

Objective Tests

TEST	D	SUB-TEST				NOTES
		Level	OBJ	REC	EO & C	
Objective Tests NTSC Reference <ul style="list-style-type: none"> • Unweighted signal-to-noise ratio • Noise spectrum • Pulse-to-bar ratio • 2T K factor • Luminance non-linearity • Group delay • Frequency Response • Differential Phase • Differential Gain • 12.5T chrominance/luminance gain and delay 	S -26dBm	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓				NDBC ¶2.1 NDBC ¶3.1.1 Make measurements with Tektronix VM-700 at middle of active picture area.
NTSC + (Data broadcasting signal off) <ul style="list-style-type: none"> • Unweighted signal-to-noise ratio • Noise spectrum • Pulse-to-bar ratio • 2T K factor • Luminance non-linearity • Group delay • Frequency Response • Differential Phase • Differential Gain • 12.5T chrominance/luminance gain and delay 	S -26dBm	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓				NDBC ¶2.1 NDBC ¶3.1.1 Make measurements with Tektronix VM-700 at middle of active picture area.
NTSC + (Data broadcasting signal on) <ul style="list-style-type: none"> • Unweighted signal-to-noise ratio • Noise spectrum • Pulse-to-bar ratio • 2T K factor • Luminance non-linearity • Group delay • Frequency Response • Differential Phase • Differential Gain • 12.5T chrominance/luminance gain and delay 	S -26dBm	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓				NDBC ¶2.1 NDBC ¶3.1.1 Make measurements with Tektronix VM-700 at middle of active picture area.

✓ Data to be taken in test plan for National Data Broadcasting Committee proponent systems evaluation.

Quality Tests

TEST	D LVL	SUB-TEST			NOTES
		Rec	Video	Audio *	
<p>Quality</p> <p>NTSC + (Data broadcasting signal off) compared to NTSC Reference</p> <p>NTSC + (Data broadcasting signal on) compared to NTSC Reference</p>	<p>S</p> <p>-15dBm</p>		<p>✓</p> <p>✓</p>	<p>✓</p> <p>✓</p>	<p>NDBC ¶3.1.1</p> <p>3 Video Images, M4, Mannequins; S8, Toys; and S10, Memorial Arch; and 30 seconds of Audio: A8, Male Speech; A3, Glockenspiel; and Silence.</p> <p>1 repeat of each trial.</p> <p>16 receivers for Video & 6 receivers with audio outputs for Audio tests.</p> <p>2x2 Expert Observers</p>
<p>Quality</p> <p>NTSC + (Data broadcasting signal off) compared to NTSC Reference</p> <p>NTSC + (Data broadcasting signal on) compared to NTSC Reference</p>	<p>W</p> <p>-55dBm</p>		<p>✓</p> <p>✓</p>	<p>✓</p> <p>✓</p>	<p>NDBC ¶3.1.1</p> <p>3 Video Images, M4, Mannequins; S8, Toys; and S10, Memorial Arch; and 30 seconds of Audio: A8, Male Speech; A3, Glockenspiel; and Silence.</p> <p>1 repeat of each trial.</p> <p>16 receivers for Video & 6 receivers with audio outputs for Audio tests.</p> <p>2x2 Expert Observers</p>

✓ Data to be taken in test plan for National Data Broadcasting Committee proponent systems evaluation.

Other Tests

TEST	SUB-TEST					NOTES
	OBJ	VIDEO	AUDIO	BER	REC	
Net Bit Rate	✓					NDBC ¶2.1
Real-Time Delay (Latency)	✓					NDBC ¶3.6
Acquisition Time • Method 1	✓					NDBC ¶3.7
Program Recordability • Subjective Test for video/audio degradation • D2 • Betacam • VHS • BER test • D2 • Betacam		✓ ✓ ✓	✓		✓ ✓ ✓	NDBC ¶3.5 Preparation of tape needed for viewing Recordings to be 5 minutes of video images, and up to 1 minute of audio. Digideck, only VHS RF input for VHS. 3 Expert Observers Wavephore only. BER = 1×10^{-5}
Out of Band Emissions RF Spectrum Plots • NTSC Reference • NTSC +	✓ ✓					NDBC ¶3.1.2
Compatibility with Existing VBI Lines Line 21 Closed Captioning • Data broadcasting signal On • Proper decoding of Closed Captioning	✓	✓				NDBC ¶3.1.3 Find min. C/N for error-free decoding.
Line 19 GCR • Data broadcasting signal On	✓					NDBC ¶3.1.3
Archive Recordings • Quality • Multipath - GCR Off - GCR On					✓	As requested by the NDBC Committee

✓ Data to be taken in test plan for National Data Broadcasting Committee proponent systems evaluation.

Legend:

TOV	-	Threshold of Visibility	BER	-	Bit error rate
POU	-	Point of Unusability	REC	-	Recording
RNG	-	Ranging (between TOV and POU)	OBJ	-	Objective
EO&C	-	Expert Observation and Comment			
W	-	Weak signal level	D LVL	-	Desired signal level
M	-	Moderate signal level	U-LVL	-	Undesired signal level
S	-	Strong signal level			

NTSC+ Data into NTSC - NTSC + Data channel interference into NTSC channel
 NTSC into NTSC + Data - NTSC channel interference into NTSC + Data channel
 NTSC+Data into NTSC+Data - NTSC + Data channel interference into NTSC+ Data channel

Multipath Ensembles

Multipath Ensemble	Delay μ s	Attenuation dB	Phase Degrees	Notes
1	0.1	-3.0	-18	Delay and attenuation parameters from Ensemble #G from NTSC Ghost Cancelling tests at CRC.
	1.0	-12.0	314	
	6.0	-17.0	40	
	20.0	-14.0	75	
2	0.2	-14.0	350	Delay and attenuation parameters from Ensemble #B from NTSC Ghost Cancelling tests at CRC
	1.9	-18.0	50	
	3.9	-24.0	0	
	8.2	-22.0	55	
3	1.0	-14.0	360 Degrees in 0.5 secs (2-Hz Rate)	
4	0.1	-10.0	240	Delay and attenuation parameters from Ensemble #F from NTSC Ghost Cancelling tests at CRC
	-0.7	-28.0	30	
	4.0	-30.0	240	

Note: The phases of the individual echoes have been adjusted, in order to equalize the attenuation at the data carrier frequencies of the two systems to be tested. Specifically for Channel 12:

Visual Carrier Frequency = 205.25 MHz.

Digideck Data Carrier = 204.25 MHz (-1.0 MHz).

Wavephore Data Carrier = 209.447 MHz (+4.197 MHz).

TRANSMISSION TESTS

WavePhore System

National Data Broadcasting Committee

**NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE THRESHOLD OF VISIBILITY (TOV)
AND DATA THRESHOLD (BER) TESTS**

Summary of pages 13-23

ATTC Test#	Description		Desired Power (dBm)	Undesired Power (dBm)	Desired to Undesired Ratio (dB)	Time of Test* (HH:MM)
271	Random Noise	BER	-14.88	-59.11	44.23	
290	Co-Channel NTSC into NTSC	TOV	-55	-95.28	40.28	
286	Co-Channel NTSC+ into NTSC	TOV	-55	-95.22	40.22	
275	Co-Channel NTSC into NTSC+	BER	-55.06	-94.58	39.52	
280	Co-Channel NTSC+ into NTSC+	BER	-55.12	-90.88	35.76	16:37
280	Co-Channel NTSC+ into NTSC+	BER	-55.12	-84.88	29.76	16:58
288	Upper Adj Ch NTSC into NTSC	TOV	-55	-46.74	-8.26	
284	Upper Adj Ch NTSC+ into NTSC	TOV	-55	-46.98	-8.02	
276	Upper Adj Ch NTSC into NTSC+	BER	-54.98	-53.12	-1.86	10:32
276	Upper Adj Ch NTSC into NTSC+	BER	-54.98	-53.12	-1.86	10:47
276	Upper Adj Ch NTSC into NTSC+	BER	-54.98	-48.12	-6.86	11:07
276	Upper Adj Ch NTSC into NTSC+	BER	-54.98	-46.12	-8.86	11:31
277	Upper Adj Ch NTSC+ into NTSC+	BER	-54.98	-45	-9.98	
289	Lower Adj Ch NTSC into NTSC	TOV	-55	-60.96	5.96	
285	Lower Adj Ch NTSC+ into NTSC	TOV	-55	-60.01	5.01	
278	Lower Adj Ch NTSC into NTSC+	BER	-54.89	-52.94	-1.95	
279	Lower Adj Ch NTSC+ into NTSC+	BER	-54.92	-53.1	-1.82	

*When a test was repeated on a given day, the completion times are shown.
See detailed data sheets for further explanation.

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE DATA BIT ERROR RATE TEST

Random Noise into NTSC+
ATTC Test # 271
Weak Desired Signal Level

BER Threshold	1.00E-05
Step Size (dB)	1

Actual Desired Level (dBm)	-14.88
Desired to Undesired Ratio at Threshold (dB)	44.23

	+2 dB	+1 dB	Threshold	-1 dB	-2 dB
Undesired Power (dBm)	-57.11	-58.11	-59.11	-60.11	-61.11
Bit Error Rate	NO SYNC	2.44E-05	0.00E+00	0.00E+00	0.00E+00
		1.62E-03	1.66E-05	0.00E+00	0.00E+00
	INVALID MEAS.	2.49E-05	0.00E+00	0.00E+00	0.00E+00

Test Completed: 12/7/94 19:02

Notes:

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE DATA BIT ERROR RATE TEST

Co-Channel NTSC into NTSC+
ATTC Test # 275
Weak Desired Signal Level

BER Thresnoid	1.00E-05
Step size (dB)	1
Actual Desired Level (dBm)	-55.06
Desired to Undesired Ratio at Thresnoid (dB)	39.52

	-2 dB	-1 dB	Thresnoid	-1 dB	-2 dB
Undesired Power (dBm)	-92.58	-93.58	-94.58	-95.58	-96.58
Bit Error Rate	0.00E+00	5.98E-05	0.00E+00	0.00E+00	0.00E+00
	4.26E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	1.50E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Test Completed: 12/7/94 23:47

Notes:

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE DATA BIT ERROR RATE TEST

Co-Channel NTSC+ into NTSC+
ATTC Test # 280
Weak Desired Signal Level

BER Threshold	1.00E-05
Step Size (dB)	1
Actual Desired Level (dBm)	-55.12
Desired to Undesired Ratio at Threshold (dB)	35.76

	-2 dB	+1 dB	Threshold	-1 dB	-2 dB
Undesired Power (dBm)	-88.88	-89.88	-90.88	-91.88	-92.88
Bit Error Rate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Test Completed: 12/8/94 16:37

Notes:

Approximately 6 minutes elapsed between determination of the threshold level and determination of the four levels bracketing the threshold level. Inspection of the data shows an apparent performance improvement over this time period (i.e., no errors were found at either threshold +1dB or threshold +2dB. The proponent attributed the improvement as time elapsed to the adaptive equalizer. The entire test was then repeated.

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE DATA BIT ERROR RATE TEST

Co-Channel NTSC+ into NTSC+
ATTC Test # 280
Weak Desired Signal Level

BER Thresnoid	1.00E-05
Step Size (dB)	1

Actual Desired Level (dBm)	-55.12
Desired to Undesired Ratio at Threshold (dB)	30.76 *

	-2 dB	+1 dB	Threshold	-1 dB	-2 dB
Undesired Power (dBm)	-83.88	-84.88	-85.88	-86.88	-87.88
Bit Error Rate	2.33E-04	0.00E+00	0.00E+00	0.00E+00	2.02E-05
	8.90E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	1.78E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Test Completed: 12/8/94 16:58

Notes:

Repeat of test 21 minutes later, with same impairment condition maintained during interim. According to proponent, improved threshold was obtained due to adaptive equalizer.

* Upon inspection of the test results and analysis of the computer algorithm, it was determined the threshold should have been reported as -84.88 (D/U = 29.76). This correction is reflected in the data summary table.

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE DATA BIT ERROR RATE TEST

Upper Adj Ch NTSC into NTSC+
ATTC Test # 276
Weak Desired Signal Level

BER Thresnoid	1.00E-05
Step Size (dB)	1
Actual Desired Level (dBm)	-54.98
Desired to Undesired Ratio at Thresnoid (dB)	-1.86

	+2 dB	+1 dB	Threshold	-1 dB	-2 dB
Undesired Power (dBm)	-51.12	-52.12	-53.12	-54.12	-55.12
Bit Error Rate	0.00E+00	5.85E-05	0.00E+00	0.00E+00	0.00E+00
	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.80E-05
	1.65E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Test Completed: 12/9/94 10:32

Notes:

Inspection of the data shows random inconsistencies over the range of Threshold +/-2dB. The proponent attributed these random inconsistencies to the Desired signal level being close to the noise floor of the receiver. The test was repeated.

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE DATA BIT ERROR RATE TEST

Upper Adj Ch NTSC into NTSC+
ATTC Test # 276
Weak Desired Signal Level

BER Thresnoid	1.00E-05
Step Size (dB)	1

Actual Desired Level (dBm)	-54.98
Desired to Undesired Ratio at Threshold (dB)	-1.86

	+2 dB	+1 dB	Threshold	-1 dB	-2 dB
Undesired Power (dBm)	-51.12	-52.12	-53.12	-54.12	-55.12
Bit Error Rate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Test Completed: 12/9/94 10:47

Notes:

Repeat of test. Same threshold achieved, but random inconsistencies found in first run did not occur in this repeat.

Approximately 6 minutes elapsed between determination of the threshold level and determination of the four levels bracketing the threshold level. Inspection of the data shows an apparent performance improvement over this time period (i.e., no errors were found at either threshold +1dB or threshold +2dB. The proponent attributed the improvement as time elapsed to the adaptive equalizer. The entire test was then repeated.

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE DATA BIT ERROR RATE TEST

Upper Adj Ch NTSC into NTSC+
ATTC Test # 276
Weak Desired Signal Level

BER Thresnoid	1.00E-05
Step Size (dB)	1

Actual Desired Level (dBm)	-54.98
Desired to Undesired Ratio at Threshold (dB)	-6.86

	-2 dB	-1 dB	Threshold	-1 dB	-2 dB
Undesired Power (dBm)	-46.12	-47.12	-48.12	-49.12	-50.12
Bit Error Rate	4.73E-05	4.22E-05	0.00E+00	3.40E-06	0.00E+00
	4.20E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.19E-05

Test Completed: 12/9/94 11:07

Notes:

Second repeat of test, 20 minutes later, with same impairment condition maintained during interim. According to proponent, improved threshold was obtained due to adaptive equalizer. Random inconsistencies found in initial run also occurred in this repeat. It was suggested that inconsistencies might be due to intentional unlock (drift) between Desired and Undesired video sources. The entire test was repeated with the sources genlocked.

NATIONAL DATA BROADCASTING COMMITTEE WAVEPHORE DATA BIT ERROR RATE TEST

Upper Adj Ch NTSC into NTSC+
ATTC Test # 276
Weak Desired Signal Level

BER Thresnoid	1.00E-05
Step Size (dB)	1

Actual Desired Level (dBm)	-54.98
Desired to Undesired Ratio at Thresnoid (dB)	-8.86

	-2 dB	-1 dB	Threshold	-1 dB	-2 dB
Undesired Power (dBm)	-44.12	-45.12	-46.12	-47.12	-48.12
Bit Error Rate	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.43E-05
	2.47E-05	3.37E-05	0.00E+00	0.00E+00	0.00E+00
	0.00E+00	5.43E-05	0.00E+00	0.00E+00	2.41E-05

Test Completed: 12/9/94 11:31

Notes:

Third repeat of test. 24 minutes later, with same impairment condition maintained during interim, except Desired and Undesired video sources were genlocked. Improved threshold was obtained, but random inconsistencies still occurred. No further runs were attempted.

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE DATA BIT ERROR RATE TEST

Upper Adj Ch NTSC+ into NTSC+
ATTC Test # 277
Weak Desired Signal Level

BER Thresnoid	1.00E-05
Step Size (dB)	1
Actual Desired Level (dBm)	-54.98
Desired to Undesired Ratio at Thresnoid (dB)	-9.98

	-2 dB	-1 dB	Thresnoid	-1 dB	-2 dB
Undesired Power (dBm)	-43	-44	-45	-46	-47
Bit Error Rate	1.38E-05	2.03E+00	0.00E+00	0.00E+00	0.00E+00
	5.60E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	4.88E-05	3.14E-05	0.00E+00	0.00E+00	0.00E+00

Test Completed: 12/8/94 17:54

Notes:

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE DATA BIT ERROR RATE TEST

Lower Adj Ch NTSC into NTSC+
ATTC Test # 278
Weak Desired Signal Level

BER Threshold	1.00E-05
Step Size (dB)	1

Actual Desired Level (dBm)	-54.89
Desired to Undesired Ratio at Threshold (dB)	-1.95

	+2 dB	+1 dB	Threshold	-1 dB	-2 dB
Undesired Power (dBm)	-50.94	-51.94	-52.94	-53.94	-54.94
Bit Error Rate	NO SYNC	2.64E-04	0.00E+00	0.00E+00	0.00E+00
	NO SYNC	2.97E-04	0.00E+00	0.00E+00	0.00E+00
	NO SYNC	1.85E-04	0.00E+00	0.00E+00	0.00E+00

Test Completed: 12/8/94 17:19

Notes:

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE DATA BIT ERROR RATE TEST

Lower Adj Ch NTSC+ into NTSC+
ATTC Test # 279
Weak Desired Signal Level

BER Threshold	1.00E-05
Step Size (dB)	1

Actual Desired Level (dBm)	-54.92
Desired to Undesired Ratio at Threshold (dB)	-1.82

	+2 dB	+1 dB	Threshold	-1 dB	-2 dB
Undesired Power (dBm)	-51.1	-52.1	-53.1	-54.1	-55.1
Bit Error Rate	NO SYNC	2.50E-03	0.00E+00	0.00E+00	0.00E+00
	NO SYNC	2.27E-03	0.00E+00	0.00E+00	0.00E+00
	NO SYNC	NO SYNC	0.00E+00	0.00E+00	0.00E+00

Test Completed: 12/8/94 17:33

Notes:

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE AUDIO QUALITY DEGRADATION

Summary of pages 25, 26

ATTC Test#	LEVEL AT WHICH AUDIO DEGRADATION HEARD WITH RESPECT TO VIDEO TOV (dB)	RECEIVER					
		A1	A6	B1	B4	B5	B7
290	Co-Channel NTSC into NTSC	0.36	1.36	1.36	4.36	5.36	1.36
286	Co-Channel NTSC+ into NTSC	0.31	1.31	-0.69	3.31	2.31	2.31
288	Upper Adj Ch NTSC into NTSC	19.90	5.90	14.90	14.90	9.90	12.90
284	Upper Adj Ch NTSC+ into NTSC	19.92	13.92	14.92	19.92	9.92	16.92

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE CO-CHANNEL TEST - AUDIO

Weak Desired Signal Level

Video FOV Level	-95.28 dBm	Co-Channel NTSC into NTSC Interference into Audio	
Receiver #	Level at which Audio Degradation heard - dBm	Observations	Agreed by 2 or 3 Experts Enter number 2 or 3
A1	-94.92	- HUM THAT MODULATES WITH LEVEL - ONSET OF DISTORTION WITH "ATTACK"	2
A6	-93.92	- BAD HUM IN THIS RECEIVER	2
B1	-93.92		2
B4	-90.92		2
B5	-89.92		2
B7	-93.92		2

Video FOV Level	-95.22 dBm	Co-Channel NTSC+ into NTSC Interference into Audio	
Receiver #	Level at which Audio Degradation heard - dBm	Observations	Agreed by 2 or 3 Experts Enter number 2 or 3
A1	-94.91		2
A6	-93.91		2
B1	-95.91		2
B4	-91.91		2
B5	-92.91		2
B7	-92.91		2

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE UPPER ADJACENT TEST - AUDIO

Weak Desired Signal Level

Video FOV Level	-46.74 dBm	Upper Adjacent NTSC into NTSC Interference into Audio	
Receiver #	Level at which Audio Degradation heard - dBm	Observations	Agreed by 2 or 3 Experts Enter number 2 or 3
A1	-26.84	COMBINATION OF RESIDUAL HUM AND TONAL DISTORTION	2
A6	-40.84	EXCESSIVE HUM CONTRIBUTING TO TONAL BREAKUP	2
B1	-31.84	EXCESSIVE HUM CONTRIBUTING TO TONAL BREAKUP	2
B4	-31.84	EXCESSIVE HUM CONTRIBUTING TO TONAL BREAKUP	2
B5	-36.84	HUM WITH TONAL DISTORTION ON HIGH NOTES	2
B7	-33.84	HUM WITH TONAL DISTORTION ON HIGH NOTES	2

Video FOV Level	-46.98 dBm	Upper Adjacent NTSC+ into NTSC Interference into Audio	
Receiver #	Level at which Audio Degradation heard - dBm	Observations	Agreed by 2 or 3 Experts Enter number 2 or 3
A1	-27.06	COMBINATION OF RESIDUAL HUM AND TONAL DISTORTION	2
A6	-33.06	EXCESSIVE HUM CONTRIBUTING TO TONAL BREAKUP	2
B1	-32.06	EXCESSIVE HUM CONTRIBUTING TO TONAL BREAKUP	2
B4	-27.06	EXCESSIVE HUM CONTRIBUTING TO TONAL BREAKUP	2
B5	-37.06	HUM WITH TONAL DISTORTION ON HIGH NOTES	2
B7	-30.06	HUM WITH TONAL DISTORTION ON HIGH NOTES	2

NATIONAL DATA BROADCASTING COMMITTEE WAVEPHORE IMPULSE NOISE TEST

Moderate Desired Signal Level

ATTC Test#	Description	Desired Power (dBm)	Noise Attenuation @ TOV (dB)
281	Impulse Noise into NTSC	-35	63.04

ATTC Test#	Description	Actual Desired Level (dBm)
282	Impulse Noise into NTSC+	-35.05

# 282 Impulse Noise into NTSC+	Noise into NTSC TOV	TOV -1	TOV +2	TOV +3	TOV +4
Noise Attenuation (dB)	63.04	58.54	55.29	51.79	48.54
Undesired Impulse Noise Level Relative to NTSC TOV (dB)	0	4.5	7.75	11.25	14.5
Bit Error Rate	3.740E-05	NO SYNC	NO SYNC	1.983E-01	2.687E-01
	4.080E-05	NO SYNC	NO SYNC	1.951E-01	2.711E-01
	0.000E+00	NO SYNC	NO SYNC	1.934E-01	2.700E-01

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE MULTIPATH BER TEST

Actual	Desired	Level (dBm)	-38
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	ENSEMBLE 1	ENSEMBLE 2	ENSEMBLE 3	ENSEMBLE 4
Bit Error Rate	NO SYNC	NO SYNC	3.302E-04	0.000E+00
	NO SYNC	5.395E-03	2.992E-04	2.180E-05
	NO SYNC	NO SYNC	0.000E+00	0.000E+00

NATIONAL DATA BROADCASTING COMMITTEE WAVEPHORE MULTIPATH VIDEO TESTS

-38 dBm Desired Signal Level GHOST CANCELING ON

IMAGE #1 Buildings		
MULTIPATH ENSEMBLE	Observer #1	Observer #2
#1	2.0	4.5
	4.0	4.5
#2	2.0	4.0
	3.0	4.0
#3	2.0	3.5
	2.0	3.5
#4	2.5	4.0
	2.5	4.0
NO ENSEMBLE	3.0	4.0
	2.5	4.0

Tektronix Demodulator 1450

System under test exhibits:

- lower resolution (definition of windows)
- more noise in sky area
- shimmering chroma noise on edges of building

Ghost Canceler was effective except for the time varying ghost, which it was unable to handle.

Noise and chroma shift were main reasons for downgrading system, followed by pre/post ringing on "Buildings"

As a supplemental test, the G.C. was bypassed, which resulted in the elimination of one remaining ghost image.

-38 dBm Desired Signal Level GHOST CANCELING OFF

IMAGE #1 Buildings		
MULTIPATH ENSEMBLE	Observer #1	Observer #2
#1	4.5	4.0
	4.5	4.0
#2	4.0	4.0
	4.5	4.0
#3	2.5	3.5
	4.0	3.5
#4	4.0	3.5
	4.5	3.5

Tektronix Demodulator 1450

Test image showed

- (1) loss of resolution (windows on buildings became less distinct)
- (2) less moiré effect than reference
- (3) slight "pattern noise" in sky area

Trials 2 & 6, 4 & 8, - Noticed increased background noise, loss of detail, but improvement in moiré.

NATIONAL DATA BROADCASTING COMMITTEE
WAVEPHORE MULTIPATH AUDIO TESTS

-38 dBm Desired Signal Level
GHOST CANCELING OFF

MULTIPATH ENSEMBLE	SOUND #1 Male Speech		SOUND #2 Glockenspiel		SOUND #3 Silence	
	Observer #1	Observer #2	Observer #1	Observer #2	Observer #1	Observer #2
#1	5.0	5.0	4.0	4.5	5.0	5.0
	5.0	5.0	5.0	4.5	5.0	5.0
#2	5.0	5.0	3.5	5.0	5.0	5.0
	5.0	5.0	5.0	5.0	5.0	5.0
#3	5.0	5.0	4.5	5.0	5.0	5.0
	5.0	5.0	4.5	5.0	5.0	5.0
#4	5.0	5.0	4.5	5.0	5.0	5.0
	5.0	5.0	4.5	5.0	5.0	5.0

Tektronix Demodulator 1450

Notes:

Significantly less noise during test for all sequences. Reference contains high frequency.

Results obtained at identical listening level for Male Speech and Glockenspiel. When level was raised on receiver, the reference silence was noisier and had discrete whistles that were not present in test silence.

TRANSMISSION TESTS

Digideck System

National Data Broadcasting Committee