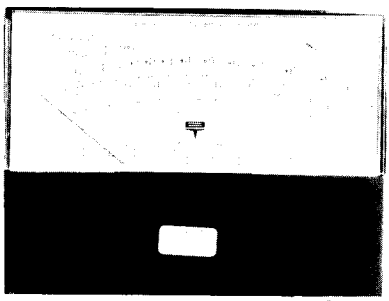
CATJ

OCT. 1974



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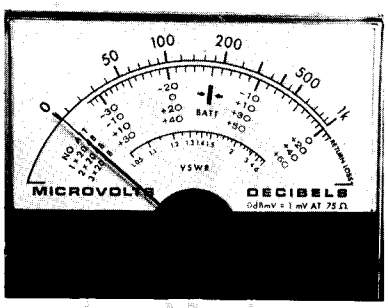

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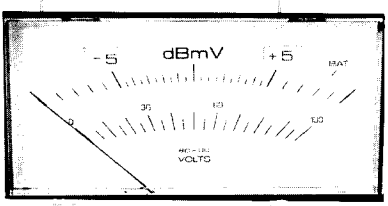

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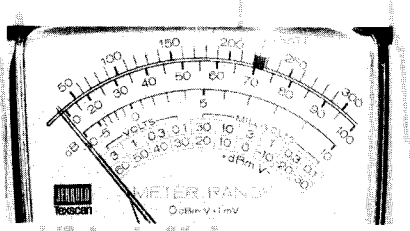

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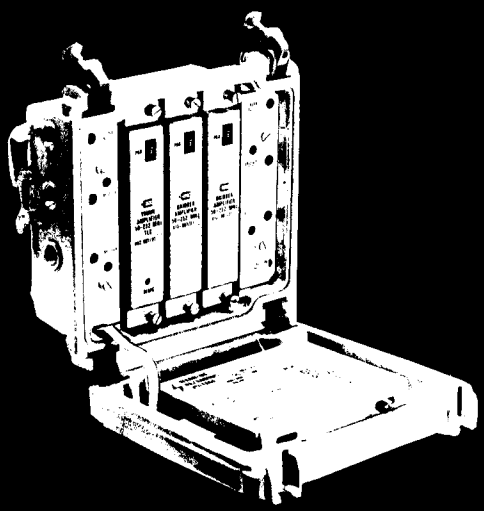

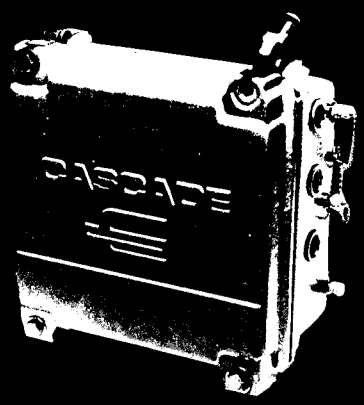

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—CONTENTS—

OUR COVER

The Field Strength Meter - what it is, how it works, and the limits of the "machine". Part One of this four-part series begins on Page 18 of this issue of CATJ.

CATA—TORIAL

KYLE D. MOORE, President of CATA, INC.

EXERCISE IN RESPONSIBLE LEADERSHIP

CATV operators from 18 states gathered in Lexington, Kentucky, October 3rd to attend a hastily assembled Copyright Summit. The purpose of the meeting was to explore the true dangers of Senate Bill 1361, and to devise a responsible method of attacking the problem.

The problem is not simply the payment of copyright. It is much more complex than that. Washington attorney Sol Schildhause and California attorney Harold Farrow talked only **briefly** of the sliding scale (½ to 2-½ percent of gross); the $12,000,000 that would take out of the industry in a year such as 1974 is "chicken feed" compared to other much greater dangers. Schildhause emphasized that the bill was filled with "hookers"; fine print language appearing not in Section 111, but elsewhere in the body of the bill. He talked for more than one hour non-stop listing "hooker" after "hooker" and explaining how they individually meant the death knell for CATV.

One example should suffice:

(1) Section 501(C) names the TV station as the **"beneficial owner of all copyrighted materials transmitted"** for the purpose of bringing suit against the CATV system, in a Federal Court;

(2) Section 111 (C) makes **you** responsible for the complete non-duplication protection (simultaneous) of all signals carried by your system from a Grade B level transmitter;

(3) Section 502 (A) spells out the "beneficial owner of copyright", **the TV station,** can institute suit in Federal Court **against you** whenever the TV station wishes to **allege** that you have violated **their exclusive right** to carry certain programs (i.e. all programs);

(4) Section 502 (B) spells out that the Federal Court may grant temporary or permanent **injunctions,** against your continued CATV system operation, pending disposition of the suit brought against you by the TV station;

(5) Section 503 (A) states that the court may order the **impounding of all of your records** pending outcome of the suit;

(6) Section 504 (A) states that the station **may sue you** for actual damages plus any profits you may have made by your **violation** of their exclusive right to carry certain (i.e. all) programs within their Grade B area;

(7) Section 504 (B) states that **you** (the CATV system) **must present to the court** a detailed accounting of your gross revenue, and that it is up to **you** (the CATV system) **to prove** what your operating expenses are, the assumption being that **your gross revenue is the same as your profit margin,** until **you** prove otherwise;

(8) Section 504 (C) gives the TV station the right to **change** from a request of **actual damages** plus your profits to a request for statutory damages, at any time **up to the moment** the judge rules on the actual plus profit damages to be awarded; and it sets out that statutory damages for **each violation** (i.e. **each and every program not properly protected is a separate violation!**) shall be **not less than $250** nor more than $10,000;

(9) Section 504 (C) (2) says that if the TV station can prove that your violation of their exclusive copyright use of a program was **willful,** that the court may increase the statutory damage award to **$50,000. per violation;**

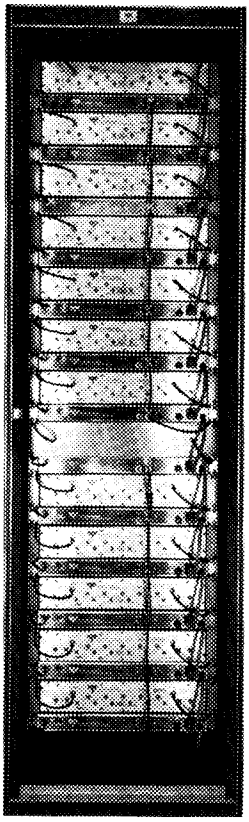
(10) Section 505 says that the court can then assess court costs and legal fees of the TV station **against you,** if you lose;

(11) Finally, Section 506 (A) says that if it is found that you have **willfully** violated the copyright statute, that the court may assess **an additional statutory fine** of $2,500 **per violation** and up to 2 years in jail, **against you,** the CATV system operator.

Would you care to hazard a guess as to **what a violation could be?** The simple faulting of a non-duplication switcher, **for whatever the cause,** leaving a Grade B (or higher level) signal unprotected is a violation. **And willful violation?** If the switcher quit on you at 6 PM and you said to yourself **"I'll fix it tomorrow"** rather than taking **immediate** steps to give the protected station emergency protection, **that would be willful.**

Scary? That is only the beginning! Space here this month does not permit a detailed report. However, the following are available from CATA: (1) A full written report of the Lexington Copyright Summit, and (2) A tape-dub of the Schildhause explanation of the bill as presented in Lexington (several state associations have already contacted us for this).

NO TWO BLONDER-TONGUE CATV HEADENDS ARE ALIKE.



There are more than 1000 Blonder-Tongue CATV headends delivering superior TV reception to subscribers from coast to coast. And no two headends are alike. That's because each headend is customized to meet the reception requirements of the area. Blonder-Tongue not only customizes its products and headends, but it also gives you a flexible headend approach to meet your needs—individual products, just what you need; a design based on a survey form; a headend assembled at the factory with guaranteed performance as a package, or an assembled headend and then turnkeyed over. And if you have a unique problem that can't be handled with existing equipment we'll design one to do the job. Blonder-Tongue keeps your cost down. The cost of a standard channel processor with all the automatic features you require is less than $500. There is one area where Blonder-Tongue headends are alike, and that is in quality and performance, proven more than 1000 times over. Prove it to yourself. We'll send a Spectrum Analyzer photograph of a Blonder-Tongue processed channel and one of a popular competitor—no obligation, of course. Write on your letterhead or call our systems engineering dept: (201) 679-4010. Blonder-Tongue Laboratories, One Jake Brown Rd., Old Bridge, N.J. 08857.

BLONDER TONGUE

CABLE CAPTIONS

The **Canadian battle lines** to prevent a Province take over of all CATV facilities is heating up. In Saskachewan and Manitoba the province wide telephone systems are **owned by** the Provincial governments. Saskatchewan has announced that applicants for new systems will have to have province approval before they start operation, and that all of the hardware and cable will be **owned** by the telephone company. Furthermore, only "non-profit community organizations" will be given provincial licenses. This is **in addition to** the CRTC (Federal) licenses required. The Manitoba plan is very similar, suggesting to most observers that since the province owns the telephone systems, the whole scheme amounts to simply a state take over of the CATV systems. **And U.S. operators think they have problems!**

Effective September 16 all cable systems are now required to maintain open public inspection files covering full copies of any applications on file with the Federal Communications Commission. If your system has a full time office in a community, the files are to be kept in that location. Any member of the public has the right to come into your office and inspect the exact duplicates of your FCC filings, and **at their own expense,** make copies of these files. If your system does not maintain an office in a specific community, the files must be kept at a location in the community (such as another local business, attorney's office, etc.) where during normal business hours they may be inspected and if the inspector so wishes, copied. This "open files policy" extends **only** to copies of your filings with the FCC, not to your other business files. The Commission is also seriously considering requiring applicants for Certificates of Compliance, etc. to publish the applications (or post same) in the community at the time of the filing, but this will probably not come for another six months to one year.

The Commission has proposed that annualized CATV fees paid by CATV systems to the FCC as a part of underwriting the administrative burden of regulating cable be dropped from the original $.30 per subscriber per year to $.13 per subscriber per year. This is the result of a court suit which ruled that the FCC may not charge arbitrary annual fees to users of its services, but must base its charges upon "value received". In recomputing the "value received" the Commission proposes to drop the annual fee to $.13 per subscriber per year.

A Vermont Cable operator has been denied a six month "technical compliance test extension". EMCO CATV, INC. had sought a six-month extension of the testing program required for 1974 for old and new systems alike. EMCO told the Commission it was working on the testing program, but that it required a six month extension to complete the tests by March 31, 1974. On August 1, 1974 the Commission ruled against the six month extension. Look at it this way J.J., had they granted you the extension, you would have gotten until September 30 to complete your tests. By filing your request **you got four of the six months** while the Commission played around considering your application....and denial!

Two translator items of interest: A "power war" is apparently underway between two channel 6 translators in **Garfield County, Colorado.** Glenwood Springs KØ6BU has been charged by Crystal River TV Association KØ6CK with causing interference. The two translators are 22 miles apart. Crystal River charged Glenwood with "allowing its transmitter site to be moved, and with redirecting its transmitting antennas south (instead of north)". A well publicized-in-advance Commission field inspection found nothing out of line however. Both stations seek 10 watt authority and the matter has been set for hearing. The **Roundup, Montana** special permit for KØ4HS to operate as part of the ATS-6 satellite program had originally been made with a number of conditions, including use of type approved aural and visual modulation level monitoring equipment. The Commission has come back and **removed** that requirement, noting "the station was authorized on a temporary basis as an experimental operation".

Three interesting full Commission actions in the State of Michigan have side effects on CATV in that state. In the most important, the hyphenated market of Kalamazoo-Muskegon-Grand Rapids-Battle Creek has been modified; **Muskegon has been dropped out of the market.** Under 76.5 (g) of the rules each city in the market must have an active telecaster or an active CP. Channel 54, Muskegon Telecasting Company, Inc. was cancelled back in 1971. Thus the criteria for its inclusion in the four-city hyphenated market was lost. This means that CATV systems within the 35 mile circle of the old Muskegon coordinates are now free and clear to operate as "out of major market systems" effective July 31. In another Michigan action, a **new CP has been granted for channel 11 in Alpena, Michigan.** Two contestants wanted the channel initially, joined late by an application of UHF station WGTU in Traverse City. The winner is Thunder Bay Broadcasting Corporation. UHF station WGTU was late to file and it was dismissed primarily because of this technicality. WGTU wanted to operate the channel 11 facility as a "satellite" of channel 29 and argued that if it did not get the grant the new permittee might cause dire financial problems for WGTU. The Commission ruled that maybe **-just maybe-** if WGTU went dark as a result of channel 11 being activated things would not be all that bad for the public **at large.** The Commission felt that establishing a new, first service, to the Alpena region was more important than the Traverse City region possibly **-just possibly-** losing one of its three local services. What is significant about this **-just perhaps-** is the Commission approach that a UHF permittee may be **less than sacred.** Finally in Michigan an application for **license renewal by WLUC-TV Marquett** has been granted, over the objection of Mayor William J. Malandrone of Marquette. The Mayor contested that WLUC had moved its main studios out of the principal city of license and that WLUC did not maintain the required signal intensity over all of the city. The Mayor noted **"residents must either subscribe to the CATV system or erect rooftop antennas with filtering devices to receive the WLUC signal".** The Commission found that lacking an engineering study by the Mayor, it was obliged to accept the station's predicted signal contours which depict adequate signal levels over Marquette.

Whenever a UHF CP holder tosses in the towel the CATV operators within his 35 mile contour have to regroup and replan their station carriage allowables. Tulsa, Oklahoma (KVMP-29) and Memphis, Tennessee (WGLJ-24) fell into that category during July with the cancellation of both CP's.

Quote of the month: Welch Antenna Company operator Bill Turner stated in a letter to David Kinley, Chief of the Cable Television Bureau, in the pending matter of the City of Welch leasing a channel and carrying blacked out WSAZ (see CABLE-captions August CATJ): "I am now between the devil and the deep blue sea. I cannot afford to fight the City of Welch or the FCC. And I think it's time that you sent somebody down here to work out something. **He will need to stay about two weeks.**" Perhaps Bill, if the FCC had to send somebody "down to the cable community" in every non-duplication battle, we would see an end to this idiocy in a big hurry!

AND THEN LIGHTNING STRUCK

EVERYTHING IN THE BOOK

In a recent issue of CATJ the wonderful world of anomalies in VHF/UHF wave propagation was discussed as an introduction to the phase of understanding what it is you must face (and conquer) as a successful CATV system operator (1).

The CATV system operator is expected to have all the answers. "Did you see those lines on channel 2 last night?", you are asked as you drink morning java. "What were they?" or *"Can't you fix that?"*

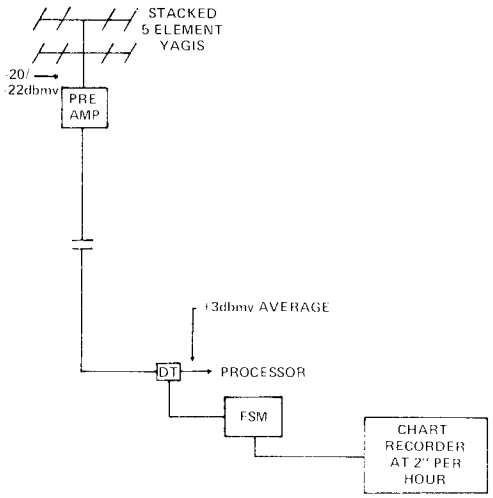
"Every channel but the weather channel had lines all over the screen yesterday..." and ..."the sound of the football game was missing for an hour and we heard a talk about fishing."

We don't expect our subscribers to understand the world of propagation anomalies, but it wouldn't hurt if we at least could recognize them when they occur. If they happen often enough to be bothersome, perhaps it is time to re-evaluate the antenna system to see what can be done to reshape some antenna directivity problems to *null out* the co-channel signal sources that show up when there is an anomaly situation.

As was explained in an earlier introduction to wave propagation (1) there are different forms of anomalies on low band, high band and UHF. The portion of our spectrum which *suffers* the most is *low band.* Just about every form of anomaly we know of occurs there at one time or another.

To further your understanding of what can happen we set out to record *a day in the life* of a 92 mile off-the-air channel 2 signal. The day was early in August of this past summer. Diagram 1 illustrates the path and receiving situation. A pair of five-element yagi antennas mount high enough to produce an average signal level of -22 to -20 dbmv were connected to a 28 db gain low noise pre-amplifier at the antennas. The downline signal was brought to a Blonder Tongue 4127 (FSM-2) field strength meter where the visual carrier level of the received 92 mile signal was monitored. To record the variations in signal level a Heath model EU-20 chart recorder (equipped with a Heath EU-20-26 multi-speed chart drive) was driven by the video voltage provided by the detector jack on the FSM-2. In this way signal variations were permanently recorded and any sources of interference which exceeded the signal level of the desired signal were apparent.

In the interest of getting the chart into the pages of CATJ the chart was "rolled along" at 2 inches per hour. The multi-speed drive of the EU-20-26 allows the operator to adjust chart speeds from 5 seconds per inch to 2 hours per inch in 21 steps. While super for high definition of fading and signal variations, 5 seconds per inch would



have required 720 inches of chart paper per hour or 17,280 inches for 24 hours! At 2 inches per hour we give away a lot in definition. However, we do derive some excellent trends of the recorded signal and if the damping on the chart recorder is adjusted properly, abrupt changes are recorded adequately, as we will show.

The charts appear 50% *of their original size.* We have broken 25 hours of recording time down into 5 groups each 5 hours long. The chart for each 5-hour increment measures 10 inches long (5 hours x 2 inches) and the natural height (vertical recording area) of the recording paper is also 10 inches. In life size this works out to a 17 db display width (top to bottom) or 1.7 db per vertical inch. In its 50% reduced size shown here, this is 3.4 db per "display inch".

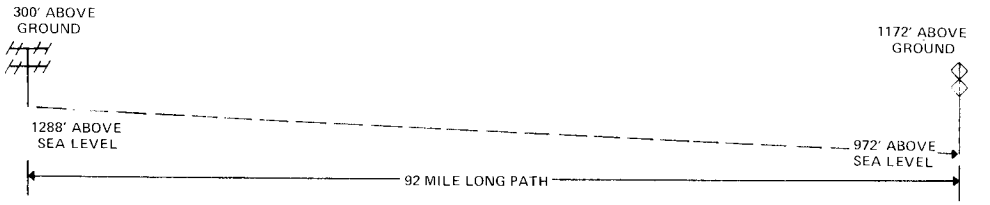
The subject of recording off-the-air signals with a chart recorder will be subsequently covered in Part Three of our current running series on "Field Strength Meters And Their Use".

The signal from the receiving system shown in Diagram 1 averages around +3 dbmv to the signal processor. This signal is right on the ragged edge of the radio horizon region when you add the height of the transmitting antenna to the height of the receiving antenna array. We feel it is representative of many low band receiving situations across the country, although some of the things that happen to this signal in the course of our 25 hour recording period could not happen within the area west of the Rocky Mountains. The heavy tropospheric fading is indicative of the flat plains or the eastern USA.

The amazing thing is that *everything* you are about to review *actually did happen* to this channel 2 signal within a brief 25 hour period. Our preparation for this article was based on setting up the recording equipment, walking away and coming back 25 hours later. We did make arrangements for a knowledgeable observer to note (on or adjacent to the recording chart) any unusual picture-degrading phenomena observed, hence the occasional reference notes on the charts displayed.

LONG TERM NORMAL

The signal measured and observed for this *"day in the life"* episode normally provides an *apparent* 33 to 40 db plus signal plus noise to noise ratios for the user's system. In real system numbers the antenna level runs



HEY TECH!

BECOME ONE OF HEATHER'S HUSTLERS

Everyone likes to hustle for a pretty young thing. CATJ first used a picture of Editorial Assistant Heather Pennington to show off our **CATJ Head End Wall Chart** in the July issue. Now she gets as much fan mail **as** CATJ! OK, so here is your chance to Hustle for Heather.

CATJ has a big promotion going on to sign up system technicians, assistant technicians and installers. We figure it this way... **CATJ** is the best down-to-earth CATV training course around for $7.00 a year. If you aren't willing to invest $7.00 for a year of solid CATV training, you will probably be picking grapes next year anyhow. **So let's have some fun** signing up you guys... for a year's subscription to CATJ.

With Heather's permission we have made up this gigantic two color, 3 inch diameter ("that's **not** small!!") badge to proudly wear on your shirt, jacket or...well, pin it where you want it. To get your very own **HEATHER'S HUSTLER badge** all you have to do is sign up (and collect money...**that may be the hard part**) three of your fellow tech/installer buddies. Use the card below (and on the back) for the names and addresses (Heather wants their **home** addresses) of three new subscribers to CATJ. **You can even be one of them.** Hurry — the quantity of HEATHER'S HUSTLER badges is limited.

P.S. Heather — you ARE a good sport!

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STOP —Right here you have just qualified as a HEATHER HUSTLER. Be honest. . . collecting money for a pretty gal was enjoyable **RIGHT?** So why stop now. . . get three more of your buddies in on the act and **become a SUPER HUSTLER!**

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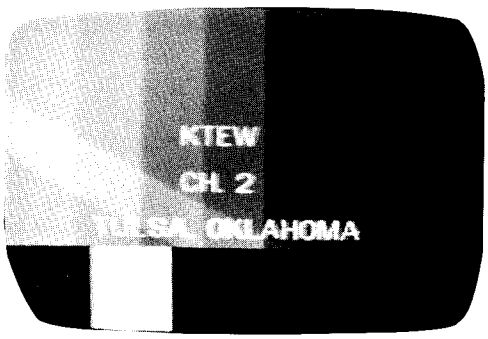
CATJ – Community Antenna Television Journal
4209 NW 23rd, Suite 106
Oklahoma City, Oklahoma 73107

around -20 dbmv to the low noise pre-amplifier. Residual background noise in the region is modest except during very dry, hot spells. Then the usual dust-coated power line insulator leakage paths and ground bonds develop arcing.

During the course of this 25 hour period the only prominent picture degrading factors were atmospheric in nature.

The first photo shows the received picture quality of the station (KTEW-2) with an antenna input level of -20 dbmv. With downline losses, the input to the signal processor is +3 dbmv. The photo was taken with the pre-amplifier output driving a TV receiver (Sony color unit). This becomes our reference picture quality for the testing period and photos to follow. A perfectionist might find a few flaws in the picture, but all things considered it is as good as most systems are able to develop over 90 (+) mile paths on low band.



Normal quality picture, 92 mile path.

2300 to 0400 CDST

The test period began at 11 PM (2300 in "radio talk" time) July 31 and ran until 0000 (12 midnight) on August 2.

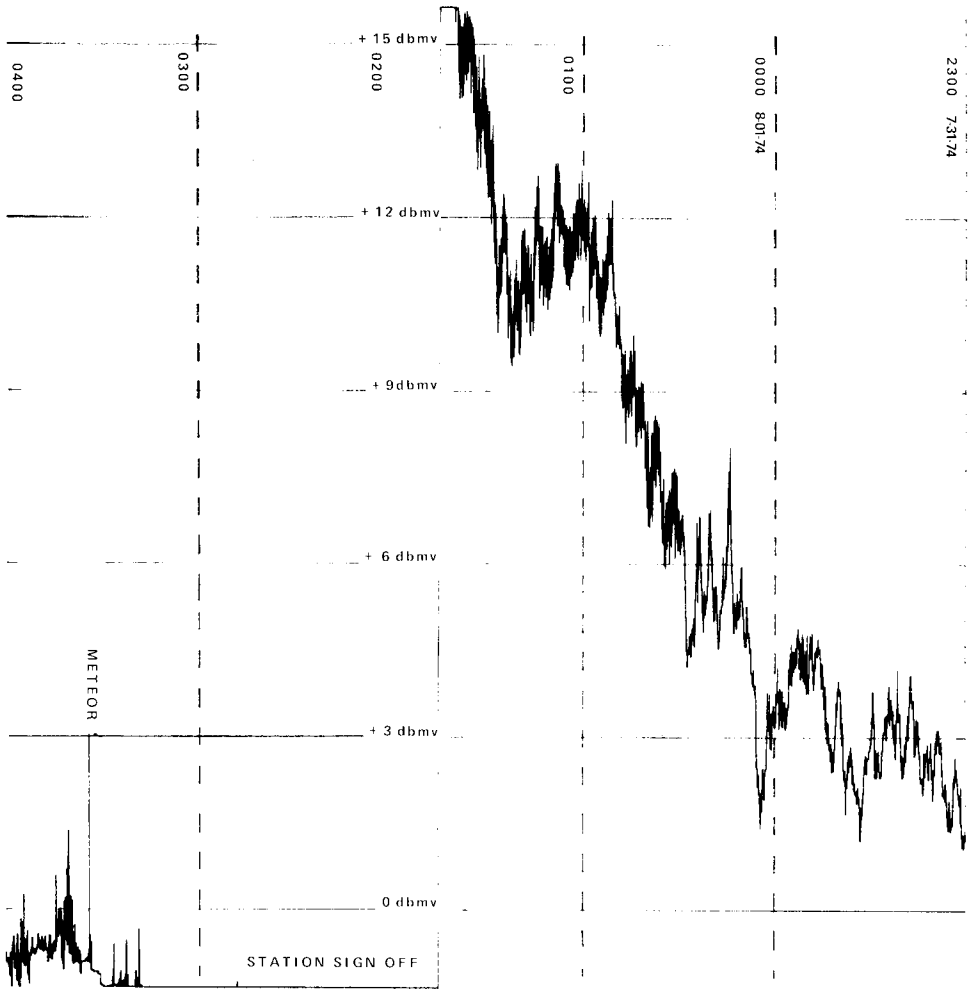
Note on the first 5-hour chart recording, the horizontal lines represent signal levels at the input to the signal processor and are horizontally lined off in 3 db steps. The lowest level solid reference line is 0 dbmv (which corresponds to a -23 dbmv antenna level). They progress upwards (in level) as follows:

0 dbmv = *-23 dbmv at antenna*
+3 dbmv = *-20 dbmv at antenna*
+6 dbmv = *-17 dbmv at antenna*
+9 dbmv = *-14 dbmv at antenna*
+12 dbmv = *-11 dbmv at antenna*
+15 dbmv = *-8 dbmv at antenna*

Several months of informal (unrecorded) level checks indicate *this signal* runs between -25 dbmv *antenna level* (less than 1% of the time) to +5 dbmv. This *30 db fade range* is about what would be expected for a far-edge radio horizon low band TV signal anyplace east of the Rocky Mountains.

Note that as the recording period begins the signal is averaging +/— 1.5 db either side of the median +3 dbmv processor input level.

After the chart had run for 25 hours the vertical time marks were drawn in to give a convenient time scale. The chart reads from right to left (earliest time is far right -- as time progresses the chart moves to the left). Between 0006 and 0100 the signal level gradually increased by about 9 db to around +12 dbmv. Notice as this up-fade period began the thickness (or degree of dark/black) of the chart recorded line is quite thin. In fact, between 0000 and 0030 the line shows normal pen thickness. However, from 0030 to well after 0130 *the recorded line gets blacker and blacker.* This is not a fault recording pen. This is due to an increase in the fade-rate (i.e. the frequency with which the signal fades up and down). Each time the signal fades up (or down) within the same few minute span the chart, moving at 2 inches per hour, sees the *new fade* as a *re-inking over the top of the last fade* by the pen on the recorder. This causes the "degree of black" to increase and



while the chart is moving (although very slowly) this broadens out the "width" of what appears to be a single line. (It is actually several lines drawn one after the other, either atop one another or alongside another.)

What is significant about this is the *distinctive signature* of the fading graphically portrayed in a way that is much easier to mentally record and retain than going cross-eyed watching an undamped FSM meter needle bounce back and forth.

This up-fade was caused by a *"temperature inversion"* forming as the Oklahoma terrain cooled for the night. Heat rises, and the heated earth finally dissipated the sunlight generated heat around 0000. This made the air next to the earth in the lower atmosphere *cooler* than the air directly above. This "inversion" (i.e. literally, the inverting of normal, normal being warmer below and cooler above) formed a layering of *higher refractive index* air (1) low to the ground (probably between 500 and 750 feet). This *"more perfect refractive index"* gradually improved the signal level transmitted through the radio horizon

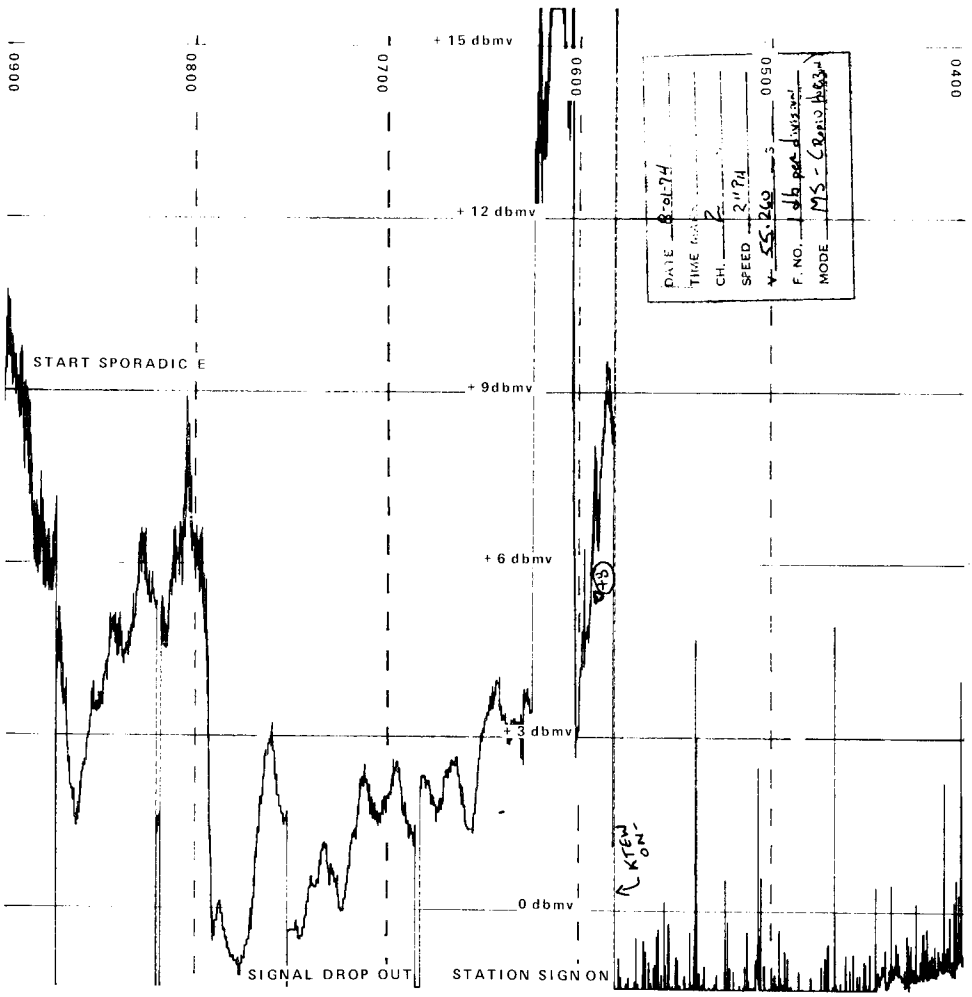
(1) *See The Wonderful World of Anomalies, CATJ for September 1974, Pages 6-18.*

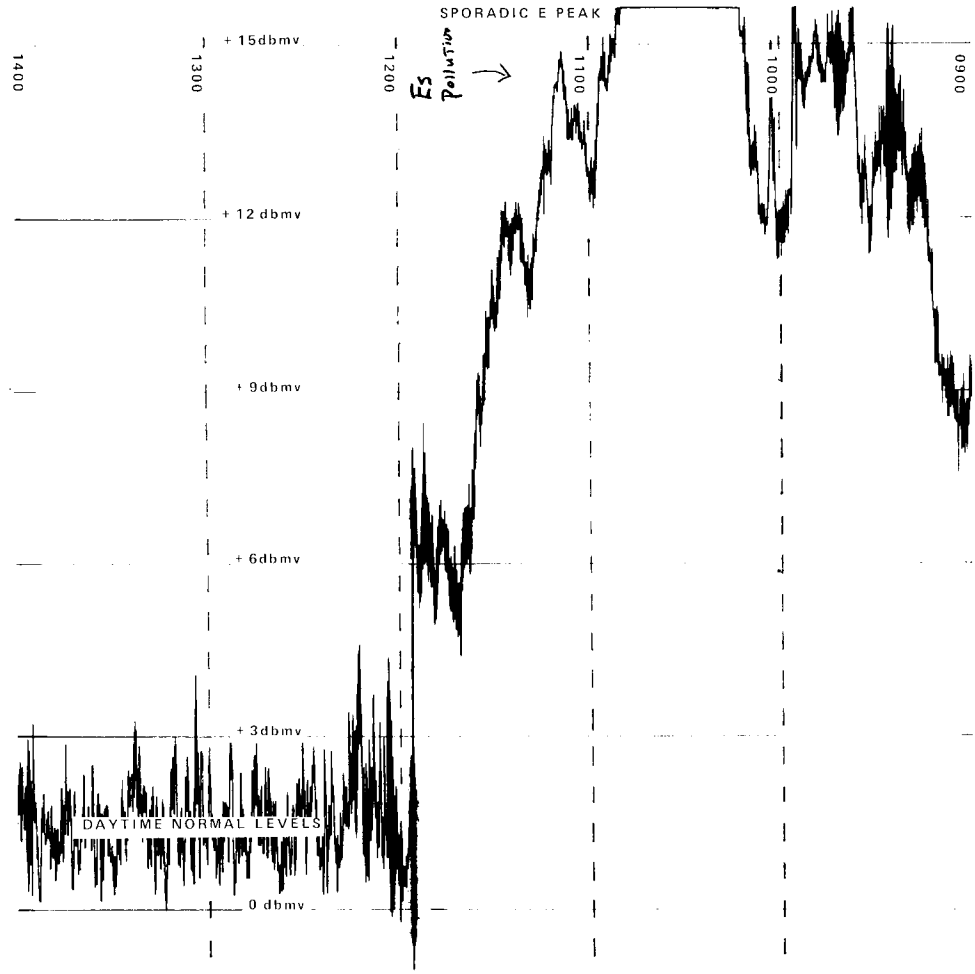
region to the receiver at our test point.

By station sign-off time the limits of our chart recorder display had been reached; *the signal was in excess of +15.5 dbmv at the input to the processor.* At approximately 0144 the station left the air, as the abrupt fall-off of the recorded signal indicates.

Seemingly that would be the end of any significant recorded activity until the station returned to the air.

Recall that we are recording right out of the pre-amplifier at the input to the processor. There is no shut-down mode *here* when the normal input ceases, as most processors contain. Any signals that show up on the channel are apparent. This includes those little blips starting around 0319. Reference is made to the article on Wave Propagation (1) appearing in the *September CATJ.* Included therein is a discussion of "meteors" and the role they play in refracting (or reflecting) for brief periods of time (of a few seconds duration) low band VHF TV signals over distances of up to 1200-1400 miles. The low level (typically below 0 dbmv here) signals would amount to modest co-channel signal interference if the desired station were on the air at the time. The meteor anomaly mode "peaks" *on a normal day* in the 0400-0700 period and because





there is usually not heavy television broadcasting (or viewing) in the period, CATV fortunately escapes this form of viewer dissatisfaction.

0400-0900 CDST

This period begins as the latter portion of the first period terminated. More meteor bursts than on occasion reached *peak levels of +5 dbmv.* At the abrupt sign-on of the recorded station the signal exhibited erratic fading characteristics. The signal "pegged" at the top of the recording chart dropped in successive stages from more than +15.5 dbmv to around +3 dbmv at 0600 and climbed again just as abruptly to greater than +15.5 dbmv at 0603. By 0614 CDST *the inversion had folded up* and signals returned to near normal levels of around +3 dbmv to the processor.

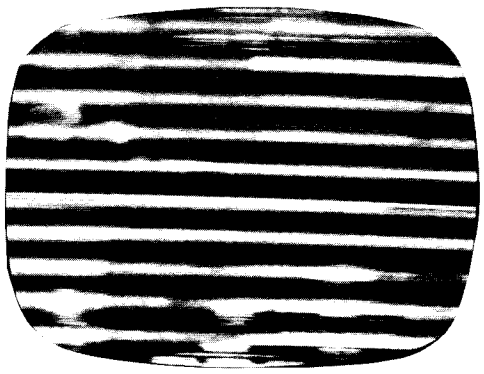
The day was just beginning for the poor cable system operator. Four times before the signal started the day's antics between 0650 and 0742 the *"bottom dropped out"* for short periods (indicated by the recorded signal dropping off the chart on the bottom). These were usually brief, but one around 0650 was deep enough the signal went into substantial noise on the system for a couple of minutes.

This abrupt *"negative anomaly"* often signals something of significance for a path of this type. *It was coming.* Notice around 0757 the recorded signal level broke into broad lines again (indicated by more intense ink on the roll) for a few minutes. This tells us the fading rate became quite intense in that period, although the depth of the fades was not great. By the time we leave the period toward 0900 the inking has become even heavier. The fade indicated is growing more rapid and the recorded signal is on its way up significantly again.

0900-1300 CDST

At first inspection the period from 0900 to 1130 looks like a significant *positive anomaly.* Signals average at or well above +12 dbmv into the processor for most of the period from 0915 to 1127. The lead-in to this span is accentuated with heavy recording lines, indicating intense fading within the ranges shown. From 1014 to 1041 the signal was beyond the recording range of the chart – in excess of +15.5 dbmv.

During this period *unfortunately for the system* the signal that was being received was *not* the desired channel 2. Rather *this was sporadic E skip from several stations* in the 900 to 1200 mile range in the same general heading as the desired station. The visual observer in this period reported station WGR, channel 2, in Buffalo, New York was especially strong in this period (1150 miles) and the desired signal was totally *"buried"* by the E layer skip signal(s) for the full period starting around 0843 until the very abrupt fade out of the E layer signals at 1156 (1). This is an *unusually long period* for such stable E layer signals, but it can (and did) happen. For this period the *real* (desired) *signal* (we would guess) was averaging around +1 to +3 dbmv while the 900-1200 mile signals were



Heavy E skip co-channel interference.

running to well over +15 dbmv. In effect there was co-channel, but the co-channel *interference* was the desired station while the undesired (and very distant) signal was the system-seen picture!

The E layer refraction signals disappeared very quickly at 1156, after which the normal desired signal showed its true colors, averaging +/— 1.5 db from the +1.5 dbmv level it sought for this time period.

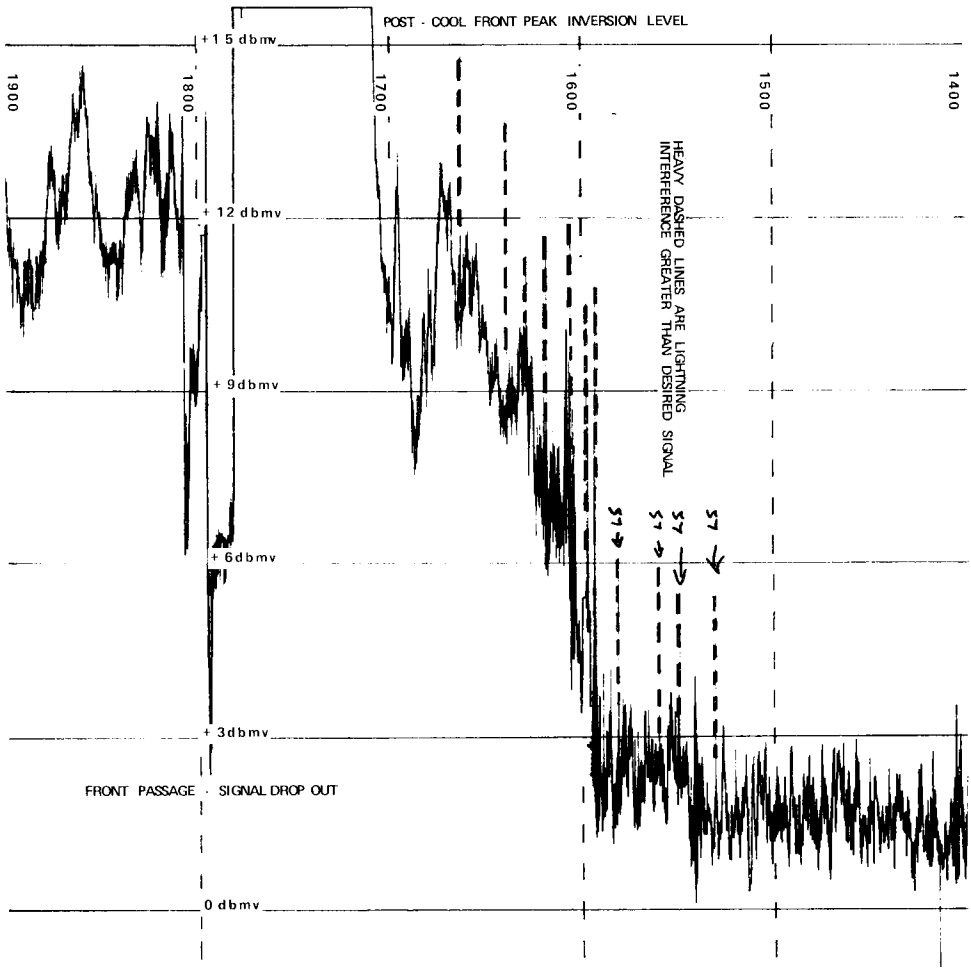
And that is how the time period ended.

1400-1900 CDST

Well, we have experienced up and down tropospheric fades, a couple of abrupt outages, and some meteor reflections, plus the more than 3 hours of E layer "pollution". *And it is only 2 PM!*

Signals ran along at their +1.5 dbmv average going into the new period with only minor +/— 1.5 db fading until the next form of customer disturbance appeared at 1518.

While the day was progressing, well west of the path, a line of thunderstorms was forming ahead of a rapidly moving cool front that was beginning to cross Oklahoma from SW to NE. By 1518 the storm line was within 25 miles of the receiving site and behind the antenna array (i.e. *off*



the back of the array). The lightning strikes and thunderclouds came over the horizon. The first recorded lightning strikes and thunderclouds came over the horizon. The first recorded lightning strike is at 1518 (3:18 PM). The quickness of the lightning RF interference "burst" is such that the outline made by the chart recording pen is very light. There is no trouble "reading it" in actual size, but because we have reduced the charts here to 50% of original size we have taken the *editorial liberty* of "doctoring" the recorded strikes as follows:

(1) We have substituted *hand drawn dashed lines* for the faintly recorded lightning strike levels.

(2) We have done this *directly over the actual strike*, being very careful not to amplify the voltage level (i.e. intensity of the strike RF) in the process.

The "observer" on hand wrote in "LS" for lightning stroke on the first few observed.

Notice at approximately 1525 the recorded average signal level takes a small "jump" upward. It had been averaging around +1.5 dbmv up to this point. Keep in mind that the *cool front* that is pushing the thunderstorms out in front of it *is approaching*

the receiving station and is running more or less *parallel to the path from the receiver to the transmitter* at the same time.

Between 1525 and 1556 the signal rises slowly within its +/— 1.5 db fade range, to approximately +3 dbmv. This is again significant because it suggests *another* inversion is forming. Only this one is a moisture and temperature related inversion that is being dragged along by the front line.

The front line brings mixed blessings. The signal levels are going to rise as the front line passes over and beyond the receiver/transmitter path. The thunderstorms along the front are tearing hell out of the picture everytime a lightning strike occurs.

By 1638 the thunderstorm line has passed. Notice that the strikes of lightning interference *built at about the same ratio as the signal* itself. There is an explanation for this and it may be unique to this kind of path. As the front line (with thunder and lightning) pushed closer and closer to the radio path line from receiver to transmitter the *inversion* improved. At the same time the direct thrust of the thunderstorms came more and more *in front of the receiving antenna array*. The antenna pattern came more and more in line with the location of the lightning strikes and the gain of the antenna amplified the level of the lightning as the antenna's pattern came into play. It *appears* on the chart that *no matter how strong* (or how much stronger) the desired signal became, the lightning strikes were always 3 to 6 db higher in level. In fact they were, but it was *not related* to the signal level itself – only to the passage of the front and the formation of the inversion behind the front as it passed.

By 1705 (5:05 PM) the full strength of the inversion behind the cool front was apparent. The signal topped out above our +15 dbmv "scale" and stayed there for approximately 44 minutes. By 1748 the inversion went into a tail spin with an abrupt "back to +3 dbmv normal" level *down fade*. The signal recovered quickly enough, but not back to its inversion line level. Still the indicated +12 dbmv or better level as we leave this period is *well above* normal.

Lightning static from nearby strike.

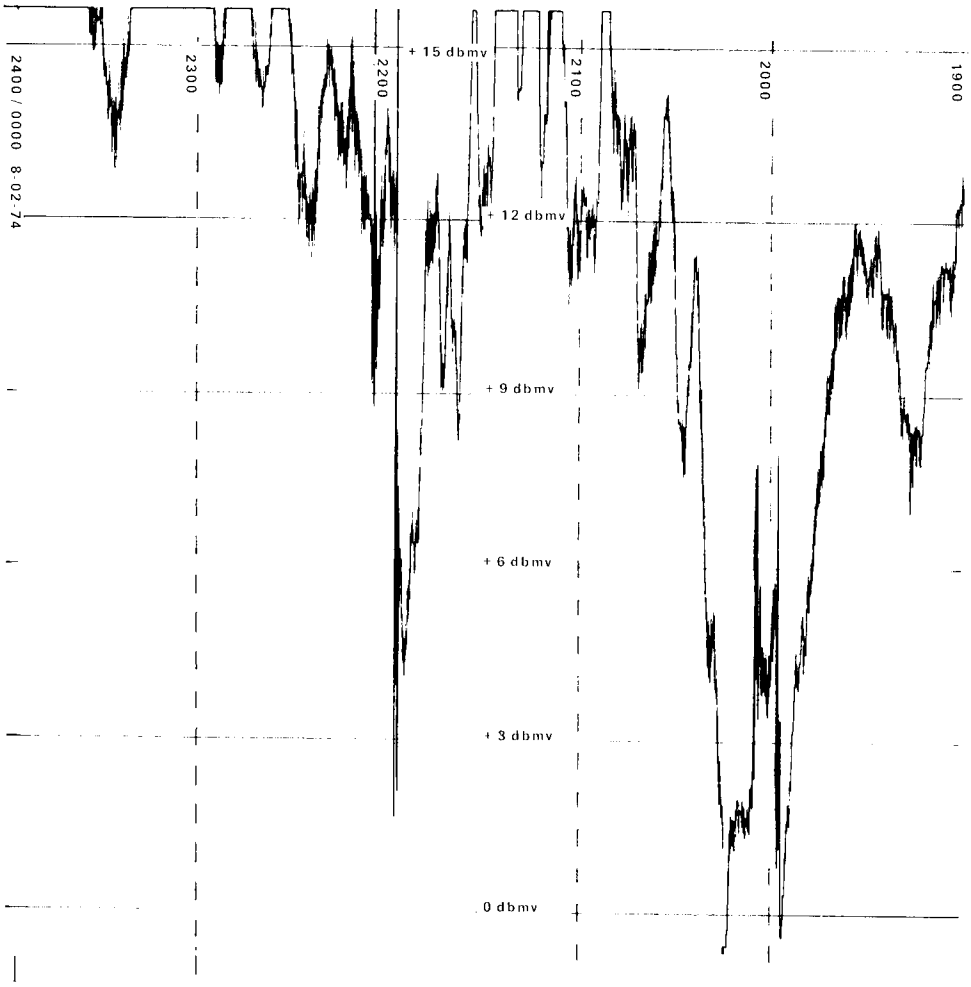
The system had earned a decent evening for its customers after the events of the day to this point!

1900-2400 (0000) CDST

If the processor AGC was up to snuff, the balance of the evening was going to be a snap.

Starting out at the post-inversion higher-than-normal level of +12 dbmv at 1900 (7 PM) the signal level had dropped to below 0 dbmv to the processor by 1956. It hit an even lower level (by fractions of a db) at 2015 but was back going off scale on the high signal end by 2051.

There was one more "ugly" fade, an abrupt one, at 2157 with the signal going from +1.8 dbmv to over +15 dbmv almost as fast as you would throw a switch. That was the end of the real problems for the day. From 2200 to midnight the signal never dropped significantly below +12 dbmv to the processor, which is a good 9 db or more above what we long-term expect on this path (+3 dbmv to the



processor).

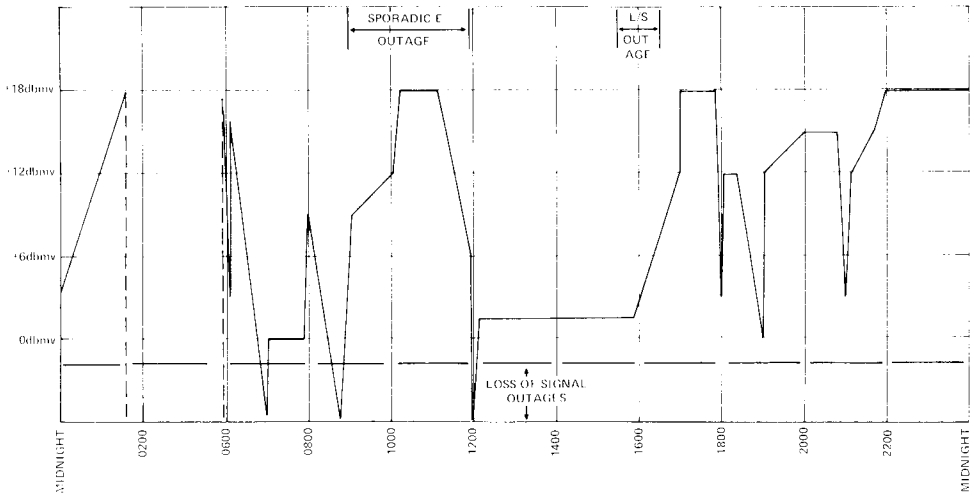
Johnny Carson never looked so good!

SYNOPSIS

For an unusually high portion of the broadcast day the desired signal has been unusable. Chart 6 shows momentary outages in the just-after-sunup hours of negative tropospheric anomalies which caused some temporary (and not unusual) losses early in the day. The 0843-1156 signal loss due to unusually intense (also unusually stable) sporadic-E session came next. Finally, the 1518 — 1638 period produced badly degraded pictures because of the passage of a front line with accompanying thunderstorms.

The system involved notes, "If this *was* a typical day, we would be advised to either drop the signal or go well into the radio horizon for a remote off-the-air pickup and come back here on microwave."

But a *small system* that really needed the signal, without the cash flow to amortize and support a microwave link, would not have *that* option. The reality is that you install the best antenna system you can afford, grit your teeth and accept the



pictures, secure *at least* in the knowledge that your pictures are vastly better than normal home antennas are developing at the same time.

Yet for a high percentage of *this* day the signal was a long way from the 36 db signal-to-noise ratio required by *76.609* (a) (5) of signals first picked up within their Grade B contours.

That is the *real life* situation cable operators experience away from the sterile halls of the Cable Television Bureau where technical standards are initially devised.

Future articles in this series will deal with high band VHF and UHF typical days on the far outer edge of the Grade B contours.

FSM, SLM, FSV . . .

FIELD STRENGTH METERS

SELECTIVE VOLTMETER

Nearly 25 years ago someone introduced the first TV signal level meter and called it a "field strength meter". The acronym has stuck, although our roots in the broadcast industry suggest this is probably an improper name for the instrument we all depend upon so much.

More recently some have begun to call the instrument a "signal level meter" or SLM, a term that has no traceability to the broadcast industry. Many communication receivers do have signal level meters of a sort, generally referred to as "S" meters.

It will be the purpose of this series in CATJ, to run consecutively over the next four issues, to say just about everything that can be said about these instruments. Here is how we intend to do that:

(1) In this issue we will explore the functions of the instrument and discuss how various designs go about putting the circuits together.

(2) In the November issue we will go into some detail on how specific instruments perform, including their desirable and not so desirable features, and cover the use of DB and microvolt scales.

(3) In the December issue we will finish reviewing the instruments on the market and go into detail on instrument calibration procedures, with emphasis on why it is important that *you do calibrate* the instrument routinely.

(4) In the January (1975) issue we will show you how to use your instrument to make chart recordings (with some adapters to do this), how to use your instrument with some simple (plug-in adapters we have developed and found in use by CATV systems to read co-channel interference (to accurately set antennas for co-channel nulling), and a few more tricks, such as making signal surveys with dipole antennas and the like.

It is our intention to *"leave no stones unturned"* in our four-part series on the signal level meter instrument.

The instrument is going to have to have a name for this series. We have debated the merits of the various acronyms and decided for continuity we will settle on SLM although *we would prefer* "Frequency Selective Voltmeter" (*FSV*). It would serve *no useful purpose* to try to foist yet another name on the instrument at this late date.

The basic instrument is shown in *Diagram 1.* Virtually all instruments now on the market or ever placed on the market follow this basic format, with the exception of a few low cost installer meters. (We don't intend to talk about these instruments in this series — we are saving that for a later date in CATJ.)

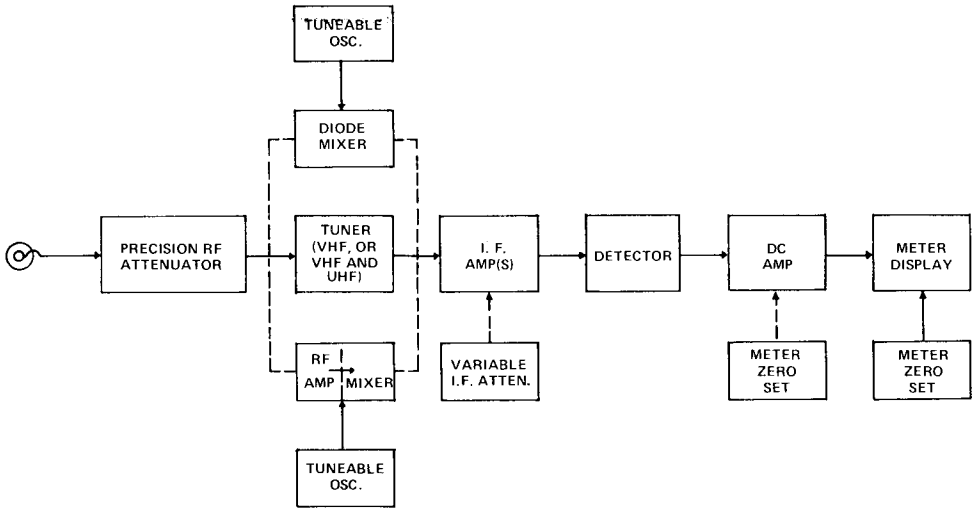


DIAGRAM 1

The SLM is called upon to read-out two basic measurements, the *absolute signal level*(s) and the *relative difference* between two (or more) carriers. The absolute levels are the trickiest to do with an instrument that gets hauled out in all forms of weather, bounces around in the tool bin of a pickup over basically unfriendly terrain, is called on to operate when it's hot and when it's cold, when it's dry and when it's wet. It often operates on old batteries and gets zapped with 30 or 60 VAC every few days as someone thoughtlessly plugs it into a nonpower blocked cable line.

A *true* field strength meter (FSM) *does read* absolute levels with repeatable accuracy and with calibration accuracy which can be directly traced back to some highly accurate reference source. A *true* FSM is barely portable and if you ever bought one, the last thing in the world you would consider doing with it is tossing it into the tool bin of a pickup. They are much too expensive for this kind of careless concern.

CATV SLM instruments *make a* valient *stab at being FSM's* by providing the user with a calibration chart which allows the instrument user to compensate (manually or mentally) for nonlinearities in the actual instrument. Still, given the manual or mental compensations, they are typically of +/— 1.5 db accuracy over normal temperatures (i.e. 0-120 degrees F).

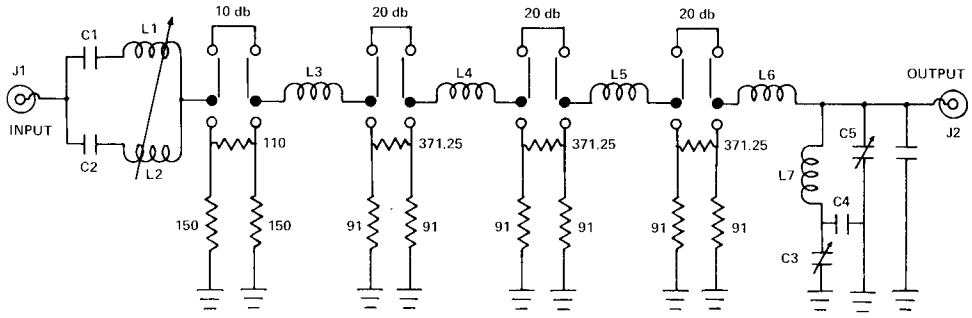
The *calibration* of an SLM is valid at the moment the instrument is calibrated and usually for the temperature conditions which existed in the calibration lab when the instrument was calibrated. *Calibration falls apart* (i.e. becomes less dependable) for absolute levels (i.e. the FSM function) for any number of different reasons. Some of the most common are:

(1) *Insufficient battery supply voltage* (this is the reason so many meters supply you with "battery condition check" function on the meter).

(2) *Aging components* (this one is tough to correct in the field).

(3) *Dirt and dust* (the heart of the instrument is the precision attenuator at the input; dust and grime that get into the switched attenuators is a common problem).

(4) *Ambient temperature* around the instrument (i.e. operating



(BLONDER TONGUE FSM-2)

DIAGRAM 2

environment) for which partial compensation can be built into the instrument.

(5) *Physical abuse* of the instrument (scratches and dents in an FSM case are a sure sign someone has given it the "drop test").

(6) *Nonlinearity* in the meter movement.

It goes without saying that if a particular instrument gets out of the manufacturing facility *without* all of the required checks and rechecks, the user will be making readings which are potentially inaccurate. Even meter alignment techs occasionally have off days!

We will explore how important absolute level readings are later in this series. Going into the instrument block functions first, let's start with the precision input attenuator.

INPUT ATTENUATOR

A typical input attenuator network is shown in *Diagram 2*. C1 and C2 are *blocking capacitors* designed to keep AC voltages (such as line amplifier powering 30 or 60 volts) out of the attenuator.

In this 10/20/20/20 db attenuator input energy arriving at J1 is coupled precisely to ground through the selected "pi-configuration" resistor group *as the switch is placed into the attenuate position.* If it helps, think of each slide switch position as a *two-way unbalanced splitter.* Part of the energy (all but 10 or 20 db of it) goes on to J4 (the output jack on the attenuator) while the precise amount called for *shunts to ground* through the pi-network resistors. The preciseness of the individual attenuator resistors is very important — 1% are used in most meters. The 91, 110 and 150 ohm values you might be able to locate in 1% values locally, but the 371.25 ohm units in the 20 db attenuators would give you some problems replacing!

This particular attenuator has *input and output compensation.* L1/L2 form a tuned network in the input while in the output L7/C3 and L7/C5 form additional tuned networks. These assist the alignment technician in *equalizing* the (0-900 MHz) *response of the attenuator* and like any tuned L/C networks *they are not unconditionally temperature stable* (i.e. response *will* change with temperature extremes).

Blonder-Tongue FSM-2 attenuator is sealed in self-enclosed RF tight container.

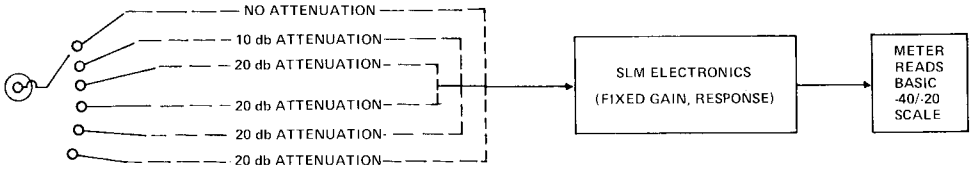
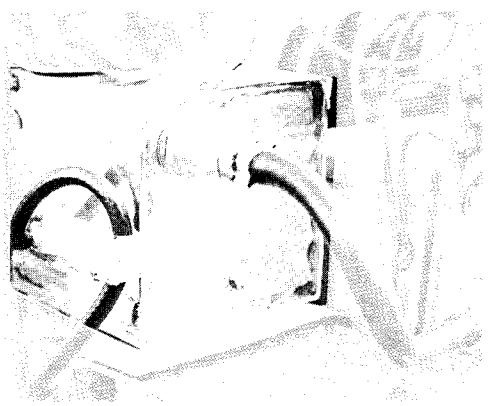


DIAGRAM 3

It is important to understand that the attenuator network ahead of the instrument is the *heart* of the instrument. The *amplified-gain* of the active electronics [i.e. from RF amplifier — if there is one — back to the DC (meter voltage) amplifier] *is fixed.* As far as the active portion is concerned it is *always* reading in the minimum input range. This point needs to be emphasized. See *Diagram 3.*

There are any number of alignment *compensating circuits* in the active electronics portion of the meter. Most instruments allow one of these compensation circuits into the "hands" of the meter operator, typically termed the *"Tuning Compensator"* (although it is located in the I.F. amplifier portion and *not* the tuner).

But *the meter itself is basically a one range instrument,* reading the minimum scale of the ranges provided (i.e. -40 to -20 dbmv typically, or 100 microvolts full scale). It becomes *a multiple range* instrument by placing *ahead* of the basic range, precision attenuators which "expand" the basic range by the 10/20 db range steps of the attenuators.

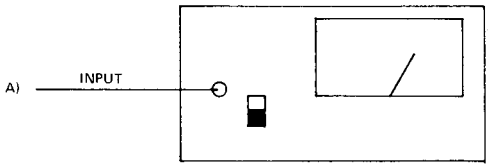


Delta Electronics FST-4 attenuator is rotary, sealed in RF tight container.

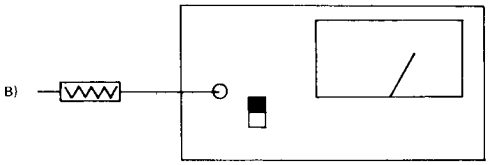
This is a pretty standard approach for virtually *any type* of measurement instrument where voltages in particular are concerned. It is a point many overlook when they try to "think through" the meter before them and the apparent operating problems they may be having.

The precision attenuator is actually an "add-on" instrument ahead of the basic meter electronics. It has its own special problems apart from those of the active portion.

Through the years one of the more persistent problems has been the switching method employed to add in (and subtract out) various precise amounts of attenuation. *CATV is a business conducted in something less than a sterile environment* and dust, dirt and moisture seep into virtually everything we use. The SLM and it's precision attenuator are no exception. Most manufacturers use either slide switches or step rotary switches. The slide switches are carefully sealed to prevent dirt and moisture from getting into the slide contacts, *but some does none the less.* When this happens contacts "stick" and the slide switches have to be "forced" to function. Often something gives and the switch hangs up, broken. Another equally common problem is contact corrosion due to moisture. Switch contacts are usually *silver plated* which resists corrosion about as long as anything can. Eventually, especially with a meter that goes into the field and gets used in wet as well as dry conditions, enough moisture gets into the slide switches to corrode the



MEASURE SIGNAL ON SLM



TAKE 10 (OR 20) db SLM ATTENUATION OUT, PLACE LAB QUALITY EXTERNAL 10/20 db PAD AHEAD OF SLM.

DIAGRAM 4

contacts so that poor contact is made. This radically *changes* the preciseness of the 10 or 20 db attenuator slide switch position, always for the worse (i.e. more attenuation, not less) and *usually when the switch is in the "off" position* (i.e. when you *believe* you have no attenuation "in").

Aside from dust, dirt, grime and moisture, the precision attenuator usually has but one enemy, *electrical shock.* Early instruments did *not* employ any form of AC blocking and when an instrument was placed on a line with AC voltage present, the AC naturally zapped the attenuator.

Most attenuators are sealed up, that is they have been designed to function without operator attention. The sealing process is double duty to keep dirt, grime, and moisture out and to prevent any direct pickup of the off-the-air signal. If you *ever* have any reason to open one up and inspect it (which *is* a legitimate exercise *if* you need to clean the contacts *or* inspect for resistor damage) *it should be done very carefully,* noting exactly how it comes apart (and goes back together). Pay *particular attention* to any shielding, including what appears to be heavy aluminum foil (excellent shielding material). Contacts can be cleaned, often *without* opening the attenuator, by using any first class *tuner-contact-spray* lubricant (note we said *tuner contact*). If you are going to check resistor values, keep in mind we are dealing with 1% *resistors* and they can not be accurately (or adequately) checked on a $9.95 imported VOM.

The quickest way to check the validity of any *particular* slide switch attenuator on a meter is to *compare* all switch positions *of the same value.* That is, reference a signal level that is constant and alternately slide 20 db steps in and out, checking each one against the others. They should read the same (i.e. 20 db on one should be close to 20 db on any other like value switch).

If you happen to own a good quality external attenuator (whether step or 10/20 db fixed) it will allow you to *substitute its attenuation* for any of the step positions on the meter to check the accuracy of the switched attenuators. *See Diagram 4.*

A good quality step attenuator is perhaps one of the best investments any CATV system can make, *provided* the step attenuator is *left in the shop* and used *only* for indoor calibration checks of company SLM units. We'll talk more about this shortly.

Finally, in a pinch, if the meter's attenuators have been damaged it is possible with some units (which *separate* the precision attenuator sub-module from the balance of the instrument, interconnecting with a short jumper of 75 ohm cable) to bypass the SLM attenuator and place an *external lab quality attenuator* in front of the unit. The calibration *may* not hold *totally,* especially where the SLM attenuator has output tuned compensating circuits such as shown in Diagram 2, but it *will get you by* until you can get the attenuator in the SLM repaired or replaced.

AFTER THE ATTENUATOR

Refer to block Diagram 1. Following the attenuator the signal is delivered

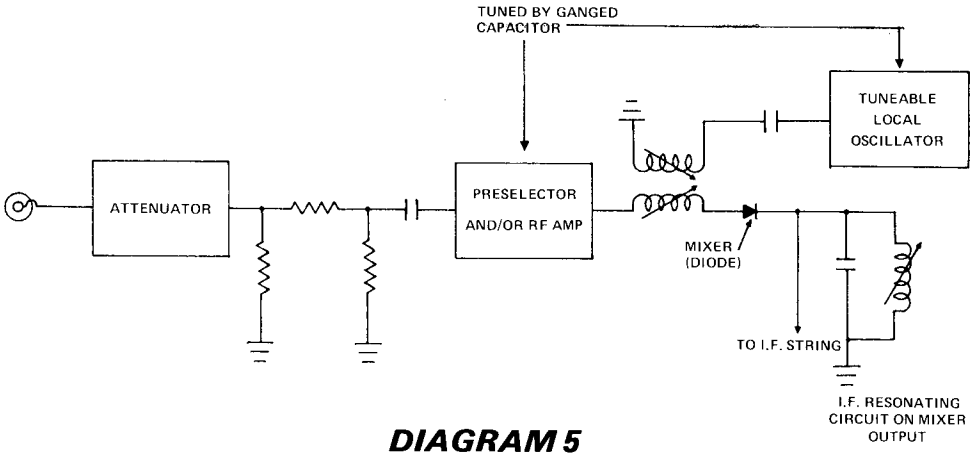


DIAGRAM 5

to the "RF head". In some cases this is a tuned passive preselector and in other cases this is a tuned RF amplifier.

Keep in mind that *after* the attenuator the whole circuit is a *one scale device* developing and reading out RF voltages in a *single 20 db* (scale) *range.* The amount of gain (which *is* an important design consideration) is constant, within manufacturing tolerances, *across the whole tuning range* of the instrument. Because gain is easier to achieve at *lower* frequencies (i.e. channel 2) and more difficult to get at *higher* frequencies (i.e. channel 13 or 83) the SLM designer has to compensate internally for gain-fall off at the higher frequencies *to ensure that gain over the full tuning range is constant.* If this were not done, circuit *gain* at lower frequencies would *"boost"* the indicated signal level on *lower channels* beyond their true values, *reference the lower-circuit gain higher frequency signals.* So the circuit *gain at the higher frequencies* determines the package circuit gain since it is the *lowest denominator.* And lower frequencies are compensated with tuned circuits to *retard* the circuit gain in those ranges.

An SLM that uses no RF amplifier stage goes through a tuned preselector directly into a mixer. Compensation, if used, is built into the preselector in such a way that preselector losses (it is a tuned band pass circuit) are higher at low frequencies. The intent *up to the mixer* (diode) is to keep all signals *to the mixer* equal, *regardless* of the frequency they come into the unit.

For example, the designer must be careful to see that a true 500 microvolt signal at channel 2 arrives at the RF-to-I.F. mixer input *with the same signal* (voltage) level as a true 500 microvolt signal at channel 13 (and at UHF if a UHF head is included). This is *no easy trick* over a wide frequency range (54-216 MHz) and it gets even more complicated when we add super band ranges and UHF to the instrument.

THE TUNER

Just as we were able to separate the precision attenuator as a sub-module, it is wise when studying an SLM to sub-module (in our thoughts) the portion of the meter *between* the precision attenuator and the RF-to-I.F. mixer (where the input RF frequency is converted or translated to the SLM intermediate frequency). This sub-module portion is *roughly* comparable to the tuner in a standard television receiver.

See Diagram 5. The output of the attenuator is taken through a tuned

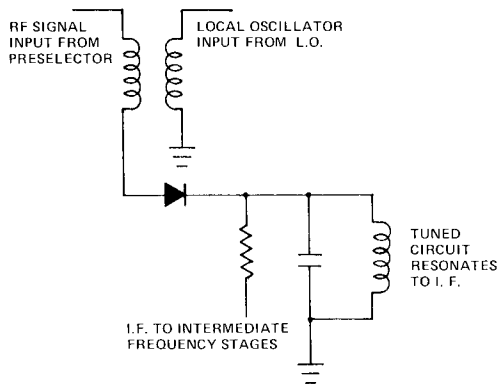


DIAGRAM 6

preselector and either directly to a mixer (RF-to-I.F.) or through an RF amplifier stage and *then* to the RF-to-I.F. mixer.

At the output of the attenuator any signals present on the input line are also present. Since we are *only interested in one carrier* at a time, some function must start the process of separating the desired (to be measured) carrier from the others present. *This is the job of the preselector.*

The preselector is a tuned bandpass filter controlled by the multi-ganged capacitor which varies the operating frequency of the SLM. One or more sections of the ganged capacitor vary the passband over the spectrum of coverage of the SLM by tuning not only the preselector bandpass filter but the local oscillator stage as well.

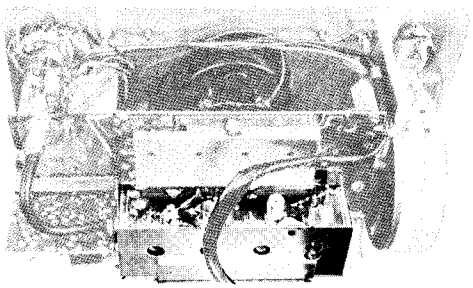
Recall that the precision attenuator is a fixed unit. That is, it reacts the same over the full coverage range of the SLM and there is no tuning involved. So also does the I.F. amplifier portion stay the same. There is no tuning involved, regardless of the frequency of the carrier being measured.

What does change is the preselector, an RF amplifier stage (if there is one) and the input circuits to the mixer stage (that combines the incoming RF carrier with a locally generated oscillator).

In Diagram 5 we see that the incoming signal from the attenuator is filtered (for frequency selection) and applied to either an RF amplifier stage (which is in truth an *active-filter stage* that combines additional filtering with amplification) *or* directly to the mixer without RF amplification.

The mixer is a fairly straight forward device that has *two inputs and one output.* One input is the *preselected* signal, the second is a *locally generated carrier* (signal) produced by a stage called a "local oscillator". The *output of the mixer stage* is the mathematical sum (or difference) between the *two* input frequencies. For example, when the local (tuneable) oscillator is tuned to 75.25 MHz and the incoming signal passed by the tuneable preselector is 55.25 MHz, the *difference* between the two signals (75.25 - 55.25) is 20 MHz. If the I.F. amplifier section of the SLM *is in fact 20 MHz* the output of the mixer (20 MHz) becomes the input to the I.F. section of the unit. In all cases the I.F. stays at the same frequency but by tuning the ganged tuning capacitor we vary simultaneously the local oscillator frequency (which is part of the gang tuning) and the preselector tuned bandpass filter. When the local oscillator is (for example) tuned to 231.25 MHz the preselector is tuned to 211.25 MHz, producing a signal at the input of the I.F. of 20 MHz (only that signal is originally a 211.25 MHz signal from a channel 13 transmitter). *Diagram 6 illustrates.*

The preselector, the RF amplifier stage, and the input to the mixer are mainly exercises in tracking. That is, an exercise in designing two or three or four stages which each do separate things, but they do them *simultaneously in concert* so that they constantly work *together* to achieve a *single objective*, which is an output on



Delta tuner is famous Mallory Inductuner, in self-contained shielded sub-case.

the I.F. section input frequency. The channel selector knob (i.e. continuous tuning) on the front of an SLM is the *common thread* that ties all of these stages and functions together. It operates the ganged tuning device(s) which must simultaneously *track* each of the separate stages to produce the successful broad frequency coverage of the SLM.

Following the mixer device which converts the input signal *down* to a common intermediate frequency we have two or three stages of *I.F.* (intermediate frequency) *amplification* and filtering. The choice of an I.F. (frequency) for an SLM is not without plenty of engineering scratching and trying. There is apparently no "right answer" to the decision making process since few manufacturers agree. Some, with several meters in their product lines, have several I.F. (frequencies).

It is an axiom of I.F. choice that *the lower in frequency you go* (i.e. closer and closer to 0 MHz) the *greater the stability* of the I.F. and the *greater the selectivity* of the I.F.

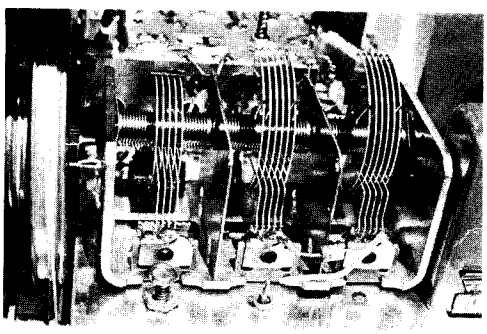
It is a further axiom of I.F. choice that the *lower the actual frequency* of the I.F. *the smaller the separation* distance between the desired carrier (say 175.25 MHz channel 7 video) and the local oscillator frequency. Since the *local oscillator is a signal* and it is right there in the same box (and often on the same G-10 circuit board) as the input to the mixer (175.25 MHz in our example) the *last* thing in the world we want is the energy from the local oscillator gumming up the works for our weak 175.25 MHz measurements.

So we want to go low in frequency *to get selectivity and stability* but we want to stay far enough away from the desired carrier measurement frequency with the local oscillator to keep it out of our hair. It is one of those endless trade offs with which every design engineer must cope.

If we are trying to receive 175.25 MHz and we have a 20 MHz I.F. our local oscillator is operating on *175.25 MHz plus 20.0 MHz* or 195.25 MHz. If our I.F. is 40 MHz and we want 175.25 MHz our local oscillator is running on *175.25 plus 40 MHz* or 215.25 MHz. There are exceptions, but most of the commonly found isntruments in CATV utilize I.F.'s between 20 and 40 MHz.

The I.F. "section" of the SLM is required for gain and bandpass shaping (i.e. selectivity). The *gain requirement* is part of the overall problem of plugging in sufficient voltage amplification "at some point between the input jack to the SLM and the terminals on the back of the meter movement" to net accurate full scale deflection in the basic range (at -20 dbmv typically). Most meters get a good share of this voltage gain in the I.F. section.

The *selectivity requirement* is just what it sounds like — the ability to



Blonder-Tongue employs ganged capacitor tuner, open on FSM-2 chassis.

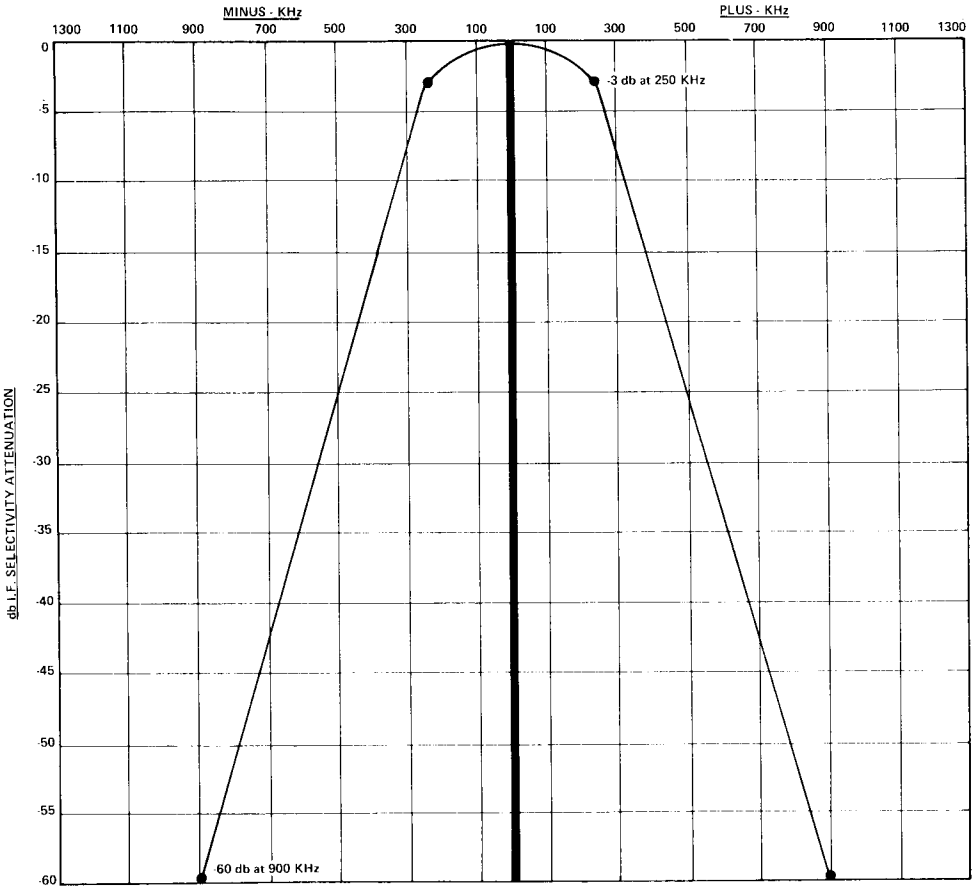


DIAGRAM 7

separate the desired carrier from any (and all) others that might be *expected* to be present. The *basic assumption* most SLM designers start with is that they must be able to separate the visual carrier from the lower adjacent aural (or vice versa). *Diagram 7* shows a typical selectivity curve.

The selectivity function is another one of those engineering trade-offs. It is no trick to make the meter *super-selective* (communication system technology regularly maintains selectivity 10 times as great as a typical SLM in two-way mobile units that bounce around in the trunk of vehicles). But *too much selectivity* would be a disadvantage for the meter operator and would require considerably more expensive circuits. *Entering into the overall selectivity equation is stability.* The sharper the selectivity the more *precisely* the operator must set the multi-ganged tuning knob *dead-on frequency* to find the desired carrier and its modulation for peak detection. Having *an extremely selective circuit would complicate tuning* and require much slower mechanical tuning rates (in the tuning knob and drive shaft). Even *if* you were willing to accept the much slower tuning rate (i.e. it would take several times as long to get from channel 2 to 13) or the units were equipped with a two-speed knob drive (i.e. fast and slow) there is another (more severe) problem with too much selectivity: *stability.*

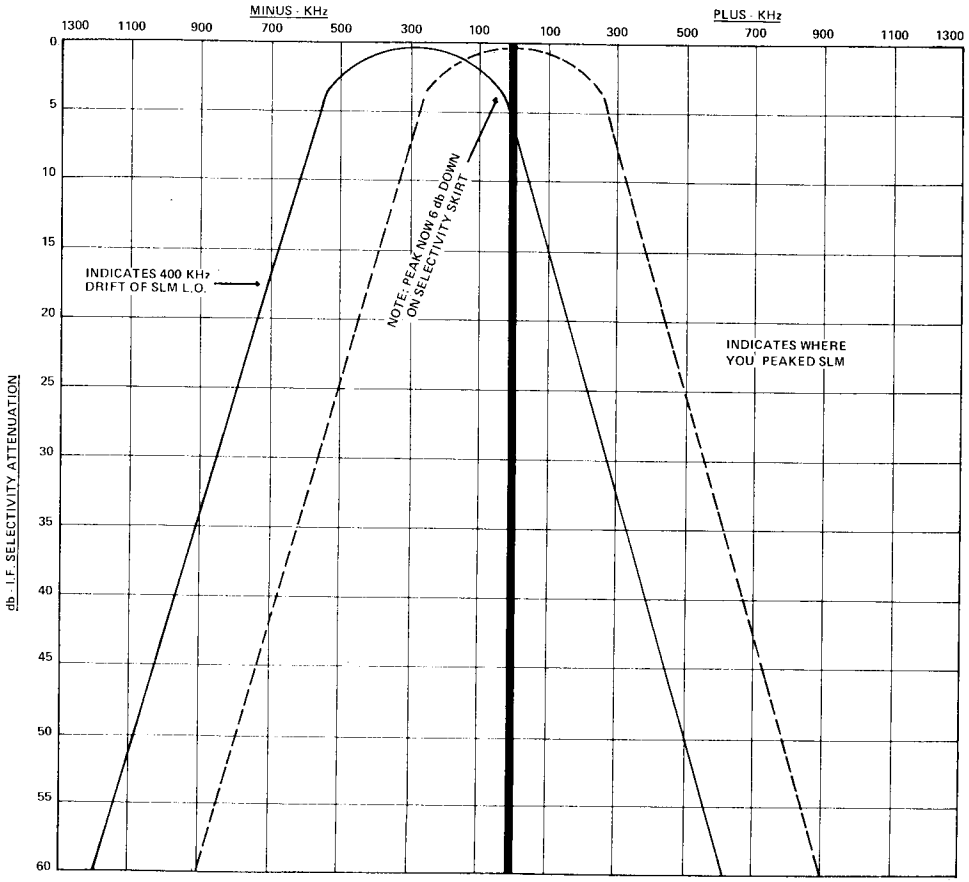


DIAGRAM 8

Recall that to tune from channel 2 visual carrier (with a 20 MHz I.F.) to channel 3 visual carrier we have to knob-tune the multi-ganged capacitor to *vary the local oscillator frequency.* At channel 2 the L.O. is 75.25 MHz and at channel 3 it is 81.25 MHz (to produce a 20 MHz I.F.). The local oscillator is temperature stabilized in design, which means capacitors utilized in its circuit have special characteristics that compensate for temperature changes. *Still, local oscillators do drift.* They drift up and down in frequency simply because in the price class of many SLM instruments it is not always feasible to build in rock solid (crystal like) stability.

And *the more selective the bandpass of theSLM the quicker a small drift in the local oscillator frequency will move the desired signal* out of the pass band of the I.F. *See Diagram 8.* If you have ever had the experience of setting an SLM on carrier frequency *carefully* and walking away for a few minutes or an hour, only to return and discover the SLM is no longer precisely on the correct frequency (carrier) *you have experienced local oscillator drift.* Even with the kind of selectivity curve found in Diagram 7, drift is not uncommon in some units.

SLM units with an I.F. attenuator (i.e. gain control) are nothing more than a calibrated means of varying the otherwise fixed-gain of the I.F. block. This is usually done as a means of giving the operator an extra operating

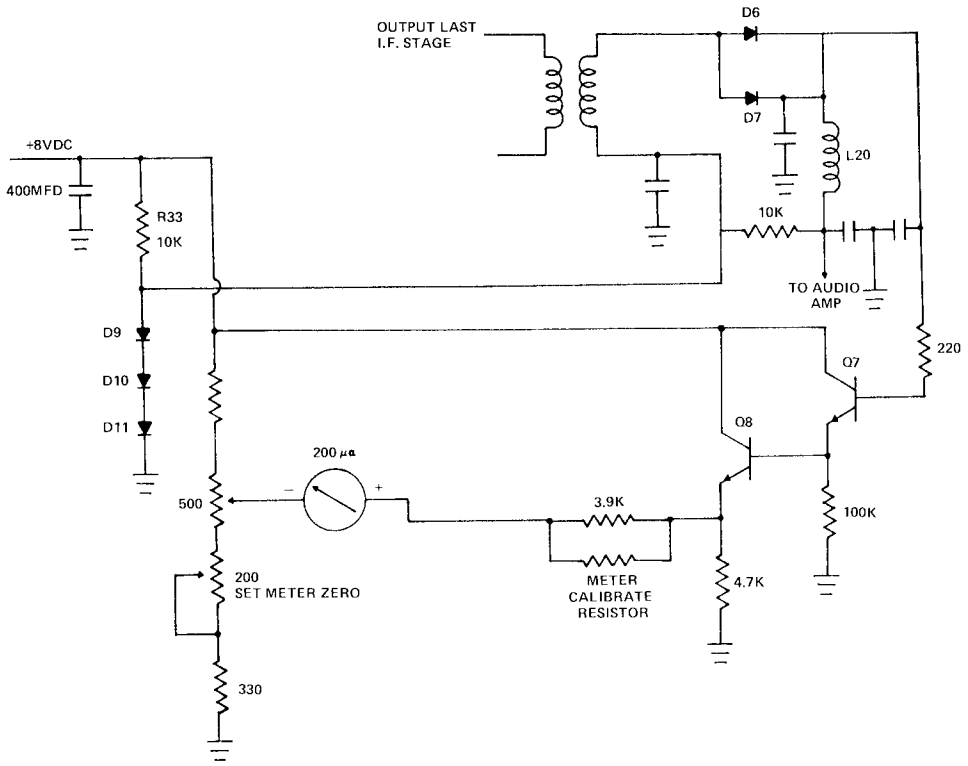


DIAGRAM 9

control, a function we will discuss in detail in November and December.

DETECTOR

The *RF signal voltage* constructed through the amplifier stages (RF + I.F. or I.F. alone) is turned into a meter reading voltage in the detector stage. The detector is typically a diode, although it may be a transistor. The detected video signal is *not* capable of driving a video monitor (even with amplification) because the selectivity of the SLM is far too tight to allow proper passage of the approximately 4.0 MHz wide video information found in a broadcast TV signal.

Some units use "snap-in" diode units that rest in position between two metal prongs. They are "pressed" into position and hold in place through mechanical strain (i.e. they are not soldered into position). This allows the user to *replace the diode* should it ever go bad without having to get into the circuit with a soldering iron. However, with this advantage comes the disadvantage that *occasionally the mechanical clip that holds the diode in place will release one end* (or both ends) *of the diode.* This is most apt to happen when the meter is accidently dropped. When this happens the meter stops working altogether or functions *intermittently* (as the diode prong makes intermittent contact with the metal clip). The solution is to open up the meter and reseat the diode in place. The clip-in diode arrangement can also cause some problems in areas of highly corrosive atmosphere. The plated contacts on the clip, like the slide switches in the attenuator, can *oxidize or corrode* making less efficient contact between the diode metal end pins and the prongs on the clip.

DC AMPLIFIER(S)

The detected voltage present at the output end of the detector (diode) is *not sufficient* to drive the meter movement in most units. A fairly straight forward DC voltage amplifier (appropriately termed a DC amp) solves this design problem by amplifying the detected signal.

Many meters use the DC amplifier as a convenient place to apply *temperature compensation* to the operation of the entire unit. The Delta FST-4 is typical of the approach taken to ensure the meter functions with similar accuracy over fairly large excursions in environmental temperature. *See Diagram 9.*

Silicon diodes D9, 10 and 11 are forward biased to give temperature characteristics equal to but opposite to D6, 7 (detector circuit) and Q8 (DC amp). R33 (on +8 volt line) supplies forward bias for Q7 and Q8 which generate thermally corrected current caused by the voltage drop across D9, 10, 11. This temperature compensated source is applied via L20 and detector diode D6 to the base of DC amp Q7 (thereby providing bias for DC amp Q7 in the no signal condition).

POWER SUPPLY

SLM power supplies are more involved than you might suspect, primarily because of two requirements.

When the SLM is to be utilized as a field strength measurement device (the FSM mode) *the accuracy of the measurements is only as good as the stability of the amplifier/detector circuits.* Stability due to changes in environment is one thing; instability due to voltage varying on the transistors and diodes is something else.

In the power supply circuitry one finds substantial differences between manufacturers. Where one company will use a single transistor regulator another will use five transistors. Where one will reference to voltage only another will cross reference voltage and current.

The complete understanding of SLM power supplies is substance for one fairly lengthy sub-report and it will be handled in that fashion before this series terminates in the January (1975) issue of CATJ.

In addition to stability *the SLM power supply is a two-source device.* Virtually all field units operate from an internal battery supply *or* standard power mains. Most of us use the instrument in the battery supply mode most of the time. Because battery life is limited we are concerned with how long the batteries will sustain the units. The manufacturers have been pretty universal in adopting an interlock switch which automatically shuts the unit off when the front cover (door) is closed, a very helpful feature if you are constantly on the move and frequently forget to shut the darned thing off with the on-off switch after a measurement is completed.

The choice of batteries is another one of those trade offs. Until the very recent introduction of small physical size, long life, high current rating cells, if you wanted longer life, you were stuck with larger and larger physical battery cases. At some point the user (you) complain about the size of the entire package and the weight. Manufacturers rate the useful life of the batteries they recommend (and design case openings for) in different ways. *Delta* tells you the FST-4 has a useful *"battery life of 14 hours continuous running"* and that the unit draws 11 mA current. The *minimum battery voltage* required to run the unit is 11 volts (two 9 volt batteries are run in series).

Blonder Tongue tells you the FSM-2 will run *"approximately 180 hours in intermittent service"* which they define as 90 periods of two hours each. The FSM-2 draws 15 mA and the *minimum battery voltage* required to run the internal electronics is 13 volts. Again, two 9 volt batteries are operated in series.

In the final analysis, an SLM that draws lower current and operates down to a lower battery cutoff voltage is going to get more useful battery life out of a set of batteries.

Battery check indications are usually made *after* the regulator circuit, thus you are reading the voltage in a go-no go situation. *If there is sufficient regulator voltage* to run the unit, the batteries are in fine shape (for the moment) and you can proceed to do your job. As soon as the regulator cannot maintain the minimum operating voltage the circuitry requires, you have a no-go situation. It is not wise to think of the battery check mode as a true "voltmeter across the batteries" circuit.

THE METER

The choice of a meter movement is basically made on the premise that the user (you) wants to be able to quickly and clearly see what the meter levels are. Large meter faces and multicolored scales are the order of the day.

Most meter movements are made to the specifications of the SLM manufacturer, either as completely custom movements (and faces) or as face variations of standard meters that meter manufacturers such as Triplett carry in their line. *The basic meter movements are low value* (such as 0-200 microamps) *units.*

If you want to check the operation of your meter movement, you can connect a good quality VOM or VTVM into the "Video Out" jack on most meters (place Blonder Tongue meter in *peak* position) and starting off around 0-500 microamps, scale down the external VOM/VTVM in voltage steps until a full scale reading on your SLM corresponds to the same on your external meter movement.

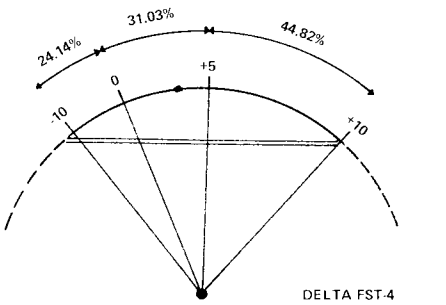
The meter movement is a 20 db "linear" scale. With the exception of a couple of installer meters that have 30 db scales, full left stop to full right stop on the meter face is a 20 db range.

The meter movement people do their best, in concert with the CATV SLM manufacturer, to build a linear movement. But because of the log voltage function and meter movement shortcomings, they fall quite short. Take a close look at your own meter; note how much of the scale is compressed to the left hand side. *See Diagram 10.* Two of the meters to be reviewed in November and December are shown in scaled relationship to illustrate the differences in meter scale approach.

The *Delta FST-4* has an exposed face area of 3.93 inches (width). The *Blonder Tongue FSM-2* has an exposed width of 4.88 inches. Thus the BT is 124.2% of the Delta face width. Seemingly the BT would be about 24% larger and correspondingly easier to read.

However *Blonder Tongue* does a clever thing with their instrument meter. Note in Diagram 10 that both meters use approximately 24.14% of the scale area to display -10 to 0 (db).

Both meters use approximately 31.03% of their face scale area to display 0 to +5 (db). Both meters use approximately 44.82% of their face scale area to display +5 to +10 (db). Blonder Tongue uses a meter design which places the center of the circle (i.e. the *apparent* pivotal point for the meter needle) *much lower* down than the Delta. In effect, the circle



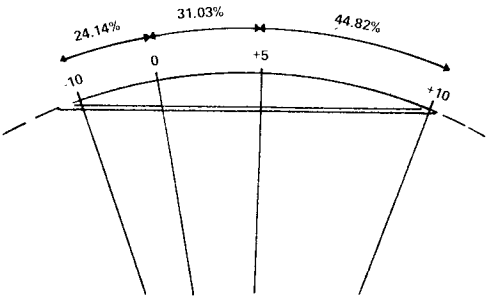


DIAGRAM 10

scribed by the face scale (or the arc drawn by the needle) is quite a bit larger with the BT. The drawing in Diagram 10 to scale shows how the BT mechanically expands the visual scale of the meter movement. The Delta needle pivotal point is approximately 2.19 inches below the scale line (i.e. that is the radius scribed by the needle to the scale). The Blonder Tongue is approximately 5.31 inches below the scale line. The BT needle *"appears to be"* 2.43 times as long as the Delta needle and in the end result is an expansion of the scale through the mechanical design of the meter face that is 31.82% larger than the Delta. To the eye, in a side by side comparison, the difference seems much greater however because of the long needle radius utilized in the BT scaling.

Finally there is the matter of the meter movement linearity - the linear response of the meter movement itself. Obviously, a meter movement that bunches 50% of the electrical scale in 24.14% of the mechanical display area *is not very linear.* What about the electrical accuracy of the meter movement? If the mechanical display vs. electrical units is non-linear, *what about the response of the electrical display to linear changes in drive voltage?*

Most SLM manufacturers will tell you *when asked* that if you want to read an absolute level with the maximum accuracy possible with their instrument you should do so with a scale reading that places the meter needle someplace between 60 and 80% of full scale. That is *mechanical* scale, not electrical scale.

The truth is that any meter movement's linearity response is *not good* on the low end. The needle deflection becomes less and less accurate in the region below 25% of full mechanical scale. In actual practice, when you are reading or trying to accurately read levels that are in the -10 to 0 range on your scale face, you are potentially as much as 2-3 db out of mechanical accuracy *on top of the electrical accuracy* of the SLM itself.

If the SLM has an absolute accuracy of +/— 1.5 db — *this will only be true in the best case,* which is when the needle is around 60-80% of full mechanical scale (between +7 and +8 typically). On the low end between -10 and 0 db *on top of the absolute meter accuracy of the SLM circuitry* (i.e. typically +/— 1.5 db) you can also be as much as 2-3 db *out of mechanical-display-accurate.* Your potential inaccuracy is as much as +/— 4.5 db in the low display ends of the scale, which a bunch.

To avoid these compounded errors, high-accuracy-requirement readings should be made (where possible) with the meter scaling in the +7/+8 region. However, getting there with 10/20 db step attenuators may be a trick and require external fixed (or switchable) precision lab quality pads ahead of the SLM.

This series will continue in the November *CATJ.*

OPENING THE BACK DOOR TO CATV

ONE WAY IN

There is a perhaps clever ploy going on about the country that is making a few people quite a bit of money in the master antenna business. A casual mention in *CABLE-captions* in the June issue of CATJ (Page 5) of an MATV type operator we are acquainted with brought nearly a dozen letters and calls from others who said (in essence) "tell us more".

Everyone who reads CATJ is aware of the official FCC definition of a CATV system. For those fuzzy of mind, it reads:

"76.5 (a)
Cable television system (or CATV system).... Any facility that, in whole or in part, receives directly, or indirectly over the air, and amplifies or otherwise modifies the signals transmitting programs broadcast by one or more television or radio stations and distributes such signals by wire or cable to subscribing members of the public who pay for such service, but (such term) shall not include any such facility that serves fewer than 50 subscribers, or any such facility that serves only the residents of one or more apartment dwellings under common ownership, control, or management...."

Although not officially defined as such, most systems with fewer than 50 subscribers are generally thought of as MATV (master antenna television) systems.

Some would include trailer parks in the MATV category, but the FCC ruled this summer that a Florida system serving around 350 subscribers in a trailer park was in fact a CATV system. So that closed that particular "loop hole".

Since trailer park systems, which charge residents for antenna service, are now officially under the protective wing of the Cable Television Bureau and systems with fewer than 50 subscribers "out in the open" are generally considered not large enough to earn one a pot at the end of the rainbow, what about systems operating in *"apartment dwellings under common ownership, control or management"?*

The *CABLE-captions* mention of the fellow we are aware of noted he now has 55,000 outlets under contract. That is a pretty fair chunk of service in anyone's book.

What we did not mention is that this same fellow is on his "second honeymoon" with "apartment dwellings under common ownership" systems. His first rainbow pot earned him nearly a quarter of a million dollars in around two years because he was at the right place at the right time with a planned program of *backing into CATV.*

HOW IT WORKS

If you are going to put in master antenna systems in this country you have an initial choice to make:

(1) Stay in the installer business. Sell the system, usually against tough low-ball bidders, as an installed operating master antenna system, collecting all of the money you are going to receive at the end of the contract. . .and run like hell before the damn thing quits working!

(2) Be in the installation business much in the same way a CATV system operator installs or builds a cable system, for the *expressed* purpose of *operating* the "money machine" for as long as it can crank out the coin. Or until someone comes along with a big chunk of change and offers you an absurd price to "take it off your hands".

Let's dispose of the first option right off. If you go into the business to sell a system on a competitive bid basis you will end up either staying in business because your systems are cheaper than anyone in town or you will go out of business in a hurry (1). There's not much future in selling broadband apartment house amplifiers for 10% over cost.

It is the second "option" that interests us, because we have seen it work.

If you go into an "apartment dwelling under control ownership, control or management" and try to sell the "common" part on allowing you to build your MATV-CATV system you are, in effect, going in after a "franchise". Only you won't call it that. You will call it what it really is, a contract between two consenting parties. You will supply a television reception service and for this service you will collect one big check at the first of each month from Mr. "Common Control" or you will collect a whole batch of little checks from Mr. and Mrs. "Common Controlee" *just like in a CATV system.*

THE CARROT

Ho-hum, you are saying, *so what?*

We will explore in greater detail how it can be made to work for you, quite handsomely, in just a tad. But first you should make note that many of the nation's bigger cities have still *not* gone into the cable franchising business. Places like Cleveland, Houston, Dallas, Washington and so on are still "considering" the pros and cons of franchising some lucky company with the responsibility of providing 120 channel two-way service to their citizens.

One day the service *will come* to the Clevelands and Houstons of this world, just as it has come to places like Augusta, and Columbia. Suppose you are already there with 1,000, 5,000 or 10,000 "apartment dwellings under common ownership, control, or management" paying you or your company a few bucks each month.

Usually this type of operation *attracts the incoming CATV company* at one of two points. They first become aware of you when they start their suburban encirclement, chasing franchises in the bedroom communities that surround the great metropolis. In their natural hurry to impress the city fathers of the great core city with their ability and intensity, they knock off the bedroom towns one after the other and rush in to get one or more operating as a "positive sign of ability and interest" in the big community. If the competition for the "biggy" is heavy, every little edge counts. That can include having a few thousand "apartment dwellings under common control" already getting service *within the city* or nearby.

So they come along to see you when their fever pitch interest in the big city is high, knowing that you represent an *edge for them* if they can persuade you

---

(1) There are many fine high-quality MATV installation firms around the country. Unfortunately, they are outnumbered by those who "slap it in" and run, having initially sold the systems for such a low price that only the cheapest of equipment and the shoddiest of installation techniques can be used in the actual system.

to sell out. Which you might do...if the price is high enough.

The second (*and last*) time they want to talk to you is after they have received the big franchise. Now they are up to their hips in FCC forms, locating a few tens of millions to wire the city, public access groups demanding their own channels and equipment suppliers offering the special of the week. They are also up to their quill pens in red ink and the pressure is on from the home office to get the damned thing producing some revenue. Your few thousand "apartment dwellings under common control" represents *some* cash flow and it may also let them *off the hook with the city* itself when construction on the big system runs 300% behind the schedule set out in the franchise.

All of this is not only possible, it is being done; right now, today, by some pretty farsighted CATV type MATV entrepreneurs who have a track record to prove they know what they are doing. Selling off 3,300 "apartment dwelling subs" for a cool $275.00 a subscriber, in cash, to the new city franchisee, as one southern operator of MATV recently did, *does* have its attractions.

ONE OF WHICH IS. . .

...a lack of FCC involvement. As long as part 76.5 (a) reads as it does the fellow who employs CATV techniques for "MATV systems" has a few edges which even his true-blue CATV competition can't match. Things like technical specs (although being shortsighted is a mistake as we shall see) and other things, like channels to be carried. As long as the FCC rules are so hopelessly confused as to preclude the bonafide cable operator from cable-carriage of signals that a decent outdoor home antenna can pick up, the MATV type has it made. As long as non-duplication eats away at the guts of CATV system signal carriage, the little fellow with a system operating in an "apartment dwelling" can not only carry the distant signals without fear of FCC reprisal, but he can forget all about those nasty, *fault-free* boxes called non-duplication switchers, and all of the grief and hassle that comes from subscribers when a football game runs long and the station is cut off in the last two minutes of the fourth quarter!

SELLING THE SERVICE

Not every community needs an MATV type of service. Many of the best ones have been gobbled up, quietly, by CATV type MATV'ers already. The perfect community for this type of service is a community that is spread out all over the devil's half acre, with rolling countryside, relatively short TV transmitting towers, and a delightful mixture of VHF and UHF network service.

Unfortunately San Diego was snapped up some time ago.

Any community with partial VHF and UHF network service rates high on the ladder to likely success. Apartments are very hard on UHF signals and the usual apartment dweller has two choices: use less than 0 db gain rabbit ears, with less than 0 db front to back ration (love those ghosts bouncing off the building's super structure, the hill across the way and the twenty story building in front) . . .or . . plugging into the El Cheapo master antenna system, tastefully constructed from an unmatched combination of 300 ohm ribbon line, Korean War surplus RG-58 and sown together with a mixture of carpenter's nails and 3/8 inch metal conduit.

Some choice.

Of course there are apartments and *there are apartments.* Mass produced $125.00 per month housing complexes are not very tempting. For one thing, the residents keep stealing your drop cables and setting fire to your attic head end (what a neat place to smoke pot!).

The really tempting morsels are the "exclusive" joints where the residents

at least stay inside their own apartments to smoke pot. These $300/$400/$500 a month folks are most likely to have one or two large color TV's, a portable or two, and a yen for sporting events. And if your town has sporting events on UHF, or the sports come in via a distant VHF or UHF transmitter, then you really do have something quite appealing to peddle, even if the residents can measure millivolts of (ghost filled) signals off their gold plated tooth picks.

These plush "apartments under common control" or the condominiums that have sprung up from coast to coast which are "managed by common management" are the best targets for the enterprising first-timer. A small $6.00 a month service charge for good TV is not something these people are likely to quibble about. And because they are packed in close together like sardines, if you can produce a good picture or two, chances are excellent your saturation will spread faster than it would in a West Virginia coal mining community where without the cable there is no TV, *period.*

Now, what are the methods being used to sell the service?

(1) *Straight Approach:* "You let me wire up your new apartment complex for *cable television*

WHAT TO LOOK FOR

Not all "markets" need CATV type MATV systems. Some have such excellent off-the-air VHF only coverage that rabbit ear antennae function just fine over the entire metro region. Others need the service for purely terrain reasons. Here is what to look for:

Terrain Advantages

The rougher the terrain in the **near market area** the more obvious the classical need for good quality master antenna systems. Many "apartment dwelling" projects are built around low lying lake or creek/river areas and when the sites are below average terrain, they probably need master antenna assistance.

High Rise Advantages

When local transmitting antennas are located right on top of the "apartment dwellings" and the area is heavily developed with multi-story steel and concrete buildings, severe multi-path reflections may make the need for an outdoor high quality antenna system obvious. Local ghosting and direct pick-up may be so severe that you are forced to convert even VHF channels to different channels for local carriage in areas where local signals are strong.

Mixed Allocation Markets

If the local UHF situation suggests that many desirable programs are available only on UHF, the market probably has possibilities. If one network is UHF and the remainder are VHF, the pot sweetens.

Hyphenated Markets

Because "apartment dwelling residents" are often forced to utilize the most meager of built-in antennas, hyphenated markets where one or more stations are in-market but perhaps **30-50 miles distant** are especially tempting.

Fringe Markets

Communities 50-70 miles from a much larger nearby major market are appealing, even if they already have local three-network-service, **provided** you can develop good usable **high quality signals** from the major market with the type of antenna height structures to which MATV type projects are usually confined.

Remember your MATV type system will have to **compete** in the open market place for subscriber dollars. You seldom have a locked in "take it or you don't get TV" situation. High quality service will not only increase your saturation, but it is your best hedge on the future value of your system when the real CATV comes to town!

(well, it *does* use cable and it is television!)" the pitch goes. "I will bill *you* $5.00 per month and you tack the TV fee onto the monthly rent." (This helps disguise the true TV system owner.) Such contracts are usually drawn for 10, 15 or 20 years at a time. The contract specifies that the cable system owner will provide a service and the builder-owner will get a plus in his building: *cable TV*. . . usually more channels and better quality pictures.

(2) *Modified Straight Approach:* The pitch is the same, except the cable system operator "gives away the system after 10, 15 or 20 years time. This is often done, but is usually unnecessary because the fellow you are dealing with intends to sell his apartment complex in a few years anyhow (if you think CATV system tax shelters are a good deal, take a look at rental unit tax shelters!). And he never plans on being around in 20 or 15 or 10 years in the first place. *So don't give the boat away.*

What many first timers do not recognize is that any *established*, experienced apartment owner (or group) has already had it "up to here" with TV complaints. If they have ever bought an *installed MATV system*, they already know there is something basically impossible about flat line, surplus RG-58 and metal conduit held together with carpenter 6 penny nails. Sure, *when* they were building the project they were out to *save* bucks. They let the project to a master con-

DEALING WITH APT OWNERS

Not all project owners are going to welcome you with open arms. It is most desirable to deal with the projects from a system construction viewpoint while construction is going on (so you too can work with the raw studs and **build the system in** as the project is constructed), many won't be **aware** of the intensity of their local television receiving problems until **after** the project is completed, people have moved in and started complaining about the poor TV reception.

Many projects leave a considerable amount of local authority in the hands of the project manager when they are owned by large out-of-town investment groups. You may be wise to **insist** on contract signatures by an officer of the corporation, not merely the local manager.

Whether you bill subscribers individually and work out rebating arrangements for a percentage of the take with the project owners, or bulk-rate the monthly charges to the project owners at a discount is an early decision you must make. Most system owners prefer the bulk rate approach since apartment dwellers move at the rate of once every year, about 50% more often than home owners.

Don't short-change yourself with your service contract. Remember everything in your system is on **their private property** and the opportunity to bushwhack you after you spend all of the money is very real. And most projects are owned as investments, subject to the whim of the investment market. You may go through several owners (contractees) in the course of a ten year arrangement. Because it is **your** money that is building the system **you want to be adequately protected.**

Condominiums are especially attractive because they are purchased, not rented. And residents tend to stay put longer. Be wary of condominium agreements that turn the project itself over to the condominium's residents in a period of time. Your initial agreement is usually with the project developers, while your long term agreement would in this case be with the condominium owner's association.

THE WINEGARD CABLEMATE TV SIGNAL SELECTOR HELPS SWITCH CATV PROSPECTS INTO SUBSCRIBERS.

Model
CTS-22 for 75 Ohm Antenna Input
CTS-20 for 300 Ohm Antenna Input

Winegard introduces an exclusive new switch with a unique circuitry designed to help turn CATV prospects into CATV subscribers. We call it the Cablemate TV Signal Selector.

And that's exactly what it does. Helps your customer select the signal he wants. Cable when he wants cable. Antenna when he wants antenna.

Which means you get extra help in converting a prospect into a subscriber. Especially all those prospects who want the many advantages of cable TV but aren't ready to give up their TV antennas.

Cablemate is also helpful in the event of a possible outage. So no matter how infrequent or how brief the interruption, your subscriber keeps his temper. And you keep your subscriber.

Cablemate, of course, is not an ordinary switch. It has specially designed circuitry with 58db isolation to prevent interference between cable and antenna signals.

And best of all, everything that Cablemate does, it does reasonably. Because Winegard has kept costs in line and produced Cablemate at a low price.

Cablemate. It even sounds helpful.

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Please send price and order information.

Attention_____

Firm Name_____

Address_____
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City State Zip

WINEGARD
TELEVISION SYSTEMS

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Burlington, Iowa 52601

tractor who in turn subbed out the TV installation ("who knows from a good or bad one?") for many bucks *less* than he had it built into his contract to start.

So along you come with your flashy smile and impressive business card that says you are in the *cable TV business.* Even if the fellow has not been exposed to the cable TV mystique, it won't take you long to explain how wonderful your industry is and why cable TV is the thing of the future (that he can have *right now,* before anybody else in his city!).

When you quietly mention that you will put your system in *free of any costs* to the apartment manager/owner, and that you *only* want to be paid for each month's service, he only wants to know one thing, "How soon can we have it?"

(3) *Lease/Contract Approach:* Now it may be that you don't have the coin to start the system once you have it signed up. If you spend a few bucks with a good attorney before you begin you can usually draft up a snazzy contract that has you signing the "apartment dwelling complex" up for service for *at least 5* and maybe 10 or more years into the future. That signed instrument, *if it has been done properly* and if your own credentials are reasonably good, is or could be your passport to not only the bucks you need to build the system, but quite a bit more.

One fellow we ran into while researching this report showed us how he had signed a 2,000 unit complex to a 10 year contract. To talk the apartment managers into this term, he accepted $3.50 for a rate the apartment people would charge $6.00 per month for. Then he took the signed contract, guaranteed by a large, well-known real estate holding company to the bank and sold it off.

Ten years at $42.00 per year gross income ($3.50 net each apartment x 12 months) is $420. This he *discounted* at the bank for $250 per apartment, or $500,000. The bank was not stupid...

they put *50% of the amount* in a reserve fund which would be paid to the system's contract management firm, a local firm specializing in maintaining MATV systems, at the rate of $25,000 per year. But this left the original builder with $250,000 gross, less the costs he incurred for building the system. He figured it cost him $55 per apartment unit or $110,000. So for about five months work he walked away with $250,000 less the actual $110,000 cost or $140,000 for his trouble.

Anyway you splice it, that's a lot of bread.

And there is more. . .the fellow still owns the "plant", which when CATV comes to town he will package off again.

BUILD IT TO SELL

Everyone *CATJ* talked with, and there are many in this business practicing their art quietly, emphasized that the reason their formula works so well is attention to details. For example:

(1) *Be very choosey* about the type of "apartment dwelling complex" you crawl into bed with. The more exclusive it is, the better your chances for long term success.

(2) *Be careful not to oversell* your product. Stick to things you can install with a maximum chance of long term, stable operation. Trying to haul in a distant 110 mile desirable VHF signal on a 40 foot mast is not a game you should try to play.

(3) *Offer at least one "local" channel,* such as a time and weather machine (of the not too fancy variety) and/or a "pool area camera".

(4) *Use the best engineering and equipment available.* Stick to proven CATV techniques for two reasons:

(A) Maintenance can be a hang up.

(B) When CATV *does* come to town, you want to be so compatible that they can simply plug a drop into your first amplifier and walk away (this will help you get the best possible price for your existing "apartment dwelling system").

(5) *Leave some type of out in your contract,* so if you should sell to a CATV system before the first contract term expires, you have some way for the "new owners" to adjust the rate you are charging to the going CATV rate (again, if you get less than a CATV system would for their service, you can expect to have to discount your subscriber selling price downward).

THE FRANCHISE ROUTE

One especially successful CATV type MATV operator franchises his "service". He goes into a market and seeks out through local advertising "investors" in local "CATV franchises". What he sells is his **know how** to build the systems and often to even manage them for the franchisees.

By franchising all of a market (**example: Philadelphia**) to local investors, he teaches them how to seek out the proper kind of "dwelling units" to "sell to", engineers their systems, contracts with the "franchisee" to install the system and maintain it, and offers day to day overseeing management services that include marketing expertise.

For this he collects a fairly substantial "franchisee fee" going in (**example: $25,000 for the Philadelphia "market"**) a healthy rate for the installation (**example: $75 per drop installed**) and an on-going franchise fee per month (**example: $1.00 per drop per month**).

THERE IS ALWAYS A CHANCE

The FCC has been making noise about regulating "loop hole systems". With

trailer parks now closed as a loop hole, there can be little doubt that apartment and condominium systems will eventually, *one day*, get the official "nod" of the Commission. What that does to you will depend upon two things.

If the Commission follows true to form, all existing systems at the time of the power grab will be "grandfathered". That means you will have "X" number of years to technically upgrade your existing system(s) and you *should* be allowed to continue carrying the signals you have on the system at the time they take you over.

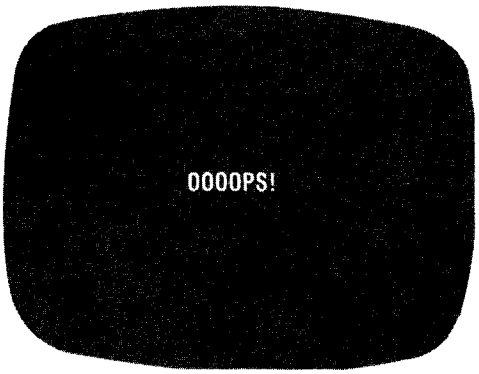
So build it right to begin with, and get as many good quality signals on the system as you can. That will help insure you that you will not be caught in the same boat as many older five channel CATV systems that are being forced to upgrade their systems without the benefits of adding channels that they could have added freely many years ago, but did not.

SYNOPSIS

Is this a "for real" report? And, is the information it contains worth the space it consumed?

Yes, it is a "for real" report. A substantial number of CATV type MATV systems are being constructed. Many are going about their business quietly, attracting little or no attention. Others are fighting running battles with established CATV operators, especially in condominium projects in places like southern Florida. It is a part of the industry we live and work in today, and as such we feel it deserves at least passing mention in CATJ.

CATJ INDUSTRY STUDY AVAILABLE - A study of the 1974 CATV industry, compiled by the staff of CATJ, with the able assistance of hundreds of readers who contributed material, is available from CATJ, as long as the limited supply lasts. Address your request to CATJ MARKET PROFILE, 4209 N.W. 23rd Street, Suite 106, Oklahoma City, Ok. 73107.



As long as your cable system broke down ONLY during commercials, you probably wouldn't get too many beefs from the subscribers (the FCC might find it extremely coincidental however!). But the truth is when it quits, **your long day just got longer (90% of your problems come 30 minutes after you finally get home and snuggle up with a copy of CATJ?)**. It is just possible.... even probable, that one good break down a year **could be averted** by information you learned in the pages of **CATJ**. So here comes **our** commercial message...Things you read about in **CATJ make your life easier,** because things you learn from **CATJ** let you trouble shoot **faster** and more **accurately.** Things you learn in **CATJ** help you **spot problems** before they occur....perhaps early enough to **avoid a break down** entirely. And here you are, possibly reading **someone elses copy** of CATJ! You could have your **very own** copy, at home, **every month.** See the subscription form below.

CATJ – SIGN US UP!

Enter my order for the items checked below:

___One year company subscription to **CATJ;** $10.00 enclosed.
___One year special tech rate subscription to **CATJ;** $7.00 enclosed.
___**CATJ Super Head End Wall Chart** (over 1,000 sold!); ___$5.00 enclosed for a single copy,
___$9.00 enclosed for two copies, ___$12.00 enclosed for three copies.

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HANDY TEAR-OUT REFERENCE CARD TO FCC

HANDY TEAR-OUT REFERENCE CARD TO FCC

Cable Television Bureau / FEDERAL COMMUNICATIONS COMMISSION
1918 "M" Street N.W., Washington, D.C. 20554

(**NOTE:** This list correct as of 1430 hours EDST September 17, 1974)

Advisory Committees (Bill Johnson)	202/632-6488
Technical Standards (Steve Effros)	202/632-6488
CATV Statistics (Walter Morse)	202/632-9797
Certificates of Compliance (Abe Leib)	202/632-7480
Setting Up New Systems (Angela Green)	202/254-3430
Obtaining A Certificate (Greg Weiss)	202/254-3407
Status Pending Certificates (Steve Ross)	202/254-3440
Copyright (Bill Johnson)	202/632-6468
Distant Signal Carriage (Abe Leib)	202/632-7480
Enforcement/Show Cause Orders (Tony Cavender)	202/632-8882
(Roger Seltzer)	202/632-8882
Equal Employment Opportunity (Walter Morse)	202/632-9797
Forms 325, 326, 326A (Bob Ungar)	202/632-9797
Franchising (Bill Johnson, Steve Effros, Larry Bloom)	202/632-6468
MATV Systems (Harlan Levy)	202/254-3407
Microwave/CARS (Frances Peck)	202/254-3480
Status, Applications Processing (Ann Stanton)	202/632-7076
Engineering Matters (Brian Moir)	202/254-3420
Interpretation of Rules, Engineering (Early Monroe)	202/632-9797
Military (CATV) Installations (Harlan Levy)	202/254-3407
Network Exclusivity (Tony Cavender)	202/632-8882
Pay TV (Bill Johnson)	202/632-6488
Pole Attachments (Jim Blaszak)	202/254-3420
Special Relief (Tony Cavender)	202/632-8882
Subscriber Complaints (Barbara Leventhal)	202/632-9703
System (CATV) Definition (Bill Johnson)	202/632-6468
Technical Standards (Jim Hudgens)	202/632-9797

Prepared by: **CATJ** - Community Antenna Television Journal
4209 NW 23rd, Suite 106
Oklahoma City Ok. 73107 (405) 947-4717

CATJ MINI-SURVEY OCTOBER-'74

Our Two-Way Talk Back Card in the **August issue** brought in hundreds of comments—
So let's do it again!

(A) I ___learned ___did NOT learn something from this issue's article on **Field Strength Meters.**
(B) I ___learned ___did NOT learn something from this issue's article on **VHF Wave Propagation.**
(C) The **best** article in this issue was_____
(D) The **least** useful article in this issue was_____
I would like to see a **CATJ** article on _____

(E) I ___would ___would NOT like to see articles on **early CATV history.**
(F) I ___am ___am NOT in favor of the FCC setting up **tests** and **licenses** for personnel working on CATV systems.

Return Survey Card to: Heather Pennington
CATJ
4209 NW 23rd, Suite 106
Oklahoma City, Oklahoma 73107

C-TAC . . .

FRIEND OR FOE

C-TAC

You may have heard or read about the *Cable Technical Advisory Committees* (C-TAC) and wondered who they are and what they do.

In two industry areas, cable television and PBX interconnection, the Commission realizes it is grappling with explosive new technology. It can either run the risk of regulating without proper knowledge of what it is like "out on the streets" (i.e. regulating *after* the fact) or it can attempt to establish some type of input mechanism whereby it is not only appraised of what is happening but becomes a part of that happening.

The Technical Advisory Committees is the FCC answer to the problem. By encouraging various groups within an industry to provide knowledgeable manpower to serve on advisory committees, which are either chaired or participated in by FCC staff members, the Commission creates a system whereby the industry participates in self regulation. The industry meets through its advisory committees, outlines objectives of study for each committee group, and then makes intra-committee assignments to members of the industry who are participating. These groups in turn do their "homework", prepare proposals for the full committee to consider and then schedule meetings where these topics can be discussed and resolved.

Many of the FCC's present regulations and most of those recently proposed by the Commission in the CATV field have come from these C-TAC groups.

In effect, the Commission gains a fair amount of filed expertise without having a very large field force or field budget. Participation in the C-TAC program is mostly honorary and it is open to just about anyone who wants to *donate his time* to the program. The Commission has actively encouraged (and perhaps solicited) assistance for these groups. Meetings are generally held in an open atmosphere with "drop-in visitors" accorded full access to the workings of the groups.

If there is a danger in the C-TAC approach it may be that over-zealous industry personnel, anxious to show their dedication to the C-TAC program, may be developing recommendations and programs for submission to the FCC which *could* be ahead of its time. If these programs carry the weight of having been developed by the industry at large, or at least by those industry members who have served on the C-TAC committee which drew up the program and recommendations, the likelihood that these programs will be presented to the Cable Bureau (and eventually to the full Commission) as a blueprint for new regulation(s) is very real.

One example of the kind of program now being seriously considered and refined at the C-TAC level is one developed by Panel 6 *(Technical Operations).*

"One of the tasks of Panel 6 is to evaluate current (technical) practices and conditions and to determine needs with respect to the qualifications of technical personnel in the operation and maintenance of CATV systems" according to O.D. Page (P.E.) of Panel 6.

In a nutshell, Panel 6 is exploring whether or not new rules should be drafted which would make it a *requirement of employment* for technical personnel in CATV systems that

C-TAC PANELS 6 / CATV SUBSYSTEMS

Subsystem	Remarks
Microwave	First or second class radiotelephone operator's license now required
Origination/Studio Equipment	Cameras, camera controls, sync generators, switches, recorders, film chains, etc. (comparable to TV broadcast studio)
Receiving Antenna System	Alignment, phasing, matching, pre-amps
Head End Processing	Filters, RF mixers, hetrodyne converters, strip processors (equipment comparable to TV [broadcast] exciters), RF leakage, generation of spurious signals (VHF and UHF ranges)
Trunk Lines (5-350 MHz)	Impedance match, operating levels, intermodulation, frequency response, alignment, RF interference
Distribution Lines (5-350 MHz)	Signal leakage, interference
All	Safety and public convenience
Non-Technical	Will or should the FCC concern itself with technical aspects of closed-circuit systems, which do not use frequency allocations except through unintentional RF radiation (leakage)?
Subscriber Plant (5-350 MHz)	Interference (signal leakage) trouble shooting, safety

IN THE NOVEMBER CATJ - Part Two of the FSM series will review the Blonder-Tongue FSM-2 and Delta Electronics FST-4 meters. Part Three in the December CATJ will review the Jerrold 727, the Mid-States SLIM, and the Sadelco FS3SB.

they obtain some existing (or new) form of FCC licensing such as FCC First Phone.

Keep in mind that Panel 6 is *looking for guidelines* and is seeking to develop criteria so that it may make its full (learned) recommendations to the Commission. This is not necessarily going to be "law" but it will be a suggestion for additional CATV rule making if in fact Panel 6 decides that these "rules" need to be implemented.

O.D. Page points out "The FCC requires certain minimum qualifications of technical personnel who operate broadcast stations (e.g. Section 73.93 Subpart A of the FCC rules requires that only a First Class Radio Telephone Operator may make certain operational adjustments and measurements for a broadcast station)."

Page asks "Would public safety and the public interest be best served by requiring minimum formal technical qualifications approved by the FCC of an engineer responsible for operation, maintenance, adjustment and/or measurement of performance of a CATV system?

If the answer to that question is yes, what qualifications would be necessary in an operating (CATV) engineer?

What problems present themselves with respect to the number of qualified people available now and in the future? What should be done to insure an adequate supply of qualified people?

Would licensing of CATV system operating engineers tend to bring needed recognition to the importance of this function, and thus tend to improve the technical competence of the industry?

Would the CATV operators (management) welcome such a move as licensing, or would it be considered overly burdensome from the administrative viewpoint? What benefits would accrue to the operator? What are the disadvantages to the operator?"

As you can see from Mr. Page's questions and comments, this panel is dead serious about evolving some recommended programs for the Commission in the area of technical qualifications for CATV personnel. Mr. Page raises many questions and this relatively little

known C-TAC panel could be developing some recommendations which will have long lasting, quite involved influences on the CATV industry for decades to come.

The table appearing here is the C-TAC Panel 6 outline of the various CATV engineering/technician functions as they view the industry today. It is from this outline that Panel 6 is developing its guidelines and recommendations.

The importance which the Commission attaches to the functions to date and the plans for the future of the C-TAC program can be found in a Commission announcement made on July 17. In it the Commission noted "The Cable Television Advisory Committee on Federal/State/Local Relationships, and the Cable Television Advisory Committee have been extended for two years subject to the approval of the Office of Management and Budget.

The Advisory Committee on Federal/State/Local Relationships was created on February 2, 1972 to provide the Commission with industry expertise concerning Federal/State/Local relationships in the regulation of cable television. Continuation of the Committee is necessary to assure that a body of experts is available to furnish additional advice and recommendations on specific regulatory issues.

The Technical Advisory Committee consisting of a steering committee and nine working panels was established to provide the Commission with technical data and recommendations on a wide variety of issues related to present and future use of cable television, including cable carriage of local origination programs, two-way communications and various other services. Many months further work is needed to perform necessary studies and technical tests and to complete deliberations necessary for compilation of the Committee's final report."

Mr. O.D. Page may be contacted at Cable Dynamics, Inc., 7501 C-1 Spring Lake Drive, Bethesda, Maryland 20034.

Worth Quoting

Arthur S. Taylor, Chairman of CTAC Panel 2 (Subjective Evaluation of Picture Quality):

"When we built our first system in Kalispell, Montana some 20 years ago, it (cable) was the only way you could get television. Something was better than nothing. So picture quality in that environment was somewhat different from the picture quality one needs in an environment where seven good quality stations are easily receivable on rabbit ears at a home. Picture quality is relevant, to some extent, to what you want. If it happens to be a dull, lifeless program that you are not interested in, picture quality does not mean much. If it is something that you really want to see badly — I've seen people watch a baseball game they wanted to see very badly when you could hardly distinguish the ball from the snow. They loved it! So it is relative to what the subject matter is — how do you feel about the subject?"

Worth Quoting

Hubert J. Schlafly, Chairman, CTAC Executive Committee:

"Cable networks are a new opportunity for communication services for the citizens of our country and for the world. The manufacturers of electronic equipment have not totally appreciated the problems or the size of the potential market. Consequently there is not as yet adequate sources of supply of hardware designed to implement the common end. We are talking about a mass market for a facility. We are not talking about military or government or bi business where individual requirements sometimes set the performance specifications, regardless of the cost. We are talking about consumer product utilization of high technology facilities. This requires great skill in manufacturing, to keep the cost down and the performance up. We do not have that yet."

Worth Quoting

Bernard D. Loughlin Chairman of CTAC Panel 3 (Receiver for Cable TV):

"Control of direct pick-up in a strong signal area requires: (1) Careful shielding of the tuner, (2) good shielding of the down lead cable, (3) good grounding of the downlead cable to the tuner ground. This almost rules out the so called hot-chassis (transformerless) receiver construction."

Worth Quoting

Henry M. Diambra, Chairman of CTAC Panel 5 (Cable Frequency Assignments):

"We are pondering whether or not converters, external to the receiver, will be a part of the scene hereafter, or whether they are only a transient phenomenon that will be forgotten within the next decade."

Worth Quoting

David D. Kinley, Chief, Cable Television Bureau:

"In my view the (CATV) industry was born as a result of legal craftsmanship. But. . .has the FCC been guilty of treating cable regulation as **strictly** a legal problem when in fact it is a technological problem? I think the industry is more a mixture of the two, both legal and technological."

Worth Quoting

Herbert P. Michaels, Chairman of CTAC Panel 6 (Cable TV Technical Operations):

"Should a CATV system be considered that group of cable and electronics that is included within a civil division, municipality, city, or what have you or should a cable system be defined as an electronic complex centered about a central distribution point that (might) include several civil divisions or several municipalities?"

Worth Quoting

Archer S. Taylor, Chairman of CTAC Panel 2 (Subject Evaluation of Picture Quality):

"Cable television today is still in a sense just like it was (twenty years ago). It is a business; it has a service to sell. That service consists of delivering what comes in one end to a customer on the other end. The measure of quality of what is delivered is the quality of the picture that the customer sees on his television set. This seems to be a fairly simple thing. Everybody looks at a TV set and can decide whether he likes the picture or not; that should be a simple natter. It turns out to be a very complex subject."

Worth Quoting

Delmer Ports, Director of Engineering, National Cable Television Association:

"I find it convenient to think of (proposed) standards in three categories:

(1) Those standards that are regulated legally in the **public's** interest. Unwarranted signal leakage from a cable system would be one of these.

(2) Those standards required for uniformity; this could be industry accepted and does not have to be legally or federally regulated.

(3) Those standards for good engineering practice which serve as objectives for equipment design or competitive ratings.

Generally, legal regulations on technical parameters tend to stabilize development. Industry standards opted to voluntarily generally foster innovation. Both the industry and the public need a healthy balance of the two."

CABLE BUREAU COMMUNIQUE

Signal carriage continues to give some operators problems. **Meadville Master Antenna, Inc.**, Meadville, Pennsylvania sought the right to waive section 76.91, to carry NBC affiliate WFMJ, Youngstown, Ohio in lieu of NBC affiliate WICU, Erie. Meadville had attempted to show with a 1966 engineering study (this fight first began then) that WICU did **not** place the required Grade B signal over Meadville. The administrative Law Judge found that contrary to the 1966 study, the WICU signal was generally superior to WFMJ over Meadville. The Law Judge also **found fault** with the system that allowed differences between "predicted contours" (which set priorities) and "signal strength" (the actual level present).

"The establishment of the contours of the station for purposes of the priority in no way establishes the level of the median signal intensity within the cable community; nor does the determination of this median value of (the) signal intensity change the location of the previously determined contour" the Commission noted.

Cable operators have attempted to use the "lack of signal within a predicted contour" as a reason for **waiver** of various carriage and non-duplication rules. The Commission has perhaps settled that argument for **all time** by noting ". . .**a community located within a station's established priority contour may not receive a signal as great in intensity as the statistical average assumed by the Commission's rules because the Commission's definition of contours explicitly contemplates that there may be pockets of poor reception within any contour. Where pockets of poor reception are situated within a community in a station's contour, this of itself is not sufficient to warrant a waiver.**"

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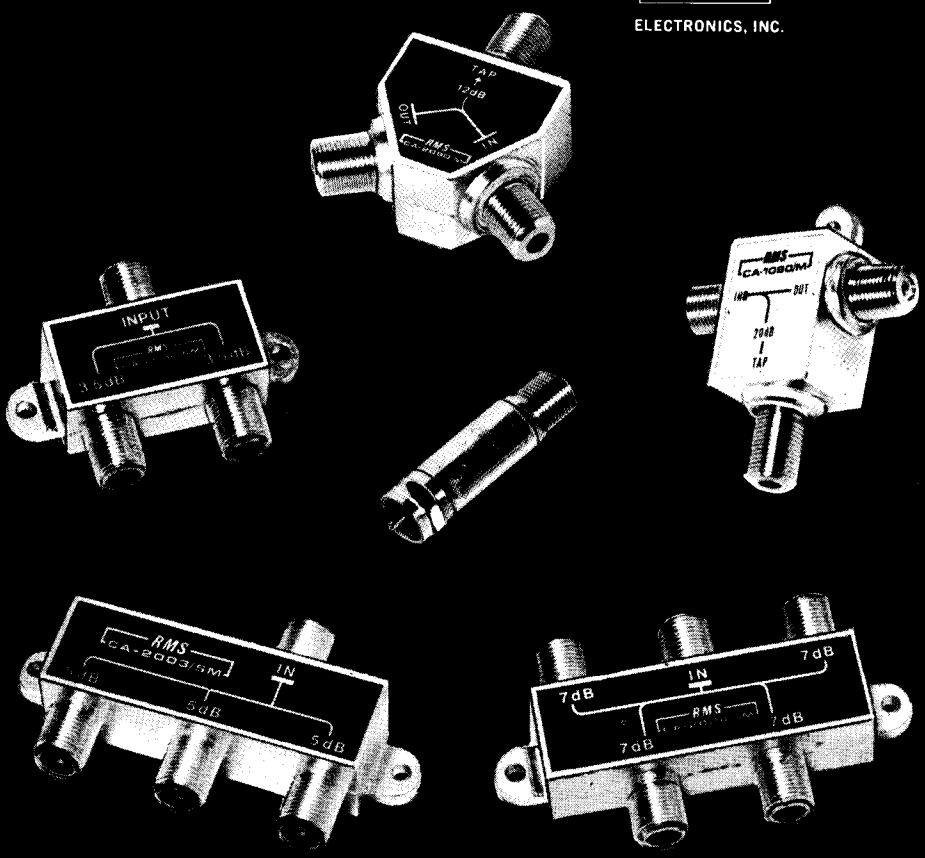

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