

# AMATEUR TELEVISION QUARTERLY

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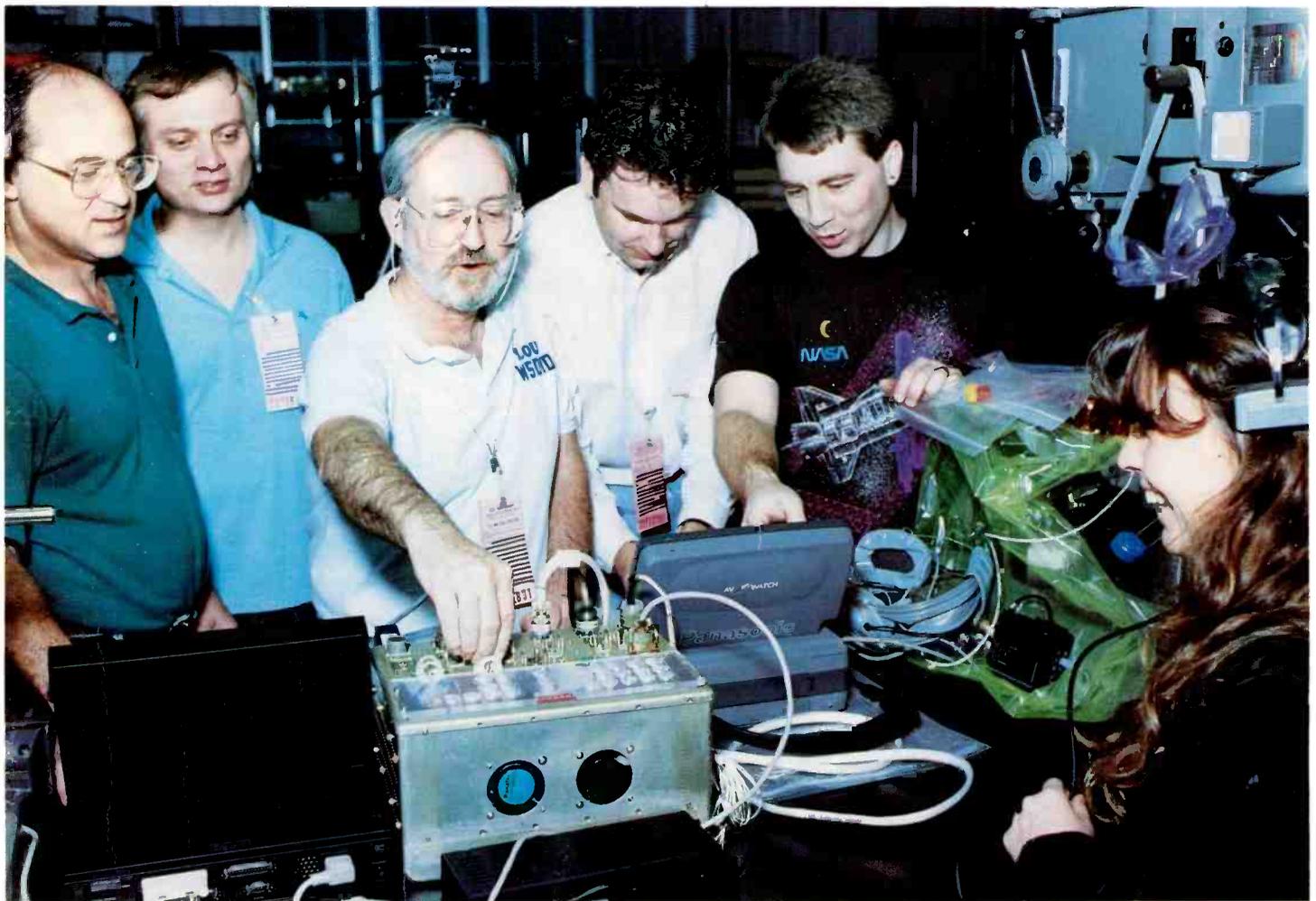
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- \*STS 37 ATV THE COMPLETE STORY**
- \*KC6A, N9AB, WA3NAN, WA4NZZ LIVE STS 37 VIDEO PIX**
- \*FRANKLIN HS COLOR ATV SPACE PHOTOS**
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FINAL CHECKOUT OF STS 37 ATV GEAR FOR SAREX. NASA Photo.



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FRONT COVER PHOTO  
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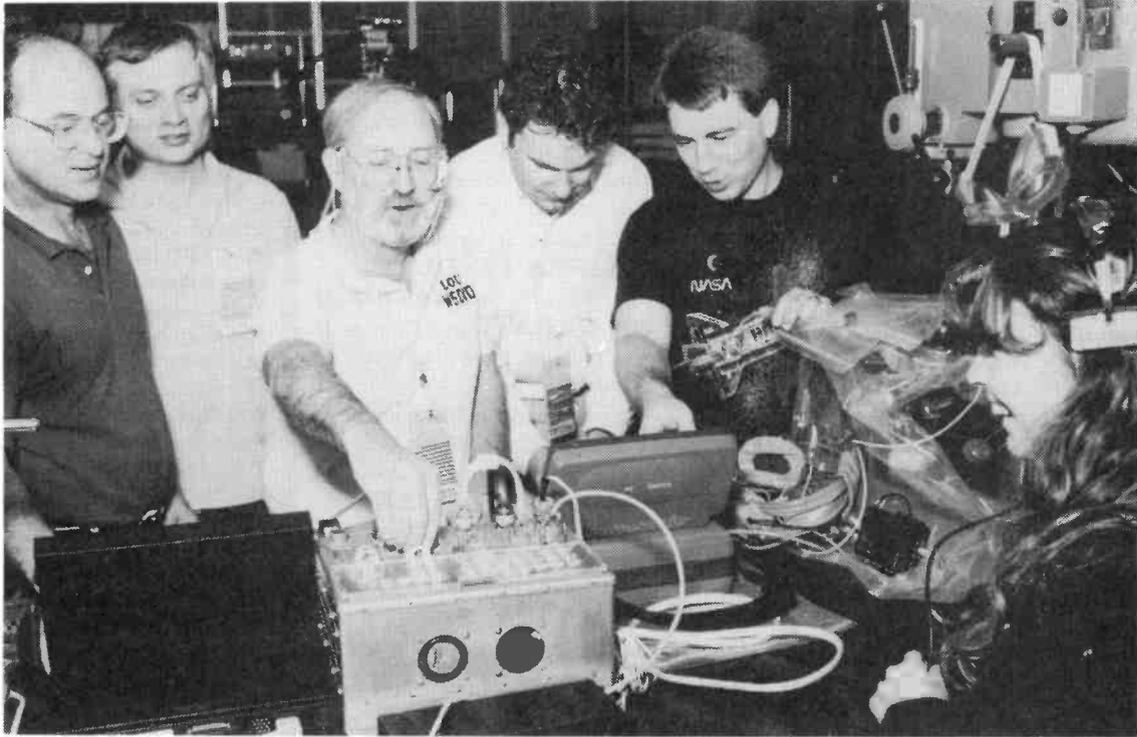
ATVQ is always looking for news, activities and technical material. Send all contributions to ATVQ, 1545 Lee St. #73, Des Plaines, IL 60018. Photos should be in black and white but color are acceptable. Diagrams should be in black ink and neatly drawn.

**ATV CONTEST**

The Central Indiana ATV and UHF club is sponsoring an ATV Cumulative contact contest. It starts Aug 1 and ends Sept 15. A photo of reception is required for qualification. For full details, send SASE to: Don Miller W9NTP, RR1 Box 95, Waldron, IN 446182 or call 317 525 6452.

# STS-37 Fast Scan TV Success!

*During last April's STS-37 shuttle missions, ATV reached new heights! Included as part of the on-board SAREX (Shuttle Amateur Radio EXperiment) equipment was a 70cm ATV receive converter and a camcorder. With the aid of a dual-band window-mounted antenna, the all-ham crew could not only communicate on 2 meter FM but watch UHF TV as well. Members of the all-ham shuttle crew were Ken Cameron KB5AWP, Jay Apt N5QWL, Linda Godwin N5RAX, Steve Nagel N5RAW and Jerry Ross N5SCW.*



Photos: TOP: Pre launch testing of SAREX equipment. L-R Kai KE4PT, Andy N9AB, Lou W5DID, John WB6DCN, Jerry KB5ARA, and technician Renee Wolf. BOTTOM: Astronaut Ken Cameron KB5AWP enjoying space ATV. Photos courtesy NASA.

# STS-37 Fast Scan TV Success!

A lot of preparation was involved in making this a successful experiment. Back in 1987, Andy Bachler N9AB discussed the possibility with Lou McFadin W5DID of the Johnson Space Center. As a result, the Motorola ARC (Illinois chapter) put together a proposal (built on a previous proposal by Art Anzic K8BVI) for a fast-scan shuttle experiment. Since a need had arisen for a new window-mounted antenna for the Shuttle, Andy N9AB and Jim Phillips at Motorola (Shaumburg, Illinois) designed and built a dual-band version that could operate on 2m as well as 70cm. Bill Bily WB9DIG built up a prototype downconverter (using parts of a Motorola UHF HT and a TV-IF recommended by Tom W6ORG.) Fred Reimers N9ATW designed a custom PC board for the final downconverter. A very compact downconverter with a direct video output was the result. With the addition of a Panasonic color LCD recorder, a complete Shuttle ATV receive station was ready to fly!

Since the bandwidth of a color ATV transmission exceeded the space uplink band segment on 70cm, a special authorization (STA) was needed from the FCC. Six selected uplink sites were given the go-ahead for the attempt. The six sites were: Jim Steffen KC6A in Long Beach, California; Andy Bachler N9AB with the Motorola ARC in Schaumburg, Illinois; the Marshall Space Flight Center ARC WA4NZZ in Huntsville, Alabama; the Johnson Space Center ARC W5RRR in Houston, Texas; the Goddard Space Flight Center WA3NAN in Greenbelt, Maryland (using the 40 foot dish at the U.S. Naval Academy); and Kai Sewiak KE4PT from the Motorola club in Ft. Lauderdale, Florida.

Just to give you an idea of some of the massive efforts involved with these uplink sites, take a look at some of the equipment assembled at a few of the sites:

Jim Steffen KC6A - A 600 watt PEP ATV transmission using a K2RIW-style amplifier fed into a single circularly polarized antenna. Jim had a separate 25 kHz wide FM transmitter operating on the audio sound subcarrier frequency to a quagi. Although the astronauts didn't hear any sound during the mission, Jim's sound came through beautifully on the video tape recorded on the Shuttle.

Andy Bachler N9AB - A homebrew ATV kilowatt feeding a 16-bay moonbounce array of quagis. Andy was the furthest north of any of the uplink sites and as a result had the most distance to cover (at times over 1500 miles away).

Marshall ARC WA4NZZ - A P.C. TC-70 to a Mirage D-100, which was then amplified by a 500 watt Motorola amplifier. The antenna system was a 4-bay array of circularly polarized helixes built by club member Gene Marcus W3PM. Total ERP - 30,000 watts!

Goddard ARC WA3NAN - Henry amplifier into a 40 foot dish (at the U.S. Naval Academy in Annapolis, MD). Bob Bruninga WB4APR manned the dish for the uplink attempt. He needed extremely accurate Keplerian elements since only a few seconds error would cause him to miss the Shuttle due to the tight beamwidth of the dish!



N9AB's signal as received on the space shuttle. This (and similar photos in this issue) were processed by the JPL from the video tape recorded on the space shuttle. Playback error caused the bend at the top of the frame.

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# STS-37 Fast Scan TV Success!

## Live Video Uplink

Shortly after liftoff, the uplinks sites got ready for the big attempt. The first try would occur on orbit 16 on Saturday morning. A special phone bridge was established between the uplink sites to coordinate transmissions as well as using a non-standard 2m frequency to communicate directly with Ken KB5AWP on-board the Shuttle. The big pass came up over the horizon, but Ken's 2m transmissions were very weak, and Ken didn't acknowledge any reception from any of the uplink sites (analysis of the actual video tape from the Shuttle do show some indications of video reception during this pass - mostly sync bars and some brief locked pictures: N9AB, WA3NAN and KE4PT can be seen during this pass). Apparently the shuttle was orientated in a position that blocked ground communications. Although disappointed with the first efforts, everyone anxiously awaited the next try on Sunday morning during orbit 32.

The first station lying in wait that Sunday morning was Jim Steffen KC6A in Long Beach, CA. Jim keyed up the ATV transmitter just before AOS (Acquisition of Signal) and waited for Ken KB5AWP to respond on 2m FM. Shortly after the AOS window had started, Ken announced that he had a good picture! Jim transmitted live video and then sent up a video taped greeting. Ken reported good black and white reception during most of the pass. The ATV uplink experiment was a success!

Next up was the Marshall ARC WA4NZZ. Once Ken KB5AWP reported that he was receiving good video, they sent up live shots of the ecstatic club members. Ken reported great video at a P-4 level during most of the uplink. Another success! The Marshall had to do some late night engineering before the Sunday morning pass. When doing their final checks, they noticed that the power started dropping. Several transistors in the 500 watt amplifier had died! They performed some surgery and stole good transistors from the driver stage. They used a Mirage D-100 for the driver stage instead.

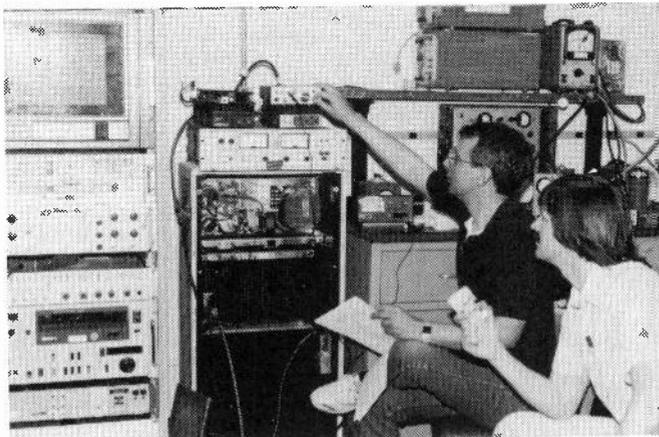
Andy Bachler N9AB next sent up a video tape of the actual liftoff of the Atlantis. This was the first time any shuttle crew was able to watch their own launch while still in orbit!

Due to the great success of the Sunday morning pass, an unscheduled attempt was arranged for Monday morning. Andy N9AB first uplinked a video tape of a local school's shuttle simulation (the Millburn School in Wadsworth, Illinois).

Next the Goddard club uplinked a nearly snow-free COLOR signal up to the Shuttle. Bob WB4APR hit the Shuttle dead-on with the U.S. Naval Academy's 40-foot dish. They didn't make it during the previous day's schedule since he was 9 seconds off in his tracking. That doesn't seem like much of an error until you consider the beamwidth of a 40-foot dish!

Weak video was received from both Kai Sewiak KE4PT in Fort Lauderdale and from the Johnson Space Center ARC W5RRR. The Johnson effort was put together by T. Brad Smith KA5CDJ and others in the JSC club.

Future SAREX packages may include an enhanced ATV receive station. Improvement to the uplink sites may allow future astronauts to receive snow-free television while in space.



Top left: Marshall ARC as they sent their live video to the shuttle. (See their story in this issue for how the signal was received) Bottom left: Club members after fixing the "Mother of all amplifiers" test their equipment. Above right: WA3NAN, Goddard Space Center uplink video as sent.

# STS-37 Fast Scan TV Success!

## Live Video Uplink

Portions of the 2m downlink (April 8th at 1226 UTC) as recorded by Bob WB4APR at the U.S. Naval Academy/Goddard site:

Shuttle: OK, We're over Florida moving at about 25,000 feet per second.

WA3NAN: WA3NAN is uplinking Fast-Scan video.

Shuttle: Roger, I see N5AB now on video.

Shuttle: Roger, it's November Niner A B.

Shuttle: N9AB... Good picture of an operator and some students it looks like.

Shuttle: No, we've never had sound and the color's not too good.

Shuttle: Yeah, You'll have to check with SAREX control at Houston for a new set of keps [Ed. Note: Keplerian elements for tracking]. We have maneuvered.

Shuttle: OK, Picture's breaking up ... A Big Dish Antenna!

WA3NAN: The big dish is WA3NAN via the Naval Academy dish.

Shuttle: OK, N9AB was also transmitting. There may be some interference. Let's switch to the Naval Academy.

WA3NAN: Ok, Naval Academy uplinking a picture of the dish...we're pointing it at you right now.

Shuttle: OK, Is that a gun mount antenna?

WA3NAN: No, its a surplus NASA low earth orbiting tracking antenna.

Shuttle: OK, I've got some horizontal lines in the picture... Now it's better.

Shuttle: YEAH! I've got COLOR!!!

Shuttle: That's a GREAT picture!

WA3NAN: We had our element set off by 9 seconds yesterday so we missed you completely. (we erroneously entered -6 instead of +2.8)

Shuttle: Yeah, yesterday was a little bit busy for us.

WA3NAN: Anybody else want to uplink at this time? Are you seeing audio also?

Shuttle: No. No audio.

WA3NAN: Aw, Shucks...

Shuttle: Well, send me some more, let me check it.

WA3NAN: That's the end of my audio. Let me rewind a little bit. OK, I'm playing again.

Shuttle: OK, I don't hear anything.

Shuttle: But you do have good color. I'm getting a lot of good picture quality. We're getting pretty far out now.

WA3NAN: QSL, Did you record this, I hope?

Shuttle: Yeah, I sure did.

WA3NAN: Fantastic, 73s and good luck on your mission.

Shuttle: OK, Thanks. I enjoyed working with you. If you want to hit us, we'll try and have the fast-scan TV up for most of the CONUS (Continental U.S.). I can't guarantee it.

WA3NAN: OK, See you in 100 minutes.

Shuttle: OK, When we get into EVA, I really get busy and everybody else gets busy. So it's pretty hard to keep the radio set up.

WA3NAN: QSL, WA3NAN.

Shuttle: WA3NAN, Nice work.

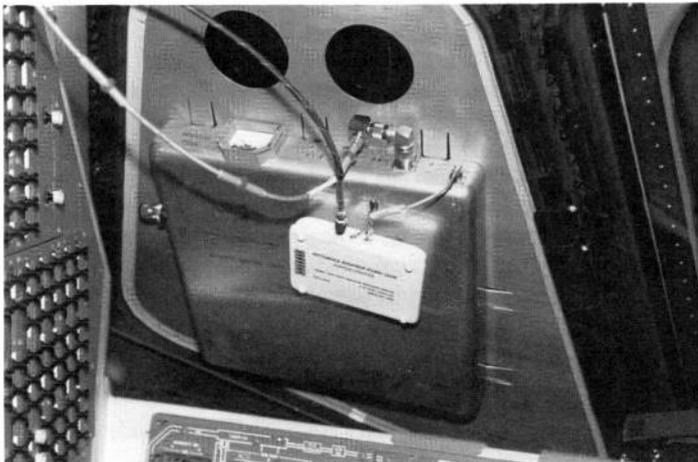


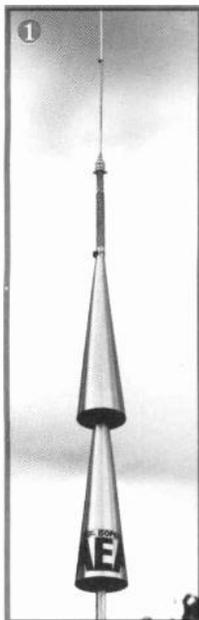
Astronauts Linda Godwin N5RAX and Jap Apt N5QWL mug for the camera while working in space, awaiting their turn at the ham radio equipment.

# STS-37 Fast Scan TV Success!

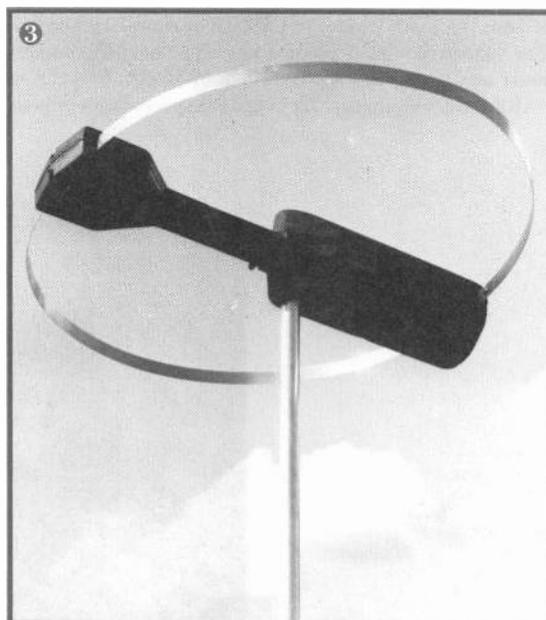
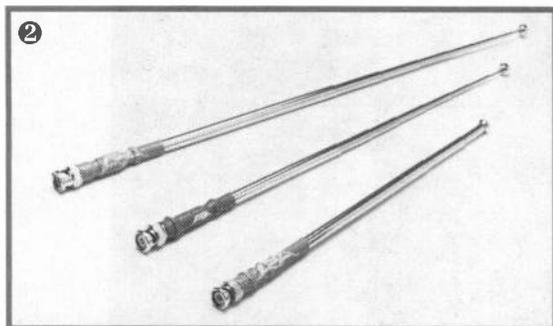
Live Video Uplink

Photos: Top: WA3NAN's video in COLOR as received on the space shuttle.  
Left: The window mounted antenna and equipment in operating position.  
Note meter and Motorola ARC ID. Photo by NASA. Right: Ken KB5AWP  
using SAREX video equipment on board the space shuttle. Photo by NASA.





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Power Rating	1.0 kW	1.0 kW	1.0 kW
Length	125.5" (3.2m)	79.25" (2m)	46" (1.2m)
Wind Area	< 1 ft <sup>2</sup>	< .75 ft <sup>2</sup>	< .2 ft <sup>2</sup>
Max. Mast OD	1.25" (32mm)	1.25" (32mm)	1.25" (32mm)
Min. Mast Length*	8.0' (2.4m)	5.25' (1.6m)	6" (50mm)
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# TECHNICAL INFO ON KC6A'S OPERATION DURING STS37 ATV SAREX

**Tom O'Hara W6ORG  
ARRL Technical Advisor for ATV**

*This information is being provided in the interests of accuracy to document the historic event of the first fast scan amateur television received by the Space Shuttle to those who will be writing articles for the various amateur publications. Although none of the ATV stations were acknowledged as having been seen on Saturday, viewing the video tape returned to Earth would later show that all stations were received by the space shuttle. The position of the antenna in the window of the Shuttle was not favorable. Spirits were dampened but Jim and his crew were ready for the next scheduled try the following morning.*



**KC6A Jim Steffen as received by the STS 37 Space Shuttle.  
Thanks to Gerry Creagen N5JXS of NASA JPL for this photo**

# KC6A LIVE VIDEO TO STS 37

ATV transmission began at approximately 14:34 UTC Sunday, April 7, and was acknowledged by Ken Cameron, KB5AWP, about a minute later on 2 meter FM. KC6A became the first ATV received by a Space Shuttle at that moment - Jim's excitement was clear in the video and audio recordings. Jim transmitted a prepared video tape of his station and those helping him out with the equipment. KB5AWP acknowledged seeing the tape and Jim talking to him live from his couch. Pictures were described as P4 (a little snow) and little color. Jim asked Ken if he copied sound subcarrier. The reply although negative was found to be present on the Space Shuttle tape - speculation was that the audio was not connected to Ken's headphones at the time.

The prepared tape was made and edited by Steve Grimm, WB6SLR. Copies were given to various news media that ended up using it on the local Sunday evening news. The Los Angeles CBS, NBC, ABC affiliates and one independent broadcast the story. If anyone is making up a complete STS37 tape they can contact Jim to arrange a tape swap and editing. Stories and pictures also appeared in the Los Angeles Times and Long Beach Press-Telegram.

The farthest distance was 2415 km (1497 miles) and 900 km (558 miles) the closest according to the Instant Track program from AMSAT. During the pass the beam swung from 100 degrees to 242 degrees and the maximum elevation was 27 degrees.

Equipment: The calculated EIRP of KC6A's video is 12 KW and the separate sound transmitter 1.5 KW. The video transmitter consisted of a PC Electronics 1.5 Watt TC70-1 ATV transceiver driving a Mirage D26N amplifier. The output of the Mirage is attenuated through a length of coax to drive a home brew K2RIW type amplifier at 20 watts. The pair of 4CX250's put out 600 watts. The antenna was a KLM 435-18C circular polarized beam feed with hard line (estimate 1 dB loss).

The sound transmitter was an old resurrected tube type RCA 4 Fleetline FM transmitter modified for the wider 25 kHz deviation and pre-emphasis. It drove a Mirage D1010N to about 50 watts. The antenna was a horizontally polarized home brew Quagi.

Of significance is that Jim only had a month and a half notice to prepare for this adventure. After 2 years of trying to work with the JPL Amateur Radio Club, W6VIO, on the project, I received a letter dated February 4, 1991 that the club board decided not to participate. They did not feel the signal margins and chance of success were worth any effort on their part. After discussing this depressing turn of events with Andy Bachlor N9AB and Lou McFadin W5DID, they felt that a station was desirable in Southern California and could I come up with one right away. Any new station would have to be added to the STA right away and time was short.

I knew Jim, KC6A, had the biggest amplifier in the area and a good unobstructed antenna view to the south, so I called him to see if he was interested. He agreed and found that all he needed was the proper crystal, which I had as part of the gear intended for W6VIO, and an antenna. I loaned him both items but found that the KLM 435-18C, while rated at 1000 watts was

actually rated at 250 watts if you read the fine print about using the circularity switcher. A call to KLM revealed that there was no 1000 watt balun available for the antenna and that they had never had such a request. It seems that satellite users are the only ones that buy it and never run over 250 watts. So what to do? The 250 watt limit is actually due to the relay contacts so we simply soldered them over. Pulling the relay out and soldering jumpers would have changed the phase too much. It worked when full power was applied.

Jim had a fine crew of hams to help him with the event. Dave Gutierrez, WA6PMX, coordinated on the telephone with NASA the ATV transmitter on and off times with the other SAREX ATV stations. Doug Gilbert, WA6LXB, manually stepped the rotors every 17 seconds to track the Shuttle in 10 degree increments. Gene Stokes, WT6U, was the live camera man in Jim's living room. Will Anderson, AA6DD, monitored the transmitting gear and kept the tube amp in tune in the ham shack in the next room.

Jim was also monitoring the Space Shuttle video and audio over the K6KMN ATV repeater located at Mt. Wilson, 6000 ft above Los Angeles. The NASA Select video and audio is routinely put out over the LA area on this 1241.25 MHz ATV repeater. Shuttle audio and video can be retransmitted over amateur radio to other amateurs per a waiver of Section 97.113 adopted September 6, 1983 requested by the JPL ARC and Kettering Medical Center ARC.

In addition to my contacting the ARRL to have KC6A added to the Special Temporary Authority waiving Section 97.209 of the rules, Jim had to immediately go to the local FCC and request a waiver to Section 97.61(b)(7) and 97.422 to run more than 50 watts out of his amplifier or more than 611 watts ERP. The OK came just a week before launch. A waiver to the Amateur Satellite Service Rules was necessary because the color and sound subcarriers of the video fall just outside the 435 to 438 MHz segment in 97.415.

Jim is writing up his personal experiences in consultation with Wayne Overbeck, N6NB, and will be submitting it to QST shortly. He has video tape and still photos which you may contact him about. Jim Steffen, KC6A, 6831 Espanita St., Long Beach, CA 90815. Home phone (213) 493-2169 or Work (Xerox Engineer) (213) 333-5561.

Personally I am quite proud of Jim and his crews' effort and achievement with such short notice. It was in the true spirit of Amateur Radio for an individual to make such a try with little assurance of success.

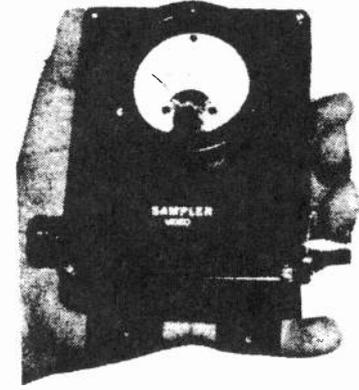
I hope there will be two way ATV on future Shuttle missions to contact earth stations and MIR. The problem is to get enough ERP by antenna means rather than high power. A high power amp might be too impractical in size, power draw and possible RF swamping of other Shuttle equipment.

If you have any technical questions, please call or write. Tom O'Hara, W6ORG, ARRL Technical Advisor for ATV and Spectrum Management, 2522 Paxson Lane, Arcadia, CA 91007, (818) 447-4565 Work, (818) 447-0489 FAX.

**DESCRIPTION**

THIS INTERDIGITAL FILTER IS OF THE SEVEN POLE DESIGN. THIS MEANS THERE ARE SEVEN TUNEABLE RODS INSIDE THE BOX. THE FREQUENCY CAN BE ADJUSTED APPROXIMATELY 6 MHz. ADJUSTMENT IS ACCOMPLISHED BY THE ADJUSTING SCREWS AT THE END OF EACH ROD. INSERTION LOSSES OF LESS THAN 1 DB HAVE BEEN OBTAINED WITH THIS DESIGN. OUT OF BAND ATTENUATION WAS >80 dB +/- 12 MHz FROM THE VSB PASSBAND. ATTENUATION AT THE LSB SOUND SUBCARRIER FREQUENCY WAS 30 dB.

VSB FILTERS 439.CH MHZ. \$150  
910.25 MHZ. \$145



**PAULDON ATV VIDEO SAMPLER**  
Model PD-VD-1 \$65.00

ATV  
VIDEO SAMPLER

This unit picks up your transmitted ATV signal by sampling the transmission line with negligible insertion loss. It uses 2 "N" connectors for input and output connections. A BNC is used on the video output. The detected output is connected to your monitor and scope so that you may accurately adjust your transmitter for proper video & sync levels. We provide two different models. Both have relative power output meters, but one has a greater accuracy. There are 2 PC controls, one for video level and the other for power output. This beats an on the air adjustment.

Special Prices on Many Products

WARRANTY IS 1 YEAR ON LABOR AND 6 MONTHS ON PARTS (SEE OUR GUARANTEE FOR THE EXCEPTION). YOU MAY RETURN ANY UNIT WITHIN 30 DAYS IF YOU ARE DISSATISFIED OR IF THE UNIT DOES NOT PERFORM TO YOUR SATISFACTION.

**BRICKS:**

SAU-11 900 Mhz. on wired P.C. Boards	\$25.00
M57762 1.2 Ghz. \$72.00; on wired P.C. Boards	99.00
SAU-4 440 Mhz. on wired P.C. Boards 18W.	85.00
M57745 440 Mhz. on wired P.C. Boards 35W.	120.00
SAV-7 144 - 148 Mhz. wired P.C. Boards 35W.	89.00
M57727 2 mtr. Linear wired P.C. Boards 35W.	98.00

**POWER AMPLIFIERS:**

144 - 148 Mhz. PD-144 N F.M. 35 watt output (2W. in) T/R	\$109.00
SAME with preamplifier	129.00
PD-144N-1 Linear 35 watt output T/R	125.00
PD-144N-2 F.M. 60 watts (2W. in) T/R	159.00
WITH PREAMPLIFIER	\$179.00
225 Mhz. PD-220N F.M. 35 Watts output (2W. in)	123.00
426 - 450 Mhz. PD-440N Linear 18 watts output (2W. in)	119.00
PD-440N-1 Linear 35 Watts out (2W. in)	135.00
Same with Preamplifier	173.00

NEW: Linear P.A. (Mini) 100MW. = 1W. & 1W. = 6W. \$55.00 - \$65.00

ABOVE FOR 70 Cm. Band. LETS YOU GET FULL POWER FROM YOUR LARGE P.A. AS AN IN BETWEEN AMP. PRODUCES GOOD VIDEO & COLOR ON ATV.

902-928 Mhz. PD-900 DOUBLER 70 CM. = 33CM.	\$45.00 & \$85.00
Above 1/4 W. in 1/4 W. or 1 W. out.	
PD33VLP mini Amplifier (1/4 W. = 1.5W.	\$49.00
PD-900N F.M. 1/4 W. = 10W.	\$50.00 or \$65.00
Above may be used on ATV with 2 to 3 watts output.	
PD-33LP 1W. in = 6-7W. output	\$99.00
PD-33HP 5 W. in = 16W. output	119.00
PD-33LHP 1W. in = 17W. output	210.00
1.2 Ghz. PD-1200N 1W. in = 18W. output	\$149.00 & \$165.00
PD-1200TR 1W. in = 16W. output T/R	195.00
PD-1200N-1 2W. in = 36W. output	285.00
Above P.A. has a P.C. Board Combiner	

2 mtr. & 70 CM  
**DUPLEXED POWER AMPLIFIER:** 35W. out on 144-148 Mhz. \$225.00  
 18W. out on 440Mhz.  
 Input power 2 watts.

**DUPLEXERS:** 70 CM & 2 Mtr. (100W.) \$25.00  
 Attenuators: (ALL BANDS) R.F. 6.00

**ATV SAMPLERS:** \$45.00 \$60.00 \$65.00  
 FM Audio Transmitters & Receivers (Single Frequency)  
**TRANSMITTERS** 1W. output 902-928 Mhz. less xtal \$239.00  
**RECEIVERS FOR 902-928Mhz.** less xtal 179.00

KITS FOR 2 METERS. INQUIRE



210 Utica Street Tonawanda, NY 14150 (716) 692-5451

**PREAMPLIFIERS**

PD-144E is a 144 to 148Mhz. dual gate low noise preamplifier (0.6 - 0.7db.) with a gain between 18 & 20db. It uses a NEC 41137 or equivalent transistor. It has a tuned input only, using 2 ceramic capacitors. The drain output has a load resistance and a cap. output. This gives a low noise performance. The unit comes with either BNC or SO-239 connectors. Supply voltage should be between 12 and 13.8 volts. It has a 5 volt regulator in the unit and is diode protected. Antenna input is also protected by reverse diodes. \$41.00 & \$46.00

PD-144TR A T/R switched unit is also available and will handle a max power of 35 Watts. \$69.00

PD-144TR-L is a preamplifier which will handle 100 watts through and has diode protection during the relay switching time. Grounded relay contacts are in the unused poles while the preamplifier is in service. The preamplifier is automatically switched out of the circuit when RF is detected during transmission time. Most of the units have a 1 to 1.5 second delay unless you desire fast switching service. It is in a wx resist painted diecast box with installation for a connector down position to help reduce contamination. The box is sealed so that water should not be a problem. SO-239 connectors are normally used, but "N" may be requested. We custom build the mounting bracket and clamp so that it can be either mast or boom mounted.

FOR VOLTAGE FEED THRU COAXIAL CABLE OR F/T CAP. CONNECTION \$129.00

PD-220E for the 220Mhz. band is the same as PD-144E \$39.00 & \$44.00

PD-440S 70cm. 426 to 450Mhz. preamplifier is a SINGLE GATE type using either a NEC 2SK-571 or a Mgf 1302 transistor. Noise figure is 0.6db. and has a gain of 16db. or better. It operates from a 12 to 13.8 volt supply, is diode protected and has a 5 volt regulator for stability. The source leads are by-passed with disc capacitors and the input uses a high "Q" piston Trim Pot. The output is not tuned so that the noise figure is consequentially low. A Toroid is used in the output, with capacitor coupling to the output. In this model either BNC or "N" connectors are used. \$49.00 & \$51.00

PD-440TRL is a tower mounted 70CM. pramplifier whose description is similar to that of the PD-144TR-L except has "N" connectors.

FOR VOLTAGE FEED THRU COAXIAL CABLE OR F/T CAP. CONNECTION \$129.00

PD-900 is a 902-928Mhz. preamplifier with a noise figure of 0.6 to 0.7db. and a Gain of 14 to 16db. With BNC. \$60.00  
 "N" Connectors 68.00

PD-900TR is a R.F. sensed preamplifier and can be transmitted through with a maximum power of 20 Watts. \$119.00

PD-1200 and PO-1200. SAME AS THE PD900) \$60.68 & \$119.00

PD-2300 is for the frequency range of 1.8-2.4Ghz. \$72.00  
 No T/R Switching Capability.

FOR ADDITIONAL INFORMATION SEE CATALOG



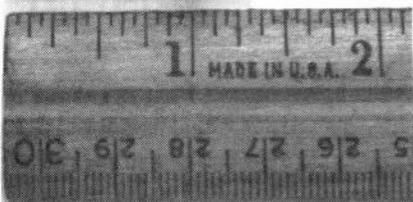
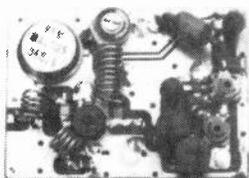
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## TWO NEW MODULES FROM P.C.

### MINI TRANSMITTER BOARD AS INTRODUCED AT DAYTON



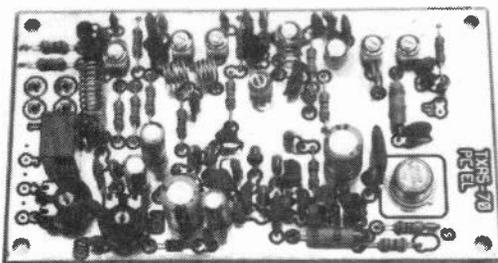
#### MICROTEK ATVM-70 Mini ATV Xmitter Board.....\$119

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

### SORRY, NO MORE TXA5-5 ATV EXCITERS!

#### TXA5-70 70cm ATV Exciter Board.....same \$89

Yes, we have finally retired the TXA5-5 work horse after 20 years. It, along with the PA5, got may of you on ATV. The new TXA5-70 is actually the TXA5-5 re-layed out on a smaller 2.25 x 4 inch board with a few minor improvements. If your old board is working OK, no need to replace it with the TXA5-70 until it quits, you have a -4 or earlier board without 2 freq. or sync stretching, or you want to re-package it. The TXA5-70 will now not only allow building a smaller 10 Watt basic module ATV transmitter, but give two frequency capability for low power portable or R/C applications. Weight is 2 oz. Requires 12.0 to 14.0 Vdc at 70 ma. Nominal 80 mw power output. One crystal included, add \$15 for second crystal. 426.25, 427.25, 434.0 and 439.25 crystals stocked. 421.25 also available if a VSB filter is used in the antenna line for a repeater transmitter.



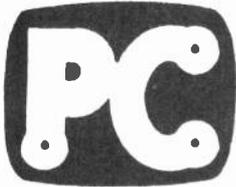
Call or write now for our latest Catalog. We are your one stop for all your ATV needs for the 400, 900 and 1200 MHz amateur bands. Value plus quality from 30 years in ATV.

Transmitting equipment sold only to licensed radio amateurs varified in the Callbook or send copy of new license.

7/91

#### NOW YOU CAN SEE THESE DEALERS FOR THE 70cm TC70-1d TRANSCIVER, TX70-1 TRANSMITTER & TUNEABLE DOWNCONVERTERS FOR ALL THREE BANDS:

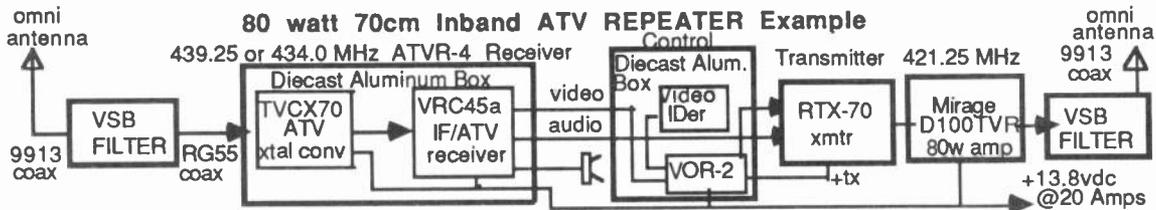
A-Tech	Bill or Tony	2210 Magnolia Blvd	Burbank	CA	91506 (818) 845-9203
The Base Station	Art	1839 East ST.	Concord	CA	94520 (415) 685-7388
IRC	Juan	5001 NW 72nd Av	Miami	FL	33166 (305) 594-4313
Honolulu Electronics	Richard	819 Keeaumoku St	Honolulu	HI	86814 (808) 949-5564
Stewart Electronics	Dale	1411-C 1st Capital Dr.	St. Charles	MO	63303 (314) 949-8890
Oklahoma Comm Center	Glen	9500 Cedar Lake Av	Oklahoma City	OK	73114 (800) 765-4261
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ELECTRONICS

READY FOR AN ATV REPEATER OR LINK IN YOUR AREA?

WE HAVE THE MODULES AND SOURCES FOR INBAND OR CROSSBAND



Select an ATVR Receiver & 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. Ask for a copy of our ATV Repeater article before you start to do it right the first time and also listed are recommended sources of filters, antennas, IDers, etc. Most can put together a good working ATV repeater for under \$2000.

**TRANSMITTERS** ready to go in a 7.3x4.7x2 die cast aluminum box for tight RF shielding. >1 Watt p.e.p. output for proper drive to companion amplifiers. Adjustable sync stretcher. Independent mic and line audio inputs. Requires 13.8 Vdc at 500 ma.

- RTX-70 specify repeater or link output frequency, 421.25 MHz most popular for inband output.....\$299
  - MIRAGE D100ATV-R 90 Watts p.e.p on ATV continuous duty 70cm repeater amp.....\$499
  - RTX-33 specify frequency - 923.25 MHz is the most used crossband repeater or link frequency.....\$329
  - RTX-23 specify frequency - 1253.25 MHz best first repeater output crossband freq., then 1277.25 MHz.....\$329
- We suggest Downeast Microwave for 900 and 1200 MHz repeater amps to match our transmitters.

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

- ATVR-4 specify frequency - 439.25 or 434.0 most popular for inband or crossband.....\$299
- ATVR-9 specify frequency - 910.25 most popular, 923.25 also available.....\$309
- ATVR-12 specify frequency - 1253.25 link, 1277.25 or 1289.25 rpt input.....\$329

**VOR-2 Video Operated Relay board...\$45**, keys RTX upon detection of horizontal sync plus 10 min. & end of transmission momentary relay for switching to video ID to meet FCC regs. See review in July 91 73 Magazine page 26.

**LMB CAB 247** die cast aluminum box. Great for housing VOR-2 and video ID boards.....\$20

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

- TVC-2G tunes 420-450 MHz down to TV ch 2, 3 or 4. Wired and tested board, put in your own cabinet..\$49
- TVC-4G ready to go in a cabinet with AC to 12V wall plug supply - contains TVC-2G.....\$89
- TVC-9 tunes 902-928 MHz down to TV ch 2, 3 or 4. Wired and tested board, put in your own cabinet...\$59
- TVC-9G ready to go in a cabinet with AC to 12V wall plug supply - contains TVC-9.....\$99
- TVC-12G tunes 1240 to 1300 MHz to TV ch 7 or 8. In cabinet with wall plug AC to 12V supply.....\$109

**ANTENNAS**

- 440-6X KLM 8.9 dBd gain 420-450 MHz 6 el beam. 28" boom, end mounted.....\$59
- 440-10X KLM 11.2 dBd gain 420-450 MHz 10 el beam 64 " boom, end mounted.....\$72
- 440-16X KLM 14.2 dBd gain 420-450 MHz 16 el beam 10.5 ft boom, center mounted.....\$129
- 3318LYARM Downeast Microwave 14.2 dBd gain 902-928 MHz beam. 6 ft boom, end mounted....\$82
- 2424LYRM Downeast Microwave 16.2 dBd gain 1240-1300 MHz beam. 6 ft boom, end mounted..\$82

# STS-37 SAREX ATV

*Members of the Marshall Amateur Radio Club, Huntsville, Alabama, successfully made history Sunday, April 7, 1991, by sending fast scan TV to a U.S. spacecraft. Astronaut Ken Cameron, KB5AWP, picked up the video from the Huntsville club station, WA4NZD, aboard space shuttle Atlantis flight STS-37. Several of the Marshall Amateur Radio Club members are also members of TVATV (Tennessee Valley Amateur Television) which operates an inband ATV repeater in the Huntsville area.*

Once Astronaut Cameron radioed he was receiving video of the call sign, the Huntsville hams switched on a video camera and sent the shuttle live shots of the ecstatic hams themselves. There were some happy hams this Sunday morning.

Basic equipment used was a PC Electronics 70-1-d 70 cm transceiver. The one watt of video from the PC was then amplified by a Mirage D-100, which was in turn amplified by a 500 watt Motorola amplifier. The 500 watt signal was fed into a four bay circularly polarized helical antenna built by a club member, Gene Marcus, W3PM. Gene is also president of TVATV. The antenna boosted the system power to about 30 thousand watts ERP.

Even though the ATV experiment went off fantastically and Ken reported back he was receiving a great P-4 (near perfect!), the night before all seemed lost. The MARC members were making some final checks when power started dropping and the picture started going to nothing land. Yep, several transistors in the Motorola amp were dying. At that point it was decided to steal good transistors from the driver stage, put them in the final stage and use a 100 watt Mirage as the driver.

As they say, "All's well that ends well", and this ham project ended well. Many thanks to the folks involved with SAREX and to those terrific hams in space!

See you on the radio! 73, KK4HF.



# MARSHALL AMATEUR RADIO CLUB STS 37 LIVE ATV SUCCESS



Ed Stuka W4QAU and Gene Marcus W3PM outside Marshall Amateur Radio Club. Four bay circularly polarized 70 cm antenna used to contact shuttle Atlantis with ATV. Gain is about 20 dB.



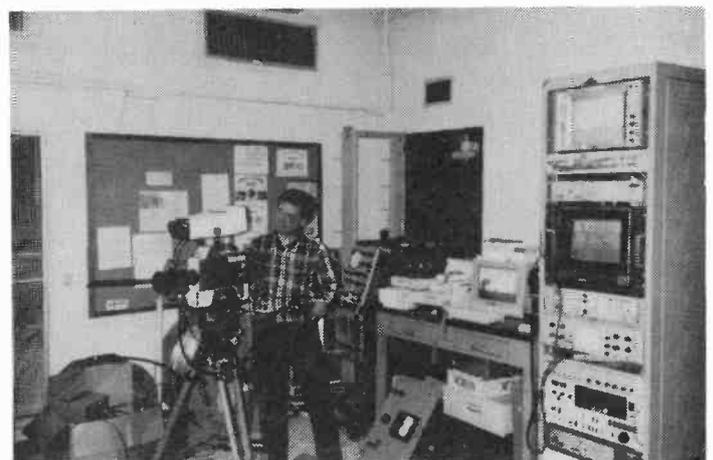
Split screen of Amiga computer (top 1/4) and live camera shot of club sign on wall.



A wave seen in space. L-R: Tim N8DEU, Don N4MSN, Larry WA4CAX, Terry NZ8C, Ed W4QAU. Seated: Randy KN4QS.



MARC members L-R: Ed Stuka W4QAU, Don Hediger N4MSN, Eddie Crawford WA4QKC, Gene Marchs W3PM, Terry Jones, NZ8C, Tim Cunningham N8DEU, Randy Galloway KN4QS, Larry Savage WA4-CAX, Dick Christiansen KK4HF. Photo by John N5AYD

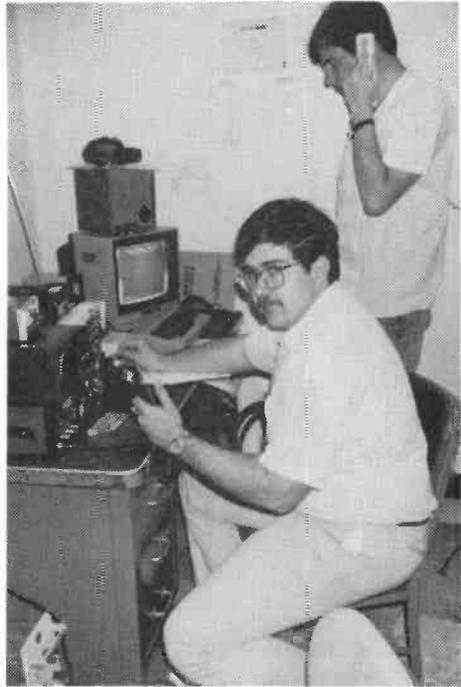


Ham behind the camera. Dick Christiansen KK4HF aiming at Huntsville hams. Note Amiga computer and video rack in background. W3PM

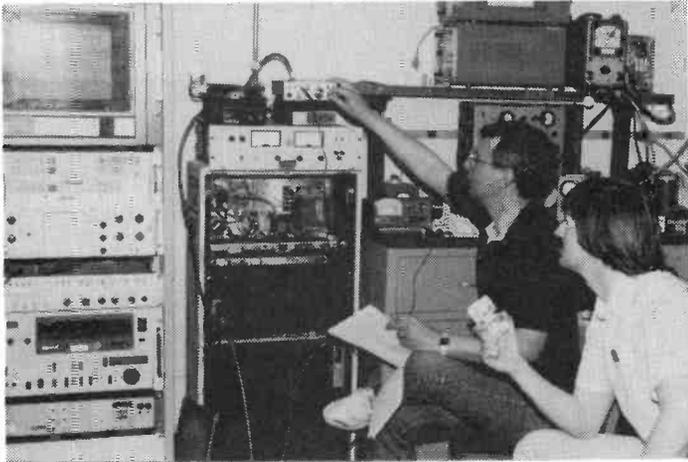
# MARSHALL AMATEUR RADIO CLUB STS 37 LIVE ATV SUCCESS



"Hi (high) hams...in orbit that is! L-r: Tom N8DEU, Don N4MSN, Larry, WA4CAX, Terry NZ8C, Ed W4QAU.



Randy Galloway KN4QS listening for astronaut Ken Cameron KB5A-WP aboard Atlantis prior to ATV transmission for MARC. Standing is Don Hediger on phone with Houston space center who was coordinating ATV attempt.



"Man with the Golden Finger." Gene Marcus W3PM got the honors to turn on the ATV transmitter when Houston said, "It's time to see if Huntsville can make contact!" After flipping it on Gene then manually rotated his home brew antennas keeping them on the Atlantis spacecraft.



MARC members Terry NZ8C, Randy KN4QS, Gene W3PM, Don N4MSN, Larry WA4CAX, Ed WA4QAU, Tim N8DEU pose in front of ATV antenna.



"Fit it!" Less than 24 hours before the scheduled uplink, the Motorola amp gave up. Gene W3PM and Larry WA4CAX switched transistors to get it working.

# 1691 MHz Weather Satellite System

Spectrum International, Inc. is pleased to announce their appointment as North American and International distributor of Time-Step Electronic's Weather Satellite Receiving System.

This high quality, low cost system consists of:

1691 MHz GaAs FET Pre-ampl. model TS-1691-P.Amp	\$175
1691 MHz Receiver model TS-1691-Recvr	\$450
Decoder Board & Software model TS-VGA-SAT3	\$300

Also available to complete the system are:

Low Loss (microwave) Coaxial Cable (65 ft) with connectors. model 1691-coax ass'y	\$ 45
1691 MHz Loop-Yagi Antenna model 1691-LY(N)	\$ 97
1691 MHz Loop-Yagi Extension model 1691-LY-XTN	\$ 80

**WX-SAT System**  
(all the above items) **\$1100**

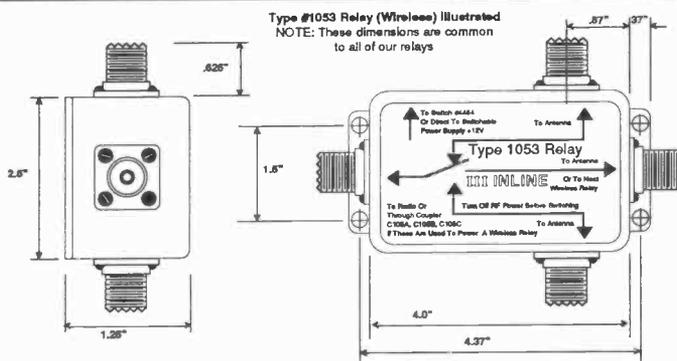
Demonstration Disc (IBM-PC VGA compatible) of signals recorded from WX-SAT system. \$ 5

Shipping: FOB Concord, Mass.  
Prices subject to change without notice.



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## INLINE™ Coaxial Antenna Relay Switching System



- Rugged Construction
- Waterproof
- High Reliability
- No Insertion Noise
- Uses a Single Coax
- Economical

INLINE™ coaxial relays are rugged, weatherproof devices that can be mounted on virtually any surface, indoors or out, wherever the relay is used to switch between two or more antennas while using only a single coaxial cable to the transceiver. Our relays are available in one of two styles WIRED or WIRELESS.

The WIRELESS style uses a separate coupler module installed near the radio. The coupler combines the RF signal and the relay energizing voltage to allow the coaxial cable to carry both signals simultaneously yet independently. This permits existing systems to be expanded with little modification. These relays and couplers have narrower bandwidths than the wired models, since their internal circuits contain filters which minimize harmonics beyond the relays' passband.

INLINE™ relays and couplers are capable of high power operation yet contribute no insertion noise in the receiving or transmitting modes. The INLINE™ design uses technology incorporating microstrip techniques resulting in a relay life expectancy of at least 10,000,000 transfer operations, offering many years of trouble free service in the field.

INLINE™ couplers can also be used to utilize D.C. voltage remotely via the coaxial cable to power other devices such as amplifiers and other equipment. Isolated D.C. energized relays are also a modification which is available and permits three-way switching in mobile applications from a common power source.

DESCRIPTION	TYPE 105	TYPE 105U	TYPE 105N	TYPE 105S
Switch Type	Two Position	Two Position	Two Position	Three Position
Frequency to...	180MHz	300MHz	950MHz	180MHz
Impedance	50Ω	50Ω	50Ω	50Ω
Energizing Coil	190Ω±10%	190Ω±10%	190Ω±10%	190Ω±10%
Energizing DC	±10V to ±16V	-12V to 0V to +12V	-12V to 0V to +12V	-12V to 0V to +18V
Insertion Loss Max. (DB)	0.2 to 30MHz 1.0 to 180MHz	0.2 to 250MHz	0.4 to 500MHz 1.6 to 950MHz	0.2 to 30MHz 1.1 to 180MHz
VSWR (or "dBR")	11:1	11:1	11:1 to 500MHz 1:1.35 to 950MHz	11:1 to 30MHz 1:1.1 to 180MHz
Insertion Noise	NONE	NONE	NONE	NONE
RF Power W.CW	1250W to 30MHz 150W to 180MHz	750W to 100MHz 800W to 250MHz	300W to 500MHz 125W to 950MHz	1250W to 30MHz 150W to 180MHz
RF Power W.-SSB	2500W to 30MHz 300W to 180MHz	1400W to 100MHz 1200W to 250MHz	700W to 500MHz 250W to 950MHz	2500W to 30MHz 300W to 180MHz
RF Power W.-AM/RTTY	750W to 30MHz 150W to 180MHz	400W to 100MHz 400W to 250MHz	200W to 500MHz 100W to 950MHz	750W to 30MHz 150W to 180MHz
Crosstalk (DB)	-45 to 30MHz -30 to 180MHz	-45 to 100MHz -40 to 250MHz	-35 to 500MHz -30 to 950MHz	-45 to 30MHz -30 to 180MHz
Switching Time (Sec.)	0.01	0.005	0.005	0.01
Standard Connectors	SO239	SO239	Type N	SO239
Suggested Couplers	C105A (fixed) C105B (on/off)	C105U (fixed) C105U (on/off)	C105N (fixed) C105N (on/off)	C105C (on/off)



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Designed specifically for amateur television in the 70cm band...

# FL407 INTERDIGITAL FILTER

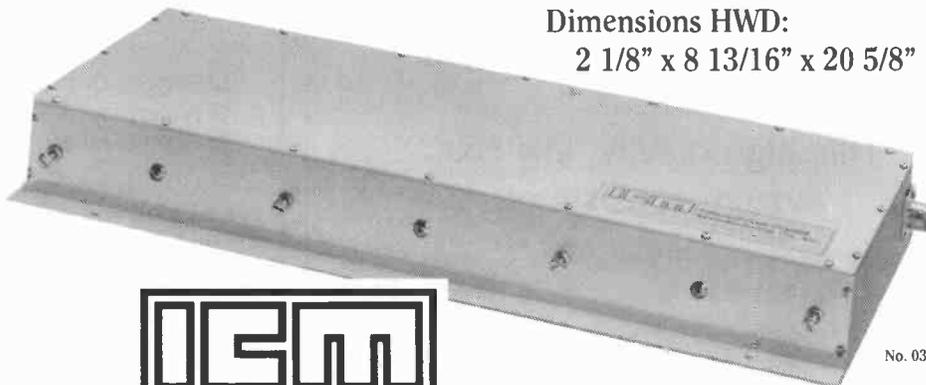
**7-Pole Interdigital Vestigial Sideband Filter for Frequency Ranges of 420 MHz to 440 MHz**

The 6 MHz nominal bandwidth and low loss design are perfect for transmitter or receiver use. Two filters can be used for repeater applications.

Heavy duty construction insures stable operation and long life.

**Ordering Information:** The FL407 may be ordered on any frequency between 420 and 440 MHz. Please specify video carrier frequency when ordering.

**Dimensions HWD:**  
2 1/8" x 8 13/16" x 20 5/8"



No. 035026



**International Crystal Manufacturing Co., Inc.**

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## SATELLITE TRACKING MADE EASY

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 **AMSAT**



Line representation of QuikTrak 4.0 World Map

### QuikTrak 4.0

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

### InstantTrack 1.0

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

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

	Recommended Donations:	Member	Non-Member
QuikTrak 4.0	5 -1/4"	\$55	\$75
InstantTrack 1.0	5 -1/4"	\$50	\$70
<b>AMSAT membership \$30/yr U.S.; \$36/yr Canada &amp; Mexico; \$45/yr Foreign</b>			

**AMSAT PO Box 27 Washington, DC 20044**  
301-589-6062 Voice, 301-608-3410 Fax

# ATV - BALTIMORE STYLE

Terry Turchin, WA3DZZ

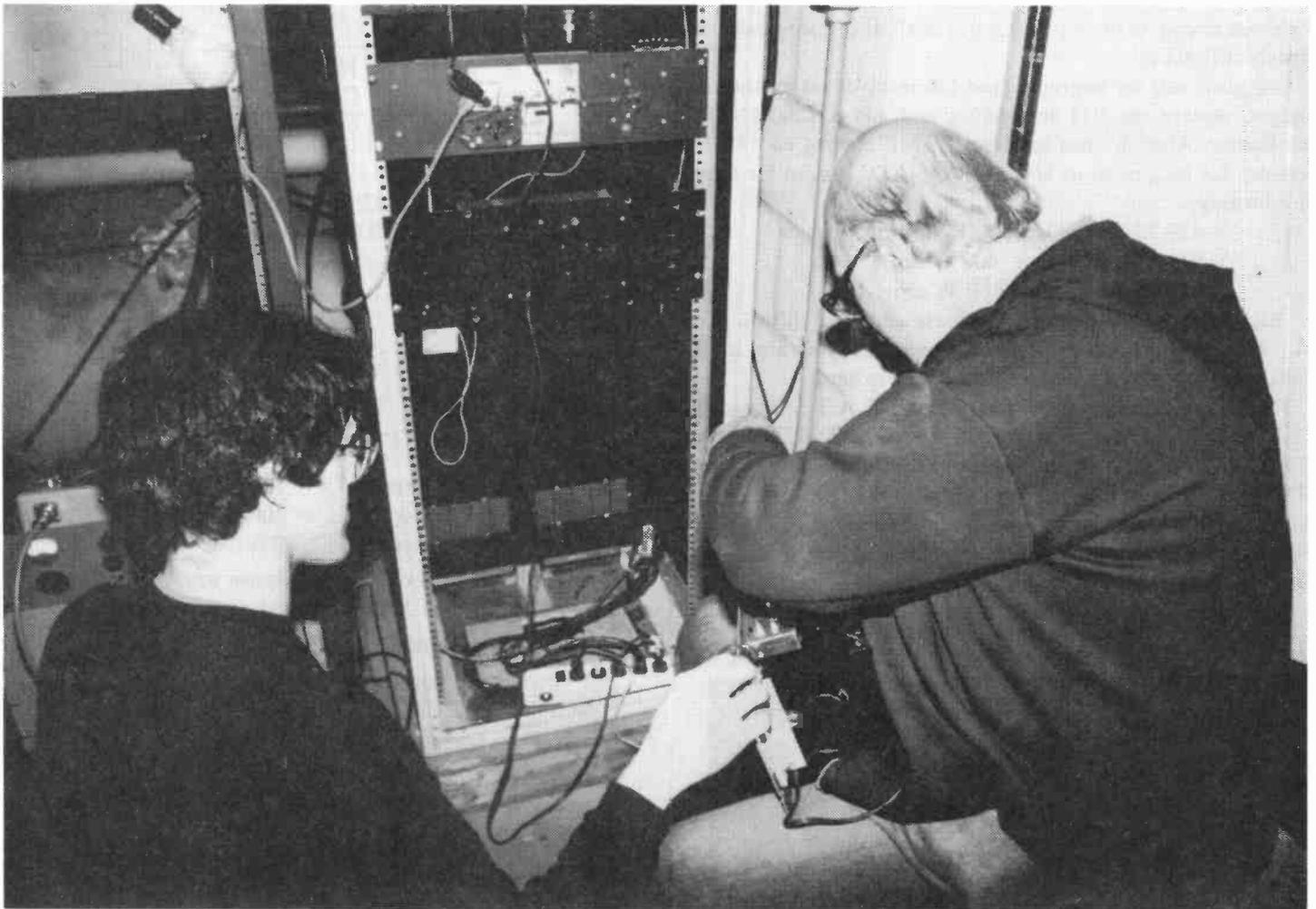


Photo 1. Fronz N3HFS (left) and Terry WA3DZZ (right) at work on the repeater.

The Baltimore radio Amateur Television Society [B.R.A.-T.S.] club was formed over twenty years ago. As with other clubs, we have put on numerous repeaters over the years, including an ATV system. After a number of repairs and older gear rebuilding of W3WCQ/ATVR, the repeater technical committee met in early 1990 to decide how to proceed. With the number of users going up along with tube and equipment failures, and a nice lightning hole two feet from the top of our xmit PD-455 ant, we felt the time was good to make our move.

Our ATV site is on top of a hospital building in the northeast part of Baltimore City. The ants are at the eleven story level giving good coverage of the metro area. But at this site there are two +500 watt ERP police transmitters on 453.XXX MHz., one sheriff's department with +500 watt ERP on 45X.XX and numerous paging bases on 150 baud! What an RF soup. We also have club packet [145.05-W3GXT-5] 220 backbone and other gear and microwave links.

As one can see from the block diagram, we at present have receivers on 426.25 MHz. and 1253.25 MHz., and transmit on 439.251-911.25 MHz. The 420/430 gear are about two hundred

feet apart, fed by hardline and a low noise channel three line amp. This CH3 is brought into the ATV rack and brought to video and audio and fed into N3E2D's home brew TV controller with sync squelch.

What we did to get our system up - First, we replaced the PD-455 with a comet 2X4Z ant. and replaced the cable with low loss semirigid line. I then went to our Board of Directors with a new budget for replacing most of the ATV gear. The budget was approved and numerous pieces of new (solid state) gear were ordered. We put the new equipment together and test ran many combinations until we arrived at the present set up. Then a newer and larger rack was secured by Bob, WB4APR. Steve, K1BYD, our ATV net controller, got some of the ATV'ers to pick up the rack and deliver it to the ATV site. When we felt that we had the right combination of gear running, we upped out the old (just limping along) gear and within a week or so, were back on the air with the new system. This was at the end of January, 1991. We now are in the process of upgrading our 426.25 REC set up, adding AGC to our system to compensate for some signals into the system.

# ATV - BALTIMORE STYLE

B.R.A.T.S. BALTO., MD  
BLOCK DIAGRAM

We have upgraded our audio system built by Heru, W3WUV, added two great proc amps built by Steve, K1BYD. We now transmit in color most of the time and have P4 to P5 pictures for about twenty to twenty-five miles in all directions, and weak signals still get in!

Our plans call for upgrading the 426 receiver set up and next budget, replace the 911 transmitter and add a 1200 [NTSC] transmitter. Also, we are adding a DTMF control on 145.130 repeater for long or short keyups of the ATV system for tuning or adjusting.

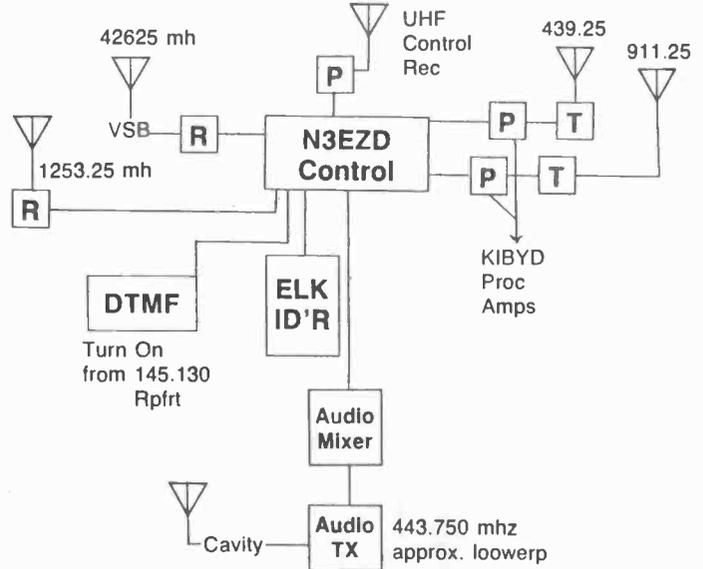
V-439.25-vert pol. + 400 W erp

V-911.25-vert pol. + 400 W erp

A-443.75-vert pol. + 80 W erp

All visual transmitter and bandpass and VSB filters. New 911 & 1200 transmitters for next year. If you are in the Baltimore, Maryland area, please use our systems.

Thanks to the following for their help. B.R.A.T.S. Board and Club Members; Bob, W3WCQ; Heru, W3WUV; Mike, N3EZD; Bob, N3HAT; Fronz, N3HFS; Steve, K1BYD; Bob, WB4APR; Bill, WB3LOT; and Frank, WB3FXA. I hope I didn't forget anyone! Any questions, contact me at B.R.A.T.S., PO Box 5915, Baltimore, Maryland 21208. 73's, Terry Turchin, WA3DZZ [SASE please].



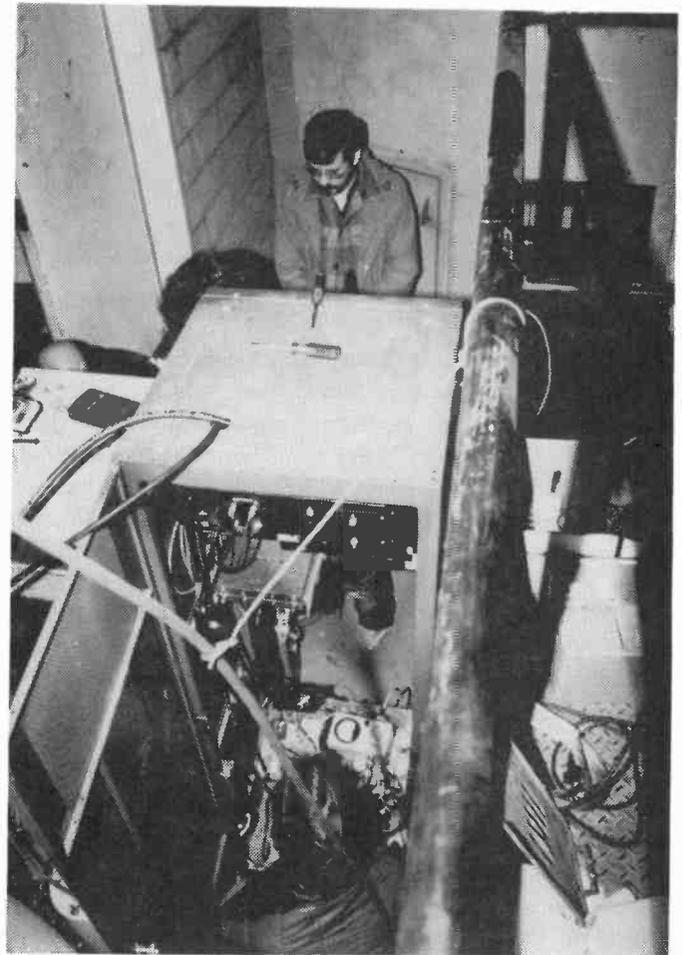
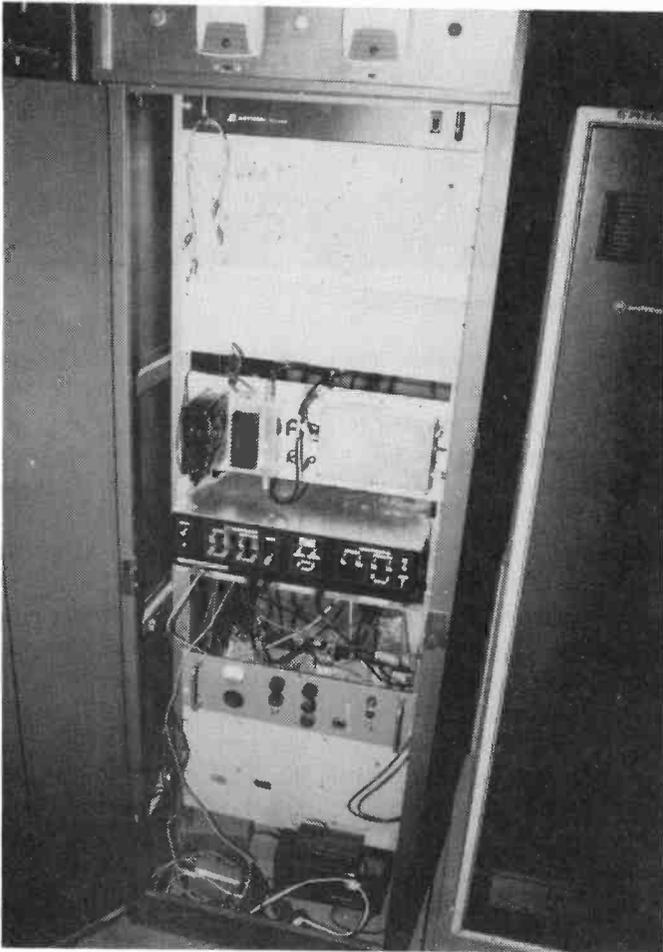
V - 439.25 - Vert Pol. + 400WERP

V - 911.25 - Vert Pol. + 400WERP

A - 443.75 - Vert Pol. + 80WERP

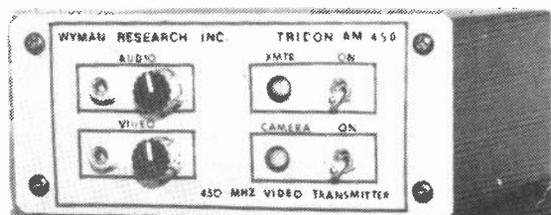
All Visual Xmitter have bandpass and VSB Filters.  
New 911 & 1200 Xmit for next year.

As of 5/91 all Ants Vert Pol.



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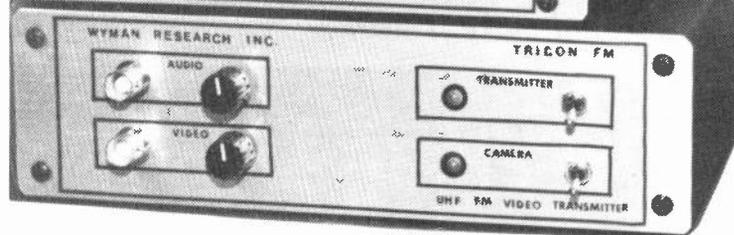
TRIDON AM 450 MHZ  
TRANSMITTER

\$319.95



TRIDON 2000 AM  
450 MHZ TRANSCEIVER

\$359.95



TRIDON FM  
TRANSMITTERS  
900 MHZ  
1200 MHZ  
ALSO 440 MHZ TOO

## 450 TRANSMITTER

- POWER OUTPUT IS 3 W PEAK
- TWO INDEPENDENT AUDIO SYSTEMS  
(Sub-carrier and On-carrier)
- 10 PIN CAMERA CONNECTOR ON BACK-BNC OR RCA CONNECTORS ON FRONT
- SYNC STRETCHER FOR OPTIMUM COMPOSITE VIDEO
- STANDARD CRYSTAL FREQUENCY: 439.25 MHZ or 434.00 MHZ
- POWERS VIDEO CAMERA (10 Pin Connector)
- REQUIRES 13.8V DC AT 600 MA PLUS CAMERA POWER ( 1 amp)
- RF TIGHT ALUMINUM CABINET WITH BRUSHED ALUMINUM PANEL CUSTOMED DESIGN-ED BY W9YL
- CABINET SIZE: 2.2"x5.25"x5.5"
- INCLUDES SEND-RECEIVE RELAY

## FACTS 450 TRANSCEIVER

- POWER OUTPUT - 3 W PEAK
- 10 PIN CAMERA CONNECTOR ON BACK PANEL, BNC OR RCA CONNECTOR ON FRONT PANEL
- MONITOR VIDEO FROM CAMERA OR DETECTED VIDEO OUTPUT
- ALL NEW VIDEO AND AUDIO CIRCUITRY WITH SYNC STRETCHER
- NEW TWO CHANNEL AUDIO SYSTEM ON TRANSMIT (SEE OPTIONAL RECEIVER BELOW)
- NEW MORE POWERFUL VIDEO TRANSMITTER
- STANDARD CRYSTAL FREQUENCY: 439.25 MHZ or 434.00 MHZ
- .8 DB NF GaAsFET PRE-AMPLIFIER
- RF TIGHT ALUMINUM CABINET WITH BRUSHED ALUMINUM PANEL CUSTOMED DESIGN-ED BY W9YL
- SIZE: 2.2"x7"x5.75"
- RELAY SWITCHED ANTENNA

## FM TRIDONS

BOTH HAVE —

- PRE-EMPHASIS CIRCUITRY
  - "N" CONNECTOR
  - RF TIGHT ALUMMINUM CABINET WITH BRUSHED ALUMINUM PANEL CUSTOM-ED DESIGNED BY W9YL
  - CABINET SIZE: 2.2"x8.2"x5.5"
  - REQUIRES 13.8 V DC AT 2 AMPS
  - LARGE HEAT SINK
- 900 MHZ OR 430 MHZ**
- 915 OR 430 MHZ FM-ATV TRANSMITTER
  - POWER OUTPUT IS 8 WATTS
  - 4.5 MHZ AUDIO SUB-CARRIER
  - USES NEW PHASE LOCK LOOP CRYSTAL CONTROLLED EXCITER
- 1200 MHZ**
- 1255 MHZ FM-ATV TRANSMIT-TER (Any optional freq.)
  - POWER OUTPUT IS 4-5 WATTS
  - 6 MHZ AUDIO SUB-CARRIER (Requires 1 V PP Audio)
  - USES MILITARY QUALITY WOOD-DOUGLAS CRYSTAL CONTROLLED EXCITER

# WYMAN RESEARCH, INC.

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W9YL

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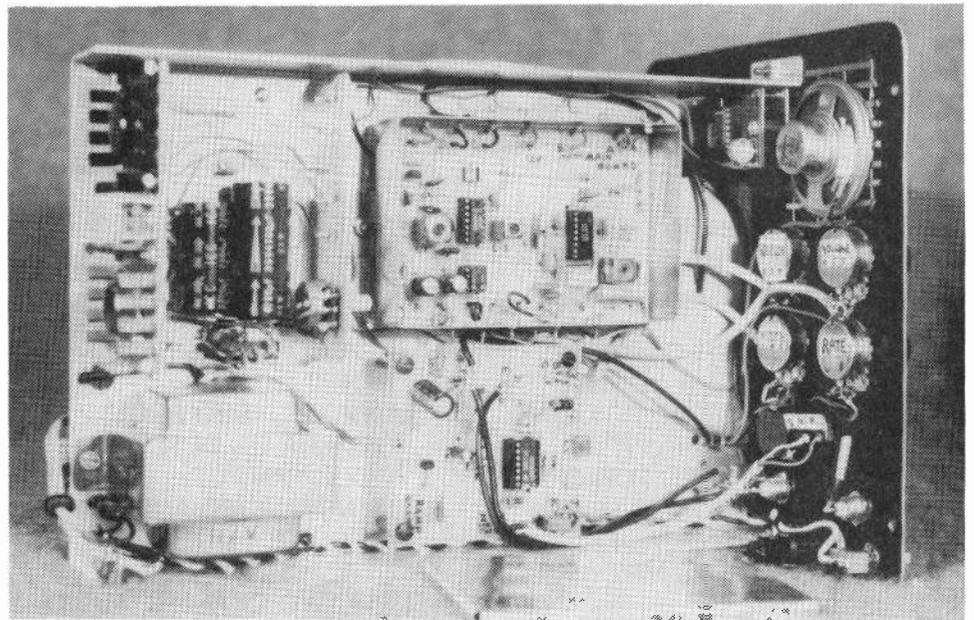
# POOR MAN'S SPECTRUM ANALYZER FOR W7SRZ

Louis Hutton K7YZZ

*After Chuck Northcutt's (W7SRZ) recent visit to the Dayton Hamvention, he visited the Wizards Cave (K7YZZ) to tell of his adventures and many acquisitions in the flea market. At the end of his story he handed me a large brown bag which contained quite a bunch of surplus parts and stuff. He said, "When this is assembled properly it is supposed to be a spectrum analyzer. Can you put it together and make it work?"*



Front of completed unit. Photo by K7YZZ



Interior showing left side placement of printed circuit boards. note power supply at rear and speaker, controls on front panel.

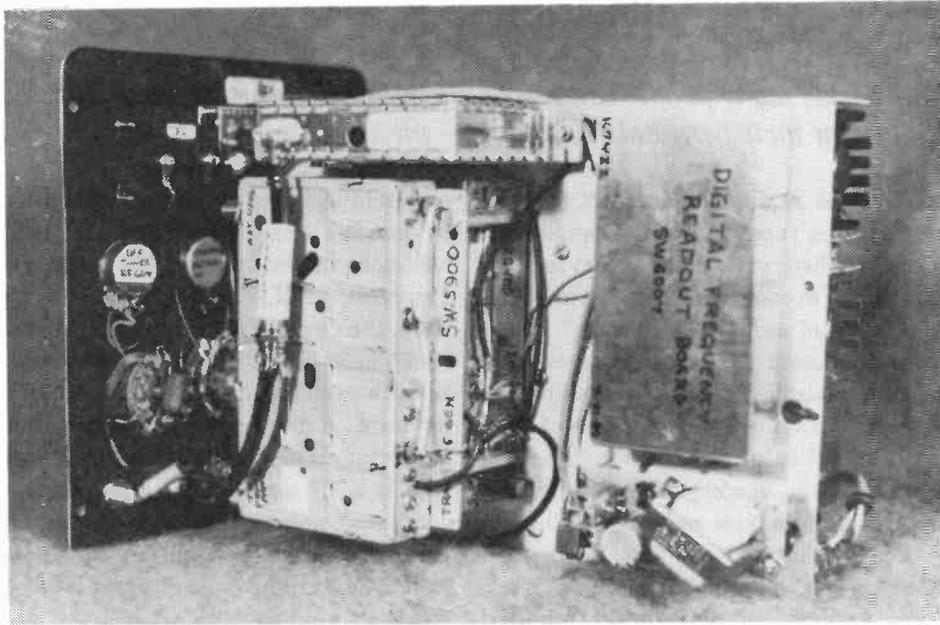
Photo by K7YZZ

I accepted the challenge as I was just a bit tired of working on that 434/923 Mhz ATV repeater and needed a change in project interest.

About two months later I had the thing built and working like the data sheets said it should. The digital frequency readout and the switch attenuator were added to the unit after initial assembly. The diagram and construction information on the switched attenuator were found in the ARRL Radio Amateurs Handbook for 1985, page 25-43. Since the front panel was pretty full of hardware, I mounted the attenuator on top of the cabinet. It was securely bolted down to that cabinet to lessen its chance of being lost or misplaced when the instrument was loaned out.

A hand made vertical chassis was fabricated and bolted to the front panel. This permitted the mounting of major components on both sides of the chassis. The Main Board (SW-6006) and the Digital Frequency Readout Board (SW-6007) were mounted inside home made galvanized tin boxes with metal covers. A small power supply built on a piece of perfboard with floating DC output was built and mounted next to the Digital Frequency Readout Board Module to provide power to that module. The schematic diagram shows the power supply I assembled that provides individual regulated voltage outputs of 30, 18, 12 and 5 volts DC.

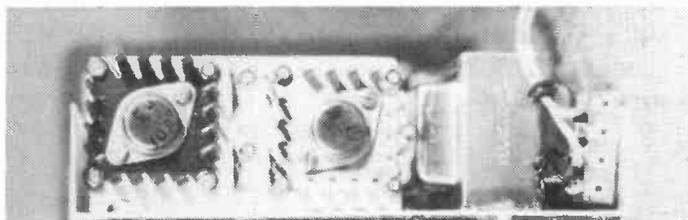
## A POOR MAN'S SPECTRUM ANALYZER...



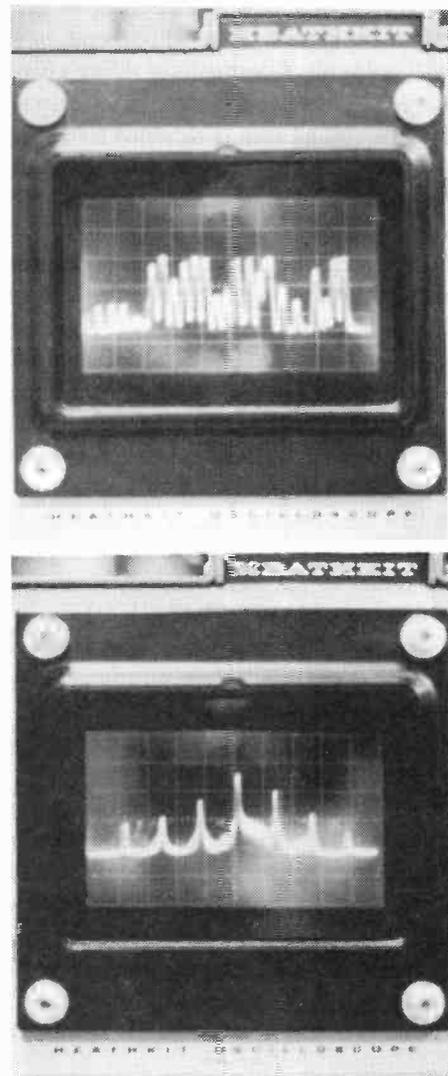
Interior view of right side showing placement of cable TV tuners and controls. Photo by K7YZZ

During the bench testing, trouble shooting and adjustment of the unit, I encountered considerable interference as seen on the oscilloscope display. Stray signals appeared to be getting into the tuners via the "tune" lines. So, I removed the insulated "tune" wire that connected SW-5810, and SW-5800 tuners to the SW-6001 Ramp Board pin F and replaced it with shielded mini coax cable. This cured that problem completely.

I find that the Digital Frequency Readout cannot be expected to be a high accuracy frequency meter, but it will give you a reading that will indicate approximately where the machine is tuned. It is possible to very accurately set the frequency readout at a given part of a band, but when you go many Mhz up or down the band the frequency readout will not be totally accurate. Even with this small inconvenience, it is most helpful in letting you know about where you are tuned or looking on the oscilloscope display. The two photos taken of my oscilloscope connected to this Spectrum Analyzer are typical of what this machine can produce. One picture is of my two meter FM transmitter at 146.42 Mhz and the other picture shows the commercial FM band as seen on Viacom Cablevision. I found it to be a most interesting and rewarding project having built several pan-adapters many years ago. Best 73's and KEEP LOOKING.



Close-up of power supply. Photo by K7YZZ



Spectrum photos (refer to text) by K7YZZ

# DDX'ERS, INC.

Bill Miller, KB7NHZ

*Around the world, many people are restricted in hobbies, sports, and other activities because of their personal limitations -- physical and mental infirmities.*

Whether you call us handicapped or disabled does not really matter. (We prefer disabled, but don't confuse it with stupidity.) What does matter is that many of us have various and sundry radio and television receivers that we use to connect ourselves with the outside world and the mainstream of society.

Many of us choose SW, both amateur and commercial world radio broadcasts, to expand our horizons, but mainly to keep us company. Most of us just listen (DX), because very few of us are fortunate enough to be licensed hams, such as the "Handi Hams", with whom we have no desire to compete with, rather, we salute them, and look to them for advice and support.

We listen on everything from X-tal sets to NRD-93's. We listen on scanners and every other "gadget" with SW capabilities. We who are disabled in Phoenix, Arizona, can now, thanks to Earl Campbell, KS8J, and either cable-ready TV or a low-cost TV down converter, through the courtesy of the Arizona Amateur A5 repeater, take a ride to a local helicopter crash, the local Denny's Restaurant, around the neighborhood, or as on Sunday, April 21, 1991, enjoy all of the thrills of riding a hang-glider from a camera attached to the hang-glider, as though we were there!

As a result of myself becoming disabled five years ago, I have developed a unique sensitivity to others like myself who are kept company by World Radio and "rag chewers". (No disrespect intended.) I often listen (or watch) from 4 to 24 hours a day, as there are many days that I am unable to move about.

Consequently, I decided to make a serious attempt to reach out to others who are in similar circumstances. Since our first appeal on the Monday night Arizona Repeater Association net two weeks ago, I have received over a dozen telephone inquiries.

We call ourselves "DDX'ers" for Disabled DX'ers, Inc. We provide land-lineline-up, and a newsletter, first edition now under production, to anyone listening.

We would like the Amateur Radio community world-wide to please consider for a second that we are listening, and to consider an infrequent holler to us, like; "Howdy to everybody DX'ing out there who is not able to holler back." I can't tell you how appreciated that would be, to say the least. Where our members only get a first name and a call, they can contact us for a full name and address, since most do not have call books. We enjoy letting someone know that we were "DX'ing" with them, and are tickled pink to get a QSL card!

All we require for membership are a self-addressed, stamped-envelope to send a newsletter or for other correspondence. Any financial contributions are strictly voluntary. However, we will accept any of the following also; contributions of hardware, equipment of any nature, software of any nature, magazines, tech manuals, study guides and/or tapes, suggestions, ideas, etc.

We also have many home-bound enthusiasts who would like to obtain a ham license and need volunteer instructors and VE's,

or would just enjoy having another fellow enthusiast just drop by once in a while. People in the amateur community in Phoenix have been very encouraging, welcoming and helpful, such as Earl Campbell, KS8J, President of AAA5, the Arizona Amateur TV Club, their members, and most other local hams. Our "mentor", Neil Vince, KA7JAS, suggested we contact "Handi Hams", and before we could make a formal contact, Rick Dill, WA0EDH came on board. A member of "Handi Hams", he is a C5 quadriplegic, and a clinical psychologist at a local hospital. Another gentleman who is a C7 quadriplegic also just came on board. He is an accountant and a graduate student at Arizona State University. Like myself, he recently passed his novice and we are both anxiously awaiting our call signs. Now we are cramming for our tech!

Many of our members are so profoundly disabled that they will always remain listeners. Especially to them, keep in contact and tell us what we can do for you.

Bob Grove, WA4PYQ, publisher of the very popular "Monitoring Times" may be doing a feature article for the "DDX'ers". Maybe we could coax him to do a regular report?

Our immediate future plans include but are not limited to DDX-targeted regularly scheduled programs on local nets, with relevant information such as who and where to call for help and assistance, and regularly scheduled programs to DDX'ers on World Band stations such as VOA, BBC, HCJB, WCSN, etc. We are also writing to SW equipment manufacturers and dealers for ideas and price bargains, since most DDX'ers are living on fixed incomes, such as Social Security Disability.

And we are writing to all the related publications such as "Monitoring Times" to explore the possibility of either reduced prices or complimentary copies, even back dated issues of their publications.

Eventually, we will have DDX'ers in each community, some with ham licenses, with the ability to transmit, monitor local DDX'ers, and provide phone-patches and land-line contact on a 24-hour-a-day basis, AND make "shack visits" once in a while!

Let me say emphatically - YOU DO NOT HAVE TO BE DISABLED TO JOIN US! If it were not for the "able-bodied" hams, and other radio and ATV related enthusiasts, we would not have a chance to exist. You are not only welcome to join us, you are cordially invited! Thank you and, as they say after Moscow Mailbag, "You couldn't do better than write us that letter!" Bill Miller, President, KB7NHZ, DDX'ers, Inc., PO Box 42536, Phoenix, AZ 85080-2536, (602) 375-9801, My license and call arrived 4-26-91.

# FOR SALE

Crush the competition! Work that DX Now! Motorola/Eimac 300 watt out for 5 watt in amp. Uses single 8874 in air cooled cavity. Tuned to 426.25. Amp is brand new with Motorola test sticker which says 298 watts out! With companion used base HV supply and bias supply. Variable bias and filament control with auto filament cutback during transmit. Also Motorola matching meter and speaker panel with 4 meters, new with original meter protect shunts still on. All rack mount. First \$600 takes it! Buyer ships or picks up. UPS shippable in three boxes.

Start your own repeater (Now that you have the power!) PC 1 watt transmitter with subcarrier sound in Dicast Hammond box mounted to rack panel. Ready to go on 426.25 with BNC video, XLR audio and DC with N output. \$200

Spectrum International VSB filter, 1 db insertion loss, tuned for 426.25 (easily tuned to adjacent frequencies). N connectors. Mounted to rack panel. \$100. Panel also has PC Power and video monitor. PC Electronics in-line video sampler with video output (BNC) and power meter output. Mounted in di-cast box, N connectors, Mounted on rack panel. \$75. Both for \$150.

Genuine RCA TV Transmitter power meter (works with unit above) mounted to rack panel which can also hold (did) Alinco or similar size power amp (up to Mirage D100NATV) \$30. (Both units for \$100)

Remote control your ATV repeater using our Regency UHF single channel receiver and Heath DTMF decoder. Now on 448.650 MHz. There is also a CW ID'er all mounted on a nice rack panel. All three items for only \$200.

Get some serious remote control going with a Connect Systems CS100 DTMF decoder with 16 output relays. Beautiful rack mounted solid state item with terminal strips for function connections. Was over \$500 when purchased. Will take \$300.

New, PC downconverters. One 900 one 1200 (Tuneable) and 1 1200 mast mounted downconverter. 20% off new price.

Telemet test signal generator. Solid state. Multiburst, ramp, stairstep, modulated ramp, etc, does not have color bars. Gen-lockable, lots of ins/outs to play with. \$300.

Consumer style video enhancer, noise reducer. RCA connectors. Does what it says! Includes a/v 4 output da. \$50.

Near new 3CX800 (less than 5 minutes use). Great for your ATV amp or spare for your Henry 2004A. What! You don't have a Henry amp? Here's your chance! MINT Henry 2004A, fresh back from Henry check-out with new 3CX800, near new spare, internal TX relay. 60 W PEP in provides 800 W PEP out! Go for the real DX! \$1400 for all (Over \$2000 value). (Just ordered 3004A!)

All items FOB Des Plaines. 708 893 8443. 6-9 PM CDST

## VIDEO CAMERAS

Camcorder cameras make great ATV cameras but they do not have 10 pin VHS connectors on them. Usually an adaptor is required from the smaller type VHS connector (with more pins). These adaptors usually have RCA female phono connectors marked video (yellow) and audio (white).

The older VHS cameras, from the video tape recorder (VTR) days, did not have a recorder built in. It was carried separately. These cameras have an output cable with the male version of the pinout at the right. There are excellent color VTR cameras, with fine lenses, to be found at hamfests for as low as \$75.

All of the present manufacturers of ATV transceivers equip their units with the connector shown at right. The remote control pin is NC'd by these companies but it can be used to turn on push-to-look relays.

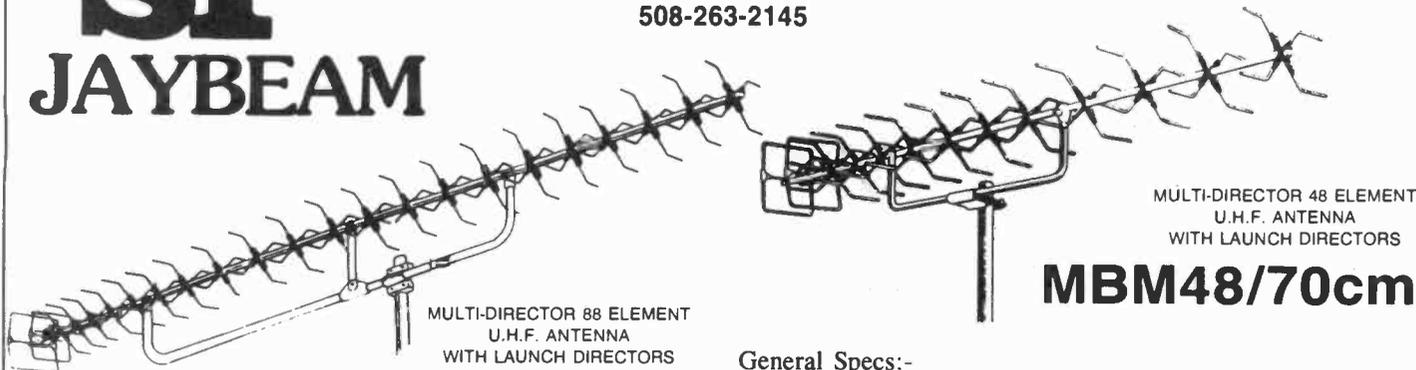
### VHS CONNECTOR PINOUT DIAGRAM

1	<i>Video Out</i>
2	<i>Video Gnd</i>
3	<i>NC</i>
4	<i>NC</i>
5	<i>NC</i>
6	<i>Remote Ctl.</i>
7	<i>Audio Out</i>
8	<i>Audio Gnd</i>
9	<i>Ground</i>
10	<i>+12 volts</i>

# si JAYBEAM

## SPECTRUM INTERNATIONAL, INC.

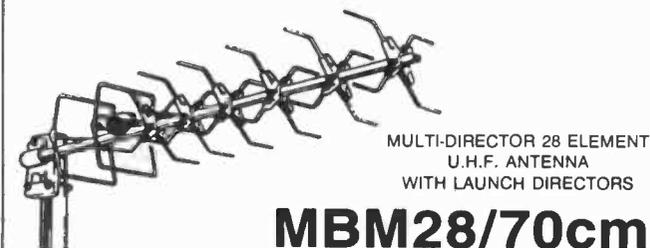
Post Office Box 1084-T  
Concord, Massachusetts-01742  
508-263-2145



**MBM88/70cm**

General Specs:-  
Frequency Range  
Impedance  
(Built-in Balun)

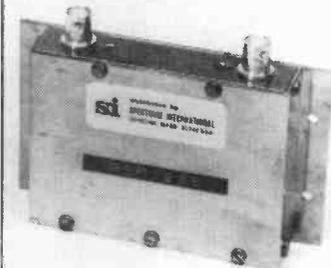
420 MHz - 450 MHz  
50 Ohms



**MBM28/70cm**

	MBM28	MBM48	MBM88
Gain	11.5dBd	14.0dBd	18.5dBd
Beamwidth (E)	40 deg	28 deg	23 deg
(H)	45 deg	35 deg	28 deg
Boom Length	4 ft	6 ft	13 ft
	\$ 60.00	\$ 110.00	\$ 150.00

### VHF/UHF BANDPASS FILTERS



**KNOCK OUT INTERFERING  
QRM OR SELF-DESENSE!**

The PSf . . . series of Band Filters are for receiver pre-selector and transmitter use. The filters are 3 pole, 7% bandwidth, 0.1 dB ripple designs with 30 dB shape factor of 4:1.

The PSf . . . ATV series of TV Channel Filters are 5 pole, 6 MHz bandwidth designs. They are used to protect your TV receiver from inband QRM and to "strip-off" the unwanted sideband of your transmitted vestigial sideband signal.

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

Model	PSf144	PSf220	PSf432	PSf900	PSf1296	PSf1691
Freq (MHz)	140-150	216-228	420-450	890-940	1250-1340	1650-1750
Loss (typ)	0.1 dB	0.1 dB	0.15 dB	0.2 dB	0.25 dB	0.25 dB
	\$190.00	\$160.00	\$105.00	\$105.00	\$105.00	\$105.00

Model	PSf421-ATV	PSf426-ATV	PSf439-ATV	PSf910-ATV	PSf1253-ATV
Loss (typ)	2.0 dB	2.0 dB	2.0 dB	2.5 dB	3.0 dB
Std conns.	BNC	BNC	BNC	N	N
	\$155.00	\$155.00	\$155.00	\$180.00	\$180.00

*All prices FOB Concord, Mass.*

PRICES SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

## SPECTRUM INTERNATIONAL, INC.

Post Office Box 1084-T  
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508-263-2145



# ATV NEWS

## ROCKOON Update

Due to weather delays, the Rockoon flight (Rocket launched by high altitude Balloon) is now scheduled for the weekend of July 20th. Two possible dates are early morning (7am EDT) on the 20th or 21st. The rocket is complete and stands an impressive 11 feet high. It weighs 73 pounds and is 6.5 " wide. The rocket engine is what's known as an 'O' motor and will supply 1000 pounds of thrust for over 5 seconds! The plan is to carry the rocket up to 90,000 feet and ignite it by remote command. Since it is above most of the Earth's atmosphere, it could go over 200,000 feet high. Radio line-of-sight range will be over 500 miles (possibly more than 750 miles if it goes high enough). It will be a brief 2 minute flight from 90,000 feet up to the peak altitude and back down through that altitude. Hopefully the parachute recovery system will work and allow for a gentle return for a splashdown in the Atlantic.

The current on board electronics package includes a Ricoh COLOR camcorder, PC KPA5-RC 1 watt ATV transmitter on 439.25 MHz., a 10-watt 1255 MHz. FM ATV transmitter by T.D. Systems, two data radios from Maxon on 2m FM (listen to 144.440 MHz. for packet telemetry - DOWNLINK only). Gwyn Ready W1BEL from PacComm donated two TINY-2 TNCs which have special parallel interface ports which allows remote control of the transmitters on board the rocket. Since the FM ATV transmitter draws a lot of current, it will be turned on by a remote packet command just before ignition. The 439.25 MHz. ATV and the 2m packet downlink will operate continuously during the flight. Telemetry decoding and parachute/ignition sequencing is done via a 68HC11 evaluation computer board.

It's quite an impressive payload that's over 4 feet long. Listen to the HF information net starting up between 6 or 7 am EDT on 7.155 MHz. (net control is KI4SR). Updates will be issued via the ATV packet mail list as well as during the weekly ATV net on 3.871 MHz. (9pm EDT).

*ED. Note: For ATVers with packet who wish to be put on the ATVDX mailing list, please send a message to KB4N @ KB4N.NH. Ask to be put on the ATVDX mail list. Then whenever anyone posts a message about upcoming events it'll go out to the world. To send a message to the members of the list just send: SP ATVDX @ KB4N.NH. It's important to make it an SP command. That's all there is to it.*

## QSO Amateur Radio Satellite show

The QSO Amateur Radio show on the TVRO satellite channels is now in full swing. Organized by Jim Bass of Syracuse, New York, a weekly video presentation about amateur radio has been active for many months and now has quite an large audience. In addition to the video segment, Jim has added daily audio talk-shows with special hosts to discuss various topics of the hobby.

The video presentation lasts around an hour every Monday evening. Still frame graphics start out around 9 pm EDT. The live video presentation begins at 10 pm EDT. Look for the video show on Spacenet 1, transponder 15. In addition, an audio talk show starts on the same channel under the 6.2 MHz. audio subcarrier. The call-in talk show operates from 9 pm till midnight. The rest of the week, including Mondays, look for a line-up of  
JULY 1991 VOL. 4 #3



The Rockoon ready to fly! Pictured here with the Southeastern Community College group with their 11 foot ATV rocket.

call-in talk shows every evening between 9 pm and midnight. These audio shows will be on the 6.2 MHz. audio subcarrier on Spacenet 3, transponder 21.

When not in use for call-in shows or presentations, the audio transponder is available for any amateur radio related activity between the hours of 6 pm - 2 am M-F and 9am - 2am Saturday and Sunday. For example, the weekly ATV net on 3.871 MHz. will be carried live on the satellite subcarrier every Tuesday night at 9pm EDT. It will be followed by a call-in talk show about ATV, hosted by Bill WB8ELK, starting at 10pm. If you would like to uplink your net or activity via the TVRO satellites contact Jim Bass at (315) 673-3752. His FAX number is (315) 673-9058.

# KANSAS

## Leavenworth ATV Growing

The impact of the ATVerS in Leavenworth: They are an enthusiastic bunch who are putting great effort into making their stations work well into the repeater from that fringe area. Kevin N0DYM and Davis WB0YNE have the strongest signals from their area so far. Bill N0NAP is hard at work trying to catch up with Davis and Kevin. They are all using 9913 type cable, good high antennas, antenna mounted pre-amps, etc. It may be possible to build an ATV link into the area at some point. That could allow an entry into the ATV repeater for other Leavenworth hams using lower power. I hope we can make plans for doing something like that in the near future.

Gary KC0R installed the remote mounted downconverter at the

EOC in downtown Leavenworth this month. That will allow the emergency weather group to follow the patch of storms and place their spotters appropriately.

They get a good P4 signal at the EOC. The Johnson County EOC also got its remote mounted downconverter installed this month by Keith KA0VVX and Cal KA0LFT. This is a backup weather radar capability for them, allowing radar to be seen even when the phone lines become disabled shutting down their primary radar. Both of these installations use the TD Systems RVT-70 and RCC-10 remote downconverters and remote controllers. The systems are very sensitive, selective and can easily power the channel 3 signal through the 250 feet of cable used. Dale WA0NKE

# MONTANA

## HELENA

This Society and newsletter is a product of Darrell Beckstrom K7IUI, box 5471, Helena, MT. 59604, to help bring together both those who are interested in ATV, and those who are currently active. A newsletter will be mailed four times a year to all radio clubs in the state, and to those who are active or have an interest in ATV. There are no dues or membership fees to receive this newsletter, as I will bear the costs myself. Of course donations for costs of printing/postage would be accepted. Also, each issue will have a directory of those active in ATV.

I would appreciate any input for the newsletter that concerns ATV. Names, addresses, projects, equipment used, club activities involving ATV, and any future activities would be appreciated. That way others interested or active could help out. The newsletter should be in the mail by the 1st of Jan April July Oct, so get your articles in early. The newsletter will continue only as long as the interest of others continue.

In the past few months, ATV has been used in the Helena area. Last fall I gave a talk to the local radio club on ATV which included a half hour video from AEA, and a demonstration. The Missoula club asked for a Demo; however, I could not make the meeting. So I sent a video of my talk, the AEA tape and literature for them to show. Bozeman ATV hams plan to have an airborne ATV flight and have others monitor.

## HELENA CLUB HAS ATV IN MALL

On December 8th and 9th, the Capital City Amateur Radio Club set up in the mall to relay messages to friends and relatives in the Gulf. In addition to taking messages, demonstration of Packet and ATV was conducted. A great deal of interest was generated in ham radio thanks to a lot of help from members of the club.

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## RACE TO THE SKY

The ceremonial start of the dog sled race was held February 8th in downtown Helena. I, (K7IUI) set up on top of my pickup and televised the start of the race to race headquarters on the top floor of the nearby Park Plaza Hotel. This impressed the viewers at race headquarters as they could not see the start. They were especially enthused when someone turned up the sound and found they could even hear as well as see what was going on! The official start of the race was 20 miles out of Helena in the mountains (where there was snow) so no ATV could be used. Well, maybe next year?

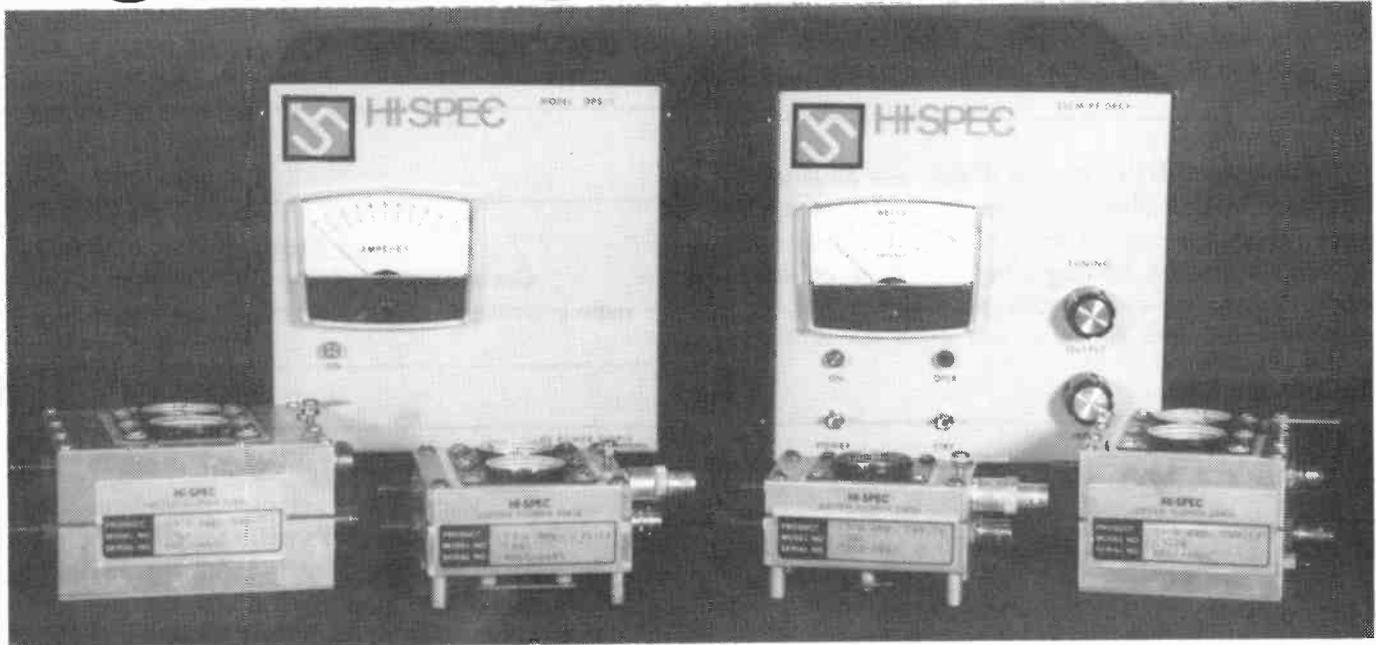


THAT'S MY BROTHER, SPIKE, THE LUCKY DOG--- HE'S RIPPIN' OFF A SHACK OVER IN RITZY HEIGHTS!

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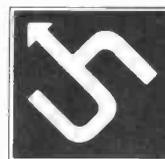
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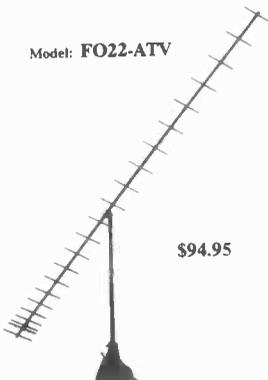
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### RUTLAND ARRAYS PROUDLY ANNOUNCES THE FO22-ATV

MEASURED GAIN >14.8 dBd FROM 420 TO 450 MHz

Model: FO22-ATV



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#### ELECTRICAL SPECIFICATIONS:

Gain peak ..... 15.8 dBd (436 MHz)  
VSWR ..... < 1.33:1 415 to 450 MHz  
E-Plane beamwidth ..... 23 Deg.  
H-Plane beamwidth ..... 24 Deg.  
Sidelobe attenuation  
1st E-Plane ..... -17.5 dB  
1st H-Plane ..... -15.5 dB  
Maximum power ..... 1500 Watts  
F/B ratio ..... 22 dB  
Impedance ..... 50 ohm

#### MECHANICAL SPECIFICATIONS:

Length ..... 14 Ft.  
Boom ..... 1" OD 6061 T-6 Al  
Elements ..... 3/16" Al rod  
Mast ..... up to 1.5" dia.  
Wind surface area ..... .78 Sq.Ft.  
Wind survival ..... 90+ MPH  
All Stainless Steel Element Hardware  
Coax connector ..... N-type  
Polarization: Horizontal or Vertical

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RA4-50, RA7-50, RA8-2UWB, FO12-144, FO15-144, FO16-220,  
FO22-432, FO22-ATV, FO25-432, FO33-432, FO22-440  
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# MARYSVILLE HAMFEST & COMPUTER SHOW

Sunday, August 25 Marysville Fairgrounds Marysville, Ohio  
This is an ARRL Approved HAMFEST

**Marysville, Ohio is located** ... 30 miles north west of Columbus, Ohio in the center of the state. We are easy to get to from all over the state. This year we are also holding a big craft show on the grounds on the same day. One price allows you to browse through both shows ... and gives the XYL a great day too.

This year we have lowered our general admission price to \$3.00. Sorry, at this price, no advance tickets are available. Vendor spaces (Tailgaters) are \$5.00 for 10 x 10 foot spaces.

**Commercial Vendors - Flea Market  
Computer Hardware & Software  
Arts and Craft Show, Too...**

**Federal Laws Forbid Us To Advertise Door Prizes...**

## How To Get Here!

The MARYSVILLE HAMFEST is easy to find, from any place in the state. If you are coming from the greater Columbus, Ohio area, take 270 outerbelt to the Rt 33 exit. Drive Rt 33 to the third Marysville exit .. marked "Kenton" (Rt 31). Just follow the many signs to the Union County Fairground (across from the MARYSVILLE MIDDLE SCHOOL). NOTE: We are using a different gate this year. Be sure to exit on Rt 31 (not Rt 4, as in the past.) From Delaware, Marion, Bellefontaine, or other cities in the state, get on the Marysville by-pass and look for the Rt 31 (Kenton) exit. We will have many, many signs on the by-pass to help you find your way .. or call us on 147.99-/.39 (MARYSVILLE REPEATER) for directions if you get lost. You can, of course, ask anyone where the fairground is and they can help you. We'll be looking for you this year!

## Plenty Of Good Food

This year, we will offer a large selection of food on the grounds. We had some indication last year that we did not have a large enough selection. We listened, and are doing something to correct it!

**PARKING...** The Union County Fairground has 47 acres of FREE parking. Our parking is directed by the Union County Civil Defense. They will be glad to help.

**HANDICAPPED PARKING...** Special Handicapped parking areas have been assigned. Just tell the parking people that you need it. They will do the rest.

**FLEA MARKET...** General admission ticket is required to visit the flea market. The flea market has always been a favorite of many of our visitors. We are noted for a good, clean flea market, plenty of shade trees, and lots of vendors. *Many good bargains will be found!*

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## For The Ladies

This year we are holding a huge ARTS & CRAFTS show the same day. Browse through the hundreds of craft tables, no extra charge! Something for everyone this year at the Marysville Hamfest.

## Air Show

Demonstrations, flying and more of scale model radio controlled aircraft, all for the same low price!

## Computer Show

This year we have greatly expanded our efforts to attract computer dealers as well as commercial ham radio dealers. We have offered several hundred dealers special deals they just can't turn down. Many of the computer dealers have told us that they would like to come to our hamfest, rather than go to Dayton. They feel that they have a better chance to sell their products at a smaller event than at the big computerfest at Dayton. Our hamfest has been the same weekend in August for 15 years, Dayton decided to have their event the same weekend. So far this has not affected our attendance. We have invited a LOT of COMPUTER FIRMS to attend and several have made commitments already. We expect a large crowd this year!

## Tickets... \$3.00 each

Space reservations and information, write to: Gene Kirby, W8BJN, 13613 US 36, Marysville, OH 43040.

FREE CAMPING available on a first come first serve basis!

## HAMCAM

You have seen articles in amateur TV magazines, 73 Magazine, about the Marysville "HAMCAM" van. The van will be on display in the merchants building at the Marysville Hamfest this year. We will have several receivers around the hamfest area, color cameras located at the main gate, and other areas. We will be transmitting live from the HAMCAM all day Sunday. You will be able to inspect the van inside and out, and see ATV in action. There will also be a video tape showing the "VIDEO SHACK" of W8BJN (Marysville).

We will have ATV personnel available to answer any questions about ATV in Central Ohio, "Smile.. You're On Amateur

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## SAVANNAH, GA

In addition to the ATV repeater news from Dave Carter, WA4VHP, we are attempting to spur interest by staging demonstrations of ATV in action from high vantage points in the Savannah area. On 2 Jun 91, I climbed to the top of the Tybee Lighthouse (150' height) with a PC Electronics TC70-1d transceiver and a 4 element 8dBd beam (mounted to a camera tripod). Typee is approximately 17 miles east of the metropolitan area of Savannah, and is, of course, a seaside location. Using only 1 watt of power from the PC, P2.5 pictures (with sound) were received and recorded on videotape over this path. Our next demo will be a remote broadcast from an even higher location; the new Savannah suspension bridge (approx. 200' height).

ATV interest in Savannah is still in its early stages of development. Our primary problem is pine trees. Their needles are approximately 1/2" long on 70 cm, and with millions of pine needles between points of operation, getting decent pictures with 16 dBd beams @50' over minimum distances, is, to say the least, frustrating. Using brute force via bricks is about the only way to go here.

Currently, Dave Carter of the Savannah A5 Society is still hunting for a location to place the WA4VHP ATV repeater, which also utilizes Tom O'Hara's excellent modules. We hope to have more interest spurred by this project. Individuals using only 1 watt or so into a low gain, low height antenna are easily frustrated by the RF-soaking terrain and pine trees in this area. "PHD" is necessary: power, height and determination.

73's guys and keep up the good work. Philip Neidlinger, KA4KOE, 3331 Louis Street, Thunderbolt, GA 31404

MORE

It was one of the best meetings on A5 in Dayton that I have been to. Please keep up the good work. The repeater is one the air in a reasonably continuous fashion. The call is WA4VHP in 439.25 in and 426.25 out. The first A5 net was Wednesday, May 29, and had six check in and some were listening to repeater 146.97 at 9 pm to about 10:30 p.m. There will be an EYE QSO meeting June 1, 1991 at the mall. Sign ins were KA4KOE, WD4AFY, KA4TGS, KA4SYY, WA4VHP and KA4ODE, who is about 25 miles from Savannah.

Shuttle video is also putting the repeater and QSO amateur radio program. A5 Society of Savannah Georgia, the Dayton ATVQ A5 program was shown on the repeater. David A. Carter, Sr., WA4VHP, 114 Croatan Street, Savannah, Georgia 31419, 912-927-2020.

## ALASKA HAMFEST

Although the summer has yet to arrive up here in Alaska, we are already beginning to turn our sights to the coming of autumn and this year's Hamfest. This year we look forward with eager anticipation to the 20th annual Anchorage Amateur Radio Club Hamfest and Electronic Flea market. It is the biggest amateur radio event in Alaska, and this year it will be held on September 21st and 22nd. We easily drew 1200 people last year, and have every expectation of drawing many more in 1991. Anchorage Amateur Radio Club, P. O. Box 101987, Anchorage, AK 99510-1987, Attn: Hamfest/Flea Market Chairman, Rick Marvin KL7YF, 1030 Denali Street, Anchorage, AK 99501.

### OTHER INFORMATION

#### Test Bench...

**NEW THIS YEAR!** The radio club will provide power, service monitor, dummy load and wattmeter, and a PROFESSIONAL two-way radio tech to help you check out your new purchase.

#### License Exams...

This year, as in the past, we will offer FCC License Exams at ALL levels. Exams will be on a "walk-in" basis ONLY. For more info write.

#### Talk-in Frequencies...

USE OUR CLUB REPEATER 147.99/39

### Grounds Patrolled from Saturday night to Sunday opening.

#### SATURDAY NIGHT ENTERTAINMENT

This year we have hired a professional dixie-land jazz band to provide free entertainment for our overnight guests. The band will start at 8 pm and provide you with good, clean fun, under the stars. We will have the same great prizes awarded, and a relaxing evening in the country. *(You bring the popcorn.) Several of our concessions will be open for your snacking convenience. Much more than just a flea market!*

In an effort to provide visitors to the Marysville hamfest more than just a flea market, we will have a large variety of forums, meetings, and displays to fill your day. There will be a radio-controlled model airplane display, a live ATV display, and the Union County Sheriff will display special equipment, including 911. We are planning an ARRL, and PACKET meetings, plus a special talk on "AMATEUR RADIO, 50 years ago", with W8OM, John, and more! We will have a special area set aside for the ladies, with crafts, etc... We certainly have an outstanding line-up of entertainment this year for everyone... yes, it's much more!

## SSTV SOFTWARE

Hi, people, I'm KC4C1Q and I run a telephone BBS here in town. I have some great SSTV (Slow Scan TV) software program for IBM PC, Atari (8 bit) and color computer TRS80 COCO 2 & 3. What do you guys have in software for trade that is related to Fast Scan TV or SSTV? BBS on line most of the time, 1-615-837-8352, 8N1 300/1200/2400 Baud, X-Modem transfer protocol. I have SSTV construction hand book from the 1970's and 1960; will trade photo copies of projects for Fast Scan & SSTV and software. Hope to hear from somebody soon.

Does anyone have a software copy of the 1983 TRS 80-3 (color computer) color T-V SSTV display and sending project?

## YORK, PA HAMFEST

We are planning our Third Annual ATV Seminar in York on 21 Sep 91. We are just now planning our detailed agenda so we can give you no more, but we plan a FB session as before.

Details: Our Third Annual ATV Workshop will be held on the Saturday night of the York Hamfest which this year will be on 21 September. We have reserved the same place, the Homestead Restaurant on Route 74 in Dover, PA (west of York) and have asked that a comparable meal be planned at a cost level near our 1990 experience. Talk in via the 146.97 repeater in York.

Theme: Having fun with image transmission!

Topics: Specific subjects in both Slow-scan and Fast Scan Television.

Attend: All are invited but this is a technical session so non-ham family members will be bored to death. (We know the York Hamfest "flyer" says "banquet" but it will be a Tech meeting with dinner.

Contracts: Your planners/Co-Chairmen for this event: Dick Goodman, WA3USG at 717-697-2353, 199 Maple Lane, Mechanicsburg, PA 17055 and John Jaminet, W3HMS at 717-697-3633 at 912 Robert St. also in Mechanicsburg.

## HAM STUFF INDUSTRY DIRECTORY

GAI Systems Press has announced the publication of a new product directory and buying guide for Amateur Radio. Called **HamStuff**, the new directory contains information about more than 1000 vendors of ham radio products and services, and contains descriptions of more than 5000 products.

Subtitled "The Who-What-Where of Amateur Radio," the book includes radios, antennas, power supplies, accessory items, personal and gift items, and other categories of ham-related equipment and services. The book is arranged into three major sections. Part I is called "Stuff to Do", and includes chapters on youth activities and programs for disabled hams, plus chapters on membership organizations and publications. Part II is called "Stuff to Buy", and includes chapters on the whole range of amateur radio equipment. More than 5000 products are included in this section, arranged into chapters and sections by type of product.

Part III of the book is called "The **HamStuff** Index." It consists of a 70-page index of vendor names, addresses, and phone numbers. More than 1000 vendors are included in that section, and more than 300 of those also have detailed descriptions of their product line, key employees, and statements of business purpose.

The editor and publisher of **HamStuff** is Walt Garrett, N0MAL. "Response to the book has been fantastic," said Garrett. "We're gratified by the encouragement and support we've received from the amateur community." Garrett said he intends to issue annual revisions to the directory, and to make it available in personal computer versions. "We hope to establish a position for the book similar to what the **Callbook** and **Handbook** every two to three years so they can stay informed about the hobby. The type of information contained in **HamStuff** is equally valuable, but it's not found in any other single publication. By revising the book every year, we'll be

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able to provide hams with timely information about equipment and services, and the people who sell them." **HamStuff** is available through local ham retail stores or by mail order from the publisher at \$19.95 per copy plus \$3 shipping and handling. For additional information, contact Walt Garrett at 314-831-6464 or 314-831-6918.

## DELMARVA

I hope you can excuse the lateness of this letter but it seems that since the time we met with you in Maine, all hell has broken loose for me personally, and in our ATV activities.

I know David (KC3AM) has been speaking with you off and on, but I do not know exactly what he has mentioned about us as a group to bring you up to speed about our ATV activities.

Since we met, we have made good progress toward getting a club together. We formed a Board of Trustees, elected members into it, set an order of business, and generally got the Organizational and Political balls rolling. We did have a major setback in the Delmarva Power and Light, because of bureaucracy (blamed on insurance, of course), denied our and all future requests for tower(s) space on any part of their system. Undaunted, we enlisted the help of Charles Tulloch, who is an attache' to two Representatives, and also has many, many connections in State and Local Governments. We hope that he will not only be able to assist us in getting a new site (we have our eyes on space atop the Delaware Memorial Bridge!), but also possibly with some funding from the State.

I also did a mailing to local hams interested in ATV and not only did we get an excellent return so far, but the ones that answered even supplied more names of who else would be interested! (When it rains, it pours!) It has mushroomed in so much as that we are getting requests for information from BRATS (Baltimore), Philadelphia, and as far south as Cape May, New Jersey, about 100 miles away.

Technically, we are still in beacon mode, but hope to go to full cross-band repeater as soon as we (or Dave, that is) can get the Video I.D. We recently upgraded the antenna on top of the Christiana Hospital's tower (our present repeater site) from the Isopole to a Comet vertical. The difference was astronomical. We had to change frequency twice, since 439.25 was bringing up Philadelphia's system even though they are 40 miles away and CROSS-POLARIZED and 426.25 was bringing up Baltimore's system on 427.25 (1 Meg away) with no increase in amplifier power.

My home system is finally up and running. I have completed the installation of the satellite dish to receive Space Shuttle stuff and also the ham radio program from WA2QYT twice a week, which I will uplink via 900 Mhz to the repeater. I still have to increase the 900 output some, since it is still quite noisy due to path loss.

The videos we made in Maine have amazed a lot of people and so far I have received requests from 3 separate clubs to show them. With your permission, I would like to edit it some and add some of our own stuff to it. I can't tell you too many times how much I appreciate your help in getting that tape done.

Lastly, we have had a wave of official interest in our activities. By official I mean agencies such as DENREC (Division of Natural Resources and Environmental Control) for possible control of hazardous spills, floods, etc., the Delaware State Police (aboard their TROOPER 3 and 4 helicopters to assist

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DENREC and the Coast Guard for boater assistance, etc.) and the Army National Guard. We were invited to cover a simulated airplane crash (Army LearJet) in Wilmington, and they were quite impressed. A copy of the tape will be on it's way to you soon.

We still have a lot of work to do, but so far we are very encouraged by what we have been able to achieve in short notice. Hopefully we can keep the ball rolling.

Hoping to hear from you soon. Andrew J. Alvarez, N3CUJ

## **LISATS ATV RPT OPERATIONAL! SAT SYSTEM INSTALLED**

The LISATS repeater, K4ATV/R is presently operational with three video inputs; 434.0 Mhz receiver, an amateur radio bulletin board, and NASA Select.

Three operating modes can be selected by users using DTMF tones on 144.34 Mhz, unless control operators disable access by users. The three modes are: repeater, scan video inputs and manually select video inputs. When in the manual select mode, users will be able to select which video input they want to use. At present, the three inputs listed above are available. A tower camera will be added in the near future, and packet and weather radar screens at a later time.

The repeater mode requires a received video input signal containing horizontal sync pulses. The presence of same turns on the repeater transmitter, just as a COR does in an FM voice repeater. If the signal is removed, the controller waits, IDs and then drops out the transmitter.

The Bulletin Board video is input by a Commodore C64 computer at the repeater site. The screens can be updated and added to from a remote C64 at K4RBD. Special cartridges allow the transfer of screen data by modem using the phone line into the repeater site. The Bulletin Board has several screens (listed on the Video Menu screen) which include: Launch Information, LISATS, Indian River ARC, RACES/ARES, and SKYWARN. More screens will be added.

The NASA Select video input comes from a Panasonic C1000 receiver fed by a ten foot dish with a 75 degree LNB. It will be active during Shuttle missions and on some Cape/KSC launches. During launches, it will be selected and locked by control operators, until the launch phase is complete.

ID screens are also selectable by users so that color bar and circular test patterns can be used for equipment adjustment.

Full details and handouts covering User Code usage will be given at the June 18 meeting.

Members in good standing, unable to attend the meeting, should send an SASE to receive a copy.

## **ATV SCORES HIT IN HURRICANE DRILL!**

LISATS and ATV were the hit of the recent Hurricane Drill on June 1 held by the Brevard County Office of Emergency Management. Led by John Anderson, K4GCC, flying as Air 1 with ATV in a Mosquito Control helicopter, Mobiles KA4FFA and K4RBD, and John, fed video through the LISATS K4ATV repeater to TV sets in the EOC bunker in Rockledge, which is equipped with a 5 element 430 Mhz yagi at 100 feet, connected  
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to a downconverter in the RACES shack. W1TLZ and K4ATV assisted KA4FFA and K4RBD, respectively. W4BAL served as ATV Net Control at the EOC.

County emergency officials were very impressed with the potential of ATV, especially the airborne, and serious planning has commenced to integrate it into emergency planning. K4GCC will be presented with the first set of LISATS wings at our next meeting!

### **THROUGH THE LENS**

The last few weeks have been a very rewarding time for me...what with the repeater getting into operation and generally performing well, for a start, anyway. I want to thank especially Bud Checkett, W0TPB, for his electrical work and long hours of assistance; John Anderson, K4GCC, for doing so much as NASA Select Project Engineer; John Link, W4BME, for zeroing in the satellite dish; Glenn Diggs, W4BFQ, for getting the contribution of the dish and to Gordon Seaward, KA4FFA, for his unceasing financial support of the overall project.

One of the things I've learned in my travels to ATV gurus is that good, interesting, video programming is important to maintaining ATV interest. After the initial rounds of showing shacks, faces and call letter screens, it is not uncommon for interest to wane if the picture isn't interesting...so be creative...show projects, diagrams, sketches, travelogues (not Aunt Sophie & Cousin Joe)...walk us through your home, show your antennas...use your computer for a video source...the list is endless!

The cooperation of WLRQ continues to be fabulous. LISATS will recognize that cooperation soon in a very appropriate way. Now on the air transmitting ATV is W4JMX (Merritt Island), President of the Indian River ARC. From one President to another, welcome, Gene!! Ernie, K4RBD

## **HEARD ON THE AIR**

"See you later" Only ATVers can say that!!

## **FROM THE MONITOR**

A lot of folks ask about receiving ATV on cable-ready TV sets or cable converters. First, a good, vertically polarized antenna is connected to the cable input of a set, using low-loss coax. Then, the set must be in the cable tuning mode and set to the following cable channels for the popular ATV frequencies listed.

439.25 Mhz Channel 60

434.00 Mhz Channel 59

426.25 Mhz Channel 58 (427.25)

421.25 Mhz Channel 57

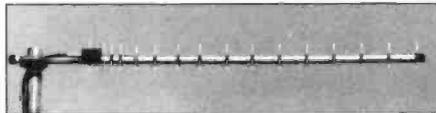
Other folks ask about receiving ATV on tunable portable TV sets. TV broadcast VHF Channel 13 ends at 216 Mhz and UHF Channel 14 begins at 470 Mhz. So you see, a set must tune through the range between 13 and 14. Some varactor tuned sets can be easily modified to do that. Others tune down from UHF Channel 14 and just make it into the ATV ham frequencies. The Radio Shack handheld LCD 2" and 3" color sets (Models 22 and 23) tune through the 70 cm. amateur band and have very sensitive receivers. Hope this info answers some questions..See ya! John, K4GCC

# COMET

ANTENNAS FOR THE PROFESSIONAL AMATEUR

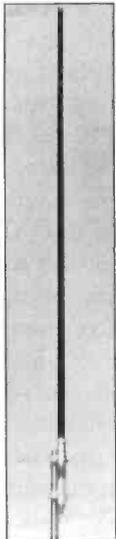
## CYA-1216E

16 Element Yagi Beam 1260-1300MHz  
 Gain: 16.6dB  
 VSWR: 1.5:1 or less  
 Impedance: 50 ohms  
 Max. Power: 100 watts  
 Polarization: Vertical or Horizontal  
 Length: 4' 5"  
 Weight: 7 lbs. 11 ozs.  
 Mounting Mast Diameter: 1 1/2"  
 Connector: N-type  
 Construction: All Aluminum



## CA-1243Z

Dual Band  
 440-450MHz  
 1250-1300MHz  
 Base/Repeater Antenna  
 5/8 Wave x 4 446MHz  
 5/8 Wave x 9 1200MHz  
 Gain: 446 9.4dB  
 1200 12.8dB  
 Impedance: 50 ohms  
 VSWR: 1.5:1 or less  
 Max. Power: 446 150 watts  
 1200 50 watts  
 Length: 7' 5"  
 Weight: 2 lbs. 8 ozs.  
 Connector: N-type  
 Construction: Heavy Duty  
 Fiberglass



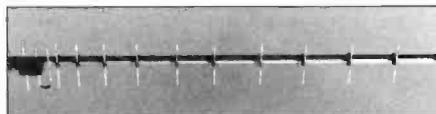
## CA-1221S

Mono Band  
 1260-1300MHz  
 Base/Repeater Antenna  
 1/2 Wave 21 Step  
 Collinear  
 Gain: 15.5dB  
 Impedance: 50 ohms  
 VSWR: 1.5:1 or less  
 Max. Power: 100 watts  
 Length: 8' 6"  
 Weight: 2 lbs. 3 ozs.  
 Mounting Mast Diameter:  
 1 1/2-2 1/2 inches  
 Connector: N-type



## PYA-913

Base 13 Element Yagi  
 904-920 MHz  
 Gain: 15.8dB F/B ratio  
 over 20dB  
 Max. Power: 150 watts  
 VSWR: 1.5:1 or less  
 Length: 4' 8"  
 Connector: N-type  
 Construction: Aluminum



## MINI SWR Power Meters

		Max. Power	Insertion Loss
CM-200	140-150MHz	45 watts	0.1dB
CM-300	200-240MHz	60 watts	0.2dB
CM-400	420-460MHz	50 watts	0.2dB
CM-420	140-460MHz	50 watts	0.1-0.2dB
CM-900	840-950MHz	60 watts	0.2dB
CM-1200	1275-1325MHz	60 watts	0.25dB

Measurements: 2.25" w x 2.25" h x 1.1" d  
 Weight: 5.25 oz.  
 CM-200, 300 and 400 have SO 239 Connectors  
 CM-420, 900 & 1200 have N Connectors

## FP-19

Base/Repeater  
 905-925MHz  
 Gain: 16dB  
 Impedance: 50 ohms  
 VSWR: 1.2:1 or less  
 Max. Power: 100 watts  
 Length: 7' 4"  
 Connector: N-type  
 Construction: Heavy Duty  
 Fiberglass

## CF-4130 446/1200MHz

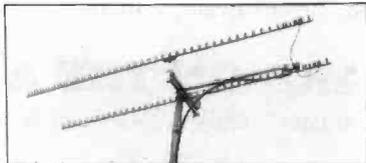
dB Loss: 1.3-460MHz 0.2dB  
 900-1400MHz 0.3dB  
 Band Rejection: 55dB Down  
 Max. Power: 146MHz 800W PEP  
 446MHz 500W PEP  
 1200MHz 200W PEP  
 Connectors: N-type



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- 902 1269 1296 1691 2304 3456 MHz

2345 LYK45el 1296 MHz 20dBi \$89  
 1345 LYK45el 2304 MHz 20dBi \$75  
 3333 LYK33el 902 MHz 18.5dBi \$89  
 Above antennas kits available assembled.  
 Add \$8 UPS s/h  
 Add \$11 UPS s/h West of the Mississippi.

### MICROWAVE LINEAR AMPLIFIERS SSB, ATV, REPEATER, OSCAR

2316 PA 1w In 18w out 1240-1300 MHz \$265  
 2335 PA 10 In 35w out 1240-1300 MHz \$315  
 3318 PA 1w In 20w out 900-930 MHz \$265  
 3335 PA 10 In 40w out 900-930 MHz \$320  
 23LNA preamp 0.7dB N.F. 1296 MHz \$90  
 33LNA preamp 0.9dB N.F. 902 MHz \$90

### NEW PRODUCT ANNOUNCEMENTS

#### New Loop Yagis

1845 LY Loop Yagi 1691 MHz 20dBi \$99  
 945 LY Loop Yagi 3456 MHz 20dBi \$89  
 Above antennas assembled and tested

### New Preamps

13LNA 0.7dB N.F. 12 dB 2.3 GHz \$140  
 18LNA20 0.8dB N.F. 20 dB 1.69 GHz \$140  
 SLNA 1.0dB N.F. 10 dB 2-2.7 GHz \$150

### New Wideband Power Amplifiers

2370 PA 3w In 70w out 1240-1300 MHz \$695  
 2340 PA 2w In 35w out 1240-1300 MHz \$355  
 2318 PAM 1w In 18w out 1240-1300 MHz \$205

Rack mount Amplifiers for repeater use available.

### NO TUNE MICROWAVE LINEAR TRANSVERTERS

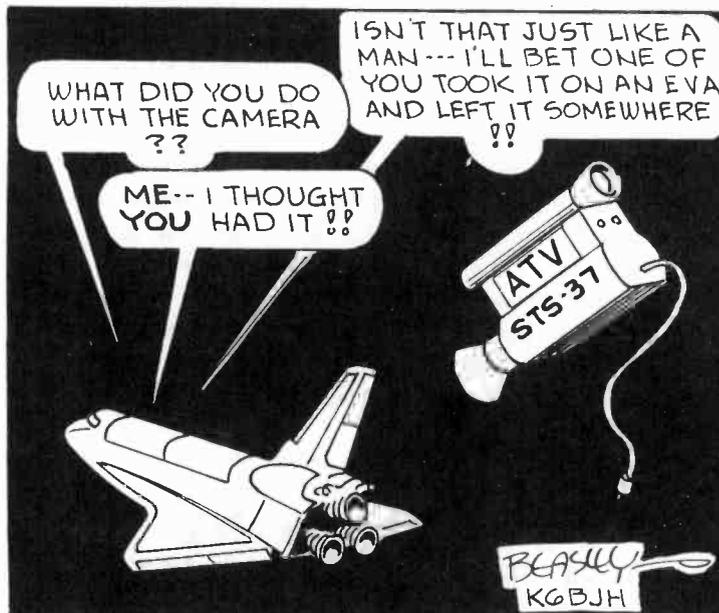
From SHF SYSTEMS a new line of transverters designed by Rick Campbell KK7B and Jim Davey WA8NLG

Available in kit form or assembled/tested

- 903 1269 1296 2304 3456 MHz
- microstrip filters eliminate tune-up
- 2m H, PIN diode switched
- sequencer standard in complete unit
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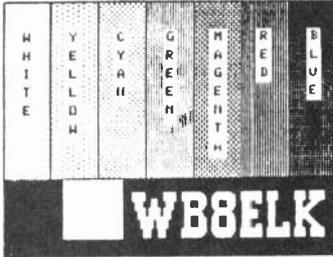
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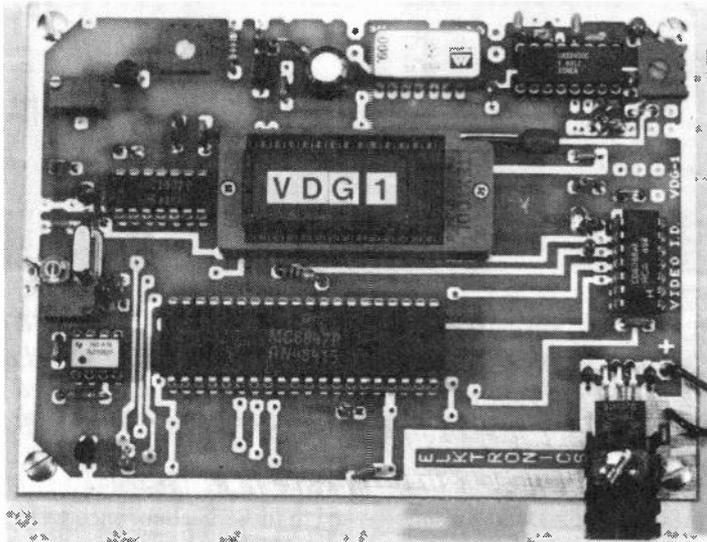
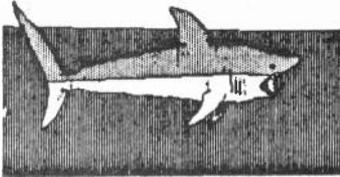


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**VIDEO I.D.**



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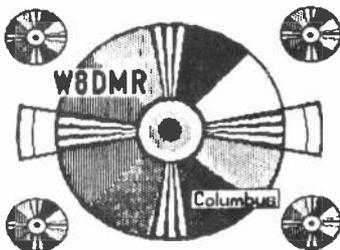
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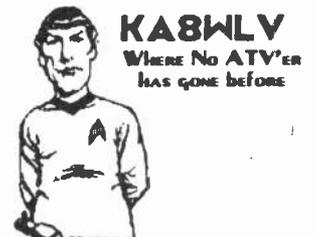
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**KA8LWR**



# DAYTON 1991



*Friday night the Holiday Inn North Ballroom was packed from start to finish. In all over 350 attended during the event which lasted well past midnight as the eyeball QSO/party began after the formal presentations ended at 10:30. The room had seats for 150 plus standees inside and in the hall outside waiting to get in! The air conditioning worked great and there were lots of free snacks and beverages. The annual SSTV forum, next door, hosted by Don Miller W9NTP, was also SRO. Look for the same arrangements next year, Friday night!*

ATV interest is really picking up if this year's Dayton Hamvention is any indication. Thursday night at the Holiday Inn North, several ATVers with "Lookie-Talkies" and portable stations could be seen roaming about the lobby and down the halls. If it had been any other location or time of year, I'm sure that hotel security would've rounded up these suspicious looking sorts in quick order! Lot's of mobile and portable ATV stations wandered around the Hamvention as well. Video was present throughout the day on several 70cm frequencies as well as 23cm FM ATV.

The friday night ATVQ ATV party at the Holiday Inn North was attended by over 350 ATVers. Visitors were treated to an aerial demonstration of a kite mobile ATV camera being flown in a nearby school yard. Even though winds were extremely light, they were able to lift the TV camera up to 200 feet plus. Larry Hillier N8EWV and Jeff Kidwell N8OKH came down from northeastern Ohio to provide us with this great show. The forum was held in a large banquet room with a continuous program of speakers. Topics covered video presentations for cable TV, a live showing of the ATV uplink experiment to the STS-37 Space Shuttle as recorded onboard the spacecraft, ATV balloon experiments and, of course, the homebrew contest. This year's home brew grand prize of \$100 was won by WA8SAR from Lambertville, Michigan for his homebrew video switcher. Another 20 prizes were awarded by random. Inside copies of ATVQ distribut-

ed to those in attendance were prize certificates for ATV goodies and ARRL/BATC books, packages of up to 10 VHS T-120 and T-180 video tapes and other goodies.

The Saturday ATV forum at the Hamvention was also well attended. Lou McFadin W5DID gave us an excellent presentation the recent ATV uplink experiment on the Space Shuttle. He showed us footage from the actual onboard video recording. Dave Baxter W5KPZ showed us all how he linked weather radar into the Tyler and Kilgore, Texas ATV repeaters. Carole Perry WB2MGP put on an entertaining presentation about ATV in the classroom and Bill WB8ELK talked about the latest in ATV ballooning and what to expect in the future.

Earl KS8J and Mike WA6SVT flew their portable ATV transmitters from an advertising blimp out in the flea market several times during the Hamvention. Spectacular views of the flea market from 100 feet were seen on our monitors in the exhibitor's area. Special thanks go to Howard Walker for the use of his blimp during the show. All in all, lot's of ATV excitement for all who attended. Just imagine what's in store for next year. I imagine you'll see hordes of ATVers with two-way video wristwatches!

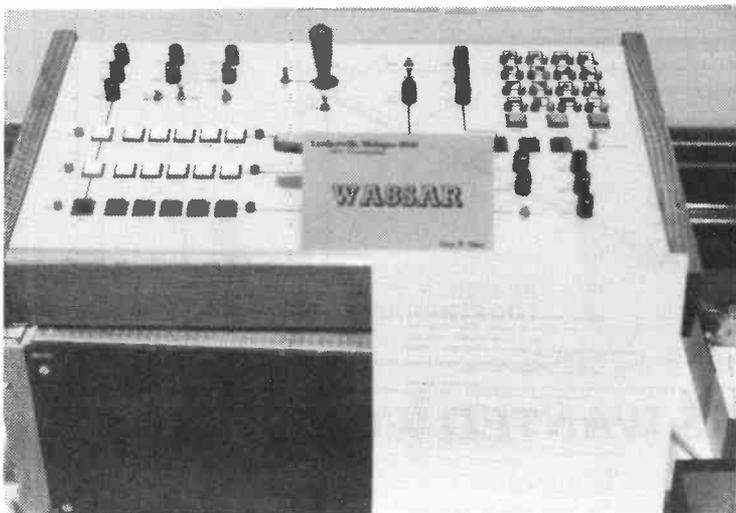
# DAYTON 1991



## HOME BREW CONTEST WINNER

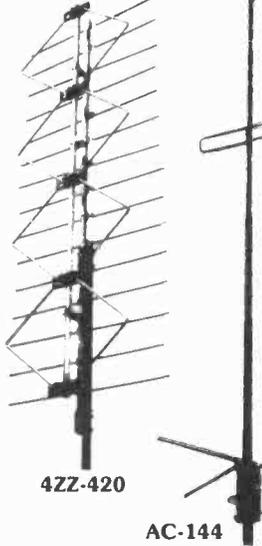
Gary Obee W8SAR won the home brew contest at the Friday night ATVQ ATV party. His entry, a video switcher with special effects, 1 ME (mix/effects) buss, preview buss, with keyer, took the \$100 prize. The photos show Gary speaking to the group about his 8 year long project, which includes the control panel and card frame of electronics, his very neat unit (with QSL card) and receiving the \$100 CASH from Henry KB9FO.

Eleven entries were on display for the contest including KS8J's lookie Talkie, N8IYD's balloon payload package, WM8W's Kite ATV package, and others. Remember next year to bring your entry. You could walk into the Saturday flea market with an extra \$100 cash in your pocket!



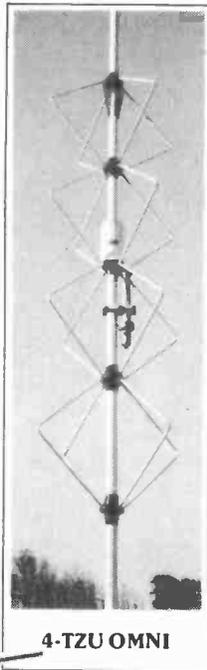
# ANTENNAS by *Lindsay*

**Amateur TV Repeaters, Verticals and Yagis Transmit & Receive Antennas**



4ZZ-420

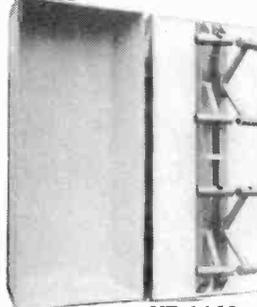
AC-144



4-TZU OMNI

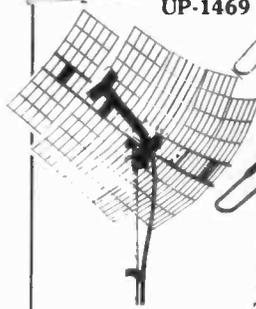
ATV-8 SLOT

**LPTV & MMDS Transmit & Receive Antennas**

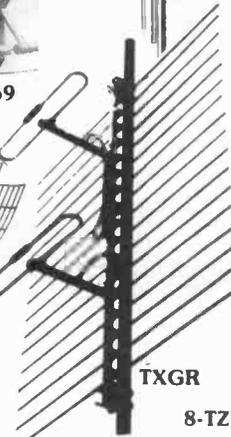


UP-1469

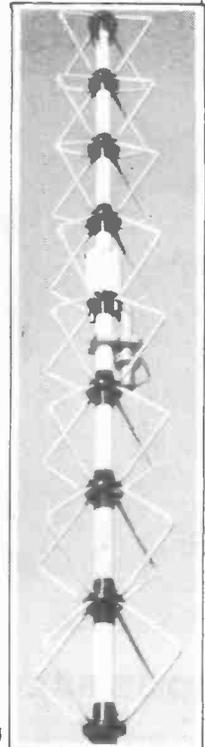
LS4  
LS8  
LS16  
SLOT



MDG-2717

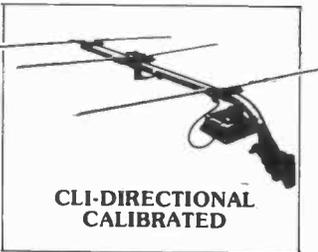


TXGR



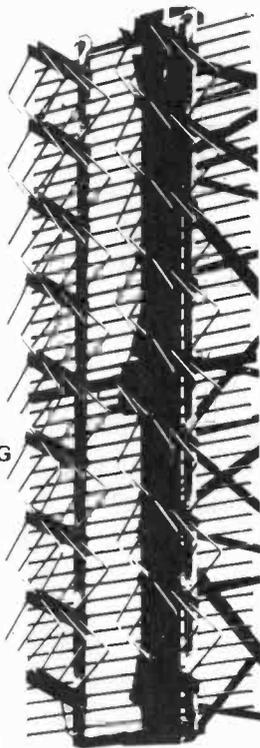
8-TZU

**Cable TV & SMATV Headend Yagis, Log Periodics, Pre Amps and CLI Antennas**

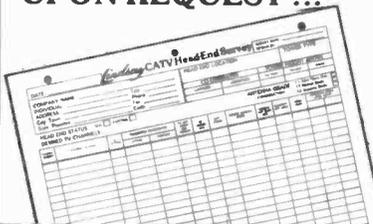


CLI-DIRECTIONAL CALIBRATED

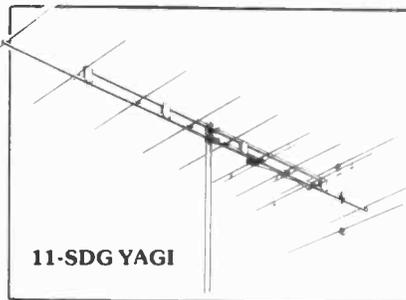
ZIG-ZAG SERIES



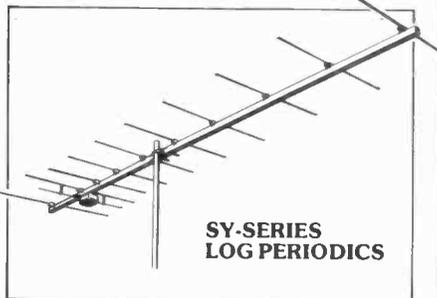
**'FREE' SITE SURVEYS UPON REQUEST ...**



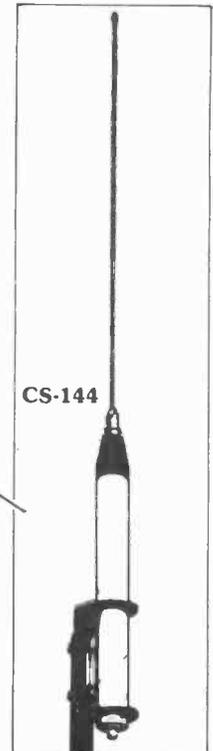
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CS-144

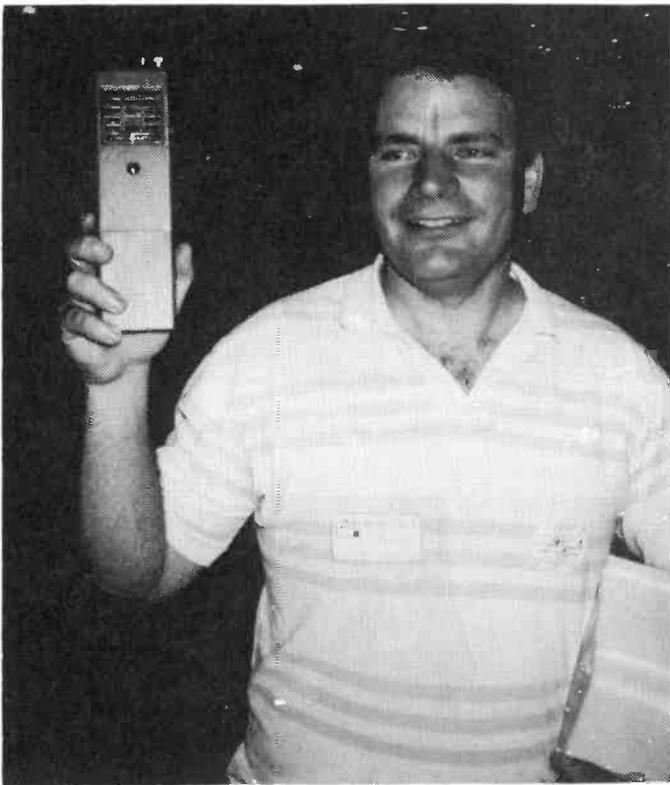
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A 100 mw ATV lookie-talkie (transmit only) held by Mike WA6SVT.



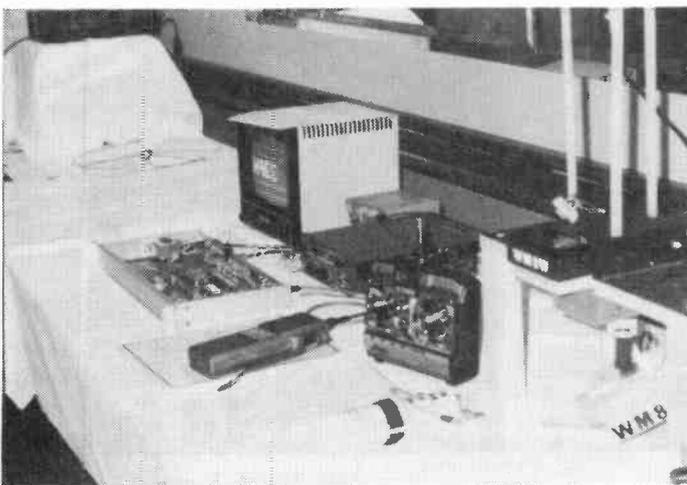
A transmit/receive lookie talkie! With a better looking holder!



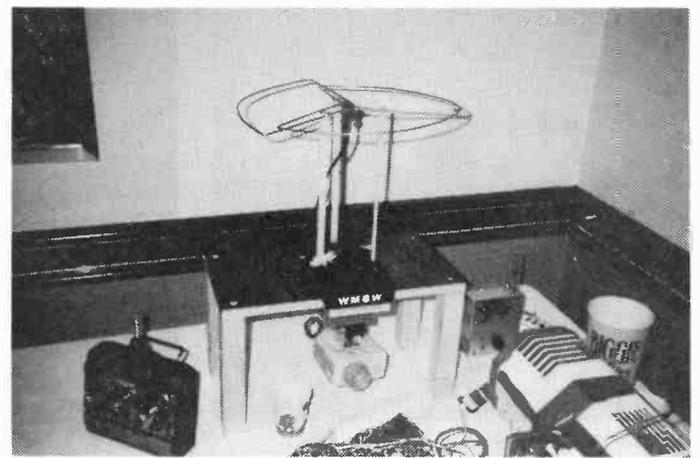
Older versions of the lookie-talkie (not as portable!)



A lookie talkie ATV transmitter in the blimp kept an "eye" on the flea market action!



Home brew contest entries



Home brew contest entries



**Marshall ATV Club describes their STS-37 Adventures!**



**Bill WB8ELK talks balloon ATV.**



**Live video R/C Model ATV adventures told by Larry.**



**John Beanland talks about his latest weather sat receive system.**



**Earl KS8J and Mike WA6SVT's lookie talkie shoot-out. (Mike is the arm holding the "HT")**



**Bob Rau N8IYD explains his computer systems for R/C model and balloon ATV experiments.**



**Dick Wolf W18X explains how to get ham radio on cable TV public access channels.**



**Tom W6ORG introduces the STS-37 ATV reception video tape. The first public showing of this historic event.**



**Mike, Al, Tom, Maryann, the ATV Kids in the Hall.**



Larry Hillier N8EWV sending his ATV kite aloft at the Dayton ATVQ party friday.



Flying an ATV kite, with Dave W6OAL, Larry N8EWV, Earl KS8J and Wilson KB8KKA



Cast (left) and crew (right) from More than Radios had their festivities Saturday night at Dayton.



The ATVQ commercial booths.

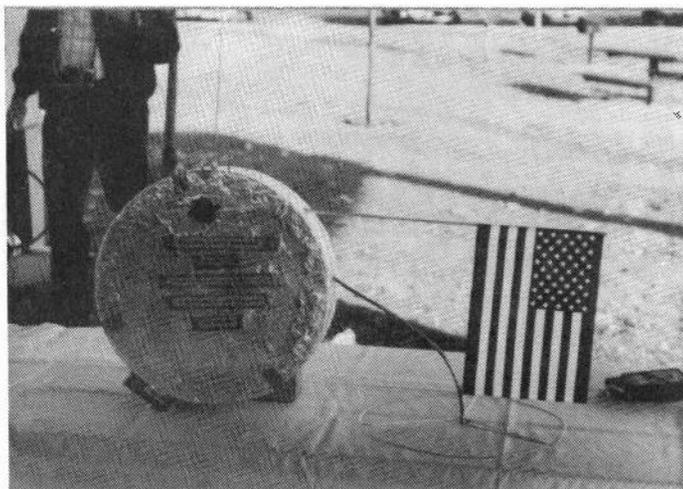


Don and Sue Miller at their commercial booth.

# E.O.S.S. (Edge of Space Sciences) Denver, Colorado

Tim Armagast WB0TUB

On November 18, 1990, the Western Vision Network sponsored the first Colorado amateur radio helium balloon flight. This payload carried a 2m FM beacon on 147.555 MHz (borrowed from a local foxhunt group), a 10m CW beacon loaned by WB8ELK, telemetry equipment donated by a local company; Atmospheric Instrumentation Research (AIR), a TV camera (GBC CCD-100) and an ATV transmitter to send back live video on 426.25 MHz. The package was designed by Dave Clingerman W6OAL. It resembled a hatbox standing on its side. He also attached a U.S. flag to the side of the package to act as a windvane for stability.



The first balloon flight from Denver. The flag is used as a stabilizer to prevent spinning. The payload is in a "hatbox".

The launch was right on time at 9:30 a.m. The balloon hovered nearly overhead for the first 30 minutes providing spectacular aerial views of the suburbs of Denver. Once in the jet stream, the package really picked up ground speed and headed out over the eastern plains of Colorado. After travelling over 130 miles almost due east, the package landed in the 'south 40' near Flagler, Colorado (nearly reaching Kansas).

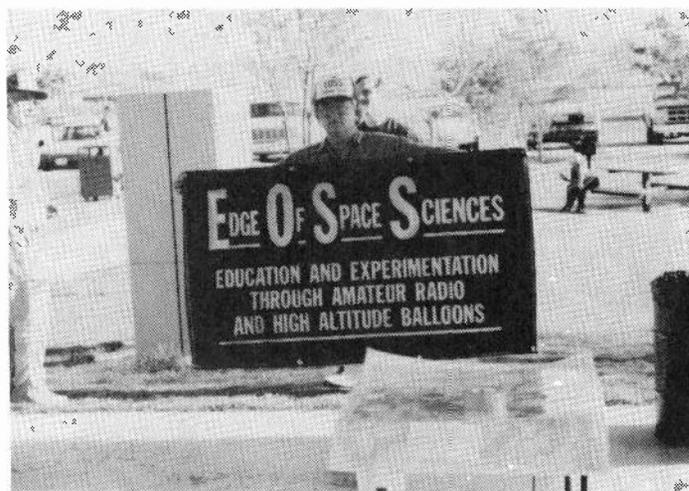
Two chase planes did a visual search of the region. One of them spotted a bright orange parachute in pasture land. The chase crew on the ground quickly headed in for the recovery. They found a balloon package all right, it turned out to be a weather bureau radiosonde that had been launched some time earlier!

The search continued as darkness drew nearer. Although the 2m and ATV signals could not be received, the 10m beacon could still be heard weakly by Bill WB8ELK in New Hampshire. Bill encouraged the chase team to continue the effort by letting everyone know, "It's still alive!". Tim Armagast WB0TUB and Vince Lawrence N0UA took off in a third airplane late in the afternoon in one last attempt to locate the package. After looking at the final video transmissions from the package, Tim drew a map of two distinguishing ground features - a dry creek next to an irrigation circle. They were able to locate this area from the air and got close enough to home in on the 10m beacon. They finally spotted the "real" payload at 4:55

PAGE 44

p.m. (sunset was at 5:05 p.m.!). The balloon system was draped nicely out on the ground. The 10m antenna was flat against the dirt and the 2m antenna was destroyed on landing.

The interest and enthusiasm generated by this balloon flight made it clear that this would be a great way to promote amateur radio. It is educational and FUN (appeals to the youth) and it requires some experimentation and engineering challenges (appealing to the experienced amateurs). Everyone had a lot of fun following along during the day listening to the altitude reports, the fox hunting efforts and hearing the jubilant cry; "We found it!". Another balloon flight was immediately suggested and heartily endorsed.



E.O.S.S.

Thus was born Edge of Space Sciences (EOSS). EOSS is a group dedicated to designing and flying amateur radio balloons. The motto "Education and Experimentation through Amateur Radio and high altitude balloons" sums up the goals of this new group. Jack Crabtree AA0P became President, Nate Bushnell KD0UE (Vice President), Dave Clingerman W6OAL (Chief Scientist), Merle McCaslin K0YUK (Treasurer) and Rick Von Glahn N0KKZ (Secretary). Over 60 area hams have joined the EOSS group so far to develop new balloon packages.

ATVQ DEVOTED ENTIRELY TO HAM TV

# E.O.S.S. (Edge of Space Sciences)

This time the balloon payload carried a 2 meter voice beacon (using a Ming voice digitizer), a 10 meter CW beacon, an ATV transmitter and TV camera as well as a 35 mm film camera. The telemetry unit from the AIR company was used to relay data back via the ATV sound subcarrier. This telemetry gave us outside air temperature, humidity, inside (payload) temperature and altitude. One of the major additions to this flight was the ability to control the pointing angle of the TV camera via a 6 meter R/C link. The TV camera was attached to a R/C servo to swing 180 degrees in elevation. It could point anywhere from straight up (looking at the balloon) to straight down (looking at the city). One note about the 2m beacon: A 2.5 minute voice message (by Sue NOGUT) was played throughout the flight. Between voice messages, a live microphone was mounted outside to listen to an audio beeper. It was hoped that the audio would show that the lack of atmosphere at 100,000+ wouldn't support acoustics! [Ed. Note: The beeper was heard throughout the flight. This was either due to mechanical sound coupling or maybe the thin atmosphere will indeed support acoustics!]

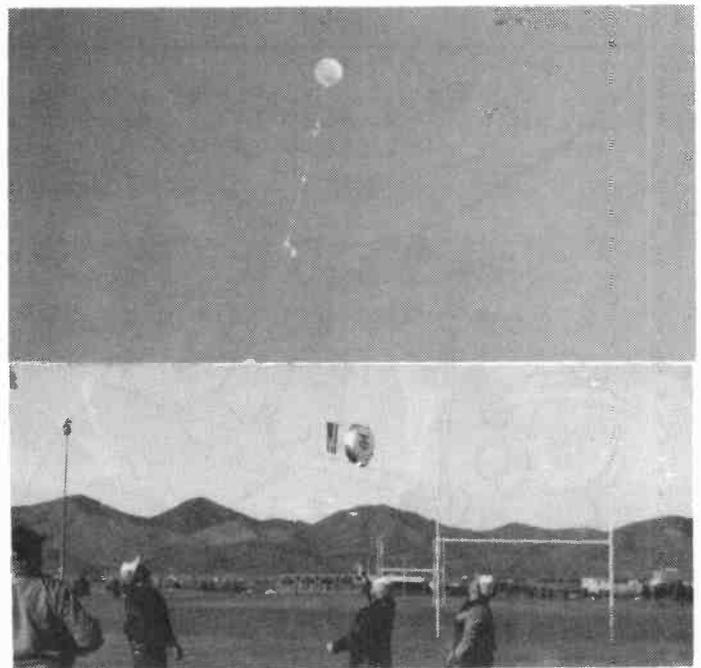


On the morning of May 11th, 1991, the balloon was inflated in preparation for liftoff. A bit of a breeze caused the balloon to move around quite a bit, so a large plastic sheet was used as a windbreak. The sheet was placed over the balloon to control it as it was carried over to the launch site. The balloon was raised, one last check of the payload and LIFTOFF!

The balloon headed up on its journey to the edge of Space. The wind took it straight north towards Fort Collins.



During the initial several minutes of the flight, the camera responded to the R/C commands from the ground. The launch site crowd was treated to fantastic views of the front range of the Rockies, the lakes and area landmarks, and even the skyline of Denver! About 10 minutes into the flight (an altitude of about 12,000 feet), the control link was lost. The camera went to a position just above the horizon and remained there. The view of the sun spinning by every 30 seconds or so was most unimpressive!



# E.O.S.S. (Edge of Space Sciences)

The recovery team left Denver well prior to the flight and had stationed themselves along the Front Range corridor. Several home stations provided beam headings to aid in the chase effort. As position reports came in, the camera control team gave chase in the hope of getting under the balloon and regaining control of the R/C camera. Having the camera point down at the ground would greatly aid in the recovery effort! At one point, Bill KORZ was able to move the camera somewhat by transmitting high power on the 6 meter R/C frequency and scratching his microphone to simulate R/C pulses! However, complete control was never regained. Murphy was apparently enjoying the view from the balloon. As the balloon burst at 111,000 feet, the camera caught pieces of balloon falling past and then Lo and Behold!, the balloon itself went right past the front of the camera with the parachute, 10 meter beacon and antennae trailing behind! As the balloon tether came to its end, it yanked the payload package upside down and tangled up in that position. When it stabilized, the tangled payload was in such an attitude that the camera was now pointing nearly straight down!

The descent provided everyone with views of rugged mountain terrain, clouds and lakes. The balloon came down about 5 miles north and 2 miles west of Ted's Place, Colorado, just north of Fort Collins. The chase team, headed by Greg KOELM had the landing point targeted shortly after touchdown. All of the trackers joined in the foxhunt and rapidly converged on the reported landing area. The balloon was found by a non-ham and his children who had been monitoring the progress of the flight on their scanner. The first amateurs on the scene were Ed NOMHU and Lance NOMKP, about 45 minutes after the landing. If the balloon had drifted just a couple of miles west it would have been in the wilds of Colorado and taken quite a hike to recover it!

Look for more EOSS balloon efforts. Planning is underway for another flight as early as this fall. For more information about upcoming EOSS events contact EOSS, 7175 S. Grant St., Littleton CO 80122.

Special thanks are in order to the following for their support of this program: Atmospheric Instrumentation Research (AIR) of Longmont, Colorado for balloons, helium and telemetry; Malcolm Benton KE9S for the lithium battery pack and balloon; and Bill WB8ELK for the 10m beacon, 35mm camera and encouragement.



LET'S WAIT TILL THE WIND CHANGES --- LAST TIME WE DRIFTED ACROSS THE "SUNNY SIDE UP" NUDIST COLONY, AND FIVE GUYS MOONED THE CAMERA!

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\*—(KDOFW Balloon Flight — FEB. 10, 1990) DAYTON BOOTH 338

# DARA LAUNCHES HF/VHF/UHF HIGH ALTITUDE BALLOON JUNE 29, 1991

Dave Pelaez AH2AR/8

*On June 29, 1991, at 8:30 a.m., EDT, Dayton Time, (1330 UTC) the Dayton Amateur Radio Association launched an Amateur Radio high altitude balloon package at the National Weather Service site in Huber Heights, Ohio. The package transmitted on HF VHF and UHF frequencies.*

As far as can be determined, this was the first time that a 20 meter beacon was used in this type of package. DARA will award a special certificate to those listeners (and watchers) who received the transmission from the furthest distances. QSL cards will also be given out to all who confirm reception of any of the three transmitters. A net was established on 7.232 MHz approximately 2 hours prior to launch of the balloon, and information given out regarding the status of the flight. Organizers of the flight include AH2AR, W8LLW, KB8EMD, N8NEU and N8JAF.

### **Balloon package equipment:**

(1) A PC Electronics TX RC5 1 watt 70 cm transmitter operating on 439.25 MHz. A "Little Wheel" antenna provided the horizontally polarized signal that will display "live video" produced by a Uniden camera. An interlaced overlay displaying altitude and outside temperature was utilized. This telemetry package is produced by RP Industries.

(2) The 20 meter beacon signal was created by the Ramsey 20 meter QRP transmitter board interfaced with a GLB automatic CW identifier board. The beacon message included a 13 WPM message that sent a series of "V's", along with QSL information. The frequency of operation was on 14.035 MHz. The 20 meter antenna for this package was a suspended vertical half wave dipole.

(3) The two meter digitized voice beacon were injected into a Hamtronics-A-51 2 meter FM exciter running at 100 MW. (Final has been removed.) The antenna for two meters was a half-wave vertical cut for 144.340 MHz.

Tracking of this balloon was accomplished by a group of balloon RDF'ers headed by W9DUU. A unique characteristic of this flight is that 2 hours prior to launch, a balloon that will be released by the National Weather Service, at the Huber Heights site, provided tracking data which will be utilized by a software program provided by WB8ELK. This tracking data will help in the planned recovery of the package by W9DUU. The accuracy of the balloon tracking program was greatly enhanced by utilizing the same site that the National Weather Service uses for their daily radiosonde launches.

The location of the National Weather Service launch site is near Taylorsville Road and Troy Pike in Huber Heights, Ohio. The launch site is near the interchanges where Interstate 70 and 75 cross. Further questions can be answered by contacting either AH2AR, N8NEU, or KB8EMD, via the Dayton, Ohio BBS, W8BI.

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# THE WIZARD'S 923 MHz. ATV TRANSMITTER

Louis Hutton K7YZZ

*After the WWATS 434/923 Mhz ATV repeater machine construction and bench testing was completed, I decided to take a look at different antenna designs for 923 Mhz operation. I did not want to tie up that repeater transmitter so decided to build a small ATV transmitter to use in antenna testing and such.*



Two circuit boards were ordered from PC Electronics. The TXA5-33 1 watt ATV Transmitter and the FMA5-E Sound Subcarrier Generator. A 5 watt RF Power Amplifier "brick" was ordered from Pauldon Associates.

The component boards were installed in a Radio Shack Cabinet 270-274. It is 8 1/4" wide by 6 1/8" deep by 3 1/16" high. Both the power supply voltage regulator and the RF Power Amplifier are cooled by large heat sinks mounted on the rear of the cabinet. The PC board mounted Video, Microphone, and Audio level controls were removed from the modules and replaced by front panel mounted controls. A standard 10 pin video camera chassis connector was installed

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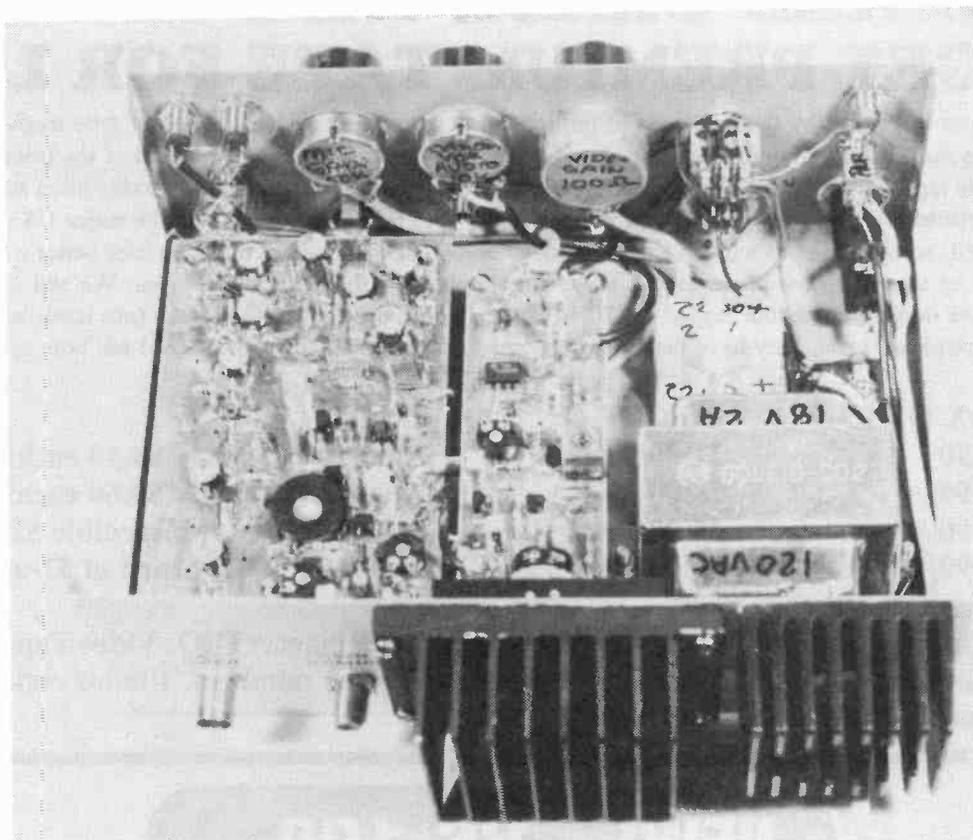
in the front panel with a switch to select inputs to the transmitter from either a Camera or VCR. Audio and Video jacks are provided on the front panel that may be connected to the output of a VCR. LED's are used to indicate status of power supply voltage and transmitter mode.

The Pauldon Assoc. RF Power Amplifier was purchased as a bare bones item. It requires DC line filtering for interference free operation. The diagram shows the decoupling and filtering I provided. On the rear of the chassis next to the heat sinks are the BNC RF output connector and a "F" connector for the video monitor output.

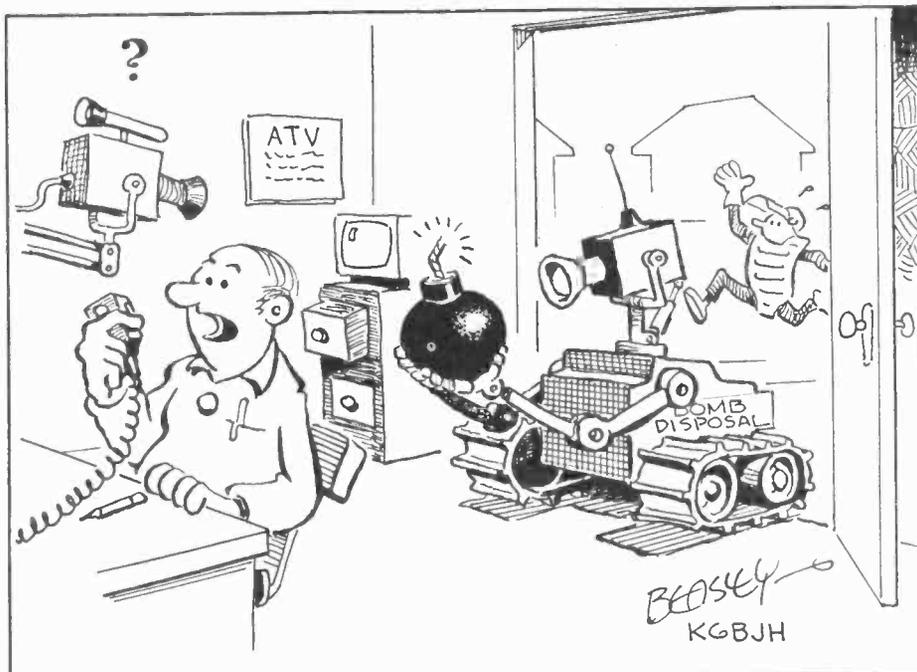
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# THE WIZARD'S 923 MHZ. ATV TRANSMITTER

With the DC bus voltage set to 13.8 volts and the sync stretcher turned off the rig puts out around 10 watts of carrier. With the sync stretcher adjusted properly, the output drops to 5 watts as specified. The little rig was easy to build and has given me no problems whatsoever. It has been used as an excellent signal source while testing antennas such as the Alford Slot, Beach Ball, Dual Quad, Ground Plane, and a 5/8 wave vertical gain type.



Inside view of transmitter, note controls are marked for easy ID. Photo by K7YZZ



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# TELEVISION FUNDAMENTALS

by Henry Ruh KB9FO

## BASIC TELEVISION SYSTEM

A look at the basic television system will further develop our understanding. Figure 1 shows the basic components of a system for transmitting and receiving television programs. The sections related to the scanning and synchronizing are shown in heavy outlines.

Scanning and synchronizing are needed to reproduce the picture and keep the reproduced picture in step with the picture originated at the transmitter. The synchronizing signals, or more simply, the sync signals, are generated at the transmitter, where, together with the video signal, they amplitude-modulate the transmitted signal. The receiver used the sync signals to synchronize the scanning of the electron beam of the picture tube with that of the transmitter camera tube. As will be shown later, the sync signals control the frequency and phase of the oscillators in the scanning and synchronizing section of the receiver.

## SIMPLIFIED SCANNING PRINCIPLES

Figure 2 shows the basic principle involved in scanning a picture. Starting at the top left side, the electron beam moves from left to right across the screen along line 1-1. During this time, picture information is being displayed. (In this illustration, it is assumed that the viewer is facing the screen of the picture tube.) After the beam reaches the right side of the screen at point 1, it is rapidly moved to the left side of the screen along the dotted line 1-2. No picture information is transmitted while the beam moves from right to left. The line marked 1-1 is called a trace, and the dotted line marked 1-2 is called the return trace, or retrace.

After retrace, the beam is at the left side of the screen at point 2. It then moves from the left to right across the screen for the next line, indicated as line 2-2. This procedure is repeated throughout the picture.

This is a simplified and slightly modified illustration of the scanning procedure. The scanning procedure is the same as that for reading a line on a page. The reader's eyes start at the top left side and move across a line or type. After reaching the right side of the page, the eyes quickly move back to the left side and begin the next line.

## THE RASTER

The electron beam moves back and forth across the screen of the picture tube whether or not there is a picture displayed. When there is no picture, the beam will trace out a white rectangle called a raster on the screen. When the standards for television were first established, it was decided that a rectangular picture (or rectangular raster) would be most desirable, and the relationship between the height and width of the rectangle was established.

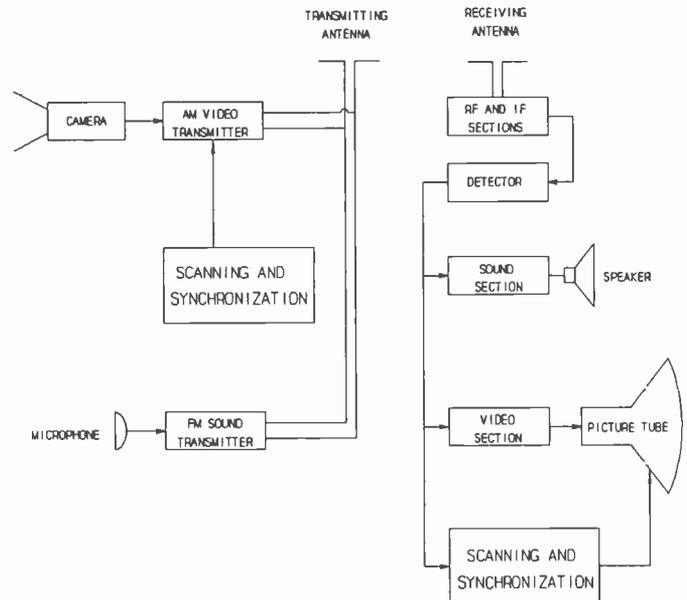


Figure 1. Simplified block diagram of a television transmitter and receiver.

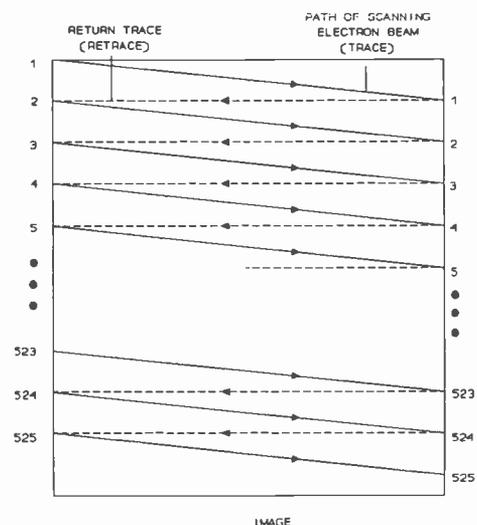


Figure 2. The procedure for scanning a television picture (somewhat simplified); solid line 1-1 is called a trace and the dotted line 1-2 is called a retrace.

# TELEVISION FUNDAMENTALS

## ASPECT RATIO

The width of the rectangle divided its height is called the aspect ratio. In television, the aspect ratio of the picture (and the raster) is four to three. Therefore, if the picture is twelve inches wide, it must be three inches high. If the picture is twelve inches wide, it must be nine inches high to obtain the correct aspect ratio.

By adjusting the voltage to the picture tube circuitry, a rectangle with different aspect ratios is produced. But, the picture is transmitted with an aspect ratio of four to three. Therefore, the transmitted picture is reproduced with minimal distortion when the receiver picture also has an aspect ratio of four to three.

## SCANNING RATE

When the trace reaches the bottom of the raster, it is quickly moved back to the top of the screen where it begins to scan lines again. The television screen actually displays 60 complete rasters (or fields) each second.

When the standards for television were established, it was necessary to decide on the repetition rate for showing complete pictures. How many complete frames were to be shown per second? The choice of frame frequency involves a tradeoff. Ideally, with a high frame frequency rate we perceive the individual pictures making continuous motion. However, a high frame frequency produces electronic problems in the scanning. For one thing, the amount of brightness on the screen is definitely affected by the rate at which the beam is moved across the screen. Specifically the faster the beam is moved, the more power is needed to get sufficient brightness. In addition, a higher frame rate requires a wider transmission bandwidth. The US, after trying many different rates, many determined by equipment limitations, settled on 525 lines per picture, 262.5 per field, and 30 frames per second. This was modified slightly for color from a horizontal scan rate of 15,750Hz. to 15,734 Hz. This produces a rate of 59.94 fields per second.

## FRAME AND FIELD RATES

To obtain the desired amount of brightness, to utilize a reasonable transmission bandwidth, and to achieve the effect of continuous motion, a compromise was needed. It was finally decided that for monochrome transmission, thirty complete pictures would be displayed on the screen each second. These complete pictures are known as frames. A frame frequency of only thirty pictures per second yields a flicker which is discernible to the eye.

Therefore, each picture is divided into two parts called fields. The fields frequency is sixty fields per second and the frame frequency is thirty frames per second. Each field contains one half of the total picture elements. The above rates are very slightly different for color transmissions. Color necessitated a departure from the AC mains locked TV system to a crystal

frequency standard and the frequencies chosen were 59.95 fields/sec. and 15,734 horizontal lines per frame or 262.5 lines per field.

## CHOICE OF RATES

Originally, the values of sixty fields per second and thirty frames per second were selected so that television picture could be synchronized to the standard United States power line frequency of 60 hertz (Hz). For a monochrome transmission, all scanning frequencies were previously derived from the 60-Hz line frequency. The receivers are automatically synchronizing pulses.

As a result of this power-line frequency synchronization, the effects of hum on the picture will be stationary on the TV receiver screen. Hum may be caused by imperfect power supply filtering. If there were no synchronization, the hum effects would cause vertically moving patterns to pass through the picture. TV transmitters in adjacent cities frequently use synchronized power line frequencies to prevent this unwanted type of interference.

## COLOR FIELD RATE

When color television programs are broadcast, the field frequency is reduced slightly from 60 Hz to 59.94 Hz. Thus, hum interference patterns are not perfectly synchronized for color broadcasts. However, they move vertically at the rate of only 0.06 Hz. which is a slow rate and not readily visible.

## FLICKER

If related still films follow each other fairly rapidly on a screen, the human eye combines them and the motion appears continuous. The eye can do this because of a phenomenon called persistence of vision. Due to this characteristic of the eye, visual images do not disappear as soon as their stimulus is removed. Instead, the light appears to diminish gradually. On the average, about 1/50 second is required before the light disappears entirely. If this did not occur, motion picture and television entertainment might not be possible.

## THE TELEVISION FRAME RATE

In television, a fundamental rate of 30 images (or frames) per second was chosen. As previously noted, this frequency and the effective rate are related to the frequency of the AC power lines. This choice of frame-sequence rate requires less filtering to eliminate an AC ripple. In audio systems, this AC ripple is known as hum. If the rate were 24 frames per second (fps), or any other different frequency (non synchronous) any ripple not eliminated by filtering produces a weaving motion in the reproduced image. Thus AC ripple is less of a problem when the rate is 30 fps.

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# TELEVISION FUNDAMENTALS

## INTERLACED SCANNING

All traces of flicker are eliminated by using an effective rate of 60 framers per second. This is accomplished by increasing the downward rate of travel of the scanning electron beam so that every other line is sent, rather than every successive line. When the bottom of the image is reached, the beam is sent back to the top of the image. Then, the lines that were skipped in the previous scanning are sent.

The initial set of scanning lines is assumed to start at the upper left portion of the camera-image plate. This is point A of Figure 10. Starting at point A with line 1, every other line is scanned. The field produced is known as the "odd-line field". When this field is completed, the beam retraces rapidly to point E in figure 10. From point E, the "even-line field" is developed by scanning lines 2, 4, 6, 8, 10, and so on. Both of these, operation and the odd and even-lines scanning, take 1/30 second. Therefore, 30 frames per second is still the fundamental rate.

However, since all the even lines are transmitted in 1/60 second and the same is true of the odd lines, the total scanning time adds up to 1/30 second. The human eye cannot separate the two. Therefore, the effective rate is now 60 frames per second, and no flicker is noticeable. This method of sending television images shown in Figure 3 is known as interface scanning.

With each frame divided into two parts, each field will have one-half of 525 lines (262 1/2 lines) from its beginning to the start of the next field. With interlaced scanning, each frame is broken up into an even-line field and odd-line field. Each field contains 262 1/2 lines. Each frame has a total of 525 lines.

## SYNCHRONIZATION

The cathode-ray beam at the receiver picture tube must follow the camera tube scanning beam at every point. Each time the camera-tube beam is blanked out, the same process must occur at the receiver and at the proper place on the screen. For this reason, blanking pulse signals are sent along with the video signals containing the image details. When these blanking pulses are applied to the control grid of the cathode-ray tube, the grid is biased to a larger negative value that prevents an electron from passing through the grid to the fluorescent screen. Vertical and horizontal blanking pulses prevent the retrace lines from being visible on the picture tube.

However, blanking voltages do not cause the movement of the beam from the right-hand to the left-hand side of the screen, or from the bottom to the top. Another set of pulses (called synchronizing pulses) are superimposed on the blanking signals to control the deflection oscillators at the receiver. These oscillators, in turn, control the position of the beam. A horizontal sync pulse at the end of each line causes the beam to be brought back to the left-hand side, in position for the next line. Vertical sync pulses occur at the end of each field to bring the beam back to the top of the image.

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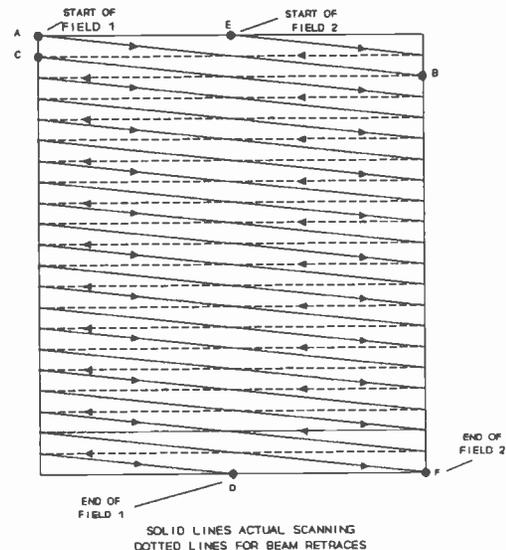


Figure 3. Interlace Scanning

## HORIZONTAL BLANKING AND SYNC PULSES

At the end of each line, the horizontal blanking signal is imposed on the beam and automatically prevents the electron beam from reaching the image plate at the camera tube or the fluorescent screen at the receiver. With the horizontal blanking signal ON, and horizontal synchronizing pulse caused the horizontal deflection coils to move to position of the electron beam from the right side of the picture to the left side. The sync pulse controls a deflection oscillator circuit which provides the proper deflection coil currents needed for the retrace.

The job of the synchronizing pulse is finished once the retrace is complete. A fraction of a second later, the horizontal blanking pulse releases its bias on the grid of the cathode-ray tube and the electron beam begins to scan again. This process continues until all the lines (odd or even) in one field are scanned. Additional details of the composite signal appear in Figure 3.5B. Details involving the horizontal blanking pulse and the sync pulse are given later.

## VERTICAL BLANKING AND SYNC PULSES

The vertical notion ceases at the bottom of the field. It is then necessary to bring the beam quickly to the top of the image so that the next field can be traced. Since the vertical sync pulse and the trace require a longer period of time than the horizontal sync pulse and retrace, a longer blanking signal (vertical) is inserted. As soon as the vertical blanking signal takes hold, the vertical-sync pulse is sent. The form of this pulse is shown in Figure 3.6. The horizontal-synchronizing pulses cannot be interrupted, even while the vertical deflection coils bring the electron beam to the top of the field. Therefore, the long vertical pulse is broken into appropriate intervals. In this way both horizontal and vertical pulses can be sent at the same time.

Each type of pulse is accurately separated at the receiver and transferred to the proper deflection system.

# ATVQ CUMULATIVE INDEX

*In response to numerous requests, here is a cumulative index of all articles, build-it projects and news by geographic location. The items are organized by subject area. Type key: Construction, Theory, Review, News, Operation, Humor, Other. Columns and features which have several topics have been broken out into the individual topics. Index covers V1 #1 to V4 #3 (13 issues) A few items have been listed more than once if they covered more than one topic area or were applicable to more than one area.*

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N/R	GB3ZZ ATV REPEATER ADVANCED CONTROL SYSTEM	BRIAN GW6BWX	55 V3 #2
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C	DTMF DECODER FOR THE C-64	LYN W1NRE	53 V3 #3
C	WWATS 434/923 MHZ REPEATER MACHINE	LOU K7YZZ	28 V3 #4
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N	LIVE TV CAMERA TO EDGE OF SPACE HESPERIA, CA	WB8ELK	45 V2 #2
N	MORE HIGH FLYING ATV (KNOXVILLE, TN)	WB8ELK	16 V2 #3
N	GO FLY A KITE!	JON WM8W	58 V2 #3
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N	KD0FW BALLOON LAUNCH, INDEPENDENCE, MO		31 V3 #1
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N	DENVER ATV'ERS CHASE KANSAS BALLOON		25 V3 #2
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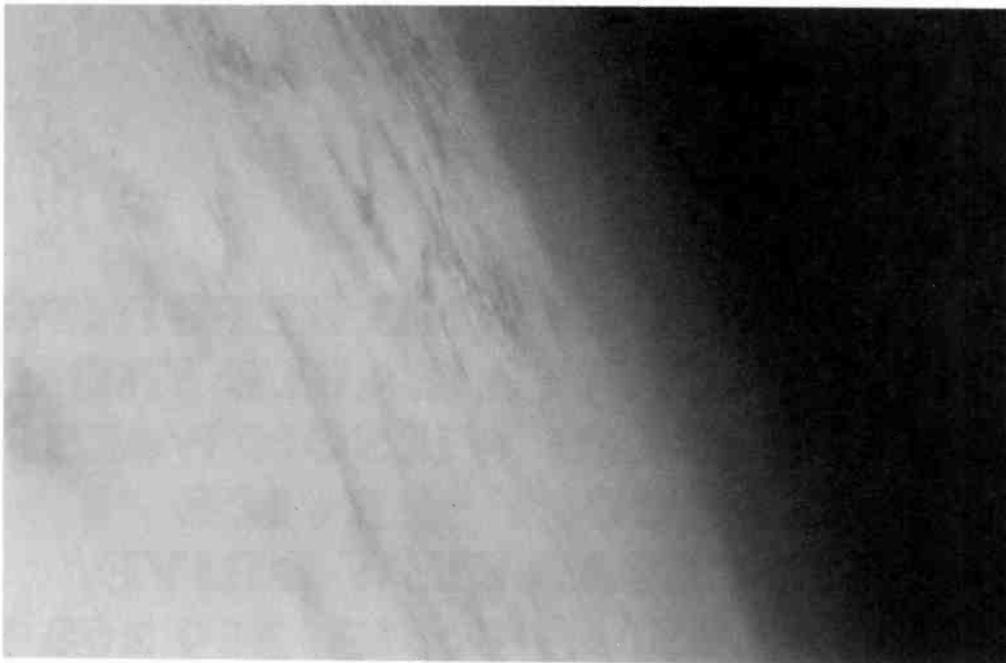
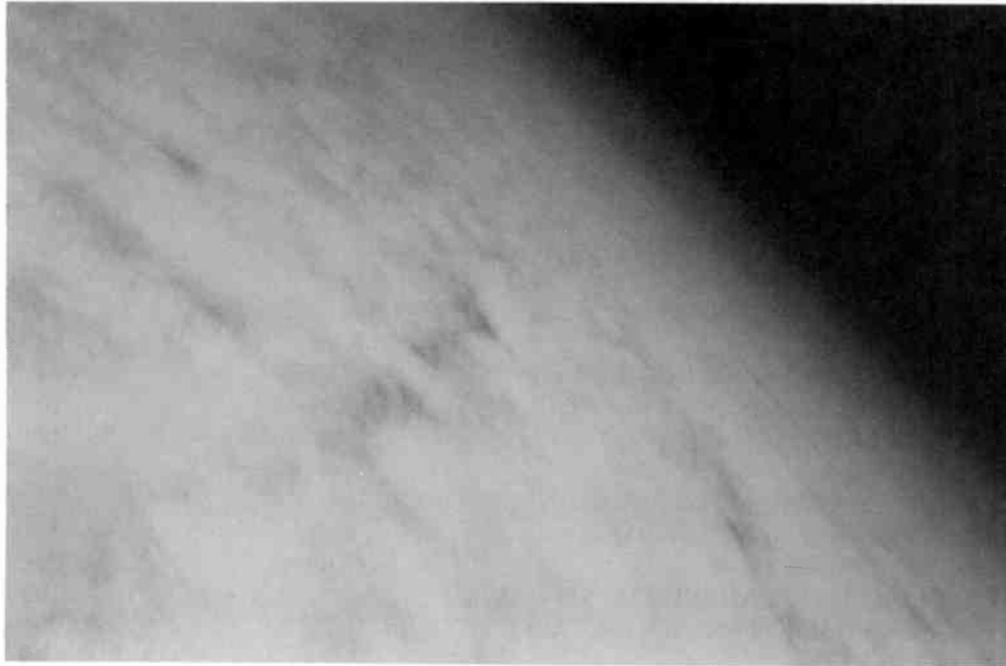




# Franklin High School Balloon

by Bill WB8ELK

*This April, students at Franklin High School in Franklin, Indiana (near Indianapolis) sent up two balloon experiments. As part of their Aerospace Technology class, they designed and built their own weather satellite. They elected to fly it up to the edge of space via a weather balloon. This "satellite" project gave them a chance to design electronic circuitry for harsh environments, to learn about aerodynamics and to study the upper atmosphere.*



# Franklin High School Balloon

Under the direction of teacher Doug Clark and Chuck Crist WB9IHS, the class held a series of classes to go over the theory of operation, their design goals and to actually build their satellite. They did wind tunnel tests to build a stable platform for their live TV camera and even did drop tests of the parachute recovery system.



Using components donated by pioneer balloon experimenter Bob Mc Auliffe W9PRD, the final payload consisted of a Wyman Research ATV transmitter, a Uniden VM-110 TV camera, 2m FM transmitter (CW ID) and a 10 meter CW beacon. The styrofoam package was hexagonal in shape with a swivel on the suspension line to help stop any spinning. In addition, I sent along a Samsung AF-SLIM automatic 35mm camera to attempt to take some high resolution photos from the edge of space. The class attached the piggyback camera on the side of their main payload so that it pointed at the horizon.

Since they were building a weather satellite, they pointed the TV camera down at the ground so they could study the cloud patterns. One nice touch was the camera lens protector (half of a pair of sunglasses!). The 2m antenna was a rubber duck and the ATV antenna was a horizontal little wheel.



As another part of their experiment, they build two different radar reflectors out of metalized Mylar. They attached the smaller one to the flight line of the ATV balloon. In addition,

they built a large reflector (garbage can sized) which they flew on a separate small balloon (no transmitters on this one). They hoped that the local Indianapolis Center FAA office could actually see the radar reflections and track the balloons.



Early in the afternoon on April 21st, they sent both balloons aloft. Ron Pogue KD9QB and pilot Ken Jessup were circling overhead in a small plane while transmitting the launch preparations from their aerial view back to the Indianapolis ATV repeater. They stopped transmissions as the balloon took off and flew along with it until it hit the cloud deck at 3000 feet. Although the large balloon headed up at about 900 feet/minute, the small balloon with the large reflector was filled to just lift off and headed up extremely slowly.

At first, everyone was treated with a great aerial view of the school grounds as the balloon headed on its way. Nothing could be seen for a few minutes when it disappeared into the clouds. Soon spinning cloud tops could be seen on their TV receiver as the balloon broke through the cloud layer. The ATV signal could be seen over a wide area of the midwest during the flight. Emmett K9YKX operated a tracking net on 40 meters and took reception reports and beam headings. The Franklin High class learned a lot about direction finding as well.

# Franklin High School Balloon

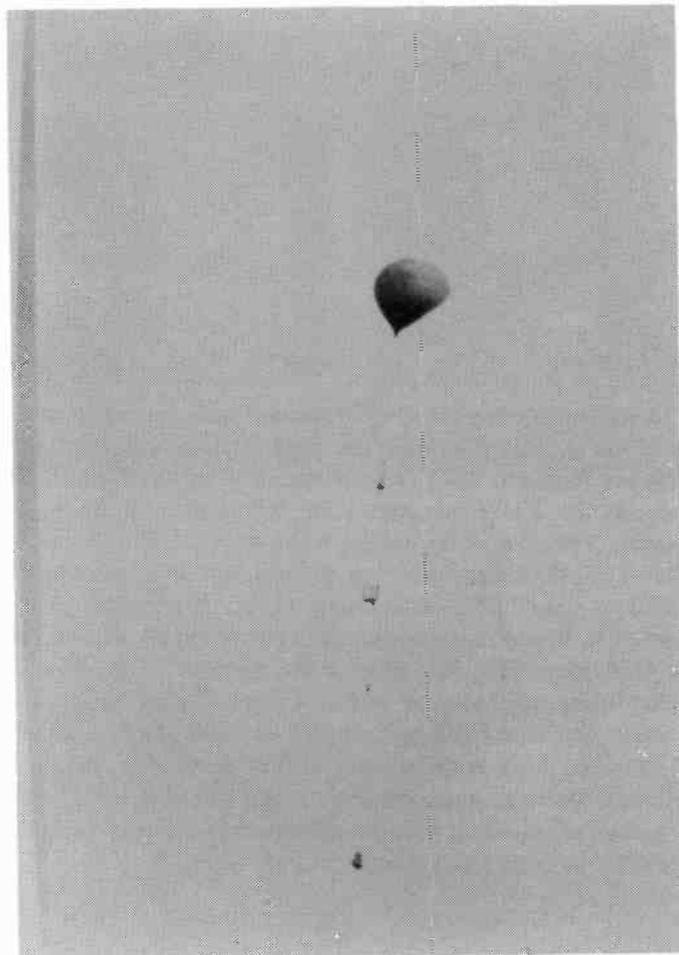
They took beam headings from the HF net and the foxhunt team and plotted them on a large map of Indiana. They did a few practice drills in the weeks prior to the flight to test out their plotting abilities. They even had a few intentional bogus headings thrown in, just to keep them on their toes. During the actual flight, they did a great job of using only the best data and throwing out any headings that seemed too far off.

After reaching the top altitude of 95,000 feet, the balloon burst and the payload parachuted back to earth. The students were so good at tracking the balloon's course that they were able to send the chase plane close enough to actually see the parachuting package before it landed! The payload landed softly into an open field just 40 feet from a passing car (if only he'd looked to his left!). Members of the Indianapolis Fox hunters were close enough to see the circling plane and drove quickly to the landing site. Veteran balloon trackers Larry Oaks WB9YAJ and Paul Bohrer W9DUU were on the spot in just a few minutes. The balloon had travelled 28 miles to the southeast to land near the towns of Westport and Alert. The town of Grammar was not too far away - you just can't escape English class!

Controllers at the Indianapolis Center FAA office were able to actually track both balloons on their radar screens. They followed the small balloon for many hours and lost it near the Kentucky border (it was found a few days later and returned!).

The 35mm film camera had a built-in 10 minute timer. It took a picture every 10,000 feet during the flight. All of the photos came out beautifully. Really spectacular photos showing the curvature of the earth, the darkness of space as well as the thin blue haze of atmosphere were taken at the top altitudes of 75000, 85000, and 95000 feet. Although it was an overcast day, some detailed cloud patterns could be seen over 200 miles away. The photo processor summed it up when he brought out the photos and asked, "How'd you take these photos? From a spacecraft!".

The balloon satellite experiment was so successful that it's been added to the curriculum for the Aerospace Class. This fall they plan a really unique experiment to link up classrooms across the midwest via a cross-band VHF to UHF FM repeater. Over a dozen schools have signed up to participate so far. The plan is to uplink on 2m FM and have the downlink come down on both the sub-carrier and on-carrier audio of an ATV transmitter (sending back live TV views, of course!).



Photos: ABOVE: The balloon shortly after launch.  
OPPOSITE PAGE >> two spactular views of space.  
(In color on the lead page of this story)  
LEFT: Suprise! Paul W9DUU is caught by the balloon camera  
as he video tapes the recovery.

# HAWAII ATV DX BEACONS

## NEWS FROM GORDON WEST

*Hawaii Beacon is turned on, tuned, tested, and . . . ready to be received by West Coast VHFers running horizontal polarization, and the exciting interest to possibly establish some new records between the Mainland and the Big Island.*



This is the inside of the KH6HME ATV beacon location on Mauna Loa volcano. Photo by G. West.

### **KH6HME BEACON CHARACTERISTICS**

*Location: 19 degrees, 35'19" north; 155 degrees,  
Elevation: 8,200 feet on the side of Mauna Loa  
volcano*

*6-meter beacon: 50.061 MHz, 20 watts, dipole  
(remote location)*

*2-meter beacon: 144.170 MHz, 60 watts, pair 7-  
element (NBS) horizontal Yagis. CW ID at 20 wpm  
with long rise in tone on steady end key.*

*70-cm beacon: 432.075 MHz, 35 watts output, into  
pair 22-313 beams horizontally polarized. CW ID at 13  
wpm.*

*ATV beacon: 434.000 MHz on command (on  
command, alternates with CW beacon), 80 watts peak  
video output, into pair 22-element K1FO beams.  
Video ID 3 changing graphics from Elktronics VDG-1  
board.*

*23-cm beacon: 1296.0 MHz, 17 watts into 4 vertically-  
stacked, 25-element, loop Yagis. CW ID at 18 wpm.*

*Liaison Frequency: 28.885 MHz, USB, 100 watts into  
full wave loop.*

I have just returned from the beacon site, and a several days stay with Paul Lieb, KH6HME, the man behind the machines. We spent days on the slopes of Mauna Loa fine-tuning everything for maximum reception at the Mainland end of the circuit. And when the beacons are substituted for the 2-way transceivers that Paul puts in place, his reception of Mainland signals will be the best ever for this coming tropo summer season.

"We also have capabilities of working on 220 MHz, 900 MHz, plus 3 additional microwave bands to contact N6CA for some additional world records," comments Paul Lieb, KH6HME, the one-man show when the band opens in the summer to the Mainland. Paul's fantastic location on the side of Mauna Loa volcano is a straight shot over-the-water to all of the West Coast, from Mexico to Alaska. Hawaii and Mainland VHF/UHF operators appreciate the courtesy of Hawaii television Channel 9 for allowing Paul to operate the beacon equipment from their Channel 9 link site high atop the volcano.

"An active volcano eruption is taking place right now just a few miles away, and last year the vibration was so fierce it knocked one of my transmitters right out of the shelf," smiles Lieb. He now has everything well bolted down in case of another earthquake at the volcano site.

The beacons run 24 hours a day, and are constantly monitored by Lieb from his downtown office in Hilo. Paul runs his own company, and is available at almost any time to drop what he is doing and to make the long, windy, 1-hour drive from Hilo to the Mauna Loa volcano to set up his transceivers for 2-way contacts to the Mainland. "But until I get a phone call, I have no way of knowing whether or not

"Call anytime--and if I'm not there, they will get a message to me," with his best phone number of (808) 959-9553. "It takes me 5 minutes maximum to load up the back of my wagon with my rigs, and in about an hour's time, you should all hear the beacons drop off the air instantly to be replaced by my voice calling CQ West Coast," chuckles Lieb.

July and August are the best months for expected tropospheric ducting between the Mainland and Hawaii. But without a phone call, Hawaii hams may have no idea that the band is open. "Sometimes we hear Mainland FM stations and TV audio, and sometimes we don't--so that's no guarantee that the band is open," agrees KH6IAA(A1), KH6FOO (Russ), and KH6CC (Jack). These well-known call signs come on the air when the word gets out that the beacon is being heard on the Mainland. "But if you guys don't get on the phone and call, we have little idea that the band is open," adds Russ, KH6FOO. Russ and Paul both agree that there may be some tell-tale signs of a band opening as seen in Hawaii and California, and a gradual rise in background noise on the VHF and UHF bands.

"I can usually see a good band opening when I'm up at the repeater site--the clouds should be just below me, and the temperature a little bit warmer than on the way up the slopes," adds Lieb.



Paul Lieb KH6HME points to the pair of 70 cm ATV antennas aimed at California. Photo by G. West.

Without question, the stationary "Pacific high" is a good sign for a tropospheric band opening. Hurricanes down south may also contribute to the band opening, but neither Paul nor Russ feel that hurricanes are absolutely necessary for the band to pop open. And most recently, studies in Europe indicate the potential for a band opening 2 days after a steady pressure system begins to recede and the barometer begins to start down. (Good reading--Winter, 1991 issue of CQ's Communications Quarterly, Page 31 on).

*So get set this summer for some band openings to Hawaii. The PC Electronics ATV system could bring pictures into a cable-ready television on Channels 55 through 60 with the TV hooked up to an outside antenna and aimed west. ATVers might want to monitor their local repeaters for a repeat-out of the 434 MHz input beacon from Hawaii. Satellite enthusiasts should go to horizontal polarization with their 432 antennas and aim them west for the 434 MHz beacon. And when the band really opens up, I can see ATVers scrambling to their roofs to switch from vertical to horizontal in order to see the picture coming in over a record-breaking distance.*

So get set for some real excitement this summer, because Paul Lieb, KH6HME, and all the gang at Hawaii have everything in high gear to make this season one of the most active ones yet on VHF and UHF frequencies.

And we close this article with memory of the pioneering efforts of silent keys Bob Cook, W6PJA, and Bill Tice, W6NGN, who devoted their life to see new records being made between Hawaii and the Mainland on VHF and UHF frequencies that no one ever dreamed would go so far. And indeed there may soon be more records to be made.

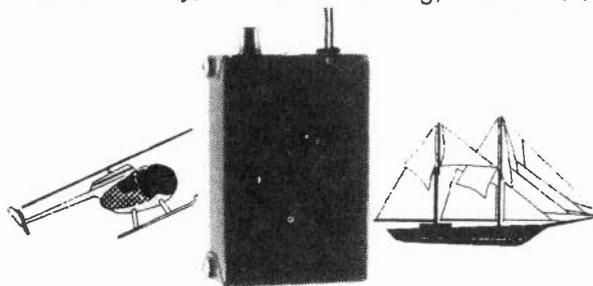
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## A NEW REPEATER IN SANTA YNEZ VALLEY, CA Ron Drumheller, K3NXF

*California's Santa Ynez Valley is surrounded by mountain ranges  
and this makes VHF communications very difficult.*

We are cut-off from the many Southern California ATV repeaters and their various activities. After reading several magazine articles about this new and challenging method of communication, three of us in the valley became very interested in ATV.

The initial interest was started by Ron Drumheller, K3NXF, and Tom Sauer, N6RNE. It was not long before they convinced Dave Lamb, WA6BRW, to join in the adventure. Dave is the local A.R.E.S. director and immediately could see the benefit of ATV for emergency operations support. We purchased our initial ATV downconverters, transmitters, and antennas from P.C. Electronics, located in Arcadia, California.

The first ATV simplex contact was very exciting; something that we will always remember. Our Field Day last year was held on a mountain top above our Valley. Tom could not join the other hams at the Field Day site so we communicated with his home QTH via ATV. A perfect color two way QSO was established. We were only using 1-watt of power to transmit 18 miles, but of course we had the help of the mountain elevation. During the year, we experimented with various antennas, amplifiers, cameras, and locations. Tom has a van which we converted for our mobile ATV use. As we experimented with the locations around our valley, it soon became evident that a repeater, with some elevation, would be necessary to provide stable television communications for emergency and community service events.

Dave and I visited the WB9KMO ATV repeater site in Santa Barbara, CA., in order to obtain information and knowledge on repeater construction and operation. We used Tom O'Hara's (W6ORG) article, "Thinking About Putting Up An ATV Repeater?", as our guideline for design and construction.

I purchased an empty equipment case from a local parts supplier and the dream of a portable ATV repeater started to become a reality. After a few meetings over coffee and doughnuts, we had the layout of the front panel designed. Since Tom is a retired electronics engineer and draftsman, he "volunteered" to perform the drilling, cutting, and labeling of the front panel. The transmitter, receiver, and VOR were purchased from P.C. Electronics. The units are assembled, tested, and superbly built in shielded enclosures. The video id'er board was ordered from Elktronics and installed in the same shielded box with the VOR circuit board. An 18-watt linear amplifier from Pauldon Associates will provide the necessary rf power for our portable repeater.

The antenna selected was a tri-band (144/446/1200) with the appropriate triplexer manufactured by Comet Antennas. Switches, leds, connectors, cooling fan, and hardware were purchased at the local Radio Shack store. The video monitor was part of a Uniden security system and was designed to work with a 12 volt power source.

All connectors in the repeater are either 'N' type coax or gold plated phono plugs. The coax is double shielded to prevent interference. The portable repeater can be powered by a 12 volt power supply or a deep-cycle marine battery. The power drain is 4.9 amps during transmit with the linear amplifier operational, and 1.1 amps in the standby mode. These readings are with the monitor turned off. With the monitor on, expect an additional 500 ma.

DC power input is fused and diode protected against reverse polarity. All toggle switches on the front panel have a corresponding led indicator light. Power switches are provided for: master power, receiver, VOR, transmitter, linear amplifier, and a cooling fan. Since the receiver provides local audio, we have included a built-in speaker, volume control, and a switch to disable the speaker.

The built-in monitor can be switched to either the video input or the video output picture, or turned off. This unit was designed as a portable repeater but it can also function as a "stand-alone" ATV cross band receiver/transmitter unit. Selector switches are provided on the front panel to select the transmitter input source. Auxiliary transmitter input jacks and auxiliary receiver output jacks are located on the lower left hand side of the front panel. There is also a microphone input jack to mix with the selected audio source. A position is reserved on the audio selector switch for future mixing of a two-meter radio audio source with the ATV receiver audio, for "field" co-ordination purposes.

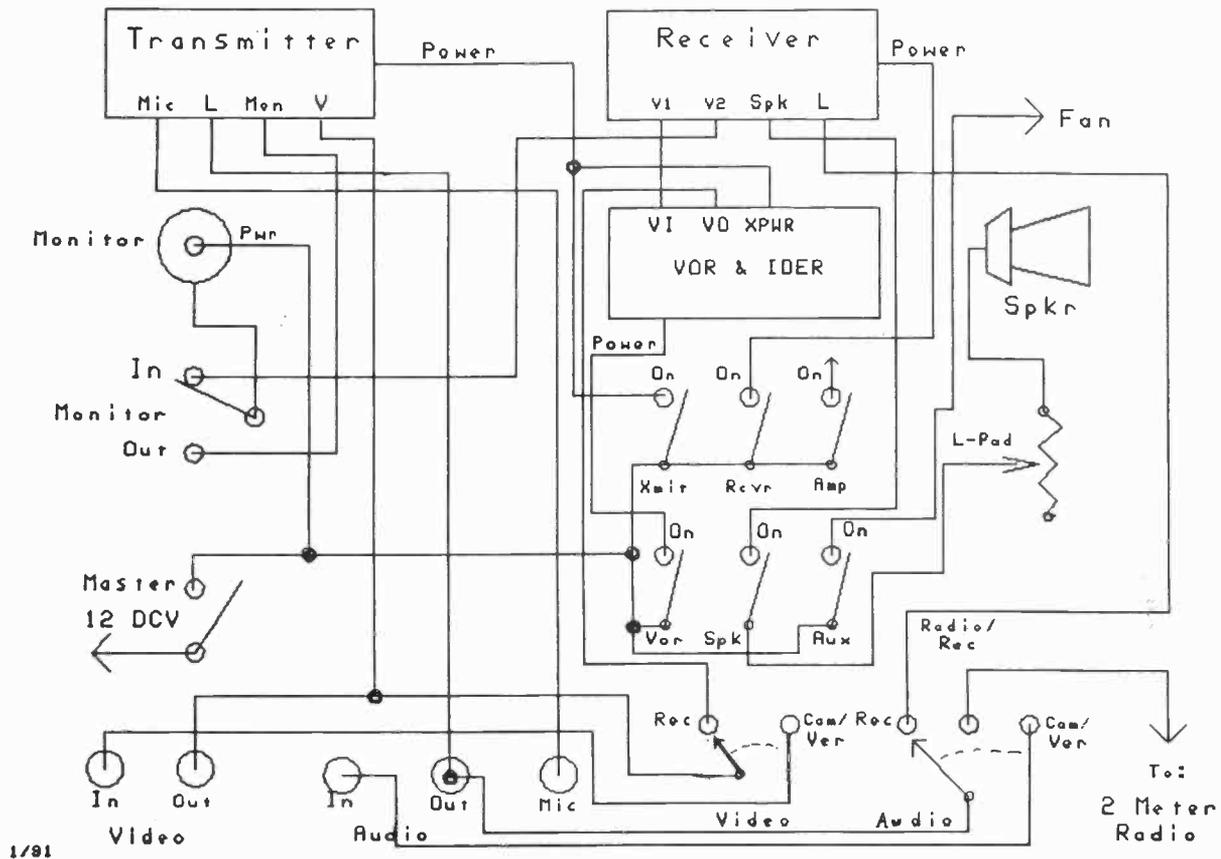
An internal switch was installed for control of the video operated relay. The VOR can be disabled, activated by receiver horizontal sync, or set to the constant enabled function.

Building this repeater was certainly a lot of fun and a great educational exercise. The cost of materials for this ATV repeater was about \$1,350.00. I am including some construction pictures and a listing of major equipment that was purchased.

P.C.ELECTRONICS of Arcadia, CA  
ATVR-4 RPT Receiver & Downconverter 434.0  
RTX-23 Repeater Transmitter 1253.52  
VOR-2 Video Operated Relay & ID Timer Board 1590D Shielded Box for VOR-2 and IDer  
UNIDEN Security Monitor 12v  
PAULDON Associates of Tonawanda, NY  
PD-1200N Linear Amplifier 18-watts with the large heat-sink option  
ELKTRONICS of Findlay, OH  
VDG-1 Video IDer Board with 4 display screens  
N.C.G. COMPANY of Anaheim, CA  
(Comet Antennas)  
CX-801 Tri-Band Antenna 144/430/1200 MHz.  
CFX431 Triplexer Unit  
CK-5LX Low Loss Coax Assemble

# K3NXF ATV REPEATER

471 Calor Street  
Buellton, CA 93427



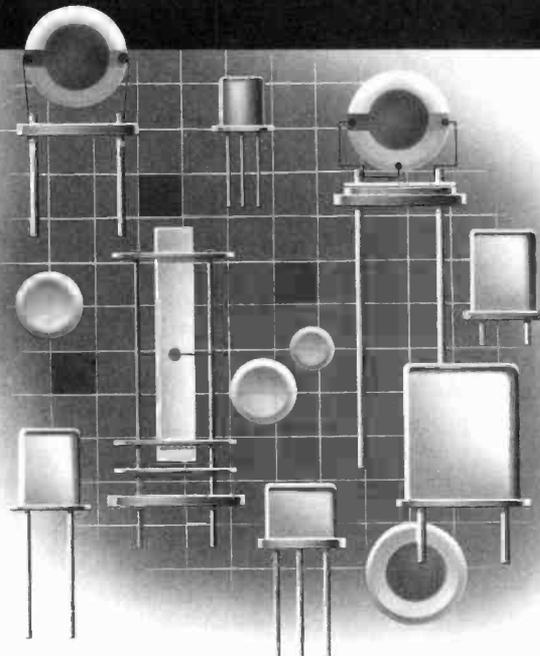
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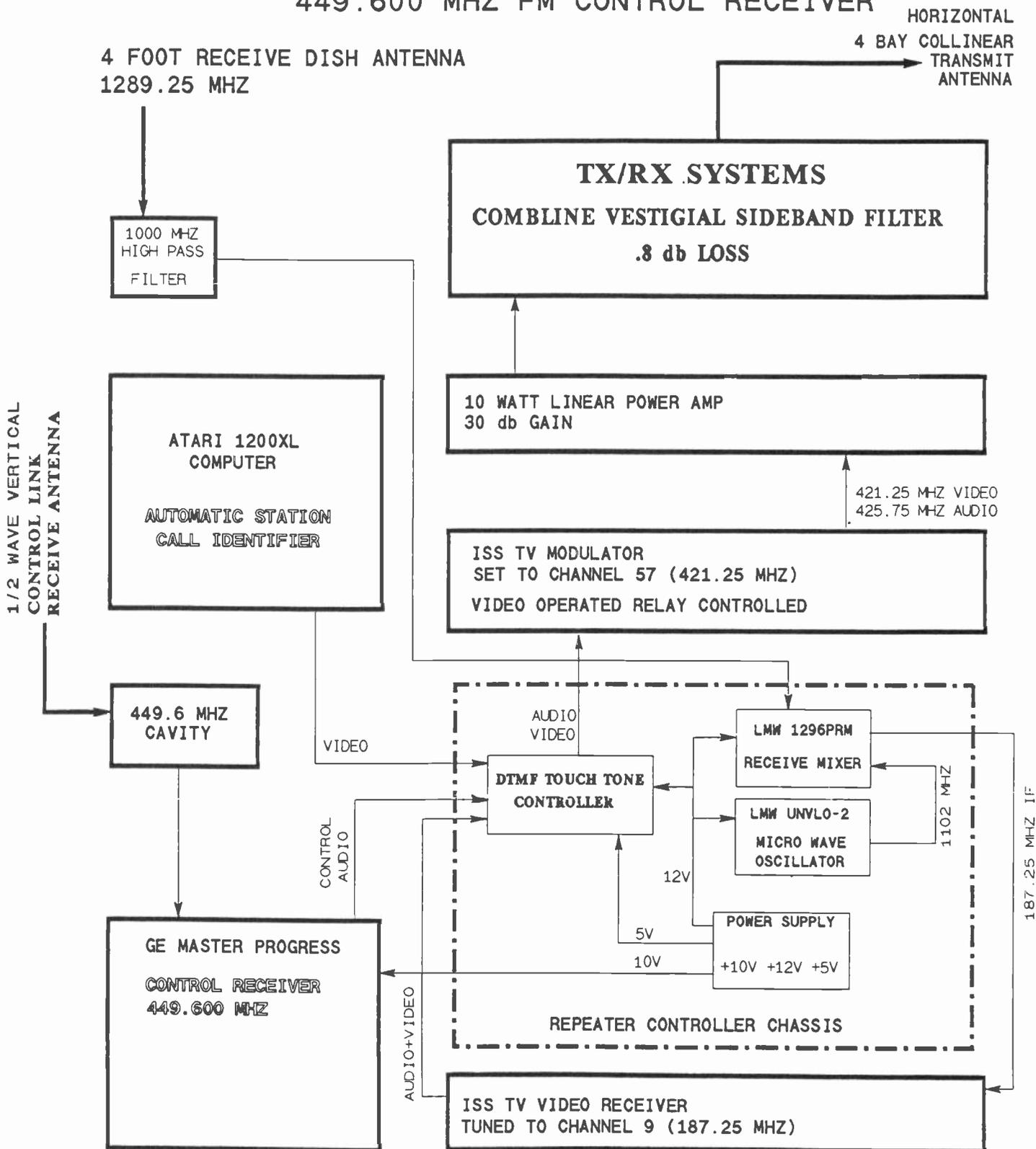
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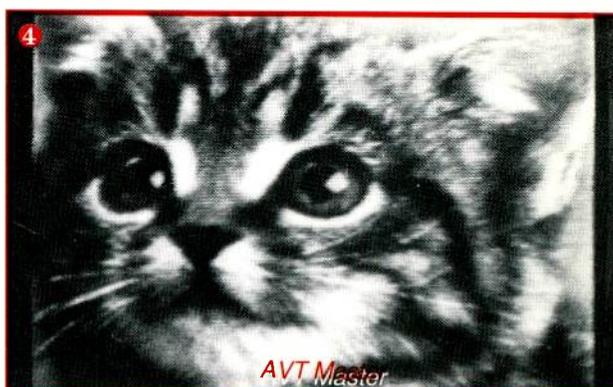
VSB-70



430-16



RLA-70 w/MPS-100



AVT Master

① **NEW! VSB-70 ATV Transceiver:** the only amateur television transceiver utilizing VSB (Vestigial Sideband) technology to minimize adjacent channel interference and preserve spectrum space; built-in UHF GaAsFET preamp to improve reception; covers the 70 cm band, 420 - 440 MHz; inter-modulation distortion less than -42 dBc; one watt PEP output; monitor transmitted and received signals on your standard TV receiver; audio and video input via front panel 10-pin camera jack or rear panel RCA audio and video inputs (switchable); crystal-controlled or variable-tuning down converter; crystals for 434 and 439.25 MHz are included; optional crystals for 421.25 and 426.25 are available; requires 13.6 VDC @ 1.5 amps ..... **\$349.95**

② **NEW! RLA-70 Remote Linear Amplifier with Power Supply:** mast-mounted amplifier boosts your ATV signal up to 50 watts PEP; equivalent to a 100 watt amplifier in the ham shack with a 3 dB line loss; built-in GaAsFET preamp mounted at the antenna where it does the most good; power supplied through the coax; includes MPS-100 Multi-purpose Power Supply: provides a well-regulated 28V DC @ 6 amps for the RLA-70; also provides regulated 13.6V DC @ 2 amps for the VSB-70 ..... **\$699.00**

③ **430-16 Antenna:** high-performance, computer optimized yagi specifically designed for ATV operation; broadband frequency

coverage from 420 to 440 MHz; 16 elements give you 14.3 dBd gain; O-ring sealed connectors; 28 degree E-plane beam width; 32 degree H-plane beam width; 10 foot boom ..... **\$119.95**

④ **AVT Master Amiga Video Terminal:** SSTV and FAX system (hardware and software) for transmit and receive with your Commodore Amiga Computer; 55 SSTV modes in up to 4,096 simultaneous colors; Nine FAX modes in up to 16 grey levels; eight function "repair kit" vastly reduces damage caused by QRM or QRN; on-screen tuning scope; mode-to-mode conversions; interpolating zoom; image tinting, brightness and contrast control; text overlay using multiple fonts, boldface, italics and underlining in any combination or color; automatic CW and/or synthesized speech ID after transmit; custom color bar generation; user-defined FAX demodulation curves; image rotation and flipping; paint compatible; extensive ARexx language support; real-time software filtering for scope and receive operations; grab screens to transmit from any digitizer or operating program in real-time; automatic start and run at any time; image printing in both black-and-white and color on hundreds of printers ..... **\$299.95**

Specifications subject to change without notice or obligation. Prices listed are suggested Amateur Net through participating dealers.

Technical support may be obtained through CompuServe's Hamnet forum. Messages should be sent to user ID #76702, 1013.

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