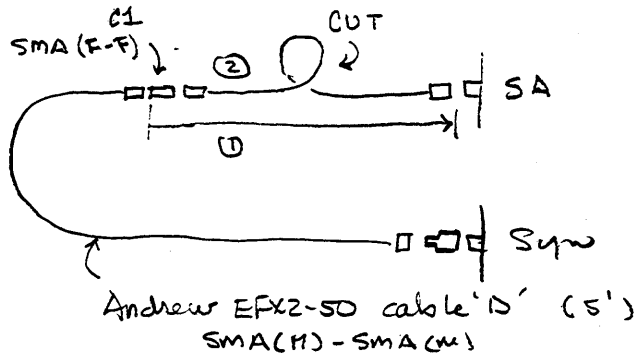


Cal Cable - Horn to LNA - HP11500F - Ref DRW-HP1



* See Plots
 ① → +0.17 dB
 ② → -1.17 dB
 Loss 1.34 dB

* After readings scattering over 0.5 dB - values based on avg. of several typ.

assume C1 [SMA(F-F) adapt] loss ~ 0.3 dB

⇒ assign to DRW-HP1 ⇒ -1.0 dB (insertion loss)



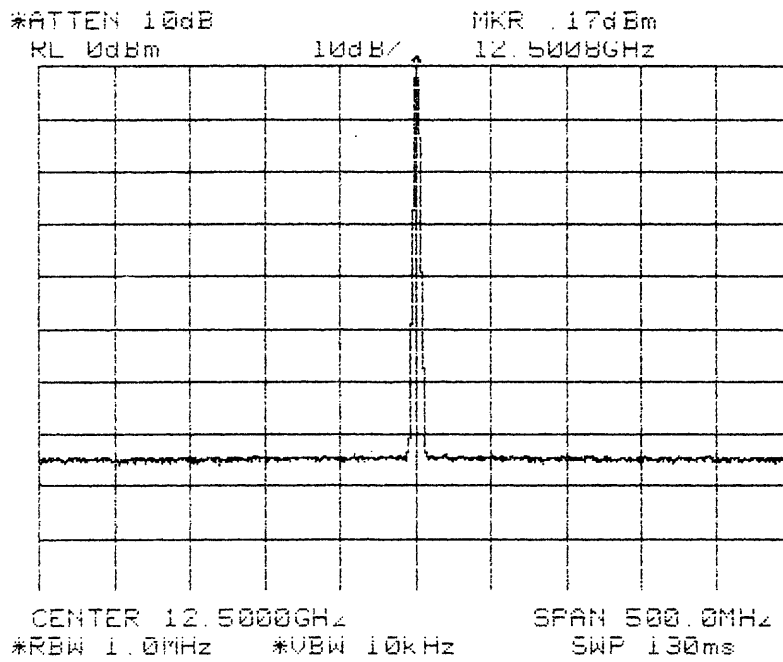
Drew/dce 1 15 Dec 93 Du

Drew-HP1

Cal of Cable HP11500F from Telogy

Ref - Drew-HP1

cond x ①

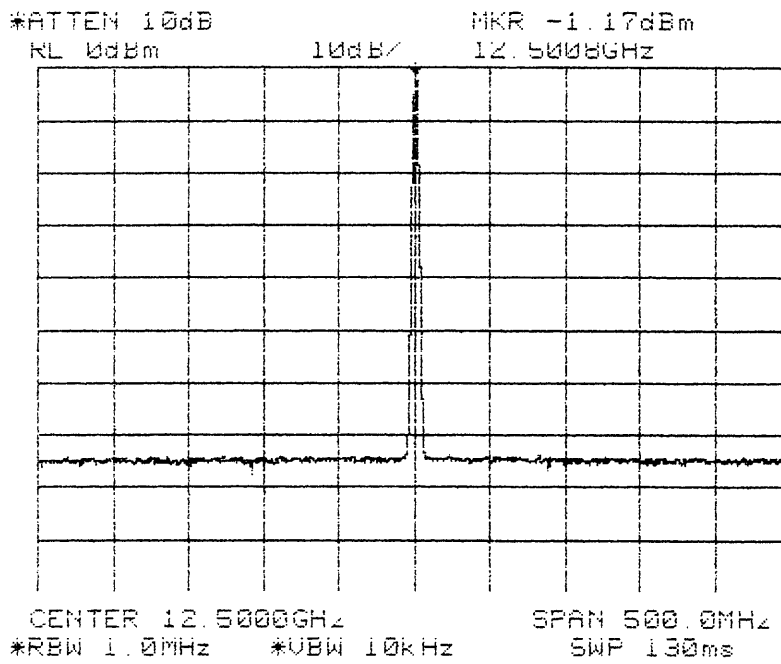


DW/dce1

15 Dec 98 Du

DW-AP1

condx 2



B. Summary of Test Set System Parameters.

Calibration Sources:

Professional Testing, Inc. (PTI)
D.R. Word Associates (DRW)

Frequency for parameters listed – 12.5 GHz.

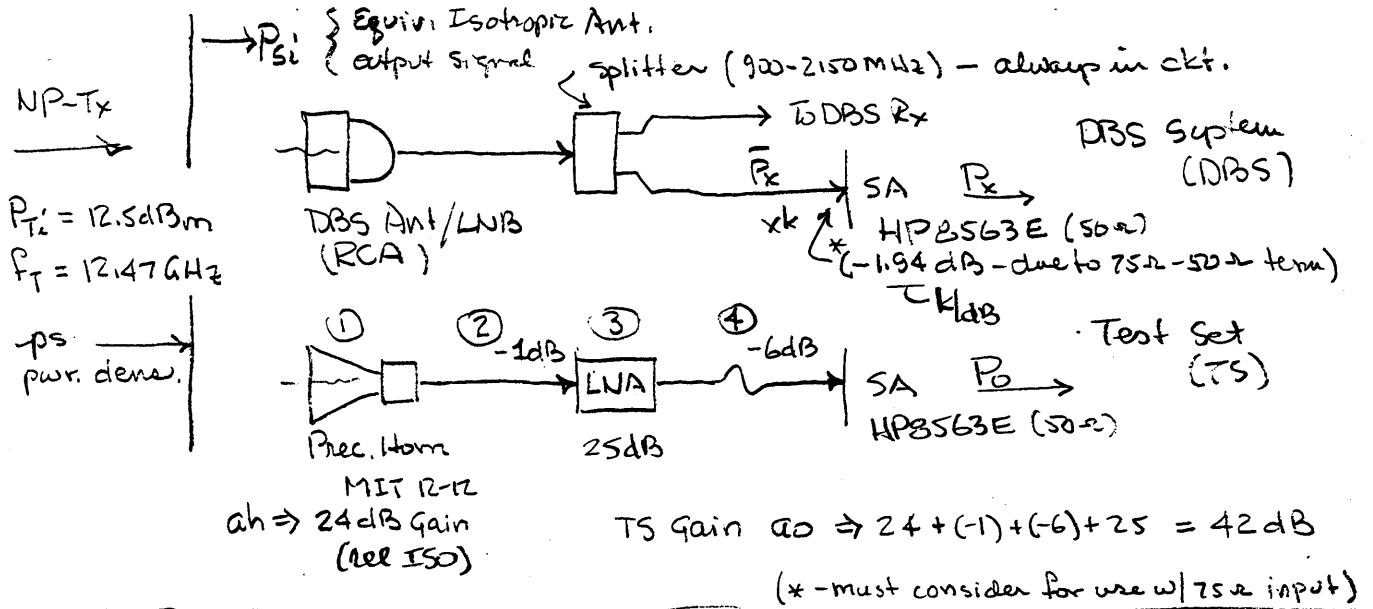
Horn Antenna (8) –	Scientific Atlanta -12-12 S/N 340 Linear polarization. w/ narda 4609 Flange to SMA(F) coax adapter Normal Op. Freq. – 12.4 –18.0 GHz Beam width (3 dB) – 9 deg H-plane / 10 deg E-plane
	Measured Gain over Isotropic (PTI) - +24.0 dBi
LNA (5) --	JCA Technology – JCA1218-F01 Op. Freq. – 12.0 – 18.0 GHz
	Measured Gain (PTI) - +25.0 dB
Cable (10) --	Andrew EFX2-50 – SMA(M)-SMA(M) – 40 ft. long.
	Measured Gain (Loss) (PTI) - - 6.0 dB
Cable (9) --	HP11500F – SMA(M)-SMA(M) – 6 ft. long.
	Measured Gain (Loss) (DRW) - - 1.0 dB

C. DBS System Calibration Notes.

DBS System Calibration -

Using Calibrated Test Set w/ Precision Horn

Source: NP-Tx \rightarrow 12.5 dBm EIRP @ 12.47 GHz, $\lambda = 24$ mm



Using Site ① data - 22 Dec 98 Du - $P_x = -30.93$ dBm
 $P_o = -66.83$ dBm

TS Aperture - $A_{po} = A_i \cdot a_o = 0.079 \lambda^2 \cdot 10^{4.2} = 0.7212 \text{ m}^2 \Rightarrow -1.42$ dB (m²)

* $A_i = 0.079 \lambda^2 = 4.55 \times 10^{-5} \text{ m}^2$ (Horn alone: $A_{ph} = A_i \cdot a_h = 0.0114 \text{ m}^2 \Rightarrow -19.42$ dB)

Signal Power Density - per TS reading - (Received Signal)

$ps = P_o / A_{po} \Rightarrow -66.8 - (-1.42) = -65.4$ dBm/m²

DBS Aperture - $A_{px} = P_x / ps \Rightarrow -30.9 - (-65.4) = 34.5$ dB (m²)

$A_{px} = 10^{3.45} = 2818 \text{ m}^2$

(* - using 50 Ω SA input.)

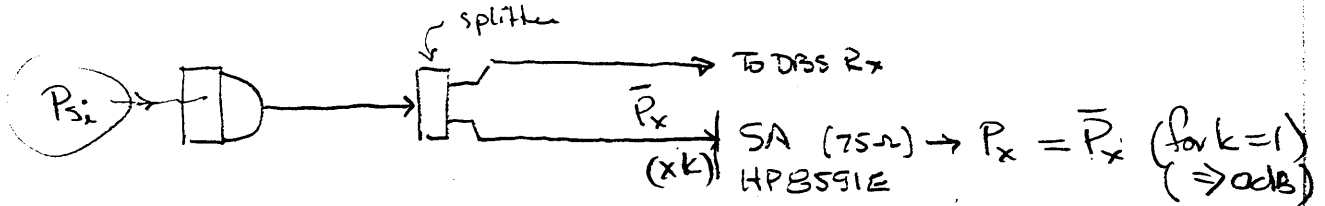
Rec Signal per Isotropic Rx Ant. -

TS Gain Rel: Iso $\Rightarrow a_o \Rightarrow 42$ dB
DBS Gain Rel: Iso $\Rightarrow a_x = a_o \cdot (P_x / P_o) \Rightarrow 42 + (-30.9 + 66.8) \text{ dB} \Rightarrow 42 + 35.9 = 77.9$ dB

ISO Scale : $P_{oi} = P_o / a_o \Rightarrow P_o / \text{dB} \rightarrow 42$ dB
 $P_{xi} = P_x / a_x \Rightarrow P_x / \text{dB} \rightarrow 77.9$ dB $\Rightarrow P_{oi} = P_{xi} = P_{si}$



DBS Sup. Cal (cont) - adjust for use of 75Ω SA input.



For cal data (pg 1) $k \Rightarrow -1.94 \text{ dB}$

$$\bar{P}_x = P_x / k = P_x |_{\text{dB}} - k |_{\text{dB}}$$

$$\bar{P}_x |_{\text{dB}} = P_x |_{\text{dB}} + 1.94$$

For $k=1$ (75Ω) input -

$$\text{DBS Aperture } \bar{A}_{px} = A_{px} \cdot 10^{0.194} \Rightarrow A_{px} |_{\text{dB}} + 1.94$$

$$\bar{A}_{px} = 34.5 + 1.94 = \underline{36.44 \text{ dB}} \quad (1 \text{ m}^2)$$

$$\bar{A}_{px} \approx \underline{4406 \text{ m}^2}$$

$$\text{DBS Iso scale} \Rightarrow \bar{a}_x = a_x \cdot 10^{0.194} \Rightarrow a_x |_{\text{dB}} + 1.94$$

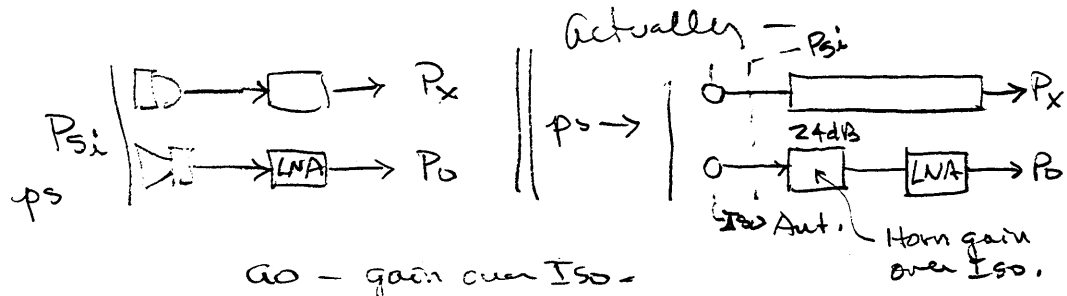
$$P_{xi} = \frac{P_x}{\bar{a}_x} \Rightarrow P_x |_{\text{dB}} - 77.9 - 1.94$$

DBS Iso Scaling:
w/ 75Ω SA -

$$P_{xi} |_{\text{dB}} = P_x |_{\text{dB}} - 79.8 \text{ dB}$$

Scratch 1

Cross-check Aperture of Gain Re Iso Values -



a_0 - gain over Iso -

$$a_0 = \frac{P_0}{P_{si}} \Rightarrow P_{si} = \frac{P_0}{a_0}$$

$$a_x = \frac{P_x}{P_{si}} \Rightarrow a_x = \frac{P_x}{P_0/a_0} = \frac{P_x \cdot a_0}{P_0}$$

$$\left. \begin{aligned} P_0 &= A_{p0} \cdot P_s \\ P_x &= A_{px} \cdot P_s \end{aligned} \right\} \Rightarrow \frac{P_0}{A_{p0}} = \frac{P_x}{A_{px}}$$

$$P_0 = -66.3$$

$$A_{p0} = -1.42 \text{ dB}$$

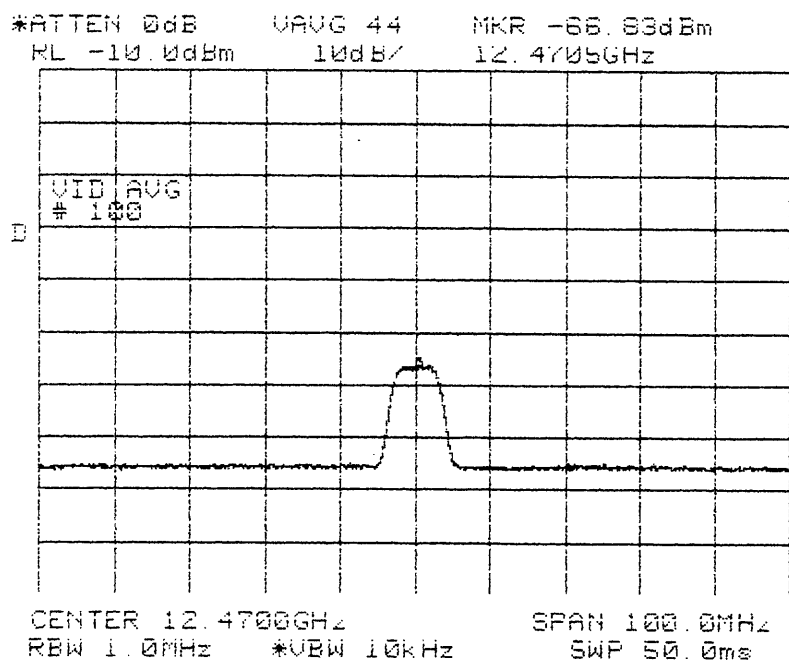
$$P_x = -30.9$$

$$A_{px} = 34.5 \text{ dB}$$

$$\begin{aligned} & \left\langle \begin{array}{r} -66.8 \\ + 1.4 \\ \hline -65.4 \end{array} \right. \\ & \left\langle \begin{array}{r} -30.9 \\ - 34.5 \\ \hline -65.4 \end{array} \right. \end{aligned}$$



1, Site-1, Horn, 12/22/98
Boom Down, 5:45 est
HP8563E



Plot: 1-N

1

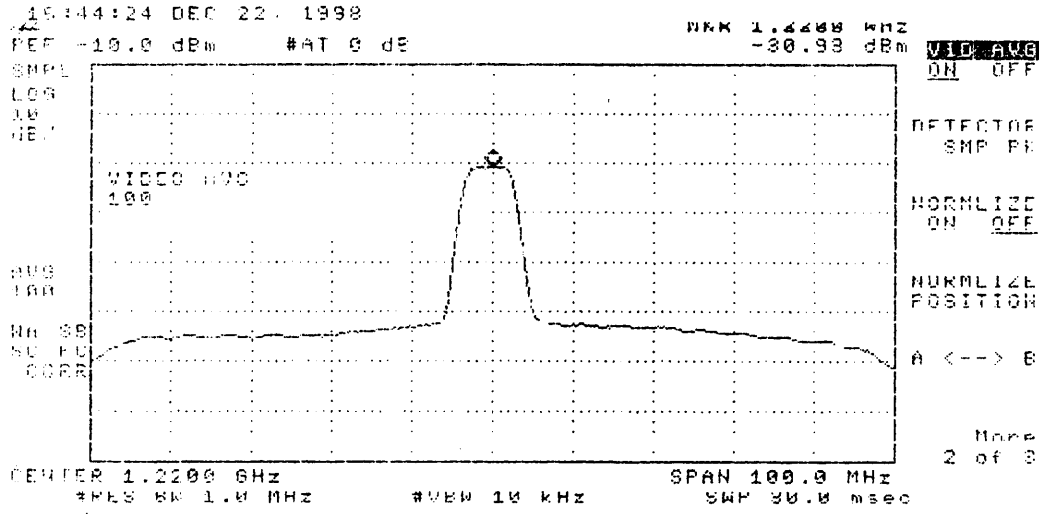
1

Boyd's Beam

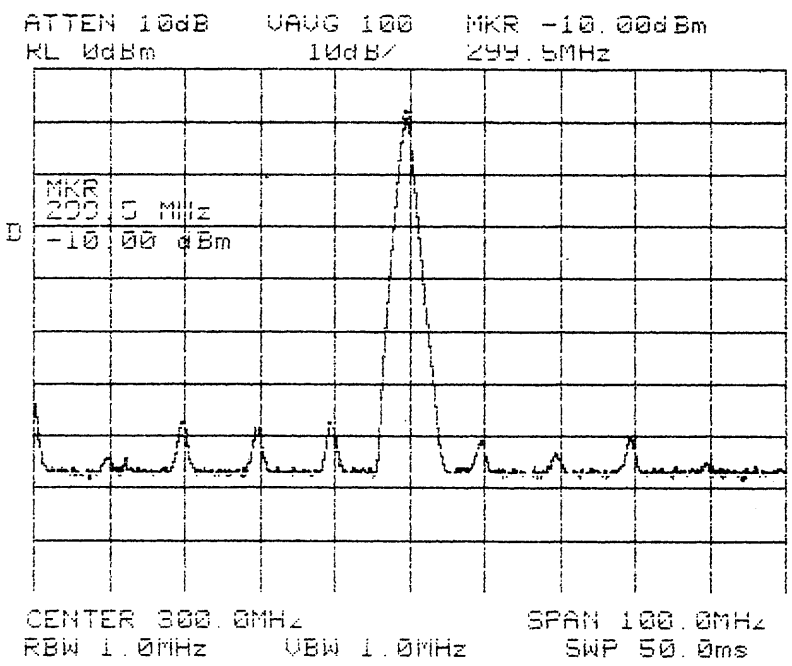
transmitter Northpoint

12 27 92

SA HD 895PE



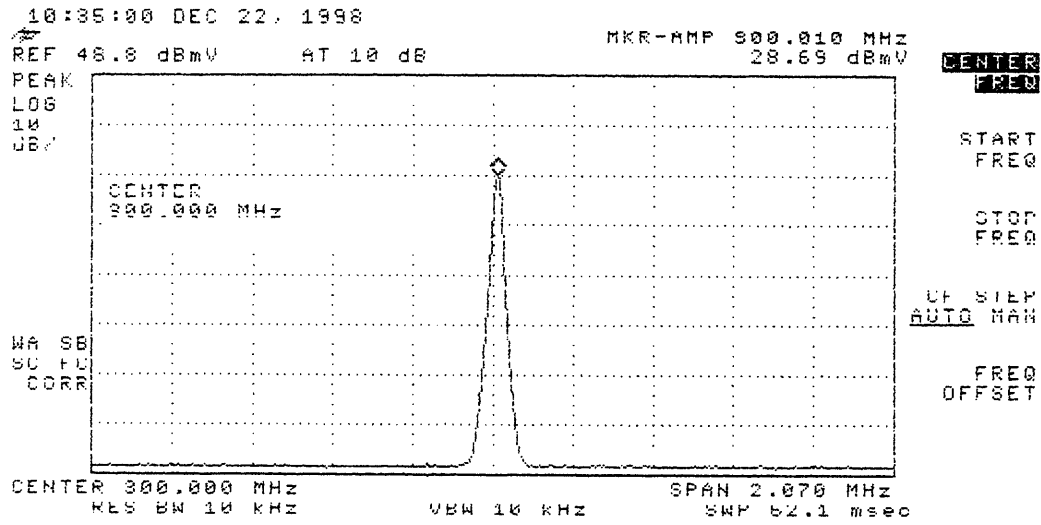
HP8563E Self calibration
22 Dec 98
(Cal output to the port)



HP 8591E Self Calibration

22 Dec 93 Jim

(Cal output to Input)

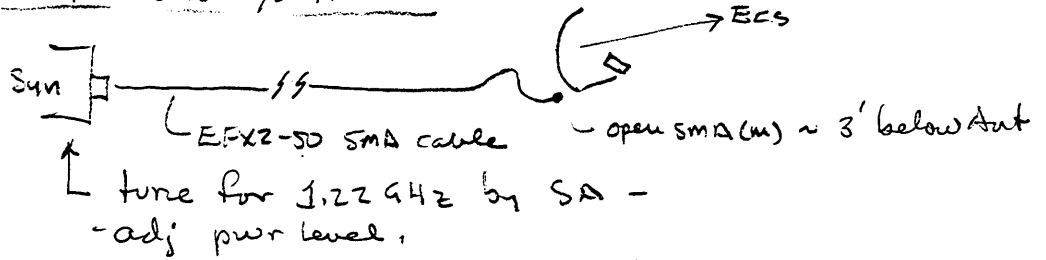


D. Echostar Transponder Loading Test

Site ① - Hyatt EchoStar Transponder Loading Test

DBS EchoStar - discover Transponder affected by 12.47 GHz carrier.

Tsp ss meter ~ 93-95% w/o interference



Can tune carrier through middle Tsp lobe & kill ch 301 (w/ pwr level elevated) -

This results in Tsp# 18 showing reduced ss meter value, while 16, 17, 19, 20 are OK. Tsp# 18 sig. returns to normal.

∴ Tsp# 18 ↔ ch 301 - affected Tsp#.

Test # 16, # 18, # 20 - Same as for DTV.

50 SHEETS
100 SHEETS
200 SHEETS

22-141
22-142
22-144



APPENDIX 3

Receiver Site Logs

- A. Rx Site Data logs**
- B. Rx Site Maps**
- C. Rx Condx Log**

Note -- Pages with typed comments were add after the fact where applicable. This is mainly to clarify some handwritten comments that were written on logs and plots during the field work, some of which might not be legible in the log copies. Not all site logs have comment pages added.

A. Rx Site Data logs

Northpoint Technology – DBS Compatibility Test – Austin Test Area

Rx Site Data Log

Hyatt

Rx Site No.

p1

Set:

Re: Rx Condx Ref. No.

Date / Time:

Re: Tx Condx Ref. No.

Operator:

Data Measurements:

- (1) On arrival --
 - Position and deploy antenna platform (first at ground level).
 - Position GPS Receiver and allow to average during site occupation.
 - Obtain information for Rx Site Location Log.
 - Point Precision Horn Antenna toward Tx (approx. direction).

- (2) DBS Signal Interference Tests – DirecTV and EchoStar.

For each satellite case (one at a time), with Tx OFF, point DBS Antenna to the satellite and peak the signal strength. Observe the monitor for the prescribed TV channel (w/ appropriate DBS Rx) and assess signal quality. Turn Tx ON and observe the TV signal quality. Note any change in signal quality that is correlated with the Tx ON/OFF condition. Repeat Tx ON/OFF sequence as needed.

With the Spectrum Analyzer (SA), observe and record the Signal Power Spectrum and its peak value at the LNB output for the two Tx states (ON/OFF). Label the Spectrum Plots and mark them with an assigned ID code.

DiracTV – Tx OFF: OK? Y___ / N___ Tx ON: OK? Y~~X~~ / N___

Any behavior correlated with Tx ON/OFF ? Y___ / N___

Comments: _____

Signal Power Spectrum – Tx ON: --Peak -- -59.62 dBm Plot ID Code 1-0
Tx OFF: – Peak -- _____ dBm Plot ID Code _____

Comments: _____

EchoStar – Tx OFF: OK? Y___ / N___ Tx ON: OK? Y~~X~~ / N___

Any behavior correlated with Tx ON/OFF ? Y___ / N___

Comments: _____

Signal Power Spectrum – Tx ON: --Peak -- -56.63 dBm Plot ID Code 1-E
Tx OFF: – Peak -- _____ dBm Plot ID Code _____

Comments: _____

Northpoint Technology – DBS Compatibility Test – Austin Test Area

Rx Site Data Log

Rx Site No. 14 / 1

p2

Set: 1 / 1

(3) Northpoint Signal Quality Test –

With the Tx ON, point the DBS antenna toward the Tx, while using the NP Rx equipment, and peak the signal strength. Observe the monitor (w/ NP Rx equipment) and assess the signal quality.

NP Signal – OK? Y / N Comments: _____

(4) NP Rx Signal Level and Power Spectrum at Rx Site – LNB output --

With the DBS antenna on the NP Tx, and with the Tx ON, observe and record the Signal Power Spectrum and the peak level at the LNB output. Label the spectrum plot with an assigned ID Code.

Signal Power Spectrum -- Peak -- -30.93 dBm Plot ID Code -- 1-N

Comments: _____

(5) Tx Signal Level and Power Spectrum at Rx Site – w/ Precision Ant. and SA.

Using the Precision Antenna and Test Set, observe and record the Tx Signal Power Spectrum and the peak value at the Rx site. Label the spectrum plot with an assigned ID Code.

Signal Power Spectrum -- Peak -- _____ dBm Plot ID Code -- _____

Comments: _____

(6) When Rx Site measurements and tests are completed, read the GPS Receiver and record the position in the Rx Site Location Log. Prepare the equipment for movement to the next site.

Use the space below for added comments and notes. Attach extra pages if necessary.

**Northpoint Technology – DBS Compatibility Test – Austin Test Area
Signal Strength Readings**

Rx Site Data Log

Rx Site No. 1

Set 1-1

Re: Condx Ref. No. 2

Date / Time 12 / 22 / 98 5:07 CST

Re: Condx Ref. No. 2

Operator: AW

Direct T.V. Signal Strength Readings

Tsp No	Signal Strength Readings										Avg
16	79	79	77	77	78	79	79	79	78	78	78.3
18	69	67	67	67	67	69	69	66	67	67	67.2
20	80	80	77	79	79	78	79	79	81	81	79.3

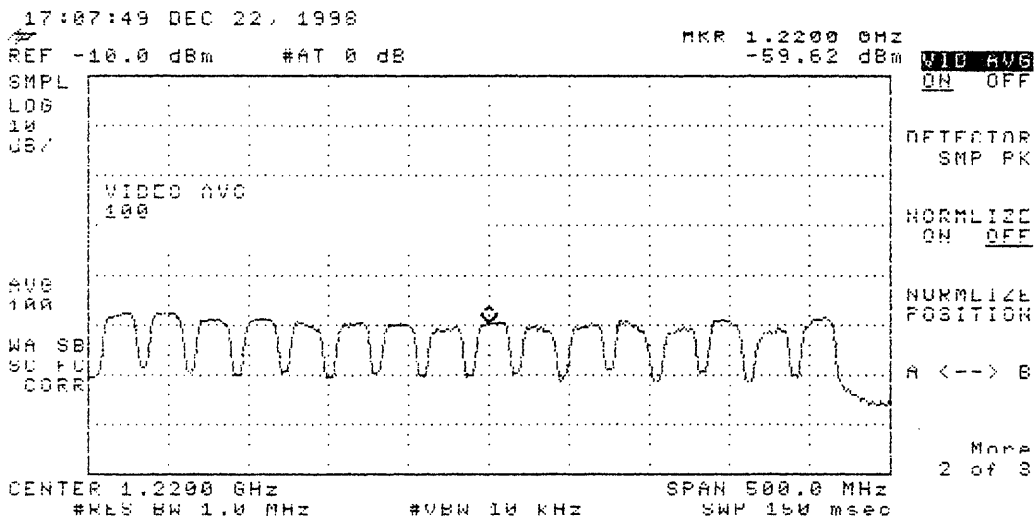
Estar T.V. Signal Strength Readings

Tsp No	Signal Strength Readings										Avg
16	93	93	93	93	93	93	93	93	93	93	93
18	93	93	93	93	94	93	93	94	93	93	93.2
20	96	96	95	95	95	94	94	95	95	95	95

Notes: *Very Cold, Over Cast, 30° - 20°*

1. DTV, Site-1, 12/22/98, 5:10cst
2. Boom Down
3. HP8591E

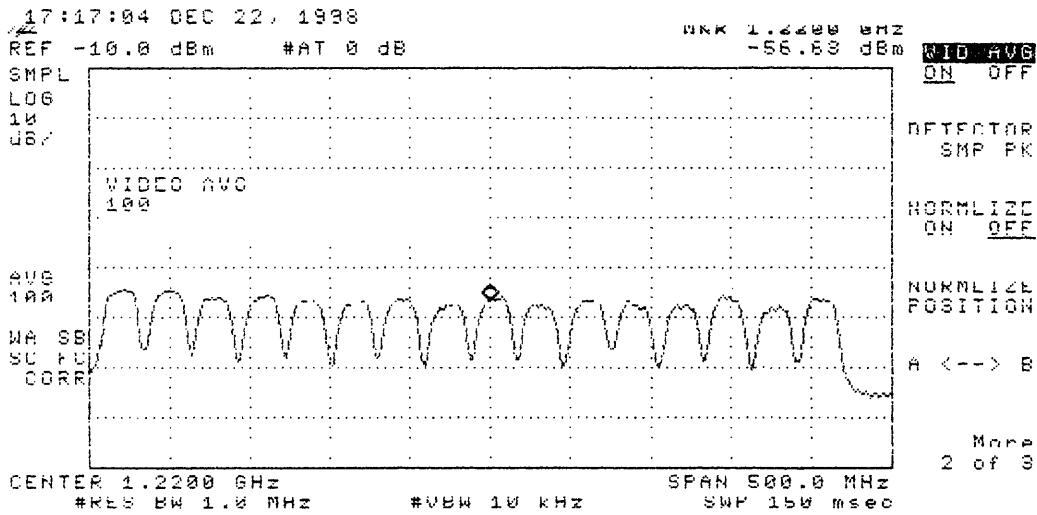
Plot 1-D



1. With pie pans shielding DTV → goes from 69-72.

1. Estar, Site-1, 12/22/98, 5:20^{est}
2. Boom Down
3. HP 8591E

Plot 1-E



Set

Plot: 1-N

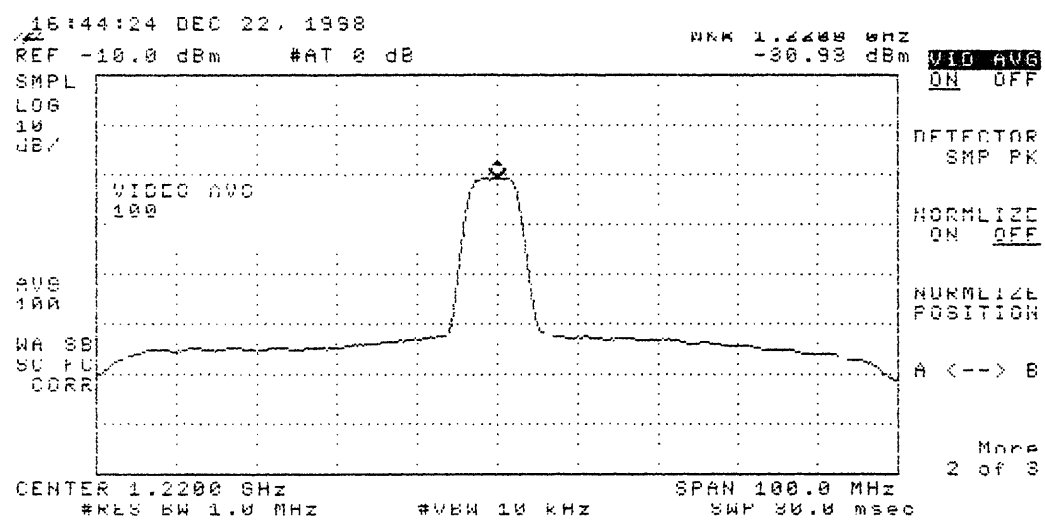
3.000

Band Pass

1.220 GHz

1.220-92

SA HD 895PE



Set 1
Site 1

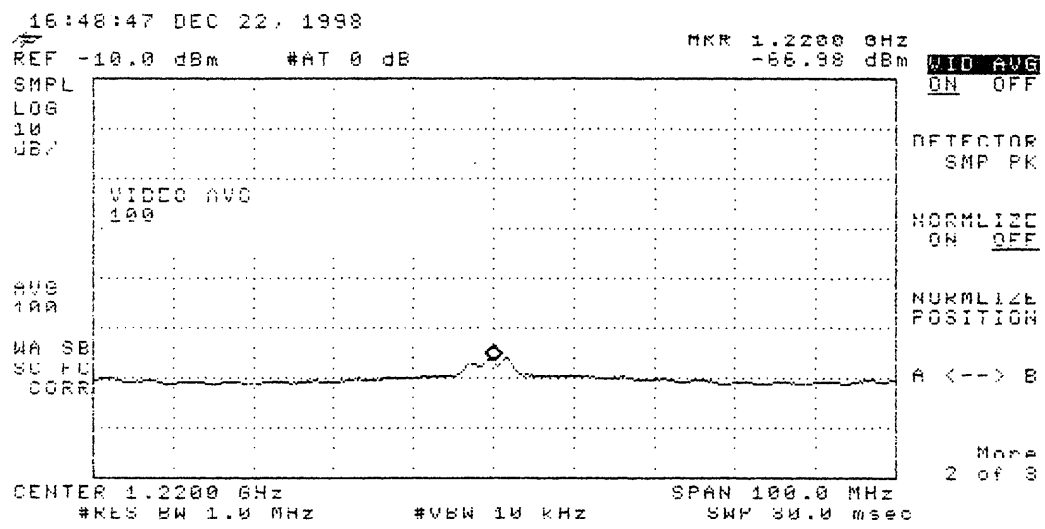
Pl 1-R-A

Brown Brick

Transmitter AP

Page 1 - 12-22-94

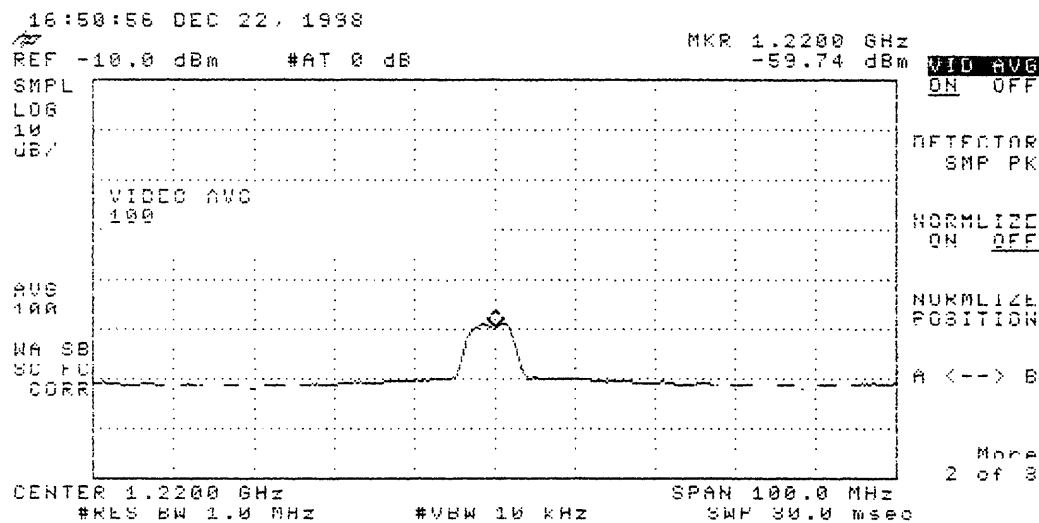
AP # 1



Pointed at Brown Brick building to the East

Plot 1-R-B

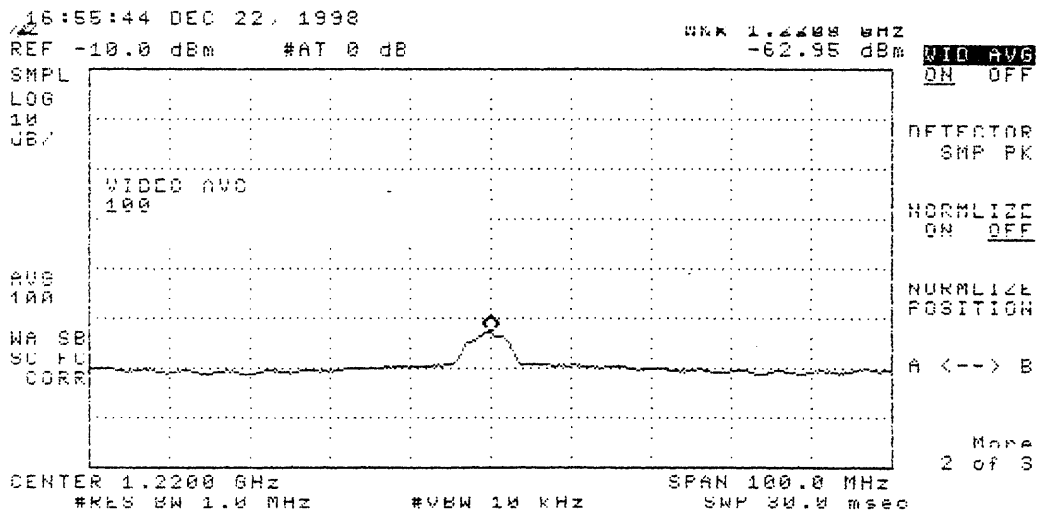
Serial
Signal
Broad Band
Transmitter - Nonlinear
Level 10 20 dB
SA HP 8951E



Pointed at Hotel, signal strong enough for
a picture.

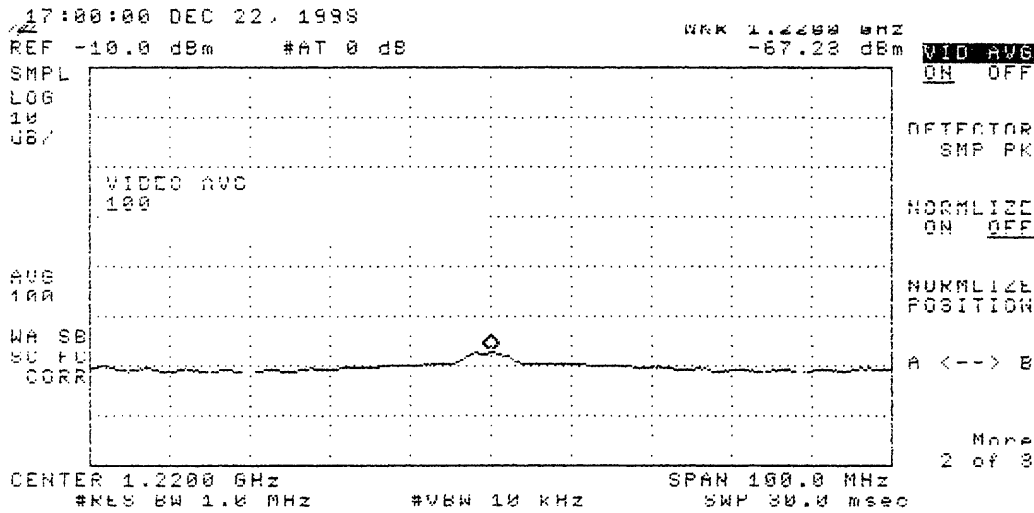
1. Pointing at Van
2. Site-1 12/22/98 4:45 est
3. Boom Down
4. Reflection of N.P.

Plot 1-R-B



1. Site 1
2. 12/22/98 4:50cs+ Boom Down
3. Reflection point at Brown office Bld.
4. N.P.

Plot 1-RC



COMMENTS FROM SITE 1

Site 1 Hyatt

- a. With pie pans shielding, DTV goes from 69 to 72.
- b. Have four reflection plots
 1. Reflection off of brown brick building to the east
 2. Reflection off of Hyatt hotel
 3. Reflection off of Van
 4. Reflection off of brown office building

Northpoint Technology – DBS Compatibility Test – Austin Test Area

Salvation Army

Rx Site Data Log

Rx Site No. p1
Set: 11

Re: Rx Condx Ref. No. Date / Time:
Re: Tx Condx Ref. No. Operator:

Data Measurements:

- (1) On arrival --
 - Position and deploy antenna platform (first at ground level).
 - Position GPS Receiver and allow to average during site occupation.
 - Obtain information for Rx Site Location Log.
 - Point Precision Horn Antenna toward Tx (approx. direction).
- (2) DBS Signal Interference Tests – DirecTV and EchoStar.

For each satellite case (one at a time), with Tx OFF, point DBS Antenna to the satellite and peak the signal strength. Observe the monitor for the prescribed TV channel (w/ appropriate DBS Rx) and assess signal quality. Turn Tx ON and observe the TV signal quality. Note any change in signal quality that is correlated with the Tx ON/OFF condition. Repeat Tx ON/OFF sequence as needed.

With the Spectrum Analyzer (SA), observe and record the Signal Power Spectrum and its peak value at the LNB output for the two Tx states (ON/OFF). Label the Spectrum Plots and mark them with an assigned ID code.

DirecTV – Tx OFF: OK? Y___ / N___ Tx ON: OK? Y~~X~~ / N___

Any behavior correlated with Tx ON/OFF ? Y___ / N___

Comments: _____

Signal Power Spectrum – Tx ON: --Peak -- -68.65 dBm Plot ID Code 2-D
Tx OFF: – Peak -- _____ dBm Plot ID Code _____

Comments: _____

EchoStar – Tx OFF: OK? Y___ / N___ Tx ON: OK? Y~~X~~ / N___

Any behavior correlated with Tx ON/OFF ? Y___ / N___

Comments: _____

Signal Power Spectrum – Tx ON: --Peak -- -59.17 dBm Plot ID Code 2-E
Tx OFF: – Peak -- _____ dBm Plot ID Code _____

Comments: _____

Northpoint Technology – DBS Compatibililty Test – Austin Test Area

Rx Site Data Log

Rx Site No.

2

p2

Set:

11

(3) Northpoint Signal Quality Test –

With the Tx ON, point the DBS antenna toward the Tx, while using the NP Rx equipment, and peak the signal strength. Observe the monitor (w/ NP Rx equipment) and assess the signal quality.

NP Signal – OK? Y___/N~~X~~ Comments: _____

(4) NP Rx Signal Level and Power Spectrum at Rx Site – LNB output --

With the DBS antenna on the NP Tx, and with the Tx ON, observe and record the Signal Power Spectrum and the peak level at the LNB output. Label the spectrum plot with an assigned ID Code.

Signal Power Spectrum -- Peak -- -62.41 dBm Plot ID Code -- 2-N-3

Comments: Seen 9 + 5 dBm Higher

(5) Tx Signal Level and Power Spectrum at Rx Site – w/ Precision Ant. and SA.

Using the Precision Antenna and Test Set, observe and record the Tx Signal Power Spectrum and the peak value at the Rx site. Label the spectrum plot with an assigned ID Code.

Signal Power Spectrum -- Peak -- _____ dBm Plot ID Code -- _____

Comments: _____

(6) When Rx Site measurements and tests are completed, read the GPS Receiver and record the position in the Rx Site Location Log. Prepare the equipment for movement to the next site.

Use the space below for added comments and notes. Attach extra pages if necessary.

**Northpoint Technology – DBS Compatibility Test – Austin Test Area
Signal Strength Readings**

Rx Site Data Log

Rx Site No.

2

Set

1.1

Re: Condx Ref. No.

2

Date / Time

12/23/98 4:05 CST

Re: Condx Ref. No.

2

Operator:

MWH

Direct T.V. Signal Strength Readings

Tsp No	Signal Strength Readings										Avg
16	86	85	85	85	86	86	86	86	85	85	85.5
18	84	83	84	84	85	85	84	84	83	85	84.1
20	87	87	86	86	87	87	87	86	86	88	86.7

Estar T.V. Signal Strength Readings

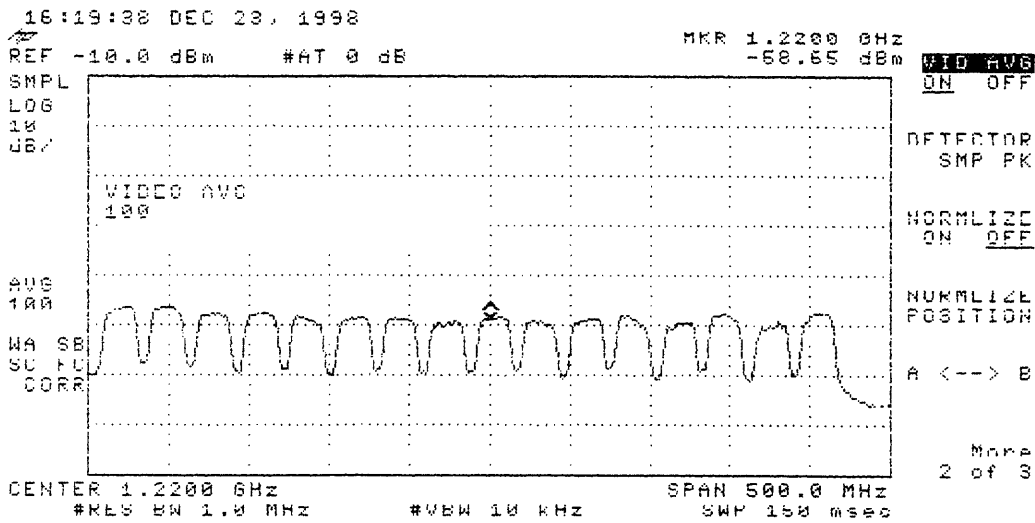
Tsp No	Signal Strength Readings										Avg
16	87	87	87	87	87	87	87	86	86	87	86.8
18	86	85	85	86	86	86	86	86	86	86	85.8
20	88	89	88	89	88	89	89	88	89	88	88.5

Notes: Over Cast, Drizzlings, cold 30°-35°, Heavy Fog can't see Franklin Bld. Windy.

1. DTV, 12/23/98, Set-1, Site-2

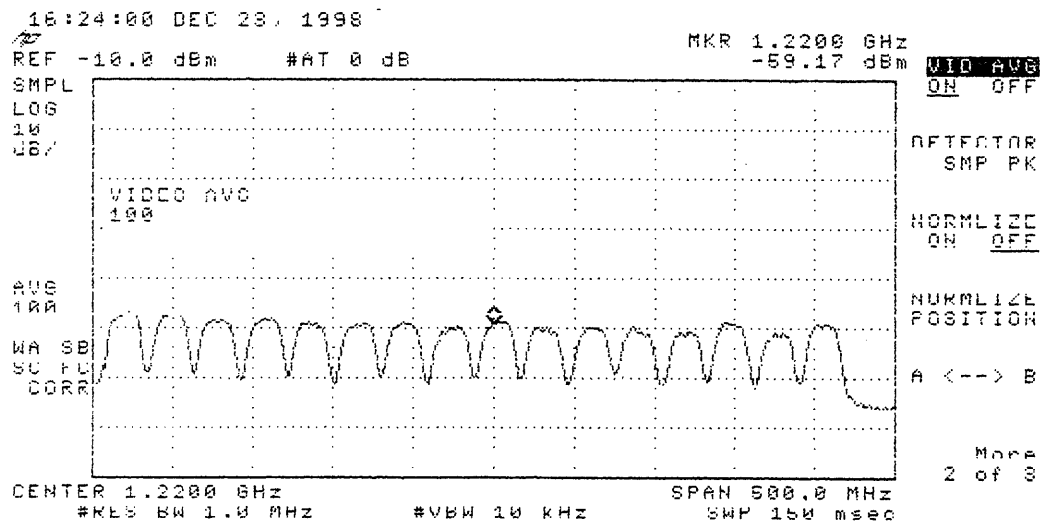
2. Boom at 21 1/2'

Plot 2-0



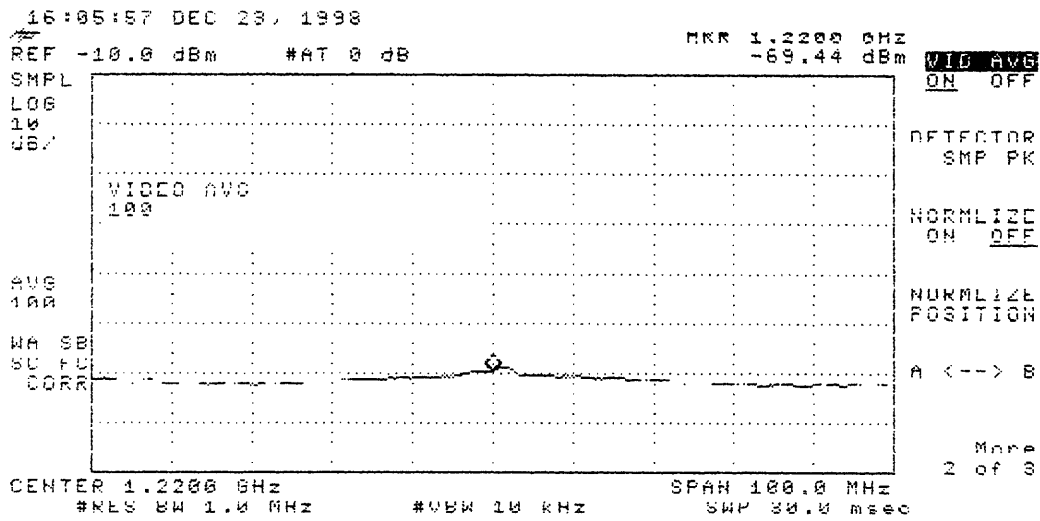
1. Estar, 12/23/98, Set-1, Site-2
2. Boom at 21 1/2'

Plot 2-E



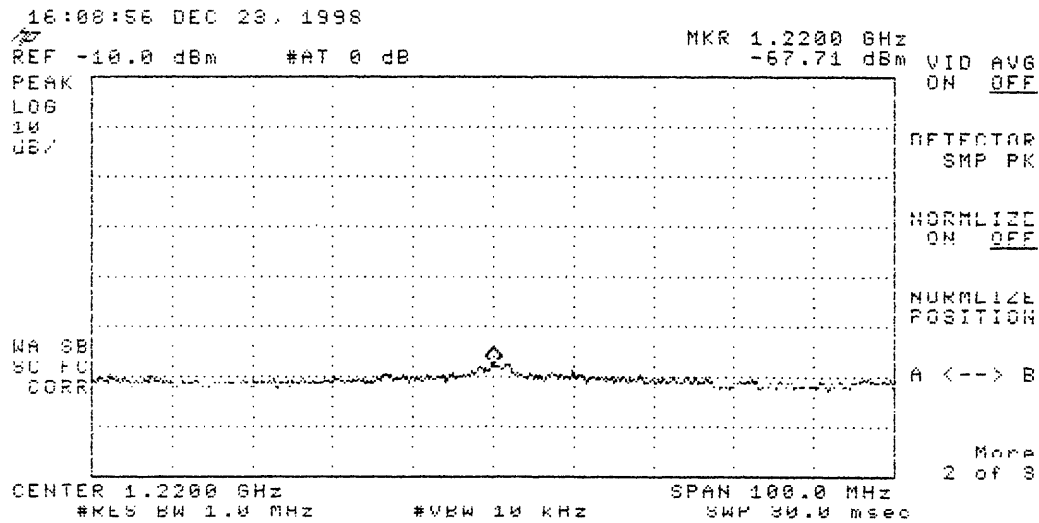
1. Site -2, 12/28/98, SE+-1
N.P. Boom at 2 1/2'
2. No Picture on T.V.

Plo+ 2-N-1



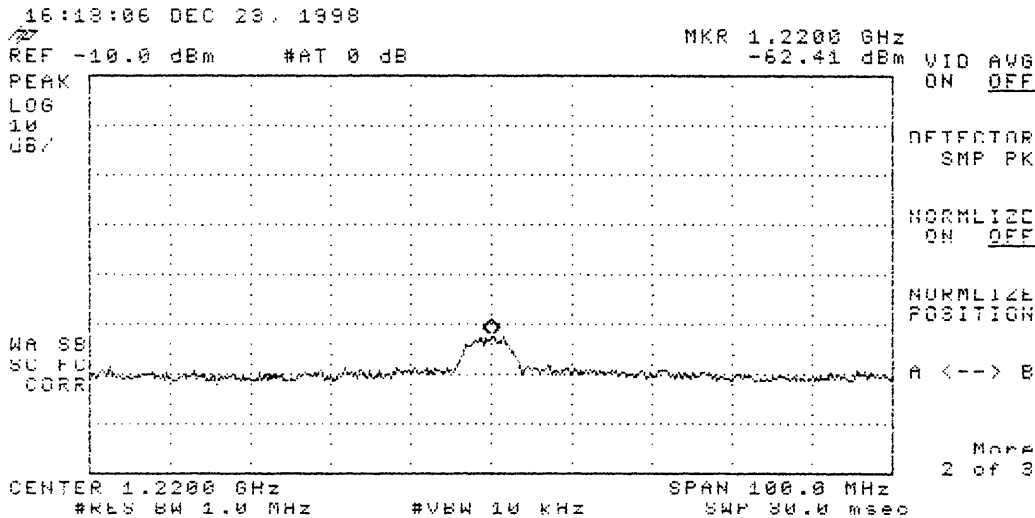
1. Site -2, 12/28/98, Set-1
N.P. Boom at 2 1/2'
2. No Picture on T.V.

Plot 2-N-2



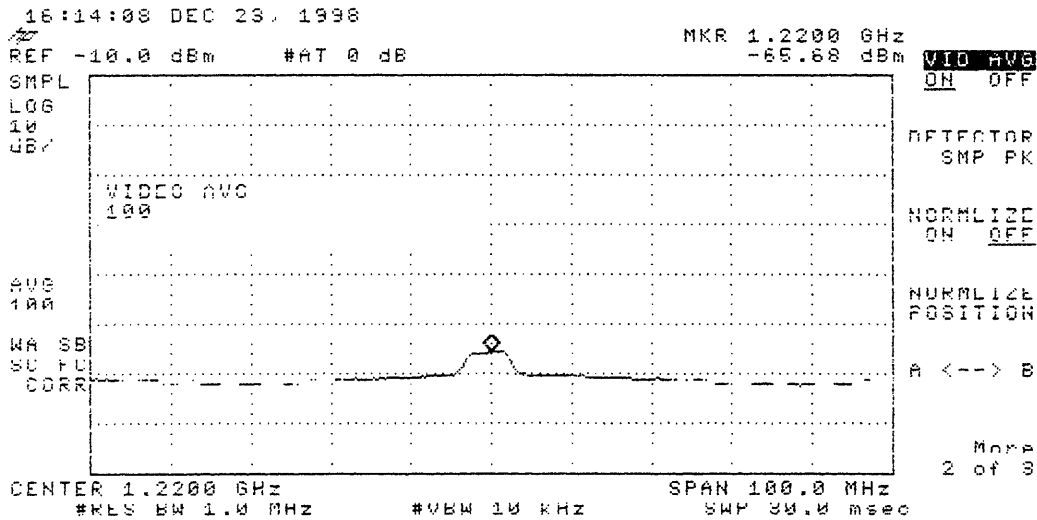
1. Site-2, 12/23/98, Set-1
2. Boom at 2 1/2' Dish held By Hand
3. Picture in and out
4. Did see a spike above 10dBm. (5 or 10-12 dBm)
could not find again

Plot 2-N-3



1. Site-2, 12/23/98, Set-1
2. Boom at 2 1/2' this is average of 2-N-3, held By Hand.

P10 + 2-N-4



COMMENTS FROM SITE 2

Site 2 Salvation Army

- a. Overcast, Drizzling, cold 30-35, Windy, Heavy Fog- can not see Franklin building.
- b. Picture is in and out on plot 2-N-3, did see spikes up to 10-12 dBm for NP Tx. Dish is being held by hand.

Northpoint Technology – DBS Compatibililty Test – Austin Test Area

Palmer
Using 859/E

Rx Site Data Log

Rx Site No. 3 p1
Set: 11

Re: Rx Condx Ref. No. 2 Date / Time: 12/22/98 10:55 CST
Re: Tx Condx Ref. No. 2 Operator: J.D

Data Measurements:

- (1) On arrival --
 - Position and deploy antenna platform (first at ground level).
 - Position GPS Receiver and allow to average during site occupation.
 - Obtain information for Rx Site Location Log.
 - Point Precision Horn Antenna toward Tx (approx. direction).
- (2) DBS Signal Interference Tests – DirecTV and EchoStar.

For each satellite case (one at a time), with Tx OFF, point DBS Antenna to the satellite and peak the signal strength. Observe the monitor for the prescribed TV channel (w/ appropriate DBS Rx) and assess signal quality. Turn Tx ON and observe the TV signal quality. Note any change in signal quality that is correlated with the Tx ON/OFF condition. Repeat Tx ON/OFF sequence as needed.

With the Spectrum Analyzer (SA), observe and record the Signal Power Spectrum and its peak value at the LNB output for the two Tx states (ON/OFF). Label the Spectrum Plots and mark them with an assigned ID code.

DirecTV – Tx OFF: OK? Y___/N___ Tx ON: OK? Y~~X~~/N___

Any behavior correlated with Tx ON/OFF ? Y___/N___

Comments: _____

Signal Power Spectrum – Tx ON: --Peak -- -60.44dBm Plot ID Code 3-D-B
Tx OFF: – Peak -- _____dBm Plot ID Code _____

Comments: _____

EchoStar – Tx OFF: OK? Y___/N___ Tx ON: OK? Y~~X~~/N___

Any behavior correlated with Tx ON/OFF ? Y___/N___

Comments: _____

Signal Power Spectrum – Tx ON: --Peak -- -58.00dBm Plot ID Code 3-E-C
Tx OFF: – Peak -- _____dBm Plot ID Code _____

Comments: _____

Northpoint Technology – DBS Compatibility Test – Austin Test Area

Rx Site Data Log

Rx Site No. 3 p2
Set: 11

(3) Northpoint Signal Quality Test –

With the Tx ON, point the DBS antenna toward the Tx, while using the NP Rx equipment, and peak the signal strength. Observe the monitor (w/ NP Rx equipment) and assess the signal quality.

NP Signal – OK? Y X / N___ Comments: _____

(4) NP Rx Signal Level and Power Spectrum at Rx Site – LNB output --

With the DBS antenna on the NP Tx, and with the Tx ON, observe and record the Signal Power Spectrum and the peak level at the LNB output. Label the spectrum plot with an assigned ID Code.

Signal Power Spectrum -- Peak -- -33.80 dBm Plot ID Code -- 3-N-A

Comments: _____

(5) Tx Signal Level and Power Spectrum at Rx Site – w/ Precision Ant. and SA.

Using the Precision Antenna and Test Set, observe and record the Tx Signal Power Spectrum and the peak value at the Rx site. Label the spectrum plot with an assigned ID Code.

Signal Power Spectrum -- Peak -- _____ dBm Plot ID Code -- _____

Comments: _____

(6) When Rx Site measurements and tests are completed, read the GPS Receiver and record the position in the Rx Site Location Log. Prepare the equipment for movement to the next site.

Use the space below for added comments and notes. Attach extra pages if necessary.

**Northpoint Technology – DBS Compatibility Test – Austin Test Area
Signal Strength Readings**

Rx Site Data LogRx Site No. 3Set 11Re: Condx Ref. No. 2Date/Time 12/22/98 11:20 CSTRe: Condx Ref. No. 2Operator: JD**Direct T.V. Signal Strength Readings**

Tsp No	Signal Strength Readings										Avg
16	76	77	76	76	76	76	75	75	75	76	75.8
18	63	64	64	64	62	60	61	61	63	64	62.6
20	75	76	76	76	75	75	76	76	74	74	75.2

Estar T.V. Signal Strength Readings

Tsp No	Signal Strength Readings										Avg
16	89	89	89	89	89	89	89	89	89	89	89
18	90	89	89	89	89	89	89	89	89	90	89.2
20	91	91	90	92	91	91	91	91	91	92	91.3

Notes: Over to Central Overcast Temp in the 30's F

(34°F)
Using program 20071 you need to adjust 74 on
transponder number 18