CLI - A TOTAL PROVEN APPROACH

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ABSTRACT

The Murphy's Law of RF transmission in a shielded unbalanced cable states that:

1) Signal will leak out
2) Signal will leak in

Signal leakage from CATV systems has always been a problem. However, prior to the general use of mid-band and super-band channels, our concerns were usually based on interference to the non-subscriber's television reception. the Harrisburg, PA incident of 1976 reminded us of the real possibility for hazardous interference to aircraft communications and navigation. The Cable Television industry was forced to take the issue of Signal Leakage more seriously.

INTRODUCTION

In the following pages you will read about a computer-aided program to effectively monitor, log, repair and file leaks. To this end, we gather important data as to the cause of the leak and the best method for repair, and we provide a preventative maintenance program to keep the levels acceptable.

MetroVision systems use a ground-based procedure to effectively monitor, log, repair and document leaks. We compile data showing the cause of the leak and method of repair. The procedures have been used in MetroVision's 1100 miles of plant in the Detroit area systems since January 1, 1987. All MetroVision systems now utilize these procedures to control signal leakage.

FCC REQUIREMENTS

Signal Leakage is like lust; we all have it - just don't let the FCC catch you with it!

1. Current FCC rules require leakage measurements to be taken 3 meters from the cable with a field strength meter of adequate accuracy and a horizontal dipole antenna.

2. Systems operating in the frequency bands of 108-137 MHz and 225-400 MHz must be in compliance with a cumulative leak index by July 1, 1990. The Cumulative Leak Index (CLI) measurement technique was developed several years ago to assure cable television operators that leakage from their system would not present a hazard to the safety of aircraft operating overhead.

3. Ground-based CLI is calculated using all leaks equal to or greater than 50 microvolts per meter. The value of each reportable leak found is squared. The squared values of all leaks are summed. This sum is multiplied by the result of total plant mileage divided by the driven mileage to compensate for partial drive-outs. CLI is equal to 10 times the log of this number. The maximum allowable legal limit is 64.

4. All individual leaks found of 20 microvolts per meter or greater must be logged showing the date found, the location of the leak, the date of repair, and the cause of the leakage. The log must be kept on file for 2 years and be made available to authorized FCC representatives upon request.

5. The current FCC regulations are that the entire cable system must be monitored once

each calendar year. (Non-grandfathered status systems must monitor substantially all their plant every three months).

6. We use a large three ring binder labeled FCC Signal Leakage Records for each drive-out. At the end of each drive-out the unrepaired leak file is purged and the repaired leak information is retained in the FCC public file for 2 years. The new Repaired Leak Report is added to the existing file and kept in the 3-ring binder. The binder is used as a current reference should there be an inspection by the FCC.

7. The cable operator shall annually notify the FCC of their calculated CLI on Form 325.

In our program we don't specifically measure each leak at 3 meters on a monitoring basis. We use the computer program to do the calculations based on an estimated footage from the leak and the direct reading of the meter. If we limited ourselves to a 3 meter measurement on each leak during the first drive-out, we wouldn't complete the first drive-out until June 30, 1990. But, as will be shown, we meet the 3 meter measurement requirement as the repairs are completed.

GETTING STARTED

The key to any good maintenance program is getting your schedules, tools, forms and people together.

1. Personnel. We use existing personnel; a team of 1 CSR, salesperson or installer and 1 technician. The technician records the leaks while the other person drives.

2. Time. Although this seems to be the only commodity impossible to make available, it can be done relatively quickly on a Saturday or in slow time. We have found a team can drive 8 miles of plant per hour with a 6 hour time limit due to fatigue.

3. Set up a schedule (See Figure 1 - calendar). This has to be a practical schedule - one that can be attained and maintained.

4. Get detection equipment. We use Augat/LRC-Vitek's leakage detection meter, model TR-1, with a cut dipole at 139.25 MHz (1 meter per 68 miles of plant). The antenna is on a magnetic base and mounted on the top of each vehicle. The meter is sensitive and should be used at a temperature as constant at possible. Calibration is absolutely necessary all through the day of the drive-out. When a leak is detected the meter has to be peaked.

5. Get system prints. We use size 11 x 17 prints in plastic covers. (These will be used for tracing the route while the drive-out is being performed.) The prints have to be updated as the plant grows or changes are made.

6. Signal Leakage Logs (see Figure 2). These logs are the most important source for field information and will have to be treated as such. Careful attention to detail is not only easy, but very important.

THE DRIVE-OUT

On the day of the drive-out, the coordinator puts the prints in groups of 48 miles per team. The technicians calibrate their meters to a known signal in the head end. They use non-permanent markers to follow their route and when a leak is detected, the technician instructs the driver to slow down from 10 miles per hour to 5 miles per hour. At the strongest indication on the meter, the driver stops to write down the level and estimate the footage to the cable plant (the leak level is calculated by the computer for the 3 meter intensity). He then records the nearest address or the system print location on the Signal Leakage Log. He continues this until his 48 miles is complete. At the end of each day the coordinator gathers all of the logs and system prints to verify that all the assigned prints were driven out, the logs are legible and all blanks are filled in. This is done to ensure that the data entry person can enter accurate information. This also ensures that the equipment is working properly and that

the drive-out team was paying attention. At this point it's Millertime (refreshments). We make sure there is plenty of pizza and other refreshments for everyone taking part in the drive-out.

Seeing the results of the drive-out is clearly the most discouraging part of the process. However, in Figure 3 you'll see a graph that indicates our service call ratio before the introduction of this program and after the first drive out and repair period (CLI & service calls vs. time). Figure 4 shows our current CLI & service calls vs. time graph after 1 year with this program.

COMPUTER

We use an IBM PC/AT compatible computer and custom software to manipulate and store all leakage data gathered during the drive-outs. The computer is equipped with a 20 megabyte hard disk and 640K of RAM memory and a dot-matrix printer. The software is entirely menu-driven and will provide all reports necessary to control and document leakage repairs and calculate CLI for all or part of a cable system.

Leak information is input into the computer in terms of TR-1 meter reading and estimated footage from the TR-1 antenna to the probable leak location. The computer calculates the leak's intensity in microvolts per meter at 10 feet. The drive-out personnel need not be concerned with determining the field strength.

The computer software provides a listing of all leaks sorted by intensity for the entire system or a portion of the system. The software also provides CLI reports for the entire system or a portion of the system.

As repairs are completed, the repair data is stored with all information required to meet the FCC's rules for

CLI PLANNER FOR 1988

* JANUARY *	FEBRUARY	MARCH
2) **Begin new drive out** 4) **Purge old data** **Enter new data** **Update binder** 5) Print work orders 13) Input repairs Print CLI reports Assign work orders 20) Input repairs Print CLI reports Assign work orders 27) Input repairs Print CLI reports Assign work orders	3) Input repairs Print CLI reports Assign work orders 10) Input repairs Print CLI reports Assign work orders 17) Input repairs Print CLI reports Assign work orders 24) Input repairs Print CLI reports Assign work orders	2) Input repairs Print CLI reports Assign work orders 9) Input repairs Print CLI reports Assign work orders 16) Input repairs Print CLI reports Assign work orders 23) Input repairs Print CLI reports Assign work orders 30) **Complete assigned work orders**
* APRIL *	MAY	JUNE
2) **Begin new drive out** 4) **Purge old data** **Enter new data** **Update binder** 5) Print work orders 13) Input repairs Print CLI reports Assign work orders 20) Input repairs Print CLI reports Assign work orders 27) Input repairs Print CLI reports Assign work orders	4) Input repairs Print CLI reports Assign work orders 11) Input repairs Print CLI reports Assign work orders 18) Input repairs Print CLI reports Assign work orders 25) Input repairs Print CLI reports Assign work orders	1) Input repairs Print CLI reports Assign work orders 8) Input repairs Print CLI reports Assign work orders 15) Input repairs Print CLI reports Assign work orders 22) Input repairs Print CLI reports Assign work orders 30) **Complete assigned work orders**

Figure 1

leakage logs. Printouts of all available reports are stored in a binder that is available for review by visiting FCC inspectors.

We keep the following reports in the public file for FCC inspection:

1. FCC CLI Report (correct CLI to lower than 64 (see Figure 5)).
2. Maintenance CLI Report (see Figure 6).
3. Unrepaired Leak Report (see Figure 7).
4. Repaired Leak Report (see Figure 8).
5. Area Information file (see Figure 9).
6. Repaired Leak Statistics report (see Figure 10).

ADMINISTRATION

The data entry person needs to dedicate time to CLI on a part-time basis; we use a CSR. Emphasis on this position must be the same as other more traditional CSR activities, such as balancing cash.

The CSR gets the drive-out information from the coordinator and then enters each leak individually. We have found we can enter approximately 4 leaks per minute.

After the leaks have been entered an Unrepaired Leak Report is generated. This report may be retrieved either by leak intensity or by leak number. The Unrepaired Leak Report by leak number is used by Dispatch to log the completion

* JULY *	AUGUST	SEPTEMBER
2) **Begin new drive out** 4) **Purge old data** **Enter new data** **Update binder** 5) Print work orders 13) Input repairs Print CLI reports Assign work orders 20) Input repairs Print CLI reports Assign work orders 27) Input repairs Print CLI reports Assign work orders	3) Input repairs Print CLI reports Assign work orders 10) Input repairs Print CLI reports Assign work orders 17) Input repairs Print CLI reports Assign work orders 24) Input repairs Print CLI reports Assign work orders 31) Input repairs Print CLI reports Assign work orders	7) Input repairs Print CLI reports Assign work orders 14) Input repairs Print CLI reports Assign work orders 21) Input repairs Print CLI reports Assign work orders 28) **Complete assigned work orders**
*** OCTOBER ***	**NOVEMBER**	**DECEMBER**
1) **Begin new drive out** 3) **Purge old data** **Enter new data** **Update binder** 4) Print work orders 12) Input repairs Print CLI reports Assign work orders 19) Input repairs Print CLI reports Assign work orders 26) Input repairs Print CLI reports Assign work orders	2) Input repairs Print CLI reports Assign work orders 9) Input repairs Print CLI reports Assign work orders 16) Input repairs Print CLI reports Assign work orders 23) Input repairs Print CLI reports Assign work orders 30) Input repairs Print CLI reports Assign work orders	7) Input repairs Print CLI reports Assign work orders 14) Input repairs Print CLI reports Assign work orders 21) Input repairs Print CLI reports Assign work orders 28) **Complete assigned work orders**

* Months with the drive out will require additional help (peoplepower)

of repaired leaks as called in by the technicians. The Unrepaired Leak Report by leak intensity is used by the Chief Technician to assign work orders (see Figure 11) by leak intensity.

The CSR will also, at that time, print work orders based on intensity, picking the highest level leaks as well as the number of leaks that can feasibly be repaired in one week. A copy is given to the Dispatch Department and the original is given to the Chief Technician of each system. We review this at our weekly regional Chief Technician meeting.

SIGNAL LEAKAGE LOG

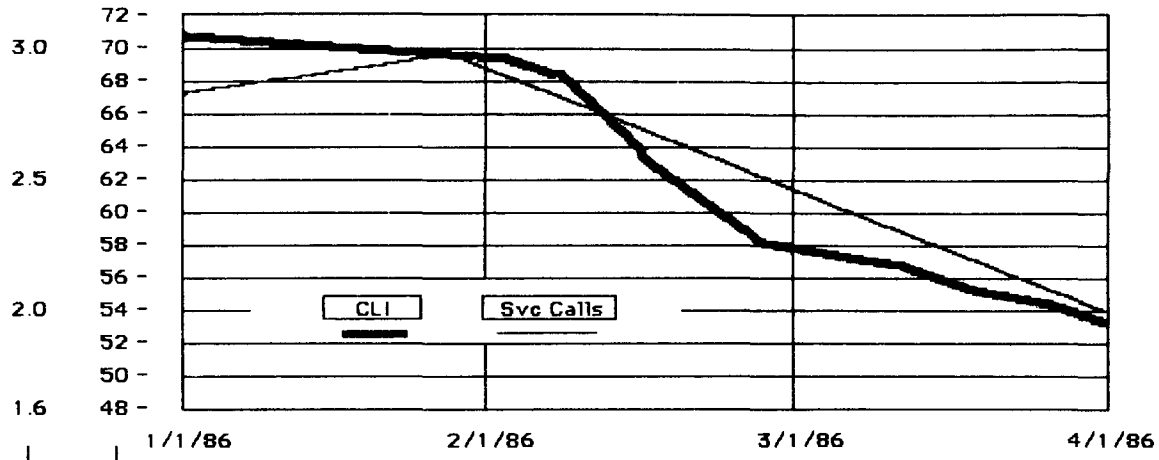
FOR DRIVE-OUT ONLY

MetroVision

SYSTEM NAME

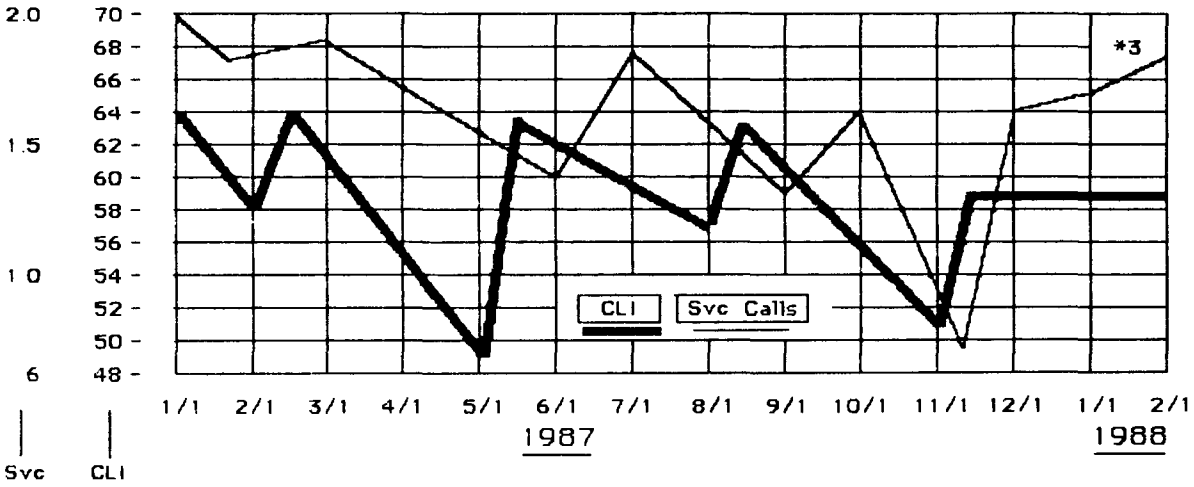
MAP NO.	LEVEL IN dB	ESTIMATE DISTANCE	REPORTED BY TECH #	DATE REPORTED	LEAKAGE LOCATION

Figure 2



1) CLI - The first drive-out period will indicate your most dramatic changes.
2) The overall trend for this drive-out period indicates that service calls per 1000 subs is directly proportional to our CLI.

Figure 3



1) SERVICE CALLS PER 1000 SUBS - You'll see an overall down trend in service calls as CLI is maintained.
2) CLI - You'll see a rise and fall as driveouts are completed. After service has been done, there is an overall decline in CLI to an average of 59.

*3) Indicates an increase in service calls when no leaks have been repaired over a period of a month.

Figure 4

```
=========================================================
=                                                       =
=    Cumulative Leak Index Report                       =
=    METROVISION; DETROIT REGION          03/04/88      =
=    Subsystem-REDFORD                    Ver-1.17D     =
=                                                       =
=========================================================

              All Areas

              FCC Report


     Mileage                  178.650
     Miles Driven             178.650
     Percent Driven           100.0
     Total Leaks               27
     Leaks per Mile             0.15
     Largest Leak             203      uV/M at 10 ft.
     Smallest Leak             51      uV/M at 10 ft.

     Leaks greater than 1500 uV/M -  0
     Leaks between 1000-1500 uV/M -  0
     Leaks between  500-1000 uV/M -  0
     Leaks between  200-500  uV/M -  1
     Leaks between   50-200  uV/M -  26

     Cumulative Leak Index     51.8     (Pass)
```

Figure 5

```
=========================================================
=                                                       =
=    Cumulative Leak Index Report                       =
=    METROVISION; DETROIT REGION          03/04/88      =
=    Subsystem-REDFORD                    Ver-1.17D     =
=                                                       =
=========================================================

              All Areas

              Maintenance Report


     Mileage                  178.650
     Miles Driven             178.650
     Percent Driven           100.0
     Total Leaks              150
     Leaks per Mile             0.84
     Largest Leak             203      uV/M at 10 ft.
     Smallest Leak             11      uV/M at 10 ft.

     Leaks greater than 1500 uV/M -  0
     Leaks between 1000-1500 uV/M -  0
     Leaks between  500-1000 uV/M -  0
     Leaks between  200-500  uV/M -  1
     Leaks between   50-200  uV/M -  26
     Leaks between   20-50   uV/M -  112
     Leaks less than 20      uV/M -  11

     Cumulative Leak Index     53.8     (Pass)
```

Figure 6

UNREPAIRED LEAK REPORT — Page- 1 — Ver-1.17D
METROVISION; DETROIT REGION — 03/04/88
Subsystem-REDFORD / AREA-All — By: Leak Intensity

Leak No	uVM @10'	TR1 dB	Est Ft.	Date Reported	Rep By	Leak Location	Area
16	202	0	100	02/20/88	107	BEST WESTERN	024
139	113	-5	100	02/20/88	103	26720 JOY ROAD	093
45	80	-8	100	02/20/88	309	15789 WOODBINE	044
95	64	-10	100	02/20/88	108	12730 TECUMSEH	073
86	64	-10	100	02/20/88	303	14201 CROSLEY	064
74	64	-10	100	02/20/88	303	26900 LYNDON	063

Figure 7

REPAIRED LEAK REPORT — Page- 2 — ver-1.17D
METROVISION; DETROIT REGION — 03/04/88
SUBSYSTEM-REDFORD — AREA-Global (all areas)

Leak Location: 16806 FIVE POINTS — File No: 7
Leak Intensity (at 10'): 160 uV/M TR-1 Reading: -2 dB — Est Dist: 100 ft.
Date Reported- 02/20/88 Reported by- 309 — Area: 044
Date Repaired- 02/29/88 Repaired by- 309
Leak Source: LOOSE FEEDER CONNECTOR — Source Code: 400
Repair Action / Comments:

Leak Location: 9060 INKSTER — File No: 8
Leak Intensity (at 10'): 202 uV/M TR-1 Reading: 0 dB — Est Dist: 100 ft.
Date Reported- 02/20/88 Reported by- 103 — Area: 093
Date Repaired- 02/29/88 Repaired by- 309
Leak Source: LOOSE FEEDER CONNECTOR — Source Code: 400
Repair Action / Comments:

Leak Location: 17398 GARFIELD — File No: 9
Leak Intensity (at 10'): 360 uV/M TR-1 Reading: +5 dB — Est Dist: 100 ft.
Date Reported- 02/20/88 Reported by- 309 — Area: 034
Date Repaired- 02/29/88 Repaired by- 309
Leak Source: LOOSE FEEDER CONNECTOR — Source Code: 400
Repair Action / Comments:

Leak Location: 27357 CATHEDRAL — File No: 10
Leak Intensity (at 10'): 2026 uV/M TR-1 Reading: +20 dB — Est Dist: 100 ft.
Date Reported- 02/20/88 Reported by- 103 — Area: 093
Date Repaired- 02/29/88 Repaired by- 309
Leak Source: LOOSE FEEDER CONNECTOR — Source Code: 400
Repair Action / Comments:

Figure 8

Other reports printed at tnat time include the FCC CLI Report and the Maintenance CLI Report. As you can see in Figure 2, the FCC CLI report only uses leaks above 50 uV/M at 3 meters in its calculation and the Maintenance CLI Report uses all reported leaks. All of these reports are copied and given to the Chief Technician and filed in the FCC binder, with the exception of work orders.

The Chief Technician accesses the information for leaks above 150 uV/m and these are repaired immediately. They are assigned from his Unrepaired Leak Report by intensity and the technicians are given the original copy of the repair work order. When these repairs are completed, he continues to hand out more repair work orders by intensity until all work orders are complete or until the next drive rolls around.

METROVISION; DETROIT REGION Page- 1
Subsystem REDFORD Area Information 03/04/88

Area	Miles	Tech
013	6.840	108
014	5.490	108
023	11.830	108
024	8.540	108
033	10.390	108
034	8.820	108
043	8.000	108
044	8.700	108
053	7.790	108
054	13.900	108
063	7.320	107
064	14.160	107
073	6.990	107
074	6.580	107
075	0.590	107
083	11.330	107
084	15.990	107
085	5.460	107
093	7.090	107
094	9.400	107
095	3.440	107

End of File- 21 records selected

Figure 9

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=========================================================
=                                                       =
=                REPAIRED LEAK STATISTICS               =
=                                                       =
=   METROVISION; DETROIT REGION        03/04/88         =
=   Subsystem-REDFORD      Page- 1     Ver-1.17D        =
=   Area-All Areas                     Miles- 178.650   =
=                                                       =
=========================================================

                Total Repaired Leaks -  17

=================================================================
Code  Leak Source                                  Leaks     %
=================================================================

 100  STAPLED INSIDE WIRING                           0    0.00
 110  CABLE SHIELD STRIPPED                           0    0.00
 120  INSIDE CABLE BURNT                              0    0.00
 130  IMPROPER CABLE SPLICE                           0    0.00
 140  SQUIRREL/RODENT DAMAGE                          0    0.00
 150  DEFECTIVE CABLE                                 0    0.00
 160  INSTALL CRAFTSMANSHIP                           0    0.00
 170  DROP NOT DISCONNECTED                           0    0.00

                          Category Total              0    0.00

 200  DEFECTIVE GROUND BLOCK                          0    0.00
 210  DEFECTIVE SPLITTER                              0    0.00
 220  DEFECTIVE FM SPLITTER                           0    0.00
 230  DEFECTIVE A/B SWITCH                            0    0.00
 240  DEFECTIVE GAME SWITCH                           0    0.00
 250  F CONNECTOR THREADS STRIPPED                    0    0.00
 251  F CONNECTOR CRAFTSMANSHIP                       0    0.00
 252  BROKEN F CONNECTOR                              0    0.00
 253  CORRODED F CONNECTOR                            1    5.88
 254  DEFECTIVE F CONNECTOR                           0    0.00
 255  LOOSE F CONNECTOR                               0    0.00
 260  DEFECTIVE TRAP                                  0    0.00
 261  LOOSE TRAP                                      0    0.00
 270  DEFECTIVE SHIELD/TERMINATOR                     0    0.00
 271  LOOSE SHIELD/TERMINATOR                         0    0.00

                          Category Total              1    5.88

 300  TELEVISION/VCR LEAKAGE                          1    5.88
 310  UNAUTHORIZED OUTLET                             3   17.65
 320  UNAUTHORIZED STEREO HOOK-UP                     0    0.00
 330  UNAUTHORIZED DROP                               0    0.00
 340  INFERIOR CUSTOMER EQUIPMENT                     0    0.00
 350  INFERIOR CUSTOMER CABLE                         0    0.00

                          Category Total              4   23.53
```

Figure 10

REPAIRED LEAK STATISTICS

METROVISION; DETROIT REGION — 03/04/88
Subsystem-REDFORD — Page- 2 — Ver-1.17D
Area-All Areas — Miles- 178.650

Total Repaired Leaks - 17

Code	Leak Source	Leaks	%
400	LOOSE FEEDER CONNECTOR	8	47.06
401	DEFECTIVE FEEDER CONNECTOR	0	0.00
402	CORRODED FEEDER CONNECTOR	1	5.88
410	BROKEN TAP PORT	0	0.00
411	BROKEN TAP PLATE	0	0.00
412	BROKEN TAP HOUSING	0	0.00
413	CORRODED TAP HOUSING	0	0.00
414	LOOSE TAP PLATE	0	0.00
415	MISSING RFI GASKET	0	0.00
420	SHIELD BROKEN FEEDER CABLE	0	0.00
421	BURNT FEEDER CABLE	0	0.00
422	CUT FEEDER CABLE	0	0.00
423	DEFECTIVE 500 CABLE	0	0.00
424	FEEDER CABLE SUCK-OUT	0	0.00
425	FEEDER CABLE RF SHORT	0	0.00
426	SQUIRREL/RODENT DAMAGE FEEDER CABLE	0	0.00
430	DEFECTIVE FEEDER ACTIVE DEVICE	0	0.00
440	DAMAGED FEEDER TEMPORARY CABLE	0	0.00
	Category Total	9	52.94
500	LOOSE TRUNK CONNECTOR	0	0.00
501	DEFECTIVE TRUNK CONNECTOR	0	0.00
510	SHIELD BROKEN TRUNK CABLE	0	0.00
511	BURNT TRUNK CABLE	0	0.00
512	CUT TRUNK CABLE	0	0.00
513	DEFECTIVE TRUNK CABLE	0	0.00
514	TRUNK CABLE SUCK-OUT	0	0.00
515	TRUNK CABLE RF SHORT	0	0.00
516	SQUIRREL/RODENT DAMAGE TRUNK CABLE	0	0.00
520	DEFECTIVE TRUNK ACTIVE DEVICE	0	0.00
530	DAMAGED TRUNK TEMPORARY	0	0.00
	Category Total	0	0.00
600	NO LEAK MEASUREMENT FOUND	3	17.65
	Category Total	3	17.65

METROVISION; DETROIT REGION

LEAK REPAIR WORK ORDER

Subsystem - REDFORD

Version-1.17D 03/04/88

==========

Leak No. - 1 Area Designator -013

Leak Location - 20029 MAC ARTHUR

Leak Level (TR-1 Reading) - -22 dB Est Distance - 100 ft.

Calculated Leak Intensity at 10 ft. - 16 microVolts/Meter

Date Located - 02/20/88 Reported by - 107

==========

Date Repaired - ____ / ____ / ____

Repaired by - _____ (Tech Code)

Leak Source Code _____

Repair Action / Comments - _____

_____

TR-1 Reading (at 10 ft.) after completion of repair - _____ dB (*)

(*) If 'No Leakage Measured', enter 'NLM'

_____

Repair Technician

Figure 11

The technician repairs each leak and records it on his work order, being sure to record a measurement at 3 meters or indicating "no leak measured." We've found that after a number of large leaks are fixed, there are no leaks where a minor leak was recorded. The technician then calls in the repair to Dispatch with the fix code, date of repair and level at 3 meters. Dispatch records this on their copy of the work order. The technician, at the end of each day, turns in his copy of the work order to the Chief Technician.

Sometimes a technician is unable to complete an assigned work order because the leak is emanating from a subscriber's home. This can occasionally be quite a frustrating problem, especially when your subscriber works days with no one at home. We alleviate this problem with a door-hanger (see Figure 12) and a series of letters that always resolve the problem. We place the door-hanger on the technicians' first attempt to correct the problem. If we get no response, we send a series of three letters (see Figure 13) resulting either in the repair of the leak or the disconnecting of the subscriber.

Weekly, the CLI CSR gathers the repaired work orders from the Dispatch Department and verifies the information against the Chief Technician's work order. The leak repairs are then logged in the computer and new reports are generated. At this point, the Repaired Leak Report and the Repaired Leak Statistics report are copied for the FCC file and the Chief Technician. We do not file the Repaired Leak work orders.

At the end of the drive-out period all reports are generated and the new drive-out information replaces it.

Sorry we missed you!

DEAR VALUED SUBSCRIBER,

WHILE YOU WERE AWAY, WE HAVE DISCOVERED THAT A T.V. SIGNAL WE SUPPLY TO YOUR HOME VIA THE CABLE IS EMANATING OUT OF YOUR HOME. THIS MEANS THERE IS A LEAK OF OUR SIGNAL INTO THE AIR. UNDER F.C.C. REGULATIONS WE ARE REQUIRED TO CORRECT THIS TYPE OF PROBLEM IMMEDIATELY. PLEASE CALL OUR SERVICE DEPARTMENT TO SCHEDULE AN APPOINTMENT SO THAT WE MAY CORRECT THIS PROBLEM.

THANK YOU

MetroVision,

of Livonia

422-3410

Figure 12

INGRESS LETTER #1

March 1, 1988

John Doe
12345 Fallow Lane
Anytown, BE 67890
092302-2

Dear John Doe:

{Cable System} has determined that the TV signal we supply to your home via the cable is emanating out of your home. This means there is a leak of our signal into the air. There are several possible causes to this condition, some of which are: a cracked cable, an unterminated end, a frayed or loose connector, or external equipment that has been installed by someone other than a {Cable System} employee.

It is after an attempt to reach you at your home that we send you this letter. We need to take the necessary steps to correct and ensure that the equipment installed in the home by {Cable System} employees has been installed correctly. Our request, at this point, is that you call our office at the number below within one week of this letter for an appointment to have it corrected. Under FCC regulations we will be required to terminate service to your home if the leak is not stopped.

Please call our Repair Service Department at 555-1111 between the hours of 8:30 a.m. and 5:30 p.m. Monday thru Friday.

Thank you for your cooperation,

{Cable System} Repair Service Department

INGRESS LETTER #2

March 1, 1988

John Doe
12345 Fallow Lane
Anytown, BE 67890
092302-2

Dear John Doe:

You were notified previously by mail that we have determined there is a cable signal emanating from your home.

As pointed out in the previous correspondence, it is imperative that you contact our office to arrange for repair service.

If, after 5 days we do not hear from you we will be forced under FCC regulations to terminate the cable signal to your home.

Thank you,

{Cable System} Repair Service Department

INGRESS LETTER #3

March 1, 1988

John Doe
12345 Fallow Lane
Anytown, BE 67890
092302-2

Dear John Doe:

You were notified on two previous occasions by mail that we have determined there is a cable signal emanating from your home.

As we pointed out in the previous correspondence, it is imperative that you contact our office to arrange for repair service.

If, after 72 hours we do not hear from you we will be forced under FCC regulations to terminate the cable signal to your home.

Please contact our Repair Service Department at 555-1111.

Thank you,

{Cable System} Repair Service Department

Figure 13

CONCLUSION

CLI is not one of those things where bigger is better.

What we've tried to show you here is a time tested method that we have found to work for us. However, as with any maintenance program we find ourselves constantly improving and streamlining the system.

We have shown that you can effectively drive out your system 4 times per year and stay within FCC standards with the use of available peoplepower.

REFERENCES

R. Amell, "CLI," Amell, 510 S. Kimberly Ct., Roswell, GA 30376, Version 1.17D (c) Copyright 1987

Code of Federal Regulations, Title 47 - Telecommunication, Federal Communications Commission, Parts 70 to 79, "Part 76 - Cable Television Service," October 1, 1986, pp. 450-517

Augat/LRC-Vitek Electronics, Inc., 9223 Billy The Kid Street, El Paso, TX 79907