there will be articles from various authors which describe send and receive equipments for AM ATV in the Ghz range. Some of this equipment will be suitable for the reception of commercial satellite television.

1. AM ATV

The AM mode was used by amateurs initially merely because this was the norm employed by commercial TV stations at both VHF and UHF.

1.1 AM ATV Transmitters and Receivers

ATV transmitters are described in references (1) and (2). The simplest type amplitude modulates a crystal oscillator at IF (38.9 Mhz) with a video signal (**fig. 1**).

After passing through a residual side band filter and the addition of a sound carrier, the bandwidth is 6.75 Mhz (**fig. 2**).

For the reception of amplitude modulated ATV signals, television receivers can be fitted with a frequency converter. The ATV signal is then translated into a suitable channel at VHF or UHF. As the picture information is contained in an AM signal, all stages in the transmitter must work in a highly linear mode. All departures from amplitude linearity have the effect of displacing the horizontal picture lines thus distorting the picture as well as falsifying the contrast and color content. The signal also suffers from reduced synchronization leading to constantly rolling pictures. Amplitude modulated transmitters must, on account of linearity, be driven at powers not more than 20% of their peak power output capability. In the receiver, the linearity problem is countered by the use of automatic gain control (AGC) in both tuner and IF amplifier.

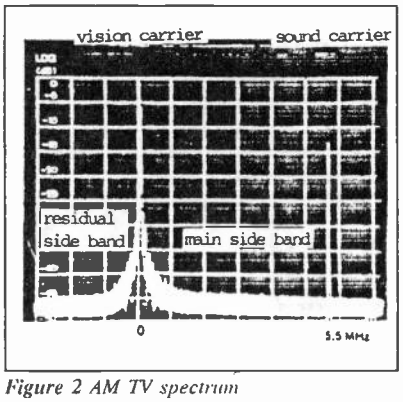


Figure 2 AM TV spectrum

1.2 Signal to Noise Ratio

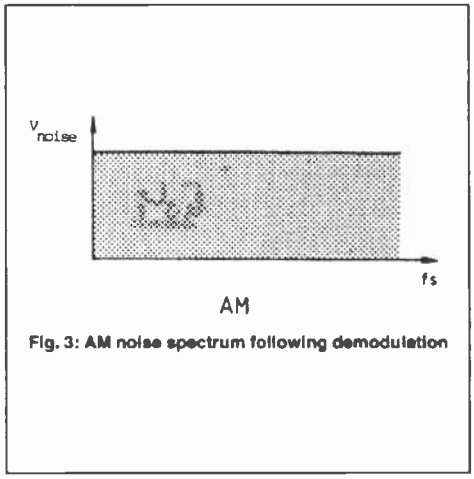


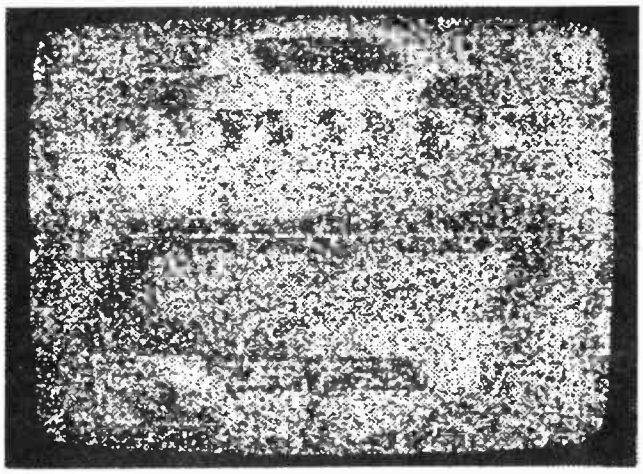
Fig. 3: AM noise spectrum following demodulation

The noise spectrum located about a demodulated AM carrier, in the absence of distortion, is of constant amplitude (**fig. 3**) with frequency.

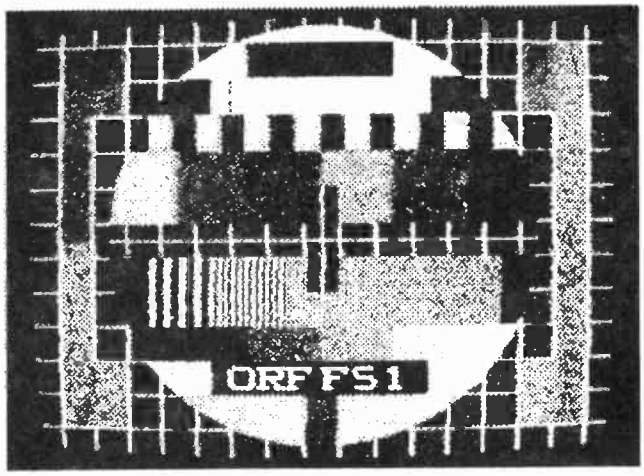
The video frequency signal to noise (S/N) ratio is equal to the high frequency carrier to noise (C/N) ratio. An improvement in picture quality can only be brought about by an improvement in the C/N ratio entailing an increase in sender power, higher gain antennas, improved receiver noise figures and lower attenuation coaxial feed cables, etc.

The visual impact of this improvement upon the picture quality is depicted in **fig. 4.** (next page)

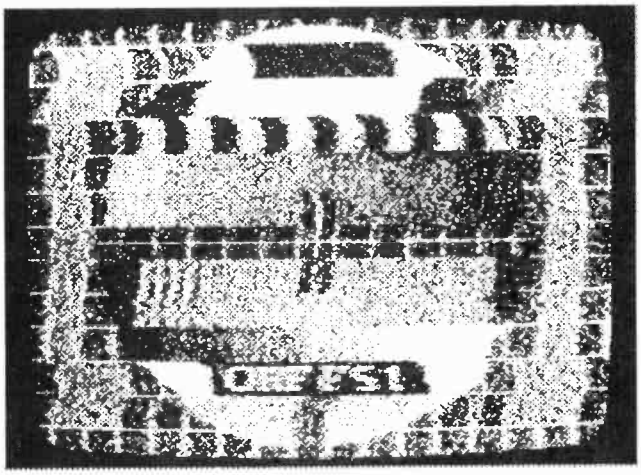
Fig. 4: Effect of various signal / noise ratios on an AM TV picture



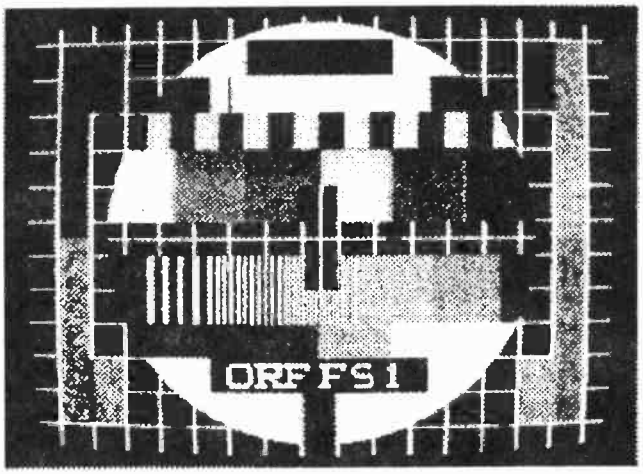
C / N = 3 dB: Picture barely discernible



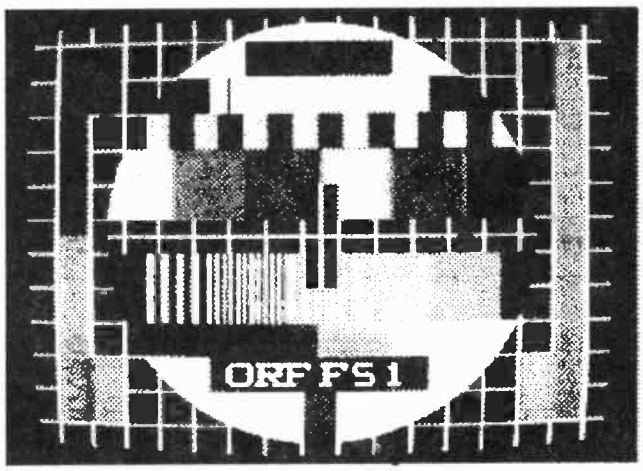
C / N = 20 dB: Details recognizable; Presence of colour



C / N = 10 dB: Picture contaminated by noise



C / N = 30 dB: Noise just discernible



C / N = 40 dB: Picture noise-free (in commercial practice a picture is considered noise-free at 60 dB)

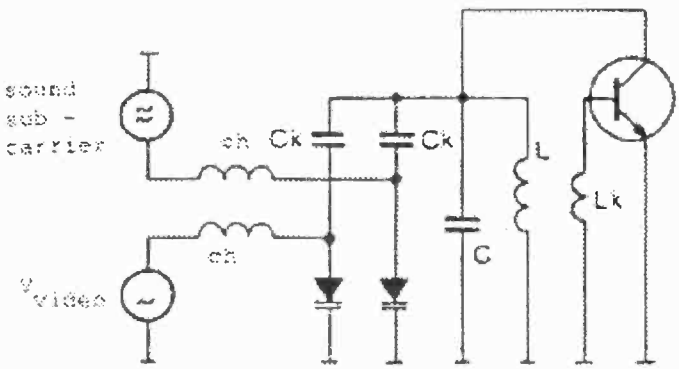


Fig. 5: Circuit diagram of oscillator FM modulated by both sound and vision

A received picture which is plagued with noise from a contact station using 10 W of power would have to request an increase in power of up to 10 KW before the picture could be considered as noise free.

1.3 High Frequency ATV Interface at 70 cm and how to find a Solution

When the 70 cm band is overcrowded an ATV contact can suffer picture degradations ranging from light patterning to drop-outs of both sound and vision. The only answer really is to move to the GHz bands. Even here, there are some obstacles in the way of approved reception.

The path loss

$$A_o = 32.5 + 20 \log.d\ f\ (dB)$$

Where A_o is the free space attenuation, d is the distance in km and f is the frequency in Mhz. A_o at 23 cm is some 9 dB more than at 70 cm and further 5 dB is added at 13 cm. The additional loss due to earth-obstacle interference is also considerable.

Cable loss

The cable loss also climbs greatly as the frequency increases. Taking the well known RG-213 as an example, the cable losses at 23 cm increase by 14 dB at 13 cm, all for a 100 m length of cable. These losses cannot be compensated by an increase in the transmitted power as this is not normally an option for radio amateurs working at SHF.

The only answer is to use a suitable transmission form which can compensate for all losses, and that is frequency modulation.

2. FREQUENCY MODULATED ATV

The modulation mode FM has been successfully employed in TV communication, broadcast TV and by direct broadcast television (DBS) satellite systems. The technology is simple enough for its adoption by radio amateurs.

2.1 FM ATV Transmitters and Receivers

The picture modulation can, in the simplest manner, be produced by impressing the video signal on to a vacation diode controlling the oscillator frequency. The audio signal is FM modulated on a subcarrier (5.5 Mhz for example) and then fed to another varicap also controlling the oscillator frequency as indicated in **fig. 5**.(previous page) On account of large deviation of the video signal, crystal oscillators are not suitable. Stable, free running oscillators are used at low frequency (e.g. 123 Mhz) and multiplied or translated up to the final frequency.

A suitable transmitter driver is described in ref. (3).

At the present time FM ATV are using a preferred frequency of 123 Mhz in order that available SHF mixers and amplifiers can be used. Such transverters are designed for the conversion of CW/SSB/FM signals from two meters up to SHF. They are inherently capable of handling wide band FM ATV signals. The FM ATV signals are generated at somewhat below 144 Mhz in order not to interfere with local receivers working on two meters. Transmitter circuits using PLL ICs working directly at SHF without the need for up-conversion, are in the course of preparation (ref. 8).

Angle modulation, i.e. frequency or phase modulation, produces a theoretically infinite number of side band frequencies which are symmetrically disposed about the radio frequency carrier. They occur at frequency intervals, about the carrier, equal to the instantaneous frequency f_s of the modulating frequency (picture and sound). The peak deviation Δf about the carrier is determined by the amplitude of the modulating signal.

The total bandwidth B of an FM transmission is given by:

$$B = 2(\Delta f_T + f_s)Hz$$

In practice the bandwidth is not infinite, as the outer signal frequencies about the carrier do not contain much power. In this application, the outer side frequencies whose amplitudes are less than 10% of the unmodulated carrier are of no importance but, naturally, the fidelity requirements set the limit to the bandwidth.

The signal to noise ratio depends upon the modulation index M.

$$M = \frac{\Delta f_T}{f_s}$$

The effect of this important FM parameter upon the bandwidth, as well as the amplitude of the carrier and side frequencies, is shown in **fig. 6.**

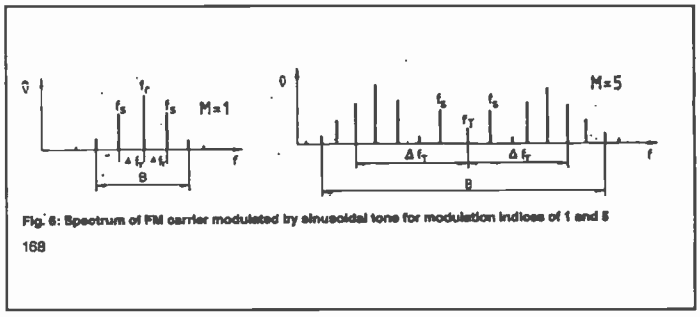


Fig. 6: Spectrum of FM carrier modulated by sinusoidal tone for modulation indices of 1 and 5

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The highest signal frequency f_s used in ATV is 5.5 Mhz which is that of the sound subcarrier. The modulation index M normally used lies between 0.5 and 1. Thus the bandwidth is approx. 16 to 22 Mhz and it can be appreciated that it would be very uneconomic in terms of channel bandwidth to use this mode below the SHF bands.

The FM receiver part of the system is more complicated than the transmitter and something more than just a frequency translator is required. The HF and IF sections of the receiver must be designed to pass sufficient of the FM TV bandwidth (and no more) to allow an acceptable picture quality. The FM demodulator must also be able to function at large bandwidths.

At first, the IF amplifiers and FM demodulators worked at 70 Mhz which is an international IF used in satellite communications. The signal frequency at SHF (e.g. 1.3, 2.3, 10 Ghz) is translated down to the IF by means of a down-converter. In references (4) and (5), suitable IF amplifiers are described. A modified version of that described in (5) is featured in a serial article in the magazine 'TV - Amateur'. The 70 Mhz IF has the disadvantage that the image channel lies very close to that of the input signal. In order to avoid the extra noise content resulting from this, a complicated bandpass filter, which has a stop band able to reject the image frequency, must be used at the received frequency. Until now, a self-constructed LC acceptor filter was used to select the IF signal (**fig. 7**). (next page)

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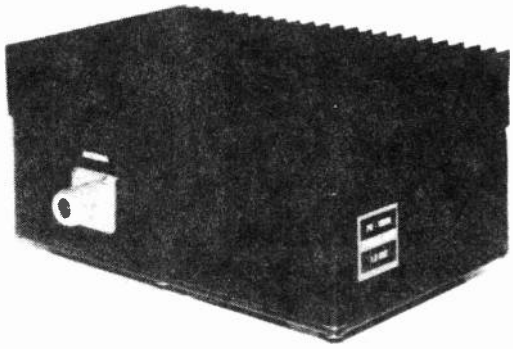

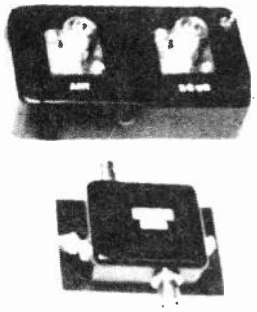

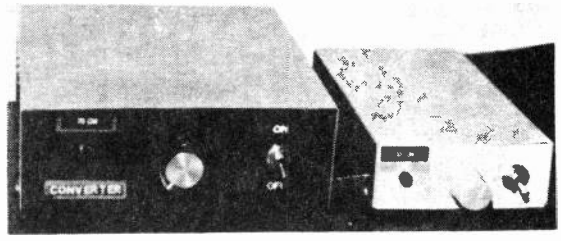

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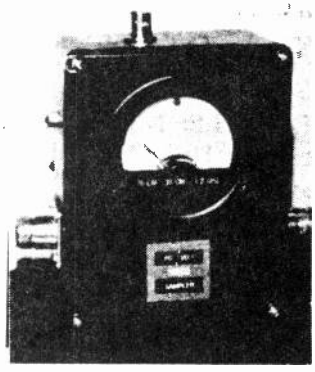

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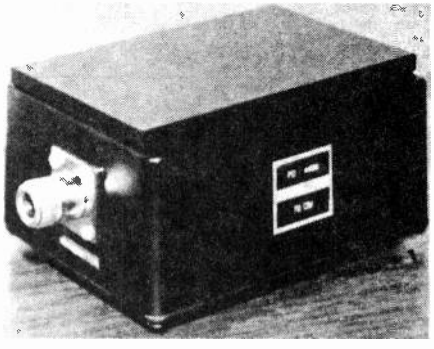

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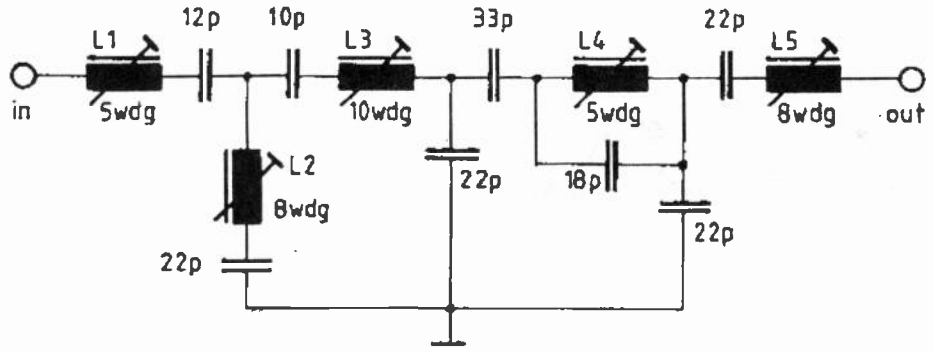

Fig. 7 :
70 MHz LC bandpass filter:
Coil dia. 5 mm, core: white

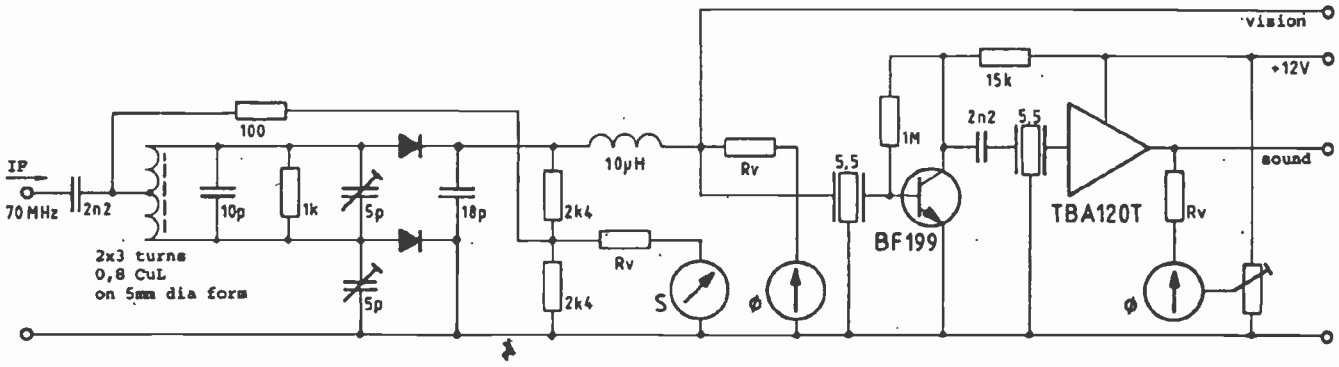

Fig. 10: FM TV diode discriminator showing vision and sound demodulators

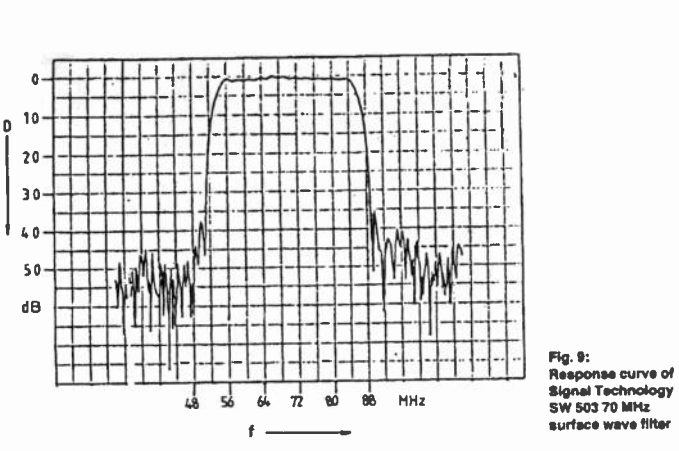

Fig. 9:
Response curve of Signal Technology SW 503 70 MHz surface wave filter

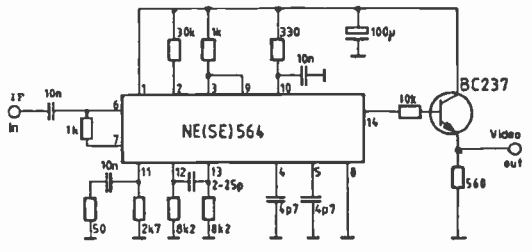

Fig. 11:
Integrated circuit PLL demodulator using NE 564

The pass band flanks are fairly steep in order that adjacent channel narrow band signals (CW, SSB, FM speech) do not interfere with the reception of FM ATV signals. A sweep generator is required for alignment. A pre-aligned, 70 Mhz mid-frequency LC bandpass filter is now available from Texscan with bandwidths of 16 to 30 Mhz (designated e.g. XBM 70/25-1). Its use obviates the requirement for a sweep generator.

In the meantime, surface wave resonators have become available for the 70 Mhz band. They are distinguished by their steep flanks and the stop-band rejection (i.e. outside the bandpass range) is better than 40 dB.

The outstanding pass band characteristics (**fig. 9**) must, however, be obtained at the expense of a very high insertion loss, about 27 dB, but the IF amplifier in (5) possesses enough gain reserve (and a good noise figure) in order to compensate for this undesirable characteristic.

Industry has now moved away from the 70 Mhz IF band, on account of the image frequency problem to a new frequency of 479.5 Mhz. Surface wave filters possessing the same specifications of those at 70 Mhz are available, for example the Y 6950 (Siemens) and the SW 504 (Signal Technology). Also FM ATV equipment should be using these new IF components and complete integrated IF amplifiers incorporating them should be available soon.

On account of the high price and the difficulty in obtaining these new 479.5 Mhz components, the use of the 70 Mhz IF technology is still justified.

Particular attention must be devoted to the FM demodulator which is largely responsible for a distortion free FM TV communication link.

At the start, experiments were made using a diode discriminator and in (6) one of these is described. The diode discriminator shown in **fig. 10** requires a very high IF input level. It is also very difficult to effect the required bandwidth using a simple tuned circuit in the discriminator.

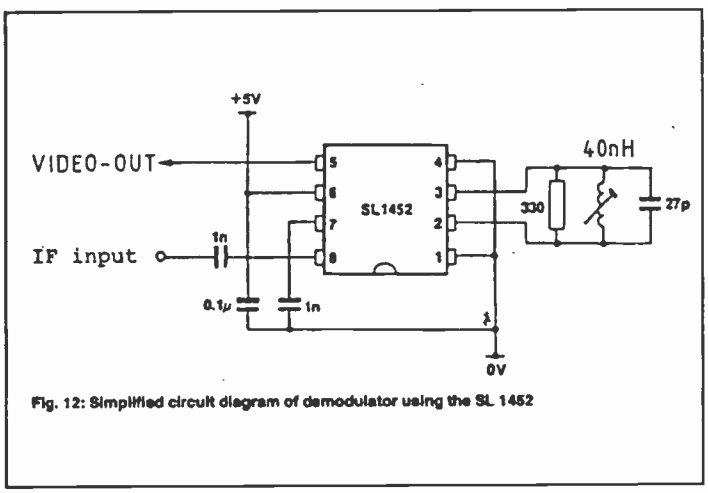

Fig. 12: Simplified circuit diagram of demodulator using the SL 1452

Better results can be obtained with the PLL demodulator using the IC NE 564 (**fig. 11**). It has a 5 dB (approx.) better signal/noise ratio with only a very weak input signal.

In spite of the outstanding characteristics of the NE 564, there are a few disadvantages which must also be taken into account. The maximum specified working frequency is only 50 Mhz and therefore some examples working at 70 Mhz are unstable. The bandwidth, also, is only 22 Mhz causing broad-band TV signals to display pictures having ragged edges. The internal signal/noise (vision) amounts to only 40 dB and the received picture is slightly noisy even under the best reception conditions. Commercial TV reproduction demands a signal/noise ratio of about 60 dB.

Finally, the NE 564, in spite of its internal limiter, can be easily overloaded. An external limiter such as the M10116 is able to help in this respect.

For the new IF band at 479.5 Mhz a better integrated circuit demodulator is already available. It is the Plessey quadrature demodulator SL 1452 (**fig. 12**).

The bandwidth can be altered according to requirements by changing the value of the external damping resistor across the tuned circuit. The vision frequency signal/noise ratio is 70 dB thereby exceeding even commercial requirements.

The author has had no experience of the NEC $_{\mu}$PC 1477 C 479.5 Mhz PLL demodulator.

At the FM receiver output the vision and the speech signals are available. The TV receiver must have a monitor input. Older TV sets can normally be easily provided with a direct input. As an alternative, both vision and speech may be caused to modulate a UHF oscillator and the modulator fed to the antenna input of the set. A suitable modulator is e. g. the Siemens IC TDA 5660 P (9).

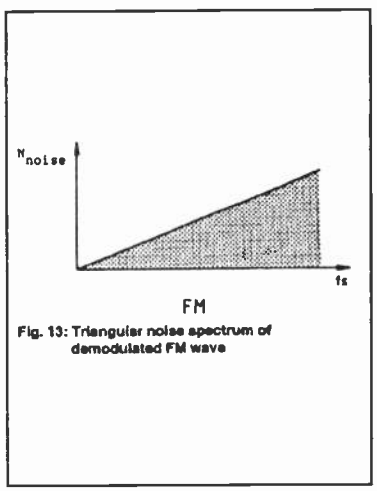

Fig. 13: Triangular noise spectrum of demodulated FM wave

2.2 Improvement of FM TV Video Signal/Noise Ratio

The demodulation of an FM signal reveals an inherent undesirable effect, the linear increase in the noise signal as the modulation frequency increases (see **fig. 13**). This is known as the 'FM triangular noise', the AM noise spectrum, on the other hand, is flat (**fig. 3**).

As the amplitudes of the higher frequency video signals from a video camera tend to be lower, the result of this FM triangular noise is a noisy picture. The universal answer to this phenomena is to emphasize the higher modulation frequencies linearly with frequency thus compensating for the noise and tending to equalize the signal to noise ratio across the band. This process is known as pre-emphasis (PE) and must be matched at the receiver by a network which effectively attenuates the high modulating frequencies thus restoring the relative amplitudes to those of the original from the camera. This network at the receiver is known as the de-emphasis (DE) network and is shown together with the pre-emphasis network in **fig. 16.**

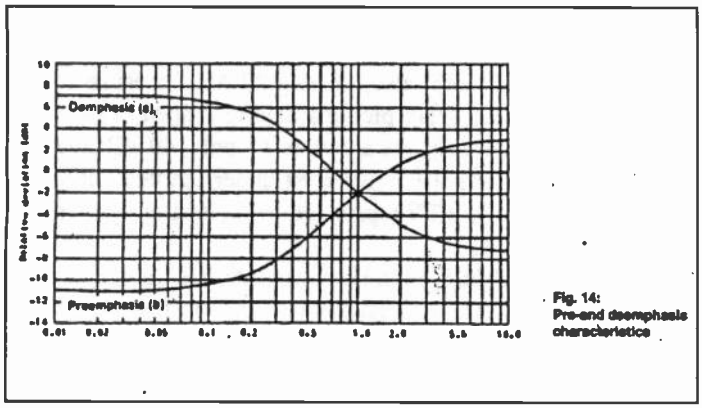

Fig. 14: Pre-and deemphasis characteristics

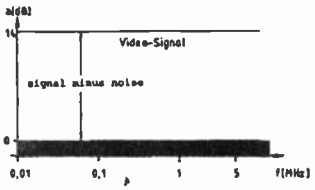

Fig. 15: Result of Emphasis on received video frequency output

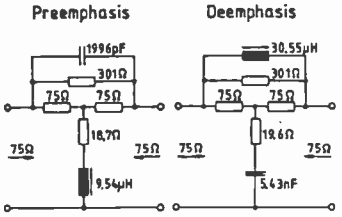

Fig. 16: Pre- and de-emphasis networks

Fig. 17: Picture without emphasis

Fig. 18: Picture under same conditions but with emphasis

The form of the characteristics are shown in **fig. 14**. The networks are of a simple nature and are installed in the video frequency circuits of both transmitter and receiver.

Figures 17 and 18 show the effects of including these networks on a marginal link resulting in a noisy picture. Following inclusion of the PE and DE networks the picture quality is noticeably improved. It is quite a simple means of improving the signal to noise by some 14 dB and thereby picture quality.

3. AM AND FM TV COMPARED

Both modes of transmission require signals at the receiver which exceed the respective threshold levels. FM cannot work wonders and make good pictures from noisy links when the signal lies under the FM threshold (T_{FM}).

With FM, an increasing system gain relative to AM is obtained as the modulation index M is increased above 0.5. The improvement is brought about because the frequency deviation of the transmitted FM signal is increasing larger than the thermal (phase) noise of the link as M is increased. This applies to all components of the modulating signal f_s comprising both vision and sound.

According to ref. (7) the system gain of FM over AM is: -

$$S = 10 \log 3(M / m)^2 \quad (dB)$$

Where m is the modulation factor of the AM TV signal. S - System gain. The AM transmission must limit the picture modulation to a maximum of 80% in order that the speed and color are not submerged due to subcarrier compression. The modulation factor m is thus 0.8. **Fig. 19** shows the curve of system gain S versus modulation index M.

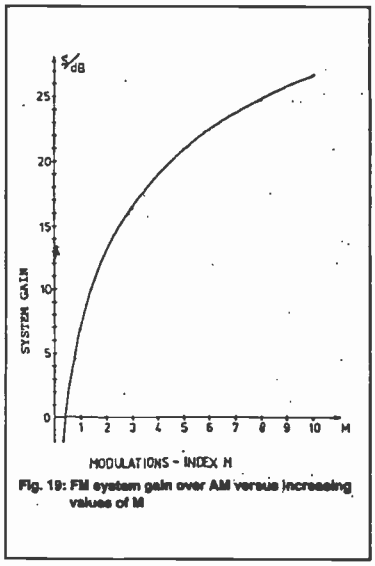

Fig. 19: FM system gain over AM versus increasing values of M

At a modulation index of M = 1, the bandwidth is about 22 Mhz and the FM gain (over AM) is 6.7 dB. This should be a satisfactory working condition for the SHF bands. The satellite TV bands, however, use a somewhat larger bandwidth of 27 Mhz. At a modulation index of M = 5 the bandwidth would be an enormous 66 Mhz at an FM gain of 20.6 dB. It is clear that gain is purchased at the expense of bandwidth in an FM system. This bandwidth is not, however, economical in terms of frequency, and in any case, the video signal could not be demodulated using means available to the radio amateur.

The use of an emphasized signal increases the gain by 14 dB but by the use of a suitable demodulator a further 5 dB may be obtained.

The overall gain of FM over AM systems in terms of vision signal to noise ratio is 20 to 25 dB.

The change from the 70 cm band to the 1.3 or 2.3 GHz SHF bands, with their higher path loss, has been more than justified. This is conditioned, however, by the fact that a clear path between the link partners is even more necessary at SHF and no obstacles such as houses, hills, woods, etc. can be tolerated.

The theory was borne out by the experience of a group using the ATV transponder DB ∅ DN situated on the top of Tegelberg.

The FM threshold in the 2.3 GHz band receiver lies about 10 dB above the system noise. Under this threshold, the received pictures are contaminated with noise but color is available as soon as the picture becomes visible, see **fig. 20**. In the region of the FM threshold the picture improves dramatically from noisy to noise free (**fig. 21**). From 3 to 6 dB above the FM threshold, the picture cannot be improved by system change, such as increase in Tx power, better Rx noise figures etc., as the picture is already noise-free (**fig 22**).

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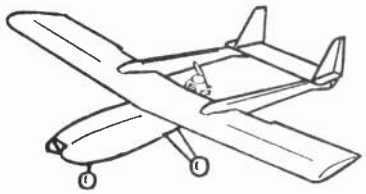

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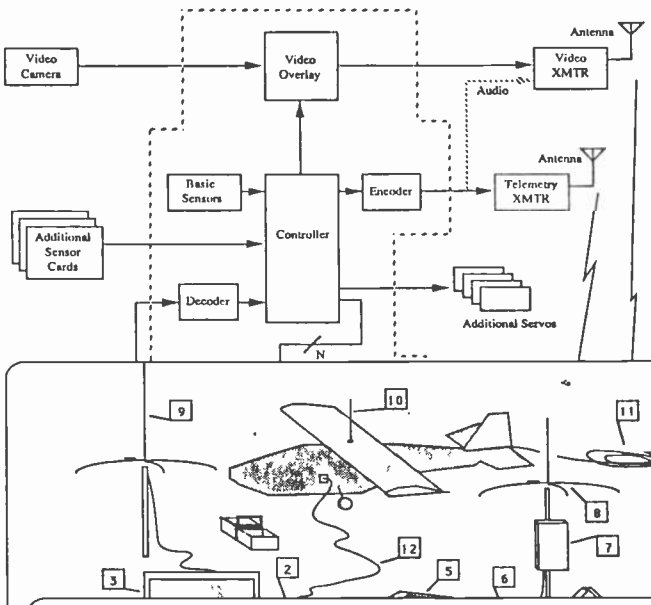

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Fig. 20: FM ATV 2.3 GHz transmission at 150 mW. Received under the receiver FM threshold (T_{FM}). Noisy but colour present

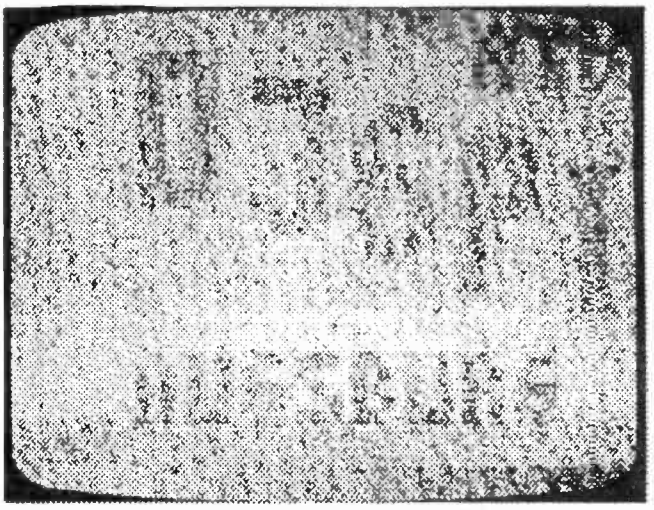

Fig. 23: AM ATV 70 MHz transmission, Po = 1 W, received C / N ≈ 10 dB, contaminated with noise, no colour

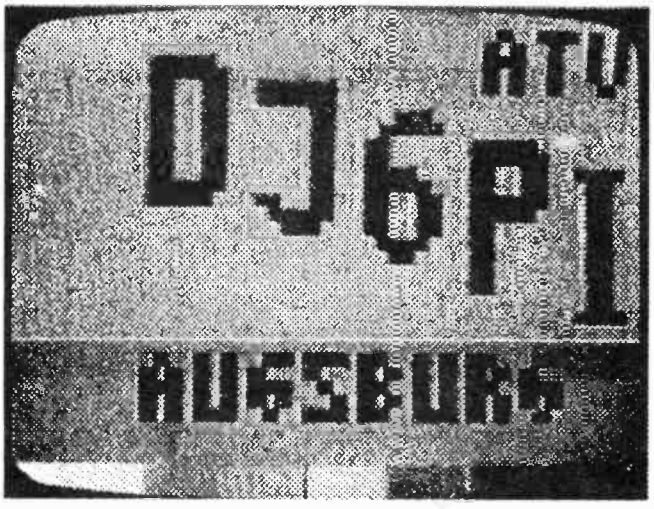

Fig. 21: As fig. 20 but Ps = 800 mW. Reception at T_{FM}, slight noise but colour present

Fig. 24: As fig. 23, but Po = 10 W, C / N ≈ 20 dB, noisy but colour present

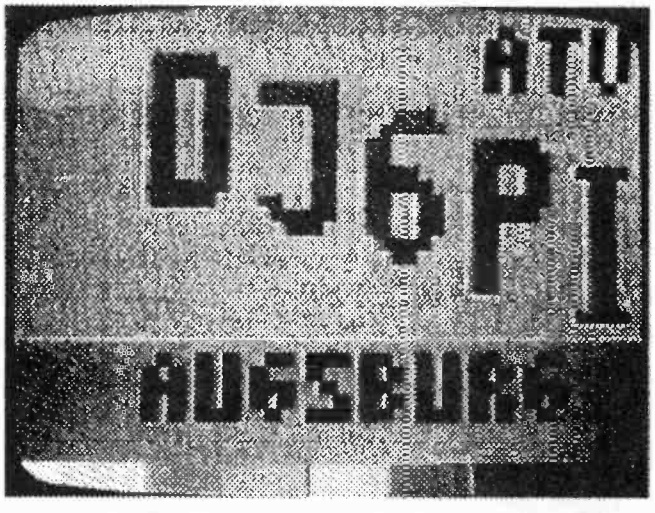

Fig. 22: As fig. 20, but Po = 1.5 W: Noise-free with colour

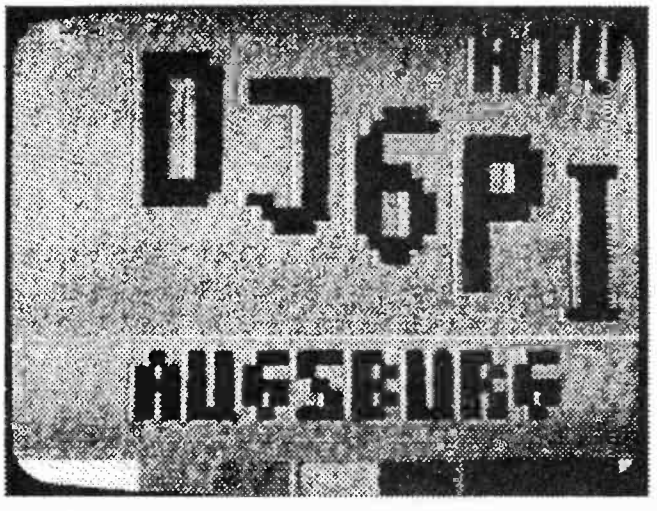

Fig. 25: As fig. 23, but Po = 70 W, C / N ≈ 30 dB, slight noise, colour present

Finally, to summarize:
FM ATV has the following advantages over AM TV.

☞20 to 25 dB better signal/noise ratio by transmitters of equal strengths. This means, conversely, that the TV sender power using FM can be 20 to 25 dB lower for the same received picture quality.

☞Simpler transmitter construction
☞All stages in the transmitter may be driven at their full permissible power ratings.

The following disadvantages must be recorded.
☞A special receiver must be built for FM TV.
☞Higher bandwidth is required.

The advantages are overwhelming for the use of an FM system and those who are tired of receiving QRM plagued pictures on the 70 Mhz band should switch to FM ATV in the SHF bands.

The pictures shown in **figs. 20 - 25** were transmitted over the 2.3 GHz band using FM ATV and over the 70 cm band using AM ATV. For a better comparison, antenna gains and feeder losses were compensated for in the final analysis in order that the transmission quality could be judged for transmitters using the given powers.

4. REFERENCES

(1)G. Sattler, DJ 4 LB, Baugruppen fur einen ATV-/Sender nach, dem ZF-Verfahren, UKW-Berichte 12 (1972 Hefte 3 und 4. Not available in English.
(2)H. Venhaus, DC 6 MR, Ein ATV-Sender fur das 70-cm Band auf einer Platine, TV-Amateur 3 / 1974, Pages 9 - 29.
(3)W. Ratz, DL 6 KA, Ein FM-ATV-Steuersender, TV-Amateur 50 / 1983, Pages 18 - 23.
(4)K. Hirschelmann, DJ 7 OO, Eine Amateurfunkfernsehstation im 10-GHz-Band, TV-Amateur 45 / 1982, Pages 20 - 29.
(5)E. Zimmermann, DD 9 QP, Universeller ZF-Verstarker fur, FM-ATV-Anwendungen, TV-Amateur 54 / 1984, Pages 18 - 23.
(6)H. Venhaus, DC 6 MR, FM-ATV, TV-Amateur 43 / 1981, Pages 14 - 21.
(7)R. Mausl, DL 9 YZ, Modulationsverfahren in der Nachrichtentechnik, Huthig-Verlag 1981.
(8)G. Sattler, DJ 4 LB, SDA 3202 - A new PLLIC for up to 1.5 GHz, VHF Communications Vol. 18, Ed. 1 / 1986, Pages 18 - 22.
(9)Siemens: TDA 5660 p - A Versatile Modulator Circuit for TV, Video and Sound Signals in the Range of 48 to 860 Mhz, VHF Communications Vol. 17, Ed. 2 / 1985, Pages 125 - 127.
(10)R. Polz, DC 2 CS: IF Amplifier and Demodulator for Wideband FM, VHF Communications Vol. 18, Ed. 3 / 1986, Pages 130 - 134.

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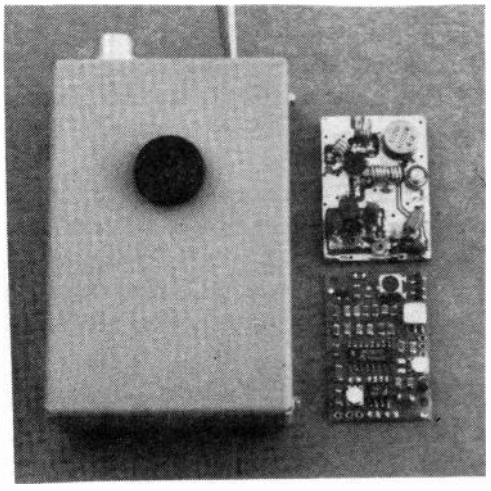


MICROTEK ATVM-70 Mini ATV Xmtr Board.....$129

Wired and tested board is only 1.0 x 1.3 inches! See article in July 91 73 Magazine page 9. Great for building a Handie-Lookie, R/C models, robots, demos, check out downconverters or short links. Nominal output 80 mw. Capable of driving the PA5 for higher power. Blanking pedestal pot, but no sync stretching. Requires 7.0 minimum to 10.0 Vdc maximum at <100 ma (9 volt battery). Weight <1 oz. Snow free line of sight DX is 1/4 mile dipole to dipole or up to 5 miles with KLM 440-16X's at both ends. Small size is due to the use of a SAW oscillator module that eliminates multiplier stages, but makes it available only on 434.0 MHz. Check your areas frequency coordination & usage before ordering.

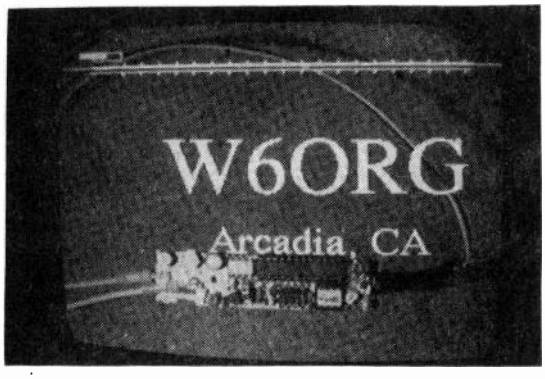
NEW MSC-2 companion Sound Board.....$59

Has inputs for mic or line level audio. Same size as the mini transmitter board. Requires 7 to 10 Vdc at <20 ma.

Microvideo B & W CCD mini camera.....$229

Just the thing to complete your Handie-Lookie. The whole thing can run off 9V batteries! Size is only 3 .125 x 2 x .875 and accepts 7 to 15 Vdc at 85 ma. 2 lux sensitivity and 240 line resolution. Standard 1 V video out through a RCA jack atop the shielded case.

YOU ASKED FOR A SUPERIMPOSED CALL IDER



NEW HIGH TECHNOLOGY FLIGHT GVID IDer.$175

This small .8 x 3.15" board can overlay your call, location and any other information in white letters on any clean video source such as from a camera, VCR, TVRO or weather radar. This is not for repeater video with less than P4 signals. The information is held in a PROM, so no loss when power fails. Ideal for putting in the video line from NASA Select or weather radar to meet the legal requirement and still not interrupt with a full screen video id source just when the best picture comes on. Or it can relieve you of remembering to ID at the home station or at public service events. There is an automatic 5 minute timer that turns it on for 10 seconds or run continuous. Also has one switch and one analog telemetry input. Req. 5 Vdc @ 120 ma. Small enough to be put inside most chassis and connect between video jack and transmitter board.

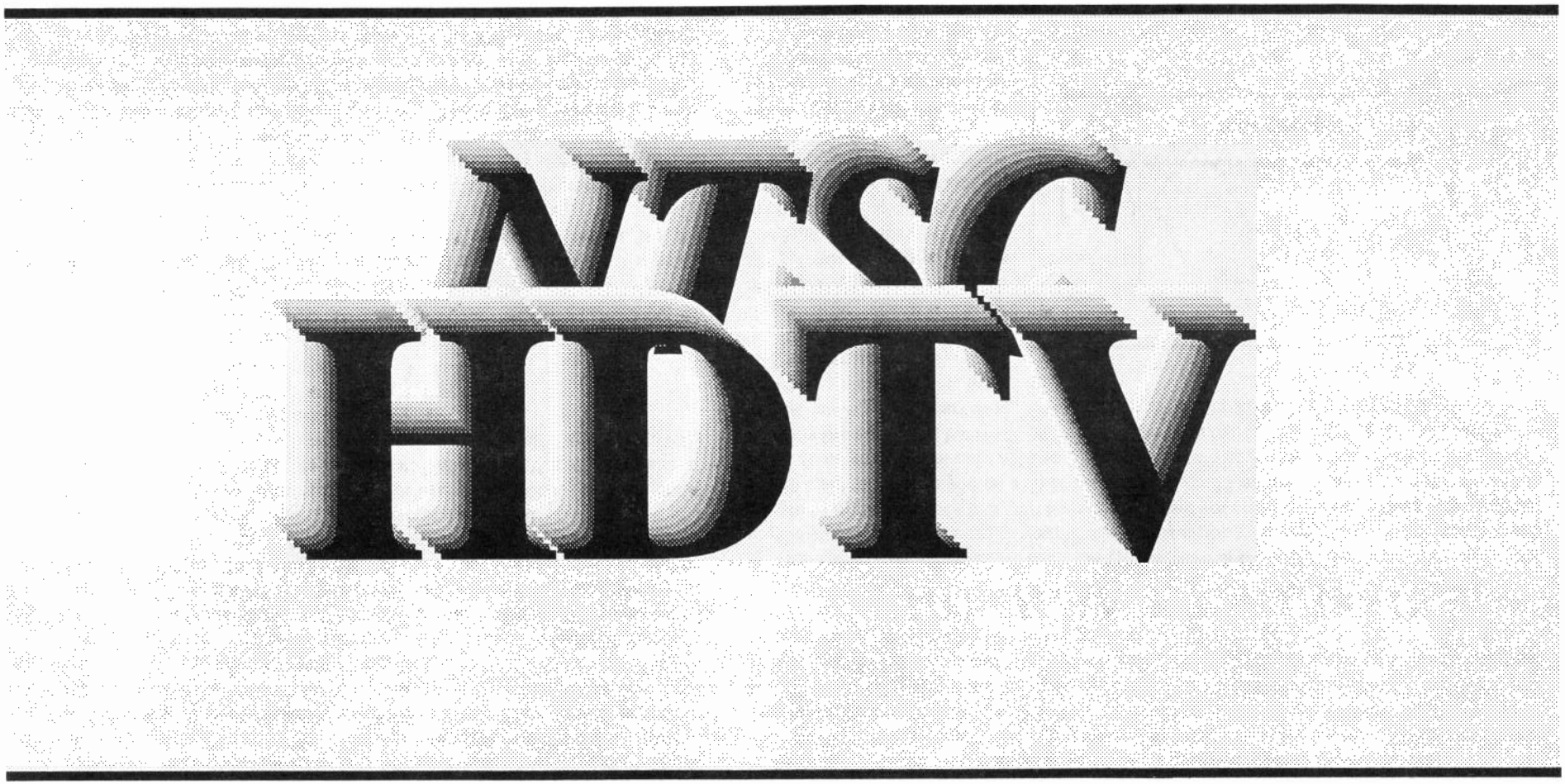
Hams, call or write now for our 1992 Catalog. We are your one stop for all your ATV needs for the 400, 900 and 1200 MHz amateur bands. Value plus quality from 30 years in ATV. We are always looking for and checking out new products from small manufacturers that pass our strict standards and add to our catalog like the two above.

Transmitting equipment sold only to licensed radio amateurs verified in the Callbook or send copy of new license. 1/92

NOW YOU CAN SEE THESE DEALERS FOR THE TC70-1d AND TUNEABLE DOWNCONVERTERS:

A-Tech	Bill or Tony	2210 Magnolia Blvd	Burbank	CA	91506	(818) 845-9203
Jun's	Raul	5563 Sepulveda Bl.	Culver City	CA	90230	(213) 390-8003
Henry Radio	Paul	2050 S. Bundy Dr	Los Angeles	CA	90025	(213) 820-1234
The Base Station	Art	1839 East ST.	Concord	CA	94520	(415) 685-7388
IRC	Juan	5001 NW 72nd Av	Miami	FL	33166	(305) 594-4313
Honolulu Electronics	Richard	819 Keeaumoku St	Honolulu	HI	96814	(808) 949-5564
Stewart Electronics	Dale	1411-C 1st Capital Dr.	St. Charles	MO	63303	(314) 949-8890
Oklahoma Comm Center	Glen	9500 Cedar Lake Av	Oklahoma City	OK	73114	(800) 765-4267

According to the FCC, every piece of TV equipment in the US will be obsolete in the year 2008. To make sure, they have made it mandatory!



DON'T PANIC!

In case you havn't been paying attention, your TV set is about to change. Change in a way that makes the entire broadcast/TV/production/film/cable system an antique.

The buzzword today is HDTV. Not Hot Dog TV, but High Definition TV. I like to call it High Dollar TV! Stay tuned and find out why!

IMPORTANT STUFF

If you are not familiar with the technical side of TV let me explain briefly what we have today. NTSC, which stands for National Television System Committee, is the name we call our TV system. The TV systems of the world are not the same. Japan, Canada, the US and most of our allies use the NTSC system which is loosely based upon 60 fields per second and 525 lines per frame (262.5 lines per field, 2 fields to a frame). TV before World War II was more complicated with lots of different scanning rates and systems which had the scan lines vertical as well as systems which were horizontal. Scanning discs varied the number of lines from 28 to just over 200. Electronic scanning ran the gamut from 150 lines to over 500 lines. The FCC decided, with input from the young broadcast industry, then mostly RCA, GE, Westinghouse, Dumont, CBS and a few others that the US system would be based on 525 lines in a 2:1 interlace (every line is interlaced, like folding your hands together, fingers alternating) with 525 lines. This was later changed slightly to accommodate color with 59.94 fields per second and from 15,750 to 15,734 horizontal lines per second. This is 29.96 frames per second.

The aspect ratio of our pictures is 4:3. For every four inches (pick any scale) of horizontal we have three inches of vertical. Thus a 5" TV is 4" wide and 3" high and 5" diagonally. Sales took over and we now measure all TV sets diagonally because it makes the picture sound bigger!

THE MOVIES!

Now enter Hollywood (and other movie centers). Most of the movies you see are shot in one of three popular film sizes, 35mm, 35mm cinemascope or Panavision, or 70mm. When you look at these pictures, the width and height are not the same as your home TV. The width is much more. If you tried to squeeze some of the desert scenes from Lawrence of Arabia, onto a TV screen, half the army would be missing.

To change the aspect ratio, a technique called pan and scan is employed. When the film is copied to video tape, each scene is transferred by itself. A colorist or film editor, adjusts the TV camera coverage of the film image to capture what he feels is the important part, and you miss the rest. The Hollywood moguls, Steven Spielberg and friends think this is not such a good idea and insist that some of their movies be put in *Letterbox* form, which is when you get to see the entire film image, plus the black band on top and bottom of the TV screen. The problem is trying to squeeze the 1.77 or 16:9 ratio picture into the 4:3 ratio TV screen.

This is almost as much controversy as coloring old black and white films. (Turn off the color on your set and you have glorious black and white again if you don't like the color in Casablanca.)

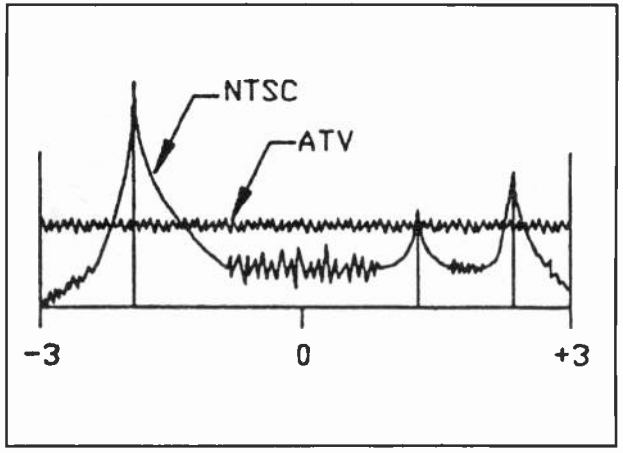
For a decade or more, there has been discussion about how to make the two more compatible. Not to get into the industry talk a lot, but there has been a lot of effort to try and come up with a compatible world side system which would be a compromise between all the various aspect ratios and all the various scanning systems.

THE PLOT THICKENS

Not Alan Thicke! Computers! More and more of your TV programming starts in a computer. Computer images, computer special effects, digital graphics, digital everything. This places a problem in the middle of our ***analog*** world. With everything going digital and computer, even your phone, analog was reasoned as not the way to go. It was a race between HDTV and Digital TV. Japan, first on the scene with HDTV went with an analog system. There are analog (super NTSC, HI-8) HDTV systems in Japan right now. Analog had the potential for being a world system if the 50 Hz people and 60 Hz people had been able to compromise on a common vertical rate frequency, say 75 Hz! Too much politics.

PHONE AND TWO WAY

The Phone company wants to enter the TV business. Specifically, the Phone company wants to give you a video dial tone, be your Cable company, be your ***everything in communications*** company. Big AT&T, Ma Bell, and their cousins want your money for everything they can think of and want to get it to you on a fiber optic link. Over 35 million miles of fiber are already in place. (And you thought only MCI and Sprint were on fiber!) They want to deliver TV to you. Not only Broadcast TV, but HBO, MTV and all the other stuff. Plus shopping catalogs, interactive games, news, data, marketing, sales pitches, anything to keep your phone (soon to be a "communicator" off the hook and running up the bill.



Two way radio is also big. Every little business, hauler truck, and big business like UPS is a potential customer for folks like Motorola. Billions of dollars in potential RF spectrum if only we could get the TV stations out of the frequency business. Now you have to have 6 UHF channels or 3 VHF channels to have one on-air TV station. This is because of technical *taboos*.

A technical taboo is, you can't have channels 2 and 3 or 19 and 20 in the same city because our TV sets would suffer interference. Likewise because of intermod products, IF intermod and a lot of other stuff, you can't have a channel 21, 22, 23, 24, 25 if you have channel 20, etc.

NTSC / HDTV

MARRIAGE

But what if you could have a system where all the TV stations are on UHF (so the VHF frequencies could be sold over and over by Motorola and friends) and if you could have a TV station on every other channel, so you could compress the upper UHF TV band into the lower UHF band? That would leave room for zillions of Cellular Phones and new Cellular data and computer communication systems! Big money talks and this is the biggest since Ross Perot for President! (Sure he can deal with Congress, all he has to do is follow what the lobbyists do....pay them off, but he can afford it!)

By using a DIGITAL HDTV system, it will be possible to have film compatible TV, high quality video (some say better than the best NTSC). Not only that, we can free up lots of spectrum space for new users *(Note: Hams need not apply)* to make Zillions of $$$ to help the economy.

In the process, everyone will have to buy a new digital TV set (part of your communicator, "On-Screen number one.") Broadcasters will have to have all new equipment (up to $5 million each or more) and we consumers will gladly pay the bill for the entire $50,000,000,000 change over! A drop in the bucket compared to the National Debt!

More jobs, more sales, more computer chips for Silicon Valley...Gold for everyone in the business of communications, presentations, delivery, programming. Such a deal can't be all bad can it?

Just think of all the cast off equipment we hams can inherit! Ham TV will never be the same with full semi loads of video dumped in our hands....or maybe.

And now...

The Rest of the Story

(Thanks, Paul Harvey)

All that glitters is not gold!

All 1873 US TV stations will have to build a new TV station!

STAR DATE 10-10-93

COMARK

Corporate Headquarters
P.O. Box 808
Rt. 309 and Advance Lane
Colmar, Pennsylvania 18915
(215) 822-0777
Fax (215) 822-9129 Telex 845075

DIGITAL HDTV AND TV TRANSMITTERS

Nat S. Ostroff

The predominate R.F. encoding method for digital HDTV is multiple state Quadrature Amplitude Modulation. Several of the proponents use 16QAM. This modulation places information on the R.F. waveform in the form of amplitude and phase. In other words, the correct amplitude of the R.F. sine wave at a specific sample time will result in the recognition of a digital one or zero.

The 16 state represents 16 distinct amplitude and phase levels of the R.F. signal.

Thus, digital HDTV transmitters will have to be very linear in both phase and amplitude over the entire 6MHz TV channel bandwidth. The power levels referenced by digital HDTV are average power because the R.F. spectrum of the multi-state QAM signal looks like a modified noise spectrum.

While the average power levels are lower than NTSC, the peak power required for digital HDTV will be between 8db and 15db above the average. This large peak to average ratio will require TV transmitters to have a large linear dynamic range.

Further, the lower gain of the transmitting antenna caused by its broader vertical beam width, will require that the digital HDTV transmitter have peak power capabilities in the same order of magnitude as today's NTSC equipment.

The large peak to average ratios of the digital TV signal and the demand for linearity point strongly toward the adoption of Class AB or B type amplifiers. Such systems will use solid state for lower power applications, tetrodes and Klystrode/IOT for medium power and Klystrode/IOT for high power.

Klystrons running in Class A will be unacceptably inefficient. Given the random nature of the peaks in the digital TV signal, it will not be possible to pulse a klystron amplifier to improve efficiency. The MSDC/ESC type klystron will be more efficient than its less sophisticated brother, but will still require 3 to 5 times more energy to amplify the digital TV signal than a Klystrode/IOT based system. Furthermore, it is questionable with the klystrons of today, including MSDC/ESC klystrons, if they will have the power bandwidth to deliver the required peak power at any frequency in the 6MHz TV channel.

The current FCC agenda is as follows:

Test the HDTV systems in the lab during 1992.

Field tests of the systems in the spring of 1993 using over-the-air facilities in North Carolina.

Selection of an HDTV standard during 1993.

Issue licenses exclusively for two years to existing broadcast stations. After two years anyone can apply. If existing stations do not apply for a license during the two years, they may not get an HDTV license.

No new NTSC station licenses to be issued after HDTV licenses start being issued.

Stations have three to five years to build and begin operation after they receive their HDTV license.

Existing stations would transmit both NTSC and HDTV until NTSC is phased out in 2008 when no further NTSC transmissions will be allowed.

NOW WHAT?

There are currently 5 systems being tested. One is analog, similar to the system used in Japan, and 4 are digital. Of the four systems, there are two camps, the 787.5 line progressive scan system and the 1150 line 2:1 interlace system. There are minor difference to separate each of the two systems in each camp.

All four systems use what is called 16QAM. That stands for 16 level, Quadrature Amplitude Modulation. More of a mouthful than PAL or NTSC and wight up there with SECAM.

In the pages of ATVQ we have published several articles on NTSC, spectrum photos, diagrams and the like to show what NTSC is made of. But HDTV has no comparison. Its like comparing perfect order with perfect disorder. Chaos and fractal geometry buffs will love it!

The HDTV signal is totally unlike any other ever used! You cannot lock to sync because there is none! You cannot observe the carriers on a spectrum analyzer because there are none! The sender can completely control what you see since it is digital, just like pay satellite TV. The Phone company and anyone else can send it since its digital, so over-the-air systems are no longer necessary! If you have a klystron transmitter, you will have to buy a new one or suffer huge economy/efficiency losses. If you have a tetrode or its cousin Klystrode, transmitter or a solid state transmitter you are in luck.

HDTV / NTSC

Being digital, either you get it or you don't. No DX here! So far the best test has been 75 miles from Milwaukee to Glenview (I was there, I saw it). The receiver had an antenna 0200 feet above the ground, on a hill, with a low noise preamp and 4 Scientific Atlanta high gain Yagi antennas pointed at the transmitter, which was on a 1000 foot tower and lots of power (A 2.4 Megawatt signal was the normal transmitter level). How much power? We're not sure, we weren't allowed to see. If you read the claims, the "average" (not defined) power is 6 to 12 dB below the peak power (peak is defined). The pictures when good were very good, but when bad, were disgustingly ugly. But it was billed as an experiment, not a demonstration.1

This is all new stuff, all prototype equipment and few pieces exist. A lot of equipment has not even been invented yet! And there lies t h e r u b .

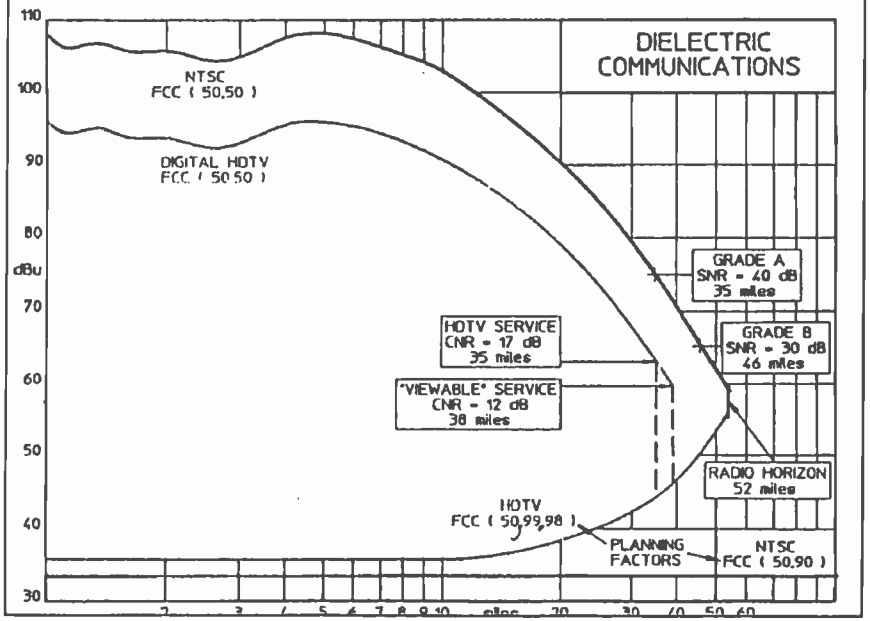
THE FCC

The FCC plan is during 1993, all four systems will be lab and field tested. The field testing is going to be in North Carolina. This is supposed to provide an "average" condition of buildings, multi-path, terrain (hills) and such. Late in 1993 the FCC, acting on the advice of the Advance Television Systems Committee, will choose a system for the USA.

Then in late 1993, the FCC will begin to accept applications from all 1873 existing stations for new HDTV stations. The FCC has not decided how to divvy up the frequencies. This may lead to problems. The HDTV channels have to fit in between the existing NTSC channels and not interfere with the NTSC signals. According to a SECRET study, 99% of the existing NTSC stations can be accommodated an HDTV UHF channel. A very few (less than 10) may have a VHF HDTV channel. Perhaps by lottery. Perhaps by auction (the big money gets the best channels (14-25) and the small money gets the worst (55-69) channels. Perhaps by technical consideration (...my antenna can work on a frequency up to 3 channels away so I want...)

PLANNING FACTORS CURVE		OPERATONAL PARAMETERS	
System independent factors	29 dBu (SS-WP3, Noise limited)	Channel	53
Uncompensated path and transmission equipment degradations	5 dB	Transmitter	60 kw
Receive antenna and front end VSWR = 2 across UHF band	2 dB	Antenna gain	20 (13 dB)
HDTV threshold CNR	17 ±1 dB	Beam tilt	.7°
"Viewable" picture threshold CNR	12 ±1 dB	Radio horizon	52 miles
Full time (99.98%) aural and visual service factor over FCC (50,50)	0 dB @ ≤ 10 miles 4.1 dB @ 20 miles 6.8 dB @ 30 miles 12.3 dB @ 40 miles 19.1 dB @ 50 miles	HAAT	1,350 feet
		Transmission line efficiency	62%
		ERP of NTSC	745 kw (Peak of sync)
		Avg. ERP of HDTV	-12 dB relative to NTSC

HDTV FIELD TEST ESTIMATED COVERAGE



But most will have to build a new antenna and transmitter (and studio). In the Major markets, like Chicago, this is not easy. Where do we put 14 new antennas and transmitters? Hancock and Sears are FULL. Channel 5 is moving from Hancock to Sears so one Hancock aperture will be open for 14 stations to fight over. Lets start the bidding at $20 Million.

Some may be able to use their antenna or parts of it. Commercial TV antennas are sometimes multiple antennas put together to act as one antenna, so split it apart, if it will work on the new channel. Things like BEAM TILT change with frequency, so you may not get the pattern you want or the cover and you want.

Most will need a new transmitter. Especially the VHF stations who will not be operating on UHF channels.

Some may not be able to afford the change at all and decide not to build an HDTV station.

The FCC says, in 2008, we will all turn off our NTSC systems and transmitters and transmit only on HDTV. In the meanwhile we are supposed to operate dual stations in simulcast, one HDTV and one NTSC.

CHART LEGENDS: FCC 50,50 means 50% of the receivers will get this amount of signal 50% of the time. Analog NTSC as we know fades out into more and more snow. Digital does not fade out, there is no SNOW margin. Either you get it or you don't! FCC 50,99.98 means 50 of the receivers will get a picture 99.98% of the time. Or 7 seconds per hour you may not get a picture. That 7 seconds is an average but could mean you don't see the last 7 seconds of the Superbowl (score 21/21 4th and goal), or who shot JR Ewing! This may not be acceptable. Zenith proposes a two level data system which has a small fade margin which loses detail during "fades" but there is still some kind of picture. Note HDTV signal does not get to the radio horizon in the test shown! Also FCC charts are +- 7dB error on NTSC .

HDTV >>>> NTSC

THE FLY IN THE OINTMENT

According to Nat Ostroff, president of Comark, which makes TV Transmitters, if all the transmitter manufacturers in the world only made HDTV transmitters, they might collectively make 200 per year. US demand for HDTV alone means 1800 transmitters (or more if stations buy dual redundant systems as many do). This means 10 years to get a transmitter if you are last in line.

OK, the manufacturers build new plants and make 600 a year, that's still three years if all the orders are in the door day one.

Where are you gonna put it? Depending on the city (market) you are in, you have different facilities. Consultants to the government are quick to say the broadcasters can simply put another antenna on the tower. This neglects the physics of tower loading and load limits. It also neglects stations which transmit from already crowded towers. If 10 stations share a tower, such as in San Francisco, you cannot add 10 more full size antennas. This means small low gain, thus low coverage HDTV antennas, or move to other towers. In New York and Chicago, most stations operate from tall buildings. In Chicago, 10 stations fill Sears and Hancock. There is no room for 10 more full power antennas. Maybe two can be added because there is one burned out channel 50 antenna on Sears and Channel 5 is moving from Hancock to Sears. Also, the 5 VHF stations will need UHF antennas which take up more room. Typically 15 to 25 feet of tower space for a VHF antenna and 50-80 feet for a UHF! Power Gains are typically single digit for VHF and range from 30 to 60 for UHF.

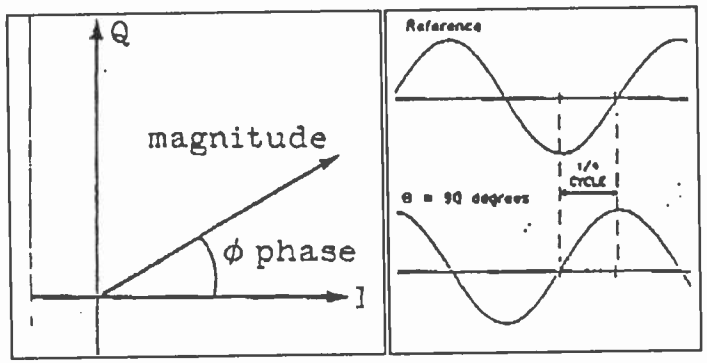
So some areas may be able to technically achieve HDTV quickly, others much longer. This does not include space for a new transmitter plant in your transmitter building (or rentals of up to $35/sq ft/month!) and rent on the new antenna space.

There are lots of other issues we in management are trying to find answers to solve. There have been a lot of joint station meetings and staff meetings to try and find solutions that are affordable. Estimates for HDTV operation range from a "low" of $2 Million, according to Jerry Perlman, President of Zenith, to over $20 Million by some stations.

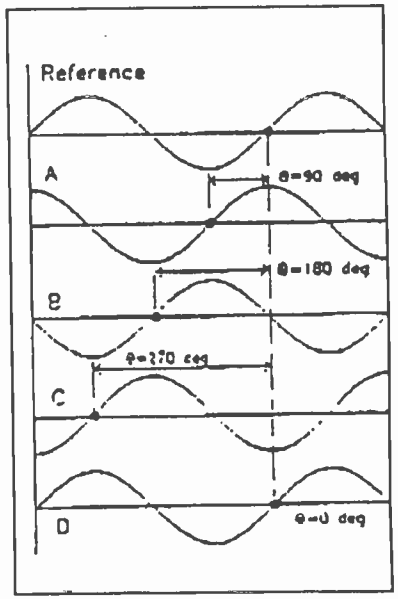
Now the technical stuff.

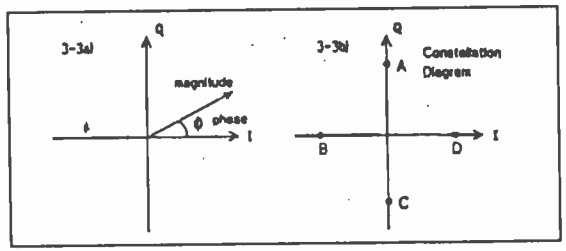
HDTV spectrum is unlike any other. It is a signal which on a spectrum analyzer looks like noise. The signal cannot be observed except through a special HDTV encoder which translates the digital information into audio and video information.

The signal itself, 16QAM is similar in concept to the NTSC color system in that it consists of multiple signals which are in quadrature to each other. Those familiar technically with NTSC or PAL color recognize that, in NTSC there are two signals, I and Q (for In-phase and Quadrature phase) which are modulated with a phase difference of 90 degrees. This, on a vector scope allows the I and Q axis to be seen dividing the vector scope into 4 quadrants. The phase of both is slightly rotated from a normal X-Y display (vertical and horizontal) to correspond to R-Y (red minus luminance) and B-Y (blue minus luminance) and green is made by taking the sum of R and B and subtracting them from Y which leaves G. This is an RGB system.



16 QAM generates four signals. Each is 90 degrees away from the others. This makes a reference signal, or reference phase, plus signal 2 which is 90 degrees shifted, signal 3 which is 180 degrees shifted and signal 4 which is 270 degrees shifted. Each signal compared to the reference phase produces a phase difference. This difference can be easily detected. A fourth signal can be added which is 360 degrees shifted, and while it is phase co-incident with the reference signal in the analog world, it is shifted by 1 cycle in the digital world. That 1 cycle shift can be measured as a time delay just as the others are also time delays.

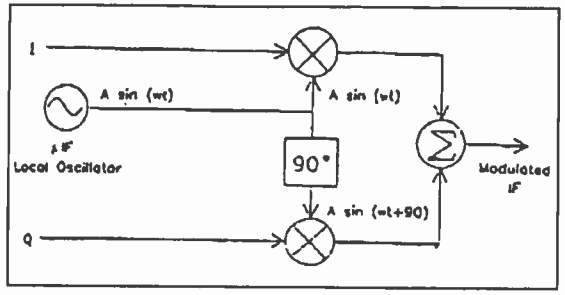


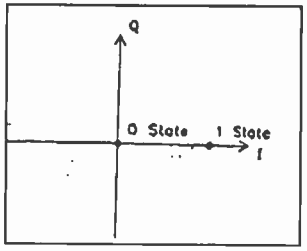


The amplitude of each of these signals can also be varied. In simple terms, if the signal is ON, it would be a ONE, and if it was off, it would be a ZERO. I can also change the phase (time) of each of the four signals so that it changes. This is phase modulation.

HDTV

Since I am using four discrete phase states (0, 90, 180, 270) I have four discrete times in which the signal can be present. If I have constant amplitude of all four signals, they my scope display will have four dots. Each dot will be at the same distance from the axis origin (amplitude) and each will be on one of the axis lines (representing 0, 90, 180, 270 degrees of phase rotation). If the signal is not present, the outer dot will be missing and I will have a dot at the center of the display which represents zero amplitude (and also zero phase). With simple on-off keying, I have created bi-phase shift keying. The signal is on or off and exists in one of four quadrants depending on the phase relative to reference.

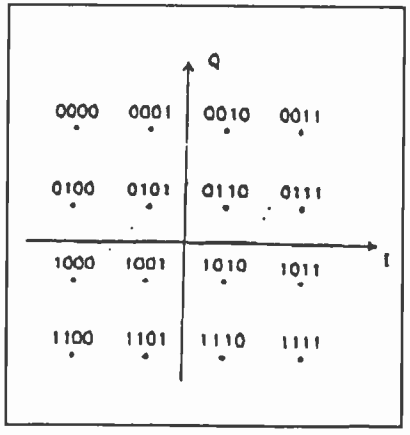




If I rotate all the phases by 45 degrees, the dots will not be in the "corners" rather than on the axis lines. The information is now at 45, 135, 225 or 315 degrees. Again, comparing the signal to the reference allows easy decoding of the information.

Now I can also change the amplitude of each signal. Since a no signal level of any of the four signals is the same, a dot at the axis crossing, it is not easily determined WHICH of the signals is at zero state. Likewise it is possible, because of binary coding of the signal to have a word which is 0000. All four signals would be at the zero point and there is no longer any signal to detect!

If you off set the voltage a little, then there is never a point of ZERO signal. The ON-OFF voltages are now two finite values between zero and one. I can also have intermediate voltage (amplitude) levels, which can represent other STATES and instead of a binary counting system (on, off) I can have as many states as I desire. for HDTV that is 4 states (0, 1, 2, 3) for each of the 4 signals. Thus we have achieved 4 states and 4 phases which can occur in any combination. This provides 16 data bits. Since we have used phase and amplitude modulation, tadaa... 16 Quadrature Amplitude Modulation or 16QAM!

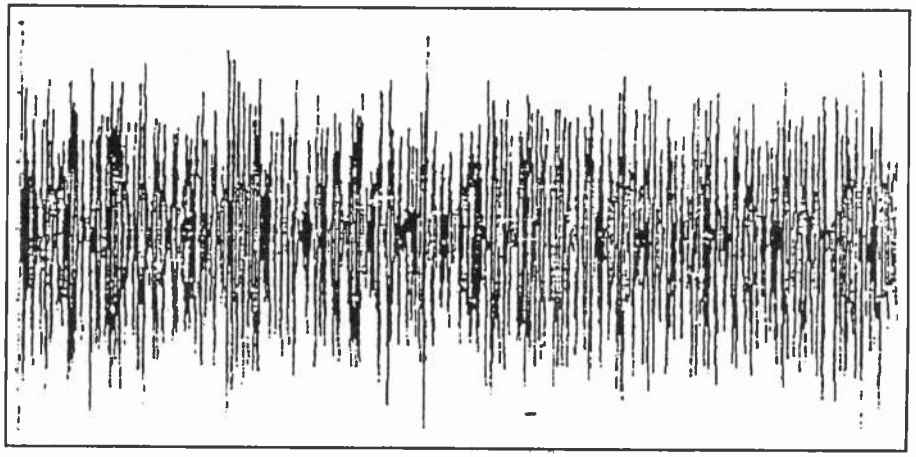


You may want to read that again!

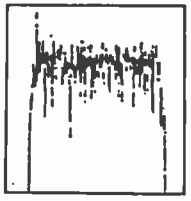
Our signal now looks a little like an analog wave in big samples. The "sine" wave taken in discrete steps at 4 voltage points, and time shifted four ways.

Each of the 16 discrete points can now be given a value. Since this is digital, we can assign digital values, 0000, 0001, 0010, 0011, up to 1111. The HDTV signal begins as a 36 Megabyte signal. To squeeze it down to a spectrum compatible 6 MHz, there is a lot of digital compression. The exact nature of this is much too involved to discuss here and is also the secret process of each HDTV proposal.

The spectrum of an HDTV signal is unlike any other. You have seen on the pages of ATVQ many examples of the NTSC signal is waveform mode (time vs amplitude) and spectral form (amplitude vs frequency). Here is a line of HDTV video:

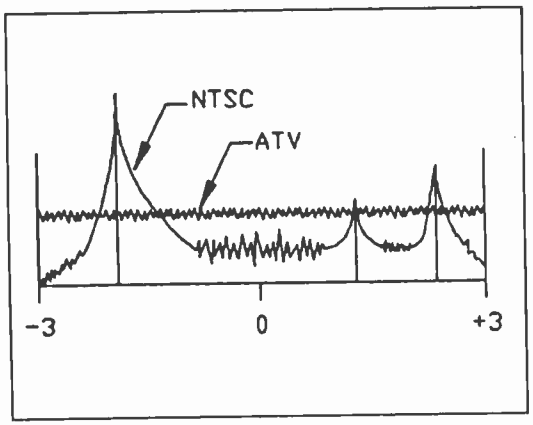


As you can see there is no sync, There is nothing to recognize as white, black, gray, outlines, horizontal or vertical objects. Now here is a spectrum of an HDTV transmitted signal:



The signal is "elevated" noise above the noise floor. Essentially it looks like white noise. In the Zenith system, there is a tiny pilot signal 1 dB above the "noise" signal whic is the small blip on the left side. Yes it is vestigial sideband!

HDTV



Here is an overlay of both the NTSC spectrum and an HDTV spectrum (ATV). ATV stands for Advance Television, not Amateur.

The carriers in NTSC are what cause the problems. If there were no carriers, then there would be no reason why we couldn't have a TV station on every channel. Its the carriers which are 10s of dB above most of the information carrying sidebands that cause the intermod and interference which prevent our using all the channels for NTSC television. By contrast, the HDTV signal essentially has no fixed carriers,except for a small pilot signal. This eliminates most of the technical "taboos" and allows more frequencies to be used. The diagram also shows the relative levels of the signals. Proponants of HDTV and some consultants say that the power required for an HDTV signal is 10 to 15 dB less than that required for an NTSC signal. On AVERAGE, this is true. But the peak power required in an HDTV signal is still 6 to 11 dB above the AVERAGE, so your transmitter, transmission line and antenna, which are VOLTAGE sensitive (arc overs) and not as much AVERAGE POWER limited will be about the same for HDTV as NTSC.

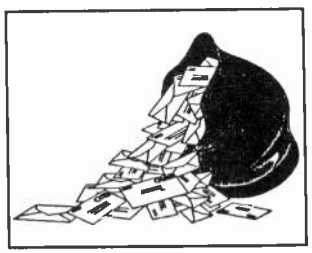
Average power is a concern for heat dissipation and current carrying capacity considerations. But peak volts in the digital signal can still cause arc overs if the system is not designed to handle the peak voltage of the system. In a broadcast transmitter an arc-over in the transmission line can destroy a $75,000 tube! It can also burn up center conductor insulators and cause other severe damage.

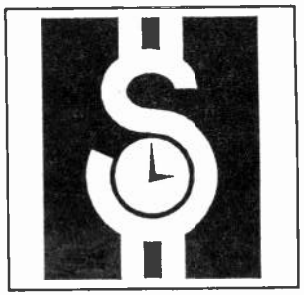
For those of us who are into video, there is a lot to be looking for in the near future. While we won't be throwing our NTSC equipment away just yet, we should be expecting to begin a transisition to HDTV for most of our video equipment.

The transisition period by FCC mandate is 16 years long. Long enough to get our money's worth out of NTSC equipment. And there is nothing to say we can't continue to transmit NTSC on ham frequencies even after the broadcasters have all gone to HDTV. THE FCC mandate is to havd HDTV simulcast NTSC. In the early stages stataions may transmit NTSC most of the time and only transmit an HDTV signal for a few hours a week. Perhaps the movie of the week or a sports special. As more and more programming is available in HDTV, we should expect to see longer HDTV program "days" on broadcast TV. Much as we saw first only a few color programs, then more then nearly all color programs broadcast.

Current speculation is that the program sources may pre-compress the digital video from 36 Mbyte to 6 Mbyte signals. The compressed video tapes would arrive at the station or be sent via satellite to the stations for relay to over-the-air broadcast. These same signals could be sent directly to cable systems or tohome receivers as now, over-the-air, or via fiber optic cable by the CATV or Telco. This is where a lot of money will be made. The delivery systems are mostly in place right now. Telco's have been putting in fiber optic cables (over 36 million miles as of March 1992) and CATV systems are beginning to covert from coax. As soon as your HDTV set is equipped with a fiber optic input as well as a coax input it will happen. With new solid state devices able to decode/receive the optical signal directly already available in manufacturers samples it won't be long before this is the "communicator" of the future. Everything can be included in the same box, telco, computer, viewer (TV) 'DVR (digital video recorder) and pay per view direct bank account access (debit). George Orwell only missed it by a few years.

We now return control of your magazine to you. This has only been an invasion by a friendly alien from the future who will now return to the 21st century. Have a nice day! I'll see you on the wide screen soon!





Don't have a fire sale on you TV equipment. But keep in mind what you buy today may not be useful tomorrow. If you can wait for a new TV set for a few years you may get a better deal when the HDTV sets begin to arrive.

Meanwhile keep those cards and letters coming!! 73 Henry KB9FO.

CREDITS: TV Technology Magazine, multiple articles on HDTV; Hewlet-Packard, I-Q Tutor; Comark Communications, Nat Ostroff, President; Zenith-AT&T long distance HDTV experiment May 27, 1992; Hammett and Edison Consultants; Chicago area Group, FCC Advisory Committee for Advanced Television Services; Dielectric Communicatins, Charlotte, NC HDTV test proposal; Providence Journal Broadcasting, FCC Docket 87-268 releases; TV All Industry Committee, HDTV Iransisition report; Sutro Tower Inc.; Andrew Corp.; New York Times, April 10, 1992; Wall Street Journal, April 10, 1992; HDTV World Conference, NAB Convention, 1991.

HDTV vs Compatible EDTV

HEY, I THOUGHT THAT HDTV WAS GOING TO BE COMPATIBLE WITH MY CURRENT TV SET. WHAT HAPPENED?

In the beginning days of HDTV/ATV/EDTV (High Definition, Advanced Compatible, Enhanced definition) the various systems were mostly analog. To achieve the additional video information on the sides of the regular NTSC picture, to make it fill the new proposed wide screen TV's, a number of systems were designed. One system added digital information to the blanking areas of the regular NTSC signal . This digital signal would be decoded at the receiver with a wide screen format to add the missing information and the regular NTSC TV set would ignore the added signals.

Another system used video compression (time compression) to squeeze the extra video in the edges of the NTSC picture and this would again be decoded only by the wide screen TV and ignored by the regular NTSC TV. These were fully compatible systems with current TV.

Other proposed systems would use two TV channels, each sending out a signal. One channel would send the normal NTSC signal and the second channel would send the additional HDTV signal. This was proposed in two ways, one with adjacent channels, which would take 12 MHz. per station. Thus channel 2 would also transmit on channel 3. The problem with this was that the adjacent market stations which would already be on channel 3 would receive unacceptable interference.

It was then proposed that the system might use one VHF channel and one UHF channel. This ignored the UHF stations somewhat and the propagation studies showed that the transit time between VHF and UHF stations varied enough that this was not a good system. The variances as we hams know are from atmospheric conditions which have different effects at the same time on different frequencies.

There were also proposals to just use a better NTSC system. This primarily involved better NTSC filtering to remove the cross luminance/cross chrominance mix products inherent in the IQ modulation process. By using additional filtering, the luminance and chromanance signals were kept more "pure" and the overall bandwidth response was improved. NTSC color information is limited to 1.5 MHz. response in the IQ modulation system. Many systems produce much less than that, often only .5 MHz of chroma response bandpass. By preserving the higher frequency color information, there is less color smear, sharper edges and better pictures. By also using a better color and luminance separator in your TV set, you got the full benefit of NTSC system performance at a tiny increase in cost.

Interestingly, tests where the enhanced NTSC signals was intermixed with an HDTV signal, many viewers could NOT tell the difference! This surprised the government and private testers, but not us who know that most consumers are happy with 6 hour mode VHS! A test of VHS tape playback showed an equal number of people judged the picture BEST in the 2 hour mode and 6 hour mode, and only a third noticed a strong difference between he quality of the two tapes!

Most consumers have never seen good NTSC video because of the limitations of the home TV set and home video equipment. I personally have seen most of the HDTV systems and to my eyes they all have visible digital artifacts which I find distracting. Much like Lexicon artifacts. Lexicon is the name brand of a device which allows TV stations to run a standard program faster or slower (I have never seen it used to make a program longer) in order to squeeze in a few more minutes of commercials, or to eliminate the video/film editors jobs. The device is a pitch corrector and synchronizer which allows a tape machine to operate at any speed (within limits) while maintaining the correct audio pitch, so the actors don't begin to sound like bad SSB. The artifact is either the picture shifts vertically at a repetitive rate giving you vertigo, or the frame has line pairing which makes it look like it is going out of focus and back into focus because the vertical resolution is halved when the field is dropped. It also produces the strange jump motion you might notice as objects cross the field of view.

The main drawback in all the systems was the video carrier and less so, the sound subcarrier. These pesky signals are why there aren't more stations on the air. Many years ago the FCC commissioned a study to see what could be done to eliminate the technical taboos. The solution was to up-convert all received channels to the 1 GHz. region for a first IF, then down convert to a second IF around 300 MHz. The only problem was that at the time (roughly 1978) the cost of the devices for 1 GHz. was high and the cost of the TV set would have been about double. Too bad the FCC couldn't see ahead to the technology of today where 1 GHz. devices are a dime a dozen. Interestingly, the new HDTV TV sets all follow the up/down convert system.

Digital devices have made quantum leaps in signal processing. Many in the TV industry including myself have said that digital would arrive before HDTV (analog) and that Japan was probably going to get stuck with an analog HDTV system while everyone else (Europe and north America) would have a digital system. There was no magic in that, just common sense that since computers have taken over everything, they would also take over TV and bring us into the Star Trek age of "viewers, sensors, communicators" and the phone companies would fiber the world before Cable TV did and would want to enter the video dial tone business, which they are. If you want to know where technology is going, watch the money flow. Follow the money and you follow the technology trends. Little money was going to analog EDTV and there was lots of money going to digital. You have to look outside of the tiny broadcast equipment market to see the whole picture.

Lastly, enter politics. The HDTV system will likely be chosen on the basis of politics as much as technology. FCC Chairman Sikes was quoted as saying that broadcasting was dead and don't let your babies grow up to be broadcasters. After all it is Chairman Sikes policy (political) positions which has forced HDTV to the American marketplace, not consumer demand. It seems that the FCC believes that HDTV is the final hurrah for over-the-air Broadcasting. It may also be the financial death knell to many stations which in today's economy are hardly able to keep their NTSC stations on the air and will not have the financial strength to also build and operate an HDTV second station. There are bankruptcy sales in nearly every issue of the industry trade journals now. Check your crystal ball. Henry KB9FO

From W5YI Report, July 1, 1992:

HAM OPERATOR K2LZ SUBMITS HDTV PROPOSAL FCC *Calls Suggestion •...a New Development in HDTV* The June 1, 1992. W5YI Report, devoted a page to the subject of High Definition Television (HDTV), and alerted readers that the FCC intends to start changing over from the current NTSC standard to a more advanced signal format by the end of 1993.

The new format is expected to provide viewers of the next generation of TV sets with at least the line resolution, that is, more than 1050 horizontal scan lines per frame in contrast to NTSC's 525-line images. Four digital systems and one analog, all of which are not compatible with existing NTSC TV sets, are competing for adoption as a new U.S. standard.

If a 6 MHz wide channel is required to send a 525 line image frame in 1/30th of a second per the current NTSC standard, then information transmission system logic tells us that a 12 MHz wide channel would be needed to transmit successive 1050 line image frames in the same 1/30th second time intervals.

Because the FCC wants to keep the current commercial TV channel allocation plan with its 6 MHz wide channel allotments, HDTV proponents believed the only way to cram more than twice the detail of NTSC video into 6 MHz of spectrum was to compress their signal formats at certain times such as during image movement or scene changes. By compressing the base band video images using certain digital or analog algorithms, the proposed HDTV systems attempt to shoehorn 1050 or more scan lines into a 6 MHz channel. But viewers will notice a loss of picture quality (1) whenever images move across the screen (as TV images normally tend to do), and (2) at the time of any scene change.

Ham operator and ATV experimenter *Leo Zucker, K2LZ* of White Plains, New 'York, has developed a HDTV broadcasting system that overcomes this problem and his invention was awarded U.S. Patent 5,067,017 last November. We recently found out about this development when our Washington attorney - who also represents Zucker - asked if we had heard about the HDTV breakthrough developed by a ham operator using amateur spectrum. We decided to investigate.

K2LZ's approach does not require compression of the video image being transmitted in order to remain within a 6 MHz channel bandwidth and, furthermore, offers compatibility with existing NTSC receivers. A very big advantage, indeed! Basically, he simply weaves two 525 line transmitted NTSC signals transmitted *on the* same *frequency* into one and ends up with 1050 line HDTV resolution The TV set actually receives two signals - the second overlapping the first! He proved it worked on the 70 cm ham band!

During initial tests of the system, two ATV (amateur television) transmitters were operated at the same time on a common carrier frequency of 434.0 MHz. The secret to the system is simultaneous transmission and receipt of horizontal and vertical polarized signals.

The two transmitters were connected to separate horizontal and vertical yagis - each modulated with an NTSC video signal. Depending on the polarization of the receiver monitor antenna, it was possible to detect and view the two simultaneously radiated video signals on the same screen without noticeable crosstalk. The approach thus allows effectively up to 12 MHz of uncompressed video detail to be radiated within a 6 MHz RF spectrum channel. Instead of using twice the bandwidth, you simply use twice the transmitters!

K2LZ's system uses orthogonal coherent radiation to provide an NTSC-compatible HDTV signal format, as follows: A 1050 line high definition image produced by a studio camera or other source, is separated into two 525 line images. One frame is composed of all the odd lines of the original image and the other frame is composed of all the even image lines. The two frames are transmitted simultaneously in the conventional NTSC 2-field interlaced format, using separate transmitters operating on the same TV channel.

One transmitter is connected to a horizontally polarized antenna and the other to a vertically polarized antenna. Conventional TV receivers will therefore reproduce standard 525 line images using their existing horizontal antennas. New HDTV receivers will use a vertically polarized antenna in addition to a horizontal one (probably on the same boom), and have appropriate circuitry to interleave all the separately detected 1050 image lines in the proper sequence and timing for a high resolution display screen. The original HDTV image can then be viewed without distortion or other artifacts due to compression.

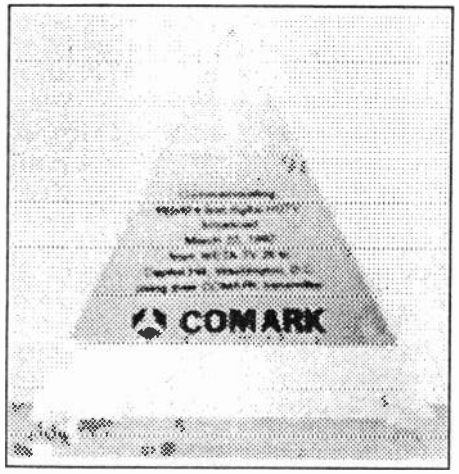
Most of the broadcasting equipment needed to implement K2LZ's proposed system (transmitters and antennas) are already in existence and would not become a financial burden to TV broadcasters who will otherwise be forced to purchase complex and expensive studio equipment necessitated by the other systems now under consideration. Nonetheless, a non NTSC compatible version of K2LZ's system can be implemented to allow high definition images to be transmitted in digital or even frequency modulated (FM TV) form with little or no base band compression.

In a *Second Report* and *Notice* of *Proposed Rule Making* released May 8, 1992, the FCC referred to K2LZ's system as a new development in the HDTV standards setting program. Additional performance data for the system is now being gathered for submission to the *FCC.*

EDITORIAL NOTE: ATVQ takes exception to several conclusions by W5YI report on this topic. Existing antennas and equipment do not exist for this signal format. At best only half, as current TV is transmitted with horizontal polarization. The additional vertical polarization antenna would have to be added. Stations currently using circular polarization to eliminate ghosts caused by multi-path reception would not be useable. Further, phase rotation caused by reflections inherent in ghosts are likely to interfere with the dual polarity signal. This might be able to be overcome by using both right and left hand circular signals but that also would require more antennas. This is already a concern as there is not space available for all stations in all markets to erect a second HDTV antenna or for this case a second polarity antenna.

The electrical cost is a major factor in broadcasting. The average UHF TV station electric bill is $7,000 to $20,000 per month., Adding a second full power transmitter to supply the second polarity automatically doubles the electric cost.

HDTV



stages are now class A or AB and the final is class AB or C. and would be class AB or A with HDTV.

Not all of the HDTV systems want to generate 1050 lines. Some proposals are for sequential and some for interlace scanning to achieve a higher than NTSC line rate while conserving spectrum.

The digital HDTV systems start with 36 Meg bandwidth and all then compress to 6 MHz. The digital systems employ both compression algorithms as well as architecture which allows for use of only portions of the digital to provide "scale-ability" between different scan rates and different digital devices. There are currently digital devices which are configured to work into NTSC and other scan systems which would have to be scaled up or down to fit into new HDTV digital systems.

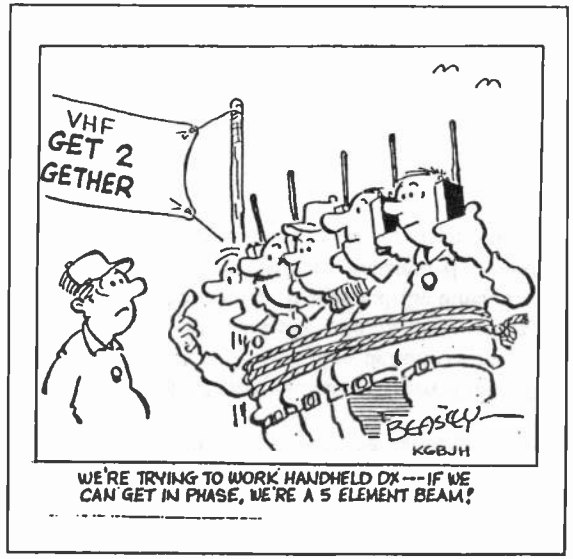
Lastly, there is no mention of the aspect ratio or increase in horizontal resolution which are also major constituents of the proposed digital and analog HDTV signals. The aspect ratio change was described earlier in this special report in more detail, but briefly, the Transmission lines are power limited. Either the transmission line would have to be duplicated at some expense or upgraded to carry the double power IF POSSIBLE. Because of frequency limitations on coax and waveguide, it may not be possible to provide a big enough coax to handle the double power requirement. Some stations operate with 240 KW TPO and this would require $480 KW TPO!. Limitations of AC mains power now enters the picture as well. Environmentalist don't like us using MORE electricity. The digital HDTV systems all claim a significant power reduction because of the lower average power level required in these systems. As much as 10 dB is claimed in transmitter power reduction which would mean up to a 70% power usage savings Control and exciter systems do not have power cost savings with HDTV only the final RF stages since driver

current system is 3:4 and proposed systems are 16:9. This takes more than just doubling the line rate. In addition, the HDTV systems also increase the Horizontal resolution (more pixels per line) to enhance the picture quality in the second dimension (vertical enhancement through increasing the number of lines enhanced the first dimension of a 2D display).

Hats off to K2LZ for his efforts although it seems to have several of the drawbacks of other HDTV systems and takes double the electric power, which will concern the environmentalists. His system also does not seem to address the aspect ratio change nor the increase in horizontal definition that other HDTV systems propose. The voiced advantages of the digital HDTV systems. There is no report of Mr. Zuckers system being scheduled into the current FCC HDTV tests.

Pictured at left are two commemorative trophies from HDTV experiments. The first commemorates the first US HDTV transmission from WETA TV, Washington, D. C. on March 23, 1992 using a Comark Klystrode equipped transmitter. The second is from an HDTV experiment conducted by Zenith/AT&T which transmitted their spectrum compatible signal from WMVT TV, Milwaukee, WI, to Glenview, IL May 27, 1992.

This concludes the special report on HDTV. ATVQ invites your comments, questions or suggestions on this subject. While not strictly ATV, it has been included because of its impact on all future ATV activity as the USA rushes into a new television transmission standard.



HDTV

Face it: Computers Ain't Television

by Mario Orazio The Masked Engineer

SOMEWHERE OUT THERE, You *might not have noticed* that computers don't have lenses. On the other hand, ya probably *have* noticed that eyes don't have teeth.

I just threw in that part about anatomy so someone doesn't bite my head off (with eyeteeth) for being a computer hater. Every time I use a word like "don't," "can't," or "ain't," I seem to tick someone off. Believe it or not it ain't the case that only negative people say ain't.

As for computers, them and me go way back. I was doing interactive spreadsheets on a Teletype terminal before anyone dreamed up Visicalc. VisiCalc is what came before Lotus 1-2-3, which is what came before--oh forget it). I even "drew" pictures on a plotter back when my "brush" was a stack of punch cards heavy enough to give you a hernia (for those of you who think a punch card is a party animal who gets funny after imbibing from the bowl, it ain't--think of it as a non-magnetic, recyclable, write-once floppy disk with a capacity of 80 big bytes).

Have a nice trip

Anyway, back when computers were computers and TV was TV, everything was hunky-dory. These days, though, ya can't move two inches without tripping over some digital video or other. That's "digital," as in computers, and "video," as in TV. And they both use picture tubes. And some elephants are native-born and over 35, but they ain't running for President (yet).

Lookee: Computer pictures and TV pictures are different. I didn't say one was better than the other or that ya can't convert one to the other, but they ain't the same thing. And now, gang, I'm gonna tell you why.

I might as well start with that lens. Look at a TV camera; see a lens. Check. Look at a computer. See any lenses? If ya do, it's time to visit either an eye doctor or shrink. TV camera pixels and computer pixels are fundamentally different. It's a simple matter to have a "naked" pixel in computer land. Write an equation that says there's just one pixel on in the center of a picture. The end.

In TV land, first the lens, then the rest of the optical system, and then the imagers (tubes, CCD's or whatever) conspire to prevent a pixel from existing on its own. It must affect adjacent pixels. Even if the front end of a camera somehow magically didn't prevent a naked pixel, the filters that follow it would.

That ain't a bad thing; it's good. Suppose ya had a camera that could capture a thin black horizontal line in just one scanning line, without affecting the lines above or below it. Now suppose ya had a mess of such lines. If they appeared on alternate scanning lines, your magical TV system would show alternating black and white horizontal lines.

OK, now tilt the camera slowly. When a line straddles two scanning lines, they'll both be grey right? So the picture on your magical TV set will flash between grey and horizontal stripes as you tilt. That ain't great. The scene being shot ain't flashing.

You may gripe every now and then about the resolution of your camera, but it does a reasonably good job of reproducing the real world. You've got the opposite problem with your computer.

It ain't E-asy

Program it to make a big letter E, and you'll get an incredibly sharp, crisp letter. Program it to do the letter O, though, and, if all you're up to is Programming 101, you're gonna have jaggies--stair step edges where the letter ought a be round. Ya can get rid of the jaggies by blurring 'em (pardon me--by *anti-aliasing* 'em), sort a what the front end of a TV camera does.

Now program the letter to move up and down. Just staying in computer land, ya might have to get into some temporal anti-aliasing, so the letter seems to move smoothly instead of jumping, something your lensed camera, once again, does all by its lonesome.

Buckle up

Here comes what you've been waiting for. Squirt the letter moving up and down out of the computer and onto a TV screen. Hooee! Fasten your seat belt!

A lot of TV people gripe a lot about the problems of international standards conversion, but at least TV's got only two line standards to gripe about: 525/59.94 here and 625/50 there. I betcha I could fill this entire page with *current* computer display standards, using no more than a line for each.

Ya basically got two choices for the picture squirting: a standards converter that takes whatever the computer is squirting out and converts it to 525/59.94 or a modification to the computer (maybe just installation of a card) to make it squirt our the right stuff. And, if you ain't too picky about exactly what kinda video squirts out, as long as ya can stuff it into a video system, I suppose another choice might be a few computers, like Amigas, that start right out with TV rates.

If you original cvomputer had 640 pixels by 480 ya can sorta get away without doing much more processing, as long as ya don't mind violating the FCC blanking specs a bit (better make that 3.5 bits; you're supposed to have 483.5 vertical lines). If it's anything else, ya need as much processing as ya do for a 625 to 525 standards conversion.

Similarly, if the vertical rate of the computers 59.95 Hz, you're in good shape. It it's 60 Hz, ya might be able to fudge. If it's anything else, you back to standards conversion.

Ya ain't done yet, though. Chances are pretty near 100 percent that your computer operates with progressive scanning (line 2 follows line 1). TV operates with interlace (line 3 follows line 1). A whole mess of people can tell ya why progressive's better than interlace; Sony's high def leprechaun, Larry Thorpe, has a bunch a reasons why interlace is good, especially for cameras. Either way, TV land is interlaced, from VHS to 1,250-line HDTV, so your progressive computer pictures need work as they get squirted out.

HDTV, computer video

Computer blues

Then there's color. I ain't gonna get into esoteric stuff about color primaries here (be thankful the old desaturated computer blue rarely shows up anymore)

Lemme just tackle something *real* simple: color encoding. Computers, in general, are component; NTSC ain't. The usual forms of computer components are red, green and blue or hue, saturation and luminance. For argument's sake, lemme use the common video components: luminance, red minus luminance and blue minus luminance. Suppose all three signals can go from zero to 255 (eight bits per component, a common computer practice. In computer land, there's no reason why all three couldn't be 255; in video land, if all three were 255, red and blue would have to be twice as great as maximum luminance, and ya just can't do that in NTSC, so ya need still more processing in the squirting.

I've got more. What's the most important part of a TV picture? The center. What's the most important part of most computer screens? The upper left corner (that's where "home" is). In TV, to get rid of the edges of the picture, monitors are over scanned; in computers, to ensure that home is visible no matter what the monitor is doing, *signals* are under scanned--just another little something to take care of in the squirting.

Artifacts we know and love

Then there are all the NTSC artifacts ya know and love so much. The naked pixel and interlace problems are what caused computer generated, one pixel high horizontal lines to flicker so badly--no camera blurred them enough to show up in both interlaced fields, so they're refreshed only 30 times a second instead of 60 (blurring software in good computer video systems substitutes for a camera).

Take a look at the line between green and magenta bars in color bars. On a component computer screen, that line can be as sharp as any white/black transition. You could do the credits of a show in magenta on a green background on a computer monitor with no sweat (except fear of the taste police); on TV it's a good way to make the "batteries Not Included" disclaimer an unreadable mess of chroma crawl.

Sometimes computer software keeps you from generating impossible or illegal TV colors and even advises you not to make stupid choices like magenta on green. I haven't come across any software yet that says, "Hey, dummy, don't choose such fine details while you're looking at a monitor from a distance of a foot; TV watchers sit somewhat farther from their screens."

None of this says ya can't squirt video out of a computer. Of *course* ya can, but it takes a little effort on your part or on the part of the designers and programmers of what you're using (come to think of it, I guess almost no one *does* take Programming 101 anymore). Everything I've mentioned to this point involves taking computer pictures and squirting them into the world of analog NTSC. It ain't a piece of cake, but it's do-able and do-able in reverse (elba-od?) to get from analog NTSC into a computer. Nope, I didn't accidentally leave out digital video. I saved it for last 'cause, in some ways, it makes everything I've mentioned to this point seem like child's play. (That's some people's problem with computers; as Tom Lehrer used to sing, they're "so simple, so very simple, that only a child can do it.") I brought up the common 640 x 480 pixel computer format earlier. A lot of computer screens share TV's 4:3 aspect ratio, so 640 x 480 provides square pixels. You can draw a circle with a computer, rotate it 90 degrees, and have it stay a circle. Now take a look at digital video. Pick a standard--any standard--4:2:2, 4fsc, 3fsc, SMPTE 240M HDEP--I don't care. *There ain't 't one single standard for digital video in the TV world that uses square pixels.* Not one. 4:2:2's my favorite. In 525/59.94, a 4:2:2 pixel is a fine, upstanding, vertically oriented rectangle; in 625/50, it's Lying on its side. Rotate a circle in either case without doing one whole heck of a lot of math to compensate for the pixel shapes, and you lay an egg.

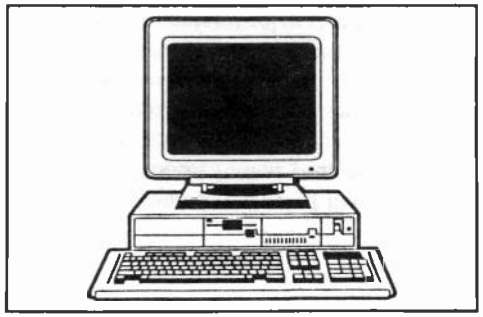
Consider this

Then there's bit depth. It ain't uncommon for computers to use 24 bits per pixel (the three 255s I invoked earlier). If ya ignore spatial chroma resolution, ya could sort a say a D-l machine records 24 bits, too, losing just a wee bit to keep standards committees happy. D-2 and D-3, though, ain't nowhere near even eight bits, thanks to those awkward little composite video matters of sync, setup and encoded color. So here's a little puzzler for those of you who thought computer pictures and video pictures were the same before ya started reading this: How come a good D-2/D-3 picture of a face (forget the early machines with lousy A/D converters), with something on the order of an effective seven bits per pixel, looks better than the same face in a computer picture with 16 bits per pixel? Hint: It's why NTSC was created in the first place.

Send your answers (in the form of title and abstract) to: Program Chair, 27th annual Advanced Television and Electronic Imaging Conference; Society of Motion Picture and Television Engineers, 595 West Hartsdale Avenue, White Plains, NY 10607-1824. Fax 914 761 3115.

Mario Orazio is the pseudonym of a well known television engineer who wishes to remain anonymous. Write to him c/o TV Technology, Box 1214, Falls Church, VA 22014

Our thanks to TV Technology for the use of this item. Computer video is one aspect of the HDTV puzzle to be solved.



The 1992 MARYSVILLE HAMFEST

SUNDAY

August 23

Marysville Fairgrounds

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Statesboro, Georgia
Kiwanis Fairgrounds
September 12, 1992
8:00 am to 4:30 pm

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VE EXAMS WILL BE
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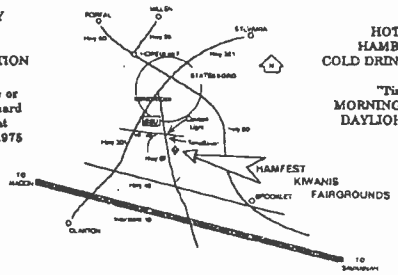

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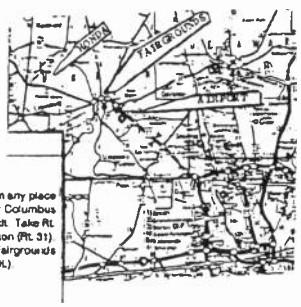
FLEA MARKET

Last year we tried something new, and it went over BIG! We allowed the local vendors to sell general merchandise at the flea market during the hamfest. Many...many people that attended told us that they loved it. One ham told us that he didn't buy any radio goodies that day..but, he did buy an old dinner bell and an old power saw that he had been wanting. We're sure some people didn't like the flea market, but the XYL's sure did. This year we will try to keep the general merchandise flea market seperate from from the electronic so if you don't want to see it..you don't have to!

COMPUTER SHOW

Although the big guys over in Dayton keep trying, they haven't affected our computer show so far. They elected to hold their computer show the same week-end as the hamfest in Marysville. This year as always we will have loads of computer hardware and software for sale. Many dealers have already reserved space and will be there ready to serve you. More are calling every day.



HOW TO GET HERE!

The MARYSVILLE HAMFEST is easy to find, from any place in the state. If you are coming from the greater Columbus Ohio area, take I 270 outerbelt to the Route 33 Exit. Take Rt 33 (West) to the third Marysville Exit marked Kenton (Rt. 31). Just follow the many signs to the Union County Fairgrounds (across from the MARYSVILLE MIDDLE SCHOOL)

RESERVATION FORM:

Mail to:
MARYSVILLE HAMFEST
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Please enter my order for:

MARYSVILLE HAMFEST TICKETS	@ $ 4.00 (adv)	
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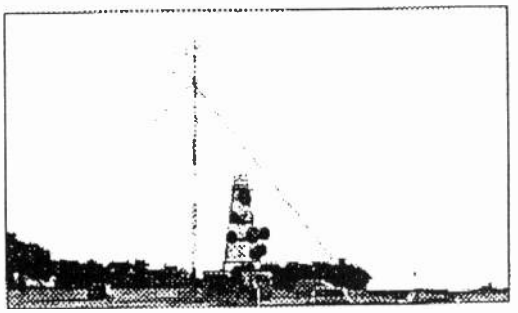
A GUIDE TO



23cm TELEVISION

SHAUN P. O'SULLIVAN

This book is intended for the Radio Amateur who is interested in amateur television on the 23 cm band. No previous knowledge of ATV or 23 cm is assumed, and the larger non-technical sections will guide the reader through the mysteries of Aerials, Cables, Connectors, Receivers, Transmitters, Repeaters and much more. It is essential reading for anyone who has wondered whether they could participate in ATV, since it shows how all the pieces can be made into a simple and inexpensive ATV operating unit. Se.

Severnside 23 cM ATV book available from Severnside TV Group, 15 Witney Close, Salford, Bristol, England BS18 3DX. Price range $8. Also several antennas for 23 cM and 10 GHz are available. All are very respected products and support their club.

ATV-5 TRANSMITTER

TEN GREAT REASONS TO TRY OUR NEW 70 CM AMATEUR FSTV TRANSMITTER ! !

- 5 WATT AVERAGE RF POWER
- .5–5W ADJUSTABLE RF OUTPUT !
- INCLUDES AUDIO INPUT
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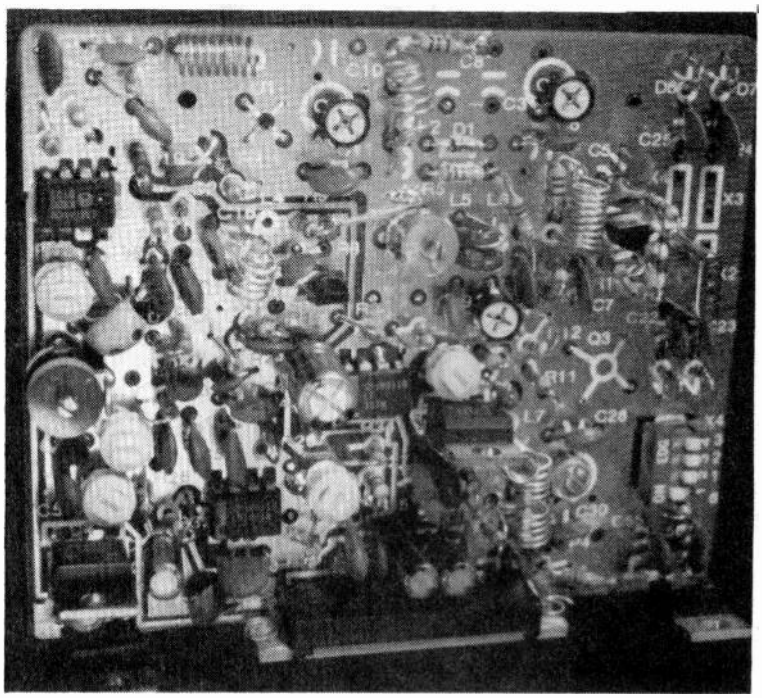
- EXTREMELY SMALL SIZE! (3.5 X 4.0 INCHES)
- MAY BE PURCHASED WITHOUT POWER MODULE



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Calls accepted after 6pm M–F (local) Includes one xtal for 434 MHz. Additional frequencies for 426.25, 427.25, and 439.25 are $15 ea. 421.25 available if a VSB filter is used for a repeater transmitter. Include $5 for shipping and handling. AZ residents add 6.7% sales tax.

ATV ELECTRONICS
16807 N. 46LN
GLENDALE, AZ. 85306

The w6ORGy Notes

By Tom O'Hara, W6ORG

ALL SEMICONDUCTORS CAN BE RF DETECTORS - SOME WHEN YOU DONT WANT THEM TO BE!

Yes they can and, of course, some are better at it than others. If the device is designed to be an RF detector, such as a hot carrier diode for instance, you want all the sensitivity and efficiency you can get. But you dont want it in a transmitter audio amp stage.

The TLO82 and other FET front end op amps are much less susceptible to RF detection than transistor types such as the 741. The FET types also have higher possible input impedances which make them more flexible for mic and line audio applications.

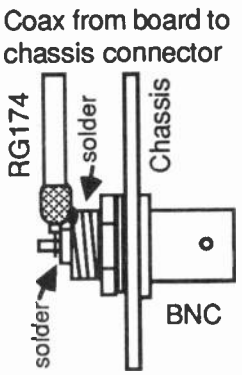
If there are strong RF fields circulating around mic amps, the AM envelope can be detected and mixed in with the desired audio. This is well known with high power SSB rigs and stereos, and can also be a problem with sound subcarrier generators. The leads and parts going to the mic op amp become significant antenna leads. Any RF floating around the chassis due to VSWR can be strong enough to exceed the detector threshold.

We know about VSWR coming back down the coax from antenna mismatch or poor connectors, but the VSWR caused by poor connection of the coax lead between the board and the chassis connector is not easily measured. A RF power meter reads the reflected power between it and the load, not the source.

Any time the center conductor is not inside the dielectric and shield, it wont be 50 Ohms at that point most probably. The actual impedance bump will depend on the length it is not coaxial vs wavelength. A small amount up to 1/4 of an inch is acceptable at UHF.

Many builders take great pains to make sure that the center conductor is shorter than 1/4" out of the coax when attaching to the coax connector, but forget that the shield must also be less than 1/4" in length from where it leaves the cable and attaches as close as possible to the shield of the connector.

I have seen long pig tails to solder lugs away from the connector. The best is to pretin the shield of the connector right next to the insulation and then quickly solder the folded back braid to it. The Radio Shack BNC chassis connectors have a solder tab at the end of the threads now for that purpose.



But lets say that you have done every thing to minimize VSWR, kept all the leads, especially the audio ones, routed well away from the RF side of the board and output connector and you still get sync buzz in the sound. The mic itself can be a detector, especially electret types. A 220 pF cap put directly across the mic element can cut its RF signal pulling ability.

If it is more on the board, where the mic in or out doesn't seem to make much difference, then putting the 220 pF disc (RS 272-124) with 1/8" long leads directly across the + and - input pins of the op amp can do the trick. On the KPA5's for instance this is pins 5 and 6. It is best tack soldered to the traces on the bottom of the board. The line audio side of the op amp is usually high level enough to not need a cap.

THE TC70-10 IS DSB

In a past issue we showed a simple modification to the TC70-1 transmitter section to give DSB rather than favored USB for those areas that elected to go to LVSB on their 439.25 repeater input. The new 10 Watt TC70-10, which uses the TXA5-70 transmitter board, was designed to be full DSB instead of the favored USB like the TC70-1 and KPA5-E board designs.

With full DSB you can work normal simplex, DX, etc., as well as your local 439.25 UVSB or LVSB repeater input. The favored USB transmitters had the LSB sound subcarrier anywhere from -25 to -45 dBc instead of the normal -15 dBc for DSB. And, of course, after going through an amateur "linear" amp. it could be anything greater.

70 CM FILTER KIT

Microwave Filter Company (800-448-1666) is offering a single cavity bandpass filter that will tune a 6 MHz bandwidth between 420 and 450 MHz with .2 dB insertion loss. Price is only $79 for their model 9397. Might be just the thing for those with strong UHF TV channel or 2 meter overload problems (>20 dB rejection at ch 14 and 60 dB at 2 meters).

73, Tom O'Hara, W6ORG
2522 Paxson Ln
Arcadia Ca 91007
818-447-4565

ELKTRONICS

12536 T.R. 77
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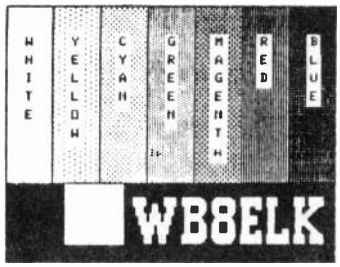
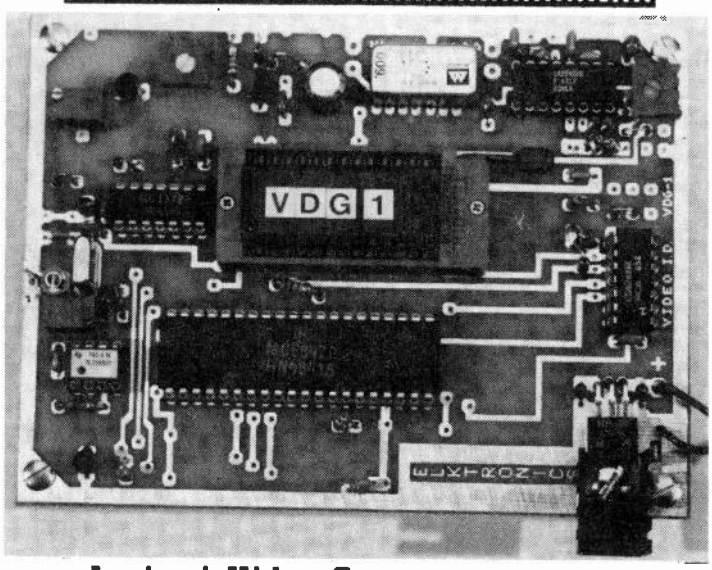


INTRODUCING THE
VDG-1

VIDEO I.D.



- Instant Video Source
- 4 Graphics Screens
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- Video Relay for switching in
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  (Steps through all 4 screens)

VDG-1 with Pre-Programmed
Custom Callsign Logo
– $99 ppd.

(Quick-release socket option)
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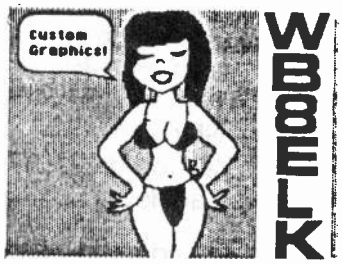
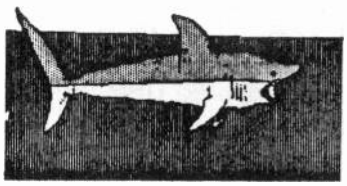
Call or Write for CATALOG of available Graphics

Additional Programmed EPROMS
– $19

Now available as a Kit
– $89 ppd. Blank PCB – $19

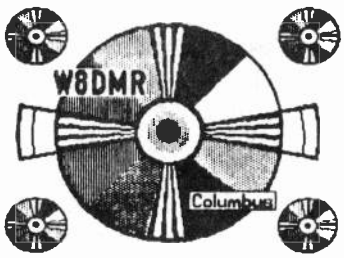


KA0JAW



N9CAI /r

KA8ZNY



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NEW TC70-10 ATV TRANSCEIVER

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>10 Watts p.e.p. Out

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- Adjustable peak envelope power RF output
  Typical range from 2 to15 Watts allows proper adjustment to fully drive the Mirage D1010-ATVN or RF Concepts 4-110 to full 100 Watts output for DX, without sync or audio clipping.
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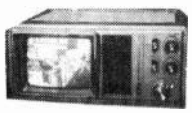
  Lets you do voice over commenting on video tapes
- Rugged 7.5x7.5x2.7" black die cast alum. box
  Stands up under rough public service applications and takes up less space on the operating table than 1 Watt plus amp.
- True Final RF detected video monitor output
  lets you properly set the video gain control based on final output RF rather than low level. Camera video is at this jack during receive for focus & lighting set up before transmitting.

Front panel jacks accept composite video and line audio from your camcorder or VCR plus a low Z mic with push to look. Sensitive GaAsfet downconverter tunes whole 420-450 MHz 70cm band down to your TV channel 2, 3 or 4. Comes with one crystal you specify on 439.25, 434.0, 427.25 or 426.25. Second switch selectable crystal add $15. Requires 13.8 Vdc @ 3 Amps.

P.C. Electronic pioneered the ATV transceiver in 1977 with the 10 Watt TC-1. While the change in 1985 to the 1.5 Watt units gives the flexibility of selecting 15, 50 or 70 Watts depending on the situation, many long time ATVers said they missed the old 10 Watter which did just fine in most cases for local and repeater use - *90 miles snow free line of sight using 14 dBd beams. You've always been able to build your own 10 Watt system from some of the basic modules on page 2 (TVC-2G, TXA5-70, FMA5-F and PA5), but now we have a ready to go alternative in a rugged die cast aluminum box.

Transmitting equipment sold only to licensed Tech class radio amateurs, verified in the Callbook, for legal purposes. If newly licensed or upgraded, mail or fax copy of license. However, receiving downconverters available to all (pgs 4 and 5).

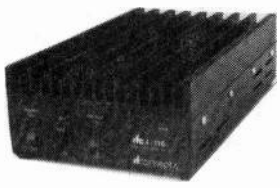
COMPLETE 70CM ATV STATION



Your TV set

+

+



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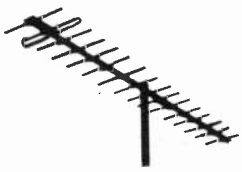

Your video camera or camcorder

+ **TC70-10...$499**
ATV Transceiver
10 Watts p.e.p. min.
13,8 Vdc @ 3A power supply req.

Optional 100 Watt Amplifiers
RF Concepts 4-110.....$349
Mirage D1010-ATVN ...$349
25 Amp pwr supply req.

Antennas - see pg 5
KLM 440-16X 14dBd $129
KLM 440-10X 11 dBd $72
KLM 440-6X 8.9 dBd $60
RUTLAND FO22-ATV 15.8 dBd $105

Remember when comparing prices, ours include UPS surface shipping.

5/92a

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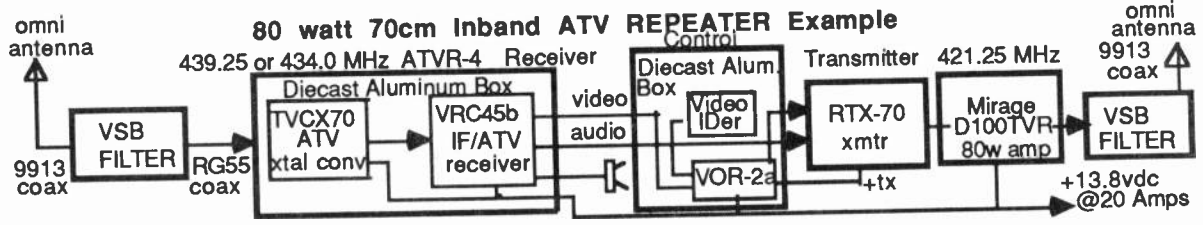
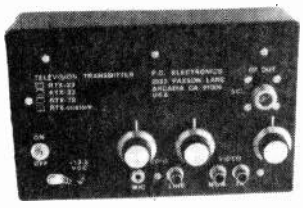
ELECTRONICS

READY FOR AN ATV REPEATER OR LINK IN YOUR AREA?
WE HAVE THE MODULES AND SOURCES FOR INBAND OR CROSSBAND



Select an RTX Transmitter and a ATVR Receiver for the bands you want, add the appropriate linear amp,VSB filters & antennas, ID & VOR-2a, power supply and coax for your own repeater. We suggest low in / high out for crossband. Ask for a copy of our ATV Repeater article before you start so you will do it right the first time. Also listed are recommended sources of filters, antennas, IDers, etc. Most can put together a good working ATV repeater for under $2000.



TRANSMITTERS ready to go in a 7.3x4.7x2 die cast aluminum box for tight RF shielding. >1 Watt p.e.p. output for proper drive to companion amplifiers. Adjustable sync stretcher to enable set up of the right video to sync ratio after an amplifier is added. Independent mic and line audio inputs. Requires 13.8 Vdc at 500 ma.

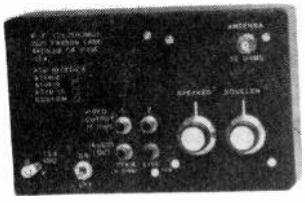
RTX-70 specify output frequency, 421.25 MHz most popular rptr. output **$299**

MIRAGE D100ATV-R 90 Watts p.e.p on ATV continuous duty 70cm repeater amplifier see page 2 for more info and picture **$519**

RTX-33 specify frequency - 923.25 MHz most used frequency **$329**

RTX-23 specify frequency - 1253.25 MHz best first repeater output frequency....**$329**

We suggest Downeast Microwave for 900 MHz (3318PA) and 1200 MHz (2318PAM or 2335PAM) repeater amps to match our transmitters. Call them at (207) 948-3741.



RECEIVERS ready to go in a 7.3x4.7x2 die cast aluminum box for tight RF shielding. Contains a TVCX crystal downconverter and VRC-45b receiver. Two composite video outputs, squelched speaker and line audio outputs. Requires 13.8 Vdc at 300 ma.

ATVR-4 specify frequency - 439.25 or 434.0 most popular for inband or crossband repeater input.....**$299**

ATVR-9 specify frequency - 910.25 most popular repeater input.....**$309**

ATVR-12 specify frequency - 1253.25 link, 1277.25 repeater input.....**$329**

VOR-2a Video Operated Relay board...$45, keys RTX upon detection of horizontal sync plus 10 min. & end of transmission momentary relay for switching to video ID to meet FCC regs. Now with pots for input sensitivity, tx hang time and 10 min. ID time. Noise imunity improved. See review in July 91 73 Magazine page 26.

LMB CAB 247 7.3x4.7x2 die cast aluminum box. Great for housing VOR-2a and video ID boards...**$20**

ANTENNAS When comparing prices remember ours include delivery by UPS surface in contiguous USA.

F718 Diamond vertical omni 9.3 dBd gain, 15 ft long. Specify 70cm video carrier frequency.....**$219**

440-6X KLM 8.9 dBd gain 420-450 MHz 6 element beam. 28" boom, end mounted.....**$59**

440-10X KLM 11.2 dBd gain 420-450 MHz 10 element beam 64 " boom, end mounted.....**$72**

440-16X KLM 14.2 dBd gain 420-450 MHz 16 element beam 10.5 ft boom, center mounted.....**$129**

FO22-ATV RUTLAND 15.8 dBd gain 420-450 MHz 22 element beam 14 ft boom, center mtg.....**$105**

FP-19 Comet vertical omni10 dBd gain, 7 ft 4 in long. Covers 902-928 MHz.....**$109**

3318LYARM Downeast Microwave 14.2 dBd gain 902-928 MHz beam. 6 ft boom, end mounted....**$82**

F1230 Diamond vertical omni 11.3 dBd gain, 10.5 ft long **$159**

2424LYRM Downeast Microwave 16.2 dBd gain 1240-1300 MHz beam. 6 ft boom, end mounted..**$82**

DOWNCONVERTER DISCOUNT of 10% is available to Repeater groups and clubs if you order 5 or more per item of the tuneable downconverters on pages 4 or 5. Special discounts for Teacher Hams - call. The order must be sold and shipped to one person at one time. It helps to have some extras available for new people to try out your repeater or use at demos at other clubs and schools. All downconverters have a GaAsfet preamp and mixer for low noise and high dynamic range. Get a board if you want to package your own - you will need a shielded cabinet with knob, switch, connectors and 11 to 14 Vdc power supply. Or get one ready to go.

SSTV TODAY

John Langner, WB2OSZ

Here is a quick summary of what is available for SSTV and WEFAX. There are probably others I don't know about.

Scan Converters

A couple of years ago, anyone who was serious about SST had a Robot 1200C.

It is a complete system dedicated to SSTV. Just connect it to (1) color TV camera (either NTSC or PAL), (2) color TV set or monitor, (3) speaker and mic connectors of a transceiver, (4) tape recorder for picture storage. It has four black and white modes (one compatible with original 8 second) and four color modes with different transmission times and resolutions. It displays images with 256 x 240 resolution with 18 bits per pixel. That's more than 250,000 colors. Robot Research, 5636 Ruffin Road, San Diego, CA 61927.

It also has a parallel port for connection to a home computer. Several different programs for transferring images to/from the 1200C and for performing various other functions are available. Hi-Res, Version 1.4 (for IBM PC), Tom Jenk-ins, N9AMR, 5968 S. Keystone Avenue, Indianapolis, IN 46227; SCAN, Version 6.0 (for IBM PC), Bert Beyt, W5ZR, 301 Tampico Street, New Iberia, LA 70560; SSTV (for IBM PC), Garnet Bebermeyer, WBØUND, 15 Almeda Court, Fenton, MO 63026; IMAGE (for IBM PC), Dick Isely, WD9GIG, 736 Fellow Street, St. Charles, IL 60174; (for Amiga), Tom Hibben, Box 188, DeSoto, WI 54624.

Replacement PROMs are available to give the 1200C other transmission modes such as Wraase, Martin, Scottie, and AVT. PROMs available from Martin Emmerson, G3OQD, 6 Mount Hurst Road, Hayes, Bromley, Kent, England.

Unfortunately, Robot Research seems more interested in selling higher priced systems to industrial customers. The 1200C hasn't been enhanced or advertised for years. There are conflicting reports as to whether the 1200C has been discontinued entirely or if an occasional batch is manufactured. **[Ed. Note: The Robot 1200 C is available from PC Electronics]**

Two clones of the 1200C are available: LM9000, John Wilson, VK3LM, R.M.B. 4201A, Tallangatta Valley 3701, Victoria, Australia; NS-88, Munaki Yamafuzi, JF3GOH, P. O. Box 670, Osaka, Japan 531.

I think the LM9000 is available only as blank PC boards. One magazine article warned readers not to be too hasty about purchasing boards because the other parts required are hard to find and more expensive than you would expect. But if you do build one it is compatible with the 1200C and can use the Martin Emmerson PROMs.

The only other stand-alone scan converter mentioned during the last few years is the Wraase SC-2. Not much was mentioned about it. Volker Wraase Electronic, Kronsberg 10, D-200 Altenholz, Germany.

Home Computers

Now that most home computers have plenty of memory and acceptable color graphics, the most cost effective method is to use a computer with a suitable interface and software. Note that if you want to send a picture of anything real, you will also need a frame grabber which will add a few hundred more dollars to the total system cost.

Amiga

The AVT system has become quite popular during the last couple of years for both SSTV and WEFAX. It is composed of an interface that attaches to the parallel port and software.

It has images with up to 4096 colors, all the popular transmission modes, built in graphics editor, text generation, image processing techniques to clean up noisy pictures, and loads of other features. AVT Master, AEA, P. O. Box C2160, 2006 196th Street S.W., Lynnwood, WA 98036-0918.

Atari ST

Color SSTV, WEFAX, and other ham radio software are available from: Atari Microcomputer Network, John Adams, KC5FW, 17106 Happy Hollow, San Antonio, TX 78232; ASTUR (Atari ST Users on Radio), GEERAERT Michel, W. Elsschotlann-21, B-8460 Koksijde, Belgium. The WEFAX program requires a very simple interface containing an XR-2211. The SSTV program can use two different interfaces. In the lost cost configuration, the internal sound generator is used for transmit and a

simple two chip interface (total cost about $7 including perfboard, connectors, etc.) is used for receive.

Much better results can be obtained with an interface from A&A Engineering, 2521 W. LaPalma, Unit K. Anaheim, CA 92801, (714) 952-2114. See 73 Magazine, December 89 and January 90, for more details.

The latest version of the software has all the popular modes (Robot, Wraase, Martin, Scottie, AVT), a graphical user interface, and full screen images with dithering to give the appearance of hundreds of colors when viewed from a distance.

IBM PC

Several WEFAX systems are available. PC HF Facsimile 4.0, PC GOES/WEFAX, Software Systems Consulting, 150 Avenida Cabrillo, 'C', San Clemente, CA 92672; MULTIFAX, Schwittek WEFAX Systems, David E. Schittek, NW2T, 1659 Waterford Road, Walworth, NY 14568; A&A Engineering (address above).

There are many others. I found these by flipping through a couple of recent magazines.

The SSTV picture is dimmer. Software Systems Consulting (above) had an interface and software for SSTV. It was only black & white. Today everyone uses color so it is not surprising that the SSTV product hasn't been advertised for a couple of years. Three or four systems are under development. Stay tuned for news as it happens.

There have been SSTV implementations for other machines such as Commodore 64 and the old 8 bit Ataris. CQ-TV also mentions SSTV for machines we never heard of in the US.

Publications

Modern information on SSTV is very scarce. The last SSTV handbook, that I know about, was written by Don Miller and Ralph Taggart about 15 years ago. The British Amateur Television Club has a book, The Slow Scan Companion, but it's not really a handbook with organized chapters on different topics. It's more like a random collection of magazine articles. There is no introductory information such as how color images are conveyed by audio tones. (Ed Note: the book is now out of print)

There are a few magazines that specialize in Amateur Television. These are mostly oriented toward fast scan TV but SSTV and WEFAX are mentioned occasionally.

But what is there to say about SSTV? A few years ago everyone bought a 1200C. Now people buy an AVT system. People send pictures to each other. The homebrewers have either faded away or are keeping quiet about what they are doing. Amateur Television Quarterly, 1545 Lee Street, Des Plaines, IL 60018; CQ-TV, British Amateur Television Club, Dave Lawton GØANO, Greenhurst, Pinewood Road, High Wycombe, Bucks HP12 4DD, England.

Booklets of old ATVQ and A5 articles are available from ESF Copy Service, 4011 Clearview Drive, Cedar Falls, IA 50613.

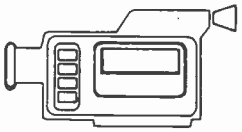
Summary

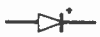
Most people are scared away from trying SSTV because they think it HAS TO be expensive. That WAS true but it's not anymore. There are rumors of three or four new SSTV interfaces for use with the IBM PC which will be available in 1992.

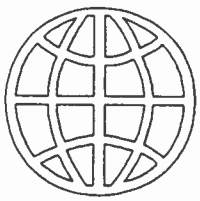
For more information contact John Langner, WB2OSZ, 115 Stedman Street, Chelmsford, MA 01824.

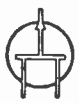
SSTV

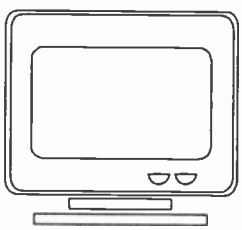
SLOW SCAN TELEVISION











"Where can I find out about SSTV ?"

If you are a Slow Scan Television [SSTV] operator there is hardly a day when you are on the air that someone doesn't break in and ask about SSTV.

"Can I use my computer on SSTV ?"

An interface and software for the IBM/MS DOS computer using a VGA monitor has recently been developed. The Amiga computer with the AVT system provides color slow scan pictures in virtually all of the modes used today.

"What equipment do you use on SSTV ?"

The Robot 1200C high resolution color scan converter is the unit most often heard on the bands today. This unit is usually enhanced with modifications for additional memory and EPROM's from "Martin" or "Scotty".

"How many different modes are there. ?"

The enclosed article "Slow Scan Television", by W5ZR [Bert Beyt] provides one of the most informative and up-to-date reviews of SSTV operations available.

Slow Scan Television

by Bert Beyt W5ZR

ORIGINAL STANDARDS:

Slow scan television was an original amateur radio development that was started in 1958 by a small group of hams led by Copthorne Mcdonald, VE1BFL. The idea of slow scan television was to reduce the bandwidth of a television signal so that it could be transmitted on the HF ham bands. This meant that a typical 3 MHz television signal must be reduced to about 3 KHz; a 1000 to 1 reduction in bandwidth. To accomplish this reduction both the horizontal and the vertical scanning rates were reduced to as low a frequency as possible. At the outset it was decided that the line and the frame frequency could be conveniently derived from the a.c. power mains (60 Kz). The line speed is 15 Kz (66 ms) and the lines per frame is 120. The line frequency is obtained by dividing the 60 Hz a.c. frequency by three, and the frame rate is obtained by dividing 60 Hz by 360. This gave the original black and white SSTV a frame rate of 8 seconds. It had an aspect ratio of 1X1, the horizontal scan was from left to right (128 pixels), and the vertical scan was from top to bottom (120 lines). The horizontal sync pulse was 5 ms, and the vertical sync pulse was 30 ms. For the subcarrier frequency the sync was 1200 Hz, black was 1500 Hz, and white was 2300 Hz; this requires a bandwidth of from 1.0 to 2.5 KHz, and will fit on a standard SSB signal. The original slow scan monitors were long persistance radar cathode ray tubes (P7 tubes). A sampling camera or a flying spot scanner were used to generate a picture in those early days of slow scan.

EVOLUTION OF SSTV:

Originally all slow scan was 8 second, Black and white frames. The received picture appeared on a long persistance P7 CRT monitor one line at a time like a window shade being pulled down, and it faded away quickly. The next advance was the digital scan converter, that displayed on a fast scan monitor. A SSTV scan converter converts the analog slow scan tones to digital data, and then stores this data in a random access memory bank. It then reads the digital data out, converts it back to analog at the proper speed for display on a fast scan monitor. The scan converter also takes in video from a camera, stores the data in the RAM bank, and then converts the output analog tones for SSTV transmission. There are many designs for scan converters. In a ham station, the receiver audio is connected to the scan converter input, and the output of the scan converter is connected to the microphone input of the transmitter. A monitor, or a TV set, connected to the scan converter displays the SSTV pictures. Over the years of operating SSTV on the HF ham bands, it was found that under differing propagation conditions, different speeds and modes were necessary to achieve good solid picture reception. Generally under the best conditions, the shortest transmission times are satisfactory; but under poor conditions the longer transmission times are necessary. Under different band conditions one type of transmission, like Robot or Scottie, may be best suited for the present conditions. So many modes and speeds have been developed to meet the conditions found on the ham bands.

Color slow scan pictures were first achieved by using digital scan converters with three memory banks. The color picture was broken down into three black and white frames, one each containing the red, green, and blue information. Each of these frames was transmitted sequentially as black and white slow scan pictures. The receiving scan converter put each frame into its appropriate memory, then combined the output into a single color picture. A black and white camera overlaid with red, green, and blue filters was used to produce the three frames.

This early RGB frame sequential system later evolved into a line sequential system (red line, green line, blue line) for a single frame color system. All three lines of red, green, and blue are then combined to produce a color line at the receiving converter.

In the early 1980's Robot Research, Inc. introduced the Robot Color System. In this system, black and white picture information as well as chromance and luminance information is sent for each picture line. A single line is sent for each line of the picture. A more recent entry is the Amiga AVT mode introduced in the late 1980's. Other currently used line sequential modes include the WRAASE, SCOTTIE, and MARTIN modes. Each of these has many frame rates (speeds) available.

THE ROBOT 1200C

In 1985 the Robot 1200C high resolution color scan converter was introduced by Robot Research Corporation, and it quickly became the standard for SSTV. The original 1200C operates with Robot single frame color, or black and white pictures. It has four different frame rates for both color and black and white, can store one high resolution color picture, or two low resolution pictures, or six black and white pictures. The high resolution format is 256 pixels wide by 240 lines by 262,144 colors. The Robot scan converters all employ vertical initial signaling (VIS); which is a signal encoding technique to automatically switch the receiving Robot from standby into the correct receiving mode and speed. At the conclusion of a picture transmission, the Robot is switched back into standby. In this fashion these scan converters receive SSTV pictures automatically. Today's SSTV systems are mostly copies of the Robot 1200C, or extensions and expansions of the unit. The VIS system is also widely copied in other systems. The heart of the 1200C is an Intel 8031 microprocessor. The unit is a self contained, firmware controlled (EPROM), dedicated slow scan converter that is easily interfaced to and controlled by a digital computer. The computer interface is usually done by mateing the 1200C parallel port to an input/output card in the computer. Computer programs written for the 1200C/MS-DOS, Amiga, and other computers are readily available from the authors of the software. The 1200C firmware, contained in an EPROM, has been enhanced over the years by various hams. Today the 1200C can be refitted with a new EPROM and larger RAM chips so that the unit will hold four high resolution pictures, and operate in any of six different modes with eight different speeds for each mode. The video output can be viewed on a RGB analog monitor, a composite monitor, or a TV set. Pictures are received and displayed in real time. They can be snatched using a black and white camera, or a color camera like a camcorder.

Computer control of the 1200C is accomplished by interfacing its parallel port to an input/output card in the computer. Software written by many hams is available which allows the computer to control the 1200C through its built in command set. The computer can read from, and write to, the 1200C. Pictures can be transferred from the 1200C to the computer memory in digital form for image processing or saving to disk. Pictures on disk can be retrieved and sent back to the scan converter. This provides for very innovative handling of the video material.

Clones of the 1200C have been produced with much success. The first of these was the Ribbit clone from Canada. The LM-9000 was developed in Australia, and the NS-88 was developed in Japan. All of these are home made copies of the 1200C. PC boards for building these units are available from the hams who originally developed these clones.

SCOTTIE MODE

The 1200C can be fitted with a "Scottie" EPROM. This chip will give the ability to operate in Robot, Wraase, and Scottie modes. The Scottie mode is GBR line sequential, with a 4x3 aspect ratio. It is a synchronous system (like FAX) and is more noise immune than those that depend on line sync pulses. This EPROM contains a complete paint program, screen graphics, image processing, cut and paste routines, and is completely mouse controlled. It allows the 1200C RAM to be upgraded with 256K chips so that four high resolution pictures can reside in memory. A multi-eprom pc board with a software switch is also available to allow up to six different EPROMs to be selected.

MARTIN MODE

The "Martin" EPROM will allow the 1200C to operate in Robot, Wraase, Martin, Scottie, and AVT modes. The Martin mode is GBR line sequential, has 4x3 aspect ratio, and is a synchronous system. This chip allows access to the Robot screen graphics by use of the unit's front panel touch pads. It also allows the RAM chips to be upgraded in order to handle four high resolution pictures in RAM.

THE AMIGA AVT MODE:

The Amiga computer with its extensive graphics capabilities has been used as the platform for an excellent computer based SSTV system. Software and a parallel port interface box developed by Ben Blish Williams, AA7AS, allows the Amiga to emulate the 1200C, and also provides a new mode, AVT. AVT is a synchronous system with no sync pulses. It has all of the advantages of using a computer, such as saving pictures to disk, image processing, and graphics. It is a bit more complicated to operate than a dedicated unit like the 1200C. The addition of a frame grabber to the Amiga gives the system the ability to snatch pictures. The number of pictures that can be held in memory is limited by the amount of RAM installed in the computer. Pictures can be saved to disk, and then retrieved easily. In some AVT modes the Amiga does afford higher resolution (320X200) than does the 1200C. The video display of this system can be as good as the 1200C when it is equipped to display 262,000 colors. A received picture scrolls down the screen in its black and white format; then the software converts it to a full color picture. The software is laid out so that windows are pulled down, or up, to select the available functions and operating modes. A mouse is used to click on icons to make the selections in the program. The current software will support all of the current SSTV modes, and also provides all of the previously used modes (55 modes). It uses the VIS codes for automatic picture reception, and the AVT modes have a header for the same purpose.

COMPUTER SSTV :

The earlier IBM/MS DOS computers were not as adaptable to SSTV because the display of these machines did not have a sufficiently large color pallet. These computers have long been used effectively with various programs for black and white slow scan. Today VGA display adapters with 15 bits/pixel now provide 32,768 different colors and 24-bit color boards are now available.. Current software [ViewPort VGA by John Montalbano - KA2PYJ] is now near the Robot 1200C for color SSTV quality. Commercially available multi-mode interface units are obtainable, and software to run color SSTV is also available. Previously these units did not allow for the same picture quality as the 1200C [18 bits/262,144 colors] or the Amiga AVT because of a limited color pallet. of the display. However, today the computer expanding color graphics video capabilities appears to provide a cost effective trend for increasing SSTV applications.

Other computers like the Radio Shack TRS-80, the Tandy Color Computer, the Commodore 64/128, and the Atari computers can all be used as stand alone SSTV systems when run with the appropriate slow scan programs for each computer. Generally all of these are black and white only systems because of memory limitations of these computers. Some computers like the Atari are being used for color slow scan, but have lower resolution. The Apple Macintosh computer is very well suited for SSTV, but no one has authored appropriate software for it yet. In Europe the British Spectrum computer, and the BBC computers have been used extensively for black and white slow scan.

THE SC-1 & SC-2 SCAN CONVERTERS :

These are commercially built German scan converters designed by Volker Wraase, DL2RZ, and the units are marketed by Wraase Elektronik. These have become the standard scan converters in Germany, and in most of Europe. Both are high resolution full color converters. The earlier SC-1 contained the first line sequential single frame color mode (GBR); thus that mode is called "Wraase" or "SC-1" mode. The newer SC-2 operates on all of the Wraase modes, as well as black and white, and the Martin modes. These units can be equipped with a companion keyboard for adding graphics to the pictures.

TYPES OF TRANSMISSIONS (MODES) :

1) Black & White 8, 16, 32 - Seconds per frame
2) Frame Sequential Color - red, green, then blue frames
3) Robot 8/12, 12/24, 24/36, 36/72 - B&W/Color Robot speeds
4) Wraase 8/24, 16/48, 32/96 - B&W/Line sequential color
5) Scottie S1, S2, S3, S4, DX mode - RGB line sequential
6) Martin M1, M2, M3, M4 - GBR line sequential color
7) AVT 24, 90, 94, 188 - RGB line sequential color, 125 sec B&W

Note: The B&W and Wraase modes are 1x1 aspect ratio
Robot, Scottie, Martin, and AVT are 4x3 aspect ratio

SLOW SCAN FREQUENCIES IN THE HAM BANDS :

3.845, 7.171, 14.230, 14.233, 21.340, 28.680, & 144.5 MHz
SSTV Nets meet Saturdays on 14.230 at 1500 GMT and 1800 GMT

TYPES OF SLOW SCAN EQUIPMENT

Robot 70/80, SBE Scanvision, Venus SS2 - P7 8second B&W gear.
Robot 300, 400 - B&W 8 second low resolution scan converters.
Robot 400C, 450C - Color low resolution scan converters.
Robot 1200C - Color high resolution scan converter. Clones of the 1200C are the Ribbit, LM-9000, and NS-88
Amiga AVT - Color high resolution computer based system.
IBM/MS-DOS - B&W or medium resolution color computer systems.
ATARI Computers - B&W, or medium resolution color systems.
Commodore 64/128, TRS-80, Tandy Coco - B&W low resolution

NOTES :

1- Robot Research Corporation
5636 Ruffin Road, San Diego, CA 92123

2- A suitable I/O card for the IBM/MS DOS computers is the Metra Byte PIO-12 card available from :
MetraByte Corporation, 440 Myles Standish Blvd.
Tauton, MA 02780
Other sources for I/O cards : G3OQD and VE3DUO

3- 1200C/MS DOS Software available from :

"HI-RES"
Tom Jenkins N9AMR
5968 South Keystone Ave., Indianapolis, IN 46227

"GEST"
Torontel Technology Systems, Ltd.
94 Sackville Street, Suite A, Toronto, Ontario
Canada M5A 3E7

"SCAN"
Bert Beyt W5ZR
301 Tampico Street, New Iberia, LA 70560

"SSTV by KC5VC"
Garnett Bebermeyer WB0UNB
15 Almeda Court, Fenton, MO 63026

"IMAGE"
George Isley WD9GIG
746 Fellows Street, St. Charles, IL 60174

4-1200C/Amiga Software to control 1200C with Amiga:
Tom Hibben KB9MC
Mule Hollow Road, Box 188, DeSoto, WI 54624

5- Scottie EPROM available from :
E. T. J. Murphy GM3SBC
65 Silverknowes Crescent, Edinburgh EH4 5JA
Scotland U.K.

6- Martin EPROM available from :
Martin Emmerson G3OQD
6 Mounthurst Road, Hayes, Bromley
Kent BR2 7QN, England U.K.

7- Ribbit scan converter boards from :
Brian Summers VE3DUO
336 Goodram Drive, Burlington, Ontario
Canada L7L 2K1

8- LM-9000 scan converter boards from :
John Wilson VK3LM
R.M.B. 4201A, Tallangatta Valley 3701
Australia

9- NS-88 scan converter boards from :
Munaki Yamafuzi JF3GOH
P.O. Box 670, Osaka 531, Japan

10- Amiga AVT system available from :
Advanced Electronic Applications, Inc.
P.O. Box C2160, 2006 196th Street S.W.
Lynnwood, WA 98036

11- Computer stand-alone SSTV software available from :

Kinney Software C-64, C-128, IBM/MS DOS, Tandy
974 Hodson Road, Pownal, ME 04069

Software Consulting Group IBM/MS DOS
1303 South Ola Vista, San Clemente, CA 92672

John Tuttle K1UTI IBM/MFJ-1278 color
Barrington, NH 03825

John Montalbano KA2PYJ [ViewPort VGA] IBM/MS DOS
10646 106th Place, Carmel, IN 46033

A & A Engineering Interface for KA2PYJ program
2521 West LaPalma, Unit K, Anaheim, CA 92801

John Langer WA2OYT Atari color
115 Stedman Street, Chelmsford, MA 01824

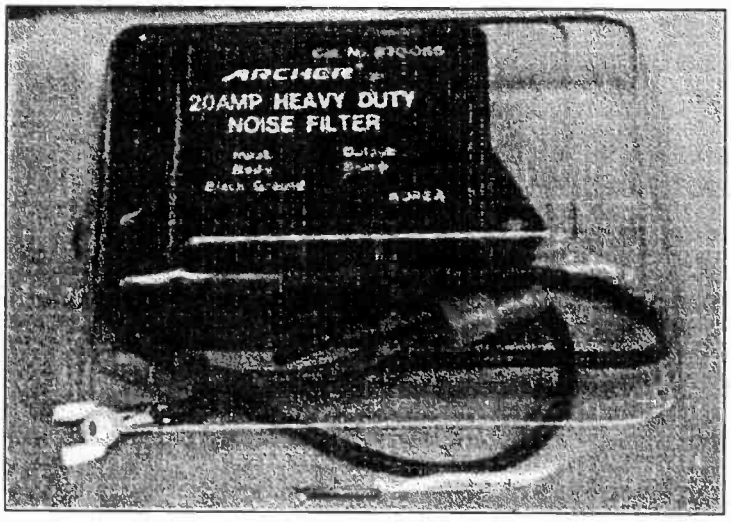
Robert Gendron VE2BNC Atari color
315 6025 Croissant Brodeur, Brossard, Longueuil
Quebec J4Z 1Y8, Canada

Atari Microcomputer Network Atari
John Adams KC5FW
17106 Happy Hollow, San Antonio, TX 78232

12- SC-2 scan converter available from :
Wraase Elecktronik
Kronsberg 10
D-2300 Altenholz, Germany

VIDEO and AUDIO IMPROVEMENT TO ATV REPEATERS

Have you ever looked at the power supply line to the power amplifier on your atv transmitter? Got lots of sync? Ours did. The cure was a Radio Shack 20 amp alternator-hash filter hooked up backwards in the 12 volt line to the amplifier.



Prior to this filter being installed the square corners on sync, stair-step and other test patterns with square pulses were typically sloped to one degree or other Sync buzz got into the audio not due to too high video levels but from common mode coupling through the power supply lines. After the filter was installed the square corners were square and the buzz in the audio went away. The exciter (PC Elect. KPA5) was left on the supply side of the filter since. I suspect the sync on the supply line was causing the slope due to undesirable feedback to the exciter. The filter cleaned up several little problems and deficiencies that made it worth the 20 dollars it cost.

On our amp, it dropped only .3 volts with black burst video so it didn't cost us any significant power. We are using a separate aural transmitter running 5 watts from the same 13.8 volt supply. Hence the cleaned up sync vbuzz in the audio. This 5 watt transmitter is then diplexed with the visual (50 watt sync tips) to a single antenna.

The power supply is a ferro-resonant 30 amp supply. With only seven components it is extremely reliable and over rated for its use here (One transformer, 2 diodes, 3 caps and a choke) Its regulation is better than 2 percent, not quite as good as a linear or switching supply but more than adequate for this application and much more reliable. Resonant supplies are far better in suppressing transients than other types as well. On the down side, it weighs over twice as much as others of similar capacity and is slightly larger. de John WBØCMC

PERRY FLORIDA FIRE

(An Uncooperative Effort)

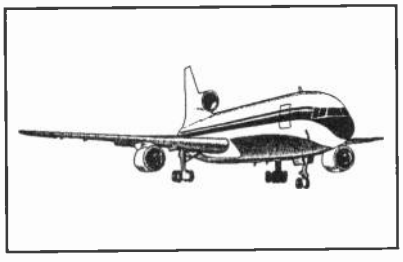
by Robert C. Cline, WB2NGZ

It started early on the morning of 05/26/92 with the Department of Forestry needing live TV of the 400 acre, out-of-control fire, before the fire reached perimeter roads which could act as fire blocks to know where to put crews to widen the gaps. RACES and ARES people were called into action and an emergency net was opened on 7.725 MHz.

I was contacted by George Thurston, W4MLE, the North Florida EC at 1030 hours and asked to help the department of Forestry with live coverage of a 400 acre fire in the Perry, Florida area. I suspected that George had received information of our capabilities as a result of our local VARECS S.E.T. exercise the prior Wednesday where the Daytona Beach ATV group had supplied the Communications Center with live remote video from five different remote locations around Volusia County.

I had Vic Leisner, W3LGV on 2 meters and he agreed to go and act as the receiving station. I told the EC, "we have the capability and we're ready to go, all we need is an airplane." He asked me to try to get an airplane and I called 8 pilot friends at Spruce Creek Fly-In and a local CAP pilot friend. All requests fell on deaf ears for one reason or another. The CAP friend told me it would be an impossibility because of insurance reasons and that approval for this type of exercise could only be obtained for a "dire" emergency. I stated that this is a dire emergency. My friend then stated that the CAP interpretation of an emergency is when they fly the mayor of a town over an area that has suffered a disaster.

I'm a slow learner but I was beginning to believe that this was going to be a red tape day of all red tape days. Before I hung up I got the phone number of CAP headquarters, I knew that when they heard the circumstances they would grant immediate approval for a non-CAP individual to be transported in their aircraft. I then got on 145.230 at the request of Fred Garrett, N4NVW, in Altemonte Springs and gave him the phone number for CAP headquarters. I knew that I wasn't in a position of authority to be requesting an aircraft from the CAP.



I was advised by George Thurston that the ARES net was in session on 7.275 MHz. and that Fred and I should QSY to coordinate activities. After checking in the net Vic, W3LGV, remained in contact on 2 meters and drove to New Smyrna Beach Airport to see Jerry Lambright, KD4BOJ, an ATV'er, certified pilot and certified A&E whose plane was out of service but he could rent a little Cessna 172. So we had two certified pilots, who were both ATV'ers and were ready to go. All we needed was authorization for reimbursement for aircraft rental fees.

I contacted net control, Bill Crandall, KM4AE and explained the situation and, long story short, nobody was prepared to authorize any expenditures of money. I began to wonder how much of an emergency we were really talking about here. Perhaps the western side of Tallahassee would have to burn before it became an emergency!

During the balance of the day CAP agreed, then recanted. Office of Emergency Management agreed, then recanted.

During this period someone came on the net and suggested that Vic and I meet the CAP at the Spruce Creek Airport, transfer our ATV equipment to their aircraft and the CAP would fly to Gainsvllle where they would assemble our ATV equipment and then journey on to Perry to do the video work. Net control, Bill Crandall, replied, "You mean you want the fellows from Daytona Beach to turn over their tv equipment to the CAP and have them operate the ATV transmitters, downconverters and receivers?"

The answer was, "Yes, that's the idea." I could tell Bill was choking back the tears but he told the station to stand by and said, "Bob, WB2NGZ, if you copied that, what do you think?" I said, "Well Bill, we've discussed the proposal on 2 meters and we all agreed that it would take a minimum of ten martinis EACH to agree to THAT idea. Bill replied, "Roger Bob, I copy that!" At this point it became evident to me that Los Angeles Police Chief Darryl Gates was in some way involved in the chain of command for this operation.

When it became clear that the efforts of many, well meaning amateurs, was being stonewalled about 1630 hours) and that darkness would soon prevent any efforts on this day I offered to drive up to Perry with 3 ATV'ers, leaving at 0400 to do the job if they could assure me at 0300 that we would still be needed. It was agreed, and I was given a department of Forestry phone number that could verify that we were needed at 0300.

After dinner I told my wife that I would be going to Tallahassee at 3 AM to do some video work for the Department of Forestry. She just shook her head, not up and down...side-ways. She had been through many of these adventures with me in the past. It's been a long 33 years for her!

At 2200 hours I called George Thurston in Tallahassee to verify that we were still needed in the morning. At 0300 hours I called the Department of Forestry in Perry... we were definitely needed and I rallied the troops: Vic Leisner, W3LGV: June Leisner, N4DWF; Wes Davis, WD8JTJ; and Alice Davis, WD8JTK (all experienced ATV'ers). We were on the road at 0355.

PERRY FLORIDA FIRE

None of us had had more than 4 hours sleep. I was traveling in the wrong direction, at the wrong time, to report for jury duty in Daytona Beach at 0830 hours. Alice was going to miss her doctors appointment at 1000 hours.

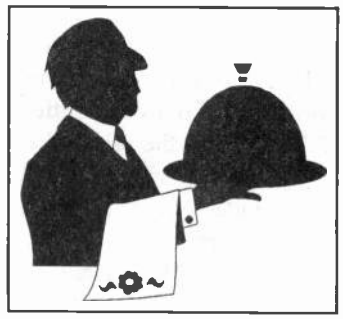
The 4 hour drive to Perry was uneventful barring the screams from the back of the van. I've always been a little heavy footed on the accelerator and route 40 is littered with little towns interspersed with 55 and 65 MPH speed limits. When I reached the outskirts of small towns, which to appear out of nowhere in the darkness, someone from the back of the van would yet, "35" or "45" whatever the posted speed limit was and I would slow down. They took turns giving me speed limit advisories! Things reached the ultimate state of decay when Wes Davis wondered how many square acres there were in a square mile. Everyone took a stab at a solution but none were correct. I didn't expect that they would under these conditions but nobody careed. It was just something to keep us from lapsing into a total coma. Vic was in the co-pilots seat and he turned to be and asked in a whiny voice, "Daddy, when are we gonna be there?" The remark brought back fond to all of us. We were going to the retirees Disney World!

At 0715 we contacted the Races people on the Perry Repeater. Thank God, we had made it," said W4MLE. KC-4KWM came out to intercept us and lead us to the DOF office. Upon arrival we were told by the DOF director, Larry Harrington, that his request had been canceled yesterday, that the fire was now out of control (1400 acres) and the only thing that would stop it was rain! Larry, I said, I called YOUR dispatched at 3 this morning and he said we need you guys up here NOW! Larry shrugged his shoulders.

The ATV group was standing behind me. I was afraid to turn around to look at them. I knew what they were thinking. I though about the long ride home with four tired folks that I had gotten involved in nothing! I was going to take some abuse during the next 4 hours on the road back to Daytona Beach. I've been in that spot before so it wouldn't be a new experience for me.

I thought that we had suffered enough, but was wrong! Larry then suggested that since we were already there, How would we like to engage in a simulated exercise! I could feel eight eyes stabbing simulated darts in my back. You'd be surprised how painful that can be. Trying to maintain some semblance of professionalism I respectfully declined.

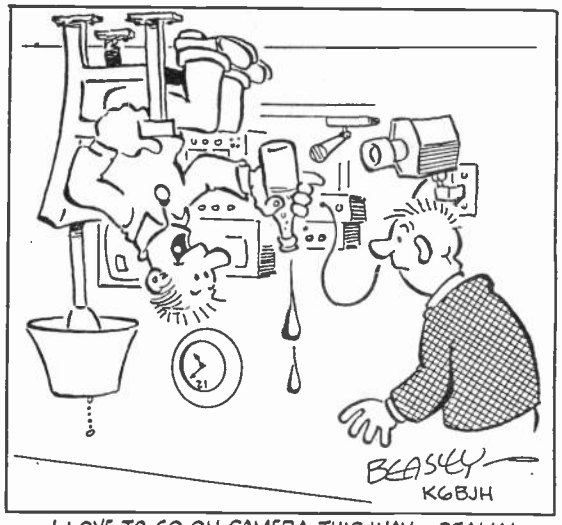
Another 4 hour drive and we were home. On the way we stopped at Rod and Crickets in Astor for lunch. My God, is it only lunch time I thought? Everyone commented, in one way or another, how nice this "free" lunch was going to be. I begged that it wasn't my fault but they weren't buying it. When the check did come I did, however manage to lapse back into a coma and I got away with it Well almost, they divided the check by six and they wouldn't accept that I was not a couple!



I could have fallen asleep in the driveway but I made it to the bed. Well almost, my wife had come home early from work and was cleaning the house and she hadn't finished with the bedroom. "Give me 15 minutes," she said. Why not I thought it's all part of the adventure. While she cleaned she told me about four things that had happened while I was gone. I pretended to listen but, of course, I wasn't.

Have I learned my lesson? Probably not. I suspect that most amateurs who have been involved in emergency work for most of their amateur careers would feel the same. At any rate, I hope so. We're a pretty sturdy group even in the face of severe non-cooperative efforts. Many of the RACES/ARES members who have been administrators and managers have suffered similar bewilderment with bureaucracy. I'm been a RACES "worker bee" for more than 25 years and the pain is no less severe.

I ENJOYED HENRY'S ATV DEMO, BUT I'M CURIOUS WHY HE MOUNTED THE MONITOR ON THE CEILING?



I LOVE TO GO ON CAMERA THIS WAY--REALLY BLOWS THEIR MINDS!

ATV SECRETS FOR ASPIRING ATV'ERS

Volume I

If you enjoy ATV and would like more information about ham TV then you should order Volume I of **ATV SECRETS.** Volume I is a non technical guide to everything you ever wanted to know about ham TV but didn't know whom to ask. Volume I includes clear easy to understand explanations of all aspects of HAM TV. Twenty five topics cover television theory, with accurate charts and useful information about video and ham TV operations. Like ATVQ, **ATV SECRETS** Volume I is highly illustrated with over 110 photos, charts and diagrams. **ATV SECRETS** is entirely new and includes information not available anywhere else.

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A GREAT CHRISTMAS GIFT FOR THAT SPECIAL PERSON IN YOUR LIFE!

from the publishers of ATVQ

"I AM JOE'S ANTENNA"
An untrue tale about some tall truths.

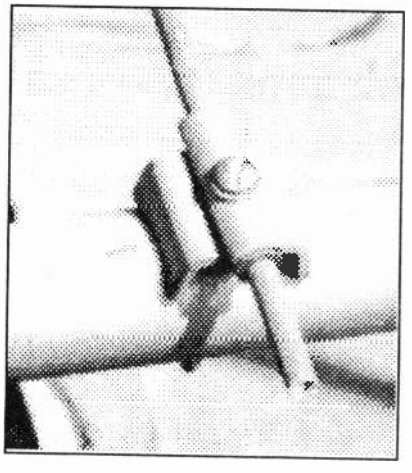
"Joe" doesn't talk to me much, but without me he can't talk at all! I am Joe's antenna and I have a few things to say about how I'm treated. Left alone in the dark, left outside in all kinds of nasty weather, and never even a coat of paint. The only bath I get, is from the acid rain and snow.

Joe Ham bought me at a hamfest or his local radio store. After a few weeks or months kept in a tiny cardboard box I wasn't sure where I was. Joe took me out and tried to put me together. My pieces were scattered about and often Joe didn't take the time to use the right tools, just a pliers which chew up my nuts and gouge my arms and legs. Joe never bothers to follow the instructions so I am out of tune. Some of may parts got lost and then Joe just left them out or substituted cheap or wrong size parts. I hate it when he cross threads my screws and nuts! I get over-heated from the VSWR as I try to get Joe's signal into the air. Sometimes Joe uses more power than I can handle and that really makes me hot! My shorter cousins with coils have even a harder time with that.

Joe never heard of lightning protection either. Here I am, stuck up in the air, some times over a 100 feet above the ground, and Joe doesn't even provide me with a ground rod. I have to take the lightning strikes with no help at all and then Joe wonders why I just go to pieces and fly around his yard! He should try holding on with 30,000 amps or more of DC going through him!

Joe is never happy with the work I do. He always complains that I don't have enough gain. Of course if he had followed the instructions and used me on the resonant frequency for which I was made he would find I have lots of gain. I was made for the high end of the band, and he wants me to work on the low end of the band and I am just too short! I can't reach that low from way up here! Joe doesn't know anything about gain/bandwidth limitations of Yagi antennas.

So Joe bought a bigger amplifier and pushed me even harder. I'd like to see him work 25 MHz. below his design frequency! It's enough to melt my silver contacts and then I can't "hear" at all! Most of his extra power is used to keep me nice and warm because I'm not resonant at his frequency.



Joe doesn't think much of my side lobes. Then again, Joe is so fat, I don't think much of his side lobes either! If Joe had put me together correctly, my side lobes would have been very attractive, but he mounted me with a metal pipe going right up my middle instead of using fiber-glass, or using me in the right polarization. If he wanted a vertical beam why did he buy a horizontal polarization beam? Doesn't he know the mast pipe is in the radiation field and distorts his view of my pattern? Maybe I should get Joe Glasses!

Well, Joe took me down the other day and added some friends of mine. He hooked us all up together. Joe says if one antenna is good, four are better. Joe is normally right but this time he didn't match the cable lengths and the spacing between me and my neighbors is all wrong. When I'm pushing, some of my neig-bors are pulling. If Joe had used matched electrical length coax, we could be working together. We need to be with 30 degrees or better but Joe bought some bargain coax at the hamfest and didn't even use the same type to connect us together. Some of us are being feed RG 8 and some 9913 and my cousin Vinny only got a used piece of RG58.

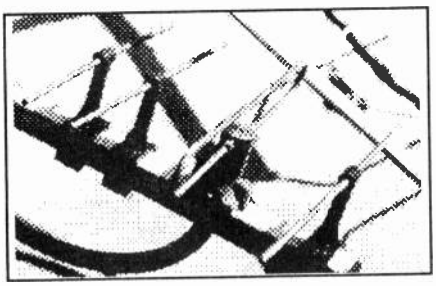
Joe wasn't very good at getting the connectors on the cable right either. He used cheap connectors, and all are not the same type. Joe doesn't know about connectors, to him a UHF is a UHF is a UHF. Someone should tell him that different dielectric materials cause different velocity changes and that also affects the phase of his array and how I see my neighbors. Then Joe tried to make some home brew connectors from used copper pipe.

I AM JOE'S ANTENNA

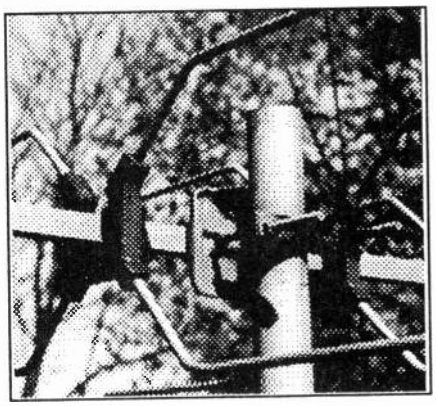
These don't match any useful impedance but Joe is a cheap guy. He spends $800 on antennas then only $.50 for a connector! Not to mention his used coax collection. Some of it is so old that its green! And I'm not talking moss here.

Joe didn't bother with a $4 bottle of protection either. Here I sit, $800 of hard earned money now transformed into aluminum and Joe is too cheap to buy a can of Krylon clear spray or other protection varnish to keep me young and beautiful. Its no wonder I wound up in the trash at the ripe old age of 4! Thats me in the (shudder) trash pile by the roadside. Not even the dignity of a trash can to hide my weather beaten scars (sniff).

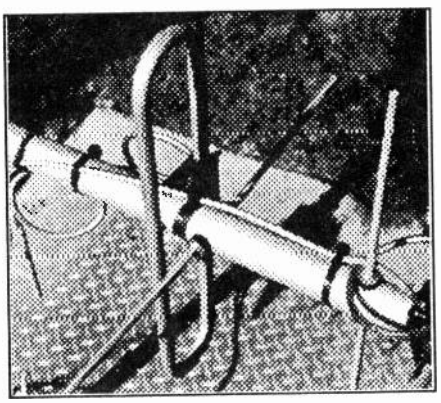
Of course, Joe bought a lot of different antennas. My ancestors made me from soft aluminum for arms but good aluminum for legs and body. My boom and supports are still good, but my arms are all brittle and falling off. Big Daddy at the factory says I was probably exposed to too much wind vibration. I'm also very pitted and corroded. Well, with luck I'll be back as a Pepsi can!



My little brother from France is still in top shape. His copper arms were covered at the factory with a tough weather and sun resistant varnish and he looks as good as new. His plastic parts needed UV protection and with the Ozone layer going away his plastic parts became brittle from too much sun.

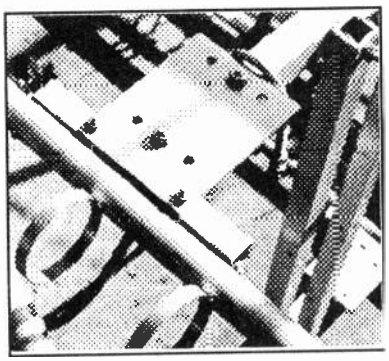


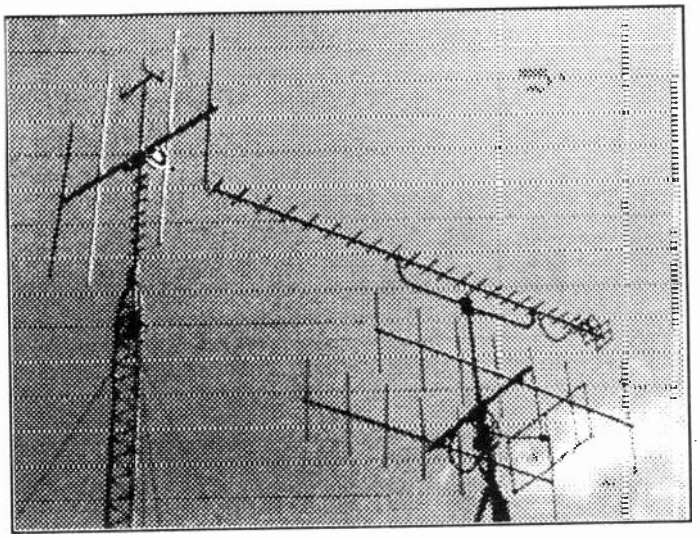
My English cousin Loopy, is a little better off. His big problem was large birds that would sit on his head and flatten him like a pancake. His loops were all bent flat, but his hardware was mostly ok, just some rust on his brackets, but the thin boom was never made for American 747 crows and Grackles! He had some support for his spine but not for his ends which caused him to meet his end early in life. He is getting a second home and some bionic parts to extend his useful life.



My brother-in-law from California enjoys the wild life. He spent his last 4 years on a fast car watching fast video and living life in the fast lane. Despite all that, he managed to survive with no visible ageing. Must be that California la la land laid back attitude....no stress in his life! He still looks like new! Even his hardware is shiny!

My sisters from Maine also have been doing well. They must have used a lot of make-up because I don't see any oxidation or rust on their parts. Why if we weren't related, I might ask them for some close companionship. But being from 1265 land, they are already very close to each other and I'm way down here at 144. I'd just be in their way! Besides, I have a hard time with a lot of my legs cut off at the knees.





Joe is putting up a new array. I won't be joining my relatives as the trash man is taking me away. The factory told Joe, they could send new legs and arms for me because I wasn't supposed to die so young, but Joe decided to replace me with a newer and more powerful antenna. And Loopy is going away too. Joe bought 8 new antennas. Says he wasn't going to let the birds fold her up again and his new antenna doesn't have loops. Joe should have bought an owl to keep the birds off me.

So don't be like Joe. Protect your investment in your antenna. Use the right tools, the right connectors and the right hardware. Use good coax to connect your radio to me and make sure I can work on the frequency you want. You and I can make the eather part waves if you just take a little better care of me. Thanks Joe!

A tale from Henry KB9FO.

ATV SECRETS FOR ADVANCED ATV'ERS

Volume II

If you enjoy this magazine, and would like more technical information about ham TV then you should order Volume II of **ATV SECRETS.** Volume II is the technical extension of ATV SECRETS Volume I and includes dozens of build it projects for all kinds of video hardware and software, television theory, accurate charts and more useful information about video and ham TV. Like this magazine it is highly illustrated with photos and diagrams. Volume II also includes a large section on FM video, a large section on ATV repeaters and how to build them, detailed technical information on all aspects of ham TV.

NO LIGHTWEIGHT

ATV SECRETS Volume II is in its final stage and will be available soon. It is currently over 200 pages long! This is a major effort to produce an encyclopedia of ATV technical information useful for yers to come. **ATV SECRETS** Volume II is destined to be a life long reference book for any video active ham or video hobbist. It includes complete detailed explnations of the NTSC television signal, NTSC color generation and RF transmission. Complete details of the VSB signal and what the real difference is between VSB and DSB video signals. The perfect companion for the technically oriented ham.

Cover price $24.95

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Yes, now that I have gotten my feet wet in ham TV, I would like to know more and get the background technical information that will enable me to fully participate, build, understand and enjoy the technical aspects of ham TV and video. Here is my pre-publication order which entitles me to a $5 discount off the cover price.

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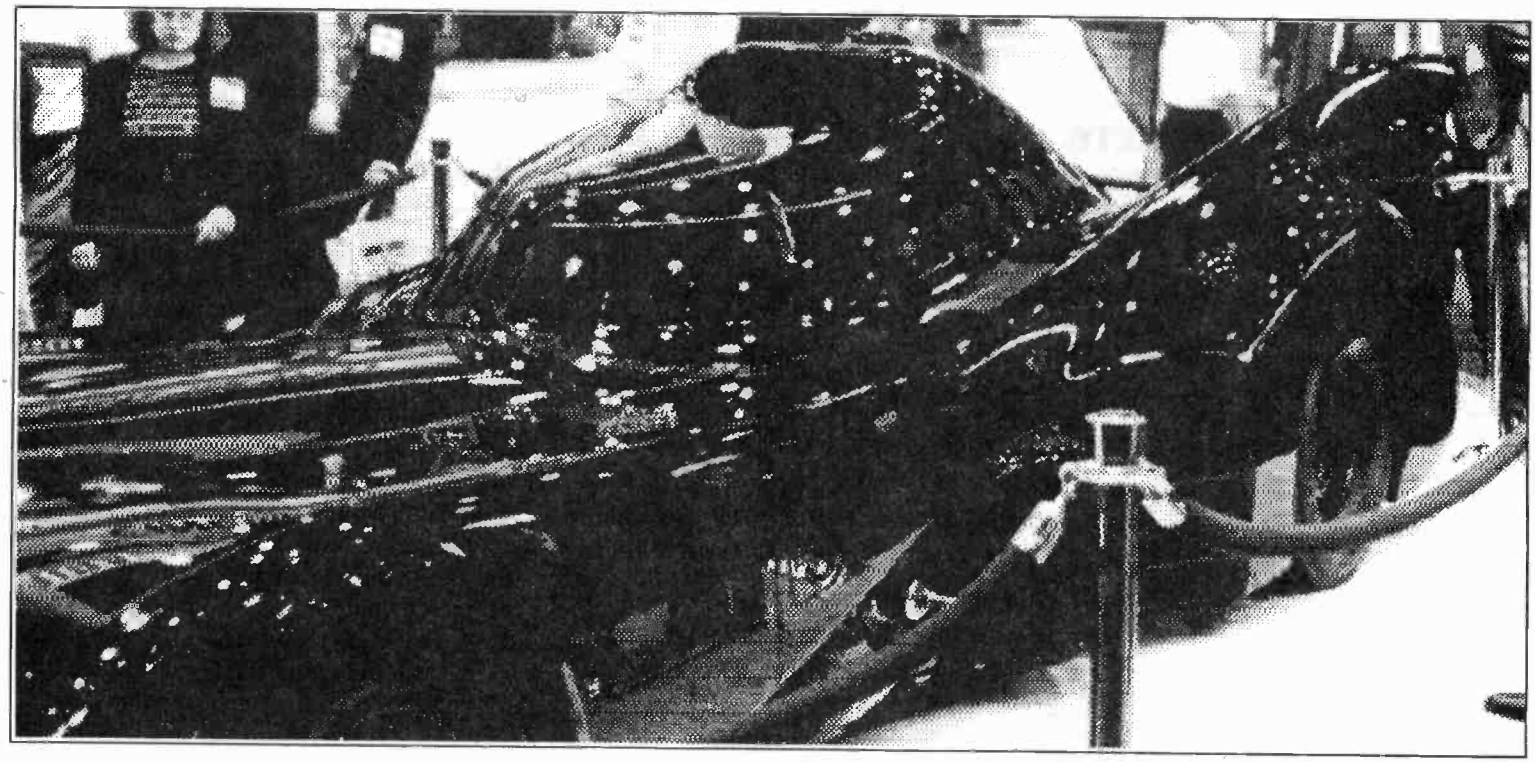
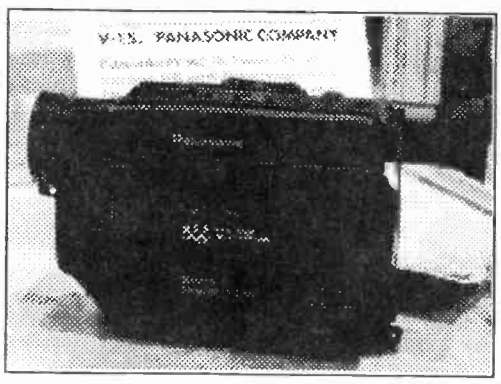
1992 SUMMER CONSUMER ELECTRONICS SHOW

Electronics for everything seemed to be the theme at the 1992 Summer CES. Not much in the way of new equipment or earth shattering developments, but the steady plod of technical progress as things got smaller, fancier and wider. Most major manufacturers featured displays of HDTV TV sets and even a few HDTV VCR's, video of the near future.



Last year we found a collection of new home/prosumer video gear. Fancy switchers, effects units video mixers, sound effects boxes and digital video mixers. This year the same equipment was on display, with only a few changes. The models were mostly the same as last year with a few minor modifications. Old stand-bys as the DirectED edit controller and Vidicraft's collection of enhances and special effects units were hardly unchanged. Looking at last years pictures was about the same as looking at this years equipment.

A few notable exceptions this year. Panasonic introduced some super compact "palmcams" using the S-VHS system with built in zooms up to 20X (pictured). Now its hard to get a steady picture with even an 8 or 10 X zoom lens in a hand held camera but 20 X is very shaky without a tripod, which seems to be an extra item to tote but out of place if you want a very small, very light palmcorder.



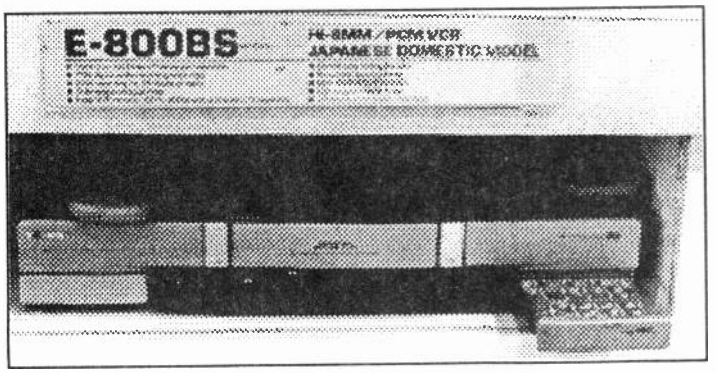
Perhaps to help those who want extreme telephoto and small size, most manufacturers had some form of image stabilizer. These were mechanical or electronic either gyro stabilizing the optical assembly or detecting motion and modifying the image from the CCD to compensate for the motion field to field. Some systems worked much better than others. One unit I tried produced a very difficult to watch field separation as it tried to follow a medium pan motion. You could see the image stepping field by field which made it look like bad 8 mm film.

Image quality continues to improve as does low light. Some cameras were sporting specs of less than .5 Lux. But be careful, it was hard to find anyone who would say how the sensitivity was measured. Lens F stop, zoom position and gain settings as well as what did you get at .5 Lux is the real question. Was it actual peak white at .5 Lux or only a dark smudge above the black level noise of the CCD? Try them before you buy them! Take the camera into the bathroom (if the store will let you) and turn out the lights, or shoot behind the row of TV's on display and see if the noise level is tolerable in low low light.

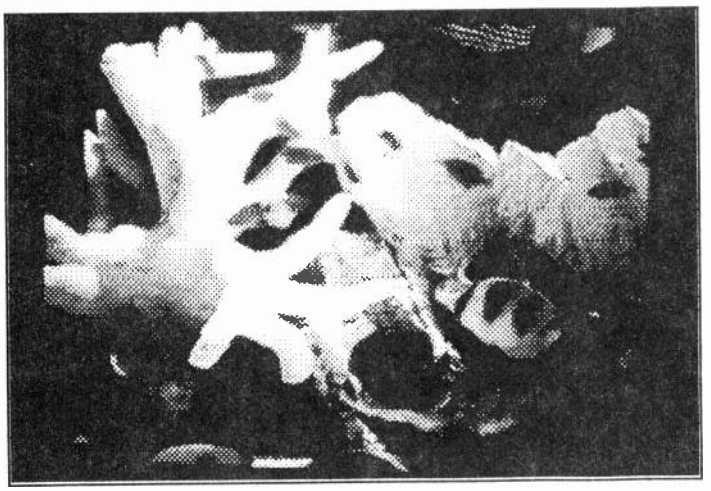
SUMMER CES

In the novelty category was a twin lens camera for instant zoom in. One lens is wide angle, the other a normal zoom so you could go from wide angle to a shocking close up. I always thought that was for editing not on-the-fly. But hey, who am I to judge.

This year was the first year the general public, those who will eventually buy these electronic wonders, were allowed in to the show. For a modest $8, less with a discount coupon at any electronic store, you could come in, see, touch and feel. The biggest attraction, besides the Batmobile (pictured) were the video games. The public, and many a vendor, spent a lot of time playing the video games. It is not known if this was because they are getting too expensive to buy, or if they wanted to practice before taking on their friends when the do buy them later. Game clues were not being given out.



Toshiba had a display model of its hi-8 video home recorder (pictured) which is sold in Japan for the Japanese analog HDTV system. Don't look for any here for a few years. Sony announced that it reduced the IC chip count from 150 to 40 for its HDTV sets and would drop the price from $33,000 to "only" $12,500! They expect to produce and sell 3000 a month. Now you know where all our US import dollars are going!



Of all the HDTV displays, the Toshiba sets seemed to have the best picture. A very large screen (part of the front cover collage) set, about 50 inches, was bright, sharp and rich. Most of the HDTV sets were soft, dim and low contrast. Displays were all driven by laser disc players as there were no HDTV tape machines on hand.

As usual there was NO HAM GEAR on display. Lots of car stereos, regular TV's, boom boxes and trinket gadgets. A few satellite dishes and receivers were on display. I stopped by HTS to let them know what crap the HTS 5 is. Mine had been back 3 times for repair, bad power supplies, bad remote, sparkles even on strong channels (bandwidth problems) which they had failed to resolve. I had just sent it back to a dealer the day before I went to the show and had installed a new sat receiver which is working much better. Now I have to send the "ice" LNB's back because they were supposed to be 20 degrees C band and .7 dB KU band but arrives as 30 and 1. I can't change them out right now anyway because a flock of sparrows has discovered the sat antenna LNB shroud and have built a nest inside. Yes I get ALL THE BIRDS on my sat system! I wonder how they like the rocking motion as I scan the arc?

The best new video item was not even at the show. The Panasonic WJ-AV-50 is a new 4 input digital mixer which combines the best of the WJ-AVE-5 and WJ-MX-12. It has full S input/output, over 200 mix/fade patterns, including effects transitions, digital picture in picture, in varying sizes, which can be moved to any position and the usual "bells and whistles" that the line is known for. What was on display, shown on the cover collage) was the newest versions of the low end of the Prosumer line which only have some of the nice effects and toys.

Sony has yet to bring out a nice prosumer digital mixer/fader/video effects unit. They are still sticking with the edit controllers, paint/titler units and color correctors which have been in their product line for ages. Come on Sony, we want some NEW toys! They didn't even have the CCDV5000 on display (but it is at the Sony store on Michigan Avenue in downtown Chicago) which is the camera used by CNN for the Gulf war video. I have 2 of them and they are GREAT! These are currently in the $2500 range and worth every penny. The only thing you can't do is gen lock, but they are full field TBC/framestore/genuine broadcastable NTSC video output with Hi-8 format, digital noise reduction and much much much more! The flexibility and capability make the Canon A-1, D-1 look like toys. The CCDV5000's also look, feel and operate much more like genuine news/broadcast camcorders.
No, that's a broadcast Sony Betacam CNN is using in the photo, not one of the smaller CCDV5000 models.

The CES likely paid for most if not all of their convention hall costs with the buying public attendance money, so look for this to be a trend in the future. Dealers were also happy to have the customers lusting over the goodies and hope it will turn the lackluster economy up a notch or two as the new products hit the stores this fall for Christmas shopping. 73 KB9FO

A 25/100 Watt UHF AMP for 400-900 MHz!

If you ever wonder what happened to VHF Engineering, the founder, Bob Brown W2EDN, now makes commercial UHF TV transmitters, mostly for non US broadcast applications. Here is his low power solid state driver/PA which is used to drive multi-KW power stages in commercial units. The unit will provide a very clean, very linear 25 watts for video/ATV, and a very respectable 100 watts for class C operation. Provided here are a parts layout, schematic and parts list. Note that the heatsink (of your choice) is isolated from ground!

No other information was provided but maybe Bob will supply PCB's ready for stuffing. Write to Browning Labs, 8151 NW 74th Ave., Miami, FL 33166. 305 885 3356. VHF Engineering made kits and ready-made units including a rack mount ATV tx for under $400, which had 10 watts output. A few of these are still to be found at hamfests.

PARTS LIST

DRAWING # 402-037, 403-031
PROJECT: P.A. 25 U. SHEET 1 OF 1
REV: "B" DATE: 1/30/92

ITEM	DESCRIPTION	PART #
C1,C2,,C8,C9	CAP. 200 pF ATC	170-0202
C3,C7	CAP. 4.7pF ATC*	170-0470
C4	CAP. 10pF ATC*	170-0101
C5	CAP. 18pF ATC*	170-0181
C6	CAP. 12pF ATC*	170-0121
C10, C13	CAP. 47pF ATC	170-0471
C11, C14	CAP. 1000pF ATC	170-0103
C12	CAP. 1000pF 10 VDC	140-1103
C15	CAP. 1uF, 35V, TANT.	150-2100
C16, C18	CAP. 0.001 uF, FEED-THRU	190-10103
C17	CAP, 3.3pF NPO	110-0330
R1	RES. 47, 1/4W	201-0471
R2	RES. 1K - 10 TURNS POT.	215-0104
R3	RES. 47K, 1/4W	201-0474
R4	RES. 2.7K, 1/2W	202-0273
R5	RES. 0.22, 5W	205-1220
R6	RES. 10K POT	215-0105
R7	RES. 100, 1/4W	201-0102
L1, L9	RG 316	737-0016
L2, L5	MICROSTRIP LINE, 30 MILS	N/A
L3, L4, L6, L7	MICROSTRIP LINE, 20 MILS	N/A
L8	MICROSTRIP LINE, 50 MILS	N/A
RFC1, RFC2	WIRE 5T, #20, 202-0561 FORM	733-0020
Q1	TRANSISTOR MJE-180	420-0180
Q2	TRANSISTOR MJE-2955	420-2955
Q3	TRANSISTOR SD-1490-1	430-1490
D1	DIODE 1N60	410-0060
J1, J2	JACK UG-535/U	710-0140
P.C. BOARD	404-034	

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Applicant is credited for:

	Elements	1(A)	1(B)	1(C)	2	3(A)	3(B)	4(A)	4(B)
A. CIRCLE CLASS OF FCC AMATEUR LICENSE HELD: N T G A		(NT)	(GA)		(NTGA)	(TGA)	(GA)	(A)	
B. CERTIFICATE(S) OF SUCCESSFUL COMPLETION OF AN EXAMINATION HELD:		Date Issued	Date Issued	Date Issued	Date Issued	Date Issued	Date Issued	Date Issued	Date Issued
C.1. FCC COMMERCIAL RADIOTELEGRAPH OPERATOR LICENSE: 2. ELEMENT CREDIT; PHYSICIAN'S CERTIFICATION:	See Inst. on page 4.								
D. EXAMINATION ELEMENTS PASSED THAT WERE ADMINISTERED AT THIS SESSION:									

EXAMINATION ELEMENTS

E. APPLICANT IS QUALIFIED FOR OPERATOR LICENSE CLASS: ☐ NONE

E1. ☐ NOVICE (Elements 1(A), 1(B), or 1(C) and 2)

E2. ☐ TECHNICIAN (Elements 2 and 3(A))
☐ GENERAL (Elements 1(B) or 1(C), 2, 3(A), and 3(B))
☐ ADVANCED (Elements 1(B) or 1(C), 2, 3(A), 3(B), and 4(A))
☐ AMATEUR EXTRA (Elements 1(C), 2, 3(A), 3(B), 4(A), and 4(B))

F. NAME OF VOLUNTEER-EXAMINER COORDINATOR: (VEC coordinated sessions only)

G. EXAMINATION SESSION LOCATION: (VEC coordinated sessions only)

H. Date of VEC coordinated examination session:

I. VEC Receipt Date:

SECTION I

1. IF YOU HOLD A VALID LICENSE ATTACH THE ORIGINAL OR PHOTOCOPY ON BACK OF APPLICATION. IF THE VALID LICENSE OR CERTIFICATE OF SUCCESSFUL COMPLETION OF AN EXAMINATION WAS LOST OR DESTROYED, PLEASE EXPLAIN.

2. CHECK ONE OR MORE ITEMS. NORMALLY ALL LICENSES ARE ISSUED FOR A 10 YEAR TERM.

2A. ☐ RENEW LICENSE-NO OTHER CHANGES
2B. ☐ REINSTATE LICENSE EXPIRED LESS THAN 2 YEARS
2C. ☐ EXAMINATION FOR NEW LICENSE
2D. ☐ EXAMINATION TO UPGRADE OPERATOR CLASS
2E. ☐ CHANGE CALL SIGN _____ (See Inst. 2E)
Applicant's initials
2F. ☐ CHANGE NAME (Give former name as shown on license)
2G. ☐ CHANGE MAILING ADDRESS
2H. ☐ CHANGE STATION LOCATION

EXPIRATION DATE (Month, Day, Year)

FORMER LAST NAME SUFFIX (Jr., Sr., etc.)

FORMER FIRST NAME MIDDLE INITIAL

3. CALL SIGN (If you checked 2C above, skip Items 3 and 4)

4. OPERATOR CLASS OF THE ATTACHED LICENSE

5. CURRENT FIRST NAME | M. I. | LAST NAME | SUFFIX (Jr., Sr., etc.)

6. DATE OF BIRTH
Month Day Year

7. CURRENT MAILING ADDRESS (Number and Street) | CITY | STATE | ZIP CODE

8. CURRENT STATION LOCATION (Do not use a P.O. Box No., RFD No., or General Delivery. See Instruction 8) | CITY | STATE

9. Would a Commission grant of your application be an action which may have a significant environmental effect as defined by Section 1.1307 of the Commission's Rules? See Instruction 9. If you answer yes, submit the statement as required by Sections 1.1308 and 1.1311. ☐ YES ☐ NO

10. Do you have any other amateur service application on file with the Commission that has not been acted upon? If yes, answer Items 11 and 12. ☐ YES ☐ NO

11. PURPOSE OF OTHER APPLICATION

12. DATE SUBMITTED (Month, Day, Year)

CERTIFICATION

I CERTIFY THAT all statements herein and attachments herewith are true, complete, and correct to the best of my knowledge and belief and are made in good faith; that I am not a representative of a foreign government; that I waive any claim to the use of any particular frequency regardless of prior use by license or otherwise; and that the station to be licensed will be inaccessible to unauthorized persons.

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT, U.S. CODE TITLE 18, SECTION 1001, AND/OR REVOCATION OF ANY STATION LICENSE, U.S. CODE, TITLE 47, SECTION 312(A)(1) AND/OR FORFEITURE, U.S. CODE, TITLE 47, SECTION 503.

13. SIGNATURE OF APPLICANT: (Must match Item 5)

14. DATE SIGNED:

(OVER)

FCC Form 610, March 1992

Attach the original license or photocopy here

SECTION II-EXAMINATION INFORMATION

CERTIFICATION BY ALL VE's

I CERTIFY THAT I have complied with the Administering VE requirements stated in Part 97 of the Commission's Rules; THAT I have administered to the applicant and graded an amateur radio operator examination in accordance with Part 97 of the Commission's Rules; THAT I have indicated in the Administering VE's Report the examination element(s) the applicant passed; THAT I have examined documents held by the applicant and I have indicated in the Administering VE's Report the examination element for which the applicant is given examination credit in accordance with Part 97 of the Commssion's Rules.

SECTION II-A FOR NOVICE OPERATOR EXAMINATION ONLY. To be completed by the Administering VE's after completing the Administering VE's Report on the other side of this form.

1A. VOLUNTEER EXAMINER'S NAME: (First, MI, Last, Suffix) (Print or Type)	1B. VE'S MAILING ADDRESS: (Number, Street, City, State, ZIP Code)	
1C. VE'S OPERATOR CLASS SHOWN ON LICENSE: ☐ GENERAL ☐ ADVANCED ☐ AMATEUR EXTRA	1D. VE'S STATION CALL SIGN:	1E. LICENSE EXPIRATION DATE:
1F. SIGNATURE: (Must match Item 1A)		DATE SIGNED:
2A. VOLUNTEER EXAMINER'S NAME: (First, MI, Last, Suffix) (Print or Type)	2B. VE'S MAILING ADDRESS: (Number, Street, City, State, ZIP Code)	
2C. VE'S OPERATOR CLASS SHOWN ON LICENSE: ☐ GENERAL ☐ ADVANCED ☐ AMATEUR EXTRA	2D. VE'S STATION CALL SIGN:	2E. LICENSE EXPIRATION DATE:
2F. SIGNATURE: (Must match Item 2A)		DATE SIGNED:

SECTION II-B FOR TECHNICIAN, GENERAL, ADVANCED, OR AMATEUR EXTRA OPERATOR EXAMINATION ONLY. To be completed by the Administering VE's after completing the Administering VE's Report on the other side of this form.

1A. VOLUNTEER EXAMINER'S NAME: (First, MI, Last, Suffix) (Print or Type)	1B. VE'S STATION CALL SIGN:
1C. SIGNATURE: (Must match Item 1A)	DATE SIGNED:
2A. VOLUNTEER EXAMINER'S NAME: (First, MI, Last, Suffix) (Print or Type)	2B. VE'S STATION CALL SIGN:
2C. SIGNATURE: (Must match Item 2A)	DATE SIGNED:
3A. VOLUNTEER EXAMINER'S NAME: (First, MI, Last, Suffix) (Print or Type)	3B. VE'S STATION CALL SIGN:
3C. SIGNATURE: (Must match Item 3A)	DATE SIGNED:

PHYSICIAN'S CERTIFICATION OF DISABILITY

Physician's Address _____

_____
Physician's Name

( )
_____
Office Telephone

I certify that _____ is severely handicapped, the duration of which will extend for more than 365 days beyond the date of this certification. Because of this severe handicap, this individual is unable to pass a 13 (or 20) words per minute telegraphy examination for an amateur operator license. I am licensed to practice in a place where the amateur service is regulated by the Federal Communications Commission as a doctor of medicine (M. D.) or as a doctor of osteopathy (D. O.). See Instructions for FCC Form 610, page 4.

WILLFUL FALSE STATEMENTS ARE PUNISHABLE BY FINE AND IMPRISIONMENT, U.S. CODE TITLE 18, SECTION 1001.

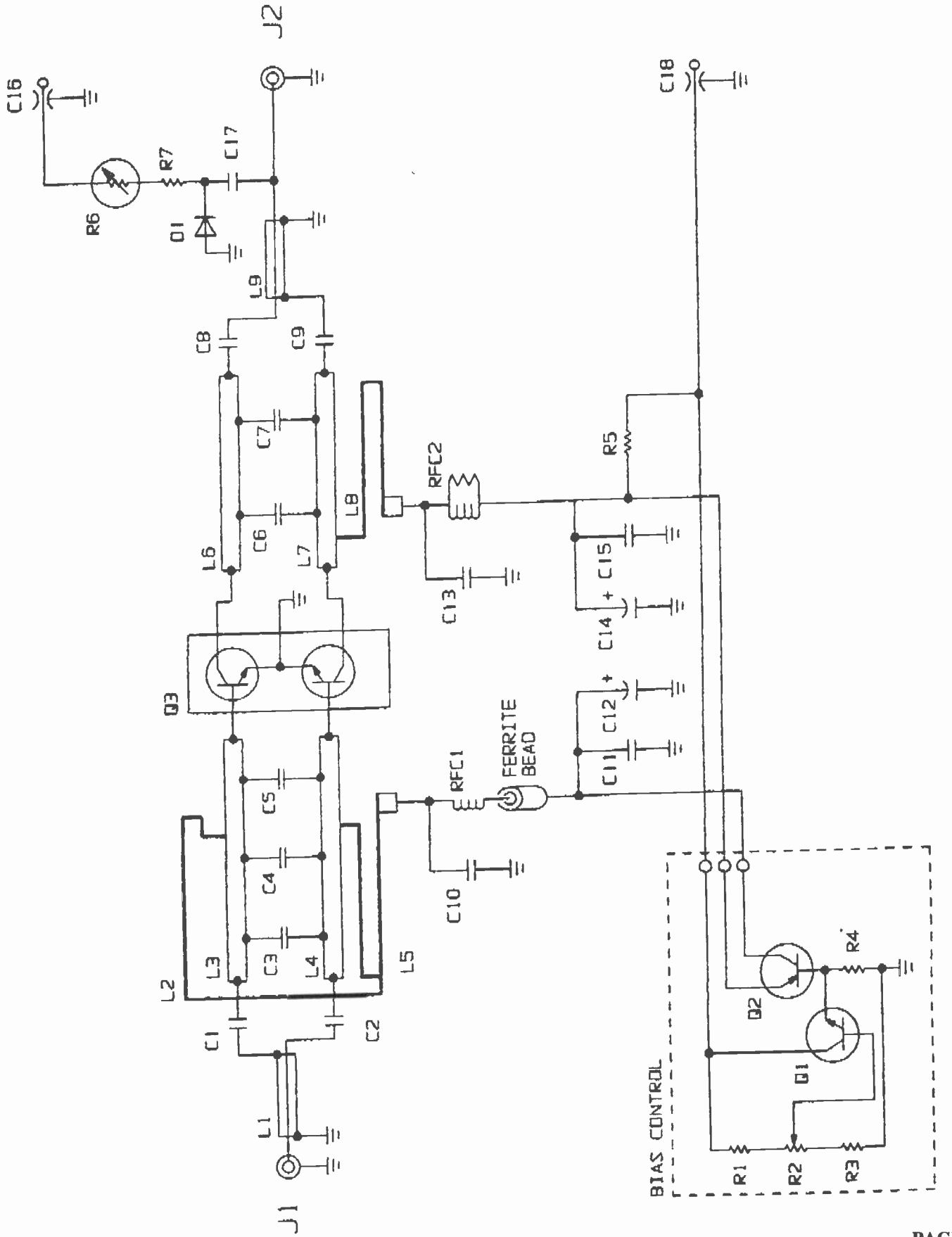
_____ _____
Signature of Physician (Stamp unacceptable) (M.D. or D.O.) Date

PATIENT'S RELEASE: Authorization is hereby given to the physician named above, who participated in my care, to release to the Federal Communications Commission any medical information deemed necessary to process my application for an amateur radio license.

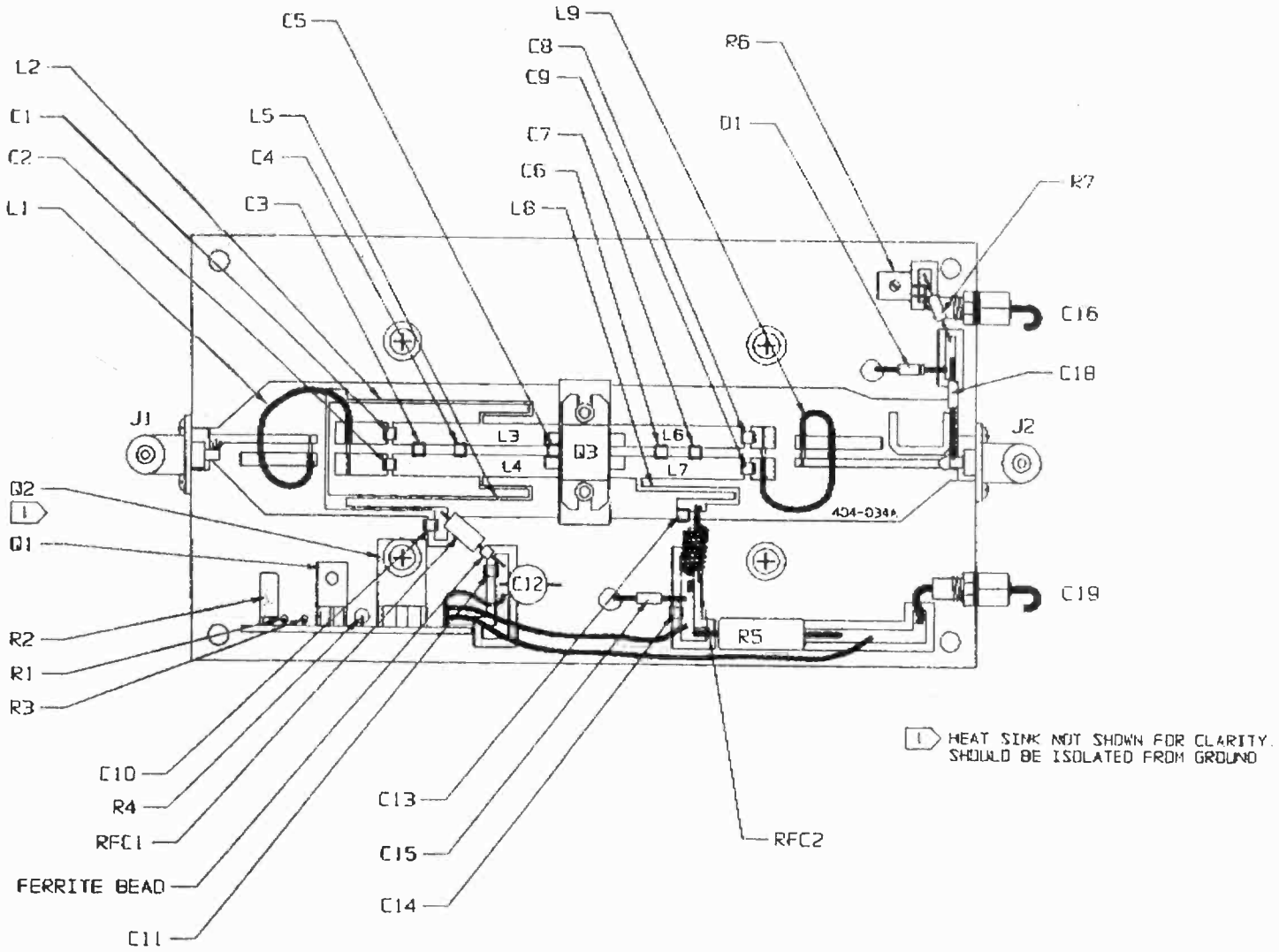
_____
Applicant's Signature Date

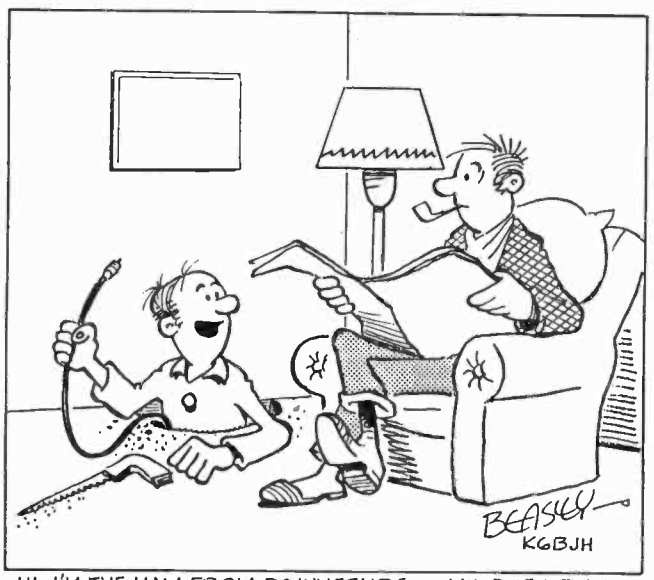
FCC Form 610, March 1992

A 25/100 Watt UHF amp for 400-900 MHz.

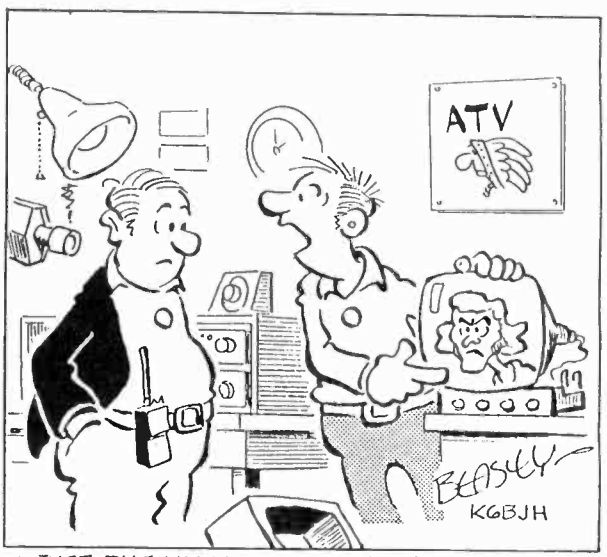


A 25/100 Watt UHF amp for 400-900 MHz.





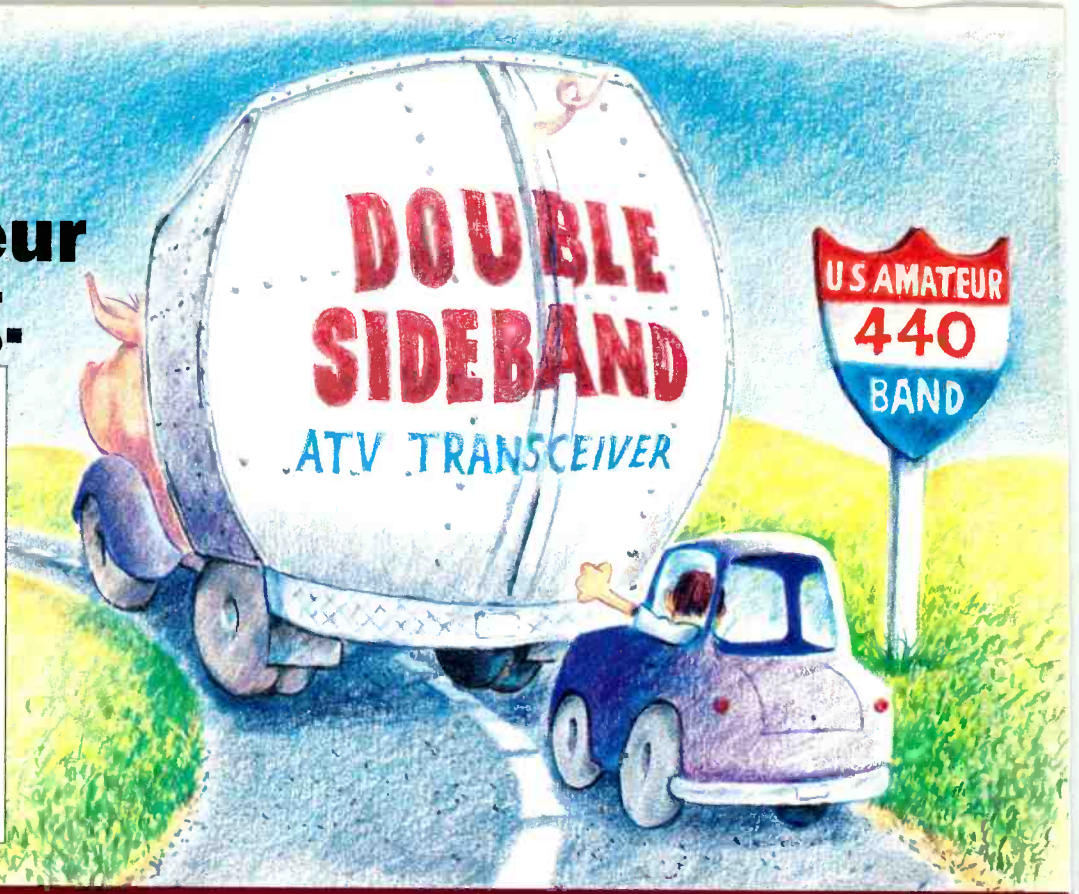
HI, I'M THE HAM FROM DOWNSTAIRS --- MIND IF I RUN MY CO-AX THROUGH HERE TO THE ROOF?



I JUST PUT MY MOTHER-IN-LAW ON CAMERA FOR A COUPLE OF MINUTES, BUT I THINK SHE'S PERMANENTLY ETCHED INTO THE PHOSPHORS

Don't Be An Amateur Band Hog.

If you're using a traditional double-sideband (DSB) Amateur Television transceiver, you're, in effect, hogging the band. DSB not only wastes power on the unused sideband, but uses almost twice the spectrum necessary. Not good, considering how limited the spectrum is to begin with.



VSB-70 with Vestigial Sideband

The VSB-70 from AEA is the only amateur television transceiver that uses Vestigial Sideband (VSB), the same modulation method used by commercial TV stations. Our VSB technology reduces the unwanted sideband over 40dBc! More power where it should be and less wasted spectrum space.

Also available is the RLA-70 mast-mount linear amplifier (with power supply), which boosts your signal while preserving the characteristics of VSB.

Be a good spectrum neighbor. Use the AEA VSB-70 ATV System.

For a complete specification sheet on the VSB-70 or any other product, call 1-800-432-8873.

Advanced Electronic Applications, Inc.
P.O. Box C2160/2006 196th St. S.W. • Lynnwood, WA 98036
Tech Support & Sales (206)775-7373 • Office (206)774-5554
CompuServe User ID 76703, 1012 • Brochure InfoLine (800)432-8873