

**COOP'S  
SATELLITE  
DIGEST**

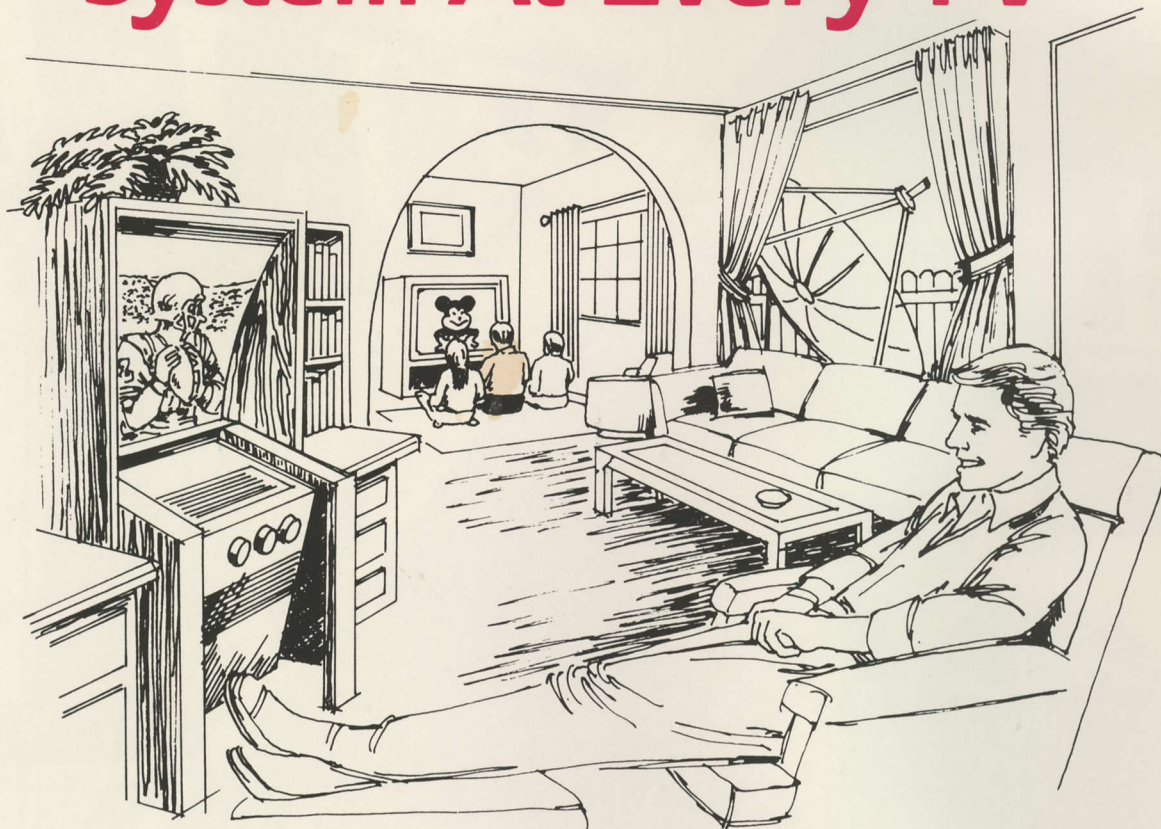


**FEBRUARY 25, 1987**

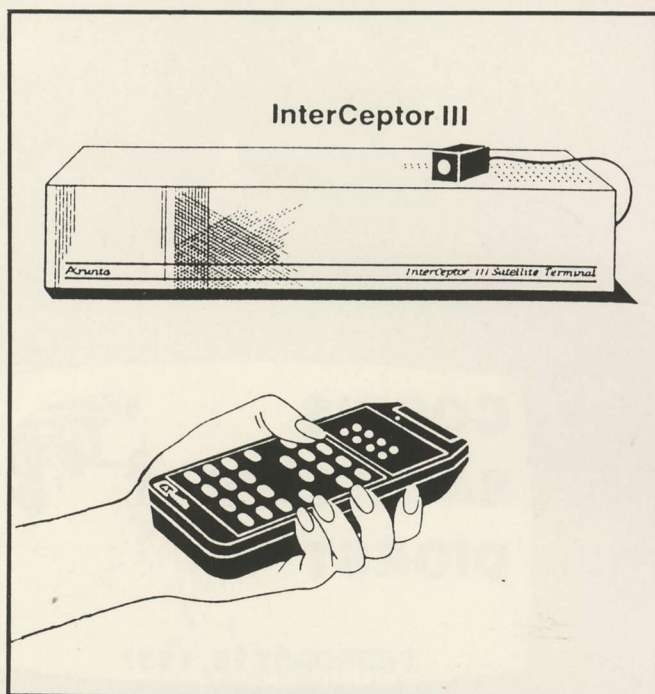
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## TOP OF THE MONTH

**DESCRAMBLING SUMMIT.**

What really happened on Provo between January 14th and 22nd? We were there and so were approximately 250 others. A significant portion of this issue is devoted to what was said, who said it, and why.

**RUMORS** related to the Summit spread like wildfire; "People were arrested and strip searched" went one. Another reversed the sequence, ie. "People were strip searched and arrested". Sorry ... not true, although perhaps some of those attending might have 'enjoyed' being strip searched.

**NEW VOCABULARY** words sprang out of the Summit; words like 'ZITS' and 'Zombie' and 'zoned'. Phrases like 'The Black Hole' were also coined, or re-coined for special meaning.

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**OUR COVER/** 16 foot spun aluminum dish from **DH Satellite** may be the largest spun dish ever created for Ku band operation. Peter Sutro reports on the evolution of higher gain Ku band dishes in this issue.

# COOP'S SATELLITE DIGEST



**COOP'S SATELLITE DIGEST** published on the 15th of each month, dated for the current month, by CSD, Limited, a Turks & Caicos corporation with corporate offices located at Tower Plaza, Providenciales, Turks & Caicos Islands, British West Indies. Under contract, an office is maintained in Fort Lauderdale, FL (P.O. Box 100858, Fort Lauderdale, FL 33310; 305/771-0505) for the contracted purpose of processing all subscriptions, advertising orders, receipt of all mail and correspondence. All communications relative to CSD operations should be directed to this office. CSD, Limited also maintains an equipment testing laboratory for satellite receiving systems and components in the Turks & Caicos Islands. CSD routinely reports on the technical performance of equipment, both privately and in print. CSD also participates in the operation of 'test tube' low power radio and television broadcasting stations and a rural area cable TV system as an ongoing research project into the challenge of bringing modern communication services to third-world, undeveloped regions. **CSD subscription rates** are \$60 for 12 issues where U.S. zip codes apply, \$65 in US funds in Canada and Mexico and \$75 in US funds elsewhere. All non-US copies are sent via AIRmail. CSD has been published each month since October of 1979 and publisher Bob Cooper created the home TVRO industry in 1978. Single copies are \$6 in US and \$7 elsewhere. Bob Cooper, Jr. is publisher, CSD is copyrighted by CSD, Limited in the Turks and Caicos Islands and USA. **Second Class postage paid** at Ft. Lauderdale, FL. Application to mail at second class postage rates is pending at Ft. Lauderdale, FL. Direct dial telephone to CSD, Limited is 809/946-4273 but be warned; this is an expensive telephone call!



## STOP-PRESS

Late News At Deadline

STAR WARS are here; GI attacked VC2000 owners by individual ID #s, blocks warning viewers with inboard message-text capability 'Do Not Cheat' and offering 'Amnesty Program' to those who turned themselves in. Viewers with musketeer boxes were asked to return units to factory for modification.

STAND ALONE Videocipher? What you see, to right, was proto-type circuit board package displayed privately during Summit conference by one attendee. He could not demonstrate unit working and many attending felt stand-alone board/descrambler would never happen. Primary design difficulties remaining to be sorted out involve U2/U3/U4 devices according to knowledgeable designers.

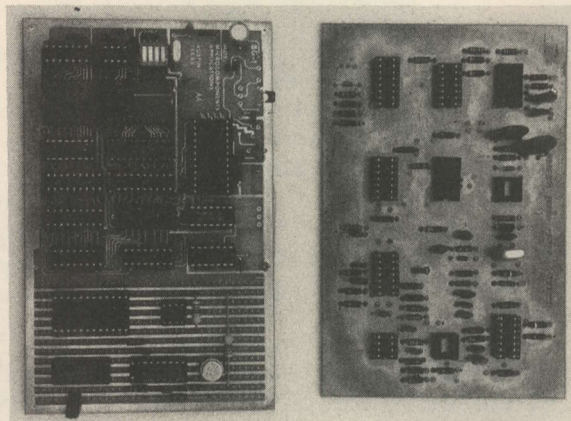
CHEMISTRY LESSON. It has nothing to do with descramblers or satellites, of course, but way back in the 11th grade you missed one day of 'Chemistry Class'. You teacher has asked us to provide you with a synopsis of what you missed that day.

On that day, he taught:

"There are no epoxys that cannot be attacked. Methylene Chloride is a very powerful solvent. It is the basis for most of the high quality paint removers (ie. 'Airplane Paint Remover', a commercial material sold in a blue can with a drawing of an airplane on it; about \$15). If 'MC' is poured into a small reservoir formed by wax or 'glue' and swirled around with a 'Q-Tip', it will eventually turn epoxy in the bottom of the reservoir into a jell; the epoxy will 'peel off' what it coats. If a small glass jar is modified to allow a epoxy coated device to fit down inside of the jar filled with 'MC', in 15-30 minutes time the epoxy will become jell-like and 'peel-off' the device. Methylene Chloride will evaporate rapidly and mixing it with CAB-O-SIL-M5 will place a film over the top of the 'MC' slowing down evaporative-loss. Methylene Chloride is highly toxic and fumes should not be breathed. Some people will develop skin redness on contact, others require prolonged skin exposure; wear rubber gloves when handling."

And now your 11th grade Chemistry teacher returns you to the satellite TV business.

PRIME-TIME 24/ Satellite Broadcasting Networks began test scrambling 2/17 on F2R feeds for ABC, CBS and NBC. ABC has hauled PT24 into federal court hoping to shut-down service.





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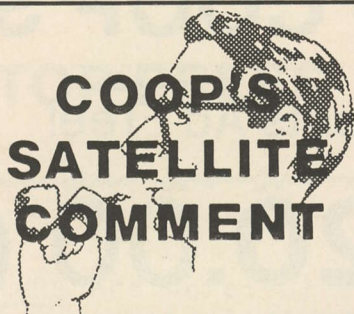
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## • DBS IN THE Japanese Mold

### OVERlooked?

In the rush to write off the new SBCA (the result of merging SPACE with DBSA), we may have overlooked one critical-to-success component part; B-MAC. Or more specifically, the S/A B-MAC transmission/scrambling system. I now bring this element to your attention.

Back in March of 1986, a group called the Advanced Television Systems Committee, searching for the perfect television transmission system of the 1990's and beyond selected the (S/A) B-MAC (multiplexed analog component) system over all others. This all stemmed from the slow recognition that our American 525 line (NTSC) television system is woefully out of date in light of newly emerging technologies. Higher definition, as in better quality, television is as near as a tour card to the nearest Japanese engineering lab. 1,000 plus line systems are all over, in engineering form, and many of these are now being heavily pushed as the "next standard"; after NTSC.

After the ATSC approved B-MAC, another group did the same thing, the DBSA. That's the same DBSA as merged with SPACE this past fall. So when DBSA became a trade association partner with SPACE, they brought with them a predetermination that when there are finally 11/12 GHz DBS birds, those birds would distribute television programming using one single standard; B-MAC.

There was an attempt, by DBSA and others, to have the (S/A) B-MAC system declared 'the standard system', by the FCC, this past year. Wisely the FCC passed on this bureaucratic opportunity and instead decided that any standard anyone wished to use for transmitting DBS was fine with them; essentially the same FCC approach as was taken to introduce 'AM stereo' some years ago.

So we have a 'defacto scrambling standard', originated by M/A-Com and purchased by GI and we have a DBSA/SBCA standard, brought to North America from the UK where it originated, by S/A. The cable people, and those of us trying to seek out a living at C band are at least temporarily wed to the defacto M/A-Com created 'standard'. The DBSA/SBCA/SPACE group seems equally wed to the proliferation of the (S/A) B-MAC 'standard'.

All of the signs we see point at the slow starving out of C band direct services to be replaced by Ku band direct services orchestrated by firms such as RCA and Hughes. One might suspect that as we learn more about 'their

plans' for our home dish customers, we will begin to see more and more discussion concerning the 'inevitable use of B-MAC' as the transmission 'standard'.

A brief background. M/A-Com tried their best to convince us that their Videocipher system would actually **improve** the video and audio quality of satellite transmissions; marginal signals would become better with Videocipher scrambling than they would be without Videocipher scrambling (ie. unscrambled). Those engineering arguments were made back in 1983 when the proposed Videocipher system was to be Videocipher '1', not the present '2' system. As we have gained practical experience with Videocipher '2' we have seen that there is typically some degradation of the video with Videocipher, even when signals are well above threshold but in particular when the signals are at or below threshold. To the best of my research, no responsible engineering study has been done on this phenomenon. If the video suffers (ie. is degraded) with at-and-below threshold levels, the audio often becomes a 'basket case'; digital audio is recovered in bits and bytes rather than as a steady stream and noise gets in the way of (and eliminates) randomly spaced bits and bytes. The result is popping audio that comes and goes with a loud 'thunk'.

B-MAC has the technical ability to produce higher definition video than we are accustomed to watching. It would be an untruth to call B-MAC video 'high fidelity' or 'high definition' television, but it is capable if properly configured of being measurably (and view-ably) better than our standard 525 line NTSC video. B-MAC audio is essentially the same digital audio we have with Videocipher, so whatever failing we are finding with Videocipher digital popping and thunking we would also find with B-MAC.

The truth is that neither Videocipher nor B-MAC offers a **significantly better** video picture than NTSC. Videocipher may be judged to be slightly worse than standard NTSC; B-MAC can be judged to be slightly better. If the signal is really strong (well above threshold), either one with digital audio can be significantly better than standard analog audio. But audio cleanliness is far harder to measure, appreciate, or "sell" than cleaner video. Only a small handful of people truly appreciate cleaner audio. Almost everyone appreciates cleaner video. The same crowd that appreciates cleaner video would also appreciate higher definition video.

Higher definition (more lines per picture) video comes



only at an expense; **more bandwidth**. The present 4.5 MHz baseband NTSC video can only cram so much information into a standard TV channel. You run out of space for more information, and therefore an increase in video definition, when you run out of bandwidth to place the additional information. This same trap from terrestrial television followed us to America (and worldwide) satellite television; it takes 36 MHz of satellite space to process the same information we process on earth in 6 MHz of terrestrial space. And while there are some 'compression' schemes around that jam extra lines of video into a fixed space, such techniques are probably not viable for a worldwide video distribution network.

Enter the FCC. The same FCC that was asked this last year to sanction the establishment of the (S/A) B-MAC system as a 'DBS standard' for 11/12 GHz direct broadcasts. Recently the FCC was entertained by a group of traveling demonstrations originating in Japan. The FCC, upon request from several powerful broadcaster groups (National Association of Broadcasters, the Association of Maximum Service Telecasters et al) authorized a Washington demonstration of a composite Japanese 1,125 line transmission system. The system used a pair of standard UHF TV channels (58 and 59) in the DC metro area to show off the difference between standard 525 line television and 1,125 line high definition television (HDTV).

Japan plans to launch a satellite in 1990-91 which will bring HDTV to all of Japan's homes. They are doing this parallel to leaving their present American-like 525 line system in operation via terrestrial TV. Japan will have new television sets, capable of processing HDTV signals, on sale in Japan in time for the launch of their new DBS-HDTV satellite.

Quite a few American interests like that plan. Let's see who might like this and why:

- 1) Projection TVs and VCRs aside, the TV boom is about over. Those who make and sell TV receiving equipment (sets) would like to start it all over again. One way to restart home electronics sales, and put profit back into the sales, is to create a new standard for TV. In a much bigger way four decades later, this is FM coming in on top of AM all over again.
- 2) TV networks are sliding; it is getting more and more difficult to make a buck and costs have gone clear out of sight. The networks would like to restart where they are once again in control, as they were back in the 60's and 70's. New programming, aimed at a new HDTV market, delivered direct via satellite would start them all over again.
- 3) Local TV broadcast stations are making money so fast they have to bury it in helicopters and Ku band transportables and sixteen color digitized radar for weather reporting. But they are threatened by the onrush of cable and satellites. Suppose there was some way for them to stick all of those spare millions each year into their future rather than their present?
- 4) Cable programmers are being sucked into the cable MSO camps; Ted Turner just raised \$550,000,000 from the cable MSOs by agreeing to sell off 30% of his WTBS holdings (that leaves him with a paltry 51%). Out of all of these big buck transactions, somebody besides Mr. 'T' is going to have to eventually realize some profits. As cable runs out of places to

wire, they have to look for new places to stick their ill-gotten billions each year.

#### Now a news item.

The FCC has decided to see how much interest there might be in taking a portion of the Ku band assignment (say 12.2 to 12.7 GHz) and turning it into a new type of "nonterrestrial TV broadcast band" Here is their suggestion.

- 1) First they offer every existing commercial TV station the opportunity to have its own 'satellite channel' in space. All channels would be 'double wide' in bandwidth so that they could accommodate high definition television (HDTV).
- 2) Next they offer a broadcaster serving say the Memphis market the opportunity to have a spot beam from space on Ku band to cover more or less the same market he now serves; except of course it is an HDTV service rather than an NTSC service.
- 3) By using multiple-multiple spot beams and zones, one satellite or a parking lot filled with satellites would sit out there spewing out the local programming from Dallas and Denver and Detroit and Duluth in glorious HDTV. The same satellite frequency used in Duluth could also be used in Dallas because with tight, spot beams nobody would get in the way of anybody else.

Naturally this suggests an entire, new generation of relatively sophisticated satellites. These satellites would concentrate individual footprints into very small areas and because of this beam focusing the same downlink frequency might be used and reused several dozen times across the USA. If such a satellite sounds expensive, remember that recently a **single** VHF television station serving New York City sold on the market for more than \$500,000,000. Even given the price of today's satellites, launched into space, you could buy and operate a couple of 24 channel standard C band birds for what that single TV station sold for.

Clearly the FCC is thinking ahead; perhaps out of character but impressive none the less. The TV broadcasters have so much money at their disposal, they and they alone are in a position to bring off such a dramatic change in American television.

By granting 'HDTV' licenses to local TV stations, a not insignificant number of the wealthy, local stations could become satellite broadcasters. Just as the FCC allowed early operators of FM stations to co-own a local AM station, as sort of a subsidy to getting the FM going, so too would the FCC allow existing VHF and UHF terrestrial telecasters to operate in HDTV from space for perhaps a decade or more. Perhaps down the road, they would either close down VHF and UHF and give it back to two-way radio (a group clamoring for more frequencies) or simply allow it to become the kind of 'secondary service' that AM radio is today to FM radio.

This is one of those 'everyone wins ... hardly anyone loses' plans. The existing, politically entrenched broadcasters get a piece of the sky. They get a place to sink their millions in excess profits for the next decade or so. The American public gets a shot at HDTV, the Japanese get a tremendous shot at a huge, new market for receiving hardware, the satellite makers get to crank up for advanced new birds and on and on.



### '...THEY CAN HAVE IT.'

Michael Fuchs, CEO for HBO and often the object of unkind remarks from within the home dish industry is reported to have offered during his testimony before the U.S. Senate this past July "**If they can break it (Videocipher), they can have it**". Several claim to have the alleged offhanded remark of Fuchs on videotape. Some of those making that claim insist that Fuchs' 'sworn testimony' before the Senate, containing this remark, is legally binding upon HBO. We doubt that.

Certainly the emotions of those who believe Videocipher was invincible and those who believe it could, would or had been broken run deeply. There are several definitions of "breaking" Videocipher. Does a Musketeer chip, so named because its use allows someone who has paid for a single service to access additional services that have not been paid for ("One for all, all for one") **really** break Videocipher? It really depends upon the reaction ability of the GI uplink data stream writers and controllers. If they have software routines which are capable of defeating or interfering with the Musketeer chip, then at best the Musketeer chip is a temporary crack in Videocipher.

Does a clone chip (so named because it allows a unit paying for one or more services to share that authorization with additional units that do not pay for the service) **really** break Videocipher? Again, are there software routines available to the uplink controllers which allow the cloned units to be turned off? Some think that answer is yes; that within microprocessor U7 there are two separate locations where the individual unit's ID or authorization code is kept in memory. If the cloning process rewrites **only one** of those location ID numbers, and the individual Videocipher retains its original ID in the second (secure) location, could not the data stream ask the unit to 'compare' the two numbers? And if the comparison found the two numbers were different, could not the system then be instructed to 'shut down' the Videocipher? Time would tell.

The Musketeer chips had been thrown a curve in mid-December; a black 'hole', originating as a black-out-window on the video by command from the on-screen text portion of Videocipher. The programmers or uplinkers had obtained one of the early Musketeer chips offered in the marketplace and figured out a quick countermeasure. The software hackers and Videocipher hackers

## IF THEY CAN BREAK IT ...

had responded, within days, by creating a technique for eliminating the black-hole window. The 'hole' was still being 'keyed on' a month or more after it started, but the majority of those acquiring X-ACT or IDS chips were able to cope with the approach because the X-ACT and IDS software writers had produced their own counter-counter measure. Was that the 'end' of the GI 'bag of tricks'? Unlikely.

Later in the waning days of January, those with cloned chips and clone Videociphers were finding a new response from GI; boxes were losing their audio but retaining their video. A vigorous data stream, transmitted by the uplink control over the weekend of January 24-25, was apparently readdressing each and every box that was turned on during the month of December. This data stream, some hypothesized, was coming from the normal HBO and Cinemax authorization computer(s) since simultaneously HBO and Cinemax shut down any new customer authorizations for the same weekend. The data stream did turn off **some** of the clone-authorized boxes leading to speculation about the system being employed. The deduction, after analysis; the data stream was asking each clone box to 'check' its own authorization number between the two U7 suspected locations. Those that did not match lost audio on all services. Can you read lips?

So had Videocipher been broken? It was suggested that "If it is not broken, it is badly bent ...". Perhaps, but as we shall see in this full report, everything you see is not as it seems.

**NOTE:** All of the material in the Summit report should be considered as an extension of **Coop's Satellite Comment**.



## DID They Want To?

**Ron Putnam**, GI's security director, offered to Coop on January 9th "We have been approached by numerous people who offered to 'sell us' technology which they claimed would 'close the holes' in Videocipher. **We declined each offer**". Stories that this group or that group, this person or that person had offered to GI their 'secrets' for figures varying upward into the six-number region proliferated on the street. The logic should have been inescapable.

- 1) The system had some software holes,
- 2) Some people had figured out those holes,
- 3) GI could close those holes if they had information, and...
- 4) Therefore GI should be in the market for information. For a price.

Verifying who was offering GI information, what information and for what price, has been difficult. In addition to Putnam's statement, we found one significant, verifiable report on such an activity.

The time is mid-October. A group spread throughout the southwest has been sitting on the 'musketeer technology' since September, or so they claimed. They had the software technology, but outside of a group of perhaps a dozen or so, it had not been distributed to anyone. They were not yet in the musketeer chip business. Their reasons were multiple.

First, they were concerned about the law. Second, they were harboring the misguided belief that they and they alone had the data and it would stay 'secure' within the group until they were ready to release chips. Third, at least some in the group believed the software information could be used as a 'bargaining chip' to 'force' cable programmers to the discussion table. Finally, there was a concern that with a Videocipher 'universe' of perhaps 50,000 in place, the 'marketplace' for musketeer chips was not large enough to support the musketeer operation.

The original musketeer group was monitoring, closely, the reported progress of others. The underground was abuzz with reports of this or that discovery but at the time none of the techniques reported seemed to be in the 'all for one/one for all' region. There came an opportunity for a single, one-time shot at reaching GI. But how to do it?

It all came to a head around the 24th of October. A very prominent individual in the cable television industry, actually a founding pioneer of the business, had a potential business investment interest in the TVRO industry. He was talking, routinely, with a member of the musketeer group; unaware at the time his discussion-partner was a part of a musketeer scheme. The TVRO person finally explained what he had knowledge of and pro-

## GI's CHANCE TO STOP IT ALL...

posed a meeting between GI and the group, using the cable pioneer as an intermediary.

A meeting was arranged. It would fall around the 26th or 27th of October and it would include the cable pioneer as well as a high management person at GI. These two individuals were friends of more than a decade, and all of the formalities of a nervous, first meeting would therefore be bypassed. The cable pioneer sought some legal advice from a well known Washington law firm. In a 'Saturday-Delivery' Fed-X parcel, the law firm's Senior Partner wrote to the cable pioneer as follows:

**"Regarding your calls of Wednesday and today and your meeting with XXXX, scheduled for Monday, concerning the 'solution' to his Descrambler, I want to advise extreme caution.**

"I do not want to be an alarmist. However, my assessment of the law, however cursory at this stage, is that it will be very difficult to obtain any financial gain through exploitation of this technology without risking potentially serious consequences. This statement (strongly urges you) to caution against any statements which could be implied as threats to market the technology or knowledge."

A brief explanation of this at this point. The cable pioneer thought he saw a commodity to be sold, perhaps; a commodity which GI would be willing to pay large dollars to receive. The attorney is advising our cable pioneer against offering this commodity 'for sale' (ie. financial gain) in any form which might later be construed as a 'threat to GI'. The law firm continued:

**"While I believe there would be no restriction on publishing the details of the 'technical solution' in an appropriate journal, a court could even construe payment for such a publication to fall within the 'commercial purpose clause' of sections 605/705. It would seem, however, that in an area of publishing the information, the First Amendment protections should be**



very broad.

"You will further note that the 'individual' home owner who exploits this technical breakthrough to accommodate 'private viewing' is very much insulated from any meaningful consequences. It is the poor fellow who for his commercial gain assists this 'private individual' who is deemed the culprit deserving punishment.

**"I speculate that (XXXX/GI) would be terrified over any method by which the individual earth station owner could, with relative simplicity, buy a stock item of hardware and thereby break the code. But I also suspect (GI) is not overly concerned with a circumstances involving (the) necessity for a sophisticated, custom-designed 'chip' and some expert assistance in the installation. (GI) probably feels that the latter can be kept reasonably under control with vigilance and some legal intimidation."**

The meeting was **not held** although the very highly placed person at GI from preliminary discussions knew that our cable-pioneer had in his hands a complete set of Videocipher breaking equipment. Perhaps the letter we extract from, originated by an attorney to our cable pioneer, frightened our pioneer off; if he could not make money with the information transfer, he would simply not be a part of the transfer. Or perhaps GI called the meeting off on their own (there are such reports), not really ready to place themselves into the position of actually being shown and knowing that Videocipher had been bent (if not busted). The reasons for the meeting not happening are conjecture and unless in some future litigation involving the participants testimony about the planned for meeting comes out, we will never know **why** the meeting **did not take place**. The dates are important none the less; in the October 24-28 time-frame. GI certainly did know at that point the system had been compromised even if the meeting did not come off.

There were other reported contacts between the 'breakers' and GI as well; a group in St. Louis was working through an intermediary as well in early November. Big numbers came easily in this game; our confident allowed "We will sell the cloning hole-closing technique for \$100,000 to GI; we expect an answer on Friday." That Friday came, and went; GI did not respond.

Much later, after X-ACT and IDS and others began actively marketing Musketeer type chips through television and other announcements, Coop talked with the GI head of security, Mr. Ron Putnam. We pleaded with Putnam to go to his superiors with a request that GI act as an intermediary between 'cable programmers and the home dish industry'.

**'By failing to talk, cable programmers are giving the impression they are totally inflexible**

**on the pricing issue. This in turn is fueling those who believe the only resolution to this impasse is the wholesale distribution of chips. If GI would take some initiative, and act as a bridge between the programmers and the chip makers to get a dialogue started, at least that would partially defuse the explosion in chips'** Coop suggested. Putnam, and by now it was January 9th, disagreed.

"HBO pulls our chain" he related "and we have very little in the way of persuasive powers in this situation."

Coop wondered "What would it take in the way of a hardware or software threat to get GI to act as an intermediary with programmers? How do we build this bridge between the two sides?"

Putnam was concise in his response.

**"Bring to me (GI) a box or a system which functions totally outside of the authorization system; a box that authorizes itself. Not a clone, not a musketeer; but a descrambler that can access programming with no assistance from the GI authorization center. Then we'll have the meeting you want."**

**Throughout the fall period, there were persistent stories that many groups or people have 'conspired' to defeat the original M/A-Com system. One of the most illogical stories of that period had GI itself involved in 'leaking' Videocipher security information to the outside world. The 'logic', as thin as it was, ran like this:**

- 1) GI has its own video scrambling system (Starlok)
- 2) GI would like to replace Videocipher with Starlok (the exact reasons why they would like to do this were never clear)
- 3) If GI could 'assist' those in the scrambling underworld to bore into Videocipher, GI might be able to get the cable industry to switch over to Starlok.

GI's own releases, early in 1987 regarding the newer and later versions of Videocipher did nothing to quell this rumour. Someone in GI was attributed with the statement that 'Newer versions of Videocipher were designed so as to employ some of the Starlok technology'. To those who **wanted to believe** that GI was sending torpedoes into its own fleet, this clinched the rumour.

Starlok is employed on F4, TR16, in the Cable Video Store pay-per-view service. Several of the "chip solutions" demonstrated claimed the ability to unlock Starlok right along with Videocipher. At least one Canadian created chip claimed the ability to unlock Starlok, Videocipher and Orion **all in a single package**.

GI's TOCOM division, located in the Dallas area and a prime manufacturer of quite sophisticated fire/burglary/security alarm system for use with



cable TV systems and a designer/builder of 'secure' cable TV set-top converters was the reported 'source' for the leak. As we shall see elsewhere in our report here this month, Dallas did figure prominently in the initial anti-Videocipher work. Whether anyone (GI inspired or otherwise) had any part in this has never been determined and the rumour surfaces and resurfaces with some

regularity even today. OnSat, the weekly satellite guide is typical of the sources who spread this sort of story and their January 25-31 edition noted (page 4) "**The announcement of the break has accomplished one major thing. It has sold an awful lot of VCIIIs. Some suggest that could be the purpose of 'the break that isn't really a break' happening. TO sell VCIIIs.**"

### NOT A Bad Idea

When GI elected to not meet with someone who could help them shut off the flow of illegal (as in Musketeer) chips in October, the die was cast. Looking back, it is now apparent GI felt they could handle the situation on their own without any outside help. That would ultimately prove to be an accurate assessment of their internal capabilities.

The concept was as follows:

- 1) Since word first leaked out that chip solutions seemed viable, there had been a proliferation of chip devices. Some worked, some did not. Of those that worked, some worked intermittently. Initially, most of the chips were being sold underground but as November turned to December a pair of firms became quite visible. **X-ACT** from Alberta and **IDS** from Ontario appeared on Boresight television as the connection-source connection developed.
- 2) Use of the chips inside of the United States seemed clearly illegal, as did the sale inside of the United States. **Coop warned against purchasing chips** and using them, on Boresight late in November and again in December. He also demonstrated a chip sent to him that did not work as evidence that the purchase of chips might be dangerous to the buyer's pocketbook.
- 3) The myths surrounding the chip technology spread like wildfire; although there seemed to be no more than two real 'technology' or 'systems' (cloning and musketeering), there were many subroutines possible which gave zealous sellers and creators the opportunity to 'build stories' about their own particular brands of 'magic'.
- 4) In Texas, Oklahoma and Arkansas, chip sellers became quite visible by the first of December. Some chip sellers were offering clone-type master chips with a companion VC2000 unit which the master was tied to for between \$4,000 and \$7,500; 100 'consumer chips' were included in these packages. The wonder at the time was that given the visibility of the selling of these clone masters that no legal action followed.
- 5) The 'Summit Concept' was very basic; clear the air about the technology. Dealers were confused about the technology, and uncertain how

## THE EVOLUTION OF THE SUMMIT

to react in a marketplace where their competition was dealing in chips. Even distributors were getting involved in the re-marketing of chips as would become evident at the Summit proper.

But how do you **teach the technology** without running afoul of the U.S. law? How do you make people who might be tempted to buy and deal in chips realize that not only were the chips illegal, but that they also carried a high risk of being technically incompetent or not secure? Ultimately, that would prove to be a problem which might not be resolved.

In December Coop asked USS's **Doug Dehnert** to try to make contact with a top executive at General Instrument; a Mr. **Fred Shuh** who is a Vice President of GI and a 'special assistant' to the President of the firm. Dehnert shared Coop's concern that there was no direct dialogue ongoing between those who would bust Videocipher and those who operate the system. Why talk?

The underlying theme in the Videocipher battle had always been fair pricing of hardware and software. The cable TV interests clearly did not want home dish service pricing 'competitive'. As the clandestine 'solutions' to Videocipher lined up coast-to-coast in increasing numbers, it was once again time to see if there might be a slow changing of 'attitude' at GI. To show a willingness to talk, to get dialogue started, Dehnert at Coop's request invited GI to send personnel to 'the Summit' to actually appear on the program and address



the dish dealers expected to attend. Out of the hoped-for appearance by GI perhaps would come the first real dialogue between the two industries.

**Surprise;** Shuh accepted on behalf of GI and suggested three people would attend. That was in mid-December and Shaun Kenny on Boresight asked viewers to indicate using the 900 number call in system whether they would prefer to see 'the Summit' have representation from 'both sides' of the scrambling issue. By a significant majority those calling in on the 'yes' or 'no' question were in favor of GI attending. But then a change in decision; after five days of thinking it over, GI's Shuh re-advised Dehnert they would not attend and speak. Fortunately, the announcement that they would attend had been held off awaiting confirmation of who the attendees would be and what their talks would contain.

**Another invitation;** this one to Jerry Freeman of the FCC in Norfolk, Virginia. Freeman had been instrumental in the Captain Midnight investigation and attended many of the early Coop TVRO seminars when this industry began. His reaction to his invitation was more immediate: 'It would be very inappropriate for the FCC to attend'. Coop attempted to change his mind by pointing out that in a competitive situation 'dialogue' was healthy, and often led to resolution of differences. Freeman was adamant none the less and while his

dialogue with Coop continued up to the opening of the Summit the FCC stayed away from direct participation.

Another scrambling system supplier, S/A, through their Canadian operation headed up by satellite-old-timer **George Bell**, opted to attend. Bell called Coop to inquire whether their sending a man to attend would cause any problems; he was assured that quite the contrary, they were welcome and could participate as either an observer or program participant. In the last session, January 19-22, S/A did have a man in attendance although he did not get involved in the dialogue.

The original plan was for there to be a pair of two-day sessions and a third three-day session. One of the important-to-Coop side benefits was the probability that his home island of Providenciales would realize a significant (although short lived) boost in tourism as a result of the Summit. Coop had worked through the fall donating his time and energies to create a new promotional vehicle for Provo. Called '**Provo Magazine**', it was a 30 minute television program created and assembled in the islands for weekly airing on the Caribbean Super Station (Westar 5, TR23). During August and September, professional travel consultants in the U.S. had been consulted to learn how Provo's tourism fortunes might improve. There is no economy in the islands that is significant other than tourism and virtually every family working in the islands depends to a large extent on the flow of tourists for their living. One of the studies revealed than 35 cents out of every dollar in circulation in the islands started out as a tourism expenditure.

More tourists equalled more money in circulation and a better standard of living for the 2,000 or so people living on Provo. 'Provo Magazine' would expose Provo to North America and result in more tourists. To make it all work, the hotels (all six of them) had to agree to work together to cooperate in promoting the island. One of the essentials would be somehow for those people learning of Provo to make contact with the islands and to receive brochures and other material about the island.

The 'Provo Hotel Association' was formed and arrangements were made with a Florida travel agency to act as coordinator for information requests. With an 800-number for viewers of Provo Magazine to call, all of the basic elements were in place. Because the travel agency had visited Provo, and had a working relationship with the island's hotels where Summit attendees would be staying, the same travel agency agreed to handle the registrations for the Summit as well. From the island perspective, the **Summit was a promotion for tourism** and if the Summit was a successful promotion every single hotel bed on Provo would be filled to capacity for the 8 days of



#### How to use the Rabbit RAMview EPROM

This is a normal U30 EPROM with SETUP-0 modified. When SETUP-0 is pressed the U20 RAM is displayed. The address at the top left of the display is the address of the U20 data that is being displayed. The HELP key will start and stop the automatic advance of the display. The RAMview display displays the same 32 bytes of U20 memory in three different formats. Lines 2-5 are in hex. Lines 6 & 7 are in text format. Lines 8 & 9 are text starting from the address in the upper left plus one. The RAMview display is as follows:

```
Line 1: 6XXX RABBIT TRADING      6XXX is the display address
Line 2: 8 bytes in hex starting at the display address
Line 3: next 8 bytes
Line 4: next 8 bytes
Line 5: next 8 bytes
Line 6: line 1 of 40 characters at the address in line 1
Line 7: line 2 of 40 characters at the address in line 1
Line 8: line 1 of 40 characters at line 1 address + 1
Line 9: line 2 of 40 characters at line 1 address + 1
```

HELP KEY: Start/stop automatic advance of display.

#### How to use the Rabbit Video EPROM

When you are on a Videocipher signal that is not available to the home dish market, pressing the HELP key will activate the video.

#### How to use the Rabbit Writer

Install the EPROM, turn on the power, press the HELP key, the CANCEL key, and the HELP key. Press SETUP-1 to verify the UNIT number has been changed. Replace the original EPROM or Three Musketeer EPROM. The VC II now has a new UNIT number and keys installed in U7. This Rabbit writer EPROM shows the capabilities of the Rabbit key backup EPROM and emulates the Super-clip transfer of U20 RAM. CAUTION! This writer chip will write over the existing UNIT address in the VC II. Please use only on boxes that have had U7 memory lost.

Rabbit Trading Co. Ltd.  
Office #10 (809) 946-4261  
First Bank Building  
Providenciales, Turks & Caicos Islands BWI

**RABBIT TRADING** literature explained operation of three free chips and gave newly established telephone number and mailing address in the Turks and Caicos Islands. Firm that had agreed to act as 'agent' for Rabbit subsequently changed their mind and Rabbit has no known operations address at this time. Agent explained in closing operation "We were being overrun with telephone calls and inquiries from stateside; people with whom we would not do business".

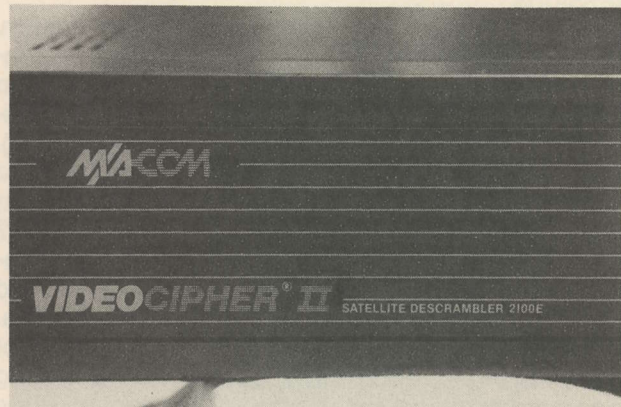


## the Summit.

There was a myriad of 'details' to work out since no prior event had ever produced that many people on Provo in such a concentrated period. Ground transportation was one of these details. How do you move 100 to 150 people around from hotels as much as 9 miles from the host Island Princess Hotel several times per day, on schedule, and not have massive problems? Just as the island's hotels formed a hotel association to work together to bring tourists to Provo, the island's taxi drivers collected themselves together and worked out the logistics of the project. And that, like the hotel association, was another 'first'; the first time the taxi drivers, each fiercely independent, agreed to cooperate in scheduled movement of hundreds of people.

**The chips.** The original plan was for there to be four chips given to each attendee; free chips, educational chips. To insure that they would not be used in commerce, the various chip suppliers were asked to design useful, informative chips which performed some function that would help the attendees better understand the mechanics of the chips themselves and how the system worked. **Comtech** (not to be confused with Commtek Publishing Company) offered a 3-Musketeer type of chip which would be overwritten with full time text that would identify the chip supplier (Comtech) as well as eliminate the possibility the chip could be used in commerce. **Rabbit Trading Company**, a cloning house when it started, was to offer a trio of educational chips. **RAMview** was a position U30 device that modified the SETUP-O sequence. In use, SETUP-O would display the U20 RAM contents in hex and text formats. **Rabbit Video** was a video-only display system (no audio) which was similar to those being offered nationally to dealers as in-store demonstration tools. With it in U30, a dealer could call up the video **only** in descrambled form to allow customers to witness the basic advantages to scrambled services. **Rabbit Writer** was more confusing to understand; it was intended as a demonstration of the backup capabilities of making an archival copy of a unit's identification keys in the event the Videocipher was somehow damaged because of lightning or voltage transients. By storing a unit's ID number away as a safety precaution, a dead unit could be 'revived' using the Rabbit Writer chip without having to go back to the factory for a \$200 repair bill.

Another chip supplier, **X-ACT**, came in late. Operating out of Spruce Grove, Alberta, Canada, X-ACT was one of the first firms to openly offer U30 Musketeer chip service. X-ACT wanted to participate and volunteered to bring to Provo the necessary equipment (computer with program,



EPROM burner) to demonstrate on-the-spot Musketeer creation techniques. Naturally, X-ACT had no desire to reveal their specific technology (ie. their software language) since those 'secrets' were what they were trying to sell, in chip form. X-ACT prepared for handout to the attendees slips of paper on which the attendees wrote down authorization numbers for VC2000 units. The slips were to be turned in to the Australian lady running the X-ACT equipment and she in turn would make up a 'free chip' for each attendee. That became a 'fifth chip' in the package; one not promised.

**There was to be another surprise;** a pair of discs containing software programming from devices U30 and U7. The discs had been donated to the Summit by another chip supplier source operating out of the Bahamas. This was a 'commented version' of the U7 and U30 programming, and supposedly it was an original work. As a matter of form, the contents were checked prior to handing the discs out to the first seminar group. There, would be found, in plain text the original Cable and Home Group copyrights. **The discs were destroyed,** not handed out.

Rounding up the speakers proved less of a challenge than initially anticipated. One decided early he would not mind being identified by his 'real name' and as the Summit wore on he would frequently tell attendees what he did for a living. That he worked for Uncle Sam at **NASA** would surprise many. Others asked that their 'real names' be disguised although in the long run that did little to mis-lead investigators intent upon learning all they could about the attendees. **Robert Richardson**, the studious 'grandfather' who had originated the concept of DESUG but who took no active role in the code 'breaking' activities readily identified himself as he gave the opening, 'keynote' address (a carefully worded paper prepared in advance) to each of the three



sessions.

The chip **creators** had a particular problem. None wished to be on view, up front, giving demonstrations of their creations (the Comtech person aside, but then he had no functioning chips to display so perhaps his was a special case anyhow). But how would they explain their products and teach attendees about the software work that had been done if they could not do it themselves? A quandry. Volunteers, knowledgeable volunteers had to be found. The DESUG group proved to be a reservoir of such people since the original DESUG project was based upon the 'challenge' of deciphering Videocipher and not upon becoming a commercial participant in the creation and sale of chips. So a call went out to DESUG participants; would any of them be willing to teach the technology of the various chips that would be on display? A **'Doctor Stevens'** and a **'Steve From New Mexico'** volunteered to work with the program.

Although the Summit was open only to those who signed up for the trip and paid a single fee that covered air fare, hotel accommodations, ground transportation, buying discounts at Provo shops and food and gratuities, the 'security' of the meetings proper was impossible to maintain. There are no single, large **meeting rooms** on Provo. There is one sometimes vacant airplane hanger, not the best option. Room for up to 100 seated attendees plus room for the speaker(s) and technical support equipment was needed. Provo was already taxed to the limit. One hotel, the Island Princess, had a front beach-side room which could hold the required number of chairs. Unfortunately, with the open beach on three sides and the need to keep the windows open so the people in the room did not succumb to the heat, the room was simply a set of walls filled with large holes. The fourth wall backed up into the lounge and bar area of the Island Princess and half of that wall was totally open for air flow.

The Summit would turn out to be a 'very public', private meeting. While admission to the meeting room proper was nominally controlled by an officer from the Turks and Caicos Police Force, anyone standing or sitting outside had no difficulty listening to the proceedings and those who elected an outdoor 'seat' outside of a window could both listen and watch. Like so many things that take place in the Caribbean, the gathering was void of either pomp or ceremony.

But obviously as events have unfolded, 'things went wrong'. Some were mechanical, some would turn out to be 'legal' in the sense that not everyone who participated or watched had the same 'view' of the intent and actual events of the seminar.

Indirectly, the Summit may have been 'the best thing' that could have happened for GI. In one place, at one time, all of the systems in the marketplace were laboriously and tediously dissected and explained. There was far more speaker attention to the systems that plug into Videocipher than to the Videocipher system itself since even today far less is understood about Videocipher than is understood concerning the various techniques that interact with it. GI probably realized this when they elected to return the invitation to attend and appear in the sessions. **Had they attended**, perhaps their own 'legal position' after the Summit might have been changed. By 'allowing it to happen', by allowing the first meager educational chips to dribble in with the first returning Summit group on January 16th, GI found themselves with the best of all worlds. They had hard 'evidence' against many of the key suppliers, they had knowledge about the type of chips and the content of the chips, and they had a 'record' which they could take to various U.S. agencies to seek prosecution of those involved. This would save GI thousands - perhaps tens of thousands - of hours of investigate legwork all over the continent. By concentrating their activities on Provo, everything they wanted was in one place for them.

## THE SYSTEMS AND THE PLAYERS

### HOW It Evolved

There was one key breakthrough in the cloning procedure which set the stage for everything else that follows. Inside of microprocessor device U7 resides a 'key number'. That key number is specific to that one VC2000 unit and the number is assigned and implanted at the VC2000 factory as a part of the production process.

The VC2000 units are actually created offshore; the boards are built in Taiwan under contract and then shipped to Puerto Rico where the circuit boards are tested and placed into the VC2000 housing. Chips with DES responsibilities are added and programmed in Puerto Rico. Puerto



Rico is considered the United States by the National Security Agency so the implantation of the DES originated code data in the Puerto Rico plant is considered 'legal'.

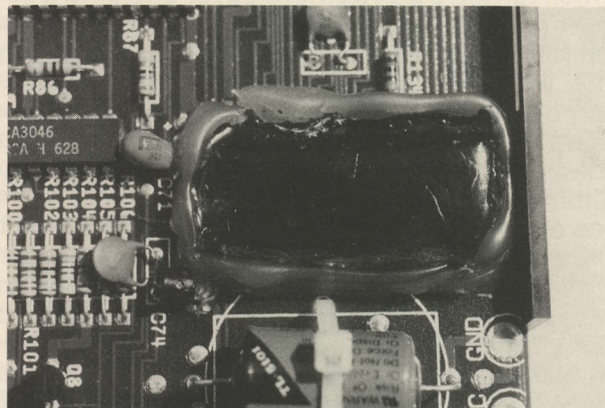
Getting the ID number 'out' of the VC2000 was important to those who would break Videocipher because you cannot 'duplicate' a number you do not know. Several techniques were attempted to extract that number. Pin 36 on the TMS70C40 Texas Instrument microprocessor is 'lifted' internally and it is on this pin where one would normally expect to find access to the key number. There were early attempts to bore into the 70C40 device, down to the pin 36 bond, where it was hoped they would be able to 'clip on' an outside set of test equipment and 'read out' the key number. A group in Texas claimed success with that approach in mid-July. This required very precise equipment and very precise techniques; it had to happen while the VC2000 was 'powered up' and operating, complicating the procedure. In its most elementary analogy, it was brain surgery on a live being using a miniature power drill/laser beam guidance system. A reported \$20,000 changed hands for 'the operation'.

The problem with this technique is that after you have done it, you then have **one ID number for one box**. Yes, you could clone that box now that you had the ID number in hand and create additional boxes sharing the same number. But how many boxes could be 'safely' cloned using that **single ID number** sequence? Could you clone enough to afford the \$20,000 per 'operation' charge? Not likely.

Preceding the Texas surgery in mid-July was a very unlikely chap in the northeast in June. His approach was different. He reasoned that the TMS series microprocessor was nothing more than a sophisticated solid state memory device. It remembered what it was told to remember and given certain commands, it responded with 'outputs' based upon the 'inputs'. He wondered what might happen if he started inputting **random data**.

Using a low priced home style computer in the VIC-20 family, he created a program to input totally random data and commands to the U7 device. At the output he connected some recording equipment. And then he placed the input program of random data into operation. This is not dissimilar to placing three monkeys in a room with three IBM typewriters. Sooner or later, something they randomly type on the keys will create a word or sentence; or if you wait long enough, a story or book.

The TMS device was never designed to withstand this onslaught of random data. The 'clock rate' and other parameters were varied by the input program and after some days of being fed incoherent input data the TMS microprocessor spilled its guts. There, on the output lines was the



VC2100E UNIT manufactured on January 17th has black colored sealant material laid over U30 device.

secret contents of the microprocessor. By correlating the exact input data and sequence being fed to the U7 device at the instant it spilled out its internal contents, this 'hacker' had a handle on getting 'keys to extract' on a repeatable basis.

This individual (we'll call him **New York Ned**) had taken on this challenge for no reason other than 'the challenge'. He did not follow the activities of Videocipher, did not care whether HBO was priced fairly or not, and in fact seldom if ever watched television. He was impressed with what he found, but totally unaware of the potential significance of his discovery. Weeks went by.

Then a chance meeting between this individual and a member of the descrambling underground, at a weekend electronics meet. The descrambling type was engaged in an open-air conversation with other would-be Videocipher busters and New York Ned overheard the conversation. He took the discussion leader aside and asked him 'How valuable would it be to have the internal contents of U?'.

The rest is until now unrecorded history. The raw data from Ned became a blueprint for what turned into the creation of a cloning 'subgroup' in the descrambling effort. Ultimately, a group of perhaps six would be formed to bring together special expertise in several specialized disciplines. Included were people heavy in software programming, software marketing and hardware design. Members of the group were 'international' in content and ultimately this would grow into the **Rabbit Trading Company** which popped out of a hutch on Provo during the Summit. But there were internal problems as we shall see.

Meanwhile in the southwest another group was taking a different approach to dissecting Videocipher. This group intended to create a technique



which turned a box authorized for one or two services (such as CNN or HBO) into a box which was reauthorized for many more services. Ultimately, this would be called 'The Three Musketeer' approach; you will remember in the story of the same name that their motto was 'one for all - all for one'. The name, incidentally, did not originate within the musketeer group; it came from a member of the **cloning** research team who initially looked down on this approach with some disdain.

The basis for musketeering is totally different than the basis for cloning. Cloning '**duplicates**' something internal to U7 while musketeering '**modifies**' something internal to U7. But musketeering, like cloning, required that somebody obtain the contents of the U7 memory before a new software program could be written to accomplish the musketeer process. Apparently, the contents of U7 arrived at the operations center for the southwest based would-be musketeering group from the Dallas area. A price was paid for the information, and ultimately a group of 6 or more would participate in what later became **X-ACT**. The origins of the U7 contents for the pre-X-ACT operation have never been totally disclosed but **here** is where some insist there was a TOCOM (division of GI) connection.

The primary problem with the musketeer program was security. Rewriting the contents of U30, knowing the contents of U7, was a software challenge. Those who now know and understand U30 (the EPROM that is the subject of all chip solutions) and U7 believe that U7 programming was done to a much higher level of competence than the U30 programming. Software writers leave a 'signature' behind and to an experienced software analyst the 'routines' built into the software are as identifiable to source as an individual's handwriting.

"U7 was ultimately a one person effort at M/A-Com" goes the analysis. "U30 was possibly done by a group because you have large subroutines appended to the basic program indicating where they attempted to patch together different aspects of the routine to make them mesh".

The Videocipher box does many things on command including some esoteric functions not yet implemented by cable programmers. Pay-per-view is one of those and each of these unique-to-Videocipher functions ('Help', 'Data', etc.) requires its own software computer language programming routine or sub-routine.

"Even with the contents of U7/U30 available, what we see and understand is but the tip of the iceberg" goes on our software analysis person. "We may understand 1/5th of the routines at this point".

The musketeer **security aspect** left its creators worried. If they took their basic program of rewrit-

ing U30 and put it on the market, the chips could be (mass) duplicated by others. This would be a 'clone of a musketeer'. Or, by comparing the original contents of U7/U30 against the musketeer U30 contents, others could simply duplicate the functions of the musketeer and sell them as their own. So while the musketeer approach seems to have been resolved as early as the month of September, the 'how-to-secure-it?' aspect was not resolved for another 30 to 45 days.

The X-ACT chips were not placed on the market in September nor October nor November for at least three solid reasons:

- 1) The chip security was not adequate and others could copy the rewritten software and compete with X-ACT with their own product.
- 2) At least one principal connected to X-ACT was trying to bring off a discussion with GI directly, through our 'cable pioneer' intermediary (see 'How GI Blew A Chance', here).
- 3) The Videocipher marketplace was frightfully small, by GI's own statements not over 50,000 authorized units, and X-ACT felt the universe should be several times that large before they came into the market.

Those who created the musketeer chip approach were ready to 'wait it out'; until April or May if necessary. Others were more impatient and by mid-November, at least one and perhaps two other groups had figured out the musketeer routine. In all of this a later-to-be-discovered thread began to unravel. This thread was shared, widely, in both the cloning and musketeer groups.

The 'secret' of making either approach work was obtaining the 4k Ram listing from U7. We can trace 'New York Ned's' forcing of the data from U7 in June and we can locate a Texas source which purported to get the same data out of U7 by drilling and extracting perhaps sixty days later. There was one other source for RAM listing data as well.

During the course of several weeks, while a clone-group was forming around Ned's data and marketing plans were being created, there was some perhaps inadvertent 'sharing' of the key extraction technique. The technique was shared on at least one occasion between a man in Virginia and another in Kentucky. With the technique went at least one unit 'ID number'; a unit, it would later turn out, which was not directly involved with the key extraction process. Apparently, a fringe person donated a VC2000 to the cloning researchers and the unit was authorized for at least some paid-for services. Unbeknownst to the donator, his unit became a live research tool and as the cloners perfected their key extraction process, copies of the U7 data from his donated box, complete with HIS authorization or ID number began to circulate in the underground! As we shall see, this unsuspecting and totally uninvolved person



might have reason to regret his donation of a live and functioning VC2000 before it was all over.

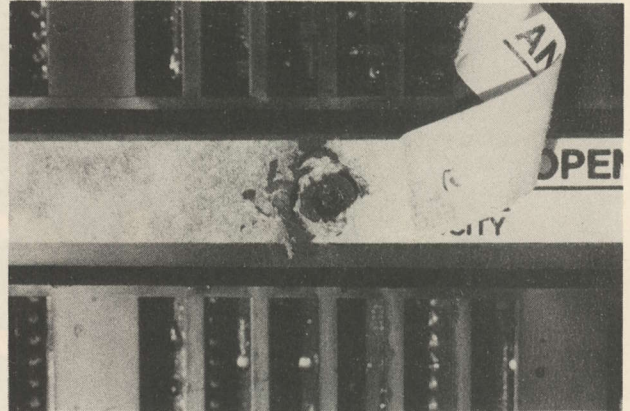
With the musketeer chip technology available to at least two research groups by late in November, a marketing struggle seemed to develop. The southwestern group was still struggling with (a) security, (b) waiting for the market to enlarge, and, (c) their hope that GI would still sit down and discuss the developments. Another group from along the eastern seaboard shared none of these concerns. They:

- 1) Did not care about security (this group would later announce marketing plans under the name of COMTECH and post a short-lived address and pair of telephone numbers headquartered in Nassau, the Bahamas).
- 2) Did not care if the market was 'large enough or not'.
- 3) Had no desire nor intention of talking with GI, even if the opportunity arose.

COMTECH's first announcement was unsettling to the marketplace; \$199.95 'direct' selling price, to consumers but not to dealers, with VISA and other charge cards accepted. It is questionable that COMTECH, through Nassau, ever took any orders or delivered any chips. That COMTECH was 'in the marketplace' with an 'unprotected' chip, at a price of under \$200, caused X-ACT and a third musketeer firm, IDS out of Canada, to react. Where both X-ACT and IDS seemed satisfied to wait out the market for its own enlargement, the COMTECH announcement caused both to immediately begin marketing of their own chips. X-ACT set up in a suburb of Calgary, Alberta and took telephone orders for musketeer chips. Callers were charged \$250 (US) for a chip that was keyed to their own unit authorization number. The number was affixed to each chip and the chips were packaged in a small package for shipment back to the United States. In the first X-ACT shipments, no return address was placed on the parcel and the chips were listed on a required custom's form with a value of \$15. That would prove to be a mistake, as we shall see.

Through the month of December and the first two weeks of January, X-ACT delivered approximately 500 chips to customers. At the same time, the eastern Canadian firm, IDS, delivered around 300 chips. As best we can ascertain, COMTECH delivered no chips in this period. X-ACT and IDS were very visible because of their frequent mention in over-the-satellite broadcasts but they apparently were only a small part of the real underground world of chip marketing.

While X-ACT and IDS were attracting the wrath and legal attention of GI and others (GI, through an employee, was one of the first to order from X-ACT), a much more significant marketing program



**GETTING** inside of Videocipher 2100E requires a new type of tool to break through the custom designed screw that holds the two piece plastic sandwich together.

was getting underway with a reported headquarters on the west coast. Here is what this group promised:

- 1) Instant turn on of any box, using a special 'number capturing sequence' that reached up and 'grabbed' an authorization number from the data stream.
- 2) A monthly turn-on chip that was first used in the U-30 position to 'prepare' the Videocipher for the operational chip was included in the package.
- 3) A third chip labeled 'repair chip' was alleged to have the capability to repair (as in fix) units which had been mistreated and which had lost their own factory installed ID number.

**Several well known distributors** put out upwards of \$10,000 for **this package** of chips, including 100 customers operational chips, during late December and January. Some suggestions that distributors were dealing in chips surfaced in the trade press and elsewhere during January. Something very similar would also surface as 'The European Chip' during the Descrambling Summit.

Until this particular package arrived in the mid-west, California and later in Hawaii, the only known players in the game were working with either a 'clone' or 'musketeer' technology. This system, unnamed initially, seemed to be playing with a new set of rules. Certainly their most impressive claim was that their software 'monitored the satellite authorization stream and adopted a satellite delivered authorization number' as its own.

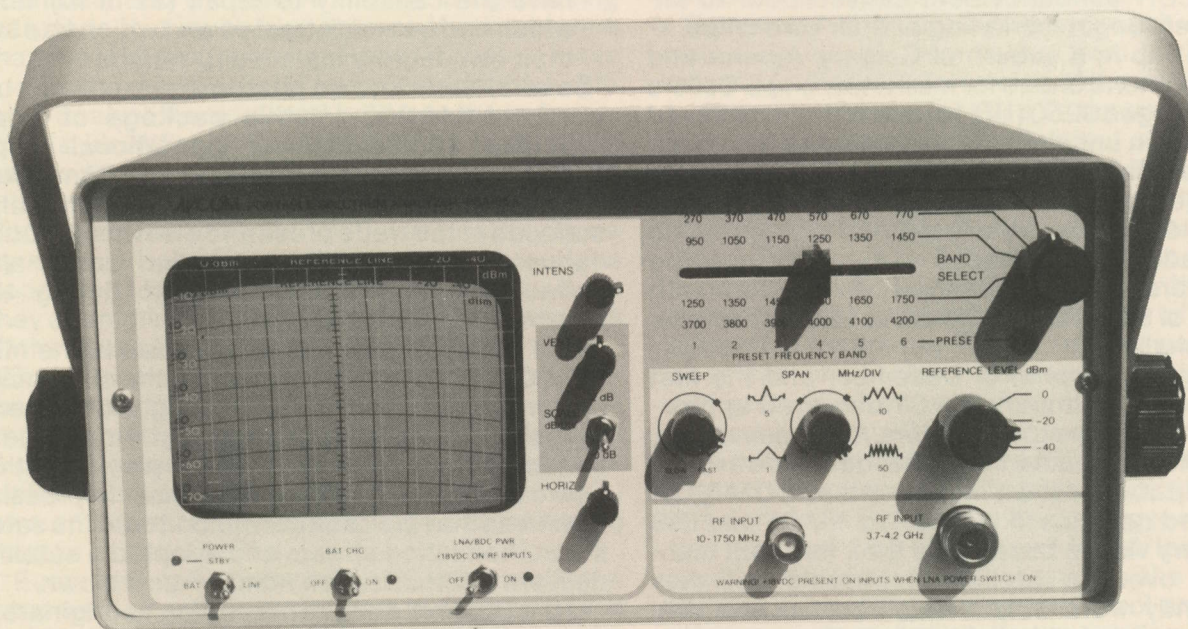
At the Summit, a group purporting to originate in Europe asked to explain their '**European Chip**'. It was dubbed the '**ZITS**' (Zero Information Turn-on System) chip by some playful participants. They made the same claims as the chip packages

CONTINUES/ page 18



# \$1101.00

**LOWEST PRICE EVER!**



**AVCOM PSA-35A ANALYZER**



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## 55 UNITS ONLY - LIMITED OFFER



CONTINUED/ from page 15

apparently originating in California but the existence of the California based chips was unknown as the Summit opened. The ZITS chip caught those who had agreed to come to the Summit and preach clone and musketeer technology off guard. In a phrase, the 'experts' who knew and understood cloning and musketeering refused to believe that the ZITS chip was capable of 'adopting' satellite sent authorization numbers. The demonstrations for the ZITS chips, perhaps encumbered by the principals behind the chip not being present and the need for a neophyte outsider to do the demonstration, were very impressive none the less.

- 1) A brand new VC2000 was taken from the box and U30 removed.
- 2) A socket was installed in the U30 position.
- 3) A monthly authorization chip keyed to the month in effect (January 1987) was inserted into the socket and the unit briefly fired up.
- 4) This EPROM was removed and a permanent chip inserted in the socket.

Up came WOR (a cable only service) plus all of the customer services including HBO Combo on G1's TR1. There was even limited video and audio service from G1's TR16 and F3R's TR5; at least once per pay-per-view day the movie appeared in the clear with full audio. All of the services, including the triple-X rated services came up.

Then in the demonstration the customer authorization chip inserted in the U30 position was removed and the box unplugged. The battery was disconnected to kill the memory of the unit and the technician proceeded to ground all of the pins on various ICs (U7, U30, U19, U20, U24 et al) to 'kill the box dead'. Here he was simulating a completely brain-dead unit which under prior-known-art would have to go back to GI for a \$200 repair job to reactivate with a new unit ID number.

A new EPROM, labeled repair, went into the U30 socket. The box was briefly turned on and then shut down. The monthly authorization key chip was then installed briefly and the box turned on again. Finally, the consumer EPROM was inserted back into the unit.

Impressively, not only did the unit snap back to life instantly but it had reclaimed its original, 'lost' ID number.

'This box can now be authorized in the normal way by any consumer' went the explanation. There were murmurs of approval in the crowd. There were also doubts.

"There are only two possible explanations; three at the outside" explained one knowledgeable VC2000 person present.

"First, the box is nothing but a super-clone. The box may be utilizing a master unit authorization which is in use at the GI facility in Puerto Rico to

test boxes. Certainly if those special authorization numbers were known, a box could be cloned to that number."

And number two?

"Second, M/A-Com set up their authorization assignment sequence in a predictable, perhaps algorithm-driven pattern. Someone has figured out that pattern and is in effect reassigning box numbers using the original M/A-Com pattern."

And number three?

"The DES Algorithm 'is broken' and in spite of all of the statements that it would take an army of Cray Computers umpteen weeks to unravel DES, it has been done."

As fate would intercede, one of the three-chip packages was purchased in Hawaii (street price \$150) just as the Summit was getting underway. A caller to the Summit from Hawaii revealed some of the numbers extracted from the street bought chip in Hawaii. The caller insisted the Hawaiian chips were 'superclones' tied to internal GI (originally M/A-Com) final-test-sequence procedures for the VC2000.

While the Summit 'experts' huddled on the sidelines trying to figure out how they could get their hands on 'The European Chip Set' long enough to do a data extraction of the internal programming (that would allow them to look for some indication as to whether the chip was mis-using some other ID number), another caller turned in the Hawaii-relayed numbers to GI. Back came a promise that the numbers, if 'real', would be corrected and turned off immediately.

The European Chip people, represented by a British chap apparently hired to take orders and supply information but who seemed to have no programming knowledge of his own, meanwhile said they would not sell their chips to anyone who might use them in the United States. The first price quoted at the Summit was \$15,000 for 100 customers chips, and two monthly authorization chips; January and February. That worked out to \$150 per chip and there were no takers, perhaps a result of that being a lot of cash money and real concerns that what people saw was different in some form from the representations. The explanation that the European Chip/ZITS Chip grabbed hold of an authorization number from 'the sky' was especially perplexing to those who thought they understood the technology. It was almost 'too good to be true' and when the demonstrating tech further explained that you could not turn on a new box effectively between 12 midnight and approximately 6AM, because no new boxes were typically being authorized during that period, it only made matters worse.

As the Summit wore on, and GI claimed they had 'disconnected' the four special numbers intercepted by a buyer in Hawaii, the European Chip



### ID ZERO KEYS/ Stolen From M/A-Com???

Four sets of keys, claimed to have come from within M/A-Com (or GI) were found in load-repair-authorize "3 chip sets" being sold on the west coast and in Hawaii simultaneous to the Summit. The numbers were given to GI as a security precaution and to determine if the European Chip itself was based upon stolen authorization numbers internal to GI. Purportedly, there was a series of authorization numbers (perhaps these) in use for VC2000 check out as the units were run through the factory for final QC. No, GI is no longer using these numbers nor any others in use prior to the Summit, having decided that if one set of numbers was 'out', all of them could have been compromised. Therefore the numbers below have no value except for their historical significance.

#0 / 144F6445FA2707

#1 / 345775459DA667

#2 / B8D7CAW643148B

#3 / 48740FB0F54FF6

continued to operate. That only perplexed the musketeer and clone chip people further because they 'knew' there was some not-up-front explanation involved.

There are more than 16,000 information locations in memory. Different locations have different data for different purposes. It turned out that if two of these locations have their input data changed, WOR will pop up on a VC2000. Yet other locations control the appearance of the pay television services such as Request. Properly changing the data in the memory positions for Request will bring up the cable-only service. Searching through the data, not only inspecting but understanding all of the routines in U30 (and U7) requires considerable skill and patience. 'Routines' built into the software refer the software forwards and backwards with great regularity.

If one bit of input signal equals a certain condition, the software directs the computer program to do one thing. If the input data, from the satellite data stream equals a different condition, the software tells the data stream to do something else within the program. Software program writers build 'traps' into their routines to catchup those who would try to unravel the mysteries of the programming. Software writers also usually build their own 'exits' into routines; a job security exercise just in case they are ever presented with a difficult decision from management. Unraveling someone's software routine, especially when the routine was

created by several separate software creators and then married together into one routine (ie. U30) can be very time consuming. The VC2000 apparently is capable of handling 32 different 'transactions'. One of those transactions is the 'loading of the box' with its own program and ID data. We'll revisit that subject shortly.

As the Summit evolved, from the first group January 14-16 to the second group January 16-19 and then the final group January 19-22, several remarkable changes were taking place in the technology being explained:

- 1) Clone and musketeer forces united in a front against the European Chip. Because the European Chip supplier had delivered no chips, there was a plan to help fund the purchase of his chips so they could be dissected and the mystery unraveled. This failed to happen even though the European Chip people lowered their entry to 25 consumer chips and 1 monthly authorization 'loader' for \$200 each (a \$5,000 entry fee). The Summit would close with no European Chips sold nor delivered.
- 2) Identification of the particular location in the European Chip program which was turning on WOR spread and new generation clone and musketeer chips might also provide WOR service in the future.
- 3) Musketeer chips, from X-ACT, sold in small quantities and were the clear favorite for their simplicity with Canadian and U.S. dealers. Clone chips, requiring the purchase of a master (VC2000) unit and a clip package to make the clone process work also went unsold. Buying interest in the clones was virtually limited to non-U.S. dealers who traveled to the Summit from various Caribbean, Central and South American countries.

In other words, other than perhaps slightly over 100 chips sold by X-ACT, there was no real commercial activity. Recall that X-ACT had sold approximately 500 chips up to the Summit so even with the concentration of interested, potential buyers at the Summit, as a sales exercise it was a disappointment to those on hand trying to sell chips 'after hours' when the Summit was closed down and people were on free time. And the Summit closed on January 22nd with the European Chip still a mystery although as we shall shortly see, in just a matter of days it would no longer be a mystery.

### WARNINGS Abounded

Surprisingly, perhaps the least concerned people with the approaching Summit were the speakers scheduled to appear in the program. Not a few would-be attendees were told or believed

there might be some difficulty with U.S. Customs and some (a not insignificant number) did cancel their reservations. Others took the spirited view that "It will be an experience no matter how it turns out". Ultimately, at least one attendee



returning on January 19th would later complain to U.S. Customs because he was NOT strip searched!

The popular and sensible assumption from the beginning was that there **would be** representatives from GI and perhaps some of the programmers in attendance at all of the sessions (January 14-16, 16-19 and 19-22). It became something of a popular 'game' to try to pick out likely candidates as 'spies'. An attendee would later write:

**"I am almost positive that there was a plant (spy) at our meeting (January 16-19).** In fact, I believe I met and talked with him. He expressed more than average curiosity in our meetings and was definitely not a dealer or satellite enthusiast. He went out of his way to express his disdain for everything from U.S. taxes to scrambling, the high cost of American life and so on. He obviously had been coached in what somebody **thought** was a "profile" of the typical Summit attendee and he sounded more like us than we did ourselves. This guy was acting out a role and it was all too obvious."

As noted previously, the 'private meeting' was hardly private. Audio and video taping was permitted in all but one session and note taking was prolific. The first group attending the January 14-16 session was told before receiving their free educational chips "If you are not comfortable returning to your home with the chips, they can be left behind and will be shipped. Allow two to four weeks for delivery." Some did this. The same message was delivered to the second group as well.

There were several questions concerning the return of chips:

- 1) Did the chips violate U.S. Copyright law? Attorney **Clare Skatfeld**, who addressed each of the three seminar sessions, took the position that the U.S. Copyright law was basically untested. He had been **told** by the chip suppliers who provided the free chips that **the chip creators did not believe** the chips were in violation of copyright.
- 2) What was the value of the chips? U.S. Customs would later attempt to get returning attendees to state the chips were valued at \$1500 (or \$1400). A slip of paper included in each chip set stated the value was \$4.20 per chip; the cost of a basic EPROM when purchased in small quantities. If one also considered the advertised price of the free chips, from Rabbit and other price sheets available at the Seminar, the total of the free chips came to under \$300. And U.S. Customs allows those returning to the U.S. to bring in \$400 or less in foreign merchandise without paying a custom fee **or declaring** the items brought back.
- 3) Did the chips contravene U.S. laws? Copyright questions raised by U.S. Customs aside, there was another possibility it would turn out; did

## WHO PULLED CUSTOMS' CHAIN???

the chips amount to 'burglar tools'?

The three basic Rabbit Trading chips, as previously noted, were all keyed to some educational parameter; a view of U20, for example (RAMview). A musketeer 'demo chip' for in-store demos promised (although not delivered) by COMTECH was a step closer to performing a possible forbidden act. The chip was to contain a full on-screen text message however that would label the chip as a clear demo device. A fifth chip, one more than advertised in advance, was from X-ACT and those attending dealt directly with X-ACT in providing the X-ACT representative with the required information for an X-ACT chip to be created on the spot for the attendee.

The first returning group, approximately 55 attendees plus wives and children returned through Fort Lauderdale customs with no incidents. Each filled out his or her "Returning to USA" card and walked through Customs unquestioned. The second group, attending January 16-19, had a different story to tell.

**"What a bummer when we tried to go through customs in Fort Lauderdale last night"** wrote an attendee. "We were all delayed at least 1½ hours and many were held up to 4 hours before they could interview all of us. There was much nervousness, much anger and huge destruction of chips which ended up all over the floor in many broken pieces! We were all taken by surprise... they knew exactly what to look for. They even knew that some of us had elected to have our chips mailed back to us."

In those 'interview' sessions, attendees were asked in detail to explain what went on at the Summit. The scope and nature of the questions revealed that someone in the first group, or still on Provo feeding 'intelligence information' to the states had prepared a thorough report on the Summit sessions. Returning attendees were asked about statements made to the Summit with full advance knowledge of what the statements were.



Some attendees were asked (or required) to give up personal notebooks and literature as well.

**It is important to remember that GI was invited to attend, as was a representative from the FCC.** And that a representative from Scientific Atlanta **did** attend. There was no effort to 'hide off-shore' to conduct a business which might have been deemed illegal onshore. Fort Lauderdale did not need a group of 300 or so additional tourists; Providenciales did (\*).

U.S. Customs personnel landed on the group returning on January 19th with both feet. It was a holiday (Martin Luther King Day) and several of the Customs people 'griped' to those they were questioning about being called out on a holiday. Exactly what happened within the immigration and customs area is not clear, even after interviewing more than a dozen people who went through the procedure.

A New York dealer reported he was at or close to the head of the line. He had filled out his Customs form stating that he had purchased a necklace and a bottle of liquor on Provo. He was asked "Do you have anything to declare?". The man asking the question had the dealer's custom form in his hand and the dealer made an assumption; 'anything OTHER THAN what is on the form?' he thought to himself, since the declared items were clearly evident. The dealer replied "No". The customs person shot back "What about these items!" pointing to the necklace and bottle of liquor.

"I have already declared those, there on the form" the dealer responded.

"I asked you if you had ANYTHING to declare" shot back the customs man. "**You are a smuggler**" and he shuffled the man and his necklace and bottle of liquor off for further questioning. In the end, U.S. Customs would take the necklace and the bottle of liquor from the man and send him on his way.

The New York dealer felt abused by the incident and as he cleared U.S. Customs went directly to a pay telephone and began calling every media (newspaper, broadcast) firm listed in the yellow pages. Within an hour, many television cameras and print media reporters were shuffling around the outside of the customs area waiting for people to interview.

Within days U.S. Customs would return the necklace and bottle to the dealer, with at least a partial apology. But the others from the same flight who witnessed the incident quickly decided they did not wish to tangle with U.S. Customs personnel. Word spread to the rear of the line; "**Destroy your chips**". A panic mood quickly developed and several hundred chips (U.S. Customs would later report 341 chips) were destroyed by those waiting in the line. Some placed the chips on the floor

and mashed them with their shoe; others tried to break the EPROMs with their bare fingers. Not a few ended up with bloody fingers resulting from the chip pins breaking the skin. Reportedly, U.S. Customs did nothing to stop the destruction of the chips by those waiting in line; they were busy taking detailed statements from those at the front of the line.

Most complained about missing their airline flight connections. There was no response from the customs personnel (although those returning on January 22nd in the third group were divided into separate lines with anyone who had a tight plane connection being processed first).

The first telephone reports from those running the customs gauntlet insisted that a U.S. Federal Court Judge had hand delivered a ruling just ahead of the flight's arrival telling U.S. Customs to check the returnees for 'illegal chips'. There was never verification of that and a search of U.S. Federal court records in Broward County (FL) revealed no such record. So how did U.S. Customs decide to single out the returning flight of the 19th and conduct the search and seizure operation?

A GI contract employee took credit for the 'tip off' 24 hours later when speaking with a newsman. There is no verification that this employee or anyone else at GI actually got Customs into high gear on that national holiday. There was considerable 'loose talk' the evening of the 19th; a returning Summit attendee reportedly worked for **another** U.S. Government agency ("I report directly to the Vice President" he said to others) and he reportedly chastised several U.S. Customs employees for their 'procedures' during the operation. Did this fellow **really** work for another agency; was he attending the Summit on his own or for some other purpose? Who was he talking to on his miniature hand held walkie-talkie as he waited his turn to proceed through customs? All unanswered questions.

One is reminded of a poignant moment in the movie "Network" which was popular 7 years ago. The newsman-star is alone in a board room with a powerful corporate person and the newsman is told:

**"There is no United States, there is no USSR.** There is only Exxon, IBM, General Motors and Volkswagen. Government is not a government by and for the people; government is a government by

---

\* / Indeed, several additional 'Provo Seminars' have been planned for the Provo Hotels Association during the first seven months of 1987. A '**Retire on Provo**' week-long session and an '**International Wind Sock Festival**' will follow the same package plan which the Summit followed during May and July.



and for the world's multinational corporations ...".

**Could GI** make U.S. Customs move the way U.S. Customs moved on January 19th? One of the last Summit attendees through the line that night reported "They did virtually no search of my bags and asked me only a few, brief questions. Four of the Customs people were standing there talking as they cleared me. From everything I heard said, they **knew** they had made some mistakes in the way they handled this matter; they were already trying to figure out **who** would take the 'blame'".

Several dozen of those inspected on January 19th believed their 'civil liberties' were 'violated'. Perhaps. But we all learned something about the credentials and legal powers of the U.S. Customs service January 19th.

- 1) U.S. Customs has the apparent legal right to **seize anything** they 'suspect' may be **associated with** the illegal importation of any contraband material. They have the right to detain such material(s) for 30 days time after which they can either return the impounded goods or destroy it if they are certain it is contraband.
- 2) In the first group, those who went through without difficulty, many if not most would later be visited by U.S. Customs and other federal agents with a request that the attendees turn over to them any and all chips they may have brought back through the Fort Lauderdale check point on January 16th. These people were told that U.S. Customs, unlike other federal agents, **did not need court orders** authorizing search and seizure to gain entry to someone's home. That statement upset many who believed their home was a sanctuary from such search and seizure.
- 3) U.S. Customs has the power to 'detain you for questioning' for an unspecified period of time. They also have the power to arrest you on the spot, having first warned you against bringing into the U.S. any alleged contraband material(s) and then finding that you have done so without properly declaring the material(s). Nominally, you are read your 'Miranda Rights' before being arrested and questioned.

Fort Lauderdale was not the only point where the U.S. Customs was active; Detroit was another. Canadian firm, X-ACT, had dispatched as we noted perhaps 500 of their musketeer chips to buyers during December and early January. At least 29 of these stopped at the U.S. Customs check point in Detroit, coming in from Canada. Some, perhaps most, were eventually released but only after U.S. Customs agents had contacted the chip buyers (on the telephone) to make inquiry as to the value and purpose of the 'computer chip' being shipped in through Detroit. X-ACT, we understand, adjusted the format of their shipments and their U.S. Customs

declaration form attached to each package as a result of the Detroit border crossing incidents. X-ACT subsequently began shipping from in-side the U.S.A.

### January 21 st

While the major action against chips occurred on January 19th as the second group returned, there were other incidents as well. Those who returned on the 16th, without questioning, would later be visited, as noted previously, by U.S. Customs or 'other' federal agents. They wanted the chips brought back turned in and they wanted information.

January 21 st, returning to Miami on a scheduled (Pan Am) flight were several participants. 'Doctor Stevens', one of the primary speakers to the event, was stopped with his family as he went through Customs. "**Doctor Bepko**" (addressing him by his real name) "**we would like to speak with you ...**". And they did, for approximately two hours. The doctor relates that he was asked many questions about the Summit, how he was paid for his appearance, and what he 'taught'. "I ended up essentially giving them my full talk" he reported. He was told by the Customs personnel "If we were going to detain you, we would first be reading you your rights", an indication up front that their detention was temporary and they were not prepared to file charges.

Another passenger on the same Pan Am flight, **Bill Miller** employed as a news and cameraman for **Boresight TV News**, was required to turn over to U.S. Customs some 61 (20 minute) videotapes from Provo. Five days later, after customs had duplicated the tapes, they were returned to Bore-sight. Boresight would attempt to file a complaint alleging violation of the First Amendment process with the tape detention but as of our closing date for this report there was no action on that filing.

### January 22nd

The third and last group left Provo without any chips and returned to Fort Lauderdale on January 22nd. When advised of the detention of chips on January 19th, Coop told the third group "U.S. Customs has raised the question of copyright infringement regarding the chips donated to the seminar by the chip suppliers. It is our understanding customs has 30 days to review the contents of the chips and reach a decision on whether the chips do indeed actually violate someone's copyright. Although the chips were donated to the Summit by chip suppliers, we cannot allow you to take the chips home with you nor can we ship these chips to you until such time as



U.S. Customs has ruled on the copyright question. If the chips are in violation of copyright(s), we will ask the chip suppliers to reconfigure the chips so they do not violate copyright. Only after they do not violate copyright will we release these educational chips to you". **Word** that the third group had no chips with them reached Fort Lauderdale customs **before the group did**. An announcement was read to the group as they assembled in the immigration area and the returnees were 'warned' that if any did have chips, detection of the chips would result in their immediate arrest. There were no arrests.

### January 23rd

Stragglers from the last session and additional speakers returned to Miami on the Friday Pan Am flight. People returning from Providenciales were asked by customs personnel 'Do you have any illegal scrambling devices?'. None did and there were no incidents.

### January 24th

The last of those who stayed on for a few extra days in the sun returned on the Pan Am flight on Saturday through Miami. None were asked any questions outside of the normal questions asked of all people returning to the United States. None had chips or chip equipment with them.

Between the initial retention of chips and associated materials on January 19th and the normal returns of January 24th, the direction of U.S. Customs did seem to change. The detentions of the 19th were all linked to '**possible copyright violations**'. By the 22nd, there was little or nothing said by U.S. Customs agents concerning **copyright**; their then-stated concern had shifted to their belief that possession of a chip was tan-

amount to somebody planning to conduct 'a crime'; ie. if you have burglary tools in your possession, you are planning to commit a burglary.

As we go to press with this report, there has been no formal statement from U.S. Customs concerning the status of the alleged copyright violations. The chips are still being held and customs is under no obligation to release either the chips or a statement until the 18th of February.

U.S. Customs activity then moved into the field. Returnees from the first Summit session, spread all over the United States, began receiving visits from customs personnel on Sunday the 25th. There are conflicting reports; in some instances, the personnel conducting the field operations identified themselves as U.S. Customs. In other cases, agents from 'FBI' and 'Treasury' were reported. Inland, away from regions where customs operates, there would be a reliance on non-customs personnel to fulfill the mission. The questioning of each Summit person, as reported to us, was similar:

"Do you have chips from the Summit?" and "How much did you pay for the chips?"

The questions reported sounded more like the questions used on the original January 19th search and seizure than those modified questions that appeared in South Florida later in the week. There is an explanation for this; the field operation instructions were prepared closely following the 19th while customs was still focusing on the copyright aspect of the chip question, and as the South Florida direction for the operation changed emphasis the instructions were not relayed to the field agents working elsewhere in the country.

But the real 'news' was ahead; chip 'signatures' would become a new problem as January turned into February.

### BUT Is It Final?

Reaction to the 'news' that U.S. Customs had detained chips from the January 19th returning group hit hard with the third session. First there was concern for their own return; would there be tough questioning? How long would people be detained? How much hassle might occur?

A handful decided they would not return on the chartered flight and made alternate arrangements. Coop's decision not to release any additional chips until U.S. Customs made their determination was received with mixed reaction. Attendees from various Caribbean islands, and central America were especially upset that they could not take their chips home with them. They understood that because they were to pass through

**THE FINAL**  
**12 BYTES**



the United States to their homes why they also could not be given chips, but the decision stung none the less.

The focus was still on 'copyright'. A lively discussion, on January 22nd, undoubtedly reported to U.S. Customs by one or more in attendance went like this.

**"The most simple change in the EPROM program** resulting in a working, modified chip is a **12 byte change** that gives you a 3-Musketeer program. Suppose that 12 byte change was released into the 'public domain'?" The discussion was from the floor and attendees.

Material is copyrighted as a protection for perceived revenue to be earned by the copyrighted material. 'Public domain' simply means that material is 'freely circulated' without compensation in one or more forums which any member of the public can avail him or herself of. A public library is where one finds material in both the private and public 'domain'.

**"What would happen to 'the system' if those who know and understand the musketeer approach, for example, were to publish the 12 byte change and instructions for its use widely; so that anyone with a small computer and an EPROM burner could simply make his own 3-Musketeer chip?"**

Additional discussion ensued. **Why would somebody do this**, if they had a perceived to be 'proprietary, income potential interest' in keeping the 3-Musketeer technology to themselves?

**"On the assumption that GI had no real defense** against the 3-Musketeer software program, if this technique suddenly became widely disseminated and widely practiced, there would be a wholesale break down in the Video-cipher system."

The reasoning behind this discussion then became clear. Those proposing that the '12 byte solution' be released into 'the public domain' were actually suggesting a 'retaliatory response' to a 'GI (et al) strike' against the underground that had created the various musketeer and clone 'solutions'.

**"If the people attending and speaking at the Summit are pushed too hard by 'the authorities' then the technology should be widely distributed using computer BBS (Bulletin Board Services) all over the United States and Canada. This should include not only the musketeer technique but the clone key extraction process as well."**

Back last fall when the first clone key extraction process was made to work, only a small handful of people were involved. But as the process was refined, the circle of those with the knowledge spread. At the same time, at least one individual in

the inner circle apparently began to deal in key extraction as a commercial enterprise. Using a 'donated' VC2000, this individual extracted its keys from the pre-authorized (and working) and began to distribute those keys to selected people; **for a fee**. At the time, the individual who had donated his working unit for temporary research was not aware that this individual was extracting its key number **and reselling** that ID number as a commercial property.

A number of people purchased the cloning package from this individual and some of these people figured out how to duplicate at least the cloning process using that number. They did not figure out how to extract their own keys; that being, at the time, a relatively guarded secret. With the speed of a fast traveling EPROM burner, this particular unit ID number became the basis for a number of cloning cells all across the United States; even offshore in the Bahamas.

Recall now the 'European' or ZITS chip system first shown in public at the Descrambling Summit. The chip seemed 'magical' and the technicians with the chips related that it had the ability to 'read' and 'capture' a data stream contained 'authorization number'. Recall also that there were skeptics from the cloning and musketeer technology camps who did not believe that was how the chip actually worked.

The Summit ended with the true nature of the European chip unresolved but the research to decipher the chip's contents continued. **Three days after the Summit closed, there was a breakthrough.**

Using equipment 'abandoned' from the Summit speaker hardware supply, the content of the European Chip was revealed byte for byte. There, buried in the program **was a unit ID number**. It stuck out like a flag because that **same number** had been found in the cloning series chips that had originated with the original 'donated for research' VC2000 unit just discussed. The European chip, like many others sold under other names, was using **this same unit authorization number!**

The use of the single unit ID number did not stop there; within days; various sources in California and Hawaii turned up with the exact same ID number in them. Remember, all of this originated from a VC2000 that had been **donated** for research on a temporary 'loan' during which its number had been extracted and then the unit was returned to its owner.

**On February 2nd around 4 PM eastern, all of the units 'sharing' that same number clicked off.** The ID number of the original unit started off with zero one zero one A, and continued.

Because of the representations before the Summit that the European chip 'stood outside of the



authorization stream' and required no turn-on through the GI uplink control center, the chip must be labeled as a 'fraud'. It **did require** an authorization number; its own, secret although well buried authorization number being used unbeknownst to its owner by a growing universe of chip sellers from Hawaii to the Caribbean and all points between. Undoubtedly, many TVRO dealers were using clone masters which were keyed in one form or another off of this particular unit. Some of the chips sold, like the European chip, attempted to **disguise** the real design parameters of what was being sold by making claims similar to (or identical to, in the case of a 'California package') the European chip. A three-chip set, which includes a 'repair chip', a 'loader chip' and a 'consumer/authorization chip' falls into the same (perhaps identical) family as the European chip. A two-chip set involving a loader and a consumer/authorization chip is simply a 'cheap version' of the same family. **They are all frauds.**

Other chips, discussed but not shown at the Summit, claimed other parameters:

- 1) "Our chips install in the U30 position and the user gains access to the **video** on all (scrambled) services.
- 2) "The user then calls a telephone number where after having his Visa or Mastercharge card debited by \$250 he is given a number to enter into the Videocipher using the front panel keyboard."

A '**video only**' preview chip is available in the marketplace for \$49.95. It may or may not be legal to use one in a satellite store for display of the **video (only)** of scrambled transmissions as a 'sales tool'. Adding audio, by calling a telephone number and paying for the service, sounds very much like a perhaps sophisticated cloning service. Somewhere the operators of this system have a clone-master hidden away and by using the telephone charge ploy your unit equipped with their chip is being added to a clone universe.

- 3) "We can add WOR (a cable only service) because we have changed the unit to a cable

address designation. That means we have eliminated the unit ID number and the unit will now have a '0000...' address."

It turns out that if two bytes of information are changed in the EPROM program for U30 (to A zero) the WOR signal is unscrambled. Units that claim they are '0000 ...' identified are merely hiding the real unit ID number behind a false set of data and the 'A zero' designation has been written into the software routine additionally. The A zero designation could be added to the proper point in virtually any program, including musketeer and clone, to add the WOR service.

In the final analysis, it comes back to there being two viable techniques and they are cloning and musketeering. Any other variety that appeared at or was described during the course of the Summit was a variation of one, or in the case of the European chip, both. By combining the features of cloning (through a hidden master-master unit) with the features of musketeer, you end up with several different 'marketplace varieties' that allow the sellers to make their own unique 'claims' for their products. But, the vulnerability of the chip to anti-clone or anti-musketeer countermeasure from the GI uplink center does not change. In spite of the 'extra wrinkles' added by the clever marketeers of chips, the basic chip functions remain the same. And that, after the U.S. Customs search, the grabbing of video tapes and the harassment of individuals who participated in the Summit is the bottom line for this point in time.

Is there a stand alone box that truly works outside of the Videocipher authorization stream? The answer clearly seems to be no at this point in time.

Will there be a **stand alone box** at some future point? GI is betting the answer is **no**, and while clearly embarrassed by the musketeer/clone advances to date remains confident that no such clandestine box will appear in the marketplace soon.

## THE End?

I was an attendee in the Descrambling Summit. I have been a dealer in the dish industry since 1980 and have participated in a wide range of industry events including the trip by 25 people (myself included) to Sri Lanka to install those three dishes for Arthur C. Clarke in 1983. I consider myself a pioneer in every aspect to the world and have learned through Coop's seminars and publications how to survive in what has been the most exciting years of my life. I truly love the home dish industry, and the people who have been a part of it from the very beginning. I covet memories of private conversations with Taylor Howard concerning feed design, Clyde Washburn concerning LNA parameters and the dozens of other one-on-one situations which the industry has provided.

Like many others, I have made a living but I have not gotten wealthy in TVRO. There was always a new piece of test equipment or a new receiver or antenna to try out and through it all I have been an enthusiastic supporter of new technology and new product innovation.

I am not quite sure why I attended the Descrambling Summit. Perhaps it was the opportunity to actually visit Providenciales after reading Coop's reports for seven years. Perhaps it was because scrambling was another mountain to climb and I hoped to be able to learn more about the mysteries of descrambling. Perhaps it was because it was mid-January and we were up to our eyeballs in snow in New York City.

Because I was at the front of the line returning through U.S. Customs on January 19th, I was one of the first to be detained and questioned. I was the fellow who got into an argument



with customs concerning a bottle of liquor and a necklace purchased on Provo. And I was the fellow who was so incensed about the way an agency of the U.S. government treated me, as a fellow American and as a human being, that I rushed to the telephone once clearing customs to telephone every news media agent I could find in the yellow pages. I watched in complete disbelief as a dealer from South Florida was manhandled and badly mistreated by the customs people. I witnessed his anger and frustration because he evidently, like me and most others, **believed** that the U.S. Constitution was a viable, living document and that the individual liberties of citizens was paramount to our citizenship. I do not care to recite the arrogance or manhandling of dealers returning to Fort Lauderdale but I have to observe that the customs personnel plainly thought they had uncovered the most hideous group of smugglers in the history of America. Here they were, dressed in jeans and T shirts, suntanned and sporting accents from the hills of Kentucky and the plains of Texas or the suburbs of Chicago all obviously (to customs) trying to undermine America. The attitude of the customs people was straight out of a SWAT-team movie or TV show. They pounced on these typical TVRO dealers as if they were carrying millions of dollars in cocaine or heroin. The dealers were abused and like anyone not suspecting such a reception, frightened and uncertain how to respond.

After I made the telephone calls to the media and I sat outside the customs hall collecting my wits, I began to reflect on what has happened to this industry. Anyone who went through the customs detention on January 19th was scared and perhaps now scarred for life. I am totally disillusioned from this incident concerning not only the TVRO industry future but the country I live in. And that is very sad, indeed.

The home dish industry which Coop, Taylor Howard and others started in 1979 was such a perfect field to be involved with. It brought to people who needed a basic commodity of life that commodity at a fair and reasonable price. It enriched the lives of those it touched and it provided a perfect opportunity for small people like myself to go into business for ourselves and to let our talents and capabilities carry us as far as we could go. The industry was the perfect example of the 'Peter Principle'; each of us had unlimited opportunity to advance as far as our abilities, talents and energies would carry us.

The home dish industry was the total window of America at work; small firms each competing vigorously with one another at every level, each trying to improve the quality of the product or service. I worked very late and got up very early for nearly six years, looking forward to each day with great enthusiasm and vigor. Every new installation was a new challenge; every trouble call was an opportunity to learn something new. Every trade show was a period of great excitement and the opportunity to see and evaluate everything these small companies had to offer. On a personal level, the industry gave me the opportunity to join a group going to visit Arthur C. Clarke and I cherish my occasional correspondence with 'father Clarke' and my memories of that visit.

All of this and more came crashing down around my ears as the U.S. Customs agents thrashed us verbally and as I witnessed the dealer from Florida gasp in disbelief as a customs agent with great ceremony turned his suitcase upside down and dumped the contents crashing to the concrete floor below. Here they were, the backbone of a once proud and great industry being subjected to the indignities of an overzealous and totally uncaring federal police force who somehow equated our trip to Provo with smuggling and our home dish industry with those who run up and down the south-

ern coasts in 100 mile per hour Cigarette boats.

I truly wanted to cry, on the spot. I wondered to myself how Arthur C. Clarke would have reacted if he saw this ultimate and perhaps final chapter being written in his dream for worldwide mass communications via satellite. **Where and how did it go wrong?**

Only days after I returned from the Summit, I was engaged to troubleshoot an installation for Ku band. The company hiring me was HBO/Time Life and the scene of the troubled Ku band installation was the home of Henry Luce, III; the present generation survivor of the founder of Time/Life. The home had **three** VC2000 units and as a perk for top management they have HBO, Cinemax and Festival in their homes via RCA's Ku band bird. One of the VC2000 units did not work and an aggressive, know-it-all engineer from HBO was on hand to 'help me' troubleshoot the installation. He insisted the problem was in the dish or the cable or the receiver. Two of the VC2000s in the Luce home worked fine; only the third did not. I applied what I learned at the Summit about trouble shooting Videociphers and I knew the problem was the Videocipher. He insisted it was not and wanted me to replace the dish and the LNB and the cabling and the receiver, one at a time. I was equally insistent that the problem was the VC2000. For two hours we argued, needlessly, and his attitude towards me was that **'I was dumb, he was smart, and besides Videociphers never break** (never break, never break...!). I became so irritated I decided to walk out; simply write off the time spent. I started to do this and as his back was turned I whipped in a VC2000 from another location in the home which was working and instantly we had service on the third set. It was no surprise to me; the faulting unit was getting 'no hits' at all, something I learned about at the Summit, and I knew it therefore could not be authorized. As he went back to get a replacement VC2000, and I left the job, I thought to myself 'Perhaps it will be a small gesture, but I am going to turn over the money I (eventually) collect for this service call to the Boreisight Legal Defense Fund'. Indirectly, HBO/Time/Life will be helping to support the legal defense of those poor people who somehow find themselves in the same position I found myself in as I cleared U.S. Customs on January 19th.

Every industry has growing pains. This industry has been going through a 'massive seizure' pain for 13 months. Our one and only hope to revive the industry is to somehow convince the U.S. Congress that without legislation, millions of Americans will never have access to the information, education and data banks which are so commonly available in urban and suburban areas. There is no remaining central leadership in TVRO, and those few like Coop who have tried to keep us advised and knowledgeable are now being attacked as individuals. When a U.S. Customs person said **"We are going after that guy Cooper and the fellow from Baltimore"**, I knew that somehow the priorities of this nation were out of balance. If Henry Luce, III can have **three** Videociphers in his home and the rest can only have two, if U.S. Customs can dump on a group of TVRO dealers because they have tried to better understand their changing business world, if I can have a necklace purchased on Provo confiscated or if Shaun Kenny can be declared 'an outlaw' by Taylor Howard and others, and banned from future trade shows... perhaps it is time to close up shop.

John Zelenka  
New York, N.Y.

**The TVRO industry was a dream. It has now taken on some aspects of a nightmare. Those who survive may well become mutants cast in the same mold as the HBO engineer John met at the home of Henry Luce, III.**

**CANCOM** warning users of Oak Orion P units in Canada 'tampered surcharge of \$100' will be assessed on P units returned to firm for refurbishing. CANCOM having problems with people attempting to install Oak scrambling defeat chips

and botching job.

**SWEDISH** national television services using I west Intelsat have adopted C-MAC as fulltime transmission standard. Prior transmissions were in PAL format.



**FCC** has approved 100 watts per channel, for 16 channels on Ku band for Direct Broadcast Satellite Corp. Firm has RCA building the satellite for early Ku band service.

**RCA AMERICOM** having problems getting FCC approval to increase power on jointly-owned-with-HBO Ku-3 satellite from 45 to 60 watts. Other satellite operators located in adjacent positions to Ku-3 are opposed.

**PBS** says, when it has to replace their transponders on W4 in 1992 or so, it will need to expand from present four transponders to as many as 7. National Public Radio will need two full transponders by the same time.

**FCC**, now certain that those firms holding permits to operate high or medium power Ku band 'DBS' satellite will probably fail in commercial world, has decided to allow the early DBS operations to sell an amount of transponder space for data and voice use.

**SWEDISH** Tele-X satellite system may be changing plans from original two channel, 230 watts per channel approach to four channels, 115 watts per channel. Group now feels higher power is overkill, and having more channels would be useful.

**SCIENTIFIC**-Atlanta has made it formal, dropping out of TVRO field. Firm has sold remaining consumer equipment to Idaho distributor and is unlikely to return to home dish field.

**SATELLITE** Theater Network, created to allow movie theaters to function as ad hoc conference halls for teleconference applications, is now operational with Ku band feeds. Twenty-five network sites scheduled to be functioning by mid '87. Details from 800/423-8907.

**HALF**-priced 'Standard D' satellite terminals for Intelsat being offered by S/A. Firm is creating marketing package for Intelsat member countries.

**HI-NET** Communications making changes in GStar fed net-

work, adding pair of pay-per-view movie services (possibly dropping ESPN, CNN Headline, Showtime from individual motel systems).

**LOWER** noise LNB created by firm called Swedish microwave claims 1.5 dB noise figure for Ku applications. Price is said to be as much as 4 times greater than 2.2 to 2.5 dB units previously available; firm is made up from personnel formerly with Luxor. Telephone is +46 141 16135 in Sweden.

**SCIENTIFIC**-Atlanta has sold 38 terminals to Oklahoma University for state-run educational network.

**KSAT** radio is now on T303, transponder 18, on 6.48 MHz subcarrier with narrow audio deviation. The service is also operating 24 hours per day with a musical program service during the non-talk show periods in the evenings.

**FUTURE COMMUNICATIONS**, the Colorado based firm which has been promoting what they claim to be the world's first steerable flat-plate satellite antenna, is under investigation by US postal authorities. According to postal officials, they have received complaints from TVRO dealers accusing the company of fraud.

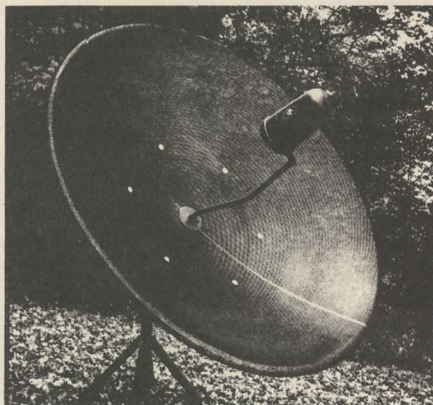
**PANAMSAT**, the US based firm that plans to launch a Caribbean-South America commercial C and Ku band satellite in 1987, has purchased ownership of the six Ku band transponders on its satellite. In a complicated ownership structure, PanAmSat was to own the C band channels while Cygnus was to own the Ku channels.

**USIA** has installed Molniya tracking antenna system at their Washington, DC headquarters.

**RSI**, now owner of Laux Communications, will supply 1,000 C + Ku band TVRO antennas to unnamed overseas customer. Value of order is said to be \$600,000 which works out to \$600 per antenna.

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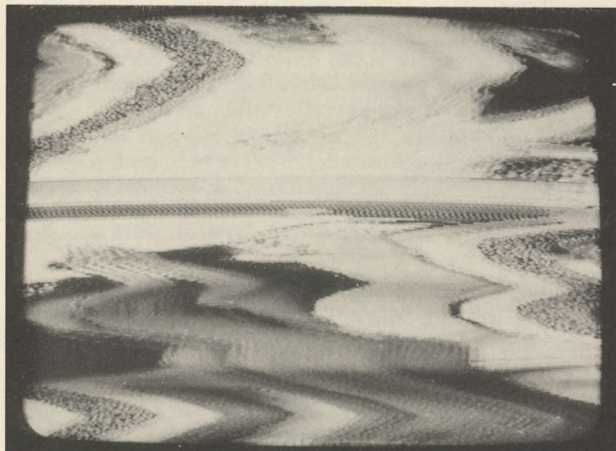
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## 'MY VIEW'

by Peter C. Sutro

Associate Editor/CSD

The town of Prairie du Chien, Wisconsin (population 6,000), is located near the confluence of the Wisconsin and Mississippi Rivers. It was here that the first white men, Father Marquette and Louis Jolliet saw the great Mississippi. They had travelled westward from Michigan to Green Bay, ascended the Fox River to a portage that crossed to the Wisconsin River, and entered the Mississippi near present day Prairie du Chien, on June 17, 1673.

It was here that **Franklin** (Frank) **Weeks** started a modular and mobile home manufacturing plant in 1965 called Design Homes, Inc. which has flourished over the years and now produces homes in five separate locations. In 1982 Frank became fascinated with satellite television and started to produce high quality parabolic antennas using spinning technology. This technique consist of placing an aluminum blank on a lathe-like device equipped with a mandrel which is tooled to exactly match the parabolic shape desired. The blank and mandrel are then spun rapidly while a steel or nylon roller presses the blank against the mandrel and forms it to the exact shape. It is an extremely accurate and cost-effective way of metal forming and avoids many of



DH's FRANK WEEKS with sampling of product line.





450 POUND aluminum blank is loaded into position for spinning of monster 16 foot dish.

the metal spring-back problems associated with stamping and hydroforming.

Additionally, one mandrel can be used to produce almost any diameter desired, although typically one mandrel is used to spin antennas from 2 to 3 feet, another from 4 to 6 feet, another from 7 to 11 feet and yet another from 12 to 16 feet. The f/d ratios vary according to the diameter but typically are between .3 and .4.

At the height of the TVRO sales era, October 1985, DH reached a monthly production record of 16,000 antennas and has produced over 200,000 antennas since its inception. DH is now looking to the Ku-Band market which is ideally suited to the spinning technology because of its very close tolerances. A 32" antenna (the largest size which is UPS shippable) is capable of receiving acceptable signals from K1 and K2 as well as the SBS satellites. I would suggest that any dealer interested in learning about Ku-Band technology invest about \$300 in the DH Ku Starter Kit consisting of the 32" dish, a Ku-Band LNB and a 12 GHz Polarotor. You can carry it around in the trunk of your car and demonstrate it to prospective customers. DH also produces a polar mini-mount for dishes up to 5 feet. The day of Ku-Band is fast approaching.

DH has also found a large market in Europe where the main satellites (ECS-1 and Intelsat V) are viewable over most of the continent on antennas from 1.0 to 1.5 meters, while in Israel and North Africa antennas of 2.4 meters and up are required. In the U.S. an interesting application for the small antenna is for the Japanese-language program which will be launched on K2 in April. This joint venture between the Japanese broadcasting company, NHK, and Yomiura World Television of Los Angeles will bring 9 hours of Japanese broadcasting on a same-day basis to Japanese-speaking residents of the U.S. A DH

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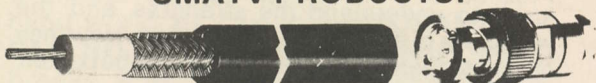
**1-305-851-4738 (FLORIDA)**

36" dish will be used and a special receiver and decoder will be produced by Anderson Scientific. 1,500 systems have been ordered to date.

DH also produced antennas on an OEM basis for numerous companies. It has recently entered the mesh antenna business with the Black Shadow line in 12' and 16' diameters. Another new product is a 6' perforated antenna designed to be mounted on a motor home or RV. Because of the antenna's wide beam angle, satellites are very easy to locate.

I was at the DH Antenna plant on January 7 when the first 16 foot Ku-Band (!) antenna was spun. While this may sound ridiculous as it is equivalent to a 50 foot C-Band antenna, it was required by a Texas-based company, TI-IN Network, Inc. which is in the business of up-linking high-school level instructional programming to schools throughout Texas and, eventually, throughout the U.S. Since TI-IN is using a half transponder on Spacenet 2 together with GI's Starlok encryption system, they require a very high gain antenna. In better foot-print areas an 11 footer was sufficient but in fringe areas such as southern Texas a larger reflector was necessary and DH agreed to spin a 16 footer with Ku-Band tolerances. As can be seen from the photographs, this involved a huge mandrel of wood mounted on a railroad car axle weighing in total over 18,000 pounds. The aluminum blank was made of two pieces of 1/8" coil stock welded together and trimmed to round weighing over 400 pounds. When spinning, the outside rim reached speeds of 60 MPH and the strength required to complete the two hour process would exhaust most men less skilled than DH's master spinner, **Vic Junkers**. He hung in there until finished and, at the end, he looked as if he'd gone 50 rounds with Rocky. For shipping purposes, these 11' to 16' dishes will be ribbed and cut into halves or quarters. DH is also experimenting with cutting 6 footers for UPS shipability.

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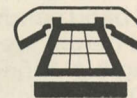
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**COOP/ Continues from page 5**

To make this work, the FCC has to step-in (perhaps out of recent character) and start to apply some cautious direction. They have to get people thinking about how they will benefit from such a dramatic change in American television policy. The recent Washington demonstrations of 'compressed HDTV' is a first toe in the water.

The National Association of Broadcasters and the Association of Maximum Service Telecasters are the two most powerful broadcast lobbying groups in Washington. They may be the two most powerful lobby groups period, even beyond broadcasting. They did not arrange this HDTV demonstration in the halls of the FCC because they were impressed with better quality TV pictures. Space is the only place we could place such a system; eating up two or more terrestrial TV channel widths for one new HDTV channel is not practical in an America which ran out of spectrum space a decade ago.

The Direct Broadcast Service (DBS) we expected to see operating by 1990 or so is now very unlikely. Simply sticking 8 or 16 or 32 cable programming channels up there encrypted with S/A B-MAC or Videocipher and then running around trying to sell 2 foot Ku band dishes to American homes is not going to fly. But sticking up some quantity of HDTV services, fed by new, special programs (already being produced in the 1,125 line format) is quite another matter. Just as "high fidelity/stereo audio" changed the buying and listening habits of America in the 50's, HDTV (with stereo audio of course) is scheduled to change American viewing habits.

So what is the SBCA (DBSA/SPACE) part in all of this? Probably not very much. Who really needs people who still favor an old fashioned, bandwidth restricted C band technology plus a bunch of early entrants in the DBS world if the new HDTV-DBS is going to supersede both C band and a form of DBS that never really got off the ground? Those forward thinking players in SBCA like Hughes and RCA are already down the road to the HDTV marker and for them there is no looking back at either C band bandwidth restrictions or a DBS that was doomed before it ever started.

The big-big money is coming to the table. GI's \$225,000,000 purchase of certain M/A-Com assets this past fall seemed significant at the time. But with one VHF television station selling for more than 2.5 times that amount, we know where the REALLY big players in this game are betting their bucks and their futures.

**US NAVY** will now attempt launch of FltSatCom F6 spacecraft late in March, following booster problems with Atlas rocket which closed down planned launch late in February.

**NSC/** National Satellite Communications preparing extensive schedule of free technical seminars and sales training sessions for 1987. Dealers interested in having seminar sessions held or in attending should contact Ted Were (518/383-2211). During 1986, sessions were held in Clifton Park, NY, Newburgh, NY, Orlando, FL and Pittsfield, NH.

**GOES-H** weather satellite was scheduled for launch late February using Delta launch vehicle. If successful, 'H' will be positioned to cover eastern view with present single bird moved west to cover Pacific coastal area. GOES program has been short a bird for more than a year.

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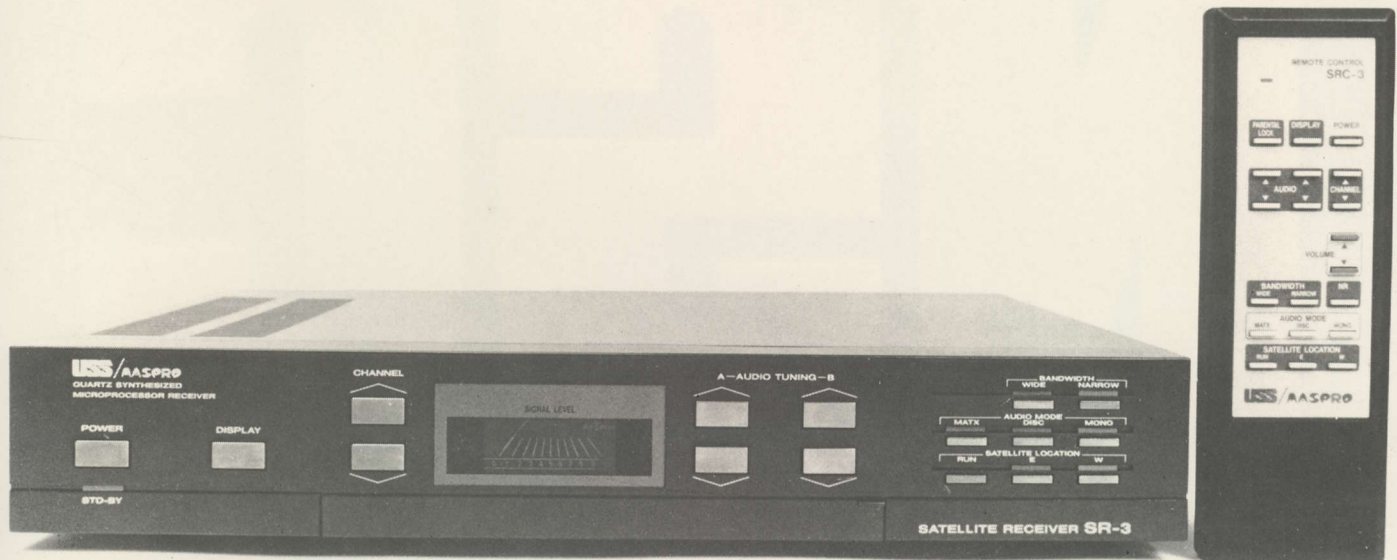
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