11. SUMMARY

The Grand Alliance 16-VSB, high data rate, cable mode, system was tested in Charlotte N.C. between 1994 May 02 and 1994 June 10 to determine its ruggedness and ensure it would operate on existing Cable television systems. The 16-VSB receiver was tested at a total of 51 receive sites (10 headend locations and 41 remote locations) in eight Cable systems, over long amplifier cascades (27 locations had trunk cascade lengths $\geq$25), microwave links (7 remote locations) and fibre links (4 remote locations) and in four systems one or two channels beyond the Cable system design bandwidth. Also, the margin calculations are considered to be "worst case" for each test site due to varying signal conditions that may occur during the course of the test.

The 16-VSB ATV receiver worked at all locations where the delivered signal met FCC specifications. Some systems were tested at frequencies above the maximum design frequency for the equipment which resulted in reduced signal levels and/or significant tilt across the test channel. The ATV receiver continued to operate in these situations until the carrier-to-noise threshold of the receiver was reached

The 8-VSB terrestrial ATV signal was received off-air at each headend site and was always strong enough (10 - 18 dB of margin) to be able to deliver error corrected data to the 16-VSB modulator at the Cable headend. In some instances, the off-air signal was not available for testing due to terrestrial transmitter or receiver hardware problems and a second locally generated pseudo-random data stream replaced the off-air data stream.

The 16-VSB modulation scheme, with the ATV average signal power 6 dB below NTSC peak sync power, was able to deliver a high data bit rate (35.6 Mb/s net) over the cable system and to the test receivers located at the extremes of the cable system. The ATV receiver worked in the direct path with 5.9 dB minimum margin at all locations that met FCC signal level and C/N specifications, including over microwave and fibre optic links. Some of the cable systems were tested at frequencies above (1 to 3 channels) their equipment's maximum design frequency, which resulted in reduced levels (up to 8 dB below minimum FCC specification) and/or significant inband channel tilt (up to 1 dB above maximum FCC specifications). The ATV receiver continued to operate at these out-of-spec locations

in the direct path (margins between 0+ and 7.2 dB), and in all but three locations for the house-in-a-box, where the low signal levels and large channel tilts caused the carrier-to-noise thresho' of the receiver to be reached. The signal was acquired at these three sites (carrier, clock, and data frame loops), but was below the threshold of data errors due to receiver noise floor. The inband H.I.A.B. amplifier oscillation occurred at two of these sites, and also contributed to the degraded noise threshold.

APPENDIX 1

Vision Cable of Mecklinburg

General System Information

Total Subscribers: 48,000	Miles of Plant: 1200	Percent Underground: 60
System Bandwidth: 50 - 450 MHz	Frequency Plan: HRC	Highest Freq. Used: 444 MHz
Test Channel: 31 (262.75 - 268.75 MHz)	Lower Channel: Scrambled	Upper Channel: Clear
Trunk Amp Mfr.: Jerrold	Operating Carrier Levels: 32 dBmV.	
Line Extender Mfr.: Jerrold	Operating Carrier Levels: 47/38 dBmV.	
Trunk Cable: .750"	Cable Manufacturer: Trilogy	Age: 7
Distribution Cable: .650"	Cable Manufacturer: Trilogy	Age: 7
Cable Tap & Passives Mfr.: Jerrold		
Channel 53 ATV Rx Level: -48 dBm (~18 dB of Margin) Tx at 31.5 Watts (IOT inoperative at transmitter.)		
Rx Site: 5.4 miles from transmitter		
Tests Performed By: G. Hovland - CableLabs and G. Sgrignoli - Zenith		
Director: Brian James, CableLabs		

TEST POINT A1

Date: 1994 May 02 Address of Location: Headend

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 3 Level: -45.0 dBm
   Comments on quality and impairments: noise

2. Off-air NTSC Direct: Impairments: 3 Level: -45.2 dBm
   Comments on quality and impairments: noise

3. Off-air NTSC HIAB: Impairments: 3 Level: -62.0 dBm (before drop amp installed)
   Comments on quality and impairments: noise

4. Local NTSC HIAB: Impairments: 3 Level: -62.0 dBm (before drop amp installed)
   Comments on quality and impairments: noise

5. NTSC Carrier Levels:

Lower Visual:	-44.8 dBm	Lower Aural :	-59.1 dBm	Ratio:	14.2 dB
Test Visual:	-44.4 dBm	Test Aural:	-59.0 dBm	Ratio:	14.6 dB
Upper Visual:	-45.1 dBm	Upper Aural:	-58.4 dBm	Ratio:	13.3 dB

6. NTSC Carrier Level: -14.5 dBm (after amplifier and filter)
   Highest Inband Spurious: -62.1 dBm @ 265.0 MHz
   CTB Level: -69.7 dBm
   Noise Floor: -79.1 dBm (100 kHz BW)

7. Direct Inband Response: 0.1 dB P-V Delay: 48 nsec Total System: 0 dB P-V

8. HIAB Inband Response: 0.3 dB P-V Delay: 7 nsec

9. Direct Connection ATV BER (Rx power -50.0 dBm):

Ch A:	0	0	0
Ch B:	0	0	0

   Signal Power: -13.9 dBm Noise Power: -53.0 dBm S/N_1: 39.1 dB

   BER With noise added to threshold:

Ch A:	1.90×10^{-6}	2.45×10^{-6}	1.43×10^{-6}
Ch B:	1.86×10^{-6}	1.82×10^{-6}	1.87×10^{-6}

   Signal Power: -13.9 dBm Noise Power: -42.5 dBm S/N_2: 28.6 dB

   Margin S/N_1 - S/N_2: 10.5 dB

10. Signal through House-in-a-Box BER (Rx power -53.6 dBm):

Ch A:	0	0	0
Ch B:	0	0	0

   Signal Power: -17.8 dBm Noise Power: -53.5 dBm S/N_1: 35.7 dB

   BER With noise added to threshold:

Ch A:	1.96×10^{-6}	1.29×10^{-6}	1.33×10^{-6}
Ch B:	1.21×10^{-6}	1.88×10^{-6}	1.97×10^{-6}

   Signal Power: -17.8 dBm Noise Power: -46.9 dBm S/N_2: 29.1 dB

   Margin S/N_1 - S/N_2: 6.6 dB

TEST POINT A2

Date: 1994 May 03 Address of Location: 5200 Clayford Ridge
Cable Location: Underground Trunk Cascade: 25 LE Cascade: 0

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 4 Level: -42.5 dBm
   Comments on quality and impairments: noise

2. Off-air NTSC Direct: Impairments: 3 Level: -42.5 dBm
   Comments on quality and impairments: noise, slight beat, smear

3. Off-air NTSC HIAB: Impairments: 3 Level: -46.0 dBm
   Comments on quality and impairments: noise, smear

4. Local NTSC HIAB: Impairments: 4 Level: -45.6 dBm
   Comments on quality and impairments: noise

5. NTSC Carrier Levels:

Lower Visual:	-43.9 dBm	Lower Aural :	-56.8 dBm	Ratio:	13.0 dB
Test Visual:	-42.8 dBm	Test Aural:	-55.2 dBm	Ratio	12.5 dB
Upper Visual:	-41.2 dBm	Upper Aural:	-54.3 dBm	Ratio	13.0 dB

6. NTSC Carrier Level: -7.8 dBm (after amplifier and filter)
   Highest Inband Spurious: -51.8 dBm @ 265.42 MHz
   CTB Level: -63.4 dBm
   Noise Floor: -69.2 dBm (100 kHz BW)

7. Direct Inband Response: 1.2 dB P-V Delay: 255 nsec Total System: 7 dB P-V

8. HIAB Inband Response: 3.4 dB P-V Delay: 285 nsec

9. Direct Connection ATV BER (Rx power -47.9 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: -9.8 dBm Noise Power: -46.0 dBm S/N_1: 36.2 dB

   BER With noise added to threshold:
   Ch A: 5.25×10^{-7} 8.63×10^{-7} 6.50×10^{-7}
   Ch B: 4.15×10^{-7} 3.70×10^{-8} 0
   Signal Power: -9.8 dBm Noise Power: -38.4 dBm S/N_2: 28.6 dB

   Margin S/N_1 - S/N_2: 7.6 dB

10. Signal through House-in-a-Box BER (Rx power -49.4 dBm):
    Ch A: 0 0 0
    Ch B: 0 0 0
    Signal Power: -13.7 dBm Noise Power: -49.1 dBm S/N_1: 35.4 dB

    BER With noise added to threshold:
    Ch A: 1.26×10^{-6} 1.18×10^{-6} 1.26×10^{-6}
    Ch B: 1.47×10^{-6} 1.32×10^{-6} 1.18×10^{-6}
    Signal Power: -13.7 dBm Noise Power: -42.5 dBm S/N_2: 28.8 dB

    Margin S/N_1 - S/N_2: 6.6 dB

Test Point A3

Date: 1994 May 03 Address of Location: 8301 Ashley Glen, Mint Hill
Cable Location: Underground Trunk Cascade: 20 LE Cascade: 0

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 3 Level: -40.3 dBm
   Comments on quality and impairments: noise

2. Off-air NTSC Direct: Impairments: 2- Level: -41.7 dBm
   Comments on quality and impairments: noise

3. Off-air NTSC HIAB: Impairments: 2- Level: -45.4 dBm
   Comments on quality and impairments: noise

4. Local NTSC HIAB: Impairments: 3 Level: -44.7 dBm
   Comments on quality and impairments: noise

5. NTSC Carrier Levels:

Lower Visual:	-39.8 dBm	Lower Aural :	-55.1 dBm	Ratio:	15.3 dB
Test Visual:	-41.4 dBm	Test Aural:	-52.2 dBm	Ratio	10.8 dB
Upper Visual:	-39.7 dBm	Upper Aural:	-53.1 dBm	Ratio	13.4 dB

6. NTSC Carrier Level: -8.8 dBm (after amplifier and filter)
   Highest Inband Spurious: -45.3 dBm @ 265.405 MHz
   CTB Level: -57 dBm
   Noise Floor: -66.2 dBm (100 kHz BW)

7. Direct Inband Response: 2.0 dB P-V Delay: 94 nsec Total System: 7 dB P-V

8. HIAB Inband Response: 3.0 dB P-V Delay: 265 nsec

9. Direct Connection ATV BER (Rx power -43.9 dBm):

Ch A:	0	0	0
Ch B:	0	0	0

   Signal Power: -8.4 dBm Noise Power: -43.4 dBm S/N_1: 35.0 dB

   BER With noise added to threshold:

Ch A:	2.08×10^{-6}	2.10×10^{-6}	1.71×10^{-6}
Ch B:	2.04×10^{-6}	2.20×10^{-6}	2.53×10^{-6}

   Signal Power: -8.4 dBm Noise Power: -37.2 dBm S/N_2: 28.8 dB

   Margin S/N_1 - S/N_2: 6.2 dB

10. Signal through House-in-a-Box BER (Rx power -47.7 dBm):

Ch A:	0	0	0
Ch B:	0	0	0

   Signal Power: -12.4 dBm Noise Power: -44.6 dBm S/N_1: 32.2 dB

   BER With noise added to threshold:

Ch A:	1.69×10^{-6}	1.18×10^{-6}	1.66×10^{-6}
Ch B:	1.79×10^{-6}	1.31×10^{-6}	1.65×10^{-6}

   Signal Power: -12.4 dBm Noise Power: -40.2 dBm S/N_2: 27.8 dB

   Margin S/N_1 - S/N_2: 4.4 dB

Test Point A4

Date: 1994 May 04 Address of Location: 500 Cresent Lane
Cable Location: Underground Trunk Cascade: 2 LE Cascade: 2

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 4 Level: -42.8 dBm
   Comments on quality and impairments: noise

2. Off-air NTSC Direct: Impairments: 3+ Level: -42.9 dBm
   Comments on quality and impairments: noise

3. Off-air NTSC HIAB: Impairments: 3 Level: -46.2 dBm
   Comments on quality and impairments: noise

4. Local NTSC HIAB: Impairments: 4 Level: -46.1 dBm
   Comments on quality and impairments: noise

5. NTSC Carrier Levels:

Lower Visual:	-42.8 dBm	Lower Aural :	-56.3 dBm	Ratio:	13.6 dB
Test Visual:	-42.9 dBm	Test Aural:	-55.7 dBm	Ratio	12.8 dB
Upper Visual:	-42.3 dBm	Upper Aural:	-56.4 dBm	Ratio	14.1 dB

6. NTSC Carrier Level: -9.2 dBm (after amplifier and filter)
   Highest Inband Spurious: -53.6 dBm @ 265.93 MHz
   CTB Level: -64.9 dBm
   Noise Floor: -72.7 dBm (100 kHz BW)

7. Direct Inband Response: 0.5 dB P-V Delay: 34 nsec Total System: 3 dB P-V

8. HIAB Inband Response: 0.7 dB P-V Delay: 67 nsec

9. Direct Connection ATV BER (Rx power -47.7 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: -11.2 dBm Noise Power: -48.6 dBm S/N_1: 37.4 dB

   BER With noise added to threshold:
   Ch A: 1.41×10^{-6} 1.85×10^{-6} 1.10×10^{-6}
   Ch B: 9.75×10^{-7} 6.53×10^{-7} 5.59×10^{-7}
   Signal Power: -11.2 dBm Noise Power: -39.9 dBm S/N_2: 28.7 dB

   Margin S/N_1 - S/N_2: 8.7 dB

10. Signal through House-in-a-Box BER (Rx power -50.6 dBm):
    Ch A: 0 0 0
    Ch B: 0 0 0
    Signal Power: -14.3 dBm Noise Power: -49.6 dBm S/N_1: 35.3 dB

    BER With noise added to threshold:
    Ch A: 2.45×10^{-6} 2.34×10^{-6} 2.73×10^{-6}
    Ch B: 2.76×10^{-6} 2.49×10^{-6} 2.55×10^{-6}
    Signal Power: -14.3 dBm Noise Power: -4 dBm S/N_2: 28.8 dB

    Margin S/N_1 - S/N_2: 6.5 dB

Test Point A5

Date: 1994 May 04 Address of Location: 13709 Jonathan's Ridge Rd
Cable Location: Underground Trunk Cascade: 11 LE Cascade: 1

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 4 Level: -46.5 dBm
   Comments on quality and impairments: noise

2. Off-air NTSC Direct: Impairments: 3+ Level: -46.6 dBm
   Comments on quality and impairments: noise

3. Off-air NTSC HIAB: Impairments: 3 Level: -50.1 dBm
   Comments on quality and impairments: noise

4. Local NTSC HIAB: Impairments: 4- Level: -50.0 dBm
   Comments on quality and impairments: noise

5. NTSC Carrier Levels:

Lower Visual:	-44.6 dBm	Lower Aural :	-60.3 dBm	Ratio:	16.0 dB
Test Visual:	-46.5 dBm	Test Aural:	-59.9 dBm	Ratio	13.4 dB
Upper Visual:	-46.6 dBm	Upper Aural:	-60.8 dBm	Ratio	14.2 dB

6. NTSC Carrier Level: -11.4 dBm (after amplifier and filter)
   Highest Inband Spurious: -55.8 dBm @ 265.285 MHz
   CTB Level: -66.8 dBm
   Noise Floor: -74.0 dBm (100 kHz BW)

7. Direct Inband Response: 0.8 dB P-V Delay 80 nsec Total System: 5 dB P-V

8. HIAB Inband Response: 1.0 dB P-V Delay 75 nsec

9. Direct Connection ATV BER (Rx power -51.5 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: -15.3 dBm Noise Power: -52.0 dBm S/N_1: 36.7 dB

   BER With noise added to threshold:
   Ch A: 1.03×10^{-6} 1.91×10^{-6} 1.50×10^{-6}
   Ch B: 9.88×10^{-7} 1.56×10^{-6} 1.62×10^{-6}
   Signal Power: -15.3 dBm Noise Power: -44.1 dBm S/N_2: 28.8 dB

   Margin S/N_1 - S/N_2: 7.9 dB

10. Signal through House-in-a-Box BER (Rx power -55.0 dBm):
    Ch A: 0 0 0
    Ch B: 0 0 0
    Signal Power: -18.8 dBm Noise Power: -52.4 dBm S/N_1: 33.6 dB

    BER With noise added to threshold:
    Ch A: 1.54×10^{-6} 1.94×10^{-6} 1.99×10^{-6}
    Ch B: 2.40×10^{-6} 2.12×10^{-6} 2.05×10^{-6}
    Signal Power: -18.8 dBm Noise Power: -48.0 dBm S/N_2: 29.2 dB

    Margin S/N_1 - S/N_2: 4.4 dB

Test Point A6

Date: 1994 May 04 Address of Location: 1412 Maple Hollo[illegible], Mint Hill
Cable Location: Underground Trunk Cascade: 20 LE Cascade

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 4+ Level: -44.5 dBm
   Comments on quality and impairments: noise

2. Off-air NTSC Direct: Impairments: 3 Level: -44.5 dBm
   Comments on quality and impairments: noise

3. Off-air NTSC HIAB: Impairments: 3 Level: -48.0 dBm
   Comments on quality and impairments: noise

4. Local NTSC HIAB: Impairments: 4 Level: -47.8 dBm
   Comments on quality and impairments: noise

5. NTSC Carrier Levels:

Lower Visual:	-46.4 dBm	Lower Aural :	-60.3 dBm	Ratio:	13.9 dB
Test Visual:	-47.7 dBm	Test Aural:	-59.5 dBm	Ratio	11.8 dB
Upper Visual:	-45.8 dBm	Upper Aural:	-60.6 dBm	Ratio	14.8 dB

6. NTSC Carrier Level: -9.7 dBm (after amplifier and filter)
   Highest Inband Spurious: -44.5 dBm @ 265.405 MHz
   CTB Level: -57.9 dBm
   Noise Floor: -62.7 dBm (100 kHz BW)

7. Direct Inband Response: [illegible] dB P-V Delay: 195 nsec Total System: 10 dB P-V

8. HIAB Inband Response: [illegible] dB P-V Delay: 91 nsec

9. Direct Connection ATV BER (Rx power -48.7 dBm):

Ch A:	0	0	0
Ch B:	0	0	0

   Signal Power: -12.4 dBm Noise Power: -45.6 dBm S/N_1: 33.2 dB

   BER With noise added to threshold:

Ch A:	2.23×10^{-6}	1.89×10^{-6}	1.38×10^{-6}
Ch B:	1.82×10^{-6}	1.48×10^{-6}	1.39×10^{-6}

   Signal Power: -12.4 dBm Noise Power: -41.3 dBm S/N_2: 28.9 dB

   Margin S/N_1 - S/N_2: 4.3 dB

10. Signal through House-in-a-Box BER (Rx power -52.0 dBm):

Ch A:	0	0	0
Ch B:	0	0	0

   Signal Power: -15.7 dBm Noise Power: -47.8 dBm S/N_1: 32.1 dB

   BER With noise added to threshold:

Ch A:	1.90×10^{-6}	1.49×10^{-6}	1.73×10^{-6}
Ch B:	8.34×10^{-7}	9.61×10^{-7}	8.23×10^{-7}

   Signal Power: -15.7 dBm Noise Power: -44.8 dBm S/N_2: 29.1 dB

   Margin S/N_1 - S/N_2: 3.0 dB

APPENDIX 2

Vision Cable of Kannapolis

GENERAL SYSTEM INFORMATION

Total Subscribers: 28,000	Miles of Plant: 680	Percent Underground: 10
System Bandwidth: 50 - 330 MHz	Frequency Plan: IRC	Highest Freq. Used: 330 MHz
Test Channel: 20 (156 - 162 MHz)	Lower Channel: clear	Upper Channel: clear
Trunk Amp Mfr.: Jerrold	Operating Carrier Levels: 37/33 dBmV.	
Line Extender Mfr.: Jerrold	Operating Carrier Levels: 46/40 dBmV.	
Trunk Cable: .750"	Cable Manufacturer: Trilogy	Age: 1 - 15 years
Distribution Cable: .500"	Cable Manufacturer: Trilogy	Age: 1 - 15 years
Cable Tap & Passives Mfr.: Jerrold		
Channel 53 ATV Rx Level: -55 dBm (~14 dB of Margin with 21 dB gain preamplifier) Tx at 31.5 Watts (IOT inoperative at transmitter.)		
Rx Site: 15.6 miles from transmitter		
Tests Performed by: G. Hovland - CableLabs and G. Sgrignoli - Zenith		
Director: Brian James, CableLabs		

Test Point B1

Date: 1994 May 05 Address of Location: Headend

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 4 Level: -34.7 dBm
   Comments on quality and impairments: --

2. Off-air NTSC Direct: Impairments: 3- Level: -34.7 dBm
   Comments on quality and impairments: noise

3. Off-air NTSC HIAB: Impairments: 3- Level: -36.8 dBm
   Comments on quality and impairments: noise

4. Local NTSC HIAB: Impairments: 4 Level: -36.6 dBm
   Comments on quality and impairments: --

5. NTSC Carrier Levels:

Lower Visual:	-34.7 dBm	Lower Aural :	-50.6 dBm	Ratio:	15.8 dB
Test Visual:	-34.7 dBm	Test Aural:	-49.5 dBm	Ratio	14.8 dB
Upper Visual:	-34.7 dBm	Upper Aural:	-50.6 dBm	Ratio	15.8 dB

6. NTSC Carrier Level: -3.5 dBm (after amplifier and filter)
   Highest Inband Spurious: -45.0 dBm @ 158.8 MHz
   CTB Level: -59.6 dBm
   Noise Floor: -62.6 dBm (100 kHz BW)

7. Direct Inband Response: 2.5 dB P-V Delay: 210 nsec Total System: 4 dB P-V

8. HIAB Inband Response: 2.3 dB P-V Delay: 115 nsec

9. Direct Connection ATV BER (Rx power -40.3 dBm)

Ch A:	0	0	0
Ch B:	0	0	0

   Signal Power: -7.1 dBm Noise Power: -46.2 dBm S/N_1: 39.1 dB

   BER With noise added to threshold:

Ch A:	7.43×10^{-7}	8.47×10^{-7}	9.38×10^{-7}
Ch B:	6.31×10^{-7}	1.26×10^{-6}	9.35×10^{-7}

   Signal Power: -7.1 dBm Noise Power: -35.2 dBm S/N_2: 28.1 dB

   Margin S/N_1 - S/N_2: 11.0 dB

10. Signal through House-in-a-Box BER (Rx power - 42.6 dBm):

Ch A:	0	0	0
Ch B:	0	0	0

   Signal Power: -9.2 dBm Noise Power: -43.0 dBm S/N_1: 33.8 dB

   BER With noise added to threshold:

Ch A:	1.24×10^{-6}	1.99×10^{-6}	1.54×10^{-6}
Ch B:	1.40×10^{-6}	2.25×10^{-6}	1.34×10^{-6}

   Signal Power: -9.2 dBm Noise Power: -37.0 dBm S/N_2: 27.8 dB

   Margin S/N_1 - S/N_2: 6.0 dB

Test Point B2

Date: 1994 May 05 | Address of Location: Davidson Dr. & Moorsville Rd.
Cable Location: Aerial | Trunk Cascade: 36 | LE Cascade: 0

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 4 Level: -36.4 dBm
   Comments on quality and impairments: noise

2. Off-air NTSC Direct: Impairments: 3 Level: -35.8 dBm
   Comments on quality and impairments: noise

3. Off-air NTSC HIAB: Impairments: -- Level: -38.2 dBm
   Comments on quality and impairments: noise & beats

4. Local NTSC HIAB: Impairments: -- Level: -39.0 dBm
   Comments on quality and impairments: --

5. NTSC Carrier Levels:

Lower Visual:	-36.7 dBm	Lower Aural :	-52.4 dBm	Ratio:	15.7 dB
Test Visual:	-36.4 dBm	Test Aural:	-51.6 dBm	Ratio:	15.2 dB
Upper Visual:	-37.2 dBm	Upper Aural:	-52.8 dBm	Ratio:	15.6 dB

6. NTSC Carrier Level: -5.4 dBm (after amplifier and filter)
   Highest Inband Spurious: -46.8 dBm @ 158.935 MHz
   CTB Level: -63.6 dBm
   Noise Floor: -66.0 dBm (100 kHz BW)

7. Direct Inband Response: 0.4 dB P-V Delay: 98 nsec Total System: 3 dB P-V

8. HIAB Inband Response: 1.4 dB P-V Delay 156 nsec

9. Direct Connection ATV BER (Rx power -41.4 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: -9.1 dBm Noise Power: -44.0 dBm S/N: 34.9 dB

   BER With noise added to threshold:
   Ch A: 9.67×10^{-7} 3.73×10^{-7} 1.70×10^{-7}
   Ch B: 2.18×10^{-6} 2.61×10^{-6} 2.74×10^{-6}
   Signal Power: -9.1 dBm Noise Power: -37.0 dBm S/N: 27.9 dB

   Margin S/N_1 - S/N_2: 7.0 dB

10. Signal through House-in-a-Box BER (Rx power -44.7 dBm):
    Ch A: 0 0 0
    Ch B: 0 0 0
    Signal Power: -11.2 dBm Noise Power: -44.5 dBm S/N: 33.3 dB

    BER With noise added to threshold:
    Ch A: 4.37×10^{-7} 5.89×10^{-7} 6.34×10^{-7}
    Ch B: 2.42×10^{-6} 2.26×10^{-6} 2.56×10^{-6}
    Signal Power: -11.2 dBm Noise Power: -39.0 dBm S/N: 27.8 dB

    Margin S/N_1 - S/N_2: 5.5 dB

Test Point B3

Date: 1994 May 05 Address of Location: Shilo Church Rd
Cable Location: Aerial Trunk Cascade: 34 LE Cascade: 1

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 4 Level: -33.6 dBm
   Comments on quality and impairments: --

2. Off-air NTSC Direct: Impairments: 3 Level: -33.9 dBm
   Comments on quality and impairments: noise

3. Off-air NTSC HIAB: Impairments: 3- Level: -36.4 dBm
   Comments on quality and impairments: noise

4. Local NTSC HIAB: Impairments: 4 Level: -36.4 dBm
   Comments on quality and impairments: --

5. NTSC Carrier Levels:

Lower Visual:	-33.7 dBm	Lower Aural:	-49.7 dBm	Ratio:	15.9 dB
Test Visual:	-33.6 dBm	Test Aural:	-48.7 dBm	Ratio:	15.1 dB
Upper Visual:	-34.2 dBm	Upper Aural:	-50.6 dBm	Ratio:	16.3 dB

6. NTSC Carrier Level: -2.3 dBm (after amplifier and filter)
   Highest Inband Spurious: -45.2 dBm @ 158.75 MHz
   CTB Level: -57.9 dBm
   Noise Floor: -65.0 dBm (100 kHz BW)

7. Direct Inband Response: 0.1 dB P-V Delay: 52 nsec Total System: 4 dB P-V

8. HIAB Inband Response: 0.3 dB P-V Delay: 175 nsec

9. Direct Connection ATV BER (Rx power -39.5 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: -6.0 dBm Noise Power: -40.7 dBm S/N: 34.7 dB

   BER With noise added to threshold:
   Ch A: 2.29×10^{-6} 2.84×10^{-6} 2.86×10^{-6}
   Ch B: 2.18×10^{-6} 1.64×10^{-6} 1.94×10^{-6}
   Signal Power: -6.0 dBm Noise Power: -34.1 dBm S/N: 28.1 dB

   Margin S/N_1 - S/N_2: 6.6 dB

10. Signal through House-in-a-Box BER (Rx power -42.0 dBm):
    Ch A: 0 0 0
    Ch B: 0 0 0
    Signal Power: -8.4 dBm Noise Power: -42.3 dBm S/N: 33.9 dB

    BER With noise added to threshold:
    Ch A: 1.15×10^{-6} 1.41×10^{-6} 1.15×10^{-6}
    Ch B: 9.88×10^{-7} 1.49×10^{-6} 1.28×10^{-6}
    Signal Power: -8.4 dBm Noise Power: -36.4 dBm S/N: 28.0 dB

    Margin S/N_1 - S/N_2: 5.9 dB

Test Point B4

Date: 1994 May 05 Address of Location: Huntley Place, Roberta Farms Subdivision, Concord
Cable Location: Aerial Trunk Cascade: 25 LE Cascade: 0

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 4+ Level: -32.0 dBm
   Comments on quality and impairments: --

2. Off-air NTSC Direct: Impairments: 3 Level: -32.2 dBm
   Comments on quality and impairments:

3. Off-air NTSC HIAB: Impairments: 3 Level: -34.7 dBm
   Comments on quality and impairments: noise

4. Local NTSC HIAB: Impairments: 4 Level: -29.5 dBm
   Comments on quality and impairments: --

5. NTSC Carrier Levels:

Lower Visual:	-32.2 dBm	Lower Aural:	-47.9 dBm	Ratio:	15.7 dB
Test Visual:	-32.0 dBm	Test Aural:	-47.3 dBm	Ratio:	15.3 dB
Upper Visual:	-32.3 dBm	Upper Aural:	-48.2 dBm	Ratio:	15.9 dB

6. NTSC Carrier Level: -0.8 dBm (after amplifier and filter)
   Highest Inband Spurious: -47.6 dBm @ 158.59 MHz
   CTB Level: -67.2 dBm
   Noise Floor: -67.5 dBm (100 kHz BW)

7. Direct Inband Response: 0.5 dB P-V Delay: 150 nsec Total System: 10 dB P-V

8. HIAB Inband Response: 0.5 dB P-V Delay: 175 nsec

9. Direct Connection ATV BER (Rx power -38.0 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: -4.5 dBm Noise Power: -41.7 dBm S/N: 37.2 dB

   BER With noise added to threshold:
   Ch A: 1.07×10^{-6} 1.19×10^{-6} 1.53×10^{-6}
   Ch B: 8.39×10^{-7} 7.27×10^{-7} 8.02×10^{-7}
   Signal Power: -4.5 dBm Noise Power: -32.8 dBm S/N: 28.3 dB

   Margin S/N_1 - S/N_2: 8.9 dB

10. Signal through House-in-a-Box BER (Rx power -40.5 dBm):
    Ch A: 0 0 0
    Ch B: 0 0 0
    Signal Power: -6.9 dBm Noise Power: -41.9 dBm S/N: 35.0 dB

    BER With noise added to threshold:
    Ch A: 1.08×10^{-6} 9.19×10^{-7} 5.30×10^{-7}
    Ch B: 8.76×10^{-7} 8.39×10^{-7} 6.21×10^{-7}
    Signal Power: -6.9 dBm Noise Power: -34.9 dBm S/N: 28.0 dB

    Margin S/N_1 - S/N_2: 7.0 dB

Test Point B5

Date: 1994 May 06 | Address of Location: Hahn Rd, Mt Pleasant
Cable Location: Aerial | Trunk Cascade: 34 | LE Cascade: 0

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 3+ Level: -32.5 dBm
   Comments on quality and impairments: Beat

2. Off-air NTSC Direct: Impairments: 2 Level: -33.0 dBm
   Comments on quality and impairments: noise

3. Off-air NTSC HIAB: Impairments: 2 Level: -35.4 dBm
   Comments on quality and impairments: noise

4. Local NTSC HIAB: Impairments: 3 Level: -35.0 dBm
   Comments on quality and impairments: beat

5. NTSC Carrier Levels:

Lower Visual:	-33.2 dBm	Lower Aural:	-48.9 dBm	Ratio:	15.7 dB
Test Visual:	-32.7 dBm	Test Aural:	-47.7 dBm	Ratio:	15.0 dB
Upper Visual:	-32.8 dBm	Upper Aural:	-48.6 dBm	Ratio:	15.8 dB

6. NTSC Carrier Level: -1.4 dBm (after amplifier and filter)
   Highest Inband Spurious: -46.2 dBm @ 158.665 MHz
   CTB Level: -69.8 dBm
   Noise Floor: -67.4 dBm (100 kHz BW)

7. Direct Inband Response: 0.4 dB P-V Delay: 66 nsec Total System: 4 dB P-V

8. HIAB Inband Response: 2.4 dB P-V Delay: 215 nsec

9. Direct Connection ATV BER (Rx power -38.6 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: -5.0 dBm Noise Power: -40.0 dBm S/N: 35.0 dB

   BER With noise added to threshold:
   Ch A: 1.81×10^{-6} 1.59×10^{-6} 2.48×10^{-6}
   Ch B: 1.81×10^{-6} 9.08×10^{-7} 8.66×10^{-7}
   Signal Power: -5.0 dBm Noise Power: -33.1 dBm S/N: 28.1 dB

   Margin S/N_1 - S/N_2: 6.9 dB

10. Signal through House-in-a-Box BER (Rx power -40.9 dBm):
    Ch A: 0 0 0
    Ch B: 0 0 0
    Signal Power: -7.3 dBm Noise Power: -40.4 dBm S/N: 33.1 dB

    BER With noise added to threshold:
    Ch A: 1.51×10^{-6} 1.19×10^{-6} 1.73×10^{-6}
    Ch B: 1.57×10^{-6} 2.15×10^{-6} 1.45×10^{-6}
    Signal Power: -7.3 dBm Noise Power: -35.0 dBm S/N: 27.7 dB

    Margin S/N_1 - S/N_2: 5.4 dB

Test Point B6

Date: 1994 May 06 | Address of Location: Shoreview Drive, Cabarrus County
Cable Location: Underground | Trunk Cascade: 32 | LE Cascade: 1

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 3 Level: -29.6 dBm
   Comments on quality and impairments: noise

2. Off-air NTSC Direct: Impairments: 2 Level: -29.8 dBm
   Comments on quality and impairments: noise

3. Off-air NTSC HIAB: Impairments: 2 Level: -32.1 dBm
   Comments on quality and impairments: noise

4. Local NTSC HIAB: Impairments: 3 Level: -32.0 dBm
   Comments on quality and impairments: noise

5. NTSC Carrier Levels:

Lower Visual:	-29.2 dBm	Lower Aural:	-45.5 dBm	Ratio:	16.3 dB
Test Visual:	-29.6 dBm	Test Aural:	-44.7 dBm	Ratio:	15.1 dB
Upper Visual:	-30.4 dBm	Upper Aural:	-46.1 dBm	Ratio:	15.8 dB

6. NTSC Carrier Level: +1.9 dBm (after amplifier and filter)
   Highest Inband Spurious: -40.8 dBm @ 160.015 MHz
   CTB Level: -64.0 dBm
   Noise Floor: -60.7 dBm (100 kHz BW)

7. Direct Inband Response: 0.5 dB P-V Delay: 135 nsec Total Signal: 5 dB P-V

8. HIAB Inband Response: -- dB P-V Delay 144 nsec

9. Direct Connection ATV BER (Rx power -35.6 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: -1.8 dBm Noise Power: 36.6 dBm S/N: 34.8 dB

   BER With noise added to threshold:
   Ch A: 9.77×10^{-7} 6.98×10^{-7} 5.97×10^{-7}
   Ch B: 4.07×10^{-7} 4.82×10^{-7} 6.45×10^{-7}
   Signal Power: -1.8 dBm Noise Power: -30.3 dBm S/N: 28.5 dB

   Margin S/N_1 - S/N_2: 6.3 dB

10. Signal through House-in-a-Box BER (Rx power -37.8 dBm):
    Ch A: 0 0 0
    Ch B: 0 0 0
    Signal Power: -4.2 dBm Noise Power: -39.5 dBm S/N: 35.3 dB

    BER With noise added to threshold:
    Ch A: 9.14×10^{-7} 1.09×10^{-6} 1.61×10^{-6}
    Ch B: 1.40×10^{-6} 1.76×10^{-6} 1.44×10^{-6}
    Signal Power: -4.2 dBm Noise Power: -32.2 dBm S/N: 28.0 dB

    Margin S/N_1 - S/N_2: 7.3 dB

APPENDIX 3

Vision Cable of Albermarle

General System Information

Total Subscribers: 16 000	Miles of Plant: 646	Percent Underground: 5
System Bandwidth: 50-400 MHz	Frequency Plan: IRC	Highest Freq. Used: 403 MHz
Test Channel: 12	Lower Channel: Unmodulated	Upper Channel: Scrambled
Trunk Amp Mfr.: Jerrold	Operating Carrier Levels: 32 dBmV	
Line Extender Mfr.: Jerrold	Operating Carrier Levels: 47/38 dBmV.	
Trunk Cable: .750"	Cable Manufacturer: Trilogy	Age: 1 - 15 years
Distribution Cable: .500"	Cable Manufacturer: Trilogy	Age: 1 - 15 years
Cable Tap & Passives Mfr.: Jerrold		
AML: Hughes Low Power		
Fibre: AM Link		
Channel 53 ATV Rx Level: -48 dBm		
Rx Site: 24.2 miles from transmitter		
Tests Performed By: G. Hovland - CableLabs and G. Krishnamurthy- Zenith		
Director: Brian James, CableLabs		

TEST POINT C1

Date: 1994 May 09,10 Address of Location: Headend - Direct feed

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 4+ Level: - 34.1 dBm
   Comments on quality and impairments: --

2. Off-air NTSC Direct: Impairments: 2+ Level: -35.0 dBm
   Comments on quality and impairments: aural carrier beat

3. Off-air NTSC HIAB: Impairments: 2+ Level: -37.8 dBm
   Comments on quality and impairments: aural carrier beat

4. Local NTSC HIAB: Impairments: 4 Level: -36.5 dBm
   Comments on quality and impairments: slight beat

5. NTSC Carrier Levels:

Lower Visual:	-33.8 dBm	Lower Aural:	-52.4 dBm	Ratio:	18.5 dB
Test Visual:	-34.8 dBm	Test Aural:	-49.2 dBm	Ratio:	14.4 dB
Upper Visual:	-37.0 dBm	Upper Aural:	-54.6 dBm	Ratio:	17.6 dB

6. NTSC Carrier Level: -2.1 dBm (after amplifier and filter)
   Highest Inband Spurious: -43 dBm @ 204.5 MHz
   CTB Level: -73 dBm
   Noise Floor: -68.5 dBm

7. Direct Inband Response: 0.1 dB P-V Delay: 92 nsec Total System: 0 dB P-V

8. HIAB Inband Response: 0.1 dB P-V Delay: 110 nsec

9. Direct Connection ATV BER (Rx power -40.3 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: -15.7 dBm Noise Power: -59.0 dBm S/N_1: 43.4 dB

   BER With noise added to threshold:

   Ch A: 2.19×10^{-6} 2.14×10^{-6} 2.88×10^{-6}
   Ch B: 1.15×10^{-6} 1.18×10^{-6} 1.32×10^{-6}
   Signal Power: -15.7 dBm Noise Power: -43.9 dBm S/N_2: 28.2 dB
   Margin S/N_1 - S/N_2: 15.1 dB

10. No data available.

TEST POINT C2

Date: 1994 May 09,10 Address of Location: Headend AML Test Point

FIELD TEST RESULTS

1. Local NTSC Direct Impairments: 4- Level: -41.8 dBm
   Comments on quality and impairments: noise

2. Off-air NTSC Direct Impairments: 3- Level: -42.9 dBm
   Comments on quality and impairments: beats

3. Off-air NTSC HIAB : Impairments: 3- Level: -45.0 dBm
   Comments on quality and impairments: beats

4. Local NTSC HIAB: Impairments: 4- Level: -44.3 dBm
   Comments on quality and impairments: noise

5. NTSC Carrier Levels:

Lower Visual:	-41.3 dBm	Lower Aural :	-60.4 dBm	Ratio: 19.1 dB
Test Visual:	-43.8 dBm	Test Aural:	-59.2 dBm	Ratio: 15.5 dB
Upper Visual:	-40.9 dBm	Upper Aural:	-61.9 dBm	Ratio: 21.0 dB

6. NTSC Carrier Level: -10.8 dBm (after amplifier and filter)
   Highest Inband Spurious: >-62.8 dBm @ 207.49 MHz
   CTB Level: -70.9 dBm
   Noise Floor: -68 dBm (100 kHz BW)

7. Direct Inband Response: 7 dB P-V Delay: 258 nsec Total System: 3 dB P-V

8. HIAB Inband Response 7 dB P-V Delay: 220 nsec

9. Direct Connection ATV BER (Rx power -49.0 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: - 15.3 dBm Noise Power: - 56.0 dBm S/N: 40.7 dB

   BER With noise added to threshold:
   Ch A: 2.05×10^{-6} 2.23×10^{-6} 2.25×10^{-6}
   Ch B: 2.16×10^{-6} 1.52×10^{-6} 1.23×10^{-6}
   Signal Power: - 15.3 dBm Noise Power: - 43.5 dBm S/N: 28.2 dB

   Margin S/N_1 - S/N_2: 12.5 dB

10. Signal through House-in-a-Box BER (Rx power -52.3 dBm):
    Ch A: 0 0 0
    Ch B: 0 0 0
    Signal Power: -17.8 dBm Noise Power: -55.2 dBm S/N: 37.4 dB

    BER With noise added to threshold:
    Ch A: 1.88×10^{-6} 1.52×10^{-6} 1.92×10^{-6}
    Ch B: 2.24×10^{-6} 2.55×10^{-6} 1.92×10^{-6}
    Signal Power: -17.8 dBm Noise Power: -46.6 dBm S/N: 28.8 dB

    Margin S/N_1 - S/N_2: 8.6 dB

TEST POINT C3

Date: 1994 May 10 Address of Location: 32299 Valley Drive, Badin
Cable Location: Aerial, AML Trunk Cascade: 21 LE Cascade: 0

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 3 Level: -36.6 dBm
   Comments on quality and impairments: noise

2. Off-air NTSC Direct: Impairments: 3- Level: -36.1 dBm
   Comments on quality and impairments: noise, beats

3. Off-air NTSC HIAB: Impairments: 3- Level: -38.8 dBm
   Comments on quality and impairments: noise, beats

4. Local NTSC HIAB: Impairments: 3- Level: -38.8 dBm
   Comments on quality and impairments: noise & beats

5. NTSC Carrier Levels:

Lower Visual:	-33.6 dBm	Lower Aural :	-52.6 dBm	Ratio: 19.0 dB
Test Visual:	-35.9 dBm	Test Aural:	-51.5 dBm	Ratio: 15.5 dB
Upper Visual:	-34.2 dBm	Upper Aural:	-54.5 dBm	Ratio: 20.3 dB

6. NTSC Carrier Level: -14.3 dBm (after amplifier and filter)
   Highest Inband Spurious: -60.6 dBm @ 206.73 MHz
   CTB Level: -78.2 dBm
   Noise Floor: -77.8 dBm

7. Direct Inband Response: 1.6 dB P-V Delay: 350 nsec Total System: 5 dB P-V

8. HIAB Inband Response: -- dB P-V Delay: -- nsec

9. Direct Connection ATV BER (Rx power -40.9 dBm):

Ch A:	0	0	0
Ch B:	0	0	0

   Signal Power: -6.2 dBm Noise Power: -45.0 dBm S/N: 38.8 dB

   BER With noise added to threshold:

Ch A:	1.75×10^{-6}	1.83×10^{-6}	1.68×10^{-6}
Ch B:	5.38×10^{-7}	9.77×10^{-7}	1.19×10^{-6}

   Signal Power: -6.2 dBm Noise Power: -34.9 dBm S/N: 28.7 dB

   Margin S/N_1 - S/N_2: 10.1 dB

10. Signal through House-in-a-Box BER (Rx power -43.3 dBm):

Ch A:	0	0	0
Ch B:	0	0	0

   Signal Power: -9.0 dBm Noise Power: -47.5 dBm S/N: 38.5 dB

   BER With noise added to threshold:

Ch A:	1.90×10^{-6}	2.58×10^{-6}	1.60×10^{-6}
Ch B:	1.83×10^{-6}	2.26×10^{-6}	1.80×10^{-6}

   Signal Power: -9.0 dBm Noise Power: -37.3 dBm S/N: 28.3 dB

   Margin S/N_1 - S/N_2: 10.2 dB

TEST POINT C4

Date: 1994 May 10 Address of Location: 42055 Gurly Rd
Cable Location: Aerial, AML Trunk Cascade: 14 LE Cascade: 2

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 3+ Level: -36.5 dBm
   Comments on quality and impairments: slight noise

2. Off-air NTSC Direct: Impairments: 3- Level: -37.6 dBm
   Comments on quality and impairments: noise

3. Off-air NTSC HIAB: Impairments: 3- Level: -39.8 dBm
   Comments on quality and impairments: noise

4. Local NTSC HIAB : Impairments: 3 Level: -39.5 dBm
   Comments on quality and impairments: noise

5. NTSC Carrier Levels:

Lower visual:	-37.3 dBm	Lower Aural :	-55.4 dBm	Ratio: 18.1 dB
Test Visual:	-36.6 dBm	Test Aural:	-53.3 dBm	Ratio: 16.7 dB
Upper Visual:	-37.0 dBm	Upper Aural:	-58.4 dBm	Ratio: 21.4 dB

6. NTSC Carrier Level: -14.4 dBm (after amplifier and filter)
   Highest Inband Spurious -61.8 dBm @ 207.0 MHz
   CTB Level: -79 dBm
   Noise Floor -76.7 dBm

7. Direct Inband Response: 0.9 dB P-V Delay: 134 nsec Total System: 8 dB P-V

8. HIAB Inband Response: 1.1 dB P-V Delay: 110 nsec

9. Direct Connection ATV BER (Rx power -43.3 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: -8.5 dBm Noise Power: -46.5 dBm S/N: 38.0 dB

   BER With noise added to threshold:
   Ch A: 1.30×10^{-6} 1.07×10^{-6} 9.00×10^{-7}
   Ch B: 1.20×10^{-6} 1.20×10^{-6} 1.02×10^{-6}
   Signal Power: -8.5 dBm Noise Power: -37.3 dBm S/N: 28.8 dB

   Margin S/N_1 - S/N_2: 9.2 dB

10. Signal through House-in-a-Box BER (Rx power -45.8 dBm):
    Ch A: 0 0 0
    Ch B: 0 0 0
    Signal Power: -11.1 dBm Noise Power: -48.3 dBm S/N: 37.2 dB

    BER With noise added to threshold:
    Ch A: 1.37×10^{-6} $1.4[illegible] \times 10^{-6}$ 1.40×10^{-6}
    Ch B: 2.48×10^{-6} $1.78[illegible] \times 10^{-6}$ 1.71×10^{-6}
    Signal Power: -11.1 dBm Noise Power: -39.8 dBm S/N: 28.7 dB
    Margin S/N_1 - S/N_2: 8.5 dB

TEST POINT C5

Date: 1994 May 10 Address of Location: 33835 Rocky River Springs Rd., Aquadale
Cable Location: Aerial Trunk Cascade: 38 LE Cascade: 2

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 3+ Level: -38.7 dBm
   Comments on quality and impairments: noise

2. Off Air NTSC Direct: Impairments: 2+ Level: -38.7 dBm
   Comments on quality and impairments: noise & beats

3. Off-air NTSC HIAB: Impairments: 2+ Level: -41.1 dBm
   Comments on quality and impairments: noise & beats

4. Local NTSC HIAB : Impairments: 3 Level: -41.5 dBm
   Comments on quality and impairments noise

5. NTSC Carrier Levels:

Lower Visual:	-38.7 dBm	Lower Aural :	-56.6 dBm	Ratio: 17.9 dB
Test Visual:	-38.5 dBm	Test Aural:	-54.2 dBm	Ratio: 15.6 dB
Upper Visual:	-48.5 dBm	Upper Aural:	-63.7 dBm	Ratio: 15.2 dB

6. NTSC Carrier Level: -19.8 dBm (after amplifier and filter)
   Highest Inband Spurious: -65.6 dBm @ 206.775 MHz
   CTB Level: -86.4 dBm
   Noise Floor -83.0 dBm (100 kHz BW)

7. Direct Inband Response: 0.4 dB P-V Delay 110 nsec Total System: 8 dB P-V

8. HIAB Inband Response: 3.5 dB P-V Delay 200 nsec

9. Direct Connection ATV BER (Rx power -44.5 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: -9.8 dBm Noise Power: -48.5 dBm S/N: 38.7 dB

   BER With noise added to threshold:
   Ch A: 1.31×10^{-6} 9.83×10^{-7} 1.03×10^{-6}
   Ch B: 8.90×10^{-7} 1.23×10^{-6} 1.19×10^{-6}
   Signal Power: -9.8 dBm Noise Power: -38.6 dBm S/N: 28.8 dB

   Margin S/N_1 - S/N_2: 9.9 dB

10. Signal through House-in-a-Box BER (Rx power -46.9 dBm):
    Ch A: 0 0 0
    Ch B: 0 0 0
    Signal Power: -12.5 dBm Noise Power: -50.1 dBm S/N: 37.6 dB

    BER With noise added to threshold:
    Ch A: 1.87×10^{-6} 1.11×10^{-6} 1.37×10^{-6}
    Ch B: 1.46×10^{-6} 1.05×10^{-6} 1.08×10^{-6}
    Signal Power: -12.5 dBm Noise Power: -41.1 dBm S/N: 28.6 dB

    Margin S/N_1 - S/N_2: 9.0 dB

TEST POINT C6

Date: 1994 May 11 Address of Location: State Road 1546, Wadville
Cable Location: Aerial Trunk Cascade: 39 LE Cascade: 2

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 3+ Level: -34.9 dBm
   Comments on quality and impairments: noise

2. Off-air NTSC Direct: Impairments: 2+ Level: -34.6 dBm
   Comments on quality and impairments: noise

3. Off-air NTSC HIAB: Impairments: 2- Level: -37.2 dBm
   Comments on quality and impairments: noise & beat

4. Local NTSC HIAB: Impairments: 3 Level: -37.1 dBm
   Comments on quality and impairments: noise

5. NTSC Carrier Levels:

Lower Visual:	-32.7 dBm	Lower Aural :	-50.7 dBm	Ratio: 18.0 dB
Test Visual:	-35.1 dBm	Test Aural:	-51.1 dBm	Ratio: 16.1 dB
Upper Visual:	-32.4 dBm	Upper Aural:	-51.1 dBm	Ratio: 18.7 dB

6. NTSC Carrier Level: -11.5 dBm (after amplifier and filter)
   Highest Inband Spurious: -55.5 dBm @ 206.71 MHz
   CTB Level: -72.9 dBm
   Noise Floor: -72.2 dBm (100 kHz BW)

7. Direct Inband Response: 1.0 dB P-V Delay: 76 nsec Total System: 7 dB P-V

8. HIAB Inband Response: 0.9 dB P-V Delay: 80 nsec

9. Direct Connection ATV BER (Rx power -41.3 dBm):
   Ch A: 0 0 0
   Ch B: 0 0 0
   Signal Power: -19.5 dBm Noise Power: -53.9 dBm S/N: 34.4 dB

   BER With noise added to threshold:
   Ch A: 5.97×10^{-6} 7.67×10^{-6} 9.72×10^{-7}
   Ch B: 8.63×10^{-7} 1.26×10^{-6} 1.14×10^{-6}
   Signal Power: -19.5 dBm Noise Power: -48.0 dBm S/N: 28.5 dB

   Margin S/N_1 - S/N_2: 5.9 dB

10. Signal through House-in-a-Box BER (Rx power -43.8 dBm):
    Ch A: 0 0 0
    Ch B: 0 0 0
    Signal Power: -21.9 dBm Noise Power: -55.9 dBm S/N: 34.0 dB

    BER With noise added to threshold:
    Ch A: 1.15×10^{-6} 1.28×10^{-6} 1.45×10^{-6}
    Ch B: 2.24×10^{-6} 1.74×10^{-6} 1.64×10^{-6}
    Signal Power: -21.9 dBm Noise Power: -50.6 dBm S/N: 28.7 dB

    Margin S/N_1 - S/N_2: 5.4 dB

TEST POINT C7

Date: 1994 May 11 Address of Location: 7300 Flowerstore Rd., Midland
Cable Location: Aerial, Fibre Trunk Cascade: 41 LE Cascade: 0

FIELD TEST RESULTS

1. Local NTSC Direct: Impairments: 3+ Level: -32.8 dBm
   Comments on quality and impairments: noise

2. Off-air NTSC Direct: Impairments: 3- Level: -32.5 dBm
   Comments on quality and impairments: noise & beat

3. Off-air NTSC HIAB: Impairments: 2+ Level: -35.5 dBm
   Comments on quality and impairments: noise & beat

4. Local NTSC HIAB : Impairments: 3 Level: -35.3 dBm
   Comments on quality and impairments: noise

5. NTSC Carrier Levels:

Lower Visual:	-33.6 dBm	Lower Aural :	-50.6 dBm	Ratio:	17.0 dB
Test Visual:	-38.4 dBm	Test Aural:	-50.5 dBm	Ratio:	15.1 dB
Upper Visual:	-46.0 dBm	Upper Aural:	-60.2 dBm	Ratio:	14.2 dB

6. NTSC Carrier level: -9.7 dBm (after amplifier and filter)
   Highest Inband Spurious: -54.9 dBm @ 209.150 MHz
   CTB level: -70.0 dBm
   Noise Floor -72.4 dBm

7. Direct Inband Response: 0.7 dB P-V Delay: 180 nsec Total System: 5 dB P-V

8. HIAB Inband Response: 0.7 dB P-V Delay: 85 nsec

9. Direct Connection ATV BER (Rx power -38.6 dBm):

Ch A:	0	0	0
Ch B:	0	0	0

   Signal Power: -18.6 dBm Noise Power: -56.0 dBm S/N: 37.4 dB

   BER With noise added to threshold:

Ch A:	2.34×10^{-6}	1.95×10^{-6}	2.29×10^{-6}
Ch B:	2.31×10^{-6}	1.88×10^{-6}	1.25×10^{-6}

   Signal Power: -18.6 dBm Noise Power: -47.0 dBm S/N: 28.4 dB

   Margin S/N_1 - S/N_2: 9.0 dB

10. Signal through House-in-a-Box BER (Rx power -41.1 dBm):

Ch A:	0	0	0
Ch B:	0	0	0

   Signal Power: -21.3 dBm Noise Power: -58.8 dBm S/N: 37.6 dB

   BER With noise added to threshold:

Ch A:	2.62×10^{-6}	2.54×10^{-6}	2.03×10^{-6}
Ch B:	2.53×10^{-6}	2.6×10^{-6}	2.91×10^{-6}

   Signal Power: -21.3 dBm Noise Power: -49.6 dBm S/N: 28.4 dB

   Margin S/N_1 - S/N_2: 9.2 dB

APPENDIX 4

Cablevision of Rockingham/Hamlet

GENERAL SYSTEM INFORMATION

Total Subscribers: 11,700	Miles of Plant: 411	Percent Underground: 2
System Bandwidth: 50 - 350 MHz	Frequency Plan: STD	Highest Frequency Used: 325 MHz
Test Channel: 42	Lower Channel: Scrambled	Upper Channel: Not used
Trunk Amp Mfr.: Magnavox	Operating Carrier Levels: --	
Line Extender Mfr.: Magnavox	Operating Carrier Levels: --	
Trunk Cable: .750"	Cable Manufacturer: Comm/Scope	Age: 10 years
Distribution Cable: .500"	Cable Manufacturer: Comm/Scope	Age: 10 years
Cable Tap & Passives Mfr.: assorted		
Channel 53 ATV Rx Level: -53 dBm (~10 dB Margin)		
Rx Site: 58.5 miles from transmitter site		
Tests Performed by: G. Hovland - CableLabs and G. Sgrignoli - Zenith		
Director: Brian James, CableLabs		