(RESERVED)

FEDERAL COMMUNICATIONS COMMISSION

FCC REMITTANCE ADVICE

Approved by OMB
3060-0589
Expires 2/28/97

PAGE NO. 1 OF _____

SPECIAL USE
FCC/MELLON MAR 08 1996

FCC USE ONLY 90-SAT-ML-96

(Read instructions carefully BEFORE proceeding.)

PAYOR INFORMATION

(1) FCC ACCOUNT NUMBER: 0 1 3 1 7 1 8 3 6 0

Did you have a number prior to this? Enter it.

(2) TOTAL AMOUNT PAID (dollars and cents): $ 17,220 ● 00

(3) PAYOR NAME (If paying by credit card, enter name exactly as it appears on your card)

Loral Corporation

(4) STREET ADDRESS LINE NO. 1
c/o Crowell & Moring

(5) STREET ADDRESS LINE NO. 2
1001 Pennsylvania Avenue, N.W.

(6) CITY: Washington

(7) STATE: DC

(8) ZIP CODE: 20004

(9) DAYTIME TELEPHONE NUMBER (Include area code): (202) 624-2500

(10) COUNTRY CODE (if not U.S.A.)

ITEM #1 INFORMATION

(11A) NAME OF APPLICANT, LICENSEE, REGULATEE, OR DEBTOR
L/Q Licensee, Inc.

FCC USE ONLY

(12A) FCC CALL SIGN/OTHER ID	(13A) ZIP CODE	(14A) PAYMENT TYPE CODE	(15A) QUANTITY	(16A) FEE DUE FOR PAYMENT TYPE CODE IN BLOCK 14
File Nos. 19-DSS-P-91(48) and CSS-91-014	95164	C G W	1	$17,220.00

(17A) FCC CODE 1

(18A) FCC CODE 2

(19A) ADDRESS LINE NO. 1	(20A) ADDRESS LINE NO. 2)	(21A) CITY/STATE OR COUNTRY CODE
3200 Zanker Road	P.O. Box 640670	San Jose, CA

ITEM #2 INFORMATION

(11B) NAME OF APPLICANT, LICENSEE, REGULATEE, OR DEBTOR

FCC USE ONLY

(12B) FCC CALL SIGN/OTHER ID	(13B) ZIP CODE	(14B) PAYMENT TYPE CODE	(15B) QUANTITY	(16B) FEE DUE FOR PAYMENT TYPE CODE IN BLOCK 14
				$

(17B) FCC CODE 1

(18B) FCC CODE 2

(19B) ADDRESS LINE NO. 1	(20B) ADDRESS LINE NO. 2	(21B) CITY/STATE OR COUNTRY CODE

CREDIT CARD PAYMENT INFORMATION

(22) MASTERCARD/VISA ACCOUNT NUMBER:

☐ Mastercard

EXPIRATION DATE: Month ☐☐ Year ☐☐

☐ Visa

(23) **I hereby authorize the FCC to charge my VISA or Mastercard for the service(s)/authorization(s) herein describe.**

AUTHORIZED SIGNATURE

DATE

See public burden estimate on reverse.

FCC FORM 159
April 1994

CROWELL & MORING
1001 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, D.C. 20004-2595
(202) 624-2500
CABLE: CROMOR
FACSIMILE (RAPICOM): 202-628-5116
W. U. I. (INTERNATIONAL) 64344

WILLIAM D. WALLACE
(202) 624-2807

SUITE 1200
2010 MAIN STREET
IRVINE, CALIFORNIA 92714-7217
(714) 263-8400
FACSIMILE (714) 263-8414

180 FLEET STREET
LONDON EC4A 2HD
44-171-413-0011
FACSIMILE 44-171-413-0333

March 7, 1996

BY FEDERAL EXPRESS

Federal Communications Commission
International Bureau - Satellites
P.O. Box 358210
Pittsburgh, PA 15251-5210

Re: File Nos. 19-DSS-P-91(48) and CSS-91-014

Dear Sir or Madam:

Transmitted herewith for filing with the Commission on behalf of L/Q Licensee, Inc., licensee of the Globalstar™ low-earth orbit satellite system, are an original and nine copies of its request for modification of the Order and Authorization, 10 FCC Rcd 2333 (Int'l Bur. 1995).

Also enclosed is a FCC Remittance Advice Form 159 and a check to cover the applicable filing fee.

Also enclosed is an additional copy of the complete filing to be date-stamped and returned in the self-addressed stamped envelope provided.

Should there be any questions regarding this matter, please communicate with this office.

Respectfully submitted,

William D. Wallace

Enclosures

cc: Chairman Reed E. Hundt
Commissioner James H. Quello
Commissioner Andrew C. Barrett
Commissioner Rachelle B. Chong
Commissioner Susan Ness
Rudolfo Baca
Kathleen Campbell
Brian Carter
Bruce Franca
Donald Gips
Scott Blake Harris
Cecily C. Holiday
Charles Iseman
Fern Jarmulnek
Karl Kensinger
Mary McManus
Michael J. Marcus
Fred Thomas
Suzanne Toller
Thomas Tycz
Philip L. Malet
Norman P. Leventhal
Jill Abeshouse Stern
Robert Mazer
Lon C. Levin
Bruce D. Jacobs
Richard Parlow
Robert A. Frazier
Gerald G. Markey

(RESERVED)

FEDERAL COMMUNICATIONS COMMISSION

FCC REMITTANCE ADVICE

Approved by OMB
3060-0589
Expires 2/28/97

PAGE NO. 1 OF _____

SPECIAL USE
FCC/MELLON MAR 08 1996

FCC USE ONLY
90-SAT-ML-96

(Read instructions carefully BEFORE proceeding.)

PAYOR INFORMATION

(1) FCC ACCOUNT NUMBER: 0 1 3 1 7 1 8 3 6 0

Did you have a number prior to this? Enter it.

(2) TOTAL AMOUNT PAID (dollars and cents): $ 17,220 ● 00

(3) PAYOR NAME (If paying by credit card, enter name exactly as it appears on your card)
Loral Corporation

(4) STREET ADDRESS LINE NO. 1
c/o Crowell & Moring

(5) STREET ADDRESS LINE NO. 2
1001 Pennsylvania Avenue, N.W.

(6) CITY: Washington

(7) STATE: DC

(8) ZIP CODE: 20004

(9) DAYTIME TELEPHONE NUMBER (Include area code)
(202) 624-2500

(10) COUNTRY CODE (if not U.S.A.)

ITEM #1 INFORMATION

(11A) NAME OF APPLICANT, LICENSEE, REGULATEE, OR DEBTOR
L/Q Licensee, Inc.

FCC USE ONLY

(12A) FCC CALL SIGN/OTHER ID
File Nos. 19-DSS-P-91(48)
and CSS-91-014

(13A) ZIP CODE: 95164

(14A) PAYMENT TYPE CODE: C G W

(15A) QUANTITY: 1

(16A) FEE DUE FOR PAYMENT TYPE CODE IN BLOCK 14
$ 17,220.00

(17A) FCC CODE 1

(18A) FCC CODE 2

(19A) ADDRESS LINE NO. 1
3200 Zanker Road

(20A) ADDRESS LINE NO. 2)
P.O. Box 640670

(21A) CITY/STATE OR COUNTRY CODE
San Jose, CA

ITEM #2 INFORMATION

(11B) NAME OF APPLICANT, LICENSEE, REGULATEE, OR DEBTOR

FCC USE ONLY

(12B) FCC CALL SIGN/OTHER ID

(13B) ZIP CODE

(14B) PAYMENT TYPE CODE

(15B) QUANTITY

(16B) FEE DUE FOR PAYMENT TYPE CODE IN BLOCK 14
$

(17B) FCC CODE 1

(18B) FCC CODE 2

(19B) ADDRESS LINE NO. 1

(20B) ADDRESS LINE NO. 2

(21B) CITY/STATE OR COUNTRY CODE

CREDIT CARD PAYMENT INFORMATION

(22) MASTERCARD/VISA ACCOUNT NUMBER:

☐ Mastercard

EXPIRATION DATE: Month Year

☐ Visa

(23) **I hereby authorize the FCC to charge my VISA or Mastercard for the service(s)/authorization(s) herein describe.**

AUTHORIZED SIGNATURE DATE

See public burden estimate on reverse.

FCC FORM 159
April 1994

FOR AGENDA

UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230

Doc. 30021/1-2.8.2.1/4.9.2
Ref. Doc. 29974/1-2.8.2.1/4.9.2

November 22, 1996

William R. Torak
Federal Communications Commission
Office of Engineering and Technology
FCC Liaison Representative, IRAC
2000 M. Street, N.W., Suite 230
Washington, D.C. 20554

Dear Mr. Torak:

NTIA comments concerning the proposed ORDER AND AUTHORIZATION for L/Q LICENSEE INC. (IRAC Doc. 29974) in the bands 1610-1626.5, 2483.5-2500, 5000-5250, and 6875-7075 are as follows:

1. The document concerns only the authorization for the space segment and not the earth stations;

2. This ORDER AND AUTHORIZATION shall not prejudice any future actions (e.g., amendments to the National Allocation Table and Part 25 of the FCC rules, consideration of any coordination requests);

3. Concerning the band 1610-1626.5 MHz, NTIA and FCC are continuing to have discussions on the protection of the radio astronomy and radionavigation-satellite services from earth station transmissions;

4. Concerning the band 5000-5250 MHz,

a. the aeronautical radionavigation service microwave landing system (MLS) must be protected from interference;

nationally,

a. the proposed fixed-satellite service (Earth-to-space) operations in the band are not in conformance with the National Table of Frequency Allocations and therefore, must be conducted on an unprotected, non-interference basis;

b. discussions will be necessary to determine the rules (e.g., Part 25) that will be applicable to the fixed-satellite service (Earth-to-space) (e.g., minimum earth station elevation angle, power limits, earth station antenna criteria);

Globalstar

3200 Zanker Road
P.O. Box 640670
San Jose, CA 95164-0670

Douglas G. Dwyre
President

February 29, 1996

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W. Room 222
Washington, DC 20554

RE: Application for Modification to
Order and Authorization for GLOBALSTAR™
19-DSS-P-91(48) and CSS-91-014

Dear Mr. Caton:

This letter is written on behalf of L/Q Licensee, Inc. (LQL), a wholly-owned subsidiary of Loral/QUALCOMM Partnership, L.P. (LQP),[1] to request modification of the Order and Authorization, 10 FCC Rcd 2333 (Int'l Bur. 1995), for the Globalstar™ low-earth orbiting satellite telecommunications system ("the Globalstar system").[2]

Grant of this request will complete the U.S. licensing process for the Globalstar space segment, and thereby serve the public interest by facilitating implementation of the Globalstar system to provide new and enhanced voice, data, facsimile and other telecommunications services in the United States and globally. See Big LEO Report and Order, 9 FCC Rcd 5936, 5940 (1994).

---

[1] The Globalstar™ license was issued to LQP; pursuant to grant of pro forma assignment dated September 15, 1995 (File No. 148-SAT-AL-95), the license was assigned to LQL, a wholly-owned corporate subsidiary of LQP. On February 12, 1996, an application was filed for consent to transfer of control of L/Q Licensee, Inc. from Loral Corporation, LQL's current controlling parent, to Loral Space & Communications Ltd.

[2] There remains pending a request to correct the "Erratum," DA 95-373 (released Feb. 28, 1995), which substituted a new Paragraph 25 in LQP's Order and Authorization. The Erratum provides in part that LQP is authorized "to launch and operate twelve low-Earth orbiting space stations and two technically identical spares . . . ." As provided in the original Order and Authorization, this phrase should read that LQP is authorized "to launch and operate 48 low-Earth orbiting space stations and eight technically identical in-orbit spares . . . ." See Letter to Scott Blake Harris from William D. Wallace (dated Mar. 2, 1995).

This application covers three matters. First, LQL requests assignment of feeder links for the Globalstar system, as contemplated by the Order and Authorization, 10 FCC Rcd at 2335, ¶¶ 15-18. Second, LQL reports certain changes to the Globalstar system design which improve overall spectrum efficiency. Third, we describe anticipated operational power flux density (p.f.d.) levels which will conform to the technical standards adopted at the 1995 World Radiocommunication Conference (WRC-95). LQL certifies that technical parameters not described herein remain unchanged.[3] See Amendment to Globalstar System Application (dated Nov. 15, 1994).

None of these matters requires treatment as a major modification. The Commission recently announced that requests by proponents of Big LEO systems for modification of their feeder link proposals will generally be treated as minor modifications. See Memorandum Opinion and Order, FCC 96-54, ¶ 42 (released Feb. 15, 1996). Changes which improve spectrum efficiency rather than increasing interference are also treated as minor modifications. See 47 C.F.R. § 25.116(b)(1). And, with respect to p.f.d. values, the Commission recently decided to apply the values adopted at WRC-95 for MSS systems, which are consistent with Globalstar's operational p.f.d. values. See Memorandum Opinion and Order, FCC 96-54, ¶ 56. Accordingly, LQL requests that this application be considered and granted as expeditiously as possible, consistent with Section 25.151(c)(1).

1. Feeder Links. In the Order and Authorization, 10 FCC Rcd at 2335, ¶ 18, the Commission's staff deferred assignment of feeder link frequencies to the Globalstar system until after WRC-95. See Big LEO Report and Order, 9 FCC Rcd at 5998, ¶ 166. LQP had requested in its November 1994 amendment that it be assigned feeder uplinks in the 5025-5225 MHz band and feeder downlinks in the 6875-7075 MHz band. Although it deferred final action on LQP's feeder link request, the International Bureau granted LQP Section 319(d) authority (47 U.S.C. § 319(d)) to construct the Globalstar system with feeder links in the 5025-5225 MHz and 6875-7075 MHz band.[4]

---

[3] See 47 C.F.R. § 25.117(d); see also supra note 1.

[4] On February 14, 1996, LQL filed a request that its current Section 319(d) waiver for construction of the Globalstar system with its proposed feeder links be modified for construction with feeder uplinks in the 5091-5250 MHz band.

As the Commission is aware, at WRC-95, with the active support of the United States, the International Telecommunication Union adopted an allocation within the 5000-5250 MHz bands for nongeostationary MSS feeder links (earth-to-space) at 5091-5250 MHz. See Final Acts of the World Radiocommunication Conference, Pt. I, at 153 & ADD S5.444A, ADD S5.447A (Nov. 17, 1995). WRC-95 also adopted an allocation for MSS feeder links (space-to-earth) in the 6700-7075 band. Id., at 158 & ADD S5.458D. In addition to these allocations, the ITU adopted MSS feeder link allocations in the 15.4-15.7 GHz (space-to-Earth), 19.3-19.6 GHz (space-to-Earth) and 29.1-29.4 GHz (Earth-to-space) bands. See id., at 180, 185, 190.

Based on these allocations, LQL requests that it be assigned feeder links in the 5 GHz and 7 GHz bands in conformity with the international allocations adopted at WRC-95.[5] Specifically, LQL requests that it be authorized to use the 5091-5250 MHz band for its feeder uplinks and the 6875-7055 MHz band for its feeder downlinks. The operational frequency plans for the bands are shown in Figure A and Table 1. The spacecraft transmit and receive feeder link antenna gain contours are provided in Figures B and C.

Globalstar recognizes that each of these band segments has been allocated for services other than MSS feeder links. Globalstar has worked with, and will continue to cooperate with the Federal Aviation Administration to ensure compatible operations of MSS and ARNS systems in the 5 GHz band. And, the Globalstar system will operate in compliance with the p.f.d. limits adopted at WRC-95 for MSS feeder links (space-to-Earth) in the 7 GHz band. See infra § 3. Globalstar will coordinate with other services located within its feederlink bands as required by the Commission's Rules.

Globalstar also recognizes that it may be required to share these frequencies with other satellite systems authorized to use the same feeder link bands. Globalstar will coordinate with other satellite systems that are authorized to operate in the same feeder link bands, as required by the Commission's Rules.

---

[5] LQL recognizes that these allocations have not yet been adopted into the U.S. Table of Frequency Allocations. Accordingly, in connection with this modification application, LQL is filing a request for waiver of Section 2.106 of the Commission's Rules to permit assignment of these feeder link frequencies on an expedited basis to serve the public interest, convenience and necessity.

LQL's feeder link request should be granted because the results of WRC-95 have fully satisfied the Commission's earlier reservations regarding assignment of feeder links to MSS Above 1 GHz licensees. See Big LEO Report and Order, 9 FCC Rcd at 5998. First, WRC-95 has made spectrum available for feederlinks for global non-geostationary MSS systems, such as Globalstar. Second, sufficient spectrum was allocated at WRC-95 to ensure that all licensed MSS Above 1 GHz systems can be assigned feeder link spectrum. Thus, the reasons for deferral of feeder link assignments have been resolved by WRC-95.

Accordingly, LQL requests authority to construct, launch and operate its system with feeder links in the 5091-5250 MHz and 6875-7055 MHz bands.

2. System Updates. The Globalstar system space segment consists of 48 technically-identical satellites, orbiting the earth in circular orbit at an altitude of 1414 km. Updated mass and power budgets for the satellites are provided in Table 2. The communications payload of a Globalstar system satellite remains a classic repeater ("bent-pipe") communications package as shown in Figure D.

The S-band and L-band antenna beams on the Globalstar satellite have been modified to improve overall spectrum efficiency. These antennas are configured to produce 16 beams as shown in Figures E and F, respectively, and will operate with LHCP polarization. These antennas are designed to provide an isoflux pattern on the Earth in the service region.

The S-band antenna gain contour for beam 1 is shown in Figure G. Beams 2 through 7 are similar in shape to each other and are shown in Figure H. The shape of beams 8, 10, 11, 13, 14, and 16 is shown in Figure I, and that of beams 9, 12, and 15 in Figure J.

The L-band antenna gain contour for beam 1 is shown in Figure K. L-band beams 2 and 12 are similar in shape to each other and are shown in Figure L. The shape of beams 3, 6, 8, 11, 13 and 16 is depicted in Figure M, and that of beams 4, 5, 9, 10, 14, and 15 in Figure N. The C-band feeder link antenna contours are shown in Figures B and C.

Representative forward and return path link budgets for the Globalstar system are provided in Tables 3, 4, 5, and 6 for operation under clear and blocked conditions for the inner, middle and outside service link beams. These link budgets have been prepared utilizing nominal feeder and service link channel frequencies, that is, matching service beam numbers for inner, middle and outer

service beams have not been paired with the corresponding feeder link sub-band channels.

The C-band antennas on the satellite use an Earth coverage beam. Command and Telemetry share the C-band with the communications feeder links. Link budgets for the C-band Command and Telemetry channels are shown in Tables 7 and 8.

3. WRC-95 p.f.d. Levels. Another result of WRC-95 was the revision to Resolution 46 to adopt higher p.f.d. levels for MSS systems. The Commission recently stated that it would "apply these revised [WRC-95] p.f.d. levels in determining whether international coordination is required for MSS systems in this band." Memorandum Opinion and Order, FCC 96-54, at 20 (released Feb. 15, 1996). The planned operating p.f.d. levels for the Globalstar system are significantly below the ITU-R Recommendation approved by the WRC-95 (Annex 2 to Res. 46 (Rev. WRC-95)).

Power into the individual S-band beams of the Globalstar system is controlled to be consistent with the S-band p.f.d. requirements at the Earth's surface. The S-band p.f.d. at the Earth's surface will be generally below the coordination threshold levels approved at WRC-95 (Res. 46 (Rev. WRC-95) A2.1.2.3.1). The 7 GHz C-band feeder downlink p.f.d. at the Earth's surface for each sub-band will be nominally -155 dBW/m^2/4 kHz for high elevation angles and will decrease linearly as the elevation angle decreases which meets the limits specified by the ITU (Res. 46 (Rev. WRC-95) A2.2.1) with substantial margins.

The p.f.d. at the geostationary orbit is also below the ITU-R recommended level of -168 dBW/m^2/4 kHz (Res. 46 (Rev. WRC-95) A2.2.2). Figure O shows the Globalstar system constellation p.f.d. at the geostationary orbit.

While actual operations may produce some variation in the parameters described in this paragraph, Globalstar plans to operate at all times at or below the p.f.d. levels approved for the international allocations.

4. Conclusion. In order to complete the process of licensing the Globalstar space segment in the United States, LQL requests that the Commission promptly grant it an unconditional authorization to construct, launch and operate the Globalstar system with the parameters described in the January 31, 1995, Order and Authorization as modified with the feeder links and system design described above. Grant of this application will serve the public interest by bringing Globalstar closer to fulfilling the benefits which the Commission has already recognized for Big LEO systems. See Big LEO Report and Order, 9 FCC Rcd at 5940. Moreover, grant of this request will allow the Globalstar system to maintain its schedule toward commencing launches in 1997 and MSS service in 1998, and, therefore, will facilitate the role of U.S.-licensed Big LEO systems "in promoting global development through enhanced communication infrastructures and services." Big LEO Report and Order, 9 FCC Rcd at 5941.

The information provided in the foregoing modification request is complete and accurate to the best of my knowledge.

Signed this 29th day of February, 1996, in San Jose, California.

L/Q LICENSEE, INC.

By: Douglas G. Dwyre
Douglas G. Dwyre

Counsel:

William F. Adler
Vice President & Division Counsel
GLOBALSTAR
3200 Zanker Road
San Jose, CA 95134
(408) 473-4814

William D. Wallace
Crowell & Moring
1001 Pennsylvania Avenue, N.W.
Washington, DC 20004
(202) 624-2807

Leslie A. Taylor
Leslie Taylor Associates
6800 Carlynn Court
Bethesda, MD 20817
(301) 229-9341

Anti-Drug Abuse Act Certification

No party to this application, as defined in Section 1.2002(b) of the Commission's Rules, is subject to a denial of federal benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988 [21 U.S.C. § 862].

Signed this 29th day of February, 1996, in San Jose, California.

L/Q LICENSEE, INC.

By: Douglas G. Dwyre

Certification Pursuant to 47 U.S.C. § 304

Pursuant to Section 304 of the Communications Act of 1934, as amended (47 U.S.C. § 304), L/Q Licensee, Inc. waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise.

Signed this 29th day of February, 1996, in San Jose, California.

L/Q LICENSEE, INC.

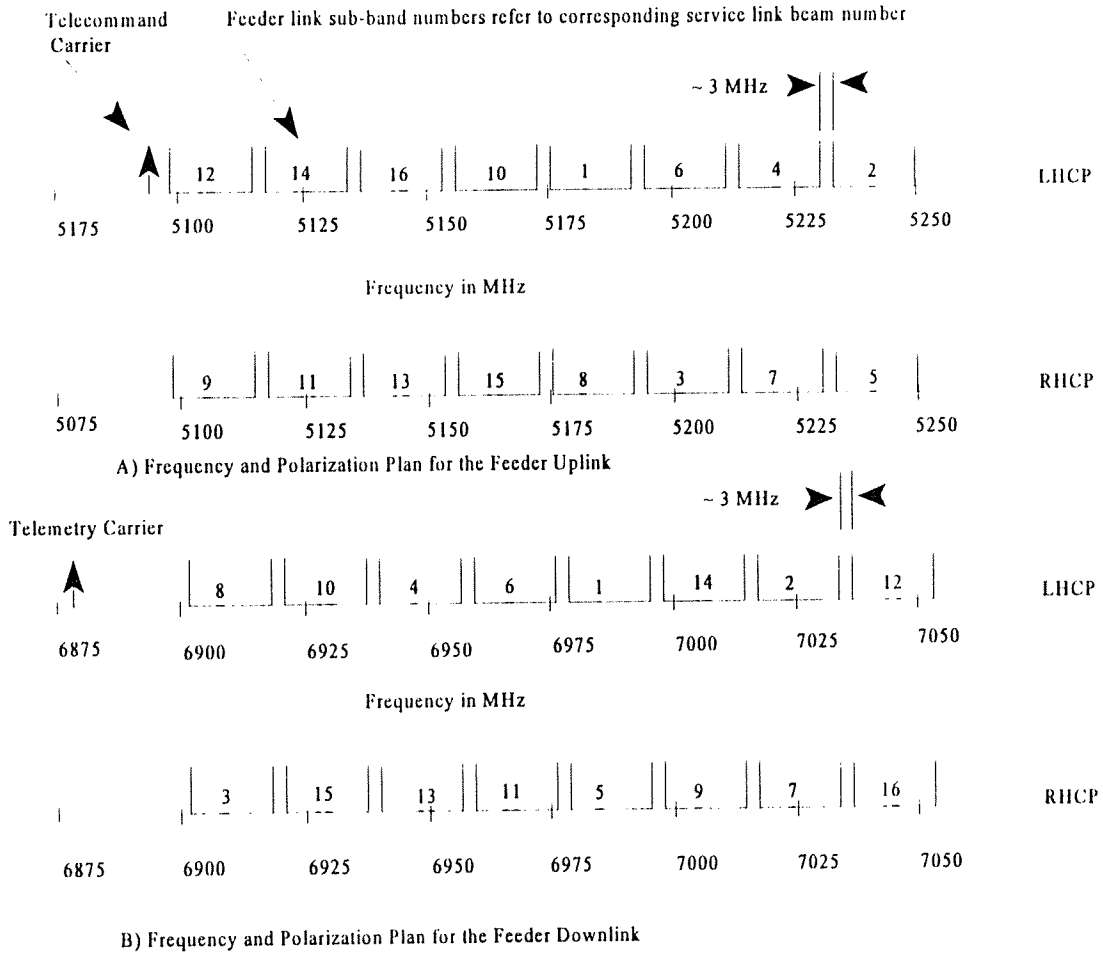
By: Douglas G. Bonner

Engineering Certification

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in the foregoing modification application for the Globalstar™ system; that I am familiar with Parts 2 and 25 of the Commission's Rules and Regulations and the rules and policies adopted for MSS Above 1 GHz in the Report and Order, FCC 94-261 (released Oct. 14, 1994) and the Memorandum Opinion and Order, FCC 96-54 (released Feb. 15, 1996); that I have either prepared or supervised the preparation of the information contained in the Amendment; and that it is complete and accurate to the best of my knowledge.

Signed this 29 day of February, 1996, in San Jose, California.

Figure A: Feeder Uplink and Downlink Frequency and Polarization Plans



C-Band Feeder Uplink (5025 - 5225 MHz)
And Downlink (6875 - 7075 MHz) Frequencies

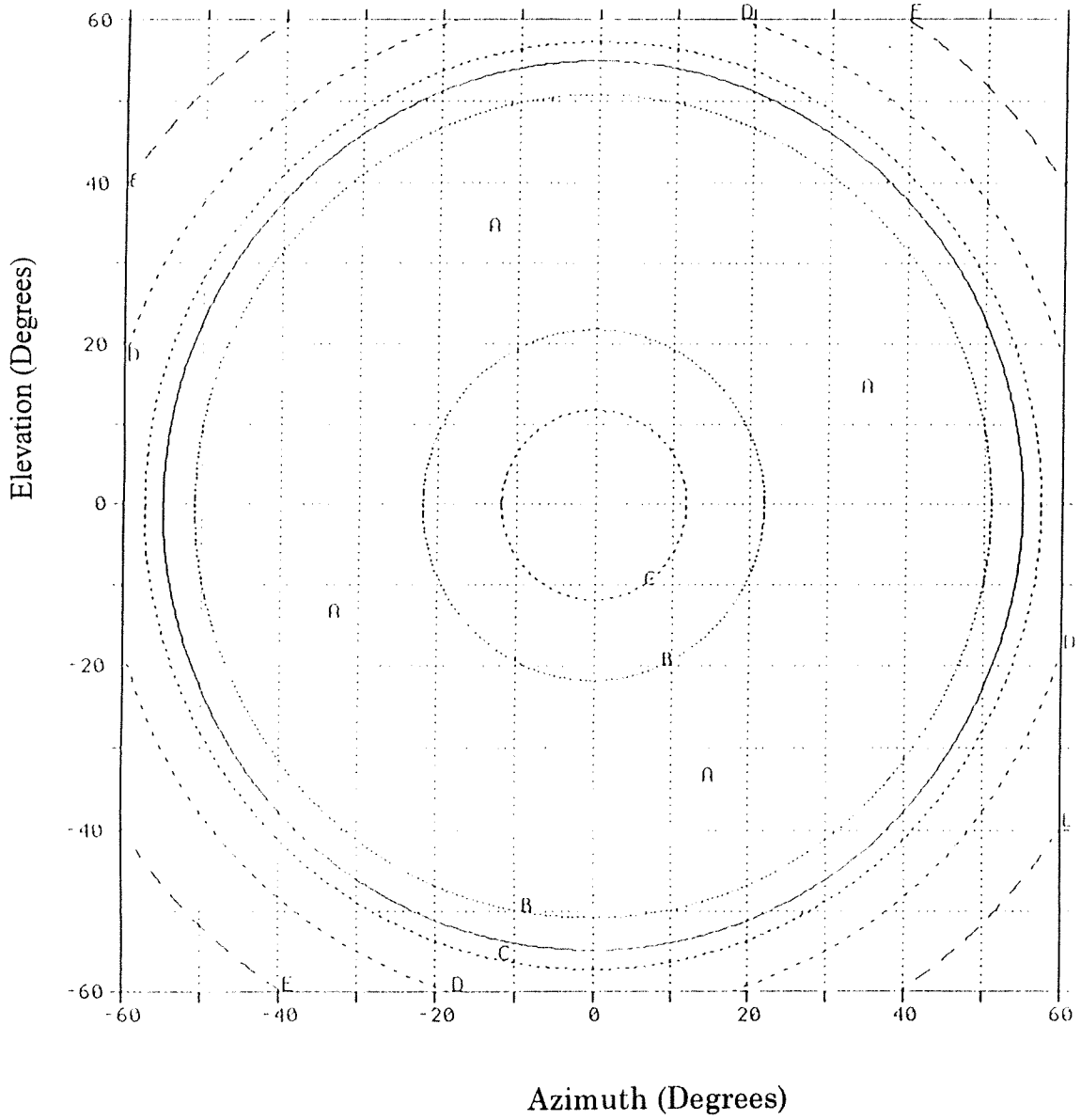
Feeder Uplink Channel Frequencies			
Feeder link Sub-band No.	Sub-band frequencies in MHz		
	Bottom	Center	Top
12 and 9	5096.96	5105.21	5113.46
14 and 11	5116.34	5124.59	5132.84
16 and 13	5135.72	5143.97	5152.22
10 and 15	5155.10	5163.35	5171.60
1 and 8	5174.48	5182.73	5190.98
6 and 3	5193.86	5202.11	5210.36
4 and 7	5213.24	5221.49	5229.74
2 and 5	5232.62	5240.87	5249.12

Command channel bandwith = 240 kHz			
Channel	Bottom	Center	Top
1	5091.38	5091.50	5091.62

Feeder Downlink Channel Frequencies			
Feeder link Sub-band No.	Sub-band frequencies in MHz		
	Bottom	Center	Top
8 and 3	6900.74	6908.99	6917.24
10 and 15	6920.12	6928.37	6936.62
4 and 13	6939.50	6947.75	6956.00
6 and 11	6958.88	6967.13	6975.38
1 and 5	6978.26	6986.51	6994.76
14 and 9	6997.64	7005.89	7014.14
2 and 7	7017.02	7025.27	7033.52
12 and 16	7036.40	7044.65	7052.90

Telemetry channel bandwidth = 100 kHz			
Channel	Bottom	Center	Top
1	6875.95	6876.00	6876.05
2	6876.05	6876.10	6876.15
3	6876.15	6876.20	6876.25
4	6876.25	6876.30	6876.35
5	6876.35	6876.40	6876.45
6	6876.45	6876.50	6876.55
7	6876.55	6876.60	6876.65
8	6876.65	6876.70	6876.75
9	6876.75	6876.80	6876.85
10	6876.85	6876.90	6876.95
11	6876.95	6877.00	6877.05
12	6877.05	6877.10	6877.15

Table 1



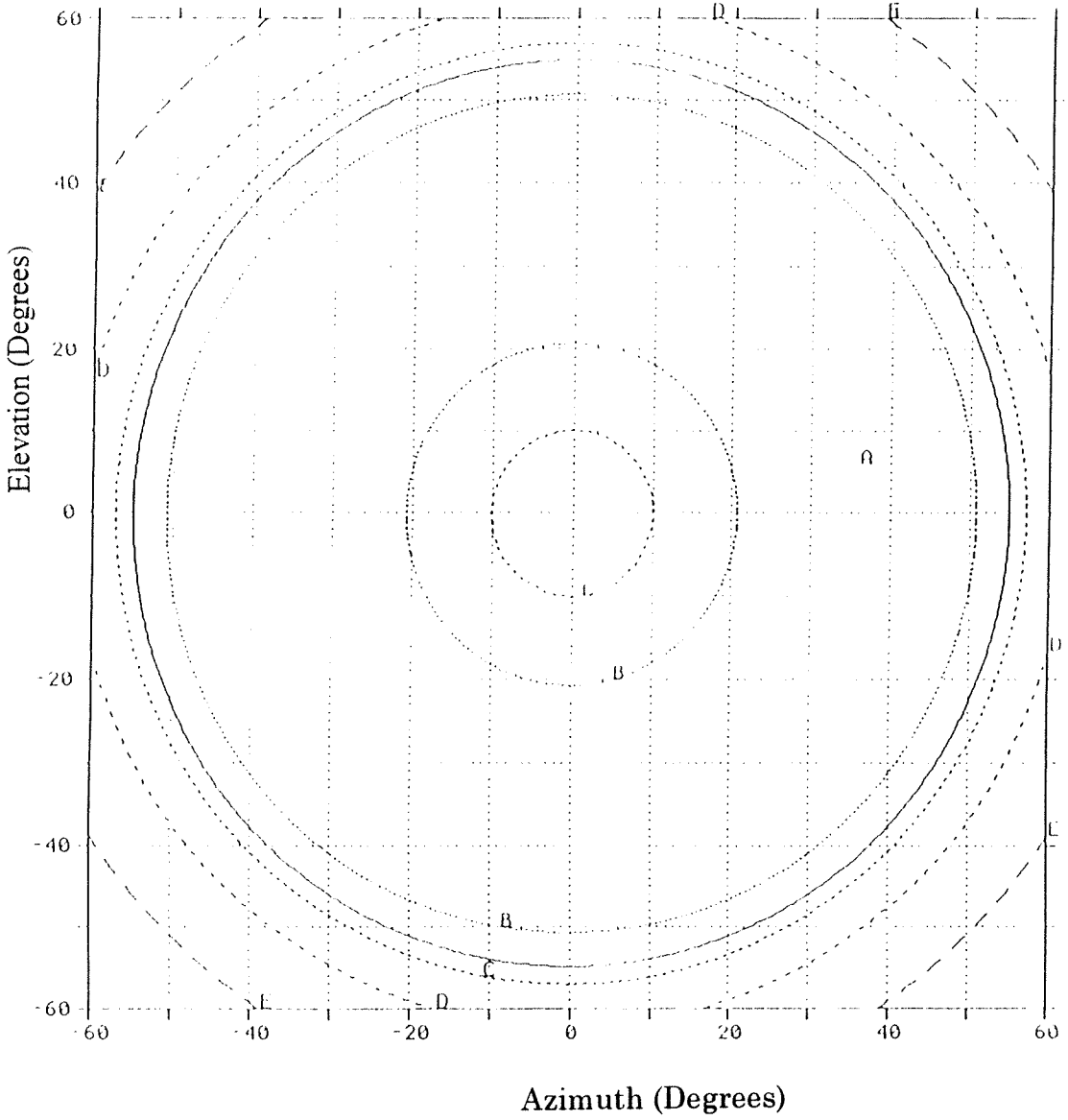
Contour Levels Relative to Peak:

A	0
B	-2
C	-4
D	-6
E	-10
F	-20

Note:

1) Maximum gain at point A is 6.16 dBi,
2) Solid Circle shows 54.9 degree Earth edge.

Figure B: C-band transmit antenna gain contour, as viewed from the satellite.



Contour Levels Relative to Peak:

A	0
B	-2
C	4
D	-6
E	-10
F	-20

Note:

1) Maximum gain at point A is 6.15 dBi,
2) Solid Circle shows 54.9 degree Earth edge.

Figure C: C-band receive antenna gain contour, as viewed from the satellite.

Subsystem	Mass (Kg)	Power (Watts) (Average)
Payload	158.2	346
Structure	45.3	0
Solar Array	45	0
Mechanisms	3.1	10
Bus Harness	11.8	2
Electrical Power	33.5	42
Propulsion	10.3	1
Thermal Control	10.1	44
Digital, Controls & AOCS	49.6	103
Mechanical Integration	6.7	0
System Total	373.5	548
Propellant Load Pressurant	76.6	
Separation Mass (Does Not Include Launch Vehicle Adaptor)	450.2	

Estimated Mass & Power Budgets

Table 2

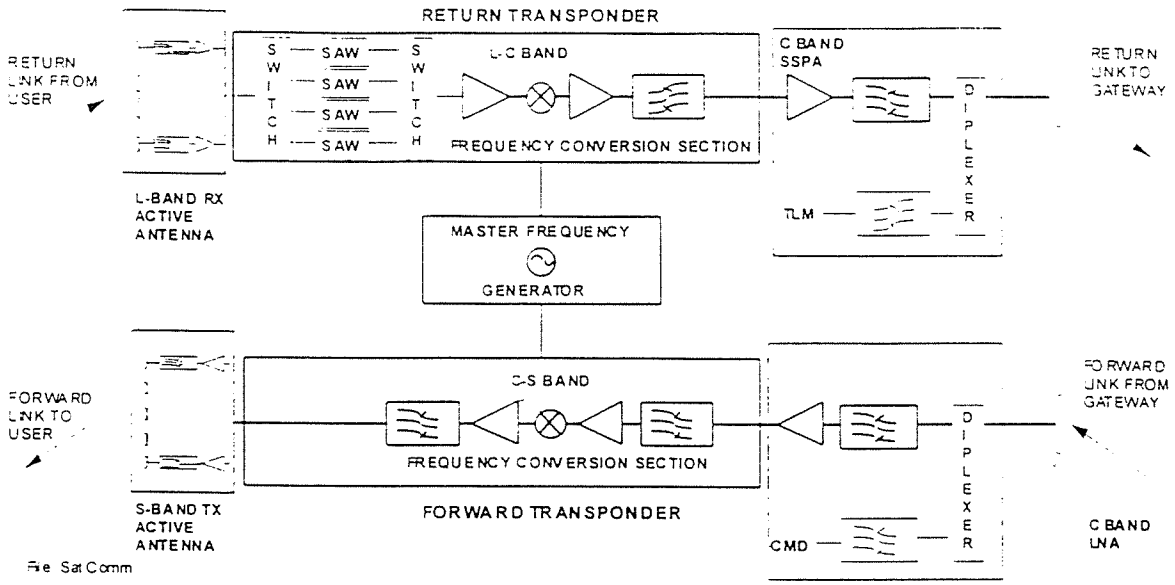


Figure D: Communications Payload Simplified Block

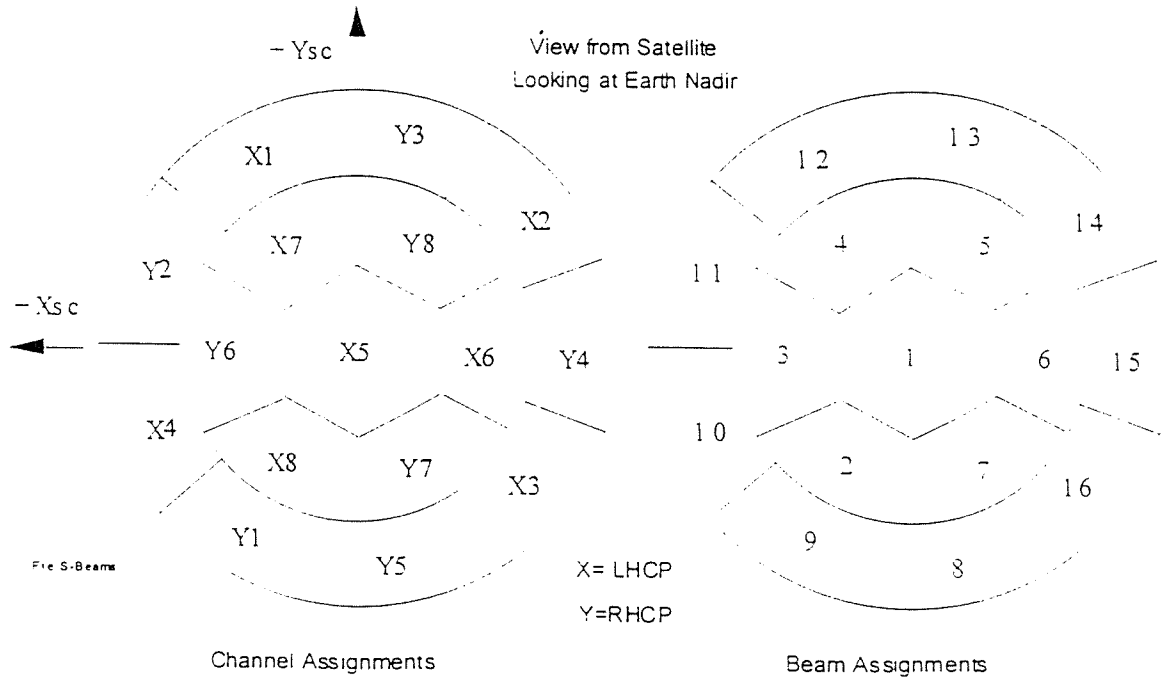


Figure E: S-band Channel and Beam Assignments, as viewed from the satellite

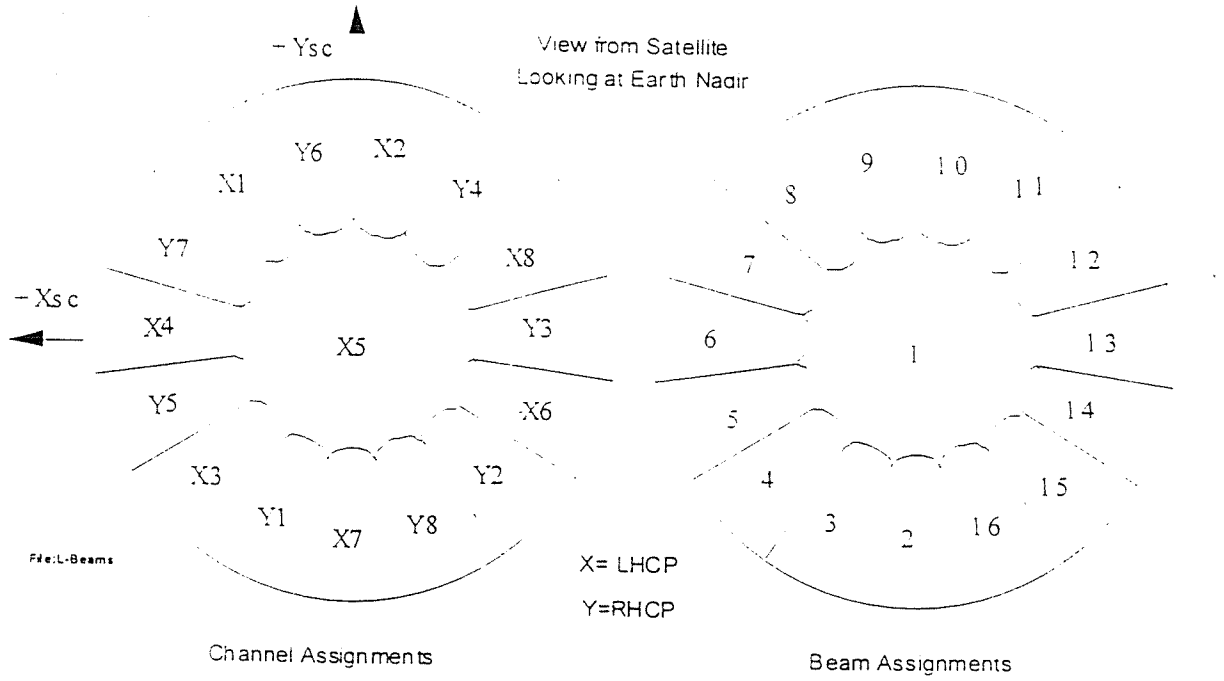
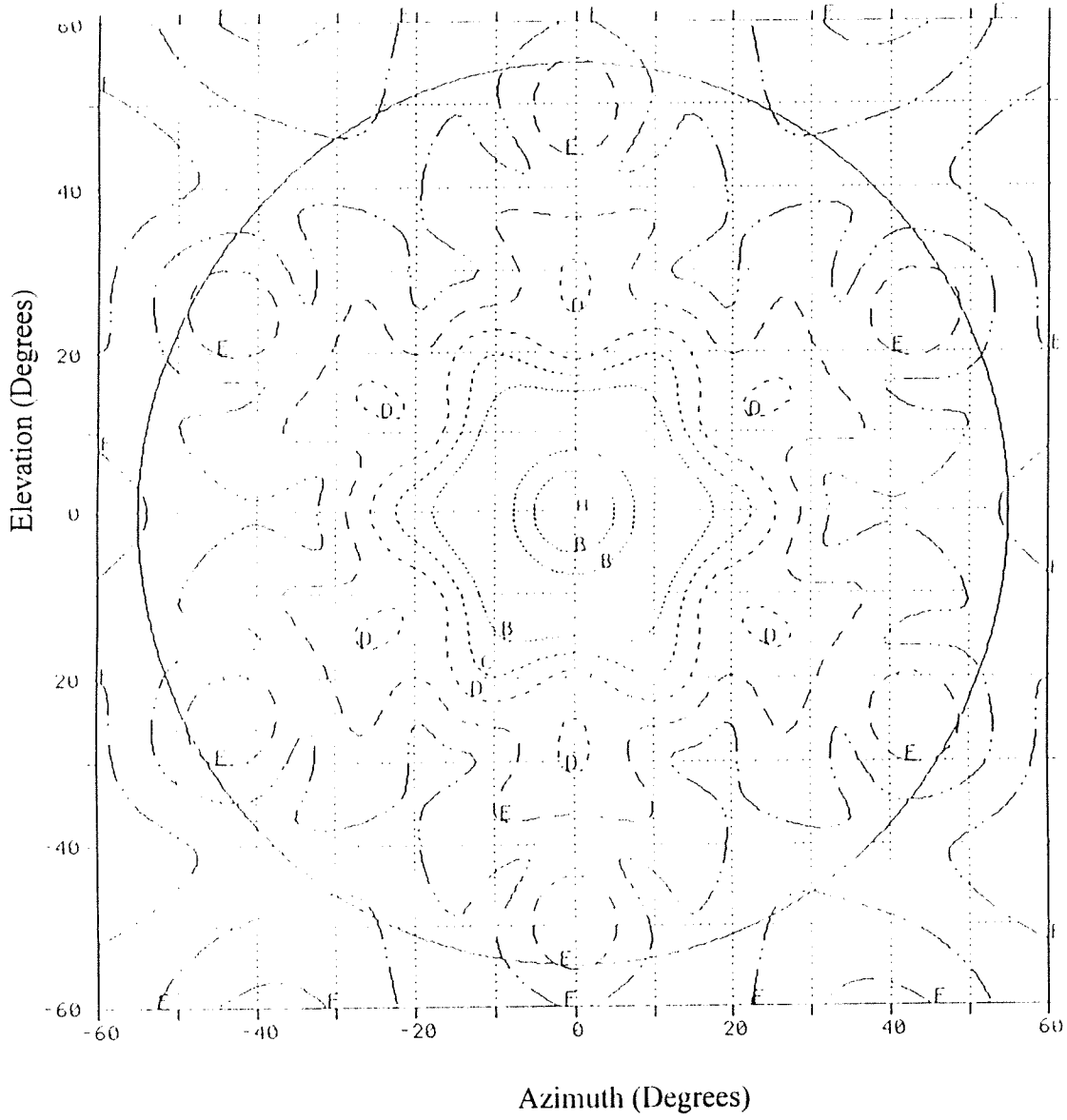


Figure F: L-Band Channel and Beam Assignments, as viewed from the satellite



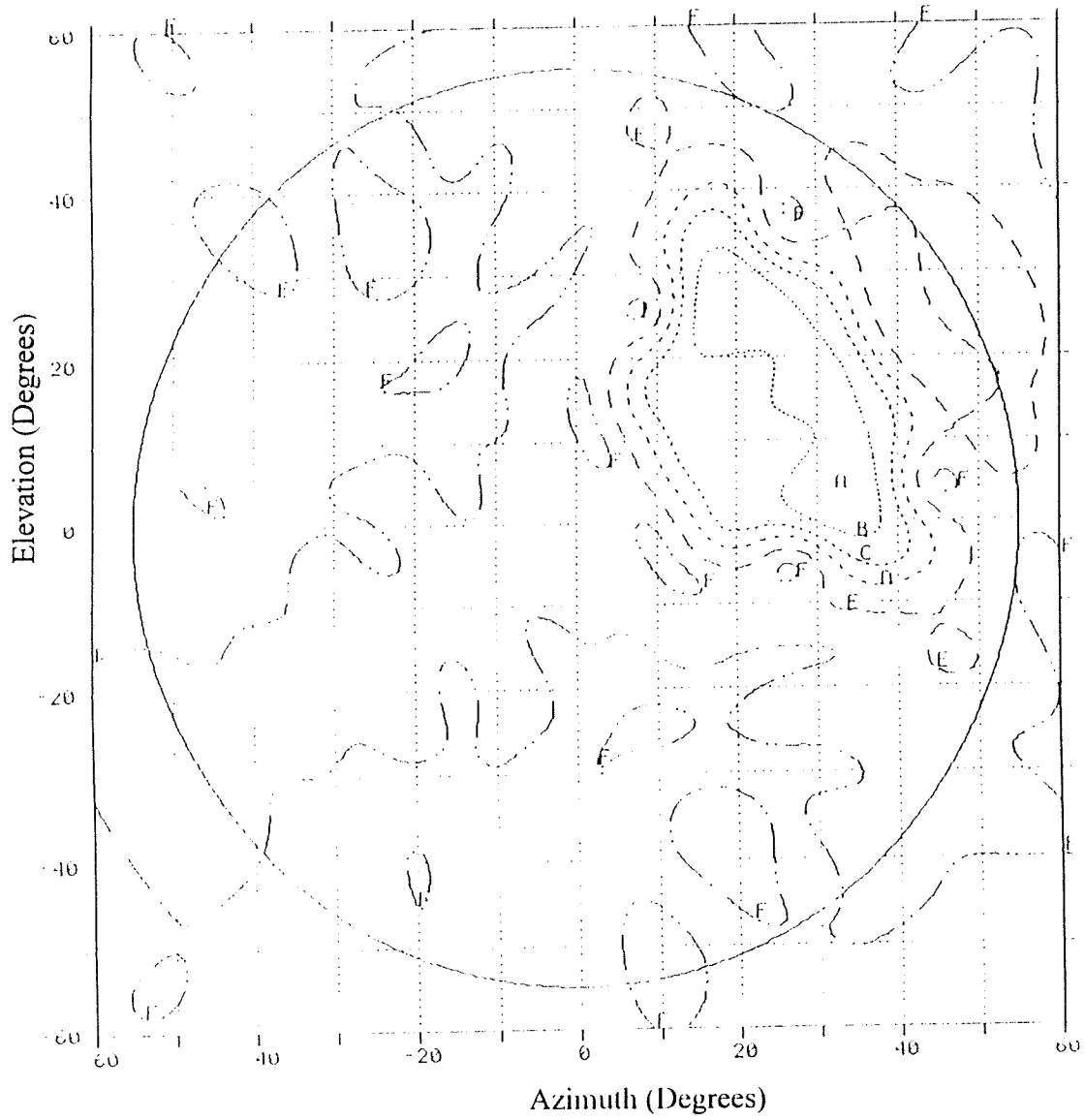
Contour Levels Relative to Peak:

A	0
B	-2
C	-4
D	-6
E	-10
F	-20

Note:

1) Maximum gain at point A is 13.58 dBi,
2) Solid Circle shows 54.9 degree Earth edge.

Figure G: S-band transmit antenna gain contour for beam 1, as viewed from the satellite.



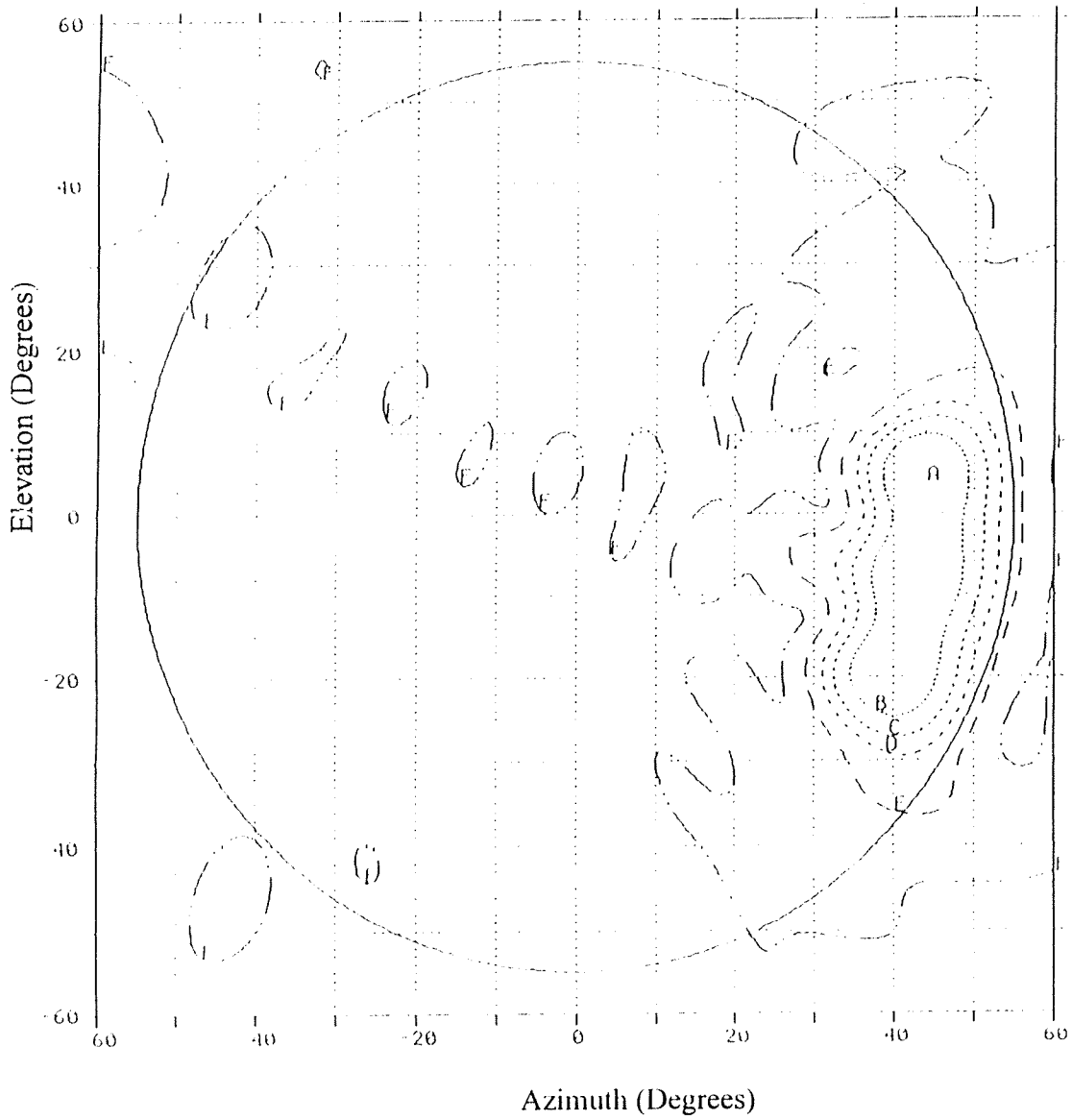
Contour Levels Relative to Peak:

A	0
B	-2
C	-4
D	-6
E	-10
F	-20

Note:

1) Maximum gain at point A is 15.79 dBi,
2) Solid Circle shows 54.9 degree Earth edge.

Figure II: S-band transmit antenna gain contour for beams 2 through 7, as viewed from the satellite.



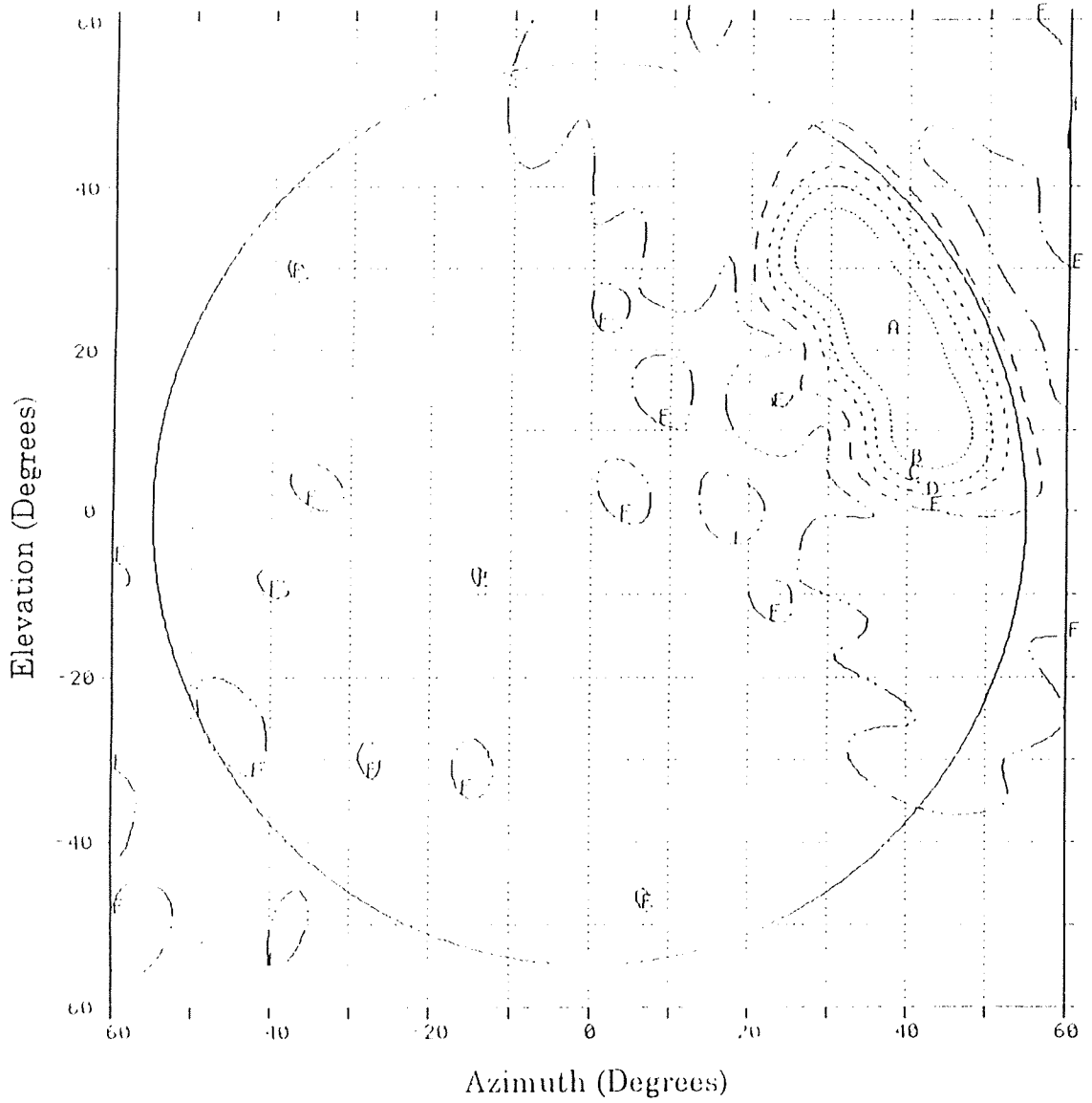
Contour Levels Relative to Peak:

A	0
B	-2
C	-4
D	-6
E	-10
F	-20

Note:

1) Maximum gain at point A is 17.93 dBi,
2) Solid Circle shows 54.9 degree Earth edge.

Figure I: S-band transmit antenna gain contour for beams 8, 10, 11, 13, 14, and 16, as viewed from the satellite.



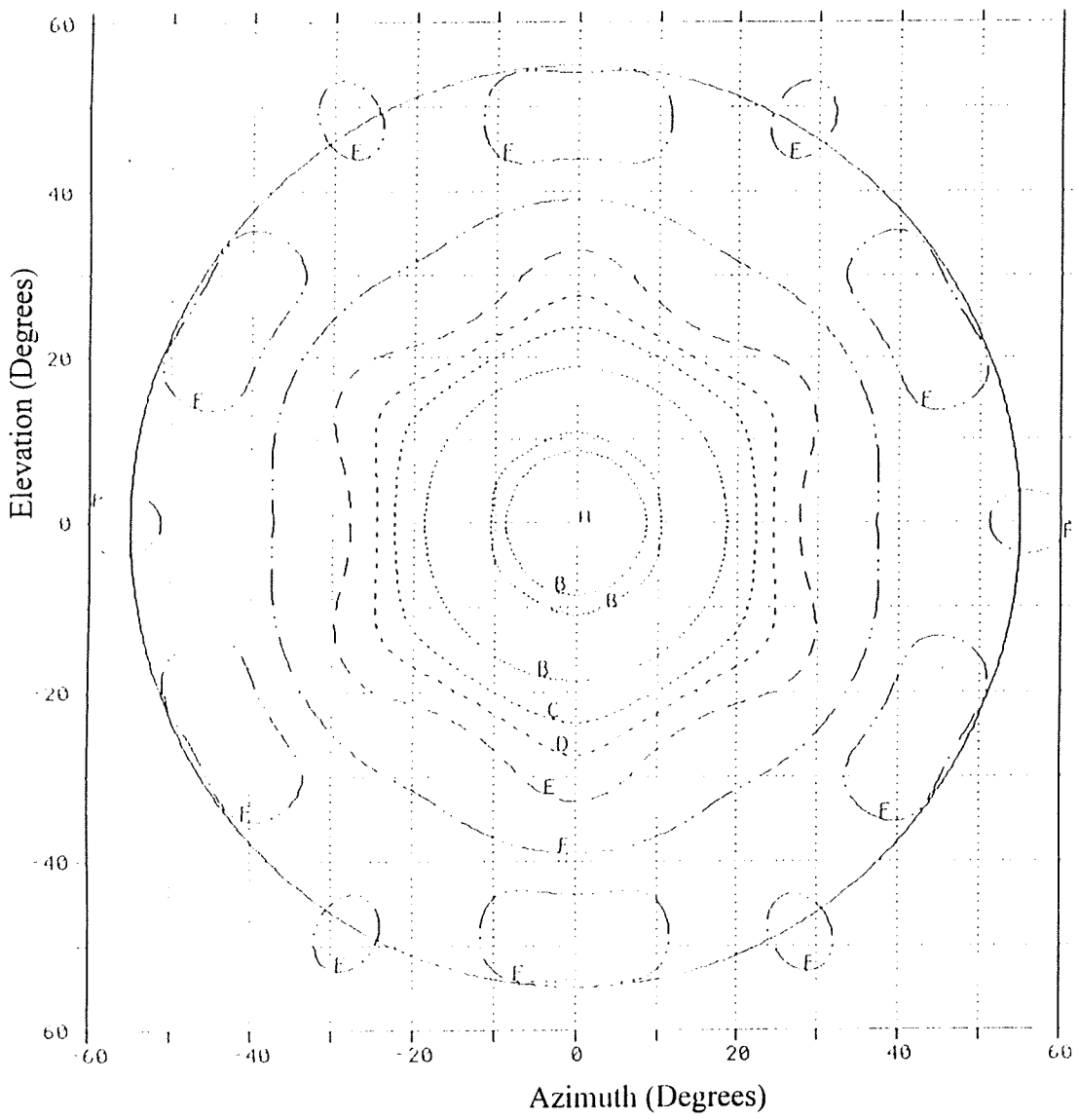
Contour Levels Relative to Peak:

A	0
B	-2
C	-4
D	-6
E	-10
F	-20

Note:

1) Maximum gain at point A is 17.82 dBi,
2) Solid Circle shows 54.9 degree Earth edge.

Figure J: S-band transmit antenna gain contour for beams 9, 12, and 15, as viewed from the satellite.



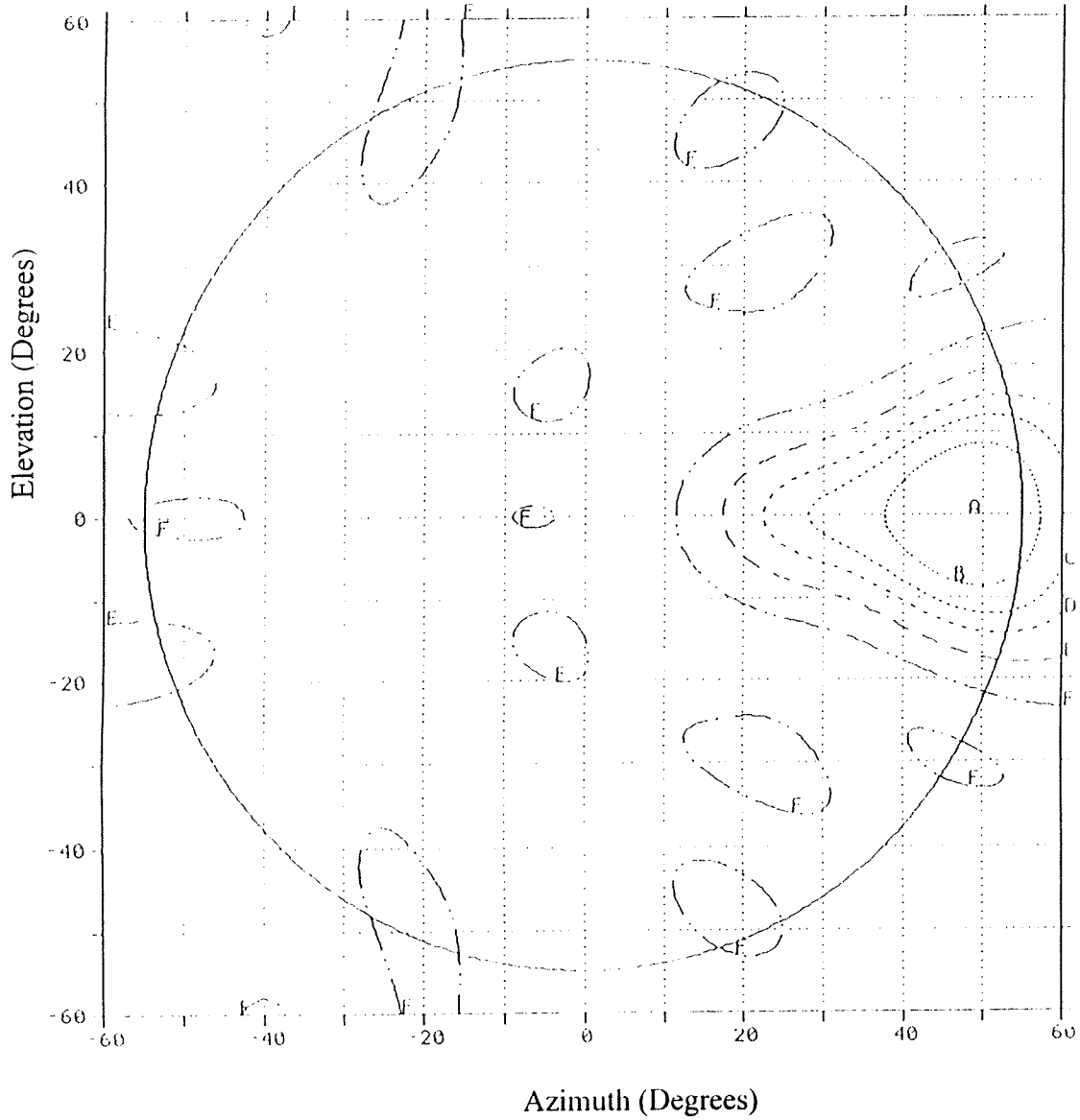
Contour Levels Relative to Peak:

A	0
B	-2
C	-4
D	-6
E	-10
F	-20

Note:

1) Maximum gain at point A is 14.09 dBi,
2) Solid Circle shows 54.9 degree Earth edge.

Figure K: L-band receive antenna gain contour for beam 1, as viewed from the satellite.



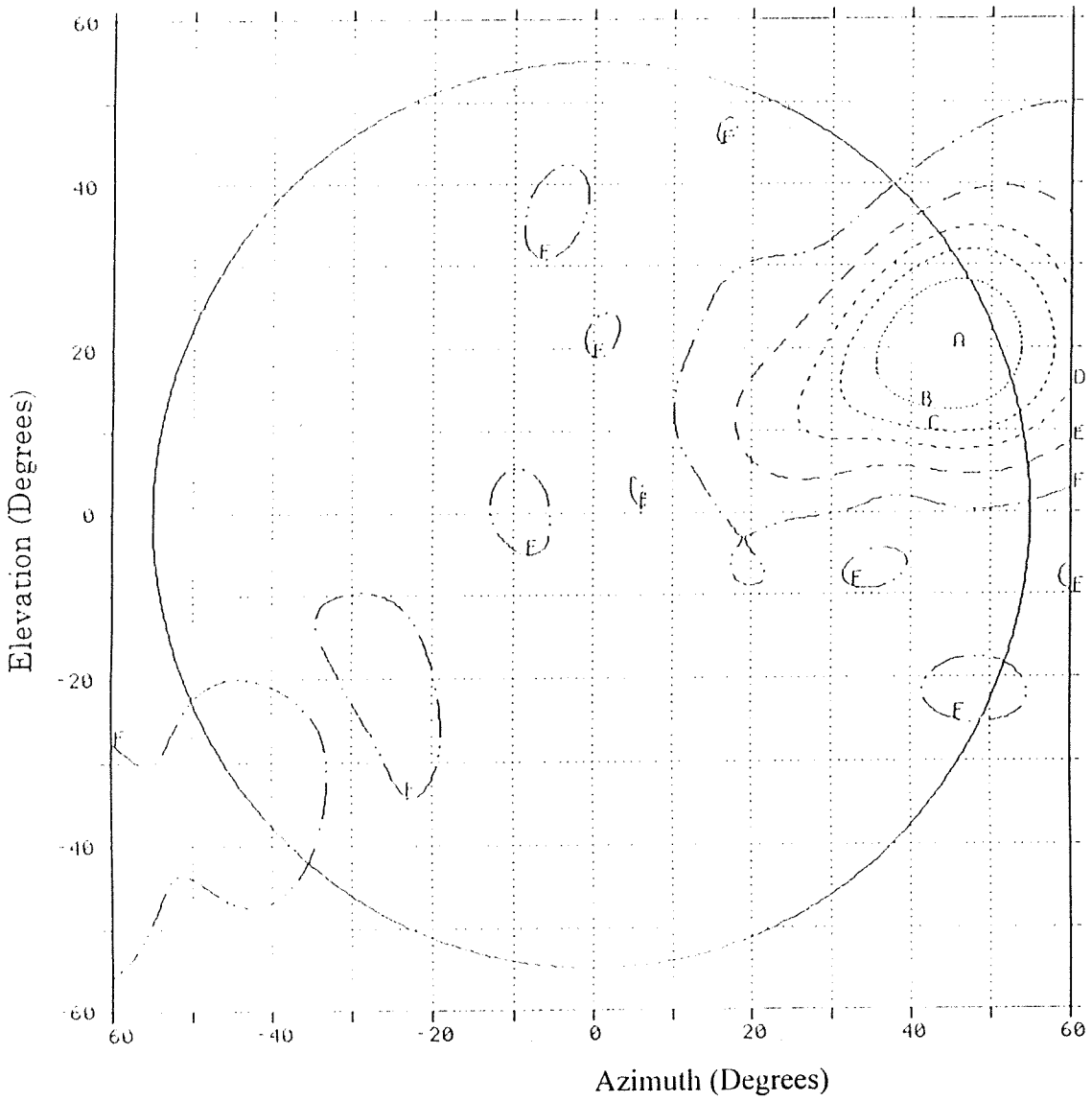
Contour Levels Relative to Peak:

A	0
B	-2
C	-4
D	-6
E	-10
F	-20

Note:

1) Maximum gain at point A is 18.06 dBi,
2) Solid Circle shows 54.9 degree Earth edge.

Figure L: L-band receive antenna gain contour for beams 2 and 12, as viewed from the satellite.



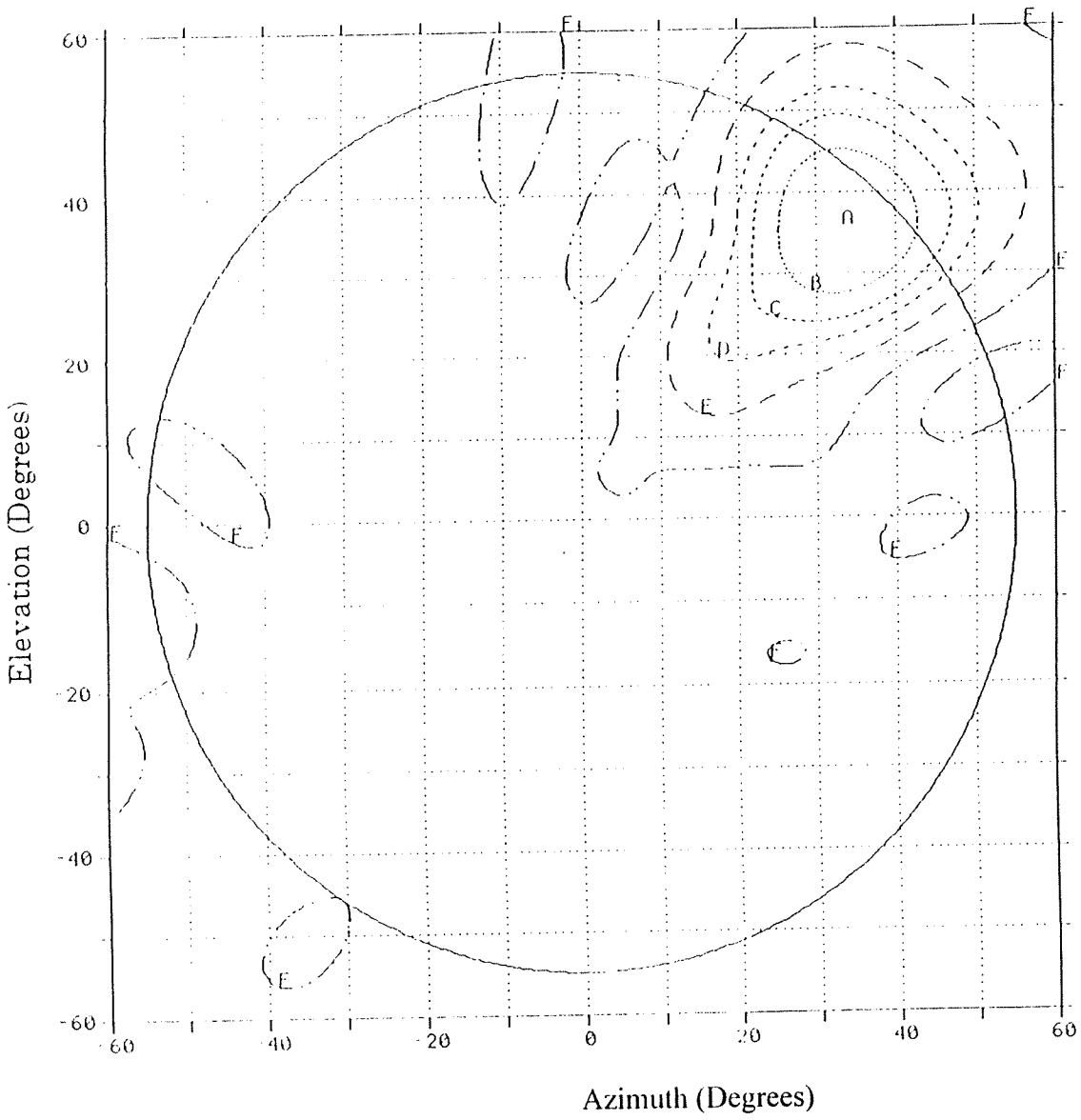
Contour Levels Relative to Peak:

A	0
B	-2
C	-4
D	-6
E	-10
F	-20

Note:

1) Maximum gain at point A is 18.46 dBi,
2) Solid Circle shows 54.9 degree Earth edge.

Figure M: L-band receive antenna gain contour for beams 3, 6, 8, 11, 13, and 16, as viewed from the satellite.



Contour Levels Relative to Peak:

A	0
B	-2
C	-4
D	-6
E	-10
F	-20

Note:

1) Maximum gain at point A is 18.08 dBi,
2) Solid Circle shows 54.9 degree Earth edge.

Figure N: L-band receive antenna gain contour for beams 4, 5, 9, 10, 14, and 15, as viewed from the satellite.

Globalstar forward link: C-band up/ S-band down
(with diversity; both paths clear)

User Beam	Inner	Middle	Outer	Units
Uplink Analysis				
Frequency	5125.0	5125.0	5125.0	MHz
EIRP per user	30.1	26.8	27.4	dBW
Path loss (40 deg. GW elev.)	-172.5	-172.5	-172.5	dB
Polarization Loss	-0.1	-0.1	-0.1	dB
Pointing Loss	-1.0	-1.0	-1.0	dB
Sat. ant. gain	6.0	6.0	6.0	dB
Line Loss	-2.9	-2.9	-2.9	dB
Rx pwr/user at LNA	-140.4	-143.7	-143.1	dBW
Average User Data Rate	2400.0	2400.0	2400.0	bps
System Noise Temperature	549.5	549.5	549.5	K
Thermal Noise Density, No	-201.2	-201.2	-201.2	dBW/Hz
Interfer. Dens. @ LNA, Io	-196.8	-198.5	-198.2	dBW/Hz
Uplink Eb/(No + Io)	21.3	19.1	19.5	dB
Downlink Analysis				
Frequency of Operation	2495.0	2495.0	2495.0	MHz
Transmitted power per user	-12.8	-16.7	-15.2	dBW
Line loss	-1.1	-1.1	-1.1	dB
Sat. antenna gain	11.5	14.9	16.6	dB
EIRP/user	-2.4	-2.9	0.3	dBW
Satellite Altitude	1414.0	1414.0	1414.0	km
Elevation Angle	70.0	50.0	25.0	°
Range	1487.1	1740.5	2529.7	km
Free Space Loss	-163.8	-165.2	-168.5	dB
Polarization & Trkg. Loss	-1.0	-1.0	-1.0	dB
Rx Signal Strength /user/sat.	-167.3	-169.1	-169.1	dBW
User Ant. Gain (incl. line loss)	0.8	2.6	2.6	dB
User Signal at antenna output	-166.5	-166.5	-166.5	dBW
System Noise Temperature	293.7	293.7	293.7	K
Thermal Noise Density, No	-203.9	-203.9	-203.9	dBW/Hz
Average Date Rate, Rb	2400.0	2400.0	2400.0	bps
Downlink Eb/No	3.6	3.6	3.6	dB
Interfer. per Channel	-148.7	-148.6	-148.8	dBW
Spreading Bandwidth	1.23	1.23	1.23	MHz
-10*log (spreading BW)	-60.9	-60.9	-60.9	dB/Hz
Interference Density, Io	-209.6	-209.5	209.7	dBW/Hz
Downlink Eb/(No+Io)	2.6	2.6	-2.6	dB
Coherent combining gain	2.5	2.5	2.5	dB
Overall Eb/(No+Io) (up&dn)	5.0	5.0	5.0	dB
Reqd. Eb/No w/ pwr ctl mgn	5.0	5.0	5.0	dB
Available margin for propagation effects	16.0	16.0	16.0	dB

Table 3

Globalstar forward link C-band up/ S-band down
(with diversity; one path fully blocked)

User Beam	Inner	Middle	Outer	Units
Uplink Analysis				
Frequency	5125.0	5125.0	5125.0	MHz
EIRP per user	32.6	29.3	29.9	dBW
Path loss (40 deg. GW elev.)	-172.5	-172.5	-172.5	dB
Polarization Loss	-0.1	-0.1	-0.1	dB
Pointing Loss	-1.0	-1.0	-1.0	dB
Sat. ant. gain	6.0	6.0	6.0	dB
Line Loss	-2.9	-2.9	-2.9	dB
Rx pwr/user at LNA	-137.9	-141.2	-140.6	dBW
Average User Data Rate	2400.0	2400.0	2400.0	bps
System Noise Temperature	549.5	549.5	549.5	K
Thermal Noise Density, No	-201.2	-201.2	-201.2	dBW/Hz
Interfer. Dens. @ LNA,Io	-196.8	-198.5	-198.2	dBW/Hz
Uplink Eb/(No + Io)	23.8	21.6	22.0	dB
Sat. Xpdr. gain	127.2	127.2	127.2	dB
Downlink Analysis				
Frequency of Operation	2495.0	2495.0	2495.0	MHz
Transmitted power per user	-10.3	-14.2	-12.7	dBW
Line loss	-1.1	-1.1	-1.1	dB
Sat. antenna gain	11.5	14.9	16.6	dB
EIRP/user	0.1	-0.4	2.8	dBW
Satellite Altitude	1414.0	1414.0	1414.0	km
Elevation Angle	70.0	50.0	25.0	o
Range	1487.1	1740.5	2529.7	km
Free Space Loss	-163.8	-165.2	-168.5	dB
Polarization & Trkg. Loss	-1.0	-1.0	-1.0	dB
Rx Signal Strength/user/sat.	-164.8	-166.6	-166.6	dBW
User Ant. Gain (incl. line loss)	0.8	2.6	2.6	dB
User Signal at antenna output	-164.0	-164.0	-164.0	dBW
System Noise Temperature	293.7	293.7	293.7	K
Thermal Noise Density, No	-203.9	-203.9	-203.9	dBW/Hz
Average Date Rate, Rb	2400.0	2400.0	2400.0	bps
Downlink Eb/No	6.1	6.1	6.1	dB
Interfer. per Channel	-148.7	-148.6	-148.8	dBW
Spreading Bandwidth	1.23	1.23	1.23	MHz
-10*log (spreading BW)	-60.9	-60.9	-60.9	dB/Hz
Interference Density, Io	-209.6	-209.5	-209.7	dBW/Hz
Downlink Eb/(No+Io)	5.1	5.1	5.1	dB
Coherent combining gain	0.0	0.0	0.0	dB
Overall Eb/(No+Io) (up&dn)	5.0	5.0	5.0	dB
Reqd. Eb/No w/pwr ctl mgn	5.0	5.0	5.0	dB
Available margin for propagation effects	13.5	13.5	13.5	dB

Table 4

Globalstar return link: L-band up/ C-band down
(with diversity; both paths clear)

User Beam	Inner	Outer	Units
Uplink Analysis			
Frequency of Operation	1615.0	1615.0	MHz
EIRP per user	-11.2	-8.5	dBW
Satellite Altitude	1414.0	1414.0	km
Elevation angle	70.0	25.0	°
Range	1487.1	2529.8	km
Free Space Loss	-160.1	-164.7	dB
Polarization & Trkg. Loss	-1.0	-1.0	dB
S/C Rx Signal Strength	-172.3	-174.2	dBW
Sat. antenna gain	12.6	16.0	dB
Line Loss	-1.1	-1.1	dB
User Signal at transponder	-160.8	-159.3	dBW
System Noise Temperature	500.0	500.0	K
Thermal Noise Density, No	-201.6	-201.6	dBW/Hz
Average data rate, Rb	2400.0	2400.0	bps
Uplink Eb/No	7.0	8.5	dB
Interfer. per channel	-142.2	-138.3	dBW
Spreading bandwidth	1.23	1.23	MHz
Interfer. Density	-203.1	-200.2	dBW/Hz
Uplink Eb/(No + Io)	4.7	4.7	dB
Downlink Analysis			
Frequency	6975.0	6975.0	MHz
Transmit power/user	-31.6	-30.2	dBW
Transmit line loss	-2.1	-2.1	dB
Sat. antenna gain	6.0	6.0	dB
EIRP/per user	-27.7	-26.3	dBW
Path loss (40 deg GW elev.)	-175.2	-175.2	dB
Polarization loss	-0.1	-0.1	dB
Pointing loss	-1.0	-1.0	dB
GW ant. gain (incl. line loss)	49.5	49.5	dB
Rx pwr/user	-154.5	-163.1	dBW
System Noise Temperature	127.7	127.7	K
Thermal Noise Density, No	-207.5	-207.5	dBW/Hz
Interfer. Density, Io	-212.3	-212.3	dBW/Hz
Downlink Eb/(No + Io)	18.0	18.3	dB
Coherent combining gain	1.8	1.8	dB
Overall Eb/(No + Io)(up&dn)	6.3	6.3	dB
Reqd. Eb/No w/ pwr ctl mgn	6.3	6.3	dB
Available margin for propagation effects	16.0	16.0	dB

Table 5

Globalstar return link: L-band up/ C-band down
(with diversity; one path fully blocked)

User Beam	Inner	Outer	Units
Uplink Analysis			
Frequency of Operation	1615.0	1615.0	MHz
EIRP per user	-9.4	-6.7	dBW
Satellite Altitude	1414.0	1414.0	km
Elevation angle	70.0	25.0	o
Range	1487.1	2529.8	km
Free Space Loss	-160.1	-164.7	dB
Polarization & Trkg. Loss	-1.0	-1.0	dB
S/C Rx Signal Strength	-170.5	-172.4	dBW
Sat. antenna gain	12.6	16.0	dB
Line Loss	-1.1	-1.1	dB
User Signal at transponder	-159.0	-157.5	dBW
System Noise Temperature	500.0	500.0	K
Thermal Noise Density, No	-201.6	-201.6	dBW/Hz
Average data rate, Rb	2400.0	2400.0	bps
Uplink Eb/No	8.8	10.3	dB
Interfer. per channel	-142.2	-139.3	dBW
Spreading bandwidth	1.23	1.23	MHz
Interfer. Density	-203.1	-200.2	dBW/Hz
Uplink Eb/(No + Io)	6.5	6.5	dB
Downlink Analysis			
Frequency	6975.0	6975.0	MHz
Transmit power/user	-29.8	-28.4	dBW
Transmit line loss	-2.1	-2.1	dB
Sat. antenna gain	6.0	6.0	dB
EIRP per user	-25.9	-24.5	dBW
Path loss (40 deg GW elev.)	-175.2	-176.2	dB
Polarization loss	-0.1	-0.1	dB
Pointing loss	-1.0	-1.0	dB
GW ant. gain (incl. line loss)	49.5	49.6	dB
Rx pwr/user	-152.7	-151.3	dBW
System noise temp.	127.7	127.7	K
Thermal noise density, No	-207.5	-207.5	dBW/Hz
Interfer. Density, Io	-212.3	-208.9	dBW/Hz
Downlink Eb/(No + Io)	19.8	20.1	dB
Coherent combining gain	0.0	0.0	dB
Overall Eb/(No + Io)(up&dn)	6.3	6.3	dB
Reqd. Eb/No w/pwr ctl mgn	6.3	6.3	dB
Available margin for propagation effects	14.2	14.2	dB

Table 6

Item	Case 1*	Case 2**	Units
Frequency	5091.5	5091.5	MHz
EIRP	53.0	68.0	dBW
Range	1414.0	3503.7	km
Path Loss	169.6	177.5	dB
Pointing Loss	1.0	1.0	dB
Polarization Loss	0.1	0.1	dB
PFD at the Satellite	-82.1	-75.0	dBW/m^2
Antenna Receive Gain	3.0	-15.0	dBi
Receiver Line/Coupler Losses	8.8	8.8	dB
Received Power at Command Receiver	-93.5	-104.4	dBm
Required Received Power at Command Receiver	-113.0	-113.0	dBm
Link Margin	19.5	8.6	dB

Command Link Budget
Table 7

Item	Case 1*	Case 2**	Units
Frequency	6877.1	6877.1	MHz
EIRP	-17.0	-17.0	dBW
Range	1414.0	3503.7	km
Path Loss	172.2	180.1	dB
Pointing Loss	1.0	1.0	dB
Polarization Loss	0.1	0.1	dB
Boltzmann's Constant	-228.6	-228.6	dBW/K-Hz
Receiver G/T	28.0	28.0	dB/K
Data Rate	1.0	1.0	kbs
Modulation Loss	1.5	1.5	dB
Received E_b/N_o	34.8	26.9	dB
Required E_b/N_o	13.6	13.6	dB
Link Margin	21.2	13.3	dB

Telemetry Link Budget
Table 8

* Case 1 uses satellite communications antenna and a Gateway antenna elevation angle of 90^0.
** Case 2 uses satellite anti-earth antenna and a Gateway antenna elevation angle of 10^0.

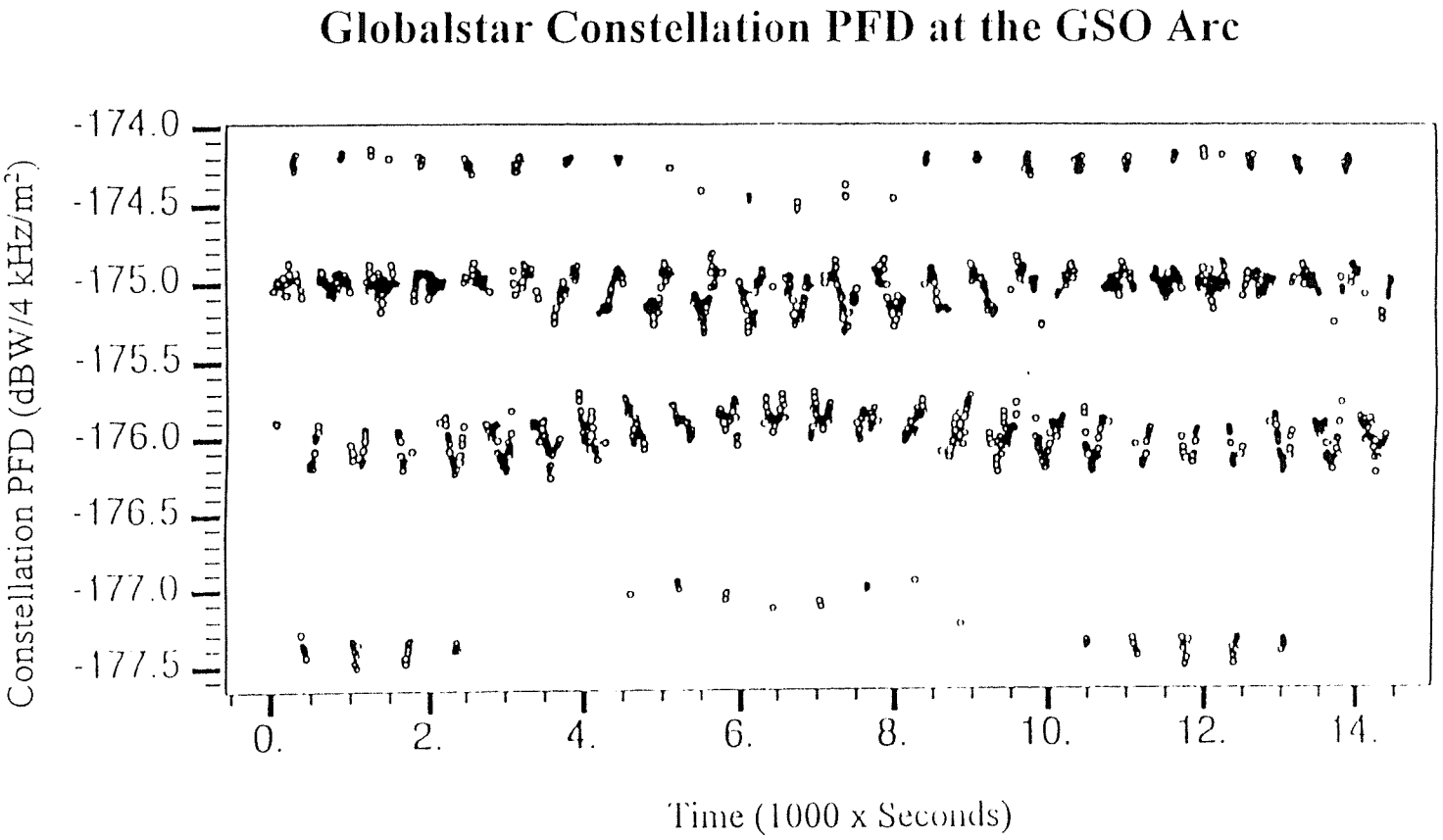


Figure O: Globalstar Constellation PFD As a Function of Time at the GSO Arc

LORAL CORPORATION

029397

ORDER NUMBER	YOUR INVOICE NUMBER	INVOICE DATE	INVOICE AMOUNT	AMOUNT PAID	DISCOUNT TAKEN	NET CHECK AMOUNT

LORAL
Corporation
600 THIRD AVENUE • NEW YORK, NY 10016

CONTINENTAL BANK, N.A.
CHICAGO, ILLINOIS 60697
70-2328/719

029397

CHECK DATE	CONTROL NUMBER	CHECK AMOUNT
2-29-96	029397	$*******17,220.00

PAY Seventeen Thousand Two Hundred Twenty and 00/100 Dollars

TO THE ORDER OF Federal Communications Commission

AUTHORIZED SIGNATURE

EM

⑈029397⑈ ⑆071923284⑆ 79⑈1042 8⑈

CROWELL & MORING
1001 PENNSYLVANIA AVENUE, N.W.
WASHINGTON, D.C. 20004-2595
(202) 624-2500
CABLE: CROMOR
FACSIMILE (RAPICOM): 202-628-5116
W. U. I. (INTERNATIONAL) 64344

SUITE 1200
2010 MAIN STREET
IRVINE, CALIFORNIA 92714-7217
(714) 263-8400
FACSIMILE (714) 263-8414

180 FLEET STREET
LONDON EC4A 2HD
44-171-413-0011
FACSIMILE 44-171-413-0333

WILLIAM D. WALLACE
(202) 624-2807

April 24, 1996

BY HAND DELIVERY

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W. Room 222
Washington, DC 20554

RE: L/Q Licensee, Inc., File No. 90-SAT-ML-96

Dear Mr. Caton:

On March 8, 1996, L/Q Licensee, Inc. ("LQL"), filed the above-referenced application to modify the authorization for the Globalstar™ low-earth orbit satellite telecommunications system. It has recently come to the attention of LQL that the figure for the estimated payload power in Table 2 of that filing is incorrect.

The estimated payload power should read 550 Watts (instead of 346 Watts). Taking this correction into account, the system total for the power budget in Table 2 should read 752 Watts (instead of 548 Watts).

Please associate the original and nine copies of this letter with the previously-filed copies of the application. Should there be any questions regarding this matter, please communicate with this office.

Respectfully submitted,

William D. Wallace

Attorney for L/Q Licensee, Inc.

cc: Chairman Reed E. Hundt
Commissioner James H. Quello
Commissioner Andrew C. Barrett
Commissioner Rachelle B. Chong
Commissioner Susan Ness
Rudolfo Baca
Kathleen Campbell
Brian Carter
Bruce Franca
Donald Gips
Scott Blake Harris
Cecily C. Holiday
Charles Iseman
Fern Jarmulnek
Karl Kensinger
Mary McManus
Michael J. Marcus
Fred Thomas
Suzanne Toller
Thomas Tycz
Philip L. Malet
Norman P. Leventhal
Jill Abeshouse Stern
Robert Mazer
Lon C. Levin
Bruce D. Jacobs
Richard Parlow
Robert A. Frazier
Gerald G. Markey

(RESERVED)

FEDERAL COMMUNICATIONS COMMISSION

FCC REMITTANCE ADVICE

Approved by OMB
3060-0589
Expires 2/28/97

PAGE NO. 1 OF _____

SPECIAL USE
FCC/MELLON MAR 08 1996

FCC USE ONLY
90-SAT-ML-96

(Read instructions carefully BEFORE proceeding.)

PAYOR INFORMATION

(1) FCC ACCOUNT NUMBER: 0 1 3 1 7 1 8 3 6 0

Did you have a number prior to this? Enter it.

(2) TOTAL AMOUNT PAID (dollars and cents): $ 17,220 ● 00

(3) PAYOR NAME (If paying by credit card, enter name exactly as it appears on your card)
Loral Corporation

(4) STREET ADDRESS LINE NO. 1
c/o Crowell & Moring

(5) STREET ADDRESS LINE NO. 2
1001 Pennsylvania Avenue, N.W.

(6) CITY: Washington

(7) STATE: DC

(8) ZIP CODE: 20004

(9) DAYTIME TELEPHONE NUMBER (Include area code)
(202) 624-2500

(10) COUNTRY CODE (if not U.S.A.)

ITEM #1 INFORMATION

(11A) NAME OF APPLICANT, LICENSEE, REGULATEE, OR DEBTOR
L/Q Licensee, Inc.

FCC USE ONLY

(12A) FCC CALL SIGN/OTHER ID
File Nos. 19-DSS-P-91(48)
and CSS-91-014

(13A) ZIP CODE: 95164

(14A) PAYMENT TYPE CODE: C G W

(15A) QUANTITY: 1

(16A) FEE DUE FOR PAYMENT TYPE CODE IN BLOCK 14
$ 17,220.00

(17A) FCC CODE 1

(18A) FCC CODE 2

(19A) ADDRESS LINE NO. 1
3200 Zanker Road

(20A) ADDRESS LINE NO. 2)
P.O. Box 640670

(21A) CITY/STATE OR COUNTRY CODE
San Jose, CA

ITEM #2 INFORMATION

(11B) NAME OF APPLICANT, LICENSEE, REGULATEE, OR DEBTOR

FCC USE ONLY

(12B) FCC CALL SIGN/OTHER ID

(13B) ZIP CODE

(14B) PAYMENT TYPE CODE

(15B) QUANTITY

(16B) FEE DUE FOR PAYMENT TYPE CODE IN BLOCK 14
$

(17B) FCC CODE 1

(18B) FCC CODE 2

(19B) ADDRESS LINE NO. 1

(20B) ADDRESS LINE NO. 2

(21B) CITY/STATE OR COUNTRY CODE

CREDIT CARD PAYMENT INFORMATION

(22) MASTERCARD/VISA ACCOUNT NUMBER:

☐ Mastercard

EXPIRATION DATE: Month Year

☐ Visa

(23) **I hereby authorize the FCC to charge my VISA or Mastercard for the service(s)/authorization(s) herein describe.**

AUTHORIZED SIGNATURE DATE

See public burden estimate on reverse.

FCC FORM 159
April 1994