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AMATEUR TELEVISION QUARTERLY

JULY 1990

VOL. 3 #3
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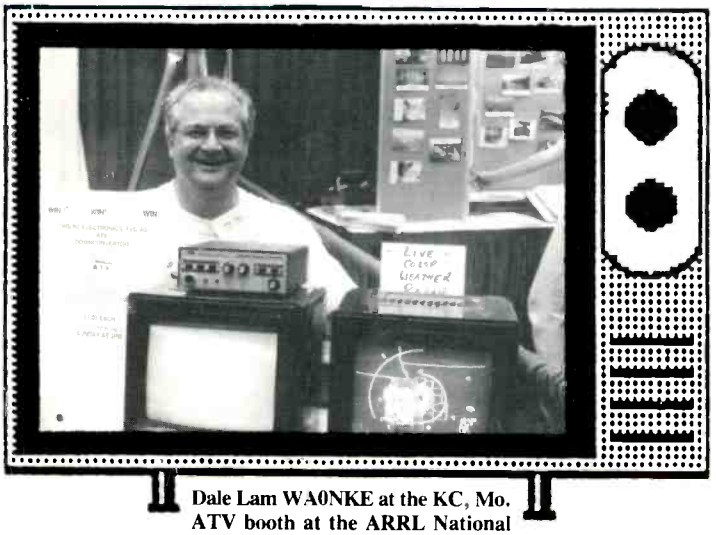
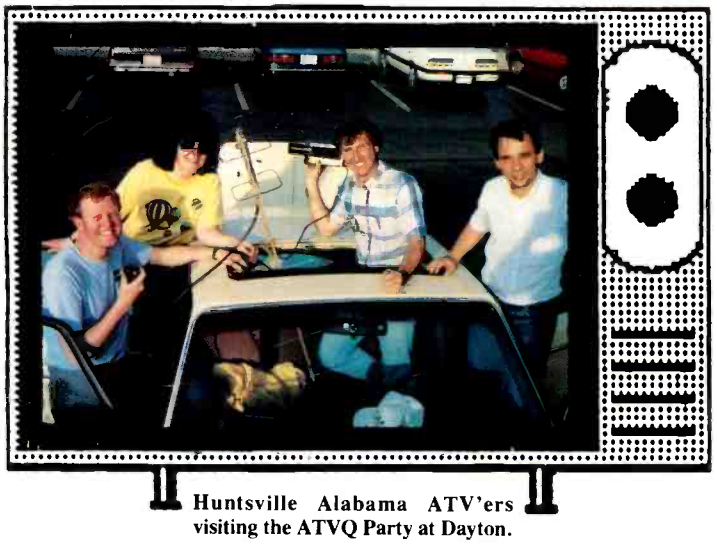
DEVOTED ENTIRELY TO AMATEUR TELEVISION

17 BUILD IT PROJECTS: R/C AIRCRAFT CONTROL AND ATV DTMF A/V SWITCHERS, COMPUTER DTMF DECODERS LOOP YAGI AND COLLINEAR ANTENNA PROJECTS, MORE!!

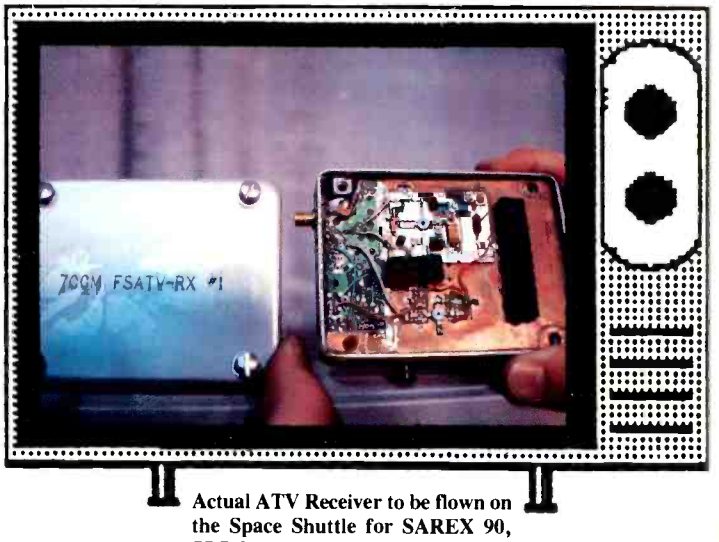


Dale Lam WA0NKE at the KC, Mo. ATV booth at the ARRL National Convention.

Lou McFadin W5DID addresses the ATV Seminar at Orlando Hamfest.



Huntsville Alabama ATV'ers visiting the ATVQ Party at Dayton.



Actual ATV Receiver to be flown on the Space Shuttle for SAREX 90, STS 37.

ANOTHER 100+ PAGE ISSUE WITH MORE TECHNICAL AND BUILD IT PROJECTS THAN 4 OUT OF 5 HAM MAGAZINES!!

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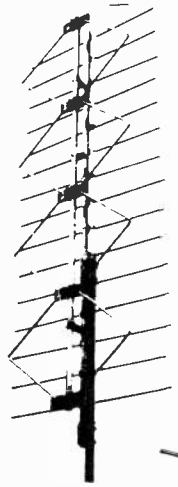
ANTENNAS by Lindsay

Amateur TV Repeaters, Verticals and Yagis Transmit & Receive Antennas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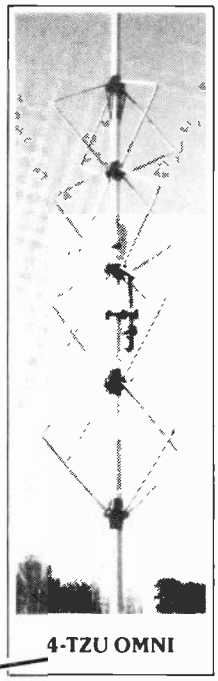
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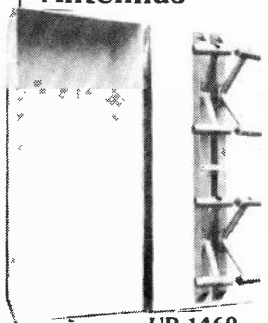
ATV-8 SLOT

LPTV & MMDS Transmit & Receive Antennas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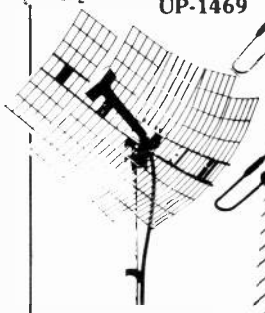
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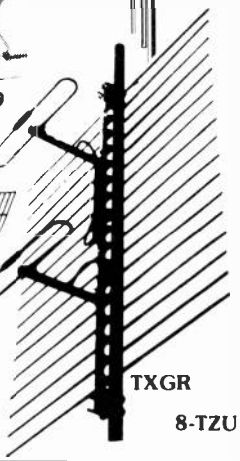
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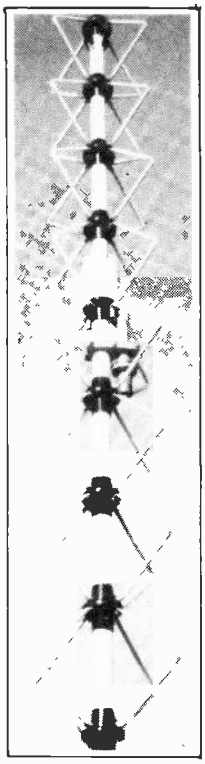
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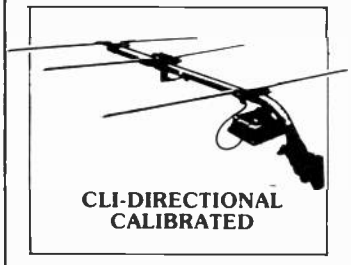
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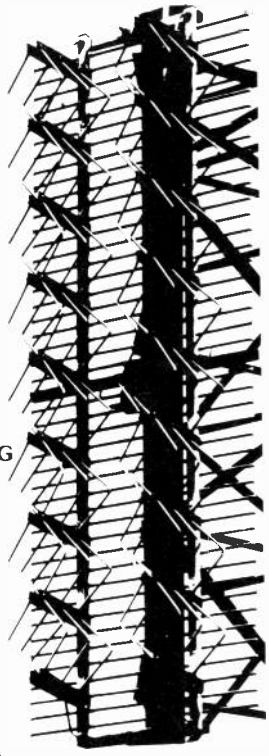
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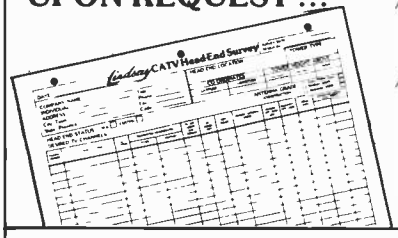
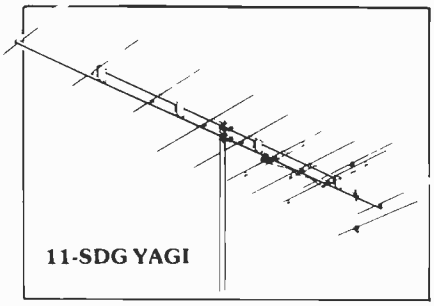


Commercial 2 Way Cellular Base Station and STL Antennas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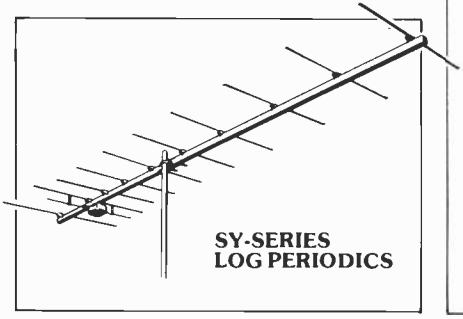
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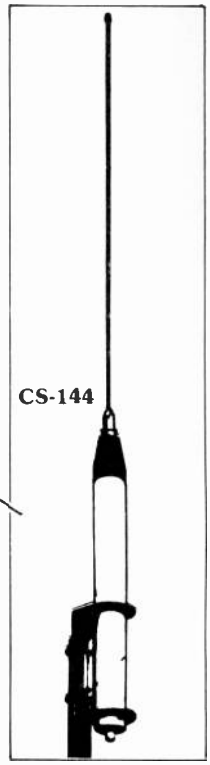
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FROM THE PUBLISHER:

Well, here it is July 10th and I am wrapping up the final touches on the issue. As with April, we managed to fill another 100+ pages with ATV. The skeptics who think that ATV is still nothing to get excited about should be scratching their heads after this! Two Hundred four pages in two issues. Both issues are larger than the average 73, CQ or (RIP) HR, and more articles and features than QST! Maybe that's why we have four new advertisers this issue! Other hams are beginning to take ATV SERIOUSLY! If our subscriptions and circulation are anything to gauge growth by, we gained over 25% in subscribers since January and the press run of this issue is 5800!

But keep those cards and letters coming. We exhaust the IN box for each issue, so now is the time to send in those articles, news items, feature stories, build it projects, hamfest reports, and whatever else you can put on paper! You can send them to us in manuscript form, or if you have a computer, a floppy disk in ASCII, Word Perfect 4.2, 5.0 or 5.1, WordStar, etc. We have conversion programs for most word processor programs. Just try and keep the diagrams neat, no photocopies unless you go over it with an ink pen. Grided graph paper is the easiest to draw on neatly as the blue lines will guide your pen yet not show up when we shoot the negatives.

We have a new staff member, Debra Gillespie, who did most of the computer text entry for this issue (blame any typo's on her) and although not a ham, she did quite well with all our technical stuff!

Mailing is done by a local professional bulk mailing service. SInce we changed from Topeka (where our printer is) we have dropped from dozens of mail complaints to none! Either the mailing service we used or the Topeka, KS post office managed to lose 400 copies of the 1989 issues, which were replaced at NO CHARGE by us for our subscribers. With the new mailing service and post office we have had only the occasional "moved, new address" to contend with.

If you renew late, or ask for a sample (mostly in response to our ads in HR, 73, CQ, Tune in the World and Radio Scan) we do a supplemental mailing. The cost of mailing 1 copy first class is $1.25-$1.45. Second class mail requires 150 or more pieces, but the cost is more like 25 cents! This saves our meager budget for big issues.

Where to buy copies of ATVQ? Most ham stores including HRO, AES, Allied Appliance (Englewood, CO), Dandy's (Wellington, KS), Hatry Electronics (Hartford), Rogus Electronics (Southington) both CT, A-Tronics (Burbank), Henry Radio (LA), Gateway Electronics (St. Louis), VHF Communications (Jamestown, NY), Hamtronics (Trevose, PA), Maryland Radio Center (Laurel), Electronic Equipment Bank (Vienna, VA), Ham Station (Evansville), Burghardt (Watertown), Missouri Radio Center (KC), Wholesale Electronic Center (Dallas), Madison Electronic Supply (Houston), Electronic Candy Store (Riverside), Honolulu Electronics.

If you local ham store doesn't carry ATVQ, send us their name and address and phone so we can contact them to be a retail outlet.

This issue is also being mailed to a number of ham clubs. The club representative is asked to check out pages 47, 48. Or take your copy to the local club meeting and pass it around! We could use another thousand or so subscribers! We specialize in TV but most of the technical matter we print is also useful for other repeaters and other modes and projects. Universal projects like computer programs, DTMF decoders, antennas, A/V switchers, don't care if you are transmitting ATV or Mooglesmoot. We appreciate the kind thoughts and calls, it keeps our intensity up!

Next year's Dayton ATVQ ATV PARTY will be friday night at the Holiday Inn North, in the MAIN BALLROOM (holds 300) which will give us a lot of space. This year we had an over flow crowd of 150, three times that of last year! Fortunately there were free sodas and snacks enough to go around. Our thanks to Chuck Northcutt W7SRZ who was our master of ceremonies. Chuck and the WWATS group are planning their own ATV party for Dayton next year, on Saturday night. Chuck says they will have 16 members coming to Dayton! Watch for the announcement in future issues of the Q.

The normal mailing date for this issue is July 25. That lets us recover from Dayton! We are waiting for some last minute ads from our new supporters so we may miss this by a few days. Also, with over 4000 copies to mail our mailing service may run out of bags. They used 96 mail bags for the last issue! They raided 3 post offices to get them all! Ah, such is success.

Thanks to all who contributed to this issue, and to those who didn't, you have another chance with the October issue, provided we receive your contribution by Sept 15.

We would like to also thank the folks from Ham Radio Magazine who provided us much support help and friendship over the years. I for one will miss HR. RIP. My life subscription will now be moved to CQ, guess I timed it right not buying a life sub to CQ just before Dayton.

73

Henry KB9FO

Amateur Television Quarterly Magazine is published four times a year by Henry B. Ruh KB9FO at 540 E. Oakton St., Des Plaines, Illinois 60018-1950. Annual subscription rate for domestic delivery is $15 per year. Canadian delivery is $20 per year in US Funds sent first class mail. Delivery to other countries is $25 per year US funds and sent as air-mail, printed matter. Second Class Postage paid Des Plaines, Illinois and additional offices of entry. Second Class Mail Permit Number USPS 003-353. POSTMASTER: Send change of address to: Amateur Television Quarterly Magainze, 1545 LEE ST. SUITE 73, Des Plaines, Illinois 60018. All inquiries, subscriptions and submittal should be sent to: Amateur Television Quarterly Magazine, 1545 Lee St. Suite 73, Des Plaines, Illinois 60018. The logo and trademark of Amateur Television Quarterly Magazine is ATVQ as displayed on our front cover. The Business phone number is 702- 298-2269. Co-publisher is Bill Brown WB8ELK. Technical Editor is Tom O'Hara W6ORG. Editor is Sylvia Kurcz. Typist and word processing by Laurie Woisniewski. Editorial offices are located at 540 E. Oakton St., Des Plaines, IL 60018-1950. However, because of curb side delivery it is preferred that all mail be addressed to 1545 Lee St. Suite 73, Des Plaines, IL 60018.

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RECEIVING SPACE SHUTTLE VIDEO VIA AMATEUR RADIO

By Tom O'Hara W6ORG
ARRL Technical Advisor

The Space Shuttle video and audio is available to the public via satellite live during the whole length of each mission. The only exceptions are when there are science briefings, mission updates or when the video is blacked out for military security reasons or astronaut sleep periods. If you have a TV Satellite dish and receiver, you can tune in directly to NASA Select. You might also be able to get your local cable TV company to put it on an open channel. The satellite and transponder may change or be on multiple birds, but generally it can be found on Satcom F2R transponder 13.

If you do not have a Satellite receiver available or co-operative cable company, a local amateur radio operator (Ham) who has a TV Satellite receiver may be retransmitting the NASA Select video and audio to other Amateurs in the area. In this case, anyone who has a TV set, proper antenna and a downconverter capable of tuning the Amateur radio frequencies can pick it up. The Amateur simply plugs the audio and video lines from the TVRO receiver into his Amateur Television (ATV) transmitter.

To receive the Amateur radio frequencies, a downconverter is connected between a good outside antenna made for the particular amateur band in use in your area, and any standard TV set. The downconverter simply converts the Amateur radio frequency band down to a standard TV channel, such as channel 3, that the TV set can accept.

Some may even be able to use a cable ready TV without a downconverter if the Amateur is retransmitting on a frequency that corresponds to cable channels 57 through 60, and the signal is strong enough. For instance, cable channel 57 is the same as the Amateur radio frequency of 421.25 MHz and cable channel 60 is 439.25 MHz. If the signal is present but somewhat snowy, a downconverter designed for the 70 CM (420-450 MHz) Amateur band will improve the picture quality. The 33 CM (902-928 MHz) and 23 CM (1240-1300 MHz) Amateur bands will require a downconverter.

By contacting the local Amateur Radio operator, you can find out where to aim your antenna, what band, frequency and times that the live Space Shuttle video is retransmitted on. The Amateur may also be able to give you some hints on properly setting up and tuning in the signal on the downconverter.

There are many variables that affect the signal strength of the Amateur TV transmission before it arrives at your TV receiver. These variables make it very difficult to predict the coverage distance . Again the Amateur can best tell you what your chances are and the best antenna size and placement. Amateurs transmit very low power compared to broadcast UHF TV stations. Therefore distances over 10 miles or non line of sight paths may require placing a high gain antenna on the roof as high as possible and finding the best position. Good low loss coaxial cable between the antenna and downconverter is also suggested.

In addition to retransmitting the Space Shuttle video, you will find Amateurs showing you around their shacks, paying their home video tapes, and all the usual amateur voice communications with the addition of video. For those schools with an Amateur Radio Club it can let the students see who they are talking to. Transmitting video to other near by schools can stimulate the interest in amateur radio among students. It is a great show and tell medium for Ham radio projects as well as any other hobby or activity.

Tom O'Hara, W6ORG, 2522 Paxson Lane, Arcadia CA 91007. Telephone (818) 447-4565 days

I NEED YOUR INPUT NOW

Rosalie White, WA1STO, the ARRL Educational Activities Coordinator, has asked me to compile a list of current operating ATV repeaters or individuals that are retransmitting the NASA Select Space Shuttle video and audio. She will in turn put that list out with the information and study curriculum the League sends out to teachers about Amateur Radio and SAREX-90. The League presently has over 800 schools that they have corresponded with.

ATV Repeater owners or simplex Shuttle retransmit stations please call or send me the following information right away:

1. ATV Repeater or simplex station call sign_____
2. Repeater output or simplex frequency_____MHz
3. ATV transmitter location (nearest landmark for antenna aiming)_____
   Primary city served _____ State____
4. Repeater antenna polarization ___Vert. ___Horz.
5. local contact Call_____ Name_____
   Address_____
   City_____ State_____ Zip_____
   Phone (_____) _____
6. 2 meter ATV calling frequency _____._____ MHz Simplex___ or Rpt +__ -__

This is a great opportunity to get young people interested in science and technology as well as amateur radio. If there is an ATV repeater in the schools area, the students might be able to see the Shuttle video as easily as connecting a cable ready TV up to a good outside 70 CM antenna tuned to a cable channel between 57 and 60. In other cases, depending on output frequency, an ATV downconverter connected between the antenna and any TV set tuned to an open channel between 2 and 4 will do the job.

Actually those areas not served by an ATV repeater can benefit if a local ATVer also has a TVRO and is willing to retransmit the NASA Select video on simplex to other amateurs and the school. The composite video and audio is simply plugged into the ATV transmitter. This is the only other service that amateurs can retransmit legally per a special agreement that myself and the JPL Amateur Radio club obtained in 1983 between the FCC and NASA. NASA uses various available commercial TV satellite transponders, such as Satcom 2 transponder 13, during Shuttle Missions. The schedule is available by calling the Goddard Space Flight center at 202-7551788. You might also contact your local cable TV company to see if they could put it on an unused cable channel.

The next time you are at your local Radio Shack or TV appliance store, and the shuttle video is on, let the store manager know how to tune the ATV retransmission in on the floor demo cable ready TV's. It can help get amateur radio into the public mind in a positive way as well as attract and sell the Novice License study guides they have.

The video, in addition to the audio we have enjoyed in the past, is especially significant now that NASA may have up to an hour of time devoted to amateur radio activity with STS-35 and STS-37.

Tnx, Tom O'Hara, W6ORG
ARRL Technical Advisor for
ATV and Spectrum Management
2522 Paxson Lane
Arcadia CA 91007
(818) 447-4565 days

OUR NEW NAME

Some time ago, we asked reader suggestions regarding a more suitable name than "NARA NOTES". The response from members was suprising and the suggestions diverse.

About this same time, the American Radio Relay League petitioned the FCC for a new class of Amateur license call the "Communicator". It was immediately obvious that this would also make an excellent name for our publication whether or not the new license class was adopted.

Here it is, our new name and logo...

The Communicator

Paul Gerhardt, KB3HH, is interested in training youth in Amateur Radio. If you live near Paul and would like to colaborate, contact him at 1255 Stonewood Ct., Annapolis, MD 21401

NEWS FROM NARA

UNITING THE WORLD'S BEST

Games Will Include Amateur Radio Contest

1990
GOODWILL
GAMES™

The World RadioSport Team Championship Committee has done an excellent job in getting Goodwill Exchange status for an Amateur Radio operating event.

Committee Chairman, Danny Eskenazi (K7SS) stated recently "The Goodwill Games could provide the ideal backdrop for our competitors and we worked very hard for over a year to get our official Goodwill Exchange program approval".

The scheduled dates of the Championship event are July 20 and 21. The competitors will consist of eight each invited US-HF contest champions, Soviet competitors and other invited DX radiosportsman (24 total). Each team will consist of two operators for a total of 12 teams. The format will be US teams versus USSR teams versus the teams from other IARU countries. The teams will compete for gold, silver and bronze medals.

"Nothing like this has been done before and we're very excited at the encouragement we've been receiving," stated Martti Laine (OH2BH), the Event Chairman. "We hope this can evolve into a continuing event including the 1994 Goodwill Games in Leningrad."

NARA INVITES YOU TO JOIN

Our Objectives

NARA wants to make Amateur Radio more widely known and to encourage more people to take up the hobby. We are especially interested in encouraging young people to join our fraternity, both for the good of the hobby and for the long term good of the country itself. NARA has committed itself to making Amateur Radio more interesting and more accessible to all concerned.

Our Goals

1. To encourage the establishment of an entry level Amateur license which removes the artificial barriers to becoming part of the fraternity.

2. To create a program oriented to youngsters and young peoples groups nationwide which will advance technical education for all through Amateur Radio.

3. To advertise Amateur Radio to the general public and increase the awareness of the importance of ham radio and as an interesting way of educating young people.

What NARA is Not

1. NARA is NOT an Amateur Radio fraternal organization. Our aim is NOT to compete with any organization, but rather, to bring to bear our talents and commitment to achieve our goals.

2. NARA is NOT looking for change by itself, but for directed, beneficial change towards the growth of our fraternity. We are committed to restructuring the requirements for entry into our hobby.

NARA, The National Amateur Radio Association is a non-profit, tax exempt organization as defined under Section 501(C)(3) of the Internal Revenue Code of 1986. Your contributions may be tax deductable. Check with your tax advisor to determine the exact status of your contribution. Your support is sincerely appreciated.

YES! I support NARA's objectives and I want to help

NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

MY DONATION IS $ _____ I SUPPORT "NO-CODE" Yes No

SUPPORT A TEACHER

They're the foundation of America

The nation's teachers provide the foundation of our children's education. Many of these educators are beginning to realize that Amateur Radio is not only a hobby but a teaching aid to instruction in math, science, languages and even social studies.

One of the goals of NARA is to publicize ham radio as a vehicle to provide a better education for our youngsters. Most children today, are rather unconcerned about getting an education. They muddle over math, fret about foreign languages and sigh over social studies. Our organization hopes to change this ambivalence by introducing them to the hobby of Amateur Radio.

Educators may not have thought of ham radio as a means of stimulating students to learn about physics and science. It can do this and more. Our hobby involves geography, math, languages and civics, in addition to the technological aspects of our world.

An interest in mathematics is stimulated in many ways via ham radio. For example, it may be necessary to locate an Amateur satellite in order to correctly aim the communications antenna. This involves trigonometry, geometry and even a bit of astrophysics.

The following list of educators have either contacted NARA for help, have received a copy of the code practice program Super Morse or are participating in the DOVE program. If you would like to assist these people, who encourge youngsters to become radio Amateurs, contact one or more of the following educators:

Bob McDermolt, Science Dept. Head, Framingham North High School, "A" Street, Framingham, MA 01701

Philip Downes, Bean School, RFD 3, Agusta. ME 04330

Robert H. Feinstein, 545 West End Ave. Apt. 14D, New York, NY 10024

Mr. Irving Felsenfeld, Ham Radio Department, Inwood Intermediate Sch. 52, 650 Academy St., New York, NY 10034

Thomas R. Leach, Elias Bernstein Intermediate, 1270 Huguenot Ave., Staten Island, NY 10312

James F. Haran, 7 Longview Road, Pt. Washington, NY 1050

Richard P. Devir, Walden School-BOCES, Yorktown Heights, NY 10598

Ms. Ann Krawet, 4 Mountainview Dr., Monroe, NY 10950

Lawrence Frey, 47D Heritage Dr., New City, NY 10956

Ms. Jeanie P., Wing, 928 56th St., Brooklyn, NY,11219

Mrs. Sophia Gruebel, P.S. 253, 601 Ocenaview Ave, Brooklyn, NY 11235

Mr. R. Gennan, Science Chairman, Freeport High School, Freeport, NY 11520

Lawrence N. Deering, P.O. 275, Bellport, NY 11713

Ms. Mari Lou Hernandez, 151 Washington St., Farmingdale, NY 11735

William M. Imhof, MA, Foreign Language Dept., Kings Park H.S.. 23 Park Street Box 401, Kings Park, NY 11754

Mr. Ruben Marshall, 1101 Vine St. Apt. B2, Liverpool, NY 13088

William Naple, North Rd. R.D.1 Box 170B, St. Johnsville, NY 13452

Joe Calzaretta, Munn School, Spencerport, NY 14559

Ms. Emma L. Smith, P. O. Box 25, Watkins Glen, NY 14891

Mickey Maholtz, Curwenesville High School, Beach Street St. Curwenesville, PA 16833

Jim McEwen, 1923 Ewins Ave., Charlotte, NC 28203

Ms. Lib Crockett, Public Information Specialist, National Dropout Prevent Cntr., Clemson University, Clemson, SC 29634

Ms. Betty L. Miles, IB Coordinator, Atherton High School, 3000 Dundee Rd., Louisville, KY 40205

Kelly Bell, Edmonton Elementary School, P.O. Box 176, Edmonton, KY 42129

Marilyn K. Watson, Liberty Elementary School, Rte. 6, Box 350, College Ave., Liberty, KY 42539

Charles Murray, Memorial Park Middle School, 2200 Maumee Avenue, Ft. Wayne, IN 46803

Mrs. Linda Reich, Crestwood High School, 1501 N. Beech Daly Rd., Dearborn Heights, MI, 48124

Mrs. Susan Krupa, Kinloch Elementary School, 1505 Kinloch, Dearborn Heights, MI 48127

Ms. Mary B. Yaunke, Teacher, Alternative Ed. Dept., Corunna Public Schools, 106 South Shiawassee St., Corunna, MI 48817

Rose Willmann, Talented & Gifted Staff, Madison Metropolitan Sch Dist., 545 W. Dayton St., Madison, WI 53703

Mr. Dennis Brown, Principal, Pleasantview Elementary School, Box 754, Lakefield, MN 56150

Mr. Glen Moss, MacArthur Junior High Schoo;, 700 N. Schoenbeck, Prospect Heights, IL 60070

Alvin R. Kempf Jr., Skipper, S.E.S. Eagle 4118 W. 17th Place, Country Club Hills, IL 60478

Ms. Marcia Haskin, Administrative Assistant, Independence Public Schools, 1231 Windsor, Independence, MO 64055

Ronald E. Meyer, Supervisor Special Projects, Omaha Public Schools, 3215 Cuming St., Omaha, NE 68131

Dayala Mahrenholtz, Abraham Lincoln School, 12620 Broadway, Whittier, CA 90601

Lawrence Randall, University of Calif., Center for Astorphysics C-011, LaJolla, CA 92093

John T. Green, Placer Hills School, P.O. Box 68, Meadow Vista, CA 95722

Rick Gantman, Bellevue High School, 601 108th S. E., Bellevue, WA 98004

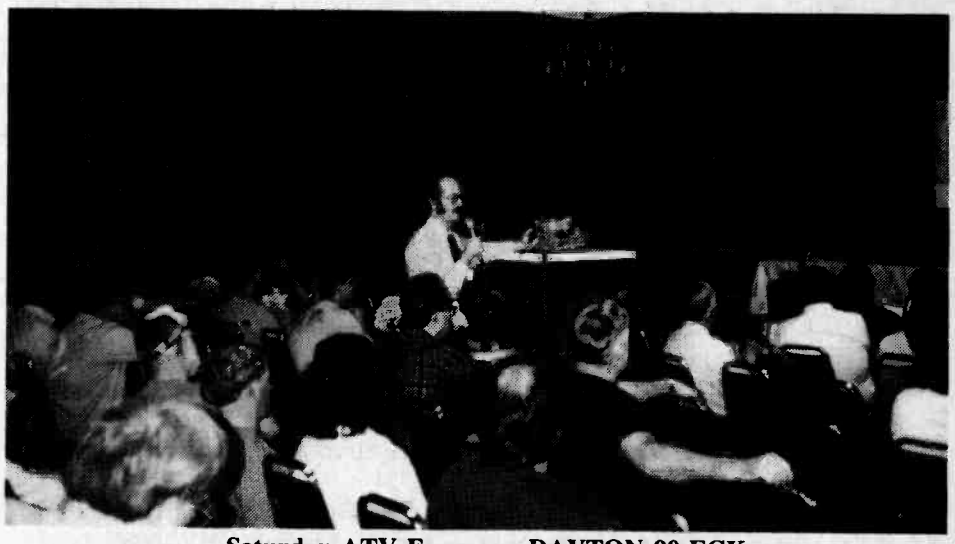
Bob Mullen, Sedro Woolley High School, 1261 E. Lake Drive, Sedro Woolley, WA 98284

Mrs. Karel Vance, Downing Elementary Sch., Tacoma, WA 98406

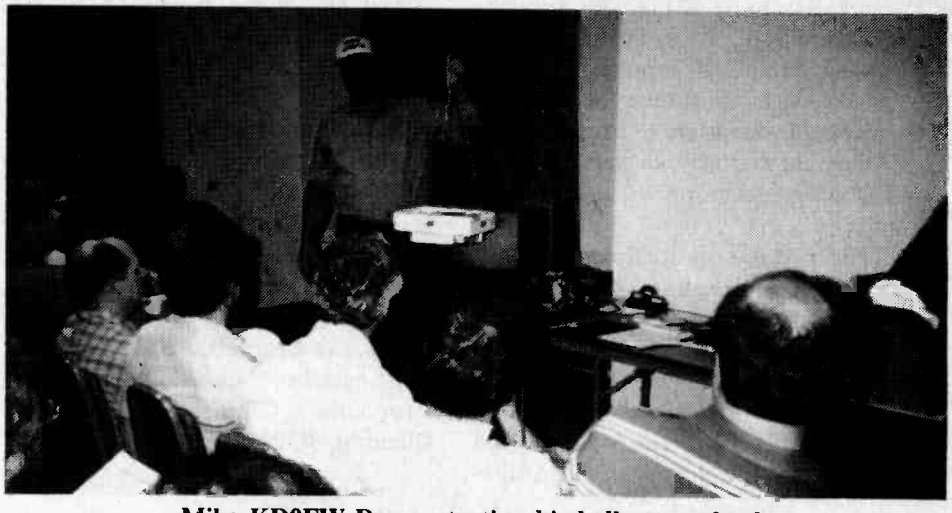
DAYTON HAMVENTION

Over 150 ATVers attended the Friday night ATVQ/WWATS (Western Washington ATV Society) meeting at the Best Western. 91's event wil be at the Holiday Inn North Ballroom. There seems to be a lot of new interest in ATV with reports of increasing activity. Chuck Northcutt W7SRZ of the WWATS group hosted the event providing everyone with a lineup of talks, video tapes and of course, a chance to meet with ATVers from across the world. Jon WM8W had his giant 16 foot kite draped across the meeting room, Bill WB8ELK and Mike KD0FW talked about their latest balloon adventures and Carl Berry K5MWN demonstrated his R/C flight simulator in the parking lot. Carl K5MWN won the $100 first prize for the homebrew contest with his unique ATV flight simulator. Carl turned an arcade game into a remote control cockpit which he uses to actually taxi, take-off, fly his R/C plane in formation and land it just by looking at the view from the model's color camera via his TV monitor in the cockpit. The winners of the video tape contest were announced with the prize winning tapes playing in one of the rooms during the meeting. The winners are: First Prize: AEA FSTV-430a ATV transceiver to Larry Mitschke N5LND for his entry "R/C Radio Control Aircraft". Second Prize: P.C. Electronics down converter was won by G. Gately KE9-OYO for a very humorous video on how to prepare for a Ham convention. Third prize: ICOM antenna was won by Dick St. Amant W8PDV who submitted an interesting video on the history of the Motor City Radio Club. There was plenty of activities for the ATVer at the Hamvention as well. Saturday afternoon Tom O'Hara W6ORG hosted the ATV Forum with a large crowd in attendance. Guest speaker Lou Mc Fadin W5-DID filled us in on the upcoming Space Shuttle SAREX missions with on-board ATV/SSTV experiments. New items of particular interest were the introduction of T.D. Systems modular ATV system, P.C. Electronics TXA5-RC ATV transmitter for R/C aircraft and Wyman Research's Tridon line and FM ATV transmitters/receivers.

A crowd gathers to see the K5MWN R/C flight simulator (ATVQ/WWATS ATV MEETING)



Saturday ATV Forum — DAYTON 90.ECK

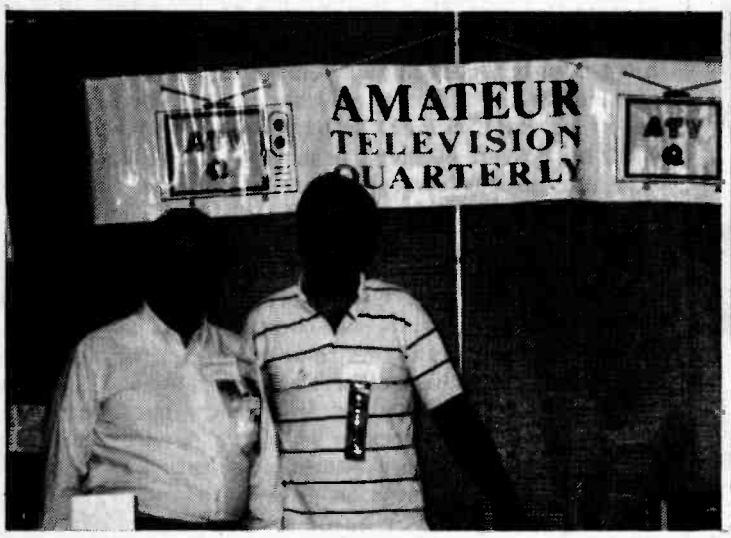


Mike KD0FW Demonstrating his balloon payload.

DAYTON HAMVENTION ATV

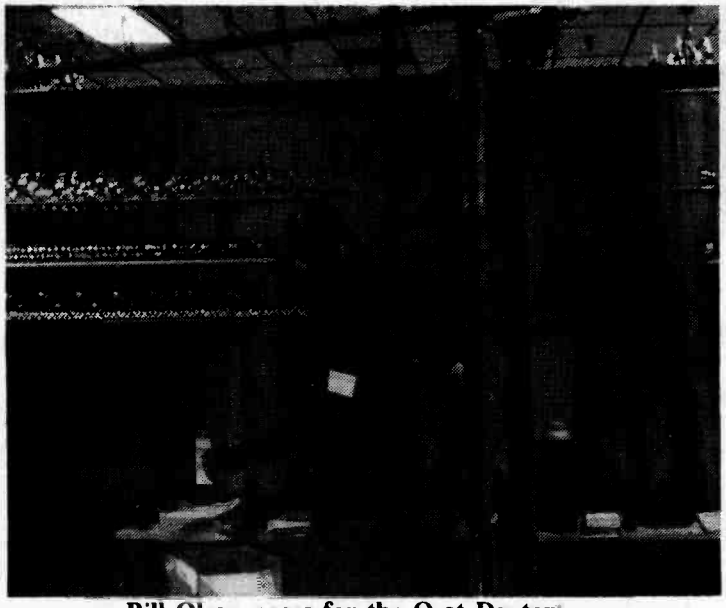
ATVQ/WWATS Friday night meeting.

Mike Lamb of AEA chats with Dayton visitors.

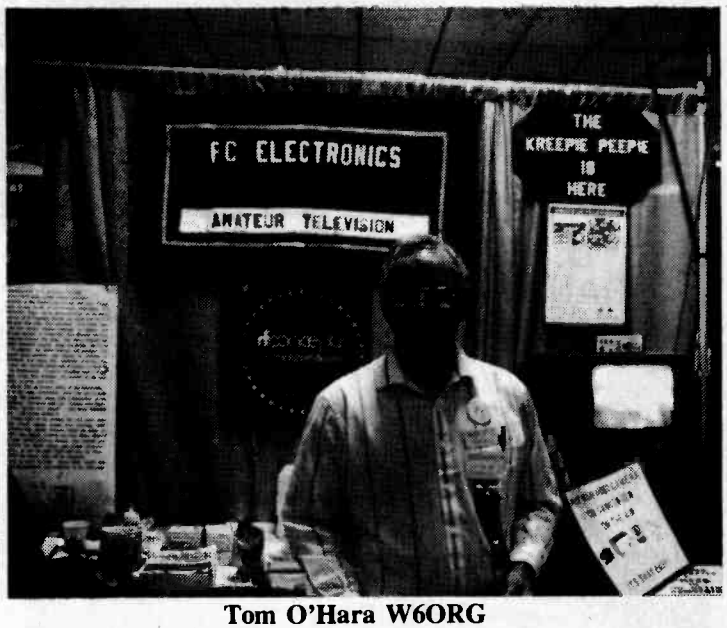


Henry KB9FO and Mike WA6SVT manning the booth.

Sue Miller W9XYL in her booth.

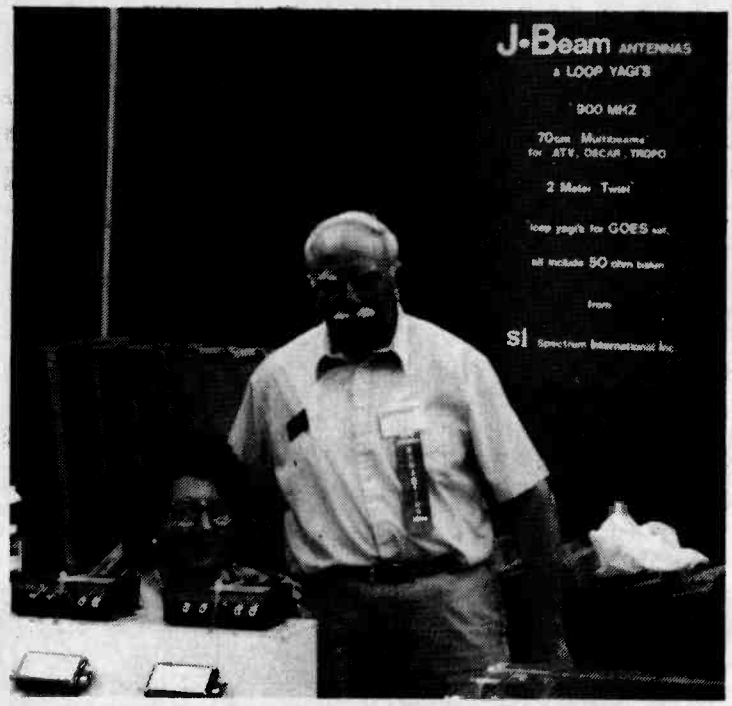


Bill Olson poses for the Q at Dayton.



Tom O'Hara W6ORG

JOHN BEANLAND AND YL AT DAYTON



STEVE FRANKLIN AND YL OF T. D. SYSTEMS

T. D. SYSTEMS ATV TRANSVRTER CONTROLLER

COLLINEAR PARTY!
by Hal Kelley KE8II, 505 W. Ohio Sebring, OH 44672

If you're looking for a great party, drop by Larry N8EWV's hangar at the Tri-City airport in Beloit, Ohio on Wednesday evenings. The local ATVers in the Youngstown/Warren area have been building a collinear each week to help newcomers join in the fun of ATV. This event has been drawing attendees as far as West Virginia and has been a boon to ATV activity. Increasing activity on the local ATV repeater (KD8PE/r at N8EWV's QTH in Beloit) has been a direct result of this party. I've taken ideas from several collinear designs seen in previous issues of ATVQ (See Franklin Collinear Array, ATVQ - Oct. 89, p. 42) and other sources. The end result is an easy to build, reproducible antenna with excellent gain.

The framework is constructed out of redwood which is cut to the dimensions indicated on the drawing. If you want additional gain extend the support pieces out another 6" in order to mount directors (mount the directors 5.5" in front of the driven element). You'll note that the support pieces have a notch carved in them to support the driven element wire. Once the elements are in place use epoxy or wood cement to permanently attach them.

The driven element assembly is constructed of six long pieces of copper or aluminum wire (can use anything between 3/32" to 3/16" diameter). We made up a jig consisting of nails to bend the wire at the appropriate points. Each driven element wire is about 143" long. Glue everything securely and varnish the wood to weatherproof it. A product called Wood Nails seems to work great for securing the elements. The collinear is fed with 300 ohm twinlead and matched to 50 ohms with a balun in the shack. This antenna is a real performer and should really net you some long haul contacts on ATV! Start up a party in your area and watch the activity increase. The balun is constructed of rg 59, 75 ohm coax cable as shown in figure. The 1/2 wavelength balun loop length is calculated as follows: 13" x .66 velocity factor = 8.58 inches. All shields are connected together and the balun converts 75 ohms to 300 ohms (4:1)

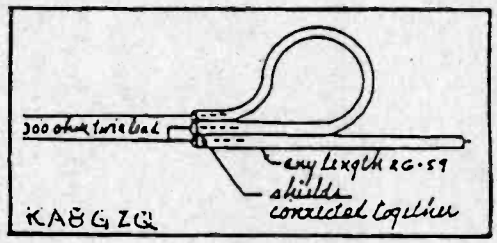
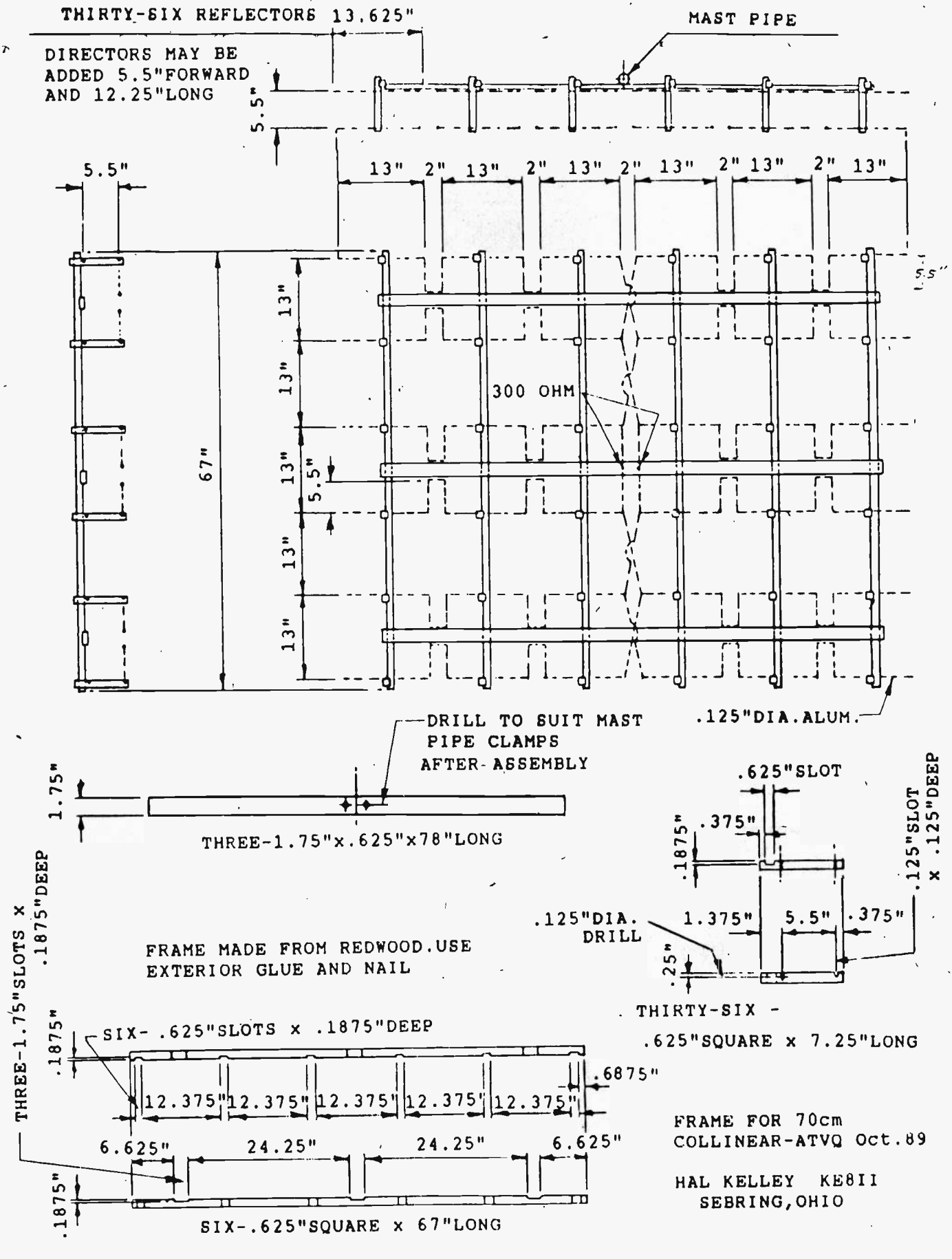


Fig. 1-BALUN CONNECTION

FILL UP OUR IN BOX WITH ARTICLES TODAY

COLLINEAR ARRAY



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- Equipment Needed
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- Programming
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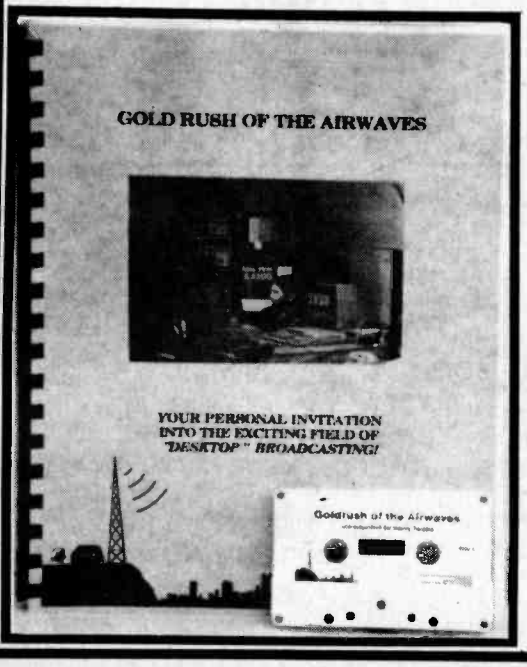

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R/C VIDEO AIRPLANE

Larry Mitschke, 10603 Wilcrest #34,Houston, TX 77099

AUTHOR WITH PLANE. ENGINE K&B .61, WEIGHT 13 LBS. WINGSPAN 7 FEET

One of the best things ATV has done is to allow radio control airplanes to be flown by television. By mounting a camera and transmitter into the plane, the flyer guides the plane by what he watches on the TV receiver, and achieves a whole new perspective to R/C flying. This is the ultimate R/C experience.

Projects usually start with a dream, and this is no exception. But I was not a ham when I started using a "TV Genie" and black and white camera in a plane I designed to carry them. The "Genie" was a commercial low-power UHF transmitter for distributing video to TVs without running cables. When it was placed off the market by the FCC, I got my ticket and joined the ATV clan. Thus I began a slow, long but enjoyable learning road in R/C Airborn ATV.

One of the first obstacles discovered was that the R/C transmitter produces very bad interference on a regular TV. So now a video monitor is used to watch the signal while the receiver is placed several feet away.

The second major obstacle was that the on-board video transmitter interfered with R/C reception. Most subsequent work involved finding a median between too much video transmission power which shortens the R/C range, and too little power which shortens the video range. An 80 mW. video transmitter (P.C. Electronics) produced minimal R/C interference and with a high gain receiving antenna the range approaches 1.5 miles.

Also to extend R/C range, an overhead dipole antenna was built and attached to the R/C transmitter. A switch selects between the attached antenna and the overhead antenna. This allows the flyer to sit in comfort inside a darkened van to view the TV without losing radio control.

Flying by TV is an almost indescribable experience. To explore new areas of the ground below, together with the constant realization that if your video link shuts down for any reason your plane has had it, makes for exhilarating flying. The most enjoyable time is had while flying in a country setting. Farm fields, trees, lakes and cattle pass below (on screen). You "buzz" the small town one mile away, chase a buzzard, discover a small lake you didn't know was in that big pasture. And landings by TV are not as hard as you might think.

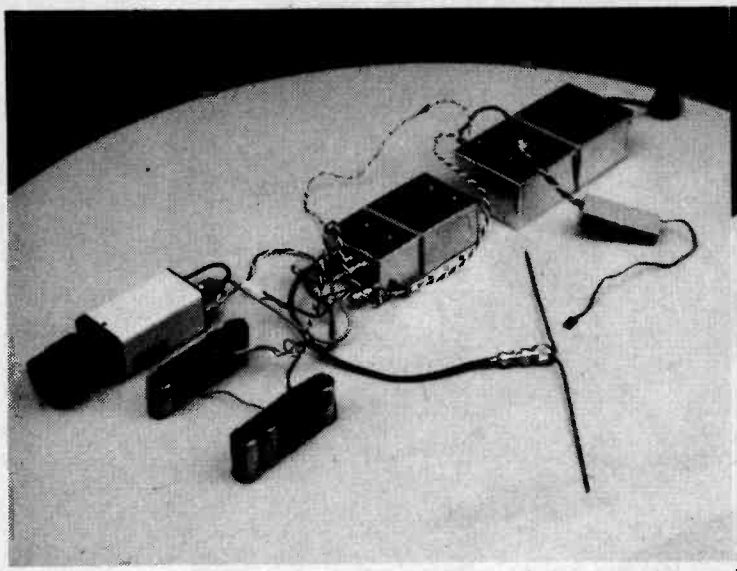
Flights past 3/4 mile away require TV-only guidance. By then the plane is seen as a dot in the sky. It is easy to lose track of what direction the plane is flying in as you view the screen, if you aren't familiar with the terrain below. For this reason I designed a built a circuit which uses a Radio Shack flux-gate compass to speak to me over the audio the direction that the plane is flying in. So while I hear the engine over the on-board microphone, I can flip a switch and hear "north", "south", "east", or "west" if the plane is in any of those directions. Some people use the audio portion to transmit data, at the loss of audio. This is a much more complicated set-up (and beyond my abilities), but to hear the engine is more natural anyway.

These days it takes 40 minutes to set up my portable ATV station in my van. An invertor powers everything, and a canvas tarp covers the rear of the van to darken the viewing area. This is very necessary for more enjoyable flying.

My next goal is to get a one watt video transmitter to work without interfering with R/C reception. That way I will not need a person to follow the plane with the high-gain receiving antenna. Then I'll need a radio direction-finder which will locate the plane at all times. How about multiple cameras to give side views at the flip of a switch?

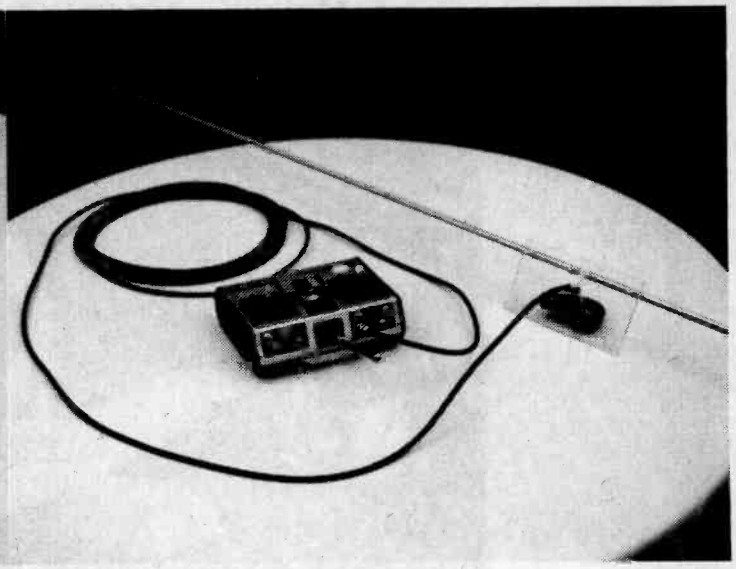
There I go dreaming again.

R/C AIRPLANE



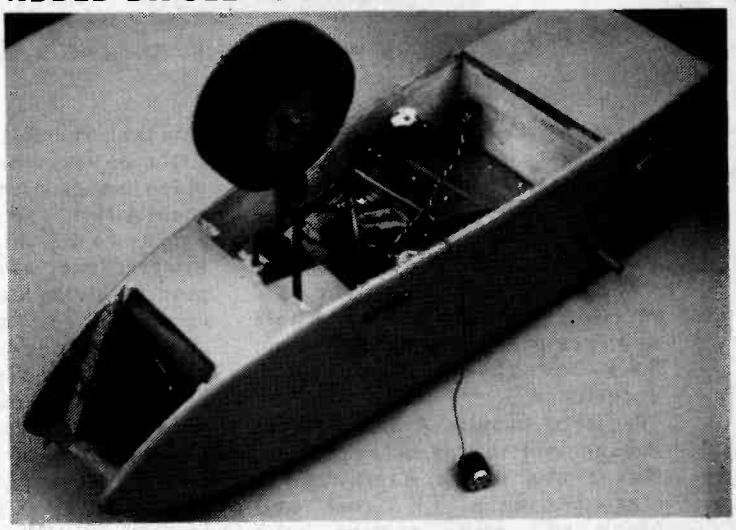
CAMERA, BATTERIES, TRANSMITTER THAT FIT INTO PLANE

R/C AIRPLANE



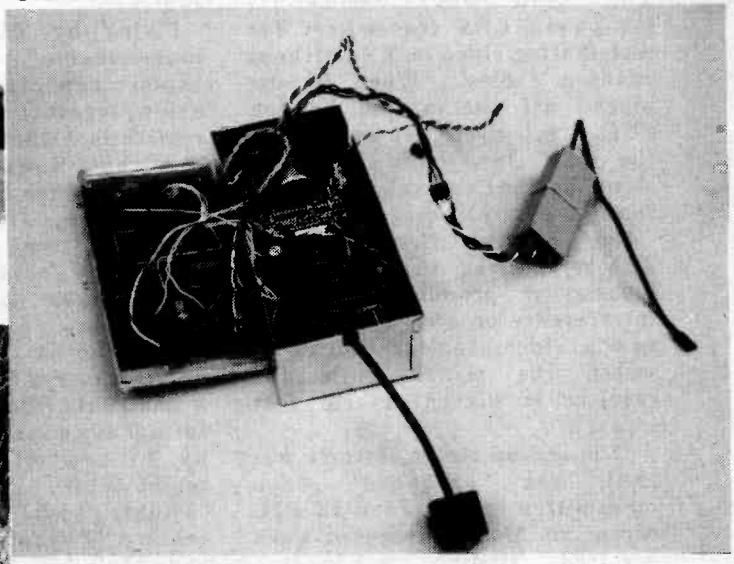
R/C TRANSMITTER WITH ADDED DIPOLE ANTENNA

AUTHOR WITH HIGH GAIN UHF ANTENNA, OVERHEAD DIPOLE FOR R/C TRANSMITTER, PLANE AND CONTROLLER.

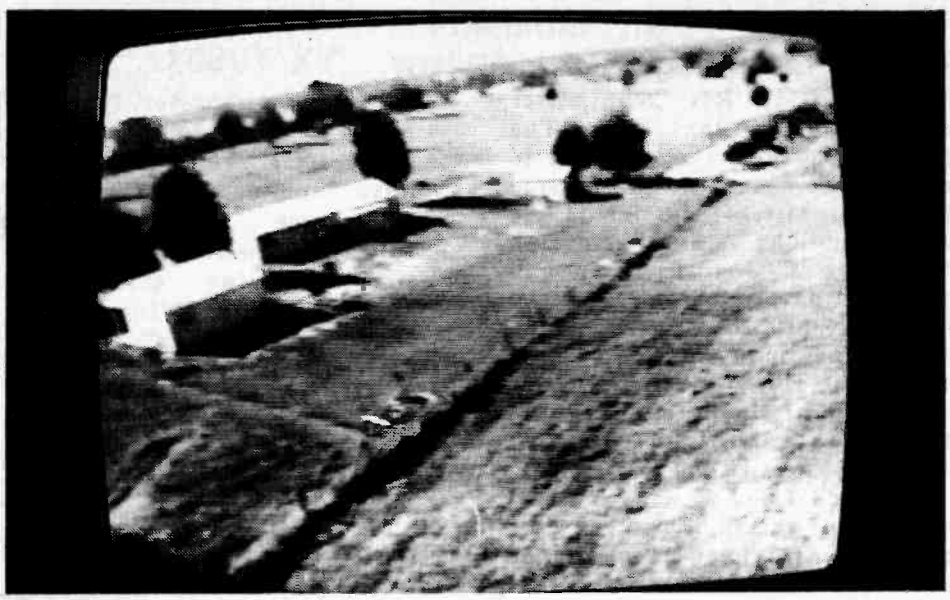


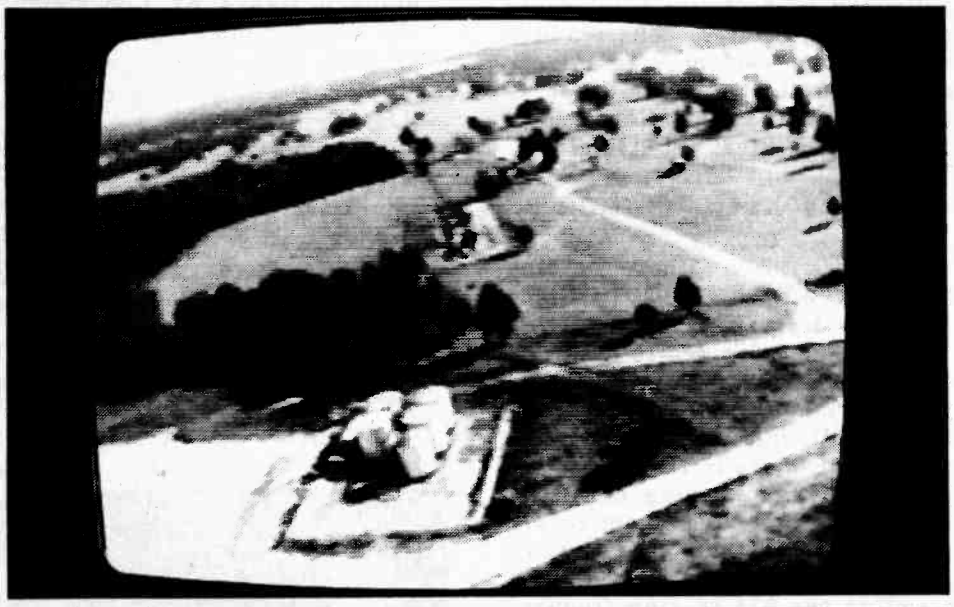
SNUG FIT INSIDE PLANE, NOTE CAMERA AHEAD OF NOSE GEAR

READY TO FLY



TALKING COMPASS





FULL COLOR (B&W HERE)
OFF AIR ATV PIX

ATVQVISITS SCHEDULE

The folks who publish ATVQ believe in getting out and getting first hand info about ATV activity when ever we can. Here is our travel plans for the next few months, which may grow as time goes by.

Los Angeles Aug 1-3
Seattle Aug 4-5
Peoria Superfest
Boxboro, MA Hamfest
York, PA Hamfest
Hawaii, Honolulu Sept 1-2
Hawaii, Lahaue Sept 3-9
Bahamas Dec 31-Jan 9
Dayton 1991 ATV Party Friday at the Holiday INN North and Booths.
Indianapolis mid January

Look for our signal on 439.25 and 144.34.

R/C Flying Box Flight Simulator

Carl Berry K5MWN, #25 Cambridge Ct., Abilene, TX 79603.

In the Abilene area we have an avid R/C model airplane club. We even have a flying field complete with an asphalt runway and taxiway. I've always wondered what it'd be like to fly along inside of my R/C plane. Thus began the construction of the Flying Box flight simulator.

The first model, Cyclops I, was a quarter scale Robin Hood 99 by World Engines of Cincinnati, Ohio. It was powered by a Zenoah G38 engine which provided plenty of lift for my ATV payload. I found an old Hitachi color TV camera (the pawn shop special) and mounted it in the cockpit of the plane. I cushioned it with 1 inch of foam lightly packed around the camera case and under the lens. This dampened out all of the vibrations and gave a rock solid picture during flight. The first flight occurred during the spring of 1989 and resulted in a fantastic color view from the airplane on our monitor on the ground. I used a 1 watt PC Electronics KPA5 to a vertical quarter wave antenna mounted on top of the plane. Cyclops I unfortunately crashed and was destroyed in Houston due to an interference problem in August of 1989.

The Flight Box cockpit

The control cockpit was constructed out of an old SEGA Turbo Race Car arcade game. I stripped out the arcade game electronics and installed an ATV receive converter, video demodulator and a large color monitor. In addition I removed the encoder board from a Futaba 5NLP PCM R/C transmitter and mounted it in an RF tight box inside the flight box. I mounted Kraft joysticks inside the cockpit in the appropriate positions you would see in a real aircraft. Controls for the throttle and flight stick (elevator and aileron) were installed. The rudder used the original arcade game potentiometer. Each joystick and the rudder pot was wired up to the 5NLP encoder board. In addition trim pots for fine tuning of the three controls were mounted in the control panel. The output of the encoder was then fed out to an outside R/C transmitter with a "Buddy Box" input. The Buddy Box system allows you to control the output of the outside R/C transmitter from inside the cockpit as long as another person holds the R/C transmitter and presses a safety switch. If I ran into a situation where I lost the ATV signal or just plain lost control of the plane, the pilot outside of the flight simulator box could take over immediately just by releasing the switch.

The rudder pedals were constructed out of the same control yoke that already existed in the arcade game. I mounted the shaft vertically and used the original gears and potentiometer. The rudder return spring system is an enlarged but duplicate system that is used by the Kraft joysticks which I made up of Steel and Aluminum.

The Next Generation

Another Robin Hood 99 was built in the Spring of 1990. Since I had a desense problem on the 70 cm band, I decided to use a PC TXA33 1 watt 923.25 Mhz transmitter. I mounted a vertical dipole in the tail and installed a small color TV camera in the cockpit of the plane. The camera came out of a junk Magnavox cam-corder with a wide angle lens adaptor. No desense problems were encountered on the 923.25 Mhz frequency.

Recently I was able to try PC Electronics' new TXA5-RC ATV transmitter on the 70 cm band. By shielding the R/C receiver with copper foil and installing a low pass filter on the R/C receiver antenna jack I have eliminated all interference problems.

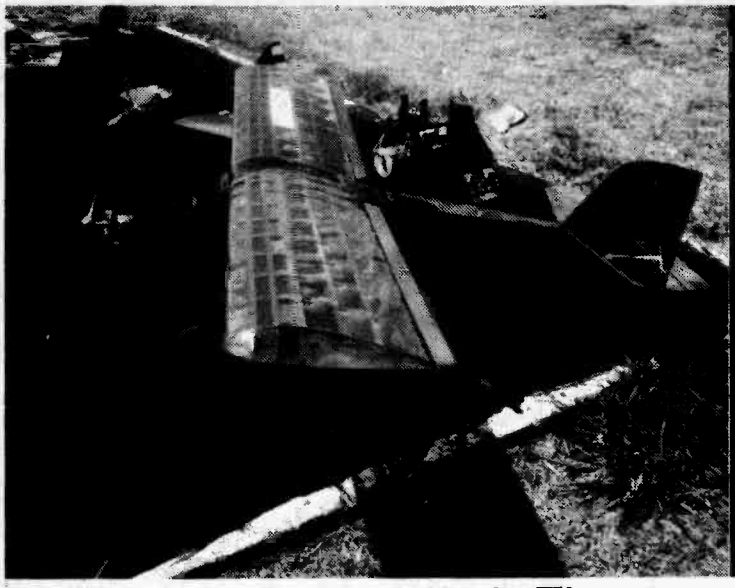
Thrills and Chills

My flying box system has been a big hit at the R/C shows we've attended. It's quite a thrill to actually fly along with your model plane. With the flying box control system I've been able to taxi, take-off, fly in formation with other R/C planes and land just by watching the down linked video on my monitor. I never have to even look at the plane itself. It does pay to have some actual flight experience with a real full-size plane. It takes similar flying skills to operate the flying box simulator. It's a totally different experience than regular R/C airplane flight.

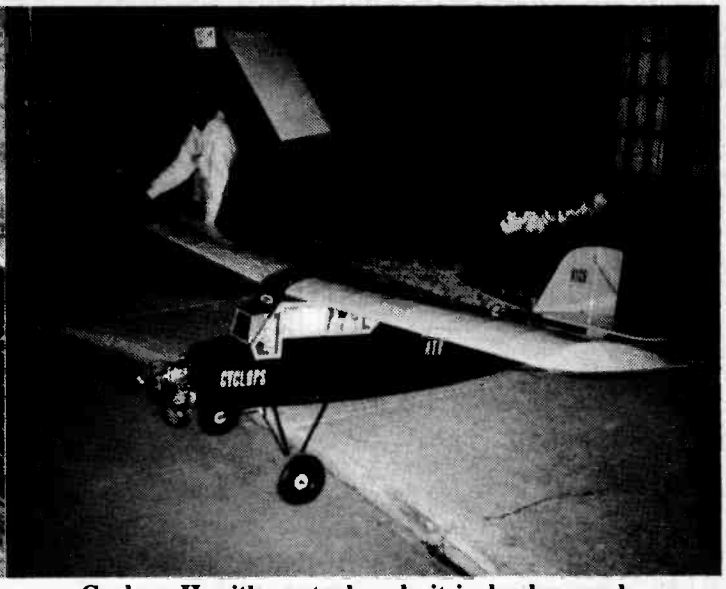
Now that my flight system is working reliably I'll be adding on-screen telemetry of the altitude and flight speed with a new video overlay flight computer being designed by Bob Rau N8IYD. It's been quite a fun project and really adds a whole new dimension to my R/C airplane flying.

[Ed. Note: Detailed plans, wiring diagrams and complete ready to install rudder assemblies are available from Carl at the above address.]

Carl shown at Dayton receiving the ATVQ $100 CASH Home Brew contest first prize from Henry KB9FO.

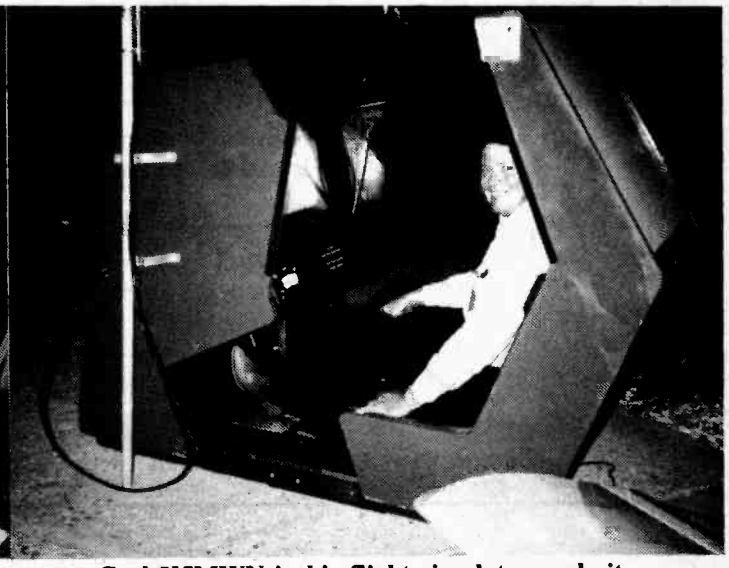


Cyclops I — the first system with color TV camera.



Cyclops II with control cockpit in background.

Throttle, joystick and rudder pedal controls in flight box.



Carl K5MWN in his flight simulator cockpit.

All controls are connected to FUTABA 5NLP PCR encoder located in flight box — inside of flight box cockpit.

Preparing to land on the R/C runway.

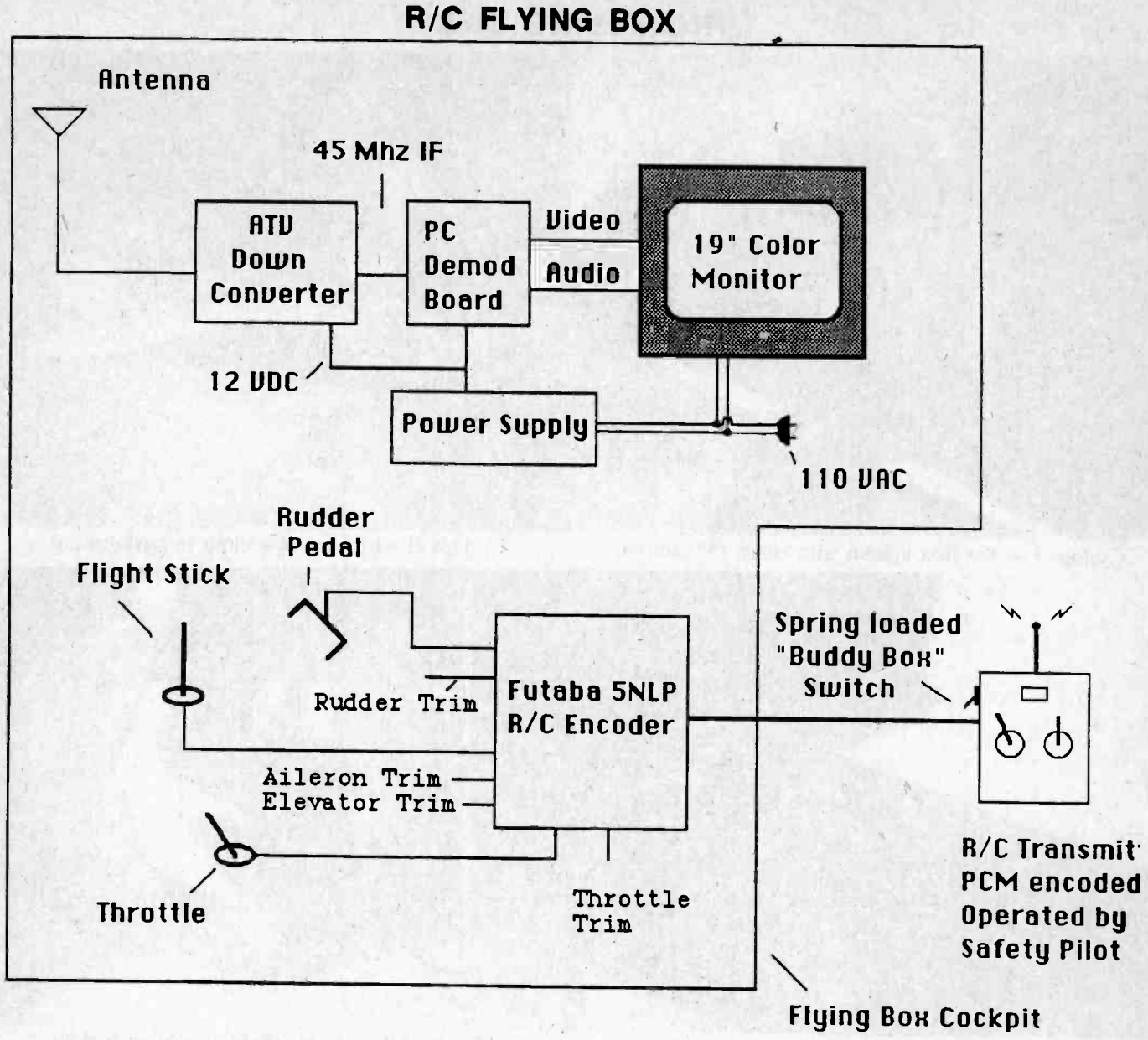
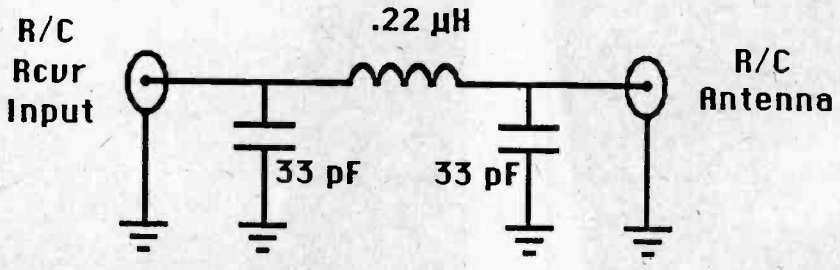


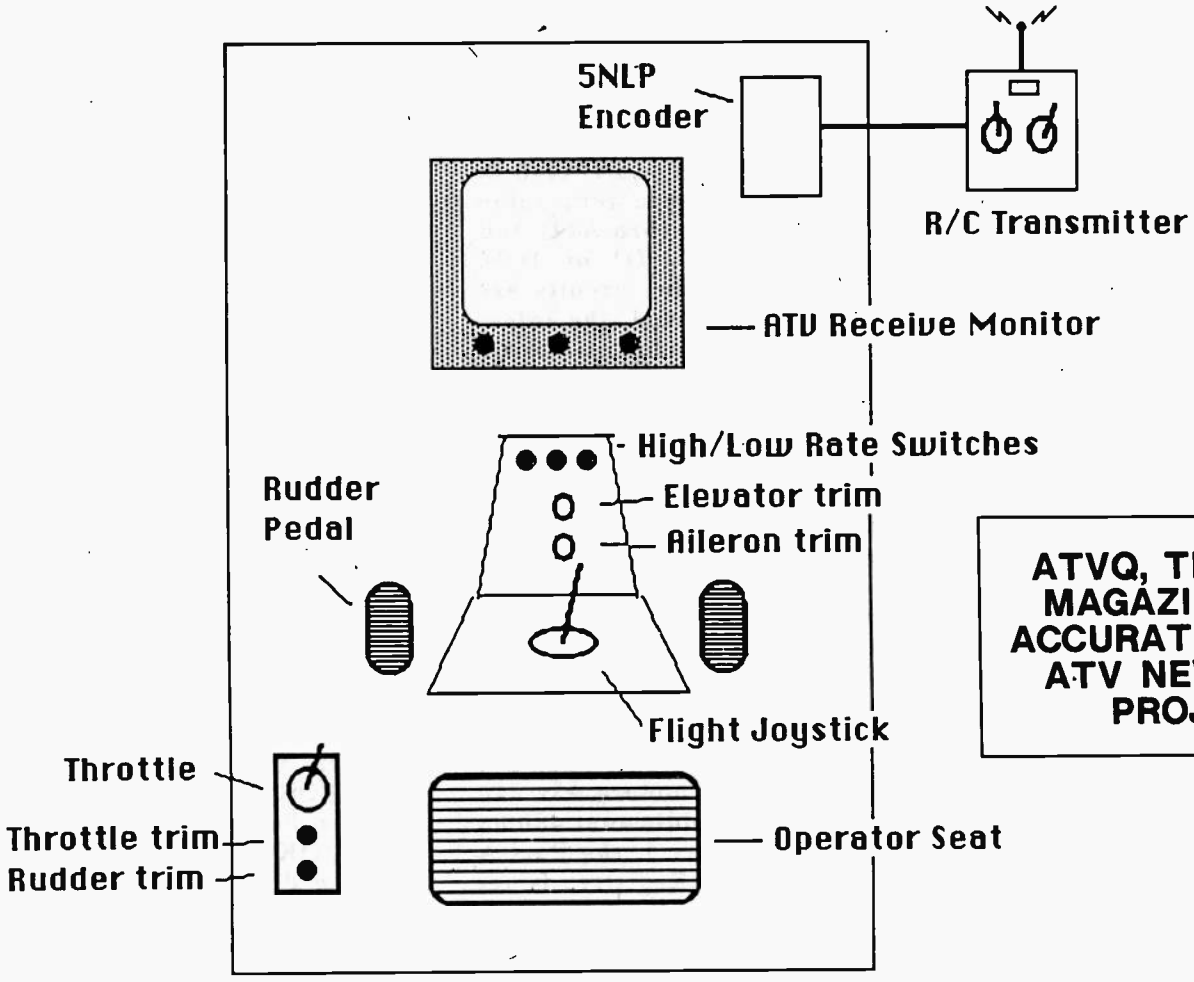
Diagram of Flying Box Control System



Low Pass Filter to Prevent R/C receiver desense

(Circuit courtesy of PC Electronics)

R/C FLYING BOX



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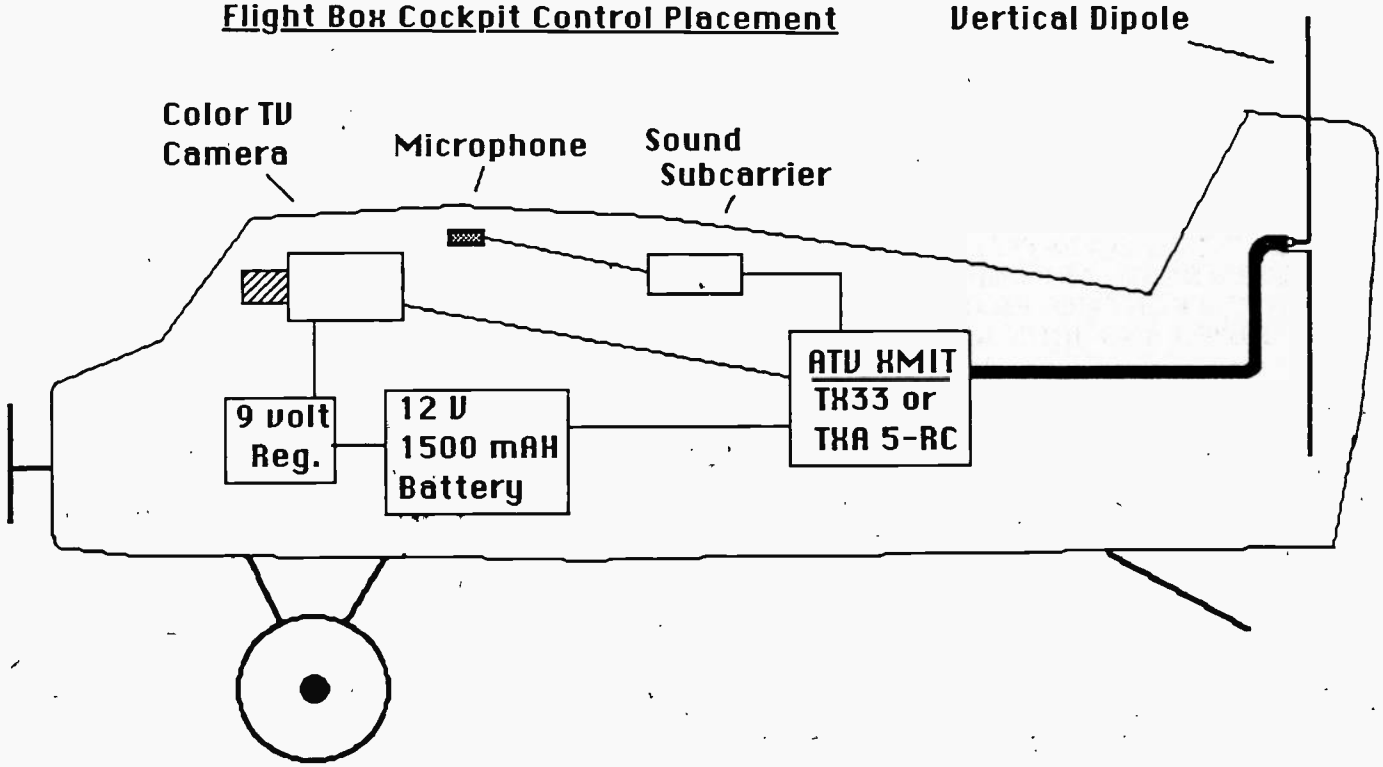
Flight Box Cockpit Control Placement



R/C Plane ATV Payload (Robin Hood 99)

C-64 I/O PORT EXPANSION FOR ATV CONTROLLERS
LYN H. CYR W1NRE

With any degree of sophistication, it doesn't take too long to run out of I/O ports on the Commodore C-64's User Port. The game ports, through which game paddles and joy sticks are connected, can be used for additional I/Os but their use requires a little caution since these ports are also shared by the keyboard. Commodore had enough foresight to provide two blocks of memory which were reserved for future I/O expansion. Most of the following circuits make use of these I/O memory blocks. There are two blocks of expansion labelled I/O1 and I/O2. I/O1 starts at memory address 56832($DE00) thru 57087(DEFF). I/O2 occupies memory location 57088(DF00) thru 57343(DFFF). There are also two active low signals available on the expansion bus labelled I/O1 and I/O2. These signals may be used in the address decoding scheme The circuit shown in Figure 1 is straight forward. The C-64 will allow you to accommodate 32 of these circuits for a total of 512 I/O bits! That should be more than enough I/Os to meet your needs. The I/O device selected was the 6522 VIA chip. It has all of the features described in the C-64 Programmers Reference Guide. The circuit of Figure 1 places the chip at addresses 56832 thru 56847.

The address decoding scheme uses A4 thru A11 and I/O1 for decoding. For other addresses, place logic inverters (SN74040 in the lines that have a zero value in the address (A4 thru A11) and select the either I/O1 or I/O2 for decoding. If the circuits are placed in a card cage, the interconnecting cables will deteriorate the Phase 2 signal. The SN74121 is used to reshape the signal. The pulse width of the one-shot should be adjusted so that the reshaped pulse has a pulse width of about 300 nSec. Wiring was done on Radio Shack fingered perf-board not critical. The I/O outputs can be terminated to a connector of your choice. In this particular situation, they were terminated to a 16 pin DIP socket. A separate +5V supply should be used to supply additional circuits as the Commodore +5v can only handle an additional 450ma As shown in Figure 1, the Port A Data Direction Register is at location 56835 and its Data Register at location 56833. The Port B Data Direction Register is at location 56834 and the Data Register at location 56832 After completing the circuit, recheck all the wiring for errors. To check out the board, turn your C-64 on and wait for the ready prompt. In some cases the computer will not boot up properly with the I/O board connected to the bus. The level of the Phase 2 signal seems a bit marginal. The computer may boot up but the cursor will be missing. Even a scope probe seems to load it down. Once your computer is booted up, connect the I/O board to the expansion port. Adjust the pulse width of the SN74121 to about 300nSec (about 2K ohms). You may want to consider placing the SN74121 in the computer itself and use it to feed the Phase 2 clock to your bus Enter the following short program to exercise all the ports

```
10 REM ** I/O Port Check Out **
 20 POKE56835,255: REM Make Port A all outputs
 20 POKE56834,255: REM Make Port B all outputs
 30 FOR X=0 to 7
 40 POKE56833,2 X: Rem Exercise Port A
 50 POKE56834,2 X: REM Exercise Port B
 60 NEXT X
 70 GOTO30
```

Examine all 16 I/O lines with a scope or logic probe. All of the ports should be pulsating. Refer to the April 1989 issue of ATVQ for more information on programming I/O ports. With this I/O Port expansion circuit you can now add all of the bells and whistles you want.

ATVQ AT THE HAMFESTS: LEFT, WELL ATTENDED ATV SESSION AT ORLANDO, FL. GROUP WAS ADDRESSED BY Lou McFadin W5DID of NASA AND SHOWN ACTUAL ATV RECEIVER FOR SAREX 1990 (SHOWN ON FRONT COVER OF THIS ISSUE). RIGHT, PORTION OF ATVQ BOOTHS AT DAYTON, WITH HENRY KB9FO AND JOHN KD0LO.

C-64 PORT EXPANSION

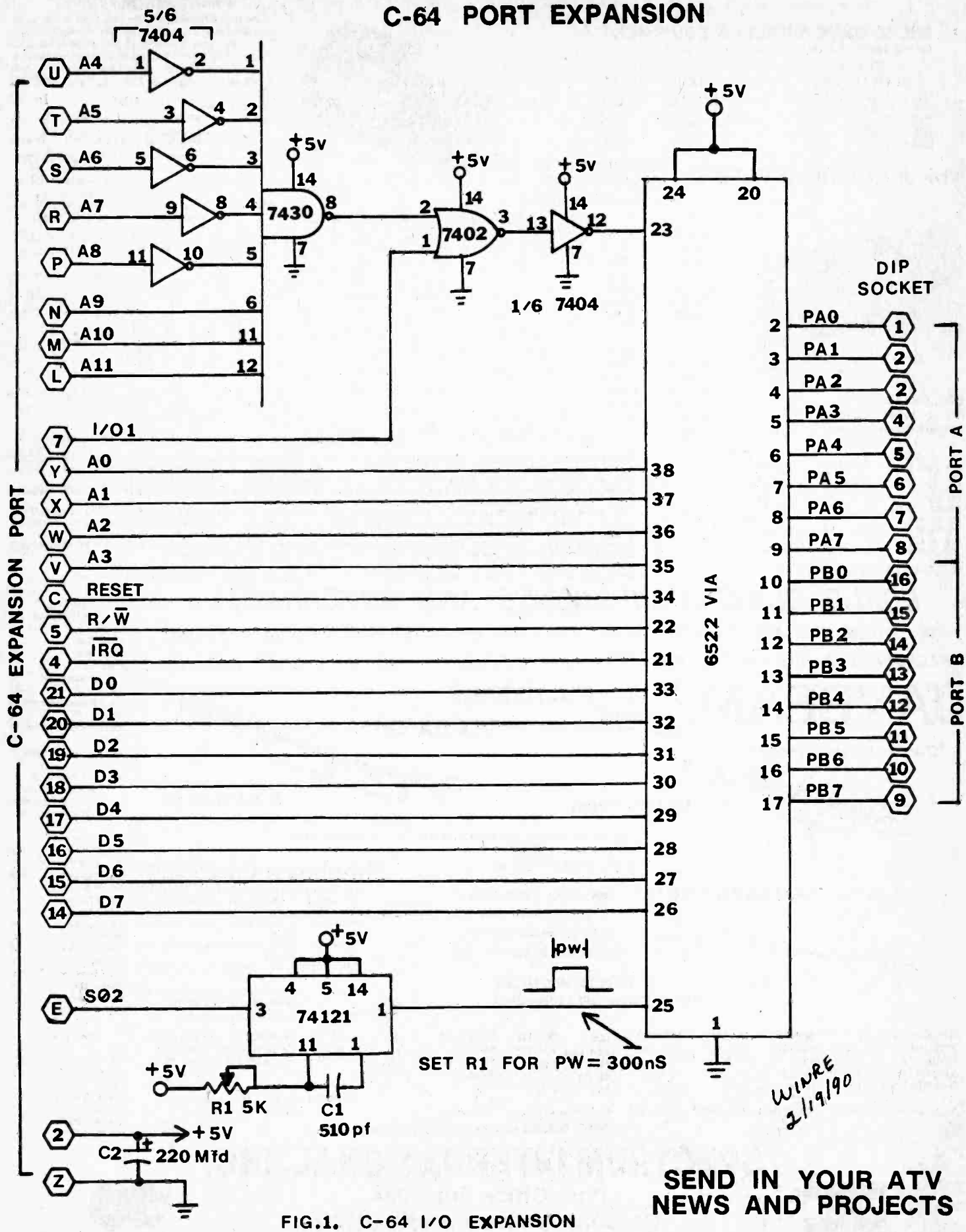


FIG.1. C-64 I/O EXPANSION

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MMt	432-28(S)	370.00
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KNOCK OUT INTERFERING QRM OR SELF—DESENSE!

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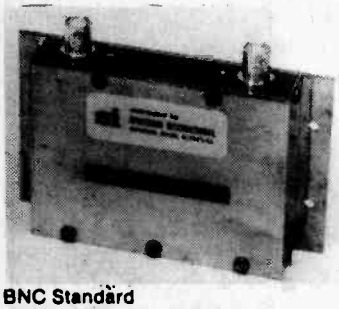
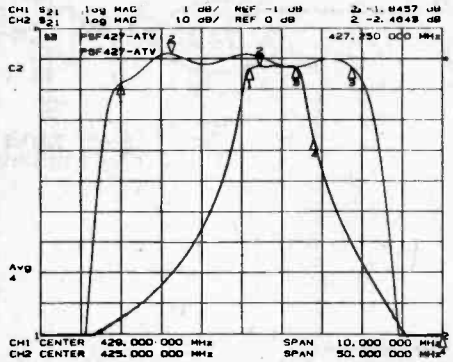
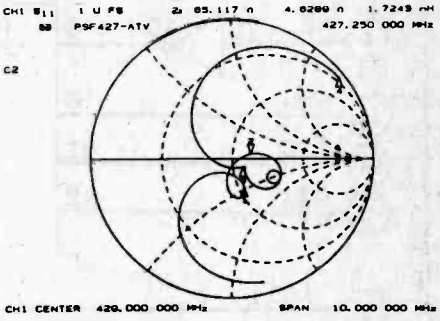


BNC Standard
TNC or Type 'N' optional
(slightly higher prices)

MMF-200-7	145 Mhz.
PSF 137-3	132-142
PSF 144-3	140-150
PSF 220-3	216-228
PSF 432-3	420-450
PSF 421-5	ATV Channel
PSF 426-5	ATV Channel
PSF 434-5	ATV Channel
PSF 439-5	ATV Channel
PSF 900-3	890-940
PSF 923-5	ATV Channel
PSF 1280-3	1230-1320
PSF 1280-5	ATV Channel
PSF 1296-3	1250-1340
PSF 1691-3	1650-1750





PRE-SELECTOR FILTERS

Spectrum International's low loss, fixed tuned, bandpass filters are a 3 pole, 7½ bandwidth interdigital design. The 0.1 dB ripple Tchebyscheff characteristic has a 30 dB shape factor of 4:1. They are intended for receiver pre-selector and transmitter applications. The very low loss is realised by using an air dielectric transmission line design.

Technical Data

General:	Ripple	0.1 dB
	Impedance	50 Ohms
	VSWR, typ	1.25
	Power, nom	100 W (BNC)
		250 W (Type N)
Size:	Width	4.0 Ins approx
	Thickness	1 Inch
Material:	Brass	Plates, Rods & Bars
	Hardware	Stainless Steel

U.H.F. Filters	
MMf 200-7	$ 55
PSf 137	175
PSf 144	175
PSf 220	145
PSf432	95
PSf 421-ATV	145
PSf 426-ATV	145
PSf 434-ATV	145
PSf 439-ATV	145
PSf 900	95

Prices subject to change without notice.

U.H.F. Filters	
PSf 923-ATV	$155
PSf 1280	95
PSf 1280-ATV	155
PSf 1296	95
PSf 1691	95
Connector Options for Filters	
for MMf200-7 U.H.F	$ 45
Type "N"	15
for PSf . . . Type "N"	20

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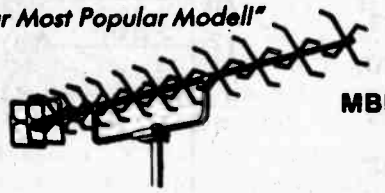
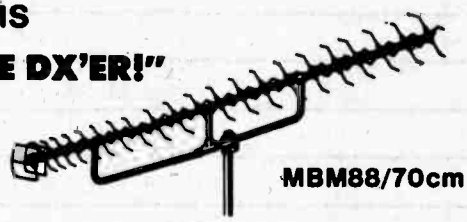


MBM48/70cm

"THE DX'ER!"



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2 way & 4 way Mounting Frames Available (Vertical slightly higher)
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MF4V MBM88 HOR $87.00

Antennas

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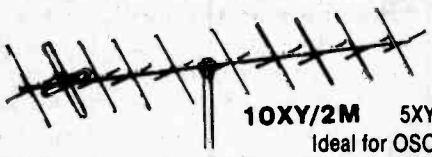
10XY-2M	83
MBM28 - 70cm	85
MBM48 - 70cm	90
MBM88 - 70cm	135
DY20 - 900 (900/930 MHz)	69
1268-LY	65
1268-LY-XTN (add 21 elements)	89
1268-LY	65
1268-LY-XTN (add 21 elements)	80
1691-LY	75
1691-LY-XTN (add 26 elements)	70

Note: 1. All antennas include 50 ohms build-in BALUN.
2. Order Loop-Yagi connector from accessory list below.

2 Mtrs. CROSSED YAGIS



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PMH2/70cm	2 way phasing harness for two 70cm aerials
PMH4/70cm	4 way phasing harness for four 70cm aerials
PMH/2C	2 way phasing harness for circular polarisation for two 2m aerials
PMH137-C	Circular harness for 5x4/137
MF2-48	48 element stacking frame $18.00
MF2-88	88 element stacking from $22.00
SVMK-48	Vertical Pol Mounting Kit $22.00

Four-way harness

All phasing harnesses and power combiners include Type 'N' (female) connector.
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Harness Kits

PMH-137C 137 circ Pol	$ 20
PMH- 2C 2M circ Pol	20
PMH2-2M 2M 2-way	23
PMH4-2M 2M 4-way	55
PMH2-70 70cm 2-way	20
PMH4-70 70cm 4-way	37
900-2way (combiner)	ask
900-4way (combiner)	ask
1268-2way (combiner)	65
1268-4way (combiner)	95
1296-2way (combiner)	65
1296-4way (combiner)	95
1691-2way (combiner)	65
1691-4way (combiner)	95

Stacking Frames

2-way
MF2 -48 MBM48 H/V $ 20
MF2 -88 MBM88 H/V 24
4-way
MF4H-48 MBM48 Hor $ 69
MF4V-48 MBM48 Vert 79
MF4H-88 MBM88 Hor 89
MF4V-88 MBM88 Vert 99

SPECIFICATION	MBM28	MBM48	MBM88	10XY	5XY-137	DY-20-900
FREQUENCY (MHz)	430-440	430-440	430-440	144-146	134-138	900-930
GAIN (dbd)	11.5	14.0	16.3	10.8	7.8	17 dbi
FRONT TO BACK RATIO	18 db	20 db	22 db	16 db		20 db
3db BEAMWIDTH	H45° E40°	H35° E28°	H28° E23°	E40°	H 58°	H 32° E 22°
DESIGN IMPEDANCE	50 OHMS	50 OHMS	50 OHMS	50 Ohms	50 Ohms.	50 Ohms

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AUDIO/VIDEO 8-CHANNEL SWITCHER

Lyn H. Cyr W1NRE

With the increasing complexity of ATV repeaters and home stations, the need arises to handle a multiplicity of audio and video signals.

The circuits to be described were intended for repeater applications but could be used as well in the home station. The switches were designed to be controlled from binary codes which lend themselves nicely to computerized control.

The same basic philosophy was used for both switches. There are eight inputs with options for three separate outputs. The control bits for each program switch was kept independent allowing full flexibility in program source selection. The audio switch has the capability of mixing any of the audio sources on two of the outputs. This feature was implemented to allow sound from the picture-in-a-picture to be heard simultaneously with the two pictures being displayed on the screen. The PIP is a Rabbit Double Play unit which is being used at the WINRE ATV repeater to monitor activity on the 33 cm machine while watching the output of the 70 cm repeater. The audio "cross-link" would also permit mixing a 2 meter intercom channel.

AUDIO SWITCHER

The circuits of the audio switcher are straight forward and simply applications of standard opamp circuits found in any reference material. Refer to Figure 1 for signal and control flow. The eight inputs are applied to eight identical audio preamps with each of the preamp outputs applied to the inputs of three 8-to-1 analog multiplexers (Figure 3). The output of the MUX switches are processed by a 3-band audio equalizer (Figure 4) to suit your particular frequency response needs. The equalizer provides bass, mid-range and treble boost or cut. Channel selection, for each of the outputs is performed by a 3 bit binary coded word for each output. The first channel is actually channel 0 but is labelled channel 1 in the documentation. The binary code "000" selects the first channel and binary code "111" selects the eighth channel. To fully implement the switcher as shown, 9 bits of channel selection and two bits of cross-link functions are required. You can see that if you're using a C-64 for repeater control, the available I/O ports are quickly exhausted. I/O expansion, for the C-64, is the subject of another article. The parts marked with an (*), in Figure 4, are only needed if you contemplate the cross link feature. The cross link switch can be operated simultaneously or independently. If you don't need multiple outputs, simply ignore those MUX switches and equalizers.

The circuits were built on Radio Shack fingered perfboards so as to fit in a card cage. The power supplies to both switches should be independent of the digital supplies to simplify and improve the decoupling of digital trash that may appear on the digital +5V.

Referring to Figure 2, the input level pots are used to equalize the audio inputs to the same level. The output level (Figure 4) will then serve as a master level control to the input of the transmitter.

VIDEO SWITCHER

The design of the video switch is pretty much the same as the audio circuit in concept. Refer to Figure 5 for signal flow and control logic. The preamp chosen was the LM318 opamp. With low level signals, the unity gain band width is sufficient for a good frequency response out to 5 or 6 MHz. The MUX circuits are identical to those of the audio switch with the exception of the cross link. Unless the two video sources are genlocked, cross linking is not possible with video unless you use a Rabbit Double Play which simplifies the situation. I also have thoughts on synchronizing independently received signals, providing you can externally sync your camera and a commercial TV station is within range of both stations... oh well, when they have 48 hours in a day maybe we'll take the soldering iron out again. The output of the multiplexers is applied to a high speed buffer with a low output impedance so that longer coaxial lines can be driven. The input level pot on the video preamp is adjusted to insure uniform video levels.

The input coupling capacitor may be bypassed if you prefer direct coupling. The offset adjustment is used to either adjust the offset or to preset the DC reference of the output signals. Output level controls were not used. The video gain controls on the transmitter are used for the purpose. Even though an offset adjustment is provided on the switcher, keep in mind that most video modulators around today are AC coupled and that the DC levels will be lost in the modulator's coupling circuit.

The method of construction was the same as the audio board and the same precautions taken with the power supplies.

Vertical interval switching is not provided, as shown, since most of these switches are selected prior to turning on the repeater's transmitter. However pin 6 of the CD4051 is an inhibit pin and could be used for such a purpose.

With independent audio and video selection and eight input channels, the flexibility of these circuits should meet most of your switching requirements.

DIAGRAMS ON NEXT PAGES >>>>>>

AUDIO/VIDEO 8-CHANNEL SWITCHER

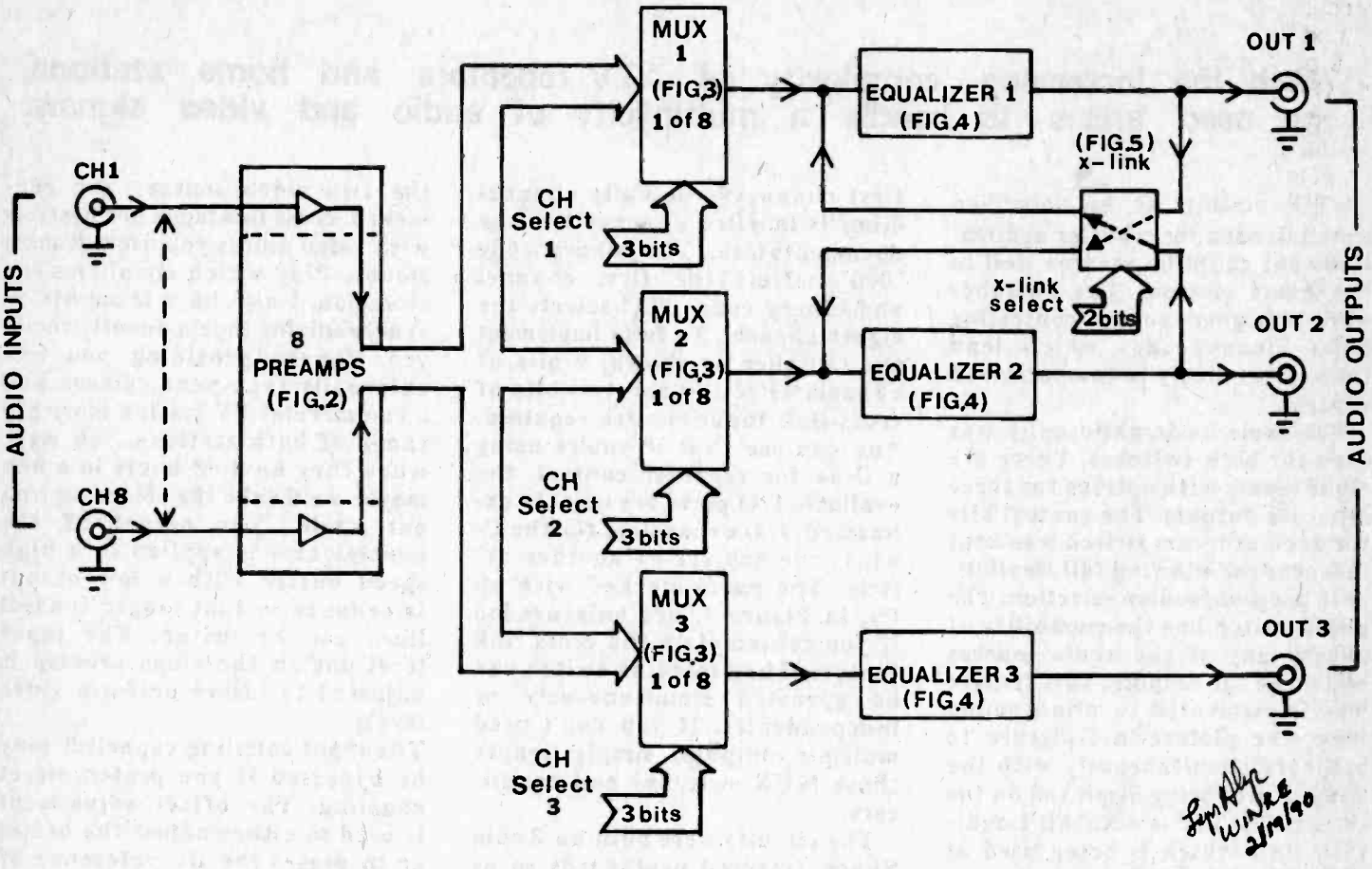

FIG.1. 8-INPUT/ 3-OUTPUT AUDIO SELECTOR – BLOCK DIAGRAM

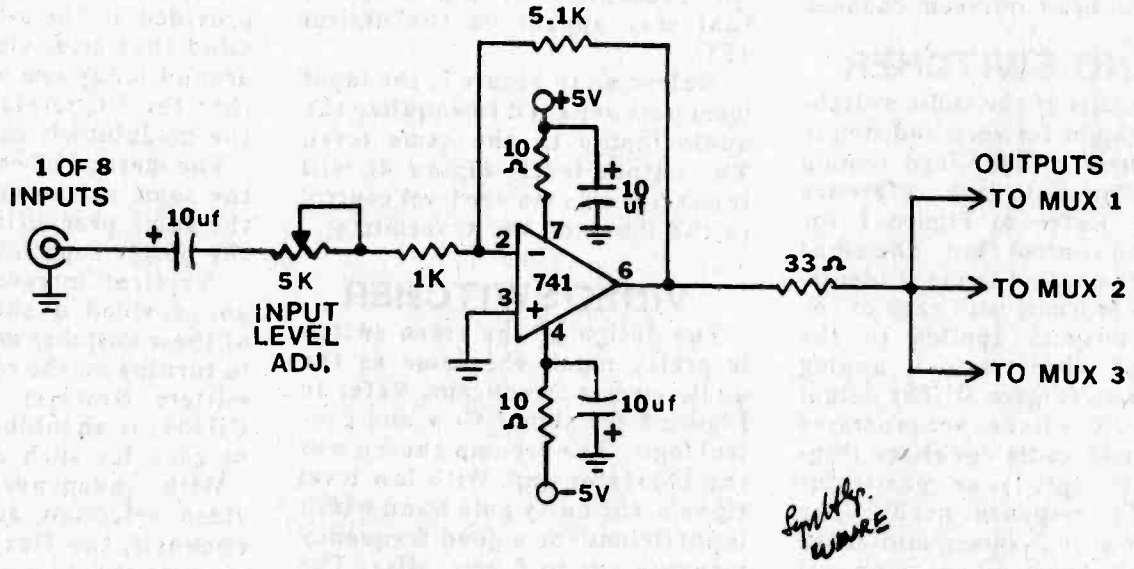

FIG. 2. 1 OF 8 INPUT AUDIO PREAMPS

AUDIO/VIDEO 8-CHANNEL SWITCHER

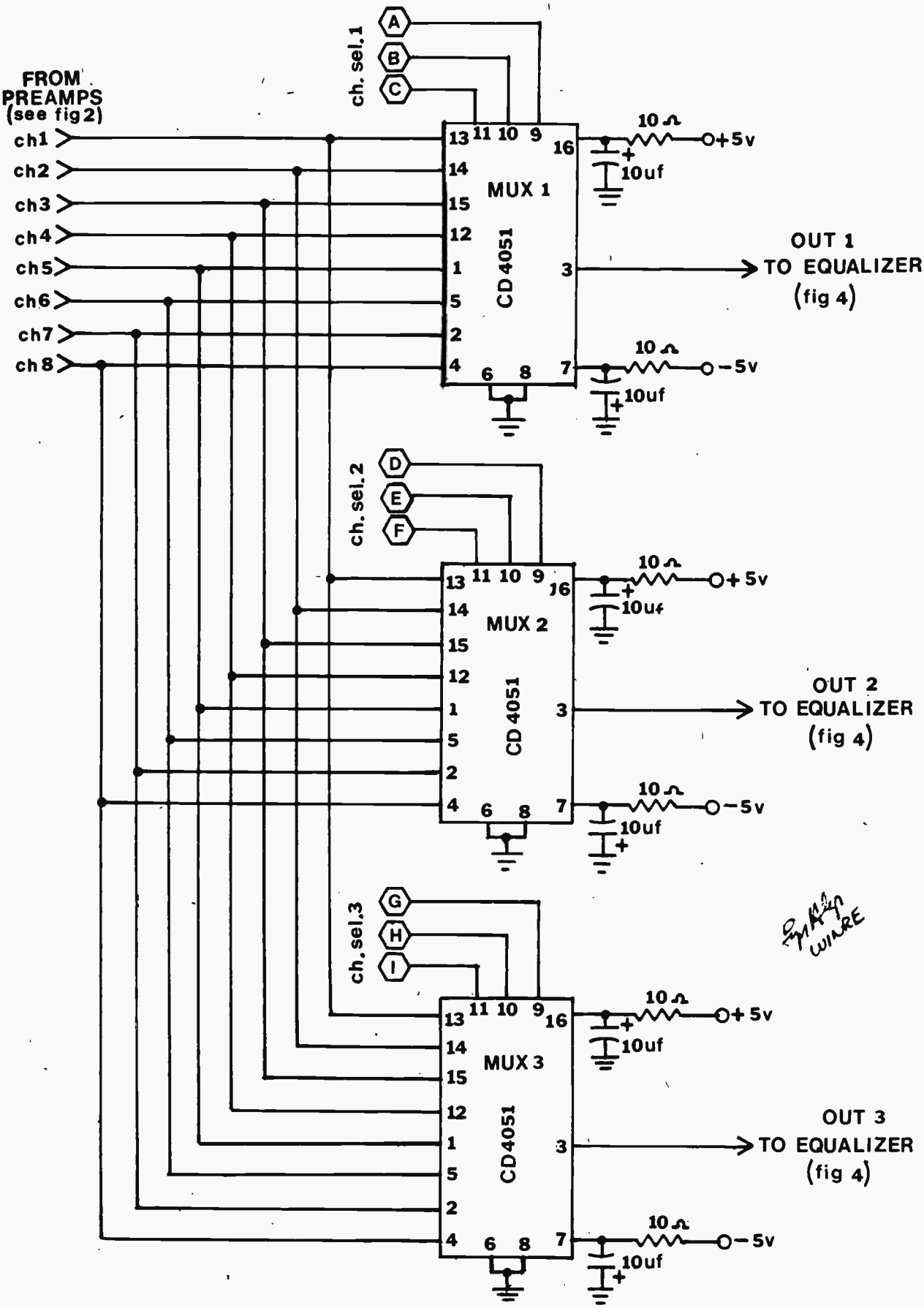

FIG.3 TRIPLE 8 TO 1 MUX

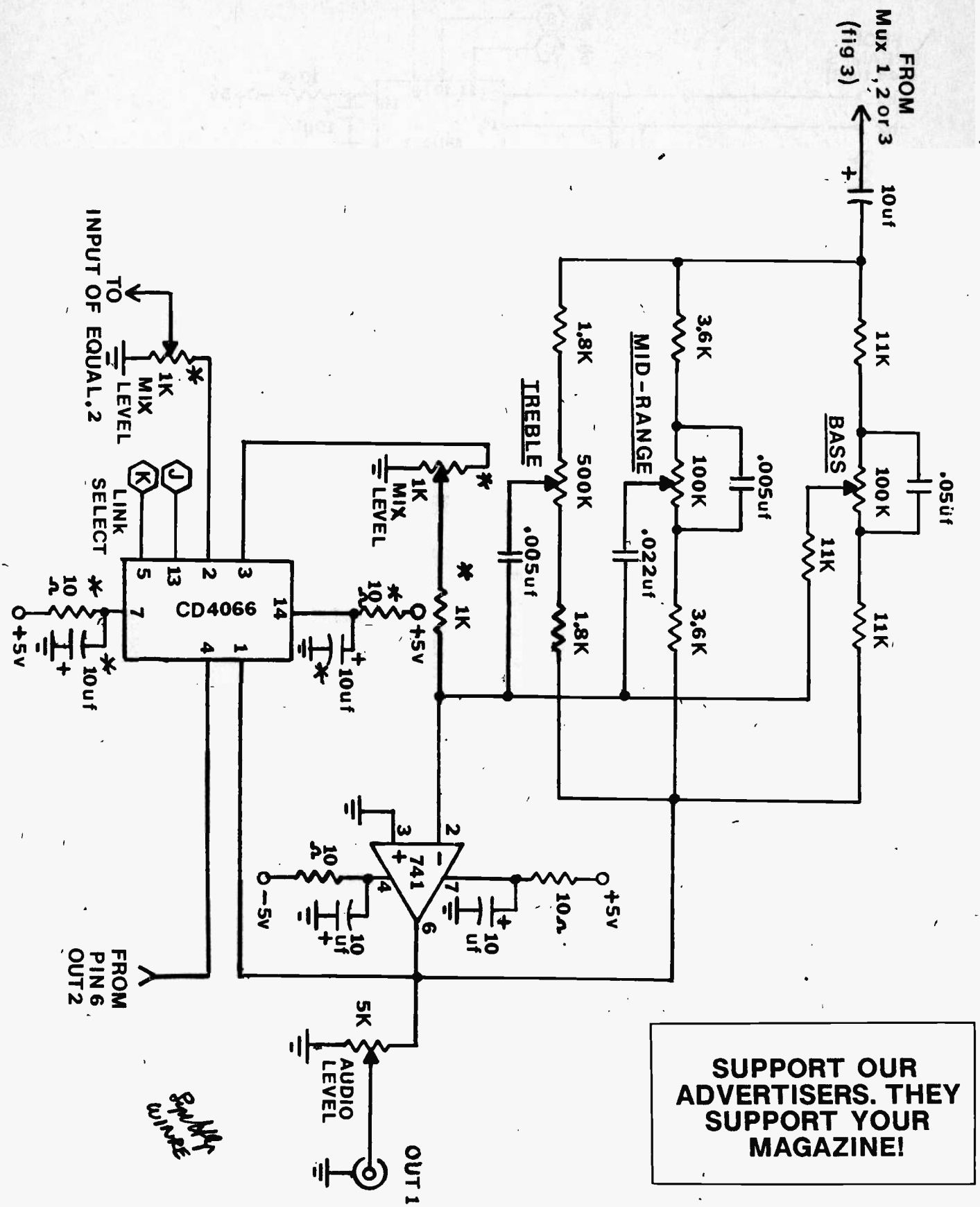

FIG.4. AUDIO EQUALIZER/LINK MIX

AUDIO/VIDEO 8-CHANNEL SWITCHER

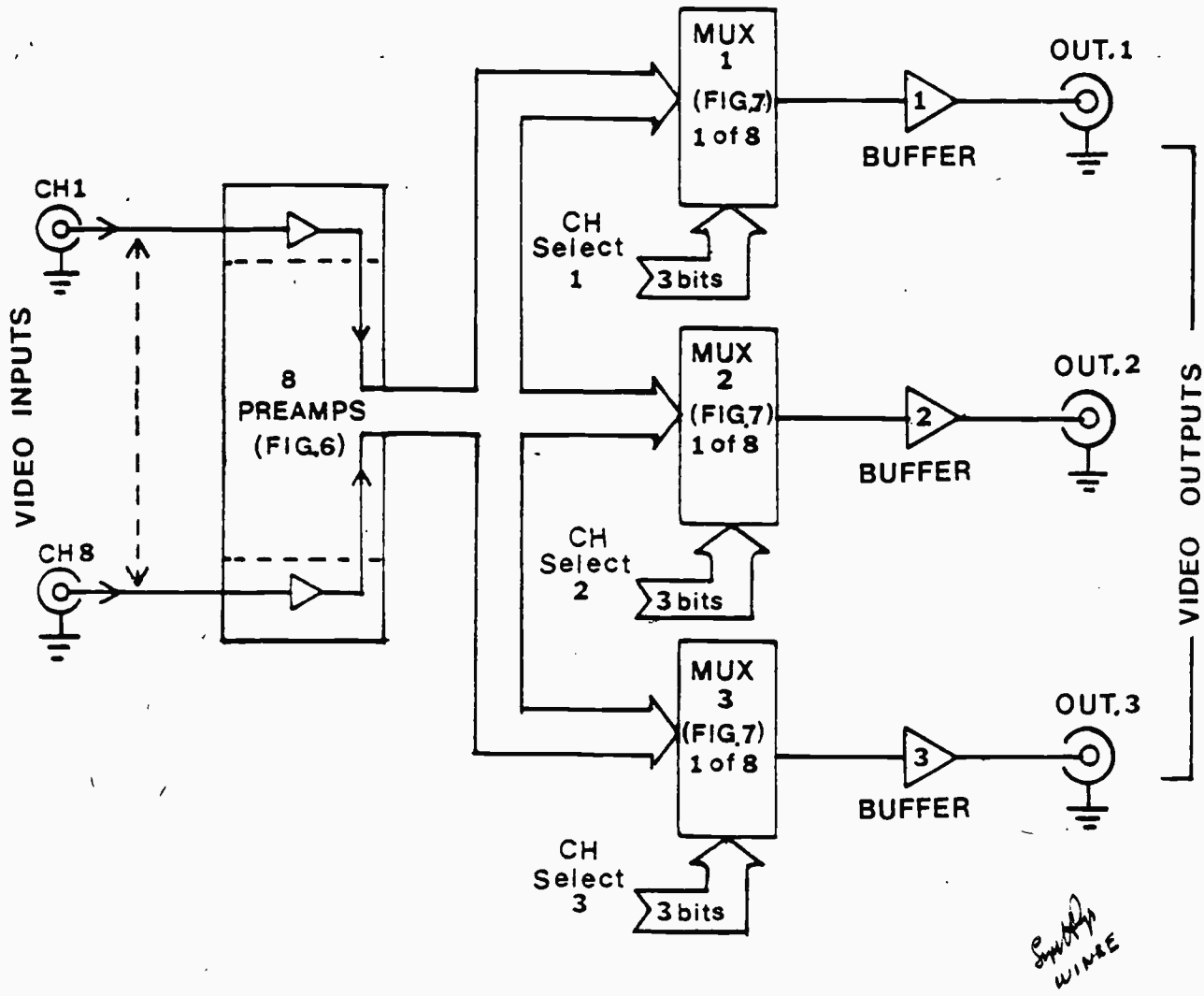

FIG. 5. 8-INPUT/3-OUTPUT VIDEO SELECTOR

ATTENTIONATV CLUBS: FREE ATV PROMOTIONAL VIDEO FROM AEA

AEA has produced a very professional video tape with Chuck Northcutt W7SRZ as host. The tape shows ATV activities including portable operation, public service applications and ATV repeater use. The tape also has a "commercial" about the AEA ATV transceiver which is very tastefully done. This is a great item for show and tell at meetings and elsewhere. The tape is about 10 minutes long on VHS. You can get a FREE copy by writing and asking for it. Write: ATV Promo Video, c/o AEA, PO Box 2160, Lynnwood, WA 98036, or call 206 775 7373. I latched onto a copy and showed it to the Baton Rouge group who immediately thought it was good enough to use for their next meeting and for ATV promo purposes.

AUDIO/VIDEO 8-CHANNEL SWITCHER

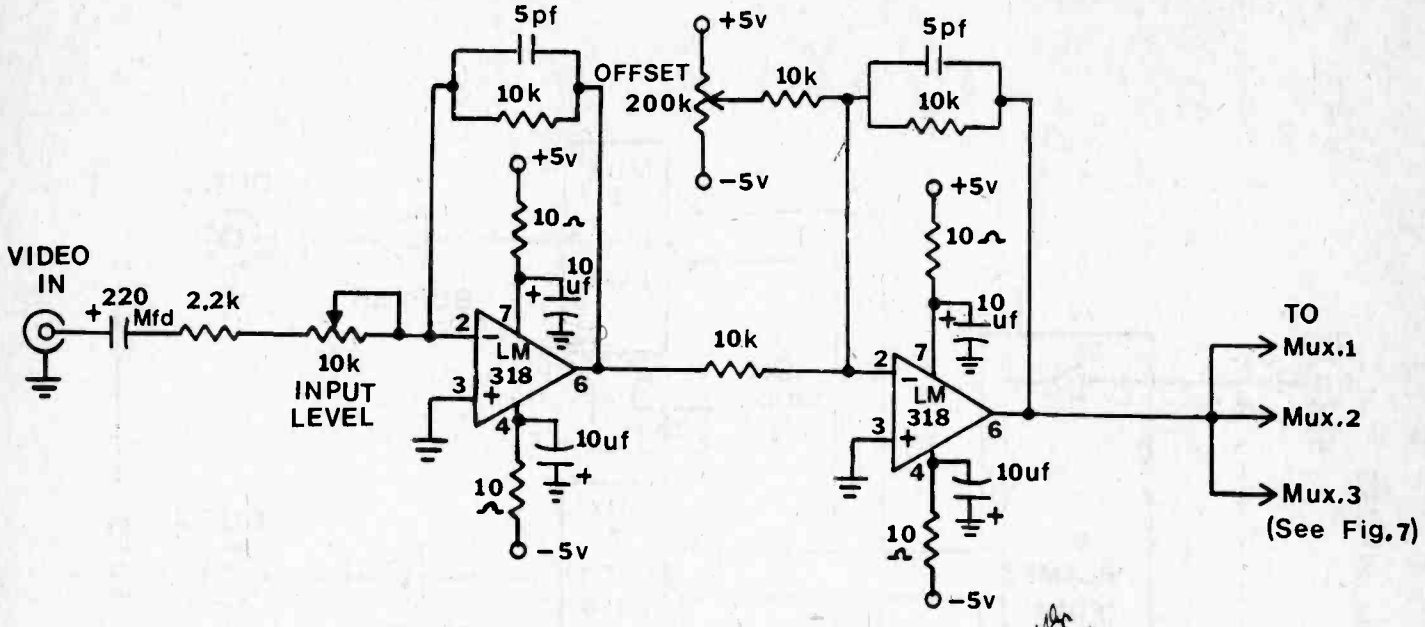

FIG. 6. VIDEO PREAMP (1 of 8)

AUDIO/VIDEO 8-CHANNEL SWITCHER

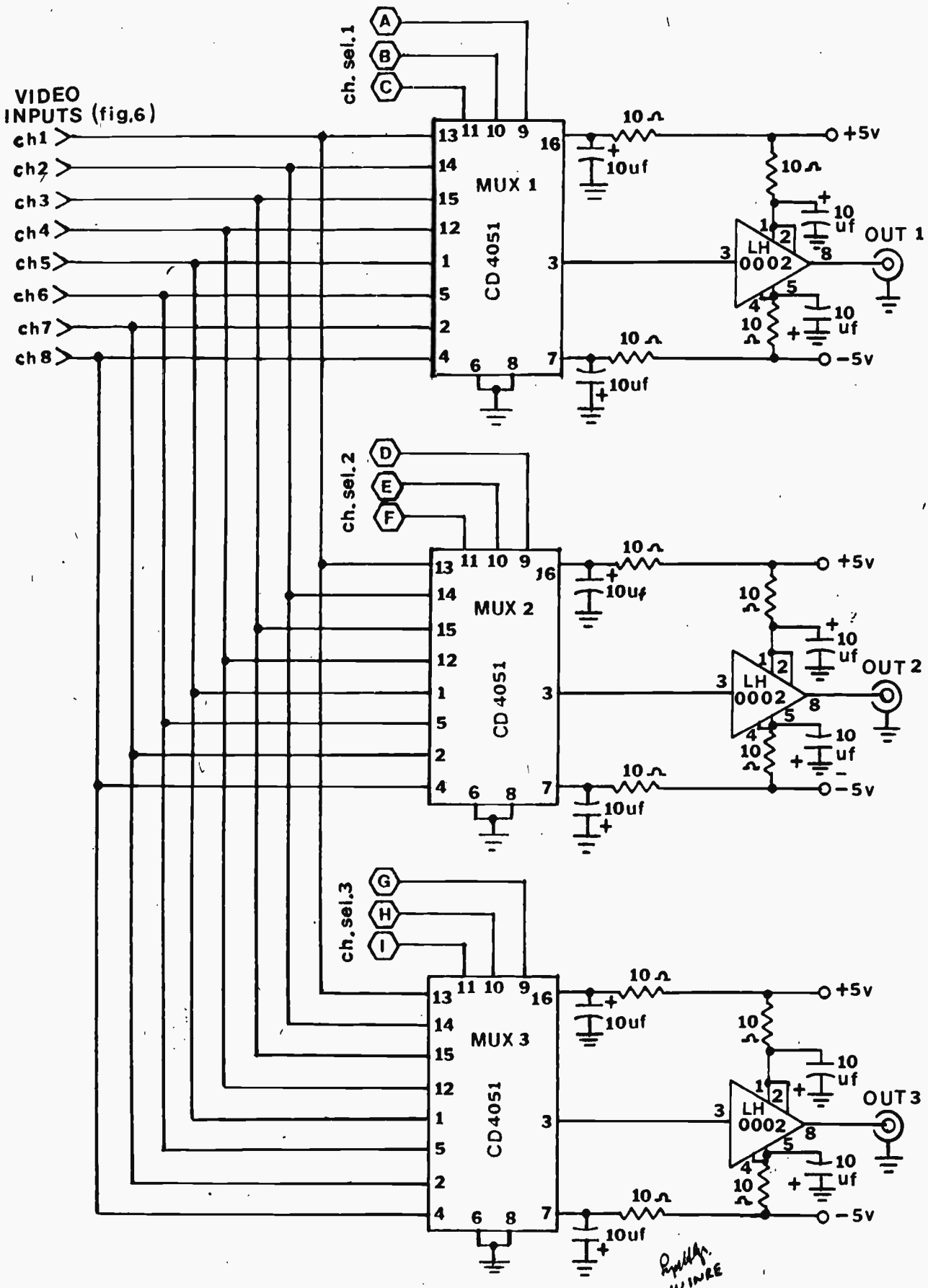

FIG 7 VIDEO 8 TO 1 MUX

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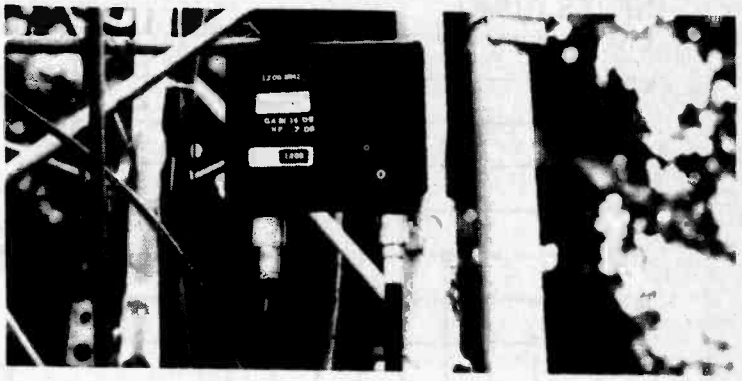

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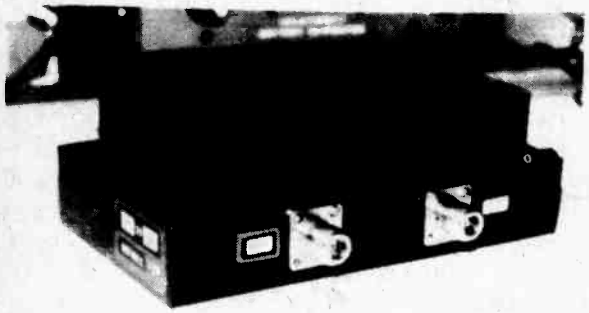

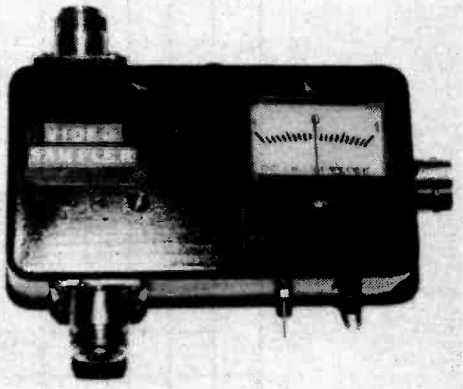

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STEALING SYNC AND OTHER DESPICABLE PASTIMES
by KD0LO John P. Spaeth

Several of you have called or written to me after modifying the Radio Shack special effects switcher, thank you all for the positive feedback ! The problem most of you have had is with trying to feed the switching unit non-synchronous video signals. This article will take a quick look at the basic tenants of "sync" and various ways to produce an inexpensive synchronizing source.

An image finds its way onto the face of your camera tube through the camera optics. This image is comprised of electrical charges which represent differing levels of reflected light. The charges are located on the part of your camera tube called the target. The camera produces a beam inside of the tube which converts these electrical charges to a video pattern, and discharges the target of the tube at the same time. This beam scans the target of the tube in a sequential manner, and every charge it encounters on the target becomes a pixel. The more pixels the beam is capable of detecting, the higher resolution the camera produces. The beam scans the target horizontally from left to right, and at the end of each scan line (horizontal-line sweep), the video signal is blanked out while the beam returns to the left edge of the next line. This process continues until the entire target has been scanned from top to bottom. thus completing one field scan. When the beam reaches the midpoint of the bottom line it is blanked again and deflected back to the top center of the target where the second field scan begins and proceeds like the first. The beam must be focused on the target to pinpoint accuracy so it only scans every other line leaving the unscanned areas for the second scan.

The half line offset at the end of the last line of the first field scan, enables the beam to return to the top of the field and make a second pass in between the lines of the first scan. These two passes of the beam are interlaced, and the two interlaced fields compromise a single frame of video. (see fig 1). From this simple description one can see that the video signal must contain not only brightness-(luminance) and color (chrominance) information, but it must also contain some blanking information to turn the scan beam on and off during the end of each horizontal scan (horizontal blanking) and off at the bottom of the field scan (vertical blanking) so it can return to the top of the target and begin its second pass.

The blanking pulse of the composite signal is at a voltage level below black level. These pulses signal the receiving video monitor where to position its beam to place the charges on the crt for viewing. If the blanking pulses are lost, the beam will not perform properly and the resultant video will be distorted.

The blanking pulses are known as synchronizing pulses since they keep the beam on its target. If the pulses are not of the correct frequency one loses sync, and the camera and monitor will exhibit erratic behavior by loosing either horizontal or vertical scan lock. If sync is lost for a long period of time the beam will stop scanning at a certain point and burn the sensitive phosphors of either the crt or the camera tube. Total loss of sync should be avoided !

The problem with using multiple video sources is that although they each may have good blanking pulses (sync), they are also producing this sync from their own time bases so that the line and field scan rates of two independent video sources may differ just enough in frequency so as not to be compatible. Additionally, even if the horizontal scan is the same, one source has no way of knowing at what point in the field scan the other is. However if the two video sources could somehow share the same synchronizing pulses, then they would be called synchronous or genlocked video sources.

If one switches from video source one to source two, no matter how fast one is able to make the switch, a momentary loss of sync will be encountered and the monitor will jump or jitter until it is able to recover from the momentary loss of sync and lock itself to the new sync pulses. For most of us this is not objectionable for full field viewing however a problem arises when one wants to have all or part of two separate video sources on the monitor at the same time. This would occur during a wipe or fade or chroma-keying as with the Radio shack special effects generator.

Commercial video installations have the same problem of course, and they must make sure that all the video sources share the same synchronizing pulses. This can be achieved by providing sync from one master source, or using a device called a time base corrector which will correct the sync from video source two until it matches source one so both will be in sync. A device called a digital frame store can be used to store one complete frame of video from source two, and gate it out in sync with source one. The later two devices are quite expensive and not practical for amateur use. But the former method of gen-locking all the video sources together is less expensive, and more practical for the amateur.

The simplest way to achieve genlock or synchronous video sources is to "steal" sync from source one, and feed it to source two ! Then it can be said that source two is slaved to source one, similar in some respects to how an OM is slaved to an XYL! One device which will allow this is a sync generator with external genlock ability. W6ORG,Tom Ohara has provided the amateur community with such a device in the past and I have used it for years. His unit has unfortunately been discontinued and there are no others available in the consumer price range that I am aware of. However if you have 10 minutes to spare and a 12 VDC supply, you can build your own device which will separate the sync

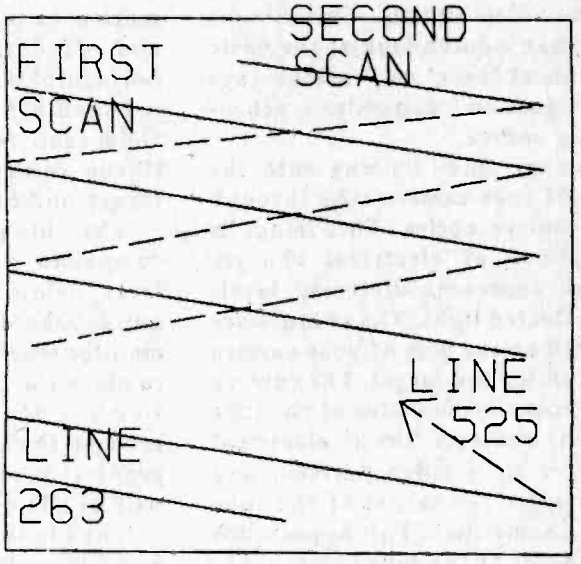
information from your "source video", and provide you with ample drive levels to feed to your "slaved source".

The LM 1881 from National Semiconductor corporation will take any composite input from .5 VPP to 2 VPP, and deliver composite blanking, vertical sync, and burst flag outputs at about 4 VPP. This is an 8 pin dip package which will run on 5 to 12 VDC (see fig 2). Hookup is straight forward. You must provide a distribution amplifier to provide one output for the switcher and another going to the sync separator chip. A block diagram of how the hookup might look appears in Fig 3. The sync outputs from this device can then be fed to your "slaved" video source so that both video sources are genlocked or synchronous. Slight timing errors might occur due to phase differences associated with propagation delay from cables of varying lengths, or slew rate delays caused by the internal circuitry of the video sources. In some instances a delay line may have to be introduced. Usually errors resulting from the above will be minimal and hardly, if at all, noticeable on the crt. However the problem can be minimized if video sources are kept at equal cable lengths from their common termination.

Many sources of video which will accept external sync are available on the surplus market. These range from inexpensive B&W studio cameras to slightly more expensive color cameras and VCR's. Most cameras can be modified to accept external sync. One camera which I have is the Hitachi VK-C800. A quick look at the schematic will reveal that the heart of its sync generation is a MC1405-0BCP sync generator chip. (see fig 4). This chip has a genlock pin #17 which is tied high on the schematic. This pin accepts external horizontal sync, and pin 19 is a common in/out put for the vertical timing signal. This is an example of how simple it is to feed external sync to a color camera. Remember that when you modify the camera it will not have sync unless you have your sync generator turned on. A camera without sync will generate a beam which is not scanning the target and likely will burn it so be careful! While you are experimenting it would be a good idea to unplug your tube to avoid accidental meltdown, and monitor your sweep on a scope.

Of course one could build a simple switch which would deliver external sync when it was present, and internal when external was not available. Don,t rely on mechanical switches to achieve this because the operator of the switch is accident prone...believe me !

Once the timing signals are in sync, one can address the problem of color subcarrier phasing. Although the chip does provide for a burst flag, it seems better to let the cameras internal comparator generate it's own color burst. One can phase the color subcarrier manually as part of the baseband signal. Several devices exist which will handle the slight phasing errors which may occur. One popular and inexpensive device is the Radio Shack color processor. This unit has a tenancy to destroy otherwise good baseband video, but one thing it does well is to phase the color subcarrier. Good luck with your mods and have fun stealing sync and other despicable pastimes! 73's John



LINE 263=END OF FIELD 1

FIG-1

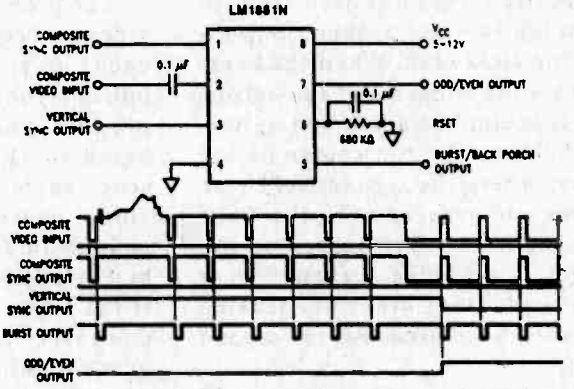


FIG-2

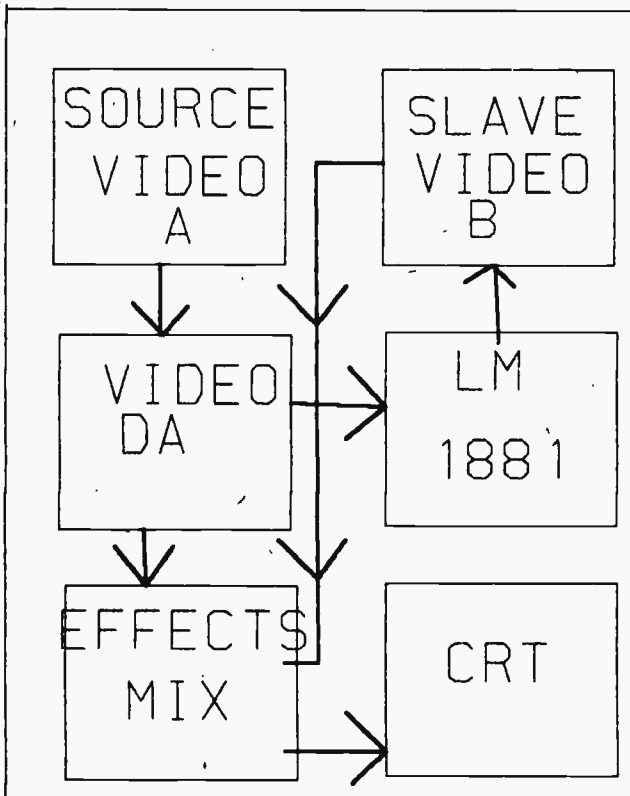


FIG-3

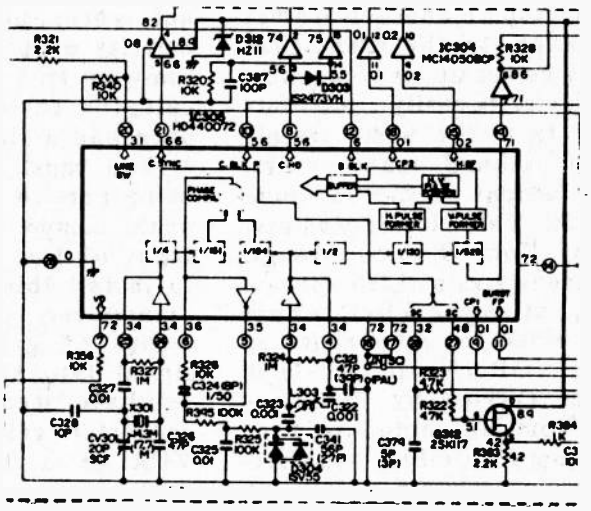


FIG-4

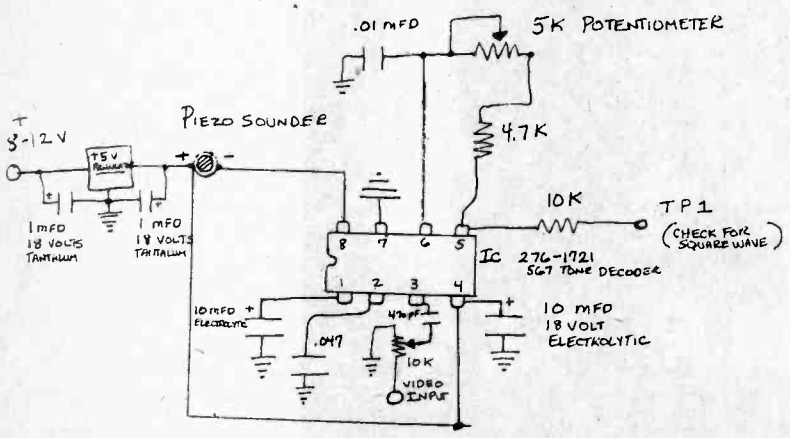
NASA SELECT VIA ATV FROM W8DMR

Sguttle Discovery at 330 nautical miles high. Note the greater earth curve at this height than ELK's ballloon ATV. Shuttle arm was preparing to unload Hubble telescope from cargo bay. This was transmitter along with audio on 70 cm to local ATV'ers who did not have satellite receiving equipment. Bill W8DMR.

ATV RECEIVE SIGNAL ALARM
BY DAVE PELAEZ AH2AR/8

A means of being able to determine if an ATVer has come up on frequency with an ATV signal without constantly looking at the TV screen would be a good added feature to the ATV gear within the shack. It would indeed be nice to have an "ATV alarm" feature on your receive gear while working on another project in the shack, in the event that somebody comes up on frequency. Such a device is easily constructed ... in fact, the basic circuit has been around many years, with the advent of the 567 tone decoder IC. This circuit was employed by Tom O'hara through PC Electronics as a video operated relay, called the TD-1, a base building block for ATV repeater use. This VOR circuit (TD-1) is no longer carried by PC Electronics; Tom has opted to produce a more reliable, sophisticated video operated relay for repeater and remote base use. However, this "old design" circuit forms the heart of the ATV receive alarm The 567 tone decoder, in practice, is an extremely reliable IC that works reasonably well as a means of detecting the ATV's signal horizontal sync. The TD-1 circuit utilized a relay as a means of keying an ATV transmitter when the video tone was detected by the IC. By simply replacing the relay, and in its place putting in a 5 volt piezo buzzer or sounder, you now have a means to "sound the alarm" when someone comes up with a video signal on frequency. The obvious advantage to this is that it's no longer necessary to stare at a field of snow on the screen, waiting for ATV signals to appear. If the alarm is loud enough, you may even be able to step out of the Hamshack, and not worry about missing ATV activity popping up, without you knowing it. I have used this circuit for three months and <u>not once</u> had a single "false alarm".

You must have a means of being able to feed 1 volt peak to peak composite video into the input of the circuit. I was able to install this in my home brew transceiver, because I had a means of getting this type of signal into the video alarm. If you have "standard" receive down converter gear, you can use a VCR as a TV tuner on your down converter, and you will be able to use the video output of the VCR to feed into the input of the ATV video alarm. I have found that it takes about a P2 video signal for the alarm to sound, but I have found that the alarm will sound on some of the weaker signals, since QSB will usually bring the signal up to the detection threshold of the decoder circuit. A switch can be placed in a convenient location, as a means to silence the system when the alarm is not being utilized Follow the circuit layout as indicated. You should get a square wave signal on TP-1 if the IC is working properly, however, the use of an oscilloscope is not needed in aligning this circuit for proper operation. Simply put in a video signal into the input and adjust the 5k potentiometer until the 5 volt piezo buzzer sounds off. Keep making the adjustment until the buzzer goes silent, then split the difference between the two settings. You have not adjusted the circuit to detect the horizontal sync that is present in the video signal. Remember that hysteresis will be present when making this adjustment, and you may have to use a little bit of "trial and error" before you find the correct setting. I found that the setting is critical on a low level setting, but once you have set it up properly, you won't have to reset this control The piezo sounder I used for this circuit was a Door Chime type sounder purchased at Radio Shack (Part #273-071). The sounder specs out at 6 volts, however, I found that it will run find on 5 volts supplied by the video alarm circuit In conclusion, the only problem with this system was my choice in piezo sounders. I made the mistake in purchasing the door chime sounder, and family members, on occasion, will check to see who is at the door, when I leave the alarm in the "on" position, and someone transmits a video signal! Dave Pelaez AH2AR/8 4872 Trailside Court Huber Heights, OH 45424

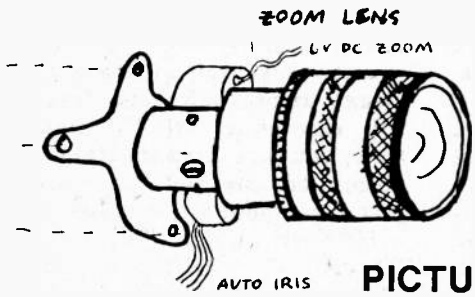


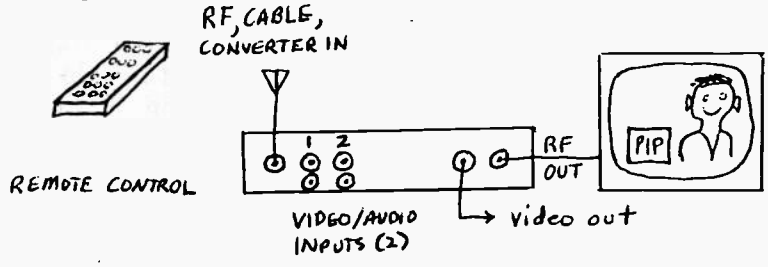
PARTS LIST FOR VIDEO ALARM

1 INTEGRATED CIRCUIT 276-1721 (567 TONE DECODER IC)
1 7805 REGULATOR
2 1 MFD 18 VOLT TANTALUM CAPACITOR
1 PIEZO SOUNDER #276-071
2 10 MFD ELECTROLYTIC 18 VOLT
1 .047 MYLAR
1 470 PFD CAPACITOR
1 10 K POTENTIOMETER
1 5 K POTENTIOMETER
1 10 K RESISTOR 1/4 WATT
1 4.7 K RESISTOR 1/4 WATT

INEXPENSIVE $35 REMOTE CONTROL ZOOM LENSES
BOB BRUNINGA WB4APR

It is usually easy to get cheap black and white surveillance cameras for less than $25 but often the cameras come without lenses. I came across a quantity of surplus camcorder 6-to-1 zoom lenses with 6 volt DC motor control of the zoom and a cross field auto iris control. The lenses have a unique mounting with three bolt hold flanges non-symmetrically arranged around a milled 1.2 inch circular surface as shown in the sketch. It is relatively easy to bolt these to the face of a camera, but unfortunately the focus distance is a little bit more than 1/4 inch closer to the image plane than a typical C-mount lens. Therefore, slightly more than 1/4 inch must be cut or ground off of the C-mount casting on the camera in order to get the zoom lens to track The zoom motor runs smoothly on 6 VDC and faster on 12 VDC. Simply reverse the leads to reverse the zoom. The auto iris took a while to figure out. It was not needed on the B/W security cameras which were vidicon tubes and had a wide range of auto-light level adjustment built into the camera. But for use on our repeater mounted traffic monitoring camera which was a color CCD camera, the auto iris was a must. CCD cameras have a very narrow dynamic range and light level must be accounted for in the optics. After trying everything, I finally took apart a $700 camera lens and discovered that the tiny wire spring which loads the iris in the closed position was missing on the surplus lenses. (Probably why they were surplus.) It took less that a few minutes to fashion a hair pin spring about an inch long from a piece of guitar string and tape it to the iris solenoid (followed up with epoxy for long term use). Now the iris works perfectly with the Panasonic CCD camera. The camera applies a fixed 10 ma to the 150 ohm coil of the iris, and a varying pulsed voltage of about 4 volts to the 1K ohm coil to open the iris. Without the spring, the iris becomes a flip flop; either fully open, or closed The lens was just perfect for my needs and if anyone else needs one, I have about a dozen left for $35 plus $5 shipping. Write to me at 59 Southgate Avenue, Annapolis, MD 21401.





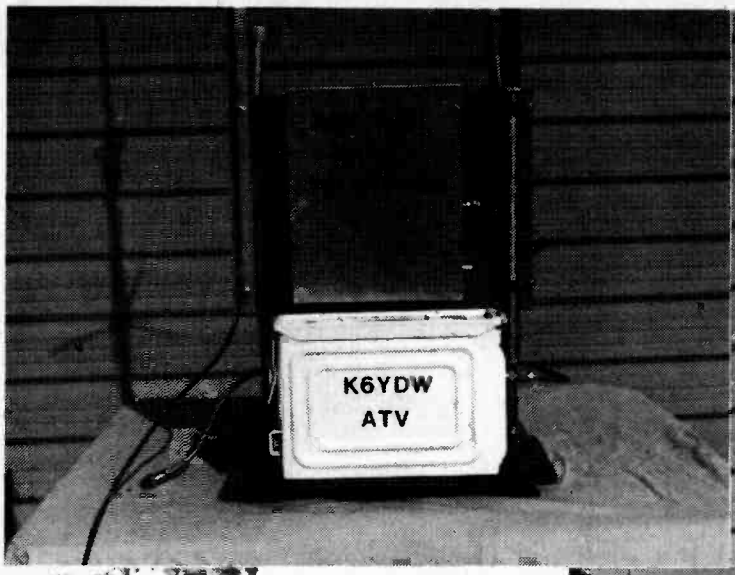
PICTURE-IN-PICTURE BOXES $99
BOB BRUNINGA WB4APR

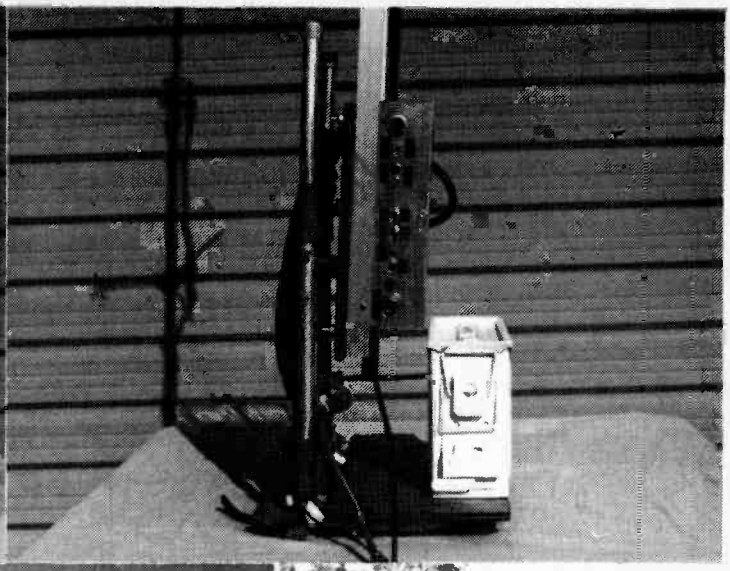
Included in the spring DAK catalogue was a picture-in-picture (PIP) box advertised as "TV Swap Meet Plus". Reading the fine print revealed that the box sells for $99 and includes a 108 channel receiver with video output. As a PIP box, it takes any additional video input and at the touch of a button, displays it as a full color insert in a corner of your TV screen. The PIP function is a cheap and dirty way of combining two video images without the complexity and expense of frame storage or genlock. All control functions including channel tuning are on the wireless remote control This box is very useful either in the shack or as the core of a simple ATV repeater. A number of suggestions are as follows:

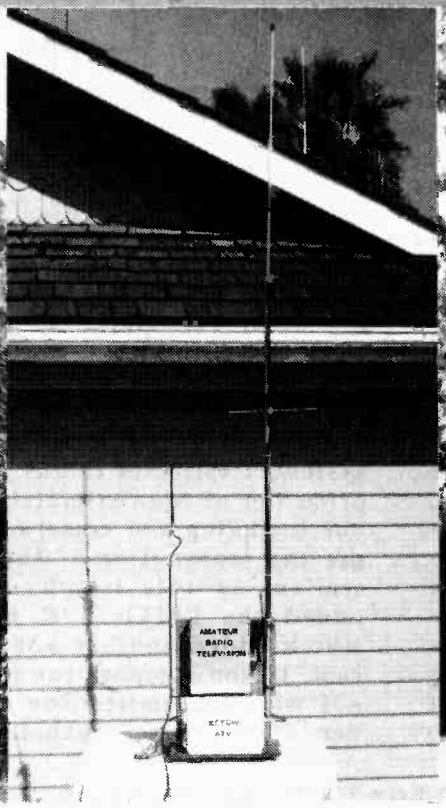
*Combine your big call letter picture with a small inset of your talking head to serve both weak and strong signals viewers * Insert your call letters in the corner of your transmitted picture * Add another band converter into the PIP box receiver so that you can simultaneously transmit your own picture while relaying video from another HAM transmitter *Build a repeater by using the built in cable tuner on channel 58 or 60 and feeding the video output into a 33 or 23 cm transmitter *Add the PIP box to an existing ATV repeater to permit simultaneous transmission from both the main receiver while monitoring an auxiliary link receiver *Use PIP freeze function to freeze call letter picture in corner while proceeding with live transmission Although the PIP box has no front panel controls, it is easy to remote the infrared control box over a radio channel. Like all infrared control devices, the codes are transmitted as digital words of multiple 1 to 3 millisecond pulses of 30 to 40 kHz carrier. To transmit this over a radio link channel, simply low-pass filter the transmitted pulses available at the infrared LED and apply to the input of a standard 202 modem AFSK transmitter and radio. At the receiver, apply the output of the 202 modem to a simple 567 chip wired as a 30 to 40 kHz oscillator and connect that signal to the photo transistor receiver in the PIP box. Using this arrangement, the ATV repeater operator has full control over the functions of the PIP receiver and PIP functions from his shack Alternatively, since the PIP receiver as part of a repeater will not need to be tuned remotely, the only PIP functions needed remotely are on/off and swap. These two functions can simply be added to the existing ATV repeater control circuitry by using two contact closures to simulate the pressing of the remote control buttons located at the repeater site Other buttons on the controller permit moving the insert almost anywhere on the screen, freezing the insert picture, and all typical TV channel controls. The box is called Double-Play by Rabbit Systems and is available from DAK order number 5148 for $99.90 plus $7 postage and handling. Phone number 1-800-325-0800.

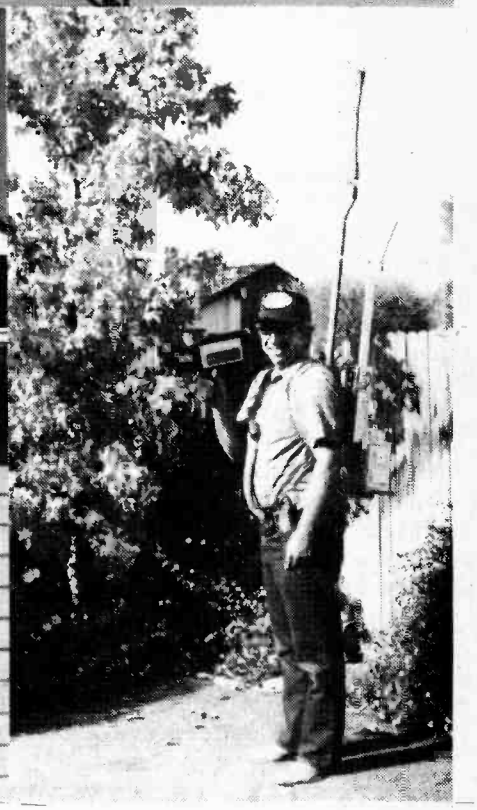
BUILDING A 10 WATT BACKPACK PORTABLE
BY JOHN NEELEY K6YDW

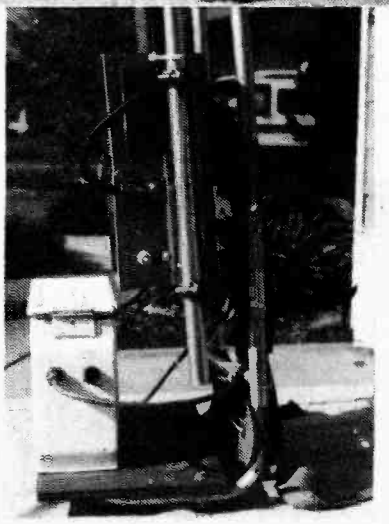
Having been into ATV for only a short time, I have come up with some screwy ideas dealing with portable, hand carry ATV stations. Most of what I have seen have been low power 1 - 2 watt transmitters, mounted in small boxes, with the transmitting antenna on top, all mounted above the hand carried camera. These setups are great for short ranges, in open areas not enclosed by buildings, trees or other obstructions. Living in an area that doesn't have an ATV high level repeater at this time, I was in need of a portable hand carry station that could be used up to 5 miles or more. Following is what I came up with, and I am sure it is not the first of its kind, but it does the job at a minimal cost As seen in Photo 1, the system is nothing more than a transmitter mounted on an Aluminum Pack Frame, along with the Battery Pack and antenna. I found the Pack Frame in a garage sale, and then thinking on how I was going to mount the transmitter onto the frame, I cut a piece of 1/2" plywood to a dimension of 15" x 11", which is large enough to mount the 8" x 10" aluminum enclosure along with the antenna mount. Also, I mounted on the opposite side, a 3 ft. piece of 1" aluminum angle, to which I have a 2 meter Rubber Duck antenna mounted, which along with a 2 meter HT, on my belt, is the communications unit back to the other station. For the Battery Box mount, which is nothing more than a 30 caliber AMMO can, I cut another piece of 1/2" plywood to 15" x 8". It is suggested that the plywood be treated with some type of wood preservative like Varathane(tm). Using 1/4" x 1 1/4" bolts and hardware, the plywood can be mounted onto the aluminum pack frame. The Battery Box is mounted using 1/4" x 1" bolts and hardware. The mounting scheme for the ATV antenna is nothing more than 2, 1 1/2" hose clamps, bolted to the backboard, which allows removal of the antenna for transportation. Photo 2 shows the side view, to give you another example on how I mounted the equipment The transmitter consists of the TXA-5-5, PA5 10 watt Module and FMA5-E purchased from Tom, W6ORG at P.C. Electronics. These 3 modules, along with a DMTR T/R relay (which isn't required for portable work) are mounted in an 8" x 10" x 3" aluminum box. Following Tom's instructions, mount and wire up the modules after all the holes for the connectors, switches, etc., has been completed. See Photo 3. To mount the box to the plywood backboard, use 4, 1/4" x 1 1/4" bolts and hardware, using at least 1 nut as a spacer between the chassis and the plywood The Battery used has been the greatest problem in this whole project. I first used a 12v @ 20 amp/hr Gel-Cel (tm), which I had mounted in a 50 caliber AMMO can, and it worked great, except for one problem ... weight. The battery alone weighed in at +20 pounds, and after carrying the system for awhile, my shoulders became a bit numb. The total weight of the pack back, with everything mounted, came to +33 pounds, which is a bit too much, so back to the drawing board again. I had a couple of 12v @ 12 amp/hr Motorcycle batteries around, and 1 fit perfectly inside the 30 cal box. After swapping out the large battery and box to the smaller motorcycle battery and ammo box, the weight dropped down to 22 pounds for the total unit, which then became more bearable to carry for long periods. The use of wet-cell batteries isn't recommended, due to possible spillage of battery acid, and I am now going to find 2 Gel-Cel (tm) batteries, which are rated at 12v @ 6.5 amp/hrs, and wire them in parallel. The 2 batteries will fit inside the 30 cal box, and the weight will not increase, yet I eliminate the possible hazard of battery acid spills The Antenna consists of a Cush Craft ARX-450B 440 Ringo Ranger, which has been mounted on a 5 ft section of 1" aluminum pipe. The pipe slides into the 2 hose clamps, which are tightened snugly. The Ringo Ranger must be adjusted to the 420-435 mHz. region, which is done by adjusting the bottom section to 17 1/2" and the Hairpin is adjusted to 3 1/4". See the antenna instruction sheet on how to do this. This antenna gives approximately 6 db of gain. Use good quality coax, which is just a short length, from the antenna connector to the connector on the transmitter box. I used a piece of RG-213/u along with an N connector Drawing 1 shows the internal power wiring for the box. The Transmitter control can be of 3 different methods: (1) SPST switch S1, (2) Push-to-Look (PTL), is an external switch, then plugs into J1, or (3) the Record switch mounted on the camera. (ATVQ Magazine, July 1989, p25, WY5V). Method 3 works very well, giving you a visual display (Record LED) in the viewfinder of the camera, that you are transmitting. The circuit for method 3 consists of just 2 components, a resistor and a NPN transistor. The value of R1 will vary with type and brand of camera, and it is suggested that you start with approximately 22 k ohms and work downwards until the transistor switches the Power Relay (k1) ON, when the Record switch on the camera is activated. Relay K1 switches the battery voltage to the modules in the box, and the contact rating should be no less than 5 amps How well does it work? Well, that really depends on any obstructions like trees, buildings, etc. around your location while transporting and transmitting. In some recent tests that have been made locally, it has worked very well, with no real difficulty up to approximately 5 miles between stations, with some signal or color loss when among large trees, etc. But all in all, it has worked out rather well. The battery pack will last approximately 4-5 hours depending on total transmitting time. The complete system draws a maximum of 3 amps when transmitting; 560 ma of which is the camera current. Since the weight of the total system has been lowered by more than 10





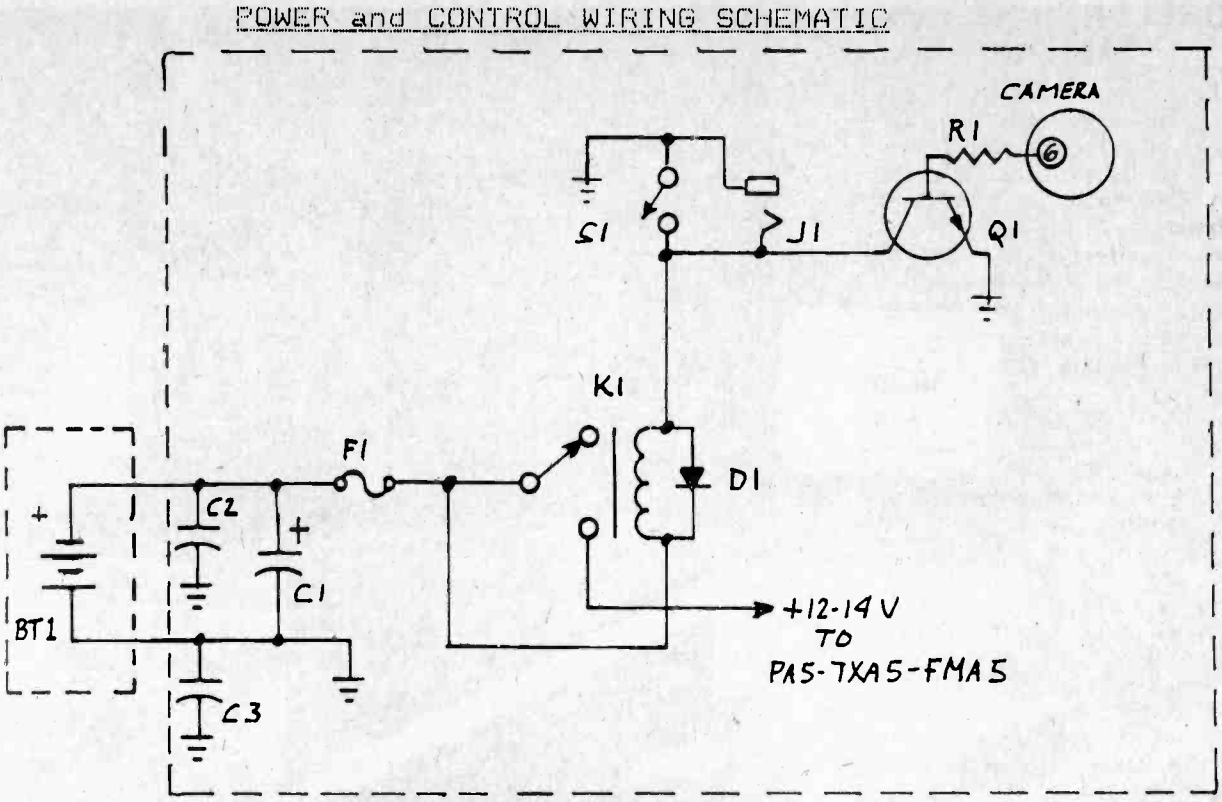






POWER AND CONTROL WIRING SCHEMATIC PARTS LIST

C1 - 6800 mfd/35v elec.
C2, C3 - .01/25v disc F1 - 4 amp/fast-blow fuse
K1 - 12v SPDT Relay, 5 amp contacts
D1 - 1N4001 Diode
S1 - SPST Mini-switch
J1 - 1/8" mini-Jack
R1 - see article
Q1 - General Purpose NPN, 2N3904, 2N2222, etc.
BT1 - 12v Battery (minimum 12 amp/hrs)



pounds, carrying the system is now more tolerant, although it is suggested that if the event you are covering is going to span more than a few hours, it is advisable to have another operator take over. I built this system thinking of the possibility for Disaster or Emergency situations, which would give local government authorities a visual assessment of any damage. How ironic that this past week, the large earthquake happened in the San Francisco area. I am wondering of the many ATVers up in that area, if they indeed use ATV to give the Disaster Services that sort of activity? Here locally in my area, our major emergency work is dealing with forest fires, although this area is also prone to earthquakes (Coalinga, May 1984) As to the cost of this system, I estimate it has a total price tag of approximately $300 not including the camera. I also use the transmitter at the home station, so this is why I also added the DMTR T/R module, which added another $35 to the cost. If you compare the price of a 1 watt transmitter, on the order of $170 not including the enclosure, antenna or battery pack, you are getting quite a good value considering you are getting 10 times the more power out from the transmitter. So, if you want or need a high-power portable, and don't mind carrying some weight on your back, this system is ideal. This has been a FUN project, which has made it enjoyable to work on. I would like to thank Rick, WB6HQU for his advice and help in this project. Without him, I think the R & D on it would have been fruitless. 73 de John/K6YDW P. O. BOX 6672 TAHOE CITY, CA 95730

HUNTSVILLE, AL ATV DELEGATION AT DAYTON WORKING ATV FROM THE PARKING LOT AND SHOWING FLEA MARKET PLUNDER!

MORE ON SONY MINI CAMERAS

The article regarding Miniature TV cameras in the July ATQ caught my eye especially since I had recently procured a similar Sony Camera under a different designation. Mine was part of a home security system which was made to leech power off a modified Watchman Television. It also came with a "through the door" mounting system which included optical tubes and a fish eye lens. Unfortunately, the bnc is not used on this one as it employs a custom miniature non-standard 4 pin plug which accommodates the power, audio and video composite for the monitor. I opted to hand make the plug to suit my own needs rather than pop for the $30 cable set The whole unit was available from Sony "once upon a time" as the HVM302 camera and is now noted as a $350 replacement camera to the vehicular (truck trailer security) system designated as HNS12A If you find one at a hamfest and are tempted to use it in you r/c applications, the pin-outs looking AT the camera itself are as follows:

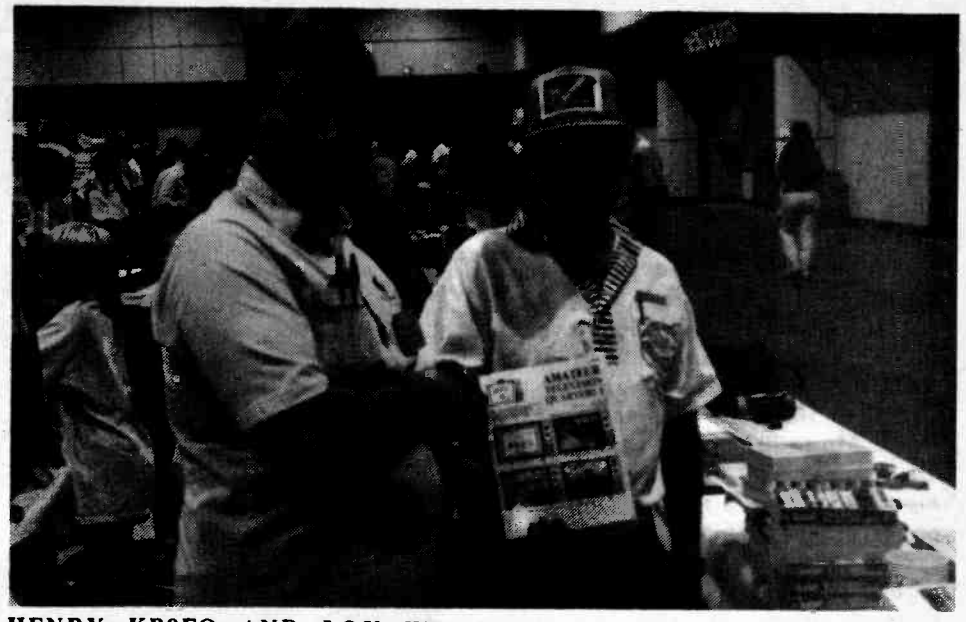
6 vdc1

audio 2 4 video

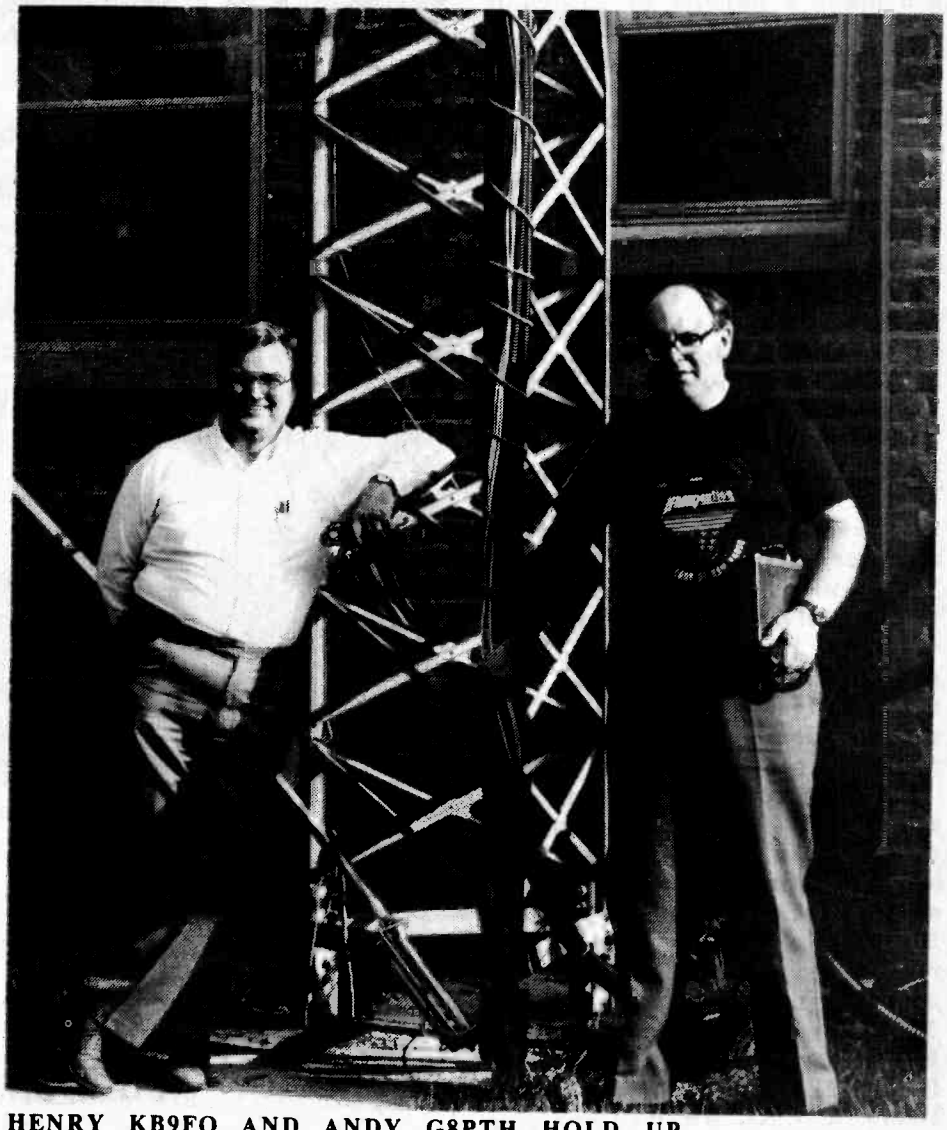
3 ground

The unit is billed as 350 lpa, 5 lux with built in fixed focus lens and 10 lux with wide angle system I've succeeded in mounting mine in an Underwater Kinetics U600 waterproof lantern housing w/4AA nicads which provide power for about an hour. Using Ikelite Compression fittings the "hardline" is for 100' of RG59u to run composite to the surface. But you can probably guess what my next step will be when I find a watertight case for my KPA5 (Humm, anyone want to guess what the field day multiplier would be for an "ATV station operating on emergency power from the radio room of the sunken ship David Dows on the bottom of Lake Michigan?") Paul Wittosch WA9JMNP. O. Box 2050 Glen Ellyn, IL 60138-2050

IF YOU LIKED HAM RADIO MAGAZINE TRY US ON FOR SIGHS!!



HENRY KB9FO AND LOU W5DID AT THE ATVQ BOOTH AT ORLANDO

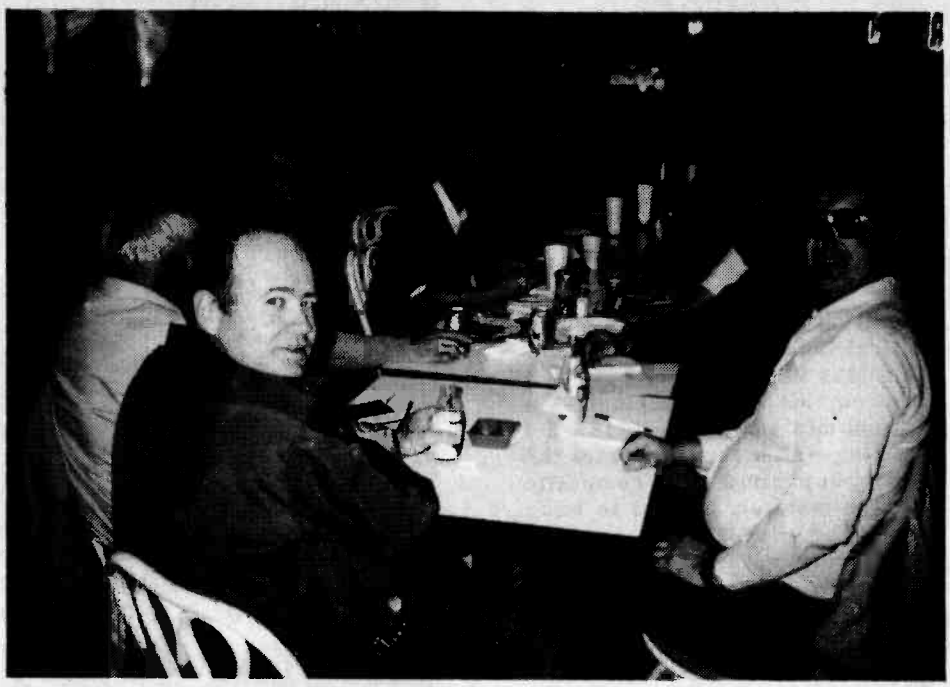


HENRY KB9FO AND ANDY G8PTH HOLD UP THE SELF SUPPORTING TOWER IN HANK'S BACK YARD IN DES PLAINES, IL.

New England

Last March I made the move to New Hampshire. Real mountains once again!! Having lived in the flatland of Ohio for some time, this was a great opportunity to go mountain-topping and try to stir up some ATV DX. However, I hadn't counted on New England weather...soon after heading for the top of the local peak (2300' Pack Monadnock) it would cloud up. Once I had the antennas mounted, the ATV system on a card table and began making contacts, the torrential downpour would start! This happened every time I drove up the mountain. Although soaked to the bone, I did make a number of enjoyable snow-free contacts with WA1UXA, NM1D, KA1QBO and KA1CRN in the Nashua, NH area. The Nashua group is becoming quite active and use the 147.045 repeater for their communications. After the Nashua Amateur Radio Club's (NARC) meeting recently a group of AT-Vers discussed the potential of linking up New England ATV repeaters. The KA1AFE ATV repeater in N. Andover, Mass. could be seen snow free as well. This repeater has an input on 434 Mhz and outputs on 421.25 Mhz (Vertical) which covers the greater Boston area. Talk frequency for the Boston area is via the 145.29 repeater particularly on Weds and Sun evenings. To the south I worked WB1HAB, WA1IAO and N1-GAU in the Springfield, Mass. and northern CT region. They monitor 144.34 Mhz simplex and are pre-dominantly horizontally polarized on ATV.

My most recent expedition netted a very enjoyable snow-free contact with a group on Mt. Equinox, Vermont (It rained on me again, of course!). Although over 100 miles away they were able to receive a snow-free picture from me using just a big-wheel antenna. Their 8 watt signal was received P5+ on my end. Jud K2CBA, Doris N2JJZ, Ed WA1MAG, Dave WA1JEX, Carli WB1BTJ and Junior WA1RKS had a great time working DX in several states.



New England ATVers out to discuss ATV and of course, eat pizza!—Nashua, NH

ATV is alive in Maine! — KA1IOD

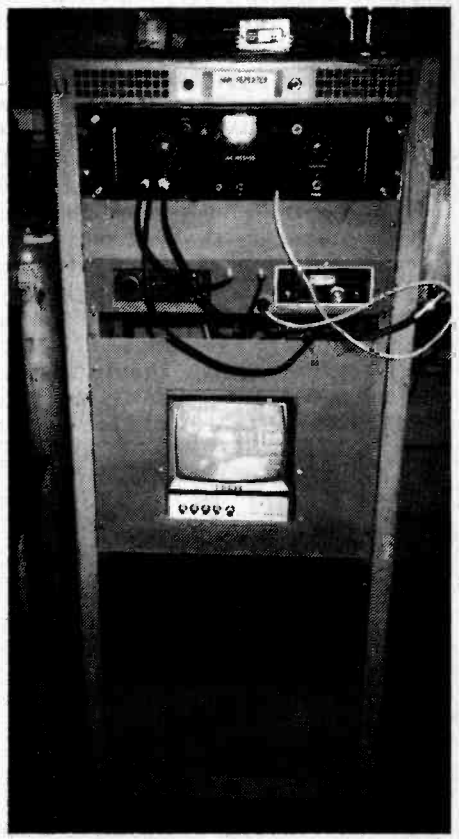
The W5KPZ ATV repeater tower in Tyler, Texas.

Texas revisited

I had a chance to attend the Dallas Hamcom this year. Andy WY5V put on an excellent ATV forum which drew quite a crowd. After the hamfest I decided to spend a few days touring around Texas. My first stop was with Steve Franklin WB5KGL owner of T.D. Systems in Pantego. Steve has developed a new line of ATV equipment which allows you to customize your station in a modular approach. I was impressed with the high quality of his system and the flexibility of using mast mounted modules with a control system in your shack. Steve has quite a background in FM TV receiver design and has used this to develop a line of AM as well as FM ATV transmitters and receivers. He currently has a 900/1200 Mhz FM ATV repeater on top of the Sheraton in Arlington and hopes to link up with the Tyler/Kilgore group (100 miles to the east) with a series of microwave hops in the near future. The talk frequency in the Dallas area is on 147.42 Mhz.

That evening, I visited Jeff Wallach N5ITU and had a chance to tour his weather satellite facilities. We were even able to view the Grand Canyon from several hundred miles up during one of the NOAA satellite passes. Jeff operates the DRIG (Dallas Remote Imaging Group) BBS. Anyone interested in the orbiting weather satellites are welcome to dial into the BBS at (214) 394--7438. The BBS offers the latest NOAA bulletins, information on new reception techniques, Keplerian element sets, upcoming satellite launches, the latest frequencies used by the weather sats and has quite a number of downloadable images from weather satellites worldwide. Jeff also edits the Journal of the Environmental Satellite Amateur Users Group. J.E.S.A.U.G. is an informative quarterly publication that provides you with the latest in satellite reception techniques. JESAUG is available for $30 by writing to P.O. Box 117088, Carrollton, TX 75011-7088.

John Sparling WB5URO in front of the balloon facility's ham shack.



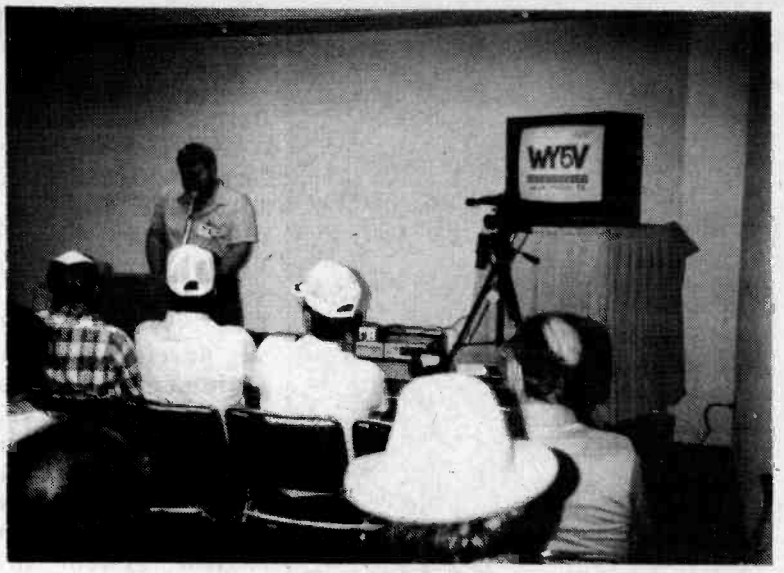
W5KPZ ATV Repeater

Next day I visited with Dave Baxter W5KPZ and toured the Tyler ATV repeater. Dave has linked up his repeater (434 in - 421.25 out) with the Kilgore repeater (439.25 in - 426.25 out) using a pair of 1 watt TDS 1255 Mhz FM systems. Although 26 miles away this provides them with a snow-free link. Local contacts take priority over the link video. As long as no one is using the Tyler repeater anyone using the Kilgore machine (K5KFC/r) is linked over and repeated out via the Tyler repeater. Likewise stations in Tyler can be repeated out via the Kilgore repeater. This system allows some reliable long range contacts. Jim WB5NLF in Shreveport, Louisiana can be regularly seen in Tyler even though he is 100 miles away. In addition, Dave W5KPZ can access a weather radar feed on 434 Mhz (Tyler repeater input) via a touch-tone command. This feed comes from Channel 56 about 30 miles away in Jacksonville, TX. The weather radar can also be seen in Kilgore via the dual repeater linkup and is watched by police and fire departments in the area via dedicated down-converters. This is a real useful tool for the local SKYWARN group during severe weather. Recently they used the weather radar to hunt down and track a tornado as it skipped across east Texas. It turned out that a particularly intense thunderstorm was observed on the weather radar. It looked like a miniature hurricane with a small eye in the center of the storm. The net control of SKYWARN was able to direct the mobile trackers into the area using the weather radar. Arlyn AA5BY was one of the first mobiles to arrive in the area and was surprised to see a twister skipping across the road in front of him. They were able to track the tornado across a large area of east Texas. The position was relayed back to the Weather Bureau in Shreveport and helped to alert many communities in the tornado's path.

Just south of Tyler is the town of Palestine, home of the National Scientific Balloon Facility. I decided to see just how the big balloons are launched (some of the balloons are 500 foot in diameter and carry 3000+ pound payloads up to 140,000 feet). It appears that we may have permission to carry an ATV package up with one of their test flights next year. These flights typically fly for some time at 140,000 feet and should really provide some real coverage range. I will probably fly an ATV repeater which should link up stations over 800 miles apart. I'll also fly my color camera since their recovery rate is almost guaranteed!

Giant Balloon ready for liftoff at the Balloon Center.

Photo courtesy of Winzen, International.



Andy WY5V at the Dallas Hamcom ATV Forum.

Jeff Wallach N5ITV at his weather satellite receive console.

Steve Franklin WB5KGL in the T.D. systems workshop.

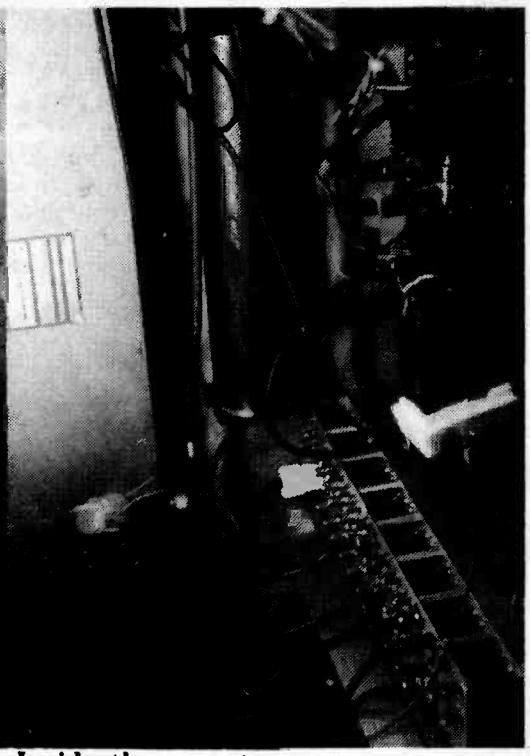
ATVQ VISITS KENNY WB5JLZ & BATON ROUGE ATV RPT

The photos below show a small part of a very enjoyable visit to the Baton Rouge ATV group, repeater and especially Kenny Gilliot WB5JLZ. Photos: L-R, T-B, Sylvia Ruh and Kenny at the ATV repeater site. The ATV repeater antennas, the TX-RX filters and other goodies in the repeater, Henry and Kenny by the ATVQ ATV Mobile (with the ATVQ mascot Gretchen) and Henry KB9FO in Kenny's studio (ham shack).

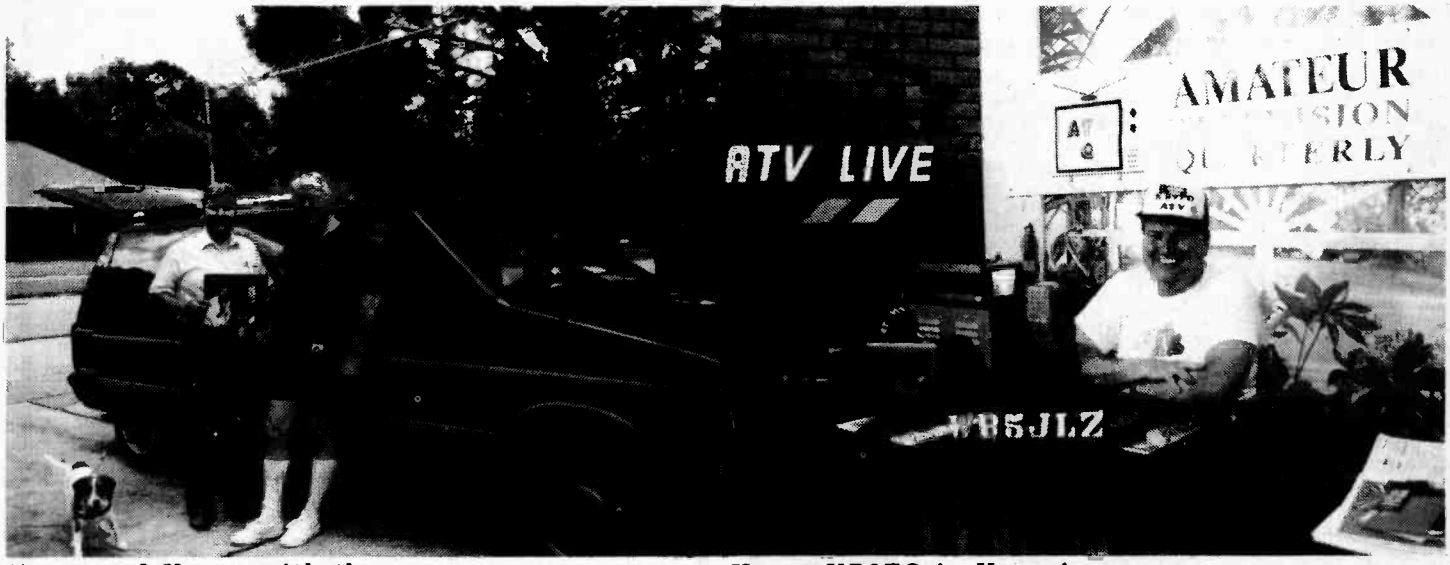
Memorial weekend provided us with an opportunity to take a little drive down to Dixie and enjoy some southern hospitality. We were able to meet several of the local ATVers who were invited over by Kenny to his spacious house, and more on the air. Mobile ATV activity was quite good until, as we left, a tornado left most of Baton Rouge in darkness. We also were able to contact Bob Spahn in New Orleans although time did not permit a visit there. Mobile contacts were made in Memphis, Jackson, MS, St. Louis, Champaign, IL, and Baton Rouge. Besides his ham life, Kenny owns a television school and is a former professional jazz musician with several records to his fame. Kenny, a modest, gracious fellow has an office full of notable certificates and awards for his professional life's achievements. Thanks for the invite!

Sylvia Ruh and Kenny Gill at the Baton Rouge, ATV RPT.

ATV RPT antennas

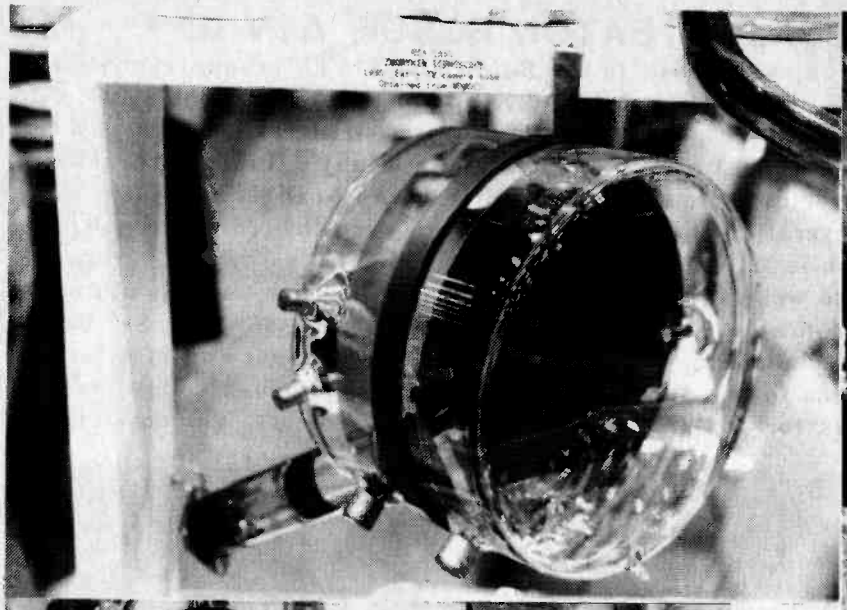


Inside the repeater note TX-RX combline filters.

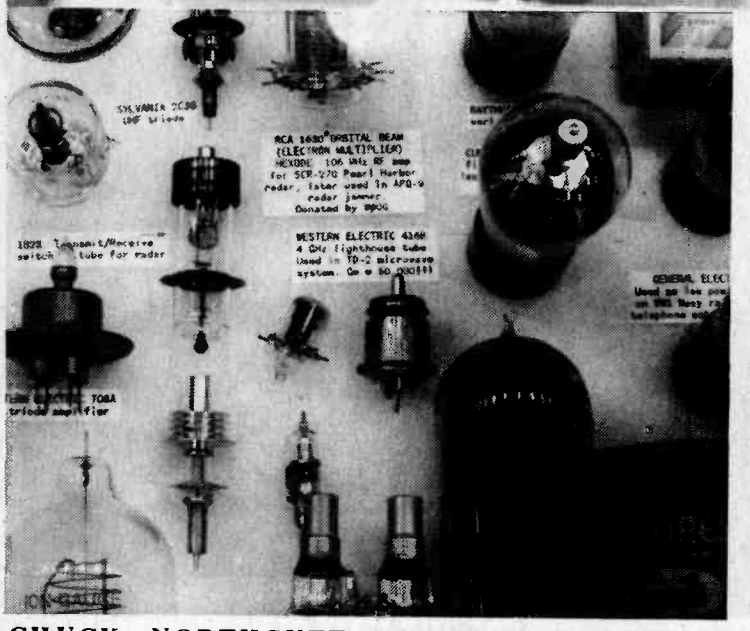


Henry and Kenny with the ATVQ video mobile and KB9FO's K9 Gretchen

Henry KB9FO in Kenny's atv studio/shack.



THERE WAS AN EXCELLENT TUBE DISPLAY AT THE KANSAS CITY HAMFEST. SHOWN HERE ARE PORTIONS VHF/UHF/ATVers SHOULD RECOGNIZE FROM THE GOOD OLD DAYS! TOP LEFT: AN EARLY ICONOSCOPE TUBE, TOP RIGHT: A SPERRY KLYSTRON FOR 900 mHz, BOTTOM LEFT: VARIOUS LOW POWER UHF TRANSMITTING TUBES.



CHUCK NORTHCUTT W7SRZ PRESIDENT OF WWATS AND ED MELLNICK PRESIDENT OF OREGON ATV CLUB ADDRESS CROWDED ATV FORUM AT SEA SIDE HAMFEST IN PORTLAND.

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Our state of the art 24 cm FM TV Transmitter gives a solid 2.5 W output on two switchable channels - 1249 and 1255 MHz are standard, but others are available to order. The ready assembled unit has both line and mic level audio inputs for inter-carrier sound, and front panel audio and video gain controls. The RF circuitry is state of the art, featuring surface mount components, superb stability, SP5060 pll chip and the SC1043 pa module. See the review in CQ-TV 150. The price is £220.00 plus £5.00 postage.

COMPLIMENTARY 20 W PA

A 20 W pa using the high power SC1040 pa module is now available to go with the 24 cm Transmitter. The cost is £150.00 plus £5.00 postage.

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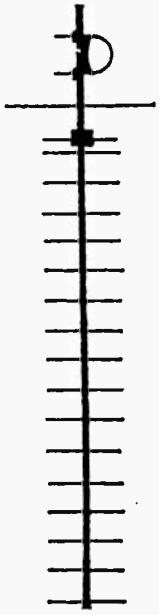
Our 23/24 cm GaAsFET pre-amplifier really is the hottest design around, and yet it is still very stable. See the review in CQ-TV 150. The typical gain is 17 dB with a noise figure of only 1 dB. The gain across the 23/24 cm band is flat, but there is 8 dB of rejection at 700 MHz, thus helping to reduce broadcast TV breakthrough. All this is achieved by the ATF 10135 GaAsFET in a state of the art circuit using surface mount components and careful screening between input and output. The pre-amp is fully boxed and assembled (but not weatherproof) and does not contain RF change-over circuitry. The price is £52.00 plus £1.50 postage.

Cheques payable to AZTEX ELECTRONICS. Send to Ken Stevens G4BVK, Aztex Electronics, 20,Coberley, Footshill Rd., Hanham, Bristol BS15 2ES. Tel. 0272 677 005 after 7 pm or weekends. Please send an SAE for full details on any of our products. Delivery 28 days.



As over 250 users from all over the UK will know, the STG 18 element wideband yagi is the affordable aerial for 23/24 cm ATV. Don't forget that your aerial must cover all the band for repeater working. Just look at some of its star features ;

* Frequency coverage 1240 to 1325 MHz.
* Gain 10 dB across the band.
* SWR about 1.5 across the band.
* Length only 900 mm, weight only 300 g.
* Supplied with clamp for masts up to 55 mm in diameter. End mounting design as shown.
* Neat and unobtrusive, it looks just like a domestic UHF TV aerial, but is smaller.
* Best of all, the price is still only £14.00 plus £2.50 postage (UK only, please write for export air freight rates).

→ NEW PRODUCT : Precision made 3 pole inter-digital filters for 1245 to 1320 MHz. Less than 1 dB insertion loss. To order, state centre frequency and either BNC or N sockets. Price £50.00 plus £2.50 postage.

Cheques payable to SEVERNSIDE TELEVISION GROUP. Send to STG, 15,Witney Close, Saltford, Bristol BS18 3DX. Tel. 0225 873 098 after 7 pm and weekends only. Allow 28 days delivery.

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Phone (kept confidential) _____

Best ATV or SSTV DX _____

Grid locator or Lat/Lon. _____

ATV RPT? _____ QTH _____

Station Equipment _____

_____

Comments: _____

_____

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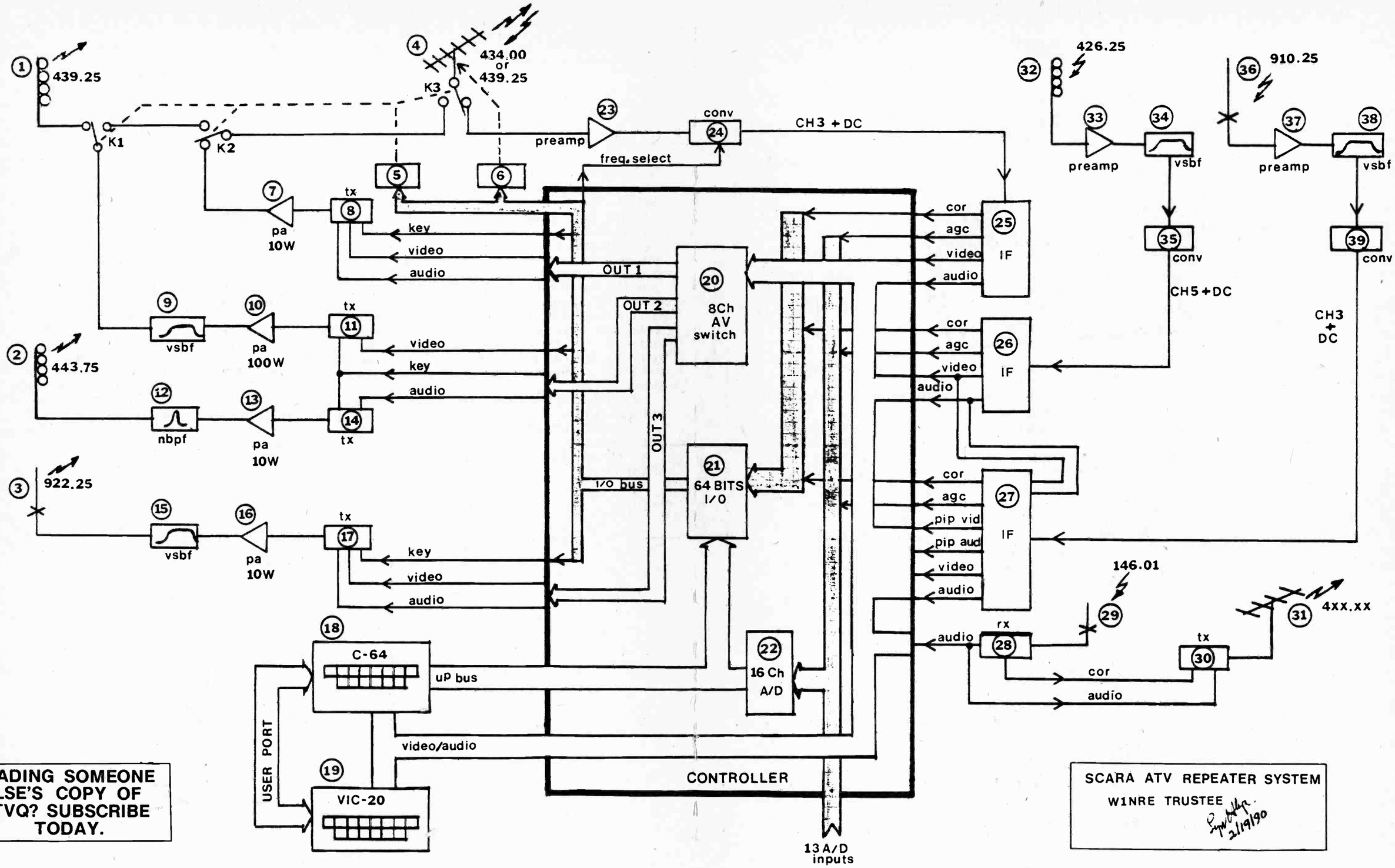


SCARA ATV REPEATER SYSTEM

W1NRE TRUSTEE

2/19/90

QUICKIE: Word is Mike WA6SVT is now known as CRUSHER since he took home a little (heavy) toy from Dayton. He has had reports of P5 video from Las Vegas from his LA mountain top site!

SCARA ATV REPEATER SYSTEM

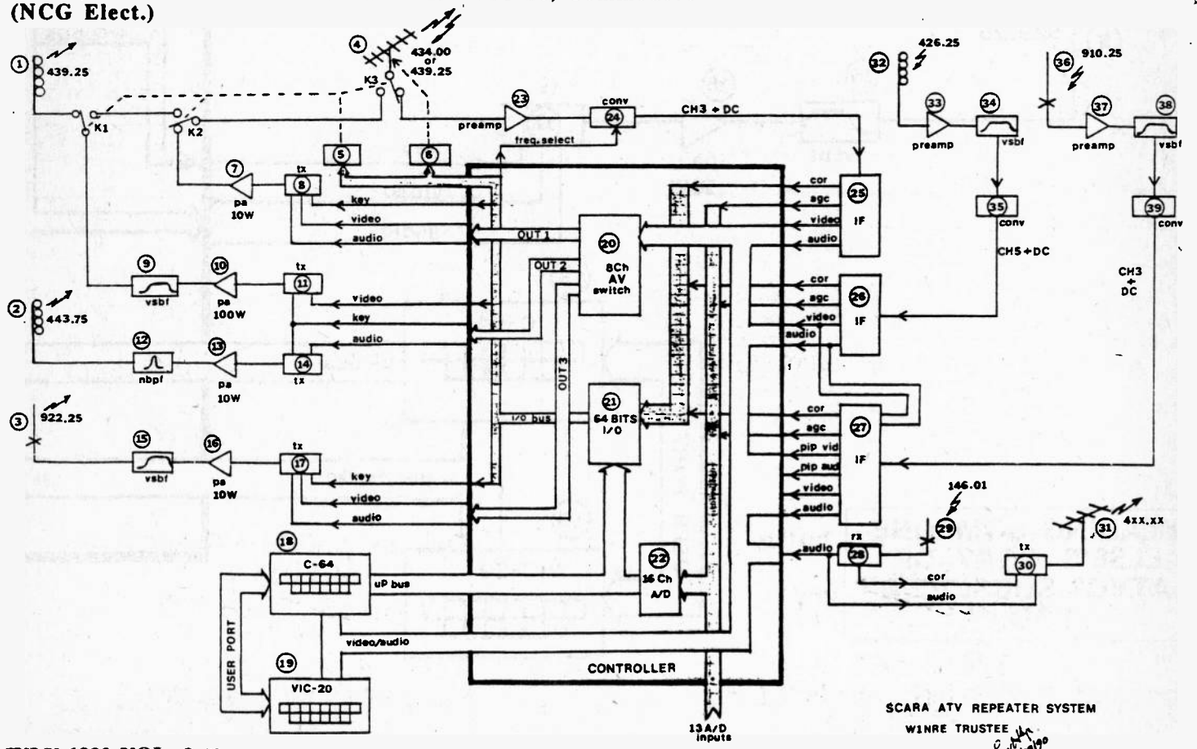
LYN H. CYR W1NRE

The following is a brief hardware description of the W1NRE ATV repeater sponsored by the South Central Connecticut Amateur Radio Association. By way of this system description, it allows me to extend my thanks and appreciation to the many people in our group who have shown an interest in the project and have given m moral and financial support. Now if we can only get the system rightfully coordinated!!!

The success of the repeater, has been in part, due to Tom's (W6ORG) suggestion years ago, that the RF package has to be completely debugged before you start with the bells and whistles. That has been proven to be correct. In any case, the following list outlines the major hardware components of the system.

1. K4NHN/G3JUL Rib cage antenna (video)
2. K4NHN/G3JUL Rib cage antenna (audio)
3. FP-19 Vertical antenna (NCG Elect.)
4. MBM28 J-Beam (late spring installation)
5. Antenna switching relays and control (early spring installation)
6. Model H-IV/CD-45-11 rotor and controls
7. Pa5-70 (SAU4) Brick (P.C. Elect.)
8. TXA5 80mW exciter + FMA5E sound subcarrier (P.C. Elect.)
9. 7-Pole Interdigital Filter (homebrew April 89 ATVQ)
10. Mirage D-1010 100 watt Amp (P.C. Elect. or dealer)
11. MTV435 ATV trans. (Microwave Modules)
12. Narrow Bandpass filter (Homebrew)
13. MHW710 Brick (Motorola)
14. TX432 FM strip (Defunct VHF Engineering)
15. 7-Pole Interdigital Filter (see #9)
16. Toshiba SAU11 Brick
17. TXA%-33 + FMA5E Exciter (P.C. Elect.)
18. C-64, Commodore
19. VIC-20, Commodore
20. 8 Channel video switcher/8 Channel audio switcher with equalization with three outputs (Homebrew)
21. 64-Bit I/O expansion port (Homebrew)
22. 16-Channel A/D converter (Homebrew)
23. P432VDG preamp (Advanced Receiver Research) (Installation early spring)
24. TVC-2G Downconverter (P.C. Elect. - Installation early spring)
25. VRC-45a IF Strip (P.C. Elect. - early spring installation)
26. AV7300 Component Tuner (Magnavox)
27. Rabbit Double Play IF Strip (DAK Indust.)
28. Standard 146 Receiver (Standard)
29. Antenna (Ringo Ranger)
30. Hamtronic 450 Strip (hamtronics) (Planned for 146.01/.61 repeater remote link - late summer)

Systems diagrams follow on the next pages.



DTMF DECODER FOR THE C-64

Lyn H. Cyr W1NRE

No claim to fame is made by this circuit. The decoder chip and its circuitry has appeared in numerous Ham journals. The applications, however, have been limited to a few functions which were hardware dependent. The software described in this article will allow you to add any number of digits, codes, and other features.

The chip is a SI11202 which can be purchased from Radio Shack (RS 276-1303) and frequently goes on sale. The application note that comes with the device is excellent and describes its use much better than I could.

The circuit of Figure 1 is directly out of the application note. The output connections are shown to be used with Game Port #1. Other connections can be made to your particular parallel I/O port. The choice of the Game Port became apparent after much of the I/Os on the User Port had been exhausted. There is a minor drawback in using the Game Port. The Game Port connections are also shared with the keyboard and interferes with its operation. The outputs of the decoder are normally sitting low and the keyboard scanning routine detects the low state of the touch-tone decoder. The simplest way around this situation is to plug the decoder into the game port after the program has been loaded and started. Another alternative would be to connect a switch on the inhibit pin of the decoder chip itself. A logic high on the enable pin (Pin 3), causes the outputs to be CMOS push-pull and become open circuited when the enable pin is low.

After completing the circuit and checking for errors, load the short 3 line Basic program shown below and type RUN.

```
10 PRINT CHR$(147)
20 PRINTPEEK(56321)AND31
30 GOTO10
```

With the decoder disconnected, a decimal value of 31 should be returned. Connect the decoder to Game Port #1 and a source of touch-tone signals to the input of the decoder. With the decoder connected, a decimal value of zero should appear. In repeater applications, the source of audio should be independent of the volume control. A separate audio preamp taken from the high side of the volume control is suggested. Once its level has been set, the setting of the receiver's volume will not affect the level to the decoder. It might save you a trip to the repeater site if you turn the volume down on your receiver and there is 12" of snow forecast for the next day. There must be a story in there some place.

After the hardware is installed, depress a touch-tone key. The screen should display a numerical value between 17 and 28. If not, check the audio levels. On my particular circuit, a minimum of .3 Vpk-pk was needed. Try to keep the levels to a minimum as this should help the noise rejection, false-ing, etc. The decimal values returned are the values read from the I/O port. These values could be used in the software, but I found it more convenient to convert the codes to the actual digits being dialed.

The demonstration routine does the code to digit conversion. It makes it a lot easier to enter new codes or modify them. The number of digits can be increased by changing the value of the loop counter in line 1090. The program is REMed enough to allow you to make easy changes. The basic idea of the program is as follows:

1. Detect an access code
2. Display a menu, if desired
3. Dial the desired function
4. Convert the decimal codes to actual digits being dialed
5. Perform a conditional branch based on the number dialed
6. Dial an exit code to exit the function

Time out delays have not been included but simple loops could be used to achieve this.

As a bonus, I have included a color bar graph display which can be used as a test pattern. The strange symbols in the color bar routine are as follows: In line 3030 the symbols are CTRL3, CMDR1, CTRL8, CTRL6, CMDR6, CTRL5, CTRL7 and CMDR7. The commands are separated by five spaces. In line 3036 the symbols are: CTRL1, RVSon, CTRL2 and RVSoff. In line 3040 the symbols are: CMDR5, CRTL2, and CMDR8. In line 3045 the symbol is CMDR4.

The next time you need a signal from your repeater and no one seems to be around, implement a touch-tone feature to call up test pattern, etc.

If you don't want to type in the program, send me a disk and a self-addressed mailer and I'll make a copy for you---no problem. (83 Bayard Avenue, North Haven, CT 06473. Tel: Days 203-852-5418....touch-tone that is.) (PROGRAM ON NEXT PAGE)

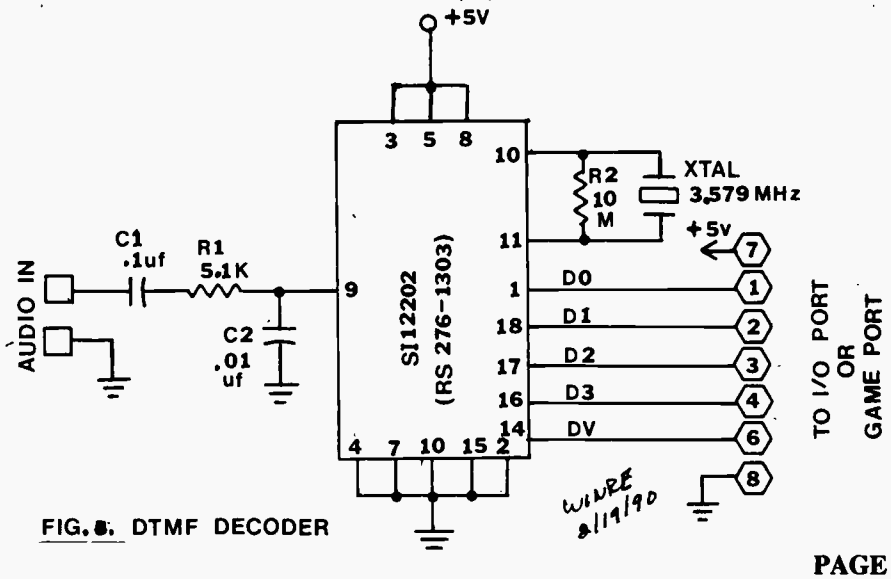


FIG. 1. DTMF DECODER

```
5 REM     ************************************
10 REM    *       C-64 TOUCH TONE DECODER    *
15 REM    *         (GAME PORT VERSION)      *
20 REM    *            L.H. CYR W1NRE        *
25 REM    ************************************
30 REM
35 PRINT"■"
40 POKE646,1:POKE53280,0:POKE53281,0
1000 REM *** TOUCH TONE ROUTINE ***
1010 T=PEEK(56321)AND31:REM READ THE PORT
1020 PRINT"■":PRINT"          waiting for access tone"
1025 PRINT:PRINT"             ACCESS TONE IS *"
1030 IF T=27GOTO1050:REM IF TONE IS * GOTO1050
1040 GOTO1010:REM GO BACK AND GET TONE
1050 S=PEEK(56321)AND16:REM CHECK FOR VALID TONE
1060 IFS=16GOTO1050
1070 PRINT"■"
1075 PRINT"■■■■■■                    DEMO MENU  "
1077 PRINT"■■■       CODE          FUNCTION
1078 PRINT:PRINT"       123            TEST 1"
1079 PRINT:PRINT"       456          COLOR BAR"
1080 PRINT:PRINT"       789          SPECIAL FUNCTION"
1081 PRINT"                       (NEEDS AN ADDITIONAL"
1082 PRINT"                        ACCESS CODE)"
1083 PRINT:PRINT"       ###            EXIT"
1089 C=0:REM RESET DIGIT COUNTER TO ZERO
1090 FORX=1TO3:REM NUMBER OF DIGITS IN CODE
1100 W=PEEK(56321)AND16:REM READ THE VALID DIGIT BIT
1110 IFW=16GOTO1130:REM IF VALID DIGIT GOTO 1130
1120 GOTO1100:REM RECHECK VALID DIGIT
1130 V(X)=PEEK(56321)AND31:REM READ THE PORT FOR DIGIT
1140 C=C+1:REM INCREMENT DIGIT COUNTER
1150 S=PEEK(56321)AND16:REM CHECK FOR VALID DIGIT
1160 IFS=0GOTO1180:REM IF DIGIT IS DONE GOTO 1180
1170 GOTO1150:REM RECHECK VALID DIGIT
1180 NEXTX :REM GO GET NEXT DIGIT
1190 FORI=1TOC:REM NUMBER OF DIGITS TO CONVERT
1200 IFV(I)=17 THEN A$(I)="1"
1205 IFV(I)=18 THEN A$(I)="2"
1210 IFV(I)=19 THEN A$(I)="3"
1215 IFV(I)=20 THEN A$(I)="4"
1220 IFV(I)=21 THEN A$(I)="5"
1225 IFV(I)=22 THEN A$(I)="6"
1230 IFV(I)=23 THEN A$(I)="7"
1235 IFV(I)=24 THEN A$(I)="8"
1240 IFV(I)=25 THEN A$(I)="9"
1245 IFV(I)=27 THEN A$(I)="*"
1250 IFV(I)=26 THEN A$(I)="0"
1255 IFV(I)=28 THEN A$(I)="#"
1260 NEXTI
1265 B$=A$(1)+A$(2)+A$(3):REM PUT CODE TOGETHER
1300 IFB$="123"THEN GOTO2000
1301 IFB$="456"THENGOTO3000
1310 IFB$="789"THEN GOTO4000
1315 IF B$="645" THEN GOTO5000
1320 IF B$="###" THEN GOTO35
1345 PRINT"■■■■■■       NOT A VALID 3-DIGIT CODE":FOR X=1TO900:NEXTX
1350 GOTO35
2000 PRINT"■"
2005 PRINT"■■                  YOU HAVE DIALED "
2006 PRINT"■                        ";B$
2010 PRINT"■■■■■■     BY USING POKE STATEMENTS, YOU CAN "
2020 PRINT"       EXERCISE ANY FUNCTION YOU WISH"
2030 PRINT:PRINT"■■                   DIAL # TO EXIT"
2040 G=PEEK(56321)AND31
2060 IF S=28 THEN GOTO35
2070 GOTO2040
3000 REM COLOR BAR TEST
3010 POKE53280,0:POKE53281,0:PRINT"■"
3020 FOR A=1TO18:PRINT"■";
3030 PRINT"■     ■     ■     ■     ■     ■     ■     ■     ";
3035 NEXT
3036 PRINT"■              ■■DIAL # TO EXIT                ■";
3040 FORA=1TO4:PRINT"■       ■       ■       ";
3045 PRINT"■                          ";:NEXT
3050 S=PEEK(56321)AND31:IFS=28 THEN GOTO35
3060 GOTO3050
4000 REM *** SPECIAL ACCESS CODE ROUTINE ***
4010 PRINT"■"
4020 PRINT"■■■■■■       FOR FUNCTIONS WHICH REQUIRE"
4030 PRINT"              MORE SECURITY"
4050 PRINT"■■■       ****************************"
4060 PRINT"         * ENTER YOUR ACCESS CODE *"
4070 PRINT"         *                        *"
4080 PRINT"         *   DIAL 645 FOR DEMO    *"
4090 PRINT"         ****************************"
4100 GOTO1089
5000 REM *** SPECIAL FUNCTIONS ***
5010 PRINT"■"
5020 PRINT"■■■■■           YOU HAVE ACCESSED "
5030 PRINT"          THE RESTRICTED FUNCTIONS"
5040 PRINT"■■■■■■■■          DIAL # TO EXIT"
5050 S=PEEK(56321)AND31:IFS=28THENGOTO35
5060 GOTO5050

READY.
```

ATVQ REVIEWS THE AEA FS430A ATV TRANSVERTER

by Henry Ruh KB9FO

Time was if you wanted to purchase a ready made ATV transceiver you had vanilla. All the units offered were of the same basic design, a strictly AM modulated RF exciter with or without power amp. This was true whether you purchased a PC Electronics, Aptron Labs, modified an HR-440 or built up a VHF Engineering transmitter strip. AEA took a whole new approach following the process used in modern Broadcast TV transmitters, incorporating vestigial sideband filtering and up conversion from a low frequency.

The unit was provided to me at Dayton as an off-the-shelf unit to be passed on to the winner of the Western Washington ATV Club Video Contest. But once I had my mitts on it, it was hard to give it up!

The front panel layout is clean with controls logically arranged. On-air operation provided reports of good audio and video. Color was reported good to excellent.

I was also able to borrow a lot of lab test gear from Tektronix including a 1910 test signal generator, precision TV demod, 497 spectrum analyzer and provided my own Tektronix waveform/vectorscope. I ran several tests into a good dummy load and the unit performed to spec. Power output at 13.6 V DC through 3 feet of 1/2" Andrew superflex hardline was 29.97 dBm PEP, essentially 1 watt measured on the spectrum analyzer with the marker set on the video carrier.

Initial frequency was 74 kHz low but a simple tweek on the oscillator brought it to 439.25 MHz. exactly. I time tested the unit over five days and found the carrier drift to be less than 50 kHz. from conditions ranging from dead cold to hot from 2 hours continuous key-down. Intercarrier frequency drift, the difference frequency between video and audio carriers (normally 4.5 MHz.) in this unit was less than 18 kHz.

The extra feature of a fixed receive for 439.25 proved helpful here in Chicago where I have to fight through interference from commercial stations, high power broadcast, 440 FM repeaters and cable TV leakage. Its often hard to find the weak ATV signals in all that mess with an uncalibrated tuning dial. Normally I switch between my Spectrum International or Janel fixed converter and the tuneable converter in my TC70.

The RF front end on receive has a lot of gain. I had to employ a bandpass filter to eliminate front end overload from the local UHF broadcasters 21 miles away with 5 Megawatts on channels 20, 26, 32, 38, 44, 50, 60 and 66. The high gain also pumped the AGC on my Radio Shack 5" color TV where I monitor signal levels with an AGC pick-off to a small meter scaled in P units. This gave everyone about 1 P unit higher readings on the "S" meter (or P meter if you will). This did not improve the picture by a P unit.

The spectrum analyzer and test equipment also showed a very good signal. Linearity was measured broadcast style. Differential phase/gain was measured using a modulated ramp signal and came out a very respectful 3 degrees. Differential gain was initially 14%. It was found that a regulator circuit for the video amp was not working quite right. A call to the factory brought a quick solution which I was told had already been incorporated into later units. A simple resistor value change. Parallel a 30 ohm resistor with R40 to bring a zener diode to conduction. After the change the differential gain was a good 5%. Users should check R40's value and make this minor change if needed. The symptom is the sync is slightly low.

Envelope delay is seen as the chroma shifted left or right relative to the luminance part of a picture. Your home VHS recorder is a good source to see this effect. This particular unit measured 220 nanoseconds, about 3/4 cycle of burst late. I made a very minor tweek on an RF amplifier stage and this reduced to a respectable 94 nanoseconds. Phase rotation of color bars was about 4 degrees, better than any home VHS recorder, so colors will not change hue going through this unit.

The internal layout is clean and parts labels easily read. You can get two frequencies of your choice which are front panel selected. For an ATV repeater the internal VSB filter allows operation on 421.25 with acceptable levels of out of band products. If you add an amplifier and operate on 421.25 you will need an additional VSB filter in your antenna line as any amplifier on the market today will re-introduce the lower sideband signals because of amplifier intermod. However, starting with a VSB signal means the amplifier filter has a lot less work to do.

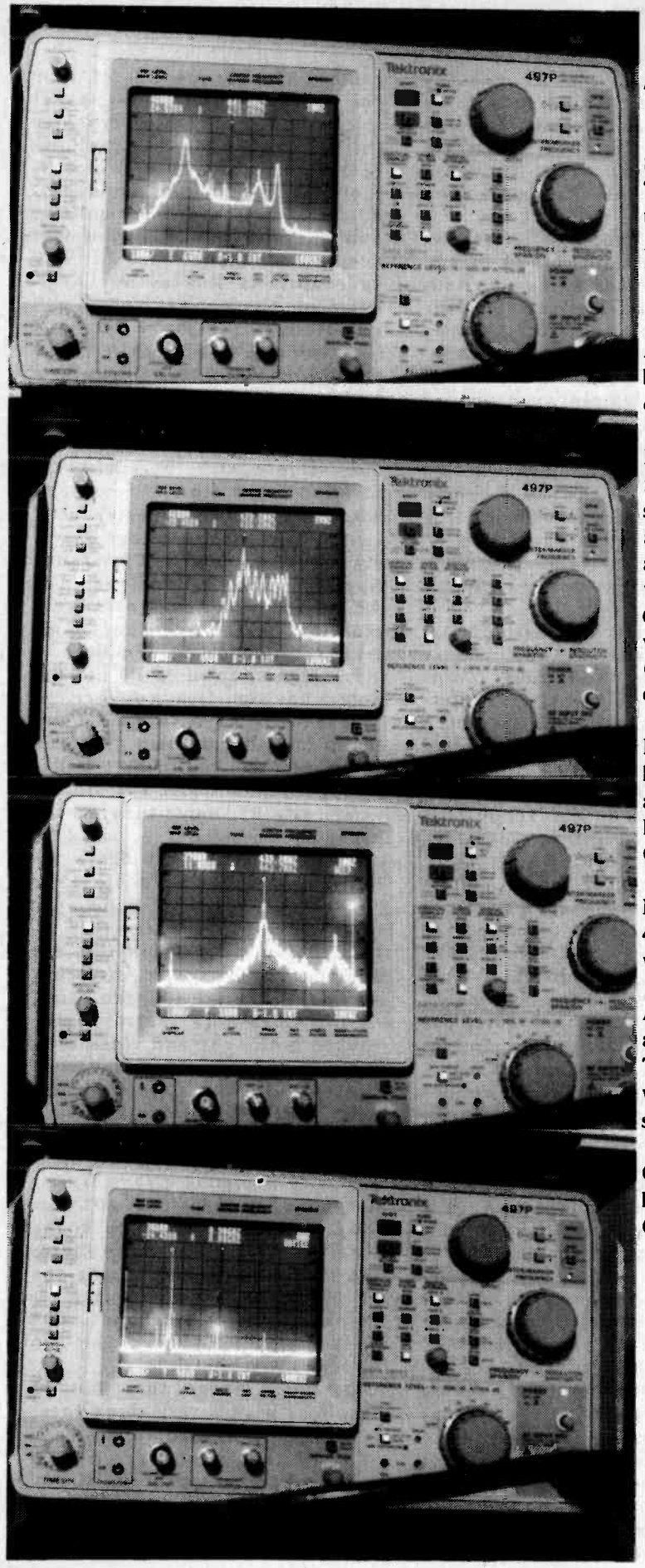
I could not measure front in noise figure with the equipment at hand but I did A/B comparisons using a N connector coax switch and identical coax jumpers between my TC70, Janel, Spectrum International and the AEA. The receive signals were identical to the eye and an attenuator added to simulate a weak signal, down to P0 did not detect any significant difference.

Use with my ARR gasfet antenna mounted preamp produced overload on the AEA under strong signals. So if the station is already P5, don't turn on the preamp!

The unit at 1 watt drove my Mirage D100NATV to 65 watts PEP. This provided good sync level without a sync stretcher although for other amplifiers the addition of a sync stretcher would be a good addition. Also, as the video gain control is advanced both sync and video level vary. It would be much better if the sync to blanking level was held constant and only the video portion varied.

Sideband response of the AEA was within commercial FCC limits for VSB operation with the lower sidebands more than the required -42 dBc. The photos show this quite well. Using the Sin X/X signal showed flat response on upper sidebands. The SAW filter used does the job nicely.

Overall I judge this unit as excellent with a very clean spectrum and the added convenience of fixed and variable receive. Its well worth the bucks. 73 Henry



AEA FS430A TESTS

The top photo is the AEA FS430A fed with a Sin X/X signal. The response is very flat as seen. The color burst and sound carriers are visible on the right and the small spikes are from VITS. All photos were taken using the MAX HOLD function to avoid time intercept errors.

The second photo is a 100% multiburst signal. Again the spectrum is clean and the lower side band response is rolled off and the upperside is cut off nicely as well.

Photo 3 is live video with a well lit shack scene from my shack. This shows typical video sidebands are 50 dBc at 2 Mhz away from carrier as expected for live video. A recent SMPTE article stated that typical live video sidebands were only significant to 200 Khz and more than 60 dBc at 2 MHz using live broadcast studio video. This also clearly shows the sound carrier (with Spectrum Analyzer added marker) is - 18 dBc. (29dBm - 11 dBm = 18).

Photo 4 is a max span showing the 0 marker at left, small transmitter artifact at 300 MHz., main and subcarriers at 439.25, and 2nd and 3rd harmonics. Scale is 10 dB/div. Span is to 1.8 GHz.

No attenuators were used except internal to the 497P analyzer. Video carrier was 29.97 dBm or 1 watt PEP.

Although Tektronix supplied a plotter with the analyzer, the prints did not show the settings. Therefore we are printing photos taken in B&W with 35mm film to show all analyzer settings should anyone want to replicate our tests.

Our thanks to Tektronix Inc of Illinois for the loan of the Analyzer, plotter, 1910 Test Signal Generator and precision TV demod.

EL-CHEAPO C-64 A/D CONVERTER

Lyn H. Cyr Winre

One of the useful features of the WINRE ATV repeaters is a relative signal strength report, in bar graph and numerical vulue, that is returned, via video, when a valid signal drops out.

This proves helpful for those users that are working on antennas, amplifiers, etc. The "EL-CHEAPO A/D" is an inexpensive way of digitizing your analog data if you don't mind some of its limitations.

The C-64 employs a 6581 Sound Interface Device (SID) chip designed for 3-voice/7-octave sound synthesizer for music and sound effects. The chip also has two A/D converters intended for video games. Two registers in the SID allows the microprocessor to read the resistance of the potentiometers tied to pin 24 (Pot X) and pin 23 (Pot Y) with values ranging from 0 at minimum resistance to 255 at maximum resistance. The two pins are brought to the two game ports via a CD4066 CMOS switch which permits the two game ports to be used. In this application only Game Port #1 will be used. The game paddles are nothing more than potentiometers connected to the SID A/D converters. The value of the resistance is updated every 512 Phase 2 clock cycles. The conversion process is based on the time constant of a capacitor tied from the Pot (X or Y) pin to ground, charged by a potentiometer tied from pot pin to +5v. With no added capacitance across the resistor, values up to about 300K ohms can be measured. By adding a capacitor of .05uFd across the terminals, the resistance range is lowered to about 8K ohms full scale. To see how the port works enter the following short Basic routine. Connect one end of a 100K pot from pin 7 (+5v) and the wiper to pin 5 (POT AY) on game port #1 (see Fig. 1a).

```
10 PRINT PEEK(54298)
20 GOTO 10
```

If everything goes well, decimal values should be printed on the screen which corresponds to the resistance value of the pot adjustment. By connecting the wiper to pin 9 and changing the PEEK value in line 10 to 54297, pot AX will be read.

By using the circuit of Figure 1(c) voltages in the 2.5 to 4v range can be measured with reasonable accuracy. Q1 operates as an emitter follower and in this mode becomes a current source. The charging rates of the capacitor will be proportional to the current and thus the digitized value will vary with input voltage. The graph in Figure 2 shows that in the range of about 2.5v to about 4.3v, the response is fairly linear. Use voltage dividers to limit the input voltage to a maximum input of 5VDC or use amplifiers to increase small signals levels.

If you simply want to measure resistance, no additional circuitry is needed other than connecting resistance to be measured to either pin 7 or 9 and +5VDC and choosing an appropriate capacitor value. The higher the capacitance the lower the full scale resistance range. Photo-cells, temperature sensors or any other resistance dependent device can be connected directly to the port.

To use the circuit of Figure 1(c) as a relative signal strength meter, some further discussion is necessary. The signal reporting system samples the AGC voltage, during initial key up, and stores the digitized value in some variable. Upon a valid drop out of the signal, the variable is recalled and displayed. Our repeater has a loss of signal delay in its software to account for mobile flutter, etc. The AGC levels and characteristics of your machine may be different than those described below, but the same techniques can be used. The AGC voltages of our repeater's receiver idles at about 12VDC with no input signal and drops to about 6VDC with very strong signals. Since we like to see increasing value with increasing magnitudes, a little software manipulation is required. With the range of AGC voltages and the circuit shown, digitized values will vary from 255 to about 50 with increasing signal strengths. By subtracting the count from 255, increasing digitized values will result from increasing signal strengths. The values will now range from 0 to about 205. With software and a little mathematical manipulation, you can make the digitized values anything you'd like. To display the sig. l levels also requires a bit of forethought. It was decided to use the low resolution capability of the C-64. In the low resolution mode, 40 characters per line are available. The idea is to take the digitized range of 0 to 205 and make it fit in 40 spaces thus there will be 205/40 counts per space or 5 counts per space. Round off the division to the nearest whole number. The Basic routine described is a simple routine that doesn't take into consideration the nonlinearity of the AGC curve nor the A/D converter so the bar graph will be sort of bunched up with strong signals.

Connect the voltage divider circuit as shown in Figure 1(b) and 1(c) and plug the A/D converter in game port #1. Enter the short program in Figure 3. Adjust R2 so that the no signal voltage (+12v in this case) is +5v at the wiper of the pot or the value of P on the screen shows 255. As you vary the pot, the bar graph should display the digitized values as well as the actual values. The bar graph should increase with decreasing voltage values. You can play around with the fudge factors so that the bar graph display suits your fancy and particular AGC voltages. If you have negative AGC voltages, use an inverting opamp ahead of the converter. The gain of the opamp could be used to set the operating range.

The next time you key up your ATV repeater, expect a signal report. See you at the bar....graph.

EL-CHEAPO C-64 A/D CONVERTER

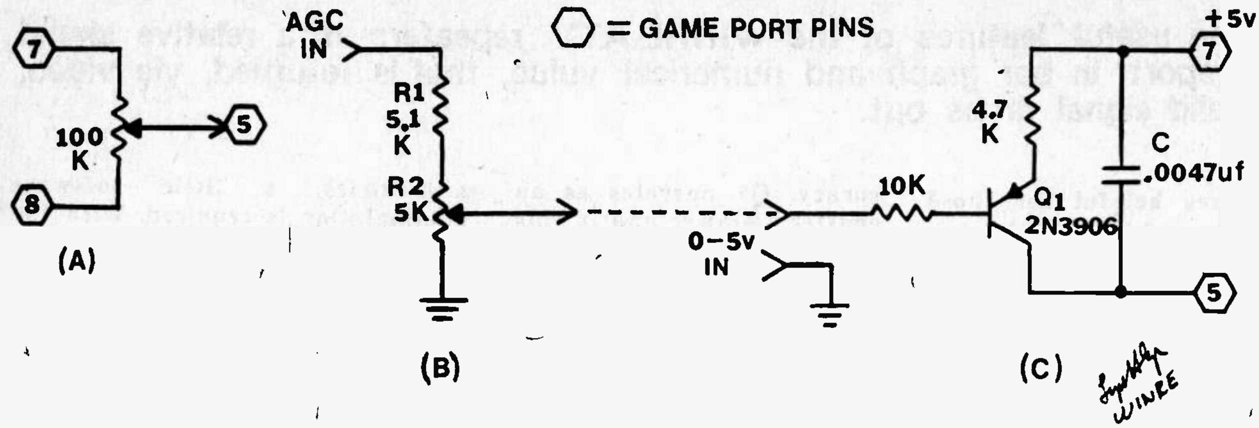


FIG.1. 'EL-CHEAPO' A/D

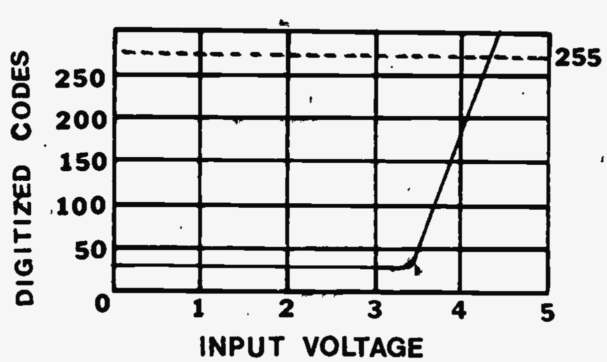


FIG.2. CODES vs VOLTAGE (C=.0047u)

```
10 REM *** EL-CHEAPO BAR GRAPH DEMO ***
15 REM ***     LYN H. CYR WINRE    ***
20 S=INT((255-PEEK(54298))/5.6)
30 P=INT(255-PEEK(54298))
40 POKE646, 1 POKE53280,0:POKE53281,0
50 PRINT " "
60 REM *** EL-CHEAPO BAR GRAPH DEMO ***
70 S=INT((255-PEEK(54298))/5.6
80 P=INT(255-PEEK(54298))
90 PRINT"  S=";S;" P=";P;
100 IFS>40 THEN S=40
110 S1=S
120 PRINT" S1=";S1
130 PRINT
140 PRINT" ôôôôôôôôôôôôôôôôôôôôôôôôôôôôôôôôôôôôô" ;
150 FORX=1TOS
160 PRINT" R !!";
170 NEXTX
180 PRINT:PRINT:PRINT"   RELATIVE   SIGNAL LEVEL="P
190 PRINT"SQQQQQQQQQ   CHANGE THE INPUT VOLTAGE"
200 PRINT"            AND PRESS ANY KEY."
210 GET A$:IF A$="" THEN GOTO210
220 GOTO10
```

FIG.3. DEMO ROUTINE

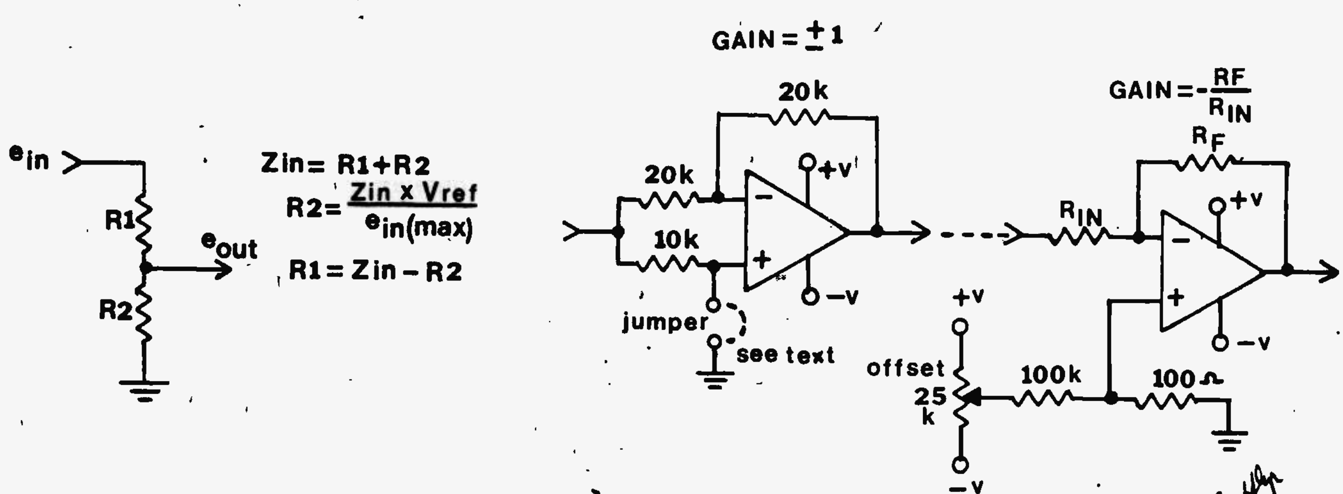


Fig.2A Fig.2B Fig.2C

FIG.2. A/D ANALOG CONDITIONING CIRCUITS

FROM "RADIO" MAGAZINE, NOVEMBER 1940!

TWO-WAY TELEVISION

• *With Voice*

Two-way television was demonstrated for the first time by amateur radio men of the W2USA Radio Club, between their station in New York City and their glass-enclosed booth in the Communication Building at the World's Fair, New York. People visiting the Fair can see and hear those on the New York end of the circuit and vice-versa. The glass booth, which is also provided with loudspeakers, enables quite a group to see and hear the demonstration. The television pick-up camera to the left is being operated by Bill Meissner, W2HYJ. The voice sending and receiving equipment is shown in the center, with Arthur H. Lynch, W2DKJ, managing director of the W2USA Club, talking to Fred Cusick, W2HID, who is at the other end of the eight-mile radio path, but who is seen in the television receiver at the right. The purpose of the demonstration is to acquaint as many people as possible with the possibilities of home-made amateur television equipment.

An example of the quality of the television image received over the amateur television system. This photograph of Lola Lane was sent over the eight-mile path between the transmitter in New York and the receiving equipment at the World's Fair, where the fluorescent screen of the receiver was photographed.

The accompanying picture of Lola Lane, star of "Girls on the Road," was photographed at the Fair end of the circuit as it was televised in New York. Photos are used for the preliminary testing of the equipment. Individuals as well as scenes of the surrounding territory may then be sent out. Definition of the images on the receiver screen is much better than these pictures indicate.

A. H. Lynch, W2DKJ, at the operating position of the W2USA amateur television demonstration at the World's Fair in New York. W2HYJ is operating the television pickup camera, and the incoming signal is viewed on the screen of the television receiver to the right and above Mr. Lynch.

NEWS ITEMS

Field Day ATV - Several groups made Field Day ATV contacts this year. A number of you expressed bewilderment as to why there is no extra point credit for an ATV contact. I recommend writing the League and suggesting that credit be given next year. If enough of you write, they may listen! Field Day is a great place to demonstrate ATV to your fellow club members. Larry KA1CRN had his setup at the Nashua club site and generated quite a bit of interest. The Nashua group (NARC) had over 17 stations operating, complete with a full kitchen. They had a large refrigerator and a full-size electric stove. They were actually baking cookies during the night. Everything but the kitchen sink, although it's rumored that they're going to bring that next year! W2-MTE and KA2HZW of the Albany group generated quite a bit of activity during Field Day. They made 13 ATV contacts from their Field Day site including one mobile contact.

Nationwide ATV packet mail list

A dedicated ATV packet BBS is now operational in Nashua, NH. For activity reports and general ATV info in New England feel free to access the KA1QBO-2 BBS on 145.07 Mhz. In addition, an ATV distribution list has been started on the KB4N BBS in New Hampshire. Just by sending a message via the command: SP ATV @ KB4-N.NH from any BBS in the country, your message will be automatically redistributed to the call signs and BBS's on the mail list. This is a great way to announce special events, mountaintop expeditions, etc. to a large group of participants.

This might just be the start of a nationwide ATV packet distribution. If you'd like on the KB4N mail list send a message to Gene WA1UXA @ KB4N.NH.USA. The Amateur Television Network (ATN) of southern California has set up a dedicated BBS located in the Santa Barbara area. Contact the K6-ZSR (alias ATN) BBS for the latest in southern California ATV. Any other groups out there using packet for ATV information?

Mountain Top ATV

ATVers from Albany, NY and southern Vermont ATV conquered Mt. Equinox, Vermont on July 1st. Ed WA1MAG, Dave WA1JEX, Carli WB1BTJ, Junior WA1RKS, Doris N2JJZ and Jud K2CBA set up their ATV equipment and made quite a few contacts in NY state, New Hampshire, Massachusetts and Connecticut. Stations worked on ATV were W2PX, WA2SRP, W2-MTE, KC1MC, WB8ELK/1, and voice contacts with WA1IAO and N1GAU. They also made a two way mountaintop to mountaintop contact over a 100 mile path with P5 pictures to WB8ELK who was on 2300' Pack Monadnock in New Hampshire.

An expedition up to a 3400' peak was mounted by K4SAO and KC4-CTW in South Carolina netting them some 200 mile plus ATV contacts. Chuck WB9IHS has made a few exploratory trips to the top of 6900' Mt. Mitchell, NC and plans a return ATV expedition sometime in the late summer.

Don K4SAO suggests that any ATVers planning on working the VHF/UHF contest this fall or next summer should consider setting up an ATV station on mountaintops nationwide just before the contest gets going. With all these ATV stations perched on top of hills some very intriguing DX may be possible. How about bringing along your VCR and setting up a video relay system between mountains!

Buzzard ATV Certificate

K8JAS "Joe's Amateur Station" is offering an official "Buzzard ATV" certificate. Joe lives in Hinckley, Ohio, the renowned Buzzard capital of the world. Each March the buzzards migrate back to Hinckley and has become quite a nationally recognized event. All it takes to obtain your "Buzzard" award is to make a two-way ATV contact with Joe.

El Paso ATV

Activity is on the rise in El Paso. Look for Frenchie N5GHQ, Reiner DC3OQ/W5, Craig KA5ZME, Jeanie WA5WAC, John WA5WAD, Chris N5LZB and Roy KB5KME. The following stations may become active in the near future: Neil WA5JXY, Rich N5LVW, Norm N5FLB, Manny W2BFI, Dan WN5E, Martin WB5LJO and Charlie KA5-KYV. A mountain separates the two areas of activity. Plans are in the works for a repeater to he link up the west and east El Pa groups.

Denver

On April 1st members of t Western Vision Network (WV helped out with coverage of t Super Cities Walk for MS. Sever ATV portable and mobile statio were set up along the route provide live television covera back to mission control. Ron N IVN, Oliver N0JBK, Sharon N JBG, Dave N0CQC and Merle K YUK manned Checkpoint 1. T lunch stop was covered by Ja AA0P and Sue N0GUT. Rick N KKZ manned checkpoint 3. Ri N2BNF was at checkpoint 4, Da W6OAL and copilot Margie opera ed the "Roving Mobile" and Ti WB0TUB, Steve NV9O and S Hoffman were at the Headquarte in the stadium press box. All pi tures from the various checkpoin were P-5, including some mobi shots from the rover station. T walk-a-thon officials were qui pleased with the coverage.

The Denver group has a repeat on top of 7400' Lookout mountai Input is on 426.25 with an outp on 1253.25 Mhz. An addition input on 1277.25 Mhz will be acti soon. Look for the Denver gro on their calling frequency of 14 34 Mhz. An activity night is he every Mon night at 8 pm. Also th have a weekly net on the 147.2 repeater every Thurs night at pm.

Calgary, Alberta

The Calgary ATV repeater (VE RTV/r) is up and running! It accessible every night between pm and 11:30 pm. Input is on 43 25 Mhz and output is on 910. Mhz. Contact Roy Hookham VE RH for more info on local activit

Aruba

Tony Thiel P43T is working stirring up activity on the Isla of Aruba in the Carribean. AT operations are only allowed to t highest class of radio license Aruba and Tony is actively wor ing on upgrading. He hopes to ha some ATV activity going by t end of the year.

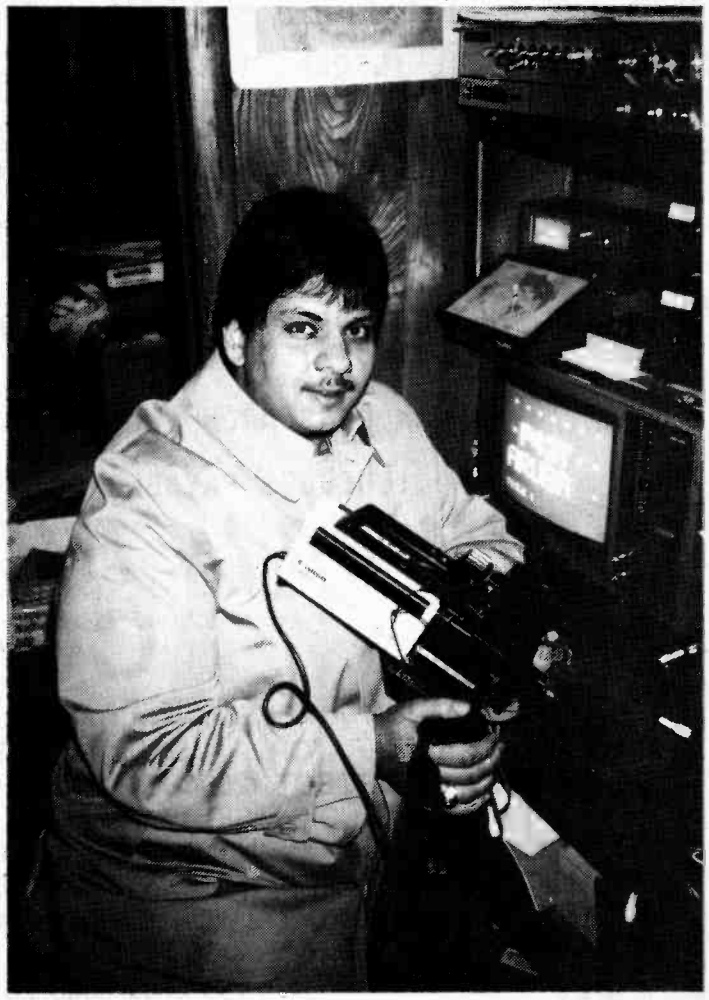
Oliver N0JBK and Sharon N0JBG, Denver, Colo.

Dave WB0FBP and Donny WD0AMA win the Foxhunt prize — Davenport, Iowa.

N2BNF at checkpoint 4.

FILL UP OUR IN BOX WITH ARTICLES TODAY

Jack AA0P and Sue N0GUT super cities walk-a-thon.



Tony P43T anxious to stir up ATV activity on Island of Aruba.

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THE BRITISH AMATEUR TELEVISION CLUB

16 CHANNEL A/D CONVERTER FOR THE C-64

Lyn H. Cyr W1NRE

The "EL-CHEAPO" analog to digital converter, in all its simplicity and limitations leaves a lot to be desired in accuracy and capability.

With a bona fide A/D converter, excellent accuracy may be achieved with very little effort and hardware. By increasing the number of channels, various critical repeater parameters may be monitored and transmitted via video on DTMF command or as part of a beacon routine. Parameters such as power supply voltages, power output, signal levels, temperature, etc., can all be monitored with suitable signal conditioning.

The A/D converter chosen for this application is a National ADC-0817. The ADC0817 is a 16 channel, 8-bit microprocessor compatible converter requiring a single +5 v supply.

The circuit, as it applies to the C-64, is shown in Figure 1. It occupies memory locations 56864 through 56879. Other addresses may be used but they have to occupy sixteen consecutive locations.

The resolution of an A/D converter is determined by the number of bits and the reference voltage. The resolution is the amount of voltage quantized per bit. In other words, it is the voltage per step. With 8-bits of conversion and a reference voltage of 5 v DC, the resolution is 5 v/256 or about 19.54 mv per step. The ADC0817 has provisions for an external voltage reference input. If a reference voltage of 5.12 v were used, the voltage per step would be a nice round figure of 5.12 v/256 or 20 mv per step. In the circuit described, the +5 v supply is used as a reference voltage. This is adequate for most purposes and can be calibrated out by software.

The clocking rate of the converter is determined by the Phase 2 (S02) clock from the C-64. The conversion takes about 60 uSec. to complete which allows AC signals with frequency components of about 1 kHz. to be digitized. For faster conversion rates, external clocks with rates as high as 2 mHz. can be used.

The input voltage range is from 0 v to +5 v DC. With proper signal conditioning, any voltage may be transformed to this voltage range. If the input voltages exceed +5 v DC, simply use resistive dividers at the inputs. For low level signals, any of the opamp circuit configuration may be used to transform the levels. Shown in Figure 2 are several possibilities.

Figure 2(a) shows the requirements of a simple voltage divider. The impedance offered to the circuit under measurement is the sum of R1+R2. Choose an impedance that is reasonable. Calculate the value of $2. Vref is the maximum input voltage allowed by the A/D. In this case use +5 v. Ein (max) is the highest expected voltage to be measured. Subtract the value found for R2 from Zin to find the value of R1. You may wish to use a pot for R1 to compensate and adjust the divider exactly. For cases where the signal must be amplified, the circuit of Figure 2(c) is offered. It is an inverting amplifier with adjustable gain with provision for adjusting the offset. Using an inverting amplifier presents a minor problem in that the positive input voltages will be negative at the output. The reason for using this configuration is that the offset adjustment will not interact with the gain determining elements. The circuit of Figure 2(b) offers a solution. It is a unity gain buffer with the output polarity selectable. With the jumper open, the circuit is non-inverting and with the jumper in place it becomes an inverting buffer.

The A/D is built on a Radio Shack fingered perf-board and wiring not critical.

The converter may be checked and calibrated with nothing more than a 5-10 K pot and a voltmeter. Enter the short Basic routine to check all of the channels. The routine will return the decimal codes of the input voltages in the range of 0-5 v DC.

```
10 PRINTCHR$(147)
20 PRINT"SINPUT CHAN-
   NEL TO CHECK (0-
   15)":INPUTX
25 PRINT"SQQQQQQQ
   PRESS N KEY TO
   SWITCH CHANNELS"
30 POKE56864+X,0
40 PRINT"SQQQQQ
   CHANNEL"
   ;X;"=";:PRINTPEEK
   (56864+X)
50 GET A$:IF A$="N"
   THEN GOTO10
70 GOTO30
```

If you wish to display the values in terms of voltage, replace PRINTPEEK(56864+X) with PRINTPEEK(56864+X)*19.53E-3;" volts".

The readout will now be in volts. With a known input voltage, say 2.5 v, you can adjust the value of the conversion factor (19.53 mv) up or down to make the reading correspond exactly with the input voltage. With the proper fudge factor, you should be able to adjust the reading to within 20 mv or so. Once the correct factor is found, use it to convert any of the channel readings to voltage readings. Other factors may be used, for example, to convert the voltage across a forward biased diode as a function of temperature.

The specific applications are left to your imagination and needs. Hope I've converted you.

CONTINUED NEXT PAGE >>>>>>

16 CHANNEL A/D CONVERTER FOR THE C-64

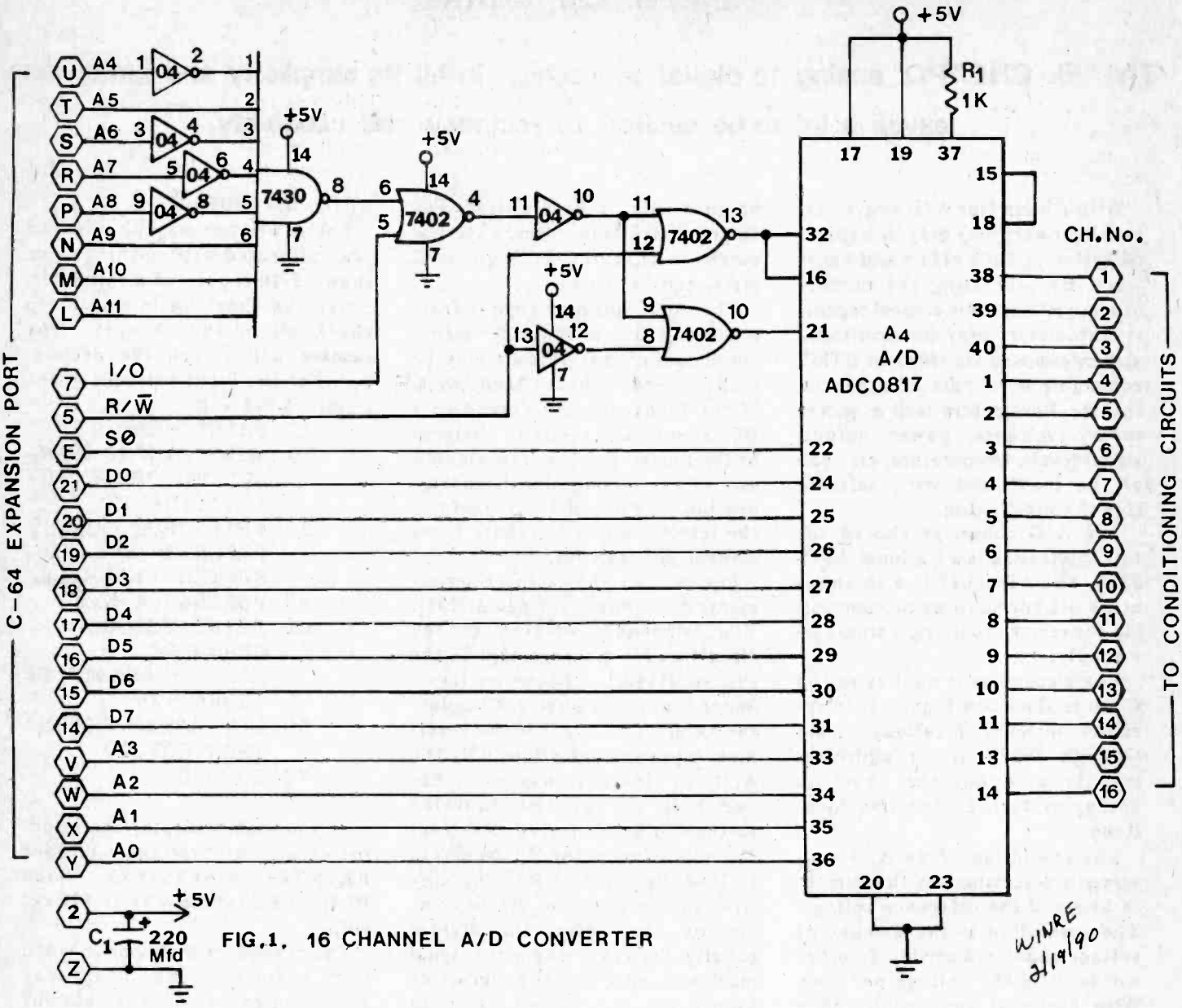


FIG.1. 16 CHANNEL A/D CONVERTER

BELOW: PANAROMA OF COMMERCIAL VENDOR AREA AT SEA SIDE HAMFEST.

B.R.A.T.S. T-HUNT

The annual B.R.A.T.S. T-Hunt came off with a bang this year. We had six separate vehicles, each operated by two or more "hunters". This year's rabbits were NGIK and N9ZK, the winners of the 1989 T-Hunt. At first, the weather prediction was for rain in the morning, but everything had cleared out by the time we got started. All of the "hunters" and rabbits met at the parking lot near the Galvin Fine Arts Building at St. Ambrose University in Davenport to get things lined up. Things got underway at 10:00 a.m. with the rabbits departing in an easterly direction. It was discussed at the B.R.A.T.S monthly meeting on Thursday night, that the immediate Quad Cities would qualify with either side of the River Fair Ground. It was not until the rabbits were underway, that the actual site was chosen. The rabbits were located in the Illinois State Police, District 7, parking lot in East Moline, Illinois. The location is a high spot and good results were achieved getting back into the repeater. The rabbits used a ten watt P.C. electronics TC-1 transceiver, started transmitting 28 minutes after ten, and the race was on. The winners were WB0FBP and WD0-AMA. They were assisted by WB0-SBL. The winning team did their job in 38 minutes, driving a total of 20.9 miles. In second place was WB0BIZ and WB0OLX, coming in at 47 minutes with 21.0 miles. (John didn't have any tenths to start us with.) In third place was WA0OEW and KC0HY, coming in with 63 minutes and 25.1 miles. Fourth place was won by K9FYV, N0ZFR, and KB9AJU at 85 minutes. No mileage data available. In fifth place was NU0G, KB9BNR, and N2-AWE. Their time was 95 minutes with a total of 40.0 miles. WB0BBM and K0AAG took sixth place. Several group and winner pictures were taken. Some video was also taken at the beginning and ending locations, not to mention, the winning team for 1990. It was the winners decision to go to Shakies Pizza on North Brady in Davenport for lunch. The B.R.A.T.S. T-Hunt was first started in 1986. Past winners of the B.R.A.T.S. ATV Hunt trophy are: 1986-Tracy Monson-N9AEP, 1987-Matt Reed-N0GIK & Lance Denger-N0HAV, 1988-Dave Johannsen-WB0FBP & Don Schneider-WD0AMA, and 1989-Matt Reed-N0GIK & Phil McMillan-N9ZK. A total of 18 amateurs participated in this year's event, setting an all time new record. A great time was had by all! It was discussed that we might have a separate T-Hunt in late summer or early fall. Also a trophy for both winners in each team. Contests like these help T-Hunters sharpen their skills in preparation for more serious searches if the need should arise!

THE YAESU FRG-9600 THE ULTIMATE ATV RECEIVER??? BY DALE LAM WA0NKE

I am always searching for better receivers, transmitters, antennas, etc. A local ham who was moving out of the country wanted to sell a receiver that he had. It turned out to be a YAESU FRG-9600 with the optional VIDEO UNIT installed in it. On the rear of the receiver was an RCA jack labeled "Video Out", I couldn't turn it down. My curiosity absolutely got the best of me, I had to try it on ATV.

It is a small receiver about the size of most 2 meter mobile rigs though just a little taller (7 x 3 x 8.5 inches), weighs about 5 pounds, operates from 12 vdc @ .5 amps max and comes with a mobile bracket. The frequency coverage is continuous tuning from 60 mhz to 906 mhz, with 99 memories available. Within that frequency range all transmission modes (USB, LSB, CW, AM-NARROW, AM-WIDE, FM-NARROW, FM-WIDE) are available, actually SSB is allowed only up to 460 mhz. One of the most useful items which is on the front of the FRG-9600, but missing from most ATV receive setups, is the S-Meter and signal attenuator. These are welcome aids when trying to accurately point your own receiving antenna at the transmitting station. One annoying item is the SO-239 antenna connector, which should really be an "N" connector for the frequency range this radio covers. These sets have just been recently discontinued by Yaesu, but when new they sold for about $500. On the used market they can be found for about $350.

As soon as I got home with the receiver I connected it to my ATV antenna, the video out jack to my computer monitor and tuned to 426.25 mhz, which is the local ATV Weather Radar frequency. I got a full scale s-meter reading but a blank screen. This was confusing, until I realized that proper tuning of a TV signal requires dialing in the audio sub-carrier frequency, rather than the video carrier frequency. When the dial read 430.-75 mhz (426.25 mhz + 4.5 mhz = 430.75 mhz) both the video and audio signals were available.

The signal quality was not up to the quality of my PC Electronics TC70-1 Transceiver, but the FRG-9600 doesn't have a low noise GAS-FET front end. The FRG-9600 produced a P4 black and white picture, while the TC-70-1 has a P5 full color pic[illegible]e. I then put on the Radio Shack 400-to-1400 mhz inline preamp and got a P5 black and white signal from the FRG-9600. I just couldn't squeeze out any color from the computer monitor.

I next tried the local commercial TV stations, including channels 4, 5, 9, 16, 19, 38, 41, 50 and 62. Each of these stations produced good color signals just like I expected from my normal TV's. This made me suspect that I was having some trouble with my monitor, so I got another monitor and began receiving very good P5 color on the ATV Weather Radar, even without a preamp on the antenna. The whole receiving system must be optimized, otherwise the available signals won't be seen at their best, this includes the antenna, feedline, receiver, and monitor.

Some of the most interesting tests have not yet been made on this receiver yet, such as: sensitivity and signal-to-noise ratio. I have enjoyed general listening to the wide variety of signals available in the 60 - 906 mhz range from ham to TV and FM, airband, police and fire, and many others. Very few receivers can provide so many modes including video that are of interest to us hams. At the next hamfest keep your eyes open for a receiver that comes close to the ultimate ATV receiver, the Yaesu FRG-9600.

MARKER/SIGNAL GENERATOR MSG-100
INTRODUCTION

The Science Workshop MSG-100 Marker/Signal Generator is another illustration of our stated goal to provide the experimenter with extremely low-cost, useful electronic equipment. As with the "Poor Man's Spectrum Analyzer", it allows us to substitute a little "smarts" for a "lotta-bucks"! And once again, the key word is COMPROMISE!

The compromises here are the same as those for the "Poor Man's Spectrum Analyzer". No Power Supply. No Calibration or Specifications. No "easy-to-get" parts or hardware that would be required to complete the project are supplied. No claim that it replaces Tektronix or Hewlett Packard equipment However, as with the "Poor Man's Spectrum Analyzer", what we do supply and guarantee, is a great educational experience, a small dose of frustration as you try to decipher my best efforts to describe how to assemble, test and apply the results of your labors, and a lot of "ban" for the "buck"!

The MSG-100 Generator is a voltage-tuned signal generator module designed to produce a frequency marker "pip" when used in conjunction with the "Poor Man's Spectrum Analyzer". It's frequency range is approximately 5 to 450 mHz. with an output of approximately 10 millivolts into 75 ohms. Even though the SW-6007 Digital Readout Kit identifies the center of the analyzer's display, the addition of the Marker Generator makes it easy to quickly identify each individual signal.

It can also be built into it's own enclosure, with it's own Digital Frequency Readout and used as a "stand-alone" signal generator in a variety of other everyday applications. Additional circuitry can be added (such as attenuators, amplifiers and modulators) to make it more useful as a "stand-alone" generator. The MSG-100 module is another modified cable tuner, modified this time to provide a single signal, rather than the swept signal produced by the SW-5900 Tracking Generator module. The principle of operation here is the same as the Tracking Generator, except that this module has it's own VFO, rather than using the VFO from the SW-5800 tuner. This gives us the ability to (voltage) tune it independently over the same frequency range as the other modules. Since the MSG-100 also has an internal pre-scaler, we can use the SW-6007 Digital Frequency Readout Kit to display it's frequency just as we use it to display the SW-5800 tuner's center frequency. This is accomplished by simply adding a SPDT switch, as illustrated. Installation should not present any problem. Physically the module can be mounted in the same box as the Spectrum Analyzer, since it is a well shielded module, or it can be assembled into it's own box with it's own power supply and additional, optional circuitry. Power requirements are the same as for the SW-5800 tuner, 24 volts @ 100 ma. and 5 volts @ 80 ma. (for the pre-scaler), plus a well filtered, well regulated 25 volts for the tuning voltage, such as that provided by the regulator on the SW-6001 Ramp Board.

ADDITIONAL CIRCUITRY

You might want to consider some of the following suggestions to make the module more useful for "stand-alone" applications.

1.) Add (build or buy) a wide band amplifier, to boost the output level. Radio Shack sells a 5 to 900 mHz. 10 dB coaxial 75-ohm in-line amplifier (Cat. No. 15-1117) for $14.95, complete with a wall plug power supply. By the way, this unit also works out great for boosting the sensitivity of the Spectrum Analyzer by 10 dB! That gives you TWO applications for a single $15 investment!

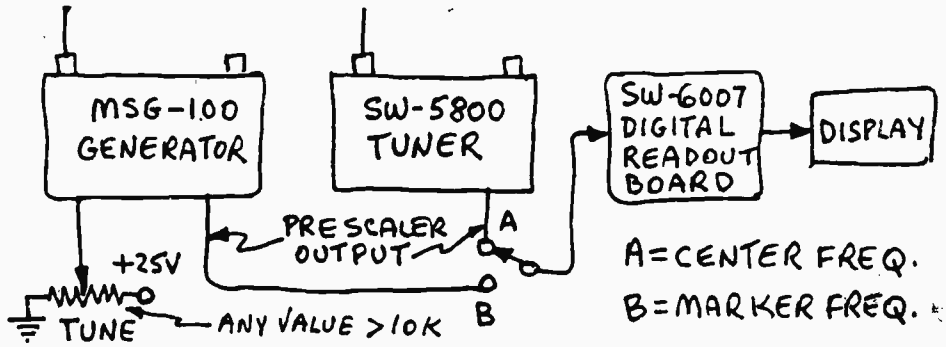
2.) Add AM and/or FM modulation. Since the generator is voltage-tuned, adding an AC component to the tuning voltage would Frequency Modulate the output of the generator. This AC component could be a sawtooth (for sweep alignment), or audio or video for other applications. Adding the AC component to the B+ supply of the 65 mHz. oscillator could Amplitude Modulate the output.

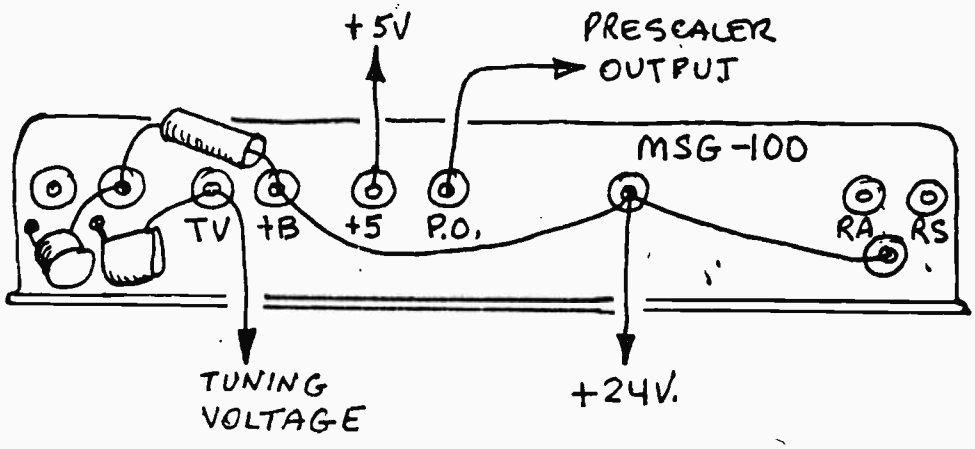
3.) Add an attenuator. If additional gain is added to boost the output of the generator, a variable attenuator would be another useful addition. It could either be a step attenuator or a continuously variable one. Look for surplus units at most hamfests. After the unit is completed, the output of the generator has to be coupled to the input of the Spectrum Analyzer. This can be done by adding either a resistor or capacitor between the output of the generator and the input of the analyzer. The value of the resistor or capacitor should be adjusted to provide a marker "pip" with just enough amplitude so that it can be easily recognized across the full range of the analyzer. The signal could also be coupled into the analyzer by adding a small whip antenna to the output of the generator, close enough so that it can be picked up by the analyzer. Varying the tuning voltage should cause the "pip" to move across the display. When the "pip" is superimposed on to the unknown signal, it's frequency can then be read directly from the digital display for the generator.

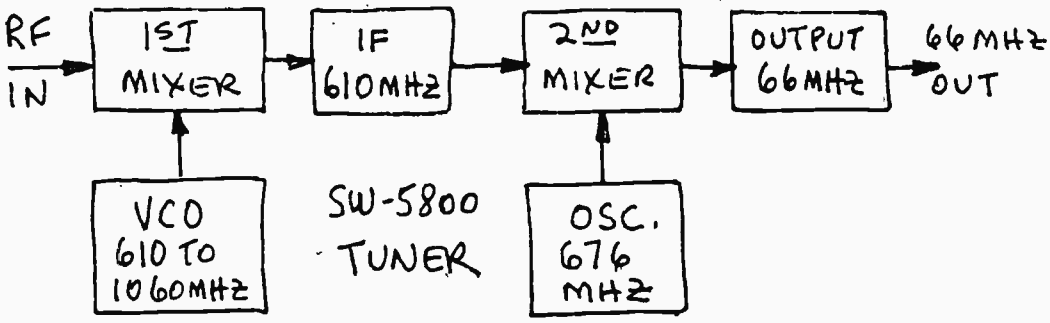
CALIBRATION

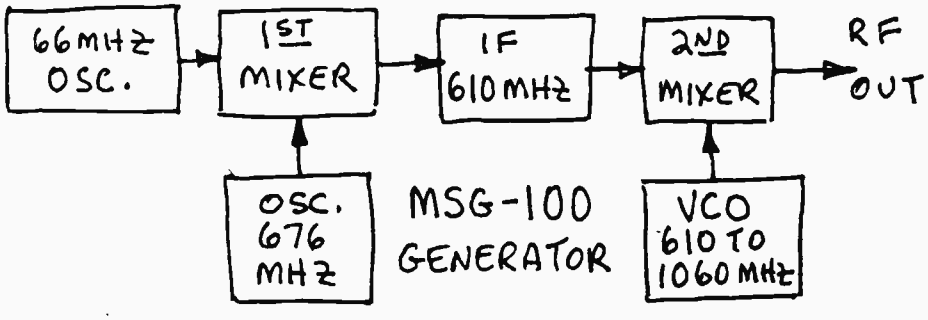
A comparison of the block diagrams of the SW-5800 tuner and the MSG-100 generator shows us how the modifications have made one the opposite of the other. The tuner accepts a wide range of input signal frequencies and a wide range of output frequencies. Since we start out with a 66 mHz. oscillator and mix it up and down to produce the output frequency, it's actual frequency effects the generator's output frequency. Calibration of the generator is accomplished by adjusting either one of two inductors in the 66 mHz. oscillator circuit. A small hex alignment tool can be used to adjust the cores which are accessible through the two holes indicated in the drawing. It is important to remember that the SW-6007 Digital Frequency Readout is actually displaying the frequency of the VCO, offset by the 61- mHz. IF.

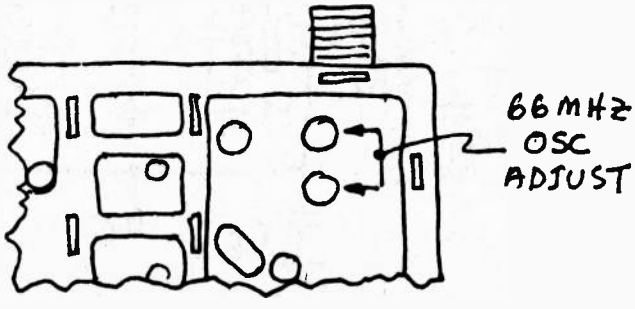
This is an indirect display of the RF signal generated. It is correct only if the 66 mHz. signal is correct. Tuning the 66 mHz. oscillator does not change the VCO frequency display. It does affect the RF signal output frequency. When we calibrate the generator by tuning the 676 mHz. oscillator, we are adjusting the RF output frequency to match the display, rather than the other way around.











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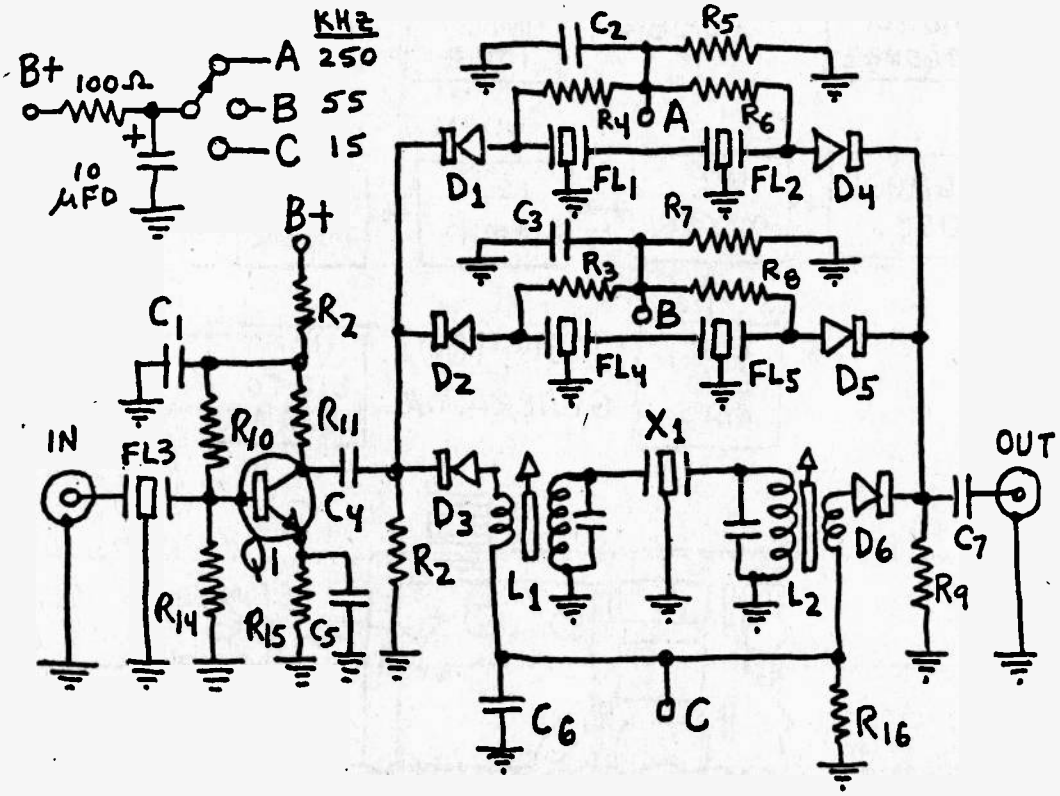

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TUNERS: a. 0-500 Mhz (Modified) cable tuner, w/prescaler) .....SW-5800 b. 420-900 Mhz (UHF ONLY tuner) SW-5800		 35.00 15.00	
TRACKING GENERATOR SW-5900		50.00	
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How did you learn of us?

LOOP YAGI for 439.25 Mhz

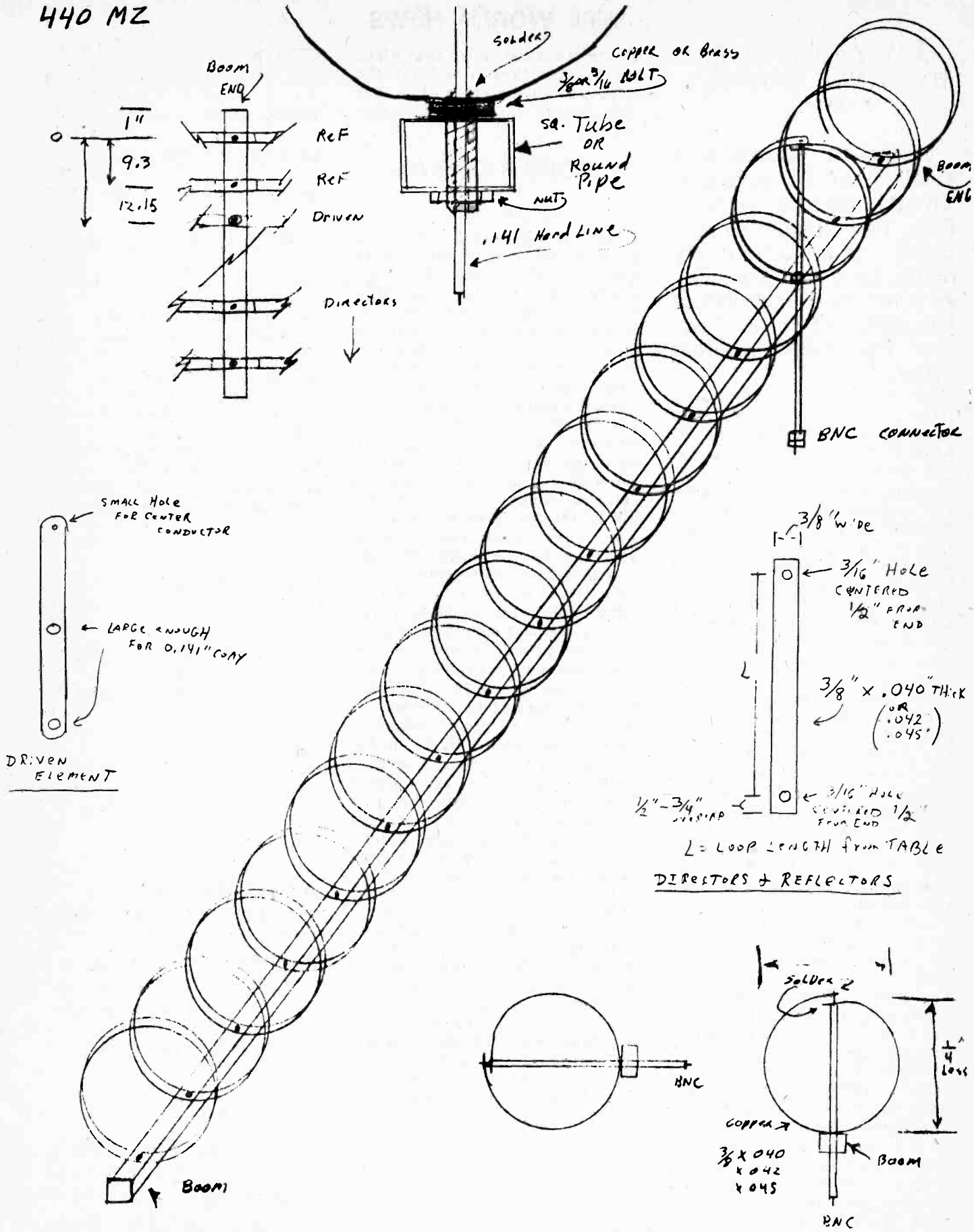
Ed Berry KA5NOJ, 5855 Walnut Creek F-145, River Ridge, LA 70123

The loop yagi has been an excellent ATV antenna and is relatively easy to build. Several AT-Vers in Virginia and Massachusetts have built this particular design with good success. Use the chart to drill 3/16" holes for the elements on the boom starting 1 inch from the reflector end.

The elements are constructed from 3/8" wide aluminum or steel strap material (approx. 0.040 to 0.045" thick). I had the local machine shop cut my elements for me, however you might try to locate banding material at an Industrial Supply house which should work perfectly for this antenna. Two 3/16" holes are drilled in each element about 1/2" to 3/4" inch from each end of the strap. Element lengths are measured from the center of each hole using the accompanying chart. Note that the element length is different depending on the boom size used. The driven element is made out of brass or copper strap. A small hole is drilled about 1/4" inch from one end of the strap just large enough for the center conductor of the coax feed. Drill a hole on the other end of the strap large enough for the 0.141 mini coax to pass though (5/32 or 3/16"). Also drill a 5/32 or 3/16" hole at the midpoint of the driven element. I usually round the corners of the driven element. Cut enough 0.141" mini hardline coax to feed though the driven loop and give you a foot or two extra to allow connection of your feedline. Pass the coax through the driven element strap at the midpoint hole. Bend the end with the larger hole around to mount on the coax shield and solder at this point. Leave about 3/8" of the dielectric sticking out past this solder point and strip 1/8" of the dielectric back to expose the center conductor. Solder the other end of the loop to the center conductor of coax. You should have about a 1/4" gap between the ends of the loop.

Next drill a hole large enoug to pass 0.141" coax (5/32 or 3/16 ") through the center of a 3/8" o 5/16" brass bolt. I usually grin the top of the bolt down until it' about 1/16" thick (this makes i easier to solder to without over heating the coax). Slide the bol over the end of the coax comin out of the driven element. Th bottom of the loop should rest o top of the head of the bolt. Scre this assembly to the boom a shown in the diagram. Compres the driven loop so that it's 1/4 wider than it is tall to give yo the best SWR. You can adjust thi for best SWR before soldering i down. Now heat up the top of th bolt and the coax shield with large soldering iron or small braz ing torch until it just flows sol der. Solder the coax and loo where it meets the bolt head quic kly and let cool. Attach an connector, find a place to moun your antenna and let the DX rol in!

SPACING 1" from the end	BOOM	REFL(2)	DRIVEN	DIR.1-12	DIR.13-25	
0.00"	1"	29.329"	27.994"	25.022"	24.516"	
9.30	1 1/4	29.213	27.883	24.923	24.320	
12.15	1 1/2	29.097	27.773	24.824	24.320	
15.51	1 7/8	28.897	27.573	24.624	24.120	
18.00		8 foot Antenna				
23.34				6 pcs.	5 pcs.	
28.68	1/2"x2"	29.213	27.883	24.923	24.670	
32.43		21 foot Antenna				
39.36				8 pcs.	8 pcs.	8 pcs.
50.04	1/2"x2"	29.213	27.883	24.923	24.670	24.410
60.72						
71.40						
82.08						
92.76						
103.44						
114.12						
124.80						
135.48						
146.16						
156.84						
167.52						
178.20						
188.88						
199.56						
210.24						
220.92						
231.60						
242.28						



DWG By KA5NOJ ED

ATV WORLD NEWS

ATV SAVES LIVES BY STEVE CARROLL WV0J

McClouth, Kansas is a small town in Jefferson County, west of Kansas City. The citizens of this small rural community could have lost their lives if not for the efforts of the only ATVer in town and the KG0R weather radar.

On March 14th, thunderstorms filled the skies. Several ARES groups and other ATVers watched intently as all levels of storms (L1 through L5) started coming through. Bob, N0EUH, went for the basement as the alarm for a tornado was sounded in McClouth. The tornado hit and the all clear was given. Bob went back to watching the weather radar. Soon after he noticed another tornado in the area. He called the local officials to warn them but was met with deaf ears.

The local officials, going on information passed to them from the National Weather Service, had decided that no new tornadoes were expected. Bob pleaded with the officials to sound the alert. Finally one official decided that Bob was no prank call and that he should be taken seriously and sounded the alarm.He wasn't a minute too soon. As the alarm sounded the tornado hit.

Just those few seconds saved lives. This brings up the problem of our local emergency preparedness officials. This is not the first problem known with getting emergency preparedness to acknowledge the help and usefulness of amateurs and especially ATV in times of crisis.

John, NU0N, of Ottawa, has approached officials in Ottawa and Olathe about the usefulness of ATV in emergency situations only to be turned away. The officials in McClouth should have sounded the alarm immediately upon hearing Bob's report.

I am sure the officials in McClouth are taking all of the credit for what happened that night but be sure that if not for the efforts of their only ATVer that things could have been devastating.

MORE R/C NEWS

KC6CCC Mike:

Just sitting here at my desk goofing off rather than doing space launch vehicle RF engineering and reading your R/C article in ATVQ (Apr 90). It seems that mounting a dipole on an R/C helo could have had produced some mechanical problems. And, I guess it did at the BNC. Let me suggest the use of a "Little Wheel" for 421.25 - 439.25, whatever ATV frequency you wish. An experiment I'd like to try with you is a combination 70 cm/2 m antenna. The 70 cm would be the "little Wheel" and the 2 m antenna would be a 19" whip attached to the center of the "Little Wheel". We could call it little wheel with hard on. Never mind. This array could be fitted with a diplexer so both 2 m & 70 cm transmitters would use the same antenna array input connector. Let me see if I can draw this. Elements of the "Little Wheel" (70 cm) The circumference of the "Little Wheel" is 14" and weighs a couple of ounces.

I'll set up some experiments this evening using the diplexer. We can put the antenna array/-system together for about $70.00, maybe we could split the cost. With this array you can have video and a 2 beacon from your helo.

See Mike Bogard's (KD0FU) balloon experiment (same issue). We had a P4 picture from his balloon at 85,000 - 90,000 feet, 393 miles away. He was running 3 watts into a "Little Wheel". We figure P5 is -60 dBm sensitivity or power. At 400 miles on 426.25 we had -143 dB space loss, 3 watts is 34.77 dBm.

Tx 3 watts	35dBm
Ant LW	0 db
	35dBm
Space loss	-143 dB
	108 dB
Rx antenna gain	16 dB
	- 92 dB
Downconverter gain	28dB
	- 64dB
Cable loss	- 3dB
	-67dB
P5	-60dBm
=	- 7

We were -7 dB of a P5 picture.

I don't know what the ceiling of your helo might be, but let's say 1000'. Your visual horizon is then about 45 miles 426 mHz attenuated over this distance is -122.25 dB. Your 1 watt (30 dBm) signal would be -92.25 dBm at distance (horizon). That is healthy, a 5.5 uv signal. Your one watt should be able to be seen at:

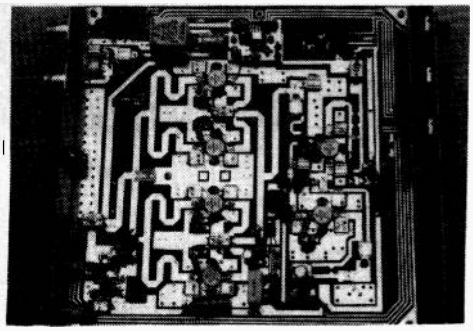
Tx power (1 W)	30 dBm
Rx antenna	16 dB
Converter gain	28 dB
	74 dB
P5 picture	- 60dBm
	-134 dB
=	125 miles

Way to go! A 250 mile diameter footprint. Let me know if you're interested. 73.
Dave Clingerman W6OAL 303 971 2549, 303 798 5926

The w6ORGy Notes

By Tom O'Hara, W6ORG

TE SYSTEMS 180 WATT AMP FINALLY ARRIVES, BUT DON'T GO FOR YOUR WALLETS YET!



I was surprised a few weeks ago with a call from Dave at TE Systems saying they finally had a 4450G amp for check out on ATV. A number of you have been calling them asking about it which I am sure helped. Although Dave did say that this unit was not producing full power, it would be good for seeing what AM video modulation would do through it and what direction to go with modifications.

First thing I had to do was go to my local auto parts store and get some #4 wire battery cables to connect between the amp and the regulated power supply. I measured the DC Volts at the amp terminals at 100 Watts CW to make sure I had no significant line drop. The 4 ft cables only dropped 1/10th of a Volt. With two single transistor driver stages and four transistors in the final, it takes a lot of current.

As is, and as expected, the video was very distorted. The amp would not get over 105 Watts so I set it up at 100 Watts sync and 60 Watts blanking pedestal. I put my scope probe on the various bias and B+ voltage points and saw the video-like loading at just about every spot. I tried the range of caps (.1, 10, 100 mF) at each pad and got a lot of it down, but the bias voltage source was not low enough to keep it from loading down DC wise under drive.

Even at audio frequencies the second driver bias dropped from .7V down to .3V. This means SSB distortion in the form of flat topping will also occur in addition to sync tip compression. You can bias the transistors on a little for class AB, but it must also be stiff enough to maintain the DC operating point under all drive conditions.

There are low frequency collector to base feedback networks across the second driver and each of the four finals which greatly distort the color and sound. The Mirage D1010N standard version has the same problem which was solved by removing it, and adding a 50 Ohm 10 Watt wirewound resistor on the RF output to prevent a low frequency oscillation. The wirewound results in a 50 Ohm load at low frequency, but is an inductor at UHF.

I did not get a manual or even a schematic with the unit because they don't have one yet. So I cannot comment on their claims or what needs to be said in it. It would have helped me if I would have had the schematic to be able to mark it up for Dave along with my suggestions when I returned it for some changes.

At this writing, the amp is at TE with my suggestions for further changes to the bias, removal of the feedback networks, add the 50 Ohm resistor, make it get 180 Watts, and to test it out with a 2 tone SSB signal before returning for ATV checkout.

This is pretty much the same test and modification routine I went through with the Mirage and RF Concepts solid state amps, and they took some time to perfect also. The difficult trade off is to preserve the video waveform up to 5 MHz, but not to let the power transistors blow their own brains out from low frequency oscillations. The low frequency oscillations can occur at some RF output VSWR's or even back through the bias and collector voltage feed traces.

So the story continues, hope to have the answers soon for those that can't wait for the next issue.

Elsewhere in the power amp department, I was told by AEA at Dayton that their long advertised 50 Watt amp is still 3 months off. Patience you power mad animals!

LET'S SEE WHAT THE PROBLEM IS.

It occurs to me that you ATVers out there could better communicate your ATV questions or problems to us at ATVQ on video tape rather than a written description. After all sight as well as sound is our mode.

Interference, low power out, sensitivity, etc. or any problems are better diagnosed if you simply shoot some tape off the screen along with some close-ups of your gear, cable, and all parts of your system. Give a running narration into the mic as you go. You can also show what you have done so far, stating the test methods and equipment used.

I can play VHS or Sony 8 mm tapes. I would also enjoy some off the air stuff to get an idea of what each area does with their ATV systems. Anything from off the air round tables to public service events would be great. After watching it, I can return the tape with some suggestions to try.

CHOKE YOUR R/C RECEIVER

R/C model flying with ATV aboard is bringing in new hams from that hobby. However, putting a 1 Watt ATV transmitter right next to an unshielded 50 or 72 MHz R/C receiver with little or no front end selectivity can spell disaster. It may work fine up close, but as soon as the ship gets out a little ways, the R/C signal gets weak enough that the ATV transmitter's energy captures the first mixer and down goes the aircraft.

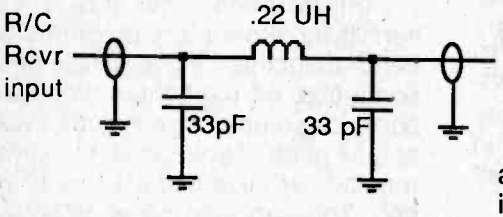
This problem is much like those of us who, when we first got on ATV, had our 2 meter antenna too close to the ATV antenna and one interfered with the other. Likewise those who have fought desense problems with an inband ATV repeater know how important shielding and front end filtering are.

Of course the R/C receiver was not designed to operate with a 1 Watt transmitter a few feet away. The first thing to do is to put the receiver in a shielded box. Soldering up some pieces of PC board or thin copper or

brass sheet should do, without adding too much weight.

Right at the antenna input a low pass filter, to pass everything below 72 MHz but roll off 400 MHz, can save your ship from becoming a mangled mess. Keep the lead lengths as short as possible since they are significant inductors at 70 CM.

75 MHz Low Pass Filter



Before the next flight, place the craft far enough away to be just within it's minimum signal strength range for full control. Then turn on the ATV transmitter and see if you still have full control. If not, as a progress reference, move it slowly closer and note the spot where full control is regained. Then go back to the bench and try adding some 220 pF disc caps bypasses on the + power and servo lines, changing the positions of the two antennas or signal wires and separating the R/C leads from the ATV leads to prevent cross-talk. Go back out and see if the changes and additions improved control range.

If the R/C receiver overload problem persists, at each servo output lead and at the DC power input, a 500 pF feedthru cap with a bead on each side should keep these leads from being good 70 CM antennas. Marlin P. Jones in their 90-2 catalog of parts shows some 470 pF solder in types on page 39. The part number CF-1960 is quite a deal at 3/$1.00. Call them at (407) 848-8236 for their catalog of goodies.

If you cannot get some feedthru caps or ferrite beads, then epoxy some .22 uH chokes in holes drilled in the enclosure (check for shorts), and put 220 pF disc caps to ground from each of the inductor leads soldered as close as possible to the inductor body.

The ATV transmitter should be shielded and the power and audio lines filtered in the same way as the R/C receiver. The video input is coax and would not normally need an extra low pass filter.

All filter parts should be physically right at the point the line goes thru the shielded enclosure to be effective.

DIAMOND SX1000 - WHEN YOU CAN'T AFFORD TO SLUG IT OUT WITH THE BIRDS.

Checked the price of a new Bird 43 RF Power meter plus slugs or even some of the equivalent types from other manufacturers lately?

The venerable 43 will run you about $200 plus $55 per slug. More if you want one to read less than 5 Watts.

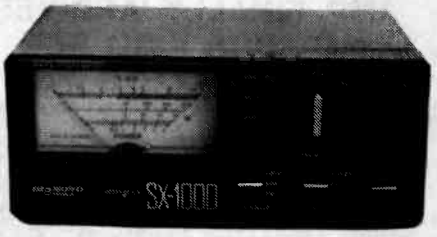
The D series slugs (200-500 MHz) are good enough if you want to cover ATV plus check out rigs and antennas on 2 or 220, but you will need one slug for the transceivers power level and one for the amps if you really want to know what the actual power levels are.

Bird says that their accuracy is 10% of full scale. This means that a 5 Watt slug can be off as much as 1/2 Watt either way at *any* point on the scale across the band. Many misinterpret this as being 10% at any point on the scale. In other words your 1 Watt transmitter could read .5 or 1.5 Watts worst case with a 5 Watt slug rather than .9 or 1.1 Watts.

Therefore if you need accuracy, you should get a slug that will give a reading near full scale with your transmitter. I use a 400-2 2.5 Watt slug, but they are up to $74 now.

In my opinion, hams, and especially ATVer's, don't need absolute accuracy as much as something versatile to check out antenna VSWR, blanking pedestal setup, transmitter peaking, etc. for all their rigs that does not cost an arm and a leg.

Merit Arnold, W6NLO, at RF Parts sent me a Diamond SX1000 power meter to check out. It covers 1.8 to 1300 MHz in 4 bands and has 3 power ranges - 5, 20 and 200 Watts full scale. Besides the power ranges, it has an adjustable forward and reverse relative power position for checking VSWR and tune up. I have seen them advertised at AES for $225.



They claim 10% of full scale accuracy and it did compare very close to my Bird 43 and IFR 1200S (7% digital accuracy) on 70 CM at 1 Watt. There are pots inside the SX-1000 which can be reset with another more accurate power meter in series if you really needed it.

Minimum power input for SWR measurement is given as 2 Watts above 430 MHz and 1 Watt below 160 MHz. But I found I only needed 1.5 Watt to get to full forward reading at 70 CM. I did find a 1K resistor under the band switch that gave 1 Watt full scale if reduced to 330 Ohms. However, doing this, requires resetting the power range pots slightly.

Although the highest full scale power rating is 200 Watts, you can only run up to 100 Watts - 70 Watts on 2 meters - continuously. I don't know how long "up to 200W in intermittent mode" is but will find out when I get the 180 Watt TE Systems amp... I better order a spare 1SS108 hot carrier detector diode.

There are two separate coax inputs on the back. An SO-239 for 1.8 to 160 MHz and a type N for 430 to 1300 MHz. Since the Japanese do not have 220, they skipped that band. However I found the lower band input usable on 220.

There is a switch that is supposed to give you peak envelope power (p.e.p.) or average power readings. All it does is put a 10 or 22 mF electrolytic cap on the detected output to dampen the meter response to low frequency AM modulations. It does *not* give real peak or average meter readings under complex AM modulation.

To give a peak reading, a detector diode load to source impedance ratio must be very high. I found this out when I was designing the peak reading test point on the DMTR RF/detector/monitor board used in the TC70-1 and board systems.

On the Diamond power meter the RF pick off source is more than 50 Ohms and the meter circuit load measured between 2 and 10K. It is curious that in the Operation Instructions it says that the PEP reading will be 70 to 90 percent of peak power at normal talking level with SSB. I think this feature is misleading and unusable.

For ATV, the filter feedthru cap on the detector diode output is 1000 pF. This filters out most all of the video waveform. I replaced this cap with a short leaded 22 pF disc cap and got a nice video waveform. For those with 10 Watt or higher linear amps that want to set the pedestal and sync more accurately with a scope, this is a simple change to do and connect the scope.

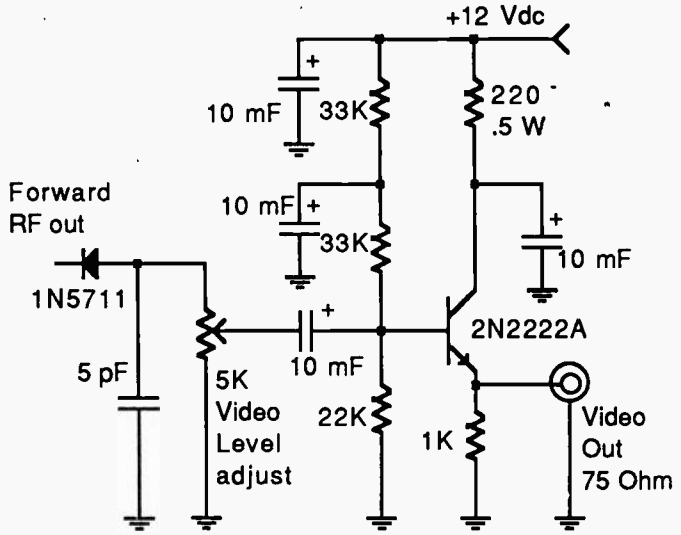
There is a 12 Vdc input to light the meter and band indicator LED's. A simple video detector and variable video amp/monitor driver could be built inside on the middle of the back panel and tap on to the 12V input connector.

Diamond also has a SX-600 power meter ($170) that covers 1.8 to 525 MHz and a SX-400 ($117) that covers 140 to 525 MHz but they only come with SO-239 connectors instead of type N. I would rather not have to use a PL-259 to N adaptor or cable on 70 CM. However, for the extra bucks I think the SX-1000 is worth it since it covers DC to light frequencies and has N connectors for UHF.

VSB FILTER FEEDBACK

It works! That's what we have heard from those that built the VSB filter by Lyn Cyr W1NRE that appeared in the January 89 ATVQ issue. I have been asking for someone to come forward willing to become a source to build these and have gotten some who are thinking about it, but have not committed.

There is a need for a good low insertion loss and low cost VSB filter to put in the antenna lines of ATV repeaters or for those who must cut down their out of normal passband energy further to minimize interference to others close by. I don't think many will pay for a filter unless they actually have a interference problem and it doesn't drop the power much.



Video detector/monitor line driver. Hot carrier Schottky diode and 5 pF cap are mounted right next to existing 1SS108 forward RF detector diode with very short leads in the SX-1000. Run a wire from the cap and diode junction to a small 5K panel pot on the back. The wiper of the pot goes to the 10 mF cap off the line driver mounted around a RCA jack for the video out. Video out must be a 75 Ohm resistive termination at the monitor end of the coax line.

THINKING ABOUT PUTTING UP AN ATV REPEATER? PART IV

The previous parts covered frequencies, antennas, filters, transmitting and receiving. The only part left is control and identification for your complete repeater.

FM voice repeaters key by means of a carrier operated relay from limiter current or squelch, or by sub-audible tones (CTCSS). The same can be done with ATV, but with the wide band nature of video and all the other modes that can get into the passband, a video operated relay is most commonly used.

A video operated relay (VOR) looks for valid horizontal sync out of a sync separator. The probability of false keying from radar, voice or digital modes is low since the signals must first go through a sync separator and then a tone decoder at 15.7 kHz. To further protect from unwanted signal capture, a time delay of a second or so of valid horizontal sync can be designed in before keying the actual relay that applies the voltage to the transmitter exciter.

Along with the video operated transmitter exciter B+ relay, timers and another relay for switching between the received video and a video ID or to key a MCW ID on the sound subcarrier or video carrier. You must identify with legible letters in the video or by audio within every 10 minutes of continuous transmission and at the end of a transmission (97.119).

While the FCC rules used to say that a repeater must turn off within 5 seconds of no input, many left the video ID on for up to a minute for individual test and tuning purposes. Maybe in this case it was not a repeater but in remote control?

Some illegally have video ID or other locally generated video turned on by anyones two meter tones. FCC rules forbid primary control below 220.5 MHz. One possible way around that is to also repeat the 2 meter audio on the sound subcarrier in which case it is a crossband repeater in the same mode and the video secondary. Turning on the transmitter with video ID by a timer with no one inputting to the machine (auto-jam mode) is also illegal. These

are grey areas that are usually not challenged but, you as a repeater owner should be aware of them.

SOME WHISTLES AND BELLS

Once the basic machine is up and running, the real fun begins by adding some additional functions.

Mixing in the local 2 meter ATV calling frequency at about half the incoming ATV sound level helps everybody hear those that are on opposite sides of the hilltop or too far away for normal 2 meter simplex communications or for repeaters that are not co-located.

This is easily done through another 10K pot and series 10K resistor and 1 mF cap to the same negative opamp pin of the line audio input. That's pin 2 on the TLO82 in the FMA5E and KPA5E, and pin 6 on the RTX-70. Actually you can add 4 or 5 of these mixed audios for other radios, voice or MCW ID's.

Other video sources such as the Space Shuttle, weather radar, links, packet BBS, remote camera, etc. can be switched in by one of the many DTMF decoders on the market (see 1990 ARRL Handbook page 34-3) in place of the received video. I suggest the decoder be connected to the incoming sound subcarrier and a timer be added to limit the on time if the users video goes away and they forget to return it to normal repeat mode.

TWO ANTENNAS VS DUPLEXER

This question is asked a lot lately by those about to put up an inband 70 CM repeater. The broadband noise out of an amp with just carrier is probably no better than 70 dB. Add to that the video source noise at 40 dB additionally rolled off by the video modulator, amp intermod and sideband harmonics and you have a lot of energy next door waiting to go into your 1 to 2 microvolt receiver.

If you have a 100 Watt amp, the peak power is 157 dB above a microvolt. Depending on what the actual transmitter noise level is from all causes at the receiver passband, the VSB filter on the transmit antenna line has to knock it down to below a microvolt. Also the receiver VSB filter has to knock the transmitter carrier as well as sideband power down to at least 1/10 milliwatt (70 dB below 100 Watts) so as not to overload or intermod with the downconverter preamp or mixer.

This is a tall order for a filter with low insertion loss and a flat 6 MHz bandpass. A good quality VSB filter has 80 to 100 dB of rejection 12 MHz away. It also means no leakage from poor shielding or coax around the filters. The TX-RX Systems 26-66-01A Duplexer or the individual VSB filters do a good job with less then 1.2 dB insertion loss. But we still need at least 50 dB more attenuation to prevent overload or desense.

With a two antenna system you can do this with vertical separation. Regardless of polarization, an omni will have a minimum field above and below it. The higher the gain the greater the isolation at the same distance, since the vertical lobe is narrowed. For the old Phelps Dodge 10 dB stick Station Masters, 20 ft end to end gave about 50 dB at 450.

If your antenna is less than 10 dB, but you don't have much room on the tower to get added separation, try finding a magic null point. Fix the transmitting antenna at its location on the tower and transmit. Connect a spectrum analyzer or other calibrated signal strength device to the receiver coax without the VSB filter. Have someone slowly move the receive antenna up and down on the tower to find a minimum point and lock it in place.

With the duplexer to a single antenna, another VSB filter from TX-RX or the lower cost but higher insertion loss Spectrum International one can be put in the line between the exciter and amp to get the added rejection.

AVM FORCES 33CM BAND PLAN CHANGE IN SOUTHERN CALIFORNIA

Yes it's all happening here first again, but this time it is not good. In the January 90 issue on page 61 we listed the major populated cities that will have to work out some accommodation with the AVM licensees if they are to have any use of the band within a few years. Those of you in the less crowded areas probably have nothing to worry about... for a long while, but the process for effective spectrum management should be of interest, especially for those contemplating putting up a repeater on any band.

Automatic Vehicle Monitoring systems take precedence over the Amateur Radio Service on the 902 to 928 MHz band. Pacific Telesis informed SCRRBA (Southern California Repeater and Remote Base Association), the frequency coordination council for the band, that it would have a wide area system in operation by the beginning of the summer.

A band plan revision meeting was held and hosted by SCRRBA on May 26th with representatives of all existing coordinated amateur users of the band and Pacific Telesis. The SCRRBA Technical Committee checked with the local FCC office to get a list of all the other licensees to make sure that once the new amateur segments were worked out, no one would be surprised by another AVM or ISM (Industrial, Scientific & Medical) user.

As with all previous SCRRBA band plan meetings, discussion was kept on an engineering basis. In other words comments and proposals from the participants were limited to the figuring out the best fit for all users given the modulation bandwidths and characteristics of each mode rather than because of prior occupancy, numbers of users of a specific frequency or the debating ability of an individual.

Each group had one vote, and nothing would be adopted until the vote became unanimous. All had to agree or there would be no agreement and no coordinations. The SCRRBA Technical Committee would stay and moderate the meeting as long as it was possible to take and direct the group toward a concurrence. The individual representatives could leave at any time if they wished, but their vote could not be transferred. Out of a half dozen or so of these meetings that I have been involved in, only one meeting was ever terminated due to a deadlock.

The beginning of these meetings can get quite emotional. But since all must agree before passage, engineering logic usually prevails in the end. The big common fear among all is the possible

interference from another mode. When one does not know the technical characteristics of the other mode, the tendency is to simply tell them to go to another band.

These affairs usually take all day and some into the wee hours. The invitees are usually advised to bring their own food and drink for a long siege, and to take the time duck to out to the rest room at their own risk. There is both mental and physical fatigue motivation to be reasonable and get down to business. The engineering/consensus method of band planing and frequency coordination has served us well out here in the highest communications density area of the country.

Most hams come out of the meetings with a much better understanding, appreciation and sometimes a new interest in another mode of the hobby.

439.25 - WILL IT BE LOST TO FM IN YOUR AREA? IF IT IS, WILL THERE BE ANOTHER 70CM FREQUENCY TO SWITCH TO?

With ATV repeaters popping up all over the country these days and activity mushrooming, the most used simplex and repeater input frequency East of the Rockies is shifting down to 434.0. I get a lot of calls for help with interference and frequency coordination problems as the most visible ATV designer, member of a frequency coordination council and ARRL Technical Advisor for ATV and spectrum management.

Florida had to change earlier this year and now I just heard the beginnings of the same routine from ATVers in Louisiana, Wisconsin and Oklahoma. With the loss of 220-222 and the real possibility of a communicator license, the FM repeaters will increase greatly in the 440 to 450 MHz segment of the 70 CM band.

Even with FM repeaters staying above 444.0 and switching to low in / high out, many areas will quickly fill up these 40 channels. Wisconsin has that problem now and is looking to get with ATVers to figure out a solution. The 3 repeaters in Louisiana are even getting interference from new FM repeaters using high in / low out per the little thought-out ARRL band plan.

A few bucks for a new crystal on 434.0, no big deal you say? The packet people, without talking to other users of the band, got the ARRL to rubber stamp their proposal to take that segment for networking. In good faith many coordination councils assigned frequencies there.

Although there are dozens of ATV repeaters listed using 434.0 or 427.25 in the ARRL Repeater Directory, they are technically illegal unless they are set to receive low resolution black and white in the case of 434.0 or no sound subcarrier in the case of 427.25 per FCC Part 97.205(b). Occupied bandwidth is that which contains all sideband energy down to -26 dBc.

So what does one do for an inband 70 CM ATV repeater, with FM repeaters moving down wiping out a 439.25 input or the coordination council not assigning 434.0 due to legal liability? Keep in mind that a Coordination Council has a responsibility to technically fit all amateurs that apply regardless of the mode as long as it is within the FCC rules and do not interfere. They must consider upon a first come, first serve basis, not by some individuals value judgement as to how he thinks the band should be occupied.

Even though local band plans supercede, we do need a new ARRL 70 CM bandplan that takes into consideration *all* users of the band and the technical characteristics. The ARRL band plan is often referenced. But the present one, as we now have found out the hard way, has serious technical flaws.

I see two possibilities for the future and I encourage some input and discussion from all of you. One is throw in the towel and have all ATV repeaters go crossband using 426.25 as an input and 1253.25 or other 23 CM channel as an output. 439.25 and 434.0 can still be used for ATV simplex and accept the interference. However keep in mind that the people above the A line do not have 420-430 MHz and there is talk of that being the next LMS grab attempt after 220.

The second is to work toward getting the ARRL to file for, or not oppose a change to part 97.205(b) to exempt ATV repeater inputs centered at 434.0 or 433.25 MHz.

The second will take some time to develop, good PR, education and discussions with the weak signal, digital and satellite people to show that it can work with minimal interference to their activities as we have shown for over 15 years in Southern California. It is a big and tricky task, but it has to have the support of the ATV community.

Meanwhile, if you are using 439.25, it is imperative that if you expect to be using that frequency or any ATV frequency on 70 CM a year or two from now, that you get active with your local frequency coordination council.

They must know we are here and are willing to work with them. Ask that FM repeaters use low inputs in the 444-445 segment rather than outputs. Start thinking and talking about the future spectrum usage and where they can put packet, control and link users that let them operate as well as you somewhere in the band. Do it now, as the difficulty goes up dramatically with the number of systems coordinated. Nobody wants to move. See the band plan meeting procedure in the 33 CM - AVM article.

Also suggest the use of sub-audible (CTCSS) on the FM repeater input to minimize occasional video hits. Show them how ATV works and all the good public service it does for Skywarn, parades, Space Shuttle, etc., and get them on ATV.

CALL FOR IT

I am always asked about sources of cameras, monitors, scopes and test equipment. Call Fordham Radio in Hauppauge NY [1-800-645-9518] and ask for their latest catalog. Lots of goodies.

CU at the ARRL SW Convention in San Diego August 25th? A good excuse to visit California with the family this summer. If you do give a call on 146.43 FM simplex or video on 434.0. The ATV repeater output in San Diego is 1277.25 MHz.

73 , Tom O'Hara, W6ORG
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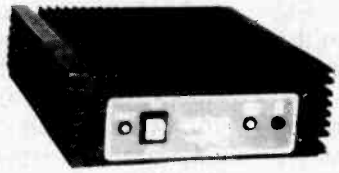

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(optional) 15 watts RF out.
Mirage D26N.....$219
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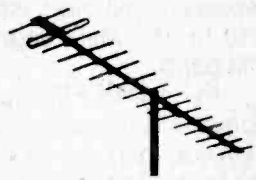

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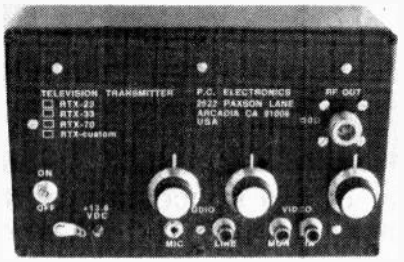

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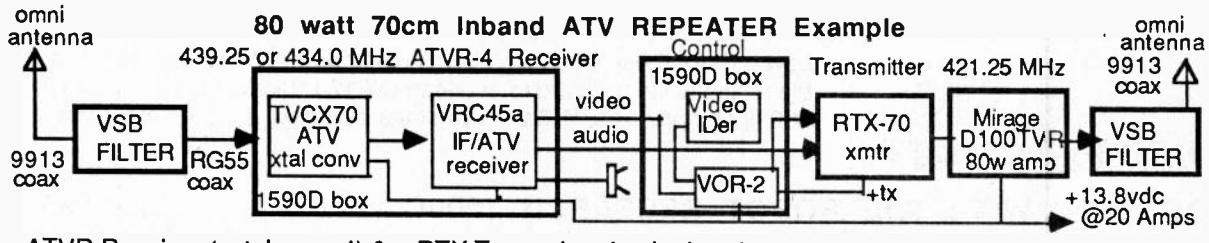
80 watt 70cm Inband ATV REPEATER Example



Select an ATVR Receiver (catalog pg 4) & a RTX Transmitter for the bands you want, add the appropriate linear amp,VSB filters & antennas, ID & VOR-2, power supply and coax for your own repeater. We suggest low in / high out for crossband. **VOR-2 Video Operated Relay board...$45**, keys RTX upon detection of horizontal sync. 10 min. & end of transmission momentary relay for switching to video ID to meet FCC regs. Contact Bill Brown, WB8ELK at (419) 4228206 for the VDG-1 video IDer directly. 33 & 23 CM Amps - Downeast Microwave Bill (207)9483741, Omni gain Vertical Ant - NCG Co. Bruce (714) 6304541, VSB Filters - TX/RX Systems Jon (716) 5494700.

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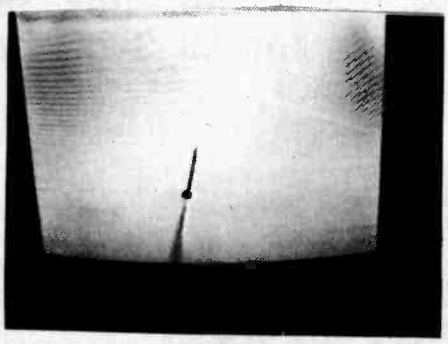

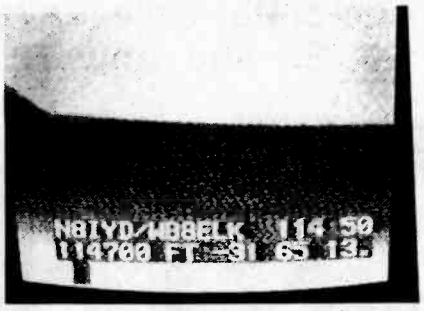

As a result of the successes of the KPA5 used on 3 of the WB8ELK balloon flights, various kites, rockets and R/C aircraft, we came up with a small video only board to better fit into these crafts, but can also be used for any ATV application.

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4. Introductory price of **$129**. Available now.

4/90

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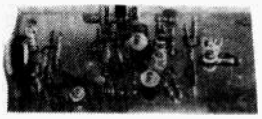
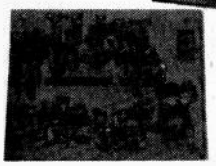
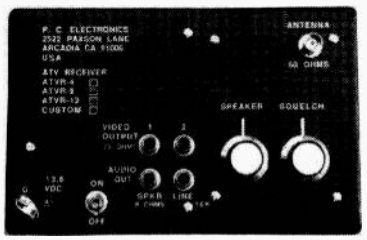


Tunable wired and tested boards, req. 12 Vdc, cabinet, connectors etc.:
TVC-2G 420-450 MHz to ch 3 .....$49
TVC-9 902-928 MHz to ch 3 .....$59



Tuneable ready to go in a shielded cabinet with wall plug power supply:
TVC-4G 420-450 MHz to ch 3 .....$89
TVC-9G 902-928 MHz to ch 3 .....$99
TVC-12G 1240-1300 MHz to ch 8 .....$109

Crystal controlled wired and tested boards:
TVCX-70 specify freq. in 420-440 range to ch 3 or IF ...$99
TVCX-33 " " " 902-928 " " " " " " ...$109
TVCX-23 " " " 1240-1300 " " " 10 " " ...$129
Ready to go in 1590C diecast aluminum box add $30



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Designed for dedicated repeaters or links, these can also be used by those who want to have composite video out to drive a monitor.
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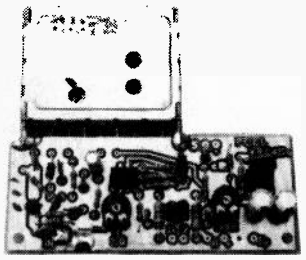
ATVR-12 " 1240-1300 " $329



VRC-45a 45.75 MHz IF/receiver module for those who want to package their own system for composite video monitor output.....$99

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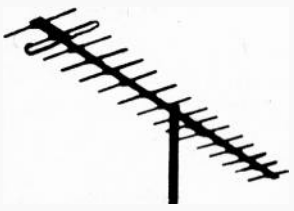
SPRING IS TIME TO REPLACE THAT OLD RUSTY SKY HOOK WITH A NEW KLM BROADBAND ATV ANTENNA



KLM 440-6X has 8.9 dBd gain, vertical or horizontal polarization rear mount on a short 28" boom. Ideal for point to point, fixed at a repeater or small enough to be portable at public service events to minimize multipath ghosts and get some gain at the same time. Wide 60 degree beam width. Type N female..**$57del.**

KLM 440-10X has 11.2dBd, 64" boom. Rear Horiz or Vert mount same as 440-6X, just longer for a little more gain and multipath rejection.....**$68 delivered**

KLM 440-16X replaces the 440-27 - 10.5 ft boom length, full 420-450 MHz bandwidth, and much more rugged . Measured more than 14 dBd at 1989 West Coast UHF Conference. As with all 3 KLM antennas the 50 ohm balun is included, type N female connector.....**$119 delivered**

ATV antennas must have broad bandwidth in addition to high gain and low VSWR. Few other antennas work well at both 439 and 421 MHz. The three KLM antennas listed here fit the requirement and have a long history of rugged operation with ATVers. The gains listed have been proven out at VHF/UHF conference antenna measuring contests, they are not marketing hype. All KLM antennas listed here take up to the maximum legal power limit. Balun or matching network with female type N connector included. Price includes UPS surface shipping anywhere in the contiguous USA.

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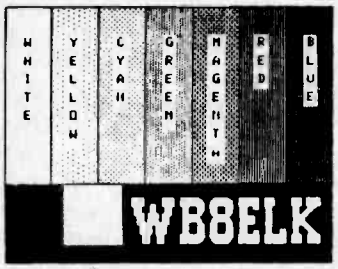

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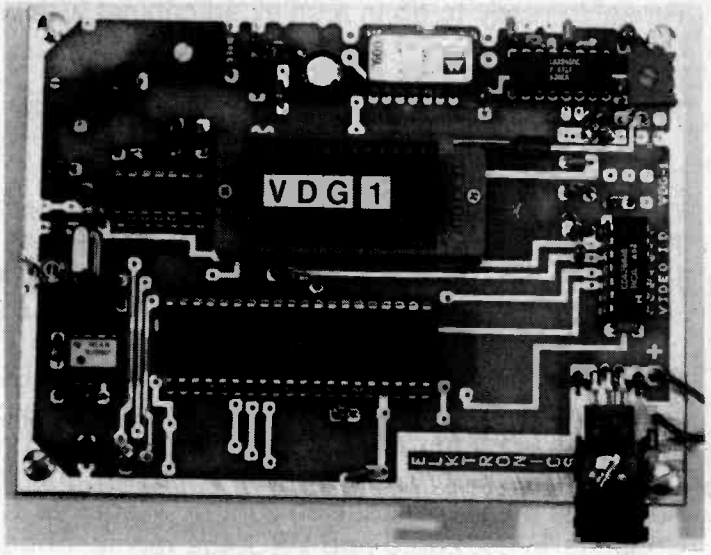
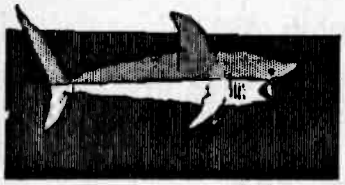
VDG-1

VIDEO I.D.



KA0JAW



KA8EEE
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Marion Ohio

N9CAI /r

KA8ZNY
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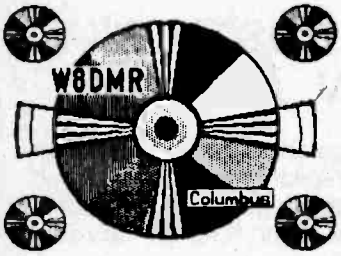

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DTMF CONTROLLED VIDEO SWITCH

by John P. Spaeth KD0LO

You video repeater buffs might like this one ! A reasonably inexpensive dual-tone multi-frequency (DTMF) video switch. As the board is presented in this article only eight video inputs can be handled. Although the decoder chip is capable of decoding 16 tones, I limited it to eight for simplicity in laying out the board. I wanted to make this circuit board single sided so it could be fabricated in the shack, and I've always had bad luck with double sided boards. So for simplicity sake, the unit will decode one of eight tones (0-7) and switch the subsequent video through to the output.

Circuit design is straight forward. The decoder is a Teltone M-957 22-pin dip available from High Technology Semiconductors, P.O.box 213, Tustin, CA. 92681 (714)-544-HTS1. The decoder outputs BCD to IC-2 which is a latching decoder to select 1 of 16, or in this instance, 1 of 16. The decoder is a CMOS 24-pin dip the generic number is 4514. The output is active logic "1" (high).

The output from the 1 of 16 decoder is used to switch the bank of quad digital switches. The 4066 was chosen for its accessibility and reliability. Perhaps a more elaborate switcher could be fashioned around the 4067 switch. For ease of construction I have used all CMOS ICs and the Teltone chip is the 5 Volt Version,be sure to specify when ordering.

Because a single ended supply was chosen, and likely most of you will not be using DC coupled video, The inputs to the 4066 chips must be biased so that the video inputs never swing below Vdd which in this instance is 0 volts.

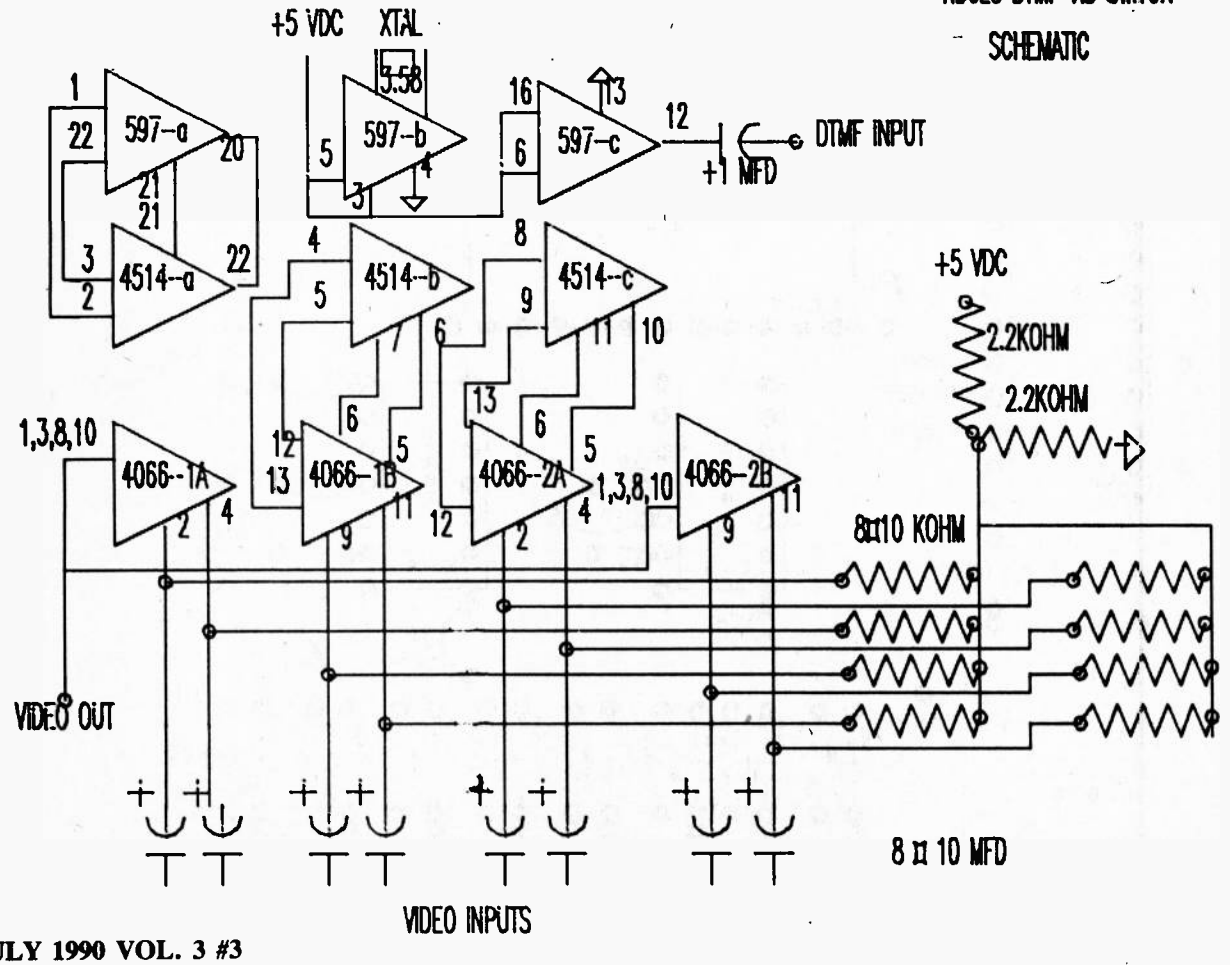
Sorry about all the jumpers, a product of a single sided board! R1 can be changed if more or less sensitivity is needed on the DTMF input. Have fun building and testing this one 73's KD0LO

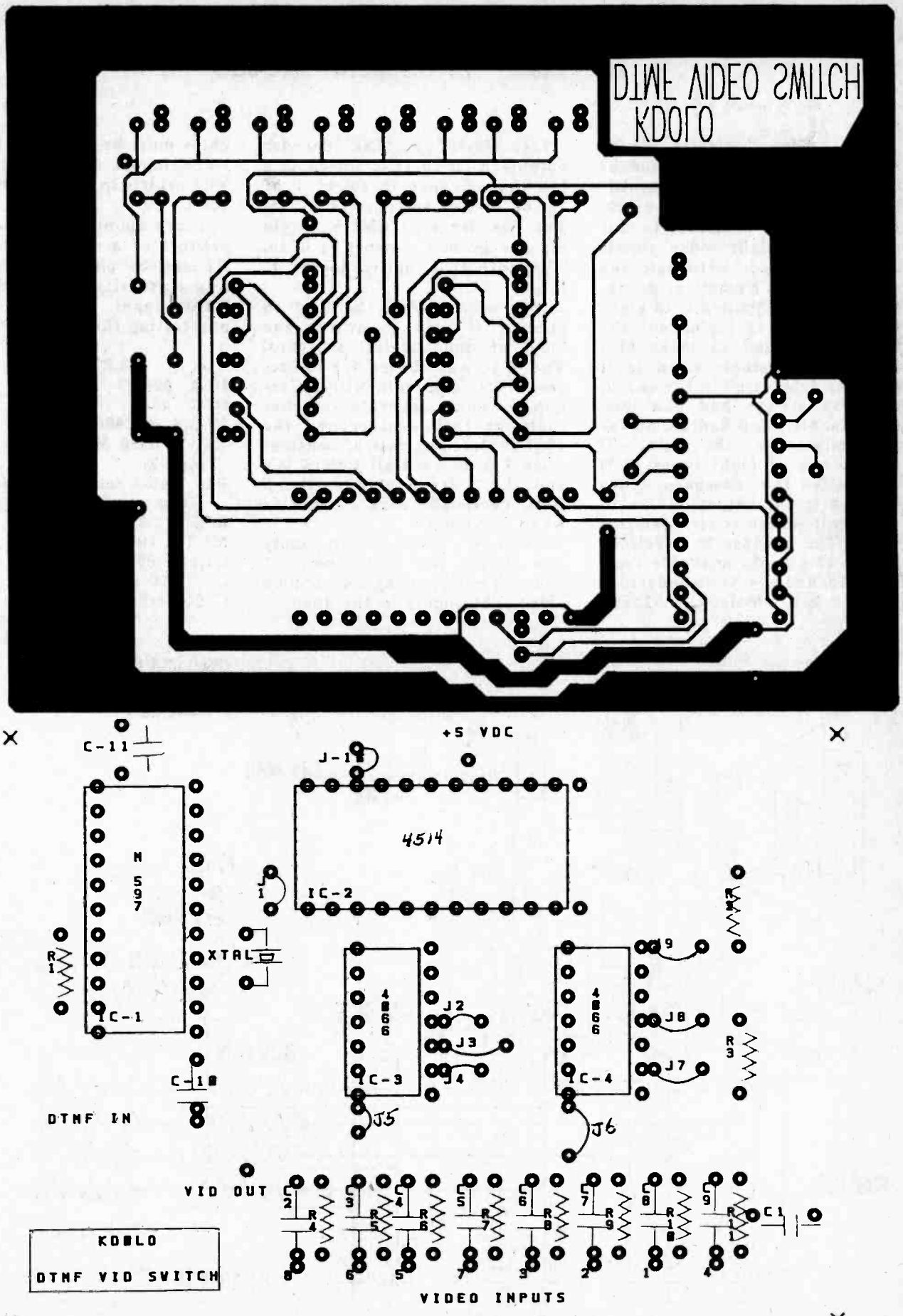
PARTS LIST

IC-1 M-597
IC-2 4514
IC-3,4 MC4066
XTAL 3.58 MHZ (comes with M-597)
R1 Value set by manufacturer (comes with M-597)
R2,3 2.2 kohm 1/4w
R4-11 10 kohm 1/4w
C1,11 .001 mFd
C2-9 10 mFd
C10 2mFd

KD0LO DTMF VID SWITCH

SCHEMATIC

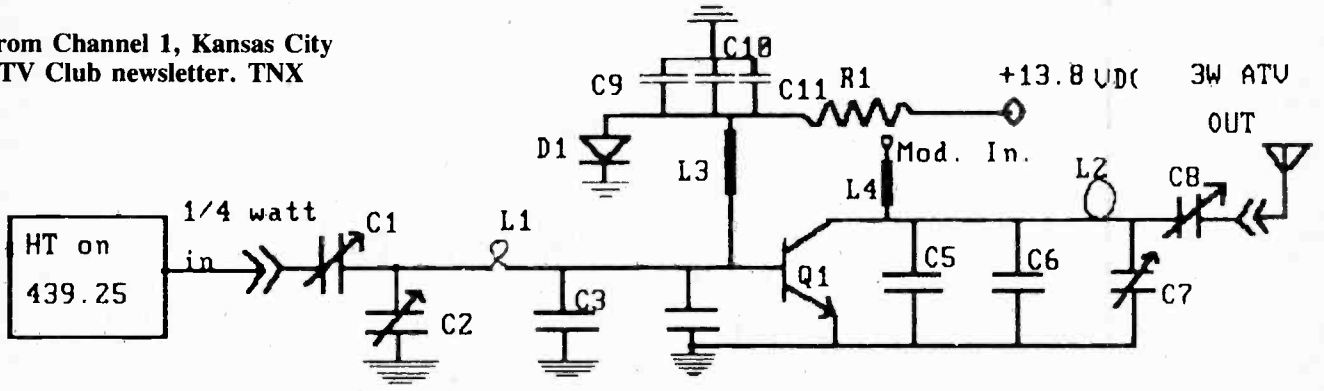



DTMF VIDEO SWITCH
KD0LO
ONE INCH
+5 VDC
C-11
J-1
4514
IC-2
M
5
9
7
IC-1
R
1
XTAL
C-10
DTMF IN
4
8
6
6
IC-3
J2
J3
J4
J5
IC-4
J9
J8
J7
J6
R
3
VID OUT
C1
KD0LO
DTMF VID SWITCH
VIDEO INPUTS

HT ATV Exciter

by Fred Floyd KY0O

From Channel 1, Kansas City ATV Club newsletter. TNX



C1	2-20pf	C4	25pf	C7,C8	2-20pf	C11	330pf
C2	2-20pf	C5	25pf	C9	100uF 25VDC	R1	50ohm wire wound
C3	25pf	C6	25pf	C10	470pf	Q1	MRF 6390

D1 1N4001

L1 1" X 3/16" wide copper strip

L2 1" X 3/16" wide copper strip

L3, L4 .47 choke or ferrite bead

COLOUR BAR AND GREY SCALE GENERATOR

WAYNE GRIFFIN ZL1UJK

Originally this project started as a grey-scale only generator using a British Amateur Television Club (B.A.T.C.) circuit from the quarterly magazine. (See Best of CQ-TV Handbook, page 83). This circuit produces a very linear staircase waveform and recently it was found that color bars with red band could be added simply, giving RGB output to a TTL coder such as the TEA-2000 coder published elsewhere.

Circuit Description

IC1a (74LS13) is a line oscillator locked to the external mixed blanking drive. This oscillator feeds IC2 (74LS193) a binary counter. The counter outputs are summed together in a weighted ladder network to produce the grey scale or staircase waveform that is amplified by the discrete transistor output stage, mixed synch being added to give them a high quality monochrome output. By using the Q0, Q1 and Q2 outputs from the counter (IC2) TTL RGB signals can be fed to the coder. Some extra ICs have been added into the RGB signal-path to produce a red band along the bottom of the picture for testing VCR machines. Also, the band is adjustable in height and a useful location for titles/captions/callsigns.

One modification done to improve the quality was the addition of 100 pF capacitors to remove TTL produced switching spikes on the leading edges of each of the steps of the staircase.

The Mixed Blanking and Mixed Synchronizing pulses required by this generator can be supplied from the Synch Pulse Generator (SPG) published in Break-In August 87.

First Bar

A monostable driven from mixed blanking generates a short line blanking period, adjustable in duration, which allows the oscillator to start before the end of line blanking proper.

Staircase Linearity

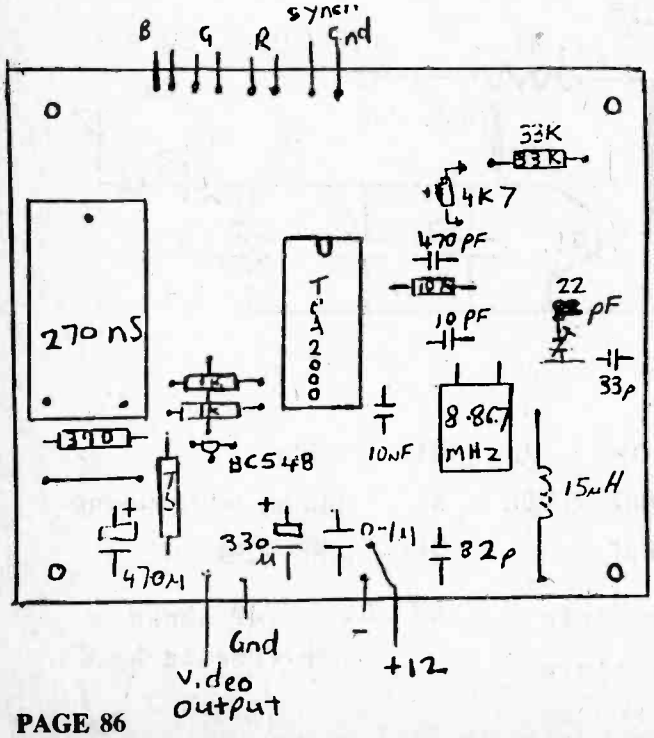
The summing point of the resistor network should strictly speaking be a virtual earth, however, in practice about 1 k is acceptable. The result of this is that the waveform amplitude is too low, so the output stage has to include some gain - 2 times is sufficient. The emitter follower output stage not only buffers the output, but also serves to set the DC level to zero.

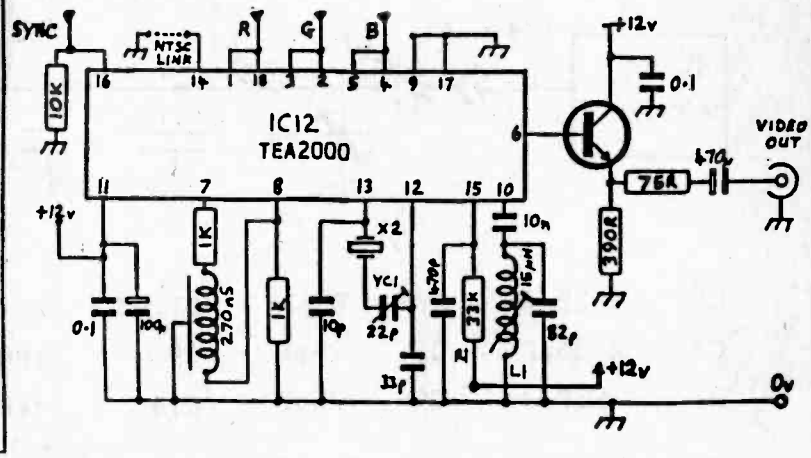
Setting Up

1. Disconnect sync input and short A-B
2. Set DC level at video outputs to Ov with RV5
3. Remove short from A-B, ter minate both video outputs in 75-ohms and confirm that the staircase is correct. Set the output level to 0.7v with RV3.
4. Re-connect sync input and set sync level to 0.3v using RV4.
5. Adjust "scan width" (RV1) and "first bar" (RV2) to give a correctly proportioned dis play.

A printed circuit board is available for this project from: W. Griffin, P. O. Box 28-300, Remuera, Auckland. It contains the grey scale and red band circuits. A separate TTL RGB coder such as the TEA2000 is needed for the colour bar output.

REF British Amateur Television Club (B.A.T.C.) Best of CQ-TV Handbook, page 83.Yet Another Grey Scale Generator by B. J. Dandy G4YPB.





Red Band Insertion Generator

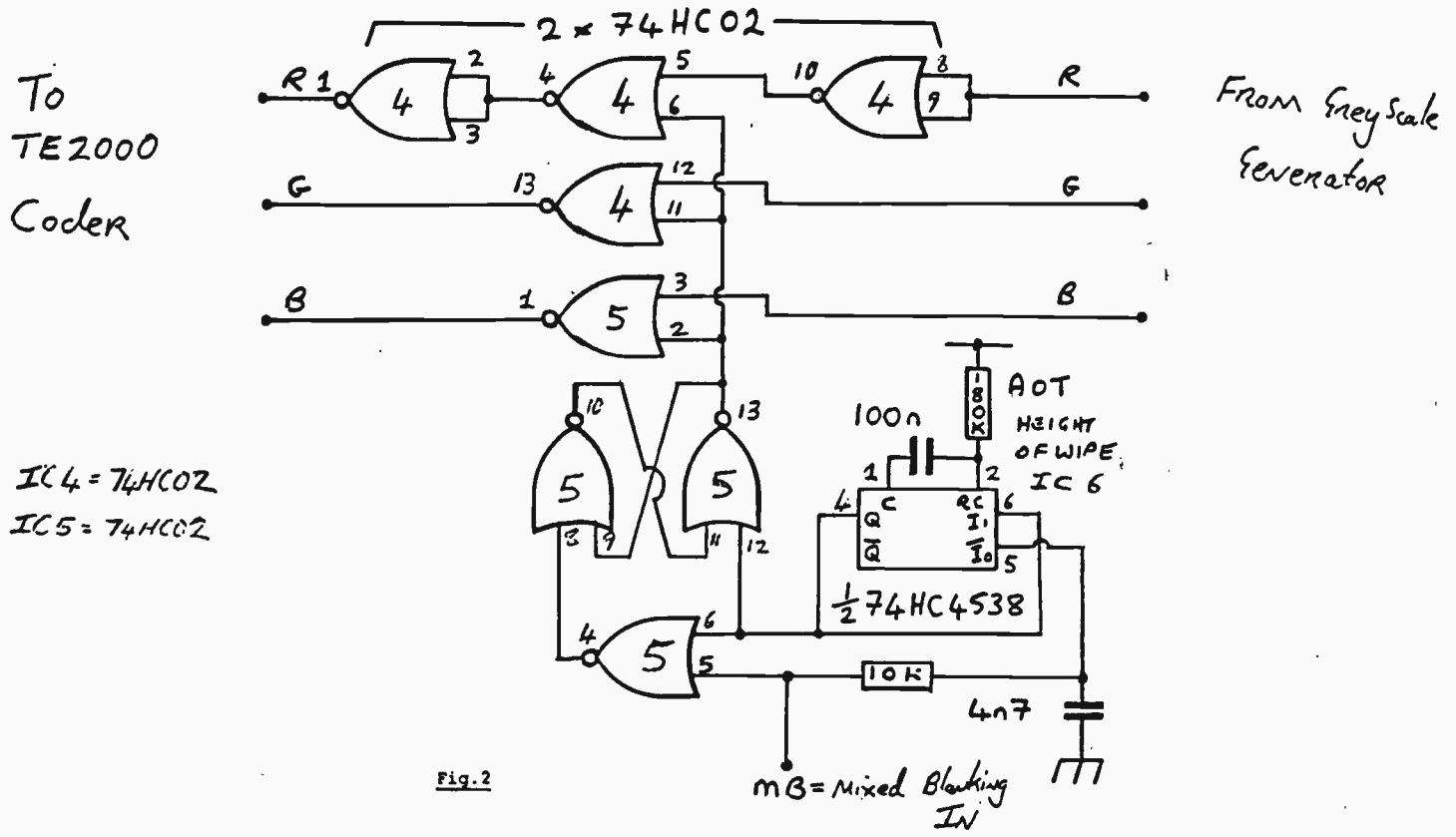


Fig.2

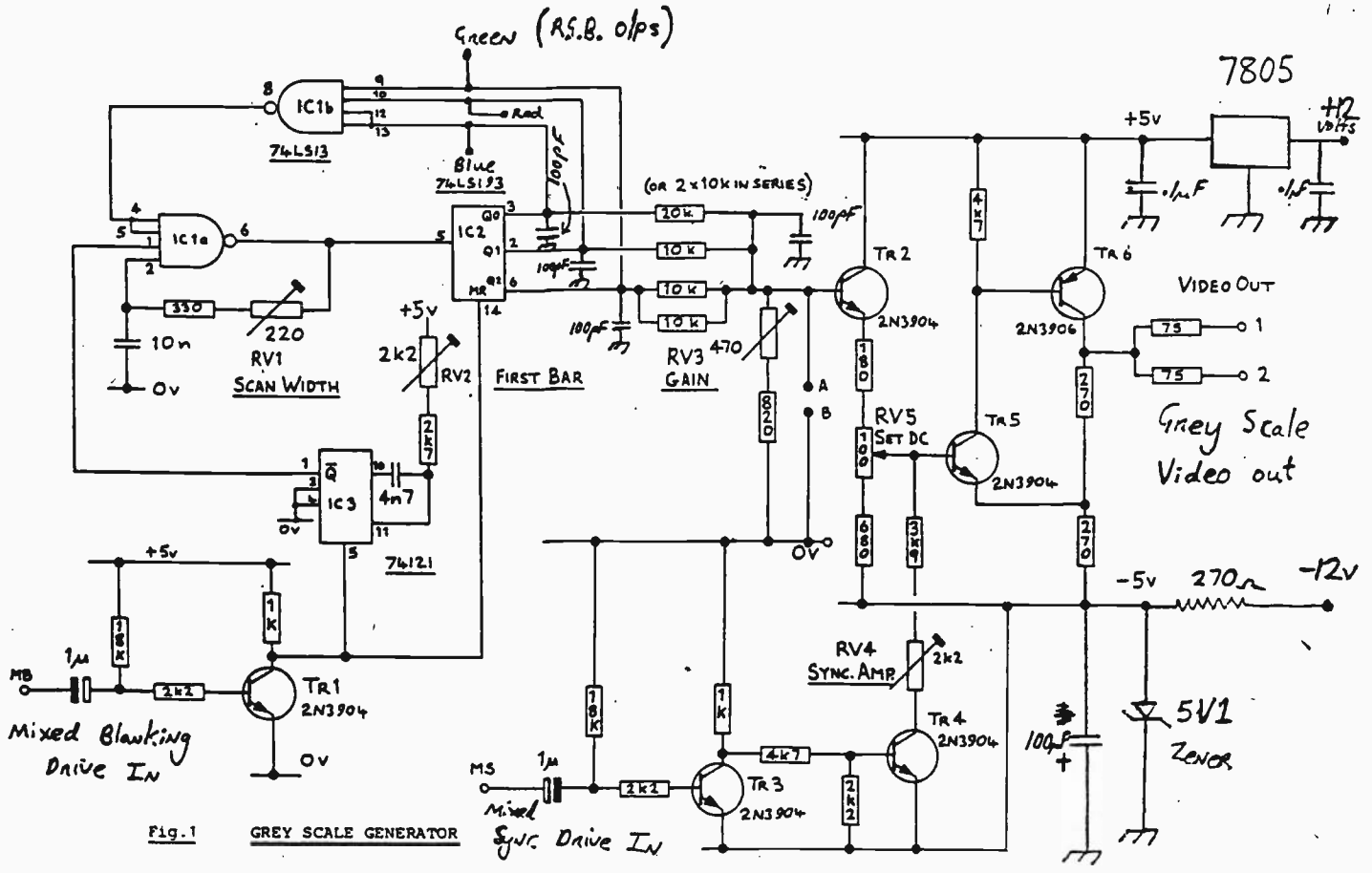


Fig.1 GREY SCALE GENERATOR

VIDEO SYNCH SEPARATOR

WAYNE GRIFFIN ZL1UJK

This circuit is used to extract a mixed synch from a composite video signal. The mixed synch can then be used to provide pulses to: genlock and synch pulse generator (SPG) or trigger an oscilloscope timebase or be remixed with reprocessed video from a processing amplifier or enhancer or video fader in a video mixing desk.

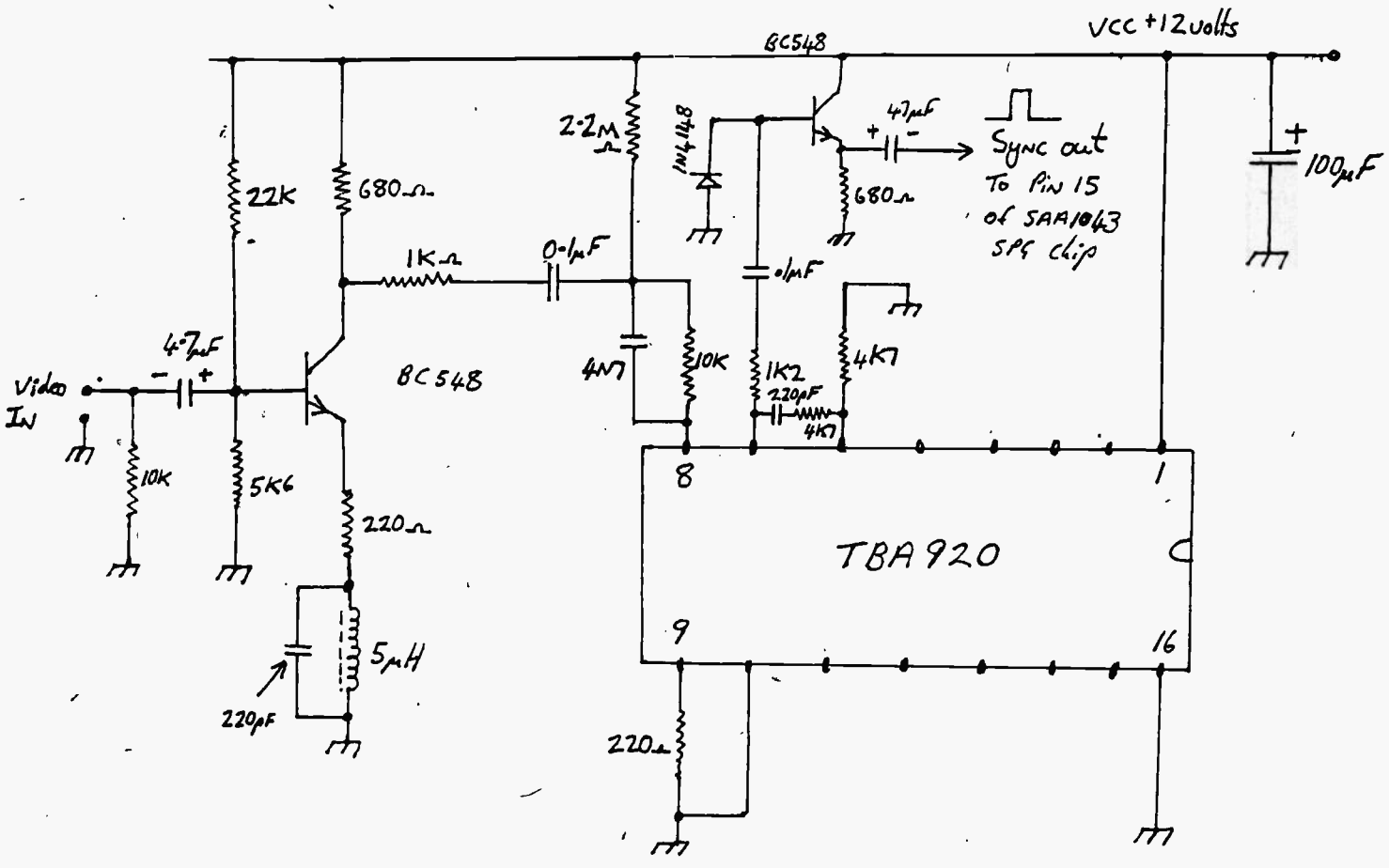
A TBA920 synch separator IC is used in this circuit as it is a readily available part from television sets built in N.Z. The preferred synch separator ic was to be the LM1881, which also outputs field drive separately. Unfortunately this IC was not able to be purchased locally.

Also included are a few notes on how to add monochrome genlock to the colour SPG published in the August 87 Break-In. The SPG IC SAA1043P requires external mixed synch at pin 15 for genelocking. The TBA920 circuit supplies this via a 47 uF capacitor. The synch strap on the SPG printed circuit board is changed over to External. A LED and 1 k ohm resistor are added from pin 13 of the SAA1043P to ground to provide an OUT OF LOCK indication, ie; the LED is ON when the circuit is OUT OF LOCK when there is no video input to the TBA920 synch separator circuit. The LED should extinguish fully when video is applied to the synch separator.

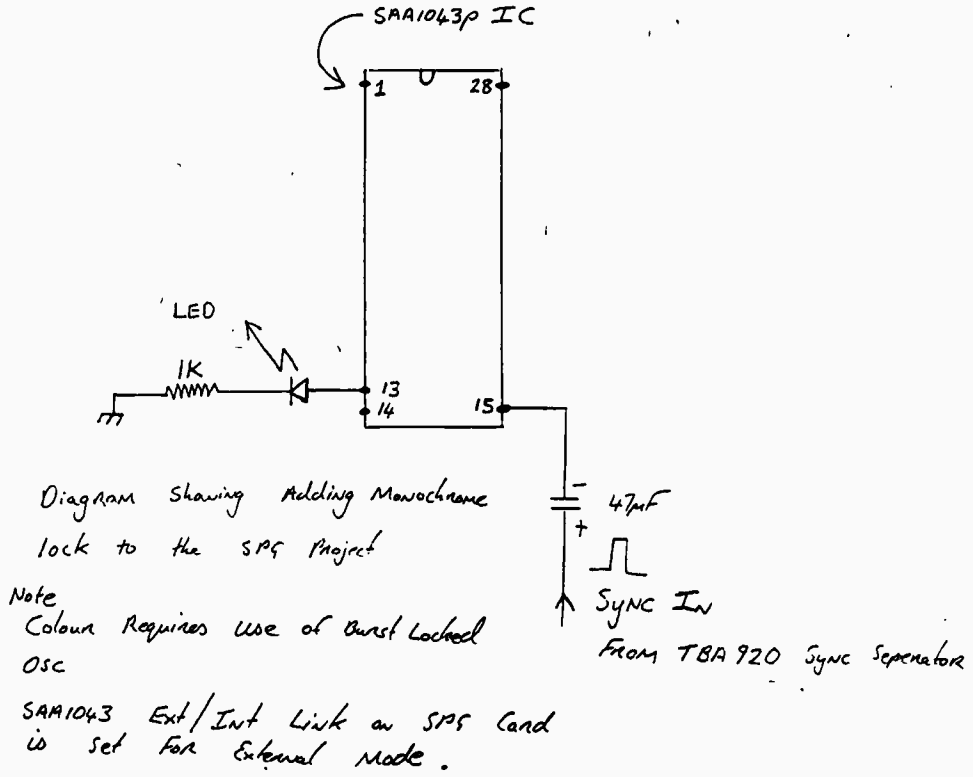
A printed circuit board is available for this circuit from: W. Griffin, P. O. Box 28-300, Remuera, Auckland.

REF British Amateur Television Club B.A.T.C. CQ-TV, no 109, "A colour Control and Processing Amplifier" by John Goode

PHILLIPS, Data Handbook "Bipolar ICs for video equipment", part 2, January 1983.



VIDEO SYNCH SEPARATOR



TEA2000 COLOUR CODER

WAYNE GRIFFIN ZL1UJK

The TEA2000 colour coder takes TTL level RED-GREEN-BLUE (RGB) signals from either computer outputs or teletext generators. It is also useful for home brew colour bar generators or character colorizers.
The TEA2000 is a Phillips device. Previous devices used in the past were the TEA1002 or LM1886/LM1889 pair for encoding RGB into composite PAL or NTSC video. These had a much higher parts count and are now obsolete, commanding high prices where still in stock. Unfortunately analogue signals from sources such as cameras can not be encoded by the TEA2000 as it was not designed to take input signals in other than a TTL on-off form. The coder is simple and easy to build up and test out. A 270 nSec delay line is used to get good colour/luminance registration. The synchronizing input for the TEA2000 is fed from the computer or pattern generator supplying the RGB signal.

Circuit Description

The colour coder is contained within a single chip the TEA2000. This device is capable of encoding to NTSC or PAL standards by either grounding pin-14 for NTSC, or leaving it "floating" for PAL. The crystal connected to pin-13 (x2) needs to be twice the frequency of the colour subcarrier, ie: 8.867 MHz for PAL and 7.1276 MHz for NTSC. L1 should be adjusted for maximum subcarrier and the burst position may need altering between standards, this is done by changing the value of R1. The delay line at pin-8 should be a 270 nS type (Philips V8470 270 nS/900-ohm), as found in domestic TV sets.

Once all the components have been fitted and soldered to the pcb connect the input signals, the DC supply and a color monitor to the output. Set the solder link at pin-14 of the TEA2000 to either floating for PAL, or to ground for NTSC (also check that the correct frequency crystal is fitted for the standard in use as given above). Adjust VC1 until color-lock is obtained, confirming that the trimmer is in the center of the lock-in range. Adjust L1 for maximum colour saturation.

If the computer or generator has open collector or capacitively coupled RGE outputs, a 1k ohm pull-up resistor to a +5 volts supply is needed on each of the three RGB input leads. A printed circuit board is available from W. Griffin, P. O. Box 28-300, Remuera, Auckland. The IC and Delay Line can also be supplied if hard to buy in your town.

REF British Amateur Television Club ATC Handbook, page 34.

EVOLUTION OF AN ATV GROUP

There are perhaps many ways an ATV group gets going, here's how our group in Huntsville got its feet wet. One night last March I was sitting down at the Red Cross pulling duty as a RACES volunteer during a severe thunderstorm warning. We were listening to activity on the local repeater. The ham on duty out at the weather bureau was describing where the storms were on the radar. I was trying to picture in my mind where the cells were in relation to the Red Cross. As I was relaying the information to Red Cross folks it hit me, why don't we get some sort of a closed circuit feed directly from the weather bureau to the Red Cross and the Emergency Operation Center (E.O.C.). Then, instead of just telling folks what's going on we could show them. Well, I got checking and learned this thing called ATV I'd heard about for such a long time would do just that ... in fact it would allow many hams with cable-ready TVs to tune in too.My first start was to find out if there were any ATVers in the Huntsville area. I began by looking in the repeater directory. Three ATV repeaters were listed for Alabama, but after calling each one learned that none was actually on the air. However, I was able to get an ATV transmitter from one of listed repeater calls. Well, like a kid on Christmas morning I rushed home to put the sucker on the air. From the front yard of a fellow hams house I cranked up on 439.25 with a quarter wave vertical. Suddenly from across the county came a reply ... I had been seen! Something else had happened too that night ... I got hooked on ATV! ... me and others listening as we talked back and forth on the audio repeater.Since ATV without viewers is pretty dull, I set out to build interest. It really didn't take much effort, ATV sort of sells itself if you let folks know about it. For the next several Sundays and Wednesdays, I took my trusty little Aptron transmitter up to a thousand foot mountain overlooking Huntsville and announced my presence on a popular two meter repeater. I told everyone to tune into channel 60 on cable-ready sets. Little by little the interest grew. We placed a group order of the P.C. electronic transceivers to get a discount. That first purchase placed 8 ATVers on the air. In two weeks we placed another order of 5 P.C.'s and then another. To date we have 25 with transceivers and the number is growing. We learned quickly that simplex is nice but a repeater would really help fill in the spaces where simplex fails. Well, anyway to make a long story somewhat shorter, we decided to put up a repeater. We haven't nailed down a permanent location but have a good temporary one. The repeater is an in-band on the ever-popular 439.25 in/-421.25 out. We've got some desense woes but are fast on the road to getting a clean, mean machine going. In fact for Memorial day we put it to good use providing continuous coverage on a local 10K run. We had a mobile camera at the head of the race and three fixed cams. The Track Club loved it and it was a blast for us ATVers! Our accomplishments are few compared to you ATV veterans, but we are building. On the way back from Dayton four of us said what-the-heck and stuck an omni out the sunroof and went mobile ATV playing tapes of the Ohio hamfest happenings. Last week we tried a 70 miler from Florence, Alabama ... a good shot considering our hilly North Alabama terrain. Our next step is to get transceivers at the Red Cross, E.O.C., and the weather bureau for radar displays and remote cameras looking for storms ... since this was the reason we got into ATV in the first place. If you don't have a local ATV repeater going in your area, begin it today, you'll not regret it. 73, and see you on the radio. Dick Christiansen, KK4HF, 137 Anna Kathryn Drive, Gurley, Alabama 35748

AND YET ANOTHER LETTER

TENNNESSEE VALLEY AMATEUR TELEVISION (TVATV)

c/o Huntsville Amateur Radio Club, P. O. Box 423, Huntsville, AL 35804

Dear Henry: The delegation from Huntsville is still raving over the informative ATV conference ATVQ held at Dayton this year. We enjoyed the Friday session and especially "balloon man", "kite man", and "airplane man". It gave us the opportunity to mix and mingle with those in the know in ATV. The knowledge we gained has already helped us avoid some major pitfalls in getting our ATV repeater on the air. Hope our pre-conference session of parking lot mobile ATV did not hold up the show, but we just had to get one authentic two-way QSO in world famous Dayton. Glad you guys were on the other end so we could have a story to take back to Huntsville. Per our conversation, we are enclosing an update on the Huntsville ATV happenings as well as a few snaps of our trip's shenanigans. We are planning an ATV session of our own at the Huntsville Hamfest, August 17, 18 and 19. We'd really like it if you and the crowd can be here. Will fill you in on the details as it evolves, but so far nearly a hundred from three states are planning to attend. We would like to publicize the event in ATVQ. Again, we thoroughly enjoyed the ATVQ session and look forward to next year, and hope to see you in Huntsville. 73 and see yo on the tube. Dick Christiansen, KK4HF Ernie Blair, WA4-BPS Carol Blair, N4QPE Gene Marcus, W3PM And the members of TVATV.

HENRY REPLIES:

THE ATVQ ATV PARTY AT DAYTON 1991 WILL BE HELD AT THE HOLIDAY INN NORTH ON FRIDAY NIGHT. WE HAVE THE BALLROOM UNDER CONTRACT WHICH WILL HOLD 300+ PEOPLE. WE HAD OVER 150 ATTEND THIS YEAR WHICH BLEW OUR SOCKS OFF!! RESERVE YOUR ROOM NOW! ALSO THERE WILL BE A WWATS ATV PARTY SATURDAY NIGHT.

LETTERS!
RON HRANAC, N0IVN
466 PLUTO COURT
LITTLETON, CO 80124

Dear Henry: I enjoyed your article "Cable Television Interference to ATV!" (April 1990 ATVQ), and most of it hit right on the mark. However, there were a few statements that were not entirely correct that could cause some confusion.CATV downstream bandwidth actually starts at 50 mHz. and ranges to a high of 600 mHz.. The average system bandwidth in the U.S. tops out at 300 or 400 mHz.. Systems operating over 400 mHz. are in the minority, although many are in the process of upgrading to 550 mHz. capability. Because of full channel loads in most systems, rare is the operator who will not use the local off-air channel assignments for signal carriage. The channel-mapping you describe (where a converter displays a channel other than what is tuned to) also is not common. On-channel carriage of local broadcast signals does not result in beats in the picture unless HRC channelization is used. Most CATV systems use standard channelization, which will result in ghosting when ingress or direct pickup occurs. HRC channelization which phase locks all head end processing equipment to a 6 mHz. master comb generator, is a technique used to reduce the effects of composite triple beat distortion in CATV distribution networks. It does not interleave sidebands, but rather causes the video carriers (which are spaced every 6 mHz. in HRC operation) to fall zero beat with the CTB distortion products. HRC provides a subjective picture quality improvement in the presence of CTB, although it doesn't actually reduce the CTB products.HRC is not used much by the industry, because of its consumer unfriendliness with cable ready TVs and VCRs. Also, it is notorious for beats in the picture when ingress of local off-air channels occurs. Another problem with HRC is a new FCC requirement that the 6 mHz. master oscillator be kept within +/- 1 Hz (not a typo!) of 6.0003 mHz. to comply with aeronautical frequency offsets. As for FM sound carrier separation in CATV systems, the industry standard is -15 dB. In fact, Part 76 of the FCC's rules states that the aural carrier is to be kept between 13 and 17 dB below the visual carrier, except when no upper adjacent channel is present. The 60 dB RF visual carrier-to-noise ratio you mentioned for a "perfect Picture" is a bit on the conservative side. For NTSC video, 42 dB RF C/N is the point at which noise just becomes visible to the average viewer on an average TV set. At about 47 or 48 dB C/N, the picture cannot be distinguished from a direct studio feed, as far as noise is concerned (picture resolution or discreet interference is another matter).No cable system operates with levels as high as 64 dBmV in the distribution network. Typical trunk levels are 30 to 35 dBmV, and feeder levels are in the 45 to 50 dBmV range. Only in head ends would you see levels around 60 dBmV, and then only at the outputs of processors and modulators. Combining losses reduce those levels considerably. Finally, a better way than dealing with the local manager to resolve cable system signal leakage complaints is to work with the system's chief tech (in some systems, this person is called the chief engineer, system engineer, or plant manager). New and tougher CATV signal leakage rules take effect July 1, 1990, and "CLI" is an important acronymn to most cable technologists. The new rules provide for the loss of the use of aeronautical frequencies in systems that fail to meet the CLI requirements, so system personnel should be more responsive. Besides, it's nice to be on the cable operator's side, so you can get the scrap reels of hardline (100 to 200 ft. lengths are commonly tossed out). 'Nuff said! Regards.Ron Hranac, N0IVN.

HENRY REPLIES:

Your statements are correct and we appreciate your learned input. As a broadcast engineer I only have had to deal with CATV systems from a signal source-/interference correction standpoint, except when I worked at GWSC/SNC which was a 16 month lived competitor to CNN done by Westinghouse/ABC. The article was originally written about 10 years ago and updated with some more recent material. The levels in a system in Topeka, KS were measured on the main trunk at +64 dBm! It also had a lot of leaks and a local ham could blow it away with a Motorola 2 Meter HT from a mile away, which was why I was called in, as a local TV station chief engineer "expert." Some of the material came from my own experience with the local TCI owned cable system which totally destroys local reception because of leaks. They apparently do not use the broadcast channel for same channel carriage (ie Bcst 2 on Cable freq 54-60 mHz..) as their leaks would cause a lot of TVI. I have been able to watch TCI crappy cable P5 on my ATV equipment and P3 on my house TV with the nearest cable 200 feet away! Its 40 over S9 of 2 meters and S9 plus on 440 mHz. It took a year to get the local leaks fixed which were back in 2 months. As for getting "free cable" I would not sell them horse manure let alone let them try and bribe me with a few feet of CATV cable. I prefer to buy real Heliax from Andrew and other sources where I know its good! I have runs of 1 5/8", 7/8" and 1/2" nitrogen filled coax for my home station VHF, UHF, SHF arrays. All of which are much better than CATV aluminum foam with unknown frequency response. 73 Henry

FLORIDA HAMS PLAN ATV/BEACON BALLOON LAUNCH

STRATONet Florida, sponsored by the Daytona Beach (Florida) Amateur Radio Association (K4-BV), will launch a high altitude Amateur Radio-equipped balloon from the Crystal River, Florida Airport on July 14, 1990 at approximately 1300Z (0900 EDST). Alternate launch dates are July 15 and July 21 with Inverness, Florida as an alternate launch site. Amateur Radio operators from all over north and central Florida expect to track the balloon's expected 2 hour flight and recover the complete package following ascent to 100,000 feet and slow return to earth by parachute. The balloon's payload

will consist of a Fast Scan Amateur Television transmitter on 434.0 mHz. transmitting a color graphics ID using vertical polarization. There will be a 1 watt ID/Flight Telemetry Beacon on 144.340 mHz. using vertical polarization. The two meter beacon will include altitude; internal and external air temperature, and battery voltage data, as well as the CW ID: K4BV. The balloon's anticipated altitude should permit the transmitted signals to be received 400-500 miles from the balloon. Ground tracking stations and FAA RADAR will provide tracking. Amateur Radio operators equipped with direction finding equipment will attempt to recover the payload at the completion of the flight. Mission Select Audio and Net Control, N4EEB in Ormond Beach, Florida will be in operation on 7.155 mHz. LSB with operation commencing at 1000Z and continuing until recovery is effected.Amateurs checking into the net who provide signal reports or tracking information from the balloon will receive a special certificate commemorating the flight. Amateurs may also respond by mail with reception reports to receive the certificate. Address all correspondence to: John Bayne N4EEB, 7 Castle Manor Drive, Ormond Beach, FL 32174, (904) 677-8520.

ATVIS A HIT
BY TIM ARMAGOST, WB0TUB

ATV, along the front range of Colorado, is a BIG HIT since the activation of the Western Vision Network repeater last July! It is a bit hard to believe that just a year ago WVN had its first meeting on the air with virtually no one with ATV equipment. Now we have about 25 folks on ATV and interest is increasing by the day!

WVN HISTORY

It all began around June of 1988 with a couple of hams talking about ATV on one of the local repeaters. It seemed that every time the subject was broughtup, a round-table would ensue with 3 to 5 hams talking about ATV. It was decided that with all the interest, perhaps a net should be started so that all would have a common place to meet and share ATV ideas. The first net was held late July or early August, 1988, on the 146.04/64 DRL repeater with check-ins numbering around 20. One of the first and most insistent subjects on the net was that of an ATV repeater and the importance it would hold for ATV activity along the front range.The first Western Vision Network meeting was held in September of 1988 with 14 folks in attendance ... the agenda was simple ... how do we get from here to an ATV repeater? The first officers of the WVN were chosen ... Director, Tim, WB0TUB, Operations Manager, Ron, N0IVN and Administrator, Bill, W0GVT. The plan of attack ... Ron though he could get the company he worked for (Jones Intercable) to donate some cable equipment and perhaps we could modify it to act as a modulator to drive an amp and use it for a beacon for initial experimentation by those interested. His first assignment was to investigate and procure what he could. Talk then centered around fund-raising and possible sites for the repeater with 3 sites being offered. We then had some equipment demo's and the first WVN meeting was over. In the months that followed, Ron did procure all the necessary items for a beacon and January 1, 1989, was the first full day of operation of the WVN beacon. Having met the first goal, the group moved on to the problem of raising the funds, gathering the equipment and building an ATV repeater. Dues were collected, monies were donated, several companies donated equipment and the first repeater planning meeting was held March 25, 1989 at the home of the Director of the WVN. Plans were laid, assignments given and all action items were to be completed by April 10th and if all was correct we would hold an assembly party the following weekend. All items were together at the appointed time but problems were found and corrected, members time schedules were in conflict and it was July 3rd before we assembled the repeater on the site chosen ... the home of Bill Burris, WD0AXQ. Bill's home is on Lookout Mountain about 7,400 feet asl (Denver is 5,280 feet asl, don't-cha-know!). We assembled antennas, ran coax and hard-line and had all ready to fly around 5 p.m. We fired up the repeater and had about 3/4 of a watt out of our 30 watt amp! Still had P-3 pictures around the Denver area, tho! After some testing we found the transmitter had gone the way of the Do-Do bird! We shipped it back to PC and with a quick replacement of the final in the transmitter and a few words of advice from Tom at PC (WATCH THE SWR!!) we had the repeater on the air July 15th! P-3 to P-5 all over the Denver metro area and a P-5 into Loveland, some 55 air miles North of Denver! The equipment, from the input antenna thru the output antenna is as follows: Lindsay omni, horizontally polarized, into 1/2 inch hard-line to an input pre-amp then to a Scientific-Atlanta cable head-end demodulator (modified for 426.25) the output goes thru one of PC Electronics VOR's then thru our ID board into a PC Electronics RTX-23 transmitter thence to a Down-East Microwave 35 watt amplifier (serial #001!) up 1" heliax to a Comet co-linear, vertically polarized, antenna. Presently, we have moved the audio net to the 147.225 repeater to take advantage of it's greater coverage (Colorado Springs to Cheyenne, Wyo.) and simul-cast the net over the video repeater on 426.25 mHz.. The net meets Thursday evenings at 7:00 p.m. local time on 147.225 mHz. and we also have an informal activity night Tuesday evenings at 7:00 p.m. A typical net has around 17 check-ins with 12 or so checking in both on audio and video, the activity nites generate in the neighborhood of 7 - 15 folks. Plans are now in the works to install another receiver on 1277.25 mHz. in order to serve those interested in L band and some thought for the future involves linking some of the areas along the front range into the WVN repeater.Bob, W6ORE, is building a computerized controller for the repeater and we then will have some plain and fancy functions! The new controller should be ready in the next few months and will probably be the basis for another

article. Upcoming activities that we will provide video coverage for include an MS walk-a-thon (April 1, 1990), the Cherry Creek Sneak 12k run (April 27, 1990) and then the severe weather season begins. We have a TV receive station at the National Weather Service and expect to give them some live video of storm cells pounding the area. The Western Vision Network is a group of talented, hardworking amateurs making sure that ATV is alive and well and remains a HIT in Colorado!

Have not seen your magazine in person, but it looked good last night on 439.25 from W5CBT, the only other active fast-scan station in Amarillo at the present time. We use P.C. Electronics equipment here in Amarillo, but not the little 1-watt jobs ... we use the earlier 10-watt PC-1's which Tom sold back several years ago. Ken, W5CBT, and I work a path which is only 7.5 miles, but it is across all the buildings in central Amarillo. I am also in a "low place" in the city, and have only about 35 feet antenna height here, whereas Ken has about 70' on his end. We get P-3 pictures usually, sometimes better, late at night. We may have to move frequency soon, because the local 450 repeater blanks out our audio when keyed-up. We usually use 146.43 for comments while the other station transmits both picture and sound via 439.25. We really envy operators in areas of the country which have mountains and repeaters! Sincerely as 73, Gene Bitner 3202 North Clema Amarillo, Texas 79107

AND ANOTHER LETTER:
QST American Radio Relay League, 225 Main Street, Newington, CT 06111
Dear Editor: I recently submitted a broad scope manuscript about getting on Amateur Television for the newcomer. It addressed operation on 900 mHz. including simple antennas, the use of free CATV cable and free 50 watt cellular amplifiers, and it showed how simple it was to put together a cross band ATV repeater using off the shelf ATV modules, a VCR and a VIC-20 as a controller. It discussed how easy it was to use simple 1 watt TV transmitters to provide roving and fixed video support to a local public service event covering ranges up to a mile without even using a repeater. The article was rejected by QST and has since been picked up by HAM RADIO. The details on using the cellular amp for ATV on 900 mHz. was published in ATVQ. On my request you answered that my article rambled and was not of general interest to the readership of QST. It was exactly the readership of QST that I had targeted! The mainstream of QST readership (sexigenarians) needs to be exposed to this inexpensive, very capable method of amateur communications. In public service and emergencies, a picture is worth a thousand words. Since submitting my article, I have received tentative permission to operate ATV on the educational channel of all three cable TV systems in my county. I have found myself writing letters trying to gather as much video material as possible to fill a weekly one hour time slot. In fact, all hours all day Saturday and Sunday are potentially available. I even found a very good article in an older issue of QST on using local cable TV to distribute Ham Radio video. Tonight while reading Packet Perspective in QST, I realized that it is probably time for you to introduce a regular page or department on ATV. Considering the already scheduled eleven ATV balloon flights and one Space Shuttle ATV experiment for 1990, plus the dozens of new ATV repeaters coming on line all across the country, I am convinced that there is more than enough material and interest. The regular feature might better be named VIDEO NEWS instead of ATV to cover the broader subject area including computer video, and VIDEO tapes of amateur radio activities. The ten ATV channels on the 70, 33 and 23 cm bands are filling fast, and video transmission IS NOW no longer a specialized communication technique. Operating ATV is less expensive than all other modes of amateur communications and offers that special interest to attract new amateurs. Please consider that the time is NOW. The ARRL should be leading this new aspect of Ham Radio with a dedicated page in QST (and my previous suggestion to include ATV bonus points on Field Day). Bob Bruninga WB4APR, 59 Southgate Ave., Annapolis, MD 21401

AND ANOTHER:
Dear Henry: I write in the hope that you can do one of the following:
a. Tell me where I can get the info
b. Put an ad/note in ATVQ
c. Ask someone to call me
Issue ... I have an old tape of ATV history circa 1978-1980 in Ampex VR5100 one-inch helical scan format which I want to put on a VHS blank tape in an unedited manner.I have an Ampex VPR 5200 (same format) which would work with new belts I think. If someone can help, I will donate this machine, or money, to them as they may desire. 73, John Jaminet W3HMS, 912 Robert Street, Mechanicsburg, PA 17055 USA(h) 717-697-3633(W) 717-790-2127

MORE NEWS

Bob Wiggins KJ4ZQ 159 Rebecca Drive Hendersonville, TN37075 Bill: We now have our ATV repeater in operation in Nashville. It's running 100 watts from around 1100 feet with a "big Wheel" antenna built by Curt N4MEY. I wanted to write about an experiment we did here. We took a KPA5 transmitter up in a Piper Club airplane flown by Dan Martz KC4DNA. We were seen in Huntsville, AL with P3 pictures from 2500 feet. We rose to 8000 feet with P4 to P5 pictures in Huntsville. This was supposed to be a demonstration for the Nashville Amateur Radio Club and to record a video tape for our ATV exhibit at the local science museum during field day. I didn't even expect Huntsville to be watching. One of the Huntsville stations, WA4AXQ, Robert, videotaped the flight and I am looking forward to seeing that. We had a blast. We are now working on another experiment. Probably sometime in July we will be going up in a Lear Jet with a complete repeater. Tom, WA4CGF, the pilot, says we will take the repeater up to around 31,000 feet. The only drawback is that I can't specify the actual date since Tom's schedule is fairly irregular. I guess I could announce it on 75 meters on the ATV net and packet bulletin boards when I find out. I would guess some Sunday afternoon in July. Repeater: 439.25 In - 421.250 Out. Bob Wiggins KJ4ZQ

EDITORIAL COMMENT

Hamfests are known for their RF jungle. With thousands of hams operating at once in very close proximity to each other, intermod and overload are the rule not the exception. At a west coast hamfest, we are told, there were two exhibits going simultanously, one on weak signal and one on ATV. Both were attempting to operate at the same time, on the same frequency, each unaware of the others skedule. What happened next is what you would expect to hapen, Tempers flared and the weak signal operator took it upon himself to write to everyone in the world he could think of to suggest that ATV move elsewhere. What we would expect exhibitors and the hamfest to do would have been to set a schedule where those who use the same spectrum space would have a share time or bandplan which would eliminate potential interference. Unfortunately this was not done. SO here is the letter we received from an elitist weak signal operator, and the responses of three ATV and weak signal world leaders. Keep in mind that part 97 clearly says that all modes and operators share the frequencies and no one has any more "right" to any particular frequency than anyone else. We all operate the the sufferance of mutual interference unless we coordinate our activites beforehand. Nuf said, Henry KB9FO. Now here is the letter we and many others received and the replies.

CLIFF BUTTSCHARDT
950 PACIFIC STREET
MORRO BAY, CA 93442
W6HD0

Dear Amateur Radio TV Participant:

There is a problem with the use of the 70 cm band between ATV and weak signal communications. Now that the manufacturers have taken an interest in the TV mode, even more interference can be expected, not to the benefit of either. Let us see if a dialogue of possible solutions would be mutually useful.

Historically, the weak signal operator will be burdened. There are two frequencies of long standing: 432 mHz. and the satellite band 435 to 438 mHz.. Both are recognized all over the world in every IRAU country. Recent amateur TV equipment has mainly occupied 421.25, 426.25, 427.25, 434.0 and 439.25 mHz.. Geographically, any of these might be in use. If any non-limiting mode is to survive the complex TV waveform, it would appear some consistency is needed. As for the satellite people, there is little choice. These are internationally agreed upon segments arrived through many years of compromise. 432.0 to 432.2 mHz. stand unique in EME and terrestrial efforts.

Let me suggest the first step toward a solution. PLEASE do not manufacture or encourage use of ATV equipment on 434 mHz. as this frequency offends both weak signal segments! Signals here are indeed very weak. The notion that ATV will live on a demand basis is false -- it never has in the past, which is understandable due to the thrill of a something new. Consider the fact that vestigial filtering is not to the benefit of the ATV operator other than the desire to be cooperative. All hams and most engineers find amplification of vestigial signals very difficult!

Obviously, ATV could make use of microwave bands as the satellite program is doing, but the argument is made that path loss is large. Of course it is! -- for both, and especially so since doppler affects are severe. TV has dealt with this loss on 4 and 6 Gc for years. Note the improvement in signal to noise in ATV if less bandwidth were used. NASA has demonstrated a 250 kHz. semi slow scan system on the ATS satellite in which an inexpensive fast scan TV set was used as a display. There simply is no need for a non-blurred picture of a baseball hurled at 100 MPH! Convenience and cost is the present day justification. Why not accept this idea and develop it as hams have done for years?

Please consider these ideas in a constructive manner. Let's preserve the two best amateur modes for all to enjoy! 73

AND NOW THREE REPLIES:

ADVANCED ELECTRONIC APPLICATIONS, INC.
P. O. Box C 2160 Lynnwood, WA 98036-0918

Dear Cliff:

Thank you for your recent letter regarding the use of 70 cm for ATV.As you are possibly aware, I have been a weak signal VHF enthusiast for many years and have even taken the VHF June contest for the Northwestern Division a couple of times. I also operate EME on six and two meters and OSCAR 13 on 70 cm. I was active on 50 mHz. and 144 mHz. scatter going back to 1960. This is simply background information to show where my real concerns lie.I first got on

ATV a few years back to fill in one of the last remaining modes of Amateur Radio that I had not yet tried. Frankly, I was IMPRESSED with what could be accomplished! We were using competitive equipment, and it seemed to do surprisingly well in as much as range and signal viewing quality was concerned. What was disappointingly surprising, was that the output spectrum of the competitive units was simply unbelievable wide. We had heard reports from some weak signal enthusiasts in Oregon about interference from ATV. When we put the accused units on the spectrum analyzer, we understood the nature of the problem. Suffice it to say that we have since put about a half million dollars into the development of VSB ATV equipment for the purpose of addressing the problem head-on. The resulting FSTV-430A is only slightly higher in price than competitive units because of what we had hoped would be a high demand volume. In addition to putting out a clean signal, our unit also offers the user other beneficial features such as much better audio even at low video levels, XTAL (or variable) receive as well as TX control, and having the TV receiver double as a studio monitor. I hear what you say about 434 mHz., but please understand that in the Northwest we are limited to ONLY 434.0 mHz. for ATV because of the "A" line and FM repeaters above. As it is, with DSB television systems, the LSB audio is unattenuated from the USB level and is OUTSIDE the band (illegal as you know what).[ed note, for 421.25 mHz.] With the FSTV-430A, the LSB is attenuated 42 dB below the video carrier level. Taking a commonly used amplifier, the third order IMD products "re-introduce" the LSB audio to perhaps - 22 dbc. If the user has one of our mast-mounted amplifiers (soon to be released), this level is -30 dbc. 30 db is the difference between one watt and a KW! The same can be achieved by any of the competitive units by simply adding a Spectrum International filter for about $140, but the user would need one for EACH channel he plans on using. The real sticky wicket is of course the attenuation of signals on ANY band above 70 cm. I have tried 900 mHz. ATV and the results are TERRIBLE compared to 70 cm. The attenuation of the higher frequency signals through forest land is simply unbelievable. This also does not address the added cost of all the equipment. Our 920 mHz. transceiver would be about $1,000 - too high for the average Ham. So there you have it -- I think ATV has a definite place in the service that other mode users should try to respect. I also feel that ATVers need to be just as respectful of the others and restrict their bandwidth to 6 mHz. instead of the relative 20+ mHz. for some of the present competitive DSB units so popular on the air today. Perhaps the ARRL needs to come up with a VSB spec, for the 430 mHz. band that will not overly tax the pocketbooks of ATVers, but will give relief to other users of the spectrum.I am sorry for the rambling nature of my reply, but I needed to finally get a few things off my chest concerning VSB. Sincerely, Mike Lamb, N7ML President

ATVQ REPLIES:

Dear OM: I think you need to do a little more research before you make recommendations and accusations as you did in your letter to us, et. al. You speak of history. Here is some you forgot to mention: ATV and "weak signal" (ie CW or SSB) originally shared 432.00 mHz. and this was mutually acceptable. Back in the early days finding anyone on the 440 mHz. band was an occasion to be celebrated. The first known ATV operations on 432.00 were in 1928 using a mechanical scanning system similar to Baird's electro-mechanical TV system first demonstrated in England in 1926. This was long before OSCAR, SSB, FM mode, repeaters, etc. The first known electronic system on this frequency was in 1936. The co-existence of both "modes" was peaceful and long lived. In the late 50's as equipment from WW II made it easier to operate on UHF, it was agreed that ATV would move to 439.25 and CW would stay on 432.00 since in the days of wide receivers this provided margin so both could operate with no mutual interference. Then the 70's arrived (and the late 60's) and FM mode began to appear. It burst upon 2 meters and the "old timers" moved to the upper end of the 440 band and operated simplex and then later repeaters established themselves in the upper 10 mHz. of the band. The band plan was for 5 mHz. spacing since this was "commercial standard" and everyone seemed to have access to cast off commercial class A/B CB hardware and the like which was easily converted to ham band use. Remote bases and links, often "secret" and unidentified took to the lower 10 mHz. of the band to hide from jammers since no commercial gear was readily available that tuned 420-430 mHz. Most of the stuff used ws commercial FM gear from the 400-420 band or home brew. All the while, "weak signal" was given a 2 mHz. wide guard band to protect operation at 432.00 mHz. Now having worked 432 CW and SSB I know that even under the most severe contest conditions hardly more than 50 kHz is used, from 432.00 to 432.050. So for 99.99% of the time there is 1.95 mHz. of unused, wasted spectrum reserved for "weak signal" use. Today we commonly use receivers with 100 Hz bandwidth for CW and 3 kHz is the norm for SSB. There is no need to keep 1.95 mHz. of spectrum unused 100% of the time to protect .01% of the time that 432.00 is used. Better yet, let's move weak signal to 900 and 1260 mHz. and up, or to the unused microwave bands only! Now I suppose you take exception to my last statement. However, it is exactly the same as you propose when you say, move ATV to another band! Likewise, any voice mode user can use 160 meters, 75, 40, 20, 15, 10, 6, 2 220 and some of the new WARC bands which ATV cannot use. So let's move all 440 mHz. voice mode users out of the 440 band to the bands where ATV cannot operate! Again an exact copy of your statement turned 180 degrees. All of these

are ridiculous! How about this: There is an old adage which says a picture is worth 1000 words. So let's provide 100 times the video frequencies as voice! Don't like that idea either, do you! Part of the fun of ham radio in any mode is DX. DX at 440 mHz. happens much more often than at 900 or 1260 or 2300 etc. DX on 440 mHz. allows any mode user the thrill of contacts from hundreds and thousands of miles away. Are you going to tell 5000 ATV operators they can no longer work DX? How about we tell 5000 40 meter fans they can no longer work DX! Then there is the problem of intercept. The higher the frequency the less users, the more directional the antenna array, since you need more gain, so the less chance you are going to find another station to work. Just try calling CQ on 2303 mHz. !How about equipment. There are lots of transverters and converters for CW/SSB for all bands including the microwave bands to 10 gHz. ATV equipment until a couple of years ago was exclusively made for 440 mHz. Only recently have there been commercial transmitters and receive converters for 900 and 1200 mHz. So for the vast majority of hams who buy rather than build their own equipment there has been little choice as to what band they could operate. You also do not cite any actual interference cases. To the best of my knowledge there has been only 1 case of mutual interference between ATV and any other mode. Quite the opposite is true however. ATV has great levels of interference from FM mode, links, repeaters, and others who operate throughout the band with little or no regard for other mode users. Packet is recently the worst offender in generating interference to ATV. It was only in the past year that the ARRL Repeater Coordinators Newsletter acknowledge the presence of interference to ATV from FM, and provided a technical discussion and documentation of the interference and suggestions on how FM mode users might avoid causing interference to ATV. While weak signal, OSCAR and repeaters have protected subbands and "coordinations", no such protection has ever been afforded ATV! The use of vestigial sideband is superfluous in nearly all instances. Interference ratios between ATV and other modes show that ATV is 50 dB more susceptible to interference from other modes than the other modes are from ATV. ATV video sidebands are 50 dB below carrier at frequencies of more than 1.5 mHz. removed from the carrier. This places ATV sidebands in the microwatt range. VSB filters are useful to remove lower side sound and color signals which comprise about 5% to 12% of the total transmitted power, depending on color saturation. In southern California where 434 mHz. is the COORDINATED ATV frequency, there exist stronger signals by 4-5 orders of magnitude on these same frequencies from radar, radio-location and military uses of the band. This is also the most densely populated ham area in the country and ATV operates here in peaceful coexistence with all other modes. Outside of So. Cal, 434 is used mostly as an escape from interference caused by FM mode packet, FM mode repeaters operating at 438-444 mHz. Hams operate under conditions of mutual interference. We are not protected from each other except by orderly operating practices. No mode user has any more "rights" than any other mode user. By convention we have selected frequencies for each mode of operation. In most cases we follow a national or regional bandplan which is the cooperative effort of many hams representing many modes and interests. While these bandplans are not 100% perfect, they have sufficed to provide harmonious relationships for 99% of the band users.Your other comments attempt to degrade the enjoyment of the ATV mode by making ridiculous statements about picture quality. We could say likewise about 100 WPM CW which takes a lot more spectrum space than hand sent 15 WPM CW, or the use of 4 KW PEP output amplifiers on the HF bands with equal aplomb. As for experimental systems, ATVers have demonstrated and use Narrowband TV (in Europe it is called Smallband) where the band assignment is only 10 mHz. wide vs. the 30 mHz. most of the US enjoys. We have had over 18 modes of SSTV and medium scan TV, FM TV, and the amount of interest and commercial equipment for these experimental modes is still near zero. Just as you might not want to be limited from buying an $8000 QRO rig with all the "bells and whistles" ATVers do not feel they should be compelled to give up the bells and whistles of our mode, namely color, motion and sound. ATV operates with the same transmission standards (frequency relationships) as all broadcasters, TV manufacturers,cable systems, TVRO systems, used in the US and about 40 other countries. It's called NTSC. It includes scanning rates, color, sound and motion. If you desire less then I suggest you join the Society for the Preservation of the Mechanical Scanning TV System. This will provide low definition, flicker and 30-120 lines of resolution, and few if any QSO's; about equal to early SSTV operations using a P-7 monitor and a dark room. Quick, trade in your color TV, VCR and Camcorder today. Be the first on your block to operate a new TV system with 20 lines horizontal resolution as your 250 kHz bandwidth would provide in an NTSC system. Just as was used in 1926-1936. A real step forward in progress of technology! Just when the world is embracing HDTV with up to 11 mHz. wide channels!In the meanwhile, since by your zip code you are about 100 miles away from the nearest known group of ATVers, perhaps you can join the effort to work video through the WeberSat satellite ATV to packet experiment, or later this year the ATV Space shuttle experiment. Or try a little weak signal ATV DX from a mountain top nearby and try to better the 1050 mile US record of Texas to Florida. Or drive to civilization and provide some public service via ATV as is done most everywhere, or put up an ATV repeater to link San Jose/San Francisco to the LA

basin! Enclosed is a copy of ATVQ in which you will find a spectrum analyzer photo of a BROADCAST TV signal which shows how the sidebands are 50 db below carrier. Also a diagram which shows the spaces between the sidebands in a video signal. Henry Ruh KB9FO

FROM TOM O'HARA W6ORG:

Dear OM:I am sorry to see that you felt you had to write a letter to the "Amateur Radio TV Participants: after I had called you to discuss your local interference problem. I am sure you will get the expected heated replies from some ATVers and rattle those who are not, to fear possible interference. Your letter with wide distribution will only serve to polarize amateurs rather than find areas of cooperation and mutual interest. We cannot hope to attract new people to the service if a few take an active elitist attitude.The fact is that 434.0 ATV, 432 weak signal and satellite activity has operated and has been coordinated in Southern California for over 15 years. The first dialogue between representatives of all modes was as early as 1972 when the local frequency coordination council brought us all together to work out a technically competent band plan that we all could work with. At that time Dr. Norm Chalfin W6PGX represented future satellite concerns and Louis Anciaux W6NMT represented the weak signal people. As expected the first few hours were taken up by each pontificating on how his mode was the most important and the band made safe with never any remote possibility of interference at any time they cared to get on. You can imagine the emotional responses. However the coordination council chairman, Bill Kelsey WA6FVC, wisely let everyone vent their spleen for a while and then restricted the discussion to engineering solutions to finding ways to fit all interests. After all there is nothing in the FCC rules that give priority to any one amateur. After the second meeting, and the band plan was adopted unanimously, we all came away with a better understanding of each others equipment, operating practices and operations. It changed a lot of preconceived ideas and opened up new parts of the hobby to many. Prior to the first meeting, ATVers used 432, 435.0 or 439.25. I got into ATV as an offshoot of 432 weak signal work. It was just easier to use the same gear without returning and to video modulate it. As it changed from a handful experimenting with ATV we moved up the band to 435 which with the old black and white cameras had hardly any energy at 432 and with no complaints from the rest of the weak signal gang. Some went later to 439.25 with converted FM surplus transmitters. All was fine until the German Satellite group went forward and set aside 435-438 mHz. with no consultation with other mode users and the treaty was struck and put upon us. With FM repeaters above 440 rapidly increasing and links below 430 we really had nowhere to go. Most ATVers were fighting mad. We had a club of almost 100 members then. It might have been really bad if the technical band plan meeting was not called.It was evident at the meeting that individuals did not know the technical characteristics of the modes he was not active in and had many misconceptions. All had the fear that someone else would just have to move to a higher band to make it safe for his mode which everyone must know was the best and most important. So a technical committee was formed with the best technical representative from each group to participate. Tests were made to establish what were the actual patterns of interference. SCRRBA still has the technical committee which meets on occasion to re-evaluate the UHF, 10 and 6 meter band plans. No band plan is adopted unless or until all agree.We found that ATV on 434 did not interfere with 432 or 435.5 mHz. reception unless the two stations were within about 5 miles and the antennas were pointed at each other. This will vary by antenna gain, transmitter power, and receiver dynamic range and selectivity. A test was made to simulate a 70cm satellite pass by Booth Hartley N6BH, of the JPL Radio Club, in his Beech Bonanza aircraft. As he flew from San Diego to Santa Maria, various satellite enthusiasts tracked and copied his signals. At the same time ATVers would point their beams at the stations. Again in only one case where the ATVers was within 1 mile was there interference. It was concluded that 434.0 ATV did cause occasional interference between stations that were in close proximity. It was not fair to deny a significant segment of the local 70cm Amateur population operation due to one or two occasional instances of interference. However to further reduce possible interference, ATVers agreed to use vertical polarization since all the weak signal and most of the satellite people were horizontal. In addition, two meter coordination frequencies were determined so that if there was an interference problem it could quickly be discussed and resolved by an agreed time shift. Likewise during the ATV nets or public service events they would get on later. We do use 426.25 simplex and minimum power necessary at conventions or radio club demos and events whenever possible to minimize interference at RF congested or unfamiliar locations to other users up the band.VSB filtering has not been a factor in the use of interference patterns of 434.0 ATV. It is often suggested as a cure-all by those not active in ATV or not familiar with what the transmitted spectrum power is. Take a look at the spectrum power density of an ATV signal (See ARRL Handbook chapter 20 figure 6b). Over 90% of the transmitted energy is within the first mHz. of each sideband. With no VSB filter the LSB is of course the same as the USB. All that gets cut off is the LSB sound and color subcarrier energy which is typically at -15 and -22 dBc worst case in amateur systems. These spot frequencies are well below 432. A true VSB roll off we are to use broadcast FCC rules has to have the LSB color down -42 dBc. The added roll off to any picture power already down more than 40 dBc would be only

10 dB more at 432. Power density as can be seen is very low within the satellite segment. Add to that the beam antenna patterns and pointing probabilities and you can see why there has been little problem in the LA area for so many years. Getting an ATVer to arbitrarily spend $160 or more for a VSB filter to put in his antenna line at 2 dB insertion loss without some proof of eliminating interference to his neighbor just won't happen. I hope there will be a lower cost and insertion loss filter manufactured soon for those that need it. Yes, maintaining a low level generated VSB signal is very difficult as amplification is added. The amplifiers intermod products simply add the lower sideband back in. Consider that even HF SSB linear amps are deemed adequate with 2 tone IM of just 30 dB. At UHF it takes heroic effort and cost above a watt. Therefore a filter in the antenna line is the only way to insure reducing the lower sideband components beginning at 433.25 mHz. Some ATVers have bought VSB filters to reduce emissions anyway. This sudden spirit of cooperation with ATVers after the first meetings also had some unexpected benefit. ATVer Gene Proctor W6TFS was working at TRW Semiconductor at the time. He obtained some RF transistors as engineering samples and did some transmitter design work for the first Oscar. Weak signal contesters found that there was a new untapped group on the band that they could alert anytime there was a contest for extra points. In fact today, Chip Angle N6CA let's it be known on the ATV nets when, where and on what frequencies he will be on in an upcoming contest ... I wonder how many in other parts of the country know that is one reason he has an edge? I suggest rather than doing things that polarize your fellow amateurs, that you find ways to interest ATVers in weak signal and satellite work. Many of the techniques and the antennas used are the same. All could benefit. It is much easier to ask someone to stay off ATV for the few minutes of a satellite pass you want to work if you take a positive approach to the use of all modes. ATV is an applications mode where any thing that uses a video source is simply transmitted. This is the video age. Possibly the orbit predicts out of your computer could be transmitted on ATV to those who do not have it to spark the interest. I know it could be valuable to know the Space Shuttle communications windows during STS35 and 37. I know my interactions with weak signal and satellite enthusiasts have benefitted me from the dissemination of technical information about preamps, antennas, coax, etc. The nice thing about ATV is that I can aim the camera at the article or project to share with others. The satellite programs interested me to the extent that I joined the JPL Radio Club and I set up some video links during the two Voyager encounters. And now there is the NASA Select Video and audio transmissions to other hams and schools. There are many other public service applications that came out of that such as the Rose Parade, Marathons, Search and Rescue, and remote damage assessment. A large body of amateurs are available for this valuable activity thanks to the ease of getting on with a standard TV set and camcorder in addition to the 70 cm transceiver. Low power, portability, cost and propagation dictate that 70 cm is the only band to use to be effective. We use 33 and 23 cm for repeaters and point to point links. The FCC says that we do not utilize our bands above 220 mHz., but ATVers got on and account for most of the use of the 33 cm band and quite a bit of the 23 cm band here. There are over 300 ATVers in Southern California into all kinds of activities with only 2 shared ATV channels on 70 cm. We reluctantly accept interference from military radar, offshore oil location transponders and satellite up-linkers. Rarely is there a complaint from others, and those are usually handled on a case by case technical or time shift gentlemanly basis. ATVers have for some time outnumbered the weak signal and satellite users here, and I think it is because we have always gone the extra mile to enable all to enjoy their segment of the hobby.So I suggest you give some thought to mutually agreed upon solutions and positive ways to attract ATVers and others to what you think are the only modes. Why not join us and find ways to improve the art. Tom O'Hara W6ORG, President, P.C. Electronics, ARRL Technical Advisor, SCRRBA Technical Committee

That's all Folks!

73

Bill & Henry

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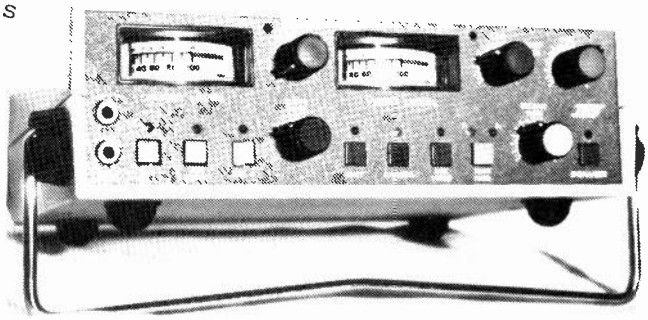

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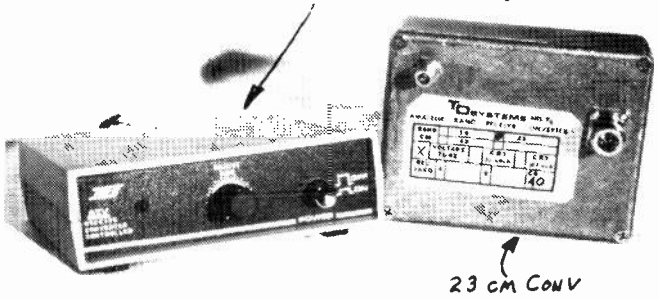

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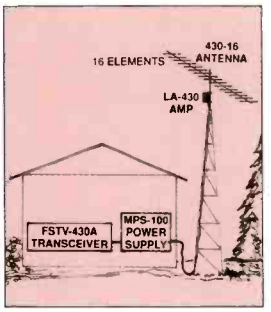

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