RF HAZARD ANALYSIS
MODEL 240KVO OR 240MVO Ku-BAND ANTENNA SYSTEM

This report analyzes the non-ionizing radiation levels for a 2.4-meter satellite earth station transportable antenna system operating in the Ku-band Fixed Satellite Service (FSS) band. It is the purpose of this report to determine the power flux density levels in the far field, near field, transition region, between the feed and main reflector, at the surface of the reflector, and between the edge of the reflector and the ground. The antenna in use is an offset feed prime focus system.

The following parameters were used to calculate each of the power flux densities for this earth station:

Antenna Diameter (D)	= 2.4-meters
Antenna Surface Area (S_a)	= $pi(D^2)/4$ = 4.52 m^2
Wavelength at 14.25 GHz (lambda)	= 0.021 meters
Transmit Power at Flange (P)	= 560 watts
Antenna Gain (G_a)	= 49.2 dBi (83,176.38)
pi (pi)	= 3.1415927
Antenna Aperture Efficiency (n)	= 0.65

1. Far Field Calculations

The distance to the beginning of the far field region can be found by the following equation:

Distance to Far Field Region (R_f)	= $2(D^2)$/lambda
	= 548.57 meters

The maximum main beam power density in the far field region can be derived from the following equation:

Far Field Power Density (W_f)	= $((G_a)(P))/(4(pi)(R_f^2))$
	= 12.32 W/m^2
	= 1.23 mW/cm^2

2. Near Field Calculations

The power density in the near field is considered to be at a maximum value throughout the entire length of the defined region. This region is contained within a cylindrical volume having the same diameter as the reflector of the antenna.

The distance to the end of the near field can be calculated by the following equation:

End of Near Field Region (R_n) = ((pi)(D^2))/((2)(4)(lambda))

= 107.71 meters

The maximum power density within the near field region is calculated by the following equation:

Near Field Power Density (W_n) = ((4)(P))/((pi)(D^2))

= 123.79 W/m^2

= 12.379 mW/cm^2

3. Transition Region Calculations

The transition region is located between the end of the near field region and the beginning of the far field region. While the power density declines relative to the distance from the antenna, the power density will in no case exceed the power density level of the near field region. Therefore, the power density level within the transition region will not exceed 12.379 mW/cm^2.

4. Region Between the Feed and Main Reflector

Since the antenna system is an offset feed prime focus antenna the power density is assumed to be equally illuminated over an area equal to that of the main reflector. The maximum power density within this area and at the reflector surface is calculated by the following equation:

Feed to Main Reflector Power (W_m) = ((4)(P))/((pi)(D^2))

= 123.379 W/m^2
= 12.379 mW/cm^2

FCC INFORMATION

Emission Standard:	36MoF39
Frequencies:	14000.000 - 14500.000 H,V
Transmitting Equipment:	MCL Model 10852
Max Output:	265 Watts, 1:1; 450.5 watts, Power-Combined
Antenna:	2.4-Meter Offset-Fed, Model RSI 240KVO
Maximum Gains:	47.5 dBi at 12 GHz
	48.9 dBi at 14 GHz
Earth Station EIRP:	73.13 dBW, 1:1
	75.44 dBW, Power-Combined

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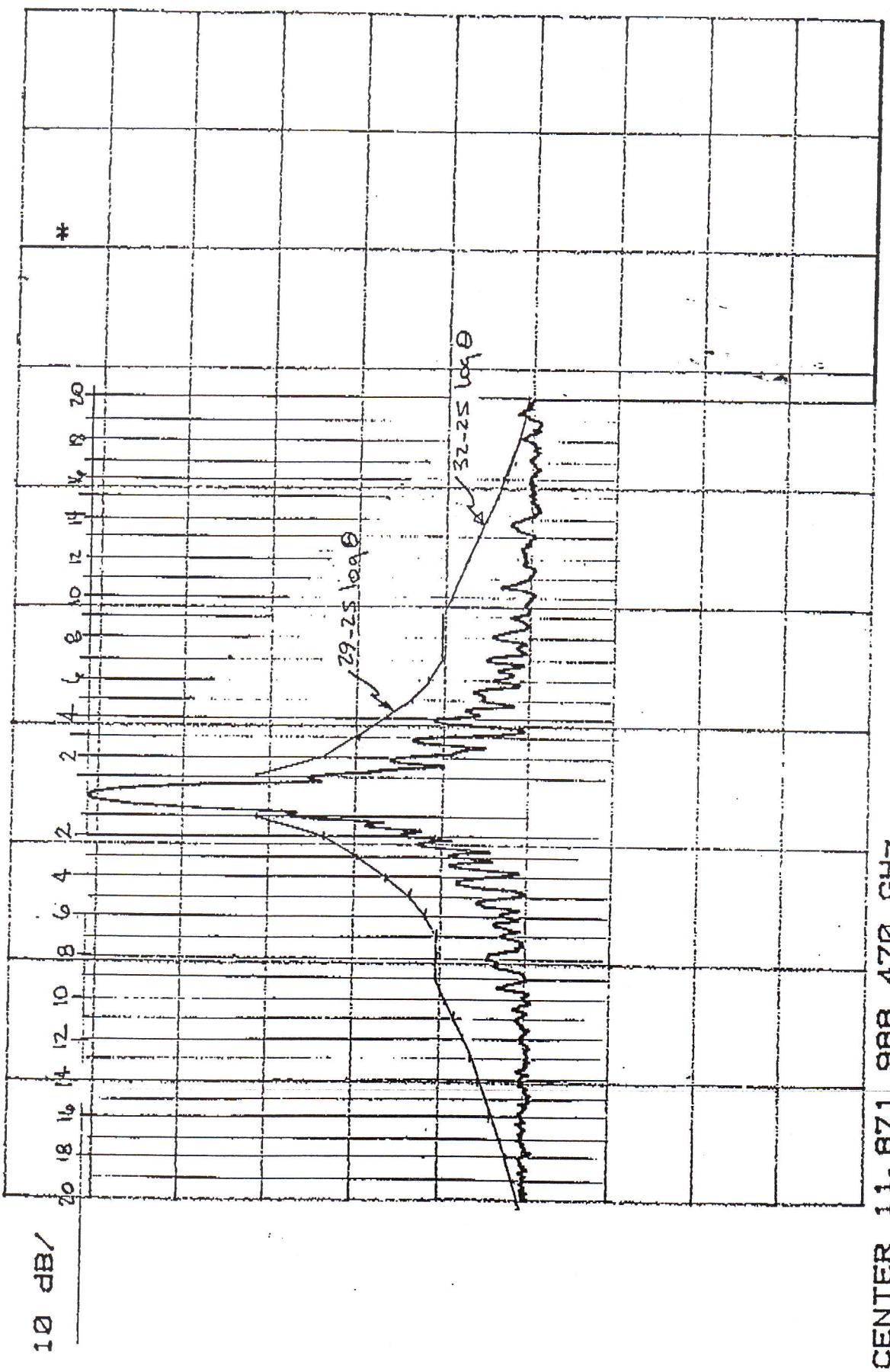

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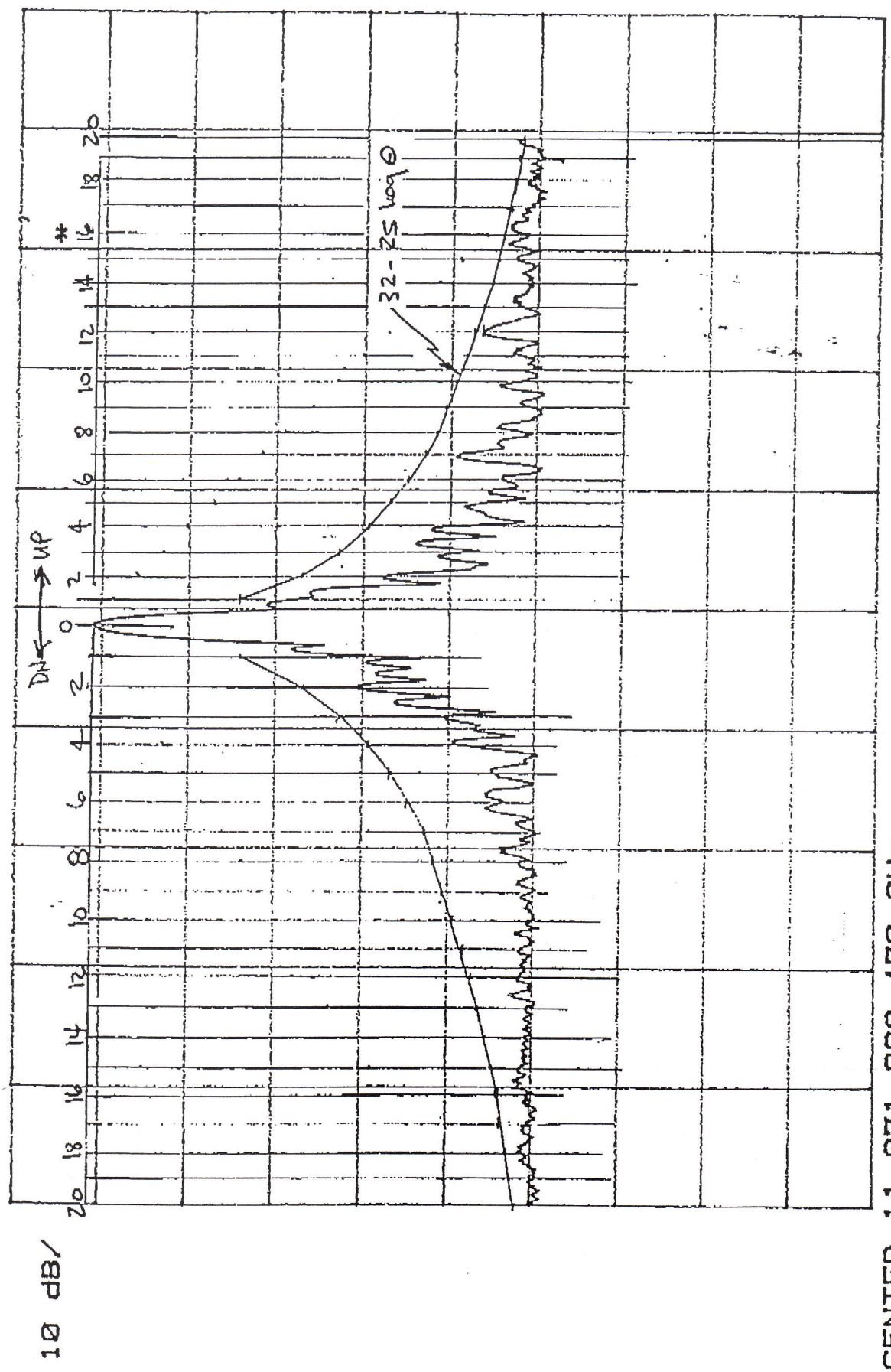
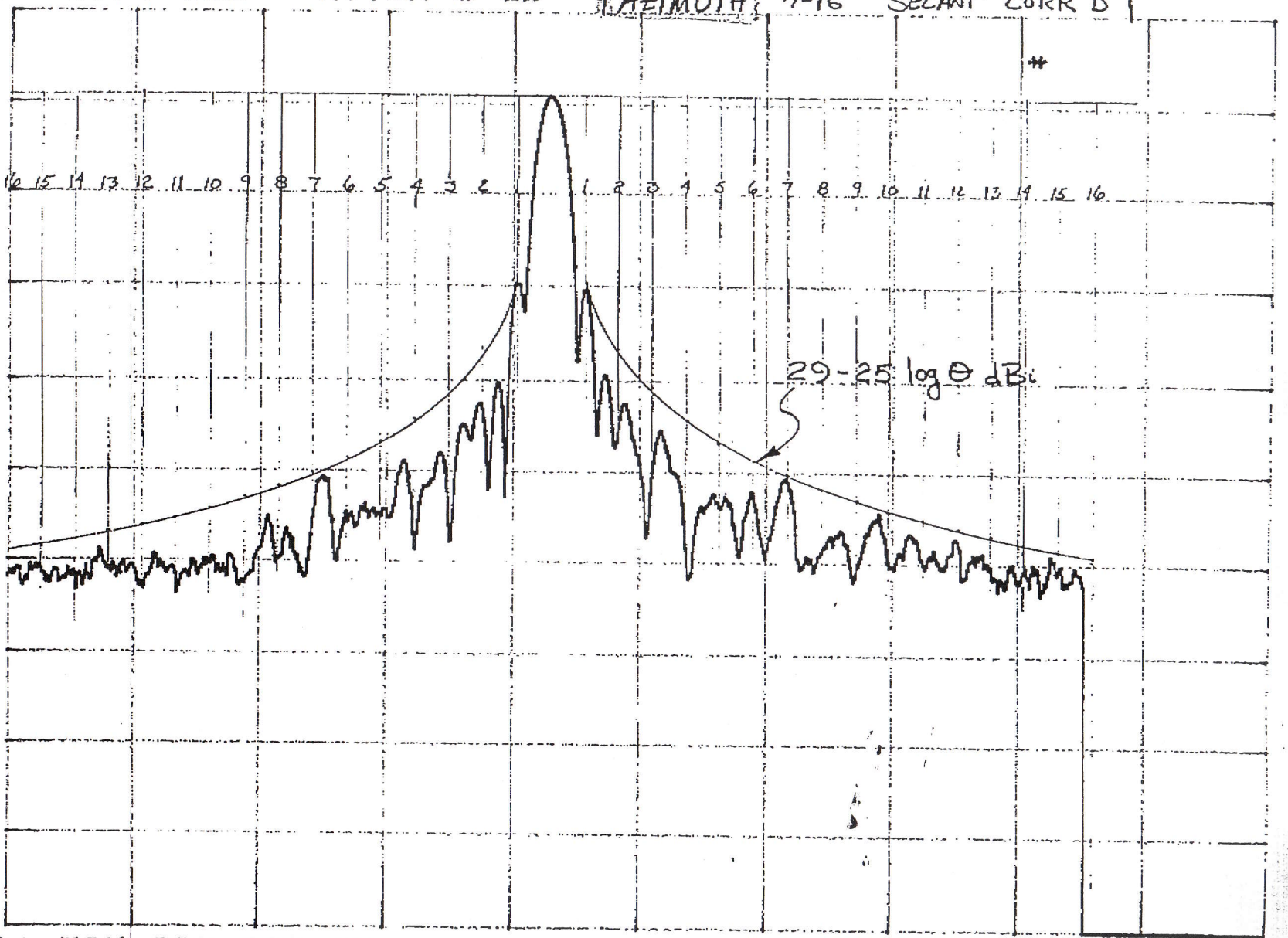


B4470/COMSAT 240 KVO

SBS IV / TXR 1 / 14.025 GHz

REF −58.4 dBm ATTEN 0 dB AZIMUTH: +/-16° SECANT CORR'D

10 dB/



CENTER 11.725 003 283 GHz

SPAN 0 Hz

RES BW 100 Hz VBW 1 Hz SWP 140 sec

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B4470/COMSAT 240KVO

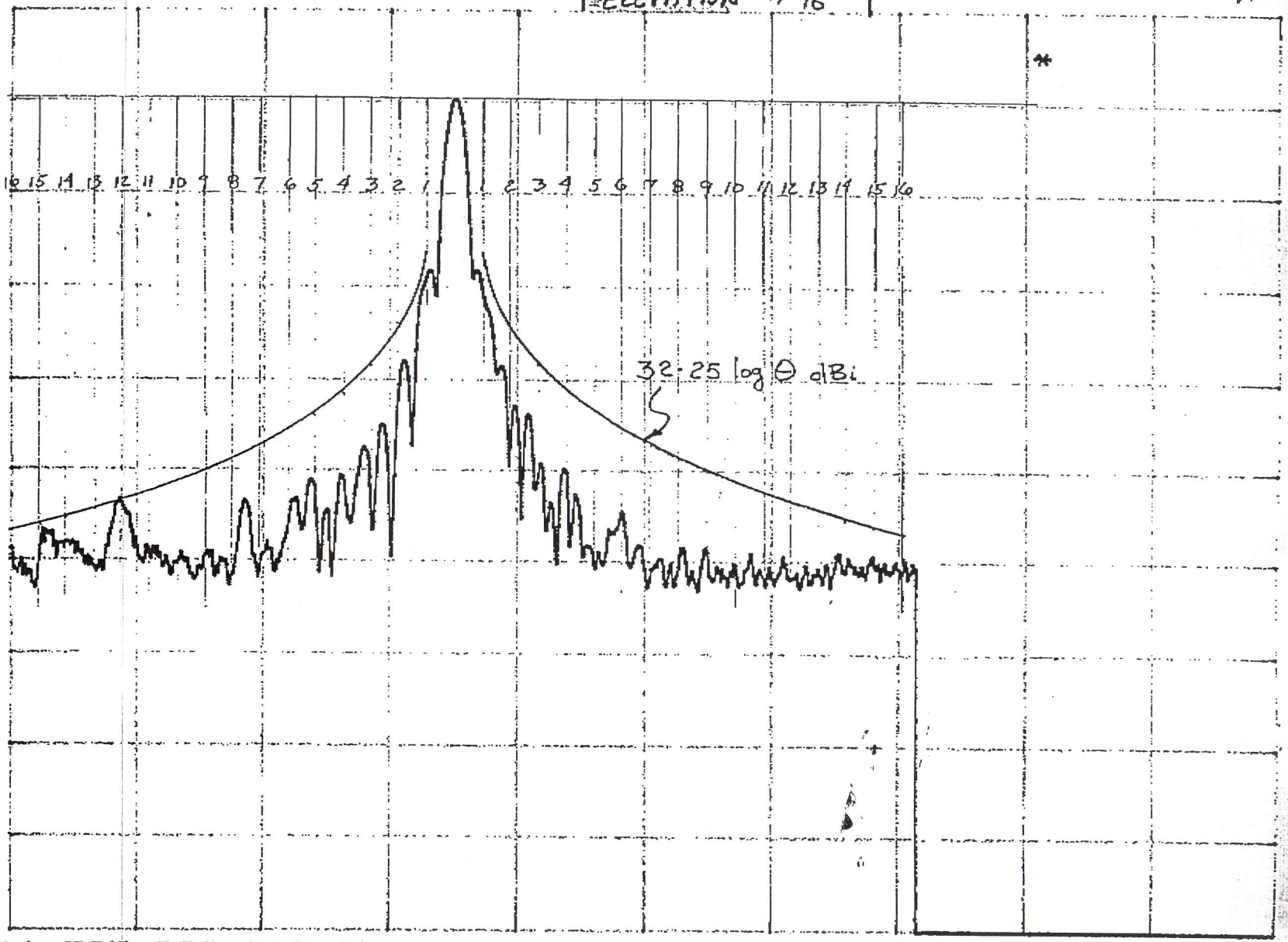
JBSIV/TXR 1/14.025 GHz

REF -58.4 dBm ATTEN 0 dB ELEVATION +/-16°

(2)

5/13/92 JPL

10 dB/



CENTER 11.725 003 283 GHz

SPAN 0 Hz

RES BW 100 Hz VBW 1 Hz SWP 200 sec

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