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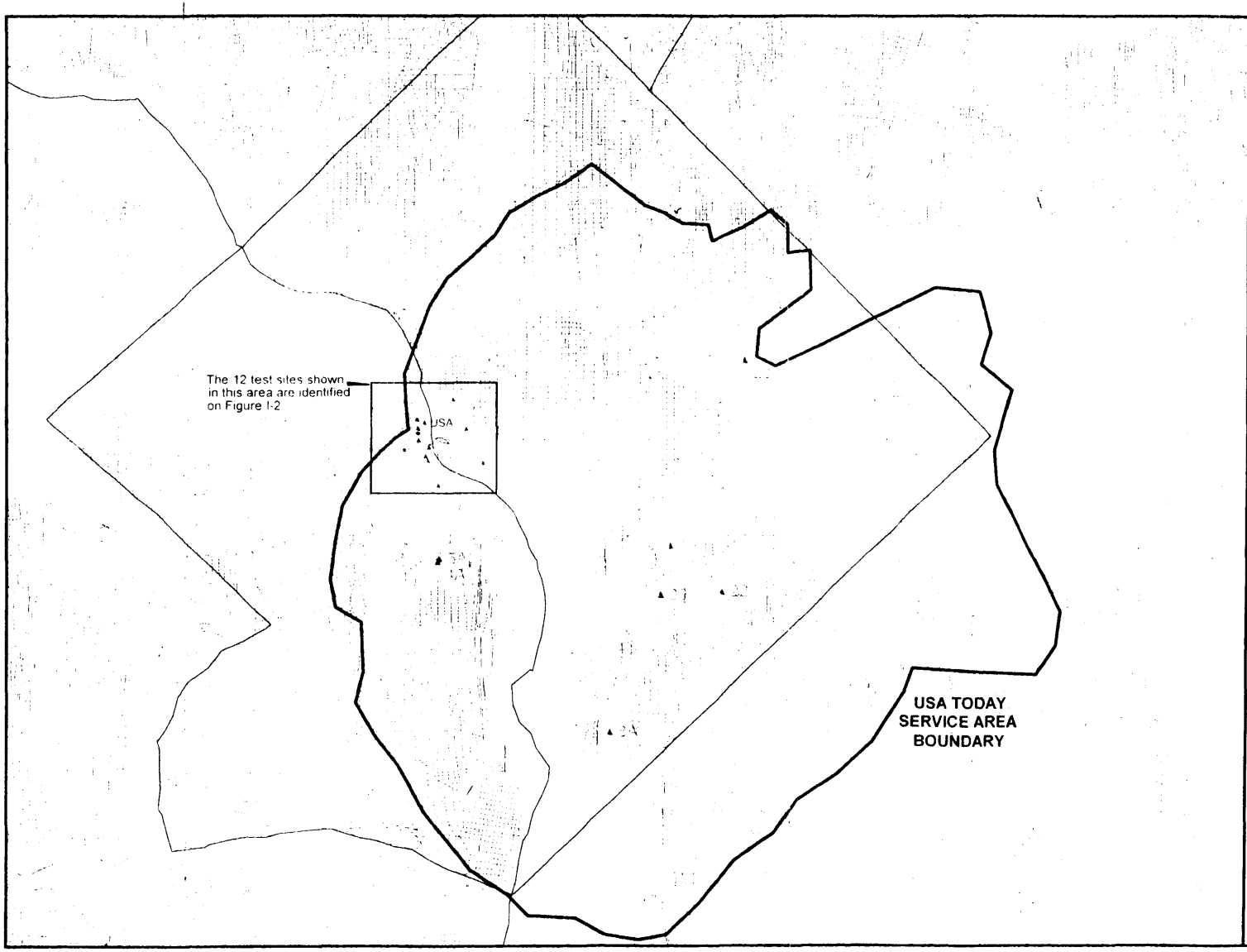
Appendix I

I. Maps of Test Sites and Service Areas



MSITE™: Wash I1.map

Prop. model: Free Space + RMD
Time: 50.0% Loc.: 50.0%
Prediction Confidence Margin: 0.0dB
Climate: Continental Temperate
Groundcover: none
Atmospheric Abs.: none
K Factor: 1.333
RX Antenna - Type: DA
Height: 9.1 m AGL Gain: 31.85 dBd

Site	Ant. Elev. AMSL (m)	ERPd (dBW)	Ant. Type/Orient	Coordinates
USA	118.9	-19.65	DA-H	N38°53'36.00"
group: 1	12500.0000 MHz	113.0		W77°04'07.00"

Notes

CONTOURS
YELLOW: 6 DB C/I MITIGATION ZONE (NONE)
RED: 10 DB C/I MITIGATION ZONE (NONE)
BLUE: 15 DB C/I MITIGATION ZONE
GREEN: 20 DB C/I MITIGATION ZONE

Site: N38-53-36, W77-04-07. EIRP:-17.5 dBW
Antenna Rad. Center: 100m AGL (119m AMSL)

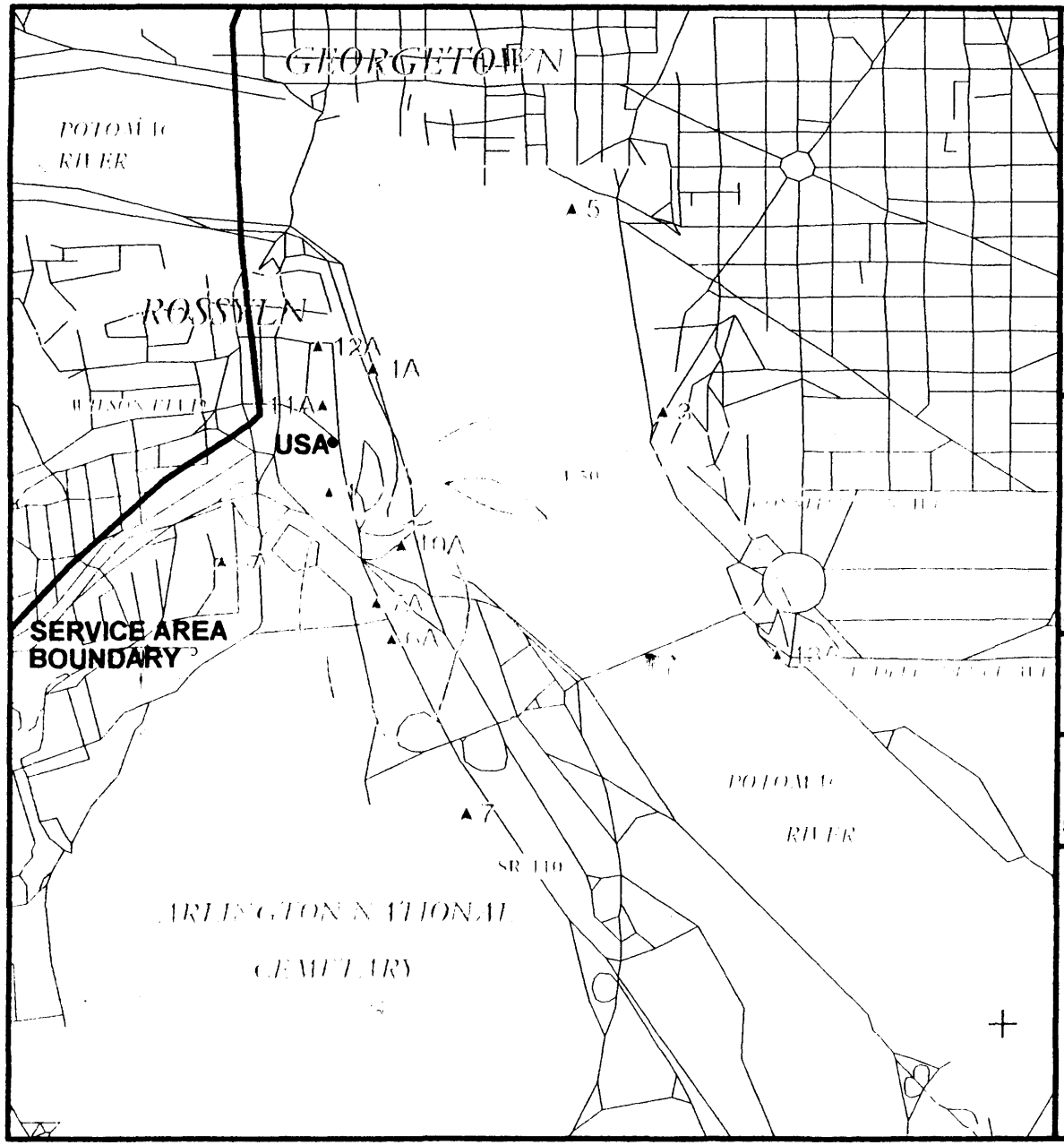
KILOMETERS

-1 0 4

FIGURE I-1

SERVICE AREA, USA TODAY

SATs:61.5,101,110,119 991007



MSITE™: Wash I2.map

Prop. model: Free Space + RMD
Time: 50.0% Loc.: 50.0%
Prediction Confidence Margin: 0.0dB
Climate: Continental Temperate
Groundcover: none
Atmospheric Abs.: none
K Factor: 1.333
RX Antenna - Type: DA
Height: 9.1 m AGL Gain: 31.85 dBd

Site	Ant. Elev. AMSL (m)	ERPd (dBW)	Ant. Type/Orient.	Coordinates
USA	118.9	-19.65	DA-H	N38°53'36.00"
group: 1	12500.0000 MHz	113.0		W77°04'07.00"

Notes

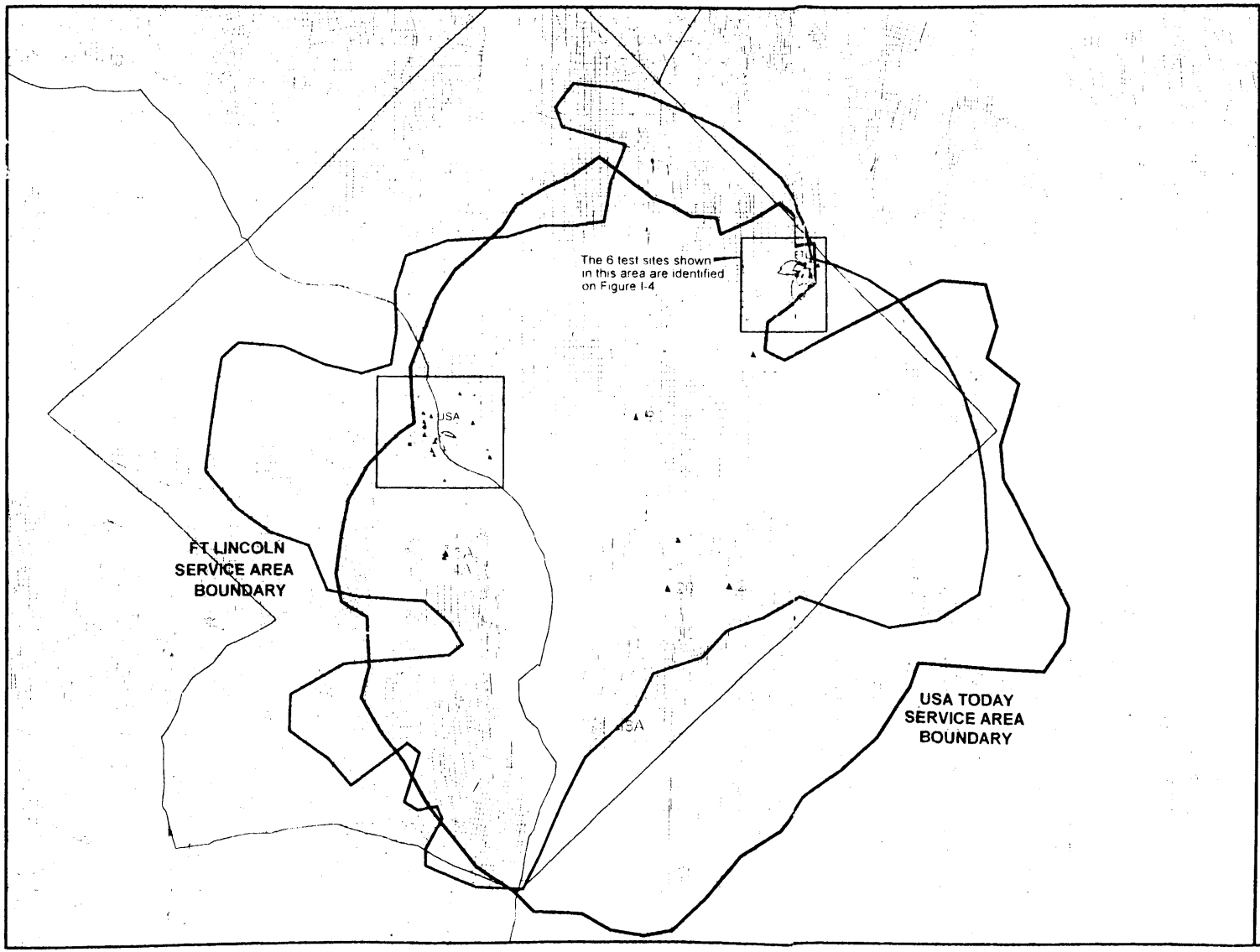
CONTOURS:
YELLOW: 6 DB C/I MITIGATION ZONE (NONE)
RED: 10 DB C/I MITIGATION ZONE (NONE)
BLUE: 15 DB C/I MITIGATION ZONE
GREEN: 20 DB C/I MITIGATION ZONE
*
Site: N38-53-36; W77-04-07; EIRP:-17.5 dBW
Antenna Rad. Center: 100m AGL (119m AMSL)

METERS
-500 0 500

FIGURE I-2

NEAR IN REGION, USA TODAY

SATs:61.5,101,110,119 991007



MSITE™: Wash I3.map

Prop. model: Free Space + RMD
Time: 50.0% Loc.: 50.0%
Prediction Confidence Margin: 0.0dB
Climate: Continental Temperate
Groundcover: none
Atmospheric Abs.: none
K Factor: 1.333
RX Antenna - Type: DA
Height: 9.1 m AGL Gain: 31.85 dBd

Site	Ant. Elev. AMSL (m)	ERPd (dBW)/Orient.	Ant. Type	Coordinates
USA	118.9	-19.65	DA-H	N38°53'36.00"
group: 1	12500.0000 MHz	113.0		W77°04'07.00"
FTL	70.0	-19.65	DA-H	N38°55'42.00"
group: 1	12500.0000 MHz	225.0		W76°57'39.00"

Notes

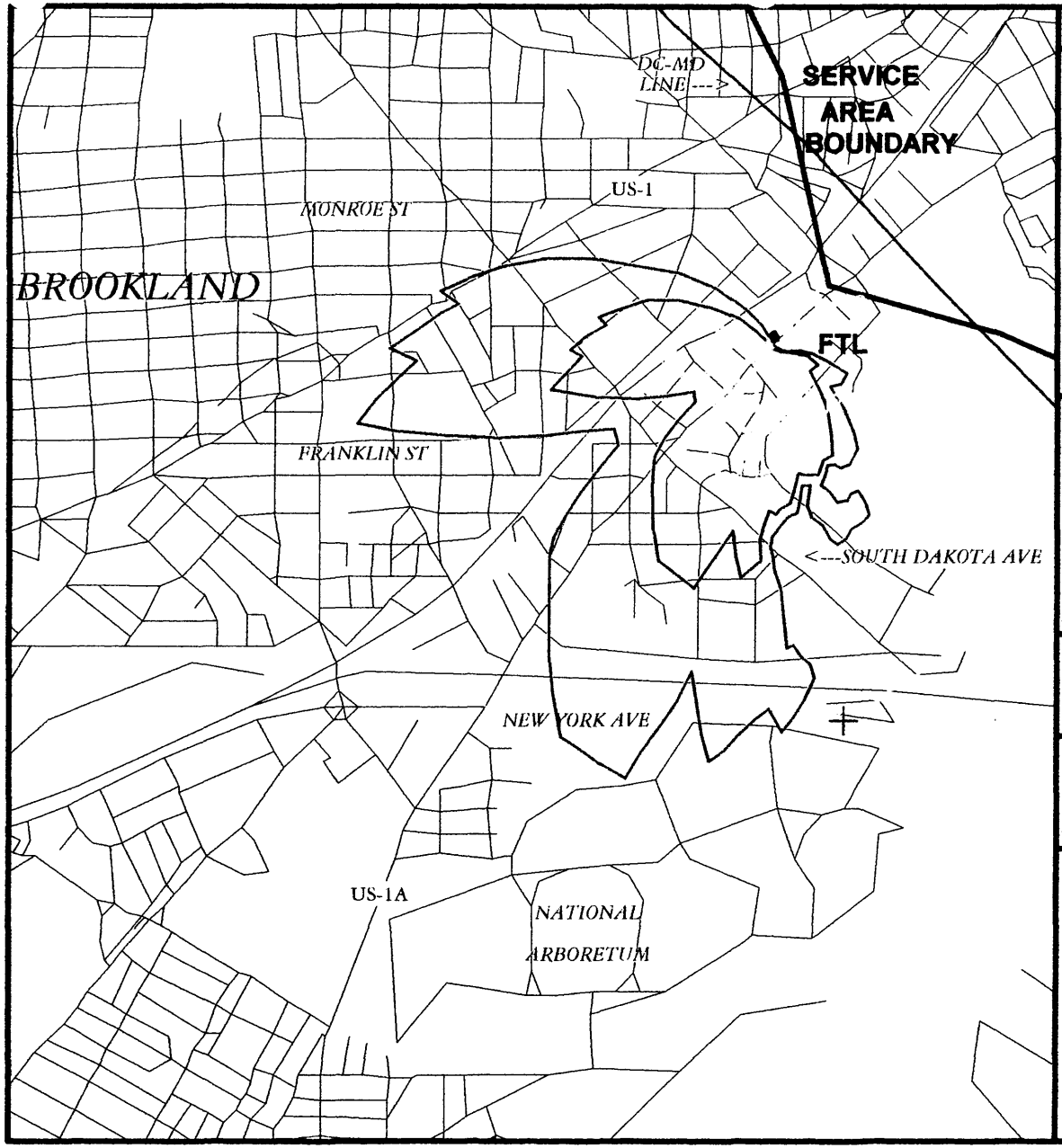
CONTOURS:
YELLOW: 6 DB C/I MITIGATION ZONE
RED: 10 DB C/I MITIGATION ZONE
BLUE: 15 DB C/I MITIGATION ZONE
GREEN: 20 DB C/I MITIGATION ZONE

KILOMETERS
-1 0 4

FIGURE I-3

SERVICE AREA, USA TODAY/FT LINCOLN

SATS:61.5,101.110,119 991007



MSITE™: Wash I4.map

Prop. model: Free Space + RMD
Time: 50.0% Loc.: 50.0%
Prediction Confidence Margin: 0.0dB
Climate: Continental Temperate
Groundcover: none
Atmospheric Abs.: none
K Factor: 1.333
RX Antenna - Type: DA
Height: 9.1 m AGL Gain: 31.85 dBd

Site	Ant. Elev. AMSL (m)	ERPd (dBW)	Ant. Type/Orient.	Coordinates
FTL	70.0	-19.65	DA-H	N38°55'42.00"
group: 1	12500.0000 MHz	225.0		W76°57'39.00"

Notes

CONTOURS:
YELLOW: 6 DB C/I MITIGATION ZONE
RED: 10 DB C/I MITIGATION ZONE
BLUE: 15 DB C/I MITIGATION ZONE
GREEN: 20 DB C/I MITIGATION ZONE
*

Site: N38-55-42; W76-57-39; EIRP:-17.5 dBW
Antenna Rad. Center: 38m AGL (70m AMSL)

METERS
-500 0 500

FIGURE I-4

NEAR IN REGION, FT. LINCOLN

SATs"61.5,101,110,119 991007

Appendix II

II. Equipment Setup and Calibration

General

Figures II-1, II-2, and II-3 show block diagrams of the main instrument systems for this test project. This appendix section will describe the essentials of the equipment and the implementations used. The equipment shown in the figures includes, respectively, the Northpoint transmitter, the repeater, and the field measurement equipment or receiver system. The transmitter and repeater systems were installed at fixed locations for the test, and the receiver system was implemented as a mobile field station for use in monitoring and assessing the DBS satellite and Northpoint signals at numerous geographical locations in the test area.

1. Transmitter System

The Northpoint Transmitter (NPTx) of Figure II-1 is comprised of the following main components:

a. Transmitter unit -- LNR Communications, Inc. model DVE-Ku-1 s/n 164, 1 watt power amplifier w/ digital encoder, QPSK modulation and power level control -- Items (30), (31), (32), (33).

b. Seavy Engineering custom horn antenna w/ 10 dB gain, horizontal polarization, 110 degree horizontal beam width and 17 degree vertical beam width -- Item (35).

c. Andrew EW127 14' wave guide sections with four WR75 flanges -- Item (34).

d. Video sources -- Item (40). Video signal sources during the test consist of local signal sources (camera or color bar generator) and of live signal feeds from certain local TV stations, depending on the project phase, as described in the report text.

e. Directional Coupler -- Item (35). Used to monitor the transmitter power output during transmitter operation.

The HPE4418B / HPE4412A power meter/sensor unit was used to calibrate the NPTx and then to monitor the power during transmitter operation during the tests. A notebook PC computer was employed to log the power meter readings every few seconds via a GPIB interface with the HP power meter.

Setup and Operation

The transmitter was installed on the roof of the USA Today building, with the transmit antenna overhanging the parapet and suspended four feet below the roofline of the building. This installation scheme provided some natural shielding of the Northpoint

signal toward the region behind the antenna and on the rooftop so as not to interfere with roof mounted DBS receiver antennas that were in close proximity to the transmitter. The antenna was pointed in a southerly direction along an azimuth of 113 degrees, with zero degrees of beam tilt. The antenna height was approximately 400 feet AGL.

The transmitter was operated at a nominal power level of 12.5 dBm EIRP and with a typical carrier frequency of 12.47 GHz. The effective operating band corresponds to transponder 18 for all pertinent DBS satellites. The transmit data rate was 27647128 bps for a baud rate of 20000050 symbols per second and a transmit bandwidth of 24 MHz. A manual log was kept of the transmitter operation, including ON/OFF times and output power. In addition, a digital computer file of output power vs. time was produced and archived.

Calibration

On initial setup, the transmitter was calibrated by connecting the HP power meter directly to the output port at the antenna input and in place of the antenna. The power was adjusted so that the Effective Isotropic Radiated Power (EIRP) would be 12.5 dBm when using an antenna with a gain of 10 dBi. The antenna was replaced and the directional coupler output sample was measured with the power meter to determine the value corresponding to the 12.5 dBm output level. The corresponding monitor output level was determined to be -1.5 dBm. This sample was then monitored during the test work and the power was adjusted as required to maintain the intended output level.

2. Repeater System

The Northpoint Repeater (NPRp) of Figure II-2 consists of the following main items:

a. LNR custom repeater unit with in-line attenuator, upconverter, and power amplifier (maximum 2 watts power output), with F (75 ohm) input for L-Band signal, and with WR75 flange output -- Items (22), (23).

b. Band Pass filter in L-Band signal path for band limiting signals and noise produced by the receiving antenna -- Item (24).

c. Seavy Engineering custom horn antenna w/ 10 dB nominal gain, horizontal polarization, 110 degree horizontal beam width and 17 degree vertical beam width -- Item (35).

d. Channel Master 0.9 meter receiving antenna and LNB, with L-Band output -- Item (20).

The HPE4418B / HPE4412A Power Meter / Sensor Unit was used to calibrate the NPRp.

Appendix II

Setup and Operation

The repeater system was installed atop a 10 story apartment building in the Ft. Lincoln area. The repeater unit assembly with transmit antenna was placed on the building parapet, and the receiving antenna was located below the parapet in a position to provide adequate input to output isolation. The receiving antenna was pointed toward the NPTx system. The transmit antenna was pointed at an azimuth of approximately 225 degrees, with zero beam tilt. The antenna height was approximately 125 feet AGL. The pointing direction was such as to direct the repeater output back into the primary service area cell, in order to facilitate worst-case performance tests in regard to overlap of the repeater and the main transmitter signal. During the appropriate test phase, as described in the report text, the repeater was operated continuously when in use, producing an output signal when the NPTx signal was present.

Calibration

The repeater was calibrated by connecting the HP power meter to the WR75 output port (via a flange to N adapter). With the NPTx transmitter ON, the repeater attenuator was adjusted to produce an output power of 2.5 dBm. The transmit antenna was then replaced for operation of the repeater. The L-Band signal was initially monitored with a spectrum analyzer to assess the stability and input/output isolation with the repeater in the operating mode.

3. Receiver System

The Receiver/Test System is described as shown in Figure II-3. Four each DBS antennas were used in order to simultaneously monitor the NPTx signal and each of the three satellites: Direct TV -101 (DTV), Echostar - 61.5 (ES1), and Echostar - 119 (ES2). Signal from the DBS antennas were transmitted by four each RG-6 coax cables (75 ft. length) to the receiver and monitoring systems. Each signal is connected to an appropriate IRD (DBS Receiver) via a power splitter. The alternate output of the splitter for each signal channel is used for sampling and monitoring the signal with the HP8563E spectrum analyzer or the Newtec demodulator box. A video/audio monitor is connected to the IRD for each signal channel used. In the diagram, 5 signal channels are shown, with splitters and IRD's 0 through 5. The channel to signal assignments as shown in the block diagram were consistently used, except as specifically stated otherwise in the logs. Antenna connections were assigned and logged for each measurement according to the cable number. The system component list is as follows:

a. Four each DBS antennas RCA/ DSA100RW with 18 inch dish, specially calibrated to determine the gain over isotropic. The tags identify the antennas used: DBS1, NP2, NP3, NP4.

b. Five each L-Band Power Splitters.

c. Two each RCA IRD's (DSS format) for DirecTV reception.

d. Two each Dish IRD's (DVB format) for Echostar reception.

e. One each Tiernan IRD for NPTx reception.

f. Four each Video/Audio monitors.

g. HP8563E Spectrum Analyzer with 75/50 ohm impedance matching pad.

h. HP2225A Ink Jet printer/plotter.

i. Newtec demodulator unit (provided by Lucent Technologies) for assessment of DVB signal, including Eb/No (signal to noise), link margin, and bit error rate (BER).

j. PC Notebook Computer with software interface for the Newtec demodulator (in-house special package provided by Newtec).

k. Related cables as described in the figure.

l. Motor-Generator unit -- Honda EZ2500 -- 2500 watt, for AC electrical power.

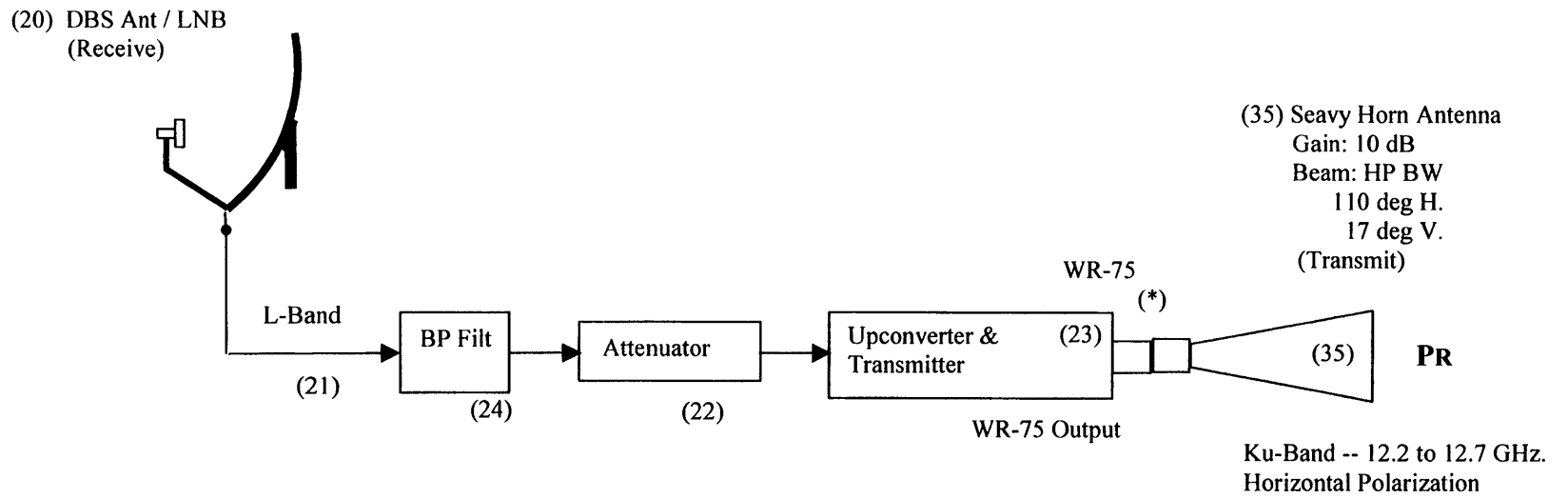
Setup and Operation

The mobile Receiver System was implemented in a 15 passenger Ford van. A towable hydraulic boom lift was used to implement the antenna platform. The four DBS antenna mounts were installed on specially constructed platforms on the boom lift carriage, with one antenna at each of the four corners of the carriage basket. Signal cables were routed along the boom to allow for elevated operation of the boom when needed for NP signal acquisition. A specially modified DBS antenna mount was used for the NP antenna to allow for the lower elevation angles normally required for the terrestrial signal. A motor-generator was mounted on the boom lift frame and used for electrical power for the system.

This mobile unit was used to acquire the test data for most measurement sites in the test, except for sites not accessible by the van (e.g. building rooftops). In cases of such inaccessible sites, the appropriate equipment was removed from the instrument van and hand carried to the site and assembled and used.

Calibration

The four antennas and the related signal channels were calibrated in terms of the equivalent gain over isotropic, in order to allow for quantitative assessment of the signal and the signal spectrum as viewed by the spectrum analyzer. D. R. Word Associates specially calibrated the four DBS antennas used.



(21) RG-6/ Sat / Foam Coax
Length 75'.

(22) Attenuator -- adjust to set
output power.

(24) BP Filter -- Band Pass Filter
to attenuate out-of-band signal.

(36), (38), (39)

Repeater Cal. Setup – For 12.5 dBm EIRP out: During calibration, the adapter (36) is connected to the WR-75 flange on Tx waveguide output (*) in place of the antenna and the power is set to 2.5 dBm.
The Tx Horn Antenna is then connected to the Output for normal operation.

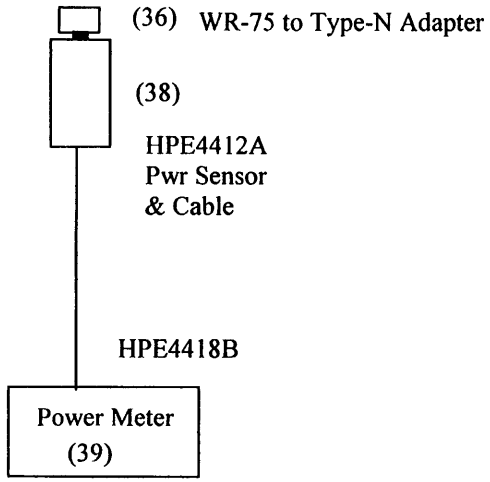


Fig. II-2: Northpoint Terrestrial Repeater Block Diagram.

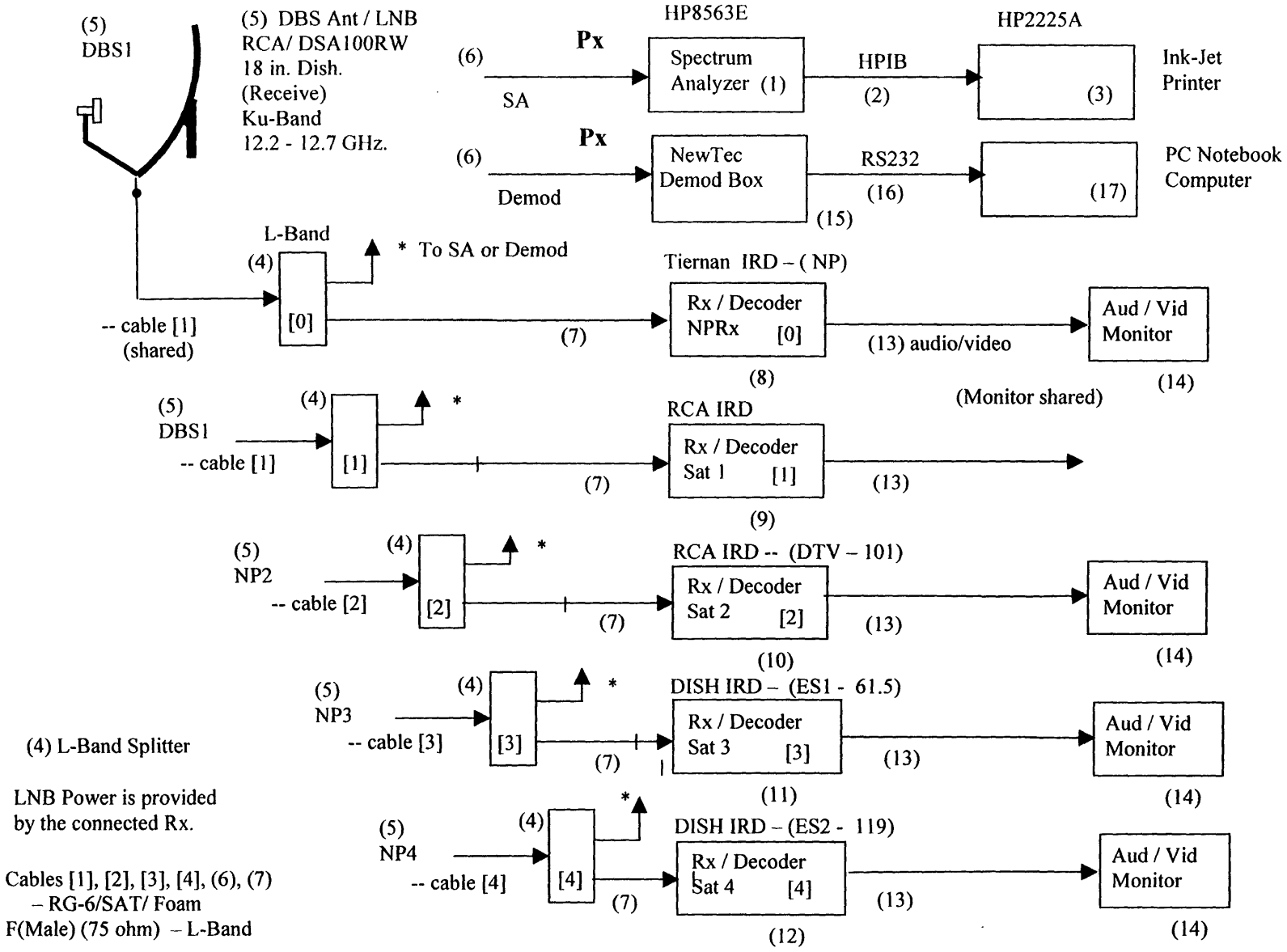


Fig. II-3: Mobile Receiver System Block Diagram

Appendix II

The four DBS antennas were found to agree in gain to within 1 dB, and the average gain at the LNB outputs is 90.4 dB over isotropic. For the system conditions in use, the signal transmission elements of concern to the calibration are as follows:

a. Cables	--	(-6 dB).
b. Splitters	--	(-4 dB).
c. Cables (*) to SA	--	(-0.6 dB).

Thus, the gain calibration at the end of the cable to the Spectrum analyzer (*) in the figure is 79.8 dB over isotropic.

For the HP8563E spectrum analyzer (SA), the input impedance is 50 ohms, and a matching pad was used to monitor the DBS signals with 75 ohm output impedance. The matching pad insertion loss is 5.7 dB, requiring a gain correction of -5.7 dB for the SA readings.

The overall system gain as applied to the SA readings is 74.1 dB over isotropic.

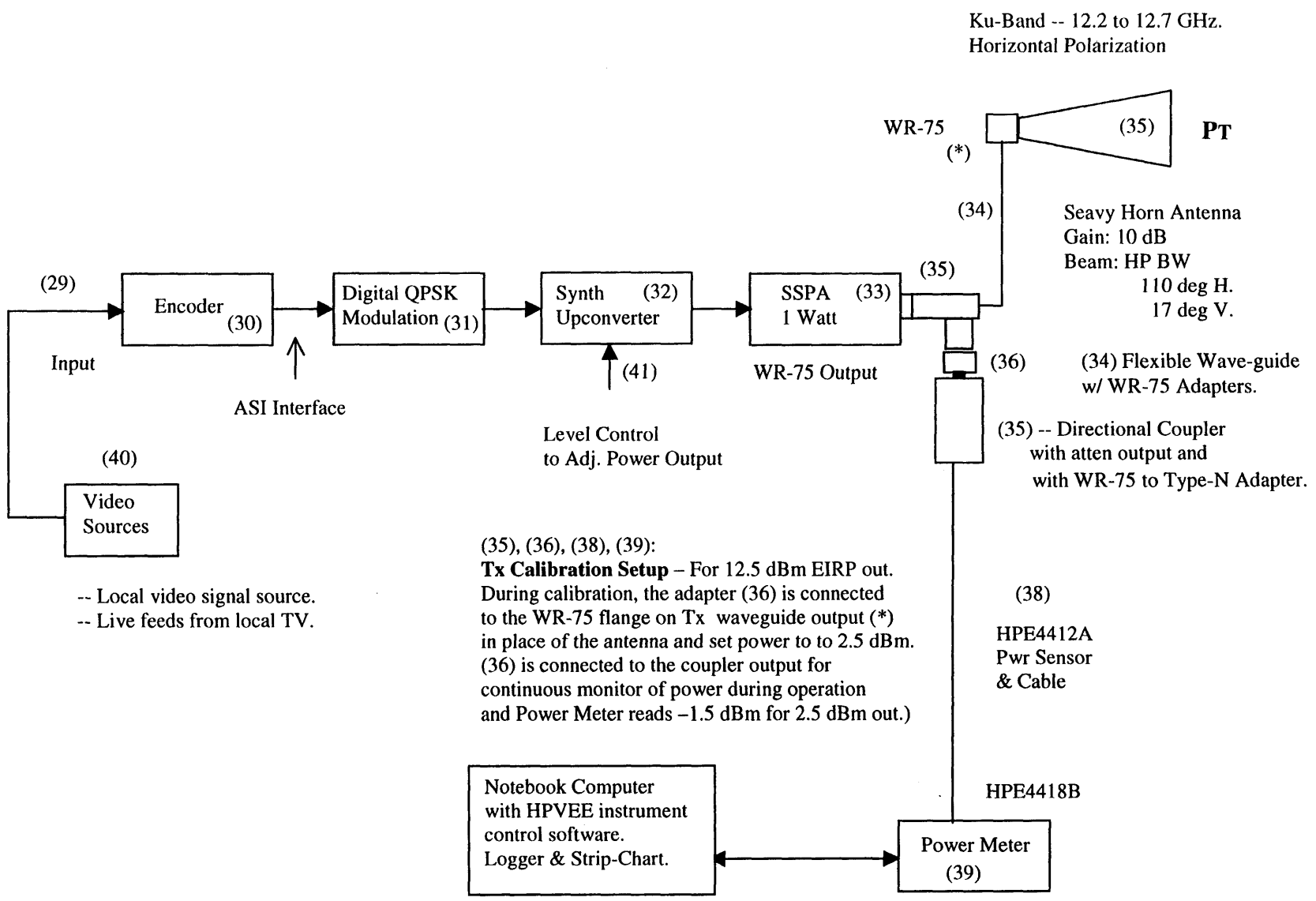


Fig. II-1: Northpoint Terrestrial Transmitter Block Diagram.

Appendix III

III. Field Data and Analysis

Table III-1. Transmitter Test Coordinates (with polar position from transmitter)

Site No.	Site Name	Range (miles)	Range (km)	Azimuth (deg)	Elevation AMSL (m)	Latitude Deg	Longitude Deg
-	Transmitter	0.00	0.00	0.0	134.4	38.89333	77.06861
11A	London House Rooftop	0.09	0.14	339.0	55.5	38.89453	77.06917
1	River Place Apts.	0.11	0.17	189.6	19.8	38.89181	77.06889
1A	Roosevelt Island	0.18	0.29	26.0	12.2	38.89569	77.06714
12A	Normandy House Rooftop	0.22	0.35	349.1	54.9	38.89642	77.06936
10A	Federal Construction Site	0.26	0.42	147.2	9.1	38.89014	77.06597
3A	Nash & 14th Street	0.35	0.57	223.8	18.3	38.88961	77.07319
7A	Rt. 110 & Marshall (median)	0.36	0.58	165.5	12.2	38.88828	77.06694
6A	Rt. 110 & Marshall (shoulder)	0.44	0.71	163.9	11.3	38.88717	77.06633
3	Kennedy Center	0.73	1.17	83.5	6.1	38.89453	77.05525
5	Thompson Boat Center	0.74	1.19	47.4	6.1	38.90056	77.05853
7	Arlington Cemetery	0.86	1.38	160.5	11.0	38.88164	77.06331
13A	West Potomac	1.06	1.71	115.7	4.6	38.88639	77.04997
5A	S. Joyce & Army-Navy #2	1.96	3.15	170.9	15.5	38.86539	77.06289
2A	Arlington Ridge Road	1.98	3.18	176.4	39.6	38.86478	77.06631
4A	S. Joyce & Army-Navy	2.00	3.21	172.0	17.7	38.86469	77.06344
19	Anacostia Park	4.20	6.76	114.4	4.6	38.86822	76.99750
20	St. Elizabeth Hospital	4.44	7.15	124.1	48.8	38.85731	77.00022
23	National Arboretum	5.06	8.14	77.4	51.8	38.90925	76.97669
22	Our Lady of Perpetual Help	5.21	8.39	117.9	81.7	38.85794	76.98292
8A	Fort Greble	5.44	8.75	147.6	51.8	38.82686	77.01442
9A	Value Inn	8.25	13.27	184.6	73.1	38.77436	77.08089

Table III-2. Repeater Test Coordinates (with polar position from repeater)

Site No.	Site Name	Range (miles)	Range (km)	Azimuth (deg)	Elevation AMSL (m)	Latitude (Deg)	Longitude (Deg)
-	Repeater	0.00	0.00	0.0	69.8	38.928333	76.96083
R1	7/11 Bladensburg	0.18	0.29	237.3	29.9	38.926944	76.96361
R2	Goodyear	0.04	0.06	301.3	29.6	38.928611	76.96139
R3	Post Office	0.14	0.22	33.1	28.3	38.930000	76.95944
R4	Banniker Dr.	0.13	0.21	207.7	33.5	38.926667	76.96194
R5	Wash. Overlook	0.13	0.21	79.6	33.5	38.928889	76.95694
R6	Ft. Lincoln Dr	0.13	0.21	152.4	50.3	38.926667	76.95972
R7	400 North Capital	3.48	5.60	229.0	12.2	38.895278	77.00972

Appendix III

Table III-3. Spectrum Analyzer Power Levels (dBm - 1 MHz)

				Northpoint		DBS (Northpoint Off)			DBS (Northpoint On)		
Date	Ph.	Site	Site Name	Trans.	Rep.	DTV	E61.5	E119	DTV	E61.5	E119
13-Aug	I	11A	London House Rooftop	-74.0			-63.7	-63.7		-63.3	-63.5
4-Aug	I	1	River Place Apts.	-56.2		-64.3	-64.7	-65.7	-64.2	-65.2	-65.5
14-Aug	I	1	River Place Apts.	-51.2		-65.7	-65.7	-66.3	-65.8	-65.7	-67.0
18-Aug	I	1	River Place Apts.	-51.0				-66.8			-66.5
4-Aug	I	1A	Roosevelt Island	-51.0		-64.7	-65.3	-63.7	-64.8	-66.2	-64.2
17-Aug	I	1A	Roosevelt Island	-51.2		-67.5		-67.0	-67.0		-66.8
13-Aug	I	12A	Normandy House Rooftop	*		-66.8	-65.7	-66.7	-65.3	-65.3	-66.3
12-Aug	I	10A	Federal Construction Site	-50.3		-66.3	-66.5	-66.5	-66.3	-66.5	-65.3
16-Aug	I	10A	Federal Construction Site	-50.8		-67.5	-65.2	-66.5	-67.2	-65.8	-66.5
10-Aug	I	3A	Nash & 14th Street	*			-63.8			-63.8	
11-Aug	I	7A	Rt. 110 & Marshall (median)	-49.3		-65.5	-65.7	-64.7	-65.7	-65.5	-65.0
11-Aug	I	6A	Rt. 110 & Marshall (shoulder)	-49.5		-66.0	-64.5		-66.2	-64.8	
6-Aug	I	3	Kennedy Center	-51.5		-65.9	-66.0	-64.0	-65.5	-66.2	-64.3
14-Aug	I	3	Kennedy Center	-50.5		-66.2	-66.5	-66.7	-66.2	-66.7	-66.2
17-Aug	I	3	Kennedy Center	-48.2		-66.2	-66.3	-67.5	-65.7	-66.2	-66.8
18-Aug	I	3	Kennedy Center	-51.0		-66.3	-66.3	-68.5	-66.2	-66.3	-68.3
9-Aug	I	5	Thompson Boat Center	-54.0		-64.5	-66.0		-64.0	-66.8	
4-Aug	I	7	Arlington Cemetery	-49.7		-66.7	-64.5	-65.5	-66.8	-65.0	-65.8
12-Aug	I	7	Arlington Cemetery	-51.0		-65.2	-65.3	-68.0	-65.0	-64.7	-68.3
18-Aug	I	7	Arlington Cemetery	-50.8				-67.5			-67.3
23-Aug	I	7	Arlington Cemetery	-51.2		-66.2	-65.8	-67.7	-66.5	-66.3	-67.5
10-Aug	I	5A	S. Joyce & Army-Navy #2	-60.3		-64.5	-68.0	-65.3	-64.7	-68.7	-65.7
5-Aug	I	2A	Arlington Ridge Road	-66.7		-65.0		-65.5	-64.5		-66.3
10-Aug	I	4A	S. Joyce & Army-Navy	*		-65.8	-64.8	-65.7	-66.3	-65.5	-65.8
16-Aug	I	19	Anacostia Park	-65.0		-66.8	-65.2	-68.3	-66.8	-65.3	-69.0
9-Aug	I	20	St. Elizabeth Hospital	-61.8		-65.0	-66.2	-63.5	-64.5	-66.5	-63.5
10-Aug	I	23	National Arboretum	-63.0		-65.7	-65.0	-66.5	-65.8	-64.3	-66.3
5-Aug	I	22	Our Lady of Perpetual Help	-62.7		-65.3	-66.7	-64.2	-64.0	-66.5	-63.8
11-Aug	I	8A	Fort Greble	-68.5		-65.0	-67.0	-64.3	-65.0	-67.2	-64.0
11-Aug	I	8A-A	Fort Greble	-65.3		-65.7	-67.2	-63.7	-65.3	-67.7	-64.2
11-Aug	I	9A	Value Inn	-72.3		-65.0	-66.7	-66.3	-65.5	-66.7	-66.2
27-Aug	II	7	Arlington Cemetery	-51.7		-66.8	-66.3	-66.8	-66.0	-65.8	-67.3
2-Sep	III	R2	Goodyear		-62.0	-67.7	-65.8	-68.3	-67.3	-65.7	-68.2
3-Sep	III	R4	Banniker Dr.		-47.5	-66.8	-65.8	-68.7	-67.7	-66.2	-67.0
3-Sep	III	R5	Wash. Overlook		*						
3-Sep	III	R6	Ft. Lincoln Dr		-43.2	-66.7	-66.3	-66.8	-66.2	-66.3	-66.8
3-Sep	III	R3	Post Office		*						
2-Sep	III	R1	7/11 Bladensburg		-41.2	-66.5	-65.5	-66.7	-66.7	-65.3	-65.5
6-Sep	III	10A	Federal Construction Site	-49.6		-67.8	-66.8	-68.3	-67.5	-65.8	-67.8
6-Sep	III	3	Kennedy Center	-47.8		-67.0	-67.8	-69.7	-67.5	-67.8	-69.3
4-Sep	III	7	Arlington Cemetery	-51.2		-67.2	-66.7	-68.0	-66.8	-67.0	-68.2
16-Sep	III	7	Arlington Cemetery (Rain)	-52.2							
27-Sep	III	13A	West Potomac	-55.7		-68.5	-66.7	-67.8	-68.2	-66.8	-68.2
5-Sep	III	R7	400 North Capital	-66.7	-69.5	-70.5	-68.3	-69.0	-70.0	-66.5	-68.6
	All Data		Average			-66.24	-65.95	-66.49	-66.07	-66.00	-66.39
			Standard Deviation			1.25	1.05	1.66	1.27	1.08	1.58

* Not found

Appendix III

Table III-4. Isotropic Power Levels (dBmi - 24 MHz)

				Northpoint		DBS (Northpoint Off)			DBS (Northpoint On)		
Date	Ph.	Site	Site Name	Trans.	Rep.	DTV	E61.5	E119	DTV	E61.5	E119
13-Aug	I	11A	London House Rooftop	-134.0			-124.3	-124.3		-123.9	-124.1
4-Aug	I	1	River Place Apts.	-116.2		-124.9	-125.3	-126.3	-124.8	-125.8	-126.1
14-Aug	I	1	River Place Apts.	-111.2		-126.3	-126.3	-126.9	-126.4	-126.3	-127.6
18-Aug	I	1	River Place Apts.	-111.0				-127.4			-127.1
4-Aug	I	1A	Roosevelt Island	-111.0		-125.3	-125.9	-124.3	-125.4	-126.8	-124.8
17-Aug	I	1A	Roosevelt Island	-111.2		-128.1		-127.6	-127.6		-127.4
13-Aug	I	12A	Normandy House Rooftop	*		-127.4	-126.3	-127.3	-125.9	-125.9	-126.9
12-Aug	I	10A	Federal Construction Site	-110.3		-126.9	-127.1	-127.1	-126.9	-127.1	-125.9
16-Aug	I	10A	Federal Construction Site	-110.8		-128.1	-125.8	-127.1	-127.8	-126.4	-127.1
10-Aug	I	3A	Nash & 14th Street	*			-124.4			-124.4	
11-Aug	I	7A	Rt. 110 & Marshall (median)	-109.3		-126.1	-126.3	-125.3	-126.3	-126.1	-125.6
11-Aug	I	6A	Rt. 110 & Marshall (shoulder)	-109.5		-126.6	-125.1		-126.8	-125.4	
6-Aug	I	3	Kennedy Center	-111.5		-126.5	-126.6	-124.6	-126.1	-126.8	-124.9
14-Aug	I	3	Kennedy Center	-110.5		-126.8	-127.1	-127.3	-126.8	-127.3	-126.8
17-Aug	I	3	Kennedy Center	-108.2		-126.8	-126.9	-128.1	-126.3	-126.8	-127.4
18-Aug	I	3	Kennedy Center	-111.0		-126.9	-126.9	-129.1	-126.8	-126.9	-128.9
9-Aug	I	5	Thompson Boat Center	-114.0		-125.1	-126.6		-124.6	-127.4	
4-Aug	I	7	Arlington Cemetery	-109.7		-127.3	-125.1	-126.1	-127.4	-125.6	-126.4
12-Aug	I	7	Arlington Cemetery	-111.0		-125.8	-125.9	-128.6	-125.6	-125.3	-128.9
18-Aug	I	7	Arlington Cemetery	-110.8				-128.1			-127.9
23-Aug	I	7	Arlington Cemetery	-111.2		-126.8	-126.4	-128.3	-127.1	-126.9	-128.1
10-Aug	I	5A	S. Joyce & Army-Navy #2	-120.3		-125.1	-128.6	-125.9	-125.3	-129.3	-126.3
5-Aug	I	2A	Arlington Ridge Road	-126.7		-125.6		-126.1	-125.1		-126.9
10-Aug	I	4A	S. Joyce & Army-Navy	*		-126.4	-125.4	-126.3	-126.9	-126.1	-126.4
16-Aug	I	19	Anacostia Park	-125.0		-127.4	-125.8	-128.9	-127.4	-125.9	-129.6
9-Aug	I	20	St. Elizabeth Hospital	-121.8		-125.6	-126.8	-124.1	-125.1	-127.1	-124.1
10-Aug	I	23	National Arboretum	-123.0		-126.3	-125.6	-127.1	-126.4	-124.9	-126.9
5-Aug	I	22	Our Lady of Perpetual Help	-122.7		-125.9	-127.3	-124.8	-124.6	-127.1	-124.4
11-Aug	I	8A	Fort Greble	-128.5		-125.6	-127.6	-124.9	-125.6	-127.8	-124.6
11-Aug	I	8A-A	Fort Greble	-125.3		-126.3	-127.8	-124.3	-125.9	-128.3	-124.8
11-Aug	I	9A	Value Inn	-132.3		-125.6	-127.3	-126.9	-126.1	-127.3	-126.8
27-Aug	II	7	Arlington Cemetery	-111.7		-127.4	-126.9	-127.4	-126.6	-126.4	-127.9
2-Sep	III	R2	Goodyear		-122.0	-128.3	-126.4	-128.9	-127.9	-126.3	-128.8
3-Sep	III	R4	Banniker Dr.		-107.5	-127.4	-126.4	-129.3	-128.3	-126.8	-127.6
3-Sep	III	R5	Wash. Overlook		*						
3-Sep	III	R6	Ft. Lincoln Dr		-103.2	-127.3	-126.9	-127.4	-126.8	-126.9	-127.4
3-Sep	III	R3	Post Office		*						
2-Sep	III	R1	7/11 Bladensburg		-101.2	-127.1	-126.1	-127.3	-127.3	-125.9	-126.1
6-Sep	III	10A	Federal Construction Site	-109.6		-128.4	-127.4	-128.9	-128.1	-126.4	-128.4
6-Sep	III	3	Kennedy Center	-107.8		-127.6	-128.4	-130.3	-128.1	-128.4	-129.9
4-Sep	III	7	Arlington Cemetery	-111.2		-127.8	-127.3	-128.6	-127.4	-127.6	-128.8
16-Sep	III	7	Arlington Cemetery (Rain)	-112.2							
27-Sep	III	13A	West Potomac	-115.7		-129.1	-127.3	-128.4	-128.8	-127.4	-128.8
5-Sep	III	R7	400 North Capital	-126.7	-129.5	-131.1	-128.9	-129.6	-130.6	-127.1	-129.2

* Not found

Appendix III

Table III-5. SSP Indications

				DBS (Northpoint Off)			DBS (Northpoint On)		
Date	Phase	Site	Site Name	DTV	E61.5	E119	DTV	E61.5	E119
13-Aug	Phase I	11A	London House Rooftop		90.3	86.4		92.4	86.4
4-Aug	Phase I	1	River Place Apts.	87.4	98.6	88.9	84.7	98.0	87.6
14-Aug	Phase I	1	River Place Apts.	82.0	92.2	89.0	76.9	91.1	87.4
18-Aug	Phase I	1	River Place Apts.			88.8			87.7
4-Aug	Phase I	1A	Roosevelt Island	82.8	85.2	95.7	80.9	80.8	96.1
17-Aug	Phase I	1A	Roosevelt Island	74.7		87.5	72.2		86.8
13-Aug	Phase I	12A	Normandy House Rooftop	84.1	95.8	91.1	82.9	96.2	91.4
12-Aug	Phase I	10A	Federal Construction Site	81.6	87.6	88.1	84.0	87.4	88.4
16-Aug	Phase I	10A	Federal Construction Site	77.1	96.9	89.3	77.9	94.3	89.7
10-Aug	Phase I	3A	Nash & 14th Street		95.0			95.6	
11-Aug	Phase I	7A	Rt. 110 & Marshall (median)	80.8	88.0	94.4	75.8	88.0	95.2
11-Aug	Phase I	6A	Rt. 110 & Marshall (shoulder)	78.2	95.4		73.6	94.3	
6-Aug	Phase I	3	Kennedy Center	82.0	91.0	98.0	81.4	90.5	97.1
14-Aug	Phase I	3	Kennedy Center	82.7	91.8	88.7	81.1	91.1	88.1
17-Aug	Phase I	3	Kennedy Center	80.6	92.1	88.7	78.9	91.8	87.0
18-Aug	Phase I	3	Kennedy Center	80.4	93.4	81.7	80.5	94.3	81.7
9-Aug	Phase I	5	Thompson Boat Center	85.3	89.5		85.2	89.8	
4-Aug	Phase I	7	Arlington Cemetery	78.3	90.2	87.1	72.7	90.3	88.5
12-Aug	Phase I	7	Arlington Cemetery	80.2	95.5	78.1	78.0	94.8	78.2
18-Aug	Phase I	7	Arlington Cemetery			88.8			87.7
23-Aug	Phase I	7	Arlington Cemetery	80.6	95.4	89.2	80.7	95.7	88.7
10-Aug	Phase I	5A	S. Joyce & Army-Navy #2	80.4	74.8	89.3	81.2	78.6	91.1
5-Aug	Phase I	2A	Arlington Ridge Road	77.7		87.0	79.5		86.3
10-Aug	Phase I	4A	S. Joyce & Army-Navy	75.4	92.5	89.0	75.9	92.8	89.0
16-Aug	Phase I	19	Anacostia Park	80.5	94.1	80.7	81.6	94.4	79.9
9-Aug	Phase I	20	St. Elizabeth Hospital	80.5	92.0	96.0	80.6	91.5	96.0
10-Aug	Phase I	23	National Arboretum	75.5	89.0	84.3	78.2	89.6	84.7
5-Aug	Phase I	22	Our Lady of Perpetual Help	81.9	90.2	95.1	82.2	90.4	98.0
11-Aug	Phase I	8A	Fort Greble	78.9	89.0	95.0	79.2	89.4	95.0
11-Aug	Phase I	8A-A	Fort Greble	82.1	87.6	97.0	80.3	85.6	96.6
11-Aug	Phase I	9A	Value Inn	84.0	87.9	87.0	87.3	88.4	87.2
27-Aug	Phase II	7	Arlington Cemetery	80.8	92.9	89.0	81.3	92.9	87.0
2-Sep	Phase III	R2	Goodyear	80.6	94.9	84.8	80.4	95.3	83.9
3-Sep	Phase III	R4	Banniker Dr.	85.0	93.4	86.2	83.2	92.0	86.1
3-Sep	Phase III	R5	Wash. Overlook						
3-Sep	Phase III	R6	Ft. Lincoln Dr	80.4	93.3	90.0	79.2	91.0	89.8
3-Sep	Phase III	R3	Post Office						
2-Sep	Phase III	R1	7/11 Bladensburg	80.4	96.2	88.4	79.1	94.2	87.7
6-Sep	Phase III	10A	Federal Construction Site	80.0	94.5	87.4	81.6	93.9	87.1
6-Sep	Phase III	3	Kennedy Center	82.9	91.5	84.3	81.4	91.5	83.2
4-Sep	Phase III	7	Arlington Cemetery	82.2	94.0	87.8	80.9	93.9	86.8
16-Sep	Phase III	7	Arlington Cemetery (Rain)						
27-Sep	Phase III	13A	West Potomac	82.5	95.6	85.5	84.5	92.8	85.9
5-Sep	Phase III	R7	400 North Capital	80.4	97.3	87.9	80.2	97.1	87.7
	All Data		Average	80.84	92.02	88.72	80.14	91.67	88.49
			Standard Deviation	2.7	4.4	4.4	3.3	4.1	4.6
			Max	87.4	98.6	98.0	87.3	98.0	98.0
			Min	74.7	74.8	78.1	72.2	78.6	78.2
			Range	12.7	23.8	19.9	15.1	19.4	19.8

Appendix III

Table III-6. Analysis of Delta Change with Northpoint Transmitter On

				Power Delta			Pointer Delta		
Date	Phase	Test No.	Site Name	DTV	ES61.5	ES119	DTV	ES61.5	ES119
13-Aug	Phase I	11A	London House Rooftop		0.4	0.2		2.1	0.0
4-Aug	Phase I	1	River Place Apts.	0.1	-0.5	0.2	-2.7	-0.6	-1.3
14-Aug	Phase I	1	River Place Apts.	-0.1	0.0	-0.7	-5.1	-1.1	-1.6
18-Aug	Phase I	1	River Place Apts.			0.3			-1.1
4-Aug	Phase I	1A	Roosevelt Island	-0.1	-0.9	-0.5	-1.9	-4.4	0.4
17-Aug	Phase I	1A	Roosevelt Island	0.5		0.2	-2.5		-0.7
13-Aug	Phase I	12A	Normandy House Rooftop	1.5	0.4	0.4	-1.2	0.4	0.3
12-Aug	Phase I	10A	Federal Construction Site	0.0	0.0	1.2	2.4	-0.2	0.3
16-Aug	Phase I	10A	Federal Construction Site	0.3	-0.6	0.0	0.8	-2.6	0.4
10-Aug	Phase I	3A	Nash & 14th Street		0.0			0.6	
11-Aug	Phase I	7A	Rt. 110 & Marshall (median)	-0.2	0.2	-0.3	-5.0	0.0	0.8
11-Aug	Phase I	6A	Rt. 110 & Marshall (shoulder)	-0.2	-0.3		-4.6	-1.1	
6-Aug	Phase I	3	Kennedy Center	0.4	-0.2	-0.3	-0.6	-0.5	-0.9
14-Aug	Phase I	3	Kennedy Center	0.0	-0.2	0.5	-1.6	-0.7	-0.6
17-Aug	Phase I	3	Kennedy Center	0.5	0.1	0.7	-1.7	-0.3	-1.7
18-Aug	Phase I	3	Kennedy Center	0.1	0.0	0.2	0.1	0.9	0.0
9-Aug	Phase I	5	Thompson Boat Center	0.5	-0.8		-0.1	0.3	
4-Aug	Phase I	7	Arlington Cemetery	-0.1	-0.5	-0.3	-5.6	0.1	1.4
12-Aug	Phase I	7	Arlington Cemetery	0.2	0.6	-0.3	-2.2	-0.7	0.1
18-Aug	Phase I	7	Arlington Cemetery			0.2			-1.1
23-Aug	Phase I	7	Arlington Cemetery	-0.3	-0.5	0.2	0.1	0.3	-0.5
10-Aug	Phase I	5A	S. Joyce & Army-Navy #2	-0.2	-0.7	-0.4	0.8	3.8	1.8
5-Aug	Phase I	2A	Arlington Ridge Road	0.5		-0.8	1.8		-0.7
10-Aug	Phase I	4A	S. Joyce & Army-Navy	-0.5	-0.7	-0.1	0.5	0.3	0.0
16-Aug	Phase I	19	Anacostia Park	0.0	-0.1	-0.7	1.1	0.3	-0.8
9-Aug	Phase I	20	St. Elizabeth Hospital	0.5	-0.3	0.0	0.1	-0.5	0.0
10-Aug	Phase I	23	National Arboretum	-0.1	0.7	0.2	2.7	0.6	0.4
5-Aug	Phase I	22	Our Lady of Perpetual Help	1.3	0.2	0.4	0.3	0.2	2.9
11-Aug	Phase I	8A	Fort Greble	0.0	-0.2	0.3	0.3	0.4	0.0
11-Aug	Phase I	8A-A	Fort Greble	0.4	-0.5	-0.5	-1.8	-2.0	-0.4
11-Aug	Phase I	9A	Value Inn	-0.5	0.0	0.1	3.3	0.5	0.2
27-Aug	Phase II	7	Arlington Cemetery	0.8	0.5	-0.5	0.5	0.0	-2.0
2-Sep	Phase III	R2	Goodyear	0.37	0.1	0.1	-0.2	0.4	-0.9
3-Sep	Phase III	R4	Banniker Dr.	-0.9	-0.4	1.7	-1.8	-1.4	-0.1
3-Sep	Phase III	R5	Wash. Overlook						
3-Sep	Phase III	R6	Ft. Lincoln Dr	0.5	0.0	0.0	-1.2	-2.3	-0.2
3-Sep	Phase III	R3	Post Office						
2-Sep	Phase III	R1	7/11 Bladensburg	-0.2	0.2	1.2	-1.3	-2.0	-0.7
6-Sep	Phase III	10A	Federal Construction Site	0.3	1.0	0.5	1.6	-0.6	-0.3
6-Sep	Phase III	3	Kennedy Center	-0.5	0.0	0.4	-1.5	0.0	-1.1
4-Sep	Phase III	7	Arlington Cemetery	0.4	-0.3	-0.2	-1.3	-0.1	-1.0
16-Sep	Phase III	7	Arlington Cemetery (Rain)						
27-Sep	Phase III	13A	West Potomac	0.33	-0.16	-0.34	2.0	-2.8	0.4
5-Sep	Phase III	R7	400 North Capital	0.5	1.8	0.4	-0.2	-0.2	-0.2
	All Data		Average	0.16	-0.05	0.10	-0.69	-0.35	-0.22

Appendix III

Table III-7. Average SSP Values within Various Distances from Transmitter, DIRECTV

Northpoint Transmitter	Distance of Data	Number Samples	Sample Mean	Sample St. Dev.	Standard Error
OFF	Half-Mile	14	81.08	3.23	0.86
ON	Half-Mile	14	79.46	3.83	1.00
OFF	First Mile	25	81.24	2.66	0.53
ON	First Mile	25	79.78	3.46	0.69
OFF	Beyond First Mile	12	79.98	2.68	0.77
ON	Beyond First Mile	12	80.89	2.93	0.85
OFF	All Data	37	80.84	2.7	0.44
ON	All Data	37	80.14	3.3	0.54

Table III-8. Average SSP Values within Various Distances from Transmitter, Echostar 61.5

Northpoint Transmitter	Distance of Data	Number Samples	Sample Mean	Sample St. Dev.	Standard Error
OFF	Half-Mile	15	93.15	3.81	0.98
ON	Half-Mile	15	92.3	4.31	1.10
OFF	First Mile	26	92.87	3.13	0.61
ON	First Mile	26	92.35	3.47	0.68
OFF	Beyond First Mile	11	90	5.96	1.80
ON	Beyond First Mile	11	90.05	4.9	1.50
OFF	All Data	37	92.02	4.29	0.71
ON	All Data	37	91.67	4.02	0.66

Table III-9. Average SSP Values within Various Distances from Transmitter, Echostar 61.5

Northpoint Transmitter	Distance of Data	Number Samples	Sample Mean	Sample St. Dev.	Standard Error
OFF	Half-Mile	15	89.07	2.9	0.75
ON	Half-Mile	15	88.75	3.3	0.85
OFF	First Mile	26	88.36	3.94	0.77
ON	First Mile	26	87.9	4.03	0.79
OFF	Beyond First Mile	12	89.48	5.19	1.50
ON	Beyond First Mile	12	89.78	5.59	1.60
OFF	All Data	38	88.72	4.33	0.70
ON	All Data	38	88.49	4.59	0.74

Table III-10. Short-Term Standard Deviation Data

DIRECTV (Northpoint Off)
81, 82, 79, 82, 81, 81, 83, 76, 82, 84, 81, 81, 80, 83, 78, 81, 78, 81, 79, 85, 79, 84, 77, 81, 76, 82, 80, 80, 81, 84, 80, 79, 80, 80, 82, 81, 79, 81, 77, 81, 82, 84, 80, 80, 83, 82, 83, 83, 80, 80, 80, 79, 78, 79, 84, 82, 80, 83, 83, 80, 80, 81, 80, 80, 81, 79, 81, 82, 80, 82, 81, 76, 78, 78, 83, 82, 85, 78, 82, 82, 79, 78, 81, 80, 78, 78, 82, 78, 82, 81, 82, 84, 85, 78, 83, 82, 84, 85, 78, 79, 84, 83, 80, 80, 84, 83, 81, 79, 80, 81, 82, 78, 80, 80, 84, 80, 77, 83, 82, 83, 79, 82, 82, 78, 81, 82, 80, 82, 79, 81, 79, 74, 81, 85, 78, 79, 80, 79, 79, 82, 81, 79, 83, 81, 81, 84, 79, 83, 82, 80, 82, 81, 81, 80, 82, 81, 81, 80, 80, 79, 79, 81, 81, 82, 87, 80, 81, 79, 80, 79, 81, 81, 79, 82, 82, 81, 80, 84, 81, 83, 79, 79, 79, 84, 78, 81, 84, 76, 80, 82, 81, 81, 79, 85, 81, 80, 80, 82, 80, 81.
Average 80.78
Std. Deviation 2.05

Echostar 61.5 (Northpoint Off)
95, 96, 96, 95, 96, 96, 97, 96, 96, 97, 95, 95, 96, 96, 95, 96, 96, 97, 96, 95, 95, 96, 97, 96, 96, 96, 96, 95, 95, 95, 96, 96, 95, 96, 95, 96, 97, 96, 96, 96, 96, 96, 96, 96, 97, 95, 95, 96, 96, 96, 95, 95, 95, 95, 95, 95, 96, 97, 96, 97, 96, 95, 96, 96, 95, 96, 95, 96, 95, 96, 95, 95, 95, 96, 96, 96, 95, 95, 96, 96, 95, 95, 95, 95, 95, 95, 96, 95, 96, 96, 95, 95, 96, 97, 96, 96, 96, 96, 95, 95, 95, 95, 95, 95, 95, 95, 96, 95, 96, 95, 95, 96, 95, 96, 95, 96, 95, 95, 96, 96, 95, 96, 96, 95, 95, 95, 95, 96, 95, 96, 95, 95, 95, 95, 95, 96, 95, 96, 96, 95, 96, 96, 95, 95, 95, 95, 95, 95, 95, 97, 95, 95, 95, 95, 96, 96, 95, 95, 96, 96, 96, 95, 95, 96, 95, 96, 96, 96, 95, 96, 95, 95, 96, 95, 96, 97, 95, 96, 96, 97, 96, 96, 97, 96, 95, 95, 96, 96, 95, 96, 96, 95, 97, 95, 95, 96, 95, 95, 96, 96,
Average 95.56
Std. Deviation 0.62

Echostar119 (Northpoint Off)
95, 95, 95, 94, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 95, 95, 95, 94, 95, 94, 95, 95, 95, 95, 95, 96, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 93, 95, 95, 95, 94, 95, 95, 95, 96, 95, 95, 95, 95, 95, 95, 94, 95, 95, 95, 96, 95, 96, 95, 95, 95, 95, 95, 95, 95, 96, 94, 95, 95, 95, 94, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 95, 95, 94, 95, 94, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 96, 95, 95, 96, 95, 94, 94, 95, 95, 95, 95, 95, 94, 95, 95, 94, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 96, 95, 95, 95, 94, 95, 95, 94, 95, 94, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 95, 94, 95, 95, 95, 94, 94, 95, 95.
Average 94.91
Std. Deviation 0.42

Appendix III

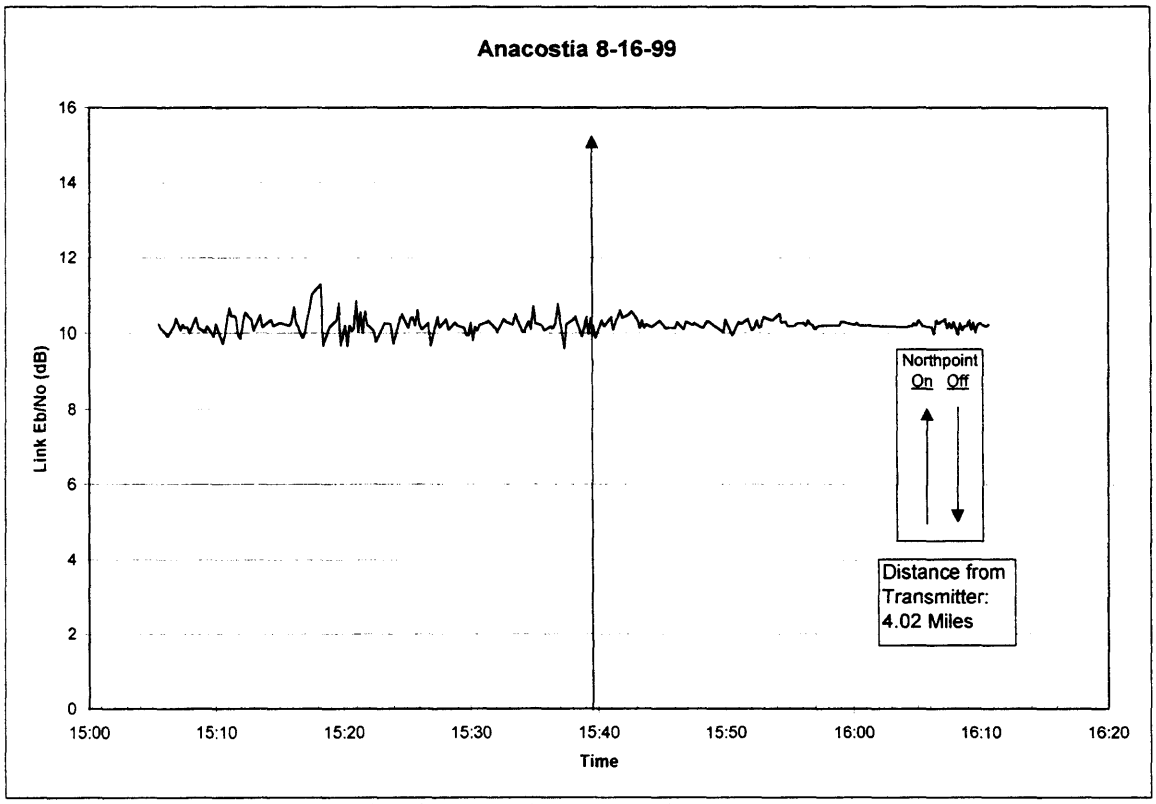


Figure III-1. Link Eb/No, Echostar at 119 W. Longitude, Anacostia

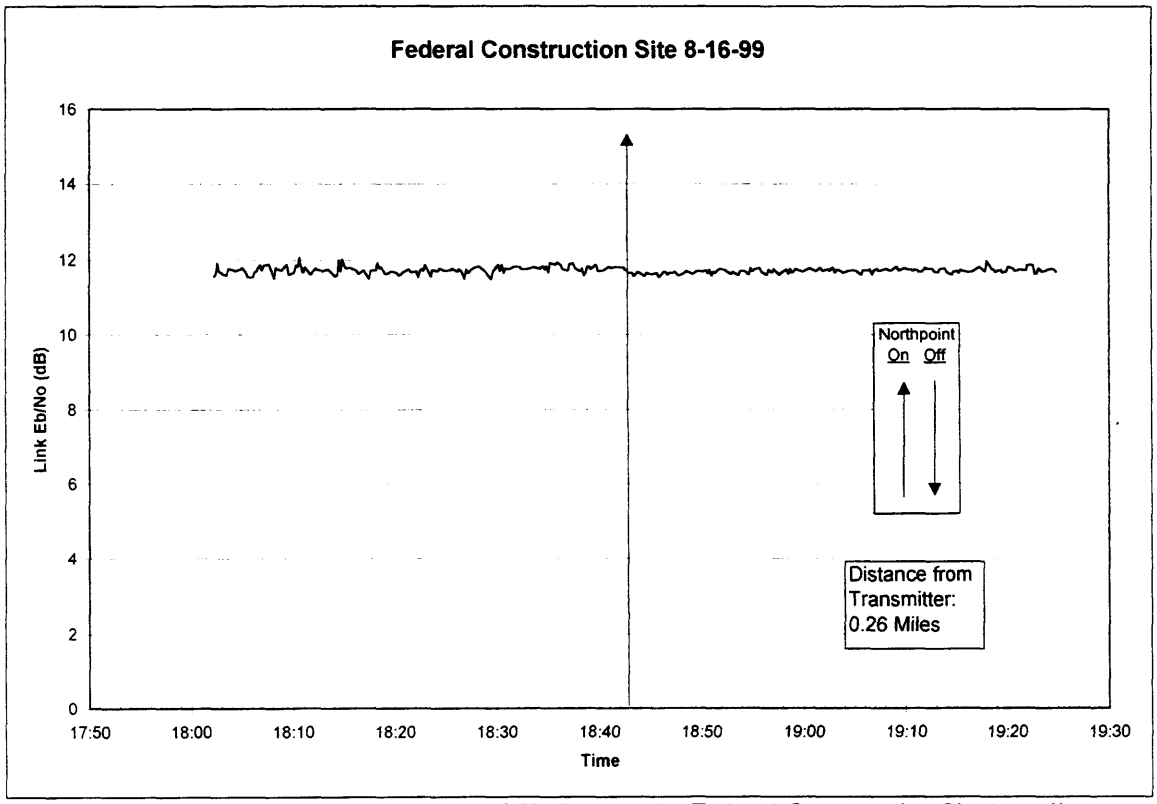


Figure III-2. Link Eb/No, Echostar at 119 W. Longitude, Federal Construction Site in Arlington

Appendix III

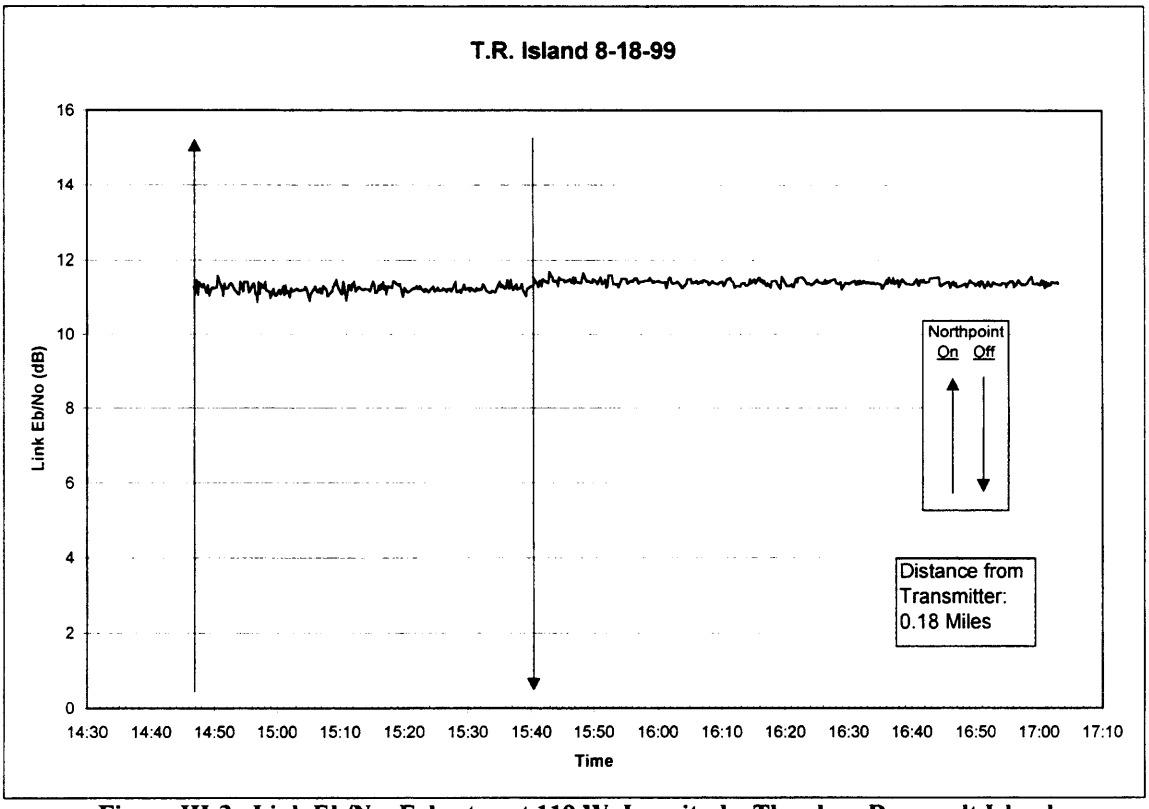


Figure III-3. Link Eb/No, Echostar at 119 W. Longitude, Theodore Roosevelt Island

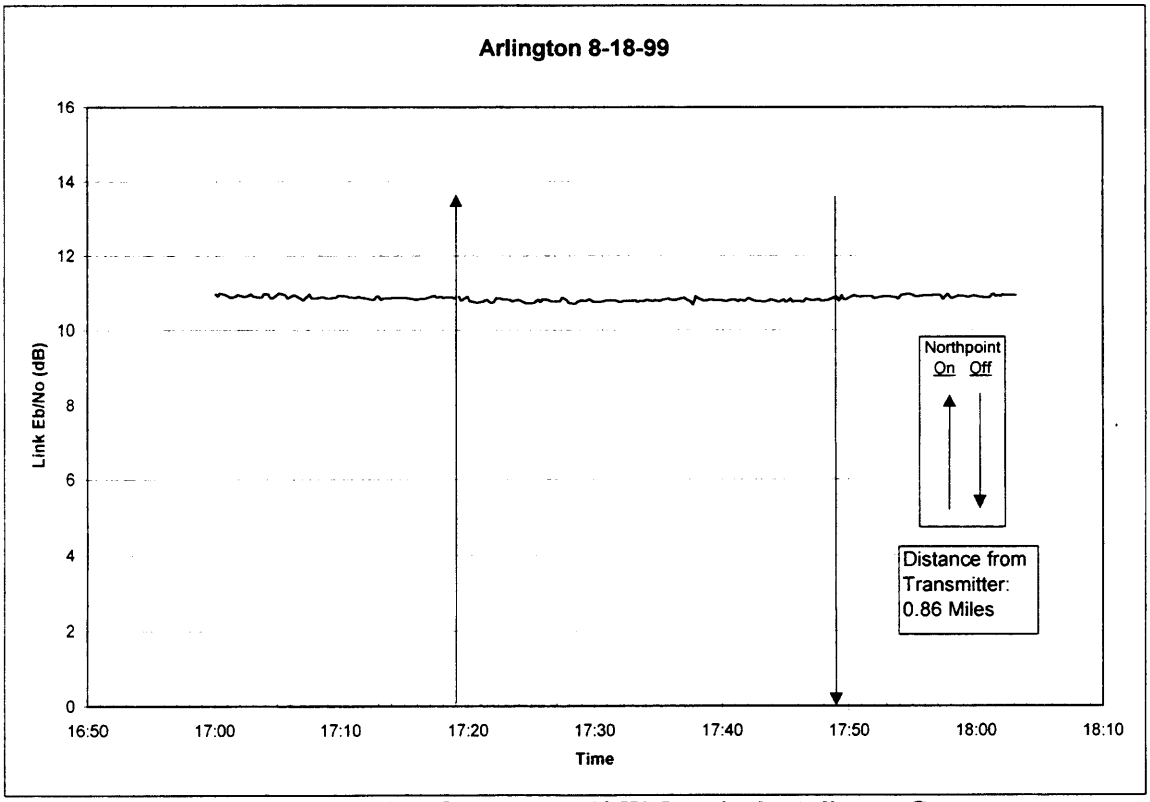


Figure III-4. Link Eb/No, Echostar at 119 W. Longitude, Arlington Cemetery

Appendix III

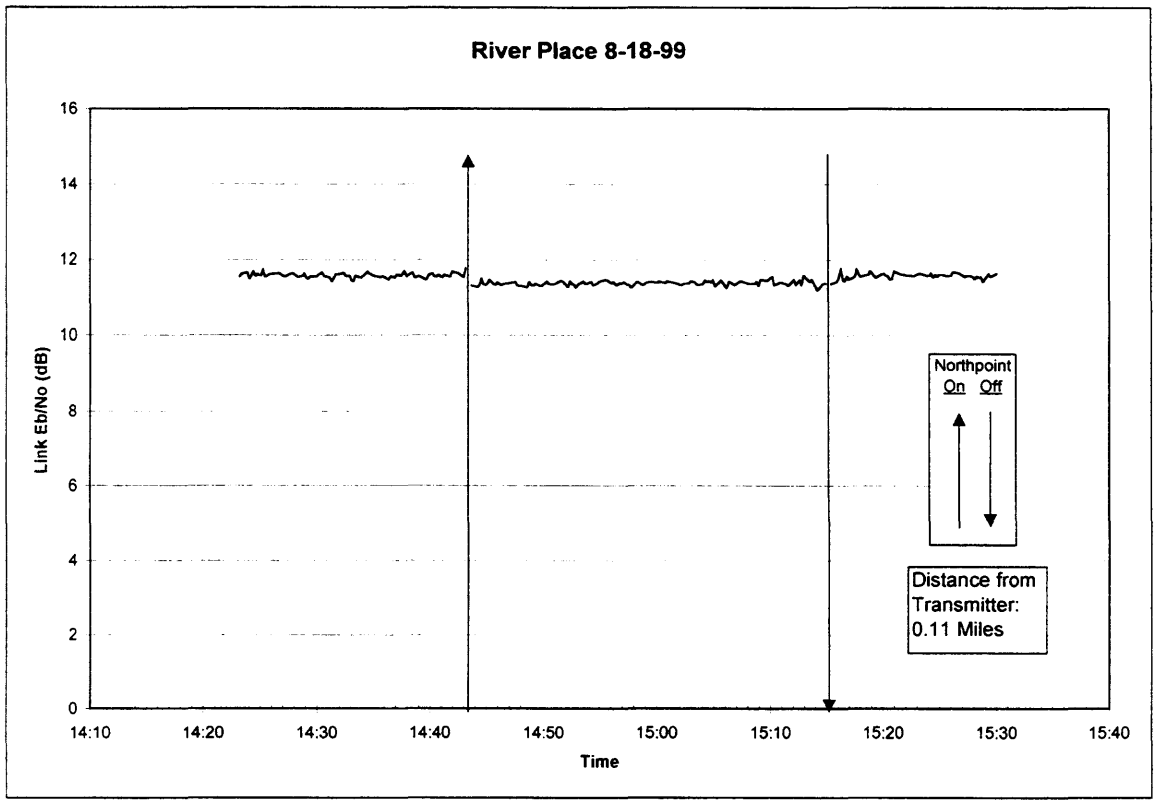


Figure III-5. Link Eb/No, Echostar at 119 W. Longitude, River Place

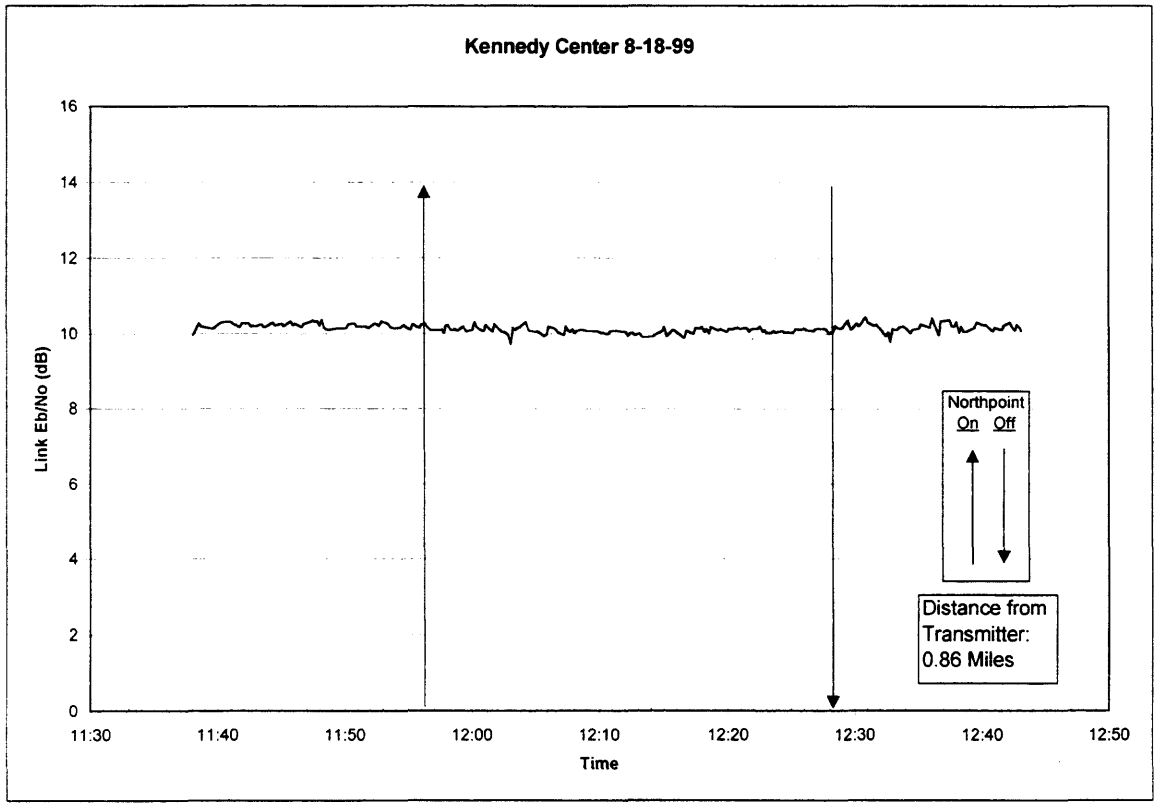


Figure III-6. Link Eb/No, Echostar at 119 W. Longitude, Kennedy Center

Appendix III

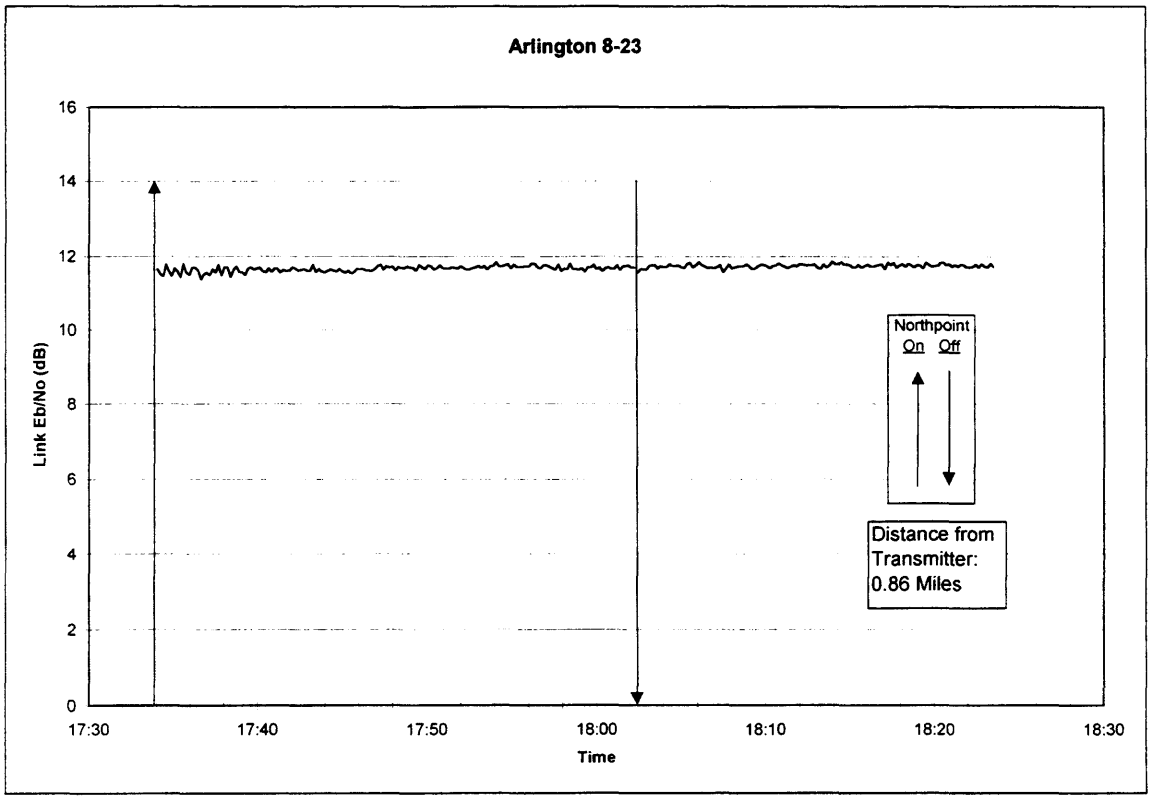


Figure III-7 Link Eb/No, Echostar at 119 W. Longitude, Arlington

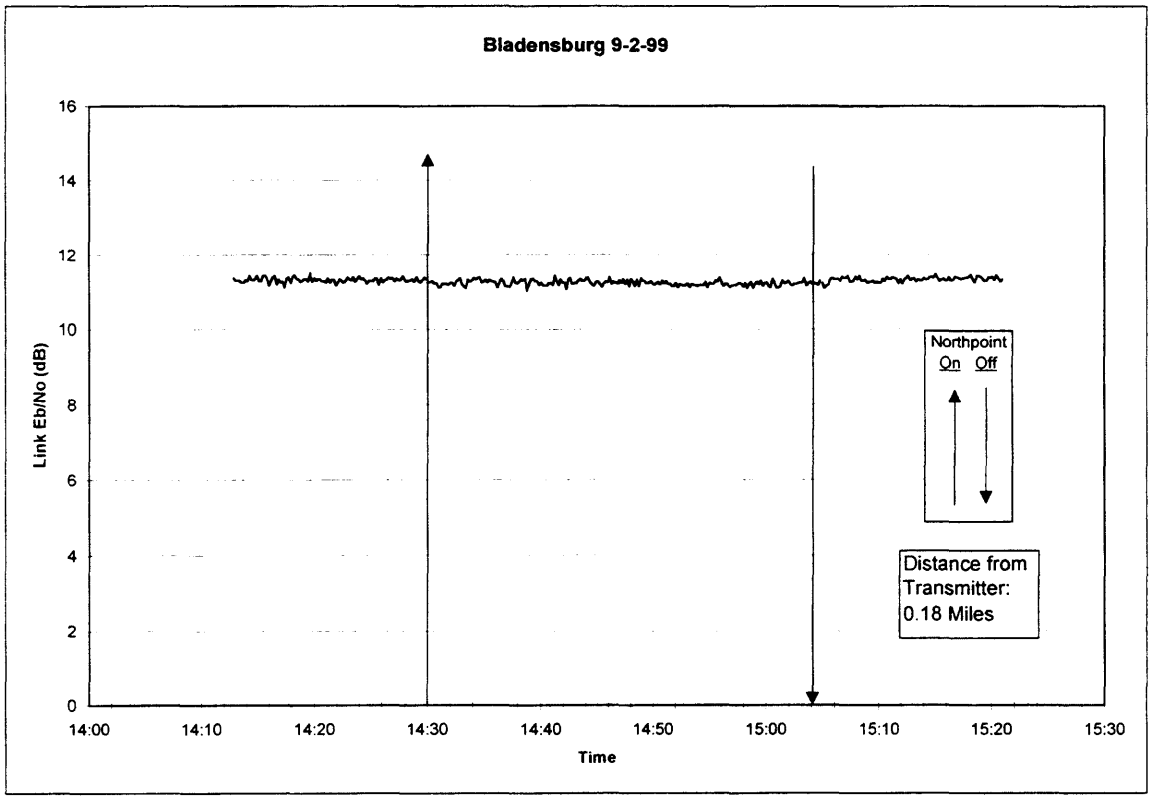


Figure III-8. Link Eb/No, Echostar at 119 W. Longitude, Bladensburg

Appendix III

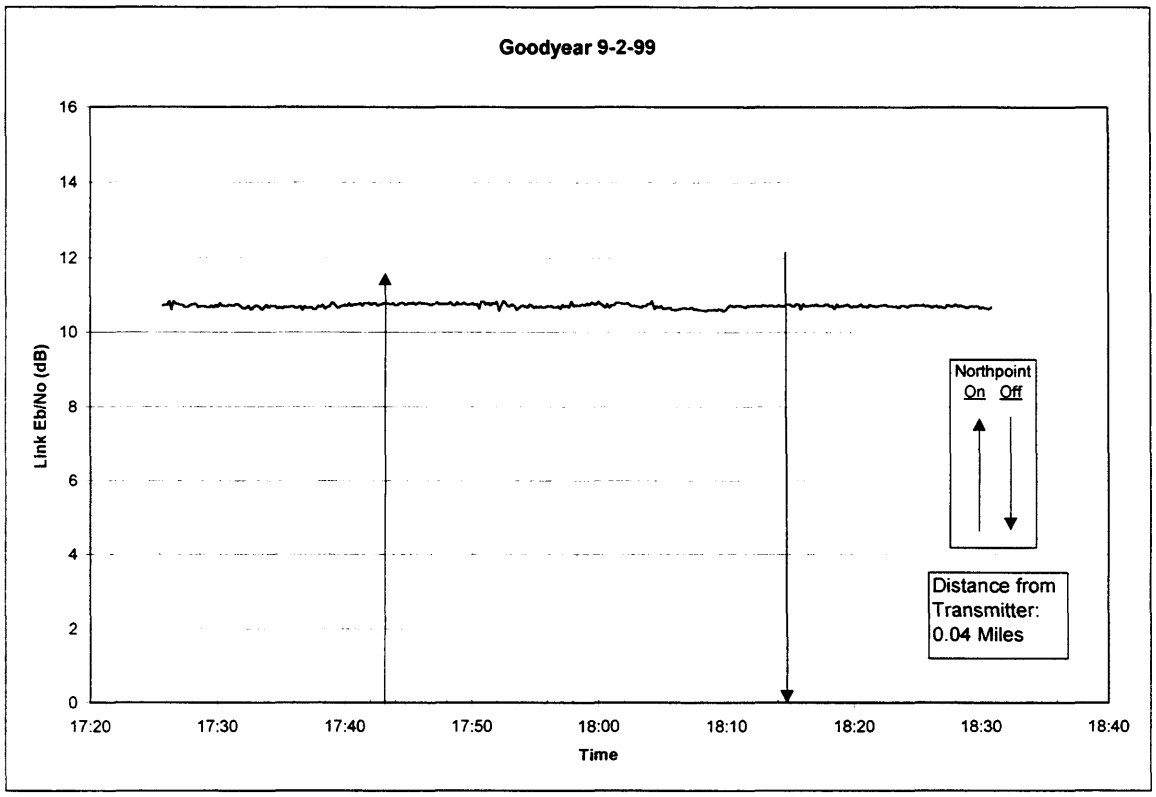


Figure III-9. Link Eb/No, Echostar at 119 W. Longitude, Goodyear

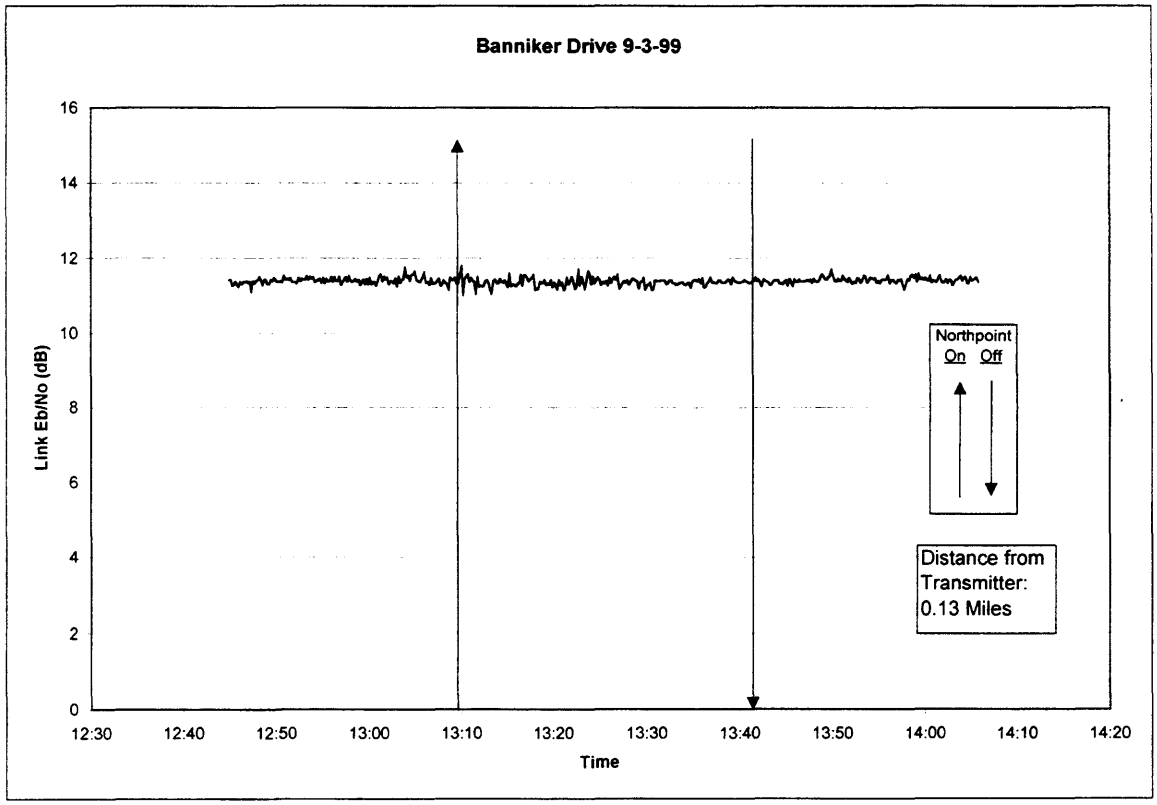


Figure III-10 Link Eb/No, Echostar at 119 W. Longitude, Banniker

Appendix III

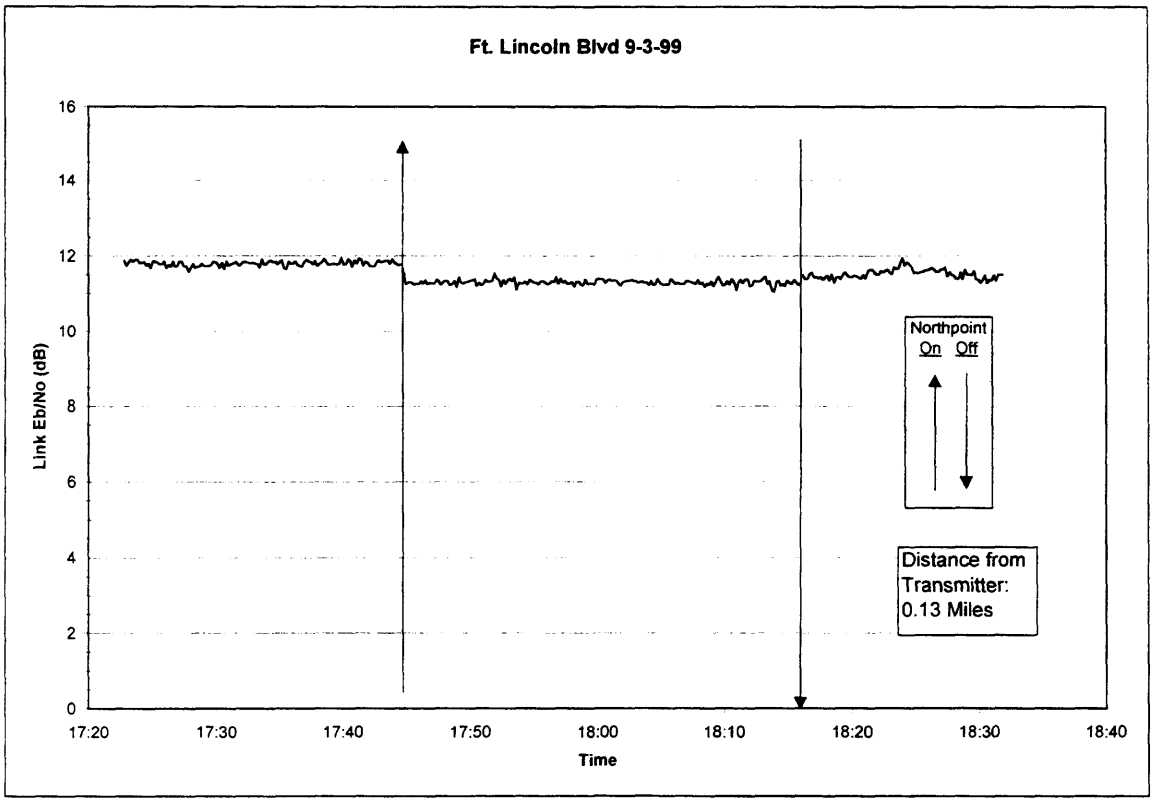


Figure III-11. Link Eb/No, Echostar at 119 W. Longitude, Ft. Lincoln Blvd