

ATCO NEWSLETTER

VOLUME 5 NUMBER 4

OCTOBER 1988

YOUR HELP IS NEEDED!

This is the eighth issue of the ATCO Newsletter published by the current editor. Most of the articles you have read were contributed by a relatively few ATCO members. We believe there are many of you who have interesting and informative items, write-ups, and comments about ATV that you wish to share with our members. Please send an article or two to the editor soon. Your help is needed!

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The ATCO Newsletter is the official publication of a group of television amateurs known as "AMATEUR TELEVISION IN CENTRAL OHIO" and is published in January, April, July, and October.

Membership in ATCO is open to any FCC licensed radio amateur who has an interest in amateur television.

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IT'S TIME AGAIN TO RENEW YOUR ATCO MEMBERSHIP

Another year has passed by, and we hope you enjoyed the 1988 ATCO ATV Technical Symposium last April, the recent Fox Hunt, the Tuesday Night Nets, and reading your ATCO Newsletter. The "12-88" appearing after your name and call letters on the back page mailing label indicates that your ATCO membership will soon expire. To renew your participation in ATCO, please use the form appearing elsewhere in this newsletter and send it to K8BGZQ. The good news is that dues will remain at \$10 for 1989.

ATCO HAMS CAPTURE FOX!

About twenty ATCO members and guests enjoyed the ATCO Hidden ATV Transmitter Hunt (Fox Hunt) on Saturday 17 September 1988. After finding the "fox" on Alum Creek Drive hidden among several satellite dishes at the All-American Cablevision Company, the hungry hunters sat down to a lunch provided by ATCO. Our thanks to the following: All-American for the use of a room in their building; Mike, WBBMMR, for making arrangements with All-American and showing us the cable company operation; Tom, K8BZNY, for organizing and conducting the event, and his son, Eric, for assisting; Bill, W88URI for arranging the luncheon and furnishing the beverages; Bill, W88ELK, for his video tape of the "Indiana Balloon Launch"; and XYL's Sherryl (K8BZNY), Patty (W8DMMR), and Maxine (K8BGZQ) for the delicious desserts. Patty also supplied the tasty baked beans and relish tray.

The hunt got under way at 10:36 a.m. and at 11:30 W8DMMR and his team bagged the fox. Each member of the winning team was awarded a T-shirt (compliments of Walt Disney, Inc. and All-American Cablevision).

Participating teams in order of finish were:

Bill, W8DMMR; John, W88EDY; and Patty, W8DMMR XYL.

Bill, K88UU, and son Brian.

Bill, W88ELK, and Louise his YL.

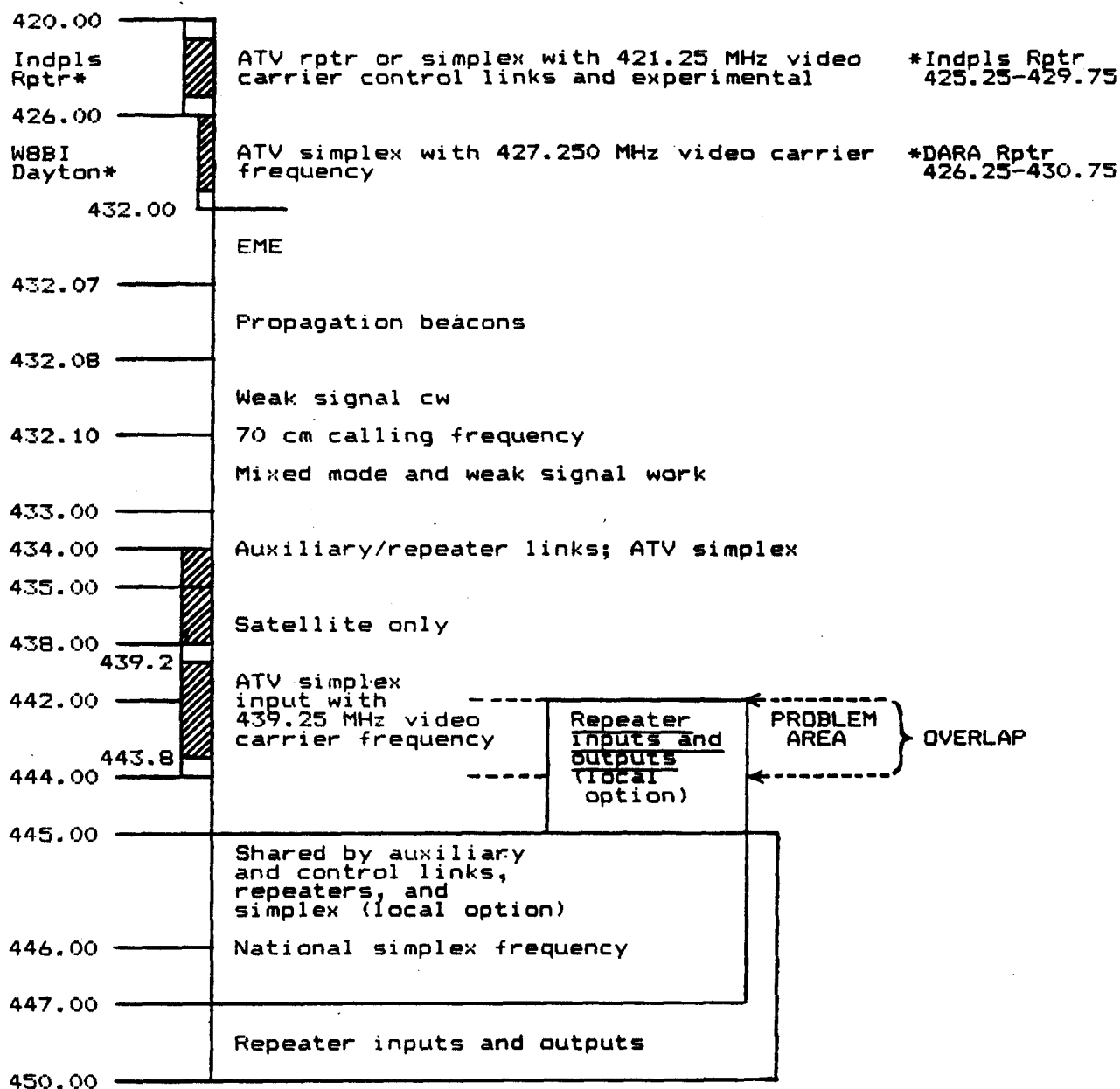
Dave, K82ARL, and Dave, W8AER.

Dick, W8RVH, and Foster, W8EHW (did not find the fox).

Bob, K88SV (solo hunter whose equipment failed).

All in attendance had a good time and expressed an interest in making the Hidden Transmitter Hunt an annual ATCO happening.

70 CM BAND PLAN AND USAGE



It can be observed that the 2.0 MHz overlap (442.0 to 444.0 MHz) is the source for much of the ATV signal interference experienced in the Ohio area. Relief from this overlap would essentially eliminate much of the interference. (Submitted by Bill, W8DMR.)

ATCO TUESDAY NIGHT NET CHANGE

In the future, each Tuesday Night Net will follow the operating procedures normally associated with the conduct of amateur radio nets (sometimes referred to as "formal nets"). After the net is closed, ATVers will have the opportunity to ragchew, test equipment, etc.

OCTOBER ARITHMETICKLER

As Chief Engineer of TV-4, Bob, W8TV, had this problem to solve because of an RFI complaint filed by the FAA concerning interference to aircraft flying over Indianapolis.

Find the value in watts of the second harmonic of a television transmitter which is running 100,000 watts ERP if the harmonic is found to be 60 dB down from the fundamental.

If the gain of the antenna is 6, and there are no transmission line losses, what is the average power of this harmonic directly out of the transmitter?

* * * * *

The solution to the July Arithmetickler does not appear in this issue of the ATCO Newsletter. In this regard, a note received from Bill, W8FRQ, requests that the following be printed: "The editor has been asked by W8FRQ to withdraw his answer to the July Arithmetickler."

NEW ATCO MEMBER

Welcome to Tom, W8ZAH, who joined ATCO in September.

TOO MUCH IS JUST TOO MUCH!

We've all heard of the guy who told us how to make a watch when we asked him for the time of day. Here's a long-winded example of stating a simple truth:

The positive appeal of a visual object depends, not so much upon the objective standards against which said object records upon the retina and optic nerve, as it does upon the cerebral interpretation of the image recorded by the organ of vision of that individual who observes said object.

Translation: Beauty is in the eyes of the beholder.

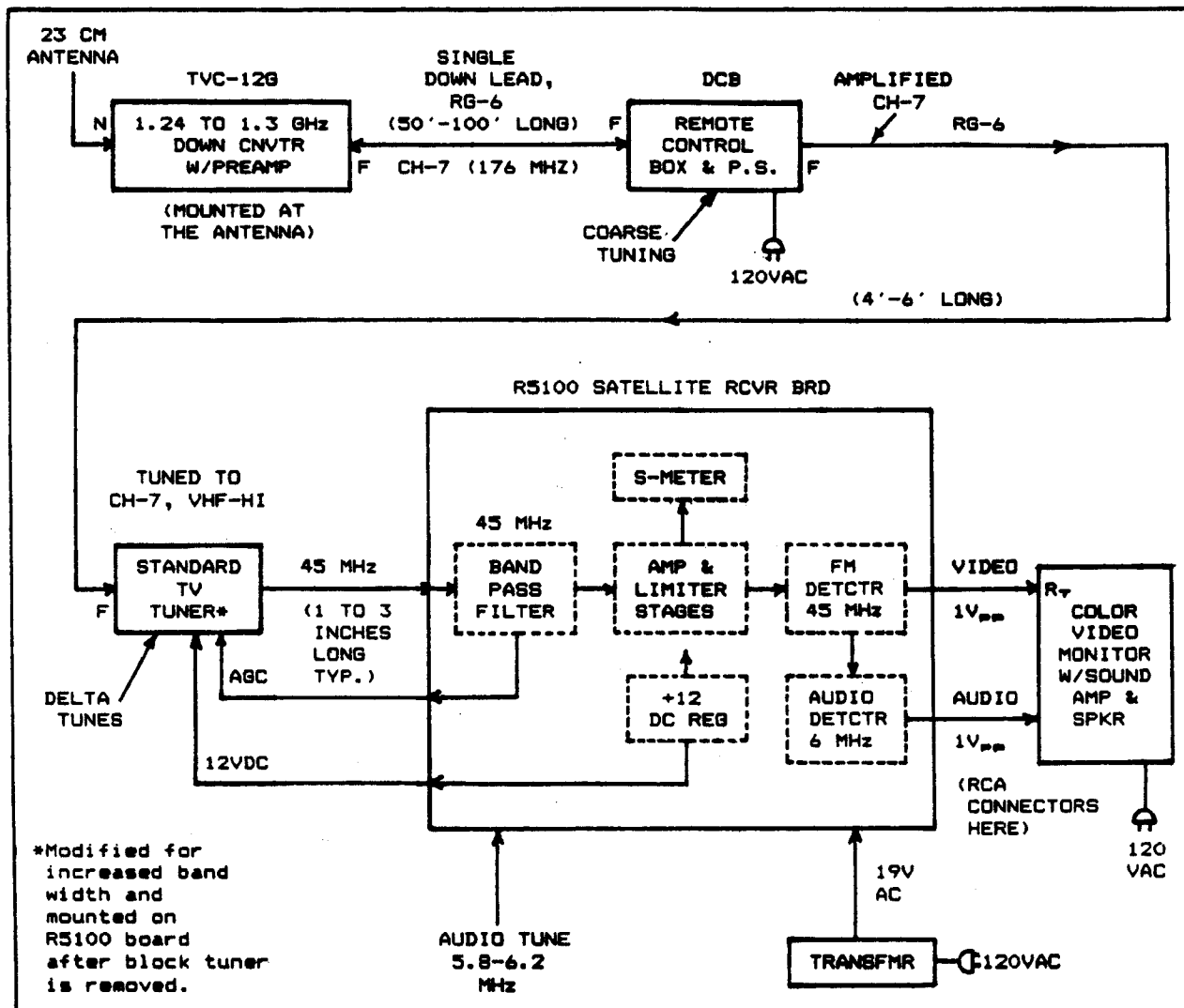
Finally, all of this brings us back to ATV where a picture on the screen is worth at least a thousand words. (Inspired by an article submitted by Tom, W8OBT.)

INVITE A FRIEND TO JOIN ATCO!

1.27 GHz FM ATV RECEIVER (PART ONE)

(If sufficient interest is shown, Part Two of this article is planned for publication in the January 1988 ATCO Newsletter and will detail some improvements to the receiver. Send your comments to your newsletter editor by 10 December 1988. The membership renewal form included in this issue may be used for this purpose.)

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



The downconverter is a PC Electronics TVC-12-GA which includes a GaAs FET preamp, mixer, and varactor tuned local oscillator. A downconverter with an output i-f frequency of 175 MHz (Channel 7) is mounted at the antenna. A single coax cable (RG-6) is the output feed line and supplies the dc power and tuning voltage to
(continued on page 10)

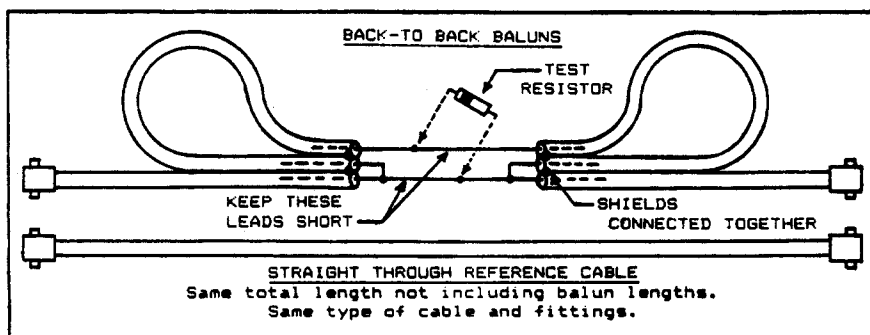
COAXIAL CABLE BALUN TESTING

Some hams prefer to use balanced transmission lines particularly for feeding collinear array type antennas. This is for two primary reasons: (1) these arrays usually have a 200 to 400 ohm balanced drive impedance, and (2) the line loss is usually lower than an equivalent length of coax cable. All of this leads to the need for a balun to match the balanced line to the unbalanced 50 ohm impedance of most transmitters and receivers.

The construction of coaxial baluns is covered well in the ARRL Handbooks and elsewhere. After making a balun according to instructions, one often wonders if it is indeed correct. Among the concerns are how much loss it exhibits, what is the actual impedance transfer, is it on frequency, and how broad is the frequency response.

One way of checking baluns is to construct two nearly identical baluns, connect them back-to-back, and then check the resulting performance.

RF power may be passed through the back-to-back pair of baluns to a wattmeter and this value compared to the power passed to the same wattmeter through an equivalent length of



straight coax of the same type. The ratio of these two measured powers will represent the loss added by the balun. The dB value of this loss may be calculated by the following:

$$10 \times \log_{10} \frac{P_1}{P_2} = \text{dB}$$

where: P_1 = power through baluns

P_2 = power through straight cable

Remember, this will be the loss for two baluns. Typically the value will be in the range of 0.8 dB; therefore, 0.4 dB per balun. These are reasonable loss expectations from well constructed coaxial baluns.

The impedance transfer from an unbalanced coax line to balanced wire lines using half-wave baluns is theoretically a ratio of four to one. This is dependent upon the surge impedance of the coax cable utilized. 50 ohm, 62 ohm, 75 ohm, and 95 ohm cable types are commonly used to make baluns which match 200, 250, 300, and 380 ohm balanced lines respectively. A quick check of the

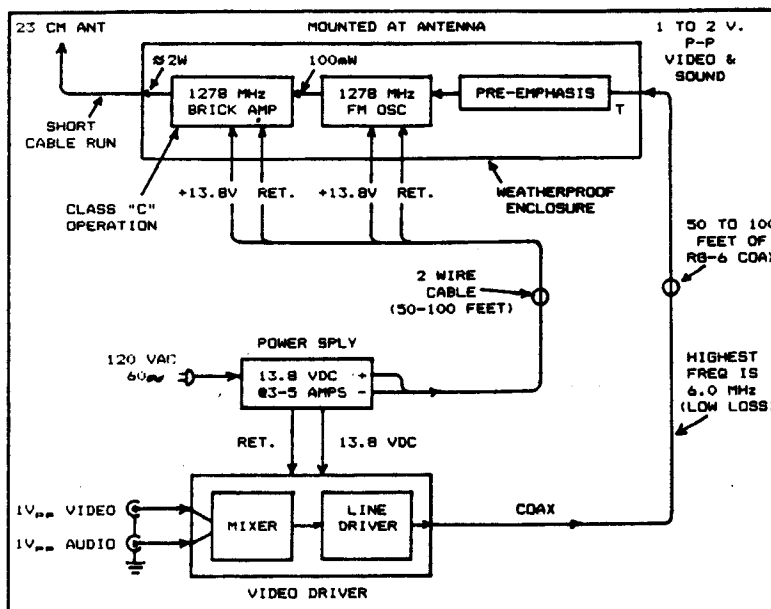
(continued on page 11)

ANTENNA MOUNTED MICROWAVE TRANSMITTERS

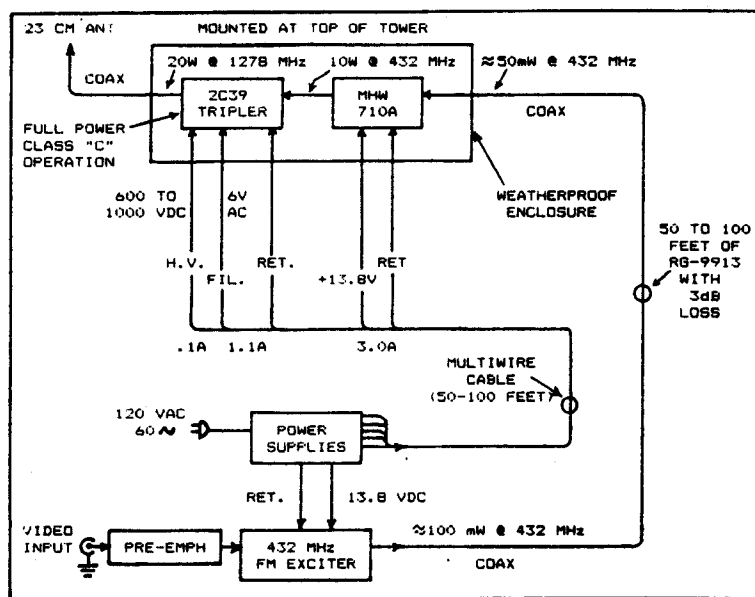
Transmission line losses at 23 cm are of such magnitude that placing the transmitter near the antenna has merit, and there are numerous configurations to accomplish this. Two of the possible configurations are presented here, each with different merit.

The first block diagram (Configuration No. 1) shows the less complicated and less expensive approach. The second diagram (Configuration No. 2) provides more power output but with more equipment required. Regardless, either configuration eliminates much of the connector and feed line losses that typically approach 6 to 10 dB.

Running high voltage up the tower and the cost of providing the necessary power supply are not required in the first method; also, it lowers the number of conductors needed. However, this approach is not without fault. It uses a free running oscillator.



CONFIGURATION NO. 1



CONFIGURATION NO. 2

A more stable exciter at a much increased cost is presented in the second method. This approach also requires the construction of a 23 cm vacuum tube tripler amplifier. 70 cm 10 watt bricks are off-the-shelf available; others, including the 23 cm brick, are not.

The primary advantage of the low power approach is the fact that only video is required to go up the transmission line. The primary advantage (continued on page 8)

ANTENNA MOUNTED MICROWAVE TRANSMITTERS

(continued from page 7)

tage of the second method is that a lower RF frequency (70 cm instead of 23 cm) is used to travel the normally long run of the transmission line. This is not to say that the 70 cm FM exciter could not be placed at the antenna along with the rest of the equipment. If this is the case, why not start with a 23 cm FM exciter in the first place and locate it at the antenna. Again, availability is the key.

Both configurations have the advantage of running the output amplifiers in the full power class C mode of operation. If AM modulation is employed, approximately one-fourth the output would be available. In addition, the advantages of the FM modulation (20 dB enhancement over AM) would be lost.

The block diagrams illustrate, much like placing a preamp or preamp-downconverter combination at the antenna, the savings in transmission line losses at the higher frequency of 23 cm are well worth the added complications and effort spent. The era of Antenna Mounted Microwave Transmitters (AMMT) is an idea whose time has come! Can ATV AMMOT's be far behind? (Submitted by Bill, W8DMR.)

(Note: AMMOT is an acronym which means Antenna Mounted Microwave Oven Transmitter. - Editor.)

LET'S HEAR FROM YOU

It's been a long time since we've seen video or heard from many of our members during the ATCO Tuesday Night Net. Check in and let us know how you're doing!

HELPFUL HINTS

Ron, N8DUK, reports that there is a newly arrived female type N inline connector on the market for 9913 feed line coax. Amphenol part number is 82-209-1006. He says this connector eliminates using two male connectors and a barrel (double female adapter connector) when splicing the 9913 coax cable. Your favorite amateur radio store should have it in stock.

Also, Ron tells of accidentally finding what he terms an "oddball connector." It's a 90 degree elbow double type N male adapter made by AIM Electronics (part number AIM 26-8022) and is available at Whitehead Electronics. Several of these have been used by Ron and have proven to work well.

ATV NEWS ITEMS OF INTEREST

By Bill, W8DMR

AMATEUR TELEVISION QUARTERLY MAGAZINE (ATVQ) - Henry Ruh, KB9FO, is thinking about publishing a ham TV magazine beginning in January 1989. His primary goal is a technically oriented ATV magazine of about 40 easy to read pages with some real prime material written by well-known ATVers. The initial printing is expected to be 4000 copies, and the cost of a year's subscription is \$15. Look out Spec-Com, here comes ATVQ!

MICROWAVE OVEN ATV TRANSMITTER? - RF Design reports in its July 1988 issue (page 24) that Dave Pacholok has converted a microwave oven to an ATV transmitter for use on the 2304 MHz band. The tuning and modulation techniques for consumer grade magnetrons may be a first! Additional details will be published as soon as available.

A CUSTOM VIDEO DISPLAY GENERATOR (VDG) - ATCO member Bill Brown, WB8ELK, has designed a VDG. Two high resolution color graphic displays are generated from a preprogrammed PROM. Many standard patterns are available or custom PROM's can be furnished to accommodate your design. The VDG ID circuit board and the standard PROM tested ready for use cost less than \$89. If interested, write to Bill for his catalog and details.

W8KQQ AND W8VSY CONTINUE TESTING ON 910.25 MHZ - Dale and Jack are sending video pictures between Greenville and West Milton each day at about 8 a.m. Dale has been using his homebrew Yagi (described in the April 1988 ATCO Newsletter) with a 300 ohm feed line.

CONGRATULATIONS! - Two ATCO members have recently upgraded to Extra Class. We congratulate Chris, W8BI (formerly W8BFWQ), and Bob, K8SSV (formerly W8BJEN).

MODIFIED SATELLITE RECEIVER BOARD FOR 23 CM USE - Modifications continue. Publication of a detailed list of the changes from W8DMR is expected to appear in the January 1989 ATCO Newsletter (see "1.27 GHz FM ATV Receiver" article in this issue).

FM ATV ACTIVITY ON 1258.34 MHZ - Running about 5 watts to 70 feet of C1190 coax and a homebrew 25 element Yagi, John, W8EQY, has been seen F5 by W8BURI in Plain City and by W8RVH in New Calisle. John is currently evaluating his 6 MHz subcarrier sound.

W8DMR GETS LUCKY ON 1270 MHZ - With about 20 milliwatts and his homebrew 25 element loop Yagi antenna, Bill's FM 23 cm test oscillator video was observed by W8BURI during a recent band enhancement. W8RVH has been able to detect the QRP signal with his enhanced R7000 receiver, but without any discernible video so far.

RENEW YOUR ATCO MEMBERSHIP NOW!

1.27 GHz FM ATV RECEIVER (PART ONE) (continued from page 5)

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

Video and audio FM detector circuitry is provided by the Ramsey RS100 satellite receiver board. The tuner on the board is a block tuner covering 450-900 MHz; it is replaced with a standard TV tuner to convert 175 MHz to 45 MHz. The fine frequency tuning control on the standard tuner offers a vernier and easy tuning adjustment which makes it superior to the coarse tuning pot on the DCB.

Compared to the use of a conventional TV receiver, a color TV monitor produces first-rate video pictures. If a TV monitor is not available, the RS100 circuit board has space to locate an rf modulator for output on Channel 3 or 4.

FM 6.0 MHz sound subcarrier is tuned with the pot on the RS100 board. RCA connectors are used for the video and audio outputs.

Desirable improvements such as circuit refinements to broad band the Ch-7 TV tuner (from 6 MHz up to 12 MHz) and to narrow the 45 MHz input filter (from 30 MHz down to 16 MHz) will improve receiver performance. (Submitted by Bill, WSDMR.)

OUR CONTRIBUTORS

Thanks to the following ATCO members for articles appearing in the October 1988 ATCO Newsletter!

Dick, WBRVH - His first contribution, "Coaxial Cable Balun Testing." Look for another of Dick's articles coming up in January.

Bill, WSDMR - "70 cm Band Plan and Usage," "1.27 GHz FM ATV Receiver (Part One)," "Antenna Mounted Microwave Transmitters," and "ATV News Items of Interest." (Without Bill's contributions, the newsletter would have FIVE fewer pages! - Editor)

Ron, N8DUK - Some "Helpful Hints."

Bob, W8TV - Try solving his "Arithmetickler."

Tom, WD8OBT - Sent in several verbose sentences and their translation into well-known maxims. One appears in this issue.

IN CASE YOU DIDN'T KNOW

Amateur TV station WBRVH in New Carlisle, Ohio, runs an output of 100 watts (about 200 watts input). If the feed line is a 3 dB loss, 50 watts is delivered to the antenna terminals. With an antenna gain of 20 dB by his homebrew collinear array (90 elements), Dick's ERP is 5 kilowatts average. His peak ERP is about 7 to 8 kW on sync tips. The antenna beamwidth is approximately 15 degrees on 439.25 mhz.

COAXIAL CABLE BALUN TESTING

(continued from page 6)

impedance transfer of baluns may be made by temporarily placing a nonreactive resistor across the junction point of the two back-to-back baluns and observing the wattmeter. Keep choosing resistor values until the power drops to the half-power point.

The ohmic value of the resistor is then approximately that of the impedance transfer value. For example, baluns made of 75 ohm cable will require a resistor value of 270 to 330 ohms to reduce the power to one half. A power level of approximately 1 watt is a convenient level for making balun measurements.

If your RF source is variable in frequency, you can determine if you have made the baluns correctly for the frequency of interest. Maximum power will be transferred through the test baluns at their resonant frequency. You will notice that they are fairly broad. A bandwidth of 5 to 8 percent of the RF frequency may be expected. At 440 MHz this translates to +17 MHz excursion from center frequency before deterioration occurs.

Calculation of half-wave balun loops may be made by using the following:

$$\frac{492}{F} \times 12 \times VF = \text{length in inches}$$

where: F = frequency of interest
VF = velocity factor of cable used

(Submitted by Dick, WBRVH.)

(Because the impedance between the baluns is four times higher than the cable impedance used, the voltage will be twice as great and the current half as great - hence the same power. - Technical Ed.)

IN CASE YOU DIDN'T KNOW

Commercial TV station W17AI has recently started broadcasting on Channel 17 with a power of 1 kilowatt. The antenna is located on Channel 10's tower at the 532 foot level and is a four bay slot with a cardioid (heart-shaped) pattern with the dip (null) toward the west. Horizontal polarization is used. Channel 17 rebroadcasts programs originated by Channel 53 near Chillicothe.

W08BV, Channel 8, transmits from Channel 10's new tower at the 750 foot level. The feed line is 1-1/2 inch heliax with an estimated loss of 1.0 dB (20 percent). An 80 watt transmitter supplies 10 watts to each of the eight antenna elements. The antenna is circularly polarized and its pattern is essentially omni.

ATCO MEMBERS AS OF 30 SEP 1988

KBAEH	Wilbur Wollerman 1672 Rosehill Road Reynoldsburg 43068	WABKQQ	Dale Waymire 225 Riffle Avenue Greenville 45331
WBAER	David Sears 1678 Kaiser Drive Reynoldsburg 43068	KABLWR	Marlin Alberty 1645 Olentangy Road Bucyrus 44820
KB2ARL	Dave DiGiuseppe 5685-B Hibernia Drive Columbus 43232	WBBMMR	Mike Knies 1715 Winding Hollow Dr. Columbus 43223
WABATF	Emmett McDonald 14120 Flintridge Rd. SE Glenford 43739	WD8OBT	Tom Camm 1267 Arkwood Avenue Columbus 43227
WBBBW	Joe Schumann 5418 Marietta Road Chillicothe 45601	WB8OTH	Ferry Yantis 1850 Lisle Avenue Obetz 43207
W8CCW	John Ferrell 3722 Wagner Court Grove City 43123	WABRMC	Arthur Towslee 180 Fairdale Avenue Westerville 43081
KN8DMK	Bill Delker 8460 Bowers Road Amanda 43102	W8RVH	Richard Goode 9391 Ballentine Road New Carlisle 45344
W8DMR	William Parker 2738 Floribunda Drive Columbus 43209	W8RZG	Corwin Miller 4966 Haughn Road Grove City 43123
N8DUK	Ron Reynolds 4642 Glengate Drive Columbus 43232	KE8SV	Bob Mills 6834 Halligan Ave. East Worthington 43085
W8EHW	Foster Warren 124 East Clark Street North Hampton 45349	WB8TMP	Dave Bourne 2200 Dividend Drive Columbus 43228
WB8ELK	Bill Brown 12536 T.R. 77 Findlay 45840	WABTTE	Phil Morrison 154 Llewellyn Avenue Westerville 43081
WABE0Y	John Schlaechter 3199 Lewis Road Columbus 43207	W8TV	Bob Dye 6118 Sedgwick Road Columbus 43235
N8FFD	Edward Hauff 2716 Columbus Avenue Columbus 43209	N88U	Philip Brooks 412 Franklin Street Piqua 45356
W8FRQ	William Ennis 146 South Weyant Avenue Columbus 43213	W8BUGV	Bruce Jaquish 193 Cherry Drive Centerville 45459
KABGZQ	Warren Duemmel 3488 Darbyshire Drive Hilliard 43026	W8BURI	William Heiden 4435 Kaufman Road Plain City 43064
K8HRR	Ira Bickham 260 Tiki Drive Merritt Is., FL 32953	K88UU	William Rose 439 S. Murray Hill Road Columbus 43228
K8HVA	Guy Cunningham, Jr. 31 Birchfield Street Plymouth 44865	W8VSY	Jack Schmermund 401 North Main Street West Milton 45383
W8BI	Christopher Vojsak 2050 Ellington Road Columbus 43221	K8YAH	Ronald Vanke 5094 Longrifle Road Westerville 43081
K8ISM	Steve Iacono 1075 Virginia Avenue Columbus 43212	W8ZAH	Tom Para 8030 Westchester Road Westchester 45069
W8JDL	Doc Althaus 2619 Love Drive Columbus 43221	K8BZNY	Tom Taft 386 Cherry Street Groveport 43125
W8BJDV	George Martini 3027 Inn Road Columbus 43232	W8BZVN	Willard Mathuews 221 Black Run Road Chillicothe 45601
K8JGY	Fred Yost 330 Dellfield Way Gahanna 43230		

 THE ATCO TUESDAY NIGHT NET MEETS EVERY WEEK AT 8 EST AND 9 EDT

ATCO FINANCIAL STATEMENT

CASH BALANCE:
As of 30 June 1988.....\$415.87

RECEIPTS:
Dues.....\$ 10.00

EXPENDITURES:
Printing charges for July 1988 ATCO Newsletter.....\$ 32.13
Postage for July 1988 ATCO Newsletter..... 10.25
Printing charges for Fox Hunt Special issue..... 3.33
Postage for Fox Hunt Special issue..... 10.25
Food and incidentals for Fox Hunt Party 17 September. 42.45
Misc. costs incidental to publication of newsletter.. 22.25

Total expenditures.....\$120.66

SUMMARY:
Cash Balance as of 28 September 1988.....\$415.87
Receipts..... 10.00
Expenditures..... 120.66

Balance as of 28 September 1988.....\$305.21

25 CENT POSTAGE STAMP INVENTORY:
Stamps on hand as of 30 June 1988*..... 7
Stamps purchased 6 September 1988..... 33
Stamps used..... 8

25 cent stamps on hand as of 28 September 1988..... 32

The above financial report was prepared as of 28 September 1988 by Warren G. Duemmel, KA8GZQ, Acting ATCO Treasurer.

ATCO MEMBERSHIP APPLICATION
(PLEASE CIRCLE CHANGES)

RENEWAL NEW MEMBER CHARTER MEMBER DATE.....
NAME.....CALL.....
ADDRESS.....HOME PHONE.....
CITY.....STATE.....ZIP.....
HAM INTERESTS.....LICENSE CLASS.....
I WILL TAKE ATCO NET-CONTROL TWICE A YEAR.....[YES].....[NO]
I WILL SUBMIT NEWSLETTER MATERIAL TWICE A YEAR.....[YES].....[NO]
COMMENTS.....
.....
ANNUAL DUES PAYMENT OF \$10 ENCLOSED.....CHECKCASH
..Make check payable to Warren G. Duemmel, Acting ATCO Treasurer.
..Mail to KA8GZQ, 3488 Darbyshire Drive, Hilliard, Ohio 43026...

Editor: Warren, K86ZD
Technical Editor: Bill, W8DMR

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FROM CENTRAL OHIO!