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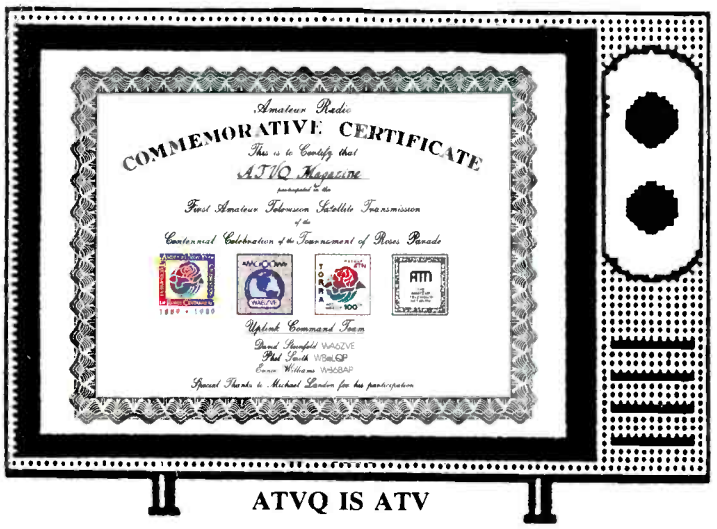
ATTEND: ATV PARTY & HOME BREW CONTEST, DAYTON, FRIDAY NIGHT
LAST CALL FOR VIDEO CONTEST ENTRIES.

VOL. 3 #2
APRIL 1990 ISSN: 1042-198X
USPS 003-353

DEVOTED ENTIRELY TO AMATEUR TELEVISION



ATVQ IS ATV

N4BBZ Charles G. Davis and son
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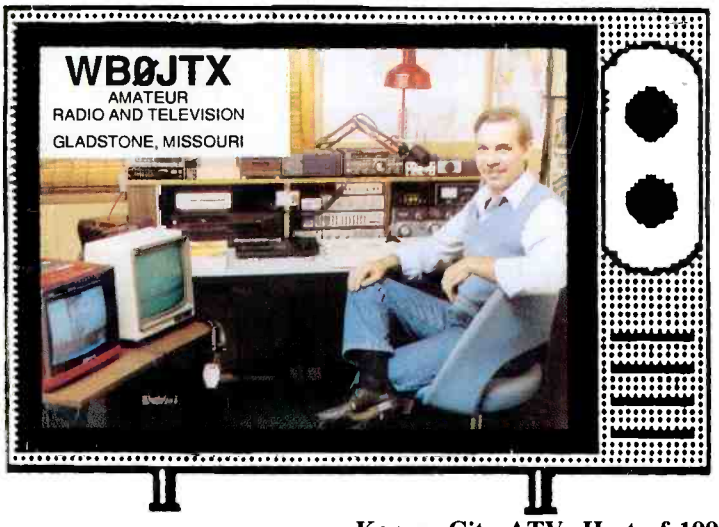

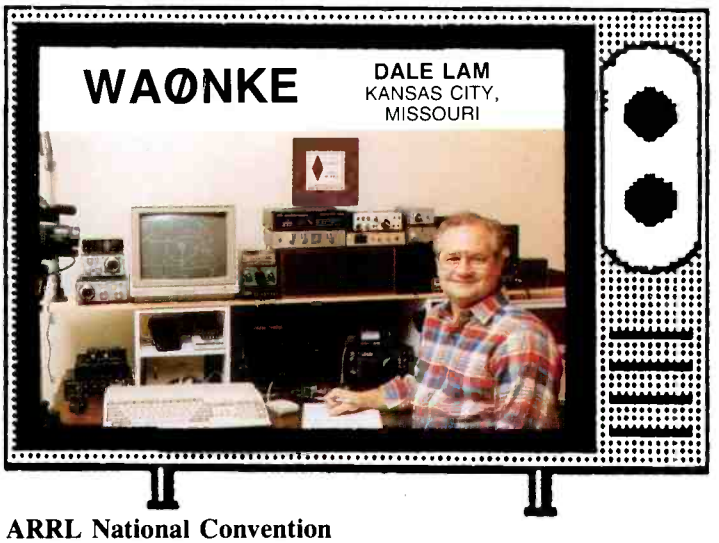

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Bill WB8ELK JOINS 73 AS EDITOR, CONTINUES WITH ATVQ & ELKTRONICS

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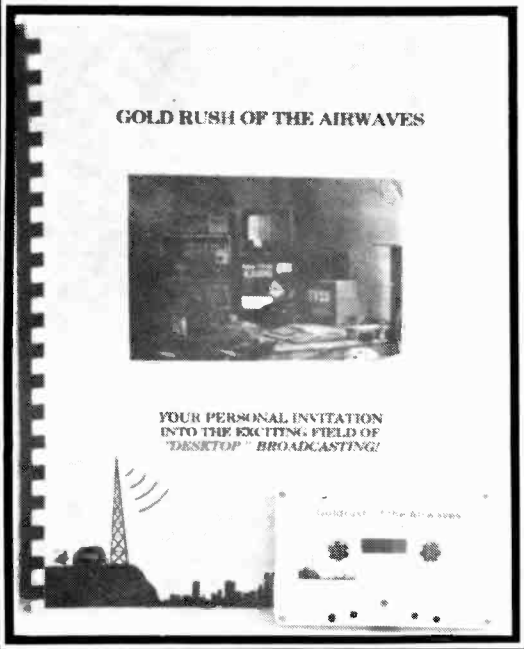

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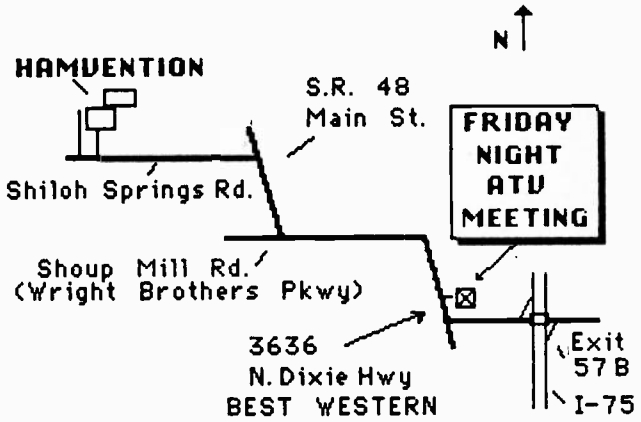
DAYTON HAMVENTION ACTIVITIES

There will plenty of ATV activities at the Dayton Hamvention this year. Friday night starting at 7:00 pm come on over to the ATVQ/Western Washington ATV get together at the BEST WESTERN. There will be demonstrations of the latest ATV equipment, video tape demos of ATV groups around the world and the Home-Brew contest. WB8ELK will have the live camera Balloon package on display, Jon WM8W will be showing his 16 foot monster ATV kite and Mike KD0FW will have his latest balloon package from the Kansas City area. Carl Berry K5MWN will be describing his ATV R/C flight simulator system. In addition the WWATS group will announce the Winner of the Video tape contest! The BEST WESTERN used to be called the TRAVELODGE and is located at 3636 N. Dixie Dr. just 4.4 miles from the Hamvention. If you're travelling from I-75 get off on exit 57-B and follow signs to the Best Western. It's located on the west side of I-75. Their phone number is (513) 276-6151.

The Saturday ATV FORUM will be held in O'Hare arena at the hamvention. It's scheduled to start in one of the main conferences from 2:45 pm to 5:00 pm. Tom O'Hara will be chairing this session along with a description of the SAREX space shuttle ATV experiment. The three talks are: "Helping Ham Radio to be Seen" - Henry Ruh KB9FO, "ATV in R/C aircraft" - Carl Berry K5MWN, "Video from the Edge of Space" - Bill Brown WB8ELK.

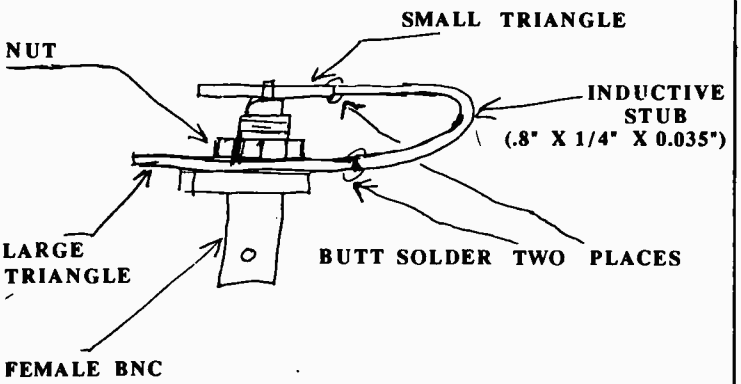
MAP TO FRIDAY NIGHT FUN, ATV PARTY, HOME BREW CONTEST



W6OAL "Mini-Wheel" Antenna Update

Last issue we published an article about the Mini-Wheel omni-horizontal antenna. (See. Jan. 90 ATVQ, p. 45) The diagram showing the matching section on p. 47 is not drawn correctly. Use the following diagram to attach the matching stub to the BNC connector and mounting plates.

INDUCTIVE STUB POSITIONING AND SOLDER DETAIL
"OAL" LITTLEWHEEL



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

WIN $100 CASH

DAYTON ATV PARTY

WIN $100 CASH

FRIDAY NIGHT, BEST WESTERN MOTEL JUST OFF I-75, 7 PM-MIDNIGHT.
BEST ATTENDED, BEST ORGANIZED, BEST SPEAKERS, FREE FOOD AND DRINKS
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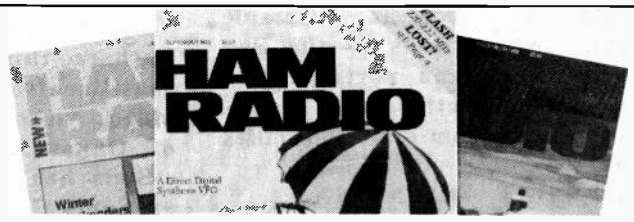
ATVQ IS PROUD TO PRESENT THE WORLD'S LARGEST ATV MAGAZINE EVER!
104 COLORFUL PAGES!



The Amateur TV Network (ATN) of So. Calif.

Hike to the top of any mountain in Southern California and you're likely to see an ATV repeater.

The Amateur TV Network (ATN) is a group of 6 repeaters covering a good portion of the southern part of the state. Eventual plans are to hook up these repeaters via 2 GHz. links to establish a TV network that will allow reliable QSO's from as far as Santa Barbara to Las Vegas, Nevada (over 400 miles).

SANTIAGO PEAK
WA6SVT/r434 in, 1253.25 out

This is the hub repeater located on 5670 foot Santiago Peak in Orange county. There also is a 220 repeater which allows control operators to access the 146.43 MHz. remote base. 146.43 MHz. is the primary ATV calling frequency in So. California. Santiago Peak covers a large portion of Orange County, the LA Basin, Riverside County and portions of the San Gabriel valley and parts of San Diego. Some stations can access the repeater from over 100 miles away.

OAT MOUNTAIN
NU6X/r434 in 923.25 out

Located 3600 feet up in the mountains north of the San Fernando Valley 74 miles NW of Santiago Peak, this repeater covers parts of the LA area not accessible to Santiago. This repeater also has a receive link with the Santiago repeater on 1253.25 MHz. through use of an 8 foot dish. Oat Mountain has a unique Picture - in - Picture (PIP) mode. If an ATV'er is being repeated by Oat mountain, an insert of anything being repeated by Santiago is displayed on the OAT primary video. If no one is active on OAT then the Santiago output is directly repeated via OAT. Eventually there will be a 2 GHz. back haul link for full duplex operation.

JOB's PEAK
WB6VVV/r434 or 426.25 in, 923.25 out

This system is located 5400 feet above San Bernadino near the town of Crestline. Job's Peak primarily covers into the Mojave Desert from the town of Mojave to Victorville. Also parts of Riverside, the Inland Valley, San Bernadino and Long Beach can access this system. In addition a 6 foot dish to receive Santiago Peak on 1253-.25 can be hooked in line to relay Santiago to the high desert.

MT. POTOSI
KB7BY/r910.25 or 434 in, 1253.25 out

This repeater should be operational this spring from near Las Vegas, Nevada. Located at the 8515 foot level, this system should have excellent coverage. Future plans are to link this system into the ATN network via Job's Peak even though it's 158 miles away.

GILBRALTAR PEAK
WB9KMO/r434 in, 1277.25 out

Located 2700 feet above Santa Barbara, this repeater covers the coastline from Refugio pass to Pt. Mugu. Although Ventura and parts of Oxnard are blocked, a new system has been recently installed on Santa Cruz Island to selectively cover these areas. Also a 12 foot dish will be used to receive Santiago Peak (over 125 miles away) to link into the ATN network.

SANTA CRUZ ISLAND
K6TZ/r434 in, 910.25 out

This solar powered system is located on a remote island 25 miles off the coast of Santa Barbara on top of 2500 foot Diablo Peak. This system is going to be used to selectively cover the Ventura / Oxnard coastal areas. Also a 1253.25 or 1277.25 receiver will be installed in the future to link into the Sulphur Mountain ATV repeater and the Gilbraltar Peak system.

All these systems have a 220 FM repeater for control functions as well as a 146.43 remote base which allows them to be linked on voice. There is an ATV net on 146.43 every Tuesday night at 8 pm.

MOBILE/PORTABLE
WB6BAP/r
Various Freq. combinations

Ernie WB6BAP has a mobile/portable ATV repeater which can be set up at a moment's notice for public service events such as the Rose Parade, LA Marathon and JPL missions.

In addition to the ATN repeaters there are several other independent machines in So. Calif:

SULPHUR MOUNTAIN
WA6UCL/r434 in, 1253.25 out

Covers parts of Simi Valley and Ventura/Oxnard. Local talk frequency is 146.43 MHz. as well as the 146.88 sulphur mountain repeater. There is an ATV net every Tuesday night at 8:30 on the 28-/88 repeater.

MT. SAN MIGUEL
WA6VLF/r434 in, 1277.25 out

This repeater is operated by the San Diego RACES group. They monitors 146.43 as well as a 220 MHz. RACES repeater.

MT. WILSON
K6KMN/r434 in, 1241.25 out

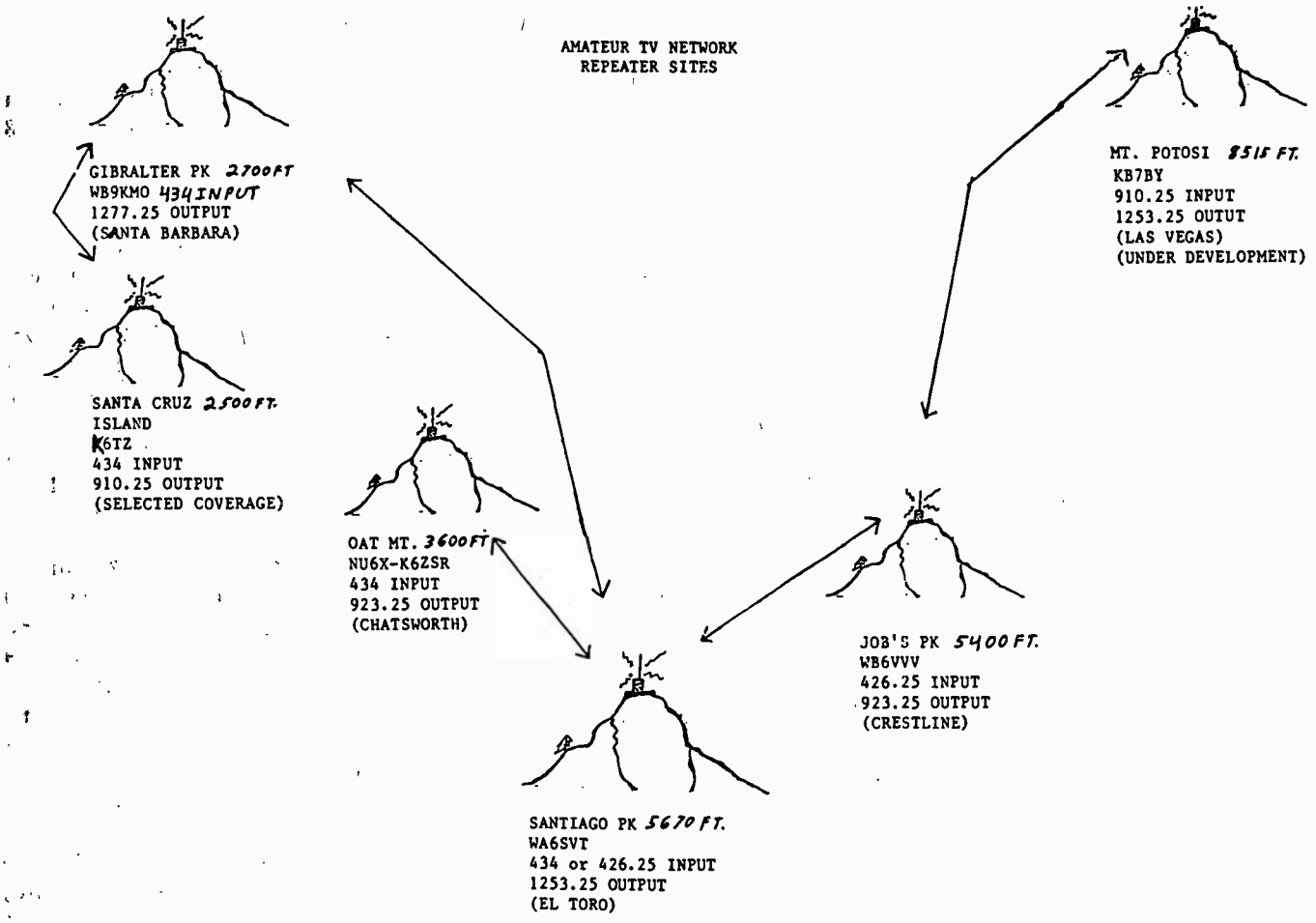
Located 5000 feet above Pasadena this repeater covers a good portion of the LA area and has been used to help cover the Rose Parade each year. An ATV net is held every Monday night at 8 pm on 146.43 MHz.

ARRL NATIONAL KC, MO

ATVQ will be in booth 96, next to AEA at the KC, MO ARRL National convention in June. Look for us there. The host of the ATV forum is Mike, KB0FW. Speaker will be Henry KB9FO.

ORLANDO HAMCATION

Henry KB9FO will be manning the ATVQ booth in Orlando at the end of March. This will be our second visit to Orlando and there will be an ATV forum there as well. Next year ATVQ will be at the Miamifest.



ATVQ VISITS YOU

ATVQ will be at several hamfests and conventions this year.

DAYTON

Meet and greet the ATVQ staff! We will have a DOUBLE BOOTH at DAYTON! We will be near the booth we had last year, but in the adjacent aisle behind PCE. Look for Bill WB8ELK and Henry KB9FO there! We will have special guests from the UK in our booth and at the ATV PARTY! And don't forget Friday night ATV PARTY. It starts at 7 PM to midnight. We encourage ATV'ers to spend some time there speaking about their local ATV activity. Coordinate your talks with Chuck Northcutt (see page 4). As always there will be

FREE snacks-pop-coffee.

and as always

FREE ADMISSION!

You can bring a home brew project or photos and a short write-up of a home brew project. We will give $100 CASH (Yankee-American dollar bucks) for the best entry which you can then spend on more goodies in the flea market or whatever! Also speaking will be Tom O'Hara W6ORG of PCE and Dr. Alan Chandler of AEA. Feel free to engage in an active Q&A with these experts! The ATVQ ATV PARTY is at the Best Western, formerly the

Travelodge at the Dixie Highway circle interchange of I-75, across from the Holiday Inn North where the SSTV party is held by Don Miller W9NTP of Wyman Associates. Henry KB9FO will be there as the BATC convention is not on the Dayton weekend as last year!

DAYTON SSTV PARTY

The SSTV get together friday night at the Holiday Inn starts at 7:30 till 11 PM. Speakers include special guests from Australia. John Langner will speak on the Atari SSTV, Ben Blish Williams K4EJI will speak on new additions and modifications to the Amiga AVT. Tom Hibben KB9MC and W9NTP will host. Additional topics by other noted SSTVers. Tom KB9MC will speak about interface between the Amiga and 1200C. Tapes of the saturday afternoon forum will be available from W9NTP.

John Wilson and Bronc are the designers and makers of the LM9-000 SSTV converter. Also there is a new Japanese clone of the 1200C which will be discussed. Henry KB9FO will drop by the SSTV friday night meeting.

The SSTV forum is Saturday afternoon from 12:15 to 2:30. Bronc Blain ZL4PJ and John Wilson ZK3-LM will speak on modification and additions to the 1200C Robot Scan converter with demonstrations of the Scotty ROM.

BOXBORO, MA

Bill WB8ELK and Henry KB9FO will be at the bi-annual Boxboro hamfest. Look for our booth and ATV forum there.

* WEBERSAT UPDATE *

Pictures from the color TV camera on board the orbiting WEBER microsat have been successfully taken of the earth. Due to the fact that the satellite spins, initial pictures were of open space or taken directly into the sun. However, the most recent pictures are quite recognizable images of cloud patterns & the ocean. As the imaging team becomes more experienced with the satellite spin characteristics, the camera can be commanded to snatch a picture with more accuracy & may give us some exciting pictures in the near future. The much awaited WEBERWARE1.0 image decoding software should be available at this writing & will allow those who have an IBM PC with either CGA, EGA or VGA to display the images. You must have a receiver on 437.1 MHz., a PSK modem & a TNC operating in the "KISS" mode. Store your raw data files using 8 bit data format with your communications terminal program. It takes 20 minutes (requires 2 passes) to receive full picture information. The first version of WEBERWARE 1.0 will not be a real-time display but works on the raw data files. WEBERWARE is available from AMSAT - P.O. Box 27, Washington, D.C. 20078.

The ATV up-link experiment may be performed sometime in late spring or early summer. Those who have at least 18 W. on 1265 MHz. & an AZ/EL antenna array on this band should contact Bill Brown WB8ELK - 12536 T.R. 77, Findlay, OH 45840. An up-link schedule will be arranged with participating up-link stations with the command station at WEBER STATE COLLEGE.

BALLOON LAUNCHES

This spring & summer will see a series of balloon experiments from several sites providing an opportunity for many areas of the country to participate. Carl WA4ADG is planning a cross band linear translator experiment sometime this spring with an input between 28.-385 - 28.410 MHz. This will output between 144.3-144.325 MHz. Send SASE for more info to: Carl Lyster WA4ADG, 4412 Damas Rd., Knoxville, TN 37921.

Chuck NJ9Y is putting together a 2 m. FM voice talker telemetry system along with 1200 baud ASCII & CW transmissions. Also CW telemetry will be output in the 10 m. band. They plan to launch from the Rockford, Illinois area in northern Illinois during MAY. If this flight works well their group plans a live TV camera flight later in the summer. Send SASE for more info to Chuck Pocius NJ9Y, 1036 E. Paddock, Palatine, IL 60067. A balloon borne ATV rpt. will be flown in late spring or summer by Bill WB8ELK & Mel KA8LWR. This system is currently planned for an input on 910.25 or 923.25 MHz. (possibly switchable between both). It will output on 439.25 MHz. & also 1255 MHz. FM ATV. A 1255 MHz. FM system may be flown before this flight to test out that part of it. Here's a chance for those building up the FM receiver shown in this issue to test out your systems. Hopefully this will help stir up some activity on the higher bands. This balloon will be flown from Bucyrus, Ohio in the central part of the state & should allow 2 way contacts between ATV'ers over 700 miles apart (St. Louis, MO to eastern PA contacts are a real possibility). All of the input & output frequencies will be using horz. polarization, although we may use a quadrifilar circularly polarized helix on 910 & 1255 to allow for both vert. or horz. polarities.

A dual-balloon Packet experiment is also planned for June which may occur as part of Field Day activities. Phil KA8TEF & Bill WB8ELK will be launching their balloon from Ohio & Ralph W0RPK & his group will be launching a packet digi from Des Moines, Iowa. After about 60,-000 feet these balloons will be able to "see" each other & allow for a linked balloon-to-balloon packet network. Each balloon will be running similar software to the SAREX Space Shuttle packet experiment & provide telemetry down link in real time via the packet TNC.

Throughout the summer some small 2 / 10 m. solar powered balloon packages will be flown cross country by Bill WB8ELK in a test of the Round the World attempt. These will be using a balloon that doesn't burst & should stay up for several days or weeks.

Keep looking at your local packet BBS for balloon updates as well as the ATVNET on 3.871 MHz. every Tuesday evening at 8pm Eastern time. Also the AMSATnet on 3.840 Tuesday evening will carry news of an impending launch. If you send an SASE to Bill Brown WB8ELK - 12536 T.R. 77, Findlay, OH 45840 I'll see you're alerted to any launches.

ED. NOTE: Although I'm moving to New Hampshire I'll continue to receive mail at this address.

YORK, PA

The York ATV rpt. will be operating soon at it's mountaintop site covering south-central PA & northern MD. Currently it is being tested at Rick WA3USG's QTH. The new rpt. will have an input on 439.25 MHz. & will output a 20 W. signal on 923.25 MHz. Both input & output will be horzontaly polarized. Local simplex calling frequency is 147.47 as well as the 146.97 rpt. Look for activity night/net every tuesday night at 9 pm on the 146-.97 rpt.

STATEN IS./BAYONNE

The BEAMARC radio club (Bayonne ARC) holds a monday night ATV net at 8pm on the 145.43 rpt. Several ATV stations are looking for contacts in the Staten Island and Bayonne, NJ areas on 439.25 MHz. (Horz. polarization). Some of the active ATV'ers are Dan N2EHN, KB2EQQ & WA2QYX.

MORE NEWS - - >

WB8ELK MOVES to NH

With the Feb. 90 issue of 73 Magazine I starting writing an ATV column. From the initial letters I've received, it looks like we may see quite an increased interest in the ATV mode. Lots of hams have been writing about finding local activity and how to get started.

In early March I will be starting as Editor of 73 Magazine and will be residing in the Peterborough, NH area. I will continue my duties as co-publisher/editor of ATVQ as well as operating ELKTRONICS. ELKTRONICS will still be operated from Ohio and the telephone and address will remain the same. For those wishing to contact me directly I'll be publishing my NH phone number in the next issue. Article submissions to ATVQ should be made to either our Des Plaines, IL address: ATVQ, 1545 Lee St., Suite 73, Des Plaines, IL 60018 or to Bill Brown, 12536 T.R. 77, Findlay, OH 45840. All article submissions will be forwarded to me at NH for editing.

With my involvement in two amateur radio publications, I hope to be able to enlighten the ham world to the joys of ATV!

MORE ATV NEWS

DAVENPORT, IOWA

KB9BNR is installing a "sky-cam" on his tower using a B/W Sanyo camera with pan action. Look for Dave's unsuspecting neighbors on ATV(he's ready for the bikini season this summer!). BARN CAM - WB0BBM has recently installed his new remote camera in his BARN! Bill wants to keep an eye on his horses. Look for the local ATVnet every Sunday night on 144.34.
Thanks to N9ZK of the BRATS group for this info.

Henry KB9FO was at the Davenport hamfest & table space was provided by the BRATS group which had a good live display of their system. The rpt. now has 10 active channels of video sources including weather radar, & a remote control tower top camera which was giving a close up look of the hamfest site entrance! TheBRATSmembers atthe hamfest allreported a significantincrease in activityon-airand at meetings as wellas several new members. Thegroup expressed distress atmisleading information published in anotherpublication.

TYLER/KILGORE, TEXAS

The W5KPZ ATVrpt. (434 in 421.-25 out) now has a full duplex link with the K5KFC rpt. (439.25 in 426.25 out) in Kilgore over 26 miles away. This was accomplished via a 1 W. 1255 MHz. FM ATV link made by T D Systems with a full color P5 signal. These linked rpt.s now can support consistent contacts over 70 miles away. ATVcalling frequencies are 144.34 MHz. simplex, 145.45 rpt. & the 146.96 rpt. Look for activities night at 8 pm on one of these frequencies.

EUSTACE, TEXAS

The East Texas Weather Watchers have installed a 910.25 MHz. in 426.25 MHz. out rpt. (Vert.) 65 miles SE of the Dallas-Ft. Worth area. One of the features of this machine is to relay the weather radar feed from Dallas or from the W5EEY ATVrpt. in Terrell, TX a-bout 50 miles to their northwest. The local talk frequency is on 144-.34 MHz. simplex as well as the 147.02 (+600) rpt.

LEXINGTON, KENTUCKY

Two active ATV'ersare looking for contacts in northern KY/southern Ohio. Brad WA4HBM& Greg WA8-FJK are just starting up & would appreciate any help in making distant ATVQSO's.
ED. NOTE: I was quite surprised to hear Greg WA8FJK ask about ATV on the 145.19 MHz. linked rpt. system in southern Ohio. I was just casually scanning across the band & heard his inquiry even though I was over 250 miles north of him. How about it fellows, here's your chance for Kentucky ATV QSO's!

TOMS RIVER, NJ

Paul N2HYG brings us news of 5 active ATV'erson the NJ seacoast about 60 miles south of NYC. They have been monitoring 146.52 MHz. & are looking for contacts in NYC & Atlantic City. They are about equidistant from both cities.

NEW HAVEN, CT

According to WA1WVJ, the W1NRE ATV rpt. now has a 426.25 MHz. input & output on 439.25 MHz. (Horiz.). This reverse pair was necessary to alleviate interference from packet links. Calling frequency is 144.34 MHz. as well as the 146.61 rpt. in New Haven. Listen for local ATV activity particularly tues. nights at 8 pm.

WEBSTER, WI

Scott, N0EDV is a very isolated ATV'er looking for activity in NW. Wisconsin. Scott is located 50 mi. south of Duluth, MN & about 60 mi. NE of St. Paul, MN. Ifyou can help Scott make a QSO contact him & set up a schedule: Scott Littfin N0EDV, 28579 County Rd. H, Webster, WI 54893. Scott is planning some aeronautical mobile ATV flights this year & should be able to work into the Minneapolis area this way.

MOBILE, AL & PENSACOLA, FL

Members of the Mobile, Alabama ATVgroup are looking to expand their contacts to the west. Anyone active in SE MS or anyone wanting to attempt some DX contacts with the group should contact Warren Locklin N4RUC, 905 Shady Brook Dr., Mobile, AL 36606 or phone (205) 479-2961. Active ATV'ers in Mobile include N4UXY, KA4FAV, W4DGH, N4RUC & N4KTI with KC4JCL, N4VBT, W4HDF & KC-4IMC soon to be active. Also in the nearby Pensacola, Florida area W4EQR, WA4DDY, KA4PME& K4-KIF are active. The Mobile group have been hooking up with the local Civil Air Patrol (CAP) with some very successful aeronautical mobile ATVdemonstrations during simulated emergency tests. An ATV rpt. may be set up in the future midway between the Mobile & Pensacola groups in hopes to establish a Central Gulf Coast ATVnet to be used during hurricane season.
Thanks to N4RUC for the above info.

AUSTIN, TEXAS

ATVis alive & well in the Central Texas area with regular contacts from Houston to Austin direct. New faces are showing up on TVsets all over the area. The Austin group hold an ATV net every Monday evening at 9:00 pm on the 145.29 rpt. For more info on Austin activity contact Pat McGuire WA8PLR, 9610 Southward Cv, Austin, TX 78733
From Camera Amateura.

DES MOINES, IOWA

From the Static Sheet Newsletter of the DMRAA Club.excerpts from an article called "Scanning Lines" by Allen Johnson WB0OEU

Starting in the fall of 1988 Des Moines hams have been making plans for a cross band ATVrpt. The Central Iowa Technical Society (CITS)is constructing a rpt. with an input on 1277.25 MHz. & an output on 427.25 MHz. They chose that specific input frequency so that novices could also participate in the fun of ATV. The output frequency, which is also cable channel 58, was chosen to help minimize the user's initial expense by allowing the use of a cable ready receiver & outside antenna which may already be at the shack. Also this frequency will enable non-hams to easily see what is going on & maybe entice them into the fraternity. Both input & output will be vertical-

ly polarized. This "high in, low out" was also chosen because it would be more practical for the rpt. to transmit with higher power on 427 MHz. Currently the rpt. is in the testing stage & has been recently used to retransmit Space Shuttle missions from the NASA Select satellite feed on transponder 13 of SATCOM F-2. Also Allen WB0OEU stirred up ATV activity this fall with a hot air balloon ATV flight using a 1 W. KPA-5 to a small coaxial collinear antenna made by Bob Evans K0IQR. Local ATV'ers watching the balloon flight were Ralph Wallio W0RPK & Bob Johnson W0-SMS. Bob was in one of the vehicles recording the ATV signal as he chased after the balloon.
He arrived at the landing site just in time to record Allen being given the "First Time Balloon Rider Ceremony" - - Champaign & weeds being poured on his head. Bet that made for some interesting video.

PACKET ATV ALERT

Bob Bruninga WB4APR writes that there have been a number of articles in PACKET radio literature which suggest that the best way to distribute bulletins of interest to specific sub sets of interest is to address those bulletins to a specific interest area. The value of doing this is the ease with which such traffic can be recalled. If every bulletin that was ever sent about ATV was sent to the TO: address of ATV, then all anyone would ever have to do to find out what bulletins were on a particular BBS having to do with ATV is to send the command: L> ATV. That command would list all bulletins to ATV.

That is what we do here in the DC area. We have asked all of the BBS sysops in the area to establish a bulletin distribution tree for our area so that a bulletin entered on any BBS in the area will be distributed to all others. To specify that routing for an ATV note, we use the routing indicator of MDCATV which stands for Maryland/DC ATV. It is important to understand the difference between the two fields. the TO: field of ATV is for the subject matter (to make it easy to search for) and the @ field of MDC-ATV is for routing. This is not only a way to keep active ATV'ers informed, but to let non-active ATV'-ers see what we are doing.

NEW PRODUCT ANNOUNCEMENT

Designed to overcome the frequency drift problems of free running microwave oscillators, such as Gunn sources, the PMRK-2 proportional heater kit from SHF Microwave parts Company attaches to existing screws in such devices and gently warms them to a constant (adjustable) temperature. The PMRK-2 will maintain temperature within .2° and consumes only 5 W (average) at +12 V DC and uses no hard to find parts. The PMRK-2 measures 1.75" x 2.75" x .5" and weighs only 1 ounce. The unit comes with PC board, instructions, and all parts including an aluminum mounting bracket which mates with all standard UG-39 horn mount bolts found on most Gunn sources. By using the PMRK-2 kit, 10 GHz. Gunn oscillators can be stabilized within 5 KHz. for long periods of time. The PMRK-2 costs $20 pp from SHF Microwave Parts Company, 7102 W. 500 S., La Porte, IN 46350. Shipment is from stock.

FOR SALE

1, VHF Engineering 439.25 1-2 W TX strip, $20; 2, P. C> video modulator for item 1 $10, 3, PCE FM-A5 4.5 MHz. sound sub carrier modulator for above $5 or all in cabinet $35. 4, VHF Eng. 439.25 to TV Ch. 3 with silicon preamp in small grey case $20, 5, PC TX-A5 ATV exciter and FMA5 sound gen, never used, mounted in RF tight 7" x 8" alum. box $75. 6, SI, micromodule 439.25 in 45 Mhz out ATV converter in di-cast box $50, 7, PC RCM-3 rpt controle module never used $25. 8, two each, Spectrum Int. Interdigal bandpass filters one on 439.25, one on 421.25 Mhz, never retuned $100 each, or $175/both. 9, VHF Eng. rpt cabinette with neat 13.5 V DC supply, documentation most, all in line new cond. Alan Rutz, WA9GKA, 7102 W 500S, La Porte, IN 46350, will ship UPS.

INQUIRING MINDS WANT TO KNOW - - AND THEY FIND IT IN ATVQ!

W8YIO 16 Foot Dish on 439.25 MHz.

VISIT OUR DAYTON BOOTH # 66 & 67

MICROWAVE MODULES EQUIPMENT

Use your existing HF or 2M rig on other VHF or UHF bands.

RECEIVE CONVERTERS

MMk	1691-137	333.00
MMk	1296-144G	235.00
MMc	430-ATV	99.00
MMc	432-28(s)	89.00
MMc	144-28(HP)	95.00
MMc	144-28	75.00

LINEAR TRANSVERTERS

MMt	1296-144G	499.00
MMx	1268-144	395.00
MMt	432-28(S)	370.00
MMt	144-28(R)	499.00
MMt	144-28	265.00
MMt	435-28(S)	390.00

PRE-SELECTOR FILTERS

Spectrum International's low loss, fixed tuned, band-pass filters are a 3 pole, 7⅞ bandwidth interdigital design. The 0.1 dB ripple Tchebyscheff characteristic has a 30 dB shape factor of 4:1. They are intended for receiver pre-selector and transmitter applications. The very low loss is realised by using an air dielectric transmission line design.

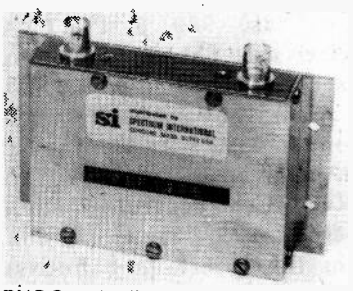
Technical Date

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

VHF/UHF BANDPASS FILTERS

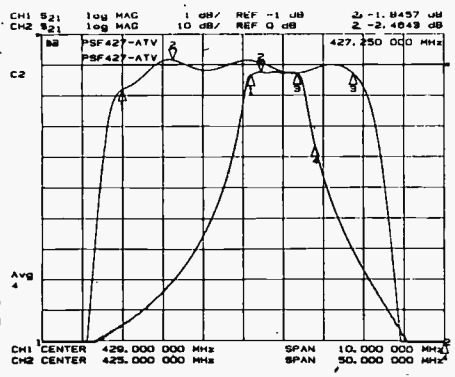
KNOCK OUT INTERFERING QRM OR SELF—DESENSE!

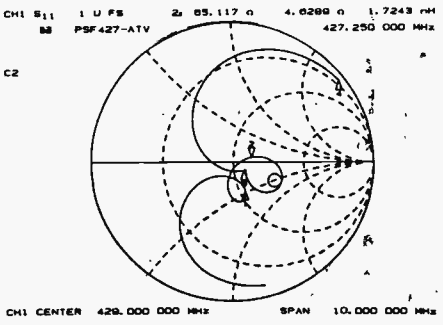
3 and 5 pole models available



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

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





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

Prices subject to change without notice.

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

General Information: All prices are NET, FOB Concord, Mass. USA. Our terms are "Payment with Order" or C.O.D. Your personal cheque is welcome; Master Card and VISA are available for your convenience. On foreign orders, U.S. Dollar cheques drawn on a New York bank and Irrevocable Letters of Credit are acceptable. From Canada only, Postal Money Orders in U.S. Funds are convenient. Prices subject to change without notice.
Delivery Information: Domestic U.S.A. delivery is by U.P.S. or the Postal Service. Small parcels are sent U.P.S. Blue Label (air) where the service is available. Overnight express delivery via Federal Express or U.P.S. is available, n request, at increased charge.
Foreign delivery is by Registered (or Insured) Air Mail for small items. Large items and high value shipments are sent Air Freight, from Boston Int'l Airport, to your local airport for Customs clearance and collection. Air freight charges, etc. are payable in your local currency at time of collection of goods. Pro-forma invoices are available (if required) prior to placing your order. All facilities for Export Documentation are available.
Returns: All crystals are "non-returnable". Please request authorization before returning any item for check-out, repair or other reason. A re-stocking/re-testing charge of up to 15% of item list price will be levied on returns, plus a cancellation charge on cancelled orders.
Massachusetts residents add 5% SALES TAX to item cost.
Spectrum International, Inc. qualifies as a SMALL BUSINESS under Federal Procurement Regulation 1-1.702 and other govt. regulations.

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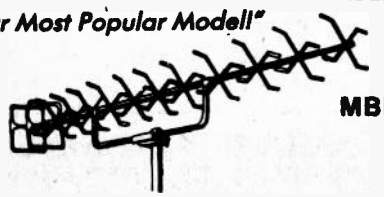
70 cm MULTIBEAMS

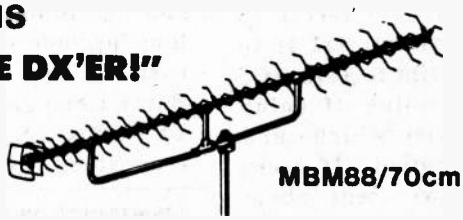
WIDEBAND
IDEAL FOR ATV!

"Our Most Popular Model!"



MBM48/70cm

"THE DX'ER!"



MBM88/70cm

2 way & 4 way Mounting Frames Available (Vertical slightly higher)
MF4H MBM48 HOR $69.00
MF4V MBM88 HOR $87.00

2 Mtrs. CROSSED YAGIS

"WE STOCK 2 AND 4 WAY POWER COMBINERS FOR 1268, 1296 and 1691 Mhz.!"
NEW 900 Mhz. BEAM IN STOCK!

10XY/2M 5XY12M or 137 Mhz. Models
Ideal for OSCAR or WEFAX Satellites!

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

PHASING HARNESSES

STACKING FRAMES AND MOUNTING KITS

Four-way harness

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

All phasing harnesses and power combiners include Type 'N' (female) connector.
"Write for Prices"

Antennas	
5XY-137 (137 MHz Weather)	$ 90
10XY-2M	83
MBM28 - 70cm	65
MBM48 - 70cm	90
MBM88 - 70cm	135
DY20 - 900 (900/930 MHz)	89
1268-LY	65
1268-LY-XTN (add 21 elements)	89
1268-LY	65
1268-LY-XTN (add 26 elements)	80
1691-LY	75
1691-LY-XTN (add 26 elements)	70

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

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

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

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VISIT OUR BOOTH AT DAYTON # 66, 67

HIGH TECH SANTA
OR
SANTA USES ATV TO VISIT SCHOOL

Have you ever been sitting around the shack at Christmas time listening to the various repeaters and find one where a walkie-talkie is taken into a school and Santa visits the kids via the magic of radio?

This happened to me two years ago a couple days before Christmas and I began to think. With the advent of satellites, computers, fax and what have you, the walkie-talkie with Santa on the other end is not too impressive. So I got an idea, why not have Santa on TV? In fact, why not go one step further and have a full duplex visit with Santa on ATV. I almost did it last year, but did not have the 900 MHz. transmitter needed so the project was put on hold. I acquired some additional equipment for our annual parade which is in August, and put it to use for this idea.

I'm very fortunate in that I only live a block from the unit grade school so the problem of erecting antennas was minimal. Of course I used my shack as the North Pole as all antennas were already in place. I mounted 440 MHz. and 900 MHz. antennas on a tripod and installed it at the school. Being so close made this part a snap.

The equipment used was a TC-1 for the 439.25 transmit from my shack and a TC-1 at the receive end. The 900 MHz. transmitter was made by DJ Electronics (WB0ZJP and KD0LO) and a PC downconverter was used as a receiver at my house. We used a couple of camcorders for the cameras at both ends. To eliminate the feed back problem we used an earphone from the TV for Santa so he could hear clearly and not have the background noise and squeal you have with normal duplex operation.

Now the hard part. I took the equipment over the night before to test it and see what would happen. I had problems with the 900 MHz. receive until I found I didn't have the 900 MHz. antenna hooked up at the house so the downconverter was receiving with no antenna and not doing a bad job. Once we (WB9QLY my XYL) were convinced that it would work we were ready for action. Of course the next day we had 3 inches of snow plus a -5° F temperature with a -40° F windchill, so school was cancelled. We planned for the next week and Wednesday the 20th of December was the big day. Due to our work schedules we decided to take just a half day off to do this and see what would happen.

I got home and took the equipment over to the school joined by another ATVer WD9ENR. After some minor adjustments and corrections we had P5 color pictures both ways. About that time we were joined by a visitor from the North Pole, one Santa Claus, who arrived at my house. I told the Principal of the school we were ready and he brought the first class in. We had decided it was easier to move the kids than the equipment from room to room. We had no idea what to expect, let alone what to say, so it was strictly adlib at the beginning.

The kids sat down in front of the TV and Kathy told them that we had a cameraman at the North Pole and he was relaying the picture by television. No need to complicate it further. I then asked one of the kids to stand up and asked Santa what color shirt he had on. When old St. Nick answered "Green" you should have seen their faces light up. We then ask if they had any questions for Santa.

They say that kids say the darndest things and I now fully believe that statement. Some of the questions were: "What do reindeer eat?" "How old is Rudolph?" "Is Prancer back from Hollywood?" "How do you get the sleigh off the ground?" "How do you get down Chimneys?" "What do you like to eat?" And so on with some of them taking some real imagination for Santa to answer.

We then would have that class leave and have another come in and start over again. I would have someone hold up fingers and have Santa tell them how many fingers they were holding up. This also made an impression and added to the realism of the operation. Originally when the Principal and I discussed this we were only going to do the Kindergarten classes. Things were going so well, and the Principal was so pleased, we also did the First and Second Grades.

In all over 200 kids got to see Santa via ATV that day. By the time the day was over, you could see the teachers watching outside the door and the Unit Superintendent came over to see our operation. Everyone was very pleased and impressed with Hi-Tech Santa. It's too bad we can't have more activities like this, because seeing the faces of the kids light up really makes it worthwhile.

I've always said we do not do enough for children and senior citizens in this country. Maybe this is a start in the right direction.

I would like to thank my wife, Kathy WB9QLY, for putting up with my ideas and dreams for without her help this would not have happened. Also to, Jay WD9ENR, for his help that day, Bill KB9DU, and John KD0LO for use of their equipment. And of course to the man of the hour, Santa, on that special day.

If anyone wants to try such a project next year, please feel free to contact me and I will assist you in any way I can. If you do plan to try it make sure Santa knows all the reindeers names as I can guarantee, you someone will ask him their names, fortunately ours did know. Scott C. Millick K9SM, 907 Big Four Ave., Hillsboro, Illinois 62049 217/532-3837

POOR MAN'S SPECTRUM ANALYZER / MONITOR RECEIVER & TRACKING GENERATOR

MURRAY BARLOWE, WA2PZO

Imagine if you will, a single piece of equipment that could provide you with the ability to be able to:

Check your transmitter output for "spurs". See if the band is "open" at a glance, or find a quite spot on the band. Monitor ALL the local repeaters SIMULTANEOUSLY!

Receive "on-carrier" or "sub-carrier" ATV sound. Examine Satellite TV signals and their sub-carriers. (Curious about those "secret" signals on the Cable?) Measure the amplitude and frequency of RFI generated by your computer, electrical appliances, etc. and instantly evaluate the results of filtering or shielding. Orient and tune antennas (and antenna tuners) for maximum results across a band of frequencies. Sweep an area for illegal "bugs". Identify modulation modes such as AM, FM, SSB, FSK, PCM etc. Signal trace transmitters and receivers, check "gain per stage" when building or troubleshooting and test for harmonic or inter-modulation distortion. Tune antenna duplexers or diplexers, make VSWR measurements, measure insertion loss and tune RF filters. Make field strength measurements. Act as a continuous tuning AM FM, VHF/UHF sound receiver. These are only a few of the applications for the New Science Workshop Spectrum Analyzer/Receiver. With "RF-Vision" you will have a new monitoring mode, with rapid signal detection, modulation analysis and band condition and activity information constantly available at your finger tips! Through its many applications, this new instrument provides information and operating techniques not available in any other way.

SOME HISTORY

Back in 1978, I assembled a few pieces of surplus electronic gear into what I affectionately called "The Poor Man's Spectrum Analyzer". I demonstrated it at the Dayton Hamfest and sold out on the first day. One of the key items was a surplus TV IF strip which I had narrow banded for this application. I found a few more, sold out again and then we were out of the Spectrum Analyzer business! The excitement created by this extremely low-cost approach to spectrum analysis and display inspired me to see if I could design a simple circuit that could do all that the original package did, and maybe a bit more.

Well, we've done it! The new design is simpler, more stable and has greater dynamic range. How could we do all this and still come up with a package that meets the economical goal of being called the "Poor Man's Spectrum Analyzer"? Simple. Careful compromise! We would all love to have an instrument which would have all of the features of the $30,000 machine or even settle for the features and accuracy of the $5,000 machine. But we also realize that it's not in the cards for under $100. How about a machine that would do ALMOST everything the professional models do, but one that would require a little more effort and ingenuity on our part when it came to making precise measurements? Isn't half a loaf better than none? Many times it is and I believe this is one of those times. The original kit was based on these assumptions, and we made lots of friends with it! The results both in performance and educational value are impressive. Once you've had the opportunity to use it and appreciate its potential you will probably find applications that we haven't even dreamed of! (see Fig 1)

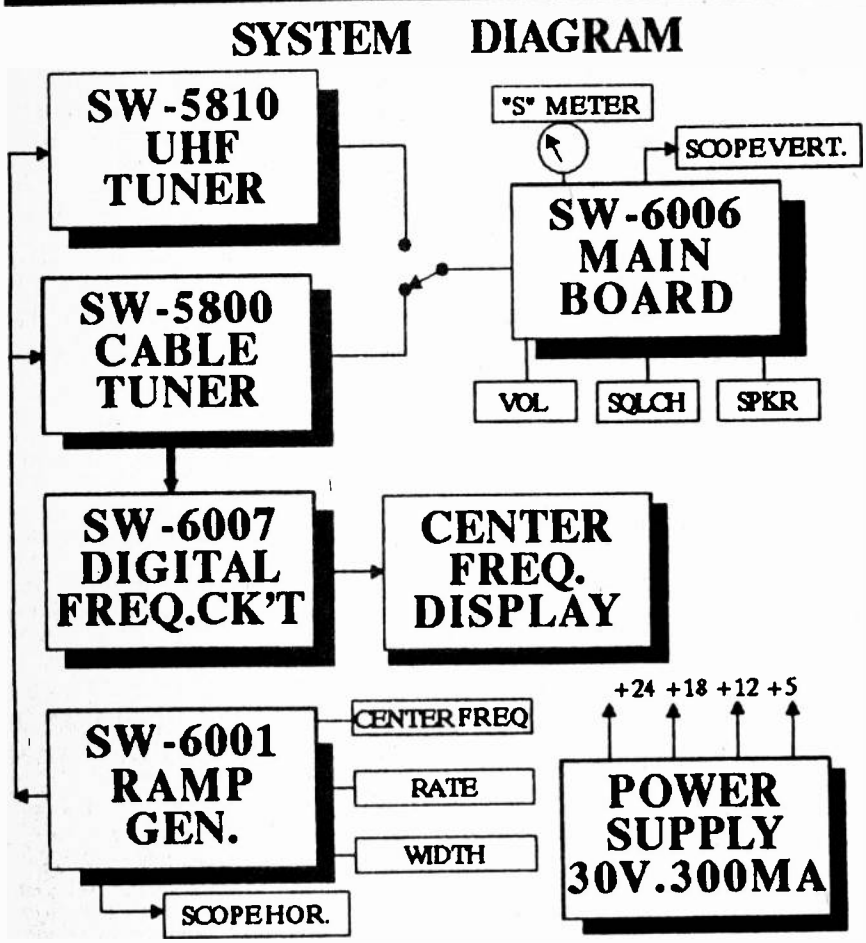
HOW DOES IT WORK?

Basically, the "Poor Man's Spectrum Analyzer" sweeps a voltage tuned front end over a range of frequencies in synchronism with the horizontal sweep of a scope. The received signal is passed through a narrow band filter and the detected signal is applied to the vertical amplifier of the scope. No signal, no vertical deflection. The deflection produced by the signal is proportional to the received signal's strength. Resolution is approximately 200 KHz., which is determined by the band width of the filter.

Since the output of the analyzer is audio, it can use ANY SCOPE for the display! If you don't have one pick up the cheapest "flea market special" that produces a horizontal line! The analyzer functions as a TUNABLE RF VOLT METER with "eyes" and "ears". This makes it a natural for signal tracing receivers and transmitters, making relative gain-per-stage measurements, tuning transmitters, receivers, antennas and duplexers, locating and identifying sources of RFI, checking receiver local oscillator radiation, transmitter spurs, remote off-the-air repeater transmitter monitoring, etc. Using the analyzer on a transmitter, provides a display of the frequency, amplitude, and purity of the oscillator, frequency multiplier, and final signals. While a watt meter indicates the total power output of a transmitter, the analyzer will tell you how much of that power is the desired output signal and how much of it is garbage. Have you ever "peaked-up" on a spur? How would you know? Wouldn't you like to see the level of the synthesizer sidebands? The harmonics?

The high sensitivity of the instrument permits signal tracing receiver circuits from the antenna through the low-level RF stages. If the

HOW DOES IT WORK?



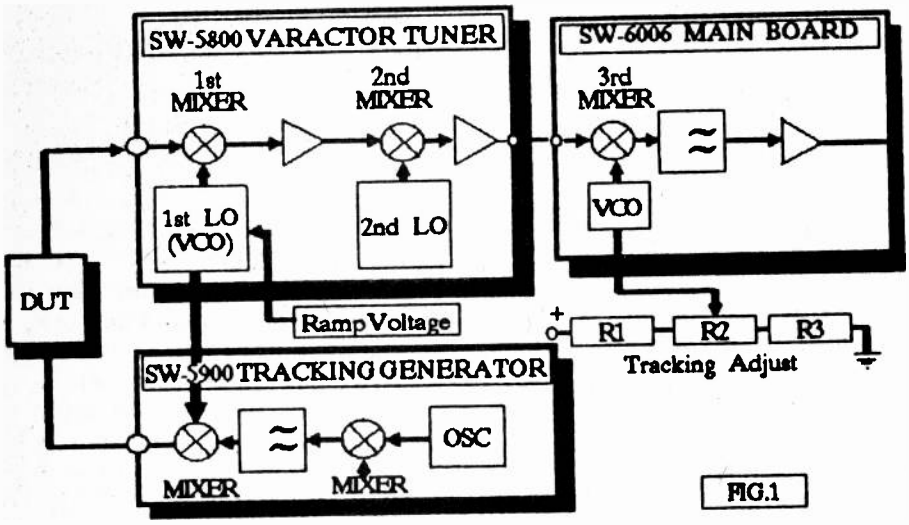


FIG.1

output of an RF amplifier stage contains signals not visible on the input, the RF stage is generating distortion products as a result of either overload, incorrect bias, etc. A conventional RF voltmeter (or scope) simply sums all of the voltages with no indication of the individual frequency components. Not so with the Spectrum Analyzer! In addition, the analyzer displays the presence of the local oscillator signal, as well as its frequency and injection level.

The Science Workshop "Poor Man's Spectrum Analyzer/Receiver" may not provide you with the built-in calibration convenience of its bigger brothers, but it will provide you with a basic instrument that will teach you how a Spectrum Analyzer works, do all the good things we've described, provide you with a continuous tuning AM/FM, UHF/VHFsound receiver and best of all, its price GUARANTEES NOT to make YOU A "POOR MAN"!

WHAT DOES IT COST?

The "Poor Man's Spectrum Analyzer/Receiver" has been designed and packaged as a semi-kit to provide the cost-conscious Ham/-Experimenter the opportunity to assemble this unit at the lowest possible cost. The heart of the instrument is what we call the "Main Board Assembly". It contains the converter, IF filter, amplifier-/detector and audio amplifier sections. All on a 3" X 4 1/2" PC board. Complete kit of parts for the "Main Board Assembly" is $30. We can also supply this board assembled and tested for $20 more.

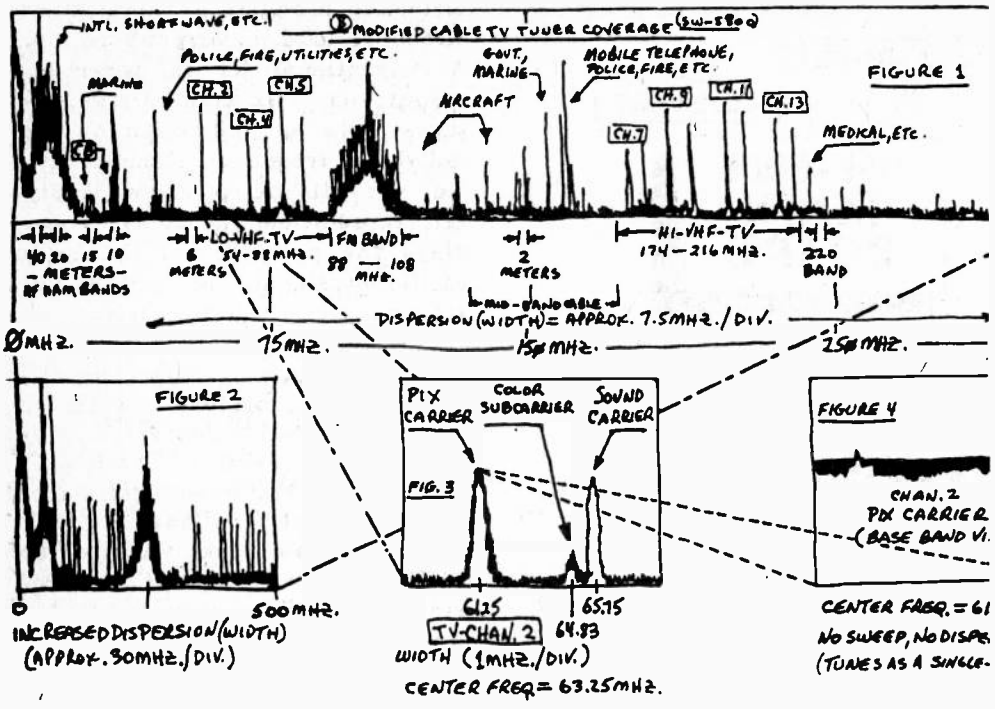
WHAT ELSE DO I NEED?

A sawtooth horizontal sweep voltage is required to deflect the beam horizontally across the screen of the scope, and at the same time, causes the varactor tuner to scan across the RF band. Many scopes provide access to the internal horizontal sawtooth voltage. If your scope does, that's all you need. Our instructions show you how to use it. If your scope doesn't, we've provided another kit

POOR MAN'S SPECTRUM ANALYZER

RF VISION FROM SCIENCE WORKSHOP

THE VIEW FROM THE ANTENNA HERE IN BETHPAGE, NY.



which uses a single LM-3900 chip to do the job. It also provides a voltage regulator and the circuitry necessary to integrate the controls for "width", "sweep rate" and "center frequency". Makes it a lot easier to assemble your analyzer even if your scope provides the horizontal sweep voltage. Order Ramp Board #SW-6001. Kit $20; assembled $10 more. To finish the project, you will have to provide a box, controls, knobs, speaker and power supply.

WE GET LETTERS, LOTS & LOTS OF LETTERS.

"Recently purchased your Spectrum Analyzer kit. It was assembled in a few hours and worked perfectly the first time out. I am delighted with your unit that compares in many aspects with Hewlett Packard, AVCOM and Tektronix spectrum analyzers costing many thousands of dollars more. We use it for looking for 6 meter openings and identifying the type of scrambling being used on Satellite TV signals. It is a real pleasure using your Spectrum Analyzer, compared to trying to guess looking at a standard TV display. There are only so many different ways a satellite TV programmer can scramble a signal and "all" of them are rather obvious when one looks at the audio and video on a Spectrum Analyzer. Also pick up the 123-136 MHz. aircraft band, 2 meter band and weather bureau from Toronto, 130 miles away. " Robert M. Richardson, W4UCH, noted author of "The Gunnplexer Cookbook", "Disassembled Handbook for TRS-80", and "Synchronous Packet Software Approach".

SEVERAL MONTHS AFTER WE RECEIVED HIS UNSOLICITED LETTER, HAM RADIO MAGAZINE (SEPT. '86) PUBLISHED HIS ARTICLE TITLED "LOW-COST SPECTRUM ANALYZER WITH KILO-BUCK FEATURES". WE QUOTE.

"Although laboratory-grade spectrum analyzers cost $4,500 or more, you can build a spectrum analyzer offering many features of its costlier cousins for about $50 (Main Board & Tuner). How can such amazing capabilities be had at such incredibly low cost? Through the use of a commercially mass produced varactor TV tuners. Through the use of consumer grade integrated circuits in the oscillator/mixer, dual ceramic filter, IF amplifiers/detector, and audio amplifier (offering audio as well as scope output, it is really a spectrum monitor). Through the use of your own oscilloscope. Just about any scope may be used. I used a 1951 Heathkit Model OL-1 with its original cathode ray tube".

AND ANOTHER.

"I was very fortunate to have purchased your "RF VISION" kit. I originally used it for listening to signals and just seeing what was on the band. My real interest was in using it as a spectrum analyzer. It has done this remarkably well. Another area of interest to me is antenna measurements. I have used a Palomar Noise Bridge for several years, and with the help of a computer, I have been able to calculate some good data on my antennas. The final data being converted manually from tabular form to graphs. It occurred to me to use your unit as the detector in place of the normal receiver. You can well imagine my excitement in seeing my antenna graphs appear on the CRT without any laborious data gathering or calculations! I am so pleased with this project that I have recommended it to several friends and plan to demonstrate it at a club meeting in the near future. It is hard to believe an electronic tool could generate so much pleasure, but this one did. Thanks again for many hours of pleasure". Terry Good, WB2-PFB, Hillsdale, NJ

AND FROM JOE CARR'S "PRACTICALLY SPEAKING" COLUMN IN THE MAR. '87 ISSUE OF HAM RADIO MAGAZINE.

"Sheer genius! WA2PZO deserves accolades and our business because of the Poor Man's Spectrum Analyzer project, which offers opportunity for experimentation in areas previously closed to amateurs solely for reasons of cost. I plan to buy the Tracking Oscillator Kit if and when it becomes available."

NOW, ZERO TO 500 MHz. IN ONE CONTINUOUS SWEEP!!!

We have acquired a quantity of NEW cable tuners (with pre-scaler) which we have modified for our application. They now provide continuous tuning from approximately 0 to 600 MHz. The drawing on the back of this page illustrates what we see (and hear) when we connect this tuner to an antenna here in Bethpage. Adding a UHF tuner gives us the ability to tune from approximately 0 to 900 MHz.! Since the resolution of the analyzer is approximately 200 KHz., it is difficultto resolve signals at the low end. It should be possible to improve this with crystal filters. The pre-scaler makes it possible

to add additional circuits to provide a direct, digital read-out of the center frequency.

SW-6900 TRACKING GENERATOR

The addition of a tracking generator to the spectrum analyzer provides a powerful receiver system for stimulus-response measurements. A tracking generator is a signal source whose RF output follows (tracks) the tuning of the spectrum analyzer. Since the instantaneous output frequency of the SW-5900 matches the instantaneous input frequency of the analyzer, this swept frequency test system acts as a very sensitive synchronous detector. This makes it the ideal set-up for measuring the frequency response of active and passive devices such as amplifiers, mixers, couplers, attenuaters, transmission lines, and even antennas when used with an external bridge. Its output signal is generated by mixing two or more oscillators. Physically, the tracking generator consists of another modified cable tuner, designed to operate in conjunction with the SW-5800 modified cable tuner.

Figure 1 is a simplified block diagram of the system. The incoming signal to the spectrum analyzer mixes with the LO, and when the mixing product equals the IF, this signal passes through to the detector. The detector output is amplified and produces a vertical deflection on the CRT display. The sweep (ramp) generator drives the horizontal CRT deflection and tunes the LO. The tracking generator uses the swept LO from the spectrum analyzer and mixes that LO with a fixed IF oscillator. The sweep of the two instruments are matched and synchronous, and precise tracking between the two is assured.

TYPICAL APPLICATION.

The RF output from the tracking generator is connected to the input of the Device Under Test (DUT) and the output of the DUT is connected to the input of the spectrum analyzer, as in Figure 1. The resulting display is an instantaneous plot of the frequency response of the DUT. If you were adjusting a band pass filter, you would immediately see the result of your tweaking. The tuned (sweeping) receive band width of the analyzer assures that you are not peaking on a harmonic or any other spurious energy.

ANOTHER APPLICATION.

Connect a piece of coax in place of the DUT (in parallel). Tune across the spectrum for a notch in the response curve. An open 1/4 wave line reflects a short, acting as a trap at the notch frequency. Clip 1/4" lengths from the open end with different values of resistance and watch the notch move up in frequency. Terminate in different values of resistance until the notch disappears. The value of resistance represents the characteristic impedance of the line at that frequency. Connect the transmission line from your antenna in its place. You may be in for a surprise! The SW-5900 Tracking Generator is NOT a kit. It is a fully assembled and tested module, ready to be installed. Best of all, it is priced at $50 and is available from stock!

NEW!!! CENTER FREQUENCY READOUT CIRCUIT KIT FOR THE "POOR MAN'S SPECTRUM ANALYZER"

This new kit uses a unique combination of Analog and Digital circuitry to accomplish a relatively complex task. The conventional approach to this problem has always been purely digital, requiring anywhere from 10 to 20 digital chips. In keeping with the philosophy demonstrated by the design of the "Poor Man's Spectrum Analyzer", I felt that there had to be a simpler, more economical way. Since we are looking at a CRT display, covering anywhere from a few MHz. to several hundred, all we needed was a 3-digit read-out that could display 0 to 500 MHz. directly.

PREVIOUS SOLUTIONS.

Most frequency read-out circuits use the local oscillator signal to generate the display. This signal is offset from the incoming RF signal by an amount equal to the IF frequency. A little arithmetic must be performed to either add or subtract the IF signal to get back to the received frequency. This has required the use of hetrodyne oscillators, pre-setable counters, or to somehow play games with the time base to accomplish the same result. These methods provide a relatively inflexible solution.

A NEW APPROACH.

Rather than using the conventional all digital circuit, I decided to use a precision frequency-to-voltage converter IC, along with the output of the pre-scaler IC in the SW-5800 tuner. A bit of analog computer circuitry took care of the remaining math. Although this circuit was designed to work with the SW-5800 tuner, it provides experimenters with a simple low-cost solution for directly displaying the received frequency of almost ANY receiver. A simple adjustment of a potentiometer is all that is required to accommodate any IF frequency from 0 to hundreds of MHz. For the first time, a TRUL UNIVERSAL DIRECT DIGITA FREQUENCY READOUT!

DISPLAY OPTIONS.

To keep costs down, I designed the circuit so that it could use your Digital Voltmeter as the display. With the meter set on the 20 volt scale, 0 to 500 MHz. would be displayed as 0.00 to 5.00 volts. At first I found the decimal point annoying, but it didn't take too long before I was ignoring it. Later, when I found time, I bought a $29 DVM, disabled the decimal point and dedicated that meter display to my Spectrum Analyzer. Now it reads directly in MHz. However, we now have 2 miniature digital panel meter modules available that are ideal for this application. They measure approximately 1" x 2" x .5" and easily mount into a rectangular front panel cut-out. They are state-of-the-art, surface

mount technology assemblies either LCD or LED. These are not kits. The LCD version sells for $59, the lED version is $3 more. We also have an LET version KIT that is slightly larger for only $39.

OTHER APPLICATIONS FOR THE SW-6007.

There should be many other "frequency meter" applications for this unique circuit. Since this circuit could be used with ANY I.F., it represents a real break-through. Adjusting the I.F. offset with the simple setting of a single control has been unheard of until now!

PC BOARD.

The SW-6007 Kit is built up on a double-sided epoxy glass board, approximately 2" X 4.5", screened with the component parts layout. All parts and instructions are supplied. As usual, NO test equipment is required!

PRICE.

Best of all, it is priced in the tradition of the "Poor Man's Spectrum Analyzer", GUARANTEED NOT TO MAKE YOU POOR! Only $39 + $4 S/H. Available from stock!

OPTIONAL FILTER KIT FK-1001 SPECIAL PURCHASE!

The 2 ceramic filters supplied with the SW6006 main board kit are approximately 200 KHz. wide. These filters are quite adequate for most applications. However, there are times when it would be desireable to be able to separate signals that are closer than 200 KHz. apart. Ideally, we would like to be able to conveniently switch between narrow and wide band filters. The present board design is not set up to accommodate more than one set of filters at a time. The FK-1001 filterkit provides you with the opportunity to experiment with a narrower IF band width. It contains one 15 KHz. crystal filter and two matching tuneable transformers. Installing the 15 KHz. crystal filter is a bit more difficult than the 2 ceramic filters. The mechanical configuration is completely different. Fortunately, there is enough space on the SW-6006 main board after the crystal filters and related components are removed. The 2 coils and the crystal filter can be mounted on a 5/16" x 1" piece of perf board. Two input and two output leads, plus a ground lead are then dropped down through the holes on the main board that were used for the 200 KHz. filters and then soldered. You may have seen this arrangement at our display at a hamfest.

These filters were purchased as a one-shot-deal. I have not been able to locate a source that would allow me to make them available at a low price on a continuing basis. So while they last they are $25 for the kit. Order part # FK-1001.

Murray Barlowe WA2PZO
TEL. 516 731 7628

SCIENCE WORKSHOP
BOX 310
BETHPAGE, NY 11714
516-731-7628

****RUSH ORDER FORM****

SHIP TO:
Name _____ Tel.# _____
Addr. _____
City _____ St. _____ Zip _____

A Spectrum Analyzer consisists of a Basic Kit, & your choice of one or more tuners which determine the frequency ranges to be covered.

Description	Quan	Price	Total
BASIC KIT(Main & Ramp Boards) SW-6006K (Main Board Kit) or SW-6006W (Main Board Wired) SW-6001K (Ramp Board Kit) or SW-6001W (Ramp Board Wired)		 30.00 50.00 20.00 30.00	
TUNERS: a.) 0-500 Mhz (Modified cable tuner, w/prescaler)..SW-5800 b.) 420-900 Mhz (UHF ONLY tuner).....SW-5810		 35.00 15.00	
TRACKING GENERATOR SW-5900		50.00	
DIGITAL FREQ.READOUT KIT SW-6007K or, same as above, WIRED SW-6007W		39.00 59.00	
LCD DIGITAL DISPLAY, WIRED LCDDVM LED DIGITAL DISPLAY, WIRED LEDDVM LED DIGITAL DISPLAY, KIT LEDKIT		59.00 62.00 39.00	
UPS Shipping & Handling*			4.00
NYS Residents add Sales Tax			
TOTAL AMOUNT ENCLOSED			

* OVERSEAS, ADD $25 FOR AIR SHIPMENT, US FUNDS.
Personal checks require 7-10 days to clear.
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How did you learn of us?

NEW FSTV EQUIPMENT
by Henry Ruh KB9FO

There is always some reluctance to invest in new equipment. Recent entries into the FSTV field are no exception. However, this should not be the case with AEA or T D Systems or Wyman.

In my travels around the country I am often asked, and also by phone and mail, "Which ATV Transceiver should I buy?" The question is asked by both new and long time ATV'ers. To be sure there is now a proliferation of equipment by several manufacturers. Questions about features, quality, operation and compatibility with local repeaters are bound to be raised.

It's no secret, PC Electronics has been making ATV equipment for more than 25 years. There is a lot of Tom's equipment in ham shacks around the world. The equipment PCE produces is of excellent quality and they stand behind their equipment 100%. But in the past, several manufacturers tried to enter the ATV market and did not stick it out long enough to last. Units by Xtronix, VHF Engineering, Aptron and a few others were introduced over the past 15 years. Each of these had a different perspective on what an ATV unit should be. Xtronix was the first to use an integrated circuit video modulator. The two units I tried died of over heat as the unit was in a Hammond type cast box and really needed a better heat sink. But the video quality was good and the idea of an RF tight box certainly was a good idea when ATV repeaters were mostly an idea by Bruce Brown WB4YTU and a handful of others. VHF Engineering was offering several kit VHF and UHF modules. These were inexpensive and for the most part an effort to provide something for most everyone. A few modifications were needed to keep the spurs down, but again, after proper tune up most worked fine and produced good pictures. The equipment was an outgrowth of the FM boom and the 2 meter FM repeaters were a spring-board for many folks to get into other products besides 2-way FM modules.

Aptron was a venture by two broadcast TV equipment Designers who had worked for Tarzian Television in Bloomington, IN. Their idea was to produce a unit which would be much closer to commercial specs than any before. They used biased discrete RF transistor stages in transmit and TV tuner technology for receive and produced a good unit. But Aptron, which still supplies equipment to the Government and broadcast, dropped out of ATV after a few years. One of their grander efforts was to make a 100 watt ATV linear with true class A operation. Alas, the devices available back in the early 1970's were not as good as needed.

Recently (in the late 80's) technology and ATV activity have improved. Enter AEA. This company is known for its good equipment for Packet and recently took over manufacture of SSTV terminal equipment. AEA has spent a lot of time, effort and money in an effort to produce a vestigial sideband class A operation ATV transceiver. As with any effort of this kind, they had to break new ground. While IF modulated up-converted TV is the standard in broadcast, only some European units were ever offered, and those in kit form. AEA recognized that there would be more pressure on our spectrum usage as time goes by and their answer was to produce a unit which would meet future spectrum needs...the future has come fast.

Dr. Don Miller W9NTP has been active on ATV and SSTV since it was invented, in fact he is one of the first three SSTV'ers. Don used to work for the Government designing video and related equipment for defense. Don's ham love led him into making ATV equipment starting with some early SSTV items, later FSTV. Don's ideas have been to promote FM TV and operation on higher bands. I should note that PCE has also been offering equipment for 900 and 1200 Mhz for some time. AEA is also about to unveil new equipment for the upper bands. Ask them at Dayton!

T. D. Systems idea of ATV is to mast mount the RF side and have the baseband hardware in the shack. This has good merit too. You certainly eliminate the coax losses and don't need to spend the month's allowance on coax connectors for 1 5/8" hard line or the like. T. D. Systems also is using surface mount technology and epoxy's the circuit board to the lid of the cast RF box. This does not interfere with service since the parts are surface mounted and strip line tuned circuits are very stable in this type of construction. TDS also offers a number of options including FM video, multi-band operation, multi-frequency operation and more.

I have personally seen all of the units and I would not hesitate to recommend any of them to new or old time ATV'er alike. The question as to which to choose is really up to what the user needs. Each has advantages and of course, cost trade-offs. We don;t all drive the same cars, but we all drive some kind of car. What we drive depends upon how we drive, how often, and where. Likewise, what you choose for an ATV rig should be based upon what kind of ATV activity you have in your area.

For example, The Europeans have long used FM video. We are just beginning to discover the advantages of FM video here. Most recently, a 1 watt FM video link was put up to connect a 26 mile path between Tyler and Kilgore, TX and is delivering P5 pictures. Unlikely if they were using AM video. FM has a significant advantage over AM up to a threshold level

we would consider as DX conditions. When AM is providing P2, FM can still be providing P5, but AM will be visible at 1 db above ESP (P0-P1) where FM has suddenly dropped to sparkles then noise. FM has the advantage of providing full power all the time whereas AM has full power only on sync tips.

Some areas are using LOWER side band for repeater inputs to try and avoid interference from NBFM repeaters in the 440-444 Mhz range. This allows local coexistence, but an AEA rig would not work here since they produce only an upperside band signal, with color and sound rolled off significantly on the lower side by the use of their SAW filter. Likewise, PCE uses a phasing technique, modulating both driver and final, to reduce the lower side sound and color, although not as much as true VSB (although it can be tweeked to near FCC specs for broadcast VSB).

Having both crystal and variable tuning is an advantage. For example; If you local area has a repeater its nice to be able to drop on channel and not have to tune for the signal each time. For DX and simplex use, tuneable allows you to choose which side of the carrier you receive, catch stations on adjacent frequencies. Not everyone is on 439.25, some are on 439, 438, 437 etc. Likewise, multi frequency or at least a 2nd frequency allows you to move off from a DX pile-up and try and get a clear signal through! Or, have separate frequencies to operate on the repeater input or a simplex channel somewhere else in the band.

All the units produce 1 watt PEP. This is sync tip power. On your Bird meter, using a black video source, you are likely to see .5-.6 watt and of course less with active video. You cannot measure PEP on your Bird or any other power meter except under carrier only conditions. If the unit has a DC clamp circuit (basically a diode to ground) which forces the sync pulse to maximum power (a good thing to do) you can measure carrier only which will be PEP, plus/minus your FM audio carrier injection. Or basically within 10% of actual PEP and the tolerance & accuracy of your power meter.

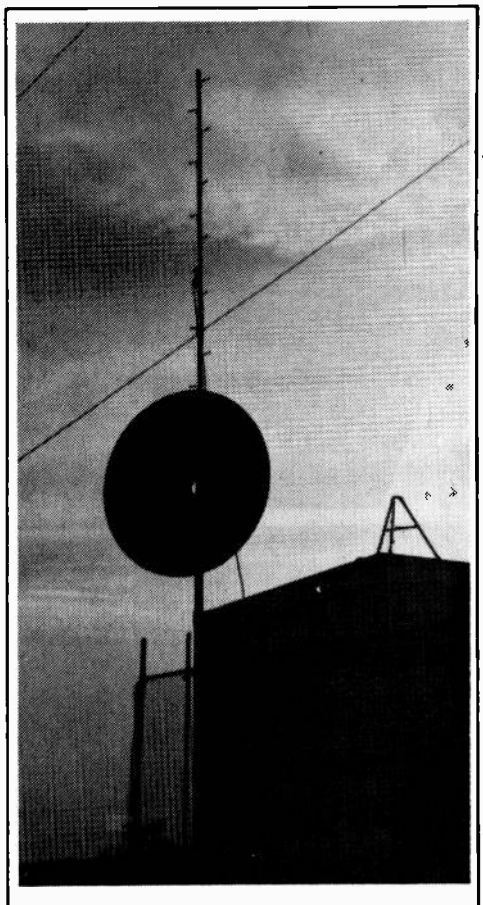
Thus, if you are going to work any sort of distance you will need a power amp. Using a D24 or D100 type amp will produce useful power gain, but you must have a pedestal control to avoid sync compression. AEA is trying hard to produce a class A tower top amplifier to provide a clean 50 watts at the antenna. This is likely to be more than you can muster from a 100 watt shack amp after your coax losses. Difficulty in RF devices in class A service as well as other technical hurdles in powering such an amp through a coax are being worked on now at AEA.

TDS approach is to mount the entire RF unit at the antenna. You could also put your 100 watt amp in a plastic cover to keep the weather out and run DC or AC to a supply to get DX power. Of course, if you used FM, you needn't worry about sync compression or coax loss since you would have a full 50 watts or so at the antenna from your shack amp full time, and not an average 20-30 watts as with AM video.

If you need on-carrier audio to work your repeater, as in Washington DC, then you need to consider units which have this feature.

Other features are as you feel you need them. An S meter of sorts is nice if you want to aim your antenna and don't want to rely solely on the picture quality. With my array I have secondary lobes which give P5 on stations even though my main lobe is 20 degrees or more away. An S meter connected to my TV set's AGC voltage was how I solved that. I also run mobile ATV a lot and so for me having DC power as an option was important, be it in my car or in my plane. If mobile or portable operation is in your operating forte, then power drain may be a consideration, or size, of if the connections are on the front or back.

So which ATV unit should you buy? The one which best fits your needs. Drop by to visit the hamfest exhibits of each of the manufacturers. Ask the other area ATV'ers or if none, pioneer a direction for others to follow! Decide which features are most important to you. And nothing says you have to have just one! I now own 6 different ATV transmitters for different power levels and bands of operation, fixed and mobile. It would not be unheard of to have a transceiver from one source and a donwconverter from another. Speaking of converters, there are several sources for these: PCE, TDS, Communications Concepts, Spectrum International (Microwave Modules) and others. And, you can "roll your own" with transceiver and converter projects available from back issues of any ATV magazine, the BATC and even some clubs. 73 Henry KB9FO



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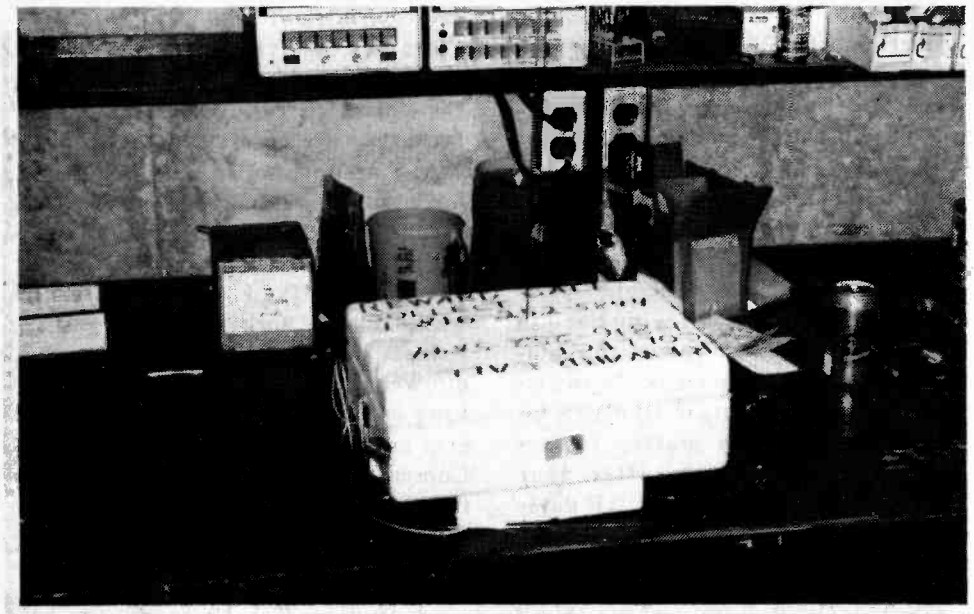
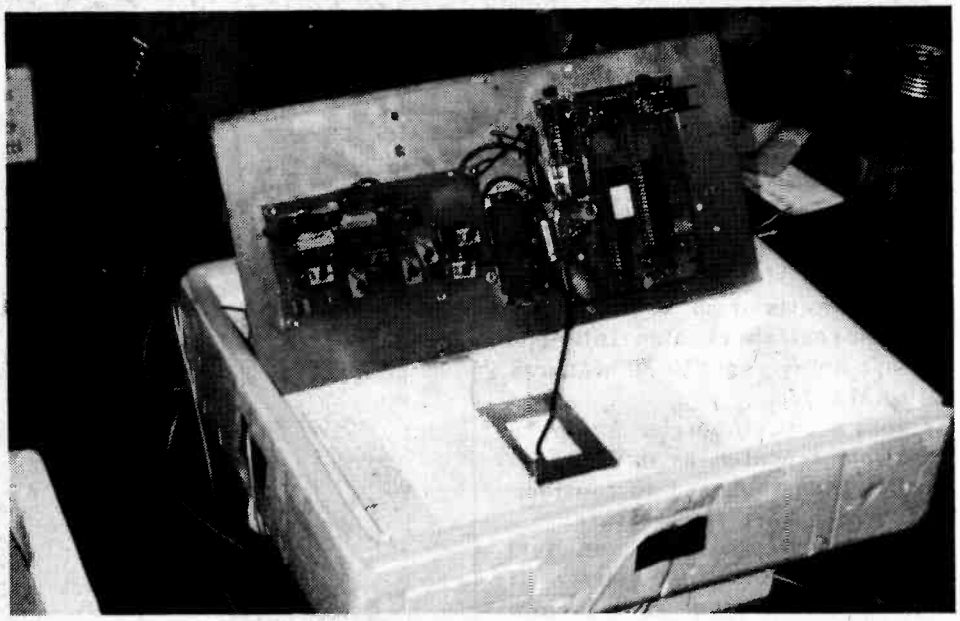
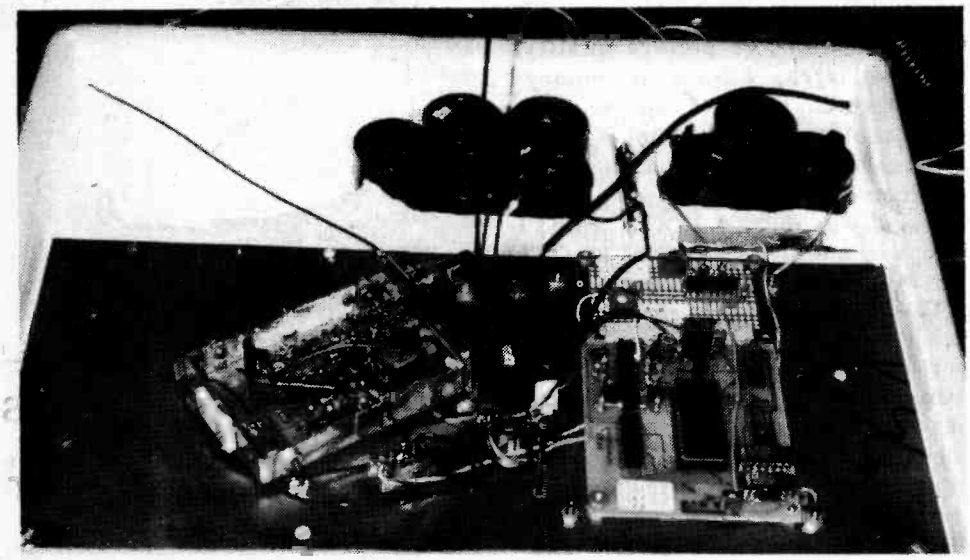
KDØFW BALLOON OVER KANSAS







The first ATV balloon flight of the year was flown from the Kansas City area by Mike Bogard, KDØFW on Feb. 10th.

Mike put together a 3 W. ATV transmitterusing an 80 mW. exciter (P.C. TXA5-2) into a MHW-710 10 W. module. This combination was operated at reduced power in order to conserve the 5 Ah lithium cell battery pack. The video source consisted of a VDG-1 video ID displaying images of the states of KS & MO as well as a farm scene with QSL information. To help the chase team track down the payload, a 50 mW. 2 meter FM signal on 144.34 MHz. was produced by a small HT module. Included was a digitized voice ID built by Carl Lyster, WA4-ADG which periodically repeated a 6 second voice message. A small thermistor sensor was used to determine the outside temperature. This sensor varied the amount of time between each voice ID message. At room temperature it had a 14 second delay which lengthened to over 48 seconds at an a temperature of -68 degrees. Internal temperature was determined by the time between each video screen. At times during the flightthe inside temperature was over 150 degrees! (ED. NOTE: If you would like the telemetry calibration chart please send a SASE to Bill Brown WB8ELK, 12536 TR 77, Findlay, OH 45840...Also if requested on your QSL, Mike, KD0FW will include a copy of this chart)

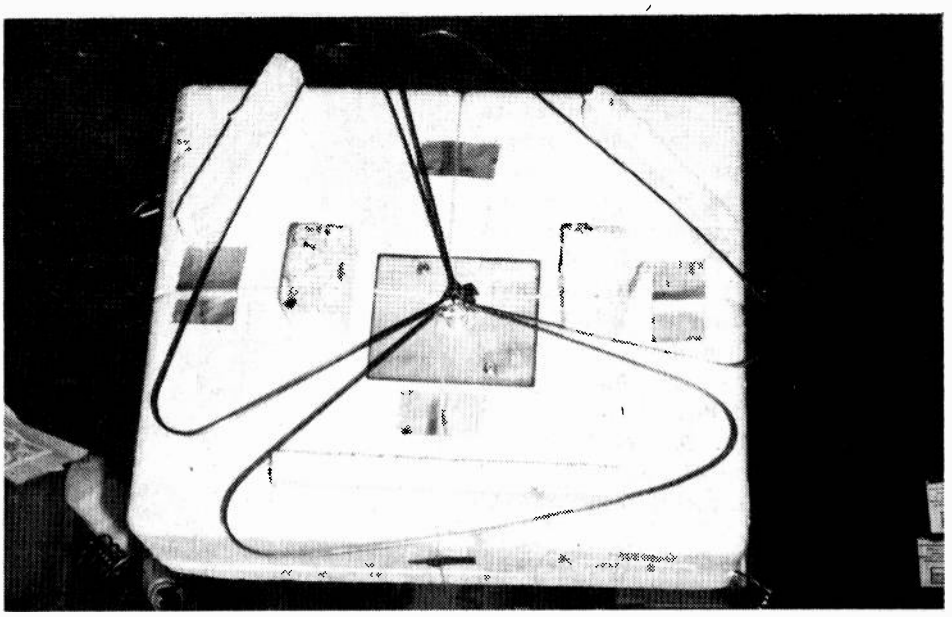
All components were mounted on a double-sided circuit board and placed in a 1 in. thick styrofoam package complete with an omni-directional horizontal big wheel (W6OAL mini-wheel design, see ATVQ Jan 90 issue) and a 2 mtr. 1/4 wave whip.

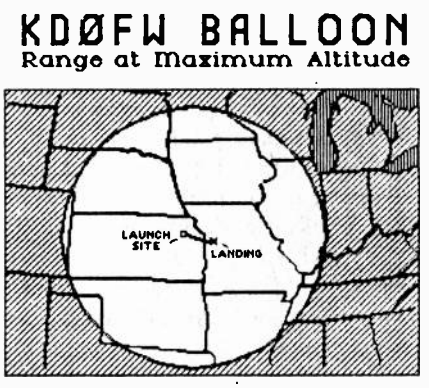
Mother Nature likes to stir things up whenever a balloon is launched and this launch was no exception! Aftermoving to the neighbor's barn for shelter, Mike inflated the wea-

KDØFW BALLOON OVER KANSAS

ther balloon with helium. Immediately after coming out of the barn he was hit with 20+ MPH wind gusts! At times the 5 foot balloon was stretched out over 20 ft.long looking more like the "BLOB" than a balloon. Aftera hair-raisingtakeoff the balloon was successfully launched at 1622 UTC from just west of Lawrence, KS. The reception reports immediately started coming in to the HF Balloon net on 7.155 MHz. run by Bill,W0ZMR. Over the next 1 1/2 hours the reports came in from increasing distances until balloon burst. At the maximum altitude of 95,000 feet, the balloon signals were being received over a 9 state area. The furthest east ATV reception was to Denny KA9DZR who lives south of Danville, IL. Denny received a P1 at 391 miles for just 3 minutes. A possible 465 mile report came in from Armando, N8IGJ in Holland, MI who saw a 3 second burst of weak video along with 10 seconds of carrier with rapid QSB which may have been due to an airplane reflection. Ron W9ZIH had a P3.5 in full color at 378 miles in Malta, IL (60 mi. west of Chicago) and Mark KA9SZXhad a P1 in Champaign, ILat 356 miles. To the south, OK. stations Warren W5DFU and Bob W5DS had P4 to P5 color pictures during much of the flight (over 200 miles). The furthest west contact was to a group from Denver who ventured out to the "highest point" in Kansas. From their vantage point on Mt. Sunflower on the Kansas/Colorado border Dave W6OAL, Jack AA0P and WB0TUB were rewarded with a nearly snow-free color picture at a 393 mile distance! The two meter signal just made it to Indiana with a report to the Cedar Lake area just south of Gary, IN (425 miles).

Balloon packages have a tendency to land in strange and "unusual" locations. Sure enough, the payload parachuted down to land in a 60 foot tree just south of PECULIAR, MO! (54 miles SE from the launch site). Thirteen chase vehicles and one chase plane converged on the



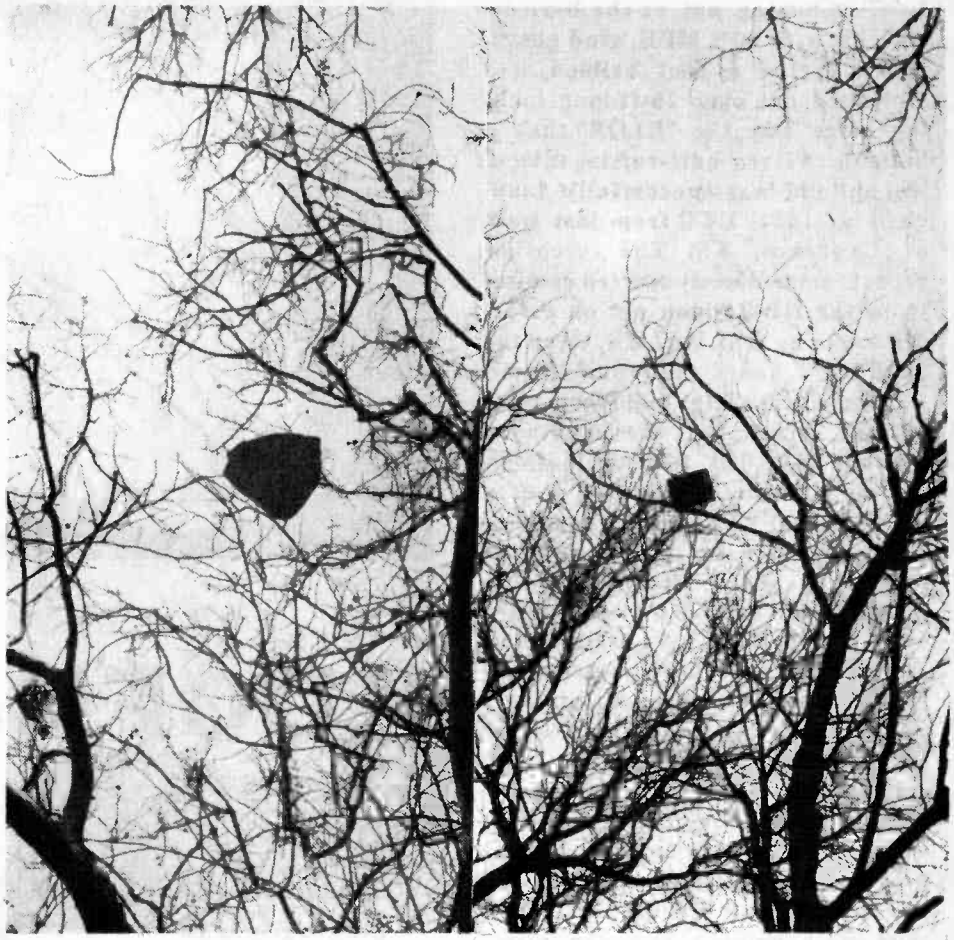


IF YOU THINK THIS ISSUE IS GREAT, SUBSCRIBE AND GET EVEN MORE!

landing site in a matter of minutes. Using weather bureau wind data, WB8ELK's landing prediction program missed by only 4 miles (a prediction made a few hours before the launch missed by less than a mile!). The fox hunters just spread out around the predicted zone and waited to catch the package. At least 3 carloads of dedicated balloon trackers from the Indianapolis Fox hunt club made a 500 mile journey to join in the fun. The trip was worth it to Paul, W9DUU who was actually able to see the bright red parachute as the package descended to land just 2 miles to his south.

Harold Spears of Peculiar, MO was surprised to see dozens of vehicles with wierd antennas sprouting out of their rooftops pull into his driveway. Harold joined in the recovery effort and soon the package was found dangling 60 feet up stretched between two trees just behind his house. His dog even assisted by barking and trying to climb the tree in question. (Hmmm, A balloon tracking bloodhound. we'll have to borrow Harold's dog for future flights!) Using the neighbor's chain saw, part of the tree was cut down. All this accomplished was to drop the package to 25 feet and provide Harold with some firewood! Then Harold and his neighbor stated that they had the perfect way to get the package down. They returned with two shotguns! Afterblasting at the string over 12 times the package still remained firmly in the tree's grasp. Finally Mike was able to loop a rock and string around the payload and pull it reluctantly to Earth. Mike is planning more flights from the Kansas City area but plans to improve his lumberjack skills before the next launch!

NOTE: For a special QSL please send your reception reports to Mike Bogard KD0FW, 2128 S. Norton Ave., Independence, MO 64052. Mike would also like video tape copies of any ATV reception of the balloon signal so that it may be included in an edited tape of the launch.



TO ACQUIRE A BALLOON
(Denver ATV'ers chase down some rare DX!)
- Dave Clingerman W6OAL

DENVER, COLORADO

A very early 4:00 am on Feb. 10th. Western Vision Network members Tim Amagost WB0TUB, Jack Crabtree AA0P and Dave Clingerman W6OAL depart for Mt. Sunflower, Kansas on the Kansas/Colorado border.

Hopes are of receiving the KD0FW balloon on the other side of Kansas. Although the elevation is listed at 4039 feet and is marked as the highest point in Kansas, it appears that the "mountain" is only a few hundred feet above the average terrain. After traversing numerous dirt roads, a rusty sign marks the spot on a small rise in the road.

8:30 am - Mt. Sunflower has been conquered! Antennas adorn it's baldness and strange noises are transported around the area by the "ever present" wind.

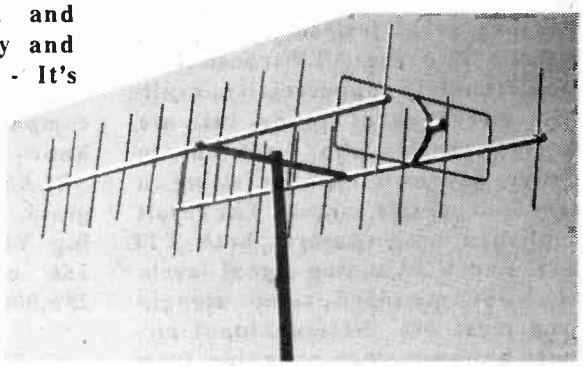
8:45 am - The N-connector falls off the coax and is re-soldered using a BIC lighter.

9:25 am MST - The 40 meter net announces the balloon has been launched. The Denver crew endures frost, throws cow chips and sips suds.

10:55 am MST - Something is heard on 144.335 MHz. - it grows in volume - the TV screen flickers - levels of gray are distinguishable - a call sign appears! The balloon is estimated to be about 85,000 feet high and 393 miles away. The video signal improves to include color while we video tape the TV screen. The picture improves to a definite P4 with full color (almost no snow and fine print clearly legible).

11:20 am - The signal dwindles, a pulsing type of QSB like the transmit antenna is spinning. The balloon has burst and the payload is Earthbound. The mini-wheel antenna (See. Jan. 90 ATVQ) on the balloon package if spiralling would produce the acquired QSB.

11:26 am - The signal is completely gone. Antenna and equipment are packed away and the crew heads for Denver - It's time for BUD



RGB to NTSC Encoder
Earl E. Campbell KS8J

How many of you have tried to show your latest computer graphics on ATV by pointing your camera at the computer monitor screen?

It'd be great just to hook video directly into the ATV transmitter. Unfortunately commercially available circuit cards to do this are fairly expensive. So I set out to design my own encoder using a very inexpensive circuit. The result published here converts both TTL level and VGA analog signal levels to NTSC standard video signals (you must use different input circuits however when changing from VGA to EGA/CGA). One of the devices I built is used where I work to encode color weather radar information obtained from aircraft instrumentation for recording by a standard VCR. So this circuit DOES work, and works quite well.

The main ingredient in the circuit is a Motorola MC1377 RGB to NTSC encoder chip. The chip is a 20 pin device which operates on 12 VDC. Use RF shielding and layout techniques when building the circuit as this thing is operating at video frequencies. All the circuits I have built using this chip have been very stable and have produced good results.

The input circuit deserves a little explanation. The circuit can be built to use either TTL or analog inputs from any typical RGB source such as a computer, etc. The main thing to watch for is that the MC1377 inputs see no more that 1 V P/P signals.

Some common video signal sources and requirements are listed here:

VGA PC Video
Uses analog output:

I use a program called Animator by Autodesk with this circuit. The program produces a TV standard sweep frequency output. It is important that whatever computer program or hardware you use with this circuit produces a sweep frequency compatible with the US TV sweep frequencies. IBM compatible PC's with CGA monitors do this. EGA and VGA adapters can be programmed to do this also, so check with a scope or ask someone who is familiar with your particular setup to see if it is sweep compatible. Another PC program I know works with this device is SPLASH, a painting graphics program. The main advantage to using VGA is the ability to display 256 colors out of a palette of 256,000.

EGA PC Video
Uses TTL level signals:

TTL level signals are 4 to 5 Volt P/P signals. Use a resistor divider network to make the signal levels 1 volt P/P for the chip inputs. Again, as with VGA graphics adapters, the sweep frequencies must be programmed to standard TV rates. Sixteen colors out of a palette of 64 may be displayed at one time. One other note here is the horizontal and vertical sweep outputs from the Enhanced Graphics Adapter are on separate pins so you need to combine them as shown in the schematics to develop the composite sync needed by the MC1377. You also need to invert the sync signal into the MC1377. See the schematics for signal level and polarity information.

CGA PC Video
Uses TTL level signals:

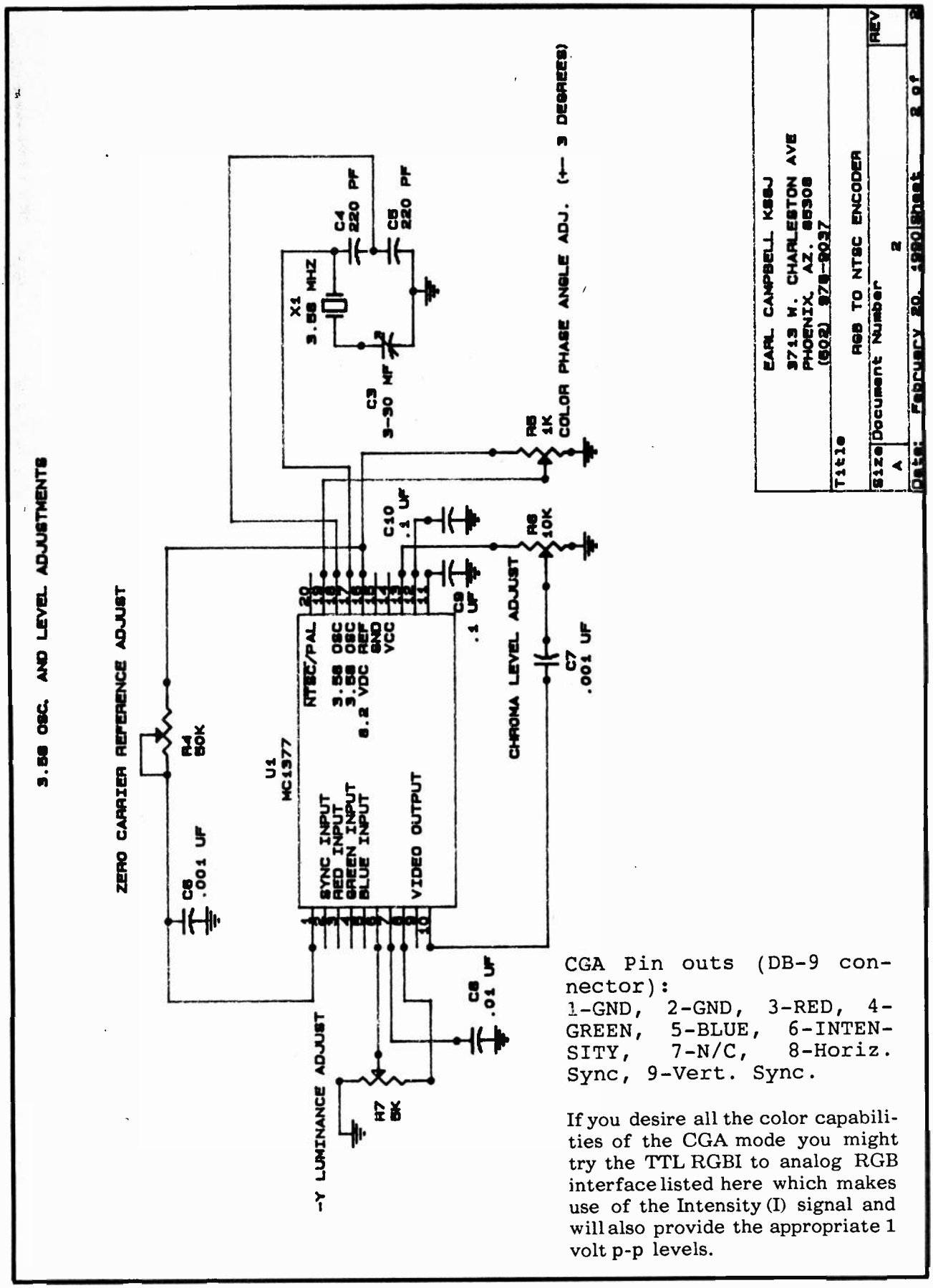
One advantage to using a CGA adapter is that the output is the standard TV sweep frequency. The levels are TTL so, again, use a resistor divider network on the RGB inputs to the MC1377. Any PC graphics programs may be displayed using CGA. The CGA application is limited to four available colors at a time but this can produce very attractive call sign displays. One other note here is the horizontal and vertical sync outputs from the Color Graphics Adapter are on separate pins so you need to combine them as shown in the schematics to develop the composite sync needed by the MC1377. You also need to invert the sync signal into the MC1377. See the schematics for signal level and polarity information.

ED. NOTE: different VGA cards may have either composite sync or separate sync. Use a 74LS86 XOR gate to combine the separate syncs in either CGA, EGA or VGA. The MC1377 can tolerate a sync level as much as 8.3 volt p-p. Also measure the RGB levels from your computer. Use a resistor divider network or pot (10 k/2 k or 10 K pot from each RGB line to ground - tap the signal off the center point of the pot or the mid point of the resistor divider) to lower the RGB levels to 1 volt p-p into the MC1377. You may have to build a separate interface card for each graphics mode. One way to tap into the RGB signals while still viewing them on your computer monitor is to make up an male/female 9 pin adaptor to go between your computer and its monitor. You can then tap the signals off of this cable. If your RGB levels are below 1 volt p-p (as may be the case when your computer monitor is attached in VGA mode) you may have to use an LH0062 video op amp on each RGB line (See Oct.90 ATVQ, p.7 for op amp interface circuit.) If tapping off the connector between the computer and it's monitor for your RGB signals run each of the video signals through a 15 uF electrolytic or tantalum capacitor (positive side towards the MC1377 inputs) before going into the MC1377 inputs.

Pin Outs for VGA;
1- R, 2-G, 3-B, 4- Composite Sync or just H Sync, 5- Vert. Sync., 6- RED GND, 7-GREEN GND, 8- BLUE GND, 9- GND.

EGA Pin outs (DB-9 connector):
1-GND, 2-Secondary RED, 3-RED, 4-GREEN, 5-BLUE, 6-Secondary GREEN, 7-Secondary BLUE, 8- Horiz. Sync, 9-Vert. Sync.

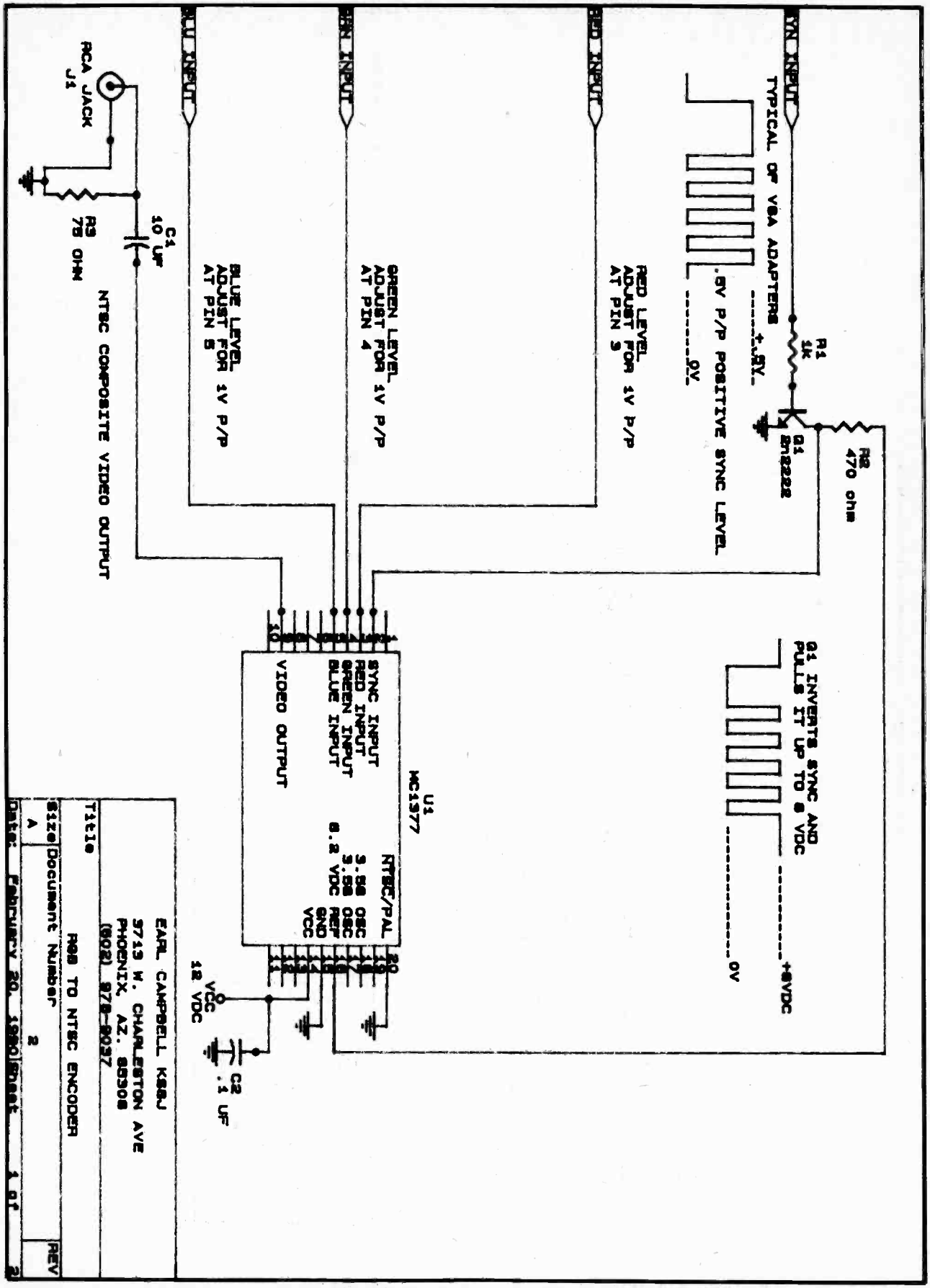
RGB TO NTSC



CGA Pin outs (DB-9 connector):
1-GND, 2-GND, 3-RED, 4-GREEN, 5-BLUE, 6-INTENSITY, 7-N/C, 8-Horiz. Sync, 9-Vert. Sync.

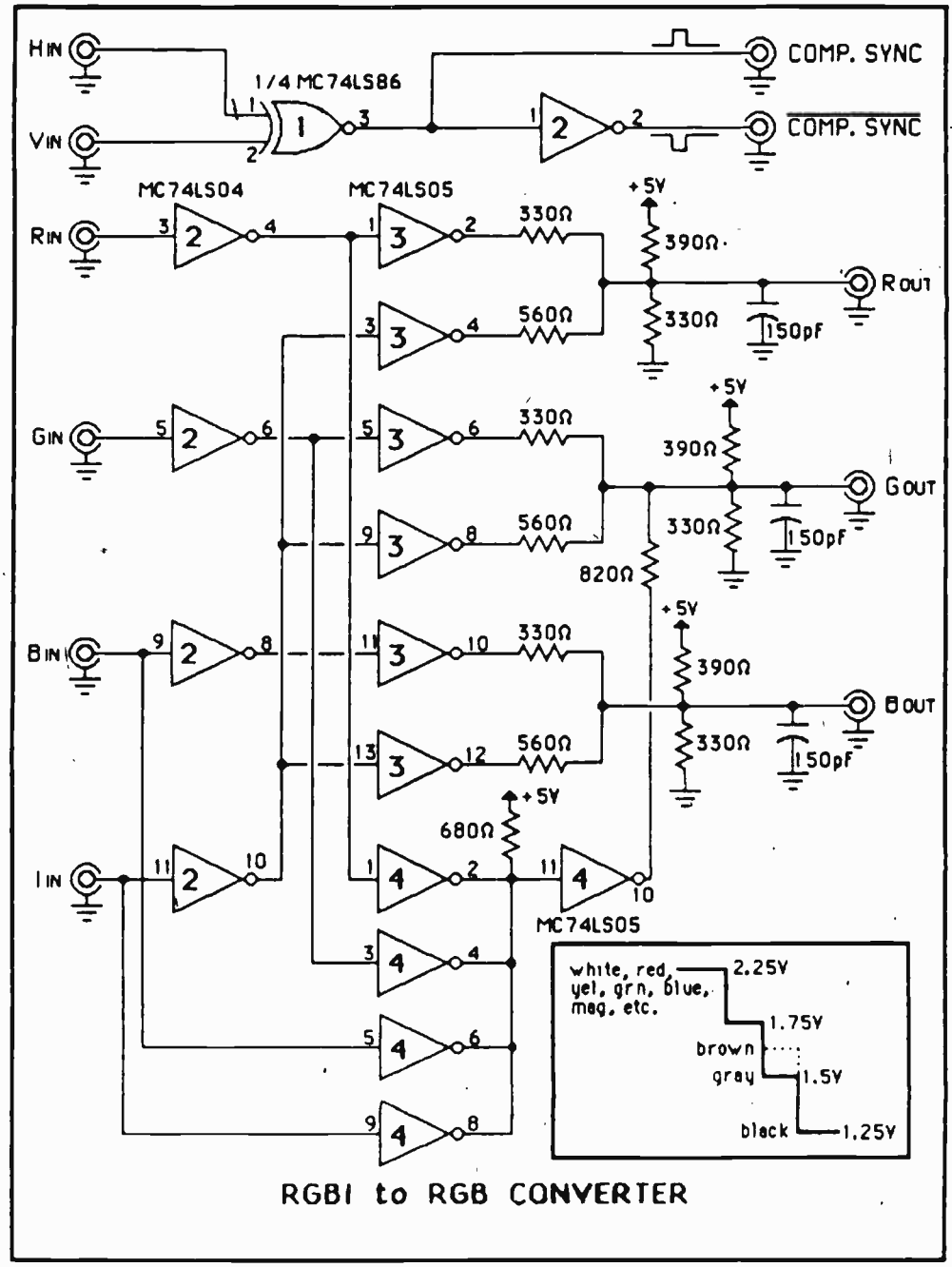
If you desire all the color capabilities of the CGA mode you might try the TTL RGBI to analog RGB interface listed here which makes use of the Intensity (I) signal and will also provide the appropriate 1 volt p-p levels.

RGB TO NTSC


SYNC INPUT
TYPICAL OF VGA ADAPTERS
+5V
0V
.5V P/P POSITIVE SYNC LEVEL
R1
1k
Q1
2N2222
R2
470 ohm
Q1 INVERTS SYNC AND
PULLS IT UP TO 8 VDC
+8VDC
0V
RED INPUT
RED LEVEL
ADJUST FOR 1V P/P
AT PIN 3
GREEN INPUT
GREEN LEVEL
ADJUST FOR 1V P/P
AT PIN 4
BLU INPUT
BLUE LEVEL
ADJUST FOR 1V P/P
AT PIN 5
RCA JACK
J1
R3
75 OHM
C1
10 UF
NTSC COMPOSITE VIDEO OUTPUT
U1
MC1377
SYNC INPUT
RED INPUT
GREEN INPUT
BLUE INPUT
VIDEO OUTPUT
NTSC/PAL
3.58 OSC
3.58 OSC
6.2 VDC REF
GND
VCC
VCC
12 VDC
C2
.1 UF
EARL CAMPBELL K5BJ
5713 W. CHARLESTON AVE
PHOENIX, AZ. 85308
(602) 878-8037
Title
RGB TO NTSC ENCODER
Size
A
Document Number
2
REV
Date: February 20, 1990
Sheet 1 of 1

RGBI TTL TO RGB, 1V ANALOG CONVERSION

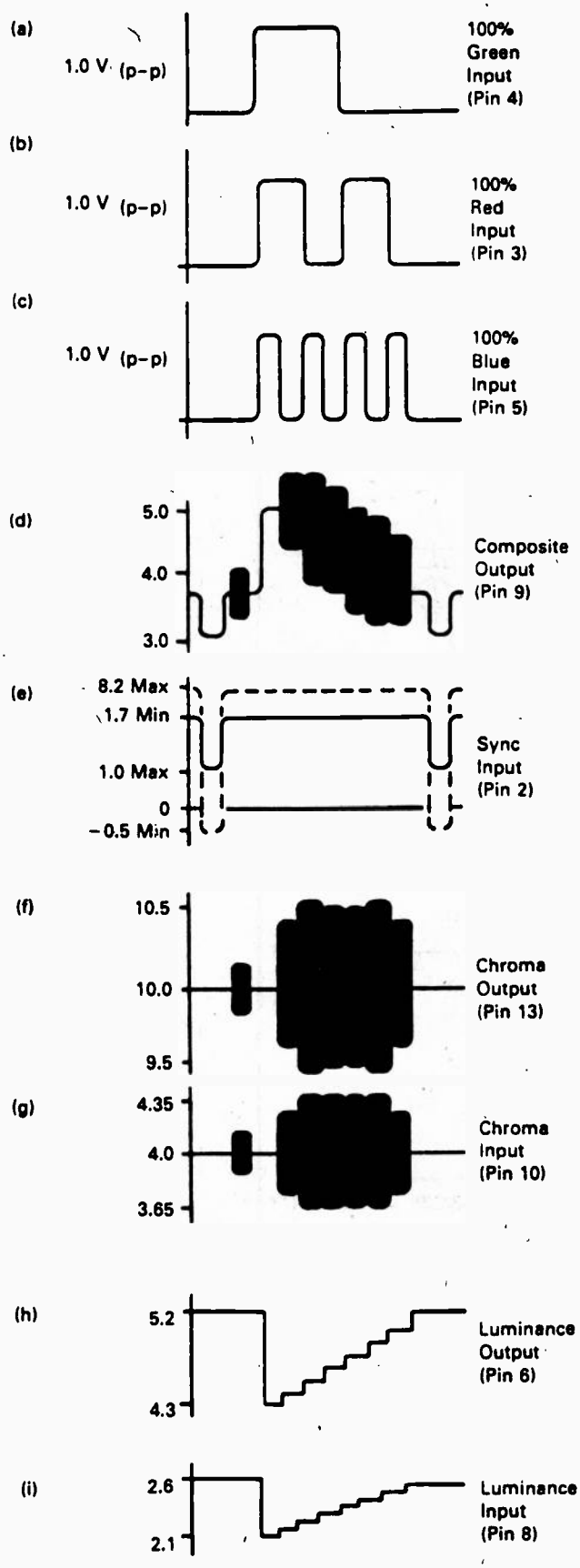
Figure 6 shows a circuit to interface a TTL RGBI output personal computer to the RGB analog inputs of the MC1377 If the circuit is used with the values shown, no coupling capacitors are required to the RGB inputs of the MC1377 The +5 volt supply to the 390Ω resistors should be very clean to prevent interference on the encoded signal. IC4 is used to simulate 'brown' to be compatible with TTL display monitors.



Choose proper sync for 1377 input

From Motorola application notes for the MC 1378

MC1377



R.G.B. Inputs should be set up to be 1.0 V p-p for fully saturated levels. This is not arbitrary, since sync and burst levels are internally fixed.

Subcarrier Oscillator. The internal common-collector Colpitts can be free run or it can easily be pulled in by a lightly coupled signal from a "master" into Pin 17. Also, it can be disabled entirely and a 0.25 V_{RMS} signal driven into Pin 17.

Modulator Phase Angles are quite accurately established internally. Taking (B–Y) as 0°, burst is at 180°, and the angle of (R–Y) is 90° ±5.0°. The (R–Y) angle can be "tweaked." For example, 470 kΩ from Pin 19 to ground will increase the (R–Y) to (B–Y) angle about 3.0°. Pulling Pin 19 up will decrease the angle.

Composite Output is dc referenced and can be direct coupled to an RF modulator In this case, the 8.2 V regulator output of the MC1377 is divided down to 5.8 V to provide the zero carrier reference to Pin 1 of the MC1374.

Burst Generation is provided by a sync triggered ramp on Pin 1 and two internal level sensors. Since the early part of this ramp is used, it is quite accurate.

Sync Input can be varied over a wide latitude but neverless must be applied correctly. The typical ac coupled sync signal has very little positive value and will require a pull-up resistor to 8.2 Vdc at the input. The sync input is a 10 kΩ/10 kΩ divider in the base of a common emitter stage. For PAL operation, the correctly serrated vertical sync interval must be used, in order to continuously trigger the PAL flip-flop. "Block" vertical sync can be used for NTSC.

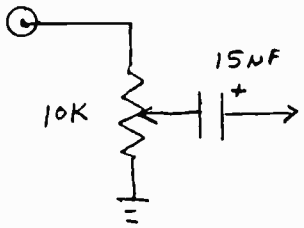
(R–Y)(B–Y)(–Y) signals are generated to NTSC values (±5.0%) in the input matrices. They are dc clamped at black level by a sync driven clamp. Burst amplitude is internally fixed to correspond to sync level, allowing for 3.0 dB loss in the chroma bandpass filter. If the filter is not used, a resistor divider should be inserted between Pin 13 and Pin 10 to provide the proper chroma level. When the chroma bandpass is not used, the (–Y) delay line should also be removed, but the 1.0 k/1.0 k divider from Pin 6 to Pin 8 should be retained.

RGB TO NTSC

CGA & EGA

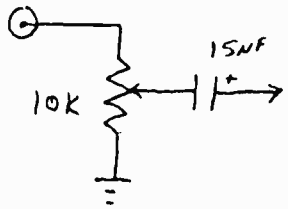
LOW COST RGB (5 v TTL) TO RGB (1 V LEVEL)

TTL R



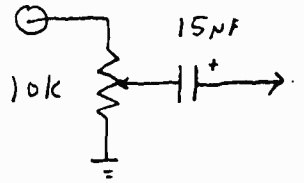
TO R INPUT MC 1377 ADJUST FOR 1 V P-P

TTL G



TO G INPUT MC 1377 ADJUST FOR 1 V P-P

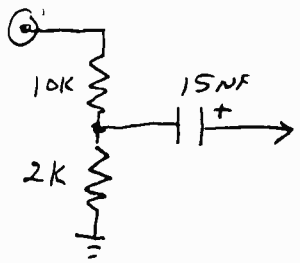
TTL B



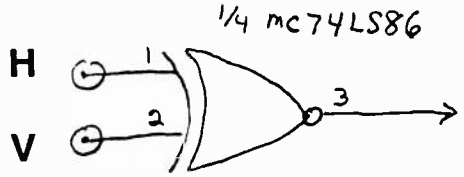
TO B INPUT MC 1377 ADJUST FOR 1 V P-P

NOTE: CAN USE FIXED VOLTAGE DIVIDER INSTEAD OF POT

TTL R, G, or B



TO R, G, OR B INPUT OF MC 1377



TO COMPOSIT SYNC INPUT MC 1377

The w6ORGy Notes

By Tom O'Hara, W6ORG

DOES YOUR LOCAL ATV REPEATER RETRANSMIT THE SPACE SHUTTLE VIDEO?

Rosalie White, WA1STO, the ARRL Educational Activities Coordinator has asked me to compile a list of ATV repeaters that are retransmitting the Space Shuttle video and audio from whichever satellite transponder NASA is leasing during each mission. She will in turn put that list out with the information and study curriculum the League sends out to teachers about amateur radio and SAREX-90, the Shuttle Amateur Radio Experiment in 1990.

NASA has offered some time on SPACELINK which reaches around 4,000 schools.

This is a great opportunity to get young people interested in science and technology as well as amateur radio. For ATVers, you might consider getting with your local schools and setting up an ATV receiver for the STS-35 and 37 missions. If you use 421.25 at your local repeater all you may have to do is run a good 70 CM antenna and coax down to one of the schools cable ready TV sets tuned to cable channel 57. If the retransmitted Shuttle video is on 439.25 simplex, use cable channel 60.

If you have a TVRO receiver, you can get with your local ATV repeater owner and work out the link. It is probably just as simple as running the composite video and audio out of the TVRO receiver to the ATV transmitter and setting up a time schedule. If there is an ATV repeater in your area you can retransmit to it so all can watch over a wide area, or if there is not, direct your ATV antenna to a specific school on simplex. NASA Select Shuttle video is the only other service that hams can legally repeat.

AMSAT is looking for some demo stations in various parts of the country. If you have packet and a nice 2 meter set up, contact Tom Clark, W3IWI or Courtney Duncan, N5BF at AMSAT-NA HQ, 850 Sligo Av., Silver Spring, MD 20910. It would also be great if you had a TV going with NASA Select video.

Roy Neal, K6DUE, Chairman of the SAREX Committee told us at the Tropical Hamboree in Miami that amateur radio might get up to 1 hour of time on NASA Select during STS-35 (May) and 37 (November). Hams who normally try to work the Shuttle on voice or packet may have the added benefit of seeing who they are in QSO with at the same time.

Please call or send me the following info right away:

1. ATV Repeater call sign.
2. Repeater output frequency.
3. Repeater location (nearest landmark, city and state).
4. Repeater antenna polarization.
5. Name, QTH & phone number of a local contact.
6. 2 meter ATV calling frequency

STS-37 CHANGED TO NOVEMBER

The mission which will have NASA affiliated amateur radio clubs uplinking ATV for the first has been changed from June to November 1. This 5 day STS-37 mission of the Shuttle Atlantis, flown by Astronaut Lt. Col. Ken Cameron, KB5AWP, will have an orbital track inclination of 28.5 degrees which will put most of the US out of range. STS-35, which will have packet on 2 meters, has been moved to May 9.

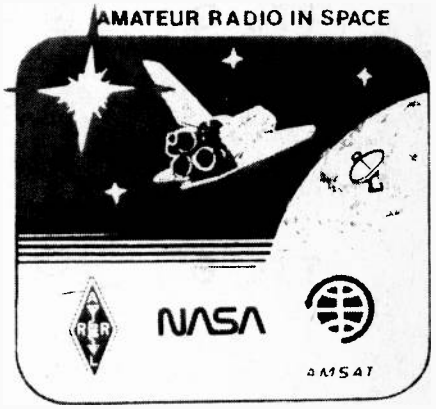
The NASA ATV uplink stations in the southern part of the US will have the most chance of getting a signal to the Shuttle. Power in excess of 100 Watts and high gain beams with accurate trackers will be necessary to get P4-5 pictures at the Shuttle.

The time available for amateur radio activities aboard the Shuttle will be late at night or the wee hours of the morning. Since one of the purposes of SAREX is to directly involve students, it was thought that the late hours would prevent this. However when the students at some of the uplink station areas were asked, it is reported that for a chance to talk to and be seen by an astronaut in the Shuttle they would gladly stay up all night - parents permission of course!

UR WRONG, STS-37 WONT BE THE FIRST ATV IN SPACE!

In a way that is correct. ATV and SSTV are often confused. Two way SSTV pictures were exchanged on 2 meters during STS-51-F in July of 1985. Slow scan can be used on any voice grade radio or hard line circuit since it takes less than 3 kHz to transmit a black and white still frame picture in 8 seconds or a color picture in 12 seconds. Since SSTV can use any voice grade medium, it can be run on 20 meters (14.230 MHz) and other HF bands for DX, 2 meters / 70 CM satellite or local.

SAREX



FIRST TWO-WAY TV FROM SHUTTLE

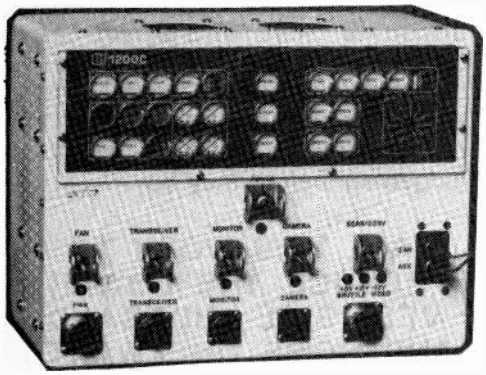
I tend to label this SSTV in discussions since it is still frame, and real time moving video ATV just to differentiate the two when speaking about these two distinct types of Amateur Television. I do not agree with those calling real time standard television fast scan TV or FSTV because there are faster scanning modes of still frame video. By calling standard television FSTV, many hams who know about SSTV think it is a higher resolution form of SSTV or faster method of sending still frame pictures. They expect to have to get a scan converter interface box to get on and really look at me funny when I say that you simply hook up the camera to the transmitter.

WHAT EVER HAPPENED TO ROBOT RESEARCH?

They are still alive and well in San Diego. Being one of the pioneers in SSTV and manufacturing probably the most popular scan converter brought them all kinds of commercial projects and business that took most of their time and effort away from their amateur line.

Last year at Dayton Rick Samos, KE6DO, said I should take a day and drive the 110 miles down to their plant and see how they had expanded from their amateur radio beginnings.

Prez. John Stahler, WB6DCN, gave me the tour of their 15,000 sq. ft. facility. They still make the 1200C color SSTV scan converter but other than a booth at Dayton every year, they have not been able to put in much marketing effort.



ROBOT 1200C repackaged version flown on the STS 51-F Space Shuttle Mission

Since my visit, there has been a resurgence in ham radio at Robot however. They have a demo room set up with both SSTV and ATV. A group of the employees took the weekend Gordon West Novice class and got their licenses.

Many SSTVers have also gotten into ATV since they already have the camera and monitors. SSTVers have also repeated DX pictures over ATV to local hams. So I suggested to John that since some of my ATV customers might be interested in SSTV and vice-versa, that we work out some kind of rep/dealer agreement where I do some of the marketing in the amateur field that he has not had time to do. So now PC Electronics will be both fast and slow.

TE SYSTEMS 180 WATT AMP STILL A MYSTERY

Sorry gang, "the amp will be shipped next week" has become like "the check is in the mail" from TE Systems. Every time I have called I have gotten the same story that they are very busy with their military orders, but that my 180 Watt amp will go out for sure next week.

Unfortunately another quarter has gone by and no amp on the door step. I know some of you are waiting for the results of the testing, rather than call me, maybe calling Dave at TE Systems saying that you are anxious to get one of the 4450G's for ATV might get better results.

As you can guess, manufacturers who advertise more than a few months ahead of actual production are a pet peeve of mine.

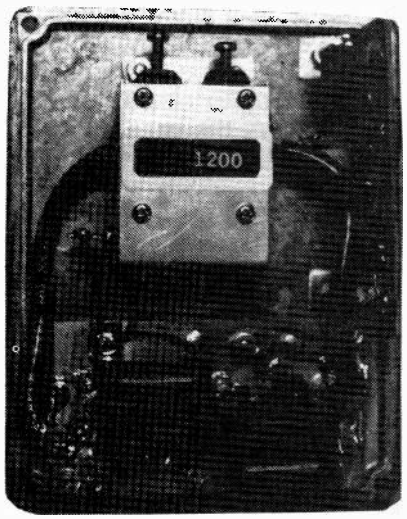
PAULDON NOW HAS AN 18 WATT 23 CM AMP & A 23 CM ANTENNA MOUNTED PREAMP WITH RF SENSED T/R RELAYS

Don Fuller, W2WHK, sent me both prototypes to check out on ATV and feed back any required changes and suggestions for the video mode.

Most ATVers have not had the requirement for T/R relays because cross band repeaters only required that you either receive or transmit on 23 CM. However, full duplex flexibility, novice privileges, and public service use have raised the need to transceive simply rather than having to run two 23 CM antenna systems or manually plugging and unplugging the antenna spigot.

23 CM Preamp with T/R switching

Lets take the PD-1200 TM antenna mounted preamp first. It is mounted in a Hammond 1590C type box with a bracket and mast clamp. The two N connectors and 12 Vdc power feedthru when properly fastened to the mast face downward to minimize moisture contamination.



23 CM Preamp inside view

The preamp itself is an imported shielded module that uses the popular Mgf 1402 GaAsfet. Pauldon listed the device at 15 dB gain and .65 dB noise figure. The input and output tuning is accessible to favor whichever end of the band you are interested in.

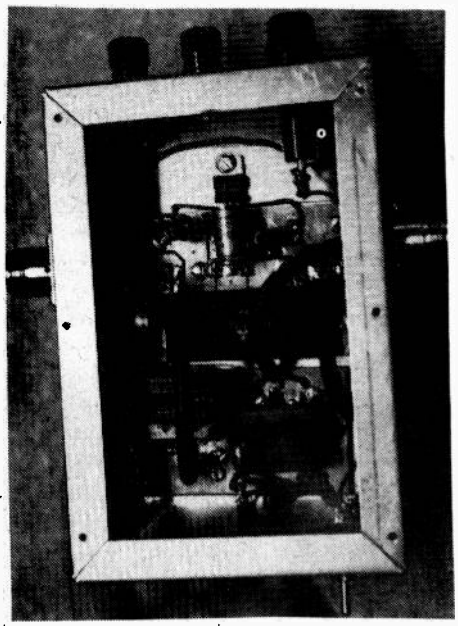
I measured 10 to 11 dB gain on the two ATV repeater outputs I can see from my home QTH on 1241.25 and 1253.25 MHz. Peaked at the low end the roll off was down to 4 dB at the top, 1300 MHz.

The insertion loss was almost 3 dB due to the way the prototype was built with excessive lead lengths around the relays, coax and connectors. I had to keep in mind that these were prototypes and one should not expect to find a nice clean layout and construction practices - you should see some of my bread boards...on second thought, no way! There is such a thing as resonant solder blobs. Don says that the production models will not have the high insertion loss and a clean looking layout. The loss in the prototype can be added to the measured gain to give an idea as to what can be possible from the module.

Maximum power into the preamp from your transmitter is 15 Watts.

Remember, you can figure the power at the preamp if you know the final amplifiers output power and coax loss. So if you have 4 dB feed line loss you could even run a 35 Watt amp in the shack and be OK.

The preamp can make a significant difference in a snowy received picture if the Belden 9913 coax run is over 50 ft, and allow you to only have to run one antenna system, if you also want to transmit on 23 CM. Pauldon offers the preamp with T/R switching for $129 or $91 without.



23 CM 18 Watt amp with T/R sw

The PD-1200 TR 23 CM linear amp uses the venerable Mitsubishi 57762 power module. This is the same module as I reviewed in the Downeast Microwave 18 Watt amp. In both these units and the later 2 and 4 brick amps, they work very well on ATV.

The T/R relay sensing keyed right up when I applied an unmodulated 1 Watt of power at 1277.25 MHz, but started to chatter when full video was cranked in. Upon inspection of the circuit I found that there were no filter caps on the RF detector output and a nice video waveform could be seen at the relay transistor input. I added a .1 disc and it seemed to solve the problem. This circuit will be optimized for AM modulations in the production models. Minimum relay pull in was .25 Watts in this prototype.

The amp has a fair sized heat sink that I think would be fine for most shacks, with maybe a little air blown on the fins for the long winded. You can get the amp with an even larger heatsink ,as might be used in repeater applications, for $11 extra. The amp goes for $169 or $30 less without the T/R relay switching

This amp, like the preamp, had excessive insertion loss and noticeable VSWR which gave less than maximum power output that the bricks are capable of. Max power out of this prototype was 14 Watts saturated with 1.35 in. The same fix on the connectors and relay board in the preamp should apply to the amp to get the power up into the 15-18 Watt area.

I liked having the 5 way binding posts for attaching the +13.8 Vdc leads to. However those wanting to use it for a repeater might request a feed thru cap instead. Current draw at max output was 4.5 Amps.

WHAT'S ON THE EQUIPMENT REVIEW LIST FOR NEXT TIME?

Hopefully the TE Systems 180 Watt amp will arrive.

I do have an Ireland Antenna Co. 8 ft long fiberglass 70 CM "vertical stick" for repeater and base station omni applications - I won't tell you what their gain claim is but you should read it on April fools day. Also I have one of their little portable half wave antennas with a tuned decoupling network that should be great for Kreepie Peepies.

Pauldon has promised one of their video samplers. There is a big need for a good power/VSWR/RF video monitor box to put on the antenna line after linear amps to properly set them up. For those that want to roll their own, check out the 1990 ARRL Handbook page 28-8 for the video sampler. I don't think you need the chopper amp section anymore with most modern DC oscilloscopes today connected directly to the diode output. Also I like HP 1N5711 hot carrier diodes over the old 1N34's.

Jim Rafferty of HRO is loaning me one of the new AEA FSTV 430A transceivers for complete review. The improved model is now at dealers.

The AEA 50 Watt antenna mounted amp is still under development at this time. It might have been out now, but the Motorola transistors that were used in the prototype have been discontinued.

Finding a replacement RF power transistor is never an easy job. You can find variations in parameters even among different production runs of the same part number from the same manufacturer that can defy the nimble fingers of even the most experienced RF tweeker.

The equipment reviews and telling like it is, as technically correct as we can, rather than like the almost ad like reviews you often see in some of the other amateur magazines, has become popular with ATVQ readers according to the feedback we have been getting.

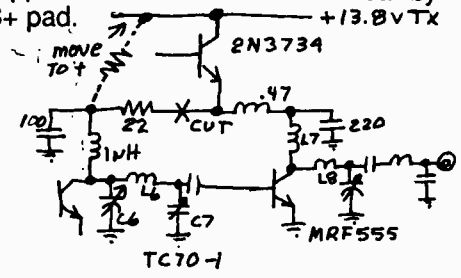
So ATVQ is looking for equipment reviews from you ATV fans out there. You will need to have adequate test equipment and technical background to verify manufacturers claims as well as what is not said but needs to be known for our readers to make a well informed judgement before they buy.

ALL THIS WORK TO REDUCE THE LOWER VESTIGIAL SIDEBAND, AND SOME ONE WANTS IT BACK!

Those areas using 439.25 MHz and getting interference from FM repeaters have temporarily alleviated the problem by going to high-side local oscillator injection in the repeater downconverter to invert the sidebands and retune their VSB filter to favor the lower vestigial sideband. However, this usually results in hardly any audio and color from transmitters that are designed to roll off the lower VSB.

On the PC 1 Watt transmitters, two RF stages are modulated with video. This is done to get at least 20 dB depth of modulation with good linearity down close to zero carrier. The phase is shifted between the two stages to buck out the lower sideband anywhere from 6 to 20 dB depending on the parts tolerances. To go back to equal sidebands it is a relatively easy change.

The end of the 22 Ohm resistor at the 2N3734 modulator emitter that feeds the RF driver collector gets clipped and reconnected to a near by B+ pad.



This effectively makes only the final MRF555 transistor video modulated. The only down side to this is that the white level might be compressed a little, but will be hardly noticed in most camera video scenes. With modulated transistor RF power amps, it usually takes two stages to get at least the desired 20 dB depth of modulation.

THINKING ABOUT PUTTING UP AN ATV REPEATER? PART III

OK, you have checked out the site, coordinated the frequencies, gotten the antenna(s), feedline and filters, now for the fun part, the repeater itself.

Repeaters tend to evolve and change over a few years so a modular approach makes much more sense than putting it all in one chassis or enclosure. It also allows changes and additions to be made easily without having to make many trips to the hill top to bring the system down to the bench for major surgery. One trip to the hill to sub or plug in a small module also saves the wrath of the flock that have no patience for down time.

To start, there are 3 basic modules: The transmitter, the receiver and the control/ID units. Each should be mounted in it's own completely shielded box with appropriate coaxial connectors for inter-connection. They can be bolted to 19" panels if they are to be put into a rack at the repeater site. I like the Hammond diecast aluminum boxes, but there are others that have complete contact along all seams. The shielding is absolutely necessary to keep your transmitter, and any others near by, from desensing the receiver. You would be surprised how RF can get through cracks in chassis and less than 100% shields in coax.

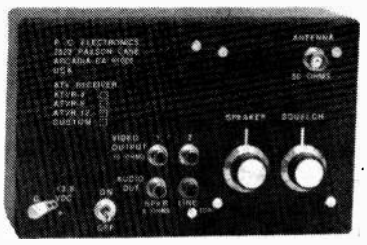
It is possible to shield and filter effectively. I have seen interference free weak signal video at repeaters sharing the same building and antenna structure with five or more 70 CM FM repeaters with associated links and control, and even some with megawatt UHF TV stations.

DC lines can be attached to 500 to 1000 pF feedthru caps. Audio and video lines should be coaxial connectors with bypass caps mounted right at the connector with as short of lead length as possible. I use 220 pF for audio lines and 100 pF for video lines.

I suggest double shielded or aluminum foil + braid coax for all interconnections. Any lead that is not 100% shielded and bypassed at the connector is likely to become a poor but significant antenna to conduct unwanted RF into the box.

Careful attention must be made to all RF internal connections as well as connector assembly. Any VSWR in the transmitter that makes the reflected energy travel on the outside of the the coax and over every nook and cranny of the box can eventually reach the receiver. Many do not realize that a good VSWR reading outside of the transmitter box does not mean that the interconnecting coax from the transmitter to the chassis connector is good. Coaxial integrity in the receiver is also important to keep unwanted ground currents from sneaking inside. So keep the RF inside the coax as much as possible with very short center conductor and shield leads. I does not make much sense to pay the bux for a good quality VSB filter to have it bypassed by poor shielding and construction practices.

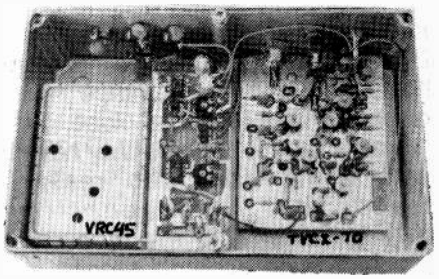
THE RECEIVER: All ATV repeater receivers should be crystal controlled. Even a temperature stabilized free running oscillator will slowly change frequency with age, dust accumulation, oxidation, etc. Once the machine is up and operating well, you probably will not want to make several trips to the hill top to just tweek the LO back on center frequency.



ATVR-4 Receiver

Outputs from the receiver module should be one or two composite video and one line level audio. The receiver composite video output standard is 1 V peak to peak into 75 Ohms just like it is for cameras and other video devices. It is nice to have one video output to go to the transmitter, and another one to go to a local monitor to aid monitoring and adjustment while at the site. The line audio is also about 1 volt peak to peak but operates into a 10K high impedance or 600 Ohm load. Another nice feature is to have the audio squelched to keep the audio noise down with the weaker video signals that can key up the horizontal sync operated relay. A local speaker amp is also of benefit for monitoring at the site.

For an inband repeater I suggest using a separate or well decoupled power supply from the one used by the transmitter. There could be some conducted interference on the common power supply lines, and the final amp varying load with video modulation could set up a feedback path through the receiver.



Xtal Downconverter & Receiver in Diecast Box

I recommend single frequency conversion directly to the standard 45.75 MHz TV IF rather than to a channel 3 receiver. A channel 3 receiver has a free running LO that can drift, and also more possible system mix and image products from strong near-by transmitters.

The 45.75 MHz TV IF SAW filters are made to favor the lower vestigial sideband. To properly receive the standard upper VSB, the local oscillator in TV tuners is above the receiver input frequency to invert the VSB. So if you have a downconverter for channel 3, it is not just a simple matter of moving the local oscillator up 15.5 MHz to output on 45.75 MHz instead of 61.25 MHz. It actually has to be moved up 107 MHz.

Many new repeater receiver systems start out having way too much system gain which ends up being swamped by the stronger ATV stations and makes it more susceptible to intermods. Total gain should be just enough to start the video AGC voltage to move on noise. Any more gain does not improve sensitivity, it just pumps up the AGC with the amplified noise floor. Adding preamps ahead of a good preamp in the downconverter most often does not improve sensitivity but rather gives more intermod interference produced in the overloaded first mixer or following stages.

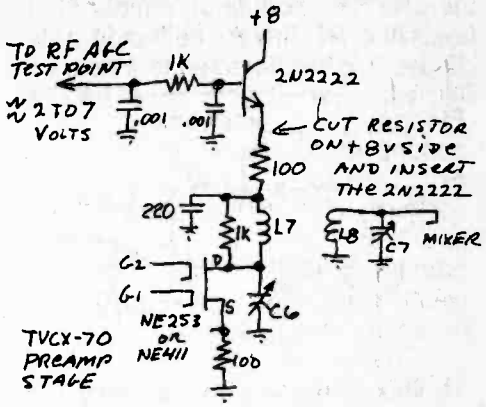
To check your system just measure the video IF AGC dc Voltage, not the RF or delayed AGC, with the downconverter turned off and then see if it changes much when turned back on. Ideally the voltage change should not be more than 1/10th of what you would measure with a very strong signal.

So if you do use a channel 3 receiver, a downconverter with 25 dB gain and also a preamp, you are probably in for trouble. The noise floor in most TV systems is no better than 1 microvolt due to the 3 MHz 3 dB bandwidth. The preamp stage should have the best noise figure device possible to get as close to the 1 uV as you can. But you may have to dump some gain with resistive attenuation between the downconverter and the receiver to also have wide dynamic range. You want to get the weakest signals but at the same time be able to accommodate that guy 2 miles away who won't turn off his 100 Watt afterburner and wonders why the repeater picture is rolling and distorted from clipping.

A channel 3 receiver will also have a delayed AGC RF stage to give a total AGC range of at least 60 to 70 dB. It is called delayed AGC because it does not start until the picture is snow free around 100 to 200 uV. There is usually a pot to set the starting point. The first stage in the TV tuner is designed for best noise figure at full gain to get the best picture to noise ratio. But once the signal is strong enough, it's gain can be cut back by the delayed AGC action without degrading the picture. FET's and dual gate GaAsfets are preferred for this because they have higher dynamic range even when the gain is cut back than most bipolars.

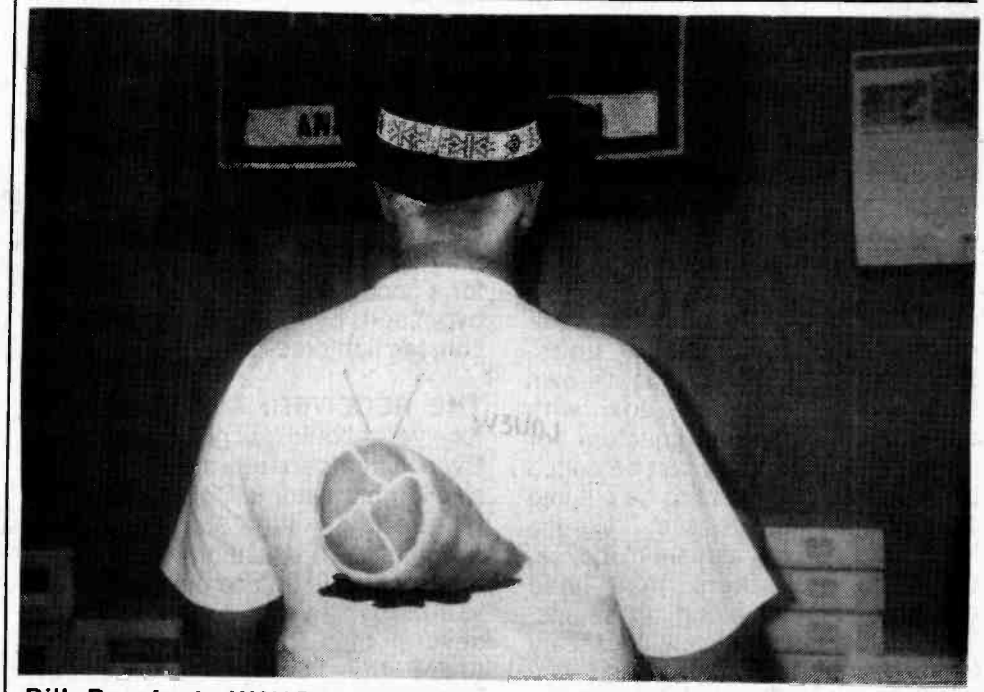
With systems that have direct conversion to the 45.75 MHz IF, a delayed AGC amplifier stage has to be added to do the same job as the channel 3 tuner. Just the video IF AGC is not enough. I use a MRF901 to do this in the VRC45a IF/receivers ahead of the SAW IF filter.

For those that want even more dynamic range or have problems with limiting on very strong signals, a 2N2222 transistor can be used to AGC the downconverter preamp stage. This is just an emitter follower in the +8V supply line to prevent loading down the RF AGC. The normal RF AGC voltage goes from about 7 Volts no signal to 2 Volts with 10,000 uV in the VRC45a. The drain voltage will follow the emitter follower voltage and directly decrease it's gain with increasing signal.



If you have a different IF module, check it's normal range to see if you can do the same thing.

To implement this modification for wider dynamic range, cut the preamps 100 Ohm drain resistor on its +8V side and lift it up. Connect the 2N2222 emitter lead to the cut end of the resistor and the collector to the +8V pad. The base needs some stray RF filtering in series with it. I put a Pi network with a 1K in series and .001 mF discs on each end to ground. The disc caps can be made into solder posts for the resistor, base and wire to the RF AGC test point pin in the VRC45a receiver IF. Solder one end of the disc cap standing on end to the ground plane. route the interconnecting wire away from any coils or other parts of the circuit.



Bill Barefoot, W3UQJ, Ham-TV

ATV IS COMING ALIVE IN SOUTHERN FLORIDA

Last February we took a few days to go to the Tropical Hamboree in Miami. MaryAnn and I had never seen Florida, so this was a great opportunity to give an ATV talk and exhibit at one of the larger ham conventions, plus take an extra day to see the area. Besides there is nothing like some nice 80 degree weather in the middle of winter even for a Southern California native.

The crowd was estimated at 15,000 with one large area for commercial exhibitors and two others for the flea market. It is like a mini Dayton but all indoors.

Tom Middleton, WB4CKY had an ATV transmitter running from the Hollywood Radio Club booth which we received at our booth at the other end of the hall. I could not resist putting a sign up over the TV saying "Live from Hollywood". That is Hollywood Florida of course.

John Sims, KA4ZAY gave a nice description of ATV activity in the greater Miami area and progress on his ATV repeater at the ATV talk. It has been burning in on a tall building in Hallandale in preparation to put it up on two of the tall TV towers near the Dade - Broward county line. It should be up and running with 434 in and 421.25 out by the time you read this. You can find John usually on Monday nights around 7:30 on 146.430 or 146.555.

John's machine went split site with a 10 GHz Gunnplexer link between 2 adjacent 1000 ft TV towers. He wanted to be up and running for the Tropical Hamboree but one of the Gunn diodes went out, and also he was not able to get rid of all the strong channel 4 TV signal out of his 70 MHz IF. He is writing up an extensive article with photos for a later issue of "the Q".

They will have a Weather radar feed from the National Hurricane Center in Coral Gables when the strong storms threaten the area and local emergency services groups need to see exactly where the cells are on a continuing real time basis. Space Shuttle video will also be available.

John also reports that Steven Grey, KC4NOL is putting ATV on a Jet Ski. What will ATVers come up with next?

The first ATV repeater in the Miami area is actually in Hialeah put together by Armando Fernandez, KA4GAQ. Input is on 426.25 and output on 923.25 MHz. His 14 Watt output was getting good pictures for about a 20 mile radius. I told him about the Hi-Spec 200 Watt 33 CM tube amps, and that I had just talked to Ott, W4WSR, the owner. His eyes seemed to light up at the prospect of a new high power amp, and said that he intended to give Ott a call.

I have been talking to Armando for many years and was glad to have the chance for the old eye ball QSO. He writes the ATV column in Radioscan Magazine. This is a Spanish language ham magazine which covers both the American continents. US hams might be very surprised how many Central and South Americans are into ATV. Quite a few came up for this convention. Radioscan is coming out with an English version which will be given out as a free complimentary copy at Dayton.

When we told Rita Vianney, KC4MJG, Radioscans Advertising Director how much we enjoyed some of the Cuban food, the next day she surprised us with 4 plantains to take home and a recipe on how to fry them up. It seemed that when we weren't talking ATV we were eating. Besides the great local restaurants, the Tropical Hamboree exhibitors committee really made sure we were well fed. It was a 5 pound week!

L-R: Lionel, KC4CLD; Pat (no call yet); Luis, KC4NOF; Armando, KA4GAQ; Manny, KC4LFO & Rita, KC4MJG.

The w6ORGy Notes Cont.

WHAT WILL YOU HAVE THIS YEAR AT THE DAYTON HAMVENTION ATV FORUM?

Captain Video, Henry Ruh, KB9FO will lead off with his introductory talk on ATV entitled "Helping Ham Radio to be Seen", with some time for Q & A. Carl Berry K5MWN will show some slides and tape on what it is like to fly by video as if actually in the cockpit of his R/C Model airplane. Bill Brown, the wb8-ELKman, will show a 10 minute video tape composite of all the balloon, rocket and kite ATV he has been involved in the past few years, and tell of future voyages to the edge of space. We hope to have a SAREX-90 up-date for you also.

The ATV Forum will be in room 3 Saturday afternoon at 2:45 until 5 pm just like previous years. Come by and join in. All your favorite ATV manufacturers will be at the same booth locations to show you what is new and wonderful.

Don't forget to bring some antennas for the Hamvention Antenna Measuring contest, everyone it seemed won a prize last year .... stick a screwdriver in a connector and see what it does, HI!

Spring is here, so it is time to think about those new antenna and feedline projects as the weather melts the ice. The Dayton Hamvention and the Central States VHF/UHF Conference Antenna Measuring contests are good places to check out new designs or see what the old ones really do. Central States this year will be held at the Wichita KS Marriott Hotel July 26-29th. Contact Jon Jones, NOØY for more info.

After Dayton, you can catch us at the Southwestern Division ARRL Convention in San Diego August 25-26. We had planned to be at the ARRL National Convention in Kansas City in June, but our son Rick, N6UEM, is graduating from Cal Poly that weekend. Henry Ruh, KB9FO will be there at the ATVQ booth and giving the ATV talk.

73, Tom O'Hara, W6ORG
2522 Paxson Lane
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R/C HELICOPTER ATV

By Mike Henkoski, KC6CCC

For the past few months, I've been working on the design of a small ATV package suitable for mounting on a radio controlled helicopter. I had researched several possibilities and decided to homebrew a transmitter that would adequately meet the size and weight requirements for a medium sized model (40" main rotor diameter, .40 powered). Most model helicopters can conservatively carry aloft about 40% of their weight in the form of payload, depending on temperature.

The model Hughes 300 weighed in at just under 6 lbs. I set a target weight for the payload of 1 lb. which would put it well within this range. At this weight ratio, the pilot would have the freedom to engage in the usual acrobatics that R/C helicopter pilots are known for without over stressing the model. The package weighed a total of 14 oz., with a 7 oz. Uniden VM110 CCD B & W camera and a 7 oz. NiCad/transmitter package (1.25" x 2" x 3.75")

The 50 mW output of the transmitter proved to be sufficient for line of sight snow-free operation up to 1/2 mile on 70 CM.

Once the Package was completed, it was time for the maiden voyage. Since I still consider myself a beginner at model helicopter flight, I decided that I would enlist the help of a more seasoned veteran of that type of flying. Dave Herbert is no beginner at R/C helicopters, he has flown many of the miniatures used in movies like "Blue Thunder", and serves as a technical consultant for the motion picture industry.

The day of the big flight arrived and the conditions were excellent, with no wind and a temperature of 72 degrees. The package was installed with very little problem utilizing plastic ties. The transmitter pack was mounted atop one landing skid and the camera on the opposite skid. the antenna used was a simple dipole placed just under the bubble cockpit.

Then the moment of truth: the helicopter lifted off with ease. The overall operation was better than I had expected. We were treated to a birds eye view of the surrounding valley and flight field below. The only problem seemed to be an intermittent loss of sync when the model was airborne at high speed. This was later attributed to the vibration of the BNC antenna connector.

I was very pleased with the operation, and intend to up grade to a higher resolution color camera and possibly try the new one Watt TXA5-RC transmitter from PC Electronics. I would encourage other Hams interested in R/C modeling to try their hand at this interesting way of merging the two hobbies.

TWO SIGNAL ENHANCEMENT EFFECT
Bill Parker W8DMR

Have you ever witnessed the phenomena when two weak ATV signals appear on the monitor at the same time?

If only one signal is observed at a time, practically nothing can be seen on the monitor. However, if both signals are observed simultaneously, more picture information may be observed. WHY?

There are two factual reasons to explain the weak two Signal Enhancement Effect (SEE). If, for example, a 1 volt p-p sinewave is displayed on an oscilloscope, then add another 1 volt p-p sinewave of a slightly different frequency. There will be peaks that are 2 volts high and nulls of zero volts. It is a form of beating. This describes the line-pairing often observed when two modulated TV signals are operating on the same channel. The broadcast industry purposely offset the carriers by 15 Khz to aid in reducing this effect.

In nearly all AM TV receivers there is a diode detector (rectifier) used for AM modulation recovery. If a received signal is low enough in amplitude, diode signal rectification is poor until the signal level approaches a level the diode can operate on. When both weak signals are present, the signal level (when both are adding) is sufficient to display the observed higher contrast. The adding of the two signals and the higher signal level supplied to the detector for more efficient demodulation explains the mysterious weak two signal enhancement effect. SEE, I told you so!

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WITH THE 1990 TC70-1d YOU GET:

1. Improved sync stretcher with *both* adjustable blanking pedistal and sync controls.

Allows you to better set up any amplifier for optimum video to sync ratio and stretch the sync without cutting off the sound by driving it into saturation. By setting the sync tip to just 1.5 dB (86%) of your ATV amplifiers saturation power, you get enough headroom to be able to increase the sound injection to -15 dBc and make it go farther without being chopped up at the sync rate (sync buzz). -15 dBc is the FCC limit for TV translators or those that do not run separate sound transmitters. The limit is due to the fact that the sound will bottom out at a fully modulated white level (12.5%) when the sound is added to the video waveform.

2. SET UP YOUR CAMERA PICTURE IN THE MONITOR WHILE RECEIVING ANOTHER ATVER.

Camera video is now present at the transmit video monitor output while in receive. While watching other stations, you can point and set up your camera well before it is your turn to transmit. When in transmit you still are switched to seeing the actual detected video present at the antenna output. This is the only true way to see what is really being transmitted after it passes from your camera and all the stages of the transmitter.

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Total prices listed delivered to you via UPS surface with no fine print handling, shipping or charge card costs. The widest variety of ATV gear available with most telephone orders shipped within 24 hours. We are your one stop ATV source for equipment and information. We have been telling it like it is over 25 years. No one else has our service policy without a time limit. Parts have different life times and in circuit stress ratios. We have even repaired a 12 year old TC-1 at no charge because we could see no customer or normal use reason why a .1 disc ceramic cap decided to open up. Customer caused service on the TC70-1 is only $40 + parts cost and most repairs are turned around within 3 days after we receive them, we want you back on the air!

COMPLETE 70CM ATV STATION 4/90

YOUR TV SET

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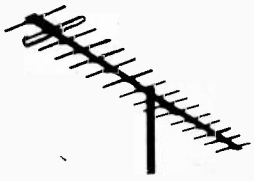

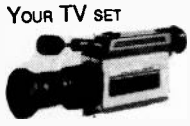

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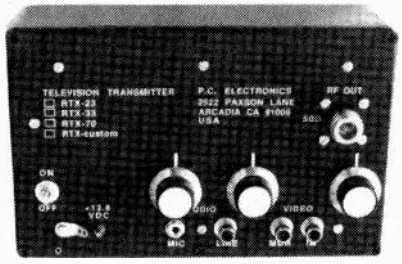
NEW TX70-1A AND RTX-70 TRANSMITTER

The family of full feature ATV transmitters for home, link or repeater use is now complete. We have models for all 3 of the popular ATV bands - 23, 33 and now 70 CM. TX & RTX 70 available May 90

TX Series



RTX Series

Features found on all 3 transmitters:

1. >1 Watt pep with adjustable sync stretcher to properly match amateur linear amps. Sets the blanking pedestal for proper video to sync ratio to compensate for the linear amps high power gain compression curve.
2. RF detector right on antenna output to see what is really going out on the air and that your video gain, focus, etc. throughout the whole transmitter is set up correctly. Detected composite video monitor outputs to a RCA jack in transmit, and loops thru in receive to enable camera set up before flipping the transmit switch.
3. Independent gain control of mic and line audio to enable external mic mixing with VCR or camera mic audio. New temperature compensated 4.5 MHz sound subcarrier generator with line audio pre-emphasis and soft limiting between the broadcast standard 25 kHz average & 40 kHz peak deviation.

CHOOSE THE TX SERIES FOR HOME AND PORTABLE USE. Has built-in RF T/R relay switching for easy connection through a BNC cable to the companion TVC downconverter. Rear panel video & audio jacks for VCR or Camcorder, or use front panel VHS camera jack. Mic & push to look jacks in front. Shielded cabinet 7x7x2.5", 1.6 lbs.

***NEW* TX70-1A** has 2 frequency capability in the 425-440 range, 1.5 W pep on sync tip typical output.....**$279**
one crystal included - we stock most used 439.25, 434.0 & 426.25, plus 427.25 & 425.25. 2nd crystal add $15.
TX33-1 single frequency - specify 910.25 the most common simplex, 911.25 or 923.25 MHz **$329**
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CHOOSE THE RTX SERIES FOR DEDICATED REPEATER AND LINK USE. Uses same transmitter in a completely shielded Hammond 1590D diecast aluminum box but without T/R switching.

***NEW* RTX-70** specify repeater or link output frequency, 421.25 MHz most popular for inband output.....**$299**
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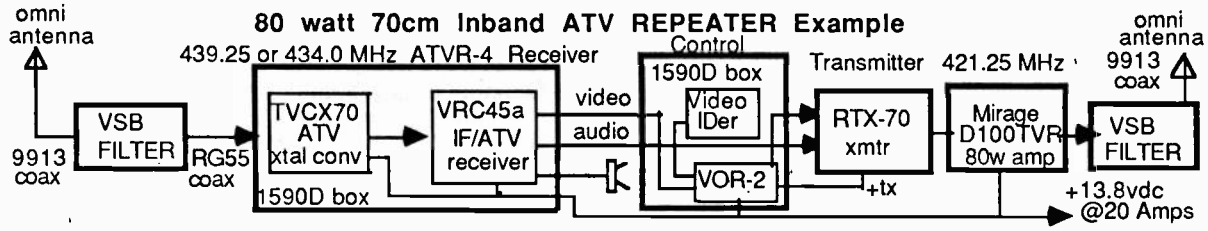
RTX-23 specify frequency - 1253.25 MHz best first repeater output crossband freq., then 1277.25 MHz.....**$329**



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

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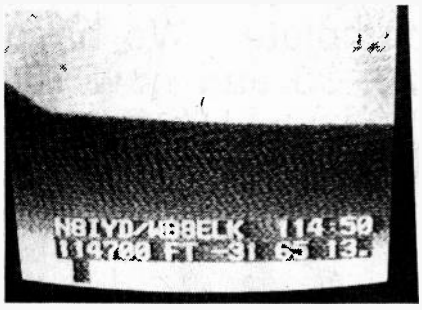
NEW SMALL TXA5-RC 1 WATT 70 CM VIDEO TRANSMITTER



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

TXA5-RC FEATURES:

1. Size only 2.25 x 4.0 inches. Weight 2 ounces. Draws 250 mA at full power with 13.8 Vdc.
2. Comes with single crystal on your specified frequency: 426.25 most popular for R/C, or any of the other standard ATV frequencies of 439.25, 434.0 or 427.25 MHz are stocked.
3. Although not necessary for the R/C application, it does have the sync stretcher in case it is to be used with a higher power amplifier and a sound subcarrier input to accept the FMA5-E. This way it has the flexibility to also be used in portable public service applications, etc., where all of the features of the KPA5 are not necessary but still could be added.
4. Introductory price of **$129**. Available now.

4/90

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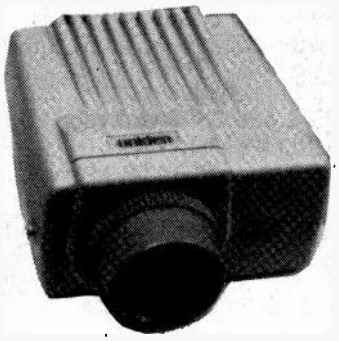

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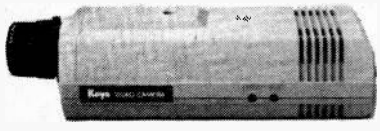
The camera was made for home security applications where low cost, ease of installation and use are more important than high resolution, color, or low light level capability. Depth of field is less than 1 foot to infinity and has auto iris.
View angle is 40 degrees with the included lens system.
Size is 4.7 x 3.9 x 2.2 inches, weighs less than 7 ounces.
Requires 11 to 14 Vdc at 200 mA
Horizontal resolution is 120 lines with 19440 pixels
Camera with 4.8" monitor model VM100....**$175**
Camera, monitor with intercom audio model VM200 ...**$199**

KOYO TVC-4000-2 600 LINE RESOLUTION BLACK AND WHITE CAMERA $199



Low cost for those who cant afford a camcorder yet, or want to leave a camera on a black and white call card for working DX.120 Vac 60 Hz line locked 2:1 interlace 600 lines horiz. res. f1.6 C mount lens included. 4 x 2,4 x 8.5 inches, 1.7 lbs.

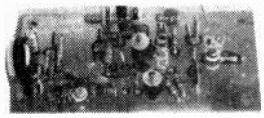
COLOR SSTV WITH THE ROBOT RESEARCH 1200C.....$1295 delivered

Still the standard for slow scan television around the world. Send and receive efficient 8 sec. Black and White or 12 sec. color with your HF SSB transceiver for DX pictures, VHF/UHF FM for local, or repeat SSTV DX over local ATV. 6 picture memories, 4 transmission formats - 120 & 240 lines, accepts any composite video or use internal color bars, 262,144 color combinations, parallel I/O printer port, outputs to composite video or RGB monitor or ch 2/3, and many other features.
WE ARE NOW ROBOT'S REP/DEALER FOR AMATEUR SSTV

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

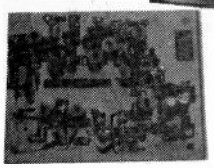
TIME FOR A NEW DOWNCONVERTER?

WE HAVE TUNEABLE OR CRYSTAL CONTROLLED BOARDS OR READY TO GO GaAsFET DOWNCONVERTERS FOR ALL 3 OF THE POPULAR ATV BANDS - 70, 33 & 23 CM.

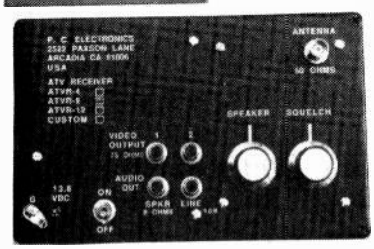


Tunable wired and tested boards, req. 12 Vdc, cabinet, connectors etc.:
TVC-2G 420-450 MHz to ch 3 .....$49
TVC-9 902-928 MHz to ch 3 .....$59

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

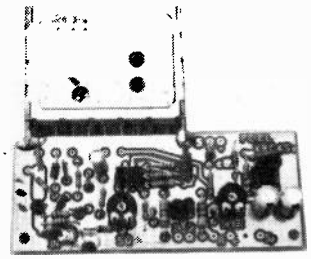


Crystal controlled wired and tested boards:
TVCX-70 specify freq. in 420-440 range to ch 3 or IF ...$99
TVCX-33 " " " 902-928 " " " " " " ...$109
TVCX-23 " " " 1240-1300 " " " 10 " " ...$129
Ready to go in 1590C diecast aluminum box add $30



COMPLETE CRYSTAL CONTROLLED RECEIVERS

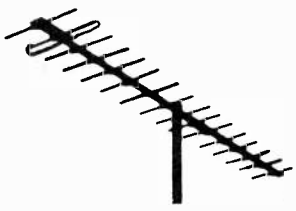
Designed for dedicated repeaters or links, these can also be used by those who want to have composite video out to drive a monitor. 2 composite video outputs, 8 Ohm speaker and line audio outputs. Audio has a variable squelch control. Requires 12 to 14 Vdc @ 250 mA. Contains TVCX board and VRC-45a receiver boards in a 1590D box.
ATVR-4 specify 420-440 frequency.....$299
ATVR-9 " 902-928 " $309
ATVR-12 " 1240-1300 " $329



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

4/90

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



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

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

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

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

THE BATG

ARE YOU A MEMBER ?

YOU CAN BE FOR AS LITTLE AS $12 PER YEAR.
($19.50 PER YEAR TO RECEIVE YOUR MAGAZINE BY AIR MAIL)

FOR THIS *VAST* SUM YOU WILL RECEIVE FOUR ISSUES OF THE CLUB'S MAGAZINE, CQ-TV, WHICH IS ALWAYS PACKED WITH UP-TO-DATE PRACTICAL INFORMATION ON ATV DESIGNS. PRINTED CIRCUIT BOARDS AND SPECIAL COMPONENTS ARE ALSO AVAILABLE FROM THE CLUB AT REDUCED RATES. A SERIES OF HANDBOOKS HAVE ALSO BEEN PUBLISHED BY THE CLUB, DEALING WITH ALL ASPECTS OF ATV, FROM SETTING UP YOUR FIRST STATION, TO THE LATEST IN STATE-OF-THE-ART MICROWAVE GEAR. MANY OTHER SERVICES AND FACILITIES ARE AVAILABLE TO MEMBERS AND PRACTICAL HELP IS AVAILABLE ON ANY TV RELATED TOPIC

FOR FURTHER INFORMATION AND MEMBERSHIP APPLICATION FORMS ETC, CONTACT OUR UNITED STATES AGENT DON MILLER AT:

WYMAN REASEARCH INC, BOX 95, WALDRON, INDIANA 46182
TEL: (317) 525 6452
(CHEQUES PAYABLE TO WYMAN RESEARCH PLEASE)

COMING IN THE NEXT ISSUE OF

CQ-TV

CONSTRUCTION ARTICLES FEATURING: A SUPER-VHS TO RGB CONVERTER, A 24CM PHASE-LOCK-LOOP EXCITER FOR ATV, A VERSATILE CAMCORDER CABLE ADAPTOR, A HIGH PERFORMANCE PREAMP FOR 24CM AND COLOUR CORRECTION METHODS. PLUS LOTS OF NEWS, DX-TV NEWS, LOGIC CIRCUITS, USING OSCILLOSCOPES, ETC. MAKE SURE YOU GET YOUR COPY, SEND YOUR SUBSCRIPTION TO DON AND JOIN THE 2500 OTHER ATV'ers WORLDWIDE WHO MAKE UP AND ENJOY BEING A PART OF:

THE BRITISH AMATEUR TELEVISION CLUB

Antenna-pointing guide

The following program is suggested as a general aid in calculating antenna-pointing information. It can be used with nearly any computer programmable in BASIC. Although some commands are more specific to the MS-DOS BASIC language than other dialects, you should not have to make many changes.

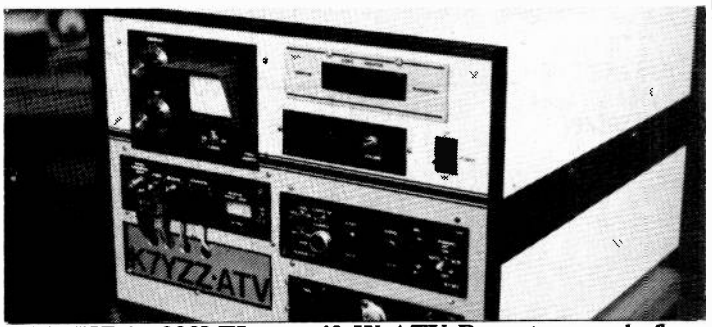
This program is available both as an ASCII text file (BESAT.TXT) and as a BASIC program file (BESAT.BAS) in the Broadcast Professional Forum data library on CompuServe. It may be obtained without charge, beyond access time, by entering GO BPFORUM at any prompt and downloading from data library DL4.

This program allows determination of proper pointing angles for the earth-station antenna in the Northern Hemisphere, given the antenna site location and the satellite location along the geosynchronous arc.

```
10 CLS: PRINT "NORTHERN HEMISPHERE ANTENNA
   POINTING GUIDE": PRINT
20 PRINT "Express all entries in decimal degrees North
   latitude,"
30 PRINT "or West longitude, i.e., 12 degrees, 30 seconds
   would"
35 PRINT "be entered as 12.5."
40 R=3963: H=22300: REM earth radius satellite altitude
50 PRINT: PRINT "Enter SATELLITE location."
60 LINE INPUT "Degrees West longitude:"; SL$:
   SL=VAL(SL$)
70 IF SL=0 THEN SL=.001
80 PRINT: PRINT "Enter ANTENNA SITE location."
90 LINE INPUT "Degrees West latitude:"; WL$:
   WL=VAL(WL$)
100 IF WL=0 THEN WL=.001
110 LINE INPUT "Degrees North latitude:"; NL$:
   NL=VAL(NL$)
120 IF NL<0 THEN PRINT "Program valid in Northern
   Hemisphere": PRINT "Modification needed for Southern
   Hemisphere": END
130 IF NL<.02 THEN NL=.02
140 TA=90-NL: A=ABS ((SL-WL)*.01745)
150 IF A>1.35 THEN PRINT "Satellite is at or below
   horizon": END
160 C=TA*.01745: CA=SIN(C)*COS(A): TA=SQR
   (1/(CA*CA)-1)
170 AA=ATN(TA): BS=SIN(A)/SIN(AA)
180 IF BS=1 THEN BS=1.0001
190 TB=1/SQR(1/(BS*BS)-1): BB=ATN(TB)*57.2958
200 IF SL>WL THEN TR=180+BB ELSE TR=180-BB
210 X=SQR(R*R+(R+H)*(R+H)-2*R*(R+H)*COS(AA)):
   SE=(R+H)*SIN(AA)/X
220 TE=1/SQR(1/(SE*SE)-1): EL=90-(ATN(TE)*57.2958)
230 PRINT
235 PRINT "Set azimuth###.# degrees clockwise from TRUE
   NORTH"; TR
240 PRINT
245 PRINT "Expected elevation above horizon is ###.#
   degrees"; EL
250 PRINT: END
```

10^{18} minations = 1 examination
10^{15} coats = 1 petacoat
10^{12} bulls = 1 terabull
10^{9} lows = 1 gigalow
10^{6} phones = 1 megaphone
2×10^{3} mockingbirds = 2 kilomockingbird
10 cards = 1 decacard
10^{-1} mates = 1 decimate
10^{-2} mentals = 1 centimental
10^{-2} pedes = 1 centipede
10^{-3} ink machines = 1 millink machine
10^{-6} scopes = 1 microscope
10^{-9} goats = 1 nanogoat
10^{-9} nannette = 1 nanonannette
10^{-12} boos = 1 picoboo
10^{-15} fatales = 1 femtofatale
10^{-18} boys = 1 attoboy

K8PYQ Lowell Brown, Mt. Victory, OH.



434MHZ in 923MHz out 40 W ATV Repeater on air for Western Washington Amateur Television Society, Jan. 6, 1990. The MKII Model built by "Mr. Wizzard" K7YZZ.

SOLID STATE YOUR TEK 529 SCOPE

Many ATV'ers have managed to aquire a used Tektronix 529 waveform scope. These are great units to monitor your video. The tubes for these are becomming scarce ane expensive. Here is a solid state inexpensive mod you can use. Reprinted with permission from Broadcast Engineering Magazine.

Transistors solve tube problems for the 529

By Kenneth O. Dixon, maintenance supervisor, WHA-TV, Verona, WI

Having a hard time locating 7788 tubes for the vertical output of your Tektronix 529 waveform monitor lately or do you object to the high tube cost for routine maintenance? Replacing the tubes with transistors provides longer life and reduces maintenance costs.

WHA-TV uses 28 of these fine scopes. but tube location and replacement costs are becoming significant. So, after receiving another trouble report from operations complaining of "sync compression in the monitor scope," we decided that the 7788 tubes had to go.

The 529 schematic shows that a transistor could directly replace each 7788 tube if it had the following characteristics: a V_{cbo} exceeding 360 V; dissipate 6 W of heat; have a good f_T; and a package which could be mounted to a heat sink with a low capacitance. The RCA 2N3439 transistor seemed to be a good choice with its V_{cbo} of 450 V; PT of 10 watts; f_T of 30 MHz; TO-39 case; and T_j of up to 200 C.

During checkout of the scope after modification the following values were either measured or computed:

	Nominal	Maximum
I_c	24 mA	50 mA
V_{ce}	147 V	211 V
P_d	3.53 W	3.88 W
Case Temp.	98 C	99.1 C

This data indicated that there should be no problems using the 2N3439 transistor.

The method of transistor mounting was an important aspect of the modification due to the amount of heat dissipated by the transistor. (The 2N3439 can dissipate up to 10 watts at a case temperature of up to 25 C, de-rated to zero power at 200 C.) The transistor in this application dissipates approximately 3.5 W. Another significant consideration is that the transistor collector when mounted must have an absolute minimum of capacitance to ground. The Wakefield series 260-6SH5B cup was used with its beryllium oxide insulator and 4 pF capacitance. Beryllium oxide is also a much better heat conductor, permitting the collector to run cooler. (Be sure to use an adequate amount of thermal compound when installing the transistors and mounting clips.)

The circuit changes are relatively easy to perform following this step-by-step procedure:

1. Remove V-164 and V-264; they are no longer needed.
2. Replace R-153 (154 K) with a 15 Kohm, 1 W resistor.
3. Replace R-150 (22, 6 K) with a 27 V, 1 W zener diode.
4. Add a 100 ohm ¼-W resistor between Q-164 collector and pin three of V-164 socket.

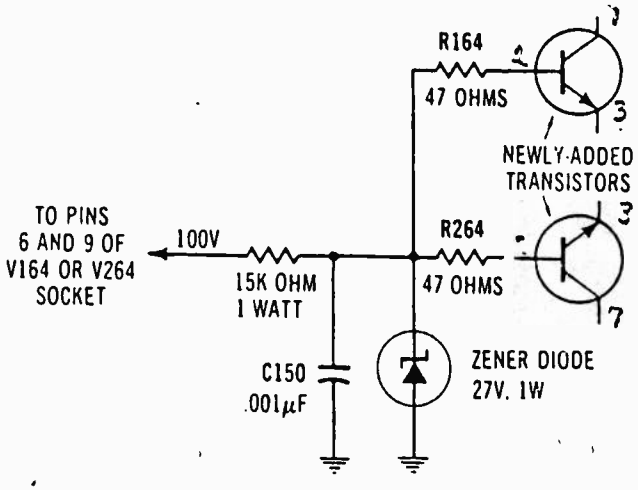


Figure 1

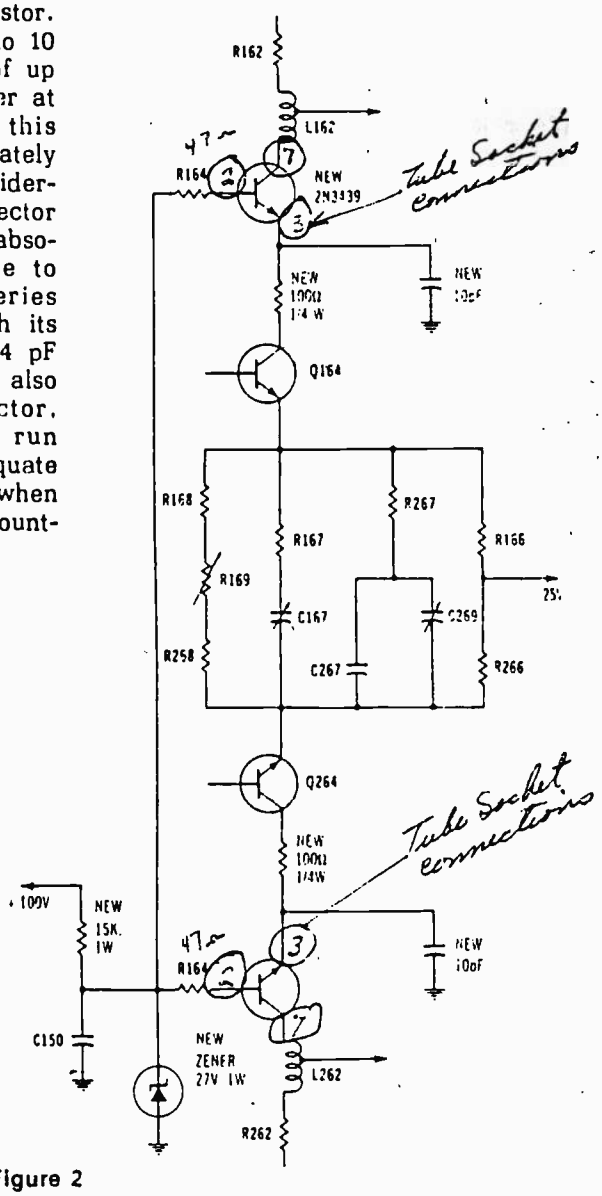


Figure 2

SOLID STATE YOUR TEK 529 SCOPE

Add a 100 ohm ¼-W resistor between Q-264 collector and pin three of V-264 socket.

6. Install a 10 pF silver mica capacitor from pin three to V-264 socket to ground.
7. Install a 10 pF silver mica capacitor from pin three of V-264 socket to ground.
8. Mount and connect two 2N3439 transistors. Base to pin two, emitter to pin three, and collector to pin seven of V-164 and V-264 sockets.
9. R-163, C-163, R-165, R-263, C-263, and R-265 are not required but may be left intact They will not affect proper operation.

On the older series of scopes R-164 and R-264 were 47 ohms and were connected to the bases of Q-164 and Q-264, respectively. For these scopes, leave the resistor values at 47 ohms but remove the ends which connect to the base of Q-164 and Q-264. Reconnect the free ends of R-164 and R-264 as shown in Figure 1.

The bases of the newly added transistors are now fixed at 27 V. This voltage keeps all four output transistors operating linearly and also ensures that the 40 V breakdown rating of Q-164 and Q-264 is not exceeded.

The transistor mounts are secured in the regular 529 scope by drilling two holes in the top of the scope chassis just above the sockets of V-164 and V-264 (number 36 drill, 6-32 tap). For the RM529 scope, remove the mounting screws from L-162 and L-262 and use the cup clip studs to remount them.

After all changes have been accomplished, recheck all connections, plug in the scope, apply composite sweep (or multiburst if sweep is not available) to the scope and adjust C-269 for flatest response. It may also be necessary to adjust L-162 and L-262 for best response near 10 MHz. If, after making the adjustments, the gain near 10 MHz is still too high, remove the 10 pF caps (which were added in steps 6 and 7). If the high frequency response is too low, increase the capacitor values to possibly 68 or 100 pF. Experience has shown that most 529s do not require the capacitors but the RM529s do. Calibrate the scope vertical gain with R-169. The modification will have increased the gain by about 30½. Confirm that channels A and B both operate correctly.

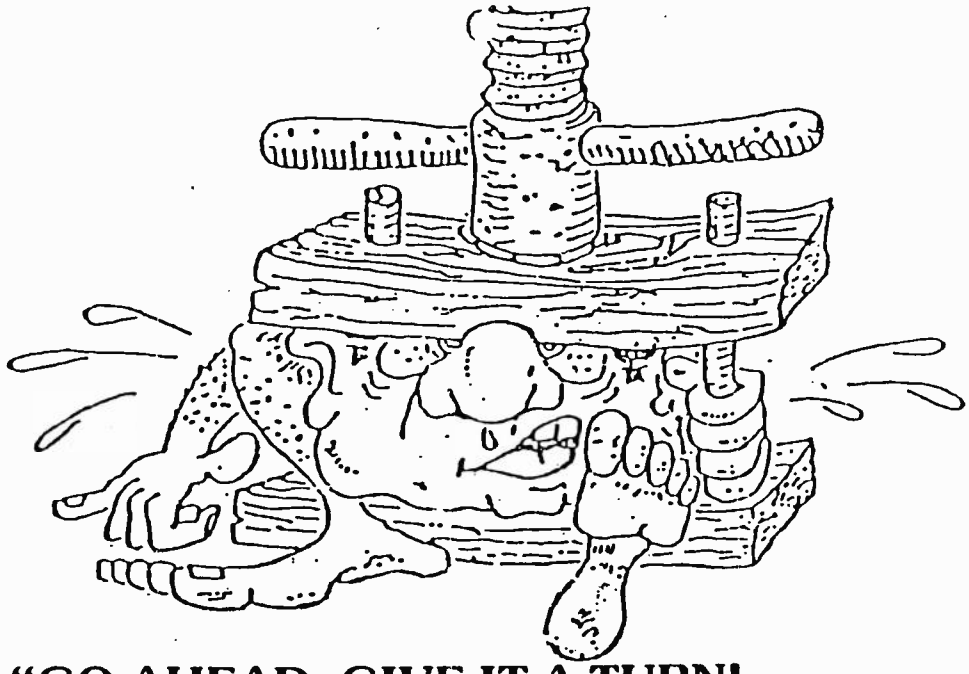
Scope pictures were taken of frequency response and of multiburst before and after modification to transistors. There was essentially no change in the 529s performance.

WHA-TV's annual scope maintenance has averaged about $1700 (2 tubes at $30 x 28 scopes). At current catalog prices, the modification to transistors costs about $8.40 plus two hours of technician time—say, $25 per scope. The immediate savings plus long-term gains in low maintenance are obvious.

To maintain flexibility and eliminate patching problems involving feeds to our Ampex AG-440 recorders, we decided to build our own switching matrix.

We have two AG-440 recorders, one 4-track and one 8-track. Our Cetec 40LM audio board is divided into two parts. One part is for production and the other part is for editing. Each side has four output lines.

One channel on each recorder is reserved for SMPTE time code. This means that our matrix should have a balanced 8-line input capacity and a balanced 10-line output capacity.



**"GO AHEAD, GIVE IT A TURN!
I WORK BETTER UNDER PRESSURE!!"**

LAST CHANCE TO ENTER

WESTERN WASHINGTON AMATEUR TELEVISION SOCIETY AND AMATEUR TELEVISION QUARTERLY

AMATEUR TELEVISION VIDEO TAPE CONTEST

— — — first prize: ICOM IC 1275 1.2 Ghz ALL MODE TRANSCEIVER* — — —

— — — — — second prize: AEA FS430 ATV TRANSCEIVER — — — — —

third prize: PC Electronics RX converter of your choice

DEADLINE APRIL 15

Have we gotten your interest? Are we motivating you? GOOD!
All you have to do is make a VIDEO about ham radio using your home VHS/Beta or 8mm video equipment!

RULES OF THE CONTEST

All licensed amateur radio operators are eligible to win except members and families of the Western Washington Amateur Television Society (WWATS), Amateur Television Quarterly Magazine (ATVQ), or publishers or staff of any other ham radio magazine. That leaves about a half million US hams and any other ham in the world!

Your video tape should be about ham radio (any aspect) and have been made since May 1988. The tape must not exceed 15 minutes in length. You cannot use professional video equipment (3/4", 1") in your production chain, only consumer grade equipment: ie S-VHS, VHS, Beta, 8mm, Super Beta, etc.

Only one entry per licensed amateur please. Video must be amateur radio related and can be a documentary, educational, technical or entertainment.

Entries will be judged on the basis of creativity, technical merit and effective use of the video medium. Contestants must be original producers. Violation of copyright laws is prohibited and disqualifying.

Winners will be selected by the WWATS appointed judges. Their decision is FINAL. No substitution of prizes or exchange for cash value allowed. Any state, local or federal tax applicable is the responsibility of the recipient. Offer void where prohibited by law. Winners may be required to attest to compliance with rules of the contest.

Winners will be announced at 1990 Dayton Hamvention. Winner need not be present! All entries become the property of WWATS and ATVQ for the promotional use of ham radio and editorial and promotional uses.

Entries must be post marked no later than April 15, 1990. Postage due mail will not be accepted. Sponsors and prize donors assume no responsibility for lost or damaged entries. Return postage must accompany any videocassette to be returned, otherwise entries become the property of WWATS. WWATS is responsible for delivery of prizes to winners.

O F F I C I A L E N T R Y F O R M

CALL:_____ NAME: _____ _____

ADDRESS:_____

CITY: _____ STATE: _____ COUNTRY: _____ ZIP: _____

Certification: I hereby enter the WWATS/ATVQ contest and agree to abide by the rules as stated above and accept the decision of the judges. My entry is enclosed. I declare that I am the producer of this video and release all rights of copyright to WWATS and ATVQ in exchange for consideration for the prizes listed above.

DATE: _____ Signature: _____

*Agreement with Icom requires 100 valid entries to contest. Enter soon, tell your friends!

SEND ENTRY TO: WWATS/ATVQ VIDEO CONTEST, 353 S. 116TH ST. SEATTLE, WA 98168
Entry form may be copied as needed.

SEND IN YOUR TAPES TODAY AND WIN!!

TELEVISION TEST SIGNALS AND CHARTS
SPECIAL PULL OUT SECTION

As a special feature of our April issue, we have produced a full color pull out section with four very useful test signal charts. You can use these to check and align your camera or your system. Here are a few words about each.

GREY SCALE

Proper camera and system alignment must include a good linear transfer from TV black to TV white. The log grey scale chart does just that when sent through a linear system. This is most often used to set up a camera. The camera gain (white level) is adjusted for 100 IRE units from the white squares (#10). The pedestal (black level) is set to 7.5 IRE units from the black squares (#1). The patch in the middle is blacker than TV black and should not be visible, unless your monitor black level is turned up. You can use this to set your monitor as well as camera.

Each of the steps should be equal change between them on a scope. If the steps are not equal, you are displaying black or white compression or expansion. If the steps get closer together as you go to white you have white compression. If they get closer together as you go to black, you have black compression. On a scope they should form an X. Adjust your camera gain and pedestal for the best linearity. Be sure to have a good amount of light and an even light on the pattern to avoid shading distortion. In sophisticated cameras you would also adjust the flare, gamma and shading controls (parabola and saw). This chart has been reproduced well enough for use on all but the most expensive broadcast cameras.

COLOR BARS

The color bars here do not replace a good NTSC color bar generator. Nor will they produce color points in the exact vector boxes on a vectorscope. But they will provide a variety of colors in each area of the NTSC color system spectrum sufficient to make camera balance and color temperature and color matching adjustments (multi-camera).

The chart has 80% white and 4% black and should also show a reasonable grey scale on a black and white monitor.

REGISTRATION CHART

This chart is used to align the individual color channels of your camera to get good registration: exact overlap of red, green and blue signals. First focus on the chart using the mechanical focus. ALWAYS use the GREEN channel as reference. The area of most concern is within the large circle. The two resolution wedges are to aid in electronic focus alignment (beam and target on tube type units).

Following the alignment procedure for your camera, turn off red or blue (usually blue) and adjust red using -G (negative green) and adjust the scanning geometry controls to get the best cancellation of the pattern starting at the center towards the edges. Some cameras have mechanical adjustments in the X and Y plane as well as electronic adjustments for skew, S, size, and centering, parabolic and saw tooth correction. Centering controls are also used at this point in an alignment procedure. After RED has been made co-incident with green, RED is turned off and BLUE is turned on and the procedure is repeated for the BLUE channel until best cancellation is achieved. Green is returned to positive and all channels are turned on. Usually color balance is now performed. (White and black balance using the chip chart).

RESOLUTION

Picture resolution is measured in lines of picture height. Focus your camera as best as possible on the chart. The darts at the edges should just be at the edge of blanking on your camera image. You could also adjust electronic focus at this time.

Observe the wedges which converge at the center of the picture. Since this is NTSC, your vertical resolution is limited by the number of scan lines to about 500. You should see the individual lines merge at about this point on the wedge. Horizontal resolution is read from the vertical wedges. Look closely at the wedge and where the lines are no longer distinct and the point where they blend together is called the limiting resolution. You will notice that the lines do not remain black but begin to turn grey as they merge. This is the depth of modulation (frequency response) curve of your camera. If you have an enhancer unit or if your camera has an internal aperture or enhance circuit you can adjust the camera to get black and white lines to the merge point. Do not go beyond in an attempt to get "extra" resolution, you will not and the picture will look overly contrasty or have trailing edges of the opposite luminance (white trailing black, etc). Do not be alarmed at the initial number you read. TV is measured in terms of vertical height, so multiply the number by 1.33 for the actual TV resolution number.

The longer black lines at the top and bottom of the pattern and the black boxing areas are to measure streaking. Streaking is a function of low frequency response. Response below .5 MHz. If your camera has a streaking or low frequency compensation or medium compensation control, you would

TELEVISION TEST SIGNAL CHART

use these to remove smear, streaking and ringing on these larger black areas.

The smaller circles at the corners are to measure corner resolution. Most cameras have less resolution at the corners than at the center. Thus most camera specs indicate so many lines of resolution at the center. Lens, optics quality and tube/ccd quality very and are usually not as good at the edges and corners. CCD cameras also vary in the quality of the CCD device. The cheaper (and more defects) in the CCD, the less the cost of the camera. "Perfect" CCD units are only sold to the military, next for broadcast, then industrial, finally consumer and "budget". CCD defects are concealed by electronically turning off a line, column or row of elements in which there is a defect. This is usually not noticeable on consumer equipment unless you run some "hard" tests such as these charts. Also a CCD array may be aligned with RGB elements staggered or in line to produce enhanced resolution or better convergence (registration) depending on the manufacturers preference. CCD's also have a fixed pattern of noise and a "window screen" pattern which you might be able to observe under high light levels and by tilting the camera while viewing the registration grid chart.

GENERAL INFO

GAMMA refers to a correction of the linearity of a picture. This is a measure of black and white stretch. A camera which has a compressed black portion of the grey scale will appear to have darker "richer" colors. A camera with a compressed white area of the grey scale will appear to be washed out and pale or pastel. A gamma of .5 is a "flat" linearity with equal steps between the 9 neutral gray patches or "chips" on the chart. The strips are arranged in opposing steps to avoid having a left to right shading error. If the gamma is adjusted to .45 the blacks would be compressed. Normally the grey scale should be equally split between steps 1 to 5 and 5 to 9.

Optical density, lens distortion especially on wide open lens settings (below F4) will show a roll off approaching the sides or corners.

Chart illumination should be on the order of 100 fc (foot candles). This insures that your camera iris is stopped down to a level where lens artifacts should not be apparent.

Optical density = -Log Reflectance. Each chip or step differs from the next by about \/2. or about 1/2 F stop per change.

We did not reproduce a "ball" chart which is used to check scan linearity. The use of a linearity chart also requires that you mix an electronically generated grating pattern (horizontal and vertical lines) with a horizontal frequency of 315 KHz. and a vertical frequency of 900 Hz. Linearity should be at least 2% or better overall and at least 1% or better in the main picture area, also called the safe title area.

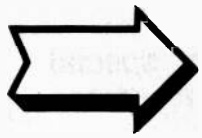
Another test chart would be optical multi-burst which would test the cameras frequency response from the lens out. This is not often used as the resolution chart is nearly as capable in this area.

On broadcast cameras, an internal set of charts in the form of slides is inside the lens and is used for automatic set-up or manual touch-up of camera parameters.

If you are not experienced in making the internal adjustments for your camera beware that they are very sensitive and the picture can be made look quite bad very quickly. If in doubt, don't touch it, or mark it clearly before you turn it!

Additional copies of these charts are availble for $2.50 post paid from ATVQ and will be available for $2 at the Dayton ATVQ double size booth!

We will have a limited number of the portable test pattern badges "hams should be seen as well as heard" at our Dayton booth and friday ATV party for $1 each.



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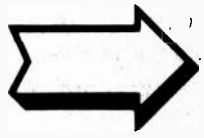
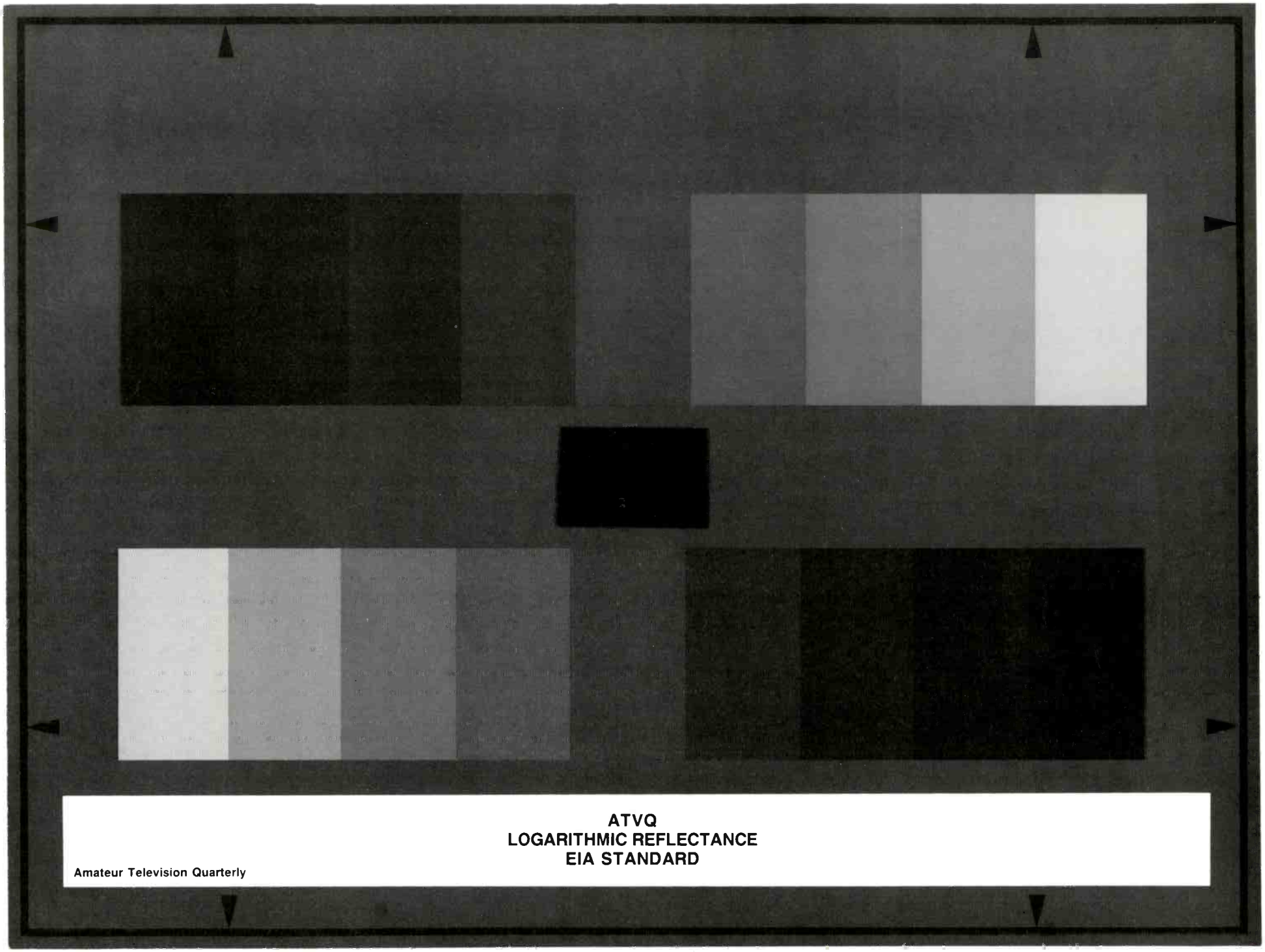
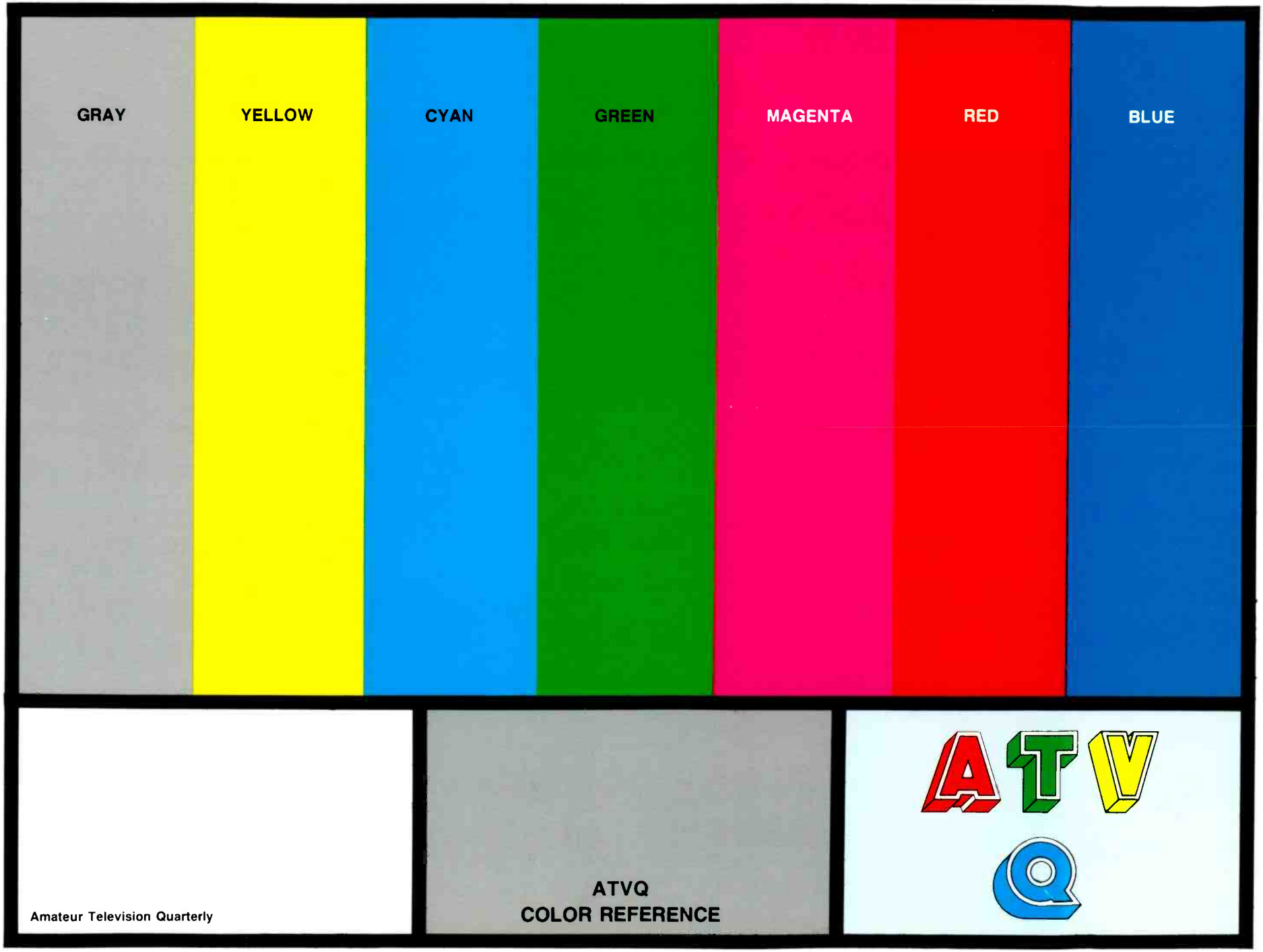


SEND IN YOUR ARTICLES NOW AND BE FAMOUS!


ATVQ
LOGARITHMIC REFLECTANCE
EIA STANDARD
Amateur Television Quarterly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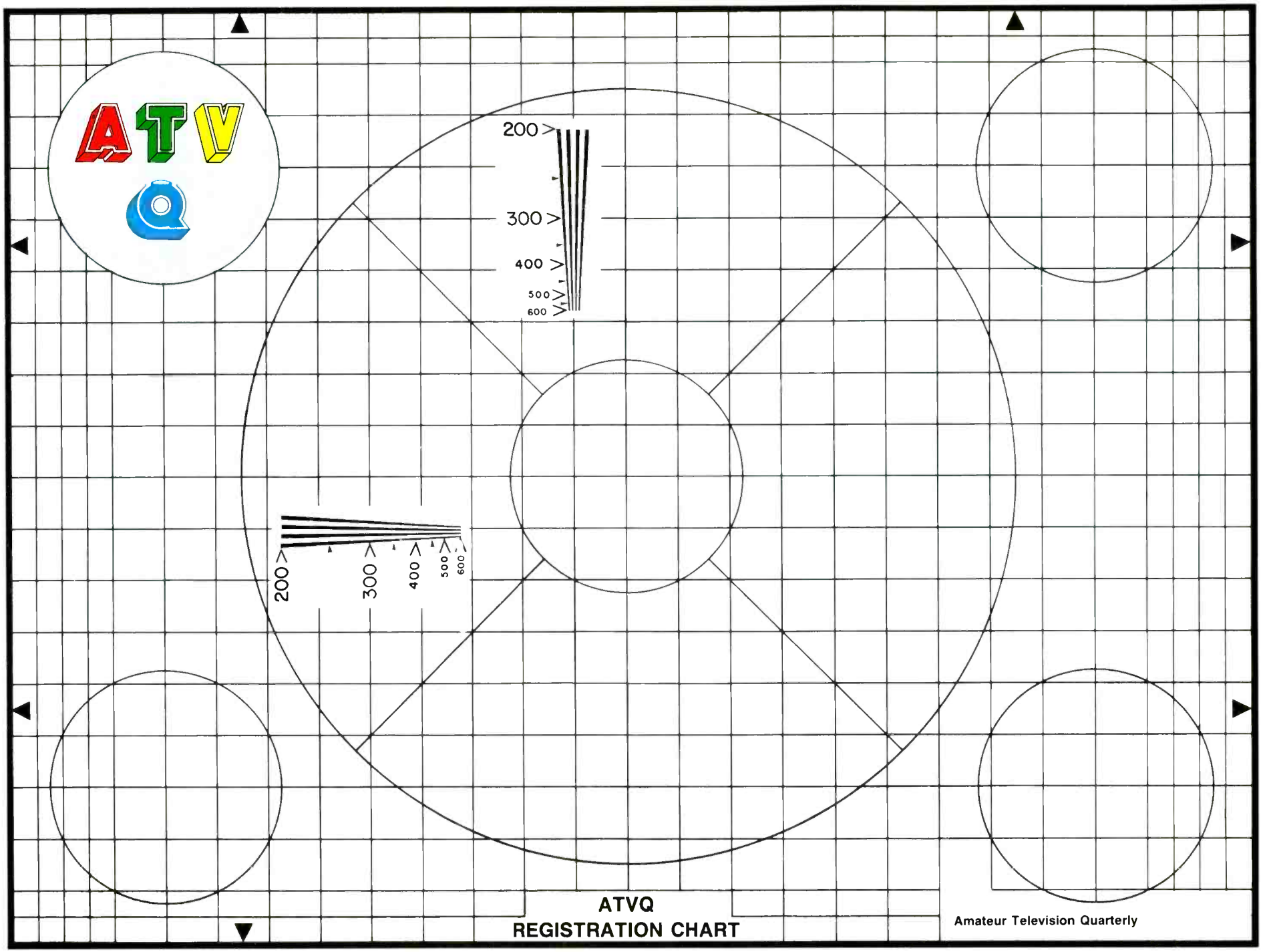
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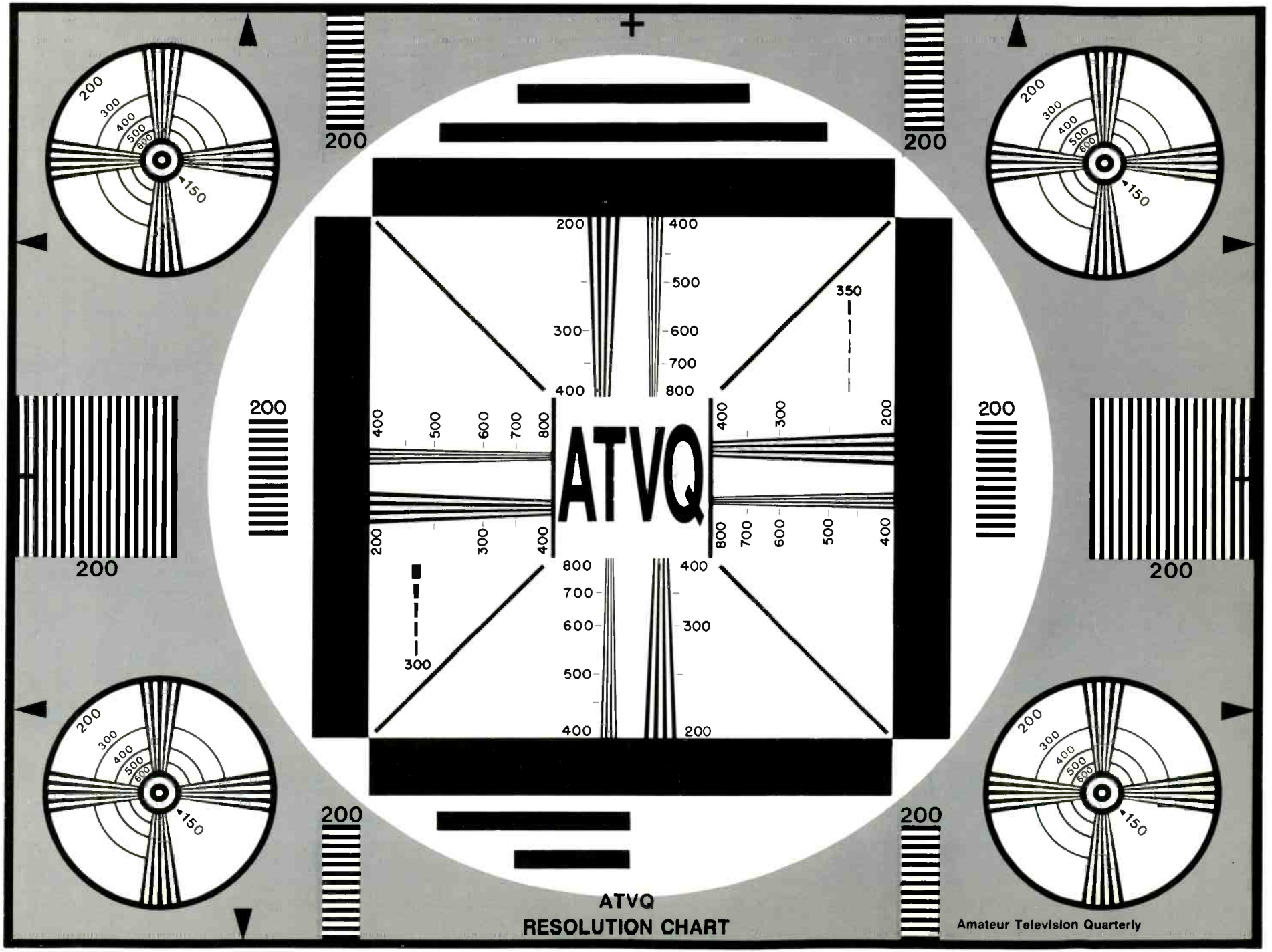
Amateur Television Quarterly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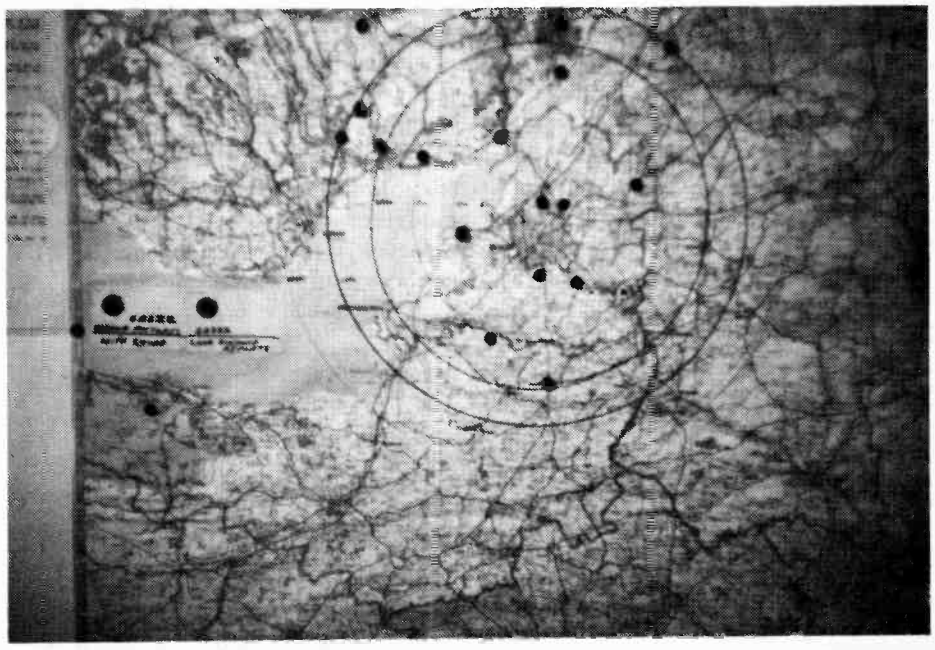
ATVQ
RESOLUTION CHART
Amateur Television Quarterly

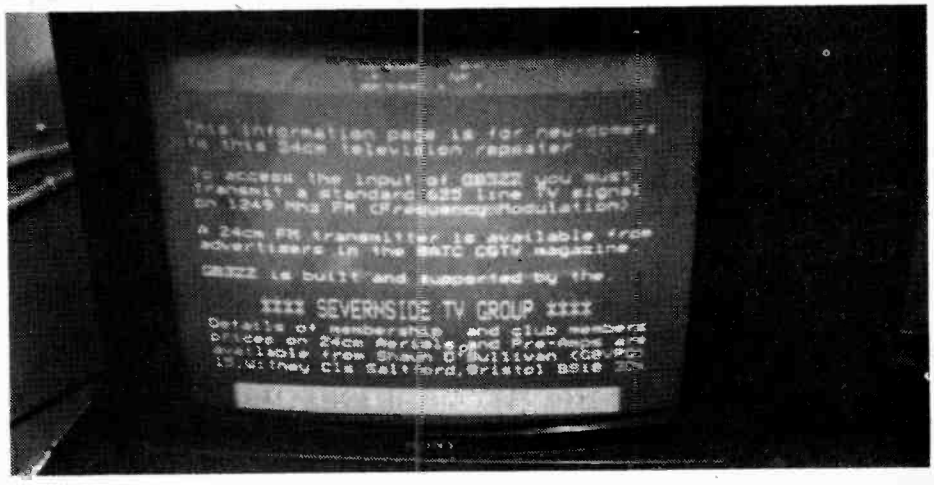
GB3ZZ ATV REPEATER ADVANCED CONTROL SYSTEM

by Brian GW6BWX/9

630 Pennsylvania Dr. # 5
Palatine, IL 60074

The January 1990 issue of ATVQ carried an article describing the operation of the TELETRON computer and its use in the GB3ET ATV repeater. In this issue I tell the story of a group of dedicated ATVers and how they took a system similar to TELETRON and advanced it to be the most technically advanced repeater controller in the UK.





Roger G4ZQF and Shaun G8VPG originally had the idea of putting a repeater on the air in the city of Bristol to promote ATV activity in that area and system similar to TELETRON was put in operation. The special repeater license was granted and GB3ZZ went on the air on 23 cm shortly afterwards.

The hardware was upgraded many times and the coverage stretched far wider than the city of Bristol it was intended to serve. The TV group changed its name to the Severnside TV Group which more accurately described its capture area of Bristol and the River Severn estuary.

Several top grade technical people joined the repeater group as it grew larger and it became obvious that the repeater would need a massive upgrade to satisfy all their needs. Heads were put together-- and with the aid of a large quantity of beer-- plans to rebuild GB3-ZZ were made.

The Antenna system and feeders were replaced, one of Ken G4-BVK's pre-amps was installed on the receive antenna and the receiver was improved which greatly increased the receive range. The

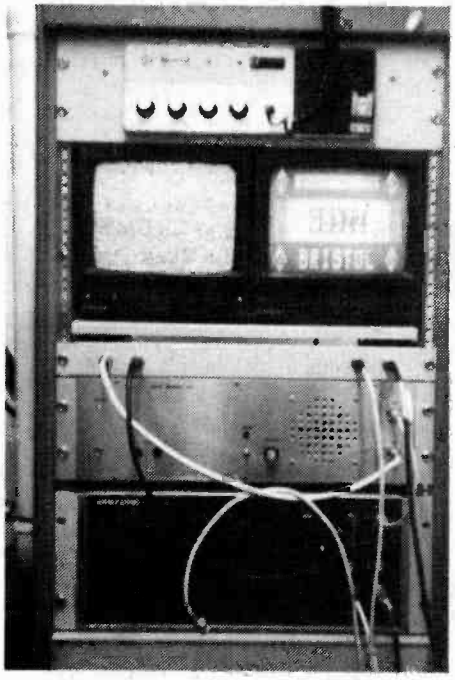
transmitter power was increased, new power supplies were fitted to cope with the extra demand and the control unit was redesigned around a computer rather than the original collection of timers and TTL chips.

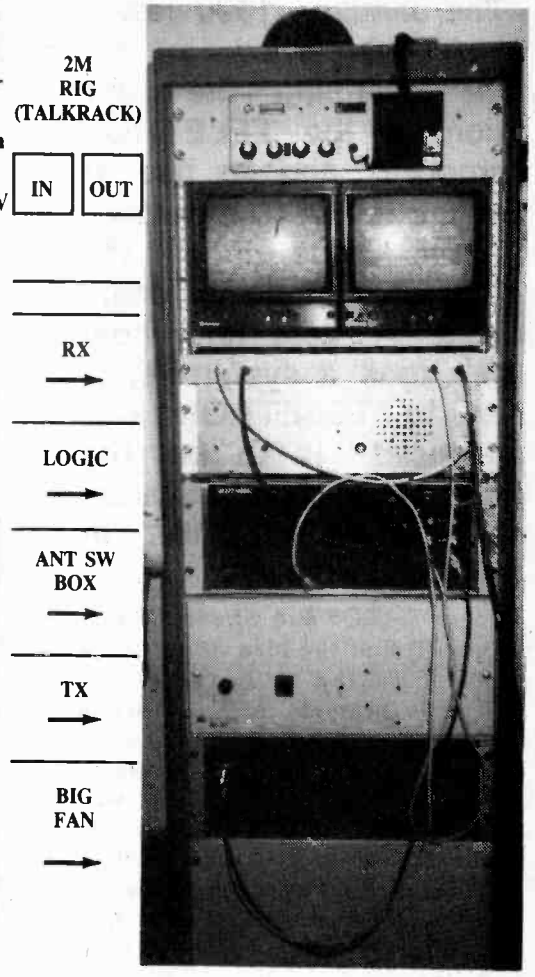
The computer system was being demonstrated to the group members at a meeting prior to being connected when the existing controller decided to die. Fortunately the meeting was being held in the same building that houses the repeater, quick action by Steve G8KUW who designed the computer interfaces had the computer hooked in and working with hardly any down time. At that time, all the computer did was emulate the original logic unit. It cycled through test cards until someone fired video at the repeater and switched the received video through to the transmitter. It had a few bugs in the software though, some conceptual and some from bad programming.

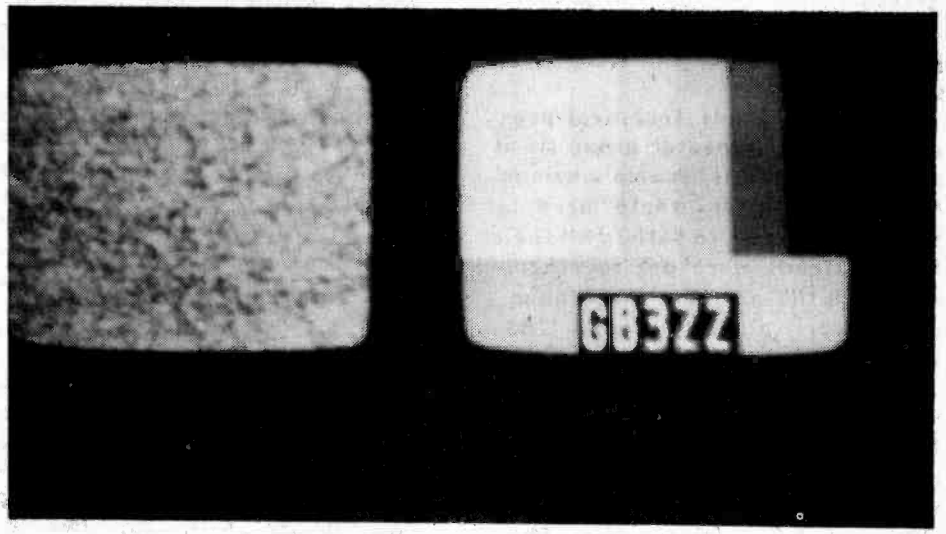
Most irritatingwas the beep generator, it was supposed to give a low pitch beep when first relaying video and a high pitched beep when switching back to the test cards after the user dropped carrier, that way anybody monitoring would be alerted to activity without getting square eyes by watching the screen all day. Due to an oversight on my part the beep didn't work quite right. It did beep when video commenced and finished but it was far too sensitive, any loss of video even for a few milliseconds triggered the beeper so every time someone switched cameras or played a VCR tape with scene changes in it, off went the beeper. The computer had a buffer which stored the beep commands and played them back one after another so with poor signal input or video changes the thing went wild, beep, beep, beep, beep for minutes in some cases (we called it "Jingle Bells syndrome"). Needless to say the software was hurriedly changed to make it ignore sudden sync losses and the beeps went away.

Technical details:

Input frequency: 1248.5 Mhz Output frequency: 1308 Mhz Output power: approx. 25 W Antennas: Alford slots with additional 5 element beams for receive. Equipment: modified Wood & Douglas modules / Solent TX with Mitsubishi PA modules. Test card generator: modified Cropredy design with colorizer (4 cards sequenced.) Caption/window generator: G8KUW design using PLL sync regen.







The computer is a BBC model B which is very popular in Britain and available cheaply on the second hand market, it advantage over most other types is that it has full color, analog to digital converters and expansion ports built in rather than as optional extras, this makes for a very compact and versatile single board system. For some reason the U.S. version didn't sell well and was withdrawn from sale, incidentally it was a U.S. NTSC version of the computer that went into GB3ZZ but it was converted to 625 line PAL before use.

Feedback from club members was noted and plans to make more changes were made. Several users had the problem of not being able to pass color through the repeater although their transmissions were perfectly OK when sent simplex to another ATVer. This effect was traced to a reflection from nearby buildings which caused their color subcarrier to get canceled out. The receiver used an omnidirectional antenna which picked up the reflection just as well as the intended signal. Experiments with directional antennas proved that removing the reflection brought the color back and gave a cleaner picture too. The problem with directional antennas is, they only pick up what they are pointing at so some method of selecting direction was needed. The possibility of using a rotator was considered but that meant the user had to have some way to tell it which way to point and that ruled out mobile operation and besides the delay while it turned to another user could cause problems.

The solution was to use several antennas pointing in different directions and to use the main omnidirectional antenna as well. The user decides which antenna to use and tells the computer to select it. When their carrier drops the omni antenna is automatically selected to give immediate all round coverage again. The transmit antenna remains omnidirectional at all times to give signals to all users simultaneously.

The need to select antennas posed an interesting question, how does a user tell the computer to do the switching? It was decided to use DTMF tones (Touch-tones) on the audio channel to do the signaling. DTMF ICs are cheap and small telephone style keypads are easy to get hold of so the decision was made not only to use DTMFbut to supply tone generator kits to club members. Keypads have 0-9,* and # keys, software was written to decode two digit sequences starting with * and ending with #, that meant *00# through *99# could be keyed. With only seven possible antenna selections (omni + 6 beams) there were 93 combinations left unused.

More software got written and those spare codes got put in to use. Two EPROMS in the computer hold general information about the repeater and the Severnside TV Group. Keying the appropriate numbers calls the information to the transmitter as pages of text. There are 25 pages at the moment plus 4 pages which are stored in RAM so that they can be updated remotely. By keying the correct sequence of digits (kept secret) the repeater goes into update mode, all through sound is muted and the picture is replaced with a "please wait" message. The RAM pages are then filled from a remote location using another computer before normal operation is resumed. These pages are typically used to display news items which need frequent replacement.

Other DTMF codes can call up a window in the top corner of the picture to display signal strength at the repeater, very useful for those who have difficultyin seeing their own picture quality because their transmitter is desensing their receiver (input and output frequencies are both in the 23cm band). The same window pops up periodically while passing through video to provide repeater ID. One of the DTMF codes switches the video and sound sources to front panel sockets on the repeater itself. This has been useful to see any activity at the repeater site itself.

Because the repeater is built inside the roof of a sports center, reaching it can be awkward. With a camera and microphone plugged in the front panel a check can be made over the air to ensure nobody has fallen through the trap door or met with equal demise. One of the next features to be added will be to remotely switch the room lights and a camera on for security checking.

The next release of software will offer digital frame storage so that a picture can be captured and displayed later. Particularlygood if you need to compare picture quality before and after making a mod to the transmitter or even if you can't TX and RX at the same time and need to see what kind of picture you sent out.

Two other repeater groups have contacted the Severnside Group for help in upgrading their equipment. Both these groups are potentially in range of TV broadcast from GB3ZZ which opens up the possibility of linking repeaters together.

Another use for DTMF codes? At the moment the U.K. authorities do not allow repeater linking (except packet data repeaters) so some pleading to the powers that be would be needed. It also poses a problem of how to route video through a network and identifying the originator who could be several nodes away.

I am currently working on software to provide a nationwide bulletin board system for ATVers to phone in to with their computers and modems. This will allow the interchange of ideas, messages and software between ATVersanywhere so long as they have a phone line. If the authorities will grant permission I hope to link GB3ZZs news pages to the BBS to allow the news to be automatically put on screen.

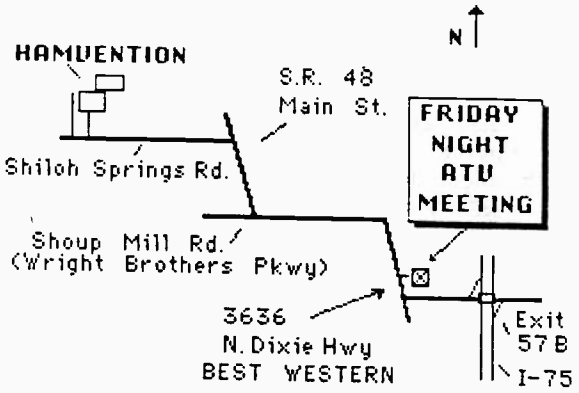
An IBM PC version of the software is planned. This would allow the same or similar features to be built into an NTSC standard repeater. If anybody is interested in the system I would be pleased to hear from them. I can be contacted on Compuserve (71141,2757), Telecom Gold (MIK406) or Prestel (919993579).

SOME FOLKS READ THE NATIONAL ENQUIRER SMART PEOPLE READ ATVQ!

DAYTON ATV ACTIVITIES

HERE IS A MAP TO THE FREE ATVQ FRIDAY NIGHT ATV PARTY & HOME BREW CONTEST. THE FRIDAY NIGHT SSTV MEETINGS ARE AT THE HOLIDAY INN DIRECTLY EAST OF THE ATVQ PARTY, ABOUT 200 YARDS. THE TRAVELODGE IS NOW KNOWN AS THE BEST WESTERN.

SPEAKERS INCLUDE: DR. CHANDLER OF AEA, TOM,. O'HARA OF PC ELECTRONICS, HENRY RUH, BILL BROWN EDITOR OF 73 MAGAZINE. ANDY EMMERSON G8PTH OF THE BATC AND SEVERAL OTHERS.



HERE IS A LIST OF DAYTON ATV EXHIBITORS BOOTHS TO HELP YOU FIND ATV GOODIES!

AEA.....	BOOTHS 256, 257, 258, 259
ATVQ.....	BOOTHS 338, 339
CQ MAGAZINE.....	BOOTHS 449, 450, 460, 461
DOWNEAST MICROWAVE.....	BOOTHS 340, 341, 342
HAM RADIO MAGAZINE.....	BOOTHS 68, 69, 70, 77, 78, 79
PC ELECTRONICS.....	BOOTH 355
PAULDON ASSOCIATES.....	BOOTH 319
SPECTRUM INTERNATIONAL.....	BOOTHS 66, 67
SCIENCE WORKSHOP.....	BOOTH 323
WYMAN ASSOCIATES.....	BOOTH 234

CONTACTING ATVQ:

TELCO: 708 298 2269 (LIVE BETWEEN 6-9 PM CST)

FAX: HENRY RUH 708 291 1944 (9-4 CST)

MCI E MAIL: ATVQ 1-800-825-1515

TELEX: 6504104395

FLOPPY DISK: ASCII FILE: 360 OR 720k

Part 97 Rules Changes

as Proposed by FCC In P.R. Docket 90-55

The FCC released its NPRM on February 16th. After 31 paragraphs of discussion as to why the Commission is, for the third time, proposing to create a class of amateur radio license requiring no knowledge of the Morse Code, the document lists the following language:

Section 97.9 is revised to read as follows:

97.9 Operator license.

(a) The classes of operator licenses are Communicator, General, Advanced, and Amateur Extra. There are also two grandfathered classes of operator licenses, Novice and Technician. An operator license authorizes the holder to be the control operator of a station with the privileges of the operator class specified on the license. The license document or a photocopy thereof must be in the personal possession of the licensee at all times when the person is the control operator of a station.

(b) A person holding a Communicator Class operator license and who holds a CSCE indicating that the person passed element 1(A), 1(B), or 1(C) is authorized to exercise the rights and privileges of the Technician Class for the duration of the license term and renewal thereof.

(c) A person holding a Novice, Technician, Communicator, General, or Advanced Class operator License who has properly filed with the FCC an application for a higher operator class that has not yet been acted upon, and who holds a CSCE indicating that the person passed the necessary examinations within the previous 365 days is authorized to exercise the rights and privileges of the higher operator class.

Section 97.17(a) is revised to read as follows:

97.17 Application for new license.

(a) Any qualified person is eligible to apply for an amateur service license. No new Novice or Technician Class operator licenses will be issued.

Section 97.119(e) is revised to read as follows:

97.119 Station identification.

(e) When the control operator is using privileges on the basis of holding a CSCE, an indicator must be included after the call sign as follows:

(1) AC for Communicator Class operator;

(2) AG for General Class operator;

(3) AA for Advanced Class operator; or

(4) AE for Amateur Extra Class operator.

Section 97.301(a) is revised and a new paragraph (g) is added to read as follows:

97.301 Authorized frequency bands.

(a) For a station having a control operator holding a Technician, Communicator, General, Advanced or Amateur Extra Class operator license: (please turn to page 7)

Courtesy Westlink Report, 28221 Stanley Court
Canyon Country, CA 91351 (805) 251-5558

Section 97.501 is revised to read as follows:

97.501 Qualifying for an amateur operator license.

An applicant must successfully pass an examination for the issuance of a new amateur operator license and for each change in operator class. Each applicant for the class of operator license specified below must pass, or otherwise receive examination credit for, the following examination elements.

(a) Amateur Extra Class operator: Element 1(C), and elements 3(A), 3(B), 4(A), and 4(B);

(b) Advanced Class operator: Element 1(B) or 1(C), and elements 3(A), 3(B), and 4(A);

(c) General Class operator: Element 1(B) or 1(C), and elements 3(A), and 3(B);

(d) Communicator Class operator: Element 3(A).

Paragraphs (b) and (c) of Section 97.503 are revised to read as follows:

97.503 Element standards.

(b) A written examination must be such as to prove that the examinee possesses the operational and technical qualifications required to perform properly the duties of an amateur service licensee. Each written examination must be comprised of a question set as follows:

(1) Element 3(A): 60 questions concerning the privileges of a Communicator Class operator license. The minimum passing score is 45 questions answered correctly.

(2) Element 3(B): 25 questions concerning the additional privileges of a General Class operator license. The minimum passing score is 19 questions answered correctly.

(3) Element 4(A): 50 questions concerning the additional privileges of an Advanced Class operator license. The minimum passing score is 37 questions answered correctly.

(4) Element 4(B): 40 questions concerning the additional privileges of an Amateur Extra Class operator license. The minimum passing score is 30 questions answered correctly.

(c) The topics and number of questions required in each question set are listed below for the appropriate examination element:

Topics	Element: 3 (A)	3 (B)	4 (A)	4 (B)
(1) FCC rules for the amateur radio services	15	4	6	8
(2) Amateur station operating procedures	7	3	1	4
(3) Radio wave propagation characteristics of amateur service frequency bands	4	3	2	2
(4) Amateur radio practices	11	5	4	4
(5) Electrical principles as applied to amateur station equipment	6	2	10	6
(6) Amateur station equipment circuit components	4	1	6	4
(7) Practical circuits employed in amateur station equipment	3	1	10	4
(8) Signals and emissions transmitted by amateur stations	4	2	6	4
(9) Amateur station antennas and feed lines	6	4	5	4

Section 97.505(a) is revised to read as follows:

97.505 Element credit.

(a) The administering VEs must give credit as specified below to an examinee holding any of the following documents:

(1) An unexpired (or within the renewal grace period) FCC-issued Novice Class operator license: Element 1(A) and the 30 written questions in Element 3(A) based upon the material from the written examination passed for the Novice Class operator license.

(2) An unexpired (or within the renewal grace period) FCC-issued Communicator Class operator license: Element 3(A).

(3) An unexpired (or within the renewal grace period) FCC-issued Technician Class operator license: Element 3(A).

(4) An unexpired (or within the renewal grace period) FCC-issued Technician Class operator license issued before March 21, 1987: Elements 3(A) and 3(B).

(5) An unexpired (or within the renewal grace period) FCC-issued General Class operator license: Elements 1(B), 3(A), and 3(B).

(6) An unexpired (or within the renewal grace period) FCC-issued Advanced Class operator license: Elements 3(A), 3(B), and 4(A).

(7) A CSCE: Each element the CSCE indicates the examinee passed within the previous 365 days.

(8) An unexpired (or expired less than 5 years) FCC-issued commercial radiotelegraph operator license or permit: Element 1(C).

Section 97.507 is revised to read as follows:

97.507 Preparing an examination.

(a) Each telegraphy message and each written question set administered to an examinee must be prepared by a VE holding an FCC-issued Amateur Extra Class operator license. A telegraphy message or written question

set, however, may also be prepared for the following elements by a VE holding an FCC-issued operator license of the Class indicated:

(1) Element 3(B): Advanced Class operator.

(2) Elements 1(A) and 3(A): Advanced or General Class operator.

(b) Each question set administered to an examinee must utilize questions taken from the applicable question pool.

(c) Each telegraphy message and each written question set administered to an examinee for a Communicator, General, Advanced or Amateur Extra Class operator license must be prepared, or obtained from a supplier, by the administering VEs according to instructions from the coordinating VEC.

(d) A telegraphy examination must consist of a message sent in the international Morse code at no less than the prescribed speed for a minimum of 5 minutes. The message must contain each required telegraphy character at least once. No message known to the examinee may be administered in a telegraphy examination. Each 5 letters of the alphabet must be counted as 1 word. Each numeral, punctuation mark and prosign must be counted as 2 letters of the alphabet.

In Section 97.511, the heading and the text are revised to read as follows:

97.511 Operator license examination.

(a) Each session where an examination is administered must be coordinated by a VEC. Each administering VE must be accredited by the coordinating VEC.

(b) Each examination for a Communicator Class operator license must be administered by 3 administering VEs, each of whom must hold an FCC-issued Amateur Extra or Advanced Class operator license.

(c) Each examination for a General, Advanced or Amateur Extra Class operator license must be administered by 3 administering VEs, each of whom must hold an FCC-issued Amateur Extra Class operator license.

(d) The administering VEs must make a public announcement before administering an examination. The number of candidates at any examination may be limited.

(e) The administering VEs must issue a CSCE to an examinee who scores a passing grade on an examination element.

(f) Within 10 days of the administration of a successful examination, the administering VEs must submit the application to the coordinating VEC.

Section 97.513 is removed.

In Section 97.519, new paragraph (d) is added to read as follows:

97.519 Coordinating examination sessions.

(d) Each coordinating VEC must compile lists of Communicator Class operator licensees who have been issued a CSCE for Element 1(A), 1(B), or 1(C) during each calendar month. The VEC must forward a copy of the list to the Private Radio Bureau, FCC, Washington. DC 20554, by the 10th day following the end of the month.

Section 97.527 is amended by revising paragraph (a), removing paragraph (c) and redesignating paragraphs (d) (e) (f) and (g) as (c) (d) (e) and (f) to read as follows:

97.527 Reimbursement for expenses.

(a) VEs and VECs may be reimbursed by examinees for out-of-pocket expenses incurred in preparing, processing, administering, or coordinating an examination.

Following the language just printed, 69 footnotes help explain the 31 paragraphs of discussion and procedure cited earlier. In the interest of saving space, we have not printed the rest of the document. However, because this matter is so important to so many hams, *Westlink Report* is making the entire docket available to anyone, subscriber or not, for $2 plus an SASE (#10 or manila) with 85 cents (or more) postage affixed. Please send your request to Docket 90-55, Westlink Report, 28221 Stanley Ct., Canyon Country, CA 91351.

We are also waiving our copyright, in this issue only, of pages 6-10. You are encouraged to photocopy these pages and give them the widest possible circulation, including reprinting them in your club newsletters, etc. Remember, you have until August 6, 1990, to file your comments on this proposal, a proposal that will have a profound impact on the very character of our hobby/service. (September 7, 1990, will be the last day in which to file reply comments.)

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1.27 GHz. FM ATV RECEIVER
Bill Parker W8DMR

Satellite TV receiver components provide versatile building blocks for FM ATV receivers as shown in the block diagram.

The front end consists of a P.C. Electronics TVC-12GA, which includes a Gasfet preamp, mixer, and varactor tuned local oscillator. The downconverter is mounted at the antenna. The output IF frequency is 175 MHz. (Ch. 7). A single coax cable (RG-6) is the output feedline and supplies the DC power and the tuning voltage to operate the downconverter. (See Editor's Note).

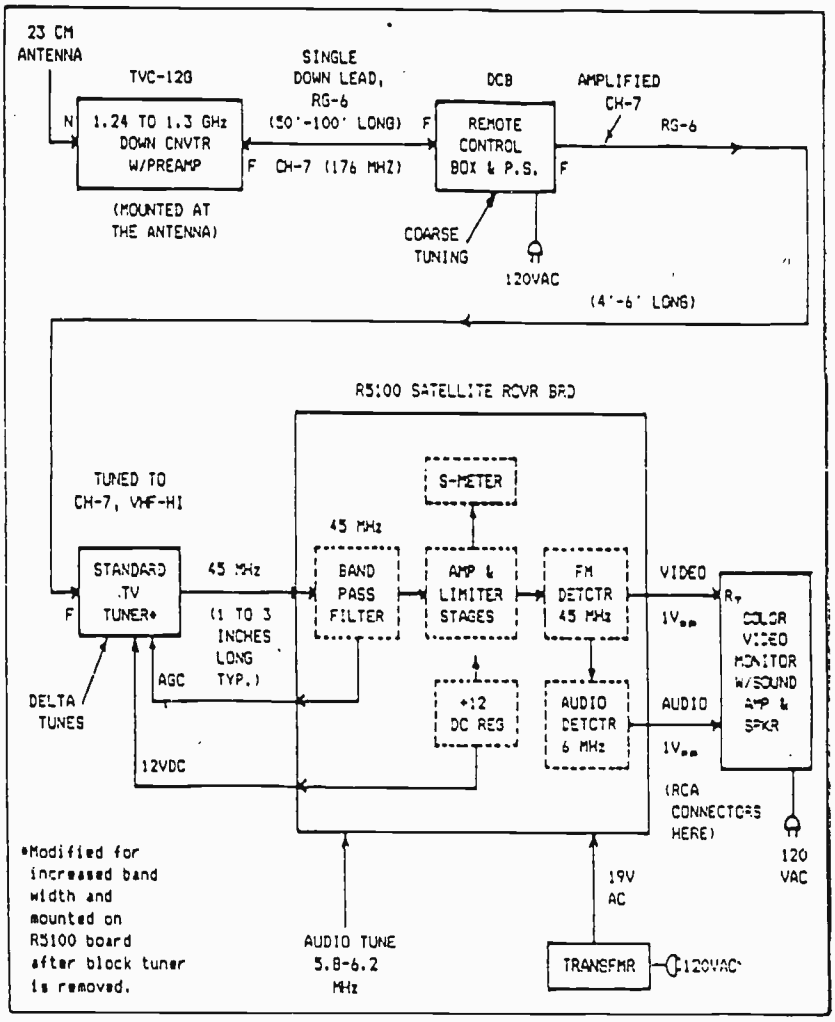
The downconverter control box (DCB) with a post IF amplifier is located in the ham shack. The DCB contains the tuning pot, bipolar IF amplifier, and power supply.

The Ramsey R5100 satellite receiver circuit board provides the video and audio FM discriminator circuitry. The tuner on the circuit board is a block tuner covering 450-900 MHz. It is replaced with a standard TV tuner to convert 175 MHz. to 45 MHz. The fine frequency tuning control on the standard tuner provides a vernier and easy tuning adjustment and is superior to the coarse tuning pot on the DCB unit.

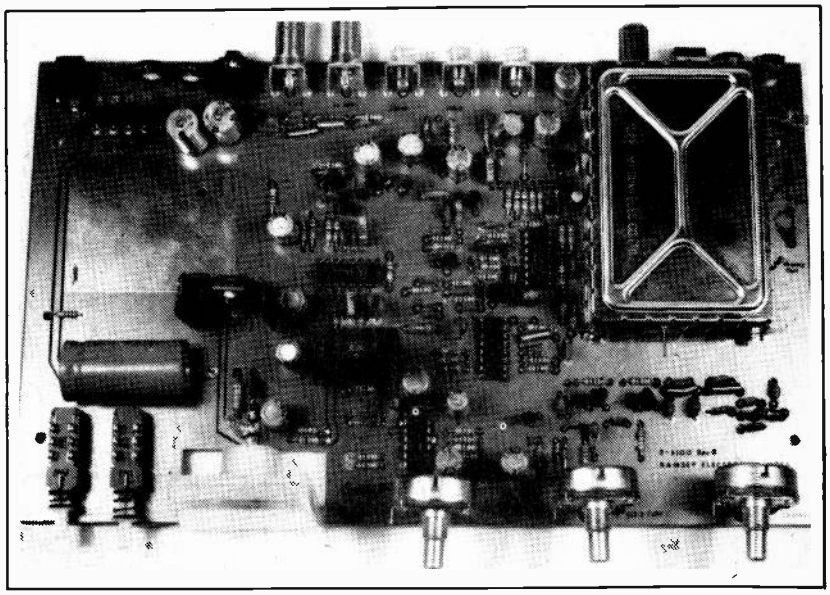
A color TV monitor provides superior video pictures compared to using a TV receiver. If a TV monitor is not available, an RF modulator may be used to provide output on Ch. 3 or 4. The R5100 has a place to locate the RF modulator.

FM 6.0 MHz. sound subcarrier is tuned with the pot provided on the R5100 circuit board. RCA connectors are provided for the audio and video outputs.

Additional circuit refinements such as broad banding the Ch-7 TV tuner (from 6 MHz. up to 12 MHz.) and narrowing the 45 MHz. input filter (from 30 MHz. down to 16 MHz.) will improve the receiver performance. Some other improvements may also be desirable.



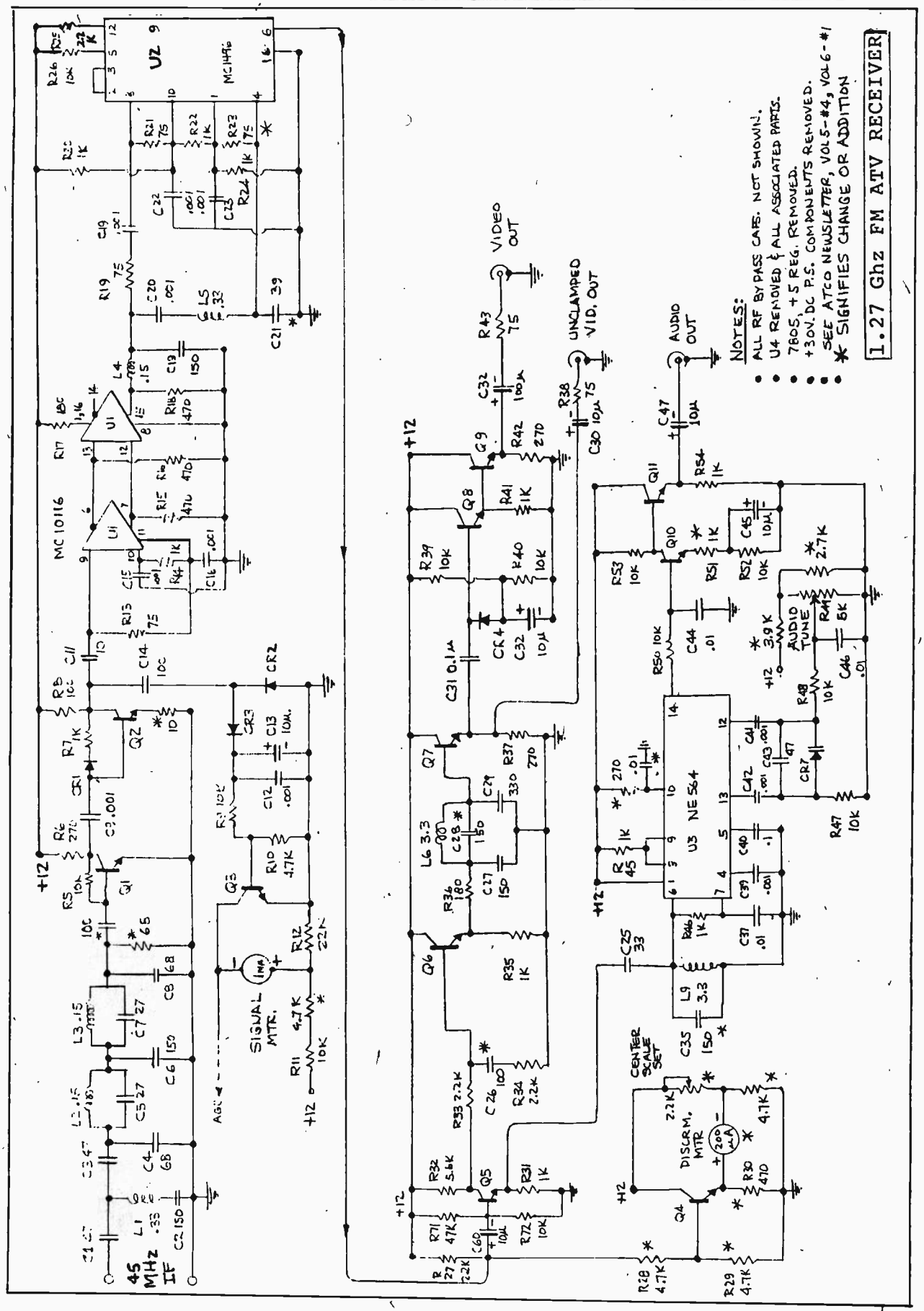
1.27 GHz. FM ATV RECEIVER



The Ramsey R5100 receiver circuit board

1.27 GHz. FM ATV RECEIVER

Bill Parker W8DMR



1.27 GHz. FM ATV RECEIVER

Bill Parker W8DMR

MODIFICATIONS:

The following are changes and modifications incorporated by W8DMR. The changes are marked with an asterisk on the schematic diagram.

1. Meter sensitivity - 4.7 K (or whatever it takes to keep from pegging meter) added in series with the 10 K resistor (R11) located near the meter.

2. Audio tuning vernier - A voltage divider to lower the 12 V was added. From 12 V to ground connect a 3.9 K and a 2.7 K in series. Connect the resistor junction to the top of the pot (R49). Cut the foil to remove the 12 V connection.

3. Subcarrier audio filter - The 7.2 MHz. filteris changed to 6.0 MHz. by adding a 100 pf capacitor in parallel with the 150 pf capacitor (C28).

4. Variable de-emphasis - The 100 pf (C26) is removed. Use a 7-60 pf variable capacitor with a 33 pf in parallel instead.

5. Quadrature Adjust - The 39 pf capacitor (C21) is removed and replaced with a 7-60 pf variable capacitor. (RS-272-1340)

6. Filter termination 45 MHz. - A 100 pf capacitor must be added in series between the filteroutput and the transistor. Parallel a 68 ohm resistor with the 68 pf capacitor (C8).

7. IF stability - A 10 ohm resistor is placed in series with the emitter lead of the second transistor after the filter.

8. VHF tuner bandpass - The normal 6 MHz. bandwidth should be increased to 12 to 18 MHz. Place a 10K resistor in parallel with the slug-adjustable output IF coil. The antenna and mixer coils (Ch-7 or Ch-8) are adjusted for broad banding.

9. Audio boost - Place a 270 ohm resistor in series with 10 uF from the emitter to ground of the audio transistor after the NE564 IC.

10. Center tune meter - Connect from Pin 6 of the MC-1496 IC thru a 10 K to the base of a NPN transistor; collector to +12 V. Emitter to ground through a 10 K resistor. Connect a 100-200 uamp center scale meter from the emitter to a voltage divider consisting of a 4.7 K and a 2 K pot. Connect the negative meter lead to the arm of the pot. Adjust pot for center scale reading. With a tuned video signal, set the quadrature capacitor for a center scale reading., The AFC amp, Q4 was used for this purpose.

11. Power supply -

Add a 10 Ohm, 2 watt wirewound resistor in series with the 19 Vac supply. If a 220 ohm resistor is connected from +12 V to Pin 10 of the NE564 IC, the +5 volt regulator is not needed and may be removed.

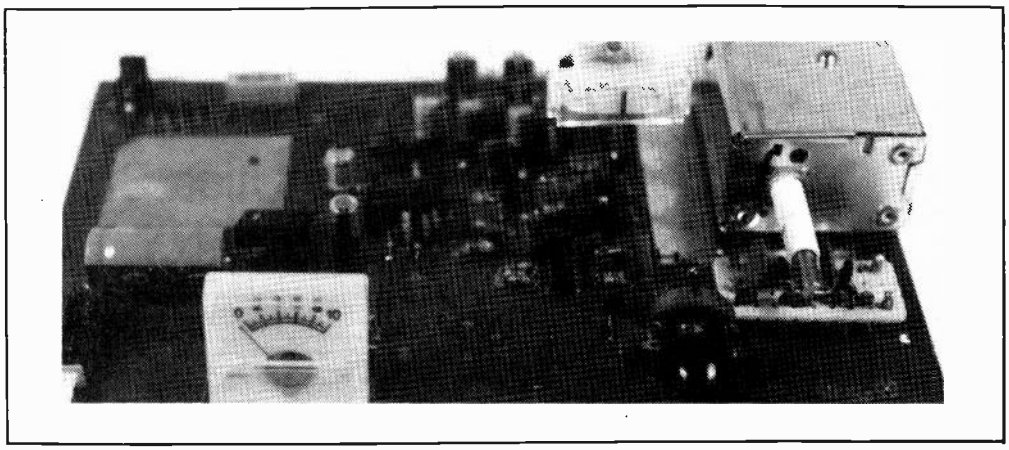
12. Subcarrier audio - The resonant circuit is lowered to 6.0 MHz. by placing a 6-60 pf variable capacitor in parallel with the 3.3 uH inductor (L9).

13. Video discriminator - The 75 ohm resistor (R23) connected between Pin 1 and Pin 4 of the MC1496 IC is changed to 220 ohms.

EDITOR'SNOTE: The P.C. Electronics TVC-12GAantenna mounted downconverter and DCB control box are no longer available. It has been replaced by the TVC-12G (in the shack) downconverter and the Downeast Microwave 23LNAWP weatherproof antenna mounted preamp. Belden 9913 is suggested between them.

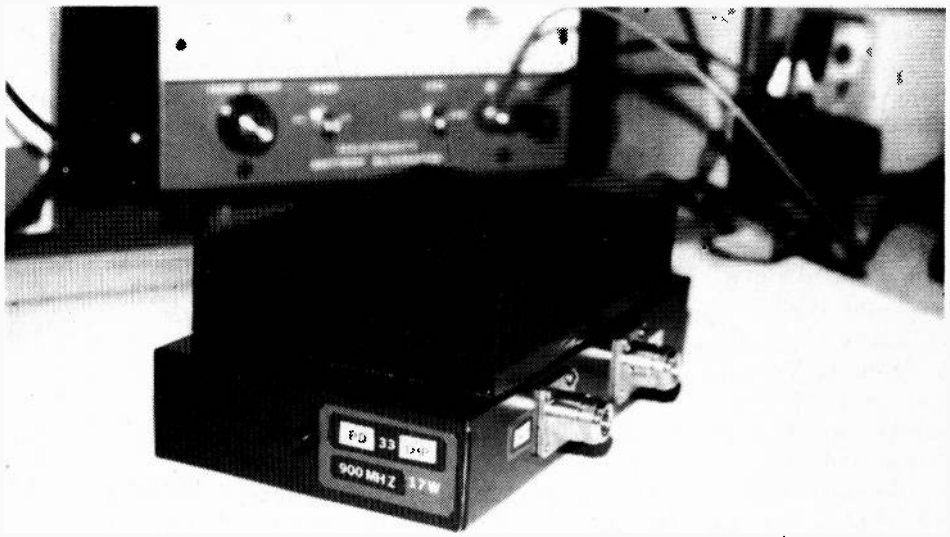
Ramsey no longer has the R5100 satellite RCVR board, however a limited quantity is available from Bill Brown -12536 TR 77 - Findlay, OH 45840 for $10 ppd. Also these boards sometimes turn up at hamfests (A quantity was seen in the flea market at Dayton last year.)

Other satellite boards may be used but may be on 70 MHz.



Completed unit after modifications

900 MHZ LINEAR POWER AMPS. 1w IN 17w OUT



The low power driver is a separate stage from the high power output stage. Each unit is encased inside a separate die cast box which is enclosed in a large 4-1/2" x 8" cabinet with a double heat sink. The linear has power binding posts, is fused, has an "ON" light, and is diode protected. Connectors supplied are "N", but other types are available. The units are spray painted black with an acrylac finish.

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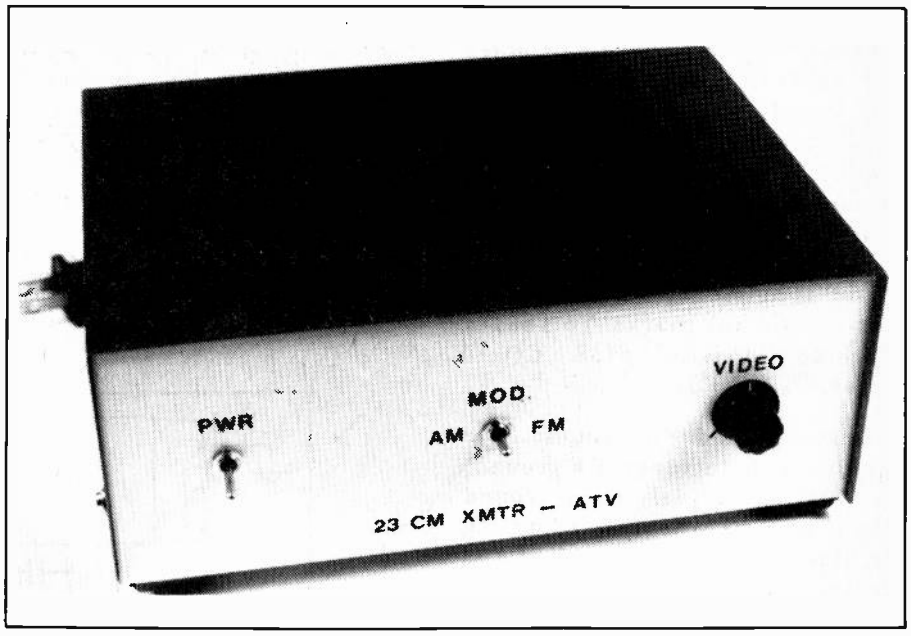
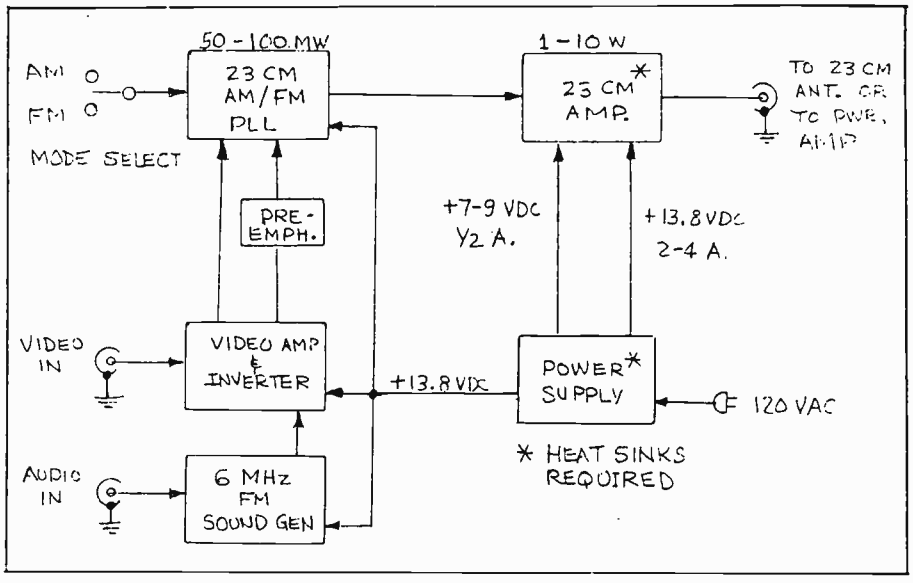
1270 MHz. AM/FM ATV TRANSMITTER (Part 2)

Bill Parker W8DMR - 2738 Floribunda - Columbus, OH 43209

Part one discussed a 23 CM PLL ATV exciter (Oct. 89 p.39). In part two we will describe how to add some real power to our system.





1270 MHz. AM/FM ATV TRANSMITTER BLOCK DIAGRAM

The 23 CM transmitter uses a P.C. Electronics TVG-12A free running oscillator with about 50 to 100 MW.. output power. It is capable of being AM or FM modulated. It sells for about $25. It is connected to drive a thick-film amplifier, often referred to as a brick. Typical output power is from 2 to about 6 watts maximum depending on supply voltage, circuit layout and other factors. Two of the amplifier part numbers are NEC-SC-1043 or M-57762. The SC-1043 is capable of being driven by 20 to 80 mW. of power. The M-57762 will accept a maximum of 2 W of drive. Typical brick cost is about $70.

The TVG-12A requires a video invertor stage for proper modulation polarity. The pre-emphasis network absolutely must have a 75 ohm source and termination to operate properly. The video amplifier must invert the signal polarity, have a gain of four, and provide a source impedance of 75 ohms. The TVG-12A should be modified by placing a 330 ohm resistor in parallel with each of the 100 ohm video gain controls. After the AM and FM gain pots are properly set, the video gain should then be adjusted only by the gain pot on the front panel which is part of the video gain and invertor amplifier including the emitter follower pre-emphasis driver. Please note that this circuit has been modified from the one which appeared elsewhere.

The FM video input to the TVG-12A should have a pre-emphasized video signal as an input signal. Pre-emphasis and de-emphasis networks with component values are shown below.

A de-emphasis network must be used in the FM TV receiver if the proper video response is to be obtained. This network does not need to be a 75 ohm network. Other impedance networks may be used, such as 500 ohms or 100K ohms. Circuit values will differ. The values shown are the nearest standard values available. It is important that the networks have the proper frequency characteristics. The boost nature of the pre-emphasis should match the roll-off nature of the de-emphasis.

The TVG-12A oscillator schematic is included to show where the two 330 ohm resistors connect. On the rear side of the PC board solder a 330 ohm resistor across each of the video gain pots.

SOME FOLKS READ GOSSIP AND FICTION SMART PEOPLE READ ATVQ!

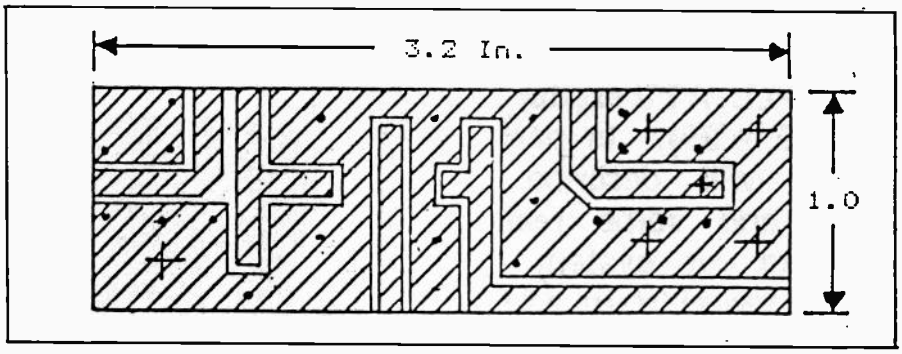
1.2 GHz. AM/FM ATV TRANSMITTER

Double sided foil is used to produce a PC board. Drill small holes to connect the front and rear foils together electrically. Short lengths of wire or small diameter rivets may be used. Solder each stake through on both sides of the board. Twenty or more will be adequate. The PC board shown accommodates a connector if holes are drilled as indicated by the (+) marks. This board appeared in issue #138 CQ-TV magazine (BATC).

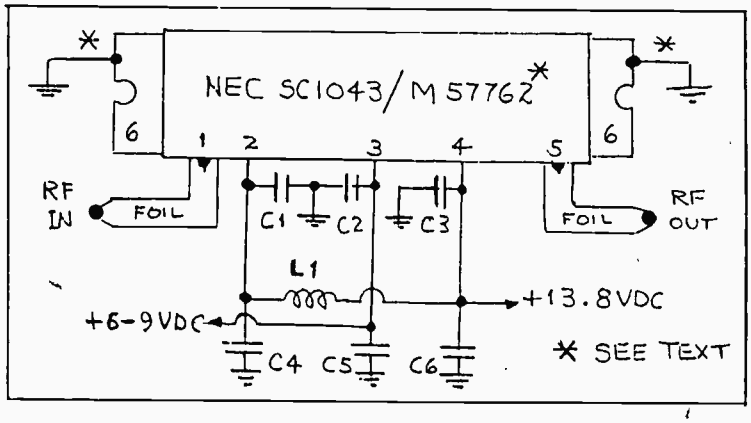
The case ground Pin 6, must be a quality low inductance RF ground! It is best to not rely on a ground established by the two mounting machine screws to the cabinet and the greased heat sink. Make two 5/16 inch wide copper grounding straps 1 3/4 inches long. Drill a hole to clear a 6-32 machine screw in one end. Put the strap over the amplifier case ground, one at each end of the amplifier. The other end of each strap must be soldered to the ground-plane foil of the PCB that contains all of the bypass capacitors. This ensures that proper RF grounding and decoupling can occur. The front and rear ground foils must be electrically connected at several places.

The schematic for the ceramic-substrate thick-film amplifier is representative of the brick technology. This schematic is for the M-57762. Bias diodes are used for zener voltages. Printed circuit screened silver foil is used for strip line impedances. Screened carbon resistors are also used. Ceramic chip capacitors are used profusely. RFC coils are created by the thin fold-back lines that can be seen connected to each base of the three transistors. Even though this is not truly monolithic circuitry, it does provide a minimum profile. The substrate is an excellent heat conductor.

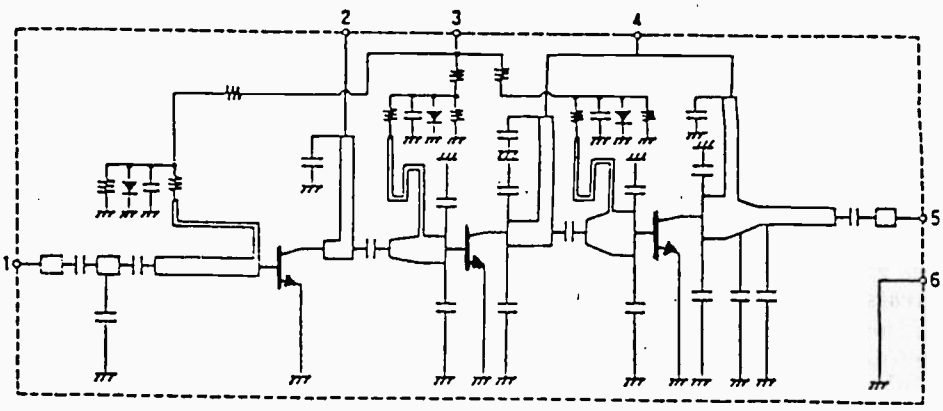
The connection between the oscillator and the amplifier should be a short length of strip conductor. Close examination of the photo shows the close proximity of the two units.



1270 MHz AMPLIFIER BOARD LAYOUT



1270 MHz BRICK AMPLIFIER SCHEMATIC

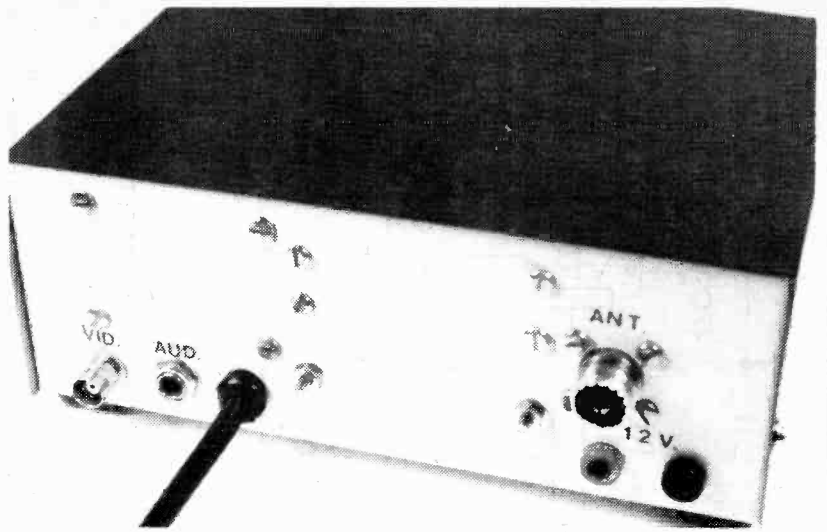


1270 MHz AMPLIFIER THICK-FILM SCHEMATIC

The M-57762 amplifier connect Pins 2 and 4 to +Vcc (13.8) VDC with Pin 3 to +Vbb (8 VDC). However, the SC-1043 amplifier uses Pins 3 and 4 to +Vcc (13.8 VDC) with Pin 2 to +Vbb (8 VDC). Let the user be aware! The SC-1040, however, uses the same pin-out as the M-57762 brick amplifier.

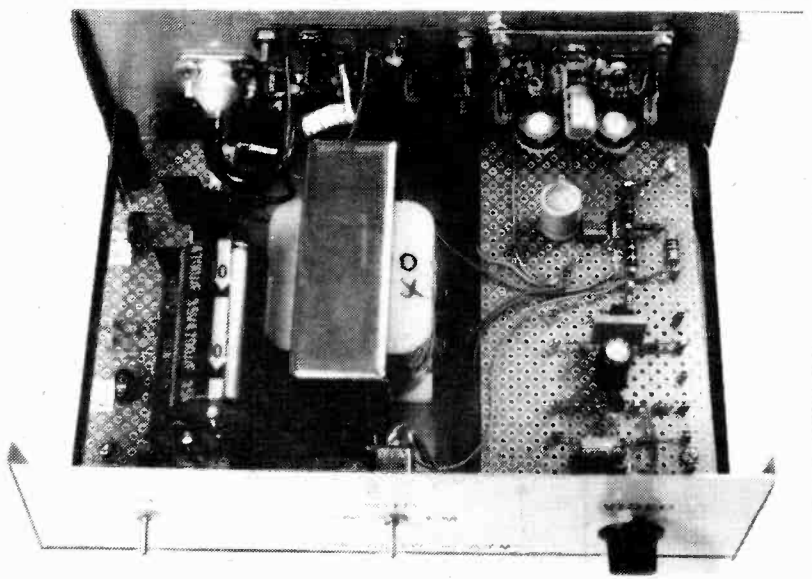
The power supply provides two regulated voltages for the 23 CM transmitter. The brick amplifier needs 13.8 Volts at about 3 to 4 Amperes and 7 to 9 Volts at about 0.5 Amps. Both IC regulators must have heat sinks. Separate voltage adjustments are provided. The power supply schematic is shown below.

EDITOR'S NOTE: The M57762 brick is available from RF Parts, 1320-16 Grand Ave., San Marcos, CA 92069 - (619) 744-0728 for $69.75 in their latest catalog.

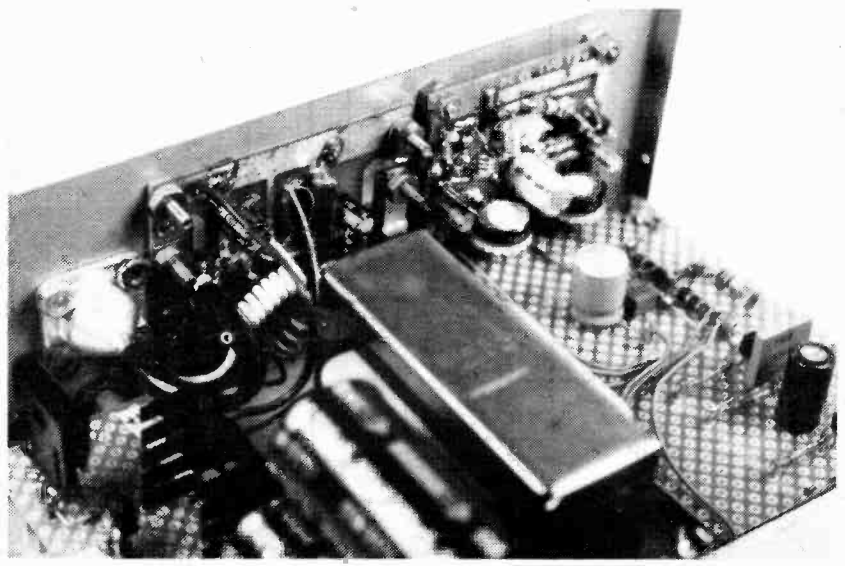


The audio, video, and RF output connectors are mounted on the rear of the cabinet. The photo was taken before the amplifier heat sink was added. Yes, the output connector is an SO-239!

The TVG-12A oscillator output connects to the input of the amplifier with a short copper connecting strap 3/8 In. long , 1/4 In. wide. Copper straps also ground the amplifier tabs.

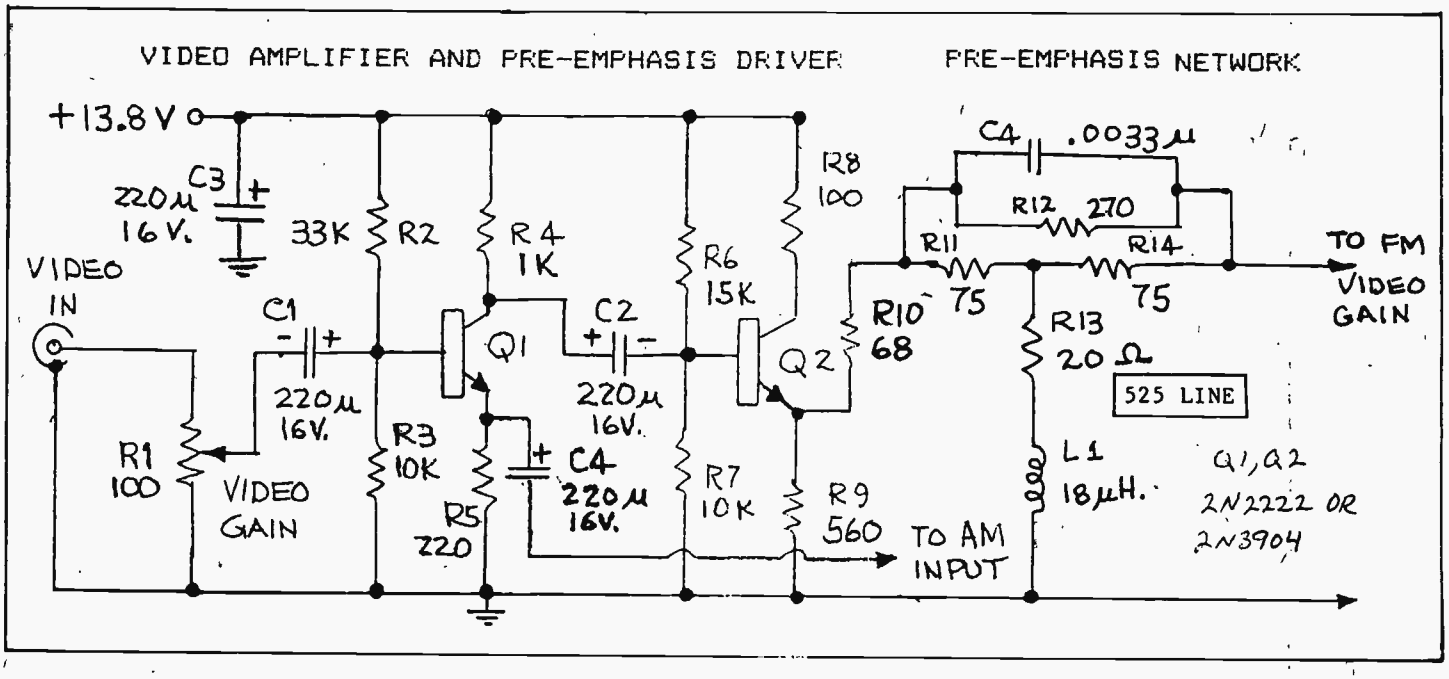


The power supply board is located to the left of the power transformer, the video amplifier and pre-emphasis network driver on the right. The pots are the AM & FM video gain controls.



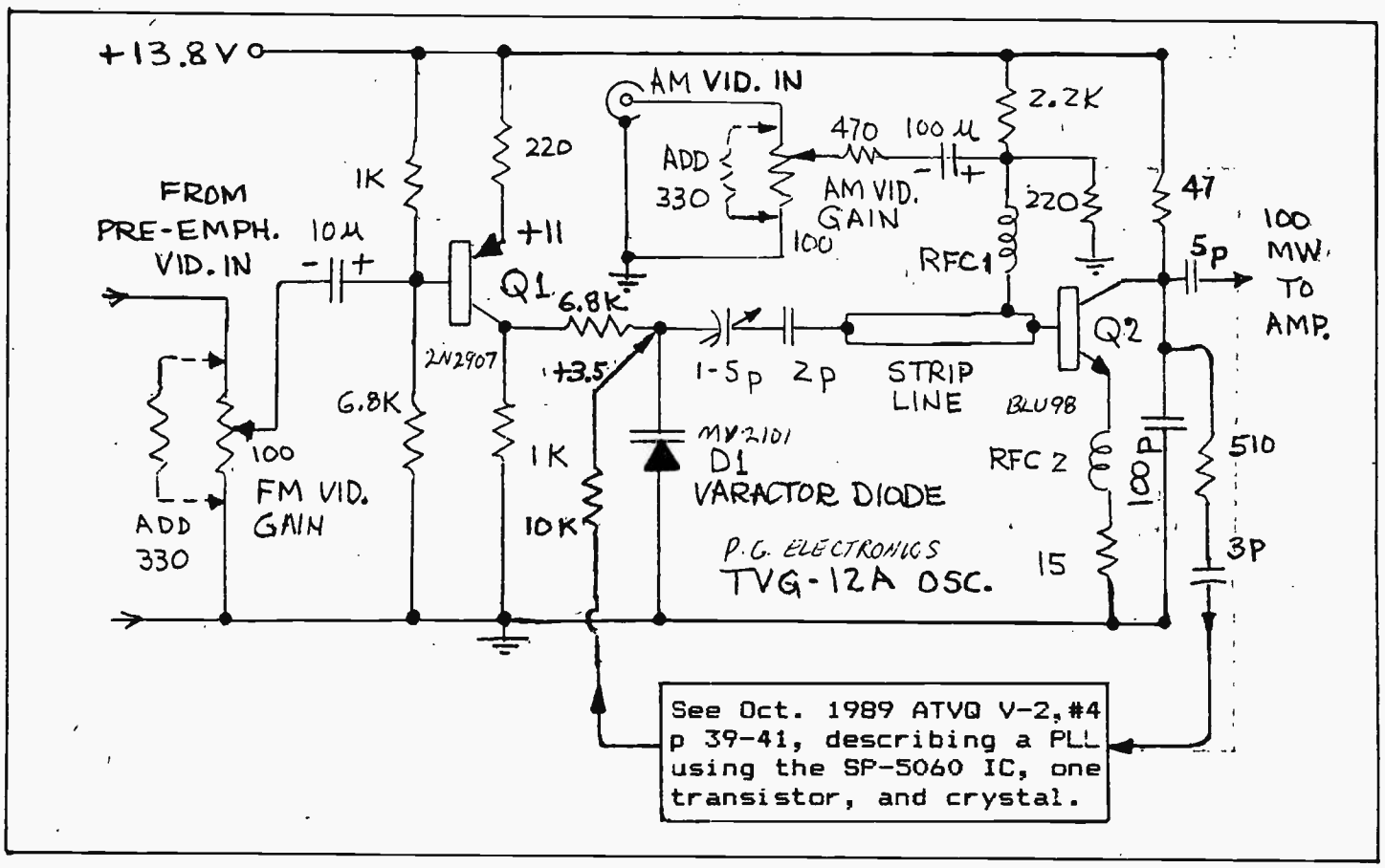
A UHF-type of output connector permits usage of a tapered shielded shroud. The short loop of coax connects to the amplifier output. The center mounted transformer balances weight.

1.2 GHz. AM / FM ATV TRANSMITTER

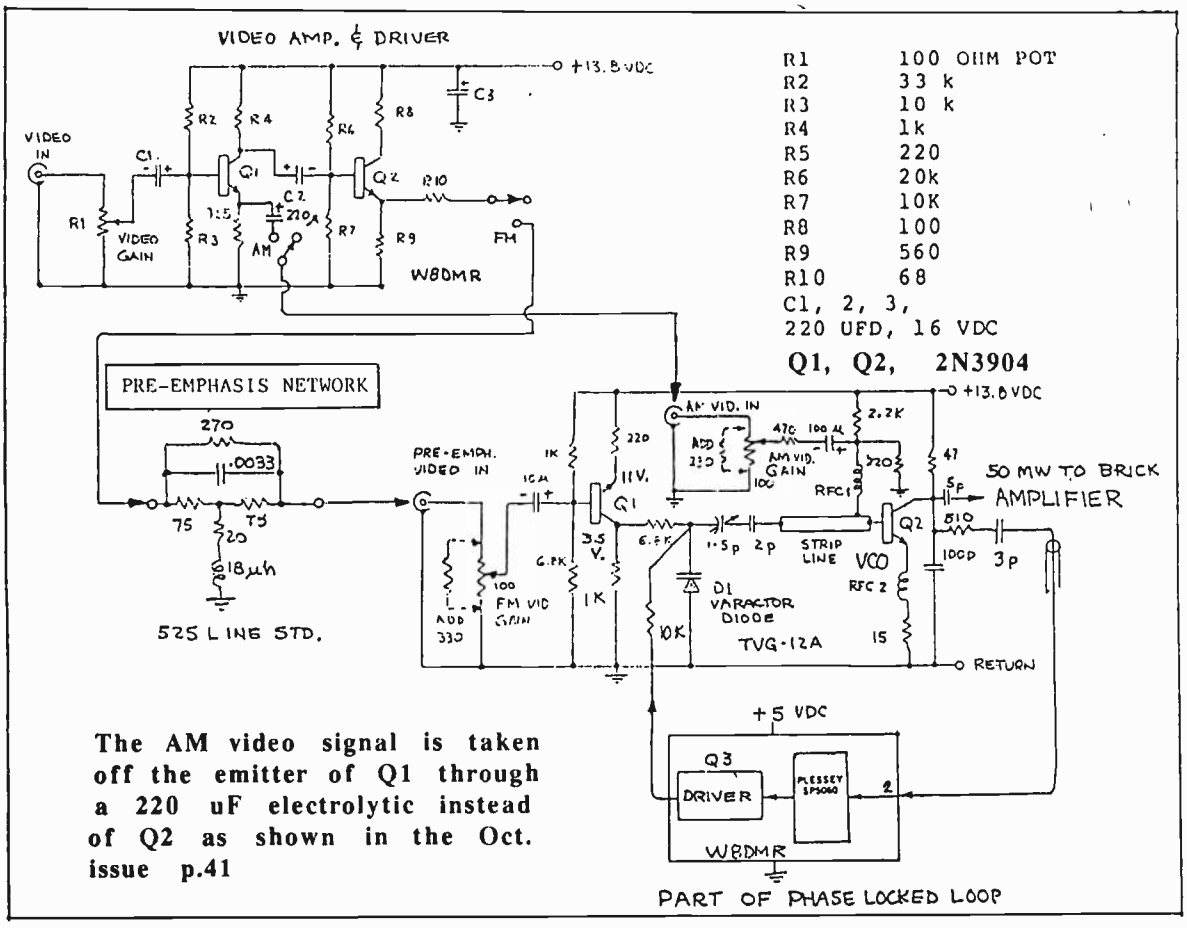


The FM video input to the TVG-12A should have a pre-emphasized video signal as an input signal.

The AM video is taken from the emitter of Q1 through a 220 uFD capacitor instead of Q2 as shown in Part 1.

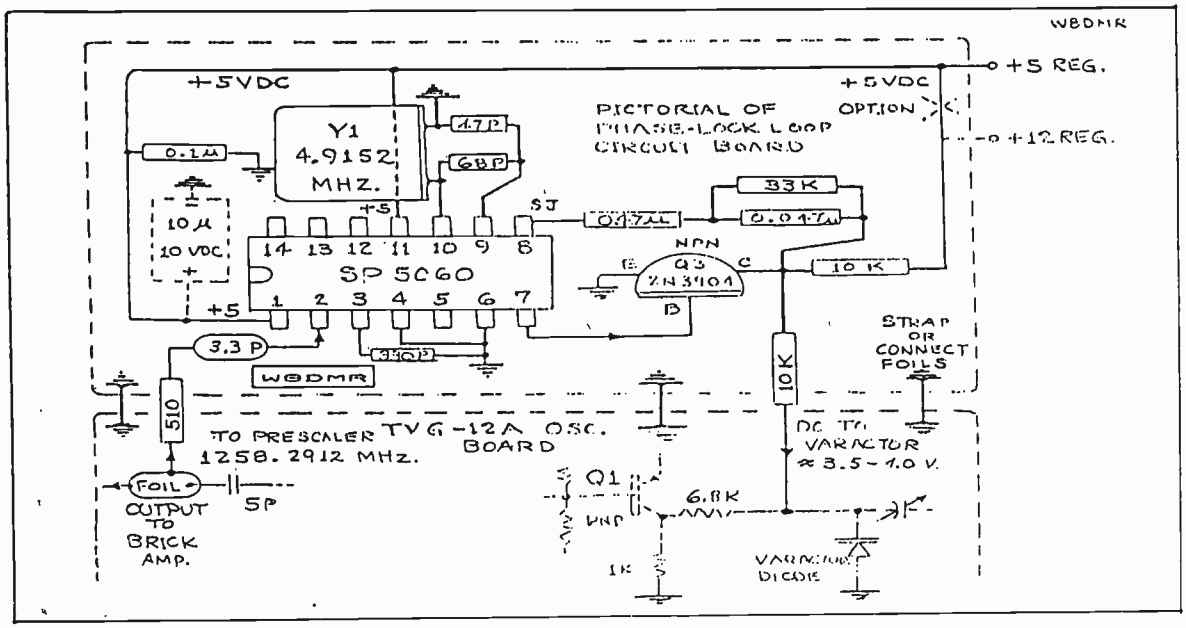


1.2 GHz. AM / FM ATV TRANSMITTER



The AM video signal is taken off the emitter of Q1 through a 220 uF electrolytic instead of Q2 as shown in the Oct. issue p.41

1270 MHz. AM/FM ATV TRANSMITTER SCHEMATIC



In the October, 1989 Issue of ATVQ, Volume 2 No. 4, a phase locked loop was described using the SP-5060 IC. and the TVG-12A. See pages 39-41.

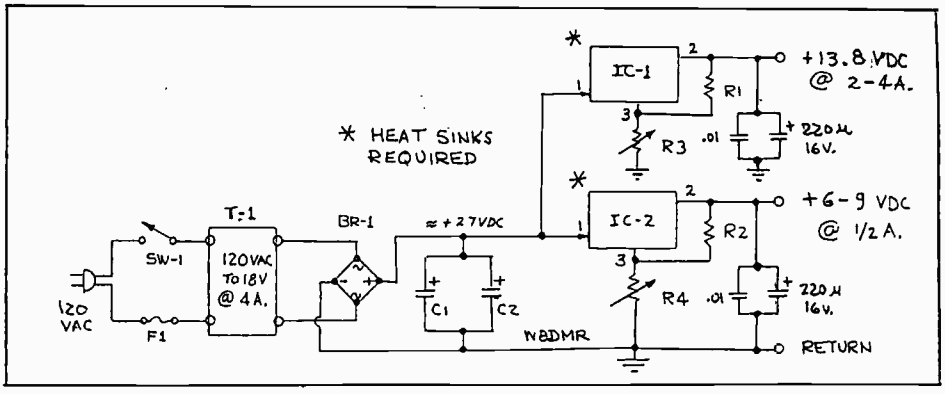
1.2 GHz. AM / FM ATV TRANSMITTER

23 CM Transmitter Power Supply Parts List

Item	Description	RS Part.No.
R1,R2	Resistor, 220 ohms 1/2W	271-0015
R3,R4	Resistor, 5K ohms POT.	271-1714
C1,C2	Capacitor, 4700 uF, 35V	272-1022
BR-1	Bridge, 4.0 Amp, 50 PIV	276-1146
IC-1	Adj. Reg. ECG-935, 5 Amps	Philips
IC-2	Adj. Reg. LM317T, 1.5 Amps	276-1778
T-1	Transformer, 18 VAC, 4 Amps	273-1514
SW-1	Switch, SPST, 3A, 125 VAC	275-0645
FH	Fuse Holder, 125 VAC	270-0364
F1	Fuse, 0.5 A. 125 VAC	270-1271
CD1	Cord, 18 Guage, 125 VAC	278-1255
HS	Heat Sink, for IC-2	276-1363

The power supply also provides voltage for the video amplifier, the pre-emphasis driver,

The case of the cabinet may be used as a heat sink for IC-1. For the best thermal coupling between the IC and the cabinet case, the paint should be removed where the IC will be mounted and heat sink grease added.



1.2 GHz AM/FM ATV TRANSMITTER POWER SUPPLY

Amplifier Parts List

Item	Description
C1,2,3	Capacitor, Chip, ceramic, 100pF. 50V
C4,5,6	Capacitor, Electrolytic, 220uF. 16V
L1	RF Choke, 6 turns, 3/16" diam. AWG #24
PCB	

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TECHNICAL NOTE

In the October issue of ATVQ (V2 #4) an article about a low cost 23 cm phase locked loop exciter has created some excitement. Several ATCO members have inquired requesting a source to purchase the SP-5060 (Plessey) IC. The fixed modulus frequency synthesizer may be purchased in quantities of 6 or more at a cost of $15.05 each. Dick W8RVH located the source, Pioneer Electronics, 1200 Troy St., Dayton, OH 45404. Delivery takes about 6 weeks ARO. W8RVH, WB8URI, WM8P, W8DMR and others have successfully duplicated the 23 cm PLL exciter using the PC TVG-12A and the SP-5060 IC. Total cost to construct the exciter is less than $48.25. The article on pages 39-41 and color photo on the front cover were authored by W8DMR. The concept of a 1280 Mhz PLL was first offered at the ATCO technical symposium in 1988. Bill Parker W8DMR

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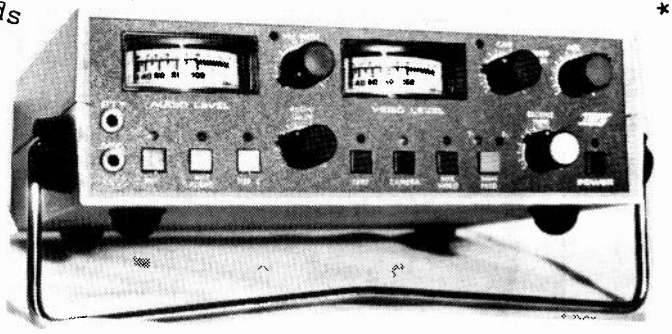

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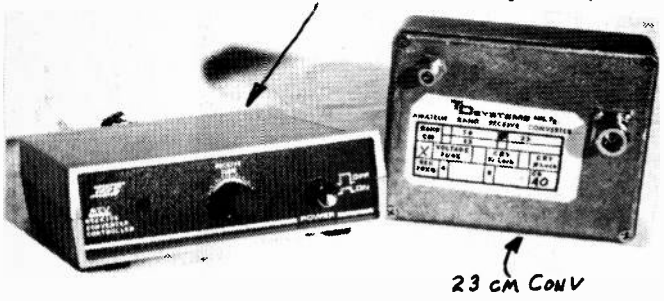
RCC-10 RECEIVE CONVERTER CONTROLLER



Incorporated in the CU-125 Control Unit is two Independent Video Inputs,One 10 Pin, and One RCA Jack.Each With Its Own Video Level Control. Each Video Input after Selected,is Applied To A Video White Clipper Where Any Video Overdrive Is Clipped Off,Reducing The Possibility Of Over Modulation An Automatic Pedestal Control Keeps The Proper Clipping Level At All Time.A Low Pass Filter IS Also Added To Remove Any High Frequency Noise On the Video Or Spurs Caused By The Clipping Action.One Item That Can Be Added At This Point Is a Small Sync Streacher PC Board That Mounts On The CU . From This Point A Low Impedance Line Driver Amplifes And Drives The Processed Video Down The Coax To The Transmitter. A Video Output Monitor Jack Is Also Included To Monitor The Processed Video Before Or Durning Transmitting.

Both V.U. Meters And Led Clip Indicators And Monitor Outputs Jacks Is In Full Operation Before And During Transmission.

External Mic Audio Is Applied To An Automatic Gain Control Amp With An Input Level Control Added To Vary The Amount Of Audio Before Compression Starts. Aux Audio Is Applied To A Rear Pannel RCA Connector With Its Own Level Control. A RCA Output Jack Is Also provided To Enable Monitoring The Audio AS Its Applied To The Audio Sub Carrier Gen.

A Crystal Controlled Sub Carrier Generator Is Also Provided Programed To 4.5 Mhz. Other Frequencies Can Be Programed By Changing PC Straps. Sub Carrier Injection Level Is Also Adjustible.

Power Requirements For The CU-125 And All Modules Is 12-14.5v D.C. Input.Complete Regulation, And Filtering Makes This Unit Ideal For Base Or Moble Operation Little Affected By Voltage Fluctuation.

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33 CM -- T33A	$137.00
23 CM -- T23A	$137.00
To add 2nd Frequency	$10.00
If on carrier audio modulation is required	$10.00
FM TRANSMITTERS	
33 CM -- T33FM	$138.00
23 CM -- T23FM	$138.00
FM DEMOD BOARD (Installs in CU 125, Required to receive FM ATV)	$169.00
REC CONVERTERS	
70 CM -- RVT-70	$89.00
33 CM -- RVT-33	$103.00
23 CM -- RVT-23	$109.00
FOR CRYSTAL CONTROL OPTION	$30.00
To add 2nd Frequency	$10.00

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910 MHz./1270 MHz. AM/FM ATV TEST SOURCE

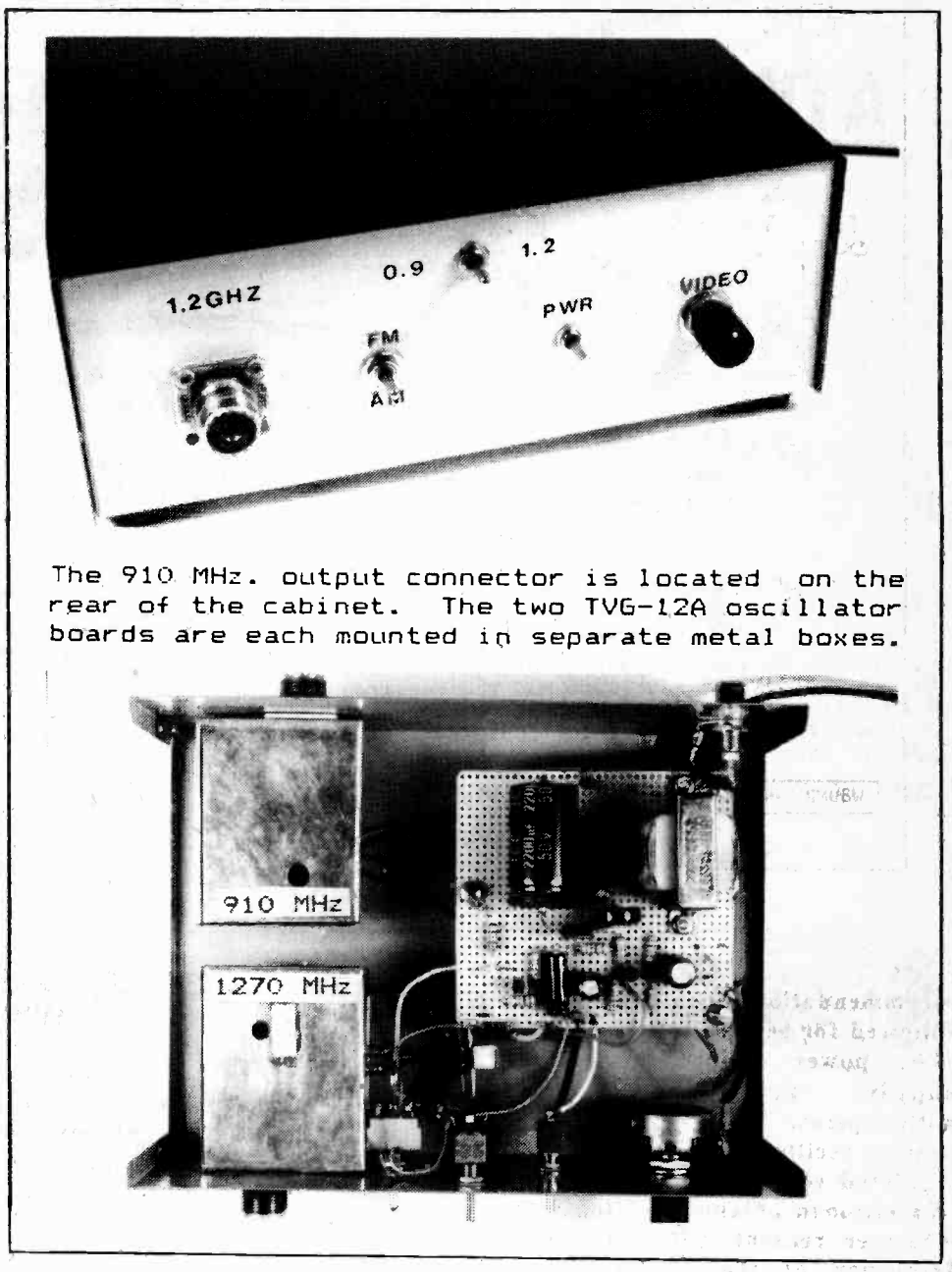
Bill Parker W8DMR

Through the addition of the video amplifier and pre-emphasis circuits described in the previous article (1270 MHz. ATV TRANSMITTER) we can use the TVG-12A as an excellent dual band low power (50-100 mw) test source.

NOTE: The PLL circuit described in the October issue p.39 is not required.

For a dual band source two TVG-12A's are required. One of these is slightly modified to operate on the 900 MHz. band (TVG-9X in the diagram). For operation in the 900 MHz. band un-solder the small variable capacitor. Then the line of foil is extended by a small jumper. Use a small piece of foil to connect to the foil that is already on the PC board. The length of the jumper is only about 1/4 inch long (and about 3/16 inch wide). Solder the small tuning capacitor to the end of the extended strip line. The oscillator will now operate on 33cm (910 MHz.) with careful adjustment of the tuning capacitor. (ED. NOTE: Before connecting either of the generators to an antenna, make absolutely sure the output frequency is within the amateur band with a frequency counter or receiver. The TVG-9 is not offered by P.C. Electronics because cellular phones are just below the 902-928 MHz. band and interference could result from improperly set oscillators.)

The 1200 MHz. test generator is set to 1250 MHz. and set to FM modulation. The third harmonic (3750 MHz.) can then be tuned in on a commercial satellite receiver (C-Band). The peak FM deviation at 1250 MHz. was about 5 MHz.. At 3750 MHz. the peak deviation was 15 MHz.. The peak-peak deviation is therefore 30 mHz.! The satellite receiver video when displayed by a quality TV monitor (not a TV receiver) produced excellent pictures. The signal was radiated by a length of wire 2 1/2 inches long protruding out of the UHF connector.

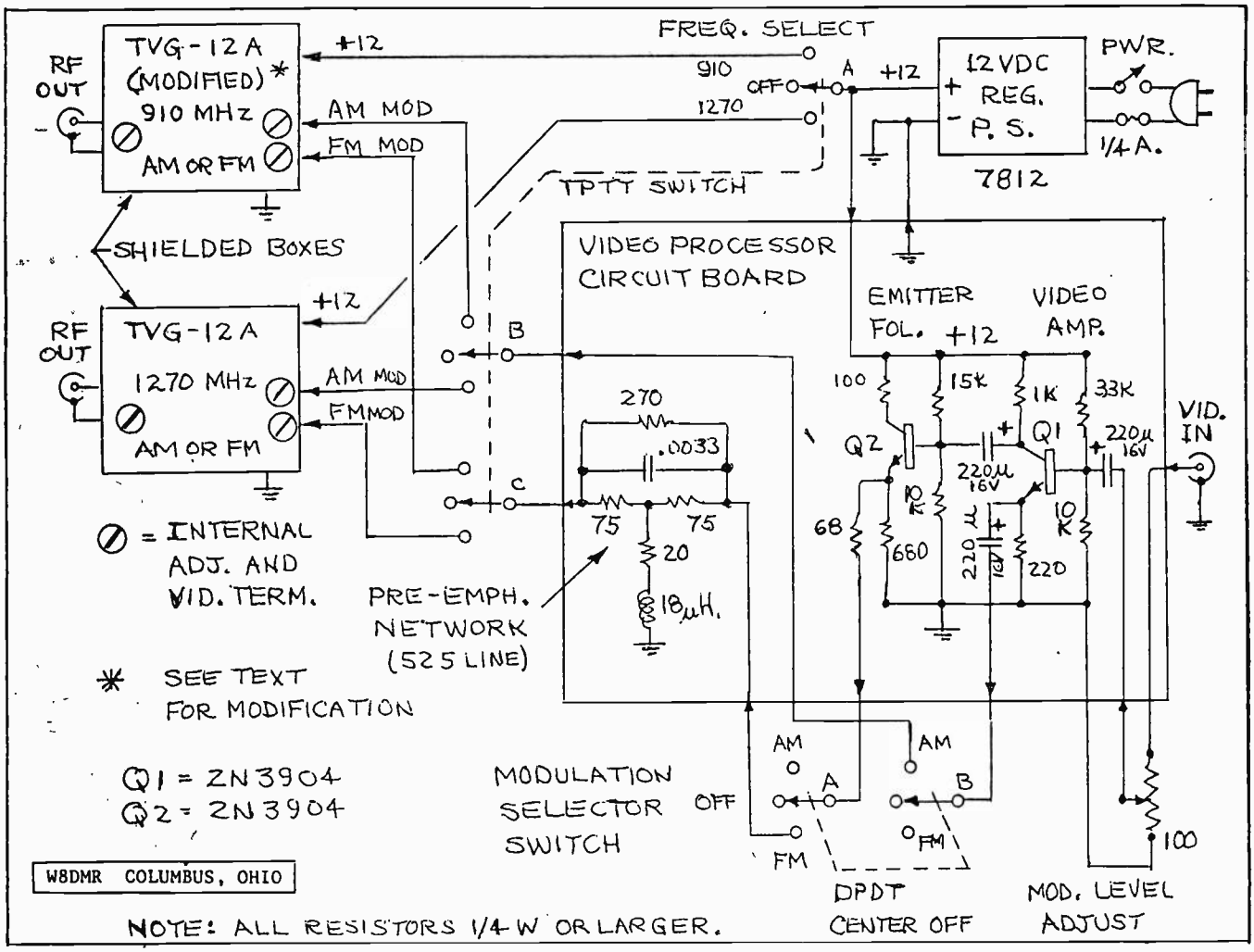


The 910 MHz. output connector is located on the rear of the cabinet. The two TVG-12A oscillator boards are each mounted in separate metal boxes.

The two RF oscillators are mounted in separate metal boxes. See the diagram and photographs for hookup details. The choice of connectors depends on user requirements. The data sheet provided with the TVG-12A has

Editors note: A TVG 9 is not offered by P. C. Electronics due to the band being too close to cellular phone. If the is done, take extra care to set the frequency within the 902-928 MHz. band.

910 MHz./1270 MHz. AM/FM ATV TEST SOURCE
Bill Parker W8DMR



recommendations that should be followed for best results.

The power supply needs to supply approximately 100 milliamperes. The low-power free-running oscillators absolutely need regulated voltage sources.

Variation in antenna loading (for whatever reason) will cause the frequency of the oscillators to change. Regardless, the generator has proven to be a handy test source for performing ATV tests.

23 CM PLL REFINEMENTS
W8DMR

Loading effects of the power amplifier stage can be minimized by inserting what is referred to as a 3 db isolation pad. The pad is accomplished by inserting a 33 to 56 ohm resistor in series between the output of the TVG-12A oscillator and the input to the brick amplifier. The 3 db pad helps minimize the loading effects of the amplifierduring modulation.

The SP-5060 and the TVG-12A in order to have a nearly noise free and hum-less carrier, must be supplied with a very well filtered 12 to 13.8 V dc. Otherwise a residual hum will exist. The residual hum does not effect video transmission. The hum, which isn't a sine wave, is not desireable when using relatively narrow band FM audio modulation.

DAYTON ATV FORUM SCHEDULE

1445-1700 AMATEUR TELEVISON (Fast Scan ATV) FORUM .....ROOM - 3

Moderator. Tom O'Hara, W6ORG

"Helping Ham Radio to be Seen" - Henry Ruh, KB9FO

"ATV in R/C Aircraft - Carl Berry, K5MWN

"Video from the Edge of Space" - Bill Brown, WB8ELK

CABLE TELEVISION INTERFERENCE TO ATV!

Henry B. Ruh KB9FO

Your new antenna and tower go up. No sooner do you relax in your ham shack than the first neighbor with reception problems rings your door bell to complain!

Well, perhaps not everyone has this problem but a new tower and antenna array do seem to attract a lot of attention from the "unwashed masses" of non hams who suddenly connect your antenna with their reception problems. Much has been written about TVI in the ham magazines but only about how your signal can cause interference. The FCC TVI handbook has many examples of how your signal or the local CB signal or proximity to broadcasters' towers causes TVI but contains little about why it happens and concerns itself with over-the-air reception problems. As more and more areas get CATV there is a new avenue for interference to and from TV sets and your ham gear! The CATV system itself. CATV is also prone to many forms of signal distortion (interference) even when not in the presence of your signal. This article will focus on the attributes of the TV signal and it's sensitivity to interference and also demonstrate some CATV problems which can appear to be TVI but are caused by sources other than your ham transmitter.

There is a lot of confusion and little information in the ham publications about the TV signal itself. The TV signal is much more sensitive to interference than other transmission modes. A lot of TV interference problems have the same or very similar visual symptoms which makes finding the cause more difficult. Most hams have little occasion to dig into CATV systems to know what problems the CATV system can cause to itself or to ham radio aside from common leakage of the CATV signals into our bands. Lets look at NTSC as broadcasters and hams use it.

SPECTRUM ALLOCATION

The TV spectrum for broadcasting has separate bands known as low VHF, high VHF and UHF. These correspond to Chs. 2-6, 7-13 and 14-83. Chs. 14-20 and 70-83 have been squandered away to land mobile service in major metropolitan areas and portions of the low VHF band at the Ch. 5/6 area have been squandered to paging, trunking and land mobile services, all of which cause interference to over the air broadcast services in the normal "TVI" mode.

The spectrum for these Chs. is 54-88 MHz., 176-216 MHz. and 470-890 MHz. You should already recognize the proximity to our ham bands at 50-54 MHz., 220-225 MHz., and 420-450 MHz., also 900-928 MHz. Fast scan ham TV uses common video carrier frequencies at 421.25, 426.25, 434.00, 439.25, 911.25, 921.25 MHz. Subcarrier sound is always 4.5 MHz. above the video and color subcarrier and sidebands are centered around 3.58 MHz. above video carrier. The color sidebands are 1.5 MHz. wide (both sides) in a full I & Q system and .5 MHz. wide in most processed color systems. (More on this later)

If CATV only used the same frequencies that the over the air broadcasters used there would be no potential problems with other spectrum users. However, the CATV folks are not limited to spectrum allocations as licensed spectrum users, They utilize all frequencies their systems will pass which start around 40 MHz. to over 500 MHz. Leakage interference from a CATV system which carries a local over-the-air TV Ch. is at its worst when its on the same Ch. as it causes a beat signal. That's why the CATV system never carries (for example) Ch. 2 on Ch. 2, Ch. 5 on Ch. 5, Ch. 7 on Ch. 7 etc. Your box may say so, but the actual frequencies are not the same, the box does some manipulation of the frequencies to give you a "dial" Ch. you are comfortable with. The only exception is FM broadcast on cable which is at the FM broadcast band of 88-108 mHz. so your FM tuner can carry it directly.

Cable TV Chs. are not spaced but rather are at every 6 mHz.. In real life there is a gap between Ch. 5 and 6 of 4 mHz., and much larger gaps between the bands. CATV uses all these frequencies and all the in between frequencies. Cable TV also does not use alternate channels (ie 2, 4; 7, 9, 11, 13) as over the air TV does. Over-the-air TV would have interference problems from adjacent channels if we used all the channels. CATV has adjacent Ch. interference too but they reduce the FM sound carrier to -20 db and use carrier frequencies which are all locked to a common oscillator (called harmonically related carriers or HRC) to make use of the interleaving of the sidebands to reduce interference.

RECEIVE FILTERING

Even with vestigial sideband filtering the upper sidebands and sound carrier will interfere with the next higher adjacent Ch. in your receiver. Also the reverse happens, its mutual. The physics of filters is such that you cannot get 100% attenuation and match passbands so that there is no gap and no overlap. Just the fine tuning of the TV set and its RF/IF response moves the receive passband so it recovers more or less of the adjacent channels on each side of the desired signal. Think of it as trying to stack SSB signals on 40 meters with no reception of the adjacent SSB signal. We hams have been trying to do that for decades and all the notch filters variable passband tuning and IF filters will not allow you to do this. There is always some overlap and thus some reception of the unwanted signals.

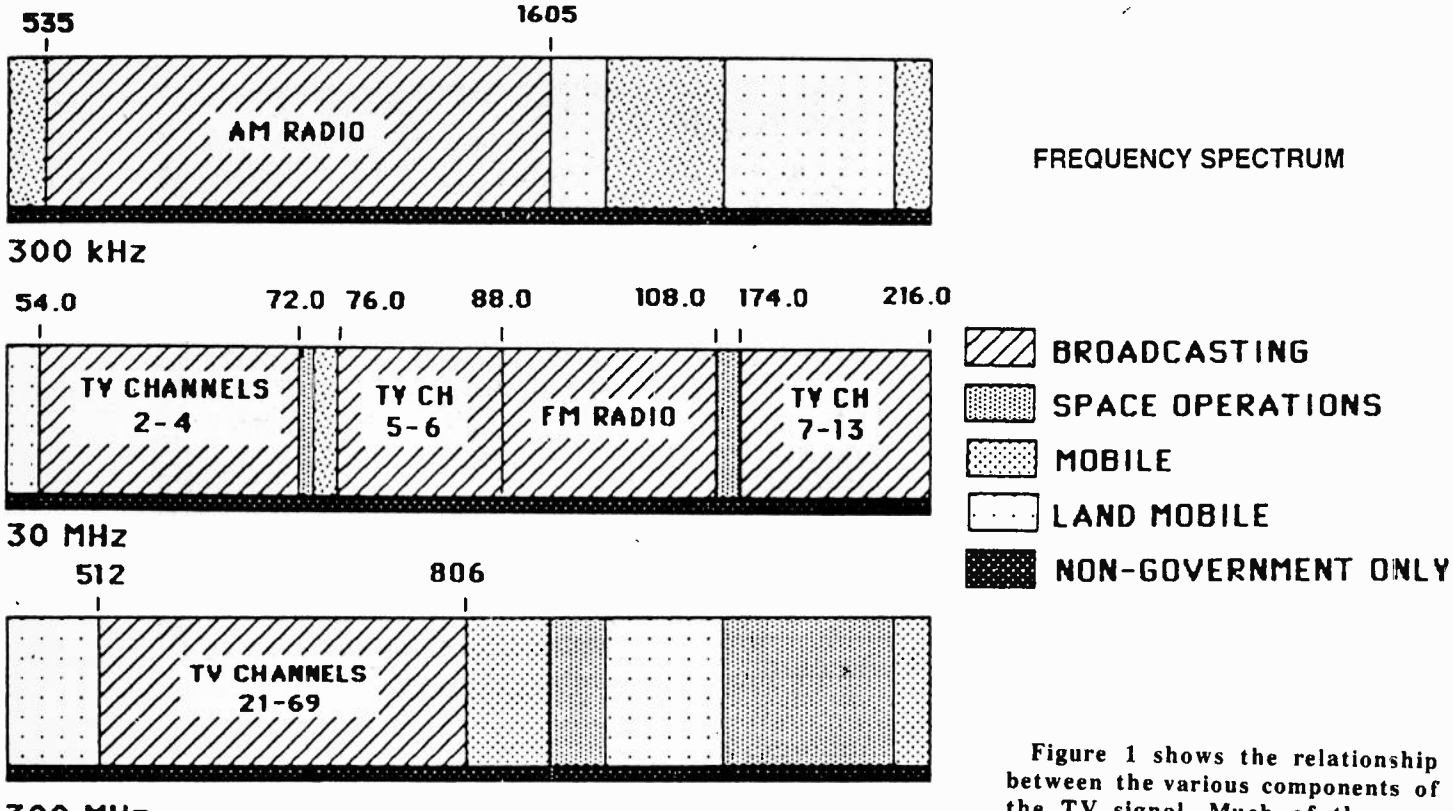
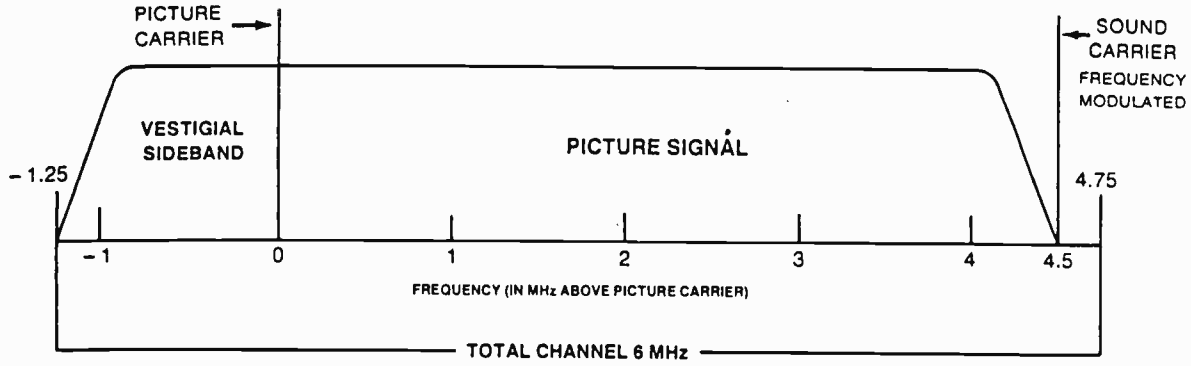
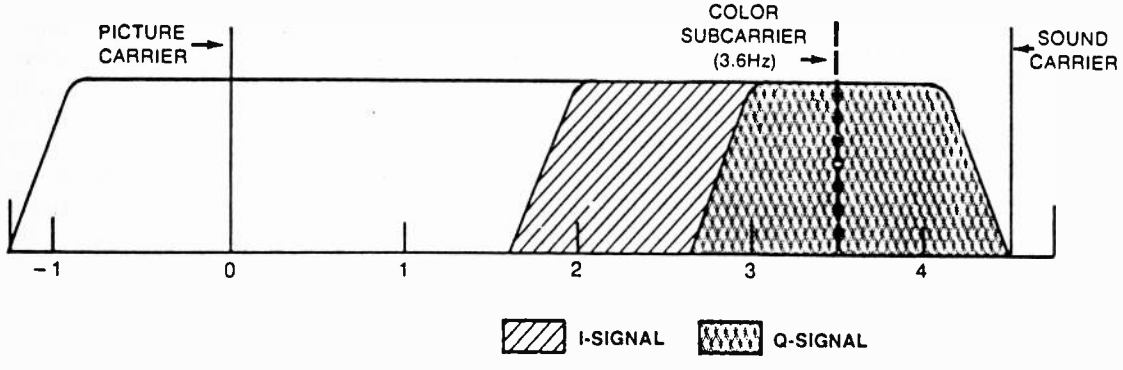


Figure 1 shows the relationship between the various components of the TV signal. Much of the confusion about TV comes from this diagram which shows the TV signal occupying the entire 6 mHz. Ch. width at a constant amplitude.



MONOCHROME TV CHANNEL



COLOR TV CHANNEL

THE TV SIGNAL

Lets look at a real TV signal. Video is pure AM modulation. Very simple. As with any amplitude modulation the sidebands are dependent upon both the amplitude and frequency of the modulating signal. Just as you are used to seeing varying amplitude on your AM or SSB ham radio signal, the TV signal sidebands act in the same way. However, you cannot modulate the TV transmitter to modulate all the possible sidebands at 100% modulation simultaneously. At best, any AM signal at 100% modulation, produces sidebands containing 50% of the carrier power. If you had 100 watts carrier level, you might be able to generate 50 watts of sideband power, but not in TV! If you had only 1 modulating frequency, a single tone, then you might actually get 25% power in each of the upper and lower sidebands, assuming NO HARMONIC DISTORTION.Remember AM has two sidebands with equal power, or each has 1/2 of the 50% power or 25% each.

But even a TV signal with only SYNC pulses is not a single tone signal. When you modulate an AM signal with a single tone, you will note that the power increases: positive modulation. An RF amp meter placed in the antenna line will show an increase in RF amps. But TV is a NEGATIVE modulation system. The modulation appears as a lowering of the power. This is why your Bird watt meter goes DOWN when you add video to your carrier. Only the sync pulses have full peak power (100 watts in our example). These occur only 5/63 of the time. About 4%. During black video you generate only 75% power (blanking level). On white peaks, your power is at 12% (broadcast level) or less if you do not have a white limiter. The average power is called APL or average picture level and power and is typically 20-40% of peak power with actual video signals. Figure 2 shows the relationship between picture level and transmitter/ signal power.

SPECTRUM ANALYZER DISPLAY OF

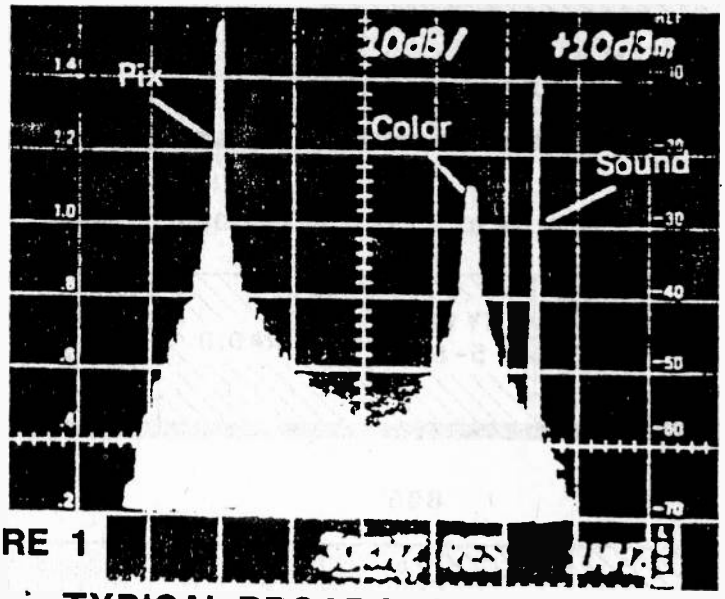


FIGURE 1

TYPICAL BROADCAST TV SIGNAL

SIDEBANDS

Sync pulses are square waves and DC. DC because they stay at a level for a period of time and square waves because they have fast rise/fall times. Broadcast TV has about 200 nanosecond rise/fall times (equal to about 5 MHz.) so the sync pulses which have fundamental frequencies of 30, 60 and 15,734 Hz have harmonics of these same frequencies all the way to 5 MHz. But the amplitude of these harmonics is very small, typically 50 db below carrier. (Fig. 1)

If we sent a picture of a checkerboard, alternating black and white squares, we would see a spectrum of sidebands, harmonically related to sync, which were higher in amplitude at the rate of the checkerboard and lower at all other frequencies.

Now lets look at figure 3. All objects in a picture will cause sidebands to fall with some amplitude at harmonics of the sync rate because all objects are dissected by the scanning scheme, thus segmented into some multiple of the scanning rate. Flat fields represent a frequency equal to their time (period) of the scan line. A full field of flat white would be about 55 microseconds long per line, and the reciprocal of 55 microseconds would be the frequency of the sidebands it would generate.

In real life, flat fields are represented spectrally by signals below .25 MHz. in bandwidth. Small details usually .5 to 2.5 MHz. and picture transitions (details) by higher order frequencies of 2 to 4.2 MHz. dependant on the rise time of the transition. In all, about 256 groups of sidebands one at each multiple of 15,734 Hz. could exist. We end up with a comb of frequencies, each with a differen amplitude, but all when summed equal about 20% of the carrier frequency. Any one sideband will never be equal to a full 20% because harmonics are always present.

COLOR

Color was able to be squeezed in because of the empty spaces between the sidebands of the luminance signal. The color subcarrier of 3.579545 MHz. was chosen to be 1/2 of 455H. This odd half harmonic interleaves the sidebands of color between the sidebands of luminance. These are centered on the color subcarrier. Figure 4 shows how this happens.

What you will notice most about video sidebands is that they are not equal. They generally decrease in amplitude (power) as they increase in frequency.

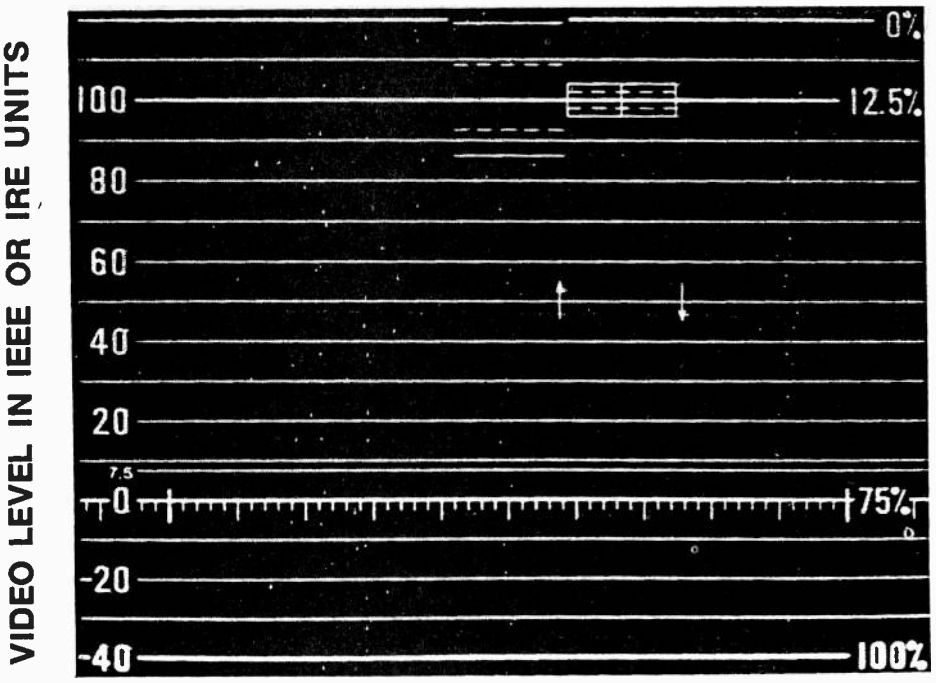


FIGURE 2

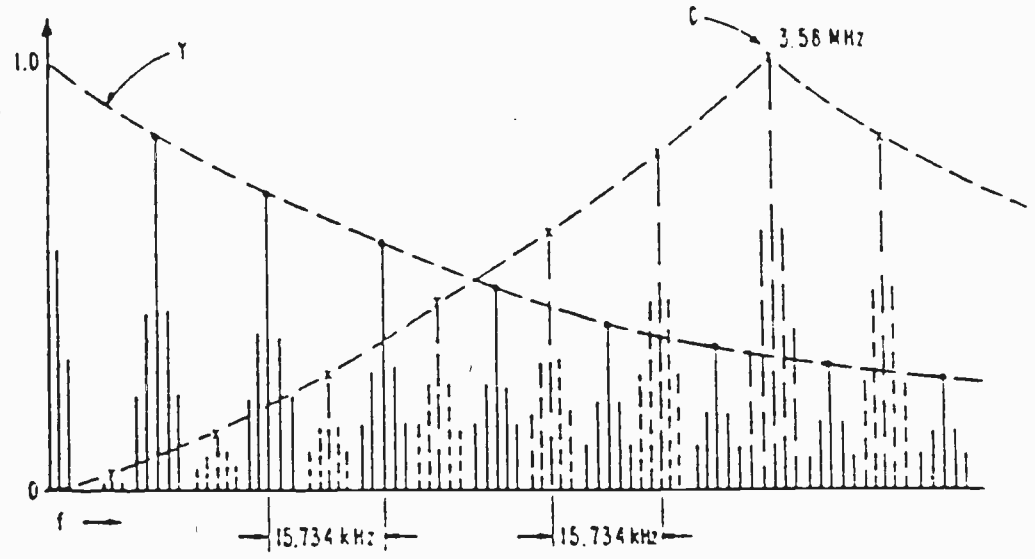
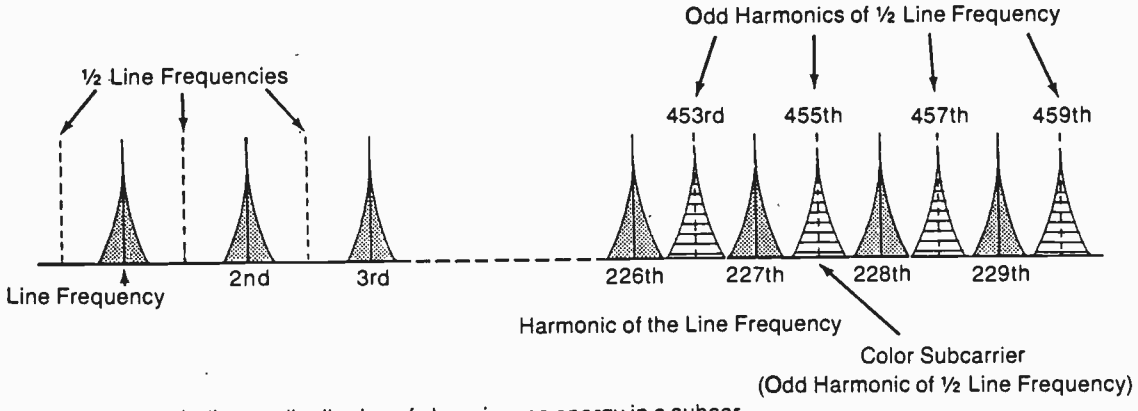


FIGURE 3



Indicates distribution of chrominance energy in a subcarrier whose frequency is an odd multiple of one half the line frequency.

Indicates distribution of brightness or luminance energy at whole multiples of line frequency.

FIGURE 4

ODD HARMONICS OF HALF LINE FREQUENCIES

Figure 4, taken from Tektronix book on TV signal measurement shows that the sidebands of a real life TV signal has sidebands which are 40 db below carrier power .5 MHz. away from the carrier, and over 50 db down at 1 MHz. away from carrier. Sidebands at 2 MHz. away are 60 db or more below carrier.

The second hump is the color information, in this case a well saturated signal but its sidebands are 55 db down at .5 MHz. away from the color subcarrier and more than 60 db down 1 MHz. away. The narrow spike is the 25 MHz. deviation sound carrier, 10 db below the video carrier. Ham TV typically has a sound carrier 14-20 db below video to reduce interference to the video in our multiplex transmitters. We do not usually have separate sound and vision transmitters, usually modulating our FM signal onto the video in the transmitter.

This also explains why a weak signal can cause interference to a TV signal since the information we want to recover to see the picture is 40 to 60db below the carrier and thus a signal from an interfering source need only be 40 to 60 db below the wanted signal to be seen as interference. This computes to the milliwatt power level at your transmitter and microwatts at your receiver.

Color is even more sensitive to interference. The color sidebands are actually two signals modulated in quadrature to each other. That means that there are two carriers which are phased 90 degrees to each other. The two carriers are called I (for in-phase) and Q (for quadrature phase). The I signal represents a color axis roughly along red and blue and can have a bandwidth of up to 1.5 MHz. The Q carrier is roughly magenta and green and can be modulated up to .5 MHz. In our ham equipment it is more likely that the color signal is derived from a VCR, computer or cheap color camera which uses an alternate scheme called R-Y, B-Y, which only provides up to .5 MHz. color bandwidth (at best). But your receiver still has a 3 MHz. bandwidth (1.5 MHz. each side) so there is lots of room for stray signals to pass through where there is no wanted signal to be received. In other words, the color receiver is much wider than the signal you are likely to receive, thus more likely to also receive interference. This is one reason why color receivers do not work as well as monochrome receivers in the presence of interference signals. Or, why B & W receivers can produce a visually better picture on a weak signal. You can re-tune your IF strip in your B & W TV set to pass about 2 MHz. max and realize a gain in useable sensitivity and noise reduction (remember bandwidth is a main contributor to your noise figure and thus minimum receivable signal) and still have a full motion picture. Most VCR's only have 2 MHz. bandwidth. VHS limits full modulation to 1.5 MHz. and is already 6 db down at 2 MHz. and 12 db or more down at 2.5 MHz. What this means is you can see a low level multiburst signal to 2.5 MHz. but a fully modulated multiburst signal is rolled off in amplitude at 1.5 MHz. they become gray instead of black and white lines. Depth of modulation could be another full article in itself, so don't worry about that right now.

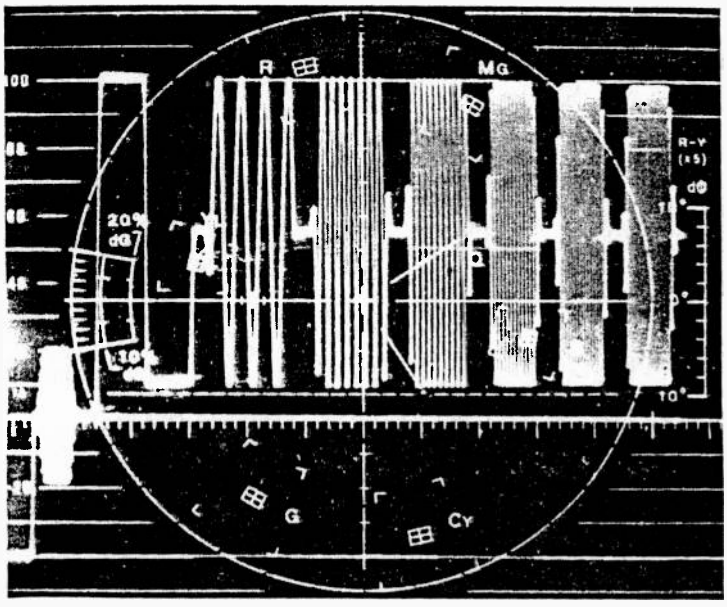
Your receiver, looking at a vestigial sideband signal is also missing the lower half of the sidebands after 1.5 MHz. Your TV set IF response has a built in 6 db boost of frequencies over 1.25 MHz. to make up for this loss in signal at your detector diode.

So in other words, to have a perfect picture you have to have a carrier level 60 db above your noise floor so that the weakest sidebands are at least 10 db above the noise. Which is why a weak signal can tear up your picture! Phew! A long explanation to be sure.

NOISE

Noise pulses represent positive modulation. Your TV set recognizes power increases as a signal going from white (low power) to black (more power) to sync (most power). If the pulse is much stronger than the picture video, it appears as being above (power) the video level and is self extinguishing as it is blacker than black. Likewise a strong carrier will cause your TV set to go to a black blank screen as it overrides the weaker video signal. The stronger the signal, the more black it appears until it is more than the black level you can see and then you don't see it. This is why sync pulses are at maximum power, they are blacker than black so they do not appear on the screen.

Now earlier I said that the diagram is misleading. It is because it appears that you could have an equal amplitude signal across the entire spectrum. If TV were FM that could be true (except for Bessel nulls). But TV is AM (unless you are among the few using FM video) and the sidebands are not nearly as powerful as anyone might think.



MULTIBURST
Photograph courtesy of Tektronix, Inc.

100 % MULTIBURST (FULL DEPTH OF MODULATION)

VISIT OUR BOOTH AT DAYTON
449, 450, 460, 461

The Radio Amateur's Journal

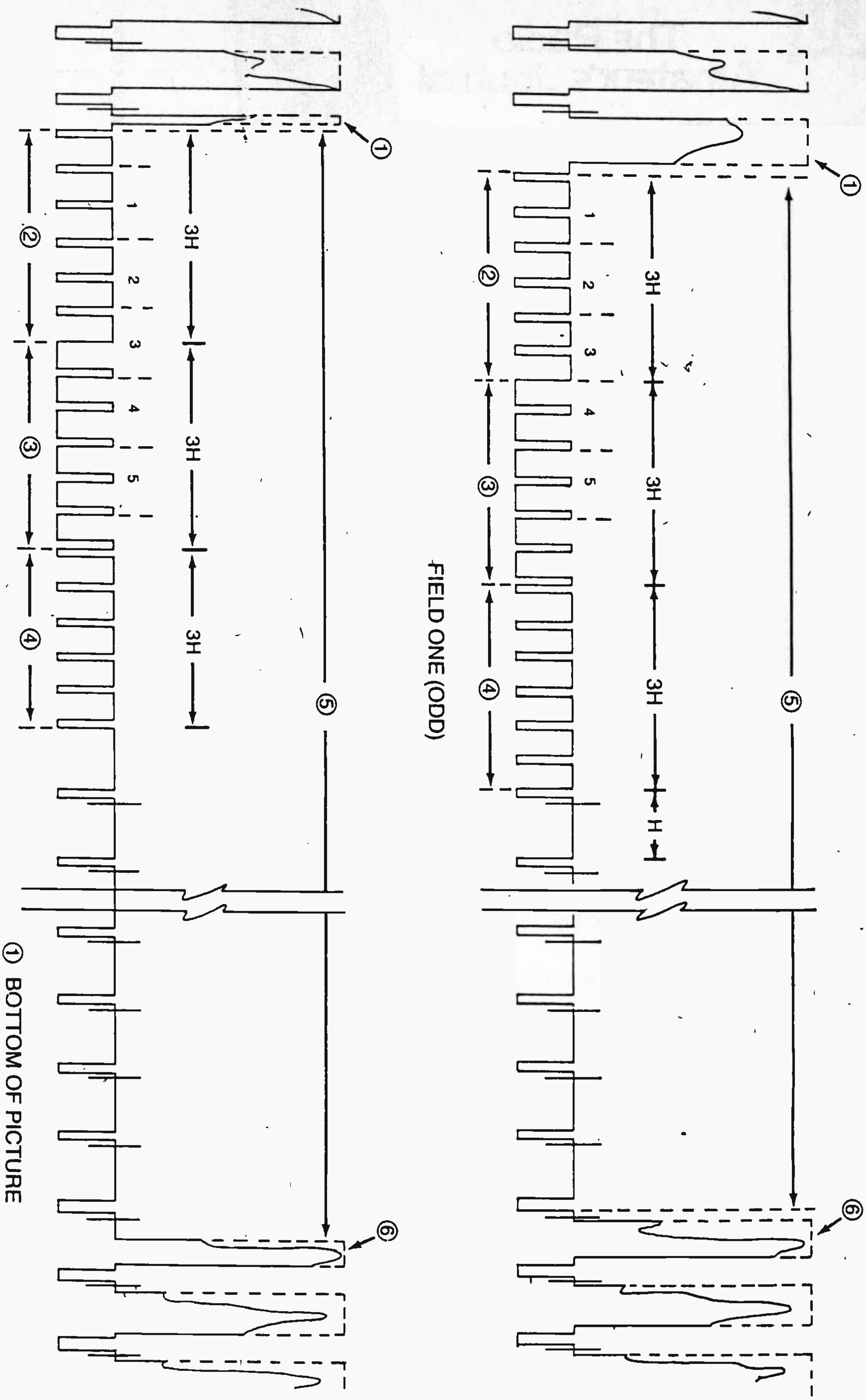
ON THE COVER: With his retirement from the U.S. Senate, Barry Goldwater, K7UGA, finds more time available for his life-long hobby of Amateur Radio from his home QTH in Scottsdale, Arizona.

MARCH 1990 **VOL. 46, NO. 3**

FEATURES

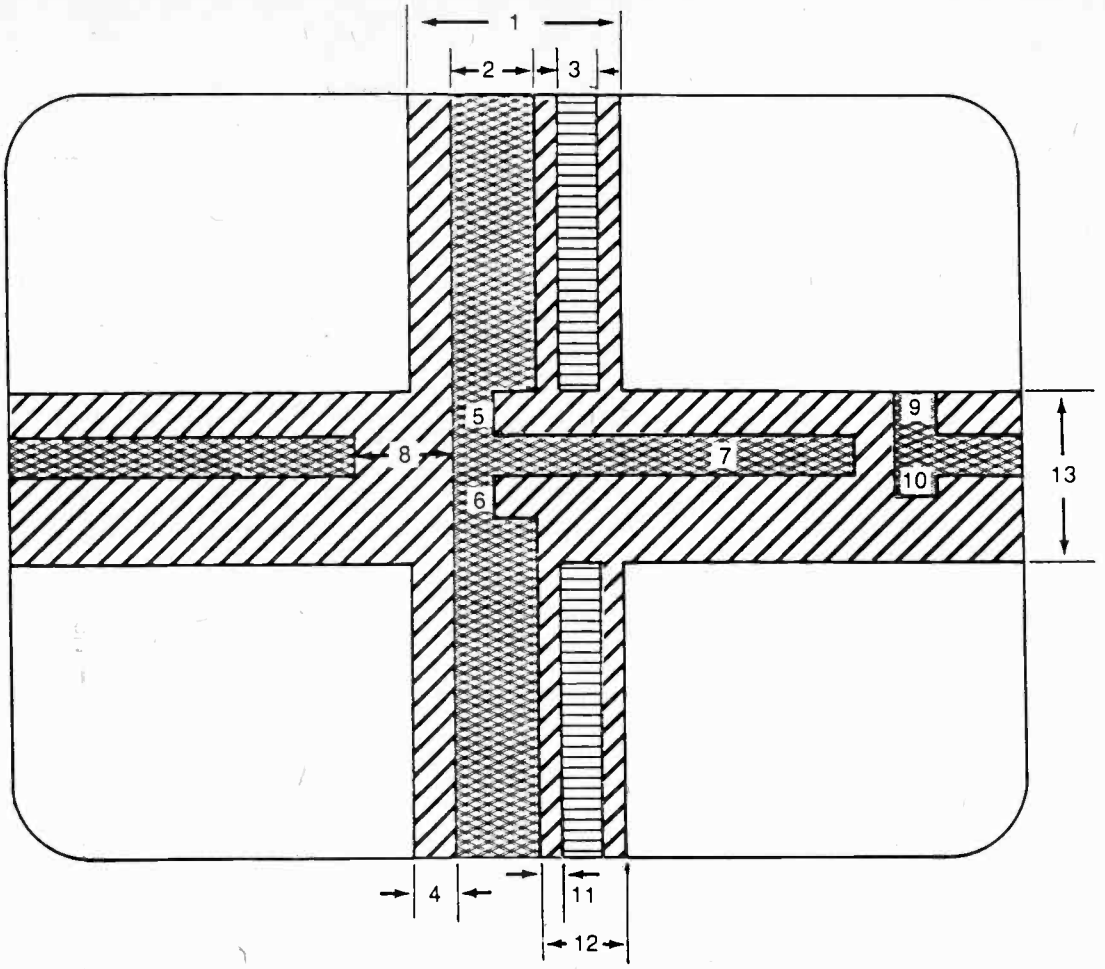
DEPARTMENTS

SYNC PULSES IN THE VERTICAL INTERVAL AS SEEN ON A SCOPE

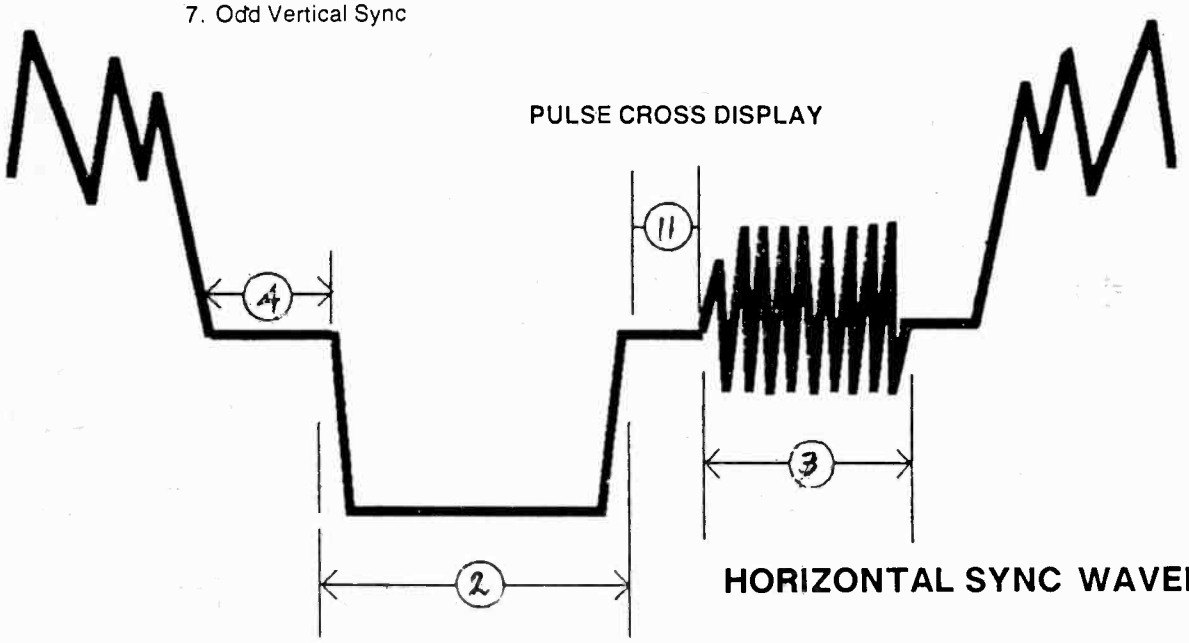


THE VERTICAL INTERVAL

SYNC PULSES IN THE VERTICAL INTERVAL AS SEEN ON A MONITOR



1. Horizontal Blanking
2. Horizontal Sync
3. Color Burst (if present)
4. Front Porch
5. Odd and Even Leading Equalizing Pulses
6. Odd and Even Trailing Equalizing Pulses
7. Odd Vertical Sync
8. Vertical Serrations
9. Odd and Even Leading Equalizing Pulses
10. Odd and Even Trailing Equalizing Pulses
11. Breezeway
12. Back Porch
13. Vertical Blanking



HORIZONTAL SYNC WAVEFORM

CATV AT ITS WORST

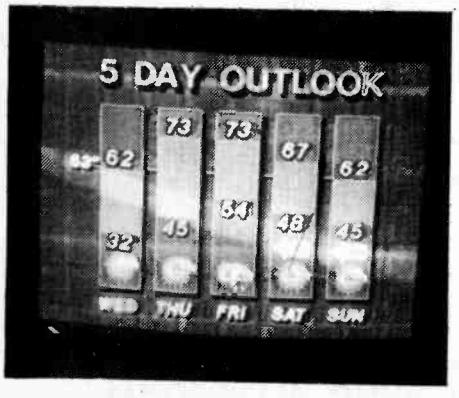
Now for some CATV problems and pictures of what they look like and what caused the problem in some actual CATV systems. These photos were taken from my home TV from a playback of tapes made to document various CATV problems I have been called upon to solve over the years. They were made on color film, so they may not print as clearly as I would like. I've tried to pick ones where even poor contrast printing will not obscure the problem we are looking at.

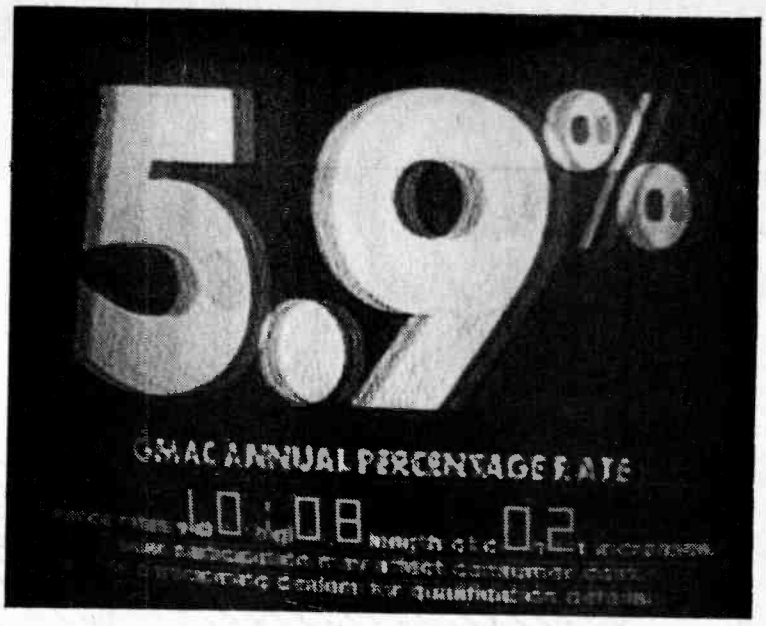
For reference, picture 1 is a good picture off cable...one of the few known to have ever existed.

Picture 2 shows the effect of simple ghosting, reception of a strong reflected signal arriving some time after the wanted signal, displaced in time by the distance the reflected wave took vs the direct wave. In this case the reflection was from an unterminated line in the system. Adding a 75 ohm drop terminator solved this one.

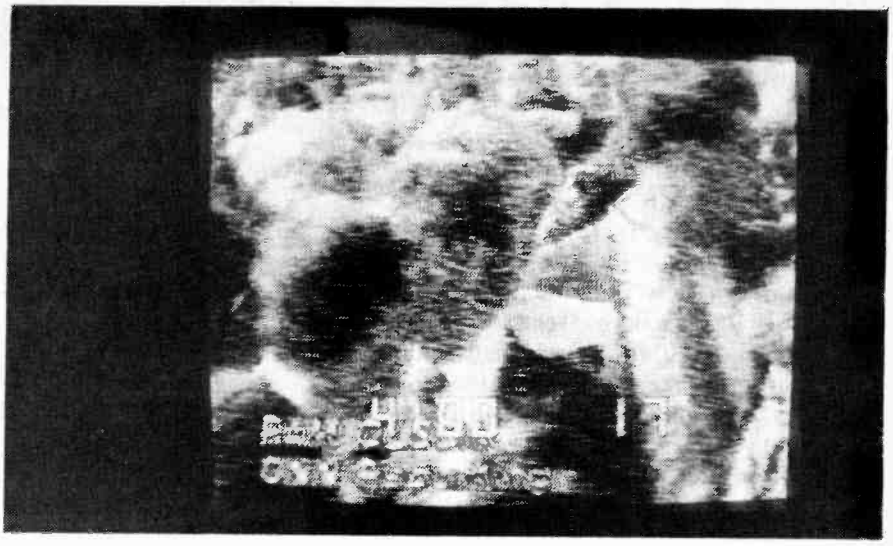
Picture 3 is severe ghosting caused by a lot of reflection on a line. It was found to be caused by a lot of bad drop connections in an apartment complex.

Picture 4 looks like even more ghosting but in fact was caused by a bad line amp which caused severe ringing and near infinite VSWR from a shorted transistor pair feeding the output.





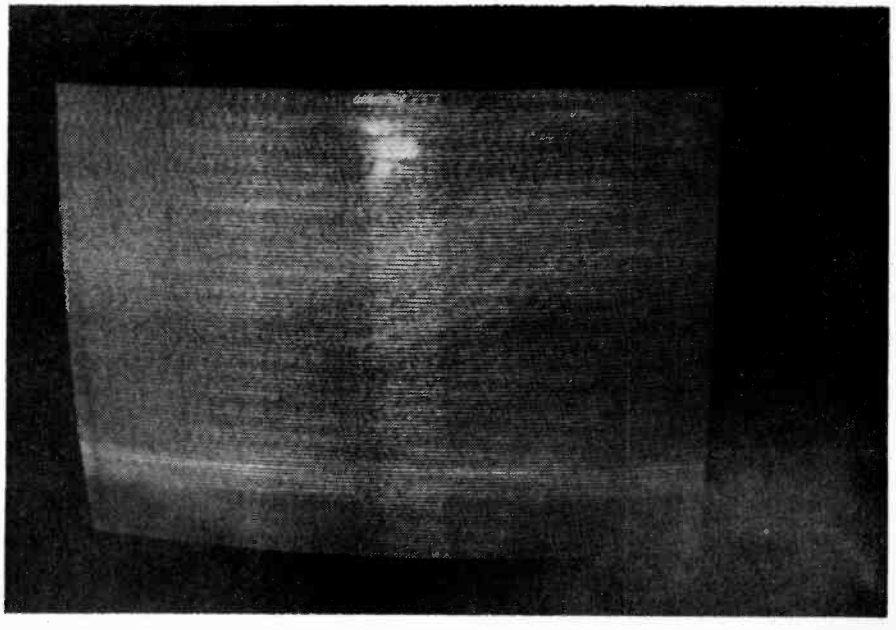
Picture 5 shows a signal which is simply weak. There is insufficient signal for the TV set to recover enough signal to present an acceptable picture. This instance was when a home owner used several splitters to add additional sets to the cable feed without an amplifier. The additional signal splitting had an ultimate loss of over 24 db.



Picture 6 shows the same channel in a neighbor's house next to where picture 5 came from. In this case it was an illegal cross feed from the first house. Why anyone would watch such a poor signal is beyond me, its not even ATVDX!

Now these have been examples of common signal problems akin to normal "over-the-air" reception problems and except for a very naive viewer, we are not like to be blamed for them. But other problems in reception are similar to TVI and in these you might be accused as being the cause, along with why the cat ran away and the high cost of gasoline!

The CATV systems has hundreds of amplifiers in their plant, spaced as needed along the main and branch lines to feed the signals all over town. Every amplifier has an overload point with results from moderate to severe. The most common form of interference in CATV seems to be simple cross-modulation of one channel into another. The most common symptom is that while watching a picture on one channel, you can see another picture or its sync drifting through.



Picture 7 shows this clearly as we can easily see the second signal's sync in "pulse cross" as it floats through the desired channel which is in a short fade to black at the moment.

Picture 8 shows a similar problem but the signals were synchronous, having been "gen locked" at the CATV headend for scrambling purposes. What we see are strong vertical "blinds" and in picture 9, a squiggly "S" shaped pattern of interference in the picture.

This is similar to the herringbone pattern (herringbone is a series of thin light/dark pattern usually diagonally) caused by adjacent channel interference. Also similar to the pattern formed when the sound is not exactly 4.5 MHz. and beats with the color signal (920 KHz. beat). If you can null out the interference with a simple shorted stub filter the problem is adjacent channel caused, if not it is likely off-frequency sound carrier.

Picture 12 shows the same problem. In this instance the source was channel 3 signal from a VCR RF output feeding back into the cable causing interference to channel 4.

Leakage in a CATV system is two way. Here is Des Plaines I can watch the crummy TCI cable system without hook-up because their system has leaks. A clear P5 full color picture with sound, for free, simply by pointing my antenna at their cable. I can detect leaks at 440 Mhz and 144 Mhz up to two miles away without a preamp, and with..sheer torture when trying to see a genuine HAM signal! Likewise, when a system leaks signals out, it will allow outside signals IN. Besides by 24 dbK signal is a lot bigger than their 64 DBmV signal. This is the only function that got the local cable company to come out and fix some of their leaks, then only after a visit by 3 FCC FOB officers to document the CATV interference to HAM RADI problem.

Leakage into the CATV system from 2-way radio is most likely to get your neighbors knocking on your door. Especially if the interference is at a syllabic rate or looks like CW. Its not hard for any 2-way signal to get into a crummy leaky CATV system. And as we discussed earlier, a video signal is very susceptible to interference from a carrier in the passband.

Picture 13 shows interference to a CATV system from a commercial FM source (land mobile). This is severe AM detection of an FM signal and is even more impressive "live" when you can see the "motion" of the interference.

Cable companies also use microwave links. The most susceptible to interference is a multichannel AM modulated system which uses the 13 GHz. band. This is the same frequency band used by some broadcast news remote vans (ENG).

Picture 14 shows what happens when a strong FM ENG video signal is picked up by a 13 Ghz AM video link. The carrier was so strong I was actually able to read the ENG truck ID video.

What can you do if you are faced with a complaint and your neighbor has cable TV? If at all possible, video tape record the TV signal, even if you have a camcorder, shoot a picture of the TV screen when interference is present. If the signal is from a CATV and you can get a direct connection (via the CATV converter box) then make a direct recording and save these as evidence.

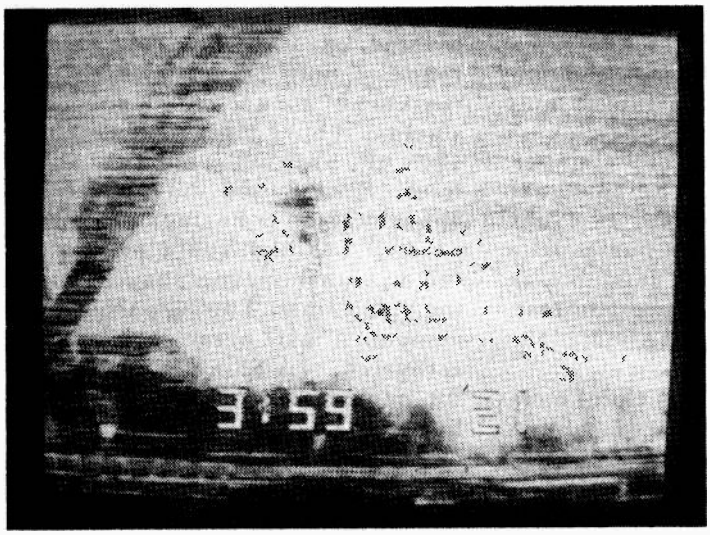
Chances are the problem is in the CATV system. If the neighbor allows you in to look at the problem, A) obviously it isn't you since you are not in your shack transmitting; B) you can hazard a guess as to the cause of the problem and help them deal with the reticent/reluctant/un-cooperative cable company: making a friend in the process...perhaps. If you want to be helpful, check the antenna connection, or if they have an antenna, check off-air reception. As an ATV'er you probably know 40 times what the CATV installer-/repairman knows about video and RF, so you might be able to help there, and get some coax handouts later. If the problem is on a local TV channel, the TV station may want to send out their own engineer to investigate (another chance to make friends with a techie and get him into ATV!.

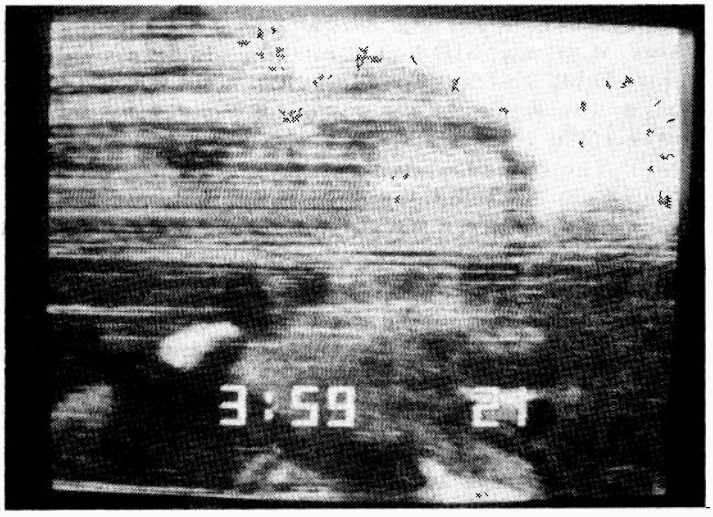
What if you are having problems with interference to your station from the cable company?

Following a few steps will save you some problems. First, contact the cable company. They may actually send someone out who will try and find the leak.

If the CATV company is un-cooperative, file a complaint with the franchise holder (city) and with the FCC FOB office. You might get an answer from the city, and the FCC will most likely send you a letter saying contact the cable company, but its proof that you tried to get it resolved. Next, contact the home office of the CATV company, not just the local "manager's" office, usually a flunky bean counter kept around to get more franchises and make lots of promises to the cities who grant the franchises. His next job is to build as cheap a system as he can and never fulfillany of the promises made to the city...100 channels, sure! Of course half are duplicates!

Next, send the local manager and the home office a letter noting that you transmit on their pay movie channels and if they leak out A) you get to watch for free; B) paying subscribers get to see/hear you! This will be taken note of by the bean counters who do not want to lose subscriber dollars.





REPEATING VIDEO - A LAYMAN's APPROACH

Dave Baxter W5KPZ

If you have ever looked at a P2 picture from a commercial TV station and saw a noisy signal that still held good color, you may have asked this question: Why do our ATV rpt lose color on weaker stations?

Next to desense, passing color and audio are possibly the most difficult problems in our ATV rpt. We can generally get around most of our audio problems by power, levels and filters but the color problem is not quite as simple.

For the lack of a more technical explanation, the color problem is due to the lack of bandwidth or frequency roll off in our ATV receivers along with the following modulator and transmitter. Some of these things we can't help, but there are some approaches and tricks that we can use to work around the problem.

Having spent many years maintaining microwave TV rpt for AT&T, I was involved in the upgrade and modifications that were required when television went color in the 1950's.

Basically commercial rpt repeat by two methods (there are others but these are the most used of the analog systems).

The IF System:

The signal is demodulated to an IF frequency (generally 70 MHz.) where it is amplified and mixed before being re-transmitted. In this system the signal is not restored to the video level.

The Demod system:

The signal is demodulated to the base band or video level and is modulated and transmitted at each rpt. site. Equalizers and processors are used to insure that the video waveform is not distorted.

The commercial users are almost all FM systems and get around many of the problems we have in our AM ATV rpt.s. Our problem, in passing a color TV signal in an AM system can, in a very broad sense, be summed up in two words - envelope distortion.

This in layman's terms means that the TV signal is not the same level (or amplitude) at all frequencies out to 4.5 MHz. (4.5 MHz.is the desirable pass band for our TV). This is one of the areas that FM systems have over the AM systems.

Lets look at our ATV rpt. system.

First our receivers down convert to an IF frequency generally around 45 MHz. where we amplify and demodulate the signal to the composite level of 1 volt p-p. The heart of our IF and demod system is generally a module designed for VCR or TV use.

We feed this video to our transmitters where we amplify and filter it. If we are not careful we lose much of our color information through frequency roll off.

THE COLOR SIGNAL

A video signal is a complex wave form so I'll keep it simple and in Layman's terms. The standard is 1 volt p-p made up in the ratio of 100 over 40. That is to say that the picture is 100 units in amplitude and the sync is 40 units. All was ok until the color system was adopted which placed a supressed carrier 3.58 MHz. signal of 40 units amplitude between the sync and the video wave form. (upon what is called the back porch)

This is the color burst and most lack of color problems can be traced to low levels of this 40 unit signal.

It can be seen that any time we amplify or work with the TV signal it is VERY important not to lower the level of the color burst. It is when this burst level gets low or distorted that we begin to lose color or have color on only the strongest stations.

There are a few things that I have used to help in this area. First: the 45 MHz. receiver IF strip is designed for VCR or TV use where they receive a good color burst and can operate with some reduced burst level. Consequently, I've found as much as 6 to 10 dB roll off between 1 MHz. and 4.5 Mhz. as seen at the video out point. If we are not careful when we align our down converters we peak at the point of most power; in the first MHz.

Here's where I use one of my tricks. I don't have a sweep generator so I use an AM signal generator modulated with a 1000 hz tone. This shows up as black bars on a TV monitor. I align my down converter with a signal 2 MHz. higher than my receive frequency. I find that this gives me a boast in the high frequency area.

Example: my receive input frequency is 434 Mhz. I set the Signal Generator at 436 Mhz. I learned this after I peaked up the receiver on a remote signal at the rpt. site. I had a higher signal reading on the meter, but little or no color on weak stations.

Note: Don't go into the IF module unless you have test equipment and know what you are doing.

Second: For desense and RF de-coupling it's been suggested that 100 pF capacitors be placed on the video line at the receiver and input to the modulator at the transmitter. This capacity adds fast, and high frequency response falls with every one you put on. In my article on rpt. de-sense, I pointed out the way that I have found to best connect video lines (bulkhead connectors and short shields). I have since removed ALL 100 pF bypasses on the video lines. Should you have desense appear after removing these bypasses, I think it could be corrected by other means than bypassing video lines. The high frequency response lost here can not be recovered. I was able to get a 2 dB improvement by removing the bypasses.

Third: Signal processing of the video signal is done to some degree by most commercial users and should be looked at by us to some degree. I built the WA6SVT proc amp and used it for some time. I wanted to be able to compensate for high frequency roll off to some degree by pre-distorting the video signal at 3.5 MHz. I was able to get a 2 dB improvement with the circuit as shown. I found that by changing the value of the bypass capacitor across the 270 ohm resistor in the 2N2222 emitter load from 100 to 240 pF, I was able to get about 5 dB of improvement at 3.5 MHz. I was still able to adjust the high freq. compensation but with a greater range.

Some months ago , I built the video AGC circuit as described by W4PPN. Howard's excellent article has meat for anyone operating a TVrpt. It's a must that some compensation for changing video levels be available at the rpt.. I am presently using one in My rpt. with a slight modification. I experimented with the other functions contained in the ECG 1264 chip as I wanted to introduce some high frequency compensation at 3.5 MHz. and clamp the video.

I don't have all this working as yet but placing a 560 pF capacitor across Q1's emitter resistor gave me 5 dB of high frequency improvement. I have gone up to 1000 pF but strange things start to happen much above this value.

I am presently using this agc amp as modified until I can get the other functions working. If someone gets them together let me know as the video AGC is a must.

The improvement offered to the color burst at 2 or 3 dB steps is helpful but a more important thing is to not loose it in your filters or receiver front ends. Filters and antennas are to be broad and flat but that is beyond the scope of this article.

With the improvements that have been made in this rpt. I am now able to repeat weak signals with color which were not possible prior to these changes.

EXTEND YOUR VCR'S REMOTE CONTROLS

Joe Moell KØOV

Your camera and rig have a place of honor in the shack but the family insists that the VCR has to stay in the den by the big screen TV.

How can you use the VCR to record and play back ATV? You could run cables (rf or audio/video) from the VCR into your ATVsystem but how can you control the VCR? Its remote control sensor won't see down into the basement!

Home brew comes to the rescue! It's easy to build an extender for appliances with an infrared (IR) type remote control. Just use an IR receptor in the hamshack wired to an IR emitter near the VCR. No mods needed inside the VCR. Remote control can still be done in the TV room as well as through the extender.

Most late model VCR's use a sophisticated IR remote system designed for across the room range with no false responses. The IR emitter in the control box is driven by coded digital pulses modulating a 40 KHz. carrier. The detector is well filtered so it responds only to 40 KHz. signals from the control box and not ambient sources of light and heat.

Fortunately, you don't have to build a well filtered detector for the extended because the work has already been done. A module containing a sensitive 40 KHz. IR detector and filter is available for less than $3 at Radio Shack stores, part # 276-137. Output is TTL compatible digital data stream.

Figure 1 shows how I incorporated this detector into my remote extender. The detector gates a 40 KHz. oscillator made from half of a 556 timer IC. The other half works as a logic invertor. The oscillator drives an IR LED at the end of the cable between the VCR and the Shack. The circuit draws only 18 mA. I powered mine from a 9 V wall plug supply. The R/S 273-1552 or 273-1432 9 V battery eliminator should.l work fine.

All the rest of the parts are common place but I have indicated RS part numbers when appropriate. By the way I don't work for R/S but it's nice to be able to say that everything for the project is available from Podunk to Pittsburgh. You may be able to get the IR detector elsewhere too but I haven't researched any other sources.

Photo A shows the hamshack IR receiver prototype built on perf board in a clear plastic box. I had lots of RG-58 lying around so I ran that to the VCR. You could use thin speaker wire instead. The IR emitter is mounted on a piece of PC board held in front of the VCR as shown in photo B.

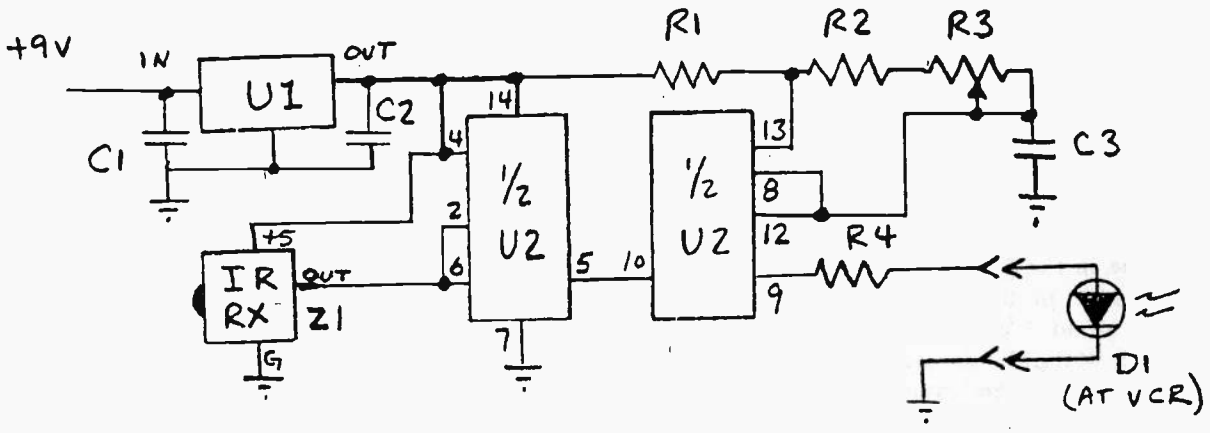
Construction and alignment of the extender is easy if you have access to a scope. When you first fire up the unit leave the lead from the IR detector to U2-6 and U2-2 disconnected. Check the 5V supply regulator output first. Then look for the 5 volt digital bit stream at the detector output with a scope as you zap the extender with your remote transmitter.

Ground U2-6 and U2-2 and you'll get a square wave at pin 9. Adjust R3 to set the square wave frequency to 40 Khz using a counter or a well calibrated scope time base. Now connect the wire from the detector to U2-6 and U2-2 and the extender should be ready to go.

If the extender doesn't work with your VCR be sure that the IR emitter is pointed at the VCR's front panel IR detector. In the photo mine is slipped over to the right. Try varying R3 to fine tune the frequency if it still doesn't work. Show us your tapes!

EXTEND YOUR VCR'S REMOTE CONTROLS

Joe Moell KØOV



C1, C2	0.47 Tant. RS 272 1433
C3	390 pF mica
D1	IR emitter RS 276-143
R1	1K
R2	33K
R3	20 K trim RS 271-340
R4	820
U1	7805 RS 276-1770
U2	556 dual timer RS 276-1728
Z1	IR receiver (see text)

Figure 1. Schematic diagram and parts list of the IR remote extender.

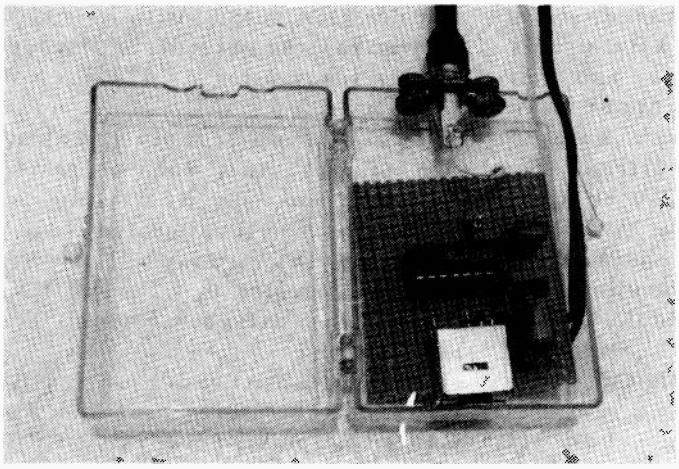


Photo A: I built the IR extender on perf board in a clear plastic box to be placed in a convenient spot in the shack.

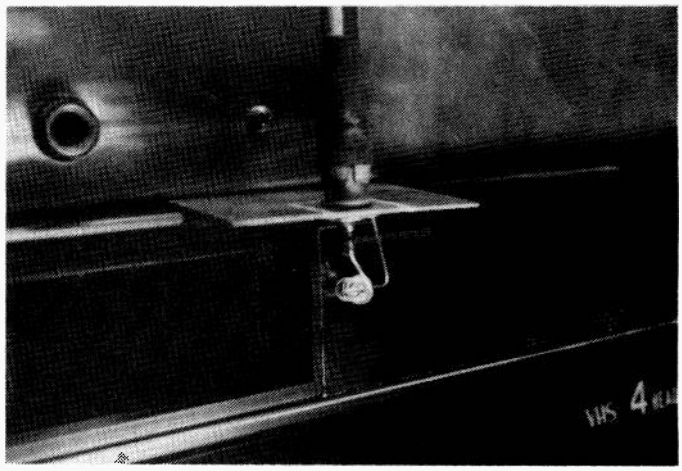


Photo B: The IR emitter hangs in place from a piece of copper clad board held to the top of the VCR.

25 WATT LINEAR POWER MODULE FOR 400 MHz.
By John P. Spaeth KD0LO

The M57745 has been around for awhile, and appears in many multi--mode portable radios. I have just completed testing the module on AM ATV and am very pleased with the results.

The unit is rated as a 30 watt, 24 DB linear power gain device. I found the unit to work well with a B+ and control voltage of 14 VDC and a Bias voltage of 9 VDC. The unit was tested with drive levels varying from 10 to 50 mW. of and found to have linear gain in the region of 13 to 30 dB. WB0ZJP had an identical unit and his unit displayed 8 DB more gain and a subsequent linear power output of approximately 10 more watts. We suspect that the linear gain is only guaranteed to a minimum level but that one should be prepared to deal with units having more gain and a higher power output. This factor is undesirable for applications such as running the units in parallel with combiners.

It appears as though one can realistically expect to see about 20-25 watts from this unit with 50-100 milliwattsof drive. The two bricks tested exhibited no tilt or sync compression when operated in this power range, and very little sync compression even as the module began reaching its 1 dB compression point. The linear characteristics of the module seemed terrific for AM ATV applications. IMD specs reveal a distribution of -30,-38 and -45 for the 3,5, and 7th respectively, however we've seen these kind of specs before and they usually don't seem to have much bearing on the complex AM waveform and subcarriers we use on ATV...thismodule is the exception. We looked at a full multiburst pattern, a sine squared pattern, and color subcarrier burst and found NO NON-LINEAR DISTORTIONS!

Fig 1 is a print of the circuit board which can be etched on G-10 board which should give good results with minimum SWR on the input or output of the module thus maximizing power transfer. The 50 ohm input and output trace can be extended to the edge of the enclosure if need be, however if the strip lines are used, the connector should lay right on the trace and not be mounted above the board and connected with a piece of wire. If you must mount the connector off the board, then use a short piece of brass or copper strap as the connection piece, about 1/4 inch wide. If you don't trust the strip lines (ye of little faith) the you may use coaxial cable instead. If you must use cable try and use hardline and don't ignore ground connections on both ends.

As you can see from FIG 2 bypassing is extremely important. I recommend as a bare minimum, the values outlined in FIG 2 or more if you so desire. There is no such thing as too much. There are well established guidelines by W6ORG (the bypass king), for video and rf bypassing on dc circuits...pay attention to them. Also make sure that the leads are bypassed as close to the body of the module as possible. Additionally, larger value electrolytics should be placed at the b+ and bias feed points.

On the test model, I used a 9 volt three terminal regulator for the bias voltage, it is important that this voltage stay below 10 volts, and the b+ stay below 14 volts or ...poof!

The unit is Available from: RF Parts Co. P.O. Box 700, San Marcos, Ca. 92069 619-744-0728 and costs about $89.00.

73's JOHN

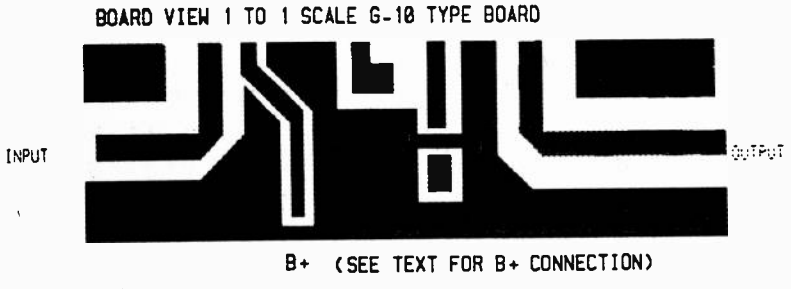
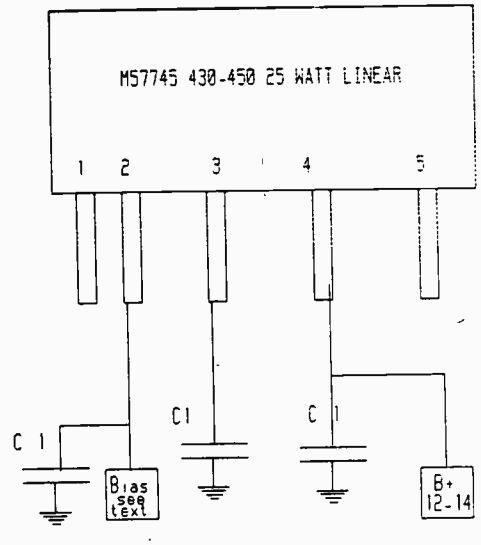


Fig 1

pin 1 Input Terminal
pin 2 Base Bias Terminal
pin 3 1st Stage dc Supply terminal
pin 4 Final stage dc supply terminal
pin 5 Output terminal
metal fin is ground



* C 1=.1,.01 AND 10 UF IN PARALLEL MOUNTED AS CLOSE TO MODULE AS POSSIBLE
* SEE TEXT FOR BIAS AND B+ SUPPLY BYPASSING

FIG 2

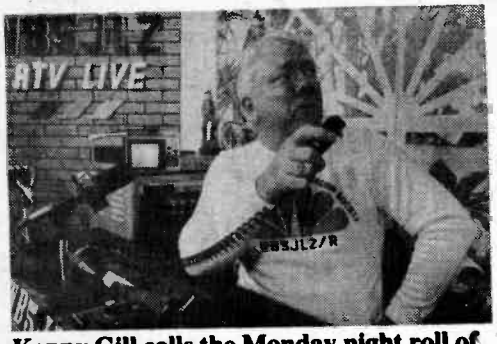
PEOPLE

Ann Landers 2C
Zodiac 2C
Business 7C

C

MORNING ADVOCATE Baton Rouge, Louisiana Friday, March 2, 1990

Hams Hitting TV waves, fully clothed



Kenny Gill calls the Monday night roll of the Baton Rouge Amateur Television Society.

By ED CULLEN
Advocate staff Writer

Amateur radio operators usually get signal reports from other Hams. Kenny Gill got a signal report from a teen-ager watching television.

Gill, the teen-ager reported, was coming in crystal clear — in his underwear.

These days, Gill makes sure he's fully clothed when he calls the Monday night roll for on-the-air meetings of the Baton Rouge Amateur Television Society (BRATS).

"I asked him if he had ATV (Amateur Television),' Gil says of the teen-ager. "He said, 'No, I'm getting you on Channel 57.''

As it happens, Channel 57 picks up BRATS' signal nicely if the viewer has a cable-ready television set or a cable black box. The set, however, must be connected to an outside antenna and not hooked up to cable.

A few minutes past 7 p.m., Wallace Allen checks into the BRATS net from The Pine Tree Capital of the World — eight miles north of Walker, 18 miles from Gill's ATV repeater atop the United Company II building on Essen Lane.

Owen White checks in from Denham Springs. White got interested in radio as a Civilian Conservation Corps Morse code operator in 1936. He's been a Ham since 1975.

Slow-scan Ham television signals, transmitted in the high frequency (HF) amateur bands, have been successfully transmitted across the Atlantic.

Ham television has been transmitted to Earth from space shuttles and from satellites built by amateur radio operators. The satellites are piggyback aboard military or commercial rockets.

BRATS operators transmit fast-scan television, which is very much like commercial television. Because of fast-scan's extremely wide bandwidth, maximum signal range is about 200 miles.

Power and antenna height, particularly antenna height, have a lot to do with signal range.

The ATV rigs of Gill and retired railroad engineer Hardy Prescott offer a study in contrast.

Hardy's transmitter puts out eight-tenths of a watt. That's sufficient to hit Gill's repeater which retransmits the signal at an effective radiated power of about 700 watts.

An overhead fluorescent lamp lights prescott's radio shack. Fellow Hams tease Prescott about the reflection off his bald pate.

Though the lighting in Prescott's radio room suggests the interior of a space capsule or deep-sea submersible, the quality of the picture he transmits is good.

Gill, on the other hand, transmits a picture — in color — as good as any commercial television station.

There is little about Gill's ATV room to suggest a Ham radio shack. Gill converted part of his attic to a small television studio.

Two 650-watt quartz television lights blaze from the blue walls opposite a talk show style desk. Gill, seated at the desk, has at his back a life-size photograph of an arched-window looking out on an imaginary garden.

Three television monitors peer doen from the wall. There's a remote-controlled television camera in one corner that Gill manipulates with a switch on the desk.

Showing other Hams on the network an ampmeter he's acquired, Gill holds up the amp with one hand. With his other hand, Gill uses the switch on his desk to make the camera in the corner zoom in for a tight shot of the meter.

BRATS has two remote cameras — one 460 feet up on the Capitol that could be used to monitor river traffic and one on United Company that Gill says might be used by the National Weather Service to look at cloud formations.

Gill says he's talked to the Civil Air Patrol about transmitting by ATV search pictures back to CAP headquarters.

The Amateur Radio Relay League's Luck Hurder in Newington, Conn., says the ARRL doesn't keep tabs on the number of ATV operators. Baton Rouge, with a large number of Ham radio operators, has only a dozen ATV operators, Gill says.

Cost of an ATV station varies with the quality of equipment and whether the gear is new or used. A good station can be assembled for less than $1,000, Gill says.

Gill, 54, who owns a Baton Rouge video and electronics school, is looking for a 1,000-watt commercial television transmitter to use in his ATV station.

That's a far cry from Gill's first radio as a boy growing up in Bunkie, a transmitter he built from a scrounged door bell.

Ron Matherne, an electronics technician at a plant down river, was once the lonely guy of Baton Rouge ATV.

As the first ATV operator in the city, Matherne had no one with whom to exchange signals. So, he keyed his transmitter, took a television set with converter to a friend's house and received a signal from himself.

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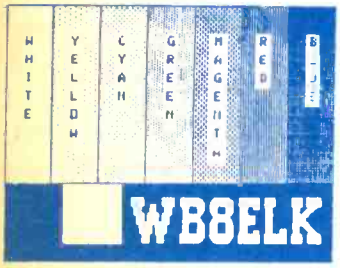

INTRODUCING THE

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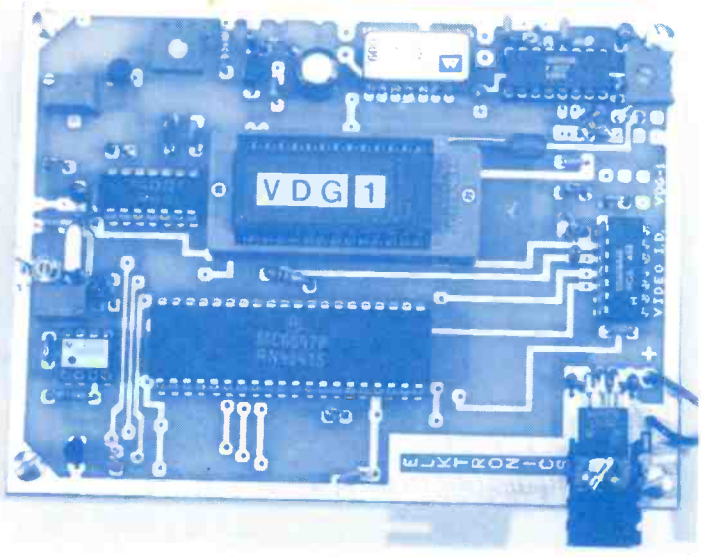
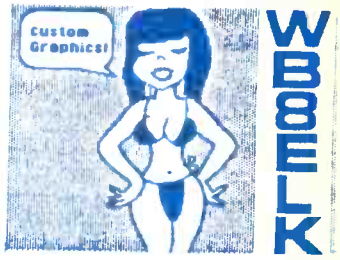
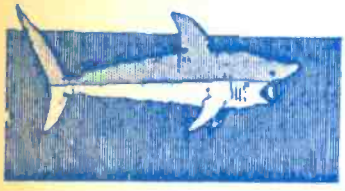




KA0JAW



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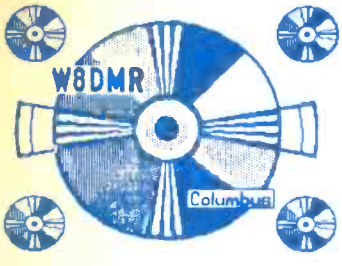

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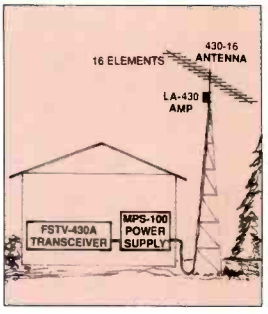
Add a new dimension to your amateur radio communications with AEA's Amateur Television (ATV) system. If you hold at least a technician-class license, you can transmit and receive live or taped audio and video Fast-Scan TV (FSTV) information that rivals broadcast quality. Now you can share more than conversation over the air with this new mode of "personal communications."



It's Easy and Inexpensive. If you have a video camera or camcorder and a standard TV set, you may already own the most expensive components of an ATV system. AEA's ATV system includes a transceiver and antenna. Simply connect the camera, TV and the antenna to the transceiver, and you're on the air LIVE with one watt P.E.P.! Your TV set will monitor your transmitted and received pictures. If you want to broadcast with more power, AEA also offers a 50 watt mast-mounted linear amplifier with power supply.

The FSTV-430A Transceiver features a low-noise UHF GaAsFET preamp with a typical noise figure of less than 1.5dB and a crystal-controlled or variable tuning down converter. Output is available on channel 3 or 4 for signal reception AND monitoring transmissions. Two frequencies can be selected from the front panel for transmission (one crystal is included). The AEA design is also optimized for superior video and audio quality without sync buzz even with weak signals. The FSTV-430A is the only transceiver you need to work ATV and it also allows you to use the same TV set to monitor your transmitted and received pictures.

The LA-430/50 Amplifier with Power Supply gives a boost to your ATV signal. It includes a 50W P.E.P. mast-mounted Linear Amplifier (**patent pending**) covering 420 to 450 MHz and a GaAsFET preamp which utilize the antenna feedline for DC power. The mast- mount eliminates the line loss between the amplifier/preamplifier and the antenna to improve both transmission and reception, and is the equivalent of a 100W amplifier in the shack with a 3dB line loss. The amplifier is housed in a weather-resistant alodized aluminum case. The MPS-100 power supply also provides a 13.6 volt output for the FSTV-430A.

What is the advantage of Vestigial Sideband (VSB)?

AEA's FSTV-430A Vestigial Sideband operation drastically reduces adjacent-channel interference. VSB requires much less bandwidth than existing double-sideband designs; it's the standard method of modulation required by the FCC for all U.S. broadcast TV stations. Similar in principle to SSB, VSB puts all of the audio energy and most of the video in ONE sideband instead of two. Using about half the spectrum space of competitive units, the FSTV-430A is the ONLY ATV unit that conserves spectrum space by using VSB. Even with AEA's LA-430/50 amplifier, one sideband is reduced more than 30dB. VSB presents an obvious advantage to the bandwidth-conscious ATV operator.

The 430-16 Antenna is a high-performance, computer-optimized yagi specifically designed for ATV operation. It features broadband frequency coverage from 420 to 440 MHz, 14.3dB gain, O-ring sealed connectors, 28 degree E plane and 32 degree H plane beam widths and 16 elements on a 10-foot boom.

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