mum) format the viewer will see:

a) **The time**
b) **The temperature**
c) **The barometric pressure**
d) **The wind speed and velocity**
e) **The cable company identification.**

These will appear a line at a time, sequencing down the list to the end and then starting all over again. This portion of the package will function through the DMC-1 and it has room for seven separate function boards (only five are 'dedicated' in the list here).

The first DMC-1 system installed went into a community where the town's one local bank picked up the tab for the whole package. They offer the unit as a message service for the community (ala a Community Bulletin Board) and the unit sits in the bank proper where people can come in and prepare their own community announcement. The system operator reports he was making money with the service from the day he turned the unit on because not only did the bank pick up the tab for the unit's installed cost, but they pay the cable company a fee per month for the on-going use of the "channel" which carries the message material plus a line of their own advertising.

With this type of technology break through in digital channel displays, one would reasonably expect many more small system communities to soon be enjoying the benefits of a local message center. Richey Development Corporation is a CATA Associate Member and their listing can be found in the Associate's roster listing starting on page 46 here this month.

PHASE ONE REPORT

VIDEO MODULATING THE GUNNPLEXER (CATV) MICROWAVE SYSTEM

A BUSY MONTH

Progress with the new Microwave Associates Gunnplexer (Gunn diode) microwave package during the past thirty days has been hectic, and on several fronts. First of all CATA President Kyle D. Moore appeared before an "en banc" session of the FCC (five of the seven Commissioners attended the session) on May 31st. The FCC first heard about the CATA plan to petition the Commission "sometime late this summer" at that meeting, and Kyle Moore passed around for all to inspect and hold the 9.5 ounce 20 milliwatt transceiver package. The "show and tell" exercise received excellent press, including an AP wire story that appeared in numerous newspapers all across the nation. By the end of a week after Moore's presentation the FCC "Public Information Office" had tired of trying to answer telephone calls and letters from people intriqued by the concept and began sending them on to CATA directly.

The Mayor of Toco, Texas (37 homes, population under 200) was typical. He told the story of being unable to enjoy the quality TV the nearby bigger community had. **"We asked them to extend the line out here but they wanted $XX,XXX. to do the job"** (we thought the price quoted was fair considering the distance; but for the 37 homes involved it just didn't make economic sense) **". . .so we have been struggling along with a 100 foot tower I put up years ago. Every home**

in town is plugged into my tower and I don't charge for the service." He wanted to know if the new low cost microwave could bridge the gap over the five mile span and make the larger community cable reception available to **his** "head end" from whence he would simply plug into the already connected 37 homes.

Reaction from cable operators was generally favorable. A few were concerned that in their particular situations (mostly in the hills of New England and in Appalachia) that the cost of the $2400 per channel commercial microwave was going to be more than they could install a new head end for. Most of these fellows admitted they would be using strip amps ("with around $500 a channel wrapped up when we are done...") in their new small town systems. A system operator in a South American country (that's South...**not** Central) wanted to know if **we** would buy a **set of six** units for him, mark them "amateur radio equipment" and ship them to him via Braniff! (Amateur radio equipment...**you see**... has a special **low** import duty tarriffs while commercial electronic equipment carries a **much higher** price tag.)

Then on June 14th CATA Directors Ralph Haimowitz (Florida), Justin Mueller (Vermont), David Fox (West Virginia) and CATJ Editor In Chief Bob Cooper traveled to Washington where they testified before Congressman Lionel Van Deerlin's House Subcommittee on Communications concerning "Rural Television Problems". Cooper explained how the unit works, what it could cost, and how important it was that the low cost equipment be approved for CATV use.

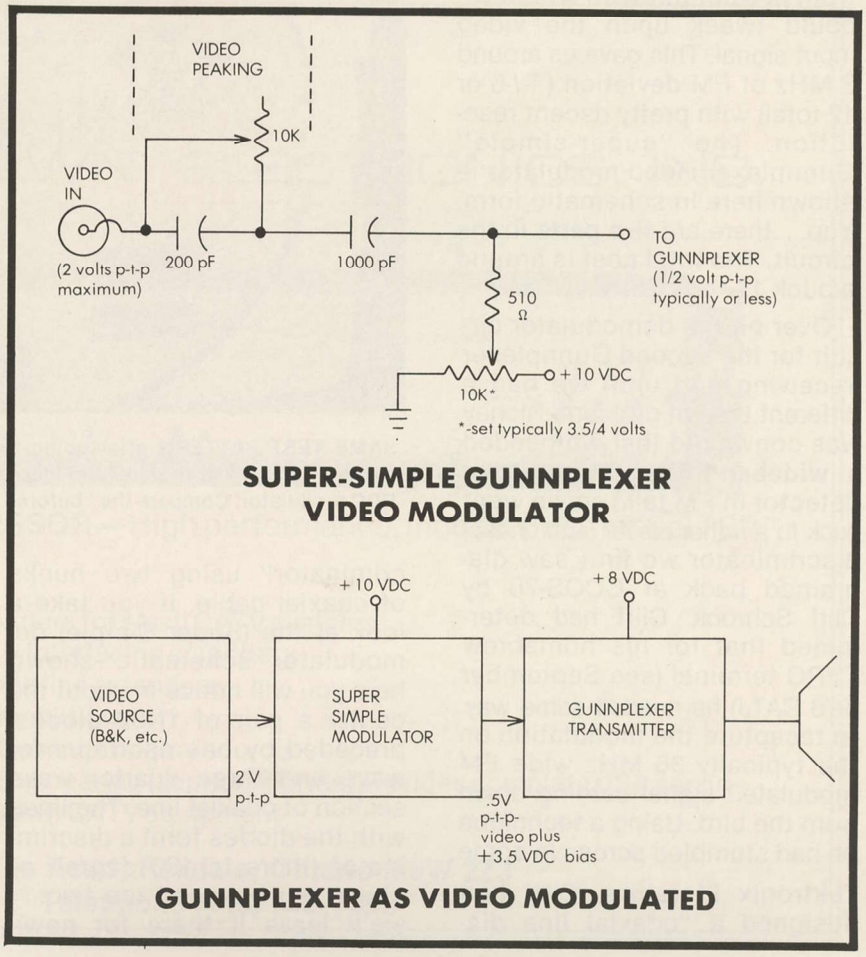
Under questioning by Congressman Van Deerlin and his Chief Counsel Chip Shooshan a representative of the FCC admitted that it might take **"...as long as two years** (or as little as nine months) **for the FCC to act on the forthcoming CATA petition."** Cooper noted that this is part of the problem with Washington; they take so long to get new technology into the main stream of American life. Congressman Van Deerlin noted **"...nine months** or **two years... that is the difference between the gestation period for a human being or the elephant".** As with the good Congressman's support for the rapid approval of small earth terminals in 1976, it was plainly evident that **he** would be **more pleased** with a six-nine month turn around for the new low cost microwave concept and the FCC also quite plainly got the message.

While all of these fun and games were being played in Washington, the CATJ Lab with a giant assist from Steve Richey and some of his crew at Richey Development Corporation were very busy trying to get video modulation through the first pair of 10.38 GHz transceivers we had ordered out as "hams" from the Microwave Associates offices. The balance of this report will concentrate on these early attempts at making the Gunn-diode video modulate and will include a complete set of schematics for doing the same on your own.

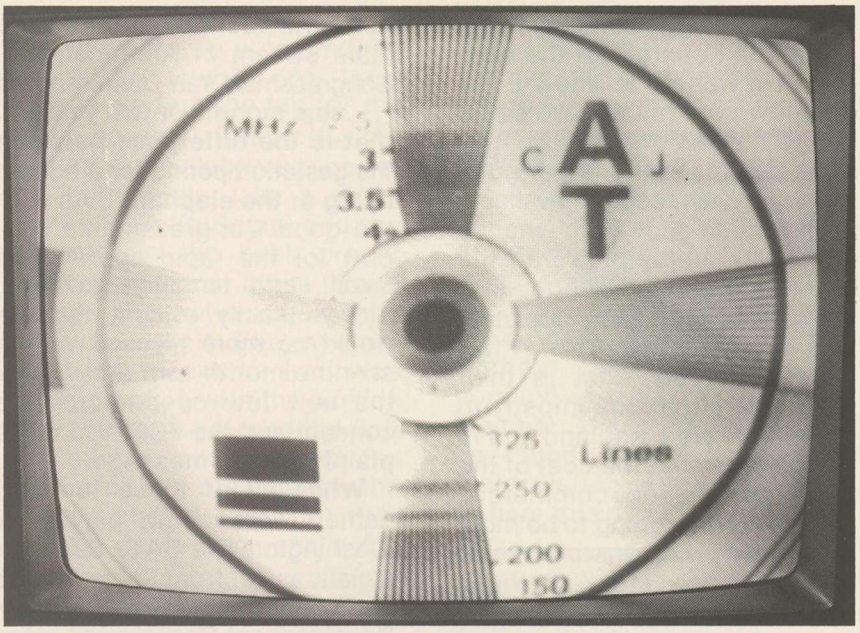
THE FIVE PART MODULATOR "thrown together" to get video into the Gunnplexer transmitter.

Nothing To It...

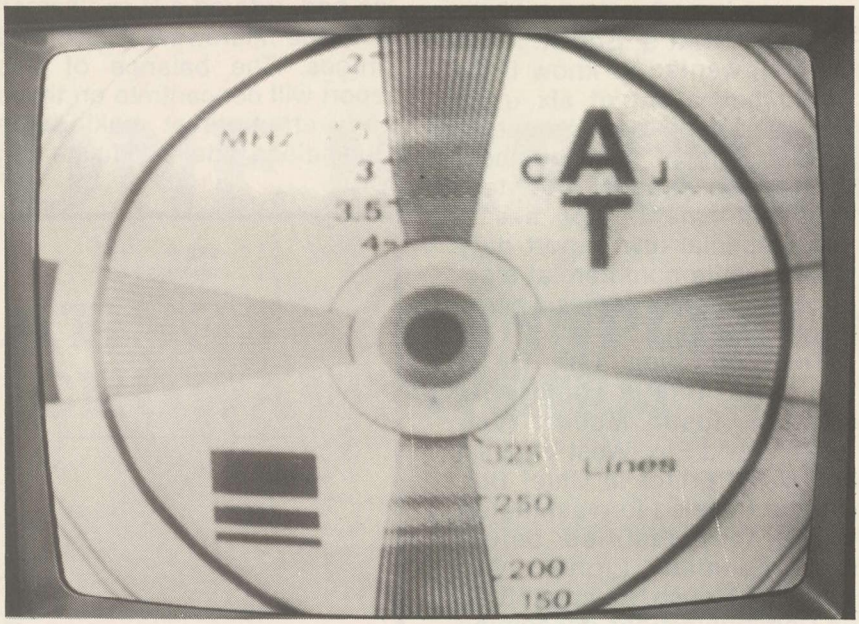
It seemed like a good idea to see if the Gunnplexer units would modulate with **any** form of intelligence, to begin with. So following some general data sheet instructions from Micro-



wave Associates we duplicated the audio modulation scheme approach shown in diagram 6 of page 16 for the May CATJ. This involves putting an audio signal into the transmit Gunnplexer and using an FM receiver tuned to around 30 MHz to take the IF out of the IF spigot of the second Gunnplexer (see pages 10 - 17 in the June CATJ). It worked almost first crack out of the barrel so we proceeded to get into the video business. Being CATV oriented we decided we would set up to use a pair of typical CATV video sources; we took the color bar and flying spot scanner test pattern video outputs out of a B and K Analyst and fed them to the biasing point on the transmit Gunnplexer unit. We found we had around 1 MHz video information present; obviously something was limiting in the video circuit and we were losing most of the highs. Any color or sound that should have been there was not. From this we progressed to a video peaking circuit for the modulator (see diagram here) which was far from perfect but with which we could tweek upon the video input signal. This gave us around 6 MHz of FM deviation (+/-6 or 12 total) with pretty decent resolution. The "super-simple" Gunnplexer video modulator is shown here in schematic form. Yup. . .there are **five parts** in the circuit. The total cost is around a buck 17.



CATJ TEST PATTERN as fed out of the B and K flying spot scanner (at video) before going through the Gunnplexer system.



SAME TEST PATTERN after going through the 10.38 GHz microwave system, being demodulated to video and then being re-modulated to TV channel two in an RDC modulator. Compare the "before" and "after" shots!

Over on the demodulator circuit for the second Gunnplexer (receiving end unit) we had a different type of problem. Richey was convinced that we needed a **wideband discriminator** (or detector in FM talk) so we went back to a rather clever (and cheap) discriminator we first saw diagramed back at CCOS-76 by Cliff Schrock. Cliff had determined that for his homebrew TVRO terminal (see September 1976 CATJ) he needed some way to recapture the modulation on the typically 36 MHz wide FM modulated signal coming down from the bird. Using a technique he had stumbled across in some Tektronix literature, Cliff had designed a "coaxial line discriminator" using two hunks of coaxial cable. If you take a look at the (Super Simple) demodulator schematic shown here you will notice in about the center a pair of 1N82 diodes, preceded by one each quarter wave and three quarter wave section of coaxial line. The lines with the diodes form a discriminator (there is 180 degree of phase lag between the two. . . **we'll leave it there for now**). Steve felt this was a good wide band approach and since one of our objectives was to deviate the transmitter quite widely (that helps all sorts of things including signal to noise) we did surely need the wide band technique. Only there are trade offs with this approach to a discriminator. One is that unless you are both careful **and** lucky, you probably need to employ this technique at a pretty **high** IF

First In Reliability

Weather Scan III

Impressive quality. . . surprisingly low price. Just $2695 for the most reliable unit available (at any price!).

We have been in the cable television business for 23 years. . . and providing weather information systems for the past 16 years. We know what you need and we know how to manufacture it. For reliability and performance.

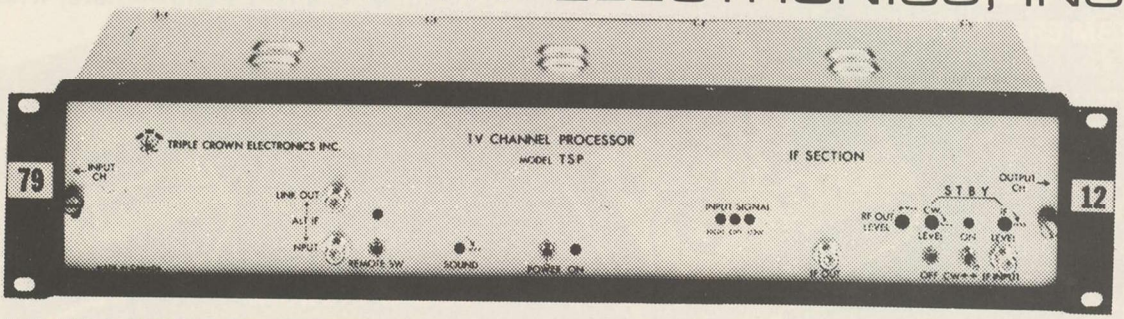
The Weather Scan III comes complete with Sony AVC-1400 camera with separate mesh vidicon and 2:1 interlace sync. Includes Time, Temperature, Barometric Pressure, Wind Velocity, Wind Direction, plus four card holders. Compact cabinet is just 38" wide, 23" deep and 14" high. For complete information call or write.

Weather Scan, Inc.

An R.H. Tyler Enterprise

Loop 132 and Throckmorton Hwy. Olney, Texas 76374 Ph. 817-564-5688

TRIPLE CROWN ELECTRONICS, INC.

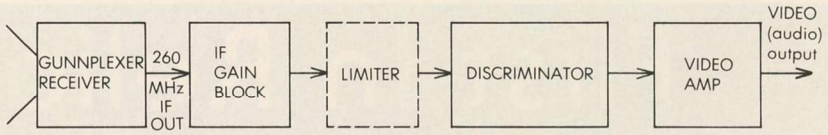


VHF/UHF SIGNAL PROCESSOR—High performance, modest price model TSP

- Specially designed trunk amplifiers for small CATV systems
- High output apartment—CATV interfacing amplifiers
- High reliability and performance line extenders
- Long-haul feed forward plant amplifiers
- Test equipment including 8-32 channel signal source
- **USA Users Note:** Broadband Engineering (Jupiter, Florida) provides complete USA service and spare parts for all Triple Crown CATV equipment

Write or call: 42 Racine Road, Rexdale, Ontario M9W 2Z3
Telephone (416) 743-1481

range. Steve chose 260 MHz, which means we offset the LO in the receive Gunnplexer by 260 MHz from the transmitter output frequency. We knew going into this that if you really want to get good **range** with these simple Gunnplexer units you must follow the IF output of the receiver unit with a low noise figure IF. However, for close range work (under a mile) we were more concerned with making the package work than we were with long haul work, so we rummaged around in Richey's junk box and came up with a **simple** gain block to act as our first IF amplifier. This turned out to be a TRW chip amp (30 dB of gain) which at 260 MHz checked out with a total package noise figure of **in excess of** 20 dB. It really needs to be down **under** 3 dB (which is not impossible, but still skillful at 260 MHz) to get maximum performance out of the system. Our ultimate goal would be to either make the coaxial line discriminator function at a low IF (such as 30-50 MHz) where we could easily and simply get good low noise (under 3 dB NF) high gain, or, work extra hard at getting a decent low noise figure amplifier string running with descrete transistors (such as J-FETs) at a higher IF (such as 260 MHz); where the coaxial line discriminator (we found) worked very well.



GUNNPLEXER DEMODULATED

But all of that was ahead. The first trick was to get the package working. Then we'd proceed with the knit-picking improvement problems.

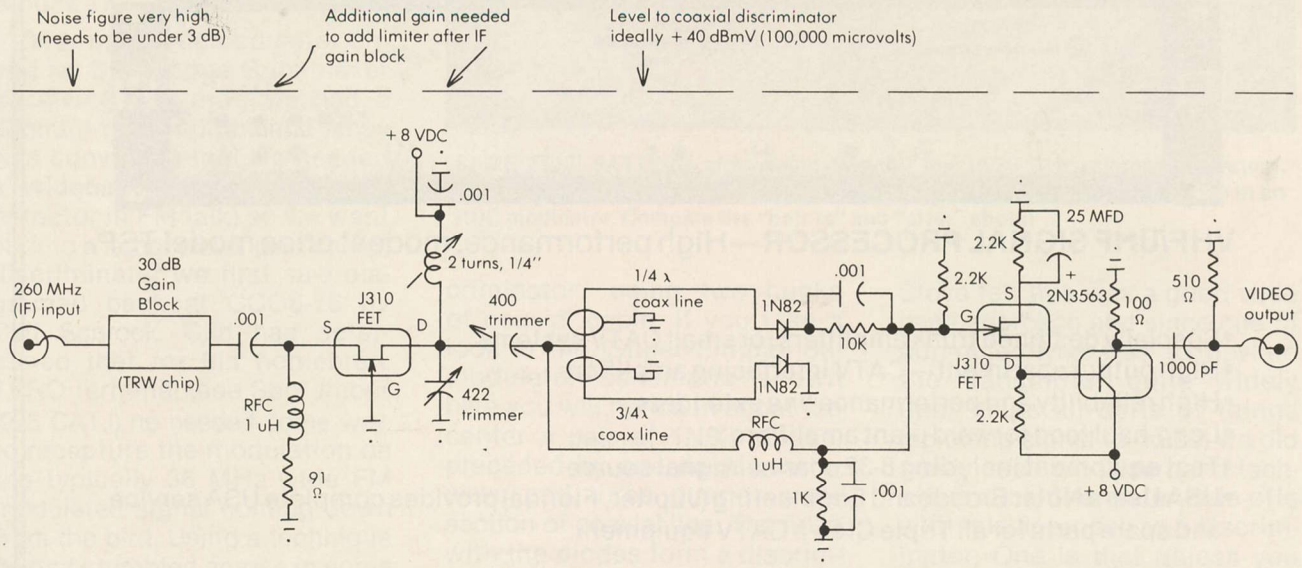
By the start of the second week in June we had such good color video going through the test system that we got real brave and took the demodulated video (**plus** 4.5 MHz audio) out of a CATV demod and ran it into the Gunnplexer transmitter. It worked very well and pointed out that perhaps before we got done we'd have to do something "a little more sophisticated" with the five part modulator unit to insure a flat modulation response passband. We found very little critical to adjust in the system as shown here in schematic form, but there was just a trace of herringbone in the color. **Part** of this was traced to the video coming out of the demodulator itself, and some **more** was traced to a local FM station that was getting into the clip-lead-lashed-together system.

But it worked, as the photo here shows. Merv Griffin was never one of our favorites but he sure looked awfully good going through the 10.38 GHz microwave system and coming out of the Gunnplexer receiver. The photo shown here (of Merv), incidentially, is after taking the demodulated video/audio from the Gunnplexer receiver and then driving an RDC channel two CATV modulator. This is not pure video on a video monitor; it is as you would put it on your own CATV system.

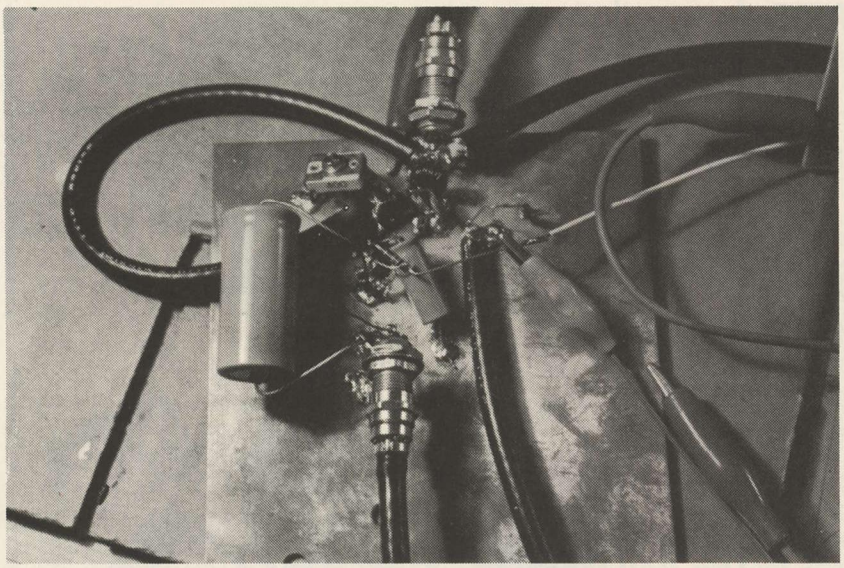
So to the five part modulator add a 27 part demodulator. That comes to around $10.00 in parts if you overlook the junk-box TRW chip amp.

What's Ahead?

The Gunnplexer CATV technology is moving so fast that long before this is in print in early July there will be a couple of additional generations of proto-type work done. **The schematics shown here**, with a pair



(ALMOST) SUPER-SIMPLE DEMODULATOR FOR GUNNPLEXER RECEIVER



OPERATING DEMODULATOR lacks many of the social graces of a commercial unit but it performs none the less!

MERV VIA 10.38 GHz experimental Gunnplexer microwave; video and audio taken from a CATV demodulator, fed through the Gunnplexer system, and then demodulated and fed back into CATV channel 2 modulator and displayed on a normal home receiver. Could you sell it?

of the Microwave Associates Gunnplexer transceivers, **will put a person into the do-it-yourself video microwave business.** For very few bucks and perhaps a couple hours of a person's time.

The then-current proto-type phase of the package will be demonstrated at CCOS-77; possibly in several forms. Microwave Associates will **also be** demonstrating **their commercial version** of the CARS band Gunnplexer units at CCOS-77. To date we've done all of our own low-cost development work with**out** doing much talking with Microwave Associates about **their** design. We wanted to see just how simply the job could be done; and as we advance from our very simple system shown here this month to more sophisticated systems throughout the summer, we'll keep you updated on how it is done and what the pitfalls are along the way.

One of the summertime projects we have in mind is a completely solar-panel-powered solid state camera **and** Gunnplexer transmitter, mounted on a tripod. This will make a very portable (pick up the estimated seven pounds and haul it with you; setting it down where you want the video feed to originate) "un-attended package for which we can see dozens (if not hundreds) of applications, both in and out of CATV.

If you haven't gotten bitten by the "Gunnplexer Video Microwave" bug yet, time is awasting. We haven't had this much fun in years!