OCTOBER 1961
40 CENTS

# TELEVISION HORIZONS

# PHASING A QUAD ARRAY

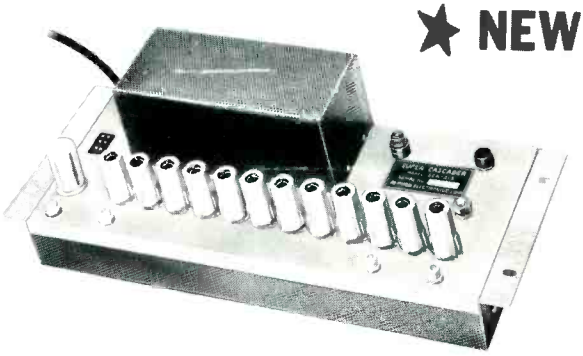
## - 6 db GAIN -

DEVOTED ENTIRELY TO TELEVISION RECEPTION

Al Bowdy, KCOP Television
915 N. La Brea Ave.
Los Angeles 38, Calif.

THIS MONTH

# Three new stars in the JERROLD CATV galaxy



## ★ NEW! ALL-BAND SUPER-CASCADER AMPLIFIER, Model SCA-213

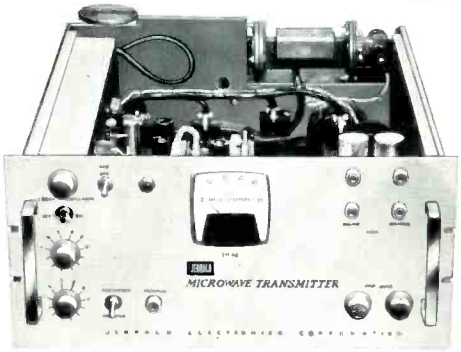
Features *twice the cascadability* of any other all-band amplifier. The ultimate unit for any new or existing all-band system. Provides for AGC, plug-in equalization, and an output capability of 45dbj* per channel for seven channels with only 0.14% intermodulation distortion.

*0 dbj = 1,000 microvolts across 75 ohms.

## ★ NEW!


## STRIP-BRAID COAXIAL CABLES— Series JT-400

Permits faster, easier, less costly installations. New revolutionary strip braid decreases attenuation, reduces over-all cable weight by 20 to 40%, provides better impedance uniformity, and makes possible single- and double-shielded cables with same O.D. A new line of Jerrold adapta-fit connectors and weatherproof splices mates this revolutionary cable to standard "F" series fittings.




## ★ NEW! WIDE-BAND MICROWAVE SYSTEMS—Series "J"

Designed specifically for the CATV industry. New compact modular construction, exceptional frequency stability (.005%), 1-watt output, front-panel metering of all tubes and circuits, and an 8mc baseband. Units stack on common waveguide without use of accessory isolators or circulators, and have individual power supplies for high reliability.

For complete information on these and other new Jerrold products, see your Jerrold Community Systems factory representative or write for full information.

JERROLD® ELECTRONICS CORPORATION • Community Systems Division

The Jerrold Building, Philadelphia 32, Pa. • Telephone: BAldwin 6-3456

Western Regional Office: 1042 Terminal Way, San Carlos, California • Telephone: LYtel 3-8273

# Channel 1

## Exclusive and Late News of the TELEVISION RECEPTION INDUSTRY

### Taco Sold — Jerrold

A long series of talks underway for several months culminated on September 7 when JERROLD ELECTRONICS CORPORATION announced the purchase of the Technical Appliance Corporation (TACO) in a $2,700,000 negotiation.

TACO, located in Sherburne, is a leading manufacturer of television antennas for the weak signal television industry, the consumer market, and a large line of military ruggedized antenna products.

TACO was founded in 1934 and since that time has never failed to show a profit. During the earliest days of consumer television growth, TACO was even engaged in the Master Antenna business, manufacturing head end amplifiers and single channel strip amplifiers to go with their consumer antenna products. As late as 1953 TACO was turning out tube amplifier units which are still in use in many of the smaller CATV systems in the hills of New York and up-state Pennsylvania.

More recently TACO interest has shifted into the microwave field. The firm now markets a complete line of industrial, military and private microwave antennas, feedlines, and mounts. The feedline products were introduced as recently as the spring IRE show in New York.

The TACO purchase was the second major purchase for JERROLD in the past year. In late February of this year JERROLD purchased HARMAN-KARDON, Inc. Since that time Sidney Harman has become President of JERROLD ELETRONICS. It was Harman who made the announcement concerning the TACO acquisition.

Present management of TACO will remain intact, according to Mr. Harman. Principal management of TACO is under the direction of Herbert Brown, President and Tore Lundahl, Executive Vice President, both founders of the company.

Apparently the prime area of consideration at TACO, under the new JERROLD ownership, will be military products. President Brown stated that with Jerrold financial resources and engineering skills, TACO's microwave work for the military and government customers can be stepped up by two years.

Other "hand-in-glove" associations are also apparent in the purchase. Jerrold recently announced a line of microwave equipment . . . TACO manufaturers microwave antennas. TACO recently introduced an "electronic antenna," utilizing a transistorized amplifier which mounts at the antenna. JERROLD manufacturers the pre-amp, TACO the antenna.

### Advantages to MPATI

With the FCC clear cut effort to push all television into the ultra high range, the fall schedule of airborne educational telecasts from the MPATI plane circling 23,000 feet above north central Indiana offers an opportunity to the off-the-air television engineer-technician to learn a little bit more about the tricky actions of the 800 megacycle signals.

The educational telecasting day is five days per week, on regular schedule, with hours of telecast confined primarily to the school hours. Fifty kw. video transmitters and five kw. audio transmitters should be pushing out the signals by the time this is read, on channels 72 and 76.

Try erecting a simple bow tie with or without reflector on a mast. If you are chasing the signal from within 80-100 miles of Monteplier, Indiana, the Bow Tie should do the job fine. Further out more complex stacked colinear arrays, the TACO C-1033-T parabolic dish or single channel 12-15 element yagis will be required.

NEXT MONTH—TV Horizons Grows UP! 

The DC 6 carrying the airborne transmitters and antennas is flying in a figure eight pattern twenty miles across. At 23,000 feet this should give line of sight coverage to a range of 210 miles. Reception reports to 250 miles have indicated to MPATI engineers that consistent signals to this distance can be managed with some antenna engineering at the site.

The long winter months ahead should provide engineers with ample time to learn more about what the UHF waves do, *after* they leave the transmitting antenna.

## Broadcasters Vow UHF Fight

VHF broadcasters are fighting back at the FCC announced intention of moving television to UHF with a "sink or swim" attitude. Many of the broadcasters have asked viewers to write the commission, others are using area congressmen to pressure the Commission into backing down. The Association of Maximum Service Telecasters (composed of maximum tower, maximum power VHF broadcasters) is soliciting additional dues from members to fight the FCC move.

Congressional reaction has ranged from outrage stirred up by VHF broadcasters to cries of "foul ball" coming from Congressmen who are protesting the switching of local television "to that inferior service UHF."

So far, however, the man in the street is apparently unaware of the furor. The Commission did postpone its deadline for comments of October 2 to December 2, 1961. The general feeling in Washington is that no decisions on the matter will be forthcoming before 1962.

The eight cities affected at the outset are Madison, Wisconsin; Champaign, Illinois; Hartford, Connecticut; Lancaster, Pennsylvania; Montgomery, Alabama; Erie, Pennsylvania; Columbia, South Carolina and Binghamton, New York.

## MPATI Converter from B-T

A specially designed converter-amplifier for low power UHF translators and the MPATI educational telecasts has been announced by BLONDER TONGUE LABS, Newark, New Jersey. Dubbed the BT-70, the new converter-amplifier spreads the UHF television spectrum from channels 70 to 83 over more than 200 degrees of dial space, greatly increasing mechanical and electrical stability of the converter unit.


BT-70 Upper End UHF Converter

## Changing Face

With this issue the long time friend of the weak signal television industry, the familiar 9 by 6 inch format of *Television Horizons*, becomes extinct. As the industry has grown so must *Television Horizons* grow. The November issue will be arriving a few days later than you are accustomed to, with a galaxy of new regular features. Foremost in the new areas of editorial interest will be a surprise servicing section, a series of "where do we go from here" reports, and a brandnew section devoted to hotel-motel distribution installation techniques.

Our page size is moving up to 8 1/2 by 11 which means more words per page, more white expanse around diagrams and schematics, and an easier to read type face and article layout.

For more details on the "growing up of *Television Horizons*," turn to page 25.

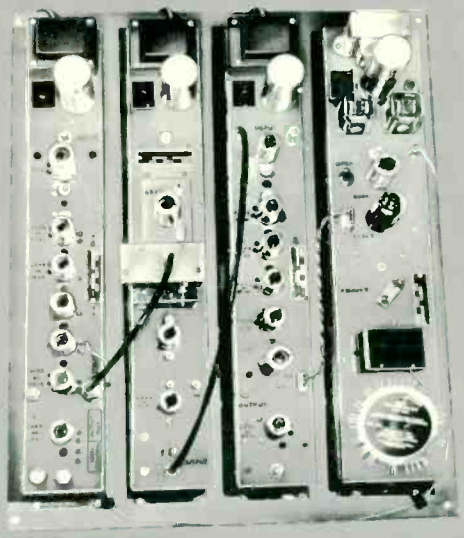
## V Multiple Outputs

The FCC is expected to pass action soon on a Commission proposal to allow multiple output VHF translators to operate with more than one one-watt final stage, in areas where two or more separate and distinct towns can be served from a single head end system.

The proposal has reached the "proposed rule making stage" at the FCC staff level, and official approval of the move is expected early in mid-October.

The FCC has granted type acceptance to EMCEE for the first Commission approved UHF input–VHF output translator. The matter has been one of considerable concern in the northwest in particular where V translators have been operating from UHF translators or UHF telecaster signals. To publishing date, no other firm had been granted type acceptance on an U in, V out unit.

**AVAILABLE FROM BLONDER-TONGUE**



# NEW BENCO (MODEL T-6) VHF TRANSLATOR

(FCC TYPE ACCEPTED)

U.S. USER PRICE $834

## THE ECONOMICAL APPROACH TO TRANSLATOR INSTALLATIONS

The Benco T-6 VHF Translator is a straightforward unit—it is business-like with no frills, yet it provides all the capabilities necessary for top performance in a translator installation at an economical price. It is a high quality translator, meeting all FCC requirements.

The T-6 provides one watt of undistorted power. It will cover distances from 8 to 30 miles. Its low noise preamp includes AGC to maintain satisfactory picture quality with input signals as low as 50 microvolts. The T-6 is equipped with an identification unit which meets FCC specifications. It sends out identifying signals and provides automatic shutoff when the master station goes off the air. If the T-6 is installed in a remote or inaccessible area, it can easily be equipped with the RC-1 remote control unit to turn the translator power on or off from a distance of 5 miles or more.

**TECHNICAL SPECIFICATIONS**

| | |
|---|---|
| Primary Power Source | 117 v ± 10% 60 c/s |
| Power Consumption | 120 W |
| Temperature Ambient | —30°C to + 50°C |
| Overall Noise Figure | |
| Low Band | 4 db ± 1 db |
| High Band | 6 db ± 1 db |
| Recommended Input | 50—4000 microvolts |
| Max. Permissible Power | 1 Watt (Peak Power) |
| Frequency Stability | .02% |
| Gain (maximum) | 105 db |
| Band Width | 6 Mc (3 db points) |
| Dimensions (metal base) | 18"x22½" |
| Weight | 27 lbs. |

## BENCO VHF AND UHF TRANSLATORS FOR EVERY TYPE OF INSTALLATION

**MODEL T-1 VHF TRANSLATOR** *FCC type-accepted.* 1 watt output for U. S. use. There is no finer translator available today. It not only meets but exceeds FCC specifications. Some of its features include a noise proof automatic shutoff; regulated power supply for stable operation even at the end of poor quality power lines; and underrated output section for continuous service; a weatherproof housing; quick easy coding of identification unit; built-in direct reading power meter.

**MODEL T-14 VHF-TO-UHF TRANSLATOR** *FCC type-accepted.* 2.5 watts output. For United States use. Includes identification units with automatic "on/off," power indicator and voltage regulator. VHF input, channels 7-13.

**MODEL T-13 VHF-TO-UHF.** Same as T-14 except: VHF input, channels 2-6; not yet FCC type accepted.

*If you're planning a translator installation, contact Blonder-Tongue.* DEPT. TH-9
*Free layout service; field engineering assistance at nominal cost are available.*

*engineered and manufactured by*

BLONDER-TONGUE

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### DEPARTMENTS



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*"Television Horizons' readers — always the first to know, the best informed, the first to act."*

# A Method of Minimizing Co-Channel Television Interference

**Prepared by**
**The Technical Appliance Corporation**
**Sherburne, New York**

FIGURE 1

The problem of co-channel interference is particularly troublesome for Community Systems and TV Stations employing standby, 'off-the-air' rebroadcast systems. Generally these systems are operated in extreme fringe areas necessitating large high gain antenna arrays. Consequently, these are the people who become bothered by interfering signals being picked up from other stations operating on the same frequency. In general, one can say that the desired and undesired signals are arriving from decidedly different angles. An accepted requirement for complete elimination of co-channel interference is 40 to 50 db. between these signals. This means that if there is 10 db. difference between the two signals, the antenna system will have to supply the additional 30 to 40 db. discrimination. It is next to impossible to design an antenna in which all of the lobes are down by this factor relative to the main forward lobe.

Obviously, a logical solution to the problem would be a method of deliberately placing the null in the pattern of the array, at the angle of arrival of the undesired signal. This paper proposes a method whereby this can be accomplished and presents experimental verification of the theory.

The pattern of a simple array can be determined easily with a knowledge of the pattern of the individual antennas in the array, the antenna spacings, and the relative amplitudes and phases of the currents on individual antennas. Assume the condition of two yagi antennas in an array D distance apart as shown in Figure 1, both yagis are driven with currents of equal amplitudes and phase. The pattern of this array is the product obtained by multiplying an array factor by the pattern of the individual yagi antenna. The array factor in this case is:

$$\cos\left(\frac{\pi d}{\lambda}\sin\theta\right)$$

where $\lambda$ is the wavelength measured in the same units as d.

If we let this factor equal zero we can determine a certain spacing (d) for which a null will occur at some angel. Since the array pattern is a product containing this factor the final array pattern will also exhibit a null at this angle. In setting up this relationship we get:

$$\cos\left(\frac{\pi d}{\lambda}\sin\theta\right)=0$$

or:

$$\frac{d}{\lambda}=\frac{1}{2\sin\theta} \qquad (1)$$

because of symmetry these nulls will occur in all four quadrants. As an example, assume

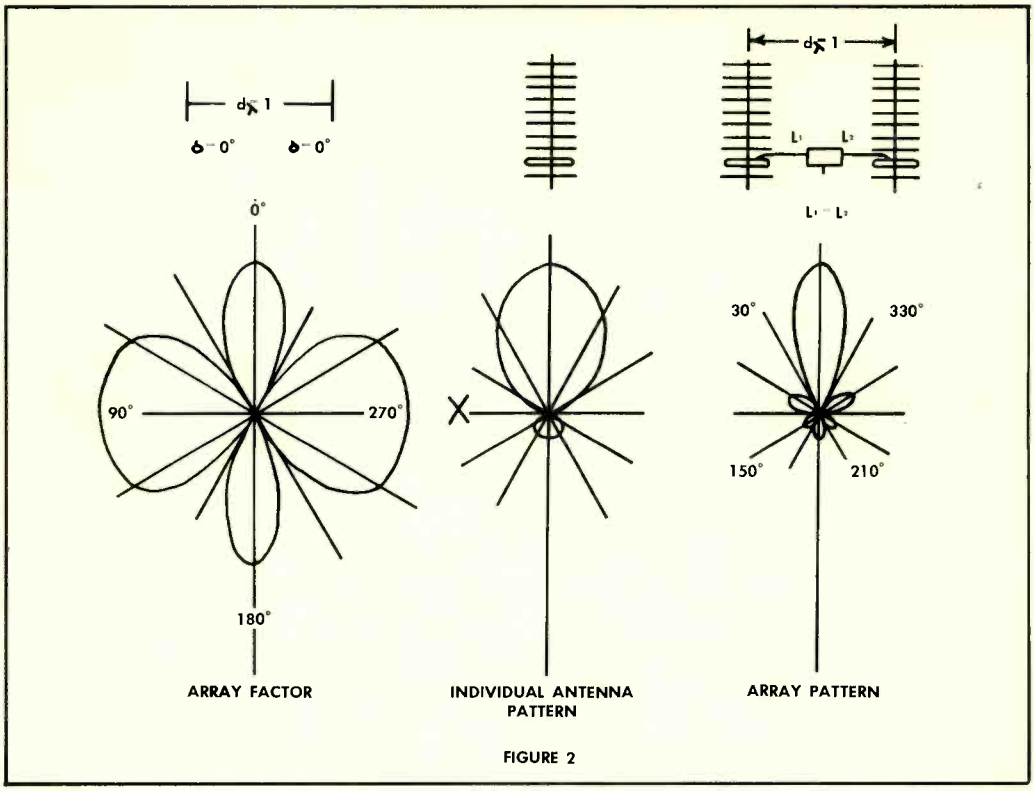



FIGURE 2

we have an undesired signal arriving at 30° from the desired signal. From equation 1 we note that the antenna spacing for a null at this angle is one wavelength. Figure 2 is a pictorial representation of the example. The pattern at the left is the array factor which, as expected, contains nulls at ± 30° and ± 150°. This pattern is multiplied by the individual yagi patterns to obtain the final array pattern. Note that the array pattern exhibits a null at these same angles independently of the individual yagi pattern.

At this point, an attempt was made to experimentally verify the theory. Figure 3 shows the calculated curve which is a plot of equation 1 and the experimental or measured points. The experimental points were measured using two, 10-element yagi antennas with a variable horizontal spacing. Agreement between the calculated and measured points is quite good. Obviously, the theory will still hold for a higher gain array consisting of four or more yagis (two horizontally and two or more vertically).

This provides a tool for the user to enable him to deliberately position nulls and enhance his chances of solving the co-channel problem. However, there are some inherent physical limitations and tolerances which impose some severe restrictions on the successful system. During the measurements it was noted that the nulls were quite sharp particularly for wide spacings. This means that the angles of arrival must be accurately know and the supporting tower or structure accurately positioned. Secondly, all of the antennas in the array must be perfectly symmetrical and identical from the impedance standpoint, otherwise we do not satisfy the requirement of equal and in phase currents on all elements. The small differences between measured and calculated points of Figue 3 are attributable to small differences in antennas which result in currents of unequal phase.

An obvious solution to the problem although an impractical one is to space the antennas for approximate location of the null and then rotate the array slightly for final null positioning. This thought, however impractical, does lead to a solution of electrically rotating or skewing the array by actually driving the individual antennas with currents of unequal phase. In this case the array factor is:

$$1 + \cos\left(\frac{2\pi d}{\lambda} \sin \theta_1 + \delta\right)$$

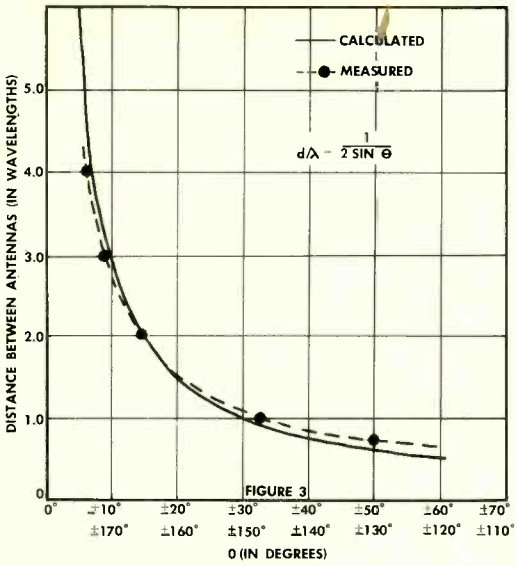


FIGURE 3

where δ is the phase difference in degrees of one side of the array with respect to the other, with equal amplitudes throughout. Setting this equation equal to zero we get:

$$\text{SIN } \theta_1 = \frac{\frac{\delta}{180}}{2\,d/\lambda}$$

From equation 1

$$\text{SIN } \theta = \frac{1}{2\,d/\lambda}$$

The difference between $\theta$ and $\theta_1$ will be the amount of angular shift or skewing of the null in the radiation pattern.

$$\Delta\theta = \theta - \theta_1 = \text{ARC SIN } \frac{1}{2d/\lambda} - \text{ARC SIN } \frac{\frac{\delta}{180}}{2d/\lambda} \quad (3)$$

Figure 4 is the same as the previous example except that a 40° phase shift has been applied to one half of the array. Note the array factor pattern is skewed shifting the nulls by $\Delta\theta = 7°$. This results in the same skewing and null shift in the final array pattern. It should be noted that the pattern is shifted in a direction opposite to that side which is leading in phase.

To verify the theory of electrical rotation or skewing, measured data was taken on the original array for various phasing conditions. Figure 5 shows these measured data along with calculated curves of equation 3. In the experimental measurements the depth of the nulls varied from about 25 db. to well over 40 db. Considerable thought was given to why there was such a wide variation of null

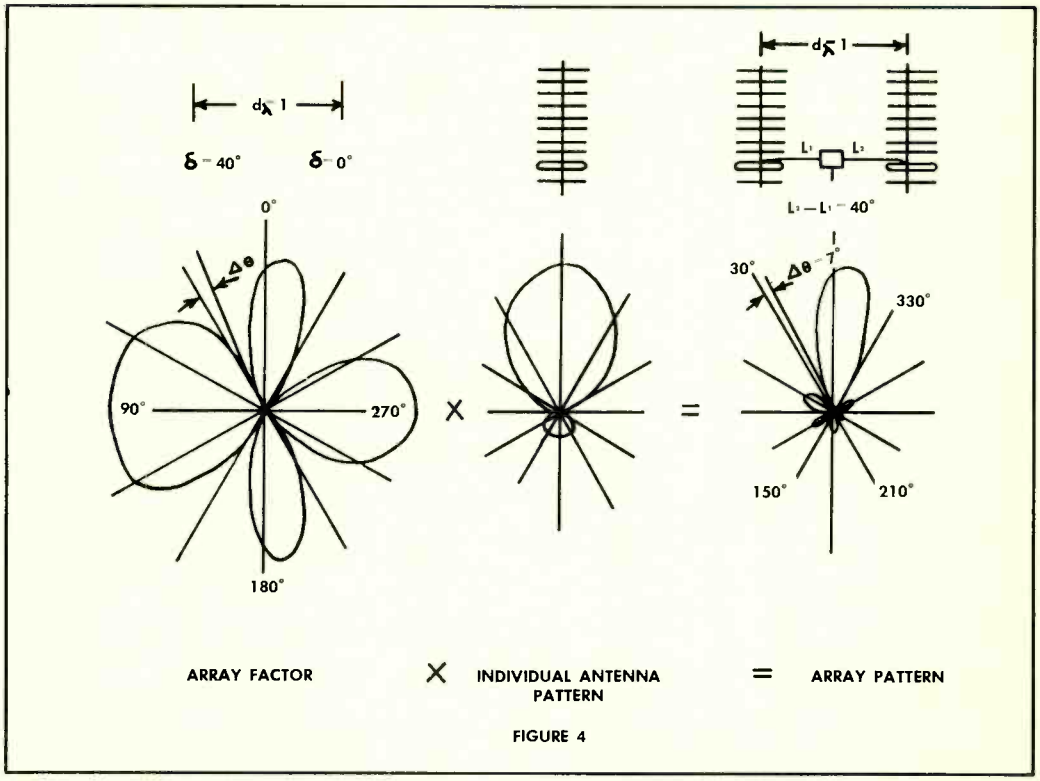
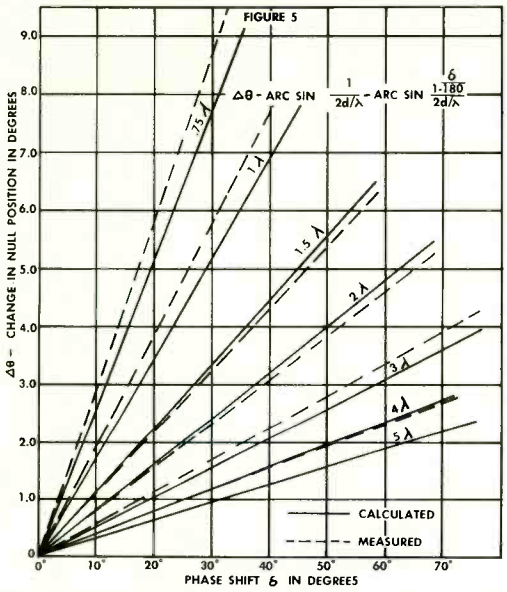


FIGURE 4




depth. It was found that at certain spacing the fields at the antennas were of non-uniform amplitude. Also, there was a correlation between the non-uniform amplitude and the null depth. It can also be shown theoretically that a non-uniformity of amplitude distribution between antennas results in an incomplete cancellation at the null points.

To insure an efficient and effective installation the following steps are recommended:—

1. Choose the location site for the antenna array.
2. With a single antenna at this spot determine the exact angles of arrival of the signals.
3. From Figure 3 determine the spacing in wavelengths between the two halves of the array.
4. With a single antenna determine if the relative amplitudes of the received (undesired) signal are equal. They should be within one-half db. for good null depth. Adjust locations of the antenna either horizontally or vertically (maintaining proper spacing) until this is met as nearly as possible.
5. Install the complete array at this location.
6. Observe the quality of the video signal.
7. If the interference is still objectionable, adjust the relative lengths of the phasing lines to one-half of the array. If the quality does not improve, adjust the length of the other phasing line. Note,

(Continued on page 24)

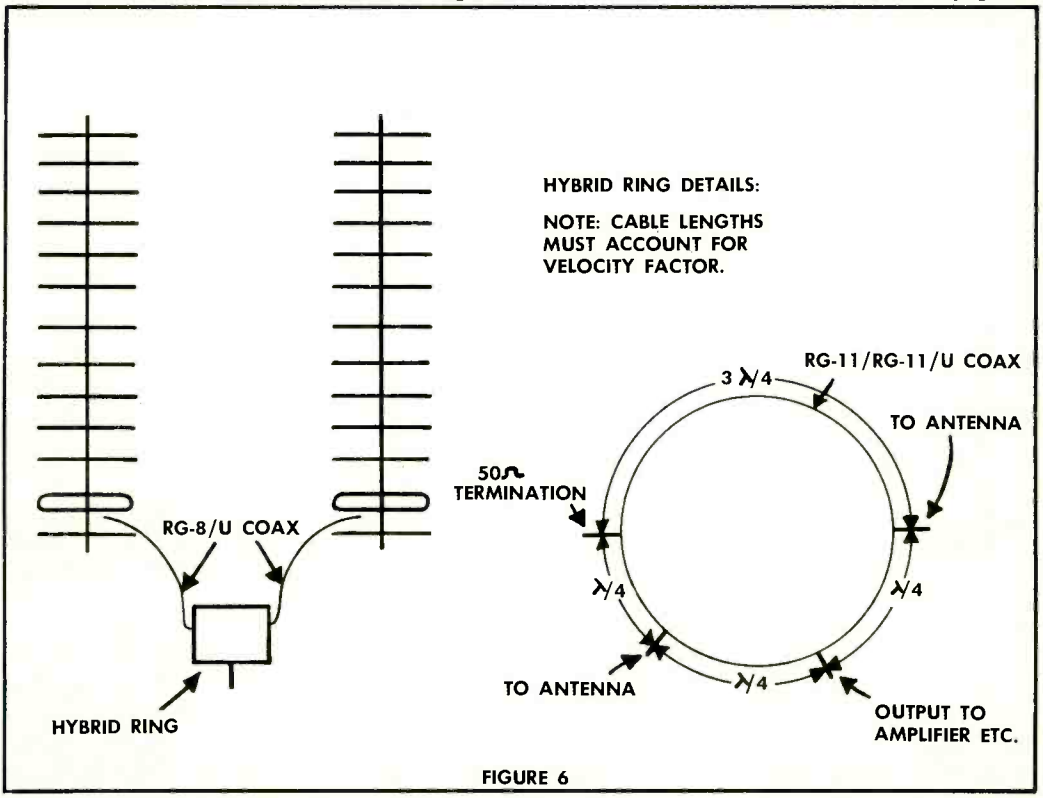
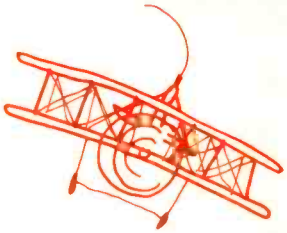



FIGURE 6

# THERE'S MONEY IN EDUCATIONAL TV



by Jack Arnold
Chicago, Illinois

**With this issue Television Horizons begins a series of editorial explorations of the Educational television market. Future segments of this series will include a thesis on educational use of wired community TV systems, and a paper on the unique Bell System ETV hook-up in South Carolina.**

Check-out of the Midwest Program for Airborne Television Instruction (MPATI) took place throughout the summer school vacation period with selected schools in a six state area taking part in the check-out phase of the year long tests. Evaluation of reception characteristics and the quality of the educational programming is determining at this writing the future of this industry-and-government subsidized program, which has been designed to improve educational offerings for schools in Illinois, Indiana, Kentucky, Michigan, Ohio and Wisconsin.

Worthington Junior High School, in Ohio, is typical of the demonstration schools assembled for the check-out testing. Similar to nearly every school involved in the program, a distribution system has been installed at Worthington Junior High to receive programming telecast from a TV studio in a DC 6 plane, flying at 23,000 feet above north central Indiana. The plane flies in a twenty mile circle constantly banked at a ten degree angle, as a means of keeping transmitting antennas oriented. Taped tele-courses, prepared by nationally recognized educators, are directed to the viewers.

The distribution system at Worthington converts the MPATI test signal from UHF channels 72 and 76 (these channels were assigned to the test program by the FCC for stations KS2XGA-72 and KS2XGD-76) so that standard distribution equipment and receivers (operating at VHF frequencies) can be used in the twenty-nine wired classrooms. The system also provides for reception of commercial channels 4, 6 and 10 from Columbus, as well as channel 34, carrying educational programming from Ohio State University. In Worthington High, the system engineers choose to use the new Jerrold J-Jacks which permits room "drop" outlet to also be utilized for TV camera input, feeding back on the same line the distribution signal is fed in on. The complete system gives the Worthington school a master antenna system AND a closed circuit system, in one installation.

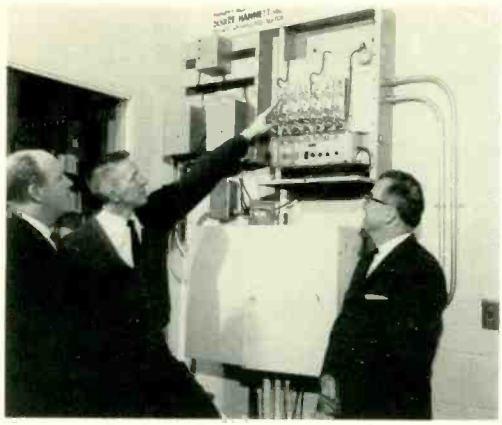
Squires-Hammet, Inc. of Columbus, Ohio is responsible for the Worthington installation, which has been lauded by Purdue University Engineers closely associated with the project. The Worthington pick up point is 140 airline miles from the radius center of the airborne flight path.

With school systems going in with increasing frequency, particularly as school gets underway for the fall semester, a pattern is evolving for service firms interested in installing similar systems.

Worthington Superintendent of Schools H. C. McCord and Assistant Superintendent Harold Armstrong, through a series of discussions with interested parties, formulated the type of school installation they wanted. The proposals, outlining the wants, and the needs, were then submitted to a technical expert who in turn selected the equipment he felt would do the job.

"We thus developed a set of specifications," Assistant Superintendent Armstrong notes.

The two school heads had decided they wanted a system which would provide effective reception in twenty-nine classrooms of MPATI programing, as well as off-the-air com-



PMA and Head-end Equipment at Worthington. Left to right: H. C. McCord, Superintendent of Schools, Bill Hammett, of Squires-Hammett, Inc., the installers; Chalmer G. Hixson, Field Associate of MPATI.

mercial and education stations. They also, eventually, want to originate programs within the school itself.

Working with Ralph Squires of Squires-Hammet, they worked out the present system. The nucleus of the system is a rack-mounted "PMA" high output line amplifier. The equipment chosen in this case was Jerrold, so the newly introduced 503HX UHF converter specifically designed for the MPATI program was chosen for the head end. The Jerrold 503TX is a crystal controlled converter, mounting directly to the antenna mast where the UHF signal is strongest. Since UHF amplifiers (boosters) are not yet practical, the UHF system must change the UHF channel 72 and 76 signals to VHF as soon as possible before the signals start down the transmission line to the distribution system. Once converted, the UHF to VHF signal can be amplified like any VHF signal.

Mr. Armstrong also felt that his system should reflect room for growth, eventually, into a local origination system. The future system, he felt, should be able to feed classroom lectures and demonstrations into other classrooms, thus making more and better use of the particular skills of the more talented teachers.

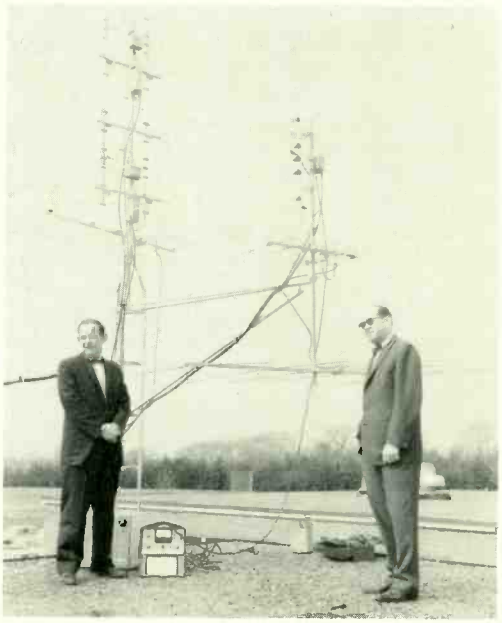
Since the system was going to be all Jerrold, the new Jerrold J-Jacks were selected for classrooms tap-offs, or drops. Now, at any of the twenty-nine points within the school, local origination video can be fed back into the system via the J-Jacks. The cost can now be amortized over a several year period as the system looks toward the future, and will never need up-dating when the day comes for local origination.

Educational TV, says Mr. Armstrong, must meet one criterion. "Will it help us to achieve a legitimate goal . . . better than we can do it ourselves?"

The Worthington installation would seem to indicate that school officials of this Ohio city believe that curriculum will be enriched by the addition.

Now that the installation is complete and school room use of the system is underway, a series of conferences will be held to carefully evaluate MPATI's benefits. The findings will be passed on to the Area MPATI Coordinator, and finally MPATI headquarters at Purdue University will have the results of the Worthington findings, as will they the results of hundreds of other cities like Worthington.

The final analysis should bring about nationwide alertness to the benefits and advantages of educational "instruction via television" and the decade ahead will undoubtedly see a mushrooming awareness of this fact in all of the fifty states.



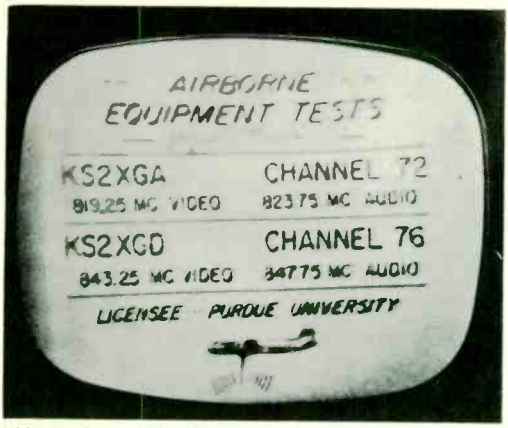
Antenna array on the roof of Worthington Junior High School. Left to right: Dr. Hugh H. Ewing, Area Coordinator; Harold Armstrong, Assistant Superintendent of Schools.

## In Michigan

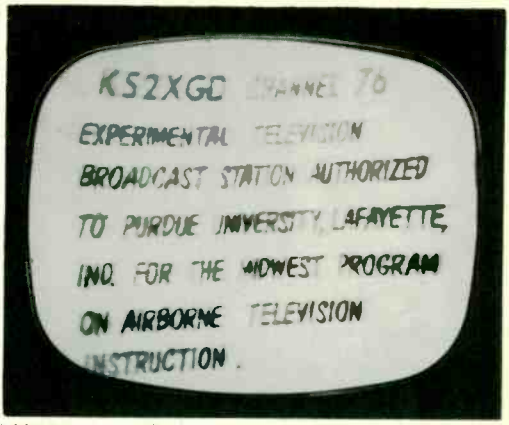
Soon after the MPATI tests got underway late last spring antennas began to rise across the mid-west as hopeful school officials worked with local installation firms probing for signs

of the elusive upper band UHF television signals. One of the furthest test sites initially put into operation was at Muskegon, Michigan, a point 196 miles from "ground zero" near Montepelier, Michigan. Early predictions that indoor antennas would work only in select locations proved true throughout the mid-west. At Muskegon, Michigan engineers found that the near 200 mile path at frequencies approaching 900 megacycles required the very best the industry could offer in the way of antennas and receiving equipment. In Muskegon, a TACO model C-1033T antenna plucked the weak channel 72 and 76 signals from the atmosphere and fed them into single channel Blonder Tongue Model MUC Crystal controlled converters, and then into single channel Blonder Tongue MCS amplifiers. The complete system was installed by West Michigan Sound Company, in Muskegon.

(Continued on page 24)

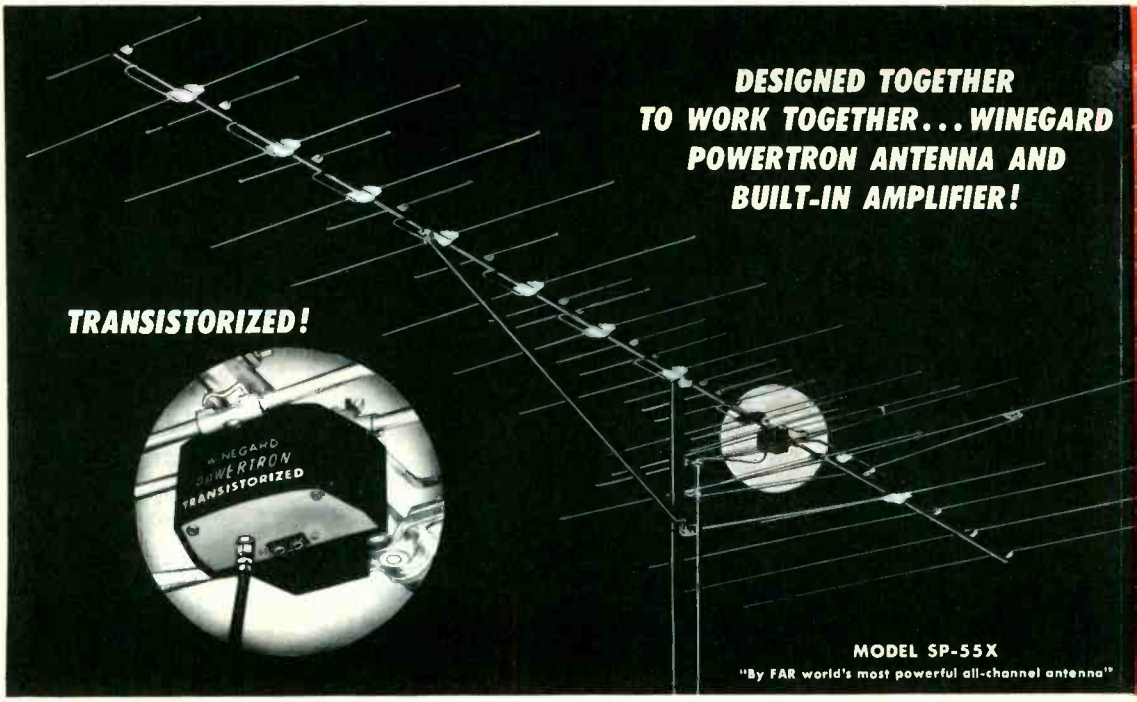



KS2XGA-72 — 200 miles as seen in Muskegon, Michigan.




KS2XGD-76 — displayed for Muskegon Educators by West Michigan Sound Company, using Blonder Tongue components.

# Why the WINEGARD ELECTRONIC MOST EFFECTIVE TV ANTENNA...




## WHY? BECAUSE...

**IT CAPTURES MORE SIGNAL** than any other all-channel antenna ever made. Patented design, electro-lens director system, dual "TAPERED T" driven elements, 30 precision-tuned elements in all.

**IT'S THE ONLY TRUE ELECTRONIC ANTENNA.** Only the Winegard Powertron is built with the amplifier as part of the driven element—not an "add-on" attachment.

**IT ELIMINATES ALL SIGNAL LOSS** that normally occurs between the driven element and the amplifier due to transmission and coupling mis-match.

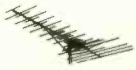
**IT BOOSTS WEAK SIGNALS UP OUT OF THE SNOW** far better than any other antenna or antenna-amplifier combination made.

**FOR VIVID COLOR, HIGH DEFINITION BLACK AND WHITE AND LONG DISTANCE RECEPTION,** nothing can compare to the Super Powertron. Thousands have been installed all over the country and our files are full of testimonials from grateful TV viewers and Service-Technicians alike.

**WINEGARD IS THE ONLY MANUFACTURER THAT MAKES BOTH ANTENNAS AND RF AMPLIFIERS.** Because of this you can feel confident of getting the very best. But don't take our word for it—let your eyes and ears and field strength meter tell the story.

MODEL P-55
Powertron — transistorized, 14 elements.

MODEL P-55X
Powertron with Pack — Transistorized, 21 elements.



MODEL SP-55X
Super Powertron — transistorized, 30 elements.

# POWERTRON is by far WORLD'S

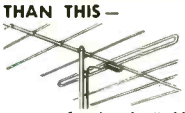
## *Not 60%...Not 70%...but over 95% efficient*

## OUTFEATURES—OUTPERFORMS ORDINARY ANTENNAS WITH "ADD-ON" TYPE SIGNAL BOOSTERS!

**THIS IS BETTER—**

Exclusive amplified "Tapered T" driven element for perfect match and lowest possible signal-to-noise ratio. Only Powertron has it.

**THAN THIS—**



Not an after-thought "add on" signal booster hung on an ordinary antenna — not an old fashioned mast mounted booster.

ONLY POWERTRON HAS *BOTH* 300 OHM TWIN LEAD OR 75 OHM COAX TERMINALS ON BUILT-IN AMPLIFIER.

ONLY POWERTRON GIVES YOU YOUR CHOICE OF TRANSISTORS OR TUBES (TUBE MODELS 300 OHM ONLY).

**POWERTRON HAS COMPLETELY AC POWER SUPPLY**

Transistorized Model has rectifier and filter in power supply — not in amplifier, where servicing is difficult. No batteries. Costs 27c to operate for full year. Battery types require $5 to $9 in batteries a year to operate continuously at maximum efficiency.

ONLY POWERTRON HAS RANGE CONTROL SWITCH TO PREVENT OVER-DRIVING TV SETS ON EXTRA STRONG CHANNELS.

ONLY POWERTRON HAS AC PLUG-IN OUTLET FOR TV SET BUILT INTO THE POWER SUPPLY.

**POWERTRON IS 100% CORROSION-PROOFED — ANTENNA IS GOLD ANODIZED, ALL HARDWARE IRRIDIZED, AMPLIFIER HOUSING OF HIGH IMPACT PLASTIC.**

## ONLY THE POWERTRON CAN DO ALL THIS!

**1.** Powertron will drive up to 10 TV sets and each set will have a better picture than an ordinary antenna will deliver to one set.

**2.** Powertron will drive a TV signal through one-half mile of lead-in with signal to spare—permits you unprecedented flexibility for remote installations.

**3.** Powertron will virtually eliminate snow and interference even on an old TV set.

**4.** Powertron will deliver superlative color reception far better than a non-electronic antenna.

**5.** Powertron brings in stations beyond the reach of non-electronic antennas—delivers greatest reception distance.

LIFE · POPULAR MECHANICS · Successful Farming · POPULAR SCIENCE · LOOK · Field & Stream

**AND WINEGARD POWERTRON** is the only antenna presold to your customers—nationally advertised in the biggest consumer advertising campaign yet! So stock up now—take advantage of the demand Winegard is building for you.

Write for free technical bulletins.

**Winegard**

**ANTENNA SYSTEMS**

Winegard Co., 3011-10 Kirkwood, Burlington, Iowa

# RECENT DEVELOPMENTS in CANADIAN WIRED TELEVISION

by R. C. Fox
Toronto, Ontario
Canada

**(EDITOR'S NOTE: Wired TV system operators in the United States could benefit greatly from the experiences of Canadian CATV businessmen. Major concessions have been made to the remote Canadian CATV oprator of late, with the entire television industry taking increased awareness that wired video reception is here to stay. Mr. Fox's report follows.)**

One of the most surprising developments of late on the Canadian CATV scene is the CBC (Canadian Broadcasting Corporation) decision to make network kinescopes available to remote CATV systems for direct cable showing.

In past years several CATV systems had applied to the CBC for permission to use kinescopes along the lines of a small non-interconnected station. The CBC had always been adamant in refusing to grant such rights.

In a statement this past summer the CBC changed their colors and announced a new policy regarding the proposal.

Said the CBC, "We are now in a position to determine whether such applications would in fact serve the best interests of the CBC and the residents of Canada."

Accordingly, the CBC now proposes to allow CATV systems to show kinescopes over wired systems when the following conditions are met by the CATV operator:

(1) To qualify for service the system must be outside the range of "C" coverage of any Canadian television station. The CBC reserves the right to act as sole judge of who does and does not meet this condition.

(2) The location in question must be served by only one such (wired) system.

(3) The system must undertake to reimburse the CBC for any out of pocket expenses involving the service. This would represent payments for shipping mainly, but there will also be a small handling charge. The CBC will set a per half-hour reel rate which the system would agree to pay.

(4) The system will agree to carry (only) the programming which the CBC would indicate. The CBC and the system will arrive at a mutually agreeable scheduling arrangement for the showing of the programs in the service.

(5) Unless otherwise indicated by the CBC, programs containing advertising supplied to a wired TV or community antenna system will be reproduced completely without any change in the commercial message or other part of the program. The system would understand that it would receive no payment from the sponsor.

(6) The system would not be permitted to sponsor any programs supplied by the CBC under this policy, but would be able to sell spots around the program. In no cases would the programs be edited or interrupted for the insertion of commercial message material.

(7) The CBC would cease to supply programming service to a system at such time as either a CBC television station or a private station commenced operation in the vicinity and covered at least one-half the subscription area of the system within the "C" contour service. The CBC would be the sole judge of this qualification."

True . . . this does not leave the wired system operator with a great deal of latitude. But there are a number of towns along the coast of British Columbia and the Maritime provinces which would meet the "C" contour qualifications. Far north spots such as Yellowknife, North West Territory are also definite possibilities.

## Telephone Company Policies

All telephone systems of consequence in Alberta (with the exception of Edmonton which operates its own city system) are owned and operated by Alberta Government Telephones. Alberta Government Telephones draws contracts for CATV systems along the following general lines.

Cable is owned and supplied by the system operator. TV cable is erected by the Telephone Company on a separate messenger. The Telephone Company charges the system operator for construction and materials used on its regular custom construction basis. Drops are supplied and installed by the system operator. There is no system of regular drop

inspection. Pole charges are $1.25 per pole per year. Underground is charged for at special rates. A bond must be posted by the operator to assure removal of the cable in case of termination of the contract. The 'usual' liability and hold harmless clauses are required.

All important telephone systems in Saskatchewan are owned and operated by Saskatchewan Government Telephones. Contracts drawn with CATV operators are similar to Alberta contracts except that existing Telephone Company messenger may be used where practical. Charges are $3.75 per span per year and 13 cents per lineal foot per year for conduit space where required.

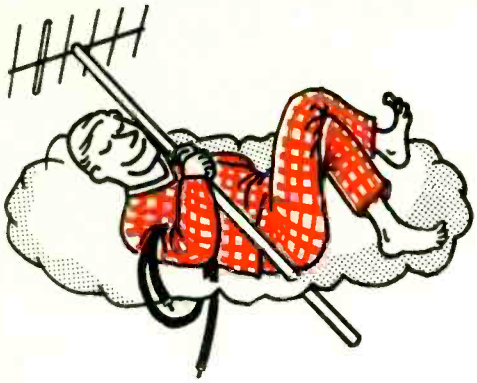
The Manitoba Telephone System, a public utility owned by the Provincial Government, operates all major telephone systems in Manitoba. The Manitoba Telephone System uses the basic Bell partial systems agreement for CATV at the present time. Standard rates have not been developed in Manitoba and individual systems are rated on a special assembly basis calculated for each system with the format of charges conforming to the Bell agreement form.

## Novel Use of UHF Translator

A UHF translator in the United States has proved to be the answer to a particularly difficult pick-up problem experienced by CO-AX Television Ltd. in Estevan, Saskatchewan. Co-Ax began operations using the direct signal of KXMC-TV, channel 13 in Minot, North Dakota, a distance of 120 miles. The pick-up system utilized multiple driven and phased yagis, but proved unreliable. A relay was clearly needed to bring the signal into Estevan. With this thought in mind Co-Ax found that Columbus, North Dakota, located just south of Estevan on the American side of the border, was also experiencing trouble with KXMC reception. Co-Ax went to the Columbus Lions Club and suggested that they erect a UHF translator to bring grade A television to the town's 1,000 residents. The town fathers were enthusiastic over the plan, but did not have sufficent funds available to promote the project. With this much accomplished, Co-Ax subsidized the cost and maintainence of the entire installation. The Lions Club arranged for use of a telephone company tower on a hill south of the town. The Lions Club, through K and M Electronics, Minneapolis, filed for the UHF translator, to operate when granted on channel 70. The FCC required proof that the installation would be owned by the Columbus group, in the public interest. Once this was supplied the FCC grant was made and the installation went ahead.

The unit has been in operation since April 15, providing Columbus residents with their first reliable television reception. At the same time enough of the ten watt channel 70 signal crosses the border to be useable and reliable at the thirty mile distant Estevan Co-Ax reception sight. Four 12 element phased yagi antennas are utilized by Co-Ax to pick up the translator signal, which is immediately converted on the tower to a VHF channel.

FCC rules and regulations have been followed to a "T" and everyone concerned and connected with the project is very pleased with the reception the system provides.



# CATV Dream Come True!

The dream of the CATV industry became an "almost reality" on September 11 when Jerrold Electronics, Philadelphia, Pennsylvania announced it will install 128 miles of coaxial cable, line amplifiers, distribution lines, tap off's and drops in Wilmington, North Carolina.

The installation is a "headliner" for several reasons. First of all, this is the first in the state of North Carolina. Secondly, it will serve a town of 65,000 plus residents, a big town for wiring in anyone's book. Third, it is expected to be a $500,000 investment, representing the most extensive and largest CATV system ever proposed. Last of all, the Wilmington system is going into a town with one local television outlet (WECT) which brings three network service to the area on a shared basis.

President of the new "Cable Television Company," Wilmington, is industry respected pioneer Martin F. Malarkey, Jr., a gentleman with more CATV system know how and experience than almost anyone around.

The Wilmington system is a sure sign of increased interest on the part of the industry to provide multiple channel television service to a number of towns and cities which already have limited local service through a single outlet. According to Lee Zemnick, Manager of Jerrold's Community Systems Division, the Wilmington system is an example of the growing trend of the industry to become interested in major growth regions with substantial population.

The entire system will be installed by Jerrold's Community Systems Division, which has completed turn key installations in areas totaling 270,000 population in fourteen states during the past twelve months.

The Wilmington system will bring five television and several FM signals into Wilmington on the Cable, including signals from stations in Raleigh, Washington, and Greenville, North Carolina, and the state's educational station at Chapel Hill. A 450 foot microwave transmitting-signal pick up point near Bergaw, North Carolina will relay the signals to a 150 foot tower located near Wilmington. The signals will then go into 128 miles of coaxial cable to serve the 65,000 residents of the town.

Mr. Frank Martin of Jerrold Electronics Corporation and Mr. Martin F. Malarkey, Jr., president of Cable Television Company, of Wilmington, N.C., after signing contract for construction by Jerrold of community antenna television system for Wilmington and surrounding area. It is planned that system, when completed, will provide five TV and five FM channels to system subscriber. Contract is largest of its kind in the history of the industry.

Rumors have been thick in recent months that a "substantial system" was about to be constructed in the east. Until mid-summer, it looked as if the largest system of all would be scheduled for Santa Barbara, California, where Jerrold, AMECO and others were engaged in a game of courting the town fathers with the advantages of multiple channel television. Santa Barbara, like Wilmington, has but one local channel, providing split time three network service.

# The Signal Is Where You Find It

by Bud Shepard
Fred Welsh Antenna Systems
Vancouver, B.C., Canada

**(EDITOR'S NOTE: CATV operators have problems alike no matter which side of the U.S.-Canadian border they hang their cable. Television Horizons welcomes to these pages this contribution from one of British Columbia's largest CATV outlets, Fred Welch Antenna Systems, of Vancouver. The problems encountered in Vancouver may bring a smile to your face . . . for except for a bit of B.C. flavoring, they are common to all!)**

"Our story begins in our accounting offices. After a few years as an equipment distributor, it was brought to our attention that we could be of more assistance to the CATV field if we had actual experience as an operator.

"The next step was to build a small system which we could use as a 'school-room'.

"Youbou, a small lumbering community on Vancouver Island, was our choice. This town was located among the mountains and had virtually no television reception.

"The choice was far simpler than the installation, as the power line climbed 2800 feet on a 4500 foot run up solid rocks; our experience was forming.

"Youbou proved very receptive to cabled television and supported it as a community project No. 1, a problem which we in B.C. are prone to. Even during these sessions we had a normal increase in connections.

"Because of our 'operator category', we added a small advertising department specializing in CATV promotion and customer education. Our experience and interest was growing, so much so that we enlarged our CATV operation.

"In Squamish, a small town within a few hours of Vancouver, we spent considerable time in the surrounding mountains without much encouragement. During our surveys we were asked, "Did you hear about the fellow who is getting 'everything', and his antenna is hanging on the side of his garage?"

"This story we had heard in many forms in a lot of towns. But, we checked it out and sure enough – he was! Almost everything; three excellent channels.

"Our Squamish antenna site is not exactly 'hanging on his garage' but it is nearby in an orchard facing into the sharp side of a 6600 foot mountain. This orchard is fifteen feet below sea level and has been delivering 'everything' for almost two years consistently. In this case, three channels, 4 and 5 from Seattle and Channel 12 from Bellingham.

"Another humorous incident which happened was the fellow who had a Channel 12 antenna within a few feet of our cable (which is double shielded) and who informs his neighbors that he is saving money watching a free Channel 12. This is quite a feat since we had converted Channel 12 to Channel 2!

"A not quite so funny incident from our Kaslo system also involves the antenna array.

"This site is located, at times, below the high-water level of Kootenay Lake. The only consistent signal from Channel 4 Spokane was located on a beach jutting out into the lake. Since the signal was averaging 18 uv. a complex array was installed, two eighty foot towers supporting sixteen yagis. During the spring and summer the level of the lake is raised for flood control on the Columbia River.

"Realizing that our towers would be partially submerged during this season, our engineers constructed a log boom around the array.

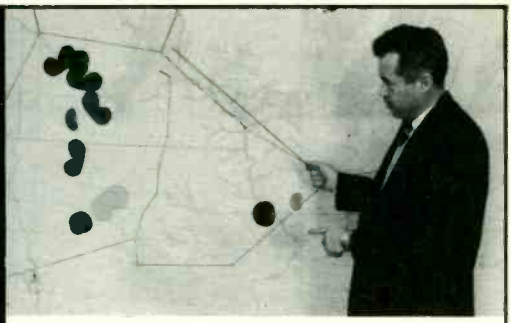
"Shortly after this was done, Kaslo experienced a violent storm which caused much turbulence on the lake with associated damage.

"Our men went down to the beach to inspect the installation and a calm, unbroken expanse of water greeted them; *no boom, no towers!*

"This same day our engineer, Mr. John Hepburn, had his first experience at skin diving. The towers were 'relocated' twenty feet underwater, submerged near our own boom which had broken loose during the storm. *Our experience was almost complete.*

"We know of no other business that affords such a continued and varied interest as the CATV business."

# TRANSLATORS ARE MY BUSINESS



TV Engineer John Klindworth points out his expanding UHF rebroadcasting empire for the TVH camera.

## The Story of John Klindworth, K & M Electronics — A Division of Miratel — Minneapolis, Minnesota

**In the August and September issues of Television Horizons the story of Minneapolis based John Klindworth's field experience with UHF translators was reported in some detail. Klindworth's faith in UHF as a television medium is perhaps second to none in the country (with apologies to Commissioner Robert E. Lee). But beyond that, his ability to sell the "underdog UHF" to others is almost surreal. The conclusion of this report follows.**

Two large scale UHF projects are underway under the guidance of John Klindworth. Both are "first-timers" and each is precedent setting in the telecasting industry.

Through the cooperation of UHF channel 21, KQTV, in Fort Dodge, Iowa, *Miratel Electronics* is assisting KRNT-8, Des Moines, Iowa to install a channel 70 UHF translator on the KQTV 600 foot tower re-broadcasting KRNT. The NBC programs of KQTV already cover a fairly good sized region in and north of Fort Dodge (KQTV could obtain NBC network affiliation only by utilizing a directional antenna array beaming the signal north of the city away from the coverage area of more southern Iowa NBC affiliates). The Fort Dodge region is strictly fringe for the signals of stations in Ames, Mason City and Sioux City. An estimated 49,800 TV homes are within the Grade B pattern of the channel 21 signal.

While set *potential* is nearly 50,000, the latest ARB surveys show that something less than 30,000 of these sets have converted to UHF, or watch KQTV once per week or more. KQTV officials feel part of this must be due to the lack of complete network programming on UHF (KQTV is NBC only).

Thus when John Klindworth came to KQTV with a proposal to add a UHF translator to the city, which would extend to CBS signal of KRNT into the city, KQTV was receptive.

Klindworth proposed to have KRNT sponsor the majority of the project (an estimated cost of $20,000), and sought the cooperation of KQTV to place the UHF translator transmitting antenna on the 600 foot KQTV tower.

As Klindworth talked, KQTV became enthused. "With CBS programming available to the city on UHF, set owners will be more prone to convert to UHF, and stay with UHF. The bothersome problem of changing antennas from V to U, etc. will be eliminated. The powerful psychological factor of spending extra money to watch 'just one more station' (i.e., for a UHF antenna and UHF converter or set) would be considerably reduced. KQTV's weekly set count should grow, and KRNT will add a potential of nearly 30,000 receivers', which it does not presently reach."

So the proposal was passed upon and the wheels began to grind. A 100 watt UHF translator signal will feed the KRNT programs through 3 1/8 inch coaxial cable, thus assuring as little loss as possible during the cable run from the translator at the base of the tower to the stacked transmitting antennas at the 600 foot level. *Adler* translator equipment and antennas are being used in the installation, the most complex single channel UHF translator installation in the history of the business.

As John Klindworth told this reporter, "The results of the test at Fort Dodge may bring an answer for other single station markets.

Additional UHF signals, we feel certain, will encourage additional UHF conversions, and thus strengthen the foothold of UHF in these regions. The combined efforts of the two stations provides a single transmitting antenna location, gives the local station technical control over the quality of the signal being transmitted over the translator."

Klindworth notes also "We hope that the ABC station, WOI-TV, Des Moines, serving this region, will also put their signal on a translator, thus giving Fort Dodge residents all of their television on UHF."

## Nebraska

Aside from the interest shown in *Miratel* UHF translators by civic groups and VHF commercial telecasters, the Nebraska Educational Television Council has found the Klindworth story impressive.

A contract was recently signed with the Nebraska educators to extend the service area of the state's educational television station, KUON-12 in Lincoln. The state's "in school" service provided over KUON has served as a model for other state's. KUON and the State Educational Council recently filed comments with the FCC objecting to the lack of adequate VHF channel allocations throughout the state for an expanded educational television program. Klindworth immediately came to their rescue (as the FCC could find little if any additional VHF spectrum space for the state's educators) by proposing a multiple hop system of UHF translators which will eventually extend the KUON class room sessions into all of the major population centers in the region. The first phase of the contract calls for *Miratel* to install UHF translators to carry the KUON signal west into the towns of York, Aurora, Grand Island, Hastings and Kearny.

Schools using the KUON signal for off-the-air instruction pay a use fee to KUON on a participating basis. By utilizing the UHF translators, the signal can be extended to further school districts. The participating funds derived from the newly served schools provided the money necessary for the installation of the translator system.

This is the first "specific use" installation undertaken by *Miratel*, as it is aimed only at the schools. However there is expected to be a number of home owners in these towns also converting to UHF to receive the excellent KUON programming, which is partially locally originated, and partially taken from NET, the National Educational Televisi network.

This, Klindworth feels, will "open up" UHF in Nebraska, which to date has seen no UHF signals on the air. This will create a demand for UHF antennas, converters and other products in the region, and bring valuable servicing and installation training in UHF techniques into the region, against the day when all television may eventually move to the ultra highs.

Of particular interest, also, is the use of UHF translators by an educational broadcaster. Educational broadcasters are, as a rule, strapped for funds and must make use of the most economical means possible when extending their coverage. Long before Klindworth came on the scene the engineers for the state's educational TV system had studied the prospects of and ruled out increasing their ERP from its present 26.3 kw. visual.

The Aurora-Grand Island-Kearny translator installations will make use of a tried

**(Continued on page 24)**

# ACKING YAGI ANTENNAS FOR TRANSLATORS and OFF-THE-AIR RECEPTION

by Les Farey
Video Reception Engineer
Blonder Tongue Labs, Inc.

The translator installation consists of two antenna installations . . . that used for off-the-air pick up of the telecaster's signal, and that used for re-broadcasting the VHF translator signal. The following information should prove helpful to those installations which require a 6 db. signal boost on either receiving or transmitting over the gain afforded with a single yagi antenna.

While normally-quality yagi antennas are not fed with 300 ohm line (i.e., ruggedized yagis as a rule utilize 52 or 72 ohm feed) many off-the-air reception sites still must stick with commercially available relatively in-expensive receiving type yagis. It is to the user's advantage to get the system into coax as soon as possible. This installation technique accomplishes just this.

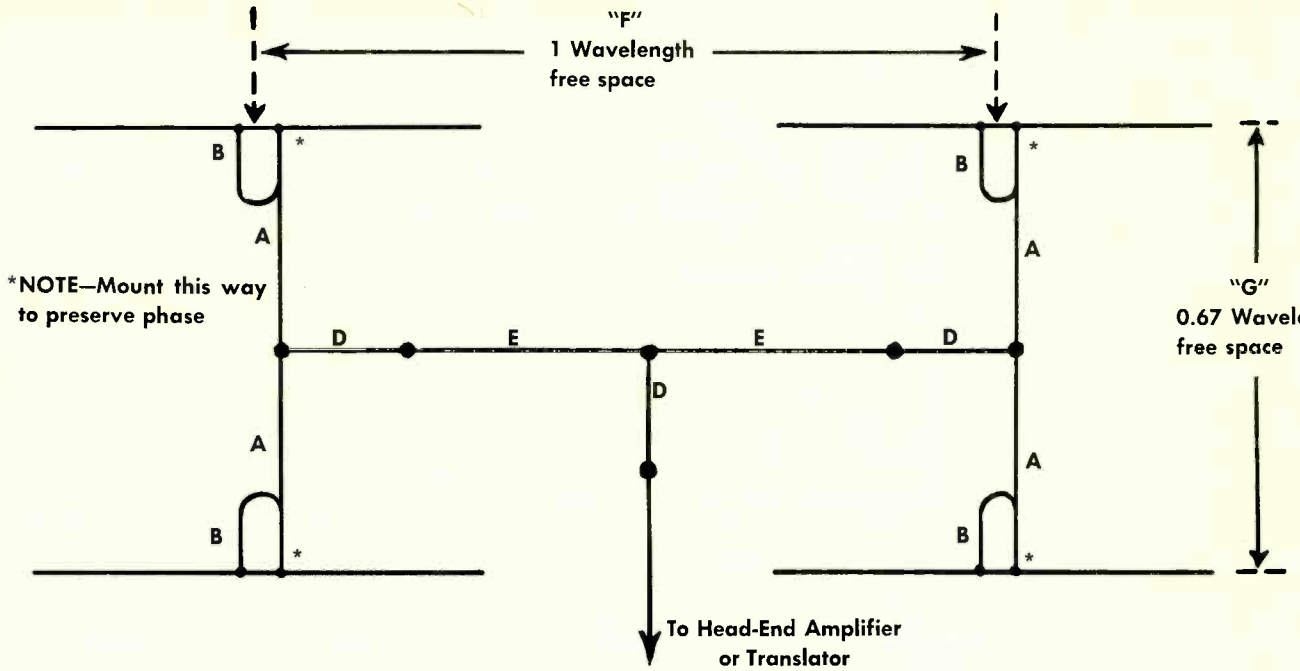
Note that the down lead is 72 ohm RG/11U, which matches 72 ohm input to amplifiers, or output on translators. If the construction dimensions are followed closely this installation should provide a minimum of mis-match to the user. Mis-match on the receiving array will show up as ghosts and/or smeared video, distorted audio. Mis-match on transmitting will severly limit the bandpass of the phasing lines to the antenna, resulting in a smeared transmitted signal.

All cables except D are 72 ohm. The balun is constructed from RG/59U, a smaller version of the 72 ohm RG/11U. D is RG/8U coaxial cable (52 ohm) and this must be adhered to!

The sample measurements shown are for channel 4 utilizing a mid frequency video point of 67 megacycles and a mid frequency audio point of 69 megacycles. For other channels, merely substitute the appropriate mid channel frequencies into the equations.

Be particularly careful of the method of interconnecting the baluns which must be mounted as shown to preserve the phasing of the array.

Gain of the four stack-quad array can be calculated by assuming X db. gain for a single yagi antenna and adding 3 db. for the second stack added (multiplying the total number of elements by two) and then adding an additional 3 db. for the second set of two yagis (multiplying the first set of elements by two once again).




All Measurements Are in Inches

"F" = 11800 divided by mid channel frequency in Mc/s

"G" = 7900 divided by mid channel frequency in Mc/s

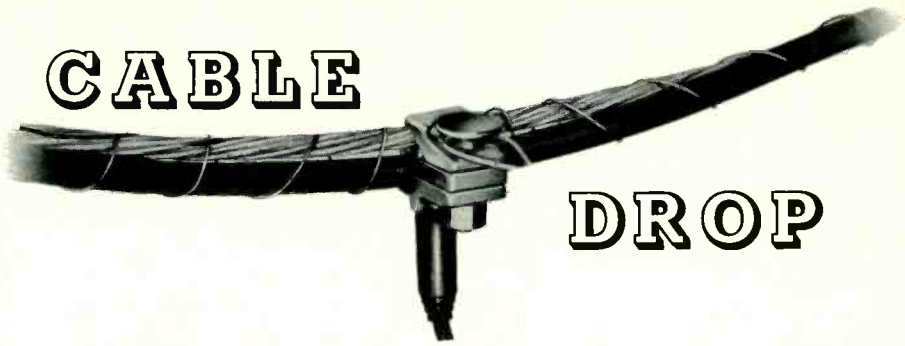
B = Balun 3900 divided by mid channel frequency in Mc/s

A = ½ wavelength or multiple ½ wavelength (normally these will be a wavelength) } or Ch. 4 = Twice balun length, or 113 inches = 1950 divided by mid frequency Mc/s channel 4 = 1950/69 = 28.5 inches

E = ½ wavelength (same length as balun), normally ½ wavelength is sufficient length.

D = ¼ wavelength (this must be RG8U)

EXAMPLE: Ch. 4 = 11800/67 Mc/s = 171 inches
Ch. 4 = 7900/69 Mc/s = 114 inches
Ch. 4 = 3900/69 Mc/s = 56.5 inches




## Changes in CATV Depreciation Schedules

The allowable CATV depreciation schedule is always a source of concern among community operators.

There appears to have been changes in the Internal Revenue Service approach to CATV systems in recent months, as the following will point out.

Readers are asked to forward any additional information they may have on the subject to this desk for evaluation by the industry as a whole.

"At present a five-year depreciation schedule for overall CATV equipment life is commonly accepted by the IRS. There should be no need, under normal circumstances, to submit a longer term depreciation schedule. If your regional IRS office will not accept the five year period. ask them to contact the IRS District Office at Scranton, Pennsylvania, where more than a decade of CATV operation in the Pennsylvania foothills has already established a precedent in the matter.

A few CATV systems have established separate depreciation schedules for different classes of equipment, ie. five years for electronic equipment and three years for coaxial cable. This type of schedule is rare however and is difficult to arrange with the IRS.

There does appear to be a development worthy of note. In many other industries the IRS normally expects depreciated items to have some value at the end of their depreciated life. This is sometimes known as "scrap value." To date the IRS advises that they have not made much of an issue of the scrap value theory in figuring CATV equipment depreciation. It is possible, however, that your local agent might incorporate this theory into negotiations with you. In practice, there is very little, if any, real scrap value for CATV equipment. The CATV market, even with its growth, is too small to provide a ready market for used equipment. In addition to this, existing equipment five or more years old is not only unmarketable, it is liable to be outmoded by technological advances which make the equipment worthless. There is an important difference between outmoded equipment (of little real value) and used equipment (with some resale value). Your tax man should be made aware of this difference.

A CATV operator in Michigan recently underwent an audit in which the agent requested a ten year depreciation schedule for the system's CATV equipment. In addition, the agent insisted that house-drops be "capitalized" instead of "expensed." At present, most CATV systems are expensing 100 per cent of their house-drop material and labor. If the agent does insist on using the capitalization method, the CATV system operator might consider suggesting an alternative compromise method of handling capitalization. In one of the first such capitalization settlements made recently, only those house drops in actual use were capitalized. Those not in use because of discontinuance of service or a subscriber move were written off and abandoned.

Word from Pennsylvania indicates that both the Scranton and Philadelphia offices of the IRS are now accepting the 100 percent expense method.

## H & B Acquires Canadian CATV Property

An international border CATV system located in Edmundston, New Brunswick and Madawaska, Maine has come under the wing of the ever expanding H & B American Corporation. 2600 families receive their television from the joint system which also serves the towns of Clair and Fort Kent. The purchase was the fourth in two months for the company, which now claims to be the largest CATV systems owner in the nation. The H &

B investment in the industry is now estimated at $10 million.

The company is expected to announce a further series of acquisitions soon, as well as plans for construction of a number of systems in large metropolitan regions.

## To Microwave or Not to Microwave . . .

### That is the Question

Interest in CATV microwave has never been higher. Perhaps it was the recent NCTA nationwide convention held in San Francisco which threw CATV operators from Maine to California together in a mass of week long conversations and notebook comparisons.

Those who have microwave are for the most part adamant over its advantages. Those without microwave are equally adamant . . . they want it!

Recently however the National Community Television Association has been warning members to proceed with caution in applying for microwave common carrier or business microwave permits. The fear is a common one among the "haves" and the "have nots." What will happen . . . eventually, when microwave systems begin to criss cross, when systems build upon systems and CATV operators find themselves sharing top sites with other CATV systems? Who can afford to waste money on duplication microwave?

Should the CATV operator apply for a Common Carrier license? If yes, should *he* become a common carrier and risk a protest from an already established Common Carrier serving the same region, or, should the CATV operator negotiate with an already existing Common Carrier and pay the rates he demands?

What about the new Business Microwave band above 12 kmc? Is it an area where equipment costs and technology are sufficently advanced to prove economical to CATV systems?

The answers are as endless as the questions, and twice as elusive.

The Nation's CATV association advises members to sit tight and be especially careful of any steps they take which may eventually criss cross their own future, or other future, CATV installations.

The advise is excellent . . . *except* in areas where population density does not demand such caution.

**(Continued on page 24)**

## CABLE DROP

**(Continued from page 23)**

The advise is excellent . . . *except* in cases where the threat of another winter of snows on mountain top receiving site installations sends chills down the back of the engineer or technician charged with the responsibility of maintaining the head end equipment.

The advise is excellent . . . *except* in cases where the CATV operator knows exactly what he is doing, and how he is going to go about it.

The advise is excellent . . . *provided* you are confused, up in the air, and uncertain about your own need for microwave.

If you are confused . . . uncertain and up in the air, the chances are you don't need microwave . . . and neither tomorrow nor the next day will bring you a clean cut answer.

*Our advise* — if you aren't certain, if your engineering studies haven't proved the need, forget the entire matter. Take your own "indefinite status" microwave application out of the fire, so the real users won't get burned.

## CO-CHANNEL YAGIS

**(Continued from page 8)**

with an adjustable line stretcher in one phasing line set at the mid point for equal phase to both halves of the array a simple adjustment can be made to control a relative phase in either direction.

TACO Y-series, coaxial input yagi antennas were used in the experimental verification measurements of this theory. These antennas have a nominal 50 ohm. input. Standard interconnecting harnesses for arraying these antennas consist of odd multiples of quarter-wave length of 72 ohm. coax which serve the dual purpose of connecting harness and impedance transformers. This does not allow adjustments in length of the connecting harness, since it would upset the electrical symmetry of the array from the standpoint of equal current amplitudes. A solution to this problem was obtained by using a hybrid ring and 50 ohm. interconnecting coaxial line as shown in Figure 6. The experimental setup used an adjustable line stretcher as shown in this diagram.

It should be pointed out that this method of reducing interference is also applicable to other types of interfering signals. As an example it could be used to eliminate adjacent channel interference. In this case the wavelength of the interfering signal would be used to determine the antenna spacing. TACO



## EDUCATIONAL TV

**(Continued from page 11)**

The results of the experimental reception installations can be seen with the accompanying photographic illustrations. Excellent video fidelity accompanied distortion free sound as educators from miles around gathered at the Senior High School to view the early tests on May 9.

With the fall test program now underway, a number of similar installations are using the MPATI signals in the Muskegon region. In the six state coverage area of the signal, an estimated 13,000 schools will eventually be in a position to feed their classrooms with the instructional programs.

Among the many firms participating in the active subsidizing of the program from the industry side of the fence, the Technical Appliance Corporation, Sherburne, New York (TACO), Jerrold Electronics, 15th and Lehigh, Philadelphia 32, Pa. and Blonder Tongue Labs, Inc., 9 Alling Street, Newark 2, N.J. are ready, willing and able to supply interested servicing-installation firms with the data necessary to approach local educators with a proposal for local use of the MPATI signals. (end part one—J.A.)

## TRANSLATORS ARE MY BUSINESS

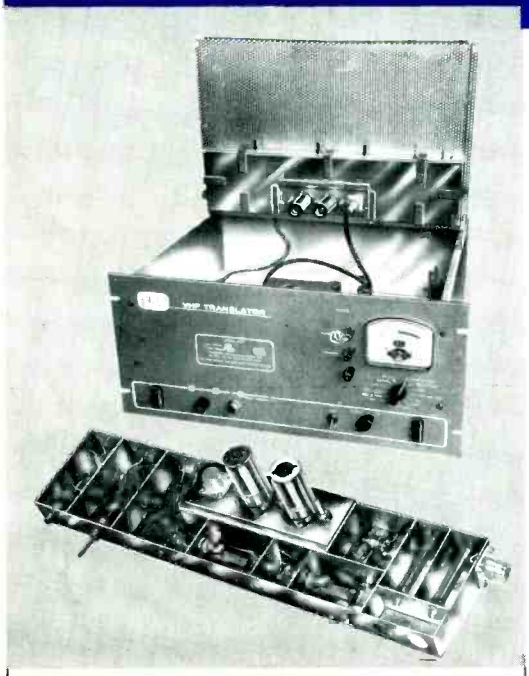
**(Continued from page 19)**

and proven Klindworth installation trick . . . feeding from one translator to the next, using each one to serve not only a definite coverage area, but also as a relay for the next unit in line.

If Commissioner Robert E. Lee ever had a staunch supporter for his UHF program, it surely must be John Klindworth!

RBC

# Here's Why EMCEE Has Now Created a Special Design VHF Translator for UHF Inputs!



**UHF INPUT • MODEL U-HRV**
Rack Model shown, Desk Cabinet Model Available.

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2. Pre-selection and band pass stability problems require completely different tuned circuit techniques.
3. To meet the requirements of the FCC Rules Part 4 Sub part G, a completely new type acceptance application is required for this more complicated translator.
4. Cable system U-V converters represent only problems in translator systems. Integrated design is even more important here.

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- FCC Type Acceptance.*
- All tubes reasonably priced and readily available. UHF circuits are RCA Nuvistors®.
- Full output — 1 watt — any specified VHF channel.
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