Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In re Application of	)	
	)	
ELLIPSAT CORPORATION	)	
	)	File No.
For Authority to Construct	)	
ELLIPSO® I, an Elliptical Orbit	)	
Communication Satellite System	)	
in the 1610-1626.5 MHz and	)	
2483.5-2500 MHz Bands	)	

11-DSS-P-91(6)

TECHNICAL CLARIFICATION AND ERRATUM

On November 5, 1990, Ellipsat Corporation ("Ellipsat") filed an application for ELLIPSO® I, an elliptical orbit satellite system. This "Technical Clarification and Erratum" is submitted by Ellipsat in response to an informal Staff request for the purpose of clarifying and correcting certain technical information in the application.

For convenience, a revised Appendix A (Technical Information), and Appendix B (Technical Systems Specifications), and a new Appendix H (Interference Analysis) are attached hereto, and should be substituted where appropriate in the original system proposal. A revised Exhibit I (Technical Information) for each of the six separate satellite applications is attached and should be substituted in lieu of the Exhibit I previously submitted. In some cases, changes in the technical appendices and exhibits required a corresponding change in the text of the system proposal and individual satellite applications, and these revised pages have

also been attached and should be substituted in the appropriate places.

Respectfully submitted,

ELLIPSAT CORPORATION

By: _____
Dr. David Castiel
Chairman and Chief
Executive Officer

Of Counsel:

Jill Abeshouse Stern, Esquire
Miller & Holbrooke
1225 19th Street, NW
Suite 400
Washington, D.C. 20036
(202) 785-0600

January 29, 1991

3. Transmit Only: None

E. Characteristics of the Space Station

1. Weight: 40 lbs.
2. Dimensions: 9 x 9 x 13 inches, plus antenna
3. Solar Power: 22 watts maximum
4. Transmitter Power: 48 watts, 35% efficiency, 7% duty cycle
5. Satellite EIRP: 24 dBW (all segments)
6. Estimated Operational Lifetime: 3-5 years
7. Antenna Beam Contour: See Figure A-1
8. Satellite Receive G/T: -19 dB/°K
9. Antenna Peak Gain: 8 dBi (Receive and Transmit)

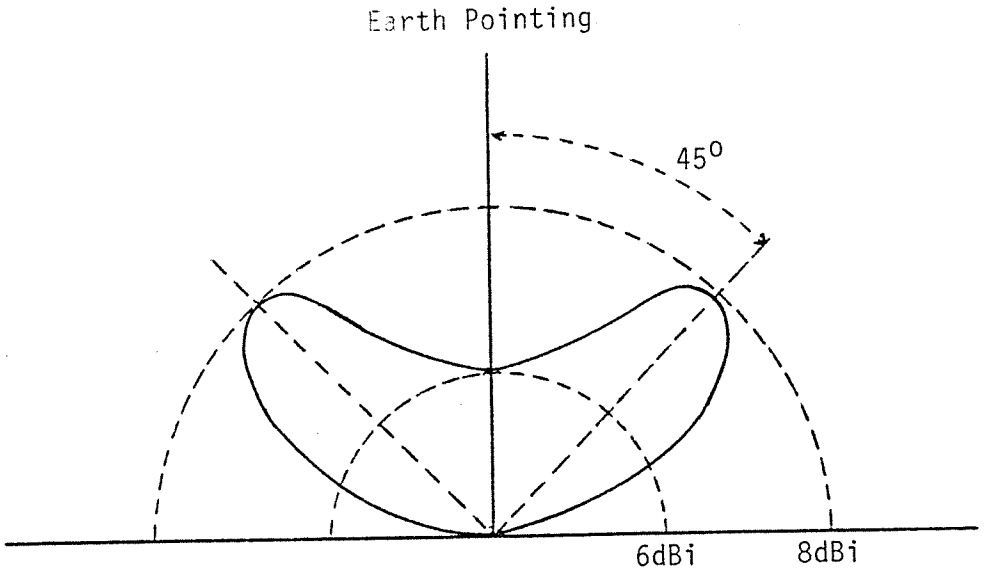

Figure A-1

Ellipsat is currently developing specifications for the enhanced ELLIPSO®II spacecraft, and will provide detailed information at an appropriate time. A summary is provided in Table 1 below for informational purposes.

TABLE 1.

SUMMARY ELLIPSO® II
SPACE STATION CHARACTERISTICS

Orbit	63.5° inclination elliptical orbit 500 km Perigee; 1250 km Apogee
Number of Satellites	24; 4 planes with 6 satellites/plane
Mass in Orbit (Boc)	150 lbs.
Size	20 x 20 x 15 inches + solar panels
Stabilization	Gravity Gradient 3-Axis Magnetic torquing & damping
Station keeping	± 5 degrees In plane ±.5 degrees Out-of-plane
Mission life	7 years
Eclipse Capability	35 percent
Earth Coverage	5,048 km at 10° elevation angle
Power Nominal	170 watts at End of Life
Polarization	Circular (RHC)
Uplink Segments	10 segments at 1.4 MHz bandwidth (1610 MHz-1626.5 MHz)
Downlink Segments	10 segments at 1.4 MHz bandwidth (2483.5 MHz-2500 MHz)
Transmit EIRP	27 dBW (all segments)
Satellite G/T	-17 dB/°K
Power Flux Density	-144.4 dBW/m2 /4KHz between 25° and 90° elevation

APPENDIX B
TECHNICAL SYSTEM SPECIFICATIONS

A. Performance Objectives

Performance objectives are 99% service when mobile transceivers are in line of sight of an ELLIPSO® satellite.

B. Transmission Link Budget

Parameter	Mobile to GCS	GCS to Mobile
Uplink		
Transmit Frequency	1610/1616.5 MHz	1610/1616.5 MHz
EIRP	4.0 dBW	16.2 dBW
Path Loss	160 dB at 30°	165 dB at 20°
Polarization Loss	1 dB	1 dB
Atmospheric Loss	1 dB	1 dB
Satellite G/T	-19 dB/°K	-19 dB/°K
Uplink C/No.	48.6 dB-Hz	58.8 dB-Hz
Downlink		
Transmit Frequency	2483.3/2500 MHz	2483.3/2500 MHz
EIRP (per user)	-14 dBW	4.0 dBW
Path Loss (20° El)	165 dB at 20°	167 dB at 30°
Polarization Loss	1 dB	1 dB
Atmospherics Loss	1 dB	1 dB
G/T	15 db/°K	-21 dB/°K
Downlink C/NO	58.6 dB-Hz	42.6 dB-Hz
System Required C/No	40.8 dB-Hz	40.8 dB-Hz
Resulting C/No	48.2 dB-Hz	42.5 dB-Hz
Margin	7.4 dB	1.7 dB

C. Earth Station (GCS) Parameters

1. Tx Power/user <1.0 Watt
2. Antenna Gain 34 dBi
3. EIRP 16 dBW (per user)
4. G/T 15 dB/°K

D. Mobile Terminal Parameters

1.	Tx Power	<1 Watts
2.	Antenna Gain	4 dBi
3.	EIRP (nominal)	4.0 dBW
4.	G/T	-21.0 dB/°K
5.	Antenna Pattern	See Figure B-1

E. Modulation Parameters

1. Access Method: FDMA/CDMA
2. Modulation: Direct Sequence BPSK
3. Spreading @ 1.28 Mcps
4. Spreading Gain: 24.2dB
5. FEC encoder Rate 1/2, K=7
6. 4800 bps voice-activated transmission
7. Eb/No = 4 dB, BER 10-4
8. RDSS through Geobeacon code detection and interpretation

F. System Capacity (voice message)

Number of simultaneous users per segment	100
Number of simultaneous users for ELLIPSO® I (within the U.S.)	150

G. Interference Analysis

Interference calculations are provided in Appendix H.

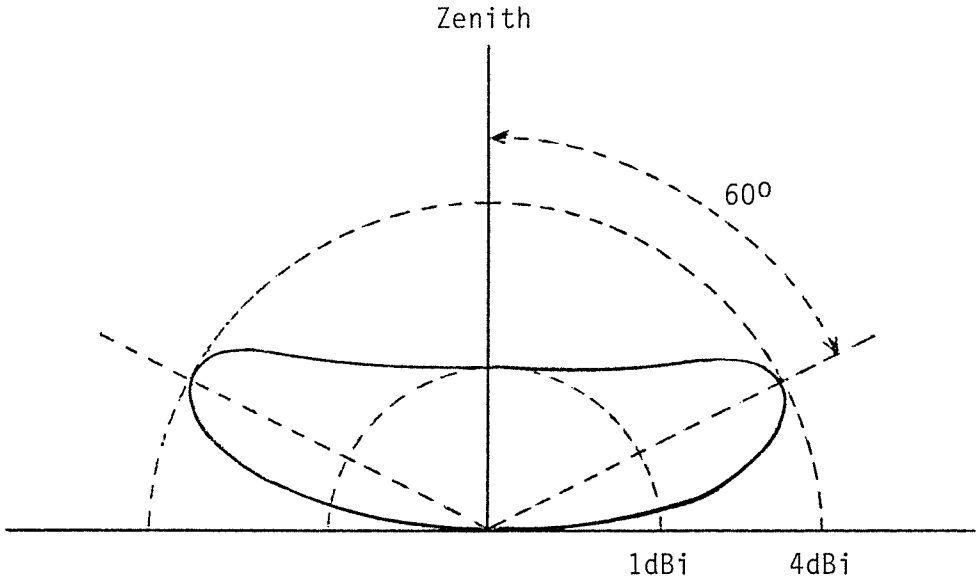

Figure B-1

Mobile Antenna Radiation Pattern

APPENDIX H

APPENDIX H
INTERFERENCE ANALYSIS

1. Radio Astronomy

Ellipsat will fully protect radio astronomy activities in the 1610 - 1613 MHz band. During periods of radio astronomy observations the segmentation of the band described in Ellipsat's application (see page 11) provides a complete avoidance capability if required. However, the elliptical orbits allow for protective restriction of user transmissions during these periods without significant impact on ELLIPSO® operation. Ellipsat has initiated discussions with the National Academy of Sciences and is prepared to enter into an agreement comparable to that reached by the National Academy and Geostar. A copy of that agreement is attached hereto as Exhibit H-1.

2. Current RDSS Licensee (Geostar System)

Ellipsat can co-exist with Geostar's interim and dedicated RDSS systems. Due to the power levels used by the ELLIPSO® system, which are fully consistent with the RDSS rules and with international requirements (CCIR RR2-S Section 2556 and 2557), the ELLIPSO® spacecraft, mobile terminals and fixed earth station facilities will not interfere with the operation of Geostar's interim or dedicated geosynchronous systems either at 1.6 or 2.5 GHz. Conversely, Geostar mobile terminals are not expected to cause harmful interference to ELLIPSO® satellites or transponders. Opposite circular polarizations will be used by ELLIPSO® to minimize any interference effects.

An interference analysis of L-Band and S-Band operations for Geostar and Ellipsat is provided below.

For purposes of this analysis, the following Geostar and Ellipsat parameters were used.

Geostar Parameters

Mobile EIRP	18 dBW/16 MHz
Access/Modulation	CDMA/BPSK
Processing Gain	25 dB
Interference/Signal Protection	21.5 dB
Satellite EIRP	48 dBW/16 MHz
Polarization	Circular

Ellipsat Parameters

Mobile EIRP	4.0 dBW/1.4 MHz
Access/Modulation	CDMA/BPSK
Processing Gain	24.2 dB

CDMA Interference/ Signal Protection	26.7 dB
Satellite EIRP	14 dBW/1.4 MHz
Polarization	Circular

a. L-Band

Because of the distance between the Ellipsat low-orbit satellites and Geostar's geosynchronous satellites (35,000 km) and the resulting loss of approximately 24 dB (depending on the angle), uplink signals from ELLIPSO® mobile terminals and fixed ground stations will not cause harmful interference to Geostar satellites.

Based on an interference analysis of the potential interference to ELLIPSO® satellites from Geostar mobile users, Ellipsat does not expect any harmful interference to be caused to its operations. This is based on a total $C/(No + N_I)$ of 47.2 dB-H_z (with 10 dB polarization isolation) and a remaining margin of 6.4 dB plus CDMA Interference/Signal Protection. Geostar will take -22.6 dBW EIRP out of ELLIPSO® I for each simultaneous (in time) Geostar transmission. This is not regarded as significant.

b. S-Band

No harmful interference to ELLIPSO® mobile terminals or ELLIPSO® fixed ground stations from Geostar's satellite downlink operations in the S-band is expected. Nor will harmful interference to Geostar mobile terminals be caused by downlink transmissions from ELLIPSO® satellites. (Geostar's fixed ground stations operate in the C-band.)

All Geostar and ELLIPSO® ground terminals have a code detection capability inherent in CDMA techniques, enabling discrimination between the two systems. In addition, the downlink parameters of both systems ensure that no harmful interference is present as detailed below.

In considering the impact of downlink transmissions from Geostar satellites on ELLIPSO® mobile receivers, an interference analysis yields the following results: a total $C/(No + N_I)$ of 40.3 dB-Hz and a remaining margin of -0.3 dB plus CDMA Interference/Signal Protection of 26.4 dB. A worst case scenario of continuous Geostar transmissions has been considered. Because Geostar typically bursts in 100 millisecond time segments, however, any interference is expected to be even less significant than this analysis suggests.

Based on an equivalent interference analysis, no harmful interference from ELLIPSO® satellites to Geostar receivers is expected based on a reduction of Geostar C/No by 0.3 dB plus CDMA Interference/Signal Protection of 21.5 dB.

3. Future RDSS Licensees

Provided that future RDSS systems conform to the RDSS technical standards set forth in Part 25 of the Commission's Rules, Ellipsat will not interfere with, nor does it expect to receive interference from, such systems, subject to Ellipsat's technical analysis of any specific proposals and to spectrum capacity limitations in the relevant frequency bands.

The ELLIPSO® system design meets the Commission's policy goals, expressed in the RDSS Licensing Order, providing for multiple entry and operation of compatible (e.g., CDMA) systems in the RDSS bands. Radiodetermination Satellite Service, 60 R.R. 298 (1986). The number of systems that can ultimately be accommodated will be dependent on the total capacity and use of each system.

4. GLONASS

Ellipsat does not expect to interfere with the Soviet GLONASS system, which operates in the 1610 to 1616 MHz band. As a domestic system, ELLIPSO® mobile terminals and ground facilities would have no impact on GLONASS receivers, which are receive-only in the L-Band and located outside the U.S. As noted below, ELLIPSO® satellites will be inactive except when passing over the United States, and would not interfere with GLONASS satellites.

At this time, no GLONASS receivers are believed to be in use or authorized for use within the United States. Even if such use were permitted, however, interference is unlikely because of characteristics of the GLONASS system, including its use of CDMA techniques and receive-only operations in the L-band.

5. International Considerations

ELLIPSO® fully complies with ITU requirements (CCIR RR2-5 Section 2556 and 2557) with respect to flux density limits in the 1.525-2.5 GHz bands as demonstrated below.

EIRP per 1.4 MHz segment 14.0 dBW

Elevation	30°	90°[1]
Distance	2050km	1250km
$4\pi d^2$	137.3dB	133dB
Flux per Segment	$-123.3 dBW/m^2$	$-119.0 dBW/m^2$
Flux per 4kHz	$-148.7 dBW/m^2/4kHz$	-144.4dBW/m2/4kHz
Requirement	$-144.0 dBW/m^2/4kHz$	$-144 dBW/m^2/4kHz$

[1] The 90 degree elevation is the worst case for any ELLIPSO® elevation angle, and even the 90 degree elevation complies with ITU requirements.

EXHIBIT H-1

GREEMENT REACHED BETWEEN GEOSTAR AND THE NATIONAL ACADEMY OF SCIENCES FOR HARING BETWEEN THE RADIODETERMINATION SATELLITE SERVICE AND THE RADIO STRONOMY SERVICE IN THE 1606.8-1613.8 MHZ BAND

Emission Limitations

The mean power density of airborne and spacecraft RDSS emissions at a frequency which is removed from the assigned frequency by more than 50% shall be attenuated below the mean power density at the assigned center frequency as specified in the following equation (attenuation greater than 75 decibels is not required):

$$A = 12 + 0.2(P-50)$$

where,

A = attenuation (in decibels) below the mean power density level, and

P = percent of assigned bandwidth removed from the carrier frequency

Radio Astronomy Coordination Procedures

All RDSS licensees will automatically restrict user transmissions to occur only within the first 200 milliseconds following the one second time marks of Coordinated Universal Time when users enter Radio Astronomy Regions (RARs) during a period of radio astronomy observations in the 1606.8-1613.8 MHz band. RARs are defined by a circle with a radius of 150 kilometers from the coordinates provided below for airborne transmissions, and by a circle with a radius of 25 kilometers from the coordinates provided below for ground-based transmissions. Any segment of a RAR which is part of a Standard Consolidated Statistical Area is not subject to coordination and transmission restriction limitations.

RDSS licensees will establish an observation notification procedure through the Electromagnetic Spectrum Management Unit, National Science Foundation, Washington, D.C. 20550, that satisfactorily provides for the restriction of user transmissions as described above during periods of radio astronomy observations in the frequency band 1606.8-1613.8 MHz.

RDSS licensees shall reimburse radio observatories for the cost of any special equipment or services required by their observation notification procedure.

Radio Astronomy Sites

The following radio astronomy sites are the centers of RARs as described above:

Name	Latitude:		Longitude:	
Hat Creek, California	40 deg.	49' N	121 deg.	28' W
Owens Valley, California	37	13	118	17
VLA, New Mexico	34	04	107	37
Fort Davis, Texas	30	38	103	56
Green Bank, West Virginia	38	26	79	49
Arecibo, Puerto Rico	18	21	66	45

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For Authority to Construct	)	
the First of Six Elliptical	)	
Orbit Satellites Comprising	)	
the ELLIPSO®I System	)	

APPLICATION

Ellipsat Corporation ("Ellipsat" or "Applicant") hereby applies for authority to construct the first of six elliptical orbit satellites comprising the ELLIPSO®I System.

I.

PURPOSE OF APPLICATION

A. Authorization Requested

Ellipsat requests authority to construct the first of six ELLIPSO® I elliptical orbit satellites. The satellites will operate in the 1610-1626.5 MHz (uplink) and 2483.5-2500 MHz (downlink) bands, in two inclined orbits providing coverage of the United States. The satellites are identical and will be launched simultaneously. This application covers all pertinent technical and operational information for authority to construct the first of the six satellites.[1]

---

[1] Detailed information about the satellites is provided in the comprehensive proposal for the entire system submitted with this application. Information in the system proposal is incorporated by this reference.

EXHIBIT I
TECHNICAL INFORMATION

A. Radio Frequency Plan and Polarization

1. Center Frequency and Polarization	Uplink 1618.25/MHz, Circular (RHC) Downlink 2491.75/MHz, Circular (LHC) Bands subdivided into 1.4 MHz "Segments"
2. Emission Designator or Allocated Bandwidth of Emission	GXX at 1610 MHz GXX at 2500 MHz

B. Orbital Characteristics

1. Orbital Locations	Low Earth Inclined Orbit, 63.5° Apogee at 1250 km in Northern Hemisphere Perigee at 500 km
2. Elliptical Orbit	500 km x 1250 km
3. Eccentricity	.0517
4. Semi-major axis	7253 km
5. Period	102.5 minutes
6. Footprint Radius @ 1200 km altitude	5048 km @ 10° elevation

C. Predicted Space Station Coverage Contours

1. Antenna Beams	90° beamwidth (See Figure A)
2. Receiving Antenna Gain	8dBi
3. Transmitting Antenna Gain at Peak (45° off center)	8dBi

4. Receiving System Sensitivity (G/T)	-19dB/K
5. Power Flux Density at Satellite	-137.2 dBW/m^2/4KHz (maximum)
6. RF Power Amplifier Output	48 watts
7. EIRP	24 dBw (composite, ten channels)
8. Functional Block Diagram	See Figure B

D. Physical Characteristics of Space Station

1. Accuracy within which Orbital Parameters will be Maintained

   +/- 5 degree In-Plane

   +/- .5 degree Out-Of-Plane

2. Accuracy of Antenna Pointing toward the Earth same as satellite (D.1 above), stabilized via Gravity Gradient method.

3. Estimated Life of Satellite In-Orbit: 5 years

4. Spacecraft Attitude Stabilization Systems Gravity Gradient/with 3-axis-Magnetic Stabilization

5. Electrical Energy System Description

   - Primary and Secondary Power Systems

   - 4 solar array panels/side, per 35% eclipse capability

   - Combined Output 22 Watts at End of Life (7% duty cycle)

   - NiCad batteries for eclipse operation and to achieve transmitter power over the service area

   - Power Control through computer-controlled Battery Control Regulation Module

E. Emission Limitations

ELLIPSO® uses a linear amplifier in the spacecraft communication subsystem and therefore no spurious emissions from non-linear elements will result. Spurious emissions due to local oscillations will be eliminated by design of the space-craft communication subsystem. Through the use of CDMA techniques, the spectrum will be well-controlled to avoid out-of-band emissions.

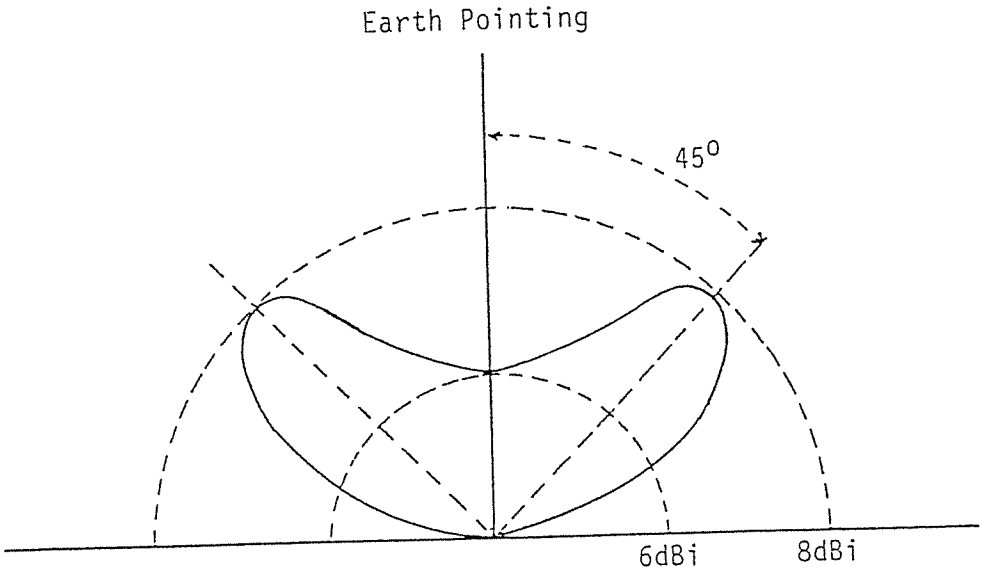

Figure A.

ELLIPSO®I Space Station, Receive and Transmit - Antenna Pattern

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the ELLIPSO®I System	)	

APPLICATION

Ellipsat Corporation ("Ellipsat" or "Applicant") hereby applies for authority to construct the second of six elliptical orbit satellites comprising the ELLIPSO®I System.

I.

PURPOSE OF APPLICATION

A. Authorization Requested

Ellipsat requests authority to construct the second of six ELLIPSO® I elliptical orbit satellites. The satellites will operate in the 1610-1626.5 MHz (uplink) and 2483.5-2500 MHz (downlink) bands, in two inclined orbits providing coverage of the United States. The satellites are identical and will be launched simultaneously. This application covers all pertinent technical and operational information for authority to construct the second of the six satellites.[1]

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2. Emission Designator or Allocated Bandwidth of Emission	GXX at 1610 MHz GXX at 2500 MHz

B. Orbital Characteristics

1. Orbital Locations	Low Earth Inclined Orbit, 63.5° Apogee at 1250 km in Northern Hemisphere Perigee at 500 km
2. Elliptical Orbit	500 km x 1250 km
3. Eccentricity	.0517
4. Semi-major axis	7253 km
5. Period	102.5 minutes
6. Footprint Radius @ 1200 km altitude	5048 km @ 10° elevation

C. Predicted Space Station Coverage Contours

1. Antenna Beams	90° beamwidth (See Figure A)
2. Receiving Antenna Gain	8dBi
3. Transmitting Antenna Gain at Peak (45° off center)	8dBi

4. Receiving System Sensitivity (G/T)	-19dB/K
5. Power Flux Density at Satellite	-137.2 dBW/m^2/4KHz (maximum)
6. RF Power Amplifier Output	48 watts
7. EIRP	24 dBw (composite, ten channels)
8. Functional Block Diagram	See Figure B

D. Physical Characteristics of Space Station

1. Accuracy within which Orbital Parameters will be Maintained

   +/- 5 degree In-Plane

   +/- .5 degree Out-Of-Plane

2. Accuracy of Antenna Pointing toward the Earth same as satellite (D.1 above), stabilized via Gravity Gradient method.

3. Estimated Life of Satellite In-Orbit: 5 years

4. Spacecraft Attitude Stabilization Systems Gravity Gradient/with 3-axis-Magnetic Stabilization

5. Electrical Energy System Description

   - Primary and Secondary Power Systems

   - 4 solar array panels/side, per 35% eclipse capability

   - Combined Output 22 Watts at End of Life (7% duty cycle)

   - NiCad batteries for eclipse operation and to achieve transmitter power over the service area

   - Power Control through computer-controlled Battery Control Regulation Module

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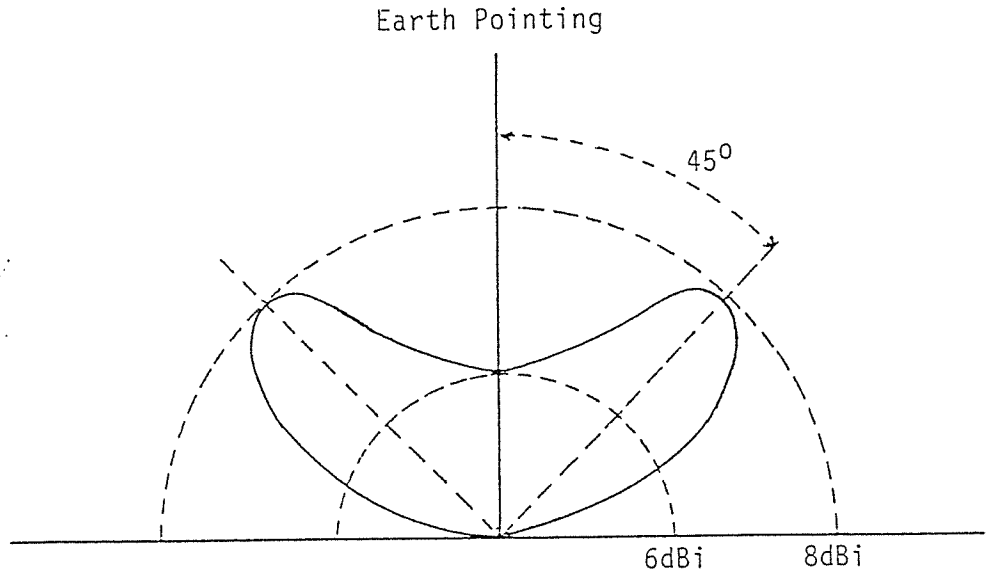

Figure A.

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B. Orbital Characteristics

1. Orbital Locations	Low Earth Inclined Orbit, 63.5° Apogee at 1250 km in Northern Hemisphere Perigee at 500 km
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E. Emission Limitations

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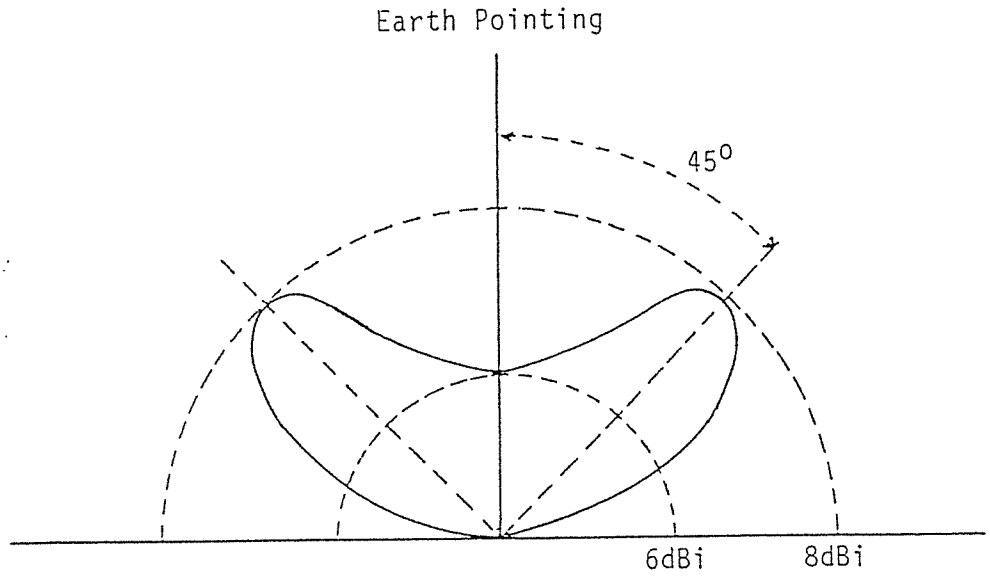

Figure A.

ELLIPSO®I Space Station, Receive and Transmit - Antenna Pattern

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In re Application of	)	
	)	
ELLIPSAT CORPORATION	)	
	)	File No.
For Authority to Construct	)	
the Fifth of Six Elliptical	)	
Orbit Satellites Comprising	)	
the ELLIPSO®I System	)	

APPLICATION

Ellipsat Corporation ("Ellipsat" or "Applicant") hereby applies for authority to construct the fifth of six elliptical orbit satellites comprising the ELLIPSO®I System.

I.

PURPOSE OF APPLICATION

A. Authorization Requested

Ellipsat requests authority to construct the fifth of six ELLIPSO® I elliptical orbit satellites. The satellites will operate in the 1610-1626.5 MHz (uplink) and 2483.5-2500 MHz (downlink) bands, in two inclined orbits providing coverage of the United States. The satellites are identical and will be launched simultaneously. This application covers all pertinent technical and operational information for authority to construct the fifth of the six satellites.[1]

---

[1] Detailed information about the satellites is provided in the comprehensive proposal for the entire system submitted with this application. Information in the system proposal is incorporated by this reference.

EXHIBIT I
TECHNICAL INFORMATION

A. Radio Frequency Plan and Polarization

1. Center Frequency and Polarization	Uplink 1618.25/MHz, Circular (RHC) Downlink 2491.75/MHz, Circular (LHC) Bands subdivided into 1.4 MHz "Segments"
2. Emission Designator or Allocated Bandwidth of Emission	GXX at 1610 MHz GXX at 2500 MHz

B. Orbital Characteristics

1. Orbital Locations	Low Earth Inclined Orbit, 63.5° Apogee at 1250 km in Northern Hemisphere Perigee at 500 km
2. Elliptical Orbit	500 km x 1250 km
3. Eccentricity	.0517
4. Semi-major axis	7253 km
5. Period	102.5 minutes
6. Footprint Radius @ 1200 km altitude	5048 km @ 10° elevation

C. Predicted Space Station Coverage Contours

1. Antenna Beams	90° beamwidth (See Figure A)
2. Receiving Antenna Gain	8dBi
3. Transmitting Antenna Gain at Peak (45° off center)	8dBi

4. Receiving System Sensitivity (G/T)	-19dB/K
5. Power Flux Density at Satellite	-137.2 dBW/m^2/4KHz (maximum)
6. RF Power Amplifier Output	48 watts
7. EIRP	24 dBw (composite, ten channels)
8. Functional Block Diagram	See Figure B

D. Physical Characteristics of Space Station

1. Accuracy within which Orbital Parameters will be Maintained

   +/- 5 degree In-Plane

   +/- .5 degree Out-Of-Plane

2. Accuracy of Antenna Pointing toward the Earth same as satellite (D.1 above), stabilized via Gravity Gradient method.

3. Estimated Life of Satellite In-Orbit: 5 years

4. Spacecraft Attitude Stabilization Systems Gravity Gradient/with 3-axis-Magnetic Stabilization

5. Electrical Energy System Description

   - Primary and Secondary Power Systems

   - 4 solar array panels/side, per 35% eclipse capability

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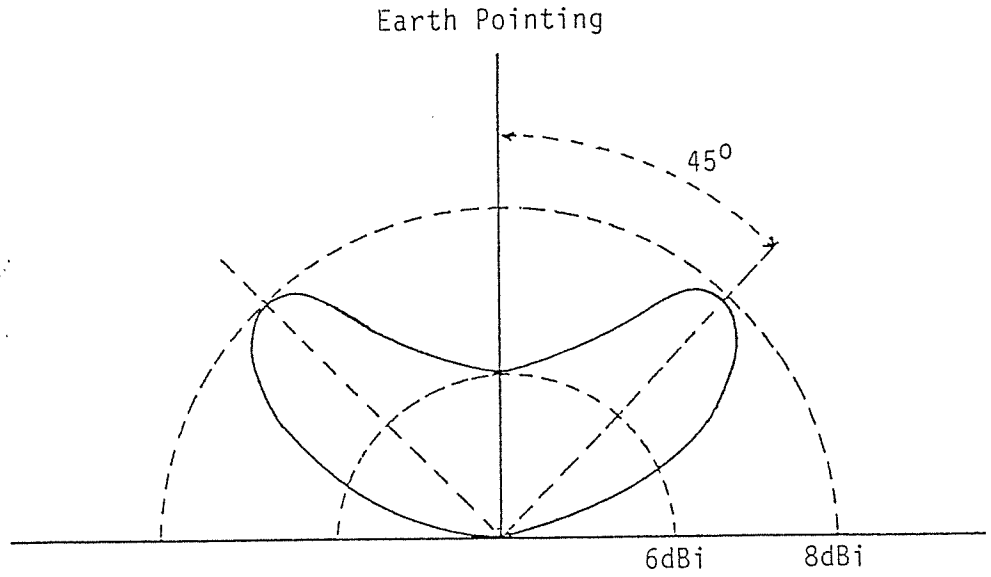

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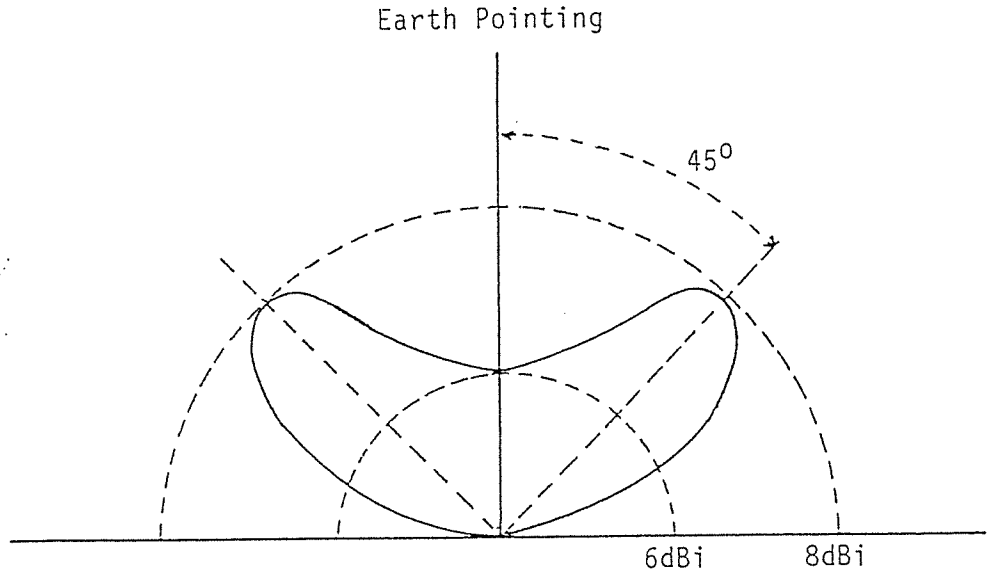

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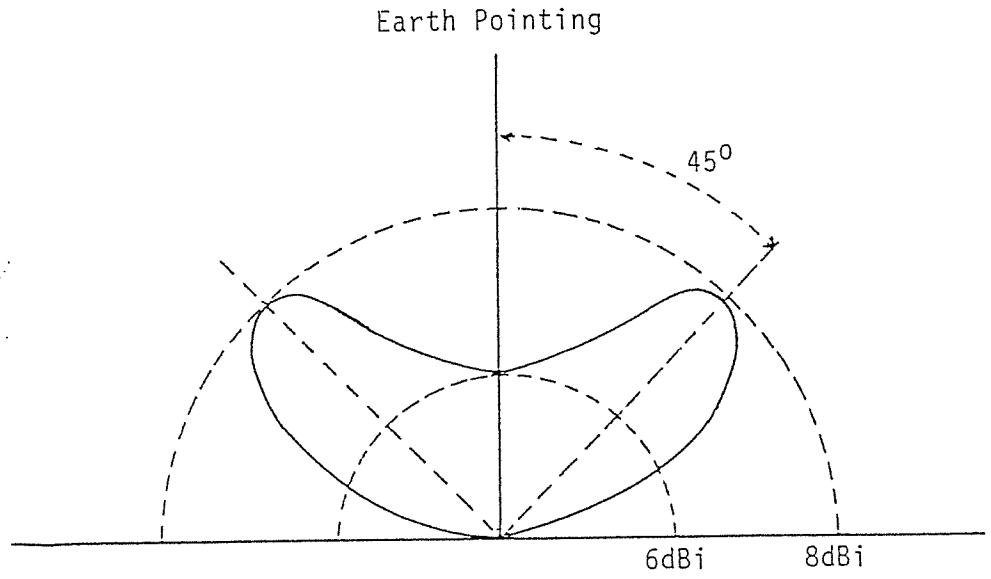

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