OPERATION ISSUES

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These are exciting times for the CATV industry. We are able to offer our subscribers more and more original programming. Fiber optics and HDTV are hot topics. Cable Labs is off and running.

Behind all of this excitement, we must not forget what got us here - **OUR CUSTOMERS.** There are numerous areas that we can address that will provide better service to our subscribers and lower our operating costs. Several items to think about are:

1. Interfaces
2. Installation procedures & practices.
3. Equipment standards
4. Maintenance procedures
5. Performance budgets

Interfaces continue to be the root cause of most of our problems. RF leakage, intermittents, interruptions, outages, water migrating into our plant, corrosion problems, and on and on are caused by bad design, bad installation, or bad maintenance of interfaces. This problem is expensive for us and very irritating to our subscribers.

Proper construction and installation procedures and practices, coupled with properly designed materials will go a long way toward eliminating many of our problems. This is an area too often taken for granted, where our field people are forced to "live with" what they have. We must focus more attention in this area.

Equipment standards are important for many reasons, not the least of which is to avoid confusion. Why do we still have some equipment with 20 dB test points, some with 30 dB test points, some with resistive probes, some with direct probes, etc.? This leads to major confusion and difficult training problems.

Maintenance procedures are slowly getting better, but not much. How many of our people really understand cable slope, proper equalization, block versus linear versus cable tilt, how to properly set up an amplifier for slope and gain over a wide temperature range, etc.? We have not worked with the different suppliers of actives and test equipment to normalize tilts, levels, and set up procedures so that we can simplify our maintenance people's lives and properly take advantage of microprocessor-based test equipment.

We must start thinking of the image transfer process in total. In other words, what is the end-to-end performance required from the point the image is generated to the point it is displayed? An overall performance budget must be established and then broken down into budgets for each part of the system. (A sample noise budget is attached.) This budget process is essential if we intend to improve the quality of the images we deliver to our customers.

Fortunately, all of the things we need to do to improve our systems for today's use are well understood. We just need to do it. The picture is not as clear as we move toward the future, as our consumers acquire better TV sets and VCR's, with BTSC stereo, with HDTV on the horizon, with consumers demanding better quality over time. However, the best way to get there is to do the best possible job now, while keeping an educated eye on where we are going.

THEORETICAL C/N AND S/N

Calculations are based on:

Headend C/N	**60**	**dB**
AML System		
Output Power	7	dBm
TX and RX Antenna	48.8	dB
Path Length	12.02	miles
AML C/N	**53**	**dB**
Distribution		
Trunk Amps		
Cascade	30	
Noise Figure	9	dB
Input level	10	dBmV
Trunk C/N	45.23	dB
Bridger Amp		
Noise Figure	8	dB
Input Level	20	dBmV
Bridger C/N	71	dB
Line Extenders		
Cascade	2	
Noise Figure	9	dB
Input Level	20	dBmV
Line Extender C/N	66.99	dB
Distribution C/N	**45.2**	**dB**
Converter C/N	**53**	**dB**
Television C/N	**55**	**dB**

Theoretical subscriber C/N is:

$$C/N = 10 \log\left(\frac{1}{\left(\frac{HE\ C/N}{10}\right)^{-1} + \left(\frac{AML\ C/N}{10}\right)^{-1} + \left(\frac{DIST\ C/N}{10}\right)^{-1} + \left(\frac{CONV\ C/N}{10}\right)^{-1} + \left(\frac{TV\ C/N}{10}\right)^{-1}}\right)$$

System C/N = 43.5 dB and System S/N = 43.2 dB
To get the actual Signal to Noise (S/N), the consumer views the camera, tape, and satellite S/N's must be added.

Camera S/N	55 dB
Tape S/N	55 dB
Satellite S/N	52 dB
System S/N	43.2 dB

$$\text{Subscriber } S/N = 10 \log\left(\frac{1}{\left(\frac{CAM\ S/N}{10}\right)^{-1} + \left(\frac{TAPE\ S/N}{10}\right)^{-1} + \left(\frac{SAT\ S/N}{10}\right)^{-1} + \left(\frac{SYS\ S/N}{10}\right)^{-1}}\right)$$

Subscriber S/N = 42.2 dB

1/25/87 TGE