AMATEUR TELEVISION QUARTERLY

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VOLUME 8 # 2
SPRING 1995

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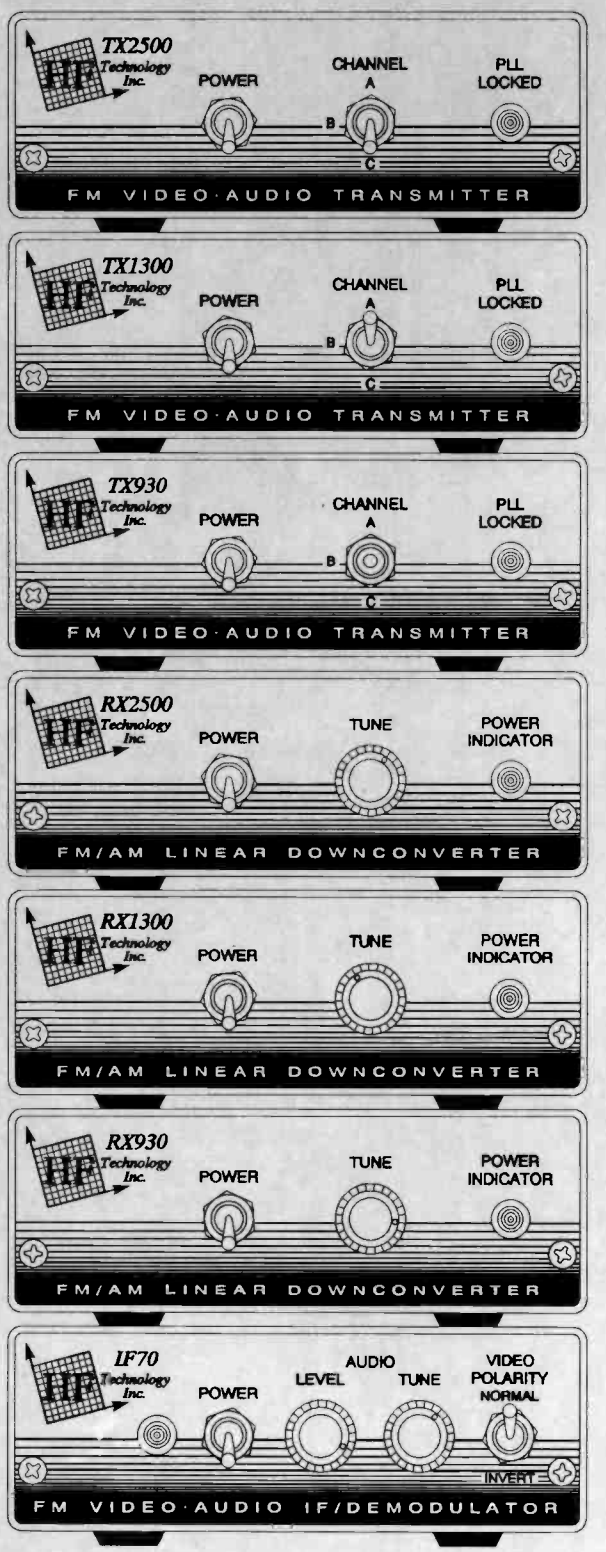

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- Phase-locked loop video and audio demodulators "lock" on transmitters with frequency drift and maintain the utmost picture clarity.
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- Optimal differential gain and phase response through the use of linear phase filtering in both the IF and base band circuitry.

Call or write for complete specification sheets, ordering information and current pricing on these and other products.

Engineered and Manufactured Entirely in the U.S.A.

AMATEUR TELEVISION QUARTERLY

VOLUME 8 # 2 SPRING 1995

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Cartoons: Robert Beasley K6BJH
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Re-draft of drawings by Bill Parker W8DMR
Typist, Debra Gillespie

Index

DEADLINE FOR THE NEXT ISSUE IS JUNE 15TH, 1995

NEW AT Q

LAST ISSUE

Our mailer would like to appologize for delaying the last issue. They received it on March 3 but didn't get it mailed until March 21st.

With Sylvia and I both under going angioplasty heart surgery the last issue was quickly put together to be done and to the printer before I went "under the knife." If nothing else, the issue would be out while I was recovering. Or so was the plan. The printer got the job done, but the issue was misplaced at the mailing service. I called when the mailbox was empty too long and got them humping. Because of the timing of various events, a great effort by Bill W8DMR arrived too late, so I have repeated the articles he worked on in this issue with his improved graphics.

We are recovering and the kennel is full (over 50 dogs and 6 cats!) as I write. I did not have time to get a notice to DARA for the ATV party, but we will meet as usual at the Holiday INN, friday night. Stop by our booth, next to the big Kenwood sign!!

COVER PHOTO: KB8MDE Shawn Miller questions Bill Parker W8DMR about readings shown on a field strength meter. Shawn constructed the dual slot horizontal polarization 70 cm omni ATV antenna for use with the Columbuis, OH ATV repeater

AMATEURS ARE PRIMARY ON 2390 MHZ TO 2417 MHZ

One of the provisions of the Omnibus Reconciliation Act passed by congress recently was to reallocate 50 MHz of spectrum immediately from government use to civilian use. This included 2390 MHz to 2400 MHz and 2402 MHz to 2417 MHz. Many Ham operators told me that there is nothing that can be done and we might as well give up. I was not going to give this up without a fight. Our Amateur Television Network (ATN) uses links on 2417 MHz. Too much time and money was spent interconnecting our system...so the fight was on!

First was the "Notice of Inquiry" by the NTIA (they regulate federal government frequencies) last fall. With the help from the ARRL in providing me a copy of this document, were spent writing comments. ATN's comments informed the NTIA of our usage and that from other groups in our area (SCRRBA). Our frequency coordinator provided me with data. They also wrote very detailed comments to the NTIA. Our best ally in this spectrum was the part 15 manufacturers and users (part 15 band 2400 MHz to 2483 MHz). ATN indicated that the part 15 usage was commercial use and met the requirements of the Reconciliation Act.

We also pointed out the public safety use of ATV and the value of linked repeaters. ARRL, AMSAT and about five other amateur groups submitted very good comments. Also, a few individual amateurs also had submitted comments. I think this is good that several commenting parties submitted, but we should have had hundreds! I asked several amateurs to write a response and the usual answer was, I don't have time, I don't operate on 2.4 GHz or the ARRL will fight, so I don't have to. I want to express my thoughts on this. If you want to keep your Amateur frequencies, take the time. It is not that difficult!

The ARRL can help you with documentation when we have to fight again. By the way, **later this year 2300 MHz to 2310 MHz is on the action block** from the NTIA so let's see hundreds of comments this time. The commercial manufacturers are numerous and they will comment, spectrum is at an all time premium so we have to fight for it. We won this last fight, so let's keep the pressure on to keep all of our spectrum!

Well, now that I have gotten off my horse, let's continue. For every comment period there is response to the comments period. ATN was there too and now we had a chance to see the comments of the commercial and amateur parties. This is where the reading begins, take notes (note commenting party, page, paragraph and item of discussion). You will comment for or against this in your response letter.

The FCC next had a Notice of Inquire, followed by a Notice of Proposed Rule Making. Both had comments and response comment periods. I will not go into the details, but the formats were about the same as the NTIA inquiry we discussed earlier. The following items are required to properly comment or respond.

1. Indicate the name of the government organization (FCC or NTIA) with address.
2. Indicate the inquire or proposed rule making document number.
3. Give your name or organization's name with address.
4. Date and sign your document.
5. Please send it in before the deadline. (Sometimes they give 30 days to respond.)
6. Send the original plus 9 copies so each FCC chairman will have a copy. (Only the original and 4 copies are required to file.)
7. Send your documents overnight or two day mail and have it registered and signed by the receiving party.
8. Please make your responses factual and leave out the cry baby comments. In short, a professional looking document will go a lot further than complaints.
9. I am not a lawyer or professional document writer, so if I can do it, you can too! One or two evenings should be enough time to write a response or comment. Enclosed is a sample of a response document.

I hope this will help you for the next fight to keep our frequencies. If you need help or have questions, I can be reached at the below address.

Mike Collis, WA6SVT
PO Box 1594
Crestline, CA 92325

Please give me your phone number too so I can respond quickly.

June 7, 1994

2400 MHz Comments

Amateur Television Network
Mike Collis
PO Box 1594
Crestline, CA 92325

Mr. Caton, Acting Secretary
Office of the Secretary
Federal Communications Commission
Washington, DC 20554

In the matter of:
Allocation of Spectrum Below 5 Ghz Transferred from Federal Government Use) ET Docket No. 94-32
) Notice of Inquiry

Amateur Television Network would like to comment and reply to the eight questions contained within this inquiry. First, I would like to give a brief description of our network. Our group currently has eight open Amateur Television Repeater (Relay) stations that are in use for emergency operation as well as for the enjoyment of the users. The repeaters used 434 Mhz AM television inputs and our Santiago Peak Repeater also has 2441.5 Mhz FM (terrestrial standards) television input. We plan to include this input to the rest of the repeaters should we be allowed to stay in the 2.4 Ghz band. Our outputs are on the 1.2 Ghz and .915 Ghz band using VSR AM television to best utilize the available spectrum. We also use 2417.5 Mhz FM as a video link channel on several of our repeaters, our longest link is 174 miles from Blue Ridge Mt. near Wrightwood, CA to Mt. Potosi, Nevada near Las Vegas.

A) The spectrum does not have limited potential for promoting economic growth in three areas as follows:

1) The appliance industry has made millions of dollars manufacturing microwave ovens using spectrum in the ISM band around 2.45 Ghz. Competition is strong among the manufacturers.

2) Part 15 devices, many using spread spectrum and other high tech modes, are selling well in southern California. Many other manufacturers have designs in for type acceptance or on the drawing board. Competition should be good as long as the band does not get spoiled as did the 900 Mhz band in use by part 90 devices.

3) As more amateurs are using the 2.3 to 2.4 Ghz band, more jobs will be created to supply and manufacture equipment. I have seen four new manufacturers start up with microwave equipment on the 2.4 Ghz band within the last two years. The band is getting most of the new users from the Amateur Television and Amateur Satellite community. I do want to stress that this is new equipment sales, not converting old surplus part 94 microwave equipment. Existing commercial manufacturers are benefiting from amateur radio sales such as Conifer Corporation (ITFS & Wireless manufacture) they are getting many orders for their dish antennas, down converters and bandpass filters for use by the Amateurs.

The most appropriate use of the band and services would be as follows:

1) Amateur Radio has first priority in the 2.3 to 2.4 Ghz band to provide public service capability as well as an overflow military spectrum to be used during wartime conditions.

2) Continue to allow ISM operation in the 2402 to 2450 Mhz area. All other users to accept any interference caused by ISM operation.

3) Part 15 devices to have last priority in the band with the power kept limited to its current level as to minimize interference to amateur operations. Part 15, 1 watt spread links (dish antennas) must coordinate with the Amateur Radio local coordinator as to avoid interference to existing Amateur links while using 2402 to 2450 Mhz.

2400 MHz Comments

B) 2390 to 2400 Mhz should be used as additional down link from Amateur Satellite service as well as medium bandwidth links to pair with 2300 to 2310 Mhz excluding 2303 to 2305 (weak signal window).

This should protect the adjacent spectrum concerns of the NTIA. Competition should grow as more amateurs buy equipment for the band. Some limited commercial use may be possible in a case-by-case basis. As an alternative, Amateur Television links can use any 20 Mhz wide channel (two minimum are required) of spectrum from 1300-2500 Mhz.

C) No, the FCC should limit the use to Amateur part 15 and ISM services. 2400 to 2402 is not sufficient to protect against interference from high power commercial transmitters to Amateur Satellite reception due to the weak signals involved.

D) No, many populated areas of the country have established links of the FDM, Digital and Video messaging. With part 15 as well as ISM operations currently sharing the 2.4 to 2.45 Ghz, this is meeting the requirements of the reallocation for this band!

E) No, in the list of filed comments on the NTIA report #035 from Motorola INC. "believes that the existing and anticipated noise levels in the 2402-2417 Mhz band from existing and planned ISM and commercial unlicensed Part 15 devices already using the band render this spectrum practically unusable in metropolitan areas for high quality, wide area land mobile communications services." GTE (#037) also has concerns that the 2402-2417 Mhz will be hampered by amateur, Part 15, and noise from ISM devices. Any new service in this band will create the same problems that plague the 902-928 Mhz band. This will reduce if not eliminate many of the jobs created by the part 15 and amateur manufacturers.

F) This is one of the best areas for the Amateur Radio community to help the Public Safety workers to communicate by use of the Amateur Television Repeaters during disasters. A helicopter can fly over an effected area and the command center personnel can see first hand the disaster damage and save several minutes of air time that would otherwise be needed to describe the disaster seen. Also, linked voice and data repeaters can help relieve congestion in ordering medicine and other emergency supplies during disasters. Health and welfare messages can be relayed as was the case during the Northridge (LA) earthquake last winter using a 440 Mhz voice repeater network linked on 2.3 and 2.4 Ghz.

G) The 1390-1400 Mhz paired with the 1427-1432 Mhz band or a 1 Mhz portion off of each band would work the best for this service to relieve biomedical telemetry especially in the larger metropolitan areas. The 2390-2400 Mhz does not provide adequate separation for duplex operation. 2402-2417 Mhz is unsafe due to part 15 devices and ISM noise. The 4660-4685 Mhz band does not provide adequate separation for duplex operation as well as poor penetration of buildings for biomedical communication.

H) This may be a worthwhile decision so time can be spent to study the results of some of the reallocated spectrum.

Thank you for your time in consideration of our comments.

Sincerely,

For the Amateur Television Network
Michael V. Collis

STACKING ANTENNAS

Over the years ATVQ has received many letters asking about stacking antennas and related questions. There is confusion because the manufacturers and various antenna books have conflicting information. In general, antennas are stacked side by side (horizontally) or vertically (above each other) at distances of half wavelengths or full wavelengths. Small antennas stack at different distances than large antennas because of aperature. Phasing cables can be cut to equal but random lengths, although most writings indicate equal lengths at multiples of a half wavelength. The purpose being to repeat the antenna impedance at the junction point to minimize any effects of antenna mismatch, since the VSWR repeats exact voltage/current relationships every half wavelength.

Mike Staal of M² answers the questions this way:

QUESTION: Why do some antennas stack at one wavelength and others two wavelength spacings?

I think you are referring to the distance between 2, 4 or 8 given yagis of the same model; i.e., -8 x 2M18XXX. The stacking distance is determined by the aperture of the single antenna. As gain goes up, aperture increases. When stacked properly for near peak gain and reasonable side lobes, the apertures just overlap. 1 wave length opening would only be right for a small, low gain yagi like our 2M7.

QUESTION: In order to repeat the antenna impedance, multiples of a wavelength or halfwavelength are required. What is the WL for common frequencies in 9913 coax?

1 WL of 9913 is about 68.8 @ 144 (using .84 vf); about 23.275 @ 432. You might heavily consider the new Times LMR 400 (same size as 9913) because it's better for weather (closed cell foam), lower loss, and weighs only 7 lb./100 ft. (9913 is 18 lb/100 ft.) Same connectors fit. We've converted completely. Price from distr. is $.50 @ 500 ft. roll. In response to your statement, "I used a random but equal length last time...is there any other reason?" It is good engineering practice but not critical.

QUESTION: Can you mount H and V elements spaced 1/4 wavelength apart on the same boom for circular polarizatrion?

Yes, many people are asking us to do that; we will soon be offering a polarity diversity switcher for receiving only producing H, V, Right Orthagonal (45 deg. tilt), left orthagonal, RHC & LHC. Regards, Mike, Myrna 88/73

DAYTON 95 SSTV MEETINGS

12:00 - 2:15 SLOW SCAN TV

Moderator: Dr. Don C. Miller, W9NTP

Speakers: "The Latest Developments in SSTV Scan Converters and Other SSTV Hardware from Japan." Presented by Izumi Soma, KH6JDU/JA1KZS"

Robot Helper, Version 2.1, (from VE3EC), A Computer SSTV Control Program, also Robot 1200C Robograb and Superscan 2001 Paragrab, A Real Time Video Capture Mod. from G7IZW,GPKH). Presented by Tom Hibben, KB9MC.

All you ever wanted to know about JVFAX (from DKJV). Presented by Elwood McCollum, KQ4XZ..

Friday Evenings

7:30 - SSTV Get Together, Holiday Inn North, 2301 Wagoner Ford Road.

Tom Hibben, KB9MC, and Don C. Miller, W9NTP will host. Several simultaneously operating SSTV systems will be on display for demonstration or audience participation the entire evening. Many experts will be present to answer your personal questions on new SSTV systems and improvements. IVCA will again operate Booth 212 at the arena with several SSTV systems operating during the entire convention.

ATVQ TECH-NOTE

Bob, KC6GAG

A logic IC can serve as an Audio Subcarrier Generator, including an audio amplifier for the microphone. A line inverter, 74HC04 provides all the necessary amplifiers.

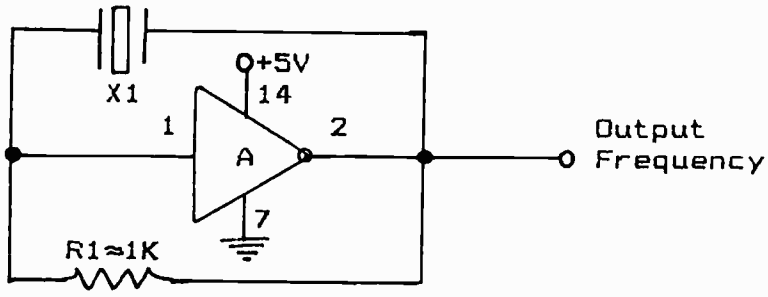


Diagram re-drawn by Bill Parker
W8DMR

OMIK Annual Convention

From: KB9PJ@AOL.COM (Sara E. Jackson)
The 43rd annual convention of the Omik Electronics Communications Association, Inc. will be held at the Richmond Omni Hotel in Richmond, Va. on July 12-15, 1995. Tech Sessions, FCC Testing, Scholarship Awards, Tours, Entertainment and much more. Contact WQ6I at POB 639 - Claremont, Ca. 91711 for registration

STEREO VIDEO MODULATORS

Single output stereo modulators deliver true MTS with dbx. Digital tuning. Available outputs: UHF chan 14-60. Hyperband cable chan. 37-64, or Ultraband cable chan. 65-111.
HCC-2011U Stereo Video Modulator/UHF Output **ONLY $599**
HCC-2011HB Stereo Video Modulator/HB Output **ONLY $599**
HCC-2011UB Stereo Video Modulator/UB Output **ONLY $599**
Saw the above ad and thought some folks may like to obtain a unit directly on their ATV frequency since these tune the cable channels 57-60 which are ATV frequencies. Have a high class repeater exciter with stereo audio! 73 Henry

1-800-CONTROL

ATV HELP NEEDED FOR SPECIAL OLYMPICS

Battles, Brian, WS1O

Hi!

As Amateur Radio Liaison to the 1995 Special Olympics World Summer Games in Connecticut this July 1-9, I've been trying to help arrange to accommodate the SO officials' request for ATV coverage of the Sailing events. I'm being assisted by active local ATVer Fran Miele, N1GAU (Fran.Miele@circellar.com). The SO officials ideally would like to have ATV transmissions from 2 or 3 judges' boats in New Haven Harbor, sending back live color TV to a receiving station on shore, where they can then display the video on a couple of large monitors, and record it on a VCR.

Fran advises me that several local ATVers have expressed the following concerns: (A) Some scheduling difficulties because of their daytime jobs (B) Concern for using their equipment around salt water (C) Reluctance of individuals to go through the process of setting up, testing and operating their gear each day, only to tear it down at night...and then have other volunteers step in to do the same thing all over again the next day...for several days!

The immediate solution that occurs to me is to obtain 2 or 3 transmitters, a receiver and antennas that can be set up "permanently" for the duration of the Games and operated by any ATVers (or other trained hams) who are able to get to the site each day. Fran and his colleagues feel that 10-watt transmitters and omnidirectional antennas will probably be needed to send the signals to the receiving station via simplex or the New Haven ATV repeater. Unfortunately, I haven't been able to find a source for a donation/loan of such equipment and don't know of any means of obtaining funds to purchase the necessary equipment (the Special Olympics claims it has no budget available for such a project).

If you have an suggestions or know of anyone who might be able to offer ideas/solutions, please contact me. We'd greatly appreciate any assistance, and it will certainly be a major "feather in the cap" for Amateur Radio if we can put together an impressive ATV operation, especially for this event, which is expected to be attended by major celebrities, dignitaries and more than 700,000 spectators, with more than 1500 international media representatives on hand! Anyhow, any help or advice you can offer is appreciated! Thanks and very 73, Brian Battles, WS1O, New Britain, CT USA, Amateur Radio Liaison, 1995 Special Olympics World Games, 203-666-1541 (work), 203-827-9956 (home), 203-665-7531 (fax) E-mail: bbattles@arrl.org (office), battles@ibm.net (home) Packet:WS1O@W1EDH.CT.USA.NOAM (AX.25) ws1o@ws1o-2.ampr.org TCP/IP)

HP ANNOUNCES TV NETWORK TO INSTALL BROADCAST VIDEO SERVER; CBS BEGINS CONVERSION TO DIGITAL BROADCASTING

Palo Alto, Calif., Aug. 30 -- Hewlett-Packard Company today announces that CBS Inc. plans to introduce digital video servers to television broadcasting with CBS' first installation of the HP broadcast video server. The server initially will replace the traditional videotape robotics carousel, called a cart system, which manages a library of cartridges and is programmed to play back commercials, promotional spots and other short form preproduced programming.

By making the commitment to digital broadcasting, CBS, one of the original pioneers in television, continues to play a leadership role in the industry by pioneering the digital television age.

CBS was the first network to set up a task force for digital broadcasting, said Bishop Cheen, senior analyst with Paul Kagan Associates, a leading media research firm, Carmel, Calif. The concept of a video broadcast server, like HP's, is the first bridge in bringing broadcasting into the digital age in a compelling cost effective way. It also does it in a way that is completely compatible with 170 million TV sets in use today.

CBS plans to install the server at WCIX-TV, the CBS owned television station in Miami. Miami is the 15th largest television market in the United States. The HP broadcast video server will work alongside WCIX's existing environment, replacing its videotape recorder system.

We have made a significant commitment to provide digital based products to the video communication industry, said James D. Olson, general manager of HP's Video Communications Division. HP's alliance with CBS is the first wave in the transition of digital broadcasting for the worldwide television industry. HP recently announced sales of its HP broadcast video server to CBS affiliated station KOLD-TV in Tucson, Ariz., and the Radio Television Luxembourg network RTS2 based in Munich, Germany.

The HP broadcast video server provides expandable disk based on-line storage from six hours to 51 hours of programming and three video output channels for users flexibility and reliability. The server includes software redundancy, dual standby power supplies and failure-proof disk storage modules with 500,000 hour mean time between failures reliability.

Hewlett-Packard Company took a great deal of care and attention by investing in meeting the critical path requirements of broadcasting, said Crag Birkmaier, a video industry analyst, based in Gainesville, Fla. The HP broadcast video server is bulletproof.

The HP video broadcast server uses Motion Picture Experts Group (MPEG) compression to store broadcast quality video.

CBS recognizes the need to look to the future of television by building the infrastructure for total digital broadcasting now, said Robert Seidel, vice president of engineering for CBS. Our vision is to combine communications and networking technology to make our operation more reliable and efficient. MPEG compression was a desirable feature in the HP broadcast video server.

MPEG is the emerging de facto transmission standard for the content distribution format, said Birkmaier. The economics of storing information by using PEG is a factor of 3-to-1 greater than an intraframe compression system such as JPEG.

In addition, WCIX will be using HP's ad management system software, which provides a total solution for automated scheduling playback of advertisements and programs to air. The software controls all steps of the commercial broadcasting process, including scheduling play lists, recording material into digital format, managing information in the broadcast video server database, playing advertisements on-air and compiling the as-run lists for advertising agencies.

Hewlett-Packard is an international manufacturer of measurement and computation products and systems recognized for excellence in quality and support. The company's products and services are used in industry, business, engineering, consumer electronics, video communications, broadcasting, medicine and education in approximately 110 countries. HP has 97,900 employees and had revenues of $20.3 billion in its 1993 fiscal year.

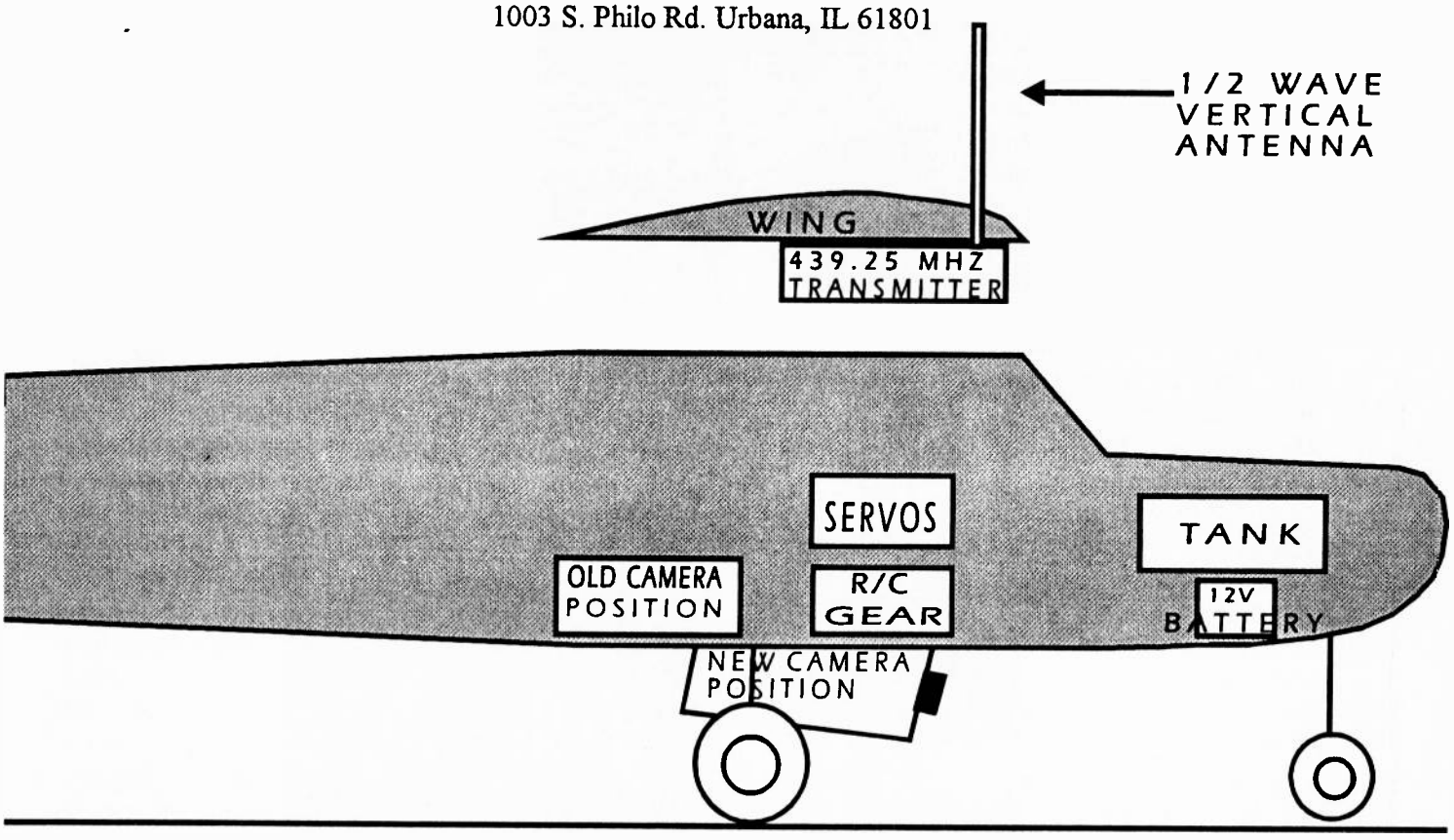
Note to the Editor: Sales information may be obtain by calling 1-800-752-0900. Please do not use editor contact or corporate telephone numbers for sales information.

Information in this release applies specifically to products available in the United States. Product availability and specifications may very in non-U.S. markets.

Contact: Hewlett-Packard Company, John L. Minck, 408-553-3891 -- CBS Television, Robert Seidel, 212-975-1785 -- Copithorne & Bellows, PR, Marcy Dockery, 408-988-2100.

UAV WITH ATV CONTINUED DEVELOPMENT

Ron Berkman KA9CAP
1003 S. Philo Rd. Urbana, IL 61801



AIRBORNE COMPONENT PLACEMENT

This is a continuation of my original article which appeared in ATVQ Vol. 6 #1 (Jan., Feb., March, 1993) and described how I first acquired live video from a Radio Controlled Model Aircraft (UAV -Unmanned Aerial Vehicle).

Since the article appeared, I have acquired a Supercircuits PC-7 color camera to replace the original B/W camera, installed it in a brass case with suitable decoupling and, due to its larger size, have mounted it on the underside of the fuselage near the center of gravity. (See Figure 1.)

Based on flights occurring on May 21, 1994, I decided that I had insufficient transmitter power on board the aircraft as I experienced a large number of picture dropouts and general messiness of the pictures from the plane, particularly at high altitudes. I ordered a TXA5-RC transmitter board from P.C. Electronics and requested that it be set on maximum power output of 1.5 watts. The previous board was rated at 80 MW. Because the dimensions of the new board matched that of the old board, I was able to mount the new board directly in the case already constructed with no modifications.

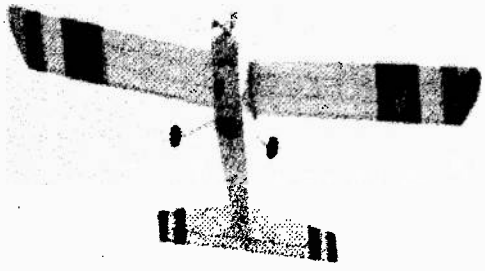
The next problem encountered with the higher ATV transmitter power was interference with the Radio Control System which operates at 53.5 MHz AM. The receiver (ACE R/C Silver Seven) was unaffected by the 80 MW transmitter, but now could see the servos "jittering" whenever the ATV transmitter was activated with 1.5W output. This meant it would be necessary to construct a shielding case for the R/C receiver, (see Figure 2), and provide for decoupling of all power and signal wires from the receiver using 470pf feed thru capacitors. I also added ferrite beads to the wires running to each of the servos. As a final touch, following P.C. Electronics instructions and using the parts they sent with the new board, I built the low pass filter consisting of a .22uH inductor and two 33pf capacitors inside the receiver case.

I neglected to retune the receiver before the first flight and lost control of the plane about 50 ft. down the runway which resulted in a crash. The lesson learned here is that when you place a receiver normally in a plastic case inside a metal case and

UAV WITH ATV CONTINUED DEVELOPMENT

add parts to the antenna system, you MUST RETUNE the receiver! I have now retuned the receiver and rebuilt the plane and conducted range checks to verify control with the ATV system turned on. The R/C receiver now appears to be operating nominally.

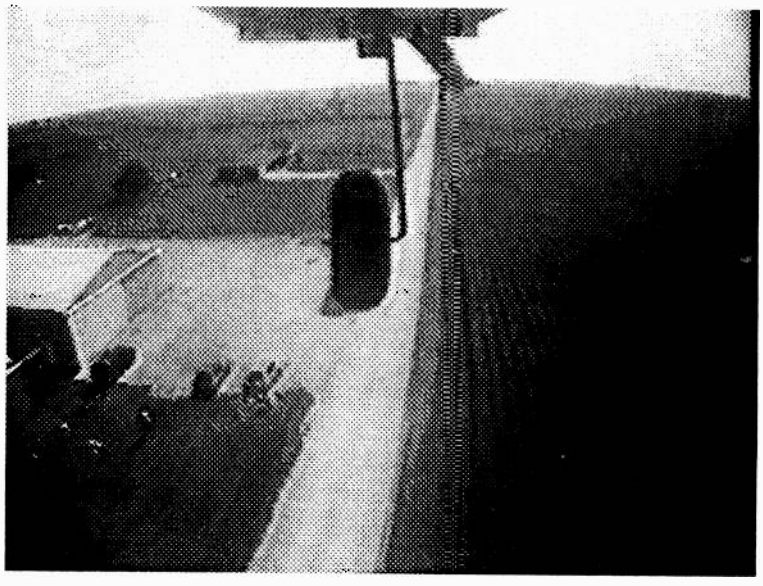
On July 18, 1994, I flew the plane with the following results shown in pictorial form:

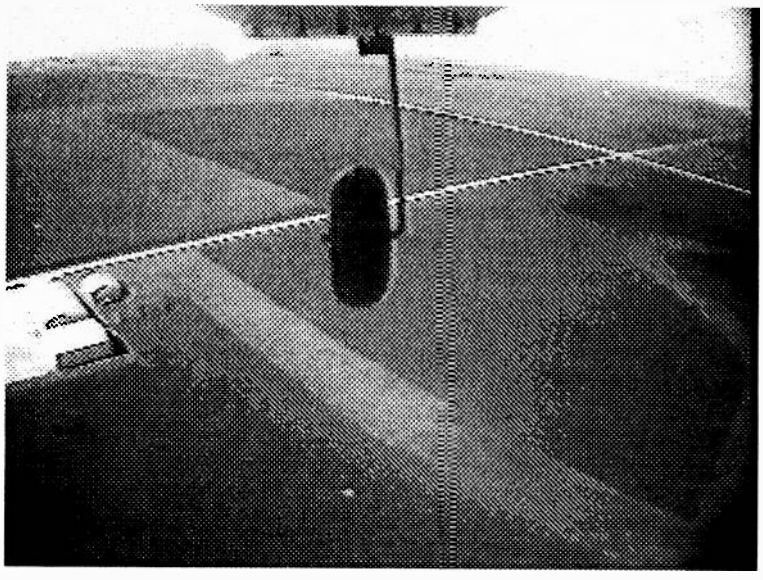


With the system now operating in good form, I can now concentrate on building a larger and more powerful aircraft to carry the additional load which will be imposed by the next phase of development.

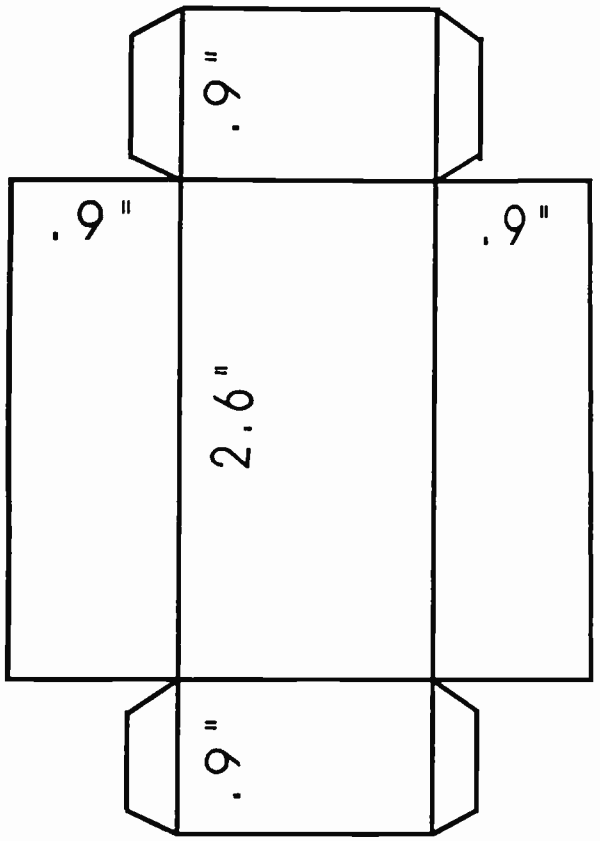
I have acquired a computer and associated equipment to add video telemetry to the downlink picture. Plans call for airspeed, altitude and compass heading to be shown real time on the video along with battery voltage readings and call sign every ten minutes. This video overlay system is available from High Technology Flight. When this equipment is finally mated with its sensors, a bigger battery pack and made operational, I will write about its performance in a future article.

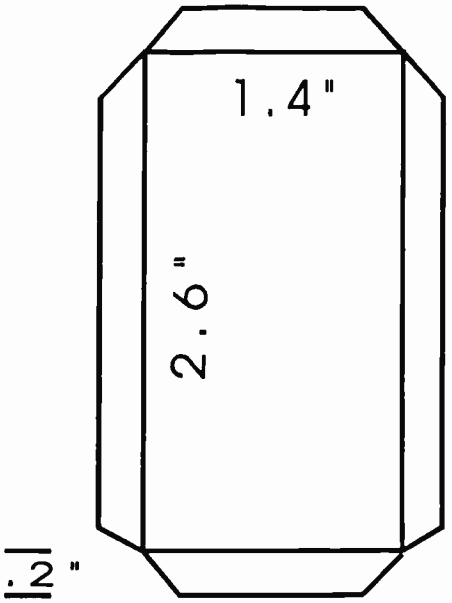
As you can see, I am still having fun with ATV and as an aside, we did some testing to see if my airborne ATV can bring up the KA9SZX ATV repeater in Champaign, IL with the higher power I am now running. The distance involved is about 10 miles as the crow flies. We found that the higher power would still not bring up the ATV repeater, however, KA9SZX at his home station, was able to view the video direct. The picture quality was poor but occasionally it "popped in" when I was banking the aircraft and causing the vertical antenna to go horizontal. Mark (KA9SZX) felt that if I had a horizontally polarized antenna on the aircraft, he would get an excellent picture direct, and since the ATV repeater is horizontally polarized, I would likely bring up the repeater. I have ordered Little Wheels from Olde Antenna Labs for installation on the aircraft and on the ground mount. More later!





SHEET BRASS LAYOUT

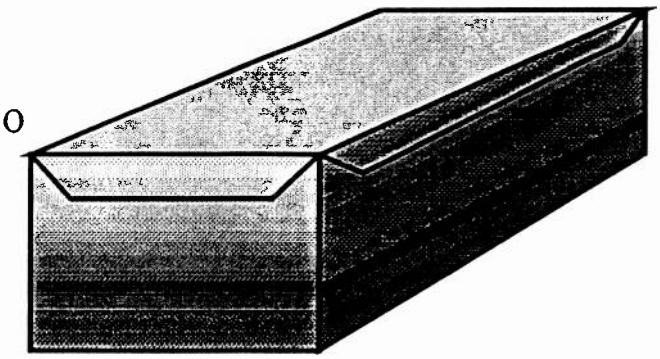




ADD GROMMET
FOR RX ANTENNA

ADD SUITABLE FEEDTHRU CAPACITORS FOR EACH SERVO AND + INPUT VOLTAGE.

CASE IS GROUND



FINISHED .010 BRASS CASE FOR SHIELDING ACE R/C SILVER SEVEN R/C RECEIVER.

GO-VIDEO TO OFFER VIDEO EDITING SOFTWARE

FOR ITS NEW PC-COMPATIBLE

8mm/VHS DUAL-DECK VCR'S

Scottsdale, Ariz., Aug. 2, 1994 -- Go-Video (AMEX: VCR) today announced it has reached an OEM agreement with Gold Disk, Inc. that will enable Go-Video to provide a video editing software package to users of Go-Video's new PC-Compatible 8mm/VHS Dual-Deck VCR's.

Under the agreement, Gold Disk is providing a special customized version of its award-winning Video Director software. The new software will be optimized to work with the Go-Video 8mm/VHS Dual-Deck VCR and will take advantage of the unique capabilities of the Dual-Deck VCR.

The software, which will be marketed by Go-Video under the trade name "Dual-Deck Director," will enable users to control the Dual-Deck VCR from their computer and perform professional-style editing. Go-Video's PC-Compatible Dual-Deck VCR (Model 8050) and the software package will begin shipping in November. The software will be available in Windows and Macintosh versions. An additional model of Go-Video's PC-Compatible VCR's, Model 8080, is scheduled to ship in 1995.

Roger Hackett, president and chief executive officer of Go-Video, said, "by combining computer technology with our new 8mm/VHS Dual-Deck VCR we are adding extraordinary value to our products and opening new markets for them. This combination of products is an example of the merging of computers and consumer electronics that is clearly the wave of the future. This product and others to follow show that Go-Video is uniquely positioned to take advantage of these new opportunities."

Hackett continued, "Dual-Deck Director allows us to offer a unique product to consumers who want to be more interactive with their electronic equipment. This product will appeal to a wide range of consumers and professionals and should be especially interesting to parents and teachers who want to provide youngsters with an educational and entertaining hands-on experience."

The software will be "bundled" with Go-Video's exclusive edit controller which is a hardware communications link between the computer and the VCR.

"The Dual-Deck Director, combined with Go-Video's new VCR, is a complete home or small office video editing solution that is easy to use and most importantly, affordable," said Neil Snyder, vice president of marketing for Santa Clara based Gold Disk. "In the past, frame-by-frame videotape editing and adding fun titles and graphics was only available to those willing to spend thousands of dollars on professional editing equipment. This technology bundle gives every 8mm camcorder user access to creativity and fun at a very affordable price."

The suggested retail price for the software/edit controller combination is $299.99. It will be sold through Go-Video's consumer electronics retail channels, computer dealers and special markets.

VIDEO TAPE EDITING MADE EASY WITH THE DUAL-DECK DIRECTOR

Dual-Deck Director is an analog videotape editor allowing Go-Video users to utilize their Windows PC or Macintosh computers to control their Go-Video 8mm/ VHS Dual -Deck VCR. Users can select scenes from any number of 8mm tapes, arrange those scenes in any order, then automatically create a new tape by copying those selected scenes from 8mm video cassettes to VHS tapes for easy distribution to family members, employees or friends. Depending on the computer hardware configuration, Dual-Deck Director provides users with the ability to add sounds, titles, animations, graphics, wipes, transitions, and music to their newly created tapes.

Go Video is the designer, developer and patent holder of the first Duel-Deck VCR sold in the United States and the only videocassette recorders that can copy any VHS videotape. The Go-Video Dual-Deck VCR's are sold through prominent retail outlets nationwide and are featured in numerous popular catalogs. A leader in VCR technology, Go-Video is continuing its tradition of innovation through continuous research and development, and a strategic relationships with other leading edge companies.

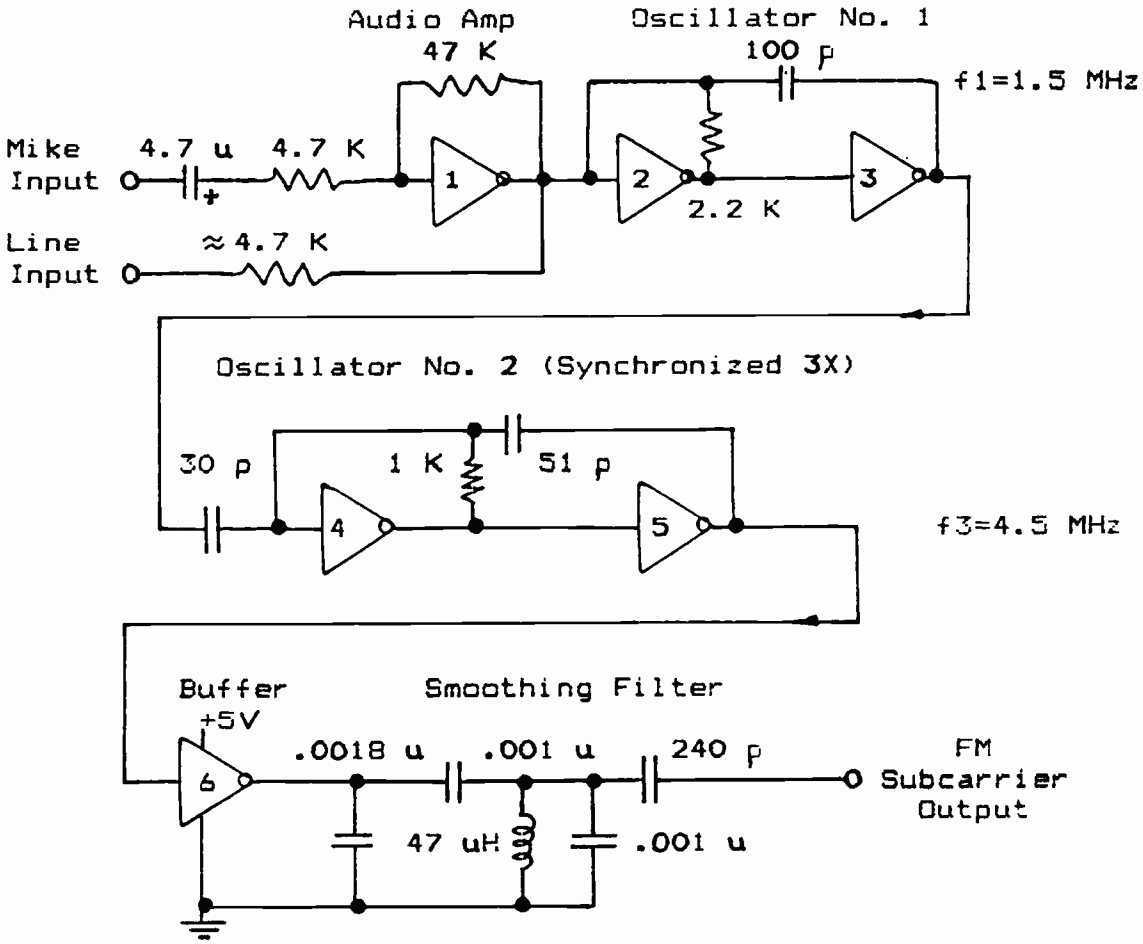
Gold Disk, Inc., founded in 1984, is a leading developer of multimedia technologies and publishers of next generation presentation tools and applications for Windows based PC and Macintosh computer users.

Other Gold Disk products include: Astound for Macintosh and Windows, Video Director for Windows and Macintosh, Professional Draw, Animation Works Interactive, Animation Works for Windows and Macintosh and ScreenCraze II. Inherent in all Gold Disk products is an easy-to-use point and click graphical interface providing a consistent look and feel for users. Gold Disk is privately held and is based in Santa Clara, Calif., with international offices in Canada and the United Kingdom.

Contact: Edward J. Brachocki, V.P. of Go-Video, 602-998-3400; or Michaela Brehm, corporate communications, Gold Disk, 408-982-0200.

ATV TECH NOTE: FROM N6RE AUDIO SUBCARRIER OSCILLATOR W/AUDIO AMPLIFIER FOR MICROPHONE

A logic IC can serve as an Audio Subcarrier Generator, including an audio amplifier for the microphone. A hex inverter, 74HC04 provides all the necessary amplifiers.



ATV Subcarrier Generator using a 74HC04 Hex Inverter

The first oscillator operates at 1.5 MHz. The second oscillator synchronizes to 3 times the first oscillator generating 4.5 MHz. The FM Deviation of the first oscillator is trippled also. The output of the first and second oscillators are square waves. The filter following the buffer smoothes the square wave to more like a sine wave and reduces the harmonic content. If a frequency of 5.8 MHz is desired, set the first oscillator to 1.933 MHz. The values shown for the filter elementws have been selected for 5.8 mHz. This unit is currently in use at the station of N6RE, Ray. (ATN Newslettter)

[Diagrams re-drawn by Bill Parker W8DMR]

BUILDING AN ATV REPEATER

Henry Ruh KB9FO

One of the frustrations in building an in-band ATV repeater is the filtering required to prevent desense and oscillation keying. The common practice seems to be to buy a receive converter, transmitter exciter, a power supply, a solid state amplifier and some filters. Without endorsing any particular brand of equipment, the solid state amp is usually a Mirage D100 ATV or similar model.

The KB9FO ATV repeater operates on 439.25 MHz LOWER SIDE BAND input and 421.25 UPPER SIDE BAND output. This eliminated most of the interference from FM repeaters which operate on 442-450 MHz. Packet users using frequencies below 442 still interfere but to a lesser degree due to fewer stations. The passband for input and output provides a filter slope to separate 434 from 426 MHz signal edges. The crossover is at 430 MHz and using the ICM filter and the RX-TX comb duplexer the system should work fine. Not so.

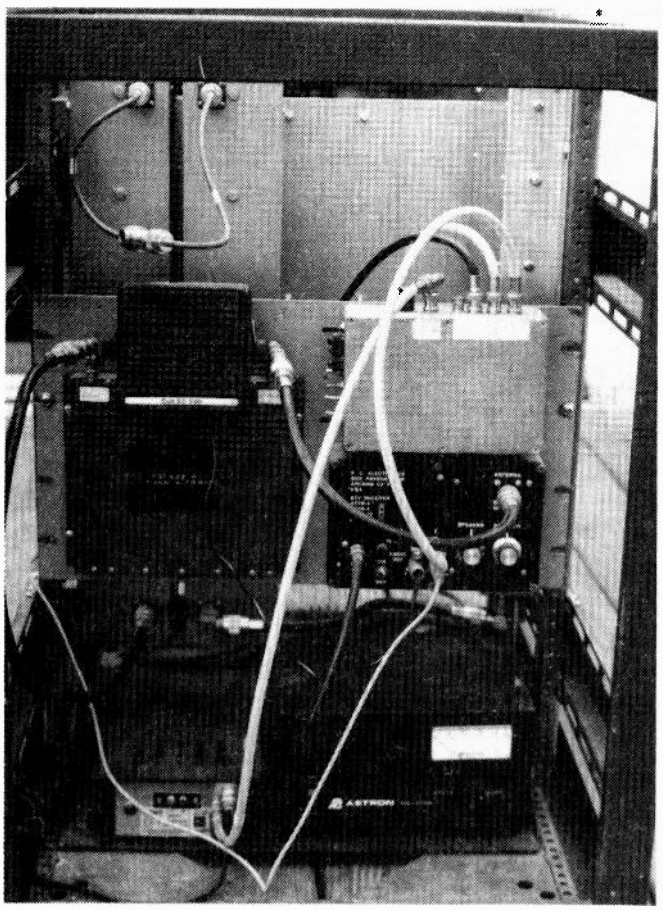
The receiver and exciter are PC units. The receiver is a self contained unit providing audio/video output. This feeds a PC VOR-2 and an Elktronics video ID board. Astron power supply was used for all the equipment. When operating at the 1 watt level, the repeater, using a single antenna worked fine. As soon as the power amp was turned on, the system would self key into an ID oscillation.

A second power supply was purchased for the receiver and video hardware. An inexpensive Radio Shack unit which proved adequate. This separated the receiver and transmitter so RF could not be leaking back through the supply leads. No luck. Two notch filters made of a helical resonator with a screw for adjustment in a silver cavity with BNC connectors were made. On a spectrum analyzer the notch filters could be seen working, removing the video carrier at the receive input even more than the three regular filters. Still, with the additional notches which put the video below the noise floor of the Tektronics analyzer the oscillation continued.

By pass filtering was added to the Mirage amp power leads, and the power supply power leads. No help. The RG214 double shielded cable was replaced with 9913 foil/braid shield. No help. The coax was replaced with Heliax! No help! Frustration was mounting.

The entire equipment package was taken apart and remounted to obtain shorted cable lengths and separate the receiver and transmitter and amplifier with a rack panel shield in between. No help!

Discussing the problem with Tom O"Hara and other repeater owners who had similar problems, it was decided to change the power supply leads to coax. Type N connectors were added to the supplies, the Mirage amplifier, and receiver/exciter. The VOR-2 and Elktronics ID board were put in die cast boxes with BNC connections for everything. Even the power relay was put in the shielded box.



KB9FO ATV Repeater, this view shows the coax cable used for power from the back of the radio shack power supply to the receiver (black box) and the video sync detector and ID graphic computer (silver box above receiver). BNC and type N connectors are used for all connections. The local monitor speaker is located just above the RX interdigital VSB filter. In the background, mounted vertically, is the ICM transmit VSB filter and the TX-RX duplexer. The antenna connection is just above the speaker.

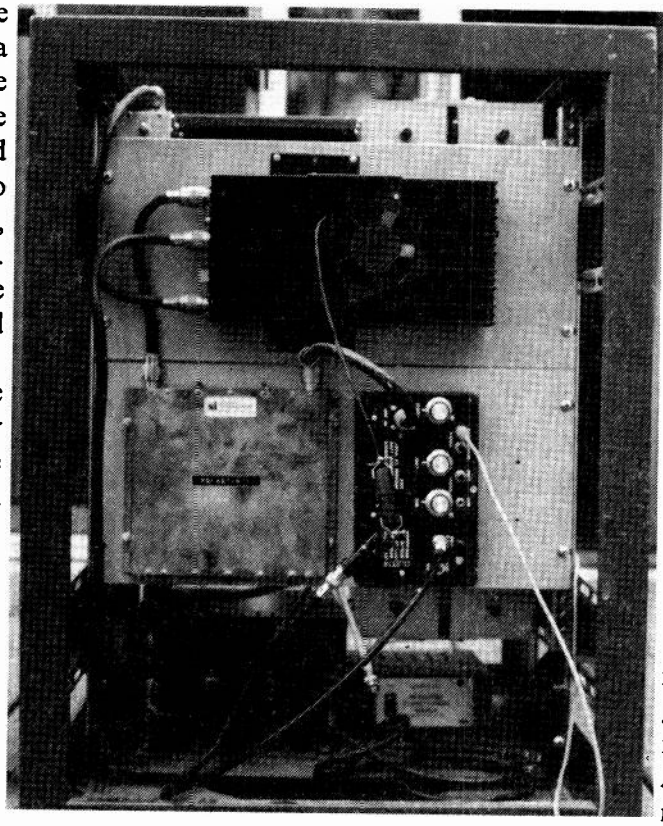
BUILDING AN ATV REPEATER

Some improvement was noted. Now the repeater would work until the key down time had reached about 10 minutes, then upon removing the input signal the system would go into the ID oscillation. Resetting the control line and allowing the system to wait a minute would bring it back to working condition.

Adding a filter to the exciter output also helped. So now the system was an exciter to a Spectrum International 7 pole interdigital filter, to the Mirage D100 amp, to an ICM passband filter, to the TX-RX duplexer, to antenna and on the receive side, the duplexer to the receiver. Adding a SI or ICM filter to the receiver signal path added nothing except receive side loss.

Now what! The Mirage amp was removed and the power supply lead wire hole and the vacant switch holes were covered with an adhesive copper foil used in broadcast transmitters. I had gotten a free sample from Harris in the mail. Covering the holes did it! The Mirage amp, leaks RF through the switch and power lead holes. The next step will be to put the Mirage amp and fan (you MUST use a fan in repeater use) will be put in an RF box with grill work vents to further shield the amp. The amp also has a tendency to get "dirty" as it warms up. I found it helped to tune the amp after it had been on for more than 10 minutes to reach a stable operating temperature. Using the spectrum analyzer I tuned the amp for minimum noise (IM) which yielded 60 watts on a peak reading wattmeter with 2 watts drive. Likewise, if you tune the exciter, use a spectrum analyzer and tune for minimum spurs/harmonics. You can easily see them rise and fall as you tune each stage. It will usually also coincide with best output power. If the exciter is 1 watt or less actual output most analyzers will allow a direct connection. If over 1 watt than a shielded RF pad should be used. A small can with BNC connectors and the resistor network soldered inside works. Keep the leads short. A length of lossy mini coax can also be used if handy.

So with the shielded Mirage amp, the repeater worked fine. Where else to look? The problem recurred after the antenna had been taken down and put back up. Unnoticed, one of the elements had a loose screw. This did not show up as VSWR on the Bird meter, but did show up on the Spectrum analyzer using a line probe. The VSWR was at the instant of key-up and the arc over then eliminated the tiny gap. Tightening the hardware a second time is good insurance against hard to find problems like this one! With 48 elements, in three bays it took a while to find the loose one! A quarter turn fixed it!



Now that the bugs are out, the system is being moved to a more advantageous location than the 70 foot tower in the back yard. Additionally, I have since moved from the half acre back yard to a 5 acre back yard, but far from civilization! Now I may also need the repeater!

This view shows the coax power leads from the Astron power supply to the Mirage D100ATVN amplifier, the transmit exciter and exciter interdigital VSB filter. The middle coax to the mirage is +14V DC. Type 9913 coax and crimp style Kings connectors are used throughout with BNC connectors on all cables except audio. Chassis N connectors were added to the Mirage and Astron units with additional bypass capacitors inside each.

TOM RUTLAND K3IPW SK

Tom Rutland, K3IPW became a silent key in February, reported to have died from liver cancer. Tom was best known to VHF'ers and ATV'ers as the manufacturer of the K1FO yagi antennas. Tom's wife has placed the business up for sale. Interested parties can call 717 774 5298 daytime.
TNX K3IWK. Charles Byers

MIRAGE SOLD

Mirage has been sold to MFJ. What changes are in the works for Mirage products are not known at this time. We can only hope that the product quality will be equal or better than it has been.

DAYTON ATV PARTY

Once again ATVQ will host a Friday night ATV party and symposium at the Holiday Inn North, Wagoner Ford Rd at I-75, from 7PM till midnight. Admission is FREE. Among other speakers, LISTS will describe their repeater technically with overhead transparencies, slides and video tape. The interference free in-band repeater was achieved by carefully chielding and by-passing practices and finding oversight by the linear amplifier manufacturer. Input signals from LISATS members will be on tape and a special presentation of gen-lock graphics will be shown. Experience with a separate audio transmitter will be reviewed. Handouts will be available. This will be a straight forward session on hot to do it right. Be there! Ernie K4RBD

HF Technology will feature their FM ATV gear and speak on the differences between AM and FM mode operation. HF Technology has also dramatically changed the design of their equipment and they will relate their experiences with micrwave band ATV.

Ed Melnick, WB2QHS will have video from the Portland, OR repeater (featured on the cover of ATVQ last year)

MUCH MORE!!

Several other presentations are also scheduled for the evening. If you have not yet scheduled your talk, contact ATVQ or show up and see Henry KB9FO to get on the program.

MINI FLEA

If you have ATV gear for sale, bring it to the meeting and place it on the Swap & Sales table.

DAYTON ATV PARTY

A TRUE RF S METER FOR ATV

Diagram redrawn by Bill Parker W8DMR

Figure 1.

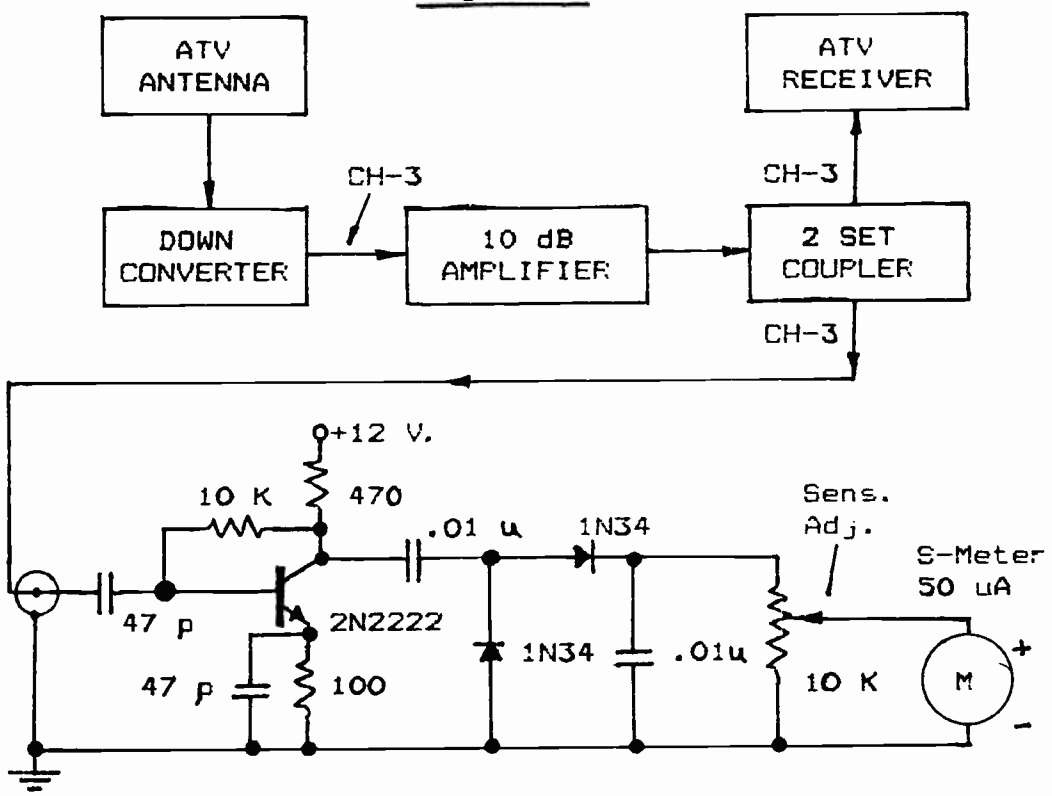


Figure 2. S-Meter Detector Circuitry.

After using the Agc voltage on my TV set (VCR) and a voltage amplifier/meter for an S meter, on my station for a while, it didn't take too long to find out that it was not very reliable when tuning the local repeater, or any local station, on in the area for maximum strength signal when aiming my antennas.

I decided that there must be a better way. After using my Satellite Receiver with a true RF S meter for 1258 FM TV and seeing how well I was able to aim my antennas and rely on the S meter reading for best signal strength - out came the diagram of the receiver, this is the end result. See figure 1.

The signal coming from the antenna system goes into my Down converter, the regular way the output Ch 3 goes into a Vhf Amp. to boost the signal on the meter, (it will work without the amp. but the indication on the meter will be low). Then using the usual cable TV Splitter Combiner, in this case 2 Set Coupler, split the signal 1 output to your TV set, the other to the amplifier/meter. Now you really have a True RF S Meter like any other receiver.

73's Manny Diaz
WB2LTS

HOUSTON AMATEUR TELEVISION SOCIETY, INC.

Greetings.

Boards have been made for the 12 beta kits of the 1.2 GHz. FM ATV transmitter. Jeff is in the process of installing the tiny surface mount components now. If you have surface mount installation experience and would like to help, please give Jeff a telephone call 233-4128 (wk) or 855-9917 (hm). He has access to a stereo microscope and small soldering equipment. If you can give some time installing parts, especially on weekends, try to help.

We discussed our participation in the Tenneco Marathon at the November meeting. Those interested in participating should begin preparing their stations now. I attended a preliminary meeting a week ago in which we heard about commercial TV coverage from Channel 2. I have been assured that they are most interested to have us do our coverage as well. There is very little control over the commercial coverage. Their work will be primarily covering the leaders in the race from start to end. We will provide video for all parts of the race during the entire event. The ultimate goal is to provide a network of TV stations that can provide coverage of any part of the course upon request of a race official. Our goals this year is to provide coverage at least as good as last year and, hopefully, improve.

When preparing your station remember a few hints. DON'T plan to rely on a non-directional antenna. At this time, we don't know whether we'll be Horizontally or Vertically polarized. Also, plan to have an amplifier available to you. If you don't have one, check around with some of the satellite users. Hopefully, we can come up with enough for each locations. We are going to change out the interdigital filter on the 434 MHz. input to see if that will clear up the problems we have had. We may have to settle for black & white. With adequate signal in, the 434 input does OK but does not allow color to pass. Of course, if you have 1.2 GHz. FM (N5MBM, N5XGW at this time), plan to use it. Consider power, location, extendable mast, etc. I am trying to locate a source of telescoping mast. I saw one at Austin that is perfect. It is an extension handle/arm for the tool used in changing light bulbs in 20' high ceilings. It is made of fiber glass and is multi-sectioned (3). It extends to over 20', yet telescopes back to less than 8' long. I have found some shorter ones at Builders Square. They are paint roller extensions and are only 16' extended. Finally, try to have a television operating at your site for the general public to view. Help promote amateur radio and ATV!

My apologies for not having the VJB 421.25 yagi kits available at the last meeting. Things just did not come together. We have started with 9 kits and three (3) are already sold or reserved. Price is $15 to cover the cost of materials.

If you can make it, you are invited to have dinner with us at El Chico's prior to the HATS meeting. We meet about 6:00 pm to 6:30 pm. Wednesday is their weekly enchilada dinner special for $3.95. El Chicos is located directly across the 610 Loop from Hewlett-Packard, just south of San Felipe (inside the loop). You can get to it by taking San Felipe to the Exxon station at 610 and turning in behind the station.

We have sold several of our antenna kits! Here is what we have. We are selling kits that are 11 element 421 MHz 76 ohm antennas. The antennas are intended to be used as dedicated receive antennas for any ATV repeater in Houston. The kit has all elements precut, and the boom precut and drilled. The cost is only $15.00 and is such a deal. It will be difficult for you to assemble all the parts for this costs. We have not calculated shipping cost, but this price does not include shipping. Please come by and get yours at the meeting.

It is time again for the Houston (Tenneco) Marathon. Once again we have been asked to provide a mode of communication that only we can offer. Video coverage of the entire course. HATS and other volunteers will be situated around the course using both 1.2 GHz FM direct and the W5PZP 434-in and 421.25 out AM repeater.

This event will take place on Jan. 15, with our job beginning at about 5:00 AM. We will coordinate meeting, setting up and transmitting by

HOUSTON AMATEUR TELEVISION SOCIETY, INC.

using the 147.70- voice repeater as we did last year.

We found out that using a vertical is out of the questions. Preferably a push up pole to gain a little height, and a 5-10 element beam are minimum configurations. Barefoot transmitters should be avoided but may work if you use a quality coax and beam. Also the best stations in previous events paid a lot of attention to details. Details like the use of Flexi-4L or Belden 9913 for coax runs AND JUMPERS. Please do not plan on installing connectors in the field! If you would like some help in assembling your station please bring it to the next meeting or give a call on 146.70.

At the beginning of the race last year it was very dark. Please bring low light cameras if you have them. The final details I learned about is to bring food and drinks. It is a long race. Also a big attention grabber is to bring a TV 9" or better to show passers by what is going on when someone else is transmitting. It is also neat to watch the race as time flies by. We will have 2 persons to each vehicle for relief but it could be a long walk to a Stop-n-Go.

Please also try to take a camera extender cable so you can get a little way away from your car to shoot. This helps to get the better scenes.

I will try to make up color signs 8 x 11 to put in your car to advertise the club. As a last thought you should bring a small roll of tape to affix your car pass, sign etc., to your window.

Once again, the plan is to have the February meeting carried on the ATV repeater for those who cannot get there. We will be monitoring the 146.7 repeater for talkback.

This month we will be discussing the results of the Tenneco Marathon ATV coverage. It was a good event with about seven different ATV stations operating. Most were operating through the 440 ATV repeater. One station was operating direct on 1.2 GHz FM. The control station at the start/finish line had continuous coverage of the event with two color monitors. There were a few unanticipated problems. A quick summary is:

1)So much RF that controlling the repeater was difficult.
2)So much RF that the ATV receiver was swamped with RF.
3)1.2 Ghz receive was not operational at the repeater.

We are working on changing the link from 1.2 am to a 3 GHz FM link. This will allow us to add 1.2 GHz FM receive and transmit, and maybe 1.2 GHz am transmit.

ATV ACTIVITY IN CHARLOTTE, NC

W4PPN

Anyone who might be interested, there is an ATV repeater in Charlotte, NC. It has been on the air since October 19, 1991 and is located in downtown Charlotte on top of No. 2 First Union Tower. (About 470 feet above ground) Input is 439.25 MHz and the output is on 421.25 MHz. Polarization is horizontal and is provided by separate Alford slot antennas on receive and transmit and on the subcarrier aural transmitter. Anyone who visits the Science Museum, Discovery Place can visit the ham radio room and see a demo of the repeater. For additional information, please contact:

W1PPN, Howard 704-896-5507
W1RP, Paul 704-588-1780

SAVANNAH, GEORGIA

Just a brief note on the KK4TO ATV Repeater in Savannah, Georgia. I will be sending in an article on our repeater's new ID system utilizing a PC at the site. We have 50+ individual ID screens from digitized video images. The number we can store is limited only by available hard drive storage. More details will be forthcoming, but it renders the Elktronics VDG-1 very obsolete. Philip KA4KOE

THE W6ORGy Notes
IT'S OK - IT'S UNDER 100 MILLIWATTS

Seen any unidentified video lately? It is happening more and more in the greater populated cities around the country. Last year two businesses in the Los Angeles area came on and tied up two of the local ATV repeaters with continuous views of their security cameras for over a week. The FCC is not able to quickly respond and run out to shut down these illegal operators given the wide area, available personnel and equipment. I got a call back from the FCC two months later asking if the matter had been resolved. All we as hams can do is track them down and acquaint the business owners with the legalities and the possible fines of up to $10,000 per day of operation. In the hard cases you can say how they could cover up necessary emergency communications which could open them up to megabuck civil suits.

I still get about 6 calls a day from people wanting to use ATV transmitters illegally. Some just don't know the FCC rules and some don't care. Most are not licensed hams but some are. The relative low cost and power of ATV gear is very tempting to those who would use it for non-amateur purposes. There is a growing need for wireless video transmission for security purposes with ranges greater than the 150 to 700 ft possible with the 915 MHz or 2.4 GHz part 15 license free equipment.

There are companies who openly advertise TV transmitters in electronic hobby magazines and will sell to anyone, no questions asked. The customer in most cases does not know or is not properly informed of the legalities. There are misleading statements like "may require a license in your area" or "we only sell to law enforcement" or just list the adjustable frequency range up through 500 MHz. Even the cops fall for the misrepresentation and end up using them illegally which can throw the case the transmitters were used to get evidence, out of court as well as a visit from the friendly feds.

There is a popular misconception that any intentional radiator under 100 milliwatts can be put on any frequency without a license or type acceptance. This comes from many years ago when that was only true of 27 MHz CB walkie talkies. Part 15 license free devices have a radiated power specification which is measured at a distance. This takes into account not only the final RF power out, but the coax loss and antenna radiation effeciency. Today any intentional radiator (read transmitter), if more than 6 are manufactured, must be type accepted and any receiver requires type certification. The FCC figures 5 or so can be made as pre-production prototypes for testing and process purposes, but if more than that then the intention is to make them generally for sale and must present proof that they meet the technical specifications of the FCC rules for the intended service. Ham gear above 225 MHz does not require type acceptance or receiver certification, besides, ads show kits to get around present type acceptance rules. FCC is looking to include kits.

So if a manufacturer makes a transmitter or receiver for the 420 or higher amateur band, he does not have to meet any specs, or pay a minimum of $5000 for the testing and submittal to the FCC, even if the device could pass the tests and legally be used in another service. He just says it is a amateur radio device and he has no control over who buys and uses them.

Since video is a wide band mode, there are no frequencies below 1.8 GHz that could be type accepted for business or public safety (the local and state police and fire). Absolutely no intentional radiation is allowed on broadcast TV channels at any power level. So if you see some one selling or using a video wireless broadcaster on a broadcast TV channel, it is strictly against FCC rules. Many of those "Rabbit" transmitters have been shut down by the FCC, but there is not too much they can do if the company puts them in the ham band and says that they are for amateur radio, unless they are misrepresenting the equipment to non-amateurs.

FCC could require type acceptance and get the ones that don't pay the thousands of dollars for it, but then you would pay the bill for that in a big increase in price for the equipment. It still would not stop those with a bigger bank roll who know that the growing security market will easily pay 3 to 4 times the normal ham market price verses 10 to 20 times the ham price for the business and public safety type accepted microwave video transmitters.

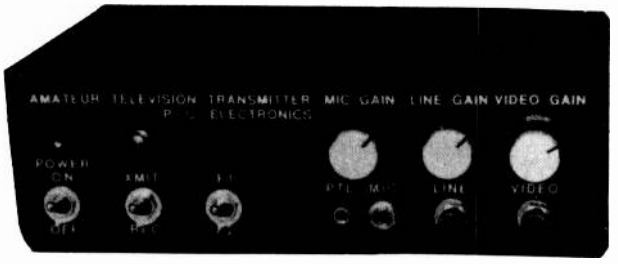
Even as a licensed ham, what can't you transmit? The purpose of amateur radio is outlined in 97.1: a non-commercial communications service particularly with respect to providing emergency communications, advancement of the art, technical skills and international good will. 97.113 spells out the no business use of amateur radio. You cannot make one way transmissions - 97.111 - except for occasional testing, specific beacon frequencies, or radio control not to exceed 1 watt. Therefore most all transmissions must be directed to at least one other ham. that means you can't set up your own surveillance camera and let it run - unfortunately

P.C. ELECTRONICS 2522 PAXSON LANE ARCADIA CA 91007-8537 USA
TOM (W6ORG) & MARYANN (WB6YSS) O'HARA (818)447-4565
24 hr FAX order line (818) 447-0489

THE ATV TWINS

THE LOW COST PROGRESSIVE ALTERNATIVE TO A TRANSCEIVER

Made in U.S.A.



TX70-1b Transmitter only $279 delivered UPS TVC-4G Downconverter $89

Not Sure what ATV is all about and your hobby budget's tight? Start with the tried and true TVC-4G Downconverter to see the action for just $89. Then later, when you want to transmit, just add the TX70-1b companion Transmitter at only $279.

TX70-1b SPECIAL FEATURES:

* Two frequency 1.5 W p.e.p. continuous duty transmitter properly matches linear amps with adjustable internal sync stretcher on the time proven KPA5 transmitter board
* Built-in RF T/R relay board switches antenna and applied 13.8 Vdc between transmitter amd your external ATV downconverter
* Full 25 kHz dev. broadcast standard 4.5 MHz sound subcarrier with independant mic and line audio controls allow voice over commenting while showing home video tapes. Accepts low impedance dynamic mics with "Push to Look" switch.
* Transmit RF detected composite video outputs to monitor phono jack on back to see what you are transmitting. In receive you see your own direct camera video at this jack to enable focus and lighting set-up before flipping the switch into transmit.
* RCA phono jack camcorder or VCR composite 75 Ohm video and line audio inputs, type N 50 Ohm antenna input, and 50 Ohm BNC output to downconverter connectors
* Small rugged shielded cabinet - 7.3 x 4.7 x 2.1", 1lb. 11 oz.

Just plug in your camera,VCR, camcorder, etc. composite video and audio, 70cm antenna, 12 to 14 Vdc @ .5A, and you are ready to transmit live action color or black and white pictures with sound to other amateurs. Specify 439.25, 434.0, 427.25 or 426.25 MHz transmit frequency. 1 crystal included, second crystal add $20.

*Transmitting equipment sold only to licensed Tech class or higher radio amateurs verified in the Callbook for legal purposes. If newly licensed, moved or upgraded, mail or fax copy of license or test certification.

WHAT ELSE DOES IT TAKE TO GET ON ATV?

Any code free Tech class or higher amateur can get on 70cm ATV with full color and sound. Any video camera, camcorder, VCR or computer with a composite video output can be plugged into the front panel phono jacks for both audio and video transmission.

Start by selecting a 70cm antenna and connecting a TVC-4G downconverter to your TV set to receive. Add the Transmitter along with your camcorder and 13.8 Vdc from a regulated power supply capable of .5 Amps and you are on the air. It's easy!

DX with TX70-1b's and KLM 440-16X antennas line of sight and snow free is over 22 miles, 7 miles with the 440-6X normally used for portable uses like parades, races, search & rescue, damage accessment, etc. For greater DX or punching thru obstacles add either of the ATV compatible 15, 50 or 70 watt amps listed below.

The TX70-1b has full bandwidth for color, sound and live action just like broadcast. You can show the shack, home video tapes, computer programs, repeat SSTV, weather radar, or even Space Shuttle video if you have a home satellite receiver. See ≤94ARRL Handbook chapters 20 & 7, or new 1995 edition chapt. 12 for more info and Repeater Directory for local ATV repeaters.

BUY BOTH AND SAVE $19

If you order both the TX70-1b and the TVC-4G at the same time, the special package price is $349

Most telephone orders shipped within 24 Hours 4/95

COMPLETE 70CM ATV STATION

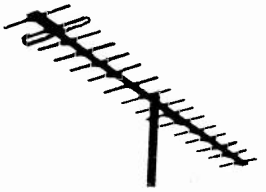
Your TV set

+

+

D26N

+



Your video camera or camcorder

+ **TX70-1b-$279 & TVC-4G-$89**
+ **ATV Xmit & Rec**
1.5 Watts p.e.p.

13.8 Vdc Power Supply required

Optional matching Amplifiers
Mirage D15N 15 Watts RF out $176
Mirage D26N 50 Watts RF out.....$249
Mirage D100ATVN 70 Watts out.$359

Antennas see page 5
KLM 440-16X 14dBd $139
KLM 440-10X 11 dBd $77
KLM 440-6X 8.9 dBd $60

Remember when comparing prices, ours include UPS surface shipping in the cont. USA. 4/95

2509+ Mile DX set with our gear, KH6HME to WB6NOA & KC6CCC - - - Can you beat it?
HAMS, call (818) 447-4565 now for your complete 10 page catalogue of our ATV products!

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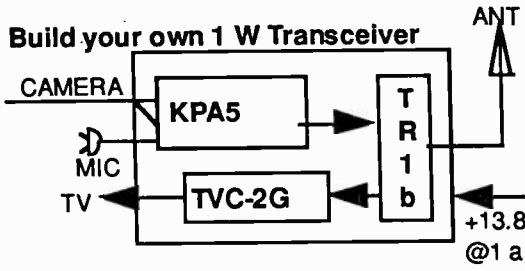
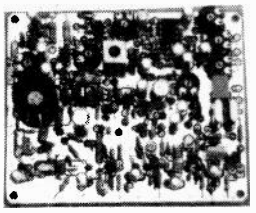
24 hr **FAX** order line (818) 447-0489

THE "KREEPIE PEEPIE" ATV TRANSMITTER

THIS IS THE ATV TRANSMITTER BOARD YOU HAVE READ ABOUT THAT HAS SURVIVED MANY BALLOON FLIGHTS TO OVER *100,000 FEET* AND BACK. ALSO USED FOR R/C MODELS WHERE AN ALL IN ONE BOARD WITH SOUND IS DESIRED OR FOR DEDICATED LINKS AND REPEATERS. JUST THE THING FOR THE BUILDER WHO WANTS TO PACKAGE AND MAKE HIS OWN PORTABLE 70 CM ATV TRANSMITTER OR HOME TRANSCEIVER WITH A WIRED AND TESTED BOARD.





3.25 x 4"

KPA5-F board only $169

KPA5-F 70CM ATV XMTR BOARD FEATURES:

- 1.5 Watts P.E.P. typical RF output. Run barefoot for portable, but if needed for greatert DX, the output properly matches the Mirage D15N 15 watt, D26N-ATV 50 Watt linear amp for full output or D100TVN to over 70 Watts with its adjustable sync stretcher. Same board as used in TX70-1b.
- FULL COLOR AND SOUND on a small 3.25 x 4" board
- Wired and tested board runs on external 13.8 Vdc @ 300 mA. supply or 12 V battery. Weighs only 3 oz.
- Accepts composite video from cameras, camcorders, VCRs, computers, etc. 2 audio inputs, one for low Z dynamic mic, & one line level from most cameras & VCRs. Transmit monitor output enables seeing your own true RF detected video.

KPA5 APPLICATION:

PORTABLE CORDLESS TV CAMERA. Think of it as a video HT. Place the KPA5 in one of the L.M.B. Diecast aluminum boxes, Diamond RH77CA half wave on top or at the end of 50Ω coax attached to a headset. Plug into a 12 to 13.8V source such as a 12 Vdc battery pack. Depending on terrain & receiving antenna DX is typically over 1 mile. Then at home with KLM 440-16X antennas at both ends DX is >22 miles snow-free line-of-sight.

Price only $169 supplied with one crystal on 426.25, 434.0, 427.25 or 439.25. 2nd xtal add $20. Has 2 relay switched crystal sockets. Specify frequency(s) when ordering, check with local ATVers, ARRL Repeater Directory or call us. Sold only to code free Technician class or higher licensed radio amateurs.

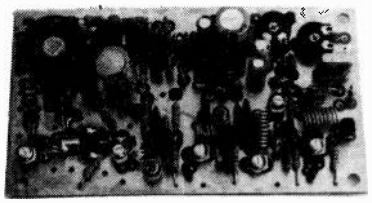
ACCESSORIES:

L.M.B. CAB247 7.3x4.7x2" roomy aluminum box.....**$22**
CAB234 4.6x3.6x2" aluminum box, smaller tighter fit.....**$14**
100 Ohm carbon panel pot for video gain control.....**$5**
TR-1b RF T/R relay module, mounts on chassis N conn.....**$29**
TVC-4G..$89 or TVC-2G..$49 Downconverter (pg 5)
RG174 50 Ohm 1/10 inch dia. coax cable, 6ft.....**$3**
MIRAGE D15N-ATV 1.5 in /15 out all mode amp.....**$176**
MIRAGE D26N-ATV 1.5 in / 50 out all mode amp.....**$249**
MIRAGE D100TVN 1.5 in/70 out all mode amp.....**$359**

DIAMOND RH77CA 2m/70cm omni antenna, BNC, 15"...**$30**
DIAMOND RH951 2m/70/23cm omni antenna, BNC, 15"..**$52**
450 ISOPOLE omni 4 dBd vert. gain antenna, N.....**$89**
KLM 440-6X 8.9 dBd ant., 28" boom, >50 deg. BW.....**$60**
KLM 440-10X 11.2 dBd, antenna, 64" boom.....**$77**
KLM 440-16X 14.2 dBd antenna, 10.5 ft boom...**$139**
UG21 type N male connector for Belden 9913 coax.....**$5**
UG58 N female flange type chassis connector.....**$2**
1000 pF Feed-thru Cap for R/C or repeater builders.....**$4**

SMALL TXA5-RC 1 WATT ATV TRANSMITTER.....$129

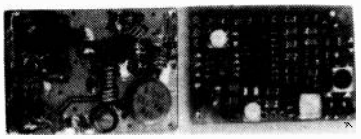
Designed primarily for Radio Control models, rockets, balloons, etc. with it's small 2.25 x 4 inch size and 2 oz. weight. Adjustable power output from 1.5 p.e.p. to 100 mW. Draws 350 MA @ 13.8 Vdc at 1 Watt, 200 ma at 100 mW. Has adjustable sync stretcher and provisions for sound from the FMA5-F board (pg 2) in case your application needs higher power sometimes or subcarrier sound. Comes wired and tested ready for you to mount in a shielded enclosure, connect up coax from antenna and camera and wires to power source. Plan on shielding your R/C receiver and adding the simple antenna low pass filter supplied with the application note. Receive with one of our 70 cm downconverters listed on page 5 and a TV set. Specify freq., 426.25 MHz suggested for R/C, other standard ATV freq. avail.



TXA5-RC 2.25 x 4"

See page 8 for mini cameras

TXA5-70a board can also be used for R/C applications where 2 frequency capability is desired. Same size as TXA5-RC but 80 mw.for .25 to 5 mile DX, or add 10 Watt PA5 amp for 3 to over 100 mile line of sight DX. See page 2....**$89**



ATVM-70 Transmitter MSC-2 Sound

MICROTEK ATVM-70 MINI ATV transmitter board.....$209
Only 1.0 x 1.3 inch, wired and tested board. See article in July 91 73 Magazine page 9. Nominal output 80 mw. Capable of driving the PA5 for higher power. Requires 7.0 to 10.0 Vdc maximum at <100 ma. Only 434.0 MHz is available with the SAW oscillator. Also Great for R/C models, robots, demos or short links. Snow free line of sight DX1/4 mile dipole to dipole or up to 5 miles with KLM 440-16X beam antennas.
MSC-2 companion 4.5 MHz sound subcarrier board, same board size as ATVM70.....**$59**

HAMS, call (818) 447-4565 for your complete 10 page catalog of our ATV products! We have everything you need to get on the 400, 900 and 1200 MHz bands. 4/95

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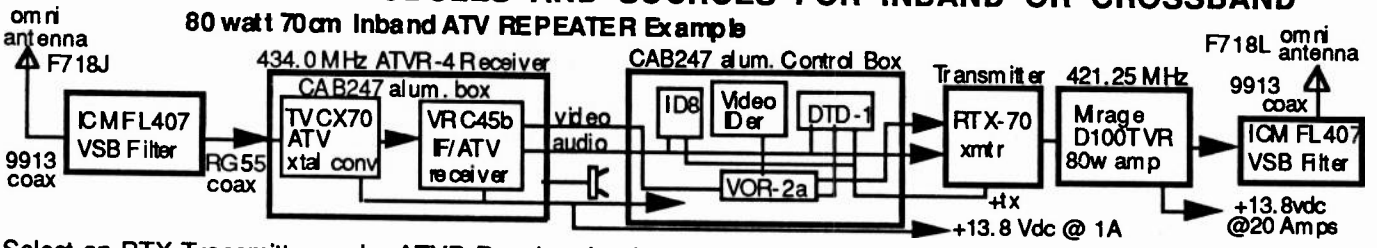
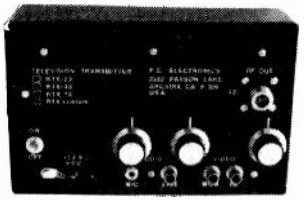
ELECTRONICS

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



Select an RTX Transmitter and a ATVR Receiver for the bands you want, add the appropriate linear amp,VSB filters & antennas, ID & VOR-2a, power supply and coax for your own repeater. We suggest low in / high out for crossband. Ask for a copy of our 8 page ATV Repeater App Note including recommended sources of filters, antennas, video IDers, etc. before you start so you can do it right the first time. Most can put together a good working ATV repeater for under $2000.



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

RTX-70 specify output frequency, 421.25 MHz most popular rptr. output **$279**
MIRAGE D100ATV-R 90 Watts p.e.p on ATV continuous duty 70cm repeater amplifier see page 2 for more info and picture **$539**
RTX-33 specify frequency - 923.25 MHz most used frequency **$329**
RTX-23 specify frequency - 1253.25 MHz best rptr output frequency.....**$329**
We suggest Downeast Microwave for 900 MHz (3318PA) and 1200 MHz (2318PAM or 2335PAM) repeater amps to match our transmitters. Call them at (908) 966-3584.

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

ATVR-4 specify frequency - 439.25 or 434.0 most popular for inband or crossband repeater input **$319**
ATVR-9 specify frequency - 910.25 most popular repeater input.....**$329**
ATVR-12 specify frequency - 1253.25 link, 1277.25 repeater input.....**$349**

VOR-2a Video Operated Relay board...$45, keys RTX upon detection of horizontal sync plus 10 min. & end of transmission momentary relay for switching to video ID to meet FCC regs. Pots for sensitvivity, hang & ID time. 1.75x3.5".
ID-8 Automatic Morse Audio Identifier...$89, Communications Specialists board has 8 programmable and selectable messages up to 200 characters, CW 1-99 WPM, ID time 1-99 minutes, and more features in Non-volatile EEPROM memory. Includes programming key pad. Output up to 4 V p-p. Size 1.85x1.12x.35. Req. 6 to 20 Vdc @ 6 ma.
DTD-1 DTMF Decoder...$59, Communications Specialists board decodes up to 4 programable digits for latched or momentary relay driver output. Use for remote repeater on/off, video switching, etc. Size 2.0x1.25". +7 to 16 Vdc.
LMB CAB 247 7.3x4.7x2 die cast aluminum box. Great for control housing VOR-2a, DTMF and ID boards...**$22**

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

70cm **F718** (L,J,A - specify video carrier frequency) Diamond vertical omni 9.3 dBd gain, 15 ft long.....**$238**
Recommended vertical omni for dual antenna inband 70cm or crossband repeater applications.
440-6X KLM 8.9 dBd gain 420-450 MHz 6 element beam. 28" boom, end mounted.....**$60**
COY4347EL Swiech 10 dBd 420-450 MHz 7 element beam. 4 ft boom, end mounted.....**$60**
440-10X KLM 11.2 dBd gain 420-450 MHz 10 element beam 64 " boom, end mounted.....**$77**
440-16X KLM 14.2 dBd gain 420-450 MHz 16 element beam 10.5 ft boom, center mounted.....**$139**

33cm **FP-19** Comet vertical omni 10 dBd gain, 7 ft 4 in long. Covers 902-928 MHz.....**$119**
3318LYARM Directive Systems 14.2 dBd gain 902-928 MHz beam. 6 ft boom, end mounted.....**$95**

23cm **F1230** Diamond 1200 MHz band vertical omni 11.3 dBd gain, 10.5 ft long **$163**
2424LYRM Directive Systems 16.2 dBd gain 1240-1300 MHz beam. 6 ft boom, end mounted.....**$95**

DOWNCONVERTER DISCOUNT of 10% is available to Repeater groups and clubs if you order 5 or more per item of the tuneable downconverters on pages 4 or 5. Special discount for Teacher Hams who will use ATV in classroom. The order must be sold and shipped to one person at one time. It helps to have some extras available for new people to try out your repeater or use at demos at other clubs and schools. Higher quantity discounts on our mfr. gear: 5-24 =10%, 25-49=15%, 50-99=20%, 100 up=25%.

Page 1 Remember when comparing prices, ours include UPS surface shipping in cont. USA. **4/95**

Hams, call (818) 447-4565 for your 10 page catalog & repeater application note! **4/95**

THE W6ORGy Notes
IT'S OK -IT'S UNDER 100 MILLIWATTS

surveillance was mentioned as a use in a QST article on ATV last year. Teachers no longer have to worry about being compensated while demonstrating ham radio in the classroom - 97.113(c), but they still cannot use it to transmit unrelated subjects, like a lesson on history, etc., to another classroom. Coaches would love to use ATV to transmit video of a game to another location for analysis, but can't do it.

I am all for doing public service events and I think it is the best use of amateur radio and good field experience for emergency communications. But you have to be careful that the event owners or promoters don't suck you into doing their business related communications. Your primary purpose has to be public safety and you cannot transmit their event video as a remote link to a cable company. They may try to convince you that it is ok because it will be on the "public access" channel - don't fall for it. If you take any direction for camera movementsor ask questions on voice from the cable company or media employees, it is probably illegal.

One of the most often I hear from hams is transmitting a church service to people who are sick or cannot make it for one reason or another. Sounds good but churches are a business even if non-profit and therefore a no-no. But the most calls I get from hams and some non hams are public safety organizations. Police and Fire departments can only use Amateur Radio frequencies under RACES rules (97.401 - 97.407). Basically they can do what ever they want as long as it is for disaster preparedness and limited to one hour per week and no more than two 72 hour drills per year. It cannot be used for the normal day to day operations - 97.113(a)(5), and all transmissions must be by an Amateur.

Some police departments cite a FCC rule that allows them to use any public safety frequency with less than 2 watts on a non interference basis and will argue and argue with me about it. While that rule is true, there is no continuous band of public safety channels that is over the 6 MHz video bandwidth below 1 GHz, even if it did not interfere. That rule applies to using voice bandwidth channels.

Lastly, there is broadcasting. Absolutely prohibited - 97.113(b), but those in remote areas, trailer parks, and ethnic communities want to use ATV to retransmit programs from satellite, video tapes or even live programs with "low power to just a few dozen people. While it is widely done in third world countries where there is no equivalent of our FCC and hardly any other transmitters to interfere with, it's strictly forbidden in the USA without a LPTV, translator or broadcast license with type acceptable equipment. CU at Dayton? Tom O'Hara, W6ORG Internet: tomsmb@aol.com

VIDEO ID

Question: Do standards for video ID's cross reference some Part other than Part 97 that I don't have? If you use another transmitter for voice, it probably has to be ID'd separately. I say probably because if you use a separate audio transmitter on the video's audio subcarrier frequency, I would still regard it as one signal and ID once.

We read the rules and concluded that we can ID on the audio channel with a subcarrier transmitter (PC) unit. I'm not sure about separate video and audio transmitters, if they are separate ID's, but what about separate units fed to a combiner and thence to a signal antenna? Where is the boundary? What about the same thing but with both transmitters and the combiner in one box with a single connector on the rear? When in doubt, do what's reasonable.

73, de Kevin, WB2EMS "Coffee...the elixir that makes life possible before noon."

ED: The rules allow the video ID to be in virtually any form. You can ID in plain video by holding a QSL card up, or generating a computer ID, or any other graphical means, or you could have a vertical interval alpha numeric ID such as the video inserter available from High Technology Flight, or you can ID on the audio carrier or subcarrier.

2 LOOP DISH FEED FOR 2.4 GIGS

by KF6YN, AL
from ATN Newsletter

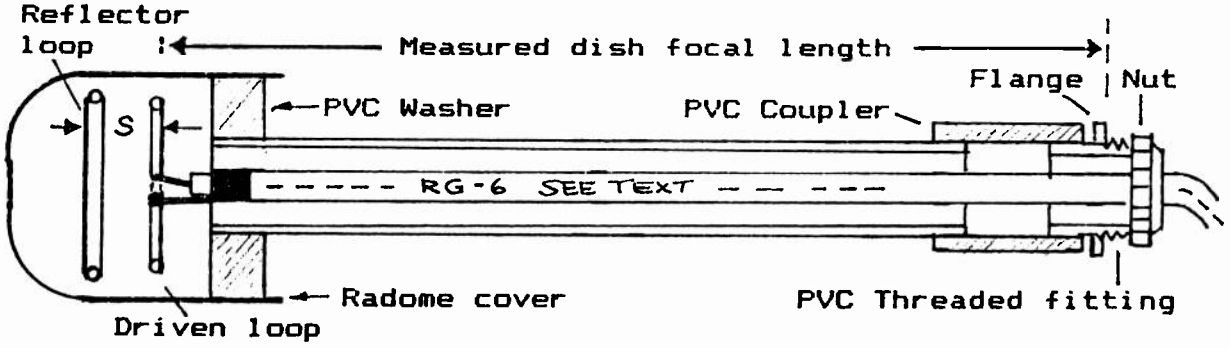
The length of the 2-loop feed assembly is determined by the measured focal point for the parabolic reflector selected. Typically 23 inches of RG-6 foam coax cable will be long enough for most 3 foot dishes.When properly adjusted the return loss will be between 20 to 25 dB. The spacing from the reflector loop to the driven element determines both the illumination and the return loss. The best spacing will be between 1/4 to 1/2 inch between the two elements.

The length of the foam coax matching section should be an odd number of quarter-waves to obtain the best return loss. This should be determined by using an 82 Ohm noninductive resistor in place of the loop driven element. Once the best return loss or SWR) has been obtained, remove the resistor and connected to the loop driven element. Add 1/2 inch to the element and again check the return loss. Trim if necessary for the best return loss.

A 1/2 inch length of 3/8 inch diameter of copper tubing is placed around the coax braid about 1/4 inch from the driven element. The driven loop is made from No. 12 copper wire and is 4 15/16 inches in length. The reflector loop is also made from No. 12 copper wire that is 5 1/2 inches long.

The support for the radome cover is fabricated by cutting off a one inch length from a PVC reducer adaptor (1 1/2 to 1 inch). The ring of PVC fits nicely over the 1 inch PVC pipe that will support the coax and dipole feed element. It will also be used to support the radome cover with reflector loop inside.

After the focal length dimension has been determined, a PVC straight coupler is used to join to the threaded PVC 1-inch fitting. This fitting is inserted through a hole in the dish reflector and is held in place with a conduit nut. Nearly any plastic cup will serve as a radome cover. Be sure to water proof the assembly but allow a small drain hole on the underside of the cover to be on the safe side.



Text edited and diagram re-drawn by Bill Parker W8DMR

A 13CM GaAsFET POWER AMPLIFIER DEVELOPED USING THE 'PUFF' CAD SOFTWARE PACKAGE

Transistorized power amplifiers for the frequency range between 2,300 and 2,400 MHz have frequently been described in recent years. (1)(2)(3)(4)(5)(11)

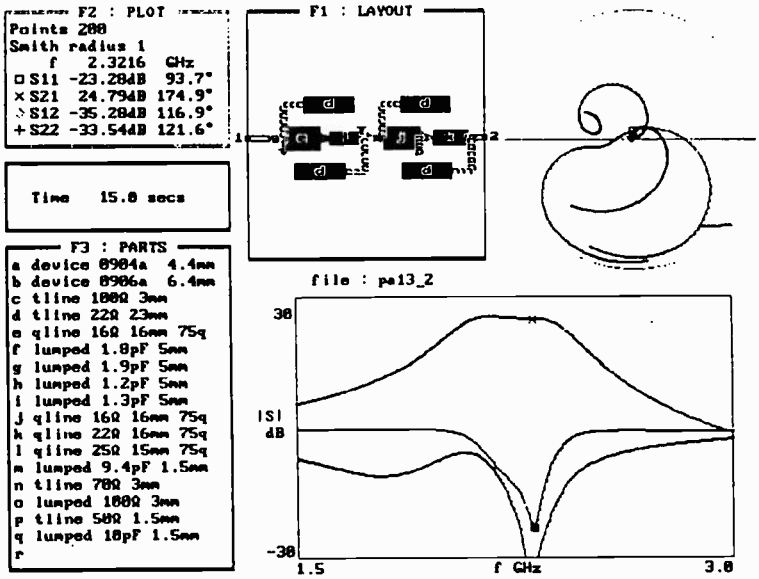
The 2-stage power amplifier introduced here supplies an initial output of 5 Watts as 23 dB amplification in the 13cm band.

1. INTRODUCTION

The circuit was developed using the PUFF CAD software package, which makes it amazingly simple to calculate and simulate even relatively complicated microwave circuits. Several publications (7)(8), together with our own research, have already put the capability of the low-cost software used to the test, so that very positive results were to be expected.

The goal of the project was to develop several amplifiers using the software, build them, and compare the readings with the simulated values. Three different types of amplifier were involved in this project, with different performance figures varying from 4 to 12 Watts in the given frequency range.

The following article describes the selection of semi-conductors, the simulation/analysis of the amplifier circuit using the CAD software, the building of the 5 Watt amplifier and the readings obtained.



The transistors used in the amplifier were Mitsubishi type, from the 0900 range for UHF power amplifiers. They were, in actual fact, N-channel Schottky GaAs power FET's, which had already been successfully used in the construction of several circuits (6)(11), and which could be obtained at relatively low cost. Their power spectrum stretched from 0.6W (the 0904 type) right up to 10W (the 0907 type) for amplification levels of between 8 and 13dB, depending on type and frequency.

The performance figures targeted by the development:

Amplifications:	>20 dB at k>1
Output:	min 5 W at
	max 1dB compression
Band width:	100 MHz

$Z_{in}=Z_{out}=50$ at return loss > 20dB

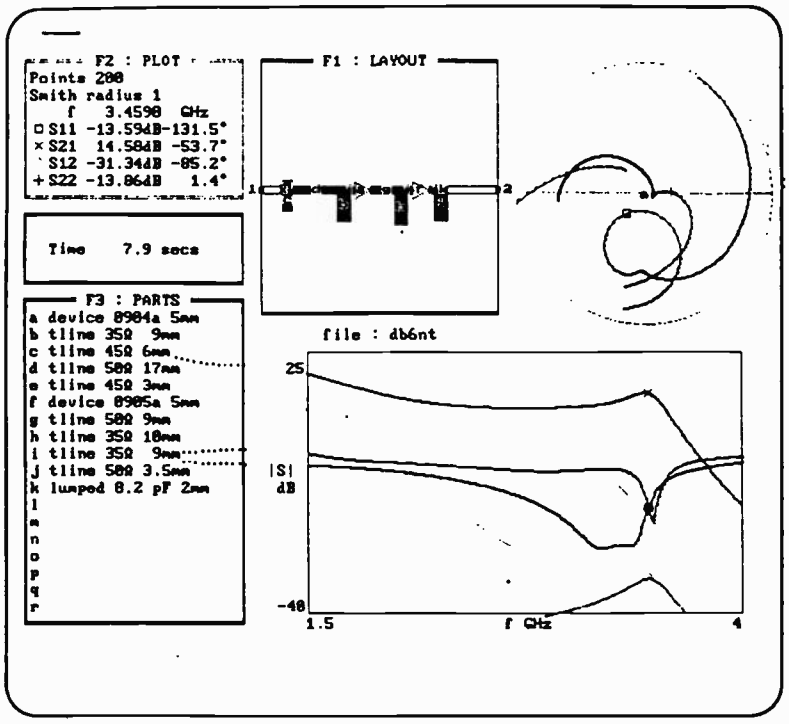
could therefore be attained only with a 2-stage amplifier.

The type 0906 seemed a suitable high-level stage transistor. It displayed particularly high operational thermal stability because of its large ceramal housing and, in contrast to the 0905, which was usually running under strain, easily supplied 37dBm = 5W at 1dB compression, thus guaranteeing stable operation with permanent output - e.g. for ATV transmitters. The type 0904 was a suitable driving transistor, because it displayed a high level of amplification (13dB) for a compression-free output amounting to almost 28dBm = 630mW. The S-parameters of the selected transistors required for the development of the circuit came from the Mitsubishi data bank, and applied under the following DC conditions:

MGF0904: UDS = 9 V at ID = 0.2A
MGF0906: UDS = 10V at ID = 1.1A

The efficiency of these transistors was normally about 40%, so that a DC input power of more than 12 Watts was required in operation, and the resulting power loss had to be dissipated through a heat sink of sufficiently large dimensions.

A 13CM GaAsFET POWER AMPLIFIER

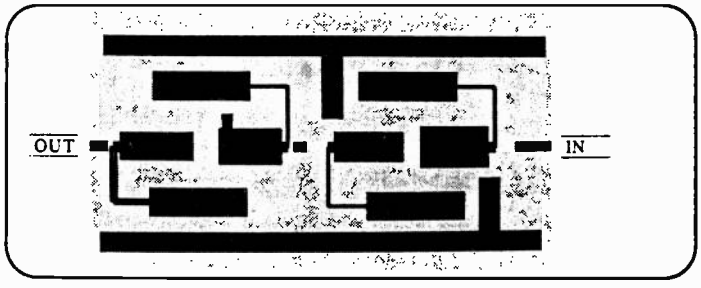


The method of functioning and the operation of the PUFF CAD software are comprehensively described in (7)(8)(9), so here we shall merely list and analyse the results obtained. Fig. 1 shows the screen dump from PUFF with the draft layout of the circuit, the associated Smith diagram, the parts and the paths of the scatter parameters over the frequency range selected (1.5 to 3.0 GHz). The plot window (top left) also shows the size and phase of the scatter parameters for the selected operating frequency (2.3216 GHz) in the order:

- input impedance (S11) with return loss value
- amplification (S21)
- feedback (S12)
- and output impedance (S22) with return loss value.

The stability factor of the amplification circuit at the operating frequency can be determined from the calculated scatter parameters. The theoretical relationships required for this can e found in (10). Determining the absolute stability (K>1) using this factor has been tried and tested as best for normal HF amplifiers, so that from knowledge of the scatter parameters the frequency range over which the circuit will be stable can easily be indicated. A quadripole (amplifier) is absolutely stable if it always remains stable whatever the adapted load at the input and output and never self-excites.

3.SIMULATION AND ANALYSIS OF AMPLIFIER CIRCUIT USING CAD SOFTWARE



The gain slope obtained S21) as a function of the frequency showed a marked resemblance to that of a coupled band filter. This characteristic was obtained, firstly, through the lengthwise layout of the transmission lines (qlines/tlines) for each stage and secondly, through the 50 coupling of the two stages.

With the lamina-disc method on the other hand, previously used frequently by the author for circuit matching, there is usually a gain slope like a deep pass - less reduction in amplification at low frequencies, maximum at the frequency to be transformed, and a more or less sharp reduction thereafter. This happens because the laminae, soldered on crosswise, act like stubs, which have either an inductive or capacitive influence, depending on the frequency and length.

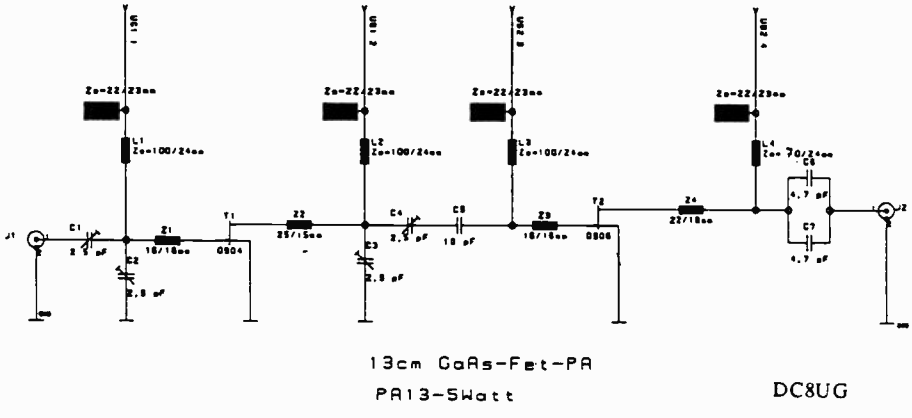


Fig.4: Circuit of the 13cm GaAsFET Power Amplifier

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FINAL CHECKOUT OF STS 37 ATV GEAR FOR SAREX. NASA Photo.

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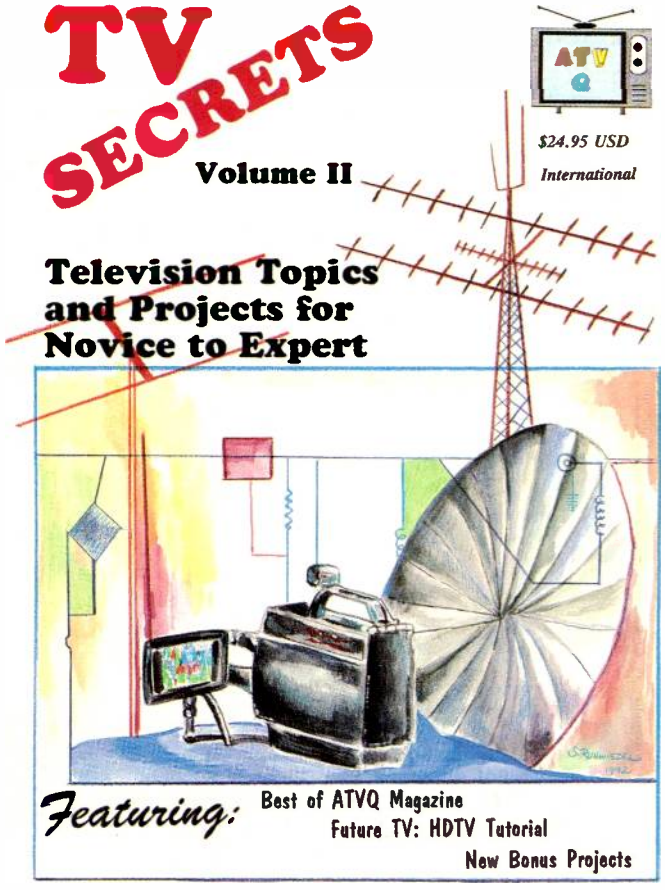

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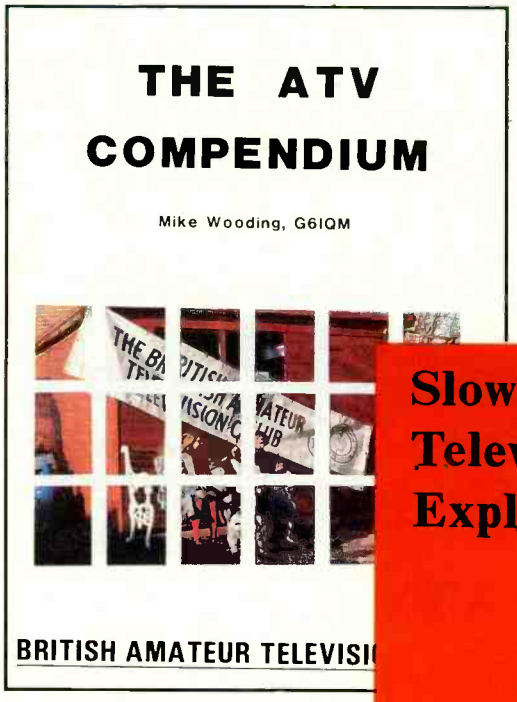

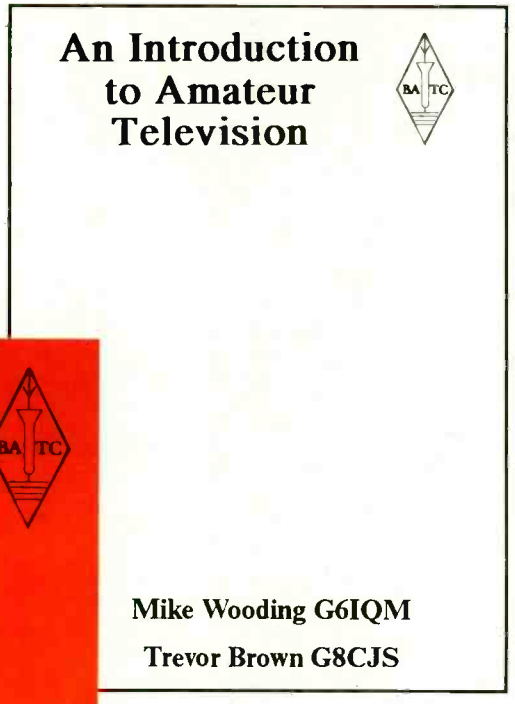

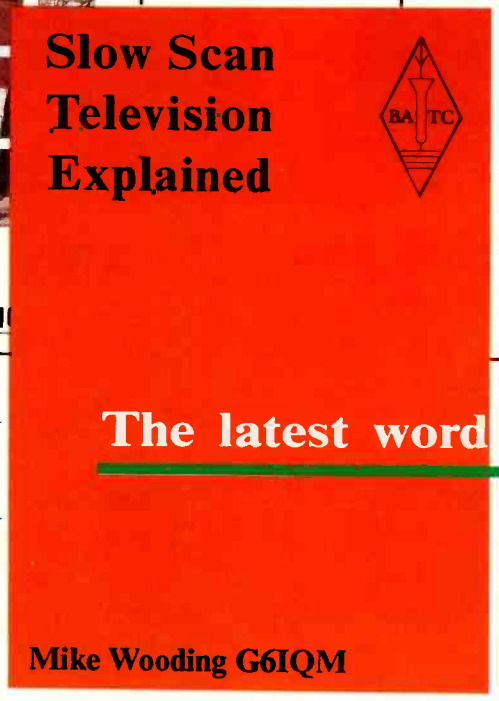

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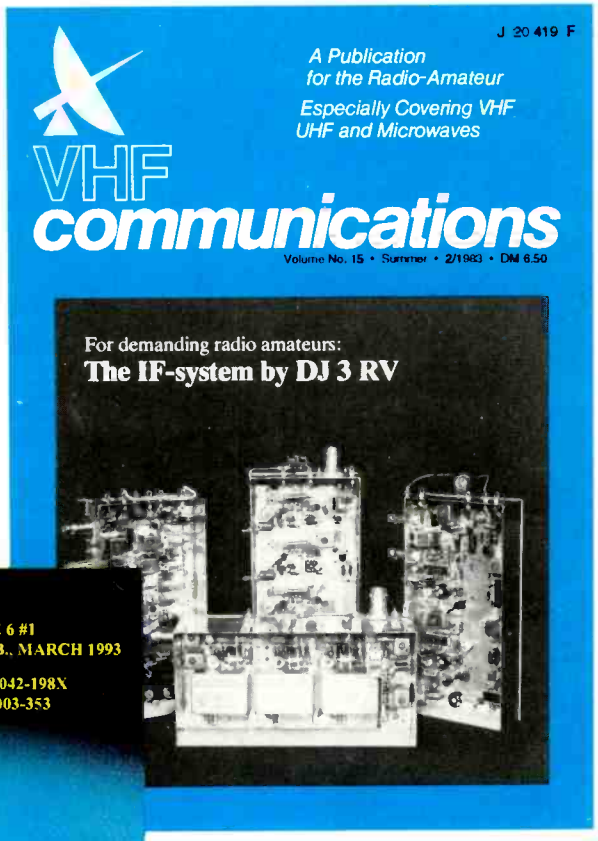

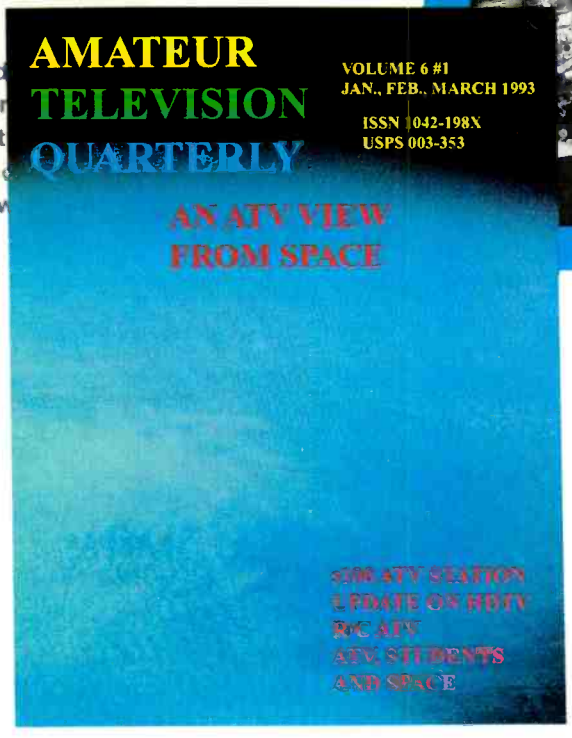

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A 13CM GaAsFET POWER AMPLIFIER

NAME	TYPE	VALUE	STYLE	COMMENTS
C1TC	2.5pf		Teflon/Ceramic	Trimmer
C2TC	2.5pf		Teflon/Ceramic	Trimmer
C3TC	2.5pf		Teflon/Ceramic	Trimmer
C4TC	2.5pf		Teflon/Ceramic	Trimmer
C5C	10pf		Tekelec-Chip	Capacitor
C6C	4.7pF		ATC-Chip	Capacitor
C7C	4.7pF		ATC-Chip	Capacitor
J1	N			N-Connector
J2	N			N-Connector
L1	TL	Zs= 100/24 mm	Stripline	Trans-Line
L2	TL	Zs= 100/24mm	Stripline	Trans-Line
L3	TL	Zs= 100/24mm	Stripline	Trans-Line
L4	TL	Zs= 70/24 mm	Stripline	Trans-Line
T1	FET	0904	Mitsubishi	N-GaAsFET
T2	FET	0906	Mitsubishi	N-GaAsFET
ZSTL	Zs= 22/23mm		Stripline	Trans-Line
Z1	TL	Z= 16/16mm	Stripline	Trans-Line
Z2	TL	Z=25/15mm	Stripline	Trans-Line
Z3	TL	Z=16/16mm	Stripline	Trans-Line
Z4	TL	Z=22163mm	Stripline	Trans-Line

Fig.5: Component List for the Amplifier

To make this clearer, Fig.2 shows the simulated frequency response curve in accordance with a circuit published in (6) for the 9cm band, with 0904 and 0905 transistors, without DC choking. With slight modifications to the circuit, this amplifier can also be operated at 13cm without problems, as shown by an article in (11), though of course at considerably less than 20dB amplification.

The readings shown in Fig.1 gave the following output values for the draft circuit:

- Return loss input: -23dB
- Return loss output: -33dB
- Amplification at 2,320 MHz: 24.8dB
- Feedback: -35dB
- K-factor at 2,320 MHz: 5
- Band width (-3dB): -280/+120 MHz

Fig.3 shows the layout generated by the CAD software as a print-out from a laser printer for Teflon-based material with a substrate thickness of 0.79mm. The subsequent introduction of a correction factor to generate a precise photographic model is thus possible. The reversed image is pictured, as generated on the exposed board.

The tracks on the longitudinal board side are earth surfaces inserted subsequently, which are through-hole plated to the earth surface when the circuit is assembled.

In the parts list in Fig.1, we can also recognize the discrete modules required for the circuit under the description of "lumped". These are capacitors and resistances which are required for the circuit to operate. In this connection, Fig.4 shows the HF circuit diagram and Fig.5 the parts list.

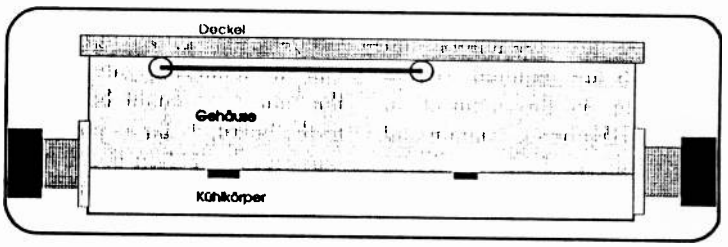
4. ASSEMBLING THE AMPLIFIER

The amplifier circuit was built on a Teflon board (er = 2.33) with dimensions of 109 x 54 x 0.79 (mm) For its part, it was screwed to an aluminium cooling body (110 x 100 x 10mm), which was used for fastening and as a heat sink for the power transistors and voltage controllers (Fig.6)

The use of epoxy resin based material was excluded, since power amplifiers in this range already produce dielectric losses of 20% (app. 1dB), i.e., a loss of 1W at 5 Watts output.

So, compared with the costs of the transistors (app. DM 60/Watt), it would be a false economy.

The DC power supply system was assembled on an epoxy board, coated on both sides (91 x 20 x 1.6mm), which was vertically soldered to the longitudinal side of the housing (Fig.6) within. Its circuit corresponded to the one published in (6).



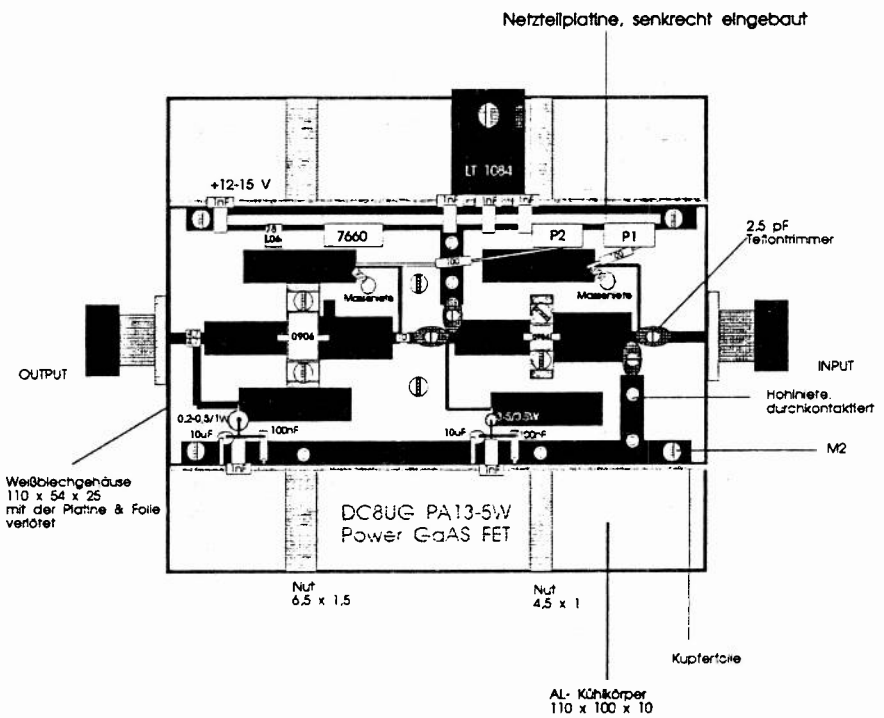
Figs. 7, 8 and 9 show the screen , layout and parts list for this power supply. The components are mounted on the foil side, so that the earth surfaces have to be through-hole plated.

Grooves were milled in the heat sink so that the drain and gate connections of the transistors could be soldered flush to the board, as far as possible. For this purpose, the Teflon board had recesses measuring 4.4 x 17 (mm) and 6.4 x 22 (mm), into which the transistors were inserted and then screwed to the heat sink (see Fig.6). There was also a copper foil between the board and the heat sink (115 x 57 x 0.08mm), which was later soldered to the tinplate housing. It provided a very good earth connection between the transistors, the board, the housing and the heat sink.

Before the board was mounted, the earth surfaces had to be through-hole plated with 2mm copper (hollow) rivets. At least 4 rivets per longitudinal side and earth connector are required for this (see Fig.6).

The board was fastened to the head sink at 6 points, using M2 screws. The transistors each required 2 threaded holes in the baseplate for the source connection, which were best provided, true to dimensions, with the help of a piece of cardboard which corresponded to the transistor dimensions.

The dimensions of the tinplate housing were 110 x 55 x 28



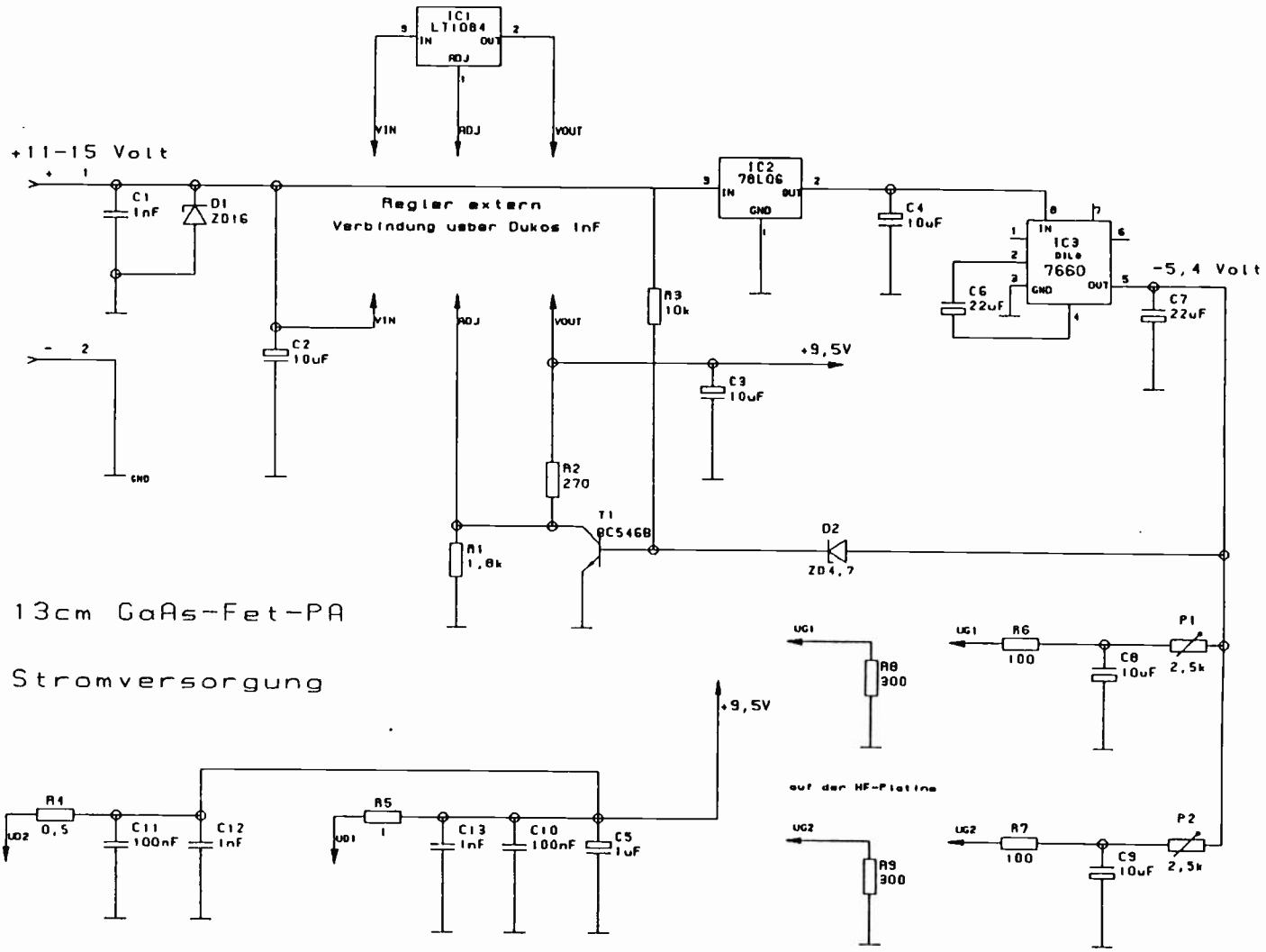
Fig's.6a& b: Side view of mechanical structure and the Component Placement and Assembly plan
(Deckel = cover; Genhäuse = housing; Kühlkörper = heatsink Netztellplatine, senkrecht wingebaut = PSU board, vertically mounted; Weißlechhgehäuse = tinplate housing; mit der platine & folie verlötet = soldered to board and foil; Nut = slot; Hohlniete durchkontakiert = hollow rivet, through-hole plated; AL - Kühlkörper = Al heatsink; Kupferfolie = copper foil

(mm) and before assembly it was provided with the necessary bores for the feedthrough capacitors and recesses for the N-sockets. The housing itself was then soldered together, and soldered to the longitudinal sides of the screwed-on board. The soldered-on sockets could then be screwed to the heat sinks on the front faces as well.

The best insertion and commissioning procedure is as follows:

NAME	TYPE	VALUE	STYLE	COMMENTS
C1	C	1nF	Feedthrough	Capacitor
C2	EC	10uF	Tant/16V	Electrolytic
C3	EC	10uF	Tant/16V	Electrolytic
C4	EC	10uF	Tant/16V	Electrolytic
C5	EC	1uF	Tant/16V	Electrolytic
C6	EC	22uF	Tant/10V	Electrolytic
C7	EC	22uF	Tant/10V	Electrolytic
C8	EC	10uF	Tant/10V	Electrolytic
C9	EC	10uF	Tant/10V	Electrolytic
C10	C	100nF	Sibatit	Capacitor
C11	C	100nF	Sibatit	Capacitor
C12	C	1nF	Feedthrough	Capacitor
C13	C	1nF	Feedthrough	Capacitor
D1	Z	ZD16	Zener Diode	
D2	Z	ZD4.7	Zener Diode	
IC1	LT1084		T0247	Low drop reg
IC2	78L06		TO92	+ve Regulator
IC3	ICL7660		DIL8	-ve Regulator
P1	P	2.5k (2k)	Piher/Cermet	Potentiometer
P2	P	2.5k (2k)	Piher/Cermet	Potentiometer
R1	R	2k (22k II 2.2k)	Metal film	Res, 2.2x6.3mm
R2		R 270	Metal film	Res, 2.2x6.3mm
R3	R	10k	Metal film	Res, 2.2x6.3mm
R4	R	0.2-0.5 /1W	Metal film	Res, 2.2x6.3mm
R5	R	3 -5 /0.5W	Metal film	Res, 2.2x6.3mm
R6	R	100	Metal film	Res, 2.2x6.3mm
R7	R	100	Metal film	Res, 2.2x6.3mm
R8	R	300	Metal film	Res, 2.2x6.3mm
R9	R	300	Metal film	Res, 2.2x6.3mm
T1		NPN BC546B	SOT54	NPN Transistor

A 13CM GaAsFET POWER AMPLIFIER



- Assemble and mount power supply board
- Gate resistances (R6, R7) should already be soldered onto power supply for better mounting (see Fig.8)!
- Assemble and wire up the 6 feedthrough capacitors (1nF) and the blocking capacitors C3, C5, C10, C11
- Fasten (insulation!) and connect up voltage controller by means of feedthrough capacitors
- Mount and connect up resistances (R4, R5, R8, R9) to and on HF board
- Mount trimmers (C1, C2, C3, C4)
- Mount chip capacitors (C5, C6, C7)
- The power supply (UG and D) can now be tested.
- Mount GaAsFET's

The static current levels can now be set:
0904 - ID = 0.2A; 0906 - ID = 1.1A

Note: for continuous operation in unfavorable conditions, it is advisable to mount the amplifier on an additional heat sink (e.g. the housing wall), to ensure stable operation.

5. READINGS

The prototype amplifier was constructed so that a 5 Watt output could be achieved with an input of 28mW at 2,320 MHz. The measurement was carried out using a type HP 432 Wattmeter and a 30dB attenuator from Narda.

Fig.10 shows the transfer characteristic of the amplifier.

At 5 Watts output, the compression range begins, i.e. a further increase in power leads to a considerable worsening of the inter-modulation interval; (1dB compression -33dB$_{in}$).

Fig.11 shows the power amplification at an input 10mW over the frequency range.

Curve A shows the measured gradient arising if the amplifier is tuned to 2,320 MHz.

Curve B shows the gradient obtained through simulation, in accordance with Fig.1.

Consequently, the amplifier has a band width of 300 MHz. Its amplification reduction at the band limits is of course somewhat

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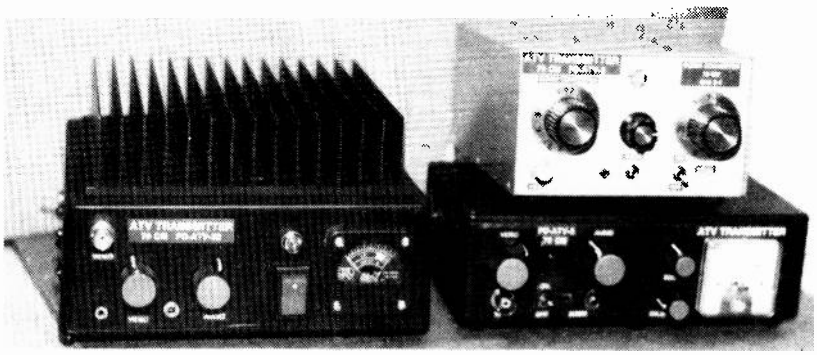

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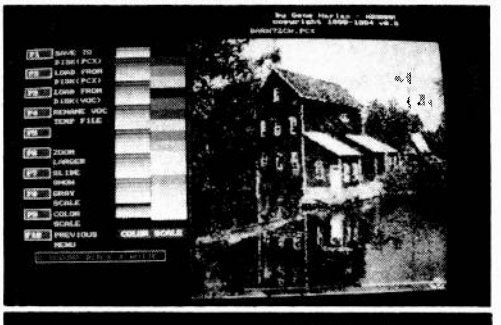

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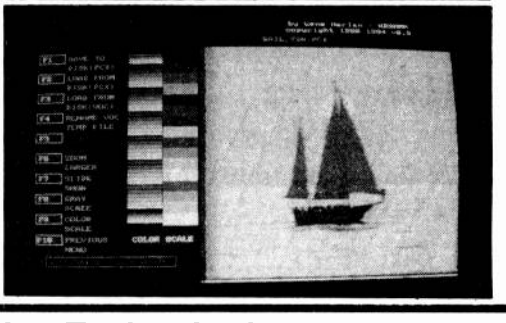

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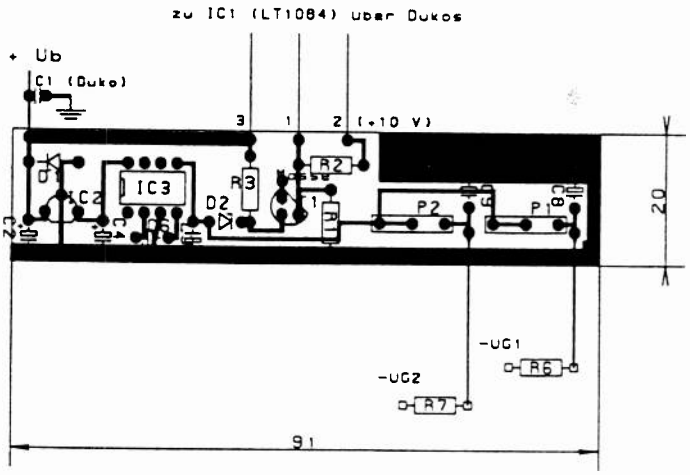
A 13CM GaAsFET POWER AMPLIFIER

less than in curve B. The reasons for this are the losses conditional on the circuit, which can not be covered completely by simulation.

The linear amplification of 2dB obtained is only slightly different from the calculated value. If the amplifier is broad-band tuned, so that its course corresponds to curve B, the amplification falls by about 1dB (20%) as the band width increases.

To sum up, we can say that using PUFF low-cost software to develop simple integrated high-frequency circuits can be highly recommended. true, the efficiency is very much reduced by comparison with high-end products such as, for example, Super-Compact, but the results obtainable are more than adequate for the amateur sector.



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Note: The PUFF software package is available from KM Publications 5 Ware Orchard, Barby, Nr. Rugby, Warks, UK CV23 8UF

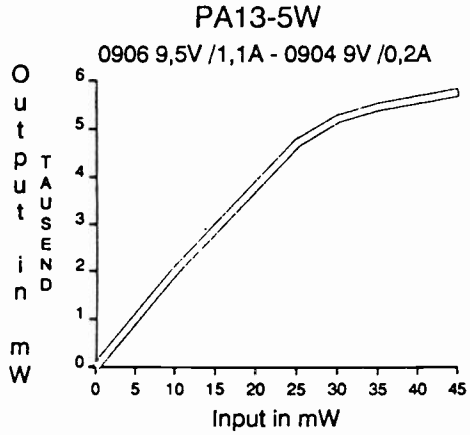

Fig.10: Transfer Characteristics of the Amplifier Tausend = thousand)

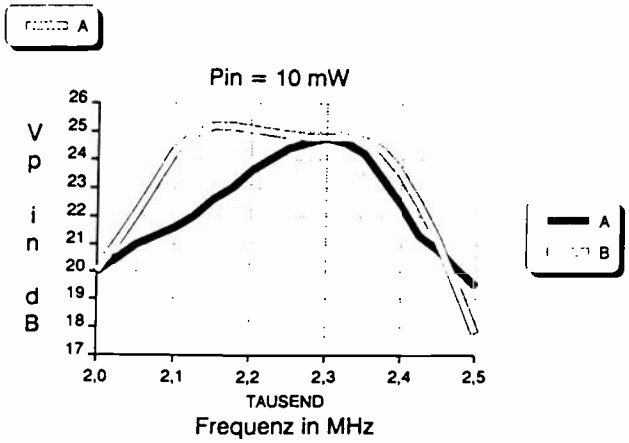

Fig.11: Comparison of Measured and Simulated Power Amplification (Leistungsverstärkung)

NEW VIDEONICS "EDIT SUITE" A/B ROLL EDIT CONTROLLER OFFERS UNPRECEDENTED VALUE AND PERFORMANCE:

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CAMPBELL, Calif., Jan. 10 -- Videonics (NASDAQ:VDNX) today introduced a major breakthrough in the field of video editing devices.

The new Videonics Edit Suite is the first low-price, universal A/B roll edit controller. It allows users to easily and affordably create video productions that rival those produced in professional editing studios. With a suggested retail price of $699, Videonics will begin shipping Edit Suite in Spring '95.

When used in conjunction with Videonics' MX-1 Digital Video Mixer, the Edit Suite is capable of either manually or automatically controlling up to four source VCRs and a recording VCR, effectively making it an "A/B/C/D edit controller." It is also compatible with other 3rd-party mixers. (When used by itself, Edit Suite operates as a single source, cuts-only editor with two separately programmable GPI ports.) Advanced features such as separate audio or video inserts, audio and video split edits and video edit preview/review are supported when connected to VCR's containing these capabilities.

A weighted, professional quality jog/shuttle wheel provides accurate and positive control of video tape whether advancing at 10x play speed or frame by frame. By adding a Videonics TitleMaker 2000, users can include professional-style titles in their productions as well.

"Since the day we introduced the MX-1, customers have been asking for an A/B roll edit controller to go along with it. The Edit Suite is the natural extension of the Videonics line," noted Videonics' Jack Aiello. "By delivering unprecedented price/performance value with the features of controllers costing thousands of dollars more, it bridges the gap between the professional and amateur videographer."

Videonics offers the industry's most complete line of home video production equipment. Videonics products are available in over 1,000 dealer locations and mail-order catalogues, as well as internationally in 49 countries.

CONTACT: Videonics
Jack Aiello, 408/866-8300
or
Dobbin/Bolgla, Associates
Sara Trujillo, 212/388-1400

SSTV PROGRAM AVAILABLE

Subject: EZSSTV Date: 95-04-02 From: k2ga@ACY.DIGEX.NET (Michael Ward)

For those of you who are interested in Slow Scan TV on the ham bands, there is a really nice little program (799138 bytes!) available as EZSSTV.ZIP If anyone is interested, please let me know and I will tell you more.

73 de, K2GA

* Michael Ward, Millville, NJ (609) 327-2188 * * k2ga@acy.digex.net (INTERNET)
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RF SHIELDING

John Battison, P. E.

The other day, a young engineer asked me what a Faraday shield was. Apparently he has come across a peculiar RF device with a vertical metal grid placed between two coils. Someone had told him it was a Faraday Shield, but didn't tell him how it worked. Our subsequent discussion ranged into the topics of skin effect, RF radiation And a RF shielding, and it is summarized in this month's column.

Skin effect produces some strange results at times and always should be considered when working with RF especially high-power RF. Two fields are involved in RF transmission: the E field (electrical lines of force) and the H field (magnetic lines of force surrounding a flowing current). Whenever electrical energy moves, these fields are produced and, together, they are know as electromotive energy. The E and H lines of force are always at right angles to each other, and the electrical energy always moves at right angles to both fields.

You might be inclined to say "So what?" Actually, these two fields have a great affect on our RF operations. The basic result of skin effect is power loss due to heating of an RF-carrying conductor. It is helpful to understand how these losses occur: We think of E lines of force as being perpendicular to the axis of the conductor. In fact, they turn out to be not quite so, but might be considered as "dragging their feet" or "leaning forward," like the wave front from a vertical antenna, which becomes tilted as ground losses cause the "bottom" of the wave front to drag behind the "Top."

Because of the tilt, the radially moving E field that surrounds the conductor actually enters it the conducting material" short circuits" the electric lines of force. As always, when an electric field moves a charge through a conductor, a current (and therefore an I^2R loss) is generated. This energy is deducted from the total power applied to the conductive path, and thus, the power loss is explained. This current also produces a magnetic field in opposition to the H fields and, thereby, tends to reduce it.

This shows that skin effect can be measured in physical units. The current density in the conductor follows the same attenuation law as the change in voltage or current along the line. Such an exponential decrease enables us to determine the effective skin thickness, which is used to calculate the resistance of paths at radio frequencies.

At 100Hz, the effective skin thickness of copper is 0.260 inches, while at 1kHz it is 0.0826 inches and at 1MHz it is 0.00260 inches — indicating that the lower the frequency, the more current flows through the center of the conductor. As frequency increases, more current moves to the outer surface of the conductor, and eventually, almost no current flows in the center of the conductor. At 1MHz, a solid copper cylinder has the same RF resistance as a half-inch copper pipe. So we use silver-plated copper tubing in RF systems and save a lot of money and weight.
Too close for comfort

Another strange peculiarity of RF in conductors is the proximity effect. When conductors are close together, this phenomenon results from a distortion of the surrounding fields and the concentration of current at these points. The smaller the separation, and the larger the conductors, the greater the proximity effect. As you might expect, this effect is extremely strong inside inductors. The current in an inductor tries to follow the path of least inductance, which exists at the smallest (i.e., innermost) diameter of coil. An interesting result is that the coil's RF resistance is about three times that of the same conductor if it were straightened.

When I was introduced to the wonder of radio in the early 1920s, the medium- and long-wave stations were all that existed (apart from a few hams). Regard for the proximity effect caused most makers of broadcast radio coils to Litzendralwire. It consisted of a number of extremely fine (small gauge), individually insulated wires, woven or cabled together to form a single strand. It was necessary to remove the silk insulation from each individual wire before soldering to a lug. The theory of operation is that the total RF resistance will be less than the equivalent-sized solid wire, because the current is distributed equally among the individual wires. You don't see much "Litz" wire these days, except in a few chokes and other special devices, or in some audiophile speaker cables.
As the electron turns

Have you ever wondered why flat straps are used instead of braided wire for connections to antenna-circuit inductors? It's because of the possibility of appreciable RF resistance at radio frequencies and a greater inductive effect from "round" wire.

On the other hand, if you pass an RF current-carrying conductor through a metal ring, the same amount of current that's in the conductor will flow through the ring. The current is said to be flowing around the ring in a toroidal direction — or like a doughnut. It is at right angles to the plane of the conductor.

This principle is applied when ferrited beads are placed around equipment leads to keep out unwanted RF voltages. Sometimes when equipment is repaired, these little beads are lost or not put back. (Perhaps the person doing the work didn't know their purpose.) It is surprising how much difference this omission can make in operation.

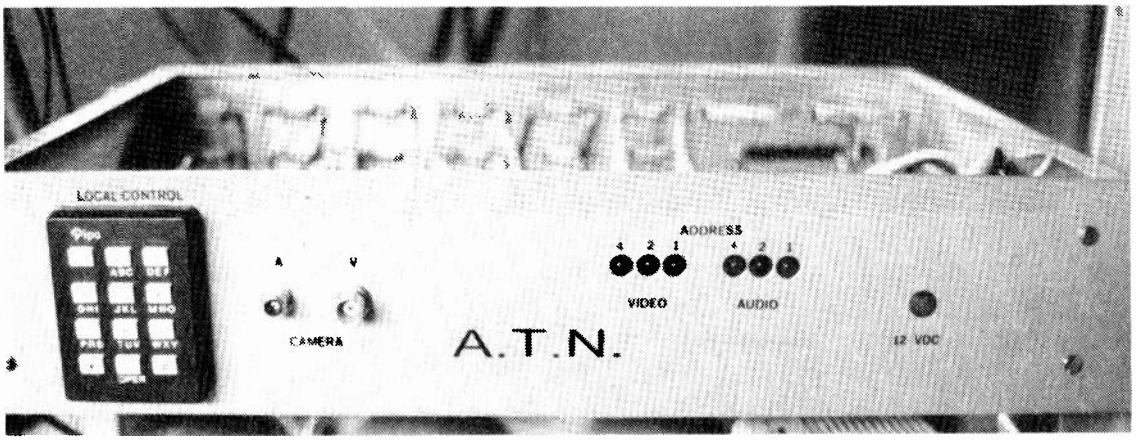
FROM BROADCAST ENGINEERING, December 1994.

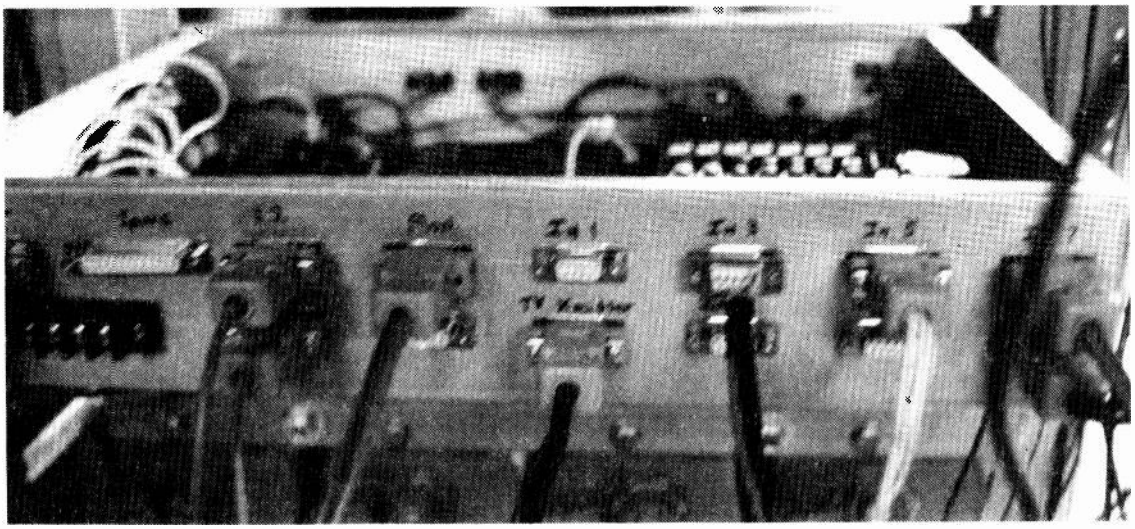
KB7BY ATV REPEATER CONTROLLER

This is a description of the controller used by A.T.N. affiliate ATV repeaters. It consists of two components, a 7 input sync detector and a 9 input video/audio switch. I will first describe the operation of the sync detector.

Video from each video source is looped through the sync detector board by means of 4 molex type connectors, 2 for video signals in, and 2 for video signals out to video/audio switch. Video is tapped off of this loop and applied to a low pass filter which strips off frequencies above 20 Khz. The remaining signal, consisting mostly of sync information, is applied to one of seven LM1881 sync separator integrated circuits. The horizontal sync signal output is used and this signal is passed on to the classic LM567 tone decoder integrated circuit which is set to detect 15.734 Khz. The 567 tone decoder upon detection, produce an active low logic signal. This active low signal then passes to a nand gate configured as a transmission gate. For a sync detected logic signal to be output, an enable signal must be present to the transmission gate. This enable signal can be provided by a simple switch or ideally a D.T.M.F. decoder, thus allowing for on/off control of each sync detector. The sync detect signal then leaves the board through a molex type connector for use by the video/audio switch. The sync detector board also contains a 10 minute I.D. timer, transmit delay and hang time (fully adjustable), and a S.P.S.T. relay with isolated contacts for transmitter keying. Control lines are also provided to cause beacon mode operation and turn system off.

The video/audio switch is based on the Maxim 455 and 453 video switches. These have excellent cross talk and bandwidth characteristics, and can directly drive a 75 ohm load to 1 volt peak to peak. The switch has 9 video inputs and 8 audio inputs. The video signals arriving from the sync detector board are input to the switch by a Molex type connector. The video inputs are D.C. coupled and terminated at 75 ohms. Audio lines are input to the board by a Molex type connector, and are also D.C. coupled. Level set potentiometers on the board allow each audio input to be set individually. Active high sync detect signals from the sync detector are applied to the switch where they are processed by 2 priority encoders. Each encoder generates a 3 bit address which is used by the video and audio switches. This 3 bit address selects the appropriate input channel to be output to the transmitter. It also establishes a priority, for example, video activating sync detector 6 causes a 110 binary address to appear on the input select lines of the 455 switch. If video simultaneously appears on input 7, the priority encoder outputs a 111 binary address and switch 7 is selected. Video appearing on input 7 now makes its way to the transmitter. This concept applies to all video inputs (6 replacing 5, 5 replacing 4, etc.) except for the video I.D. input which is controlled by I.D. timer, regardless of priority encoder status. Typically in a normal installation, video and audio switch together (video 7 with audio 7, etc.). However, if it is desired, the two





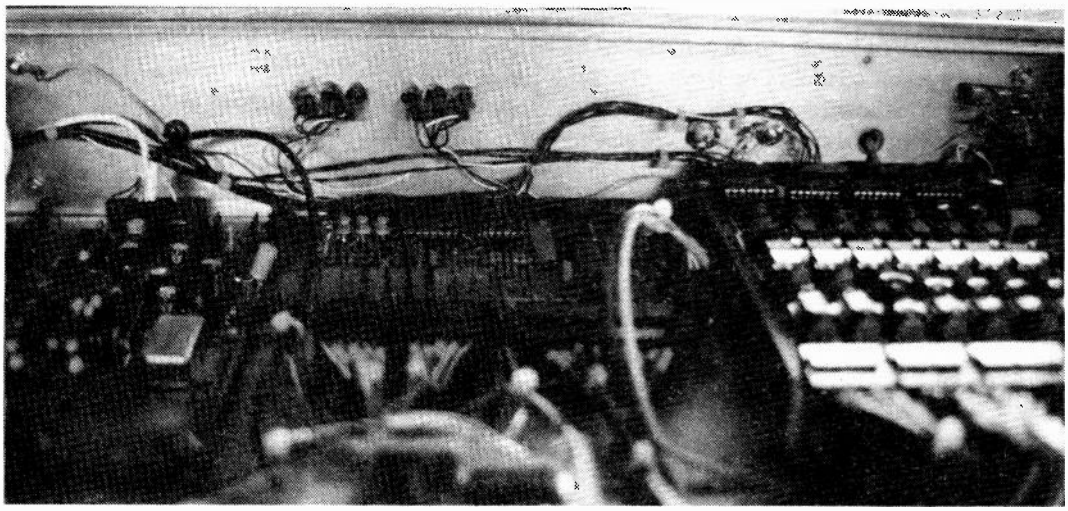
KB7BY ATV REPEATER CONTROLLER

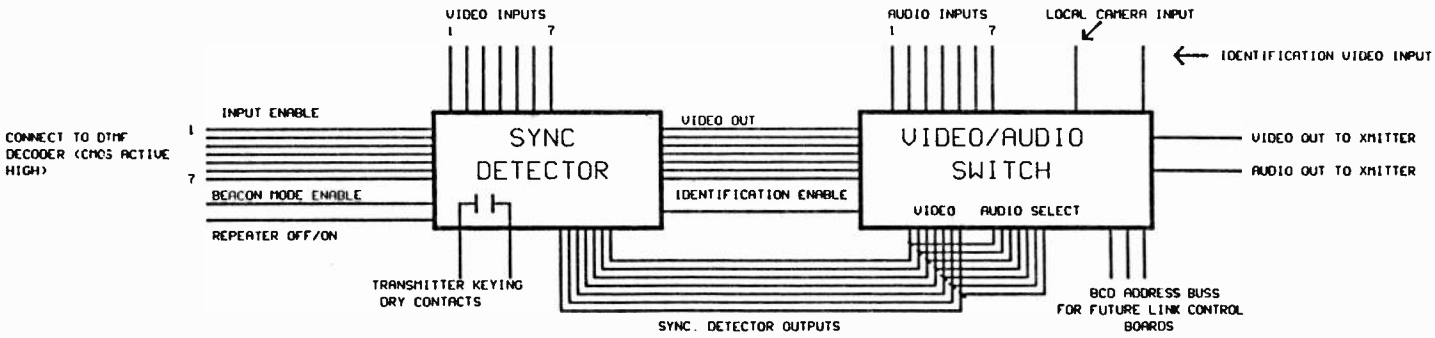
switches can be separated and inputs can be enabled separately.

The KB7BY ATV repeater in Las Vegas, Nevada uses the following priority scheme:

Input 7	913 Mhz FM Input
Input 6	434 Mhz AM Input
Input 5	2.4 Ghz FM Input
Input 4	2.4 Ghz FM Link Input
Input 3	10 Ghz FM Input (future)
Input 2	Amiga 500 visual telemetry computer (future)
Input 1	Tower mounted camera
Input 0	Spare

If there is sufficient interest in PC boards, PC boards with all components installed, or complete controllers can be provided. Printed circuit boards are double sided and have separate analog and digital ground planes. All video and audio traces are separated from each other by ground planes. A 16 output microprocessor controlled D.T.M.F. decoder with user programmable site prefix is under development.





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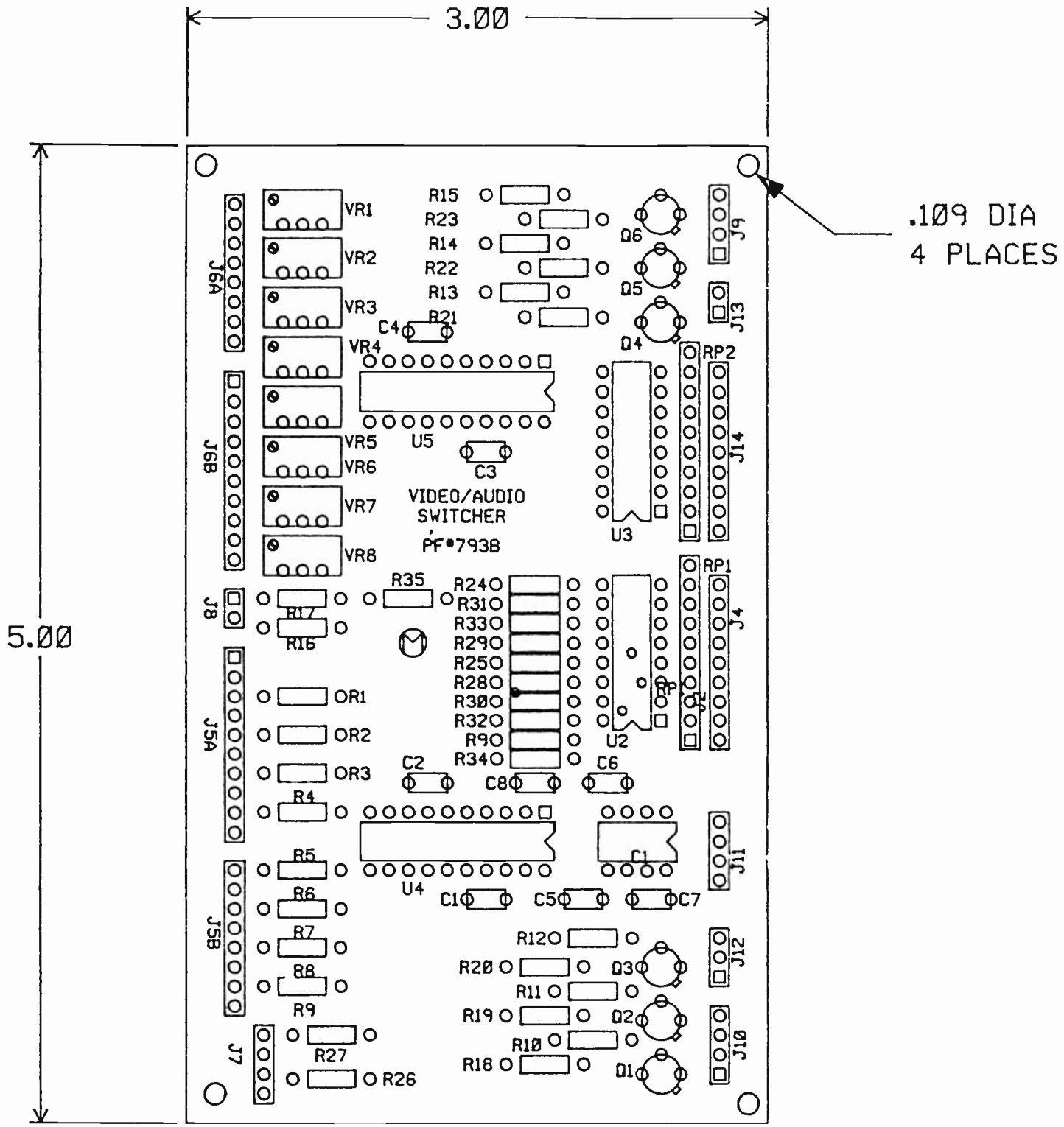

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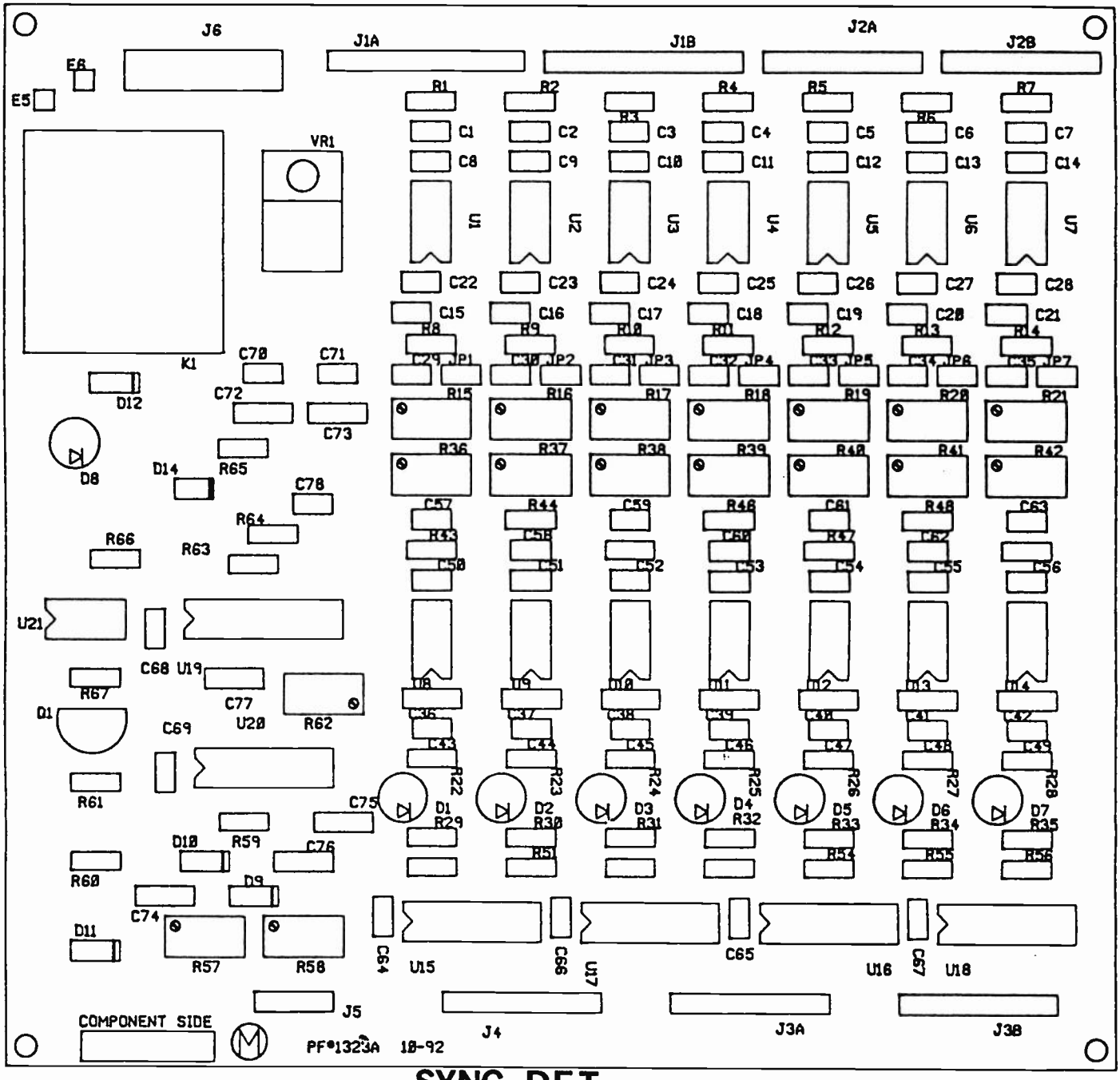

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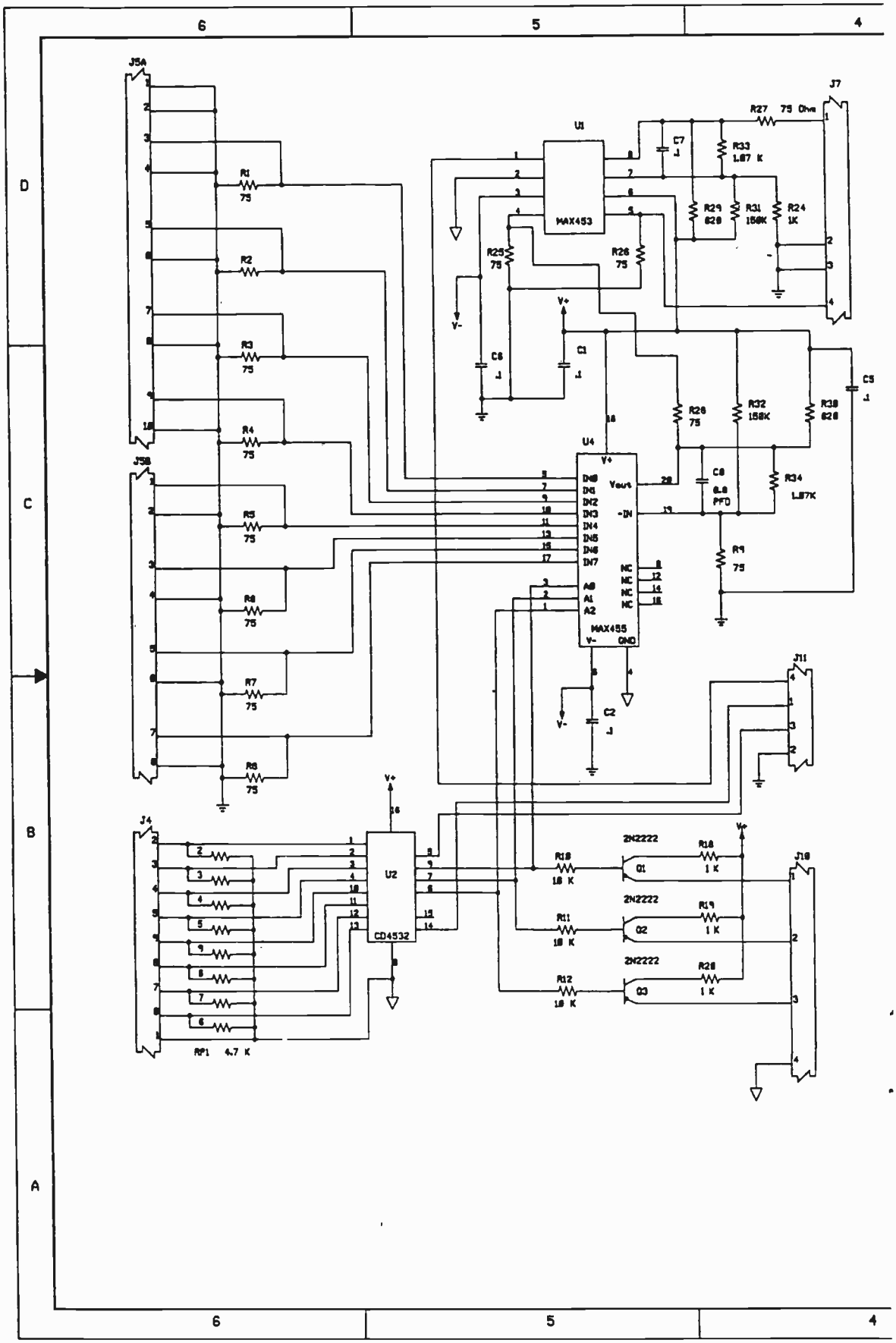

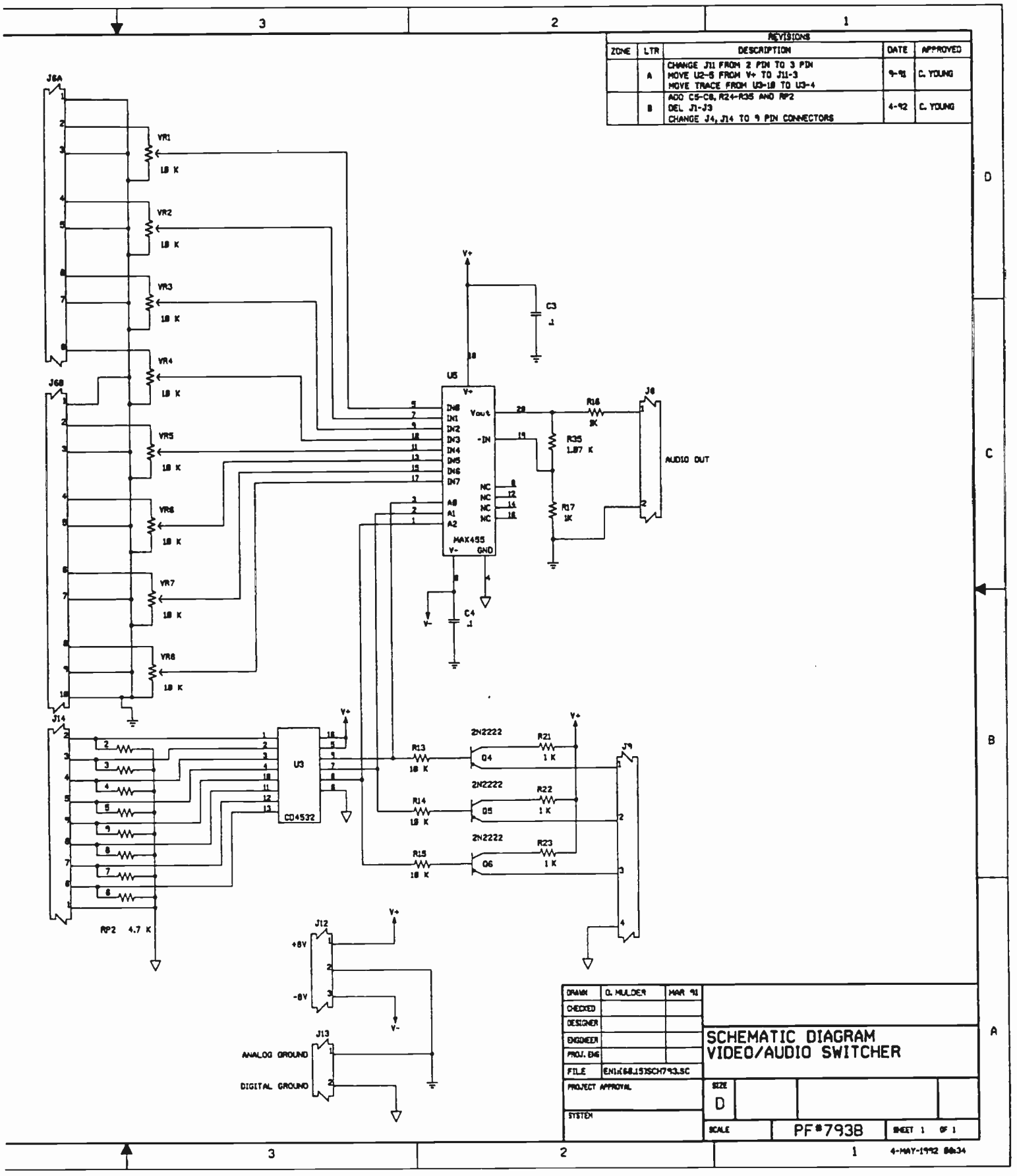
REVISIONS
ZONE | LTR | DESCRIPTION | DATE | APPROVED
A | CHANGE J11 FROM 2 PIN TO 3 PIN; MOVE U2-5 FROM V+ TO J11-3; MOVE TRACE FROM U3-18 TO U3-4 | 9-91 | C. YOUNG
B | ADD C5-C8, R24-R35 AND RP2; DEL J1-J3; CHANGE J4, J14 TO 9 PIN CONNECTORS | 4-92 | C. YOUNG
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J6B
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VR2
VR3
VR4
VR5
VR6
VR7
VR8
10 K
U5
MAX455
V+
V-
GND
Vout
-IN
NC
C3
C4
R16
1K
R35
1.87 K
R17
AUDIO OUT
J8
J14
U3
CD4532
RP2 4.7 K
R13
R14
R15
18 K
2N2222
Q4
Q5
Q6
R21
R22
R23
1 K
J9
J12
+8V
-8V
J13
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DIGITAL GROUND
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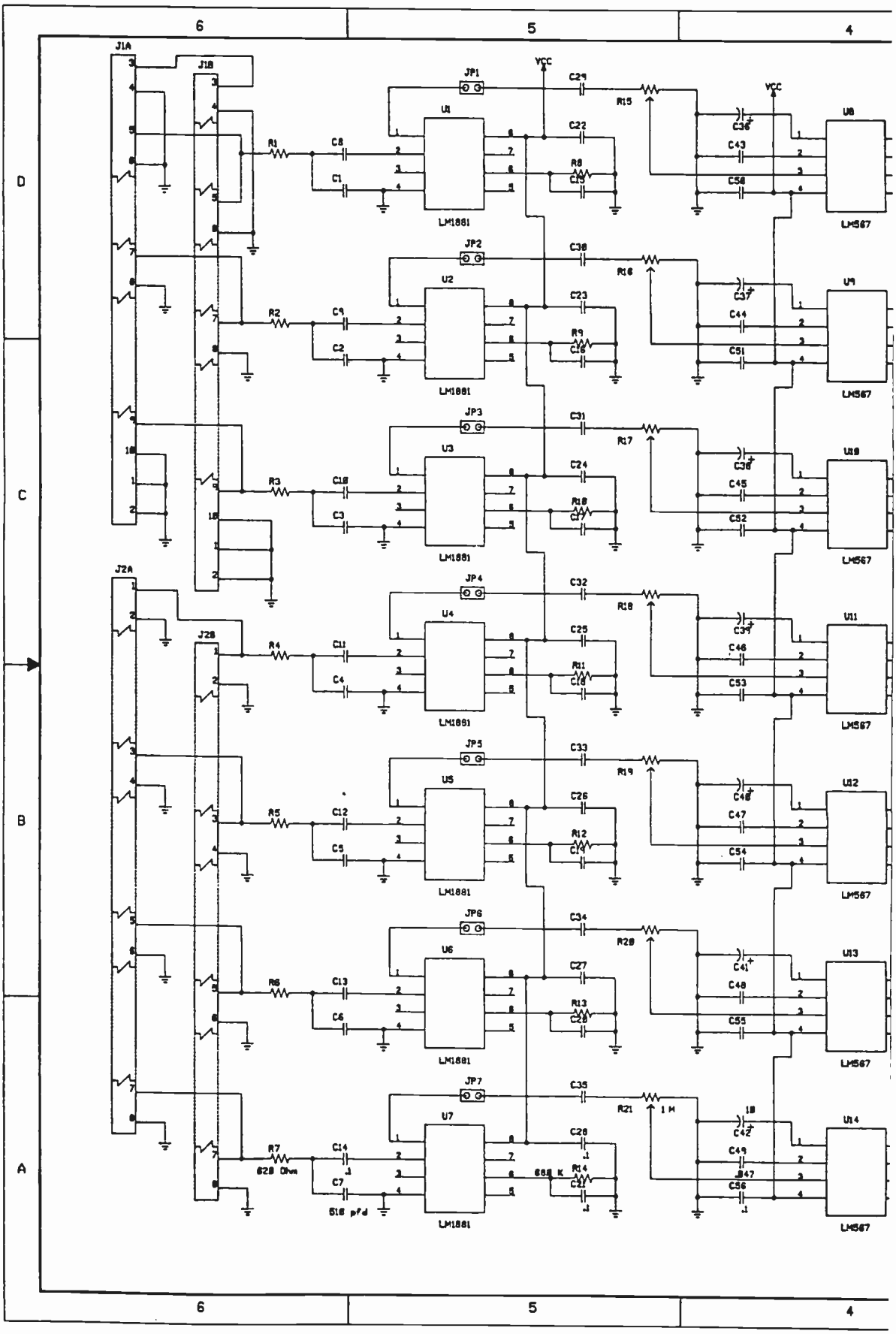

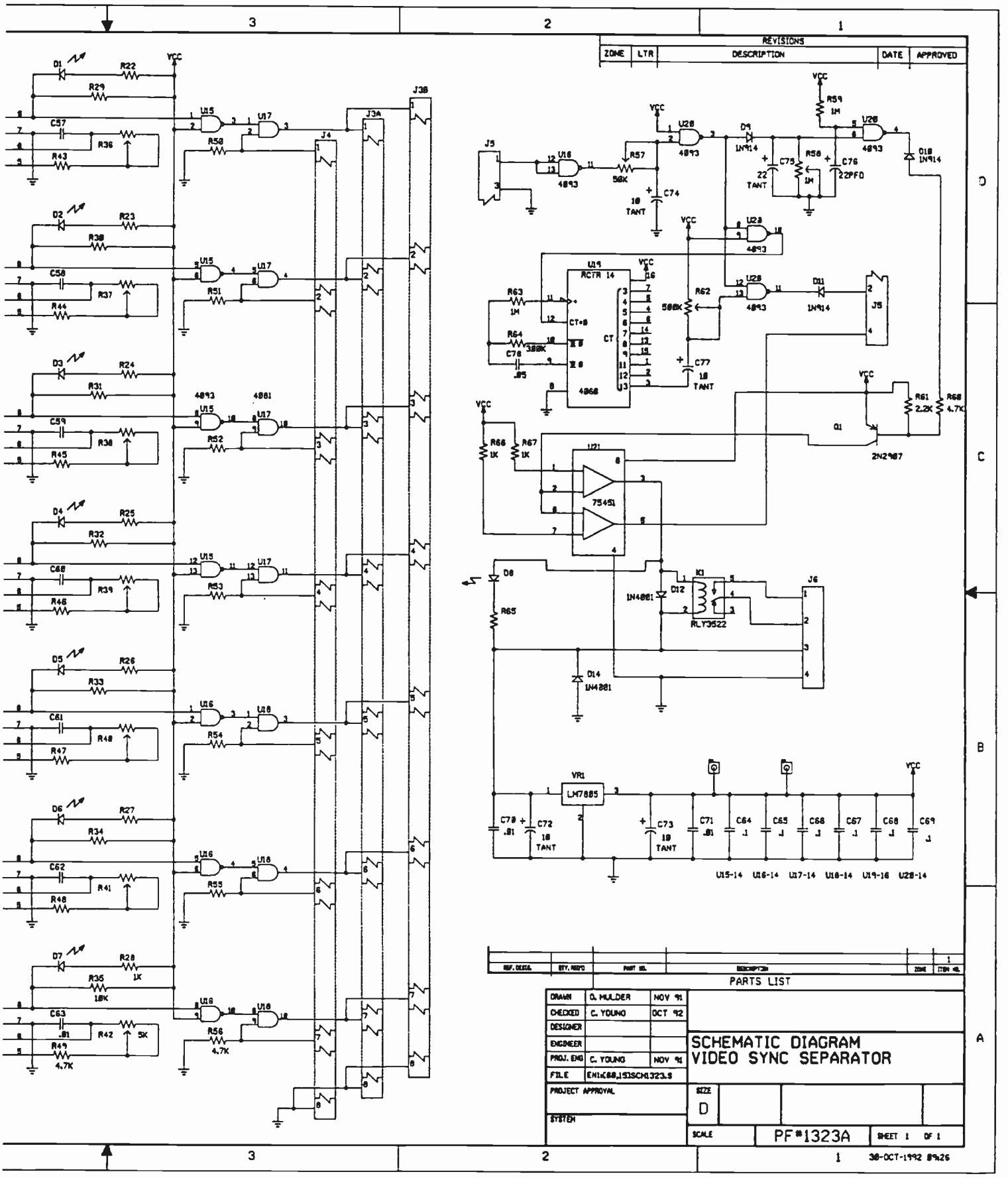
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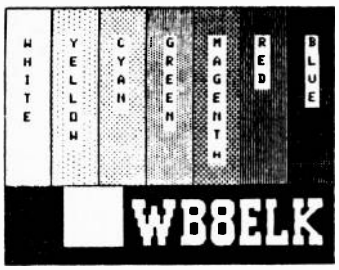

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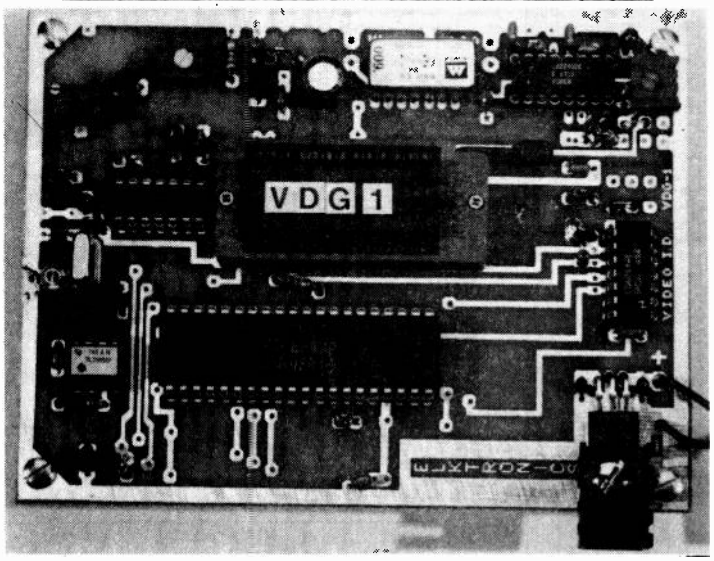

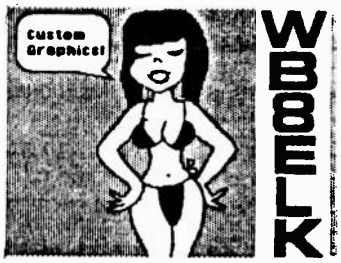

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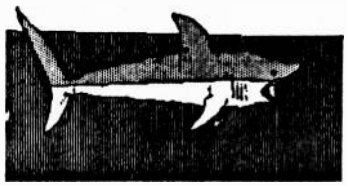

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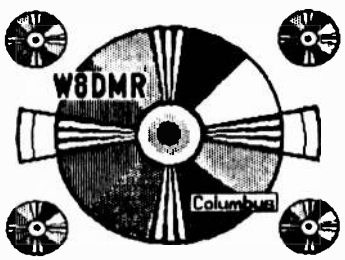

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IN BUCYRUS, OHIO

KA8WLV
Where No ATV'er
has gone before

A TWO BAND WIDEBAND FM-TV RECEIVER

Bryan Davis, K3AAF
Sr. Engineer, Microdyne Corp.

I think most of you have heard of Microdyne...years ago the leader of Satellite TV receivers...well, they made several models that are starting to show up in the used market that are useful for ATV in the 910 Mhz and 1250 Mhz bands. The two models I have in mind are the 100 BKR and 1100 CKR. Both are frequency agile using thumb wheel switches to set the RF frequency. The CKR had fixed frequency audio sub-carrier discriminators. There was even a remote control (RS232) option for the BKR. The RF frequency tuned the standard C Band (3.7 - 4.2 Ghz) and Ku Band frequencies. But, since it was working with a Block Down Converter, it was really tuning the 1st IF from 950 to 1450 Mhz.

Now, if you connect a 25 dB gain (min.) low noise preamp (connected to an antenna) to the IF input, you can tune 950 to 1450 Mhz. But you had to set the RF frequency dial to 4.2 Ghz to receive 950 Mhz and 3.7 Ghz to receive 1450 Mhz. Even though the tuning was backwards, I could (with the aid of a calculator) figure out what to set the dial for to receive a particular frequency. Well, all this doesn't get the Ham band at 900 Mhz. So I proceeded to con (beg actually) an engineer that was involved with the software, to modify it to tune down to 900 Mhz and up to 1500 Mhz...and do it with a direct readout on the thumb wheel switches. He finally did it and also kept the original tuning for C Band and Ku Band. One other neat feature is the manual selection of Horizontal or Vertical polarization...this can be a preamp...antenna selection. In other words, you hook your 900 Mhz antenna and preamp to Horiz. and your 1250 Mhz preamp and antenna to Vert. (or vice versa).

The Second IF in these receivers are centered at 70 Mhz as most TV Satellite receivers are. The CKR has one fixed bandwidth (LC), while the BKR had a selection of 4 (LC). The adjacent channel rejection is not very good so I have been thinking about using a SAW device to cure this problem. SAW devices are available in bandwidths from 0.125 Mhz to 40 Mhz and about $100 each. I have a small quantity of 18, 24, 26, 36, and 40 Mhz bandwidth SAW filters.

The software is available from me for $25, (a $5 rebate if old software is returned). It is written in EPROM. You unplug the old EPROM and plug in the new one. Also, there is one other change one needs to do. The tuning voltage that tunes the 1st IF needs to go down to about zero volts when tuning to 900 Mhz. The OPamp presently installed in the synthesizer board needs to have 3 to 5 volts negative on pin 11. It presently is tied to ground which means that the output will not go much below +2 volts. I have used two ways to generate small negative volts. First is to use a MC79L05 with the input tied to neg. 15 volts, and second is to use 4 diodes (1N914) in series with a resistor to the -15 volts. The information on exactly how to do this will come with the EPROM. Or, you can send your BKR/CKR to Hi-Tech Repairs, Inc. which is a repair center for all non-warranty Microdyne Satellite TV and Telemetry receivers. Call Don Powell at 904-622-3635 or Fax 904-622-3978. One can ship equipment to Hi-Tech Repairs, Inc. located at 643B S.W. 15th Street, Ocala, FL 34474. They have a large inventory of Satellite receiver parts, boards and units. Incidently, Microdyne no longer services TV products.

RESULTS

I have one of these modified units on the receive end of a 912 Mhz video link. The path is 12 miles and the transmitter is putting out 15 watts. It works very well. I have a loop yagi at the RX site and a regular yagi at the TX site with about 200 feet of 1/2 inch foam hardline. Both antennas have about 13 dB of gain and are about 150 feet above the ground. I have placed a 10 and then 20 dB attenuator in front of the preamp and can not see any difference between the 20 dB pad and no pad. A word of advice...do not use the 900 Mhz band for video if you are at or near a cell site. I had to use a very good filter to get rid of the interference coming from a 850 Mhz system.

I hope to have three of these modified units for sale at Dayton. The price is tentatively set at $1200.00 each.

Here are some of the notes that pass across my computer screen from America ONline.

ATVQ on America online

REACH ATVQ VIA E-MAIL from any computer service : ATVQ @AOL.COM.

Subj: S band Antenna help - 95-03-19 From: Tomfaux

I'm conducting an experiment that would require a portable S-band (2.3 GHz) receiving antenna. Does anyone know what would be my best option (Yagi?, Parabolic Reflector??), and manufacturer. I need at least 30 dB gain to reciever a very weak 300 KHz bandwidth signal. Please help. Tomfaux@aol

Subject: new 33cm rules Date: 95-03-19 From: elt@zen.irony.com (Ed Taychert) Reply-to: atv@irony.com (The atv mailing list) To: atv@irony.com
The following is from a The VHF Journal, Vol 46 Number 3, March 1995 (Newsletter of the Rochester VHF Group)

NEW FCC REGULATIONS FOR THE 902-928 MHz BAND

(most of this is excerpted from FCC Report and Order, 95-41, 6 FEB 95)

FCC rules now state that "the band, 902-928 MHz, is allocated on a secondary basis to the amateur service subject to not causing harmful interference to the operations of government stations authorized in this band, or to Locating and Monitoring Service (LMS) systems."

Amateur operations in the 902-928 band have always been secondary to the federal government operation and had to accept any interference from the operation of Industrial, Scientific, and Medical (ISM) devices. But, as of 6 February 1995, the FCC has allocated the whole 902-928 band to the LMS, secondary only to government stations. This means that amateur operation in the 902-928 band is secondary to LMS and must not cause "harmful interference" to LMS. (More on this later.) Part 15 devices are still secondary to the Amateur service.

LMS is the FCC's new name for the Automatic Vehicle Monitoring (AVM) service that has been around on parts of the 902-928 band since 1974. The FCC has divided LMS into two types of systems: multilateration systems and non-multilateration systems.

Multilateration systems use spread spectrum technology to locate vehicles (and other moving objects) with great accuracy throughout a wide geographic area. This technology is used, for example, by trucking companies to locate and track their vehicle fleets, by municipal governments to pinpoint the location of their buses, and by entrepreneurs who are developing subscriber-based, stolen vehicle recovery systems. Multilateration systems locate vehicles or other objects by measuring the difference of time of arrival, or difference in phase, of signals transmitted from a unit to a number of fixed points, or from a number of fixed points to the unit to be located.

Non-multilateration systems use any technology other than multilateration technology to transmit data to and from vehicles passing through a particular location. This technology is now providing valuable services to state and local governments operating various types of automated toll collection systems — with an estimated 500,000 cars currently served by such systems — and by the railroad industry in the monitoring of their systems' railway cars. A typical non-multilateration system uses an electronic device placed in a vehicle to transfer information to and/or from that vehicle. When the vehicle passes near one of the system stations, the station transmits an interrogation signal. The interrogation signal is then either modulated with unit-specific information and reflected back to the station's receiver, or the tag transmits its own signal in response to the interrogation.

900 MHZ RULES...

The FCC has defined specific sub-bands for the two types of LMS systems:

Band (MHz)

System License 902.00 - 904.00
Non-multilateration 904.00 - 909.75
Multilateration 909.75 - 919.75
Non-multilateration 919.75 - 921.75
Multilateration & Non-multilateration 921.75 - 927.25
Multilateration 927.25 - 928.00
Multilateration (forward links)

LMS transmitters are authorized up to 30 Watts ERP, but will typically be spread out over 2 to 12 MHz. (The energy from one of these transmitters received in a 3 KHz bandwidth receiver, would be equivalent to that of about a 30 milliwatt narrow band transmitter.) In the 927.25-928.0 MHz range, narrow-band forward link LMS transmitters are authorized with an ERP of 300 watts.

Most LMS equipment has been designed to operate on shared frequencies. Much of it uses spread spectrum techniques that minimize narrow-band interference. The new rules make it plain that the LMS service must be able to operate with other users of the band, including the several million Part 15 devices. The FCC states that the new rulings "...seek to maximize the ability of Part 15 and amateur operations to coexist with the operation of LMS systems."

Amateur and Part 15 users are prohibited from causing "harmful interference" to LMS systems. Although the FCC has a definition of "harmful interference", it is some what subjective. So, as part of this rule making, the FCC has defined what "harmful interference" to LMS systems is not. New FCC paragraph 90.361 states that if an amateur station (or Part 15 device) meets at least one of the following two conditions, it is not causing harmful interference to a multilateration LMS:

"(b) it does not employ an outdoor antenna; or

(c) if it does employ an outdoor antenna, then if

(1) the directional gain of the antenna does not exceed 6 dBi, or if the directional gain of the antenna exceeds 6 dBi, it reduces its transmitter output power below 1 Watt by the proportional amount that the directional gain of the antenna exceeds 6 dBi; and

(2)either

(A) the antenna is 5 meters or less in height above ground; or

(B) the antenna is more than 5 meters in height above ground but less than 15 meters in height above ground and either:

(i) adjust its transmitter output power below 1 Watt by 20 log (h/5) dB, where h is the height above ground of the antenna in meters"

After this definition of what is not harmful interference, the FCC states "We emphasize, however that Part 15 or Amateur use is not restricted from operating beyond these parameters. Part 15 and Amateur operations can continue to operate as long as interference is not caused..."

In other words, you can continue to operate in the multilateration sub-bands as long as no one complains. If a LMS licensee complains, you can change frequency to a spot where you do not cause them interference.

Or, you can reduce your antenna gain to 6dBi (at any power output up to the legal amateur limit). If you want to keep your high-gain antenna, you will have to decrease your power to 6dBw ERIP (0.5 watt into a 9 dBi gain antenna or 0.25 watts into a 12 dBi gain antenna) if your antenna is at or lower than 5 meters above ground. (If this doesn't make much sense, it is because the rule was written for Part 15 devices, that are already limited to 1.0 watt/6dBw ERP, and then amateurs were added on also.) At 15 meters above ground you are limited to -4 dBw ERIP (50 milliwatts into a 9 dBi gain antenna or 25 milliwatts into a 12 dBi gain antenna). Or put your antenna in your attic (and run any ERP). Now you meet one of the FCC's "not causing harmful interference" conditions and the LMS must accept any interference you cause them.

Reading the full Report & Order is interesting. It comprised 74 pages, of which only 13 are actual rule changes. The remaining pages are a discussion of the various parties comments, how the FCC came to their decisions, plus dissenting and concurring statements of the commissioners. The ARRL had commented on the proposed rules, mainly requesting a section of the band be set aside for amateurs with a primary status. (This proposal was not accepted.) The ARRL stated "that there has been 'rapid increases in amateur use', that 'the Amateur Radio Service is increasingly looking to the 902-928 MHz band,' and that 'amateur use of the band has been growing,' the only quantitative support that it provides is that there are 16 known manufacturers of amateur equipment for this band and that there are 20 amateur stations in Rochester, New York using the band." (Its too bad that the ARRL couldn't have looked at a few VHF & UHF contest results to come up with some better numbers!)

900 MHZ RULES...

One problem with the lengthy discussions in Report & Orders is that they occasionally say or imply things that are not detailed in the actual rule changes. The non-interference conditions above specifically refer to the multilateration sub-bands only. The rules definitely state that amateur and Part 15 are secondary to LMS and may not cause any harmful interference. Yet in the discussion by the FCC of solutions to multilateral interference problems, they suggest that part 15 users (and imply amateurs also) use the 902-904 and 909.75-919.75 MHz sub-bands that will not be occupied by multilateration systems. This statement implies that there will be no (or less?) "harmful interference" to the non-multilateration stations operating in these sub-band, but there is nothing in the rules to support this.

It was obvious from reading the Report & Order that the FCC had a difficult time trying to meet the wishes of all of the 902-928 MHz groups. At times they seemed almost apologetic to the Amateur and Part 15 users for dumping LMS on them. One FCC commissioner dissented the decision and another who concurred, did so only because it was "the best of three not very good alternatives." Both were concerned with the possible interference problems and how sharing of the 902-928 band would continue with increased growth of Part 15 and LMS systems.

For now, the amateur community can continue to operate on the 902 band as it has been, it will be a few years before many of these systems go into operation. Only time will tell whether the band will remain useful, but you might think of other alternatives before you plan any major projects for this band. Duncan Brown, K2OEQ 73!

Subject: ATV Mailing List, 900 MHz Amps,

From: (Mel Markowitz)
To: ATVQ@aol.com (ATVQ)

Hi Henry,

Just subscribed to the list and received the list of current subscribers. Hope the list will grow with increased publicity. I am in the Atlantic City, NJ area and am in the process of setting up a crossband 434 MHz in and 923 MHz out repeater. Would be interested in obtaining a solid state 923 MHz AB1 linear with about 100 watts out on this frequency. Does anyone have a model/manufacturer. I heard that there may be a commercial amp available through a company called TL. Anyone have any specifics on this company? Thanks for any help. See you all again soon.

Do you know of an ATV Internet list. I saw in your last issue a list at ATV@irony.com, but that seems to no longer exist! If it does, how do I subscribe.

REPLY: Contact via e-mail TSTADER, (Terry Stader) for complete info on the ATV net on AOL.

I'm putting together a crossband repeater and would like to know if you have any leads on a good quality linear amp for 923.25 output (100 watts or so). I'm using a PC Electronics transmitter to drive a Downeast Microwave amp to about 18 watts. Thanks for your help and reply. Mel Markowitz, K2JWD, 207 Alexander Drive Linwood, NJ 08221.

REPLY: 900 MHz amps are not plentiful since none of the ham suppliers are building any. We have published several 900 MHz amps in ATVQ most are designed around various bricks. Commercial cellular telephone sites have been upgrading and tossing old amps, ranging from 35 to 150 watts. These are severely class C in operation but can be used on ATV with sync stretching and at reduced drive, to stay within the more linear portion of the power curve of the amps.

Re:ATV@900 MHz with 'Rabbit'

From: Bruce N0CV

3 or 4 ATV'ers here in the Twin Cities are using rabbits for portable ATV operation. Some have added "bricks". Contact Rollie KB0GL for details. 73's, Bruce

From: John H Davis

I'm wondering if anyone has had experience with the Gemini VC-5000 version of the rabbit, which apparently is crystal controlled. I don't have one of my own to play with yet, but the antenna seems to be mounted a bit differently (maybe not quite as easy to add an RF output jack to). Can anyone shed light on this? Thanks.

Dear Henry,
Hi Henry it's Rick Keniuk (N9DUA). Our video repeater is on hold temporarily until we get some time and money. The repeater site is waiting for us. The current state of frequency usage will be 1252.00 FM video input, and 915.00 FM video output. Both input and output will have 5.8MHz subcarrier sound. The other channel for FM video on 23cm in the Chicago area would be 1282.0MHz. This is placed directly between the voice repeaters at 1272 and 1292. At this time 1282 would be best left as a simplex channel or an input to a repeater. AM guys are on 1280.25. Enough for now lets see if this message makes it.

Subject: Where to get FCC forms?

From: MedEd455@AOL.COM (Edward A. Gutowski)
The number for the FCC to obtain forms is 1-800-322-1117 , between 8 am and 4:30 pm EST.

I hope you are settled in your new home by now. I wanted to drop you a note concerning the Ohio Valley Wireless Image Associations Repeater located in Huntington, WV. This repeater has been on the air since May 94. The output is on 421.25 and input on 439.25 Mhz. During the fall/winter months, we have made major receiving improvements by installing video and filters.

In the past year I have spent a great deal of time with SERA coordinators in getting the repeater coordinators in the state of WV to approve coordination. I won't bother you with the gory details, however, this past week Mr. Alex Hedrick, Jr. said he was holding up our coordination again because of the ARRL disapproval of the new 1994 SERA 70cm bandplan. It appears that either Alex Hedrick or ARRL does not want any ATV on 70cm. SERA has approved a new 70cm bandplan providing one ATV repeater on 421.25 out/434.00 input. We, OVWIA, agreed to change the input frequency to conform to the new SERA bandplan. For now, it seems that 70cm ATV is on hold across the South Eastern part of the United States.

I will close on a higher note with the comment that I have enjoyed the past 70cm ATV band openings. Bill Brown called by phone from Finley, OH on Dec 27 to turn on my ATV Equipment. He saw both the Huntington WV repeater and my ATV even with his antenna pointing up into the sky. EMF, ATV Bill? If you find out what is really going on with SERA and the ARRL, please drop me a fax. My 24 hour fax number here is 606-928-2505, or voice 606-928-6672. 73, Don Curry, WA4GSS

February CAATN Quarterly ATV Seminar

by
Mike Dees N3EZD

The Central Atlantic Amateur Television Network (CAATN) held its quarterly seminar on February 26, 1995, at Poor Jimmy's restaurant in Elkton, Maryland. Attendance was excellent in spite of the threatening weather with possibly the largest number people attending the seminar to date.

This seminar session was sponsored by the Baltimore Radio Amateur Television Society (BRATS) with Bob, W3WCQ, serving as the program chairman. In addition to Bob, BRATS was represented at the seminar by Heru W3WVV, Betty KA3RRK, Bob N3HAT, Fred K3TAZ, Neil WA3ZQI, and myself.

The program had several very interesting topics including, two presentations by Heru on his experiments with cell phone power amplifiers and a modification which adds color to the old diode matrix video ID generators, a presentation and demonstration by Bob W3WCQ on the new 1200 MHz linear power amplifier offered by Down East Microwave, a presentation by myself on the firmware revisions to the VS-100 controller, and the highlight of the program, a live demonstration of the 1 kW ATV station built by Bob Curry, KC3VO. This was the ATV station that was used with the Naval Academy's 10 meter dish antenna to send video to the space shuttle and was the only station that the astronauts received in color. There were also discussions of intercity ATV linking, the Canadian and SERA proposed band plans for 440 MHz, and a video tape of European ATV activity from HB9AFO.

The next CAATN seminar will be held in Philadelphia on June 11, 1995. Thank you Bob for putting together such an interesting and informative meeting.

PITTSBURG PA ATV RPT

The Laurel Highland VHF Society sponsors an ATV repeater on 434.00 MHz inoput and dual outputs on 421.25 MHz and 923.25 MHz horizontal polarity. Voice coordination is on 146.670 MHz. Call ID W3NBN on 421.25, call ID KA3FZF on 923.25 MHz. Repeaters are located 35 miles south east of Pittsburgh, PA. 73 Robert W3NBN

SO YOU WANT TO BUILD AN ATV REPEATER

PART 4 ANTENNAS

by Mike WA6SVT

The antenna system and the placement of it on the tower is one of the most important aspects of good coverage of the repeater. Lets first review antenna specifications.

GAIN: Gain of an antenna over a reference source, we will use dB over a 1/2 wave dipole.

AZIMUTH PATTERN radiation of signal around the horizon

ELEVATION PATTERN radiation of signal above/below the horizon

NULL FILL some signal is used to fill in coverage between the main lobe and the first minor lobe. It is used to fill in coverage for close in stations directly below the mountain top or tall tower.

DOWN TILT tle elevation pattern is tilted down, usually .5 to 6 degrees to properly illuminate the coverage ara.

BANDWIDTH frequency range of low VSWR and maximum antenna gain.

ELEVATION BANDWIDTH elevation beam tilt of the antenna with frequency. Usually with end fed collinear antennas. Normally if the antenna is cut higher than the frequency you are using it till give some down tilt.

WIND AND ICE The ability of the antenna to survive severe climates.

POWER. The ability of the antebnna to handle your kilowatt repeater.

Is the highest gain antenna the one I want to use? Only in some cases. Most important is the azimuth and elevation patterns. Select an antenna that has a pattern that best fills in you coverage zone of the repeater. Living out in Southern California, I have had many repeater groups ask; Why do I have problems directly below the site in hitting the repeater. I have the highest gain antenna from brand X! The problem I have told them is that the gain is on the horizon and you are below the pattern. It may work very well to talk to airplanes and other hill tops but you need down tilt and possibly some null fill.

Because the earth is round the coverage area is always below the horizon An exception to this is a site in the floor of a valley surrounded by mountains. A good rule of thumb is to use 2 degrees of down tilt for installations that are between 3,000 and 6,000 feet above the coverage area (note not above sea level). At sites that are in the 7,000 to 9.000 feet above the coverage zone 3 to 4 degrees is a better choice. at sites that are below 1,000 feet down tilt is usually not required but .5 to 1 degrees is normally used on very high gain antennas. This elevation information is applicable to both Vertical and Horizontal polarized antennas.

What polarization should an ATV repeater have? It depends on many variables. Cochannel use by another mode, personal preference, mobile operation etc. For horizontal antennas Lindsay Antennas from Canada has some good ones that are suitable for mounting at a commercial site. Ye Old Antenna Labs have some good designs too but need a radome for mountain top use. For vertical polarization you have a smorgasbord choice. Most of the commercial antenna manufactures have antennas that will cover most ham bands.

Comet and Diamond have 440 MHz 915 MHz and 1280 MHz antennas comet has a 2.4 GHz antenna too. The comet and Diamond brands are an economical solution for your needs. Most of these antennas have no down tilt. Using a 1280 MHz antenna at 1253.25 MHz will give 1 or 2 degrees of down tilt but at a Gust 0~ a little gain and usually a 1.4 to] VSWR. A new comer to the game is Hustler's spirit line of super strong built to commercial standards antennas. They have various gains, down tilt and null fill options.

They will also customize the antenna to your frequency. They are more expensive than the Comet and Diamond antennas but about 1/2 the cost of other commercial antennas. They also have come out with panel antennas for controlled azimuth patterns.

Antenna feed lines should be 1/2 inch or larger hard-line or helix. Be sure to ground the outer conductor at the top of the tower, bottom of the tower and building entrance. Grounding kits for hardware cost several dollars and you can substitute a hose clamp and braid or I 6 wire for the ground wire. Use coax seal or rubber slicing tape to Seal the outer conductor then several layers of good quality electrical tape. Scotch coat the tape between at least one of the layers of tape. Avoid sharp bends in the ground cable.

A final thought is to take some time and research the various manufactures to select the best antenna that covers your coverage area. Also try to wade though the antenna gain marketing hype. dBd is the gain you want to reference and look for the manufacture using the RS-329 method for gain measurement. It is more realistic in actual antenna gain. Good luck and if you have any questions about ATV repeaters or antennas send me a letter and I will respond. My address is Mike Collis WA6SVT P.O. Box 1594 Crestline Ca. 92325.

BUILD YOUR OWN WHEEL ANTENNAS

from ATCO Newsletter

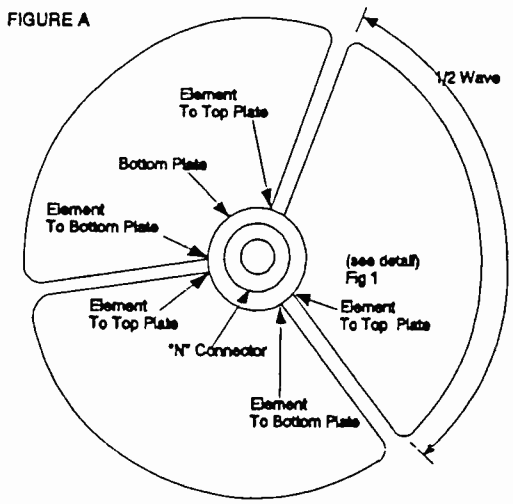
Table 1.

Band	L	A	V	h	S	Bd	Td	d
70cm	26"	6"	6 1/4:	1/4"	1"	1"	1"	1 3/4"
23cm	8 5/8"	2 1/8"	2 3/8"	5/16"	9/16"	1"	1"	5/8"

"L" = Total Element Length, "A" = 1/4 Side Length, "V" = Brass Plate to 1/2 Wave
"h" = top to bottom plate distance "S" = Matching Stub Length Bd = Bottom Plate diameter
Td = Top Plate Diameter
d = approx distance between adjoining (top to bottom) elements at intersection of the 1/4 and 1/2 wave bend.

Sketch of Bottom View of Antenna

FIGURE A



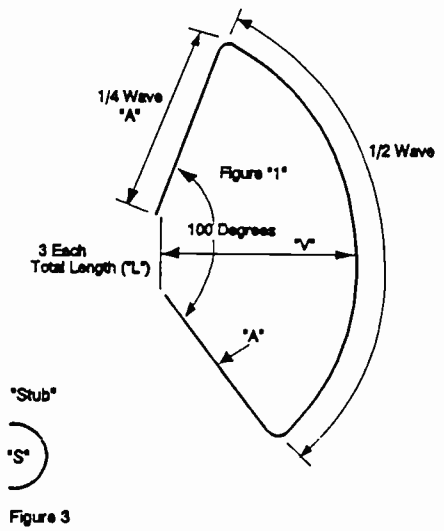
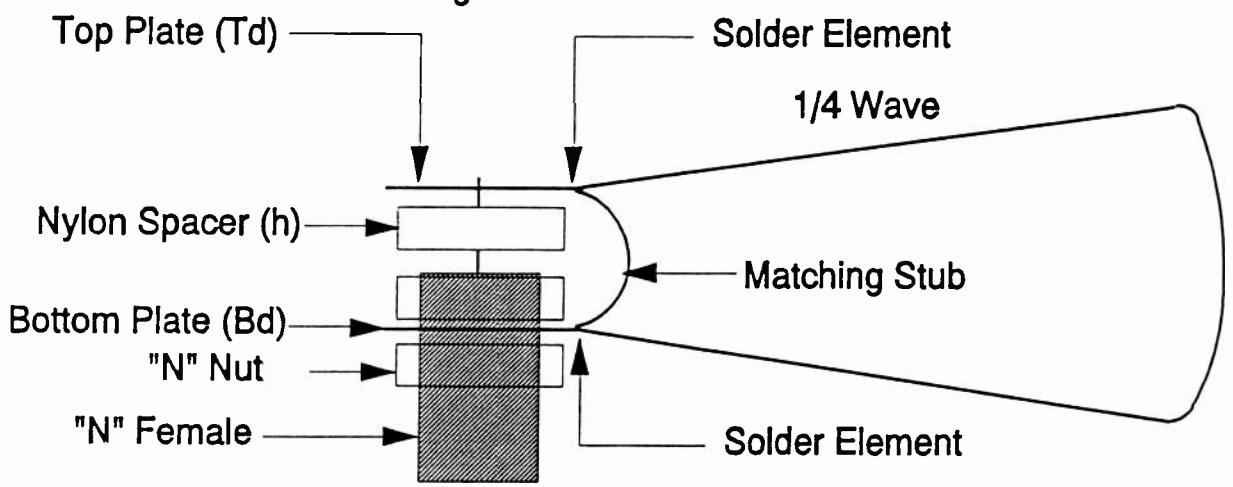


Figure 3

"N" Connector Body Detail Figure 2



Top Plate Solders To "N" Center Conductor
Via 1/4" 12 Gauge Wire

Distance Between Top a & Bottom Plate ~ 1/4"

BUILD YOUR OWN WHEEL

Antenna Mounting

Two ways of mounting the Wheel are described here. If you have an existing mast mounted on a Mag mount (like the Hustler 22" short mast for HF) you can use it directly. All you need is a matching thread nut to secure the bracket on top of the mast. If you don't have a Hustler or similar mast, one can be made from 3/8" thread rod (found in most hardware stores) cut 16-1/4" (5/8 wave on 70 cm) and fastened to a mobile magnet mount. The mounting of the "Wheel" antenna is a flat sheet aluminum bracket 2" long and 1-1/4" wide. Drill a 5/8" hole in the center 3/4" (center) from one end. Drill a 3/8 hole 5/8" in from the other end. 1-1/4 " wide.

Mount the antenna to the 5/8" hole and secure with a second "N" connector nut. Mount the antenna to the mast. The antenna is now ready for tuning & testing. Use good quality RG 8x feed line even for very short runs. RG 58 has too much loss even at 400Mhz!

Tuning & Testing the Wheel Antenna & Checking Resonant Frequency

Check the SWR on the frequency it will be used (ie 439.25 /427.25 or 1280/1255).

If the VSWR is 1.2/1 or less, it will work fine for receiving the output of the repeater. If the VSWR is very high (> 3:1), check for a feed line problem (connector?). If the VSWR is reasonable, no further tuning is necessary. If you would like to fine tune the antenna, the following procedure worked for me:

A good quality watt/SWR meter (like a Bird 43 or Diamond SX1000) for the 70 or 23 cm band is necessary to check out the antenna. Using a 440/1200 transmitter that will tune 430 to 450 Mhz, or 1250 to 1290 plot the VSWR curve for the antenna. To raise the center frequency, bend each element (slightly) using pliers at the point the element soldered to the brass disks to separate the 1/4 wave feed section; Gf the .,lover leaf (see Figure 4). Plot the curve again. Repeat as often as necessary to obtain the desired center.

Checking the Pattern

A very rough check of the OMNI directional pattern can be performed by using the repeater BEACON mode as a signal source. Use a Decade attenuator box to add enough attenuation to reduce the repeater signal to about "P2". In an "open" area and line of sight with the repeater, rotate the antenna while mounted over the car roof on the Mag mount. Watching the picture, you should see no change in picture strength. The antenna has been measured with a far more sensitive equipment to have -0.3db nulls 120 degrees apart in the OMNI pattern. Theses nulls can not be detected by watching the TV monitor (it takes 3db to change the picture 1/2 a "P" unit. If vOu have a sensitive IF AGC "P" meter on your ATV receiver, you may be able to detect the -0.3db nulls.

A final word

Don't expect this antenna to perform like your Beam or Loop Yagi! It does, however, perform like a Horizontal, OMNI Directional unity gain antenna. Using the 70 cm version, I routinely copy the Columbus repeater while mobile "P2" 40 miles from Columbus and the 23cm version, I can see the repeater anywhere in the Columbus area (12-15 Miles), shorter distances when the leaves are on the trees!

If you would like to buy this antenna ready made and tested, contact "The Olde Antenna Lab" in Denver, CO (303-798-5926). The basic antenna sells for $44.95 and a Mag Mount version sells for $59.95.

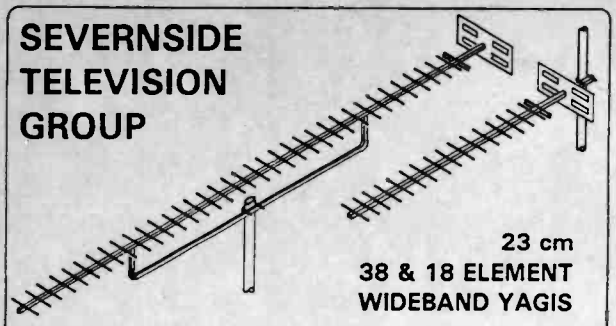
If you build this antenna, please let me know your experience with it. I have a Wheel antenna mounted up about 40 feet on my tower, if you would like to have a "Wheel to Wheel" contact, let me know! 73 & CU on ATV Ken...WA8RUT

CORRECTION

With the weight of the medical matters and flood on my mind I should have known better than to trust my memory! The old land ATV DX record was incorrectly stated. It should have been KØIWA of Burlington, Iowa as the west end. The east end, K3POS was correct. The record was set on Thanksgiving, 1986. My thanks to Paul Nees KØIWA for bringing this to my feeble attention. Well, I was in the right neighborhood!

Now that life is back to normal (EKG now shows no problems) with just the usual pressures of the TV station activity and the wife's kennel business and working to get the antennas up, I should do better! 73 Henry KB9FO

SEVERNSIDE TELEVISION GROUP



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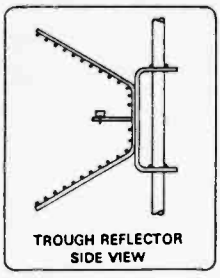

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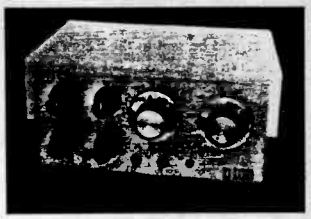

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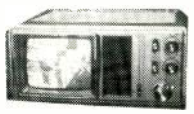

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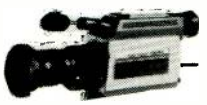

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