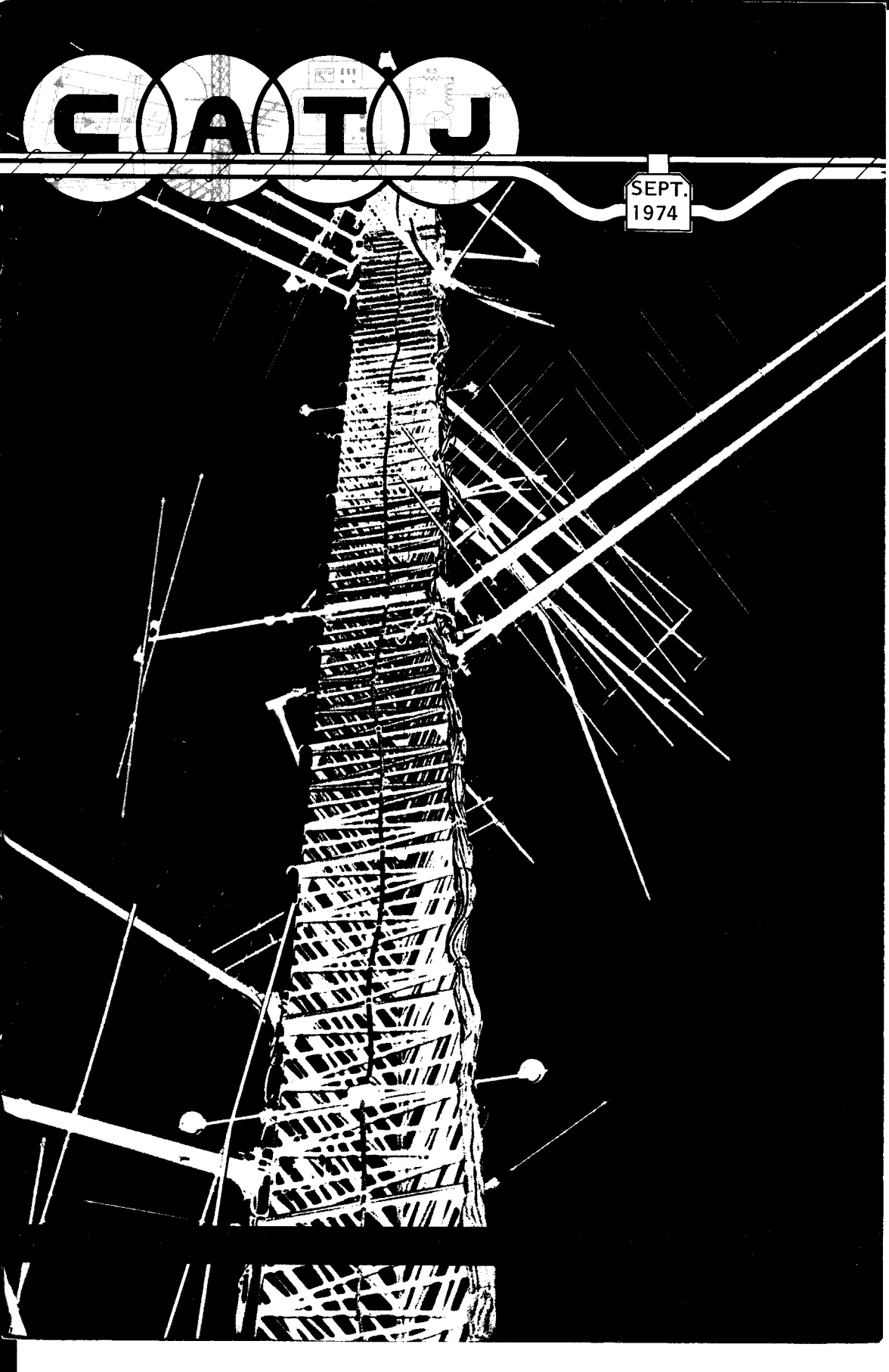
# CATJ

SEPT.
1974



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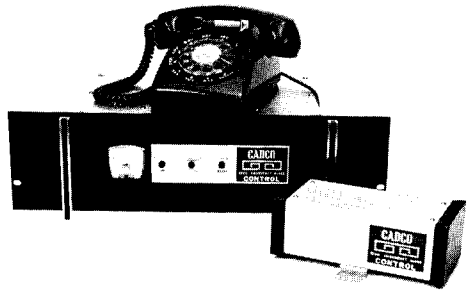


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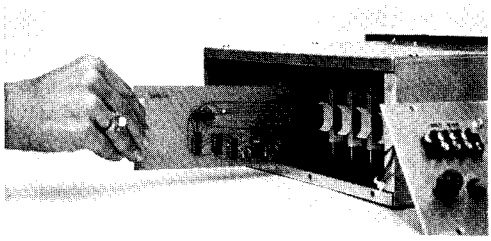

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SEPT. 1974

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**OFFICES**

4209 N.W. 23rd St., Suite 106
Oklahoma City, Ok. 73107
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**OUR COVER**

This 445 foot, 42 inch face tower, constructed by Alert Cablevision for its new Pryor, Oklahoma system handles 12 off-the-air channels, three of which are 120 miles plus!

# CATA –TORIAL

KYLE D. MOORE, President of CATA,INC.

Recently, California attorney Harold Farrow took the giant California electric utility PG & E (Pacific Gas and Electric) to task for failing to make "meaningful progress" in settling a pole rate dispute. PG & E, **perhaps taking their clue** from General Telephone and Pacific Bell, had announced to pole attachees late in 1973 that **1974 rates** would be $5.00 per pole per year. Farrow and his California law firm responded with a large ($1,000,000.) law suit, and there were implications of a pending class action on behalf of **all** California CATV operators.

This stopped PG & E in their tracks. PG & E operates in 48 of California's 56 counties. They got into the CATV attachment biz in 1953, on a very small scale. Because 90% of California poles are joint-owned, fewer than 10% of the poles were PG & E without **joint** pole rights. So on the average, the California CATV operator had to talk to PG & E about attaching to **every tenth pole** in his plant; the rest of the time he went to see General or Bell Telephone PG & E never bothered with messy details like "franchises"; at least one California county (Mariposa) has never bothered to get into franchising and the systems operating there (three we know of) run essentially on PG & E poles without having any legal county (or town) instruments.

Early California PG & E attachments were informal; the operator paid $2.50 per pole per year, and the rate structure still sets forth an **extra** charge of $1.00 per pole where an amplifier is mounted, and $1.50 per anchor attachment contacted. PG & E is also in the gas and water business in some areas. A large percentage of the total PG & E plant is in rural areas, where early CATV systems sprung up like California gold nuggets.

Apparently no one is still around from the 1953 era. Most, if not all, CATV operators of that period have passed on, or retired, and PG & E officials have a difficult time tracing the history of attachments in their own shop.

The new breed of CATV operator is having some difficulties with the current crop of PG & E regulators. Most PG & E poles where they own them solely, are 40 footers. With the increasing costs associated with buying and setting these poles, PG & E calculates the **annual CATV attachment fee should be** something around **$14.00.** They base this on the 25 year life of a pole averaged to 12.5 years, and they calculate the use-advantage of the pole for CATV should be 40% of the total installation cost. Let's see.

If 40% of "X" is $14.00 per year, times 12.5 years, then "X" must be $437.50 per pole set. How long would you stay in business if you allowed yourself to build a cable plant on your own poles, at a per-pole-installed cost of $437.50?

Now PG & E **doesn't** ask $14.00 per pole per year, although they maintain that if the question was going to be resolved by preparing a "rate making case" for presentation to a government regulatory agency, "they could substantiate that rate". What they **have asked** of California operators is **$5.00 per pole per year.**

The arithmetic of calculating the true value of a pole attachment is at best difficult to compute. For example, a very high percentage of all PG & E poles are in very rural, very rugged areas. Setting a pole in the outback country has got to cost a few bucks more than in a suburban easement. PG & E would like the CATV industry to overlook this and to believe that at $5.00 per pole per year we are getting a bargain.

They calculate we would use 40% of the space, or 16 feet of a 40 foot pole. However, to be **exceedingly fair,** let's confine our space requirements to **40% of the useable space.** A 40 foot pole should protrude 34 feet out of the ground. Subtract from 34 feet the usual mandatory (worst case) 18 foot clearances and we have 16 useable feet left. Now give us our 1 foot working space and **credit us** with the 4 foot separation. That is 5 feet out of 16 left, or 31.25% of the total pole space. To pay for 40% of the pole, we need to use not less than 6.4 feet of it. All of which is a little far fetched. Good luck Harold Farrow; although we know you have the matter well in hand!

# CABLE CAPTIONS

**What products or innovations are needed in CATV?** Most of us have a pet suggestion or two we could or would make to a manufacturer, if offered the opportunity. Perhaps your suggestion would apply to a specific unit you use (i.e. "The XYZ line extender housing is such a tight fit it is impossible to get at the power director plug.") or, it deals with some problem nobody has yet solved with a commercial unit or device (i.e. "How about a noise limiter that would clip lightning spikes before they trigger the head end processor AGC?"). Tell CATJ about your suggestion. We will print (and credit you) the best of each month's suggestions, and award you either a free CATJ Wall Chart or an extension of your CATJ subscription for one year for your thoughtful suggestion. Address your suggestions to: Heather Pennington, CATJ, 4209 NW 23rd, Suite 106, Oklahoma City, Oklahoma 73107, Attention: **"Our Industry Needs Department"**.

**Most CATV types are not aware of it,** but the FCC cranks out a tremendous amount of paperwork every month. During the month of August CATJ kept the copies which we managed to run down during that 31 day period. At the end of the month we measured the height of the stack (11.7 inches) and the weight of the pile (over 6 pounds). Someone at CATJ has to **read** through **every bit** of that material just to glean the few items we deem newsworthy for use here in **Cable Captions** or in our **Cable Bureau Communique.** That's a lot of reading for idle hours!

**One of the more pleasant announcements** by the Commission recently was dated July 26. **Abraham A. Leib("Abe")**has now been appointed to head up the **Certificates of Compliance Division** of the Commission and **Robert J. Ungar** is now Chief of the **Research Division.** Leib made the FCC meetings circuit in the summer of 73 at Boise, Spokane,and Portland. By our measure he has shown rare dedication to the industry, going out of his way to assist applicants for CAC's to unravel their misfilings. Abe joined the CATV Talk Force back in 1968 which makes him a real veteran in the industry.

**The full Commission is just not going to be pushed** or shoved into making any long term commitments to satellite television. The PBS (Public Broadcasting Service) people wanted to procure an "earth receiving terminal" for hauling around the United States to conduct tests and demonstrations of possible future linking of PBS stations via a bird in the sky. PBS pushed for approval because an equipment supplier had offered the mobile system at a substantial savings, but only if PBS moved quickly. The Commission approved the earth terminal proposition, but only after warning PBS that in doing so it was **not** passing on the qualifications of PBS to have (and to use) an earth receiving terminal **nor** on the merits of future PBS interconnections via satellite(s).

**Ever wonder why MSO's seem less concerned** with nonduplication protection than individual system operators? One operator in New York State suggests a reason. Non-dup grief begins and ends with the operator **on hand at the system.** He is the one who has to answer the phone calls, take the snide remarks at the coffee shop, and run to the head-end in the middle of the night when the switcher false switches. When you own **and** operate, you are the **same guy** who gets all of this "attention". When you own **from** New York or Atlanta and operate in Podunk you, as an owner, are shielded from the day to day aggrevations of non-dup, Are MSO's really not concerned about non-dup? Probably not, at top management level. If you want an earful, **talk to an MSO system manager** in a system that has to non-dup protect. **These guys sound just like the owner/operators** talking!

**West Virginia Plan:** what is it? The portion of the CATV industry that believes there should be no copyright payments for classical **community antenna** systems may one day erect a plaque to **Charlie O. Erickson** of **Durfee's TV Cable Company** of **Parkersburg, West Virginia.** Erickson proposed and implemented a well thought out grass roots advertising/awareness campaign during August in West Virginia **and** Arkansas. Here is how the plan works. A series of advertisements are run in regionally circulated newspapers. The first ad in

CONTINUED TO PAGE 45

# MECHANICS OF VHF/UHF WAVE PROPAGATION

*THE START*

One of the lesser understood mechanisms in CATV circles is the mechanism by which VHF and UHF signals travel that uncertain route from transmitter to receiver. Unfortunately, for anyone that possesses a receiver, the signal path is seldom *straight and true* and when the path is not direct from transmitter to receiver, we describe the actual path as a *propagation anomaly.*

If there were no anomalies in wave propagation, there would probably be a much lower level need for CATV services. If all transmitted waves flew straight and true, without deviation or path irregularities, a very small computer could spit out a VHF and UHF TV channel allocation schedule which would assure each and every major and minor center of population in the United States (and Canada) its representative number of local broadcast services.

Propagation anomalies are a fascinating subject. The VHF/UHF world is resplendent with "hard to believe *if* true", and "harder to believe *because* they are (certainly!) true", examples of places where distant VHF/UHF signals *wandered* for short (and sometimes not so short) periods of time, far from their originating transmitter.

There is, in fact, a fairly large family of research scientists who are devoting their very lives to the study of propagation anomalies. In our own sphere, a number of crack research people associated with the Environmental Science Services Administration (*ESSA*), operated by our National Bureau of Standards, do nothing but study propagation anomalies. Regular world-wide conferences on the whole subject, as well as small, little understood phases of the topic, are routinely discussed, studied, and monitored, and discussed some more.

Everyone knows that VHF and UHF signals travel routinely from the transmitting antenna towards the visual horizon (i.e. line-of-sight). Everyone also knows that when a VHF or UHF wave front encounters some obstacle (such as a hill, tree, building, or the horizon itself) that the signal's flight through the relatively uncluttered lower atmosphere is interrupted. Beyond that point of interruption, if the signal continues to be propagated, it is at a lower (or lesser) signal level. It is, from that point on in its travels, subject to signal strength variations which deviate substantially (or a little bit) from the forecasted levels.

The first use of the VHF and UHF region was during World War II. The modest use of these frequency ranges prior to WWII provided only a small insight to its true value, but the assumption was made prior to WWII that VHF signals were going to be essentially *line-of-sight only.* This assumption was only briefly shaken, just prior to WWII, by an amateur radio operator named Ross Hull, who living in Connecticut, spent thousands of hours monitoring VHF transmissions over paths that exceeded by 100-200% "line-of-sight". He found, much to the skeptical analysis of scientists of that period, that routine every day weather fronts and patterns were certainly capable of extending useful VHF ranges by as much as several hundred miles.

During WWII, use of VHF was primarily associated with the new in-flight communications developed for the air force, and the amazing new device called RADAR. In the hurry-up rush of fighting a war, U.S. and other pilots found just enough frequency to propagation anomalies to cause the super-secret people at the Pentagon to set up a propagation study task force. One of the factors that bothered the people at the Pentagon was the *previous* assumption that if they wanted *secure* communications between two fairly close (i.e. near proximity) points, that by utilizing VHF frequencies, they would avoid any chance that the *enemy might overhear* the communications at some distant point.

It was during WWII that military users of VHF (then 30-150 MHz) communications uncovered the fact that signals in this range covered distances far greater than line-of-sight on a fairly routine basis, and that in some parts of the world paths of up to several thousand miles were not uncommon as much as 10% of the time. The discovery had mixed reactions. . .mostly unpleasant to the security conscious military commanders.

Immediately following WWII our own Federal Communications Commission set about reestablishing a VHF allocations scheme. Going into the "war" initial provisions for television broadcasting had established a group of 18 VHF channels, starting with a channel 1 down around 50 MHz, and then proceeding upwards through channel 6 (as now), jumping then to present day channel 7, and proceeding upward through what are now our CATV-secure super band channels. The plan was scrapped (killing channels 1, and the *original* 14-18 in the process) when the tremendous potential of the VHF range became apparent during the war. The FCC recognized that the 12 VHF channels remaining would hardly be adequate for the grand "everyone will have television" scheme then set forth. But not all of the lessons of the wartime discoveries sank far enough into the Commission's conscious. Because, the allocations scheme, revised in the immediate post-war period, was hardly into operation when propagation anomalies jumped right up and bit the Commission in the hind end. This resulted in a freeze on additional station construction permits, which lasted into the year 1952. In the intervening years, propagation scientists went back to the field to find out why their paper-models did not fly. Why, for example, was channel 4 in New York City raising so much havoc with off-the-air reception around Boston and Washington, D.C., where channel 4 stations were also located? And, what could be done to eliminate the problem, if anything?

## *WEIRD WAVES*

Whether a signal in the VHF or UHF range is carrying television program intelligence, radio broadcasting, two-way communication data, or data for a communications system, the signal, once it leaves the transmitting antenna, is on its own and subject to propagation anomalies. And, what may be an anomaly in one part of the world, will not be an anomaly in another region. Even within the United States, different regions of the country have different degrees of anomalies, although for allocation purposes the entire country is considered pretty much identical.

VHF and UHF signals always travel better, further, and longer over large bodies of water than over land. For this reason, transmission/receiving paths that cross over the Great Lakes, or up and down the coasts, or along the Gulf of Mexico just naturally propagate further. *This is normal,* and we expect this to be the case.

No matter where we are in the world, once a VHF or UHF signal finds its way to the radio horizon (1) it is on its own and an anomaly can take over. *The horizon is actually two-part.* The first horizon the signal "sees" is the *visual horizon,* which is the *last point* at which the signal will continue traveling through the lower atmosphere and *begin to graze the earth.* In CATV language, this is roughly equivalent to the Grade "A" signal contour region, give or take a few miles. Now

(1) The radio-horizon begins where visual line-of-sight transmission leaves off, and extends to the point where useful signal levels are no longer available.

of course the path between the transmitting antenna and the visual horizon may have a few anomalies of its own such as a "shadow region" created by a hill, mountain, or tall building. Or, the horizon for visual line-of-sight transmission may be *artificially shortened* referenced to a smooth earth sphere because a tall obstruction such as a mountain, or hill, jumps up along the path and prevents the transmission wave from traveling all the way to the calculated line-of-sight horizon point.

Seemingly, based upon theory and straight lines and tower heights above average terrain, once we got beyond the visual line-of-sight, we would be in deep trouble. *Fortunately, this is not quite true.*

While VHF and UHF signals do travel in what is essentially a straight line (i.e. radiating from the transmitting antenna onward until they bump into something solid), they also have the facility to bend just a tad during their travels. In fact, they start bending the minute they leave the transmitting antenna. In actuality, they are constantly being bent just a fraction of a little bit as they travel through the lower atmosphere because of something called the *refraction index.*

In a near perfect vacuum, the VHF/UHF waves would encounter little, if any, resistance (i.e. friction) to their passage. In a sense, you would shoot a signal into the vacuum at one end of the arena and it would pop out the opposite end of the vacuum, having traveled straight and true along the way.

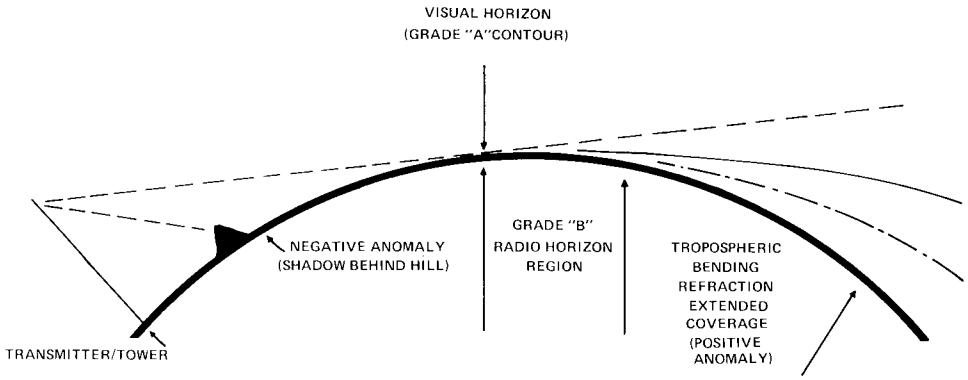
The lower atmosphere is *something other than a vacuum.* The air itself creates a drag on the passage of the wave front (signals), and when the air has moisture (any moisture) in it, the drag forces increase. It is this drag, enhanced by moisture (and other factors we shall discuss) which creates a *refractive index for the lower atmosphere.* The refractive index is merely a convenient tool for measuring the *amount of drag* on the passage of the wave front, as things like percentage-of-moisture content vary within the lower atmosphere.

Because of this drag, something called the *radio horizon* is created. When the transmitted wave front reaches the visual line-of-sight point, it is already dragging as it were. This drag is causing the wave front to travel at something less than a true straight trajectory. In fact, it is traveling with a slight list. The drag on the upper portion of the wavefront (i.e. that portion furthest above the ground below) can be said to be lesser than the drag created by the slightly denser air down lower, closer to the ground. This causes, we believe, the upper (highest above ground) portion to travel *just slightly ahead* of the lower (closer to the ground) portion of the wavefront. In a sense, the wave is constantly trying to *tip* over, with the top out in front (minutely) of the bottom. This is the drag factor which ends up bending the wavefront ever so slightly as it travels onward and onward.

This drag or refraction process started way back at the transmitting antenna, and it continues beyond the visual or line-of-sight horizon. The zone created by TV stations which we normally refer to as the Grade "B" region (i.e. that area that extends from the end of the Grade "A" to the outer extreme of the Grade "B" region, the contour itself) is the radio-horizon area. Within the radio-horizon zone, the signals are arriving purely on "drag-power" created by the refraction process within the lower atmosphere. Because the refractive process is totally dependent upon the condition of the lower atmosphere (moisture content, temperature, etc.) the extent of the "drag" created changes daily (and hourly, and by the minute) as the state of the lower atmosphere changes.

Thus, there are days (and hours and minutes) when the refractive index is *high,* and the radio-horizon *signal is relatively high* in level. There are days (and hours and minutes) when the refractive index is *low,* and the radio-horizon *signal level is correspondingly low.* These changes in the refractive index are a major contributory factor for fading experienced on received signals.

Because the drag or bending process is initiated very close to the transmitting antenna, and continues to extend beyond the visual horizon, there is every reason to assume that it continues indefinitely beyond the horizon; and in fact it does. There is nothing




magic about the outer edge of the radio-horizon "ring" of coverage, nor is it a sharply defined sudden cut-off point where the signals *suddenly disappear* from view (pardon the pun). Rather, the *Grade "B" contour is simply a mathematical calculation* of average signal strength, and when a station draws a contour line over some precise point and says *that point* is the extreme edge (boundary) of the Grade "B" contour, it is in fact stating that "based upon calculation and computation, *that point should be the location* where the average received signal level shall be right at the signal level prescribed by the FCC for minimum service levels for Grade "B" coverage" (2).

*If in fact* the map location for the edge of the Grade "B" contour coverage *is the location* where it really falls, what happens a mile, two miles, or ten miles beyond that point (i.e. further out from the transmitter)? The same thing that happens (and was happening) a mile, two miles, or ten miles closer to the transmitter. The signal closer to the transmitter was simply *on the average* a little *stronger* with each mile one moved closer to the transmitter, and the signal further out simply becomes a little *weaker* (on the average) with each passing mile.

All of this is pretty standard. There are reams of data which the television broadcasting industry, CATV, and other users of the VHF and UHF spectrum have created to give us plenty of raw data from which we can *average* ourselves right into an anomaly situation, quite fast.

## *WHEN AN ANOMALY?*

Grade "A" contours (the rough equivalent to visual line-of-sight) are pretty hard to *anomalize.* It is a pretty ho-hum type of computation that starts with the height of the transmitting antenna and some elementary mathematics to derive how far away the signal will "see" when it leaves the transmitting antenna, before it runs into the predicted location of the horizon. As noted previously, we can have anomalies *within* the Grade "A" region, but they tend to be *negative anomalies* created by terrain or man-made obstructions.

Even assuming the presence of no obstructions along the path within the Grade "B" coverage region, the computation of the projected signal levels will *begin to show anomalies* substantial enough to give the CATV system builder some fits. Because suddenly, as we move out of the visual horizon region where we always receive some direct, non-anomaly signal level in the Grade "B" region, *we are counting on a form of an anomaly* to produce signal. *That anomaly is, of course, the refractive index of the lower atmosphere.*

As we proceed outward and onward beyond the Grade "B" region, and leave the so-called radio line-of-sight district, our anomalies increase. For every mile we travel, we are subjecting the signal that has traveled some distance beyond the *visual* line-of-sight to a *higher and higher percentage of total path traveled within an anomaly zone.* If visual line-of-sight (near-similar to Grade "A") is 44 miles, by the time we reach 88 miles, we

have traveled 50% of our total path length in a zone that was *100% anomaly* dominated. When we reach 132 miles (44 x 3), 66.66% of our total path length was within an anomaly dominated or influenced region.

Once we are inside of an anomaly path region, it becomes convenient to begin thinking about *positive* and *negative* anomalies. A positive anomaly enhances the received signal, while a negative anomaly degrades the received signal.

But enhances *above what* level? And degrades *below what* level?

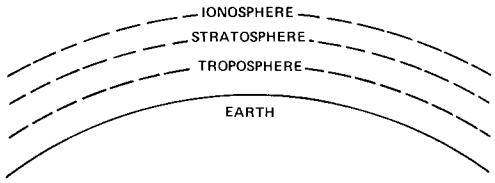
Usually, the reference level is the average level we have *measured*, or the projected level that has been *computed*, such as the "computer surveys" prepared by one of the several CATV antenna manufacturers.

So in actual practice, *when an anomaly?* Whenever the best estimates and computations show one number, and the *actual* signal level is something else.

## *WONDROUS ANOMALIES*

Early in this report we mentioned that some very strange, not entirely understood anomalies have been reported through the years. Many more were reported, as a group, in the early days of television, than in more recent years. Some would attribute this to "mistaken reception identification", while others would suggest that as the number of stations using the various channels and frequencies have increased, the opportunities to observe anomalies have diminished. (There is one factor that runs true for virtually all anomalies: they are not usually terribly strong. So, if you have a local channel 2 signal in your region, it becomes difficult, if not impossible, to identify an anomaly signal over, through, or around the *local* signal.)

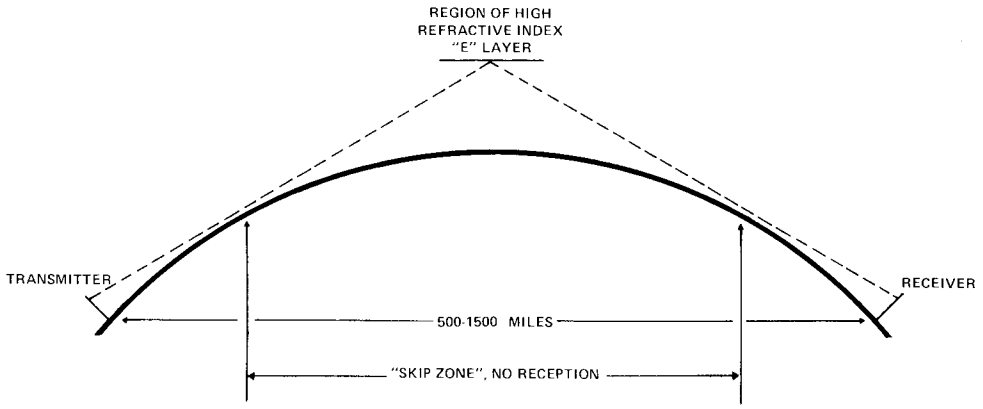
If this is true, then all that one would have to do to dig into the world of wondrous anomalies is to haul some sensitive receiving equipment to some remote spot on the globe (where there are no local, strong VHF and UHF transmitters) and wait for the anomalies to occur. Unfortunately, finding spots like this is becoming more and more difficult for scientists who study anomalies with greater and greater intensity each and every year.




One of the favorite *stories* of the 50's involved early pioneer KLEE-TV, today KPRC-TV, operating on channel 2 from Houston, Texas. KLEE began operation on January 1, 1949 and was one of the earlier occupants of the channel in the United States. During the early and mid 1950's, a number of British television viewers in and around London, England reported seeing programming, test patterns, and call slides on their television receivers which they identified as KLEE-TV. Now the English television standards are different than those utilized here. For one thing, they have no frequency assignment that coincides directly with our channel 2. For another thing, they have polarity reversal of their television modulation, and what is white here becomes black there, and so on. Still, a number of independent, non-affiliated viewers did see *something.* And here is the corker. All of the reported reception occurred well *after* May 1950 when the station had been sold, and the call letters changed to the present KPRC-TV! In effect, *if* the signals seen *were KLEE-TV,* they had been traveling someplace for up to six years between the time they left the transmitter and were picked up in England. *Chalk one up for mysterious anomaly!*

Serious students of anomalies tend to write off the KLEE incident as something other than a wayward signal that traveled for nearly six years before coming "back to earth". Others are not so easily written off, and are in fact part of the anomaly textbook of the 70's.

Anomalies are not *all* that mysterious. In fact, the greatest portion of those reported and authenticated are understood, if not fully understood. There are four primary propagation modes via which anomalies can occur. Within the forms of propagation anomaly we know about, and of which we at least have a basic grasp or understanding,




virtually every report of anomalous reception can be catalogued.

(1) *Sporadic-E Skip:* Not all refraction takes place in the lower atmosphere. The layers above the lower atmosphere are known (in order of ascension above the lower atmosphere) as the stratosphere, and the ionosphere. Within the ionosphere there exists three distinct layers or regions which have markedly different influences upon broadcast signals which may wish to pass through them. The lowest ionospheric layer is called the "D" layer, and it has virtually no known effects upon VHF or UHF waves. They tend to pass through the "D" layer as if it were not even there. Above the "D" layer is the "E" layer, which at an average height of 50-70 miles, does on occasion do some funny things to VHF signals. Above the "E" layer is the "F" layer, which has been known in certain years to have some interesting effects on VHF signals, especially those in the lower portion of the VHF spectrum (say 30-70 MHz).

For our ionospheric discussion here, we will limit ourselves to the "E" layer, since *it* is the one which is most likely to cause anomalies to VHF signal transmission. The "E" layer has different characteristics in different regions of the earth. For example, in equatorial regions, it has an almost daily almost predictable ability to *refract* VHF signals back to earth at some distant point. It is not at all unusual in regions near the Equator for signals at 50-60-70 MHz to be received via "E" layer refraction at distances of 500/1000 or 1500 miles.

This is also true in regions other than near the Equator, although it is not as common an occurence. For example, well north of the Equator and over the Malaysian Peninsula in the Pacific, there are certain paths such as *Korea to Viet Nam* where signals in the 50 to 100 MHz region propagate over distances of up to 2,500 miles almost daily, for hours on end. An AFRTS (Air Force Radio Television Service) television station located in Korea had regular viewers in the battlefields of Viet Nam during the recent skirmish there, and U.S. troops stationed in Korea regularly listened in (and some say participated in) "fire fights" in Viet Nam on VHF air-to-ground frequencies which were supposedly "secure" beyond their localized line-of-sight transmission paths.

If the United States had happened to be similarly located on the globe, our VHF television allocations scheme probably never would have been placed on VHF at all, because stations in Chicago would have torn the devil out of stations in San Francisco day in and day out!

So fortunately for our general scheme of allocations, the region of the world encompassed by the North American continent is *not* subject to *this kind* of anomalous "E" layer propagation. However, we are not entirely free from the effects of the "E" layer, not by any means.

In the North American region, we have something called *Sporadic-E Skip*, which simply means that on an *infrequent, here and there basis*, we do have anomalous "E" pro-

pagation. Unlike the predictable (and therefore not *entirely* anomalous) "E" layer propagation that occurs over the equatorial regions and the (for example) Malayasian Peninsula, *our form of "E" layer* propagation is about as predictable as earthquakes. And probably less so.

But in spite of its "infrequent, here and there" habits, it does have a format. For example, we know that it occurs *most often* between April 15th and September 1st, although it can occur (and probably has) virtually anytime in the year. We also know that during the 14 week "summer season", it will occur from any given earth-locked vantage point from 2-4% of the total time. We also know that it will occur most often between 8 AM and 2 PM, and 5 PM and 9 PM local time. But again it can, and has occured at any time.

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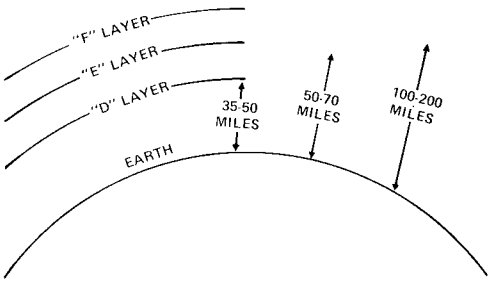
(2) *The Commission defines Grade "A" and "B" coverage levels as follows:*

*At 50% of the receiving locations for (at least) 50% of the time, signal levels shall be measured at (or greater than) the following:*

| | Grade "A" | Grade "B" |
|---|---|---|
| Channels 2-6 | 1700 microvolts | 150 microvolts |
| Channels 7-13 | 900 microvolts | 160 microvolts |
| Channels 14-83 | 350 microvolts | 110 microvolts |

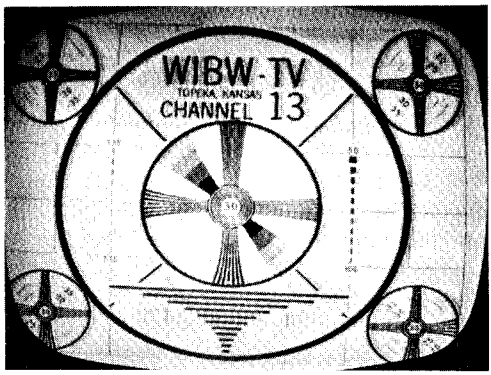
*These readings are for measurements made on a 75 ohm dipole antenna, 30 feet above ground.*




We know more about Sporadic-E here in North America than perhaps most other propagation anomalies. It has been studied time and time again. But even with *all* that we do know, we still *do not know* what causes it to occur (i.e. why it suddenly pops up), or exactly what it is that is happening within the rarified "E" layer to make it suddenly take on a very high refractive index, an index that is sufficiently high to reflect back to earth VHF signals over distances of typically 500-1500 miles, but on occasion as much as 3,000 miles and further.

By observation, we know that *when* it forms, approximately 50% of the time it will refract back to earth signals on frequencies up to approximately 50-60 MHz, which includes television channel 2. We also know, by observation, that higher frequencies (such as channels 3, 4, 5, 6, and the FM band) are progressively less frequently refracted as the frequency increases. Perhaps *only 5% of the time that there is Sporadic-E* does the "E" layer effect frequencies as high as 100 MHz over the North American region. In fact, it

1009 mile Sporadic-E Signal, notice ghosting from multipath reflections.




275 mile Tropospheric Bending Signal, notice lower adjacent aural beat in video.

has been observed as high in frequency as high band channels 7-13, perhaps as few as fifteen times in a time span, that began in the late 1940's and runs through the present.

This is *not true* in other regions of the world where Sporadic-E is known to occur. In the Australian region for example, Sporadic-E type reception at frequencies in our high band TV channels is quite common, occuring perhaps dozens of times each year.

Sporadic-E reception is therefore very frequency and location sensitive. It always *appears* (i.e. is observed) first at lower frequencies, and then as the refractive index builds up within the "E" layer (i.e. increases in density) the higher and higher frequencies (channels) are propagated via the "E" layer. The critical nature of the "E" layer refractive index is such that the *maximum useable frequency* (a term that describes the highest frequency being propagated via the anomaly) may fall *within* a TV channel. That is, you may have *video* reception from a distant station on channel 2, but the aural carrier frequency, which is higher in frequency (55.25 visual vs. 59.75 MHz aural), *will not propagate.* The cut-off may be so sharp and so well defined, that your video reception is strong and snowfree, but there is not even the faintest hint of an audio signal. *This is the ultimate bandpass filter!*

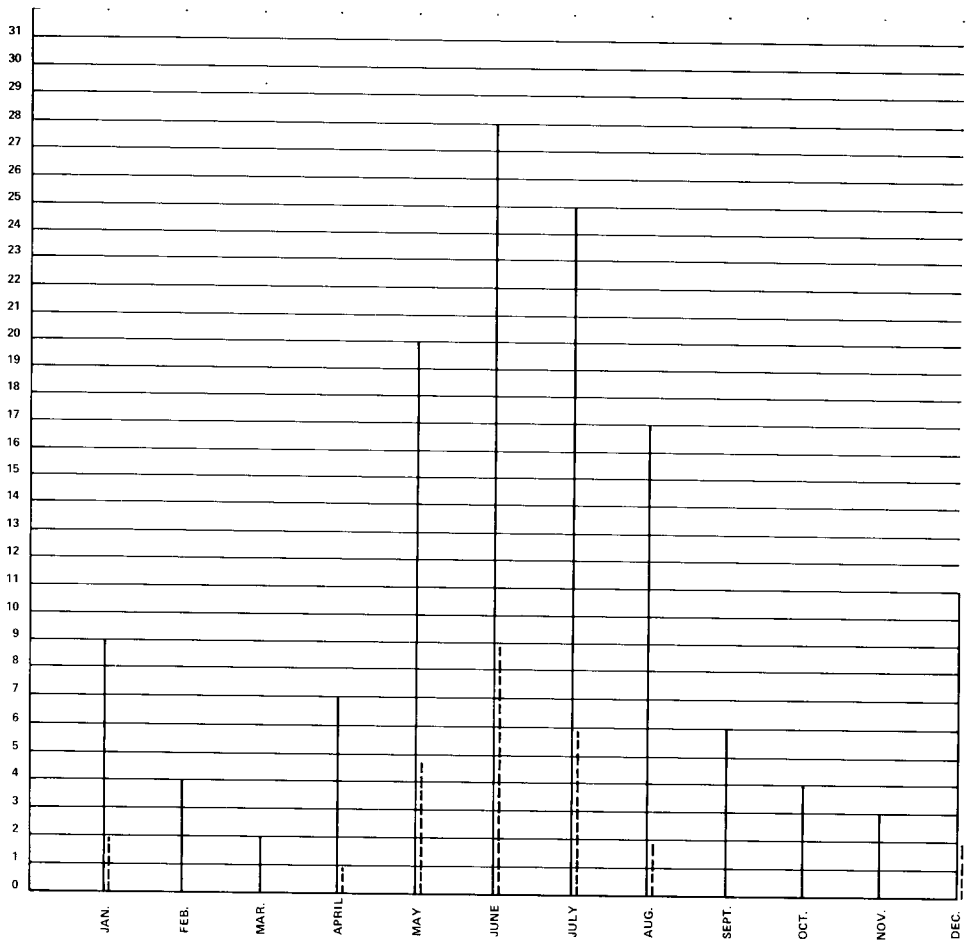



Chart depicts number of days per month in recent year Sporadic E skip was observed at channel 2 or higher over North American region (solid lines); dashed lines represent number of days with period that E skip was noted at 100 MHz or higher for same period. (Source: VUD)

(2) *Tropospheric Bending:* Getting back down to earth now, recall that the refractive index within the lower atmosphere fluctuates as a function of something called density. The density is in turn determined by the percentage of moisture in the air (the common *humidity* factor), and this in turn relates to the temperature of the air.

When the *refractive index is high,* the degree of signal bending *increases* into a *positive anomaly* situation. That is, the signal strength at some point beyond the visual horizon (whether within the radio-horizon area or beyond) is higher than normal.

When the index over your region builds up, signal strengths from stations within the geographic zone that the build up occurs in are stronger than "normal". In effect, the beyond-the-horizon signals simply get stronger because the bending within the lower atmosphere becomes more efficient. More and more of the signal that normally escapes through the lower atmosphere and into the stratosphere is held *down* close to the earth for distances beyond the visual (or radio) line-of-sight regions.

*These refractive index increases in density can occur over very large areas.* They tend to form where the air is *stable,* and the flow of *moisture* is either good *into* the region, or the moisture is already present. The latter is the case over large bodies of water, such as the Gulf of Mexico, where evaporation is constantly drawing moisture up through the lower atmosphere whenever the sun's rays are available.

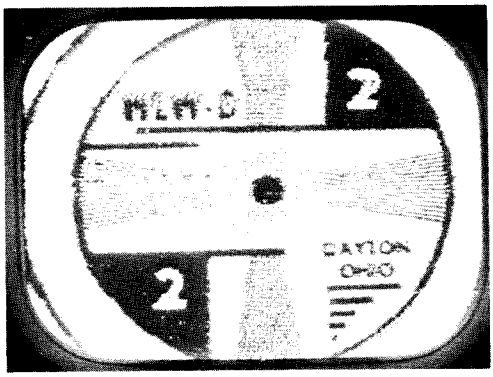
On the other hand, this type of anomaly very seldom forms over very dry regions, or over rugged (i.e. mountainous) terrain where vertical, or near vertical, updrafts (or downdrafts) along mountain slopes keep the air in a constant state of motion.

This type of anomaly occurs quite close to the earth's surface, and unlike the "E" layer where the refraction takes place 50-70 miles above ground, it happens *right along the ground,* or just above it, with tropospheric bending. One of the nearby regions where it is *an almost constant thing* is along the northern shore of the Yucatan Peninsula in Mexico. There an almost continuous (it has been measured as 80-85% consistent) high refractive index maintains VHF signal propagation from locations such as Vera Cruz east along the edge of the Gulf and the Peninsula to locations such as Ciudad del Carmen and Campeche, making possible VHF TV reception over distances of 350-500 miles, 80-85% of the time.

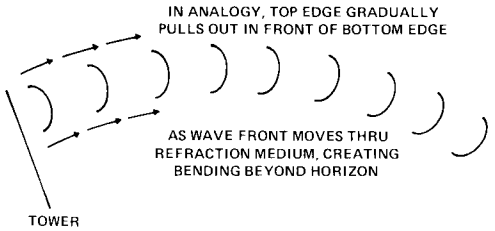
This, like the Equatorial-E skip, is *pretty darned predictable,* and it begins to fall *out* of the anomaly class. But, further north along the Gulf Coast from Texas on around to Florida, we have a "Malaysian" type of situation where tropospheric bending occurs very *frequently* but hardly constantly, so, that systems constructed there become quite accustomed to 200-300 and 400 mile co-channel problems.

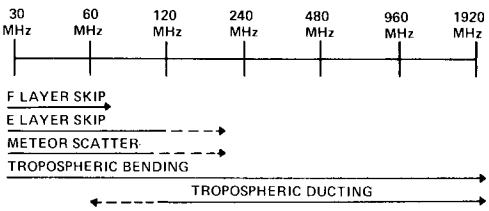
Over land tropospheric bending becomes less frequent, although there are certain types of weather situations which can cre-


1250 mile channel 34 Tropospheric Ducting Signal (received in Oklahoma City).




785 mile Meteor "Burst" Signal received in Oklahoma from Dayton, Ohio.




ate havoc for days on end. Generally, the warmer, moisture laden months are the worst for co-channel created by tropospheric bending. And, the early morning hours (up to 9 or 10 AM local time) are the worst of the worst.

Recall that Sporadic-E skip involves a mechanism where the transmitted wave travels through the visual zone, the radio-horizon zone, and penetrates into and through the troposphere and stratosphere until it encounters a dense area *within the "E" layer* some 50-70 miles above the earth, whereupon its direction of flight (path) is changed to *re-enter* the stratosphere, the troposphere, and the lower atmosphere. In-between the point where it *left* the lower atmosphere on the transmitter end of the path, and where it *re-entered* the lower atmosphere on the receiving side of the path, is a substantial region or zone where the signal was not received, a so-called skip zone. It was (way) over head within that region.

This is not true with tropospheric bending. The high refractive index that started within the primary visual and radio-horizon zones of the transmitter kept the signal *close to the earth's surface* for its entire journey from transmitter to your receiving location. Any point along that path, not shadowed by some (relatively speaking) small or big obstruction, would also be able to receive the tropospheric bending propagated signal.

In effect, *tropospheric bending can be likened to a dramatic increase in the transmitting antenna height,* during the period that it occurs. *If* you could reach down from above and *lift* the transmitting antenna 1,000, 2,000, or 3,000 feet higher above the earth than it normally rests, you would of course increase the visual line-of-sight and the radio-horizon zone (distances). Every point within the "new expanded taller tower zones" would receive *increased* signal strengths from the new installation.

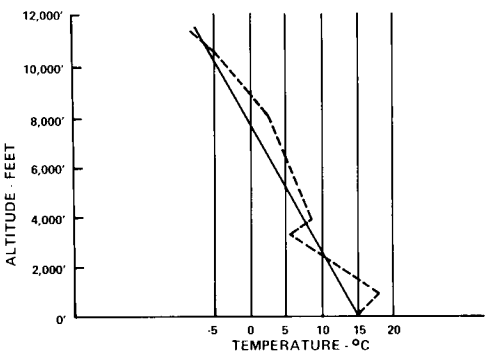
(3) *Tropospheric Ducting:* Tropospheric bending occurs pretty much nation wide, although it *cannot form* for very great distances where intervening obstacles (such as mountains) get in the way of the signal flight between the transmitter and the receiver. It typically occurs within the first 1,000 feet of lower atmosphere above ground, and if an obstacle suddenly protrudes above average terrain, *higher than the level* at which the refraction is taking place, the "bending" signal is stopped in its tracks by the obstacle.

That is not necessarily true with another form of propagation anomaly called *tropospheric ducting.* Ducting, as it is abbreviated by propagation types, has some of the peculiarities of both Sporadic-E skip and bending. It occurs within the lower atmosphere, although it may typically be somewhat higher above the earth (in its transmission flight from transmitter to receiver) than bending. It frequently has a "dead zone" along its path where there is no signal reception akin to Sporadic-E.

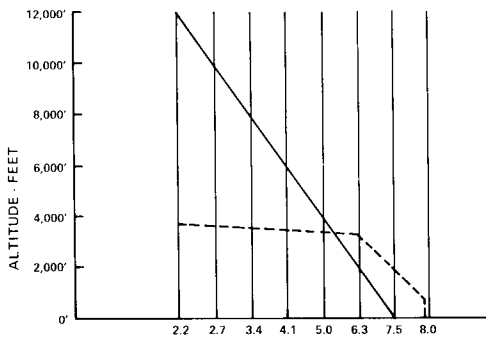
Our discussion of bending has related the bending or signal-extension (beyond the normal range) to an *increase in the refractive index caused primarily by moisture content* in the lower atmosphere. Certainly this is a primary contributor to bending, although other lower atmosphere anomalies can contribute as well.

One of these is *temperature.* Temperature normally descends with altitude, and it does so on a pretty progressive and even rate. For every increase in height above ground under "normal conditions", there is approximately 2° Centigrade drop per 500 feet of altitude above ground. However as air masses move over land, and more particularly where they meet (i.e. a cold air mass and a warm air

mass), there is often a sudden change in this *standard atmosphere* condition. The drop in temperature may be according to the standard for a few thousand feet, and then either *rise sharply* (as when a warm air mass overruns a colder air mass), or it may drop suddenly (as when a colder body of air overruns a warmer body of air). When this happens, a sharp boundary between the two differing air temperature masses is delineated, and the apparent refractive index changes sharply *at this point.*




*Normal temperature drop per rise in altitude is shown in solid line. Broken line shows measured variance under conditions that supported tropospheric ducting between Midwest and eastern USA. Note "dog-leg" at 800 feet and 3200 feet, probably elevations for ducting.*




*Normal "mixing ratio" (grams of water vapor per kilogram of dry air) is shown in solid line for altitude increase. Broken line shows measured variance for same conditions as temperature chart above.*

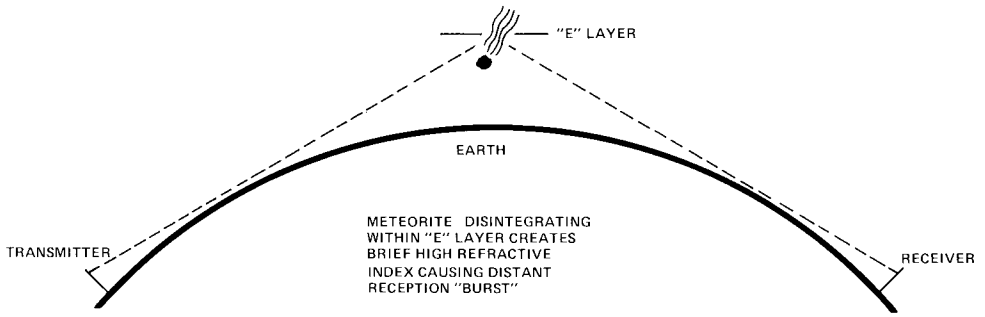
If this occurs at an elevation of 2,000-6,000 feet above ground, and it occurs over a large (long) area, such as Kansas to Pennsylvania, a phenomenon called a *duct* forms. That duct is the *delineation line* where the air masses of sharply contrasting temperatures met, and the refractive index rises so high along that line that VHF and UHF signals are literally trapped by the line *just as if they were inside a piece of waveguide.*

Usually, an air mass temperature change also includes a sharp change in the water vapor content, all along that line, since water vapor content (percentage) is a function of temperature (remember dew point?). Thus, the combined forces of a sharp temperature change, plus a dramatic change in the normal water vapor content level, interact to produce *super refraction.*

One of the more interesting features or characteristics of ducting is that it is usually reverse-frequency sensitive. That is, whereas Sporadic-E is effected on the lower frequencies (channels) first, and then *if* the intensity of the refractive index is sufficient, it builds higher in frequency; ducting works essentially in reverse.

Ducts *are* frequency sensitive. They can *almost* be visualized as waveguide stretching from near the transmitter to near the receiver, capturing within their boundaries, or perimeters, those signals which happen to "line up" with the path from transmitter-to-duct-receiver. They *may only be a few feet in height,* and it is the height measurement which determines their frequency limits. When they are typically "short in height" only relatively speaking, short wavelengths can *fit inside* of them for transmission to a distant point; and short wavelengths are higher frequency wavelengths, such as UHF-TV.

Ducts tend to form best over locations where the air is exceedingly stable. This would include over water, over the flat plains of the Midwest and Mid-South, and east-west over the Great Lakes. Over water, they may exist for a very high percentage of the time. Two such *almost continuous* ducts exist over the Pacific, west of Los Angeles and San Francisco towards Hawaii, and another exists over the Atlantic, extending westward from




the tip of the African coast towards northern South America. In both situations, VHF airborne communications in the 120 MHz and higher frequency ranges have almost daily communications with ground based airport two-way radios over distances as great as several thousand miles.

Naturally a TV (or FM radio) signal finding its way into such a duct will travel some considerable distance, usually to as far as the duct itself exists. How signals get into and out of ducts is little known, although it is suspected that ducts tend to lower gradually towards the ground level on one or both ends, just before termination. Like Sporadic-E, there *may well be no reception along the path itself, only at both ends.*

Ducts propagate UHF-TV signals (within our sphere of interest) best, high band VHF next best, and low band VHF last in line. Ducting at UHF is very common in the late spring, summer, and early fall months, but is less common the balance of the year.

(4) *Meteor Scatter:* The last of our common forms of propagation to be discussed at this time is something which probably is more of an annoyance than a critical situation.

Recall that Sporadic-E propagation occurs when the refractive index within the "E" layer reaches a degree of intensity so that the VHF signal is bent in its travels back to earth at some distant point.

Recall also that we noted that scientists are not yet certain what it is that causes this refractive index to rise sharply. (If they knew what caused the index to jump so dramatically, without warning, they would possibly be able to forecast the event.) Actually, there *is one mechanism* which does raise the refractive index within the "E" layer very dramatically, and which scientists know about. That is a (or several) meteorite(s).

The earth is bombarded by minute particles of space dust each and every day. Something on the order of billions of small dust particles are either run down in space by the rapidly trajecting earth, or are swept into the earth's gravitational field. As these dust (and larger) particles are caught up by the earth's fields, they are pulled towards the earth itself by the gravitational pull of the large body. These particles come flying through the "F" layer of the ionosphere and then enter the "E" layer of the ionosphere. At the speed at which they are traveling (typically 22 to 72 kilometers per second), they encounter their first real resistance to the earth's rarified gaseous membrane at around 60-65 miles above the surface. This encounter results in the *speed plus the mass* of the small particle creating old fashioned friction. This friction causes the temperature of the particle to increase until it reaches a critical temperature and ignites. We commonly refer to these particles, when we are able to observe them with the naked eye, as "shooting stars".

As these ignited or heated particles speed through the "E" layer, where they have encountered their first significant resistance, the heat they create forms a gaseous trail behind them. Unless these particles are very large when they enter the "E" layer, this process of ignition disintegrates them completely by the time they reach an altitude of 50 miles or so.

But in the process of disintegrating, and leaving burning gas trails behind them, they leave behind a very high refractive index. This

index, for as long as the gases stay in place in an ignited column, has the ability to refract a VHF signal back to earth at some distant point. This is called *meteor scatter,* or *meteor bursts.*

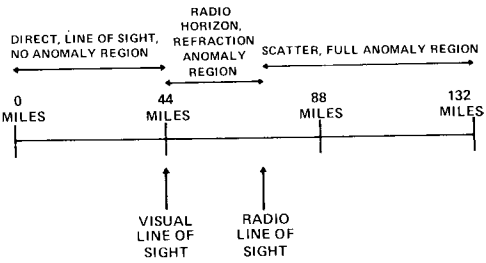
Typically, such a propagation anomaly lasts perhaps a few seconds, and like Sporadic-E, it occurs most frequently on the lowest of the low band channels, such as 2, 3, or 4.

At the CATV served home, these bursts of distant signal will typically only show up as co-channel interference, and short lived co-channel at that. A particularly large meteorite particle may produce "skip" that will last for a minute or two, but durations longer than that are exceedingly rare.

This type of anomaly falls into two broad categories. It is either *daily,* or "meteor shower" related. Daily, between 6 and 8/9 AM local time, the forward sweep of the earth just naturally runs into more space debris, and as a consequence the number of "bursts per hour" is considerably enhanced during this time period. By the same token, during 6 PM to 8/9 PM, it is very rare, since a particle would have to be traveling *faster* than the earth to even catch up with the earth and be drawn into the earth's ionosphere during that time frame.

There are perhaps a dozen "annualized" meteor showers which come around as regular as clock work each year. They may occur most anytime of day, depending upon where they appear to originate in the galaxy (i.e. the radiant), but is always known far in advance by astronomers.

As a practical manner, meteor bursts are not a particularly damaging anomaly of propagation for CATV systems. They tend to be a minor annoyance that will show up only on low band channels received, and then typically only on low band channels that appear at your antenna terminals with levels of -15 dbmv or less. They will only show up during the early morning hours (or during one of the annual shower periods), and only for very brief periods per "burst", typically averaging a few seconds, or less, of co-channel.




**WHAT IT IS / WHEN IT HAPPENS**

Four common garden variety wave propagation anomalies can give CATV operators grief. Knowing what they are, and when they are most likely to occur may save you some nervous moments trying to explain when they cause unexpected co-channel interference on your system.

**Sporadic-E Skip:** Primarily a summertime phenomenon; most pronounced low band channels 2, 3, and 4. The hours 8 AM - 2 PM and 5 PM - 9 PM are the most "dangerous". Signals average 50-100 microvolts on a 10 db gain antenna pointed at the source, although levels of 10,000 microvolts have been recorded on rare occasions. Stations 800-1, 200 miles distant are most common.

**Tropospheric Bending:** Primarily a warm-weather month phenomenon. Low band, high band, and UHF are equally effected, although high band tends to be the worst effected. Stations within 200-400 miles are most likely to be trouble. Morning hours (sunrise to 9 AM) the most common, followed by sunset to midnight. Signals average 100-500 microvolts on a 10 db gain antenna.

**Tropospheric Ducting:** Primarily a warm-weather phenomenon, although fall is the peak period. UHF and high band are most likely offended channels. 7 AM-10 AM and 7 PM - 11 PM are the most common time slots. Stations 400-800 miles distant are most common. Signals average 50-200 microvolts on a 10 db gain antenna.

**Meteor Scatter (bursts):** Like Sporadic-E, primarily a low channel phenomenon. Most susceptible are channels 2, 3, and 4, where the receiving antenna array is large (12-16 db). Signals are short-lived (1-3 seconds usually), peaking in the early morning hours (up to 9 AM). Various annual "showers" of extra-heavy meteorite concentrations (such as annual Perseid showers every August 10-14) increase frequency (i.e. rate) of bursts.

Future installments of this series will deal in greater detail with the particular weather patterns and mechanisms which produce common tropospheric (bending and ducting) interference patterns.

# THE HORRORS OF PREPARING FOR MARCH 31,1977

*March 31, 1977.*

What will *the* world be like? What will *your* world be like? The nation's bicentennial will have come and gone. Another national election will have come and gone, and the 39th President of the United States will have been placed into office. (Perhaps the nation's 40th President will have been placed into office.)

On March 31, 1972, the Federal Communications Commission made effective the rules and regulations of Part 76. Based upon Commission records as of that date 2,839 CATV systems were in operation at that time. All 2,839 of the then operating CATV systems were functioning with some type of permit, easement, franchise, license, or agreement which when viewed against the standards set forth in Part 76 was inadequate. The Commission recognized that when it asserted the new rules and regulations of Part 76 these 2,839 CATV systems were going to have to have some *period of time* to adjust to total compliance with these new rules and regulations. And so the last in a series of *grandfather* clauses was invoked; a clause within the rules and regulations which allowed all of the then operating CATV systems to continue to operate until March 31, 1977 under their present permits, easements, franchises, licenses or agreements *but only until March 31, 1977.*

After March 31, 1977 all CATV systems, including the 2,839 in operation on March 31, 1972 must have permits, easements, franchises, licenses or agreements with the local franchising authorities which are in *full compliance* (1) with the rules and regulations as then in force on March 31, 1977.

Full compliance in 1977 has a double meaning and many sub-meanings. First there is the matter of the franchise, permit, etc. To

**HONEST CONJECTURE vs. OPINION**

This report is bound to anger some readers. Preparing for the approach of March 31, 1977 is probably not one of the favorite light conversational subjects within our industry. Still, like death and taxes, March 31, 1977 will roll around.

**The road to March 31, 1977 is fraught with difficulties. There are no blueprints and the questions of "what if. . ." far outnumber the answers available.**

CATJ believes that if we are to survive the 1977 transition period, the problems facing us in this change over **must be laid out frankly and discussed openly.** Towards that end we are attempting to provide a forum for ideas, thoughts, and yes, even opinions. If we, or anyone else, had a blueprint for handling the 1977 change over, it would appear in print here, **now.** But as this report suggests we are, as an industry, ill equipped to make the transition into "full compliance" by 1977. And if the FCC wants CATV to be fully in compliance by 1977, they had better get a move on and provide the blueprint. **Lacking that, 1977 may well be 1984. . . seven years early!**

*(1) Many CAC applications now being granted are being granted only through March 31, 1977. This includes older systems which are seeking to add one or more new signals to their systems at this time, but who are putting off until sometime between now and 1977 a full revision of their franchising instrument.*

be in compliance in 1977 the CATV system must between March 31, 1972 and March 31, 1977 have gone back to the local franchising authority and negotiated a new instrument with the city, county, etc. agency. The new instrument must contain all of the required provisions in effect at the time the instrument was negotiated, plus the instrument must have a built-in provision so that as new requirements, refinements, etc. are adopted after the date of the instrument, they automatically become a part of the instrument within a period of one year's time (2).

Secondly there is the matter of *technical compliance* with the provisions of Part 76. The portion of the rules which relate to system operating parameters and engineering standards must be complied with not later than March 31, 1977.

And there are many sub-parts. Between March 31, 1972 and March 31, 1977 at various due dates along the way, broadcasters with CATV system interests within their Grade A or B contours must have disposed of these CATV system interests. Telephone companies with CATV interests in the same areas or regions as their telephone interests must have likewise disposed of those CATV interests or have secured "waivers of the rules" prohibiting co-ownership.

*WHAT IT ALL MEANS*

To the Commission, five years time to "get into full compliance" certainly seemed adequate in 1972. Unfortunately, *on September 30, 1974 we will be 50% of the way to the full compliance term period.* Not many systems have actually begun on the work to place their operations into full compliance. A random sampling by CATJ in July indicated that of the approximately 50 systems we talked with, only one had actually gone before the local authorities and obtained a new franchise permit, etc. and only four were on a planned engineering revamp of their systems for 1977 technical compliance.

**". . .the Commission, by its own admission, has not helped things along"**

*The Commission, by its own admission, has not helped things along.* In the area of franchise, permit, etc. renegotiation, there is a natural reluctance on the part of existing system operators to disturb the status quo they have with their municipal authorities. More about this critical aspect shortly. The FCC has been nurturing this foot-dragging approach along simply by its unclear and less than precise leadership. As this is being prepared, seven major amendments to the franchising procedures section of Part 76 are out for comment and reply comments. And the man who goes *today* before his city council and asks for a modification and renewal of his franchise *may learn* early in 1975 that he has to *do it all over again* simply to cover the new changes adopted for the rules in the interim. In the area of technical standards there is even *more* confusion. The technical portion of the rules (sections 76.601, 76.605, 76.609, 76.613 and 76.617 of Subpart K) were widely described as being "interim in nature" by both the Commission and industry leaders when they were first announced in March 1972. Since that time various Cable Television Advisory Committees (C-TAC) have met and met again on where the provisions of 76.6 should be modified, excluded or redesigned; but no hard suggestions, not to speak of proposed rules, have evolved. Again, the Commission *must share* part of this responsibility in as much as the Commission's CATV engineering staff has only started to come to full force the past 9 months and it is still building. Until just recently the Cable Television Bureau had to rely on other bureaus (notably the *Broadcast*

*(2) Full compliance with the provisions of 76.31 (franchising standards) must include a provision in each franchise that as FCC rules are updated or amended, that these updates or amendments will automatically become a part of each local franchise, permit, etc. within one year of the date they are adopted by the FCC.*

*Bureau)* for technical guidance in the field of CATV.

So a CATV operator today has to face the fact that 1977 is but 2-1/2 years away, and the industry still does not know what form the franchising instrument must take in order to win full compliance in 1977. A system built today with hard expensive dollars to comply with 1977 technical standard requirements may be out of date before 1977!

*THE LOCAL PERMIT*

Gnawing away at the pit of every CATV operator's stomach is the very real possibility that when he goes before his city council or county board of supervisors to ask for a franchise renewal and language redraft of his local instrument, he will be met in the chambers by one or more new applicants for his very system.

In effect, the Commission has set out to draft rules which would give assurance that every single hamlet, town, city and county area in the United States with operating CATV systems would have granted such authority to operate these systems *only* after offering a broadly based local population *the opportunity to participate* in the licensing process. The Commission has adopted this procedure because it honestly feels that local CATV will one day become a most important local communication medium. The Commission feels if CATV is to rise to this aspiration it must have the total local involvement of everyone from municipal authorities to local church groups, educators, schools, and the millions upon millions of John Q. Citizens who will make up the subscriber base for the service.

Most of the difficult sections of 76.31 (including those sections now before the Commission for modification) relate to the full public access to the franchising procedure. Section 76.31 (a) (1) initially read: In order to obtain a Certificate of Compliance, a CATV applicant must have a franchise that contains provisions indicating that *"The franchisee's legal, character, financial, technical and other qualifications . . . have been approved by the franchising authority as part of a full public proceeding affording due process."*.

By memo and memo-action this has been subtly refined through the approximately 2-1/2 years since it went into effect to include such things as the "franchise" being granted only at a *regularly* scheduled (open to the public) meeting of the local municipal authorities and a filing in a "public place" of the full CAC application by the CATV franchisee. Talk of expanding this to include a public notice in a local newspaper that the CAC application has been filed and a recitation of what the application contains has cropped up from time to time but has not yet been adopted.

**". . .fully 40% of all applications for Certificates of Compliance are defective. . ."**

Cable Bureau sources indicate that fully 40% of all new applications for Certificates of Compliance are *defective* and the majority of these are defective because the instrument itself is defective. These are *new* applications for *new* systems, systems which have been proposed and started well after the March 31, 1972 guidelines were released (76.31). A high percentage of these "defects" are resolved by Cable Bureau staff attorneys taking the initiative and working directly with the applicant. When the staff attorneys bring these problems to the attention of the applicant, the applicant must go back to the franchising authority and have one or more sections of the instrument modified into compliance. Many of these modifications, we suspect, are done without the due-process procedures. Apparently the Cable Bureau has the same procedures. Apparently the Cable Bureau has the same suspicions; a "large number" of modifications are validated by "letters from the Mayor of the municipality" we are told.

Accordingly, the Cable Bureau has recommended to the Commission that *"specific guidelines and requirements on the information to be considered prior to the selection of a franchisee"* be adopted. This is Rule Making Docket 20019 currently before the full Commission.

Some CATV operators have quietly accused the Commission of "speaking out of both sides of their mouths". Cable Bureau people maintain a hardline image when it comes to "bending" the rules. Yet the processing of Certificate of Compliance applications is the lifeblood of a struggling industry. Without the coveted CAC the sophisticated lenders simply won't disgorge the cash that it takes to build a new system. When CAC's are rejected or held up because of "technical infractions of the provisions of 76.31" the industry progressively slows down. Charged with administering the rules the Cable Bureau is caught squarely in the middle. If they "bend the rules" a precedent is established which slowly erodes away the worth and value of the rules in the first place. If they hold the line on the rules, people like Loren Young at *Heller-Oak Cable Finance Corporation* in Chicago get up-tight because without the CAC the system never gets dime one to start construction. It is not difficult to see how fast someone's State Senator or Congressman will get a call and a "plea for help with those SOB's at the Cable Bureau" in a situation like this.

And the Cable Bureau *is quite concerned* with its own public image, especially within the industry itself. It does not want to be known as a bunch of IRS-type-agents who are out to enforce the rules come hell or high water. It wisely recognizes that the CATV industry operated for nearly two decades *before* the Cable Bureau came on the scene and there is a simmering resentment just below the surface that they are here at all now.

All of this complicates the decisions a cable operator must make. *What* should he do and *when* should he do it?

The problem is not going without notice. *CATA* (Community Antenna Television Association) is addressing the problem by inaugurating a series of reports in *CATJ*. A lesser known effort by *NCTA* (National Cable Television Association) is apparently addressing itself primarily to the problems encountered by being in full *technical compliance* by 1977. CATJ would like to make known its desire to make available space in this publication to *any* group or individual who has constructive comments or programs to offer. As an industry we have been so wrapped up fighting the brush fires of copyright, nonduplication, expensive money and pay-cable during the past 2-1/2 years we have allowed 50% of our grandfather period to slip away almost unnoticed. We need to pull together *now* and circulate as widely as possible those well thought out plans to attack this problem that will surely develop in the next six months to one year.

*OVER-BUILD?*

Will the Commission grant more than one Certificate of Compliance for the *same community?* And for the *same area* in the same community?

*The answer is yes.*

**"What is the Commission's attitude towards direct head-on competition?"**

What is the Commission's attitude toward direct head-on competition between cable operators slugging it out door by door, street by street?

The FCC has had precious little opportunity to comment on this problem to date. The most recent example of a "statement of policy" is found in Frankfort, Kentucky where the initial system operator *(Consolidated TV Cable Service, Inc.)* has been overbuilt by a quasi-municipal owned system *(Community Service, Inc.)*. Recently Consolidated asked the Commission to intervene in the local pole-use dispute. Consolidated asked the Commission to rule that Community was employing "unfair competitive practices" because (Consolidated alleged) the quasi-municipally owned Community would not allow Consolidated on poles in the town.

The Commission backed way off from that one, for the time being, but it did state *"We have never attempted to discourage competition between cable systems in the same geographic area but have encouraged such head-on competition through the certification process."*.

OK. . .so the Commission actually wishes to *encourage* head-on competition. Unlike the broadcast regulatory area, where only one transmitter can operate on a discrete frequency at one time, the Commission views cable as a non-monopoly business.

Where does that leave the man faced with going before his local authorities to obtain a new (renewal) franchise, permit, etc.? He runs the risk that he *may not* get his franchise renewed and will therefore have no way to get his Certificate of Compliance in 1977 (or before).

Let's suppose:

(A) *You cannot get your renewal.* At the same time the local authorities *refuse to grant* a permit, franchise, etc. *to anyone* else either. What then?

(1) If you cannot get a renewal, and no one else can get a permit, franchise, etc., we must assume the local authorities simply *refuse to go along with the mandates set down by the FCC.* More and more of the Commission's franchise standards provisions are spelling out specific duties which the local authorities *must accept* as a part of the granting of the franchise, permit, etc. It is conceivable that sooner or later a municipal group will say *"the hell with Washington".*

**". . .the hell with Washington"**

(2) The local authorities might be persuaded to grant you the renewal you seek, but they may do it *only in a format* which they draft, not one forced on them by the FCC. At that time you have a permit, franchise, etc. which totally satisfies the local authorities, and as far as they are concerned, you can operate. But at the federal level you will not get a CAC. What happens then? *Do you shut down your system?* Unlikely.

(B) *You get your renewal* in a form satisfactory to the FCC. At the same time, someone else receives a permit, franchise, etc. You both go to the FCC and assuming both franchises, permits, etc. are identical and satisfactory to the Commission, you both receive CAC's. Then what happens? You are already in operation, the new fellow has to build his plant. A Frankfort, Kentucky all over again.

(C) *You are denied a renewal,* but someone else gets a franchise, permit, etc. This is the "suppose" that scares the pants off most of the 2,839 operators *in place* back on March 31, 1972.

CATV operator *Ms. Polly Dunn* speaking at the *Jackson, Mississippi Cable Bureau* meeting June 6, 1973 asked CATV staff attorney *Tony Cavender* "Suppose a system did upgrade its technical qualifications, at a considerable outlay in capital funds, to meet the March 31, 1977 requirements. Now what assurance will the system have that somebody who might covet your growing community antenna system might not come in there and outbid you?".

**"What assurance someone might not come in and outbid you?"**

That question seems to be uppermost in the minds of grandfather CATV system operators. Everyone recognizes that some new franchise instrument is going to be required. Most people should recognize, after reading this report, that getting that renewal too soon may cause the system operator to have to go back before the municipal authorities again before 1977, simply because the Commission may so modify the rules in the interim that

another major face lifting is required on the instrument itself.

FCC staffer Cavender responded to Ms. Dunn's question with "How are they going to outbid you? We are simply saying that in order to receive a Certificate of Compliance you have to get some authorization from the local level, and the city must make the judgment who they want to operate in their town. That seems to me to be perfectly reasonable, don't you think so?".

Which is the exact point where the FCC mentality loses ground to the hard facts of American life. The FCC assumes by developing franchise standards and guidelines that uniform, nationwide qualification minimums will develop for CATV franchises. And that if these standards are adhered to, the local municipal authorities in effect will do a screening job of applicants for "national CATV licenses" for the Commission. It is an interesting example of local/federal relations where the federal government says "we will tell you what to do and how to do it" and "after you do it we will certify the results" (by issuing a CAC).

*It might work* if the program was the same for everyone along the way. To date the thousands of new system applications have moved through the Commission with only minor procedural hitches. However, in each *new* CATV system situation there is no existing property involved. The man with an application has a dream and some plan that if he does this and that he will someday hope to have built up some *real property* value (his CATV system).

But when we come to the existing systems, *the systems which have demonstrated real property value*, we have what Polly Dunn calls *"something to covet"*. With high risks, years of struggle and more unpleasant moments than pleasant ones, the 2,839 systems in operation on March 31, 1972 suddenly find themselves facing the very real prospect that before 1977 they will find an unfriendly, unsympathetic or even covetous city or county council.

Many of these CATV systems will most assuredly find their applications for renewal opposed by one or more *"strike applicants"* (3). In the very best case, the existing franchisee will win but it will cost a great deal of money and time. In the very worst circumstances he will lose his CATV system franchise, which was his right to operate, and someone else will obtain a new permit or franchise. As Polly Dunn told Tony Cavender "On March 31, 1977 anyone who has not yet obtained a new franchise will be legally without a franchise, what then?".

*Indeed, what then?*

The Commission is not unaware of the problem. In fact, FCC Docket 20022 specifically asks the question. . *.how can we adopt rules "requiring franchises to contain specific provisions and procedures relating to expiration, cancellation and continuation of service?"*. What about the person like Ms. Dunn and her Mississippi system? Should she upgrade her system to attempt compliance with the 1977 technical requirements and risk losing any fair return on the new capital expenditures?

In asking for industry comments on Docket 20022 the Commission wrote "First as the franchise term draws to a close with no assured renewal or fair compensation (if there is no renewal) in sight, the cable operator acquires a strong disincentive to invest in needed new equipment that he cannot be certain of amortizing over the remaining term, the result is obvious deterioration of service.

**"As a cable franchise draws to a close, the operator acquires a strong disincentive to invest in needed new equipment"**

The situation has in the past created extreme and sometimes unwarranted pres-

*(3) In broadcasting ranks, a strike application is one filed by a group which seeks the broadcast frequency (channel, etc.) of the existing holder. Strike applications are usually filed at license renewal time. Congress is presently investigating, after NAB prodding, ways to prevent strike applications from "endangering license holders" at renewal time.*

sures on the franchise authorities and system operator to reach renewal agreements.

There should be no cancellation or expiration of the franchise without fair procedures and fair compensation (to the existing nonrenewed operator).

If the decision (of the franchising authority) is adverse to the existing franchisee, the franchise should have some provisions for an assignable obligation to acquire the system at a pre-determined compensation formula. (i.e. It appears the Commission is suggesting that if you do not receive a renewal, that whomever does receive the new authority to operate would be required to buy out your interests at some pre-determined compensation base.) In the case of nonrenewal, payment (should be) fair market value of the system as a going concern; in the case of cancellation of the franchise for material breach of its terms, the compensation criterion might call for depreciated original cost with no value assigned to the franchise."

So the Commission *is aware* of the problem; Ms. Dunn and others have seen to that. But the Commission carefully words *its concern* around a *greater concern* for a continuation of service to the customers than a concern for the 2,839 existing CATV system entrepreneurs on March 31, 1972.

**"What is to stop the authorities from calling the nonrenewal a breach of contract?"**

The concern and suggestions may be nothing more than another demonstration of the federal mentality. For example, if a system operator *simply cannot get along* with the local authorities and they have their own *personal* reasons for awarding the franchise for the operating system to another party, what is to stop the local authorities from calling the nonrenewal a "breach of contract"? This would immediately place the existing operator in the position of having to accept *only* his depreciated value for his system. If the Commission is successful in making "compensation for nonrenewal" stick and the nonrenewal was primarily because someone "coveted" your system, who for one minute would believe the "covetous party" would be apt to offer you "fair market value" when the provisions are in the law to force you to accept "depreciated value". After all, if the covetous party was influential enough to cause you to lose your renewal in the first place, why also could they not influence the decision as to which formula would be utilized to "pay you off" for leaving town?

The franchise which extends *now* beyond March 31, 1977 is in particular trouble here, if this is adopted, because as far as the local municipal authorities are concerned, the franchise will not expire and be renewed; *it will be terminated early.* That would probably be considered a material breach of contract.

And if you were forced to accept depreciated value, what are you going to tell Loren Young at Heller-Oak Cable Finance Company? You have a seven year loan which runs through 1979 covering your extensive rebuild. Now two years *before* your loan is paid off you lose your cash flow machine. Sure you may be paid depreciated value (oh God why did you elect a five/seven year rapid write off!) but the small pittance you have coming is a small portion of the unpaid amount you owe Heller-Oak Cable Finance Company. *Now what do you do about the balance of that note?*

Someplace between the concern of Ms. Dunn and the sympathetic understanding of the federal mentality there is the real world of 2,839 1972 CATV systems who have their work cut out for themselves.

*OVERBUILDING - 1974 STYLE*

There are overbuilds in many places. Some are relatively minor where two systems build into adjoining (probably non-city) areas to serve subdivisions not directly a part of a municipal area. Others are flagrant attempts to run the first system out of business.

*Why do overbuilds occur?* Probably two major factors contribute to overbuilding. The first is greed. There is a system in the outback of Texas which had originally found its funding at a local bank. The system had a potential of perhaps 600 homes and the town needed CATV in the worst possible way. The

town is so far from any television stations that even with careful choosing of the head end location, large antennas, and ultra low noise pre-amplifiers, the 150 mile plus signals just are not very reliable. Still, it is the best service a man could afford to provide to a town with so few potential subs and so far from any TV transmitters.

The system did quite well. About 450 homes connected up in fairly short order, and the local banker watched his loan security grow. Then one day the banker decided having a piece of the principal was better than all of the interest so he went to the system owner and made his demand. The owner balked and the banker then went to the town

**"Today there are two systems in town; nobody wins in this one. . ."**

council and secured his own "franchise". Today there are *two systems* in that town, both delivering essentially the same quality service. And each has around 225-250 subscribers. *Nobody wins in this one.*

Then there is the absentee owner syndrome. A large MSO group had built a system in a town of 50,000 plus people. The system was badly needed and the growth rate was good. But the money the system generated was going out of state to a distant home office.

A local businessman saw the potential and greed set in. He put together a local group of investors and they built a second system, parallel to the first one, throughout the town. Today both systems offer essentially the same services, and both have around 6,700 subscribers. Where one really first rate system of 13,000+ subscribers could be heavily involved in off-the-air plus substantial (needed) local origination, two systems with more than 325 miles of combined plant fight it out for drop offs and the other system's subscribers, averaging under 41 subs per mile each when they have over 80 per mile combined. *Again, nobody wins in that one.*

**". . .a local TV shop owner felt he was being subjected to unfair business practices. . ."**

There is the second most "popular" reason for overbuilding: *political persuasion.* Frankfort, Kentucky is perhaps an example of this sort of situation where the municipality itself got involved in the CATV system ownership, but it did so as a *direct competitor* of the existing private enterprise system already there (and struggling). A small Oklahoma town of 1,750 people and perhaps 500 potential subscribers is going to be a real test case before it is finished. The original system operator began service in 1962 with a low band only system and five channels. The system was constructed for the most part on its own poles.

A local businessman who operated a TV service shop apparently felt he was being subjected to discrimatory business practices by the system operator and he attempted to get the city council to force the system operator to *upgrade* his service. When the system operator refused, the local businessman/TV repair shop owner decided the only way to get the system operator to move was to threaten to build a new "modern" system. Only after the local businessman had obtained a franchise the system operator still refused to do anything. So the local businessman, to save face with his town, *went ahead* and filed with the FCC for a Certificate of Compliance and proceeded with plans to build his own system.

At that point the initial system operator decided he *had better do something.* Unfortunately he went about it incorrectly. He asked the city council for a new franchise, a 25 year term franchise (this was in 1973 long after the Commission had decreed 15 year term maximums) and he promised that if he got the 25 year renewal term he would update his system for twelve channels and add channels to the five he carried. The city gave him his 25 year franchise and sure enough he added four or five additional signals. Only he did not *bother* to go to the FCC with his

new franchise (which would have flunked anyhow) *or to get permission* to add the new channels to his system.

Today the second system is nearing completion. It is carrying ten channels, all certified by the Commission. The older system is carrying nine or ten channels also, but the fellow who owns it faces some real problems in Washington when the Commission discovers he has a new out-of-compliance franchise granted in 1973 and has added numerous signals to his service without CAC action. Normally in a situation where an operator "errs" and receives a new out-of-compliance franchise and adds channels without CAC approval, the Commission would look first at the impact on the community. If shutting the system down, or forcing it to go back to its original five channels while it applied for CAC's on the new ones, would deprive the public of needed cable services, the Commission might tend to be lenient on the operator. However, when the town *also has* an operating system with the same channels that *does have* its Certificate of Compliance, it is just possible that the Commission may throw the book at the older grandfather operator who went ahead and obtained a new, out-of-compliance franchise and added channels.

**"Again. . .nobody wins in this one"**

In the interim the older operator has cut his monthly service rates *in half* apparently on the theory that he can starve the competition out. *Again, nobody wins in a situation like this.*

Where is all of this leading us, as an industry? Time will tell, and we will see as this series of reports on preparing for 1977 continues in future issues of CATJ.

*NEXT MONTH IN CATJ . . . . . PART ONE/UNDERSTANDING FSM's*

# BUILD THE WHOLE PLANT WITH LINE EXTENDERS

*WHY NOT?*

When the majority of us think about line extenders, we tend to envision a series or cascade of two to three units following a bridger output. In larger systems there is no question (or will we suggest to the contrary) that this is a must approach. The integrity of the trunk *must be maintained.* In older systems, with multiple pressure taps and/or directional taps without seized center conductors, the idea of keeping the feeder lines as autonomous as possible from the trunk line was (and is) a good idea.

*But. . .what about the new, now being designed, small(er) system;* the system with five to ten miles of distribution plant. On the one hand we have ever spiraling costs associated with increasing cable and hardware costs, increasing amplifier costs and last but hardly least the gradual erosion of the labor base costs to install a mile of *plant.* Today we have high-quality (i.e. high isolation) directional taps with seized center conductors. We also have higher quality (i.e. better cross mod rated) line extender amplifiers. Perhaps it is time for small(er) system builders to give *serious reconsideration* to designing a plant with a tapped trunk (or all feeder) approach.

*THE ECONOMICS*

Naturally we are interested in this approach only if it will save money for initial capital outlay and not affect the quality of of the service to our subscribers. If it will do both *there may well be a number of small towns of 250 to 2,000 population* badly in need of cable. If we use this approach we can install CATV, *but* if we are *forced* to use accepted trunk *plus* feeder techniques the economics will not allow a CATV system to be built.

*The advantages to this approach are as follows:*

(1) No feeder lines paralleling trunk lines (eliminates expensive double cabling);
(2) No expensive (relative to line extenders) trunk amplifiers;
(3) No expensive (relative to line extenders) bridger amplifiers;
(4) No overlashed cable (why not simply use integrated messenger cable?);
(5) A minimum of capital tied up in spare, standby amplifiers or modules, since all (line extender) units use the same type of module;
(6) Reduced maintenance costs (simple system) and lower system complexity (i.e. one set of numbers for the entire plant, not one set for the trunk and one set for the feeders).

So much for the advantages. Naturally there are some *disadvantages* also.

(1) Possible disruption of service for the entire plant beyond a certain point if an amplifier quits or connector pulls (or a tap fails, although this should be rare with today's high quality taps);
(2) Possible picture degradation due to unterminated drop lines or feedback

by:
*S.K. Richey*
*Richey Development Company*
*Oklahoma City, Oklahoma*

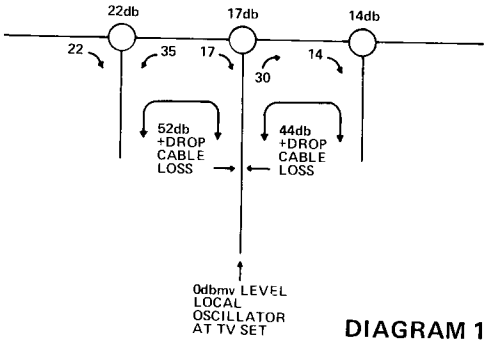



**DIAGRAM 1**

through the drop from a runaway local oscillator in a TV receiver;

(3) Possible amplifier-additive degradation due to line level changes;

(4) Possible trouble with cross modulation because we must run the line extender at a fairly high output level to facilitate *efficient tapping* procedures.

As for savings, it should be readily apparent that if you can eliminate the trunk cable and trunk (plus bridger) amplifiers, you have saved several thousand dollars even in a small system.

The key, or at least one important key, is the *quality* of today's line extender amplifiers. To establish design criteria for what follows, CATJ looked at the specs for several amplifiers now on the market and developed the following standards for the system designs to follow:

1. *Gain*. . . . . 24-26 db
2. *Cross Mod* at 50 dbmv output for 12 channels. . . . . -57 db
3. *Cross Mod* at 42 dbmv output for 5 db block tilt. . . . -73 db
4. *Cross Mod* at 35 dbmv output for 5 db block tilt. . . . -87db
5. *Noise Figure*. . . . . .12 db
6. *AGC*. . . .available as option
7. *Equalizer*. . . .plug in type

If you will check these standards against data sheets now available from a number of manufacturers you will find that *this type of performance is available* from any number of plant equipment manufacturers.

## *OBJECTION-CONNECTORS*

To answer the first objection, it should be obvious that a seized center conductor fitting, properly installed, should all but totally *eliminate the chance* for a connector related outage.

## *OBJECTION-AMPLIFIERS*

Anyone currently using recent vintage plant line extenders is already impressed with their reliability. It simply should not be a problem. And when there is an outage, the modular "snap-in" design of today's line extenders should facilitate quick service restoration.

## *OBJECTION-TAP DISCONTINUITIES*

By utilizing today's high quality directional taps or couplers from plant service lines to the home drop, ghosting caused by non-terminated drops and local oscillator feed back should be not less than 40 db down (plus the natural loss of the drop cable). Running the numbers Diagram 1 is a depiction of three taps in a system with the television set connected to the middle DT and a local oscillator radiation *output* of 0 dbmv.

Notice that the level at the 22 db tap is down 52 db and at the 14 db DT the undesired oscillator is down 44 db. In both cases this is adequately down to meet FCC specs (1).

## *OBJECTION - LEVEL STABILITY*

Line extenders are available today with AGC for approximately $20.00 more than with manual gain. If each and every line extender AGC'd by the AGC system, levels should be constant at the end of a 10 amplifier cascade within 2 db without any need for seasonal adjustments.

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*(1 - Section 76.605 (a) (11) states "Terminal isolation provided each subscriber shall be not less than 18 db, but in any event shall be sufficient to prevent reflections caused by open-circuited or short-circuited subscriber terminals". Section 76.605 (a) (10) states "The ratio of visual signal level to the rms amplitude of any coherent (such as a receiver local oscillator) disturbance shall be not less than 46 db".)*

CROSS MODULATION COMBINING DERATE: FOR DISSIMILAR AMPLIFIERS

| DIFFERENCE IN dB | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | 6.02 | 5.97 | 5.92 | 5.87 | 5.82 | 5.77 | 5.73 | 5.68 | 5.63 | 5.58 |
| 1.0 | 5.53 | 5.49 | 5.44 | 5.39 | 5.35 | 5.30 | 5.26 | 5.21 | 5.17 | 5.12 |
| 2.0 | 5.08 | 5.03 | 4.99 | 4.94 | 4.90 | 4.86 | 4.82 | 4.78 | 4.73 | 4.69 |
| 3.0 | 4.65 | 4.61 | 4.57 | 4.53 | 4.49 | 4.45 | 4.41 | 4.37 | 4.33 | 4.29 |
| 4.0 | 4.25 | 4.21 | 4.17 | 4.13 | 4.10 | 4.06 | 4.02 | 3.98 | 3.95 | 3.91 |
| 5.0 | 3.88 | 3.84 | 3.80 | 3.77 | 3.73 | 3.70 | 3.66 | 3.63 | 3.60 | 3.56 |
| 6.0 | 3.53 | 3.50 | 3.46 | 3.43 | 3.40 | 3.36 | 3.33 | 3.30 | 3.27 | 3.24 |
| 7.0 | 3.21 | 3.18 | 3.15 | 3.12 | 3.09 | 3.06 | 3.03 | 3.00 | 2.97 | 2.94 |
| 8.0 | 2.91 | 2.88 | 2.86 | 2.83 | 2.80 | 2.77 | 2.74 | 2.72 | 2.69 | 2.66 |
| 9.0 | 2.64 | 2.61 | 2.59 | 2.56 | 2.53 | 2.51 | 2.48 | 2.46 | 2.44 | 2.41 |
| 10.0 | 2.39 | 2.36 | 2.34 | 2.32 | 2.29 | 2.27 | 2.25 | 2.22 | 2.20 | 2.18 |
| 11.0 | 2.16 | 2.13 | 2.11 | 2.09 | 2.07 | 2.05 | 2.03 | 2.01 | 1.99 | 1.97 |
| 12.0 | 1.95 | 1.93 | 1.91 | 1.89 | 1.87 | 1.85 | 1.83 | 1.81 | 1.79 | 1.77 |
| 13.0 | 1.75 | 1.74 | 1.72 | 1.70 | 1.68 | 1.67 | 1.65 | 1.63 | 1.61 | 1.60 |
| 14.0 | 1.58 | 1.56 | 1.55 | 1.53 | 1.51 | 1.50 | 1.48 | 1.47 | 1.45 | 1.44 |
| 15.0 | 1.42 | 1.41 | 1.39 | 1.38 | 1.36 | 1.35 | 1.33 | 1.32 | 1.31 | 1.29 |
| 16.0 | 1.28 | 1.26 | 1.25 | 1.24 | 1.22 | 1.21 | 1.20 | 1.19 | 1.17 | 1.16 |
| 17.0 | 1.15 | 1.14 | 1.12 | 1.11 | 1.10 | 1.09 | 1.08 | 1.06 | 1.05 | 1.04 |
| 18.0 | 1.03 | 1.02 | 1.01 | 1.00 | 0.99 | 0.98 | 0.96 | 0.95 | 0.94 | 0.93 |
| 19.0 | 0.92 | 0.91 | 0.90 | 0.89 | 0.88 | 0.87 | 0.86 | 0.86 | 0.85 | 0.84 |
| 20.0 | 0.83 | 0.82 | 0.81 | 0.80 | 0.79 | 0.78 | 0.77 | 0.77 | 0.76 | 0.75 |
| 21.0 | 0.74 | 0.73 | 0.73 | 0.72 | 0.71 | 0.70 | 0.69 | 0.69 | 0.68 | 0.67 |
| 22.0 | 0.66 | 0.66 | 0.65 | 0.64 | 0.64 | 0.63 | 0.62 | 0.61 | 0.61 | 0.60 |
| 23.0 | 0.59 | 0.59 | 0.58 | 0.57 | 0.57 | 0.56 | 0.56 | 0.55 | 0.54 | 0.54 |
| 24.0 | 0.53 | 0.53 | 0.52 | 0.51 | 0.51 | 0.50 | 0.50 | 0.49 | 0.49 | 0.48 |
| 25.0 | 0.48 | 0.47 | 0.46 | 0.46 | 0.45 | 0.45 | 0.44 | 0.44 | 0.43 | 0.43 |
| 26.0 | 0.42 | 0.42 | 0.42 | 0.41 | 0.41 | 0.40 | 0.40 | 0.39 | 0.35 | 0.38 |
| 27.0 | 0.38 | 0.38 | 0.37 | 0.37 | 0.36 | 0.36 | 0.35 | 0.35 | 0.35 | 0.34 |
| 28.0 | 0.34 | 0.34 | 0.33 | 0.33 | 0.32 | 0.32 | 0.32 | 0.31 | 0.31 | 0.31 |
| 29.0 | 0.30 | 0.30 | 0.30 | 0.29 | 0.29 | 0.29 | 0.28 | 0.28 | 0.28 | 0.27 |
| 30.0 | 0.27 | 0.27 | 0.26 | 0.26 | 0.26 | 0.26 | 0.25 | 0.25 | 0.25 | 0.24 |
| 31.0 | 0.24 | 0.24 | 0.24 | 0.23 | 0.23 | 0.23 | 0.23 | 0.22 | 0.22 | 0.22 |
| 32.0 | 0.22 | 0.21 | 0.21 | 0.21 | 0.21 | 0.20 | 0.20 | 0.20 | 0.20 | 0.19 |
| 33.0 | 0.19 | 0.19 | 0.19 | 0.19 | 0.18 | 0.18 | 0.18 | 0.18 | 0.18 | 0.17 |
| 34.0 | 0.17 | 0.17 | 0.17 | 0.17 | 0.16 | 0.16 | 0.16 | 0.16 | 0.16 | 0.15 |
| 35.0 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| 36.0 | 0.14 | 0.14 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.12 | 0.12 |
| 37.0 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 | 0.11 | 0.11 | 0.11 | 0.11 |
| 38.0 | 0.11 | 0.11 | 0.11 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| 39.0 | 0.10 | 0.10 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 |
| 40.0 | 0.09 | 0.09 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 |

TO USE THIS CHART:

1. DETERMINE THE CROSS MOD LEVEL FOR EACH AMPLIFIER OR GROUP OF AMPLIFIERS WHICH ARE TO BE COMBINED
2. COMPARE THESE LEVELS TO OBTAIN THEIR DIFFERENCE.
3. USE THIS DIFFERENCE FIGURE TO OBTAIN THE DERATE ON THIS CHART.
4. DERATE THE WORST CROSS MOD LEVEL BY THIS DERATE TO OBTAIN A COMBINED CROSS MOD LEVEL.

TABLE ONE - developed from data supplied by Jerrold and Cascade

## *OBJECTION - CROSS MOD*

Before we jump into possible cross mod problems with our ten amplifier cascade of line extenders only, let's go through cross mod derating in a normal CATV system.

First we have our trunk line amplifiers which we derate down to a worst case cross mod situation of -57 db. Then we run our bridger out at a cross mod (down) point of -63 db. This is a difference (57/63) of 6 db between the two. Look at Table 1. For a difference of 6 db we have to subtract 3.53 db from our worst case cross mod (-57 db) which nets us -53.47 db.

Now a typical line extender cascade carried to its extreme is run at -63 db also. Now we combine the -63 db cross mod from the line extenders to the -53.47 db from the

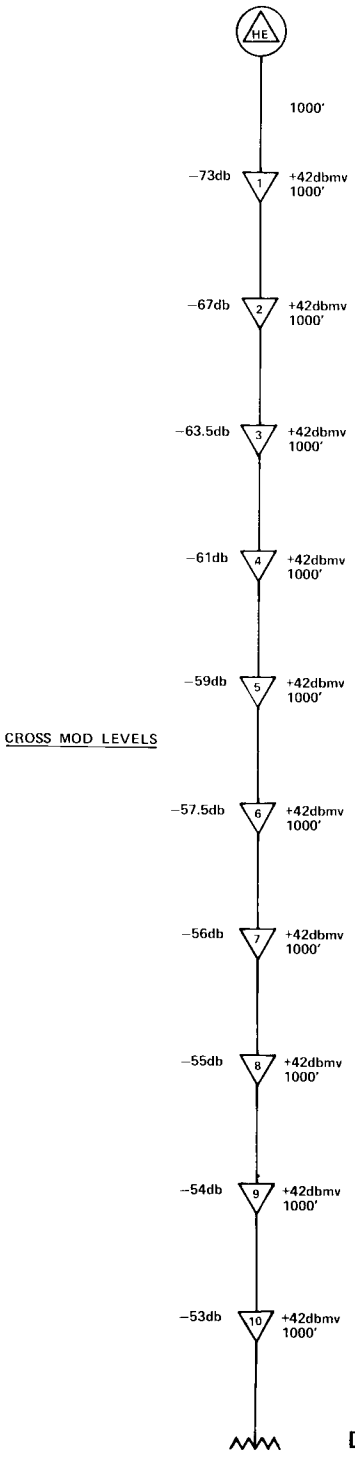



**DIAGRAM 2**

bridger, and again in Table 1 we find that we need to subtract 2.51 db from the -53.47 which leaves us with -50.96 (call it -51) db.

In a *typical* modern system, with a full cascade run of line extenders, we are actually -51 db for cross mod in a typical (*real-life*) situation.

At the same time, most of the cross mod (and concern for same) is really back in the trunk amplifiers and bridgers anyhow.

Diagram 2 shows the actual cross mod (calculated using Table 1) of a derated system for a cascade of ten line extenders running out at +42 dbmv. The important point to notice is that at the 10th line extender the cross mod is only -53 db, or 2 db *better* than would be tolerated in a so-called conventional system. Actually we *could* carry this out to the 12th line extender amplifier and still be at -51.42 db on cross mod.

This works out to 11,000 feet of direct plant (2.083 miles) in plain old every day .412 cable (2.55 db at channel 13). Naturally a man could use more exotic cable, larger cable, etc. and pick up quite a bit of extra mileage *if* the system and costs justified additional runs.

In a real situation where the plant was not all down one straight run (we usually have at least a few side runs involved) you would carefully use directional line taps and splitters and this approach can easily add up to 5 to 8 or 10 miles of total cable plant with nary a bit of trunk involved.

## *OBJECTION - TOWER DISTANCE*

Suppose the tower is a mile (or more) out of town? How can a system afford to use up 50% (or more) of its cascade ability just getting into town?

Diagram 3 shows a cascade of four line extenders used as *"trunk amps"* with 10 db inputs and 35 db outputs spaced at 1,923 feet in .500 cable. After the fourth (trunk) extender we short space at 1,384 feet in .500 cable and go directly *without a bridger* into line extenders running out at +42 dbmv and

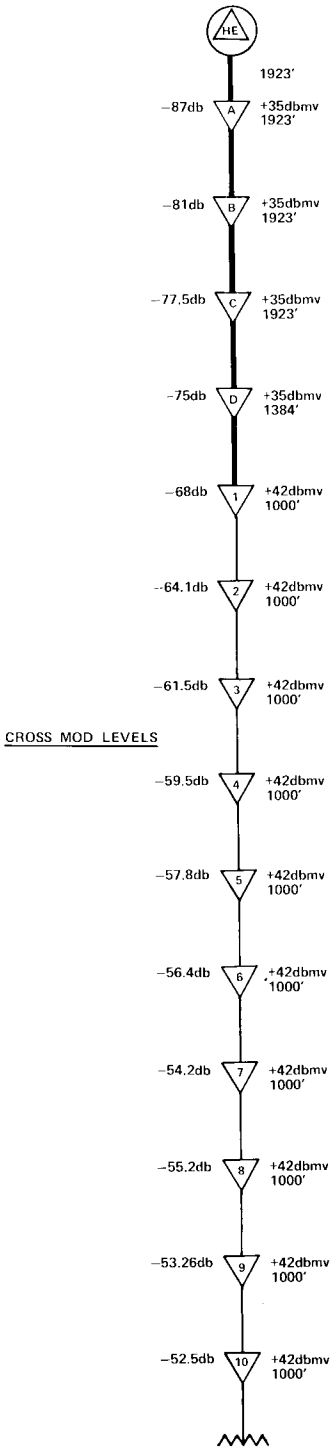



**DIAGRAM 3**

spaced at 1,000 feet in plain old .412 cable. As you can see in Diagram 3 the cross mod at the first *trunk* is -87 db and after the fourth trunk it has dropped to -75 db. Then each *customer extender* (as opposed to *trunk extender)* is derated per the chart in Table 2 resulting in the cross mod at the tenth customer extender (fourteenth total amplifier of same extender variety) of -52.5 db. This is still well within acceptable limits.

If we look at the problem as being two separate cascades, the first being four deep, Table 1 shows that we must subtract 12 db and we end up with a cross mod of -73 db. In the second cascade of ten extenders we have a derate in 10 amplifiers of 20 db. And that gives us 73-20 or -53 db cross mod. In Table 2 we can also see that for a 20 db difference we have to subtract 0.83 db or 53 - 0.83 which is -52.17 db cross mod. That is very close to our calculations of -52.5 db in Diagram 3.

## *POWERING PROBLEMS*

Most line extenders available today were designed around the Western Electric specs set forth nearly a decade ago when Telco was leasing back systems all over the country. That spec calls for 6 amp *through power handling capacity,* an amount that will keep you well out of trouble.

Different line extenders draw different amounts of current; some are voltage conscious. With a switching regulator type of extender, typical current draw values per line extender are around 250 mA. Other approaches have current draw per amplifier as a function of voltage supplied to the amplifier. One popular series draws approximately 350 mA on 45-60 volts while the same line extender draws 800 mA at 20-26 volts.

The same approach to directional taps indicates that typically *5-6 amps through current* is specified.

Normally you would locate your power supply near the plant *mid-point* and you will probably run out of voltage (especially with .412 cable) before you run out of current handling ability.

NOISE AND CROSS MODULATION DERATE: CROSS MODULATION DERATE ON 12 CH. SYNCHRONOUS

| NOISE DERATE | AMPS IN CASCADE | CROSS MOD DERATE | NOISE DERATE | AMPS IN CASCADE | CROSS MOD DERATE | NOISE DERATE | AMPS IN CASCADE | CROSS MOD DERATE | NOISE DERATE | AMPS IN CASCADE | CROSS MOD DERATE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 0 | 12.04 | 16 | 24.08 | 14.91 | 31 | 29.83 | 16.63 | 46 | 33.26 |
| 3.01 | 2 | 6.02 | 12.30 | 17 | 24.60 | 15.05 | 32 | 30.10 | 16.72 | 47 | 33.44 |
| 4.77 | 3 | 9.54 | 12.55 | 18 | 25.10 | 15.19 | 33 | 30.37 | 16.81 | 48 | 33.62 |
| 6.02 | 4 | 12.04 | 12.79 | 19 | 25.58 | 15.32 | 34 | 30.63 | 16.90 | 49 | 33.80 |
| 6.99 | 5 | 13.98 | 13.01 | 20 | 26.02 | 15.44 | 35 | 30.88 | 16.99 | 50 | 33.98 |
| 7.78 | 6 | 15.56 | 13.22 | 21 | 26.44 | 15.56 | 36 | 31.13 | 17.08 | 51 | 34.15 |
| 8.43 | 7 | 16.90 | 13.42 | 22 | 26.85 | 15.68 | 37 | 31.36 | 17.16 | 52 | 34.32 |
| 9.03 | 8 | 18.06 | 13.62 | 23 | 27.23 | 15.80 | 38 | 31.60 | 17.24 | 53 | 34.49 |
| 9.54 | 9 | 19.08 | 13.80 | 24 | 27.60 | 15.91 | 39 | 31.82 | 17.32 | 54 | 34.65 |
| 10.00 | 10 | 20.00 | 13.98 | 25 | 27.96 | 16.02 | 40 | 32.04 | 17.40 | 55 | 34.81 |
| 10.41 | 11 | 20.82 | 14.15 | 26 | 28.30 | 16.13 | 41 | 32.26 | 17.48 | 56 | 34.96 |
| 10.79 | 12 | 21.58 | 14.31 | 27 | 28.63 | 16.23 | 42 | 32.46 | 17.56 | 57 | 35.12 |
| 11.14 | 13 | 22.28 | 14.47 | 28 | 28.94 | 16.34 | 43 | 32.67 | 17.63 | 58 | 35.27 |
| 11.43 | 14 | 22.92 | 14.92 | 29 | 29.25 | 16.44 | 44 | 32.87 | 17.71 | 59 | 35.42 |
| 11.76 | 15 | 23.52 | 14.77 | 30 | 29.54 | 16.53 | 45 | 33.06 | 17.78 | 60 | 35.56 |

TABLE TWO developed from data supplied by Jerrold and Cascade

## *CONCLUSION*

CATJ hopes that this kind of "think about it" article *will start you thinking* about how you can save money without cutting important service quality corners in your next small(er) system. Naturally it would be impossible to give a complete plant layout that would suit *your situation* in one "cover it all" feature. By the time you add in (on paper) your own variables, splitters, directional line taps for splitting, your selection of cables, etc. you will be able to calculate your own "tapped trunk" system costs vs. the more conventional trunk and feeder system.

## MORE ON ATS-6

It was **intended** and **planned** that a full description of a do-it-yourself earth receiving terminal for the ATS-6 satellite program would be offered in this issue of CATJ.

Between the date the August feature was prepared (mid-July) and the deadline for this issue (mid-August) CATJ has been successful in getting the antenna, preamplifier, and RF to video portion of our receiver unit perking; which is more than we can say for many of the sites installed by Hewlett Packard for the program!

However, we have a problem that we **share** with the sites now in the field. It seems that when the uplink portion of the package was planned, a very unusual amount and type of video **pre-emphasis** (or planned distortion) was built into the package. For whatever reason this pre-emphasis was "built-in", there are a number of technicians and engineers associated with the project who now wish more attention had been given to this phase of the project.

The receivers built by H-P naturally have **de-emphasis** built in to **compensate** for the pre-emphasis at the uplink end. Unfortunately, the de-emphasis networks built into the ground receiving terminals were constructed or designed with 10 and 20% resistors and capacitors, which is another way of saying **"they are not very precise"**.

The end result is a video/sync stability problem at receiving terminals. There is plenty of RF (i.e. received signal level) present and we can verify that. But the end result, badly distorted video, is something else.

It is correctable we are told, and we agree that it should be. But **how** it is going to get corrected and **how fast,** we cannot report.

We are staying close to the people running the project, and out of their way, while they work on the problem. Then, we will pick up this series as promised and continue with detailed plans for the construction of your own CATV system receiving terminal for ATS-6.

# TECHNICAL TOPICS

## REVIEW- SP-1 MINI-MIZER

**Brown Electronics,** Liberty Street, Barbourville, Kentucky 40906, has over 400 of their **Mini-Mizer** units in service now in 70 some systems throughout the United States and Canada. Dwight Brown's Barbourville CATV system was suffering from the same type of line surges and spikes/transients which so many CATV systems fight daily. Between power company spikes (for which most power companies deny any responsibility, or even deny that they can occur) and lightning damage to amplifiers, Brown's life was seldom peaceful. But that was before he developed the **Mini-Mizer.**

The **Mini-Mizer** is a sophisticated surge/transient/lightning strike protection package that installs between your AC main source and your CATV power supply. In the case of the head-end, it goes between your head-end equipment and your AC line.

CATV operators who have bought and installed the **Mini-Mizer** have been telling CATJ about the unit for several months, so we decided to see what all of this good talk was about.

We set out to deliberately destroy the **Mini-Mizer** only we wanted to know what the operating parameters were when it (finally) failed. The boxed report here tells what we did and what the **Mini-Mizer** did in return.

The **Mini-Mizer** can be hung by two keyed holes on the mounting plate or it mounts in an optional weatherproof housing. Operating on 120 VAC, 50 or 60 Hz, it will handle **continuous thru-current** of 7.5 amps, although it is rated for 0 to 5 amps continuous (at 120 VAC). The AC source "sees" the **Mini-Mizer** as a load and the CATV power supply "sees" the **Mini-Mizer** as a source. When a spike or transient comes along it is delayed a minimum of 45 milliseconds by the unit and shunted to ground. The delayed spike or transient can be up to 30 milliseconds long and still be controlled by the circuit.

Brown's experience in CATV is evident because the unit has such features as a built-in RF filter to ensure RF radiation will not occur, and it operates over the temperature range of -40 degrees to +150 degrees F.

There is a slight voltage drop through the unit (on the 120 VAC side) as each amp is

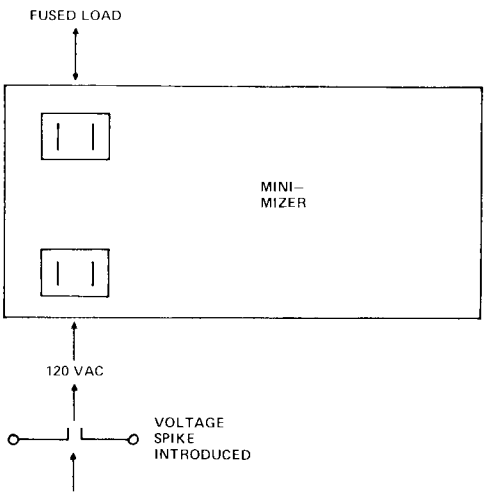
### TESTING MINI-MIZER

Testing the **Mini-Mizer** is a matter of trying to make it quit, or seeing if you can **drive** a voltage spike through the unit which will kill the equipment connected to the unit.

Following instructions from Mr. Brown, we set up as shown in the diagram here. A large electrolytic capacitor was charged with two separate external supplies: one a 680 volt supply, another a 1,000 volt supply. The "loaded" capacitor was placed across the AC input line to the Mini-Mizer at points "X", thereby inducing the loaded capacitor voltage spike to surge into the Mini-Mizer.

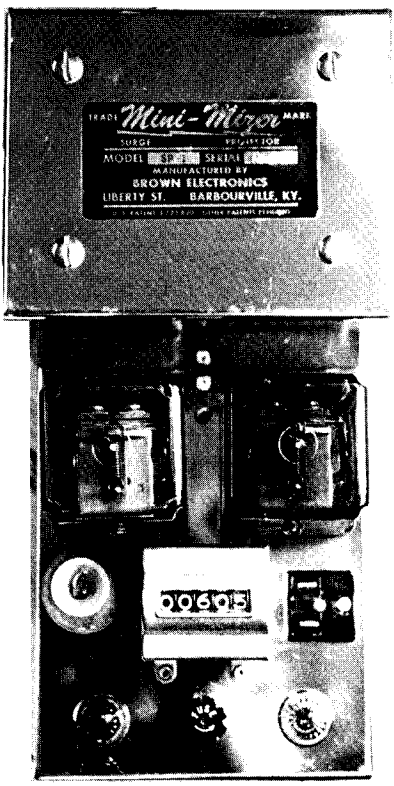
The capacitor-induced spike causes the Mini-Mizer to trip, removing voltage from the load, moving the counter ahead by one number, and then resetting after two seconds time, reapplying voltage to the load.

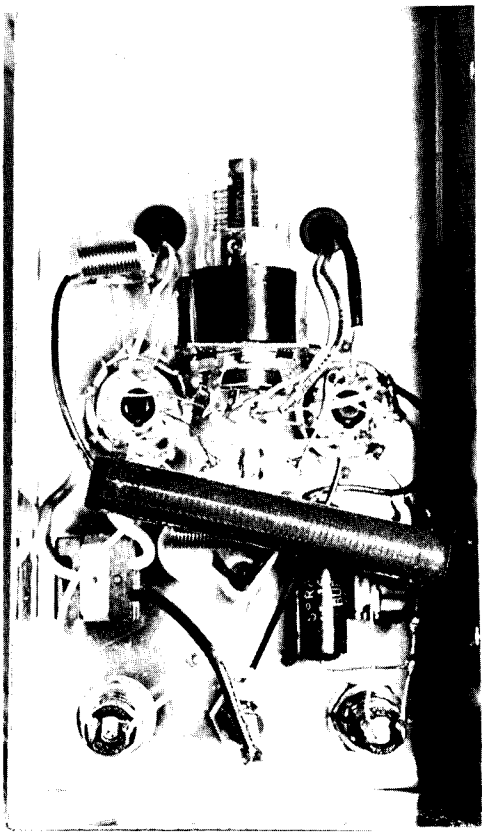
Tests conducted by CATJ confirmed that spikes of this magnitude do




in fact (1) shut down the Mini-Mizer, and (2) protect the load connected to the Mini-Mizer.

Which is what it should do.



drawn through the unit the output voltage drops 1.75 volts. The unit measures 5" x 10" x 6.5" (see photo).

One of the more interesting features is a "counter" on the unit (see photo). Each time there is a spike or transient, the counter responds by recording the event. Thus the CATV operator can readily check on the performance of the unit by noting and recording the number of spikes/transients which might have been severe enough to cause an amplifier or power supply or head-end outage for various increments such as a week or month.

Dwight Brown advises "the units are designed to operate in a well grounded system. We connect to the power company grounds at every pole (where they are available) and we haven't had any damage to our 48 main line amplifiers or our head-end equipment in the past two years".

However, as Brown warns "if a system is now well grounded it is possible for a damaging spike to be induced into the cable center conductor by a heavy lightning strike near the cable and travel into the amplifiers without giving the **Mini-Mizer** an opportunity to shunt it off to ground ".

Brown is now working on a 240 VAC version which will be intended primarily for microwave installations.

Price range of the **Mini-Mizer** is $200.

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**CREDIT WHERE DUE**

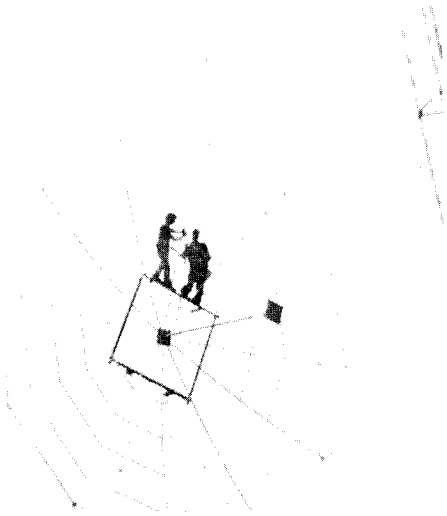
In the June issue of CATJ there appeared an article on co-channel interference, and how to deal with it effectively with antenna system phasing techniques.

It should have been pointed out that the chart appearing on Page 16 of that issue, showing horizontal spacing between identical antennas for signal nulling of precise co-channel sources, first appeared in a technical data sheet prepared by the engineering staff of **Scala Radio Corporation,** San Leandro, California. The work done by Scala in this field is indeed legendary, and while other antenna firms have contributed to the data base from which we drew in preparing our material, the Scala effort should be singled out for special mention.

**Editor:**

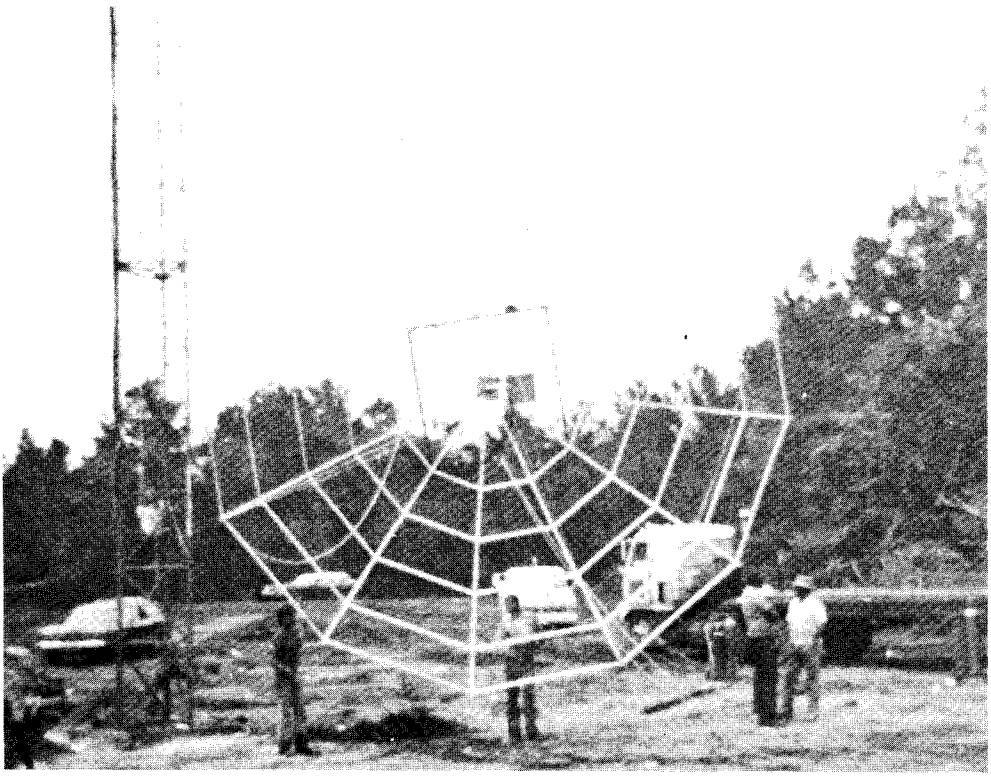
Thought you would be interested in the installation completed in late July of 24 foot parabolic for a 150 mile channel 36 here. Fortunately, we build better antennas than we take photographs! The dish was constructed per July CATJ and is installed 105 feet above ground on our 500 foot tower. Those who are skeptical of the "lightweight aluminum construction" probably will have faint hearts when they notice the two workmen "riding the dish up the winch line" in the photo here. We are shooting for what I call 70/90/70 reception: "70% of the people will find the reception 90% acceptable 70% of the time". Channel 36 is a much needed independent here, and until we can get it in on microwave, the 24 foot parabolic is our answer. If we could learn how to control the 60-70 db up fades we might not need microwave at all!

Bill McVay
Coastal Cable Company
N. Myrtle Beach, S.C.



**ABOVE** - 400 pound of tower crew ride the big array up the winch line to the eventual home, 105 feet above ground!

**BELOW** - 24 foot aluminum ribbed array constructed at North Myrtle Beach prepares for launching.



Editor:

The article on Parabolic antennas in the July CATJ was most interesting. Perhaps you can answer some questions I have.

The data you give specifies a single channel. Other data I've seen quotes the possible use of several channels if in the same general direction and perhaps no more than 20-30 degrees apart. Other data not given in the article relates to ghost-rejection, one big reason for our building one of these antennas.

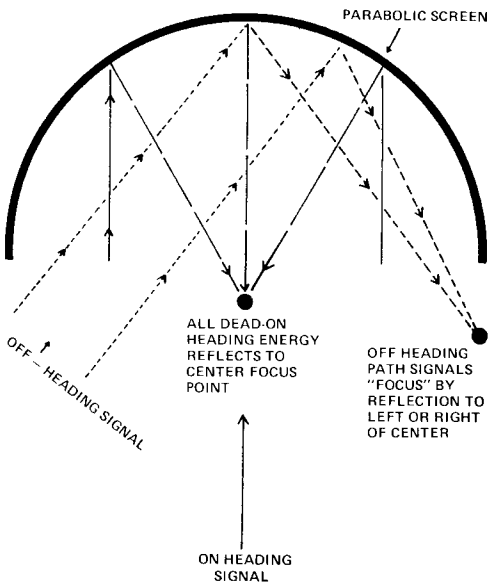
Our application for a parabolic involves a situation near a busy highway, so high rear noise rejection is required. And three or four channels, all of which have multi-path ghosts and are received 0-30 degrees apart. Will the parabolic design do the trick?

We would also like to know if more detailed plans are available with the kit and who makes the kit? Finally, I would like to comment that there has long been a need for a purely technical magazine of this type. Thank you!

J.J. Mueller
EMCO CATV, INC.
Manchester, Vt.

Mr. Mueller:

**Because the focus point of the dish is a true point (within the vertical up and down plane limitations discussed on Pages 16 and 17) signals that come to the dish from any heading other than dead on (see sketch here) end up being focused not at the main focal point but at some focus point left or right of**



**center. In effect, as you go further and further off of the main dead-on heading, less and less of the curved parabolic surface "sees" the signal and in addition to "shifting" the focus point left or right of the main dead-on focus point, you also lose gain. Beyond 15-20 degrees off dead-on your gain has dropped off by 30-50% of main lobe gain. If multi-path ghosts are widely offset on the screen (indicating wide path dispersions) the sharp focus-point-beamwidth of the parabolic would undoubtedly greatly reduce any apparent multi-path signals. They would be arriving at some angle to the parabolic screen BUT dead-on, and would in effect "focus" left or right of center. The front to back ratio of the parabolic seldom will exceed 25-30 db in actual practice, about what you could expect with a CATV quality log. There may be no more help for your rear auto ignition problem than with logs. However, auto ignition is usually not severe at high band VHF and is almost unheard of at UHF. The 24 foot model is not large enough for low band VHF. Our 24 foot "kit" is put together by a small Oklahoma City firm that specializes in custom VHF and UHF communication antennas. Under contract to a CATV equipment supplier, they recently completed installation of a 24 foot model 105 feet above ground in South Carolina on a 147.9 mile channel 36 path. Initial results (using an entirely new approach to UHF scatter fading rate control) looks so promising CATJ plans a feature on this installation late this year.**

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Editor:

I wish to comment on the article on parabolics (**July CATJ**). The historical background is excellent. You might also mention that Stan Hosken built an 80 foot (true) parabolic for the Ottawa, Ontario system and it is supported 200 feet in the air for VHF reception. It was built five years ago to "professional standards" and was a very expensive installation. To my knowledge it is still in use.

The company with which I am associated, Maclean-Hunter, still have several "dew line" type antennas in use. Our later models were built on wood pole structures and are about 60 feet high by 300 feet long. They have no "vertical curvature" and the focus is a "line" at the focal point rather than a "point". We use a stacked log periodic array or zig-zag, designed to properly illuminate the "dish". The screen wires are insulated from the structure and can be heated by electric current flow to prevent ice formation during freezing rain and sleet conditions. We put about 50 KW through the screen in this anti-ice mode.

These antennas will be phased out (of service) just as soon as we can microwave to feed the systems involved. Any signal situation in which one of these big antennas is appropriate is so marginal that our subscribers just won't put up with (wide signal variations) anymore. They demand Grade "A" reception and only microwave will provide totally blemish free pictures from the more distant stations.

We are using parabolics extensively for UHF reception. In these cases we buy "conventional dishes" from established manufacturers - usually grid screen or parallel bars, such as the Mark Products antennas. You can buy a very good 10 foot dish for less than $1,000. Any UHF situation requiring more than a 10 foot dish has special problems and maybe you should be microwaving from a closer location.

Incidentally, the major factor affecting the designs and construction of the antennas we buy is insurance. All of our systems are insured against wind and ice damage and also against a loss of revenue from loss of head-end tower and antennas. The insurance company requires that all of our antennas and structures be designed or approved by a consulting engineer specializing in structures. I don't think the homemade 24 foot parabolics described in CATJ would meet our consultant's requirements or those of CSA or EIA for strength. The basic criteria are 100 mph wind and 1/2 inch ice loading. The older dewline types we have won't meet this spec and are not covered. We protect them with electric heating however as our own form of "insurance". A 24 foot parabolic to meet EIA and CSA wind/ice loading specifications would probably cost around $25,000 and take a corresponding tower structure to support it.

Finally, I want you to know how much I enjoy CATJ. It is a great publication.

I. Switzer, P. Eng.
Consulting Broadcast Engineer
Switzer Engineering Services Limited
Mississauga, Ontario

Sruki:

**Only the Canadians would be concerned enough with maintaining customer service to invest in deicing equipment on 300 foot parabolic screens! And only a fellow with his head buried deep in the sands of the Florida Keys would dare suggest that the Canadians are NOT the real innovators of this industry!**

**Editor CATJ:**

The August issue report on parabolics might be expanded to include some additional data. While it is true that with an f/d of 0.5 and a dipole/reflector feed (design), a parabolic is generally assumed to be no more than 50% aperture efficient. **It is possible** to realize in real life 5-6 db additional gain beyond 50% efficiency.

The trick to to throw out old "notions" about linear (i.e. horizontal in the case of CATV off-the-air signals) feeds, accepting the **fact** that beyond-the-horizon signals have anything but a linear polarization.

The transmitted wavefront will leave the transmitting antenna horizontally polarized, and in fact once the signal progresses into the "scatter region" the wavefront has skewed, and is changing polarity almost constantly (in the scatter mode) with respect to the plane of the earth. Thus a system operator going to the expense, time, and trouble of building a large parabolic should not stop with the design and installation of a purely (horizontal) linear feed, because in so doing the operator is throwing away additional aperture efficiency for that **percentage of time** during which the arriving wavefront is no longer horizontally polarized. The answer is a feed with crossed dipoles (i.e. one vertical and one horizontal) which is somewhat better than a pure horizontal linear feed (but still not perfect because how often is the arriving wavefront purely vertical **or** purely horizontal?), or better yet, a circular feed which is not responsive to individual polarization planes. Additionally, the dish should be designed for an f/d of 0.47 because beamwidth of this type of feed (crossed dipoles) is approximately 104° and an f/d of 0.47 is properly illuminated with a 104° feed antenna beamwidth.

The parabolic designer after maximum control of side lobes from the antenna chooses an f/d of 0.50. If you are scanning the horizon for "bogies" (such as in radar work) side lobes become paramount (who wants to have an airplane off to the side show up as a front-lobe!). There is an additional few db (perhaps 3) to be achieved if the dish designer builds for an f/d of 0.47. When you couple this with the additional realized gain of a non-linear feed, the net result can be a substantial improvement over a straight linear feed 0.5 f/d antenna.

Finally, if you boil this down into a table (Page 30 CATJ July), and translate dish gain (a form of size measurement) into 3 db beamwidth patterns, you find:

| Parabolic Gain | 3 db beamwidth (1) |
|---|---|
| 13 db | 40 degrees |
| 16 db | 30 degrees |
| 20 db | 20 degrees |
| 26 db | 10 degrees |
| 32 db | 5 degrees |
| 38 db | 2.5 degrees |
| 46 db | 1.0 degrees |

(1 — horizontal and vertical beamwidths)

Tony Bickel
Chief Engineer
CADCO, INC.
Oklahoma City, Oklahoma

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Editor CATJ:

The July CATJ (Cable Captions, Pg. 5) contains a report on the Applications Technology Satellite (ATS-6) experiment that may inadvertently be misleading to cable operators who are seeking information in this area of communications networking. Nothing in the news item was inaccurate but the reader is left with the impression that a $3,000 or $4,000 satellite receiver is now available for video distribution service. If this were so, anyone who would suggest the purchase of a receiver (station) 20 times more expensive should clearly have his head examined. Here are some facts concerning ATS-6 that may help establish the proper perspective:

1. The ATS-6 is a complex experimental space vehicle. It cost in excess of 60 million dollars. (By comparison, Westar cost about 7 million.) The launch vehicle is large and expensive, possibly twice that of the Westar launch.
2. Solar power for the ATS-6 transponders is concentrated into two (potential) video channels (Westar has 12 video channels).
3. The "footprint" of the ATS-6 in the 2.5 GHz band is less than 10% of the area of the continental United States. Therefore it is not suitable for national networking.
4. The 2.5 GHz band is reserved for educational and public service transmissions and has not yet been approved for commercial or carrier use.
5. The ATS-6 is already booked for the next several years and is not available for CATV service.

So in spite of the lower price tag on an earth receive station, the total cost per hour may be greater and service might not be available for many years - if at all.

True, satellite receive stations that can work today with existing and available domestic satellite carriers are more expensive than the ATS-6 receiver. Cost must be evaluated in terms of service performed - revenue producing value. If the importation of useful programming to a cable system offers revenue producing benefits greater than the cost of the program and the shared cost of the distribution system - the importation is a good buy. Here we are considering the shared cost of the distribution system. Would a user-owned satellite receive station that cost "tens of thousands of dollars" make this practical? As an exercise let's determine the cost per use, based upon these assumptions:

1. The receive station, similar to the one demonstrated at Anaheim, is $75,000 installed.
2. The equipment is amortized over 10 years on a straight line depreciation at a 15% (user) cost of money.
3. The network consists of 100 receiving points whose average "use factor" is 2-1/2 channel hours per day.
4. Each cable system in the network owns and operates its own receive station at its own head-end site (no additional real estate required). Unattended operation permits use of existing technicians and test equipment for routine maintenance.
5. Spare parts and factory service costs over the 10 year period does not exceed $30,000 (additional expenditures).
6. The current carrier rates for occasional transponder and uplink service apply and these costs are shared equally by the cable systems on the network.

Given these assumptions, (it can be shown that) the cost to each cable system for distribution of a 1/2 hour program is $15.14. If the cost of money were less (than 15%), if the number of cable systems served were larger (than 100 systems), or if the useage factor were greater (than 2-1/2 channel hours per day) the per (unit) cost would be less.

This is a reasonable cost of high quality, real time delivery of program signals which can be put into the cable system without local handling or operational expense. This figure is a small fraction of the program cost and hopefully a small fraction of the revenue producing potential of that programming. (For anyone) to suggest that the real issue of viability of national networking of programming for pay TV, commercial sponsorship, or for improving subscriber sales be postponed for several years in the hope that lower hardware costs will reduce the distribution expenses (which even now are but a small frac-

tion of total cost) does not seem to be realistic. I believe a disservice is done when anyone distracts attention from major issues and makes hypothetical comparisons between an existing commercial reality and a government funded experiment.

Robert E. Button
Director, Satellite Operations
TelePrompTer Corporation
New York, New York

**Mr. Button's concern that the current series of articles appearing in CATJ will distract from the long term program to satellite interconnect (larger) CATV systems is misplaced. As the August issue of CATJ noted, the ATS-6 program is an experimental program and we noted it will last only through the current school year. As we noted, while it is operational to North America it provides an opportunity for CATV system operators (of virtually any size) to acquaint themselves, by first hand experience, with the new world of up and down links. If we conveyed the impression that a CATV operator could go to Hewlett-Packard and purchase a $3000/$4000 earth receiving terminal for this program, we erred. We are told that H-P will not provide units for individual purchasers, that in fact all of the receivers ordered and produced were delivered directly to the project. This then leaves the CATV operator with a desire to experiment-with-the-experiment on his own, to design and construct his own earth receiving terminal. That is our function here in CATJ, to give whatever guidance we can towards achieving individual system operational earth receiving terminals.**

## SUPPORT CATJ ADVERTISERS

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## MORE - UNDERSTANDING 325

No one will be more pleased than CATJ when this fine little booklet that details how to get along with the FCC and complete your Form 325 properly (including making initial application for a CAC) . . . .is finally released and into the mail!

Getting it finally done is a little bit like trying to catch a greased pig. . .the darned thing just doesn't stay still long enough to get a handle on it!

The Commission is changing the rules to the ball game almost weekly. We have written and ripped up enough sets of instructions to fill several books. On the present schedule, it will be in the mail by the last week in September which, like washing your car, will almost surely guarantee that by the first week in October the Commission will inact a major rule change once again!

# VERY SELECTIVE RECEIVING SYSTEM FOR DISTANT FM

## *DIFFICULT OFF AIR*

In most CATV areas the quantity and quality of off-the-air FM broadcast signals is more than sufficient to satisfy subscriber needs. Seldom are CATV operators asked or told to provide off-the-air reception for cable carriage of one or more stations which are *just not technically reliable.* The nature of FM broadcasting program formats is such that if one station that might be desired cannot be brought in with adequate clarity and fidelity, one or more other stations can be "found on the dial" with a similar or identical format to satisfy subscriber needs.

There are exceptions of course. Some public broadcast stations, for example, have unique programming formats and they are highly desirable signals for that very reason. Some commercial stations have such an outstanding listener appeal (i.e. *KIOI in San Francisco)* that they are much sought after beyond their normal Grade B contours.

CATV FM signal carriage equipment falls into three broad operational categories:

(1) *Broadband signal processing,*
(2) *Individual station signal processing,* with heterodyne processing units,
(3) *Demodulator units* which take the received signal to audio, and companion cable modulators for cable carriage of the audio signal(s).

Broadband FM carriage is perhaps the simplest to install, but it leaves the subscriber's receiver at a definite disadvantage because no CATV head-end effort is made to *individually balance* the RF signal level of each station received. Digging one specific FM station out of the 200 FM channels between 88.1 and 107.9 MHz is only possible with broadband FM processing when the desired station is equal to or stronger in strength than stations +/- 2 FM channels either side of its assigned channel.

Individual station processing via heterodyne techniques offers some hope for difficult signal reception, but not when the desired station has one (or two) strong adjacent channel signals also present. Modern CATV FM heterodyne processors simply cannot function to separate a weak desired 99.7 MHz signal from one that is several times (or several hundred times) as strong on 99.9 (or even 101.1) MHz.

To achieve the kind of selectivity necessary to "find" (reliably) a distant signal on FM, it is imperative that the system designer approach the problem as a *"receiving problem"* and not as a "processing problem". Before the signal can be processed (onto the cable) it must be *received.*

## *GENERAL RECEIVING PROBLEMS*

Distant FM stations may be difficult to receive because they are some distance away or because they are not all that far away, but a much closer station is located on an *adjacent* channel. In some situations the station is both distant from you and on a frequency with a strong nearby adjacent channel signal.

Virtually all FM tuners or tuner/receivers are designed primarily with the consumer in mind. They are generally intended for use within medium to high signal level areas, and

with normal station separations between channels in use. The FCC never assigns stations in the same market area to channels closer than 3 apart, and as a consequence this 600 kHz separation in assignments within a locale has helped determine some standards for FM tuner/receiver manufacturers.

However, as you move out of a major market area, you often find a peripheral market station sandwiched in between 3-apart assignments in the major markets. In situations like this you lose the ability, with normal receiving techniques, to utilize those channels immediately adjacent (on either side) of the peripheral market station if it is near to you.

Systems that have attempted to "bring in" distant stations in a situation like this usually go through the phase of *trying* to attenuate the undesired signal with an RF in-line trap. It won't work because at 100 MHz an in-line trap is sufficiently broad that as you *selectively attenuate* the undesired station (the *close* one) you also attenuate the distant station 1, or even 5 channels away.

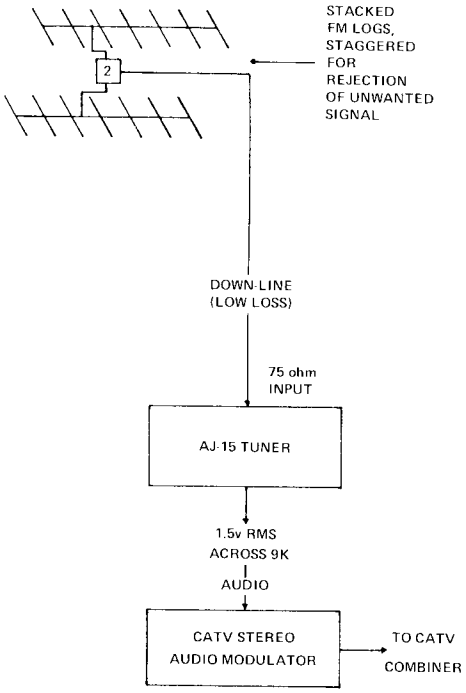



DIAGRAM 1

Then many systems go through the "get me a selective RF pre-amp" phase. Again, there is *no such animal* commercially available at this time. A "single channel" FM pre-amplifier is merely a *broad banded pre-amp peaked on a single channel* and it will amplify the undesired signal almost as much as the desired signal.

An RF pre-amplifier, if it is needed, is a sign that:

(1) The front end noise figure on the receiving system you are using is a long way from FM receivers state-of-the-art (i.e. even mediocre FM receivers have noise figures so low that an RF pre-amplifier should not help them at all);

(2) You are approaching the problem *backwards.*

What you need to do first is to *receive* the signal in the head-end with no objectionable interference. There is only one way to do this; that is with a highly selective, stable, and sensitive FM tuner (de-mod).

If you survey the tuners on the market you will eventually come to the conclusion that very few are designed like the communications receiver they truly are. Most are more interested in hi-fi than selective receiving ability and all of the engineering that has gone into them has been directed at making the average non-technical consumer *proud of his front panel.*

There is, to our knowledge, *one exception* to this general analogy. That exception is the Heath Company Model *AJ-15* FM tuner (de-mod) at a *price* which will make it worth considering for even modest size CATV systems.

The AJ-15 by the Heath Company (1) is currently in the $200.00 price class. It is a kit, in the Heathkit tradition, and should require approximately 20 hours of assembly time by someone who knows which end of a soldering iron to hold. Basically, it is a tuner that accepts 88-108 MHz input RF energy and gives you a couple of audio outputs. The output audio level is low (1.5 volts RMS across approximately 9K ohms). This is adequate to drive the audio input of any conventional FM modulator. Audio output is in stereo.

The big advantage to the all solid state AJ-15 is that it has been designed by someone who understands and appreciates communication receiver problems. This is evident to anyone who looks at the schematic and understands things like front end noise figure (CATJ measured it at 2.2 db at 100 MHz), sensitivity (1.8 microvolts produces a signal-to-noise ratio of approximately 30 db), and most important for our considerations here, selectivity.

The AJ-15 achieves its selectivity by utilizing a pair of factory tuned *crystal filters* in the 10.7 MHz i.f. section. This results in better than 70 db rejection of adjacent channel signals. In effect, a 100,000 microvolt local signal (+40 dbmv) on an immediate adjacent channel will not overpower a distant 32 microvolt signal (-30 dbmv) on the desired channel.

All of the usual audio (de-mod out) specifications of the AJ-15 are equal to or better than any CATV type FM demodulators on the market today.

The AJ-15 is gang-variable tuned and normally you might worry about drift. A number of CATV systems CATJ talked with, who have used this unit for several years, reported they have had no problems with tuning drift with the unit. Heath has done something in-

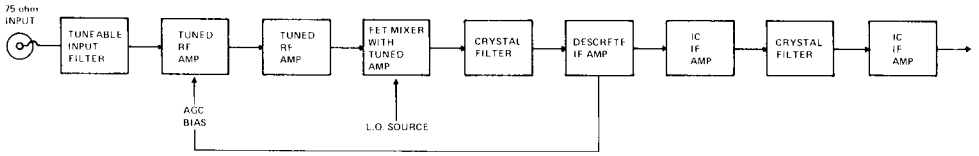



**DIAGRAM 2**

teresting with the RF front end. It employs a pair of FET's (field effect transistors) which have been selected for optimum noise figure, gain, and resistance to overload. The gate of RF transistor number one is above ground through series 100K resistors. An AGC voltage developed in the IF is coupled back to the junction of the two 100K resistors to bias down (or off) the RF preamplifier in the tuner's first RF stage when the input signal *rises* dramatically. The interesting part is that this biasing does not *begin* until the input voltage across 75 ohms has risen to *200 microvolts* or -14 dbmv. The RF stage has a wide dynamic range (from -14 to down below -64 dbmv or 50 db of range) within which the RF stage runs wide open, offering all of the gain it can muster for the weak signals. This happens to be a very desirable *dynamic range window* (-64 dbmv to -14 dbmv) for most CATV applications we have been discussing. Signals which fall in the -55 dbmv (1.8 microvolts) to -14 dbmv (200 microvolts) range are going to be noise free and that is exactly the range with which we are concerned.

*(1) The Heath Company, Benton Harbor, Michigan 49022*



CONTINUED FROM PAGE 5

the series is a simple box which reads **"S.1361 Will Get Into Your Pocket "**. That is the total (teaser) advertisement. The next ad, a day later, reads **"S.1361 Will Tax You For Watching TV "**. The series builds from there, pointing out that cable-connected homes (40% are so connected in West Virginia) are about to pay a "viewing tax". The purpose of the campaign is to alert and alarm cable viewers to the ramifications of S.1361 and to create large volumes of mail to members of the U.S. House and Senate from viewers, city councils, and everyone concerned with **"yet-one-more-tax"**. CATV operator Erickson personally has donated the funds for saturating West Virginia and Arkansas (home state for Senator McClellan) with this program. Other operators are already joining the program on a regional committee basis in other states. **CATA has prepared a series of advertisements, which are available for the asking.**

**What happens when a broadcaster is caught** in an act that raises the question as to the broadcaster's right to continue holding a federal license? Ask George T. Hernreich, owner of KAIT-TV, Jonesboro, Arkansas. On July 9 the Commission announced KAIT-TV's application for renewal of license was denied. The Commission has been reviewing the KAIT case for several years, a situation that developed when it was learned that former ABC official, Thomas Sullivan, solicited and was paid a total of $6,000 by Hernreich as "consideration" for KAIT receiving a higher network base (advertising proceeds) rate, a matter over which Sullivan apparently had control. After hearings and more hearings, arguments and evidence, FCC Administrative Law Judge Forest L. McClenning ruled that the KAIT license will **not** be renewed. At the same time the Hernreich station in Jonesboro was denied license renewal, station KFPW (also owned by Hernreich) in Fort Smith was granted a license to cover a construction permit. **Now what happens?** The Commission will direct Hernreich to **either** dispose of the property (through forced sale to a Commission qualified buyer) **or** the Commission could ask for new applications for station frequency (channel 8).

# CABLE BUREAU COMMUNIQUE

The Federal Communications Commission continues to handle actions pending before it in ways which continue to indicate current Commission interpretation of the Rules.

The Commission desire **not to become embroiled in local franchise matters** is found in a decision relating to **Frankfort, Kentucky.** Consolidated TV Cable Service, Inc. had charged that in-town competitor Community Service, Inc. was practicing anticompetitive procedures and Consolidated asked the Commission to enforce a cease and desist order against Community.

Consolidated is a privately owned CATV system while Community is allegedly municipally owned. Consolidated maintains that Community, as a "nonprofit municipally owned CATV system" operates under an agreement with the city which allows Community free (i.e. no charge) useage of municipally owned poles, and that Community use of joint-use poles owned by the City and by Southern Bell is also free of any annual charges. Consolidated also alleges that Community was able to grow into South and West Frankfort while Consolidated was denied use of poles for that area. This, Consolidated alleged, has enabled Community to gain approximately 400 subscribers while reportedly Consolidated growth has halted. Finally, Consolidated alleged that it has been forced to lower its monthly service rate to stay in business against Community competition.

The Commission admitted that Consolidated had "raised a host of issues" but noted "the pleadings were **regrettably vague** (Commission emphasis)". The Commission pointed out "it had never favored or opposed municipal involvement in cable television" and **"The City of Frankfort's direct or indirect involvement in CATV was immaterial."** The Commission further noted "We have never attempted to discourage competition between cable systems in the same geographic area but have encouraged such head-on competition through the certification process."

However, the Commission stated **"Consolidated had raised a possible claim concerning discriminatory use of pole attachment rights"** but **"it has failed to make a sufficient showing that a discriminatory situation exists in Frankfort."** The Commission did note that Consolidated was free to initiate a new proceeding if it could demonstrate the existence of anticompetitive conduct.

The Commission has once again demonstrated that the **mere filing of an alleged loss of economic base** will not keep a CATV system from carrying any and all ETV stations it can find to bring into an area. Coastal Cable TV Company, operator of new systems at **Groton, Ledyard,** and **Stonington, Connecticut** has received Certification for all three systems to include carriage of ETV station WGBH-2 Boston. The opponent, Connecticut Educational Television Corporation (WEDN-TV) had told the Commission that system carriage of WGBH would have an adverse impact on the CETC ability to raise operating and capital fund contributions. The Commission responded by pointing out that the CETC filing contained no factual evidence of economic harm to the CETC operation.

A number of Commission rulings dealing with systems operating close to major markets, but with various forms of **limited channel capacity** (i.e. fewer channels available than the rules required) continue to indicate the Commission's willingness to be practical when the situation would force a hardship on a system and its subscribers.

**Clear Cable Television Corporation, Berkley Township** and **Beechwood Borough, N.Y.** has been given until January 1, 1975 to place a converter into the home of all of its subscribers. Clear offers 15 cable TV signals over 12 channels under a dual rate structure that allows subscribers to receive 12 channels for one rate or 15 channels for a second rate. Those receiving 12 channels have several shared-time channels with partial programming from several stations. Station KYW, Philadelphia had instigated the actual complaint with the Commission by demanding that it be carried (as a must carry signal) 100% of the time on one of the 12 channels that all subscribers receive all of the time. The Commission heard from Clear that it was endeavoring to eliminate the dual-rate structure by placing converters in all homes, whereupon all subscribers would have available all of the signals on a full time basis. The Commission agreed that this was a fair solution to the problem and gave Clear until January 1, 1975 to receive the converters from the supplier and have them installed in all homes.

**Coaxial Communications, Inc.** of **Whitehall, Ohio** has received Commission approval to share the local origination facilities at the Coaxial nearby (and inter-connected) Columbus, Ohio system. In waiving section 76.251 (a) (4), the Commission noted that at the present time forcing the Whitehall system to maintain **separate local origination** and **access facilities** would not be in the public interest since such interconnected facilities were a part of the overall Columbus system.

**Sonic TV Systems, Ltd.,** a franchisee at **Highland Falls, New York** has been granted a waiver of 76.251 (a) (2) which normally requires that the cable system provide **one channel** suitable for transmission of Class II or Class III signals **for each Class I** (off-the-air) **signal** utilized in a major market. Sonic received a certificate to cable-carry 13 off-the-air signals. The rule would have required that Sonic provide at least a 26 channel capable system. However, Sonic successfully argued that the approximately 1,000 subscribers which it expected to obtain in the town of 4,600 people could not justify more than a 20 channel system at this time. The Commission agreed with the usual provision that should the situation change at a later date the system would be required to modify its channel capacity (upward) and file for recertification.

Applications by **Leesburg Cablevision, Inc.** of **Leesburg, portions of Lake County,** and **Fruitland Park, Florida** certification of the addition of two

independent signals (WSWB and WTOG, both Florida) have have been approved with a waiver of 76.251 (c). This in effect allows the system to operate from a single head end. The system will provide two access channels for now and will be prepared to increase the channel capacity to provide an additional access channel at a later date "as the need increases". The Commission agreed with the program offered.

The Commission continues to look with special regard on those **exceedingly small market television stations** who find cable making (they allege) their lives more difficult. The argument that nonduplication protection should not be afforded to a television station that had an inferior quality transmitted signal was not adequate to get a waiver of 76.91 for **Community Service Television** of **Willston, N.D.** The cable operator asked for a waiver of the nonexclusivity provisions of 76.91 because (it claimed) "KXMD-TV's signal varies drastically in video level, noise and color quality". The cable operator maintains that the TV station (a satellite of KXMC-TV, 110 miles from KXMD) receives its feed from its parent station via a microwave hop that is 65 miles in length. The cable system alleged the quality of the KXMD signal was such as to preclude it from receiving nonduplication protection. The Commission ruled in favor of the television station in requiring Community to provide nonduplication protection, and noted it was "unconvinced that the method of signal transmission employed to carry the network feed to KXMD-TV would cause the serious signal degradation alleged".

Another smaller market TV station found that the Commission was not going to rewrite the 35 mile zone rulebook just because it **alleged** economic injury from area CATV systems. Station KDUH-TV, Hay Springs, Nebraska had objected to a request for a certificate by **Community Telecommunications, Inc.** (TCI) to add via microwave Los Angeles independent stations KHJ, KTLA, KTTV and KCOP to cable systems in **Kimball, Sidney, and Alliance, Nebraska.** The Hay Springs station maintained it has lost money in 10 of the last 13 years and lost $102,000 in 1971 alone. It also maintained that 83% of its advertising trade business was from outside the 35 mile zone afforded the station (all three systems are so located). The Commission found that "the sential consideration for requests for special relief is not cable penetration or audience fragmentation; rather it is whether the impact of cable operations on station revenues and profits has affected a station's ability to serve the public interest". The Commission did not find the addition of the Los Angeles independent signals would be likely to cause the KDUH operation economic hardship.

The age old fight between a local TV station and a cable operator has been settled once again in favor of the broadcaster in **Weston, West Virginia. Weston Television Cable Corporation** had been directed to comply with the provisions of sections 76.91 (a)/76.93 (a) (network exclusivity); 76.55 (a) (2) (onchannel carriage provisions); and 76.55 (a) (3) (single channel carriage provisions). The complaining station, WDTV channel 5 Weston noted the cable company carries three other CBS affiliates: KDKA Pittsburgh, WCHS Charleston, and WSTV Steubenville (ABC/CBS).

Weston Television presented the arguments that other systems in the region did not have to limit WDTV carriage to a single channel, and that three

cable channels would be "blank" substantial portions of each day. The cable company also maintained that to be forced to "blank" its channels would result in severe economic injury to the system and that its head end was so inaccessible that it would not be able to maintain properly nonduplication equipment.

The Commission found the arguments unpersausive, and noted that while the rules allow off-channel carriage of "local signals" where on-channel carriage would be technically infeasible, Weston Television had **not** shown that carriage of WDTV on-channel would be infeasible. Consequently, the system was directed to begin providing single channel carriage of WDTV, on-channel, and to afford the station nonduplication protection.

A prospective cable operator in **Rincon Valley, Arizona** has learned that unless he has a franchise to operate his system he cannot obtain a Certificate of Compliance. Rincon Valley CATV had requested a Certificate to operate a new system within the Tucson, Arizona market. The system proposed carriage of locally available signals only. The applicant has no franchise. The applicant stated that the County Board of Supervisors for Pima County had granted no franchise and was only "considering" whether to enact an ordinance to regulate cable television in the county. The Commission found that the Arizona Legislature had on April 18, 1974 enacted a bill into law giving franchising authority to the Board of Supervisors in County Districts in Arizona and the effective date of the law would be August 9, 1974. Although the Rincon Valley application had been filed with the Commission prior to the April passage of the new Arizona law, the Commission found "the alternate proposal suggested by the applicant would serve to undermine the county's impending authority to franchise and regulate cable television ". Consequently the applicant must now go before the County Board of Supervisors and request a franchise.

A CATV system that dutifully filed its annual Form 325 with the Commission probably wishes it had not now. **REX TV, Inc.** of **Rexburg, Idaho** has been directed to comply with network program exclusivity rules by the Commission in favor of KID-TV and KIFI-TV, Idaho Falls. The system maintained, among other things, that it was a system with fewer than 500 subscribers and was therefore not required to provide the exclusivity protection required by the Rules. The system also maintained that the television stations did not place **actual** Grade "B" contours over community of Rexburg.

The Commission found the REX TV contention of non-actual coverage of the area was unsubstantiated and according to the system's most recent Form 325 filing it had 778 subscribers, slightly more than the "under 500 level status" it claimed in answering the complaint of the two Idaho Falls stations.

When a new television station comes on the air and the cable systems in the area have only five channel capacity and the TV station that must be carried will be the sixth channel, what happens? **TelePrompTer** found out in **Big Fork** and **Polson, Montana.** KPAX-TV had asked for same day protection and must carry status on both TelePrompTer systems. TelePrompTer argued that to eliminate one of the existing channels carried would disrupt viewer habits and patterns. The TV station argued that was exactly what it had in mind, so it could obtain parity coverage with a local competitor already on the air and on the cable in both communities.

The Commission agreed with the station (KPAX-TV) and ordered TelePrompTer's Polson system to provide nonduplication (same day) protection to KPAX within 30 days, and to add the signal of KPAX to both systems in the same period.

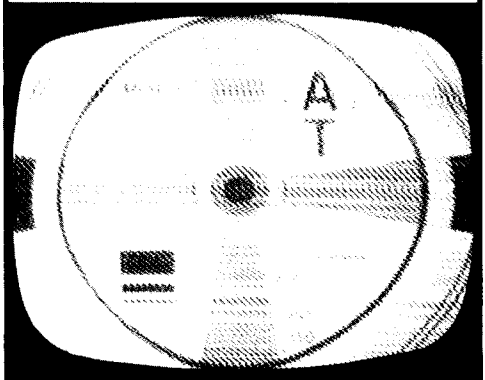
UHF station **KCBJ, Columbia, Missouri** had petitioned the system to request that future CATV systems that commence operations in that city **not be allowed** to carry signals **previously approved** for two earlier franchisees in the community. Columbia currently has no franchisee but the Commission had at one time approved that a system then qualified could carry distant signals from St. Louis and Kansas City, under old section 74.1105 of the earlier rules. KCBJ wanted the Commission to rule that no new systems built in Columbia would be entitled to such signal carriage, and cited its self-proclaimed weak financial status as a UHF station as proof of its concern. The Commission ruled to the contrary, and in effect assured whomever does in the future build a system in Columbia the right to distant carriage of St. Louis KTVI (ABC), KMOX (CBS), KPLR (Ind.), KSD (NBC) and Kansas City KCPT (ETV). However, the Commission **did allow** KCBJ some hope by pointing out that when such an application for a certificate is filed in the future that KCBJ could at that time file a protest if it could show that carriage of the signals would not be in the public interest.

**Community TCI of Ohio, Inc.** franchisee of a CATV system for **Wintersville, Ohio** has been denied a CATV certificate on the basis that the company that holds controlling interest in TCI (Tele-Communications, Inc. of Denver) has a director who also owns a controlling interest in Rush Craft Broadcasting, Inc. which operates WSTV Steubenville, Ohio. The proposed Winterville system is within the Grade "B" contour of WSTV. The Commission also found that Rush Craft directly owns 4% stock interest in TCI, Inc. Consequently, the system will not be certified for operation.

For several years the Commission has been in a quandry as to how to handle applications for **Certificates of Compliance from military base grants.** The problem, according to the Commission, is how does the "full public disclosure" and "opening hearing" procedures set forth in the rules be rationalized when in fact military bases normally contract with CATV suppliers. A number of military base CAC applications have been resting in "holding baskets" at the Commission for up to two years. Recently the Commission turned loose several of these, including one for **Telecommunications Contracting International** at **Homestead Air Force Base** (South Florida). Telecommunications proposed to carry the signals of WPLG (ABC), WTVJ (CBS), WCKT (NBC), WPBT/WTHS (ETV), WSEC (ETV), WCIX (IND), WLTV (Spanish IND), and WKID (IND). The Commission found that the "CATV Franchise Agreement" negotiated between the CATV company and the Air Force was inconsistent with the specific requirements of 76.31 (a) (1) and (4). The Air Force procedure for awarding these contracts (Air Force Regulation 70-3) was however followed. The Commission noted "because of the unusual nature of operations of military installations and the special considerations which led Congress to establish the armed forces procurement statute, it was appropriate to waive the (FCC) requirements". The Commission found the Air Force/Contractor agreement generally consistent with CATV rules in other areas.

# CAN YOU IDENTIFY

THIS INTERFERENCE?



It is lower adjacent channel interference resulting from the lower adjacent aural carrier level being 30 db stronger than the desired (test pattern) video.

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