

AUGUST 1961  
40 CENTS

# TELEVISION HORIZONS



MICROWAVE  
IN  
CATV

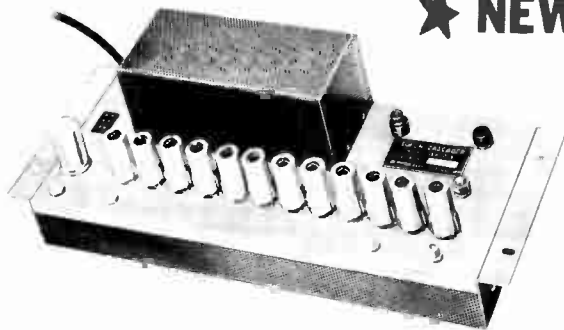
DEVOTED ENTIRELY TO TELEVISION RECEPTION

Gregory E. Milnes  
15 North Groveland Ave.  
Medford, Oregon

**THIS MONTH**  
Microwave in CATV  
Translators Are My Business  
Part-Time TV  
RF Preamplifiers

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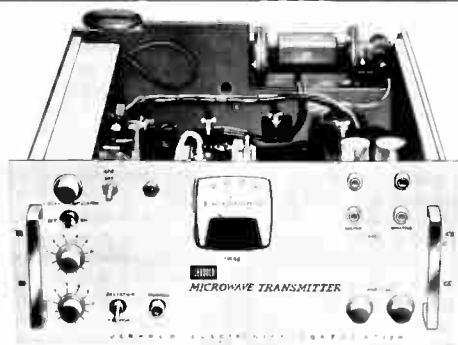
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## Exclusive and Late News of the TELEVISION RECEPTION INDUSTRY

### About Palm Springs

Our story on the subject of television in Palm Springs, California has drawn more industry reaction than most anything run to date. Most of this reaction has been rather violent... some pro... and some con.

In the complete interest of fair-minded reporting *Horizons Publications* feels a sequel to the currently running story (part two is in this issue, the conclusion will run in September) should be prepared on the behalf of the NEW owners of the Palm Springs cable system, *H & B American Corporation*. As noted on this page in July, the ex-owner no longer has any ties with the franchise, and any and all comments made in the first part of the story last month, in reference to the cable operation, are now in the past tense. *H & B American* has assured *Horizons* that any wrongs created by the former owner are being corrected as fast as possible. A *Horizons* reporter has been invited to "tour the new plant at our convenience" and report back to our readers on the changes being made. We will do this, and readers can look for a full report in the October issue.

### UHF Translator Sales

It's no secret that mushrooming sales for UHF translators contributed "in part" to the *Adler Electronics'* decision to kill a production run of 50 VHF translators. *Adler's* UHF sales are on the ascending side of skyrocket ride which is attracting the interest of a number of other manufacturers in allied fields.

Recent stateside sales are best counted by the number of applications for U units filed with the Commission in the past 30 days (12).

Unofficially, the real U market may shift outside the United States. Italian RAI authorities have been frequent visitors in recent weeks to American UHF transmitter (and

translator) manufacturers, with a reported order for 800 plus units ready for the signature of the "right bidder." Rumors are thick and fast at press time as *Adler* and several anticipated competitors jockey for position with the Italian authorities. The latest reported bid from one American manufacturer involves the setting up of plant facilities in Italy, where the UHF units would be turned out with Italian skills, and American know-how.

The Italian TV network engineers have long been enthusiastic about TV boosters and satellites in a country where the terrain is on a par with the best the Rocky mountain states have to offer. The V channels in Italy are about exhausted and the next move, to fill in the last of the "TV devoid areas," will utilize the virgin UHF spectrum of Italy. The government will purchase and pay for all 800 plus units, so the buy is one of special interest to American manufacturers.

### UHF Input — VHF Output

Clearing the record—for translator readers in regions where UHF signals are available for driving VHF translators—this word from the FCC.

"If your translator is type accepted for VHF operation, the addition of a UHF converter ahead of *that* translator, to bring the UHF signal down to a VHF frequency for driving the VHF translator, IS NOT in keeping with type accepted regulations. A VHF translator, with UHF input, must be type accepted all over again."

The big rub appears to be the conversion stability of the UHF converter unit. By FCC standards, .002% stability is tough to find in most all UHF crystal controlled converters on the market.

So a word to the wise... check with your local FCC office before accepting a VHF

translator with a U converter "tacked on." It may . . . or may not be . . . legal for operation.

## Mexican Market

The long expected — but slow to come — investigation of Mexico as a market for weak signal TV devices seems to be under way. Pete Collins, AMECO engineer, made a field survey trip into portions of Northern Mexico (Monterrey and other stops) immediately following the close of the NCTA convention. Monterrey, in particular, appears to be a very possible CATV town for importing American signals. One question remains unanswered . . . will Mexican authorities permit U.S. programs to be piped into their towns, where local TV has only recently gotten a start?

CATV salesmen are not the only parties interested in Mexico's TV reception problems. A recent foray into central Mexico by a Translator engineer turned up the interesting fact that translators could, initially, be put on the air for a simple \$35.00 filing fee, *on an experimental basis*. The Mexican government is interested . . . and they say "one watt? 100 watts! We want television!"

## Four FCC UHF Target Areas

The July featured report under this title drew more than normal interest from both engineers and broadcasters. Most inquiries sought further information in more detailed form from the FCC records on the subject. Unfortunately, we were unable to reveal more, even privately, without betraying the confidences of several helpful folks at the Commission. We do note one apparent error in the story, however, which Ed Allen of Winona, Minnesota was kind enough to bring to our attention. Noted Allen, "You reported Winona County, Minnesota is one example of a UHF translator showing up in the county by county total of UHF set saturation in excess of fifty per cent of the sets owned. I beg to differ. Winona County not only has no UHF translators, we have no UHF broadcasters (nor can any be received here) and in fact, after checking with local TV receiver sales shops, I am of the opinion we have no UHF receivers . . . and certainly not fifty-nine per cent saturation!"

TVH quickly referred back to our original copy of the FCC report on the subject, where we verified our earlier report. The FCC apparently believes somebody is selling a lot of UHF converters and receivers in this southeastern Minnesota county!

## And

One of the four UHF target areas noted in last month's report was Hartford, Connecticut. Already the open faced wheels of the industry are turning to remove channel 3 from Hartford and reclaim the Connecticut Valley region as an UHF ONLY preserve. In a public notice dated July 7, 1961, the FCC announced, "A . . . proposal by Springfield Television Broadcasting Corp. to provide a third service to (the) Providence area on channel 3 by deleting it from Hartford, Connecticut and substituting a UHF channel in its place will be considered in . . . rule making proceeding which the Commission expects to open shortly, directed to the question of deintermixture of Hartford."

## Les Farey Joins Blonder-Tongue

It is with particular enthusiasm that we are able to announce the appointment of well known CATV engineer Les Farey, most recently of Seattle, to the *Blonder-Tongue* line-up in the western U.S.A. Les leaves *Video Utility Company*, Seattle, to which he came from *Benco* of Canada. Mr. Farey will be traveling the western states after August 1 dishing out good helpings of CATV technical information, and weak signal TV and FM data in general on behalf of his new employer, *Blonder Tongue*. Les came to Canada seven years ago from England where he began working in weak signal and distribution video more than 30 years ago! It's going to be nice having Les close enough to us (he plans a San Francisco home) for a personal visit now and then. With a little prodding from the field, we hope to see his *decade-inactive-pen* put back to work preparing a series of articles for TVH readers.

## AMECO Appoints Northwest Man

Donald J. "Chris" Arvas, well known in CATV circles throughout the Pacific Northwest, has been named Northwest Regional Manager for AMECO, the manufacturing division of Antennavision, Incorporated, Phoenix, Arizona.

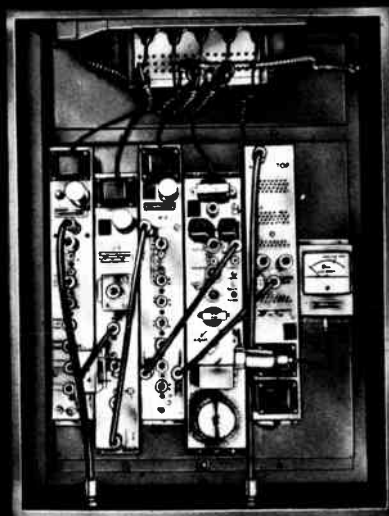
The appointment of Arvas as regional manager for the Pacific Northwest is part of an overall expansion program at AMECO. Arvas will be responsible for servicing of AMECO customers in Washington, Oregon, Idaho and Montana. He will also manage a new AMECO warehouse which will be opened in Spokane during August.



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Primary power source	117 V $\pm$ 20% 60 c/s
Power Consumption	150W
Temperature Ambient	-30°C to +50°C
Max. Permissible Power	1 Watt
Overall Noise Figure:	
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High Band	.6 db $\pm$ 1 db
Frequency Stability	.02%
Gain: (Maximum)	135 db
Dimensions of Housing	35" x 28" x 10 1/2"
Weight	130 lbs.

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**MODEL T-11 AND MODEL T-12 VHF TO UHF TRANSLATORS**—3.5 Watts output. For Canadian use. Model T-11, VHF input, channels 7-13; Model T-12—VHF input, channels 2-6. Features: Automatic shut-off • remote 'on' and 'off' control facilities • weatherproof housing • type approval from Canadian Dept. of Transport.

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AUGUST 1961  
VOLUME 2 • NUMBER 8

# HORIZONS

Formerly DXing Horizons

PUBLISHED MONTHLY BY HORIZONS PUBLICATIONS  
POST OFFICE BOX 3207 • MODESTO, CALIFORNIA

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## ADVERTISING

TELEVISION HORIZONS accepts commercial display advertising from bona fide manufacturers, distributors of electronics equipment and associated apparatus. Advertising rate card and coverage data available upon request.

## CIRCULATION

TELEVISION HORIZONS is circulated through the mails on the 30th of each month to television rebroadcast and distribution systems, broadcasting personnel, television engineers and technicians, servicing and sales personnel and long-range television experimenters. Television Horizons is recognized as "the trade publication" of Cable TV, Translator TV, and fringe area TV engineers and technicians.

## SUBSCRIPTION

Subscription rates in the United States, Canada—\$4.00 per year. Single copies \$.40 each. Subscriptions outside the U.S.A. and Canada—\$4.00 per year. Subscription remittances should be made by bank draft or postal money order.

Two year subscription rate U.S. and Canada—\$7.00. Three year subscription rate U.S. and Canada—\$10.00.

Airmail subscription available at \$7.00 per year, U.S. and Canada.

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POSTMASTER: Send Form 3579 to Television Horizons, P. O. Box 3207, Modesto, California.

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

# TRANSLATORS

## ARE MY BUSINESS

THE MAN AND HIS EMPIRE — John Klindworth pinpoints "homebase" with the aid of a pointer on a large wall map of the upper-midwest. The dark areas to the left represent UHF translator installations in Minnesota, Iowa and Wisconsin.



### **"The Story of John Klindworth K & M Electronics Minneapolis, Minnesota"**

Pick a town in Minnesota. Go ahead—name it. Chances are you said Minneapolis, St. Paul or Duluth. Now pick a town . . . *a small town*. Let's try on Olivia or Redwood Falls for size. Small, upper-midwest farming towns you say. The congregation point for farmers in a 15-20 mile radius.

People live here . . . people who are just as American as you and I, people who voted for the President just like you and I. People who want to know what is going on in the world . . . and most of all . . . people who want to watch television, at the flick of a switch, like their big city cousins.

But the residents of Redwood Falls, Olivia and many other Minnesota towns have not always been able to "flick the switch" and enjoy viewable off-the-air reception. It took John Klindworth of Minneapolis to show them how.

Klindworth is one of the most amazing young-energetic pioneers we have had the opportunity to meet during our editing travels for *Television Horizons*. His devotion to extending "big-city television" into the fringes

has been active for a number of years, but never so much as recently. It all began . . . really began . . . only three years ago when he formed a partnership with one Bill Saddler, an television broadcasting engineer, to become *K and M Electronics*. Saddler, it was decided, would handle production (closed circuit monitors, custom orders of school distribution equipment and more recently, an exceedingly nice CB transceiver) while Klindworth would devote his time and energies to engineering off-the-air rebroadcasting systems, utilizing UHF translators.

For a pure engineer (John K. came from a background of engineering for Dumont) there were many surprises in store. A bit naive at first, he honestly believed a team of engineers could demonstrate a product (UHF Translator television) and the public would buy . . . sort of automatic like. Shortly after, Klindworth decided his engineering experience wasn't going to handle the job alone . . . he was going to have to become a salesman as well. "Pure products," he found, "don't sell themselves in this day and age."

And so he began. First a town with poor off-the-air reception was anchored down for field testing. The town's governing body would have to be approached with a plan to

bring decent television to the region, a fund drive organized to build up the monies necessary to do the job, and the construction permits and legal papers filed with the FCC. Once the town fathers were sold on the idea the real job began. Klindworth himself does not participate in the 'local fund raising drive' except to advise. A local civic organization will normally take on the project as a civic duty, and raise the entire amount needed.

But here an interesting method emerges from the Klindworth bag of tricks. Let's take the Klindworth installation in Redwood Falls. Today an estimated 2,000 plus receivers are converted to UHF in the town. Before the UHF translators, none had UHF because there was no UHF! Before the town's council was approached on the subject of translators, a K and M crew surveyed the town. The total number of receivers (potential) was calculated and the general economic situation in the region noted. Next the K and M engineering department tackled the job of finding suitable off-the-air signals in the area. This is made easier for John's engineers because Klindworth is an experienced pilot and the company plane is well equipped with test and signal measurement equipment to plot the signal strength levels above the flat-upper mid-western plain. Unlike the many problems western translator engineers encounter, due to uneven or rough terrain, finding suitable input signal over the midwest is usually only a matter of height. . . you know, the old theory about a smooth sphere and free space loss.

In the case of Redwood Falls the suitable signal level proved to be 450 feet above ground, so Klindworth marked down the town for one 450 foot tower, to hold the TACO receiving yagis and ADLER transmitting antennas.

Armed with approximate cost estimates the town fathers were presented with the Klindworth case. K & M would provide the town's sets with good quality off-the-air UHF reception for X number of dollars. The town's people would take care of raising the money, Klindworth would take care of the engineering. When the money had been raised to pay for the installation, it went into escrow where it would remain until K & M had completed the system and the signals were radiating forth on the UHF translator channels. If the town was not satisfied, K & M would correct the system to satisfy the town. Then, and only then, would K & M receive payment for the

installation. Klindworth calls this "a proof of performance arrangement."

What about those residents who contributed to the fund-drive and then found they lived in a null of the transmitting pattern, or perhaps outside the range of the stations?

We wondered too, and asked John.

"Look at it this way" he replied. "If you live in a town, and have worked hard to conjure up public enthusiasm over the project, you feel very strongly about the system's performance. You have been told by K & M before the installation exactly what the system would do. In most cases, it does just this, and



450 FEET ABOVE GROUND hidden in a swirling April snowstorm, the Redwood Falls, Minnesota receiving-transmitting tower looks anything but a "typical translator installation." Half way up—the transmitting antennas, at the top—the TACO ruggedized receiving yagis. Notes Klindworth, "I have over 400 TACO yagis in service, I've never had a major breakdown."

perhaps more. But out on the fringe you have a complainer who has water in his twin lead or just plain can't get the tricky little UHF signals. What do you, as a town father, do? Why naturally you return the man's money and everyone is happy. However you probably will only do that a few times before you start checking up on 'just how good' this complainer can receive the translator signals. Some viewers aren't above squawking if they think they can get their contribution back,

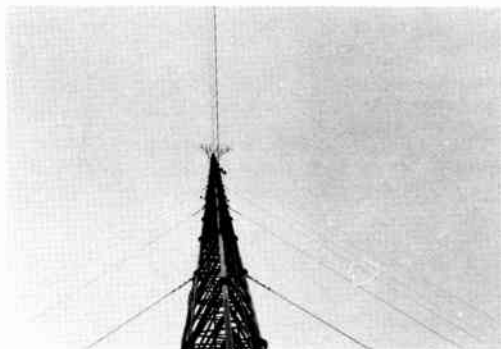


no matter if it is \$10.00 or \$50.00."

Thus in the end result, the problem of a dissatisfied viewer would seem to be best solved by returning the man's money if he has a legitimate complaint which cannot be traced to a defective receiving installation.

But if the man is just a plain old stinker, let a local committee investigate the signal he is receiving. Nobody, in a small town, can afford to become known as a spoil sport. People live in too closely knit groups for this kind of feeling.

The immensity of the K & M success over a short three year period is perhaps best illustrated by the 25,000 plus UHF conversions in the state of Minnesota. There are no UHF broadcasters in the state, and in fact no UHF off-the-air broadcasts can be received in the



**LONG WAY TO THE TOP**—Another translator giant, located at Olivia, Minnesota . . . 600 feet to the top! When your editor stopped off in Minneapolis to tour with Klindworth in April, we were dressed for California. When this picture was taken it was fifteen degrees, with near blizzard conditions!

state, save of course the chain of Klindworth installed translators.

Nor have K & M confined their activities to the state of Minnesota. A recent filing with the FCC will add a UHF translator to Fort Dodge, Iowa, already the home of KQTV-21, a UHF island in a VHF sea. The translator in Fort Dodge is a special project of Klindworth who believes that if the operation is successful he will be able to get FCC permission to move the UHF device down the UHF band nearer to KQTV's channel 21, and operate as a satellite of the origination station, KRNT-8 in Des Moines.

KQTV, strangely enough, is backing the VHF Translator (morally) as they would very much like to have the CBS programming of KRNT added to their NBC programs on UHF, believing that the availability of two

prime networks on UHF in the Fort Dodge area would greatly speed up the regions' UHF conversion rate. The end result will be more potential viewers for KQTV, and a more successful operation all the way around. So enthusiastic is KQTV over the project they are allowing the UHF translator to side mount its' antennas on the side of their tower!

Klindworth, as you might suspect, is not adverse to working with broadcasters. He feels that they have more at stake in the air-wave race than anyone else, and they should therefore have first crack at helping to support UHF translators wherever possible.

Not that he is entirely negative in thinking when it comes to VHF. VHF broadcasting is fine, he admits . . . *but there is just too much of it!* As a case to point, he notes the trouble he had "co-channeling" his TACO receiving yagis at the Dubuque, Iowa UHF Translator receiving site. "Three viewable stations on channel 2" he comments, "and on our tall 600 foot tower, we had a devil of a time getting the interference down to a point where we could use WMT in Cedar Rapids."

On the subject of servicing, Klindworth notes "we don't make it mandatory for a town to stay with us after the system is installed. Often there will be a local technician who believes he can do the job, and he sells the town fathers on the point. Often we go along with this, if the town is so out of the way that it is difficult to get too. In cases such as these we sign on to "advise" for a token fee each year, and take their technician in to Minneapolis for a round of shop training. In one case a town decided they could do it completely alone for a year, and they signed a servicing contract with a local type. The units stayed on the air . . . most of the time . . . but when the year was up they were more than happy to have our trained staff back with them. In some cases servicing contracts must take into account traveling time, and other unusual expenses. Generally speaking, it cost from ten to fifteen percent of the system cost per year to keep it perking."

## Next Month

So grandiose is the K & M Klindworth story that we feel the surface has barely been scratched in this, part one. Next month *Television Horizons* will take you on an auto tour of three Minnesota K & M translator installations where we asked residents questions, viewed the off-the-air VHF and UHF signals and counted the antennas.

# Multi-Channel Microwave for CATV Systems

**By Paul Hertel**  
**Assistant Director of Research**  
**and Development**  
**Collins Radio Co., Texas Division**

Microwave relay systems offer to the CATV operator a means of extending or expanding his service. By use of microwave, transmission of video signals may be relayed, with good quality, over distances which become impractical with cable transmission because of technical and economic limitations. Though most systems have been installed to "reach out" and obtain pictures that cannot be reached by cable, systems are also proving competitive to cable over short distances. When the drop area to be covered is spread out microwave relays may even be applied to reduce the cost of the distribution system and increase the quality of picture delivered to the customer.

Microwave equipment designed for portable or STL service does not always meet the requirements of the CATV system operator, as multichannel operation is usually required. For proper operation multichannel design must give careful attention to interference characteristics and spurious emission from both transmitters and receivers. Equipment reliability is also a more important consideration than it is with STL equipment as standby equipment cannot be economically justified. On the plus side however, propagation reliability is usually of less importance as the viewers on the CATV system are likely to be more tolerant to fades. For this reason CATV microwave paths are often times engineered for less fade margin and hence poorer propagation reliability than is common in STL systems. Often the VHF television path is the limiting factor in propagation reliability and engineering the microwave paths for much greater reliability cannot be

economically justified.

A microwave system can be designed that is especially suited to the requirements of CATV systems. The novelty of the system would lie primarily in the simplicity, efficiency and economy with which multichannel operation is provided. Transmitters and receivers should be designed as compact modules which contain all the microwave circuitry necessary for multiplexing the RF signals into a common antenna system. Units are stacked to provide the necessary number of

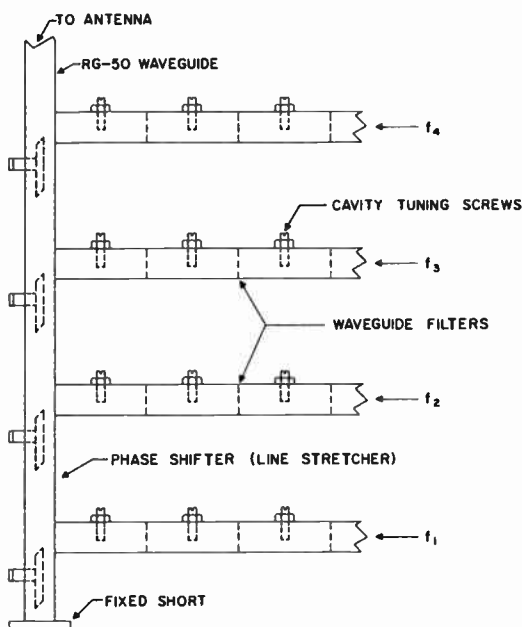


FIGURE 1

microwave circuits, and racks may be wired for expansion and channels may be added as required.

A simplified diagram of a microwave transmitter and receiver is shown in Figure 2. The klystron employed is a reflex type with probe

output. The output is coupled into a starting section which launches the RF energy into the guide. This energy is sampled by coupling loop to provide a relative indication of power and the indication aids transmitter adjustment. The RF energy then passes through a forty db. isolator. An isolator is a non-reciprocal device which will pass energy in one direction with minimum of loss while highly attenuating energy which enters from the other direction. The use of such a device frees the klystron from pulling or non-linear effects which can result from slight mismatch in the waveguide system. The energy at the output side of the isolator is sampled through a resonant cavity with a Q of about 3000. This cavity is tuned in production with a precision wavemeter and serves as a built in fre-

quency reference for routine check and adjustment. The transmitter energy is then coupled through a waveguide filter into the transmission line.

The basic waveguide coupling is shown in Figure 1. The waveguide feedline from the antenna continues through the RF units and is closed at the bottom end by a short. Each transmitter or receiver is connected to the waveguide feed line by a waveguide filter which will pass only the channel to which it is tuned. Other signals are not affected by this filter, and the shorted line from the filter forms a matching section so that maximum signal may be transferred into or out of the filter. Since one adjustment of the length to the short is not satisfactory for all frequencies the length is physically fixed but is electrically varied with phase shifters or line stretchers. An identical phase shifter is placed below each filter. Each phase shifter affects the match to the filters above it, hence adjustment must begin from the bottom and proceed in

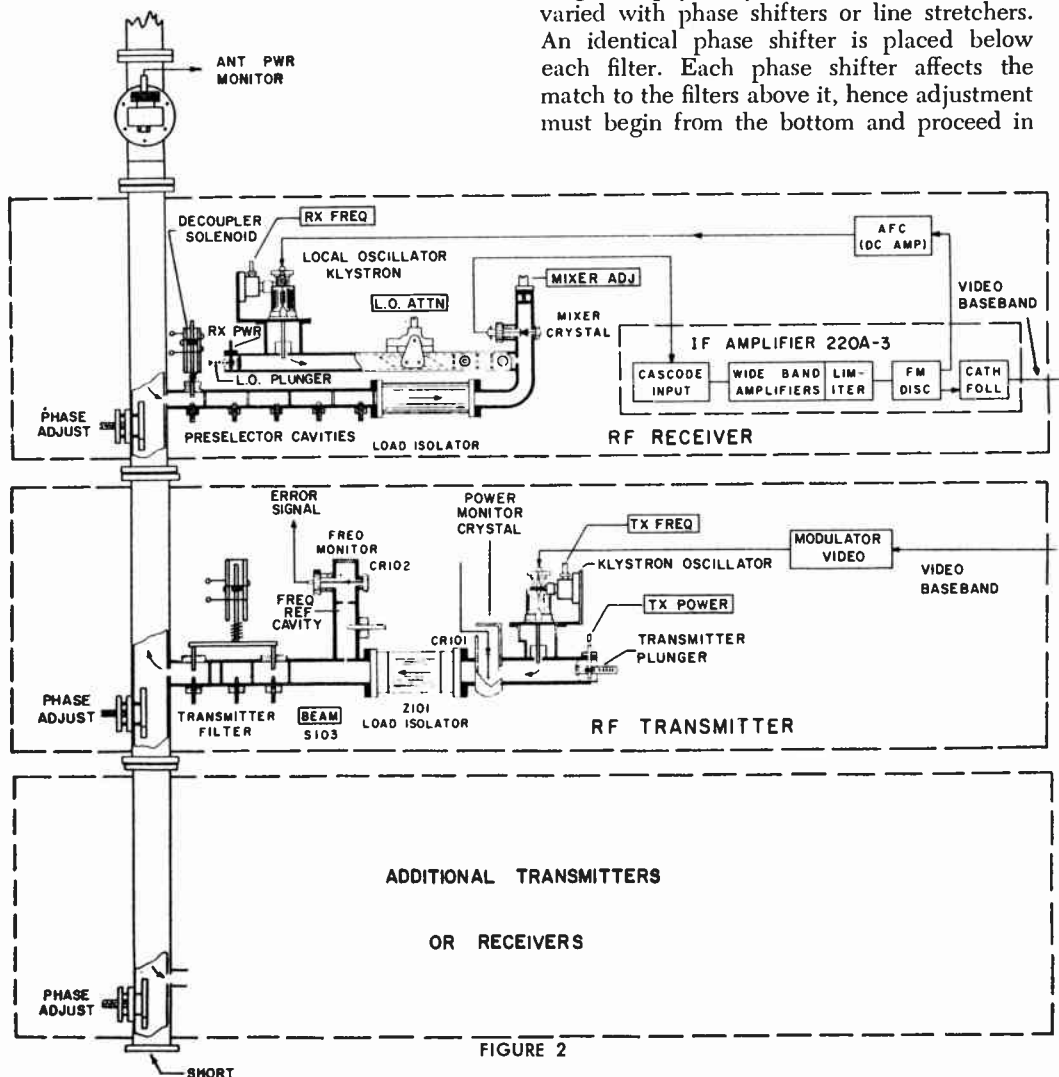


FIGURE 2

consecutive order to the top. Adjustments are made simple by varying the phase shifter for maximum output power or maximum received power. These relative indications are provided as part of the built in testing facilities and no external test equipment is required.

The receiver is similar to the transmitter in the design of the filter and decoupling scheme but a five or eight cell filter is used to provide image rejection and freedom from interference from local transmitters and other strong signals. The output of the receiver filter is coupled through an isolator into a crystal mixer, while the local oscillator energy is coupled through a two cell filter into the mixer. The receiver isolator performs the following important functions which contribute to receiver performance.

1. The filter is well matched under all conditions hence the filter response is independent of variations in crystal characteristics, local oscillator injection level and mixer plunger setting.
2. The local oscillator energy is reduced by the isolation of isolators as well as the attenuation of the filter 70 mc. from its operating frequency, hence spurious local oscillator energy is reduced to a level of -130 dbw. or less at the output waveguide.
3. The isolator presents an image frequency termination to the mixer which results in better envelope delay characteristics.

The local oscillator signal, which is spaced at IF frequency away from the receiving frequency, is coupled through a filter which effectively removes noise components which lie at the signal frequency. In this way low noise performance is obtained without the complications of a balanced mixer. The local oscillator injection is adjusted with a variable attenuator which also acts as a pad between the klystron and the injection filter. The local oscillator klystron is the same as employed in the transmitter but the mixer injection level is padded to about one half milliwatt. A rod decoupler is also used in the receiver but unlike the transmitter the decoupling is adjusted to a minimum which eliminates interaction between filters. Under normal signal conditions the leakage into the standby receiver is sufficient only to allow normal adjustment.

The mixer output is fed to an IF amplifier which has a three db. bandwidth of about fifteen mc. and either sixty or seventy mc. center frequency units may be used. Careful

attention to design and quality control has allowed this unit to be built with most stages fixed tuned. Only two bandpass adjustments are provided and they have limited range so that they may not be grossly misadjusted by an inexperienced technician. The FM discriminator is also a part of the IF assembly. The d-c component from the discriminator is coupled to the AFC which allows the receiver to stay tuned to the transmitted signal even if it should drift a moderate amount. The range of operation of the AFC is intentionally limited with adjustable "clamps" to prevent locking to signals on adjacent channels should the desired signal be interrupted.

The RF multiplexing scheme described above is quite efficient in coupling power to a transmission line. The only significant losses are in the filters and isolators, and since these components are required for other reasons this loss should not be charged to the multiplexing. By measure, the stubbing losses are but a few tenths of a db. maximum.

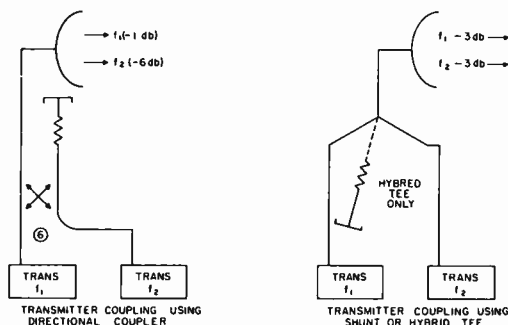


FIGURE 3

Two commonly used coupling schemes are shown in Figure 3. The directional coupler arrangement is simple and provides isolation between the two transmitters by the directivity of the coupler. This is commonly twenty to forty db. If the positions of  $f_1$  and  $f_2$  are reversed at the receiving end the net coupling loss, in each path, will be equal and total about 6.5 db. A waveguide tee may be employed in a similar arrangement. Here output is down three db. on each path and a total loss of six db. results if this arrangement is used on both receiver and transmitter. If isolation between transmitters is required a hybrid tee may be used.

A coupling arrangement using a circulator is shown in Figure 4. A circulator is a non-reciprocal device which passes energy with low loss in one direction only. Forward atten-



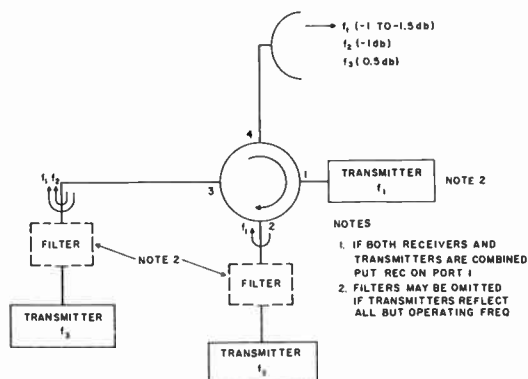


FIGURE 4

uation of 0.5 db. and reverse attenuation of twenty db. between adjacent parts is typical performance. If the transmitter does not reflect signals at frequencies other than its operating frequency then a filter must be used. This arrangement provides isolation in one direction only but otherwise has no advantage over the stacked filter scheme and has the added loss of the circulator. A similar arrangement may be employed for coupling of receiver and transmitter into a single antenna. With this arrangement the receiver should be connected to port Number 1 as shown.

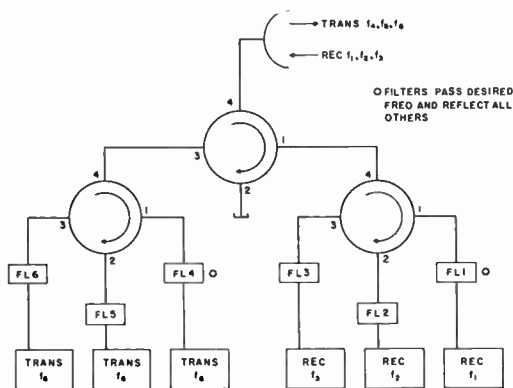


FIGURE 5

A more complex arrangement is shown in Figure 5. Three circulators are employed to couple three transmitter and three receivers to a common antenna. The isolation obtained between receivers and transmitters through the use of a circulator is helpful in reducing the filter requirements.

A much more extensive arrangement is shown in Figure 6. Here the use of filter combining and circulators are employed to provide a high density of RF channels on a single antenna. In spite of the large number of chan-

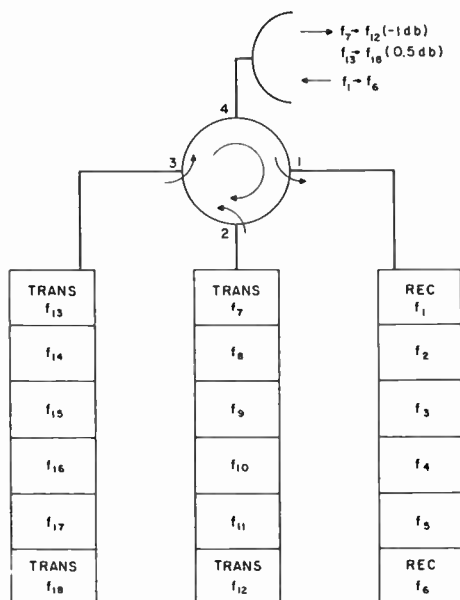


FIGURE 6

nels the signal loss to each channel is quite low. Obviously, such complicated arrangements require good filter design and careful attention to frequency allocation.

Occasionally it is desirable to split the microwave signal and feed it in more than one direction. The loss of signal that results from such signal splitting is usually not significant and larger antennas can be used if necessary to provide the desired performance.

A hybrid Tee should be used if it is desired to isolate the two antennas should this arrangement be used for receiving. This splitting process may be continued indefinitely but of course the power per path will decrease in proportion to the number of splits.

Microwave relay offers to the CATV operator a means of improving service and reducing operation cost. Multichannel microwave can open many new areas to CATV operators and equipment is available today which is simple, reliable and easy to maintain.

## Once Again — Daniels Strikes!

Daniels and Associates, pioneer CATV brokerage firm in Denver, announces negotiation of the sale of the Oil City, Pennsylvania CATV system, formerly owned by the NWL Corporation.

Purchaser of the Pennsylvania system was National Trans-Video, owned principally by Charles A. Sammons, Dallas, Texas.



# LAB HORIZONS

## Mast Mounted Preamplifiers

### WHY and HOW?

(CONCLUSION)

By Jack Beever  
Jerrold Electronics Corporation

Last month we ended with a promise to discuss the affects of standing waves on mast mounted amplifiers. So . . . take, for example, the output of a preamplifier feeding a long line which is unterminated, and therefore has reflected waves. These waves will return to the amplifier's output and appear there as either bucking or adding voltages — and this will depend on the wavelength. It is possible for the reflected wave of the visual signal of a television broadcast to return out of phase while the aural signal returns in phase — thus weakening the visual signal while strengthening the aural signal. Television receivers don't like this situation and you might have trouble with sync. buzz, and certainly will have trouble with picture quality. Standing waves, then, can be bothersome, and should be eliminated.

The only way to prevent standing waves is to "match" the line — terminate it in a resistive load equal to the characteristic impedance of the line, 300 ohms for ordinary twin lead, 75 ohms or coax, such as RG-59/U or RG-11/U. This "termination" absorbs all of the incident wave, dissipating it as heat in the resistor, and none bounces back to create standing waves.

Television receivers are usually designed to match a 300 ohm line; sometimes they do, sometimes they don't — especially after someone has diddled the tuner slugs. Match in these devices is not done with a resistor, but with a resonant circuit which looks like a pure resistance *at the frequency of resonance*.

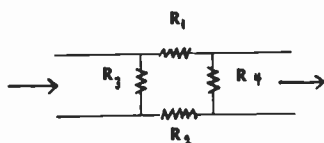
They only match at one channel, the one they are tuned to. A significant mismatch in a television receiver can be detected by running the line between the thumb and forefinger for about five or six feet starting at the receiver antenna terminals. If sudden changes occur in the picture quality, you've got a bad mismatch at the receiver.

A cure for this is simple *if you have sufficient signal that you can afford to burn some up*, which calls for either plenty microvolts from the antenna or plenty gain in the preamplifier. You just put a 300 ohm "pad" (attenuator), in the down lead very close to the receiver terminals. Such pads improve the match, and the more attenuation they have the better the match, but three or six db. of attenuation is usually enough. See Fig. 5 for pad design.

There's another point where standing waves can give trouble, and this is where a pad can not be used. This is the lead between the antenna and the preamplifier input — and this can be a nasty problem which is only really cured by proper preamplifier design in the first place. We must now consider the antenna as the generator and the preamplifier input as the termination. Since television antennas and preamplifiers for home use are broad-band devices, they must ideally match from channels 2 to 6 and 7 to 13. This isn't easy. As a matter of fact, the match figure which is considered pretty good for antennas is poor in any other equipment.

Assume we have a poor match in both antenna and preamplifier input: then the incident wave from the antenna travels over the short lead to the preamplifier, reflects in part from the preamplifier, bounces back to the antenna, reflects in part here, and so on. It may go back and forth twenty or more times before it is reduced to insignificance by losses. Your television receiver can see these bounces

### 300 OHM Attenuator Construction



db loss	$R_1, R_2$	$R_3, R_4$
3	51	1800
6	110	910
9	180	620
12	270	510

Figure 5

— they look like smears on the trailing edge of the image.

There are two ways we can help this situation, one, have the best possible match in the load (preamplifier input) and two, keep the lead as short as possible. The second item helps by keeping the phase difference between the reflected wave and incident wave at the antenna as small as possible, but it doesn't help if the preamplifier input is very poorly matched, since then the wave will keep bouncing back and forth long enough to cause trouble anyhow. This situation is often called "ringing", since it resembles the vibrations of a bell in the way it dies out.

There's another source of match problems we haven't touched upon, and it mostly happens with parallel pair lines. This is mismatch occurring when discontinuities — impedance changes — are caused somewhere along the line itself. Last month's article talked about losses caused by stand-offs, staples, etc. in 300 ohm line. Such devices or any foreign material in close proximity to the line cause losses in two ways—by simple absorption of the energy in the surrounding field and by changing the characteristic impedance of the line. The second effect produces mismatch and reflected waves, which are lost in part in the source generator's load, and by coming back as delayed reflections. Of course, the line must be supported, but common-sense applied liberally can keep these losses to a minimum. Bear in mind that conductors affect the line more than lossy insulators, and lossy insulators more than good insulators. The best possible environment for twin lead is a vacuum, with dry air a very close second. Coaxial cable doesn't much care what's around it, because it's fields are all internal—which is why it's used in CATV systems.

To put this information in the form of precautions, you need to remember that a matched load prevents reflections—no matter what

the impedance of the source (generator). You must then choose devices which either have a good input match or can be made to match. You must preserve this matched condition by carefully installing the transmission line or using a line which is not affected by installation.

To determine the match of a preamplifier input, for example, requires a complex test set-up, so you are best advised to look at the manufacturer's specifications. Match is measured in V.S.W.R.—the standing waves caused by reflected energy from the device are measured and the V.S.W.R. quoted. Obviously if no energy is reflected the match is perfect, and there will be no standing waves. A good spec., here is about 1.4—which means that the voltage peaks on the line will be about 1.4 times the voltage nulls. A worse spec. than this can be tolerated if the line is very short—a few inches from antenna to preamplifier input for example, and it may be deliberately done by the manufacturer, because getting good match and good noise figure are mutually exclusive in design. The best noise figure won't come at the best match figure, no matter how much engineering sweat is used up. Which brings us to noise figures.

"Noise figure" is a figure of merit which tells how much noise a preamplifier makes compared to the noise an ideal preamplifier would make. Let's look at the ideal preamplifier.

Since any circuit components have their own electrons banging around from the heat activity in them, they all contribute to the noise power developed in the complete circuit. Then the lesser the number or size of the components, the lesser the noise. The least possible number of components you can have is a 300 ohm resistor, in the case of a 300 ohm input circuit, or a 75 ohm resistor in the case of a 75 ohm input circuit. Then the noise created in this resistor at a normal ambient temperature will be the best possible we can do.

However, we can't build preamplifiers this way, we need tuned circuits and tubes or transistors—but, we can use the resistor's noise as a basis for comparison. We can't use the actual microvolts of noise because these vary according to temperature, but we can compare the ratios at a given temperature, and the ratio will always be correct.

Suppose for instance we know that at normal temperatures a 75 ohm resistor produces 1.1 microvolts of noise (as it does) and that a preamplifier input circuit under test produces 2.2 microvolts at the same impedance, 75 ohms. Then the ratio of 2.2 to 1.1 is 2, and 2 expressed in decibels is 6 db. Then the noise figure of the preamplifier is 6 db. This figure is independent of input impedance, since if the input impedance had been 300 ohms, the noise of the resistor would have been 2.2 microvolts and that of the input circuit would have been 4.4 again a ratio of 6 db. This is because of the fact that an antenna produces *power*—not microvolts alone, and a 300 ohm antenna produces twice the microvolts and half the microamperes of a 75 ohm antenna—which is exactly the same power. The preamplifier input also works on the power it receives, and it doesn't much care what ratio of voltage to current makes the power as long as it matches the design requirement of the preamplifier input—in other words, it must have the same impedance, whether 50, 75, 200, or 300 ohms.

Now, this noise is the greatest single source of snow on the television screen of a TV set-preamplifier combination, and it therefore behooves us to keep it as low as possible. This we do by simply picking the preamplifier with the best noise figure—*plus some other capabilities. It must have enough gain to prevent the set from adding its own noise to the picture.* This fact was pointed out briefly in the June article, but here we'll go into more detail.

Briefly, the total snow seen on a television set is the product of the *system* noise figure, not the preamplifier's noise figure alone. We hate to do this in a general interest article but we'll have to go to a little mathematics to make clear what we're talking about. Here's the system noise figure formula:

$$F_s = F_1 + \frac{F_2 - 1}{GL}$$

where:  $F_s$  = System Noise Figure  
 $F_1$  = Preamplifier Noise Figure  
 $F_2$  = Receiver Noise Figure

$G$  = Preamplifier Gain

$L$  = Down-lead Loss

We're not going to work this out—it's not necessary, and it's difficult since all the expressions are power ratios, but we'd like to point out something that is important to the installer, and which is implied in the formula. Note that the system noise figure is the sum of the preamp. noise figure plus the receiver noise figure less one, divided by the residual gain ( $GL$ ). This means that if the preamplifier just overcomes the down lead loss, then the residual gain is unity—1,—and the system noise figure becomes  $F_1 + F_2 - 1$ , which is almost the sum of both!

But, if the residual gain is high, perhaps four times, then the system noise figure becomes the preamplifier noise figure plus *one-fourth* of the receiver noise figure less one. Then you can see that it is important that the preamplifier have more gain than the down-lead has loss.

Since it's very difficult to measure the down lead loss in an actual installation, and the receivers' noise figure depends on the tuner's tubes and the condition of the tuner, we need a rule of thumb based on usual expectations. Here it is:

If we do not want to add tuner noise to the picture, then the receiver should get at least 1,000 microvolts (at 300 ohms) of signal. We can't specify the gain required because we don't know the down lead loss of the installation but if the set isn't getting that 1,000 microvolts, then the pictures aren't the best possible under the circumstances, and a high gain preamplifier is needed. Don't think you can boost it at the bottom—the gain has to be at the top.

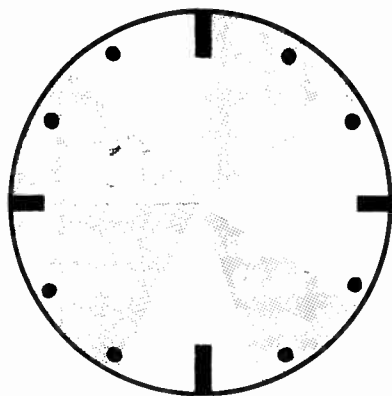
This boils down to signal-to-noise ratios, which is the ratio between the noise voltages in the picture and the signal voltages. A near-perfect picture has a 40 db. S/N ratio—meaning that the signal is 100 times greater than the noise. With a receiver having a 6 db. noise figure, 4.4 microvolts of noise will appear from the tuner itself. The ratio between 4.4 and the 1000 microvolts we recommended is about 228 to 1, about 47 db. With this ratio, the TV set's noise is invisible, and all we see is the preamplifier's noise, which is the best we can do.

*\*For further reference, see "Electronic Designer's Handbook," McGraw-Hill Pub. Co.*

(Continued on page 28)



# PART-TIME TELEVISION



## "Is It In The Public's Interest?"

(PART TWO)

In over 95 per cent of the homes in America, full-time off-the-air television is available with the purchase of a receiver and the erection of an outside antenna.

It is for the businessmen and civic leaders who provide the other five per cent that this publication, **TELEVISION HORIZONS**, exists.

The theme of this report is a simple one . . . "Who actually owns the airwaves, and to what extent can the broadcaster control the dissemination of his signals once they leave his transmitter?" The Communications Act of 1934 states very clearly that "the broadcasting spectrum is owned by the public." And stations utilizing a portion of this spectrum must do so with the consent of the public, in the form of the government agency (FCC) set up to handle and control the airwaves.

On the other hand, the regulations of the FCC also state that anyone rebroadcasting a signal radiated from a privately owned station—operating in the public's radio spectrum—must have the permission of the origination station.

With these facts in mind, decide for yourself if Los Angeles television stations **KRCA** and **KNXT** have a legal right to grant "partial rebroadcast privileges" to UHF translator stations **K70AL** and **K73AD**, refusing rebroadcast permission of any and all "locally originated" programs.

### In the Early Days

The requests were first filed in 1956 and 1957. UHF translator advocates in Palm Springs desired to erect three or more UHF rebroadcasting stations to bring Los Angeles television into the desert town. There was no form of off-the-air reception available to the residents of the town . . . not even marginal signals.

Pursuant to the Commission's Rule (section 4.784) which makes it mandatory that a translator constituent obtain the written permission of the origination station planned for

rebroadcast before filing an application with the FCC, the Palm Springs Translator Association wrote to each of the Los Angeles (seven in all) television stations.

### KNXT

On March 2, 1957 a letter was mailed to Edward P. Shurick, National Director of Station Relations for CBS television in New York City. Shurick answered the Palm Springs request on March 13, 1957 with a letter and triplicate copies of a "Transmitter Affiliation Agreement."

In his letter to the attorney for the Palm Springs Translator Association, Shurick wrote . . . "As you will note, the Transmitter Affiliation Agreement relates solely to network programs; complex legal problems preclude our making local programs available to you at this time . . ."

The affiliation agreement was apparently handled through the New York office of CBS television because **KNXT** is an *owned and operated station* of the network. Previous to contacting Edward Shurick, the Palm Springs group had been led around in circles in Los Angeles proper by **KNXT** which *neglected* to once mention that they couldn't handle such permission requests without New York permission and action.

The first reaction to the "partial permission" was one of indignation, but the translator group later decided to sit tight and apply for its translator license (so as to be able to put the station on the air) before further exploring what seemed to be a hopeless cause.

### KRCA

The **KRCA** story is similar in context to the **KNXT** story. The rebroadcast permission for the network programs carried over the net-



TRANSLATOR BACKER BENNETTS' station wagon parked on top of the translator site hill, overlooking the desert valley below. The installation has withstood the rigors of sudden desert storms, including the blowing sand visible in the background as haze.

work (NBC) owned and operated station had to come from the New York office. The permission was granted, on March 1, 1957. At the same time the network granted the permission for K73AL to carry the network programs of NBC, KRCA-Los Angeles transmitted a similar letter of permission for the group, noting that "If the quality of the signal of station KRCA as picked up and rebroadcast by you in your area is satisfactory by NBC standards and the applied FCC standards, this letter will constitute our consent to you to pick up and rebroadcast over your Translator Station by the means of the above such network programs as are broadcast by Station KRCA."

Then the axe fell with "The permission hereby granted is for the rebroadcast of NBC Television Network programs *only* (italics ours-Ed) and may be revoked by us at any time upon notice to you of our intention to do so."

NBC did not close the door completely to rebroadcasting studio films and live programs originating at KRCA. In fact the letter of March 1, 1957 concluded with "NBC may hereinafter grant you written permission to pick up and rebroadcast over your Translator Station K7OAL programs locally originated by Station KRCA, other than NBC Network Television programs, provided you have obtained all clearances necessary for you to transmit over your Translator Station such local programs. Such clearances shall be in writing and shall be furnished by you to NBC in a form satisfactory to Counsel for NBC..."

## Clearances

The "clearances" NBC referred to involved two areas of conflict, neither of which has

ever materialized. One is with Unions who provide talent and floor help (technicians, engineers, etc.) to the Los Angeles stations. The second is with the "film-packagers," those firms which sell or lease films to the Los Angeles stations for showing "only within the Los Angeles area" at a specified rate (or rates) based for the most part on the total number of potential TV homes within the coverage area of the station involved.

Both KRCA and KNXT maintained that (A) If they were to grant rebroadcast permission to Palm Springs' translators, the unions might decide the origination station PLUS the translator equalled a "network." Fearing the worst, KRCA and KNXT conjectured the unions *might* try to take the stations to court to force them to pay "back salary differentials" to all of the Union people who appeared on the stations, *and through the translators*. The stations said "If the unions won such a court contest, we would owe them a gigantic sum of money based upon the difference in talent and technical fees paid to persons working on programs broadcast only over the local station, and fees paid to persons working on a networking broadcast."

In other words, two distinct levels of pay scale exist today, with the *network scale* obviously being the higher. If the tying in of the translator to the origination station constitutes a "network" then the station *might* be liable for the higher pay-scale during the entire broadcast day, IF the translator carried both network AND local programs.

So the two stations (KRCA and KNXT) worked around their "fear" by merely refusing to grant permission on local programs.

(B) Both stations also expressed some concern over the agreements they had entered into with film distributors. Said the stations "Our film rental (use) rates are based upon a certain specified number of sets within our coverage area, and it is entirely possible the extra 3,000-5,000 sets in Palm Springs would like this rate considerably."

This argument was never considered very substantial however in light of the fact "every other translator" in the nation poses the very same problem, to other broadcasting stations, and to date no-one has ever been concerned enough to test-case the matter in court.

## Admittedly — Unique

Los Angeles network owned and operated stations, admittedly, do pose a unique prob-

lem to themselves. Not only do the stations originate for local presentation, they also regularly feed their respective network chains. In other words, *there might be a union problem*, as long as the case goes un-contested.

The crux of the matter is the network's fear that "a broadcasting station AND a translator form a network."

## Proposal

The entire matter MIGHT be solved, soon, if the FCC would be so bold as to take the matter into consideration. Some of the points which might be considered are:

- (A) What comprises a network (i.e., definition needed here).
- (B) Does a broadcasting station and a translator (or translators) fit this definition?
- (C) If "yes," what can be done to remedy the "error" so as to free the translators from the stigma of being classified as a part of a network?"

## The KABC Problem

Both KNXT (CBS) and KRCA (NBC) granted permission to the Palm Springs' translators, although under "duress" and with "conditions."

The American Broadcasting Company proved less cooperative. Letters to ABC in Los Angeles and New York drew no response. Finally, on December 26, 1957, after nearly nine months of writing letters, paying personal visits to KABC-Los Angeles and placing telephone calls to both Los Angeles and New York, Selig Seligman, General Manager for KABC-TV replied to Merrill Brown, legal Counsellor for the Palm Springs group. Seligman wrote "... we regret to inform you ... (our policy is such that) ... we must deny your request for permission to use the KABC-TV signal for translation purposes in Palm Springs."

## However

Despite the troubles the Palm Springs non-profit translator group had in dealing with the Los Angeles stations, it would appear that U.S. Government military bases located in Southern California were experiencing fewer problems. For example, Camp Irwin, Barstow, California advises (through the office of Captain L. F. Pearson) letters granting *full rebroadcast permission* to their VHF Boosters were issued between February and April 1955. These letters were duly signed by each of the Network owned and operated stations, as well as Los Angeles independent stations KTLA-5, KHJ-9 and KTTV-11.

## The Independents

There are four independent stations in Los Angeles. Three of these resisted all efforts to grant any form of rebroadcast permission (KTTV, KHJ, KTLA). One, KCOP-13 at the time owned in part by *Bing Crosby* enterprises, did grant full rebroadcast permission ... for a short time.

KCOP-TV granted full "permission to rebroadcast programs originating at KCOP through means of (your) translator serving the Palm Springs area ..." in a letter dated February 19, 1958. Acting with this letter in hand the Palm Springs Translator Association filed on May 5, 1961 an application for a third UHF translator to serve the region.

On May 23, 1958 KCOP-TV contacted the translator group by letter advising "We wish to notify you that we have not consented to the rebroadcasts to which your letter of May 12 refers."

The station thereafter denied ever granting any permission for rebroadcasts, UNTIL the Palm Springs Translator Association produced the letter which granted that permission.

THEN the station wrote "... On February 19, 1958 we granted you the right to rebroadcast the programs of KCOP. A long span of time elapsed and you did not exercise your right ... and ... as a consequence we recently made other arrangements for extending our program service in the Palm Springs area."

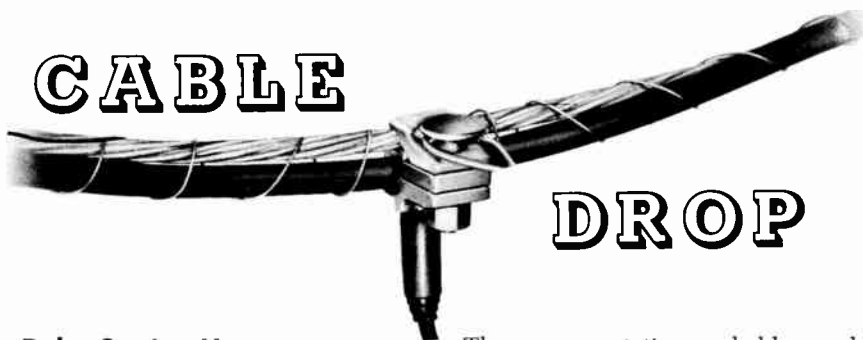
The long period of time referred to extended from February 19, 1958 to May 12, 1958, or 82 days. The "other arrangements" KCOP referred to in its letter quoted above (dated June 9, 1958) was quite possibly the addition of the station's signal to the Palm Springs Cable Company "station line-up" which took place about that time.

The Palm Springs Translator Association was forced to withdraw its application at the FCC for an additional UHF translator to carry the KCOP signal, and all hopes for anything more than partial television originating through the carriers of KNXT and KRCA faded for the fourth time.

Public support of the translators dropped to an all time low in the summer of 1958, and a citizen's committee began talking up a "study" of the entire Palm Springs television situation.

**NEXT MONTH—The results of the citizens committee and an outline of a possible "way-out" for Palm Springs. RBC**

# CABLE



# DROP

## Court Rules Station Has No Property Right in Signal

CATVers returning home from the NCTA convention in San Francisco found a welcome present awaiting their arrival. A decision had been announced by a San Francisco based judge, which seemingly put to rest (for the time being) the bug-a-boo of TV broadcasting stations claiming any type of property rights over the signals which they transmit from their stations.

"In a highly important and to the CATV industry most significant decision, U.S. District Judge W. T. Sweigert, (sitting for U.S. District Court For the District of Idaho, Southern Division) held that television broadcasters 'have no property right quasi or otherwise' in their broadcasts, which is being infringed by CATV operation. The decision, in the case of *Intermountain Broadcasting & Television Corporation et al. vs. Idaho Microwave, Inc., and Cablevision, Inc.*, did not deal with the statutory copyright question which was not in issue. However, the issue decided, that of whether or not a broadcaster has any type of property right in the signal as distinguished from possible statutory or common law copyrights in individual programs and whether CATV reception of such signals constitutes 'unfair competition' with the broadcaster, was one which the National Association of Broadcasters and many individual broadcasters have long sought to have tried and determined. To the CATV operator the decision means that broadcast stations may not prohibit CATV reception or require payment for such reception on the basis of claimed ownership of the signal. Since the broadcast stations do not have statutory copyrights in programs produced by network and other producers of television programs and cannot secure such rights it means that there probably is little that a station can do by way of court action to prevent CATV reception.

The average station probably would not be justified in securing statutory copyright of its own locally originated shows and it seems doubtful that actions based on common law copyright to prevent reception of locally originated programs would be justified. The really important remaining question is whether CATV reception infringes statutory copyrights held by the producers and others, which is at issue in the United Artists case."

In the closing statement from the court, Judge W. T. Sweigert stated . . .

"Turning to another aspect of the pending question, the Court notes that plaintiffs concede that individual owners of receiving sets in the Twin Falls area, or groups of such owners, could, without infringing on any rights of plaintiffs, construct their own antenna of sufficient height, location and design to pick up the plaintiffs' broadcasts and bring them to their home receiving sets. The fact that owners, unable or unwilling to undertake the difficulties and expense of such construction, prefer to use the similar antenna service provided by defendants does not change the essential situation."

*"Defendants' antenna service facility is simply a more expensive and elaborate application of the antenna principle needed for all television reception. It does not otherwise differ from what the owners could do for themselves."*

"Nor does the fact that the owners are willing to pay for such a service facility change the essential situation. The test for purposes of determining unfair competition is not whether defendants are paid for their service or whether, as appear in this case, they expect to realize a profit. The true test is whether any such profit is one which under the circumstances rightfully belongs to plaintiffs so as to make it a misappropriation by defendants."

*"Let us assume for the purpose of discus-*



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sion, that the owners of home TV sets in Twin Falls, chose to form a non-profit co-operative to construct facilities identical with those planned by defendants. Certainly, the owners could do collectively, through a non-profit cooperative, what each one of them could admittedly do for himself. The Court does not believe that the mere profit-purpose of the owners would transform the operation into unfair competition with plaintiffs."

"The Court left the case open for the filing of an amended complaint founded on common law or statutory copyright if the plaintiffs 'desired to do so. That this will be done seems unlikely. The Court also indicated that a case might be prepared based on a theory that the plaintiff has 'exclusive licenses' to the programs for the area involved. The ruling came on the plaintiffs' Motion for Summary Judgment but the decision is a ruling on the merits of plaintiffs legal position. The Court did not dismiss the complaint so there appears to be nothing at this time which the defendants can appeal."

## **CATV Microwave Applications**

### *—Unrestrained bedlam*

So fast is CATV microwave catching on that one FCC department head was heard to remark during July "soon we will need a separate office just to handle these applications."

While this may not be strictly true, it is true that CATV operators are filing for microwave applications in increasing numbers these days, and microwave manufacturers are hard pressed to keep up with orders.

Here is a run down of the most recent filings, most of which are still locked up in FCC files pending processing.

*Midwest Video Corporation* — to serve Paris, Texas and Hugo, Oklahoma CATV systems with signals from Dallas-Fort Worth, Texas.

*Kincheloe Air Force Base, Michigan*—to serve, via a power split, this government base with signals from Flint and Bay City, Michigan stations.

*Bannock TV, Pocatello, Idaho* — seeks to provide video and audio of Salt Lake City stations to three new subscribers through the use of power splits on existing microwave hook-up. Splits would feed studios of KTLE-TV (Pocatello), KIFI-TV (Idaho Falls). *Rawlins, Wyoming*—10795, 10835 and 11075 mc. will be utilized to feed CATV system in this town. Mountain States Telephone and Telegraph will provide the service.

*Bisbee, Arizona* — System will provide 6Kmc. service of four channel video from Tucson, Arizona to CATV system in Bisbee.

*Ithaca, N.Y.—Wellsboro, Pa.—Corning, N.Y.*—Signal of WPIX-TV will be fed to CATV systems in each of these towns through a four hop system. A joint project of each of the CATV systems.

*Dubuque, Iowa* — A three hop one channel system to provide reception of WGN-TV (Chicago) to Dubuque TV-FM Cable Company, Dubuque.

## **Western NCATA Convention Scheduled**

The National Community Antenna Television Association of Canada's Western Director asks TVH to remind all Canadian readers of the Western NCATA convention scheduled for August 24-25 and 26 in Vancouver, B.C.

August 24th will be basically a registration date and a session for trade displays. August 25th will concern itself with NCATA business, the subjects of Pay TV, system appraisal, microwave and the Canadian Electrical Code. The final date, August 26th, will be devoted to the presentation of new technical innovations on the part of manufacturers on hand.

## **H & B American Grows Some More**

The country's largest owner-operator of community antenna television systems has done it again . . .

H & B President David E. Bright, Los Angeles, announced the purchase of the Trinidad Community Television, Inc., Trinidad, Colorado, the oldest known system in the Rocky Mountain state.

With the purchase of the Trinidad system, H & B tops the \$9 million dollar mark in CATV properties, with some 70,000 subscribers in all.

# JERROLD-

## A Laboratory Helps to Pace a Company's Growth

Jerrold Electronics Corporation has always maintained that a key factor in the growth of the company has been the capabilities of its research and development laboratory.

Last January, in ceremonies which dedicated the latest laboratory expansion, Milton J. Shapp, the company's President, addressed the engineering staff as the "core" of Jerrold. He stated, "This facilities expansion at Jerrold's Laboratory reflects a policy of planned growth, with increasing requirements for improved and new concepts relating to equipment and systems for distribution of television and radio frequency signals."

In the past six months, implementation of that concept has been amply displayed. A phenomenal step-up in the products made ready for Jerrold's production line has topped any similar period in Jerrold's history.

The new equipment, according to Shapp, applies to a wide range of communication needs. One group of products provides new capabilities for community antenna systems. Others are directed to distribution systems for education, the military, industry, and for improving TV reception in the consumer market. Included, also, are several test instruments of broad capabilities which are scheduled to be exhibited at the Wescon Show at San Francisco during August.

Jerrold's Laboratory, presently expanded to cover approximately 20,000 square feet, (doubling its former area) has been situated at its present location in Huntingdon Valley, Pennsylvania, for approximately five years. Before that, one room was allocated to research and development personnel in the building in South Philadelphia which then housed Jerrold's plant.

At that time engineers and technicians grappled with any and all problems that arose. Subsequently, specialization developed with expansion. In the new location, 30 miles north of the new Jerrold Building, in Philadelphia, engineers and technicians focused on products for the particular markets of the growing company.



Development work on the 900B Sweep Generator, test equipment will be shown at Wescon Show. Its unique capabilities feature high stability for sweep widths as narrow as 10 kc., as well as wide sweep width capabilities as broad as 400 mc.

The present laboratory set-up parallels the four sales divisions, with which close liaison is kept. Thus, individual laboratories specialize in (1) community sales equipment, (2) industrial test equipment (used widely in industry and the military), (3) communications systems equipment for a variety of markets, and (4) equipment aiding TV/FM reception in the consumer field. An important area of development in the past period has been equipment for school master antenna systems, in connection with the Midwest Program for Airborne Television Instruction.

The majority of Jerrold's engineers have been with the company a good percentage of its existence. According to Kenneth A. Simons, Chief Engineer, when the expansion was being planned, most of the men were extremely vocal in describing what they thought the expansion should do for the Lab. These ideas were incorporated into the plans. Affected

(Continued on page 28)



Jerrold engineers completing the Audiotrol (Model AT) which provides for inclusion in distribution systems of FM and AM radio, background music and special announcements by use of unused TV channels.

# TV DX - 1961

## "Season in Review"

### **Thrill of a Lifetime . . . Hi Band SKIP!**

For TV DX enthusiast Bill Hauser, Enid, Oklahoma July 10 started out like a dozen other days had this past summer. Low band E skip (the reception of stations 500-1500 miles distant) popped in just before 1100 EST with stations in Florida, Virginia, Georgia and North Carolina showing. The "opening lasted until 1500 (3 PM) when WTAR-3 Norfolk, Virginia (1185 miles) dropped back into the snow, having stayed on the screen in Enid for more than an hour. At 1729 (5:29 PM EST) WUNC-4 Chapel Hill, North Carolina was back in once again and the skip suddenly improved to a point where WTVR-6 Richmond, Virginia, and WECT-6 Wilmington, North Carolina were fighting it out on channel 6 with near perfect signals." Towards the 1830 (6:30 PM EST) station break Hauser flipped on to channel 7 . . . not quite sure why . . . and sat back amazed to see a strong local newscast in process. Now on channel 7, *you don't get skip reception*. At least-fewer than 6 DX enthusiasts in more than ten years of organized DXing have ever seen hi-band (channels 7-13) reception which even appeared to be "skip." But Hauser was sure he had some, for the "local newscast" he was watching was all about North Carolina. . . the same state he was receiving strong signals on channels 2-6 from. "The video was strong," reports Hauser, "but the audio had some interference from an ABC station." Writes Hauser "several minutes after I switched to channel 7 the newscast changed to strictly local North Carolina news. The *Channel Seven Reporter*, a Benny Waters, finished up at 1839 and by 1840 the signal had faded and was gone."

So rare is long-range reception of the E skip type on channels 7-13 that fewer than ten reports have ever been authenticated. At the same time, E skip reports for reception in the 500-1500 mile range on the low band are so commonplace during the summer that this



SAN JUAN, PUERTO RICO as seen in Truro, Nova Scotia, Canada by TV DX enthusiast Ronald Boyd July 1, 1961. Distance—1,850 miles.

desk has nearly 2700 individual reports on hand for this past summer alone!

A tip of the DXing hat to TV long range enthusiast Bill Hauser for his 1155 mile reception on channel 7 of WITN-Washington, North Carolina. *Where were you at 1830 EST July 10?*

### **A Wild, Wild Summer of DX**

Seldom have TV DXers experienced such a summertime of long range reception. DX reception was more frequent, more potent and more reliable this past ninety days than it has been in any year since the fabled '55. DXers in the midwest (Gould-Indiana, Olsen, Illinois, Eckberg-Illinois, others) reported 25-40 days of consecutive skip reception . . . records unequalled in the entire annals of long range reception!

One of the best guide-lines to "how good the season was" is found in the channels five and six and FM DX reports. When we have just experienced a so-so season TV DX reports concentrate on channels two and three. When the season is above average the greatest number of identifications seem to be made on channels three and four (whereas channel two becomes so clogged with DX stations that identification of the distant station is often impossible.) This year the concentration of



DX identifications fell on channels four and five, the first such occurrence in the entire history of TV DX.

Correspondingly, FM DX never had it so good. By theory, when the TV DX reception gets above par on channels four to six, FM DX begins to break through the noise barrier, with "skip" showing across the 88-108 megacycle region. TV and FM DXer Dave Beal adopted a "band open from XXXX to XXXX" policy with his FM DX reports after the first few TV and FM combination openings. Notes Beal, who reports from Tucson, Arizona, "Nearly everytime TV opened up, so did FM, and I ran around in vain trying to keep all of the bases covered."

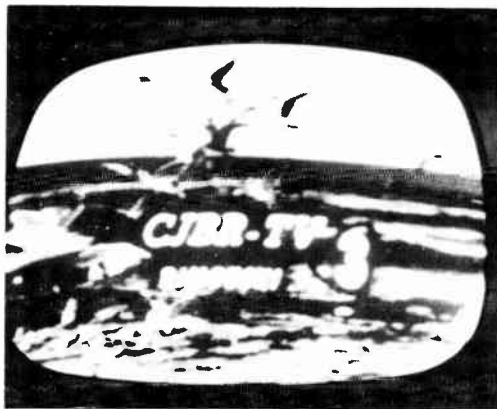
The first FM skip DX of the season for Beal popped on May 23rd when he found the band open from 1300-1305, 1455-1505 and 1550 to 1615 MST. Some of the FM skip got quite short, as evidenced by reception from San Francisco Oakland Bay area stations, as well as stations from the Great Plains states.

May 30th was a real winner in Arizona when Beal reports "FM open form 1230-1800 MST, nearly six hours of FM skip!" Stations from Missouri, Illinois, Kentucky, Tennessee, Arkansas, Oklahoma and Kansas were logged as high as 107.3 megacycles.

As far as TV DX was concerned May 30th, old pro Beal reported "1830-2045 MST, same old routine stations from Texas, Louisiana and Mississippi." And we never thought we would see the day when a DXer called any DX ROUTINE!

June 10 was another big FM DX day for Beal with midwestern stations heard from 1810 MST on. June 11 was a repeat with skip to 107.3 megacycles once again around 1300 MST.

One of the happiest FM DXers around hangs his hat in Bethesda, Maryland, a suburb of both Washington, D.C. and Baltimore, Maryland, "where the dial is filled to capacity with strong local stations." Under these conditions, a less enthusiastic DXer would never give a second thought to DX potentials on FM. But not Hank Holbrook!! Holbrook thought "the band sounded like skip" on May 27th, so he tried an old broadcast band DXing trick, disconnecting the outside mounted TACO FM yagi and "going it alone-barefoot" on the inside dipole. Net result? 100.5 mc.—K100 Oklahoma City, Oklahoma in like a local from 1105-1207 EST; 97.5 mc.—KOCW Tulsa, Oklahoma heard well from 1155-1207



RIMOUSKI, QUEBEC, CANADA logged in Walnut, Illinois by TV DX enthusiast Bill Eckberg June 17, 1961. Distance —1,145 miles.

EST; 99.9 mc.—KAFM Salina, Kansas copied well from 1307-1330 EST.

Another FM long range enthusiast found skip hot on May 27th, which to date would seem to have been the top FM-skip day for the year, at least in the east.

Robert Dufault of Duluth, Minnesota will remember the 27th "for quite awhile." Heard were WGKA-FM (92.9 Atlanta), WFLA-FM (93.3 Tampa), WBIR-FM (93.3 Knoxville), WNDB-FM (94.5 Daytona Beach), WHOO-FM (96.5 Orlando), WTIC-FM (96.5 Hartford, Conn.), WCSC-FM (96.9 Charleston, S.C.), WTOG-FM (97.3 Savannah), WSB-FM (98.5 Atlanta) WKIS-FM (100.1 Orlando), WPLO-FM (103.3 Atlanta) and WNOK-FM (104.7 Columbia, S.C.).

A station heard on 101.9 identified as WSEV, Seveville, Tennessee, a call and location Dufault could not trace down in existing logs.

## Double Hop

Sporadic E skip is a 500-1500 mile range form of DX affecting channels two to six. On occasion however DXers report skip-like reception which extends out from 1500 to 2500 miles, and would seem to be the familiar Es.

This is for the most part true. There are occasions when the TV signal takes a "double bounce" (or double hop) and covers two skip paths, in a concentric arc. This type of reception is rare in that it requires two E skip clouds to "line-up" almost perfectly. Double hop signals are by nature weaker than signal hop signals (some of the strength is lost in the "second skip") and occur for the most part on channels two and three. Unfortunately, these weaker double hop signals are almost always

buried beneath a wall of interference coming from other stations on the same channel within single hop range (500-1500 miles). *But sometimes not.*

For example Ronald A. Boyd, Truro, Nova Scotia has a clear "double-hop" path to Puerto Rico and Cuba, approximately 1850 miles from his location. Both paths are over water the entire distance, and thus there are no single hop stations at the mid point to cause server interference. On July 1 and 2 of this past summer Boyd caught WKAQ-2 San Juan, Puerto Rico for periods up to ninety minutes long. WAPA-4 San Juan was also seen at 1829 EST on July 1.

On May 24th David Beal of Tucson caught WUSN-2 Charleston, South Carolina over a 2000 mile double hop path, from 1455-1505 MST. June 5th was a repeat with more WUSN reception from 1942-1949 MST.

## UHF Horizons

One of the highlights of the past season for the UHF clan was the appearance of KS2XGA and KS2XGD, educational airborne stations participating in the IMPATI Educa-

tional program, over Montpelier, Indiana. DXers from Detroit (Rod Luoma) to southern Illinois (Gary Olsen, Barrington) reported the channel 72 and 76 stations over distances to 250 miles. Surprisingly enough, no reports of real DX reception of the stations have yet been received by this desk. The stations are operating on greatly abbreviated schedules at present, although they are planning to increase the telecasting day in the fall.

## An Old DXer — With a Twist

Over the years of evolution here at Horizons one of the mainstay DX reporters has been Bill Eckberg, of Walnut, Illinois. Eckberg's DX feats, on a station-for station basis, are perhaps second to none. Eckberg's 225 Stations logged represents an increase of ten stations over the past six months, all on sporadic E skip.

On May 28th Eckberg caught E skip dropping in as close as North Platte, Nebraska, a mere 586 miles, on channel two. This was all the more amazing to Eckberg, as Nebraska stations on both the high and low band are frequent visitors to his set on tropospheric bending (extended ground wave).

Noted Eckberg, in his report for June 10th, "The last eighteen days have been the best for skip I've ever seen. Almost everytime I turned the receiver on there has been Es. I know I've probably missed half the skip there has been, but one does have to work, eat and sleep occasionally!"

And that comes from an eight year pro in the DXing game!

## A Helping Hand

DXer Daryl Reedy, Peoria, Illinois notes "I lost my antenna in March during a wind-storm. So I wrote to Jim Gould, the Eastern Lab Editor, for advice on replacing my system. Jim suggested the Channel Master Super TW-10 for my budget and uses."

Reedy goes on to report DX skip on May 27, 30 and on into June. Reporting on Memorial Day, Reedy wrote "Who wants to go out on the highway and get killed on a day like this . . . WOW—what skip!"

His skip for the holiday included stations throughout Texas and Mexico as high as channel 6.

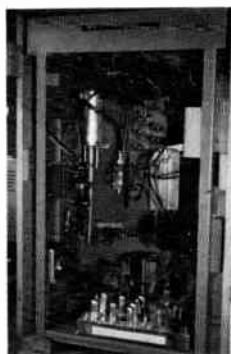
## Conclusion

The '61 season of E skip DX will carry fond memories for the entire DXing clan for many years to come. If you missed out during

(Continued on page 28)

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**VHF-TR-10/1  
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# TRANSLATOR

Prepared monthly by  
**James Beamer**  
P. O. Box 833  
Livingston, Montana

# TOPICS

## Clarification on 100 Mw. Translators

In our June (1961) column we reported on some apparent progress being made by the people at MARS (*Mid America Relay Systems*, Rapid City, South Dakota) with a one-tenth watt all-transistorized VHF translator. Among other things, we noted there was a possibility the unit might scrape by the "incidental radiation clause of part 15 of the FCC rules" thereby by passing the need for licensing. A recent letter from acting FCC Secretary Ben F. Waple advises...

"Any VHF translator intended for unlicensed use would first have to be certified as a low power communication device under subpart E of Part 15 of the Commission's rules. Subpart E does not provide for certification of units operating in the 54-70 mc. band. Unlicensed operation on frequencies above 70 mc. is authorized only under section 15.206, which, among other things, provides that the device must be equipped with a means for automatically limiting operation to one second out of thirty. A device complying with this rule could not render a useful television service."

FCC Secretary Waple further states, "We further understand that the MARS unit does not meet the automatic cut-off requirement of Section 4.750(c)(5) or the station identification requirement of Section 4.750(c)(7) of the Commission's rules. It would therefore appear that the unit could not be type accepted for licensed use, as it now exists."

Waple further seals the lid on the controversial unit with, "Unless the MARS unit is modified or the Commission's rules are amended, the MARS unit would appear to be unsuited for either licensed or unlicensed VHF television operation. We are not presently considering amendment of our rules in this respect."

So there you have it. If we want to see one-tenth watt unlicensed VHF translators, we will have to petition the Commission in sufficient force to instigate a rule-making amendment. We did it once before... and there is no reason why it couldn't be done again!

## Broadcaster Translators — Proposed Rules Released

Last month we devoted considerable space to the controversial subject of broadcast licensees applying for VHF translator licenses. This month we have a copy of the official rule-making in hand, which was actually issued on June 29th, one day before the July issue was mailed. We came very—very close in calling the shots in this case, and for the record, here is how the proposed rule making (comments invited prior to September 5th) stacks up:

(1) The Commission noted that since the VHF translator service was established in 1960, there has been a growing tendency for broadcasters to regard the service as a means of extending their signals beyond their normal viewing regions.

(2) The Commission believes that unless some restrictions are placed upon the service, VHF translators will become merely one more weapon in the competition between TV licensees, rather than an instrument to be utilized by people living in areas receiving little, if any, TV service.

(3) "Accordingly, the Commission proposes to amend subpart G of part 4 of its rules to provide, in substance, that a VHF translator will not be granted to a TV station, or a TV station financially interested in a VHF translator application, *unless the translator would fill in an unserved area within the TV station's Grade B contour*, and neither duplicate any part of the network service of another TV station serving the proposed translator area with a Grade B signal or better, nor serve any community which has a TV channel allocation on which a TV station grant has been made or a construction permit issued."

(4) Under the above proposal a station would not be precluded from getting a VHF translator grant to extend its service to a place receiving its only TV service via VHF translators (i.e., regardless of whether there be network duplication between translators or not). However, it is proposed that VHF grants to TV stations, or station-interested grantees,

may be cancelled upon sixty days notice, without hearing, if local circumstances change which cause such grants to be contrary to the rules.

(5) No changes are planned in the existing rules which allow station operation of UHF translators.

## New Mexico Mess

The plight of off-the-air television in the vicinity of Bloomfield and Farmington, New Mexico gets more involved by the day. During the past thirty days, the FCC has

(1) Issued a decision looking towards the denial of applications from Bloomfield Non-Profit Television Association for temporary authority to operate three VHF TV repeater stations on channels 2, 6 and 10 to serve Bloomfield, New Mexico by rebroadcasting programs from stations KOAT, KOB and KGGM, all Albuquerque. The Commission noted that Bloomfield Non-Profit TV could re-apply for new permits if it so desired. This action grew out of a complaint lodged against the Association by a wired TV system in the area which charged one of the three units

came on the air after the July 7, 1960 cut-off date.

(2) Consolidated for hearing the applications of San Juan Non-Profit TV Association for new UHF TV translators on channels 73, 77 and 83 to serve the Farmington-Bloomfield Highway Area and the Huerfano-Bloomfield Highway Areas from transmitter locations on Huerfano Peak, New Mexico. The Commission made Teleprompter Transmission of New Mexico, Inc., licensee of fixed point-to-point microwave station KKY-43 which serves its CATV systems in Farmington a party to the proceeding, which will be held in Farmington.

## CP's Continue to Roll

July was a banner month for FCC action on existing repeater applications for construction permits to become full fledged VHF translators. June 29th was the top day to date with some sixty plus stations granted CP's.

Meanwhile early CP holders continued to file for their licenses. The Alexander application in Monticello, Kentucky filed for its license, apparently the first VHF translator east of the Mississippi to finish construction and get FCC approval in the form of a license. The equipment is EMCEE.

Meanwhile the translator salesmen continue to be busy. Two Dot TV Association of Big Elk Valley and Two Dot, Montana filed for an amendment to change its transmitter type to Benco, while Stuart Community Club, Stuart, Nebraska asked to change to a MARS RX-17B.

Another application has turned up in Kentucky. David Smith, doing business as "Community TV Service" has filed for a channel 7 unit in Williamsburg, to repeat WLOS-13, Asheville, N.C.

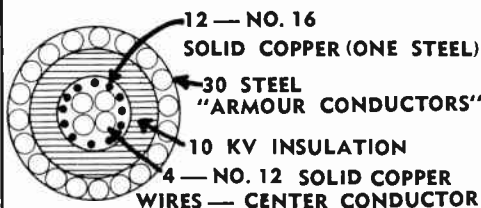
## Experimental VHF Translator

The FCC has granted the application of Dr. Byron W. St. Clair of EMCEE, Mount Vernon, New York for a new experimental TV translator station to operate on channel 12 at "various locations in the state of New York" for the purpose of making coverage tests under actual field conditions to determine the extent and quality of coverage which can be achieved by translators. EMCEE's home base is in Mount Vernon, New York.

## TV PIX Becomes ElSCO

TV PIX, field representatives for the EMCEE line of VHF translators, CECO low-noise preamps and TACO receiving and transmitting yagis, Salt Lake City, has become ELSCO, or Electronic Sales Corporation. JB

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- Second Conductor — eleven separate strands — solid copper number 16 (one solid steel).
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- Low noise, high gain pre-amp with 50 db. gain.
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## JERROLD—

(Continued from page 21)

were placement of supplies, lighting, and even the color of the walls (pale green). The end result is a spacious, convenient, well-equipped facility, sound-proofed, with accommodations for individual concentration on problems and study facilities, as well as for staff conferences.

The Laboratory is a self-sufficient unit and includes its own machine shop, which is responsible for precisely machined parts, gears, etc. It also includes a model shop, where prototypes of products are prepared for production.

Both Herbert Barnett, Administrative Manager of the Lab, and Kenneth Simons have stated that the Jerrold engineering group uses, by necessity, an empirical approach to its work, since electronic factors and mechanical factors interrelate. Equipment cannot be completed without engineer and technician working right at the bench, each with a particular contingent of test equipment.

Jerrold's history, since the company's founding thirteen years ago, has been one of growth, diversification and expansion. Basically this has reflected the growth of the community antenna system industry, in which Jerrold was one of the pioneers. In the past, a large portion of its engineering time and effort has been devoted to developing community antenna system equipment. Currently, the design, manufacture and installation of this equipment remains an important aspect of Jerrold's operation, which has expanded into manufacture of equipment and installation of communications systems for a variety of additional markets.

Jerrold's Laboratory has not merely kept pace; It has helped to pace this growth.

## TV DX IN '61

(Continued from page 24)

the summer, keep a sharp eye peeled for the remaining fall and winter sessions which promise to show frequently and with good strength.

In the meantime don't overlook the fall time tropics season, which will be covered in detail-forecast style—in September. RBC

## LAB HORIZONS

(Continued from page 14)

To sum it up let's codify the rules for mast or antenna mounted preamplifier use.

1. Use a high gain antenna suitable for your area.
2. Choose a preamplifier with gain which will overcome the down lead loss *at least three or four times*.
3. Use a preamplifier with a good noise figure—between 4.0 and 5.5 db., low band and no higher than 7.0 db. in the high band.
4. Mount the preamplifier as close as possible to the antenna terminals.
5. Carefully install the down lead to avoid causing discontinuities and excessive loss.
6. Check your installation for standing waves.
7. Make sure that the preamplifier has the proper power delivered to it, since gain will go down and S/N ratios up with falling power.
8. Instruct the preamplifier user *not to turn it off*. Tube and component life is actually extended when run continually instead of in an on-off cycling.

And that's about it. Yours for better "de-snowing"!

Jack Beaver

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SHELTER  
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**300 AND 75  $\Omega$  OUTPUT**

**EXCLUSIVE!**  
**AC RECEPTACLE FOR TV**

**Clears up snow, improves contrast, adds miles to reception distance!**

Here's the most unusual (and most useful) home TV-FM signal amplifier you've ever seen! Winegard "Booster-Pack" utilizes new low noise, high gain transistor\* to give you a flat gain of 16 db on the low band and FM ... a flat gain of 14 db on the high band.

Shock-proof ... full AC chassis with AC isolation transformer (not AC-DC). Draws only 1.2 watts ... cost only 27c per year to operate if left on continuously. No heat radiation. Can be mounted on back of TV set, on baseboard, in basement, attic, etc. Use "Booster-Pack" as a single set booster or as a home system amplifier for up to 6 or 7 sets. (See right)

\*Special transistor so new that this amplifier could not have been produced until now.

**No other amplifier under \$80.00 has all these features!**



- Drives from 1 to 7 TV/FM sets
- Ideal for color
- Power Consumption: 1.2 watts

- Gain: Low and FM: 16 db.  
High: 14 db
- Input: 300 ohm
- Output: 300 ohm and 75 ohm
- Transistor\*: Low noise, high gain type
- Power Transformer: AC isolation type
- Gain Control: 3-position switch
- AC Outlet: To receive TV set power plug
- Precision Wiring ... finest quality throughout

**1 USE IT AS A "SINGLE SET" AMPLIFIER**

WITH ANY OUTDOOR ANTENNA

WITH "RABBIT EARS"

**2 USE IT AS A "HOME SYSTEM" AMPLIFIER**

WINEGARD "SIX-SET" COUPLER

300 OHM SYSTEM

8 DB to each set

DRIVES UP TO 6 SETS

75 OHM SYSTEM

8 DB to each set

DRIVES UP TO 6 OR 7 SETS

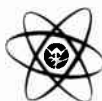
## New! Winegard "Six-Set" SIX SET TV COUPLER

For connecting up to 6 TV sets to "Booster-Pack" or to Winegard Powertron antenna. 300 ohm input and outputs. Low insertion loss, positive isolation between sets.



Mod. LT-63  
\$7.95 List

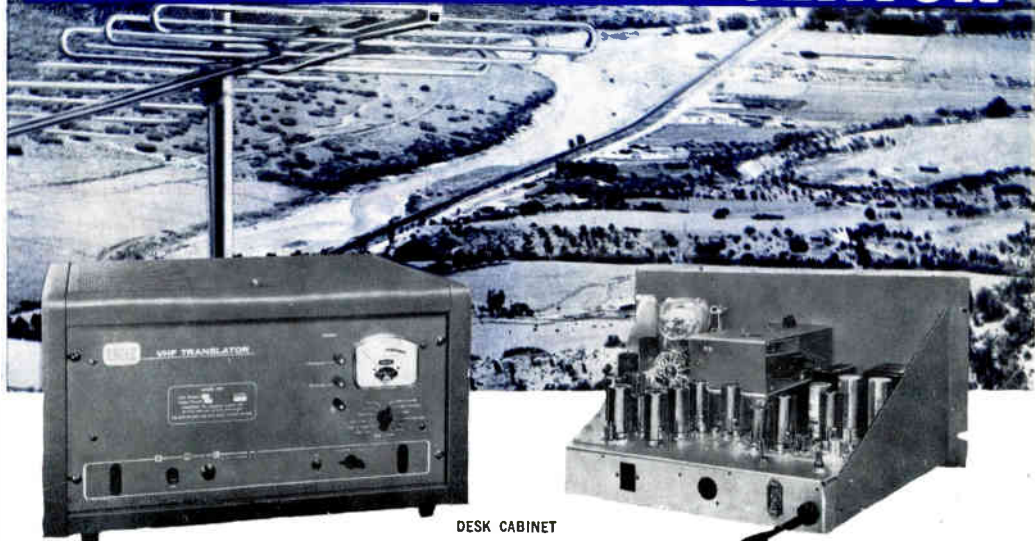
ASK YOUR DISTRIBUTOR OR WRITE TO:



**Winegard**  
ANTENNA SYSTEMS

WINEGARD CO., 3011-8 Kirkwood Ave., Burlington, Iowa

# The EMCEE VHF TRANSLATOR



DESK CABINET

## TECHNICAL DATA (MODEL HRV)

**Input:** Down to 50 Microvolts on 75 ohm line. A.C.C.: 30 db input variation produces less than 1 db output variation for signals from 50 microvolts to 50,000 microvolts.

**Output:** 1 watt with no measurable sync compression; 50 to 75 ohms. Mountings available: 8 $\frac{3}{4}$  rack or cabinet; self-contained outdoor housing available.

- **MODEL HRV** Complete FCC-Type Accepted VHF Translator.
- **MODEL UHRV** Same as Model HRV with UHF Input Included.
- **LEGALIZER** For existing installations... provides 1 watt output... automatic on-off and identification... supplementary AGC... makes compliance with FCC rules easy. Factory measured electrical characteristics minimize field measurements.

**EMCEE** suggests you compare...

**LOOK AT THE SPECIFICATIONS!**  
**LOOK AT THE PERFORMANCE!**  
**LOOK AT THE CONSTRUCTION!**  
**LOOK AT THE PICTURE!**

*over 100 field representatives are ready to show you the difference:*

- **LOW FIRST COST** results from an efficient design and high volume production
- **INEXPENSIVE TUBE COMPLEMENT** saves you money.
- **UNIQUE BUILT-IN FEATURES** simplify installation — preventative maintenance — make it easy to have peak performance year around.

◆◆◆◆◆ Expecting higher power authorization from the FCC? Here's a guarantee of equipment availability — from the team that engineered the highest power VHF translator (150 watts for export) the model TOA-10 amplifier for a full 10 watts... only \$275.00 ◆◆◆◆◆

Warranty service stations in all principal areas. There's always someone nearby to back-up the best factory warranty, and to supply factory supervised service under contract or on an "as needed" basis.

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 reprint of  
 FCC rules  
 covering  
 translators

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- My community needs better television. Please rush free planning package including data sheet, complete installation check list, coverage calculation form.
- UHF input
- **LEGALIZER** for existing installations
- Please send free reprint of FCC rules covering translators.

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