Table B-5. Interference Analysis between Expressway™ and System-X

PARAMETER	UPLINK		DOWNLINK		UPLINK		DOWNLINK		UNITS
	Desired Other	Interf. Own	Desired Other	Interf. Own	Interf. Other	Desired Own	Interf. Other	Desired Own	
Signal frequency	48.7	48.7	41	41	48.7	48.7	41	41	GHz
+ TX Power	14.8	14.8	20.0	20.0	14.8	14.8	20.0	20.0	dBW
- TX Loss	1	1	1	1	1	1	1	1	dB
- HPA Backoff	3	3	2	2	3	3	2	2	dB
+ TX Ant. Gain	59.5	20.4	49.0	52.0	20.4	59.5	52.0	49.0	dBi
- Per Carrier Loss	0.0	0.0	10.0	10.0	0.0	0.0	10.0	10.0	dB
= Tx EIRP	70.3	31.2	56.0	59.0	31.2	70.3	59.0	56.0	dBW
- Space Loss	217.3	217.3	215.8	215.8	217.3	217.3	215.8	215.8	dB
- Atmospheric Loss	5.1	5.1	3	3	5.1	5.1	3	3	dB
+ Rx Ant. Gain	49.0	52.0	58.0	20.4	52.0	49.0	20.4	58.0	dBi
= Carrier Power (C)	-103.2		-104.8			-103.2		-104.8	dBW
= Interfer. Power (I)		-139.3		-139.4	-139.3		-139.4		dBW
- Rx Noise Temp.	28.1	28.1	26.6	26.6	28.1	28.1	26.6	26.6	dBK
- Boltzmann's Const.	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	dBW/K-Hz
C/No or I/No	97.3	61.2	97.1	62.5	61.2	97.3	62.5	97.1	dB-Hz
C/I_{up} or C/I_{down}	36.1	(up)	34.6	(down)	36.1	(up)	34.6	(down)	dB
C/I_{total}		32.3	(total)			32.3	(total)		dB
- Signal Bandwidth	84.5	84.5	84.5	84.5	84.5	84.5	84.5	84.5	dB-Hz
Co/No or Io/No	12.8	-23.3	12.6	-22.0	-23.3	12.8	-22.0	12.6	dB-Hz
Co/Io_{up} or Co/Io_{down}	36.1	(up)	34.6	(down)	36.1	(up)	34.6	(down)	dB
Co/Io total		32.3	(total)			32.3	(total)		dB

Single satellite

C/I analyses were also performed to determine whether Expressway™ could share spectrum with a hypothetical GSO FSS system operating in the Ku-band, referred to here as System-Y. System-Y has earth station and space station characteristics derived from operational Ku-band satellite systems. The System-Y transponder bandwidth is assumed to be 30 MHz for satellite television signal transmissions. In the interference scenarios, an Expressway™ satellite and a System-Y satellite are spaced 2° apart on the geostationary arc. The earth stations for both systems are considered to be co-located. The interference calculations for these scenarios appear below. Table B-6 shows interference calculations between

Expressway™ 1° x 3° Ku-band beams and System-Y, while Tables B-7 and B-8 show interference calculations between System-Y and Expressway™ 6° Ku-band beams. These calculations show that 2° sharing is feasible for both 1° X 3° and 6° beams.

Table B-6. Interference Analysis between Expressway™ (1° X 3° Beam) and System-Y

PARAMETER	UPLINK		DOWNLINK		UPLINK		DOWNLINK		UNITS
	Desired Other	Interf. Own	Desired Other	Interf. Own	Interf. Other	Desired Own	Interf. Other	Desired Own	
Signal frequency	13	13	11	11	13	13	11	11	GHz
+ TX Power	17.0	20.0	15.4	14.0	17.0	20.0	15.4	14.0	dBW
- TX Loss	0.3	0.3	0.5	0.5	0.3	0.3	0.5	0.5	dB
- HPA Backoff	0	0	0	0	0	0	0	0	dB
+ TX Ant. Gain	54.8	20.4	34.0	37.0	20.4	48.8	37.0	34.0	dBi
- Per Carrier Loss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	dB
= Tx EIRP	71.5	40.1	48.9	50.5	37.1	68.5	51.9	47.5	dBW
- Space Loss	205.9	205.9	204.4	204.4	205.9	205.9	204.4	204.4	dB
- Atmospheric Loss	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	dB
+ Rx Ant. Gain	34.0	37.0	49.2	20.4	37.0	34.0	20.4	47.5	dBi
= Carrier Power (C)	-100.7		-106.6			-103.7		-109.7	dBW
= Interfer. Power (I)		-129.1		-133.8	-132.1		-132.4		dBW
- Rx Noise Temp.	31.8	31.8	23.0	23.0	25.6	25.6	18.6	18.6	dBK
- Boltzmann's Const.	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	dBW/K-Hz
C/No or I/No	96.2	67.8	99.0	71.8	70.9	99.3	77.6	100.2	dB-Hz
C/I_{up} or C/I_{down}	28.4	(up)	27.3	(down)	28.4	(up)	22.6	(down)	dB
C/I_{total}		24.8	(total)			21.6	(total)		dB
- Signal Bandwidth	74.8	83.8	74.8	83.8	74.8	83.8	74.8	83.8	dB-Hz
Co/No or Io/No	21.4	-16.0	24.3	-12.0	-3.8	15.5	2.8	16.4	dB/Hz
Co/Io_{up} or Co/Io_{down}	37.4	(up)	36.3	(down)	19.4	(up)	13.6	(down)	dB
Co/Io total		33.8	(total)			12.6	(total)		dB

Single satellite

Table B-7. Interference Analysis between Expressway™ (Bogota - CONUS link) and System-Y

PARAMETER	UPLINK		DOWNLINK		UPLINK		DOWNLINK		UNITS
	Desired Other	Interf. Own	Desired Other	Interf. Own	Interf. Other	Desired Own	Interf. Other	Desired Own	
Signal frequency	13	13	11	11	13	13	11	11	GHz
+ TX Power	17.0	23.0	15.4	14.0	17.0	23.0	15.4	14.0	dBW
- TX Loss	0.3	0.3	0.5	0.5	0.3	0.3	0.5	0.5	dB
- HPA Backoff	0	0	0	0	0	0	0	0	dB
+ TX Ant. Gain	54.1	20.4	34.0	37.0	20.4	48.8	37.0	34.0	dBi
- Per Carrier Loss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	dB
= Tx EIRP	70.8	43.1	48.9	50.5	37.1	71.5	51.9	47.5	dBW
- Space Loss	205.9	205.9	204.4	204.4	205.9	205.9	204.4	204.4	dB
- Atmospheric Loss	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	dB
+ Rx Ant. Gain	34.0	37.0	47.5	20.4	30.2	27.2	20.4	47.5	dBi
= Carrier Power (C)	-101.4		-108.3			-107.5		-109.7	dBW
= Interfer. Power (I)		-126.0		-133.8	-138.9		-132.4		dBW
- Rx Noise Temp.	31.8	31.8	23.0	23.0	25.6	25.6	18.6	18.6	dBK
- Boltzmann's Const.	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	dBW/K-Hz
C/No or I/No	95.5	70.8	97.3	71.8	64.1	95.5	77.6	100.2	dB-Hz
C/I_{up} or C/I_{down}	24.7	(up)	25.6	(down)	31.4	(up)	22.5	(down)	dB
C/I_{total}		22.1	(total)			22.1	(total)		dB
- Signal Bandwidth	74.8	81.4	74.8	81.4	74.8	81.4	74.8	81.4	dB-Hz
Co/No or Io/No	20.7	-10.6	22.6	-9.6	-10.6	14.1	2.8	18.8	dB/Hz
Co/Io_{up} or Co/Io_{down}	31.3	(up)	32.2	(down)	24.8	(up)	16.0	(down)	dB
Co/Io total		28.7	(total)			15.5	(total)		dB

Single satellite

Table B-8. Interference Analysis between Expressway™ (CONUS - Bogota link) and System-Y

PARAMETER	UPLINK		DOWNLINK		UPLINK		DOWNLINK		UNITS
	Desired Other	Interf. Own	Desired Other	Interf. Own	Interf. Other	Desired Own	Interf. Other	Desired Own	
Signal frequency	13	13	11	11	13	13	11	11	GHz
+ TX Power	17.0	20.0	15.4	20.0	17.0	20.0	15.4	20.0	dBW
- TX Loss	0.3	0.3	0.5	0.5	0.3	0.3	0.5	0.5	dB
- HPA Backoff	0	0	0	0	0	0	0	0	dB
+ TX Ant. Gain	54.1	20.4	34.0	29.8	20.4	48.8	37.0	26.8	dBi
- Per Carrier Loss	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	dB
= Tx EIRP	70.8	40.1	48.9	49.3	37.1	68.5	51.9	46.3	dBW
- Space Loss	205.9	205.9	204.4	204.4	205.9	205.9	204.4	204.4	dB
- Atmospheric Loss	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	dB
+ Rx Ant. Gain	34.0	37.0	47.5	20.4	37.0	34.0	20.4	47.5	dBi
= Carrier Power (C)	-101.4		-108.3			-103.7		-110.9	dBW
= Interfer. Power (I)		-129.1		-135.0	-132.1		-132.4		dBW
- Rx Noise Temp.	31.8	31.8	23.0	23.0	25.6	25.6	18.6	18.6	dBK
- Boltzmann's Const.	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	-228.6	dBW/K-Hz
C/No or I/No	95.5	67.8	97.3	70.6	70.9	99.3	77.6	99.1	dB-Hz
C/I_{up} or C/I_{down}	27.7	(up)	26.7	(down)	28.4	(up)	21.5	(down)	dB
C/I_{total}		24.2	(total)			20.7	(total)		dB
- Signal Bandwidth	74.8	81.4	74.8	81.4	74.8	81.4	74.8	81.4	dB-Hz
Co/No or Io/No	20.7	-13.6	22.6	-10.8	-3.8	17.9	2.8	17.7	dB/Hz
Co/Io_{up} or Co/Io_{down}	34.3	(up)	33.4	(down)	21.7	(up)	14.8	(down)	dB
Co/Io total		30.8	(total)			14.0	(total)		dB

Single satellite

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Appendix C
Antenna Coverage

APPENDIX C: ANTENNA COVERAGE

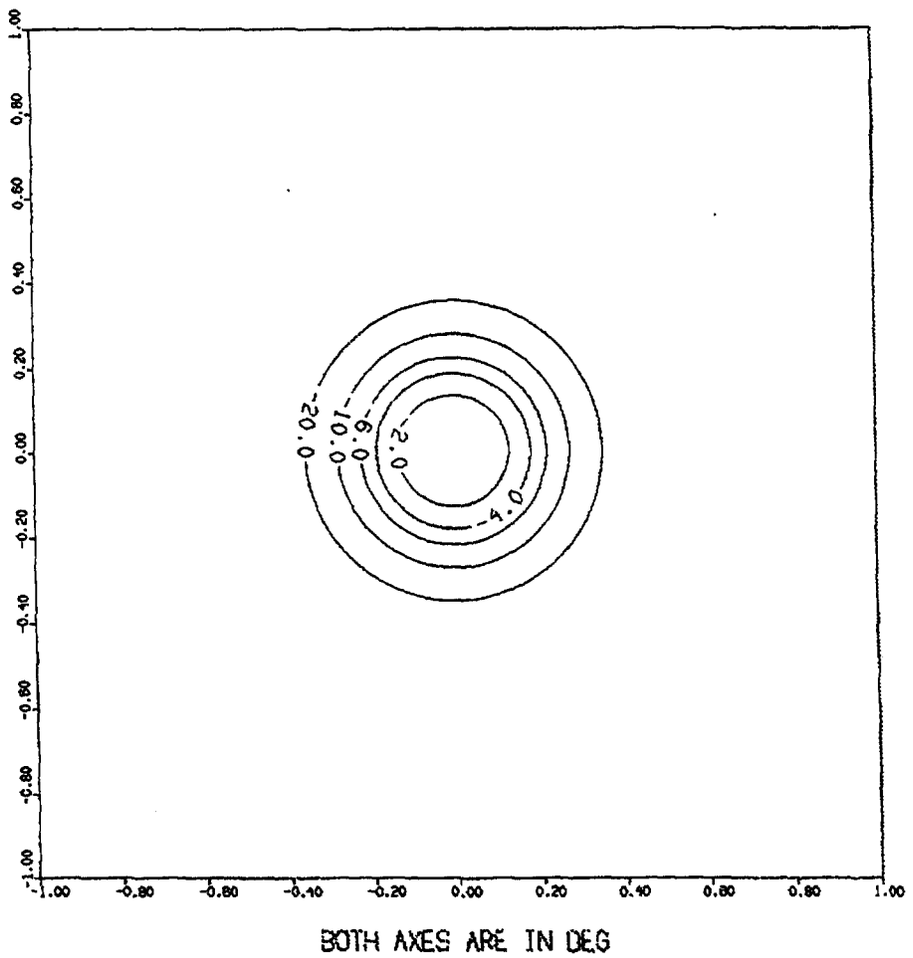

Figure C-1. V-Band Receive/Transmit Spot Beam Contours (G_{max} = 52 dBi, G/T=23.4 dB/K)

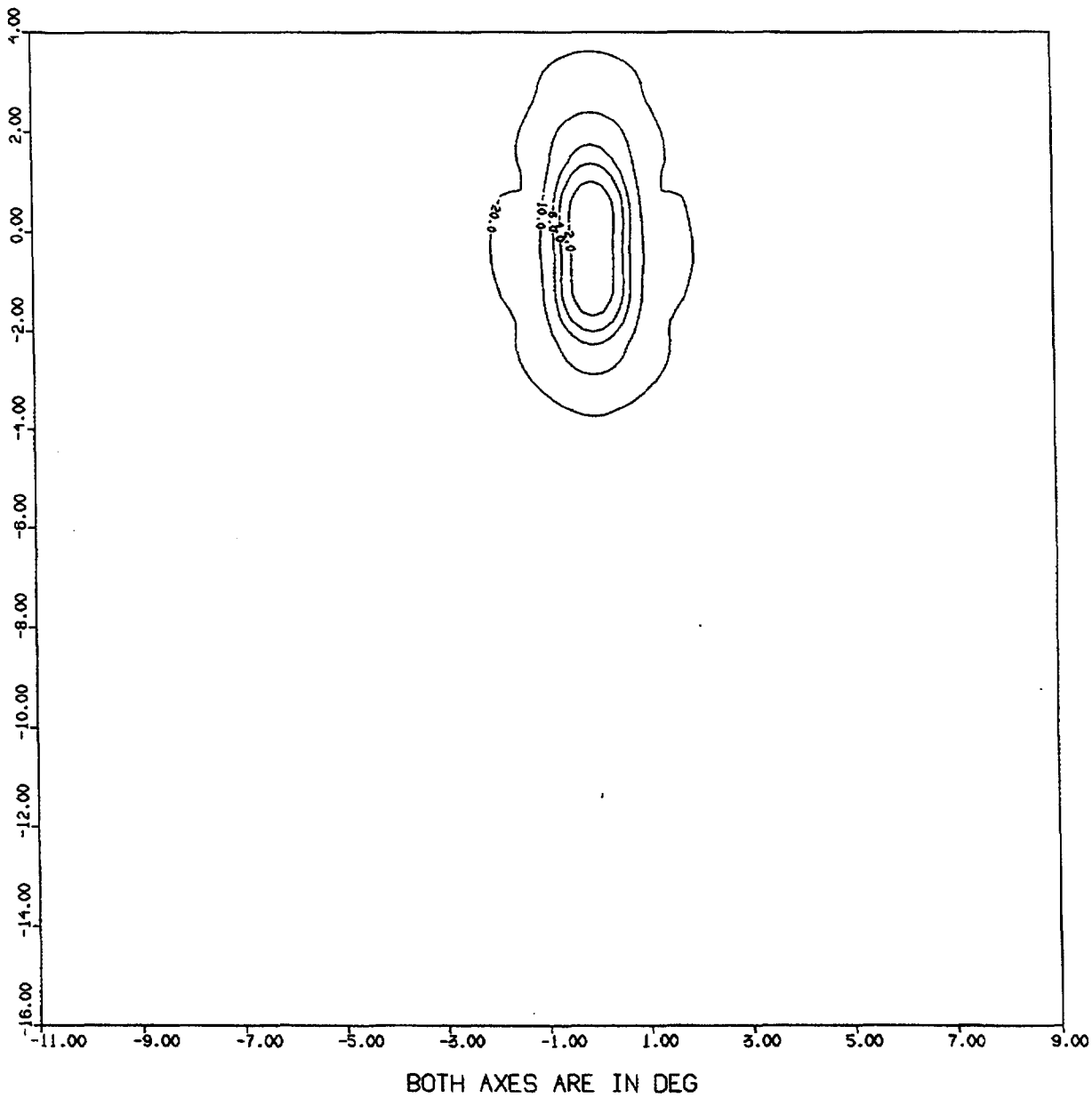

Figure C-2. Ku-Band Receive/Transmit Elliptical (1°X3°) Beam Contours

(G_{max} = 37 dBi, G/T = 10.4 dB/K)

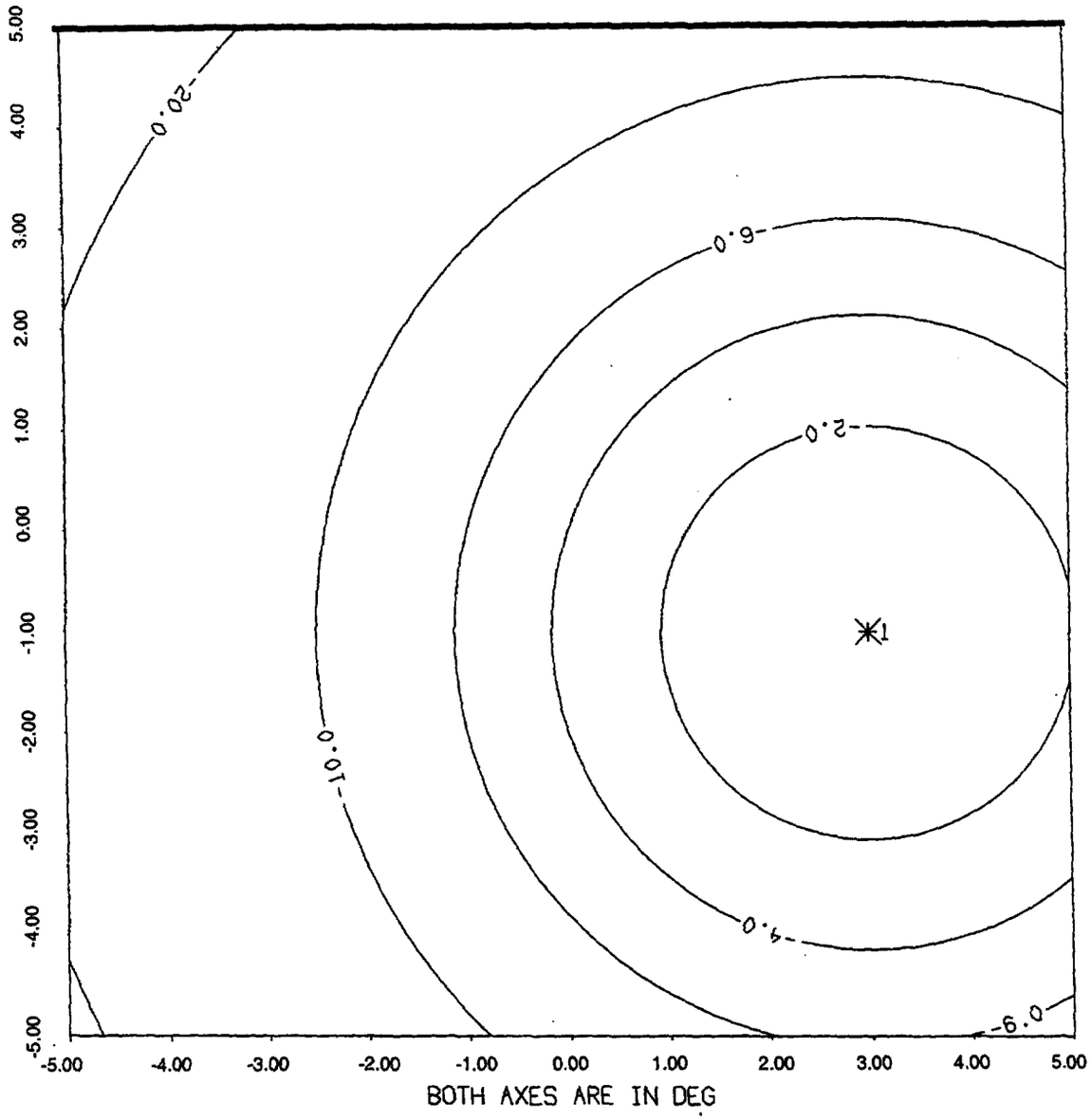

Figure C-3. Ku-Band Receive Hemispherical Area Beam Contours

(G_{max} = 30.2 dBi, G/T = 4.1 dB/K)

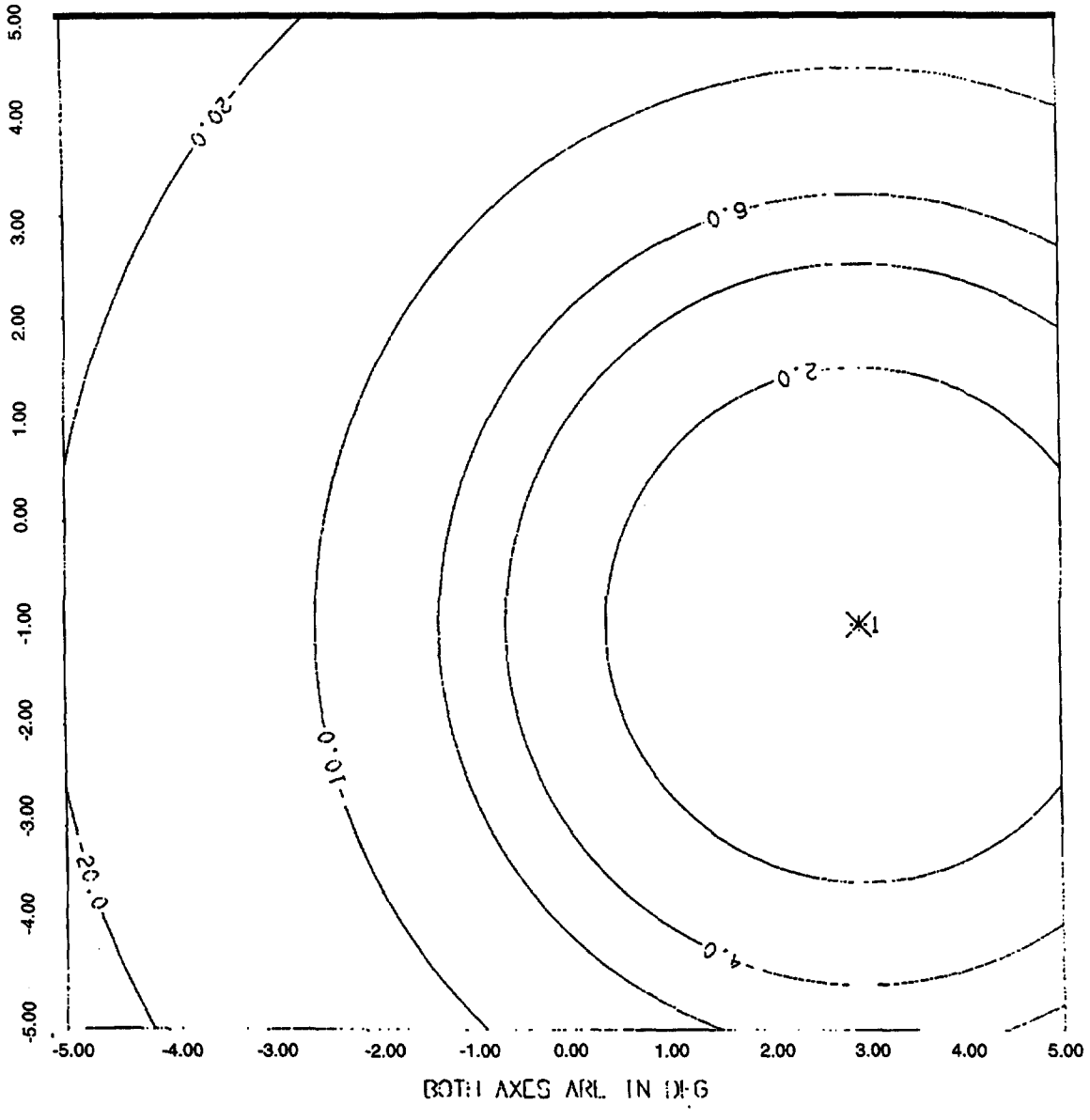

Figure C-4. Ku-Band Transmit Hemispherical Area Beam Contours (G_{max} = 29.8 dBi)

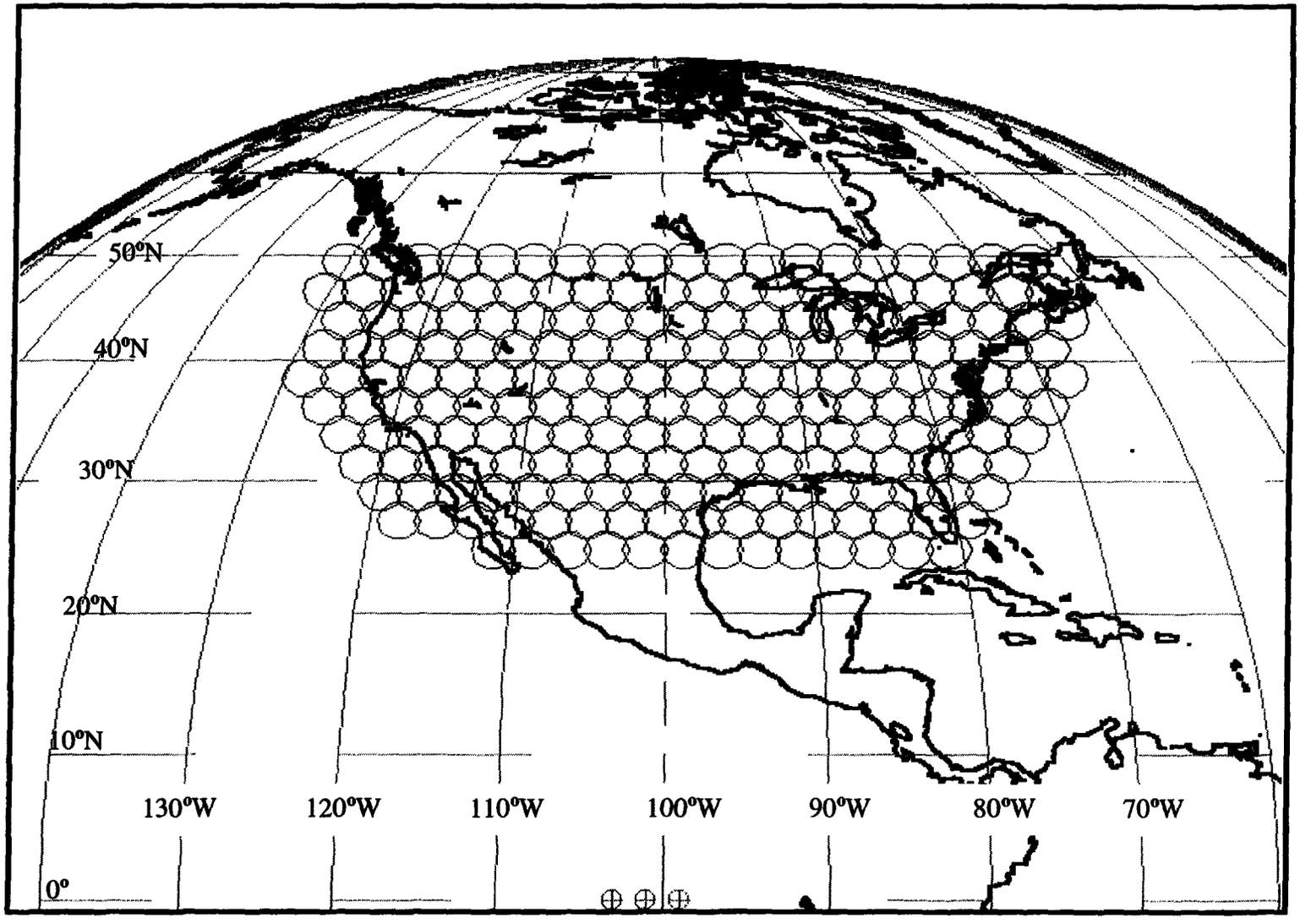

Figure C-5. V-Band Beams at 99°W, 101°W, and 103°W Orbital Positions

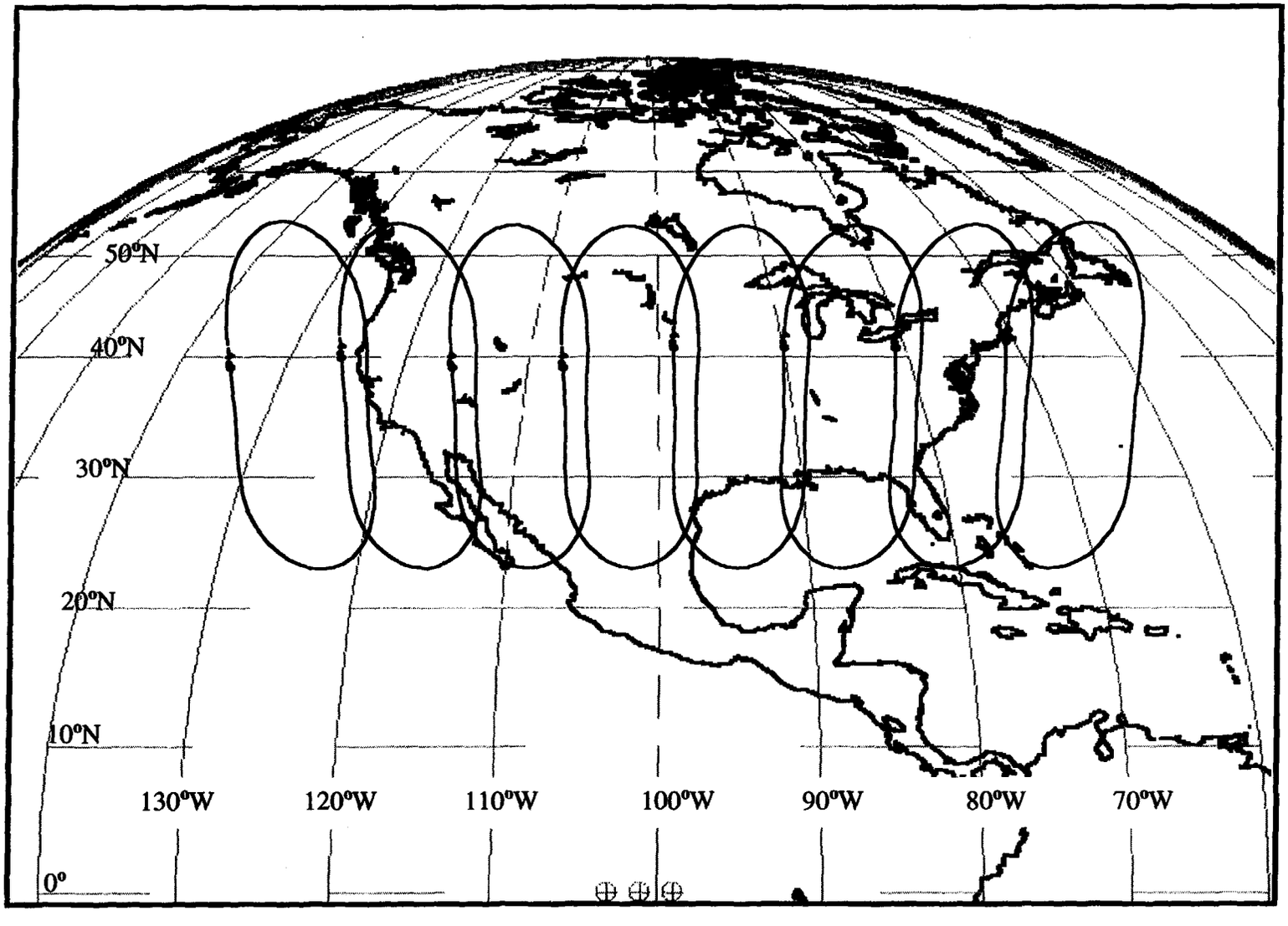

Figure C-6. Ku-Band Beams at 99°W, 101°W, and 103°W Orbital Positions

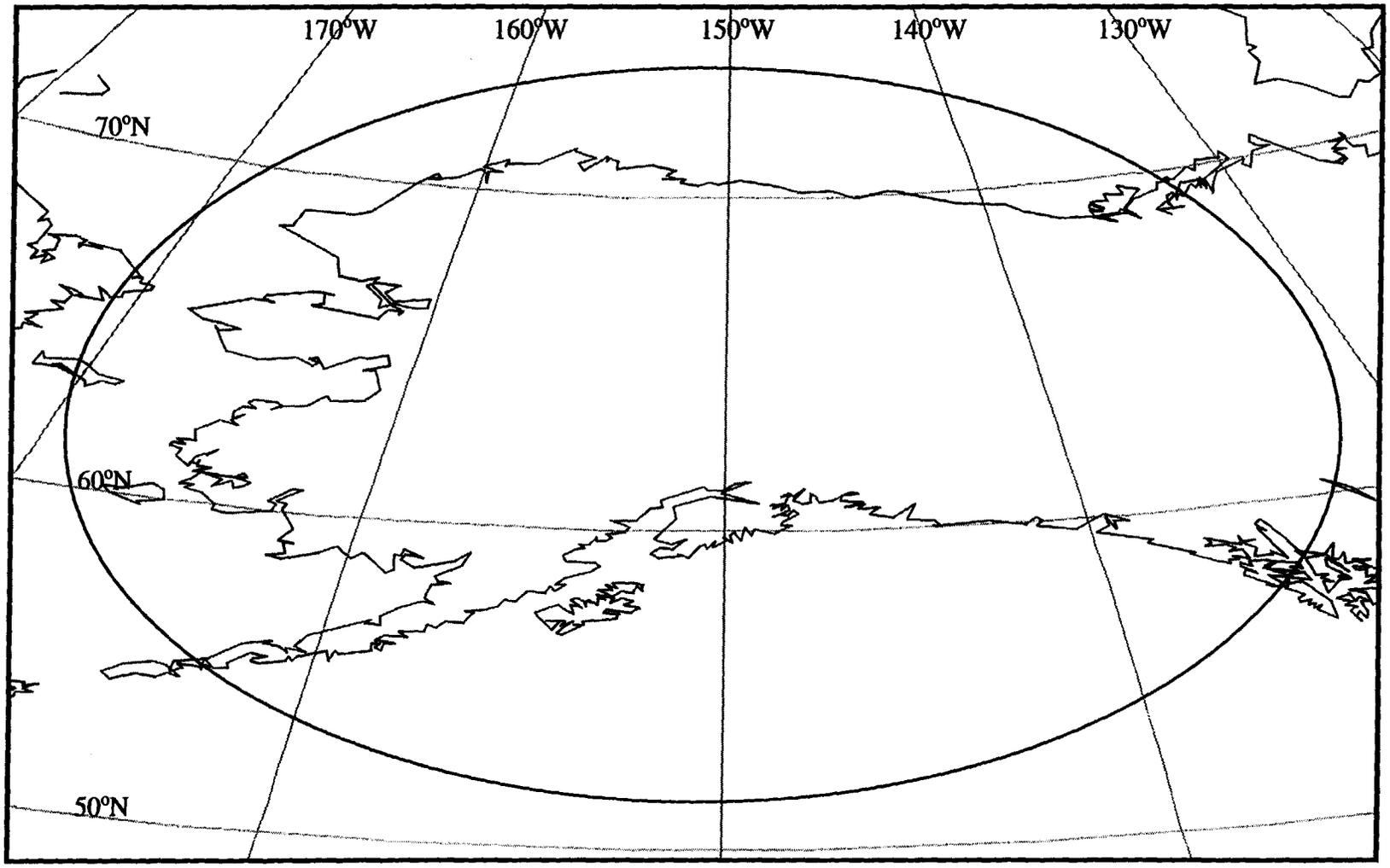

Figure C-7. Receive/Transmit Alaska Beam at 103°W Orbital Position

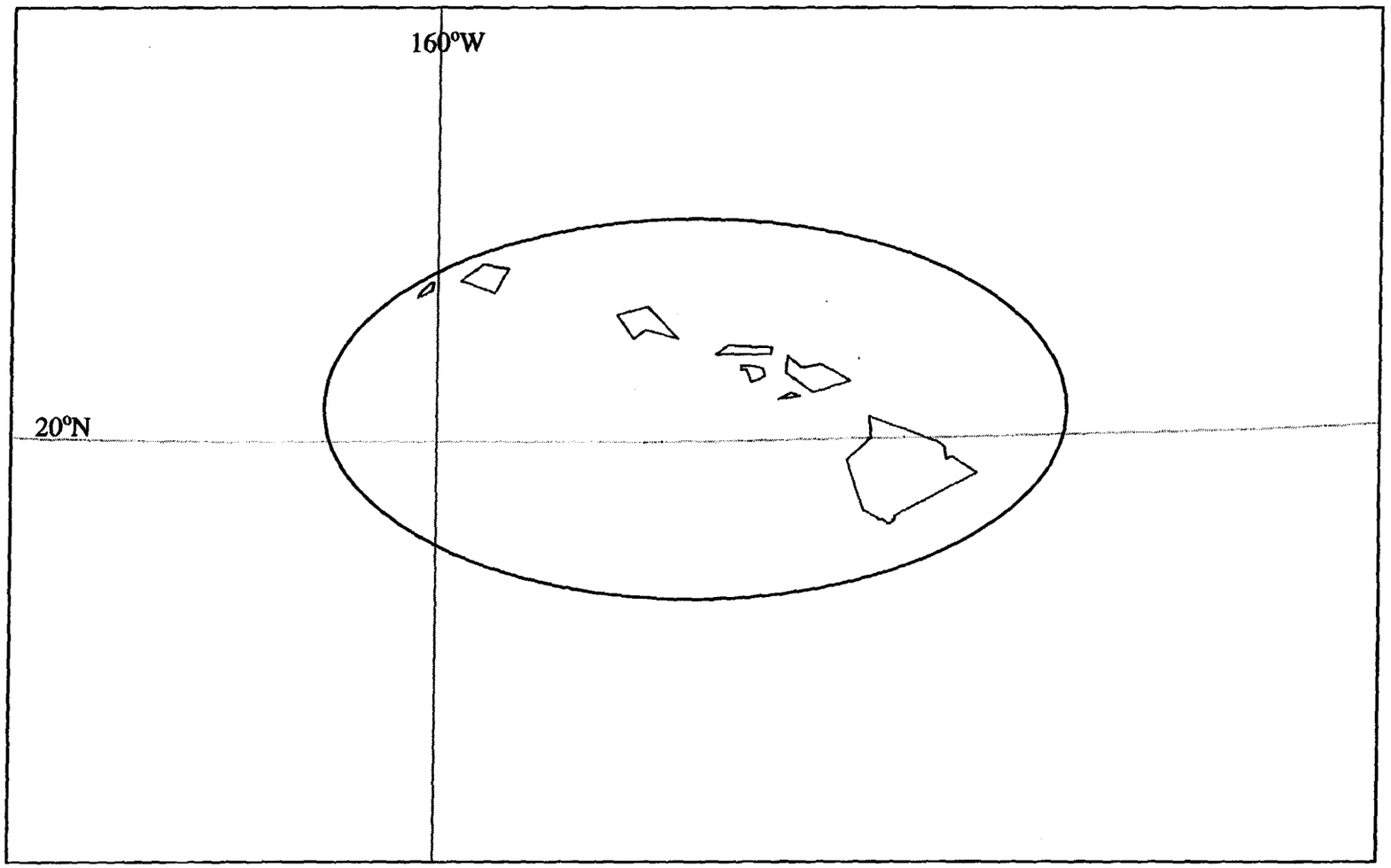

Figure C-8. Receive/Transmit Hawaii Beam at 103°W Orbital Position

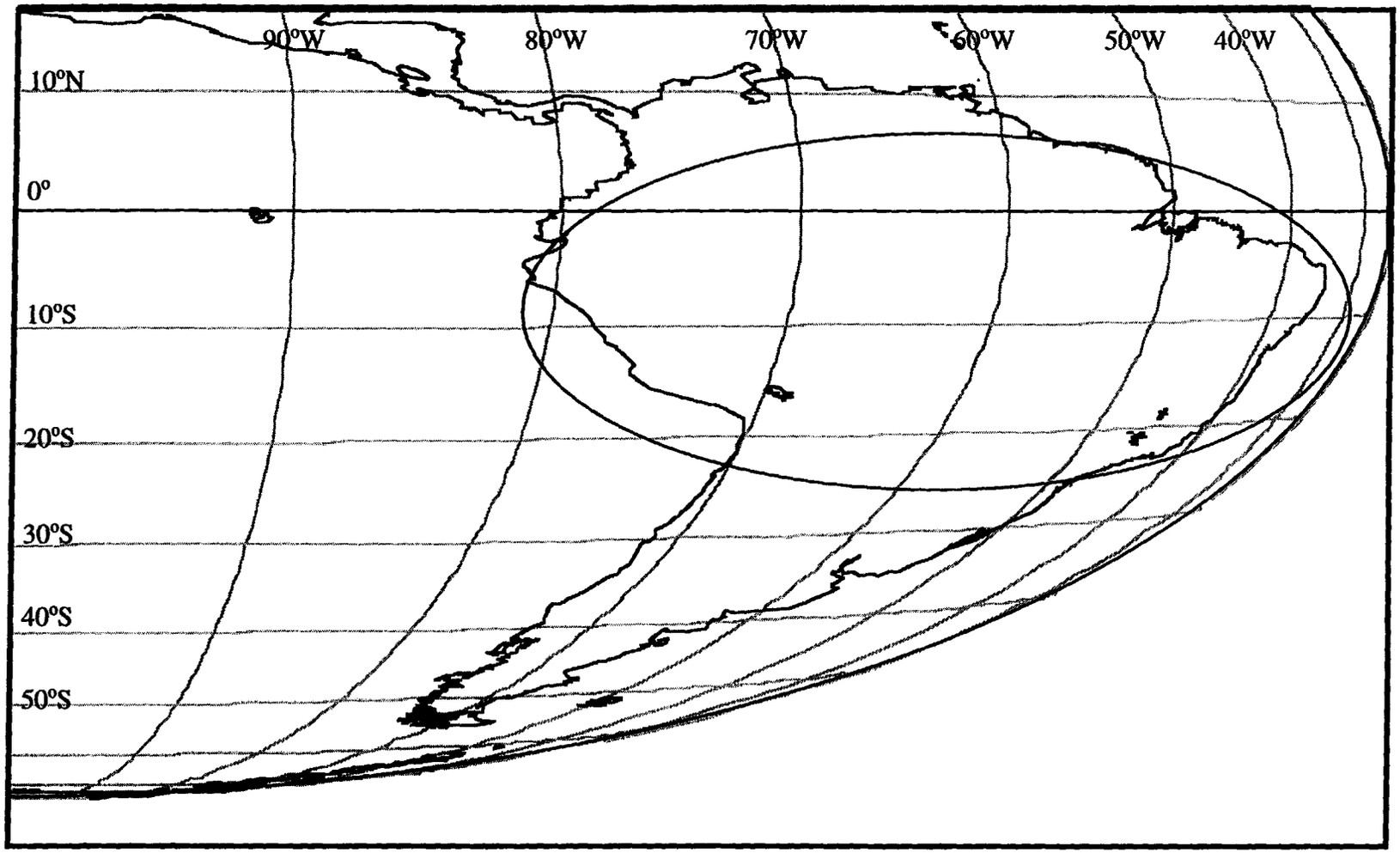

Figure C-9. Receive Ku-Band 6° Beam at 99°W, 101°W, and 103°W Orbital Positions

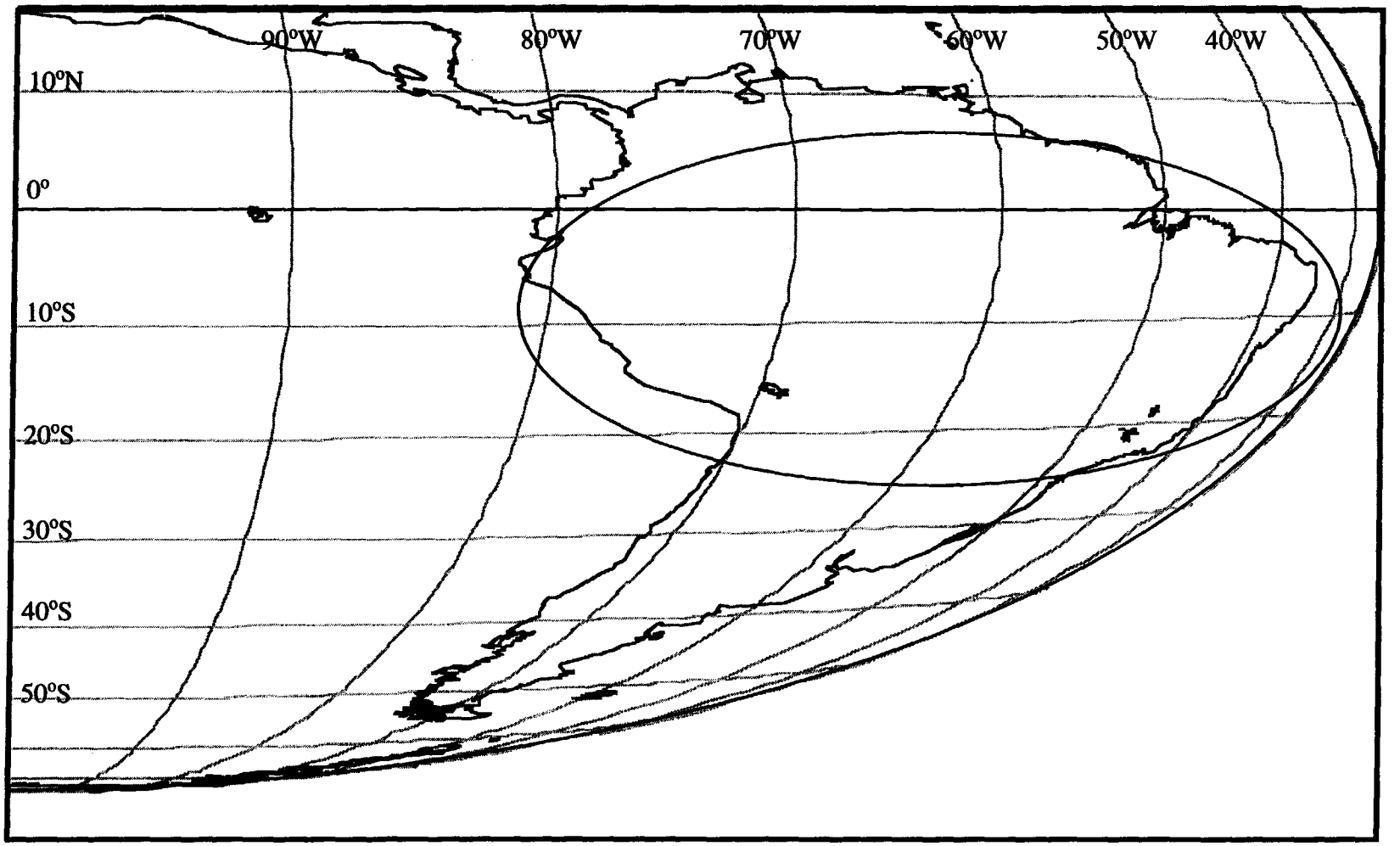

Figure C-10. Transmit Ku-Band 6° Beam at 99°W, 101°W, and 103°W Orbital Positions

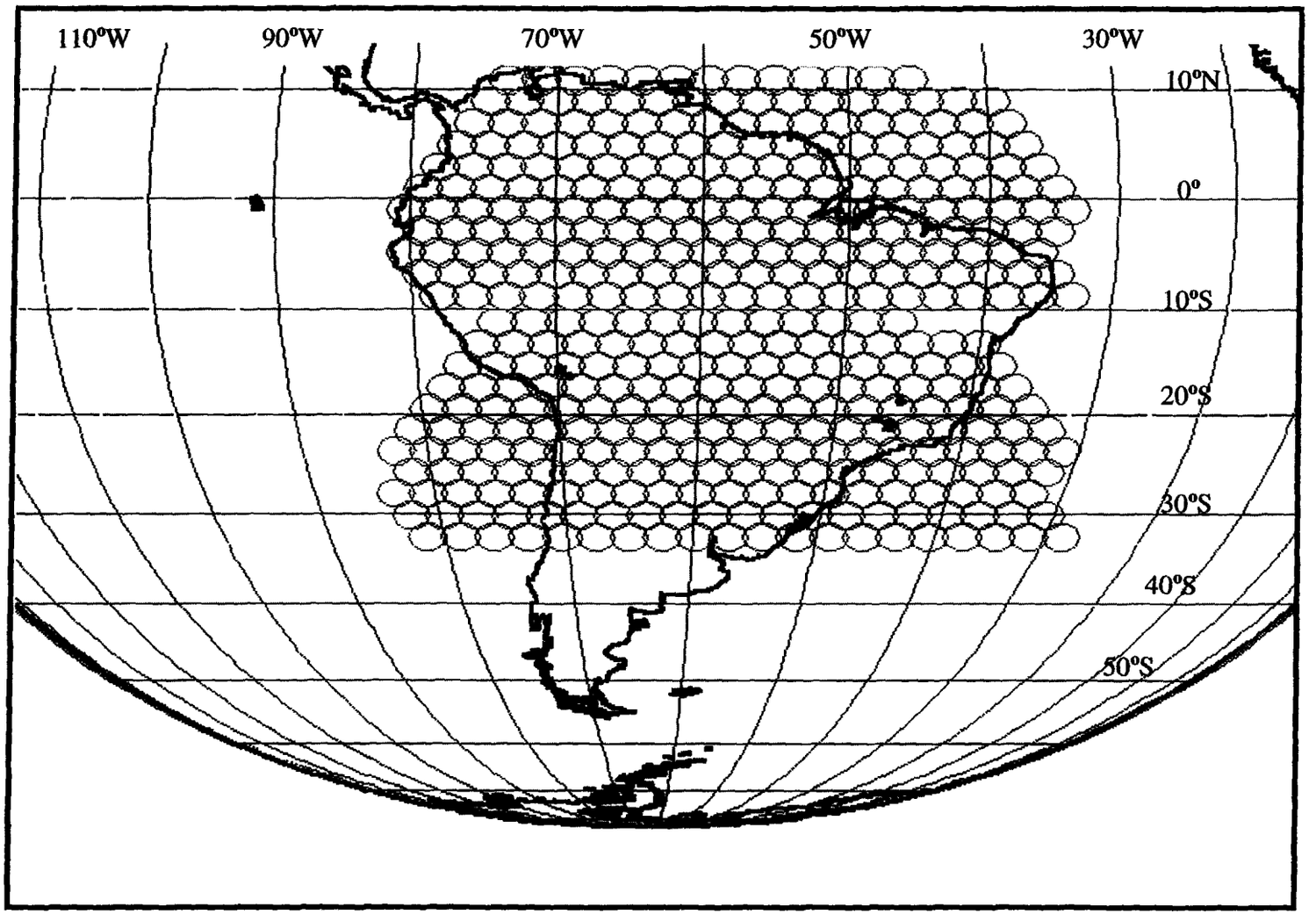

Figure C-11. V-Band Beams at 53°W and 63°W Orbital Positions

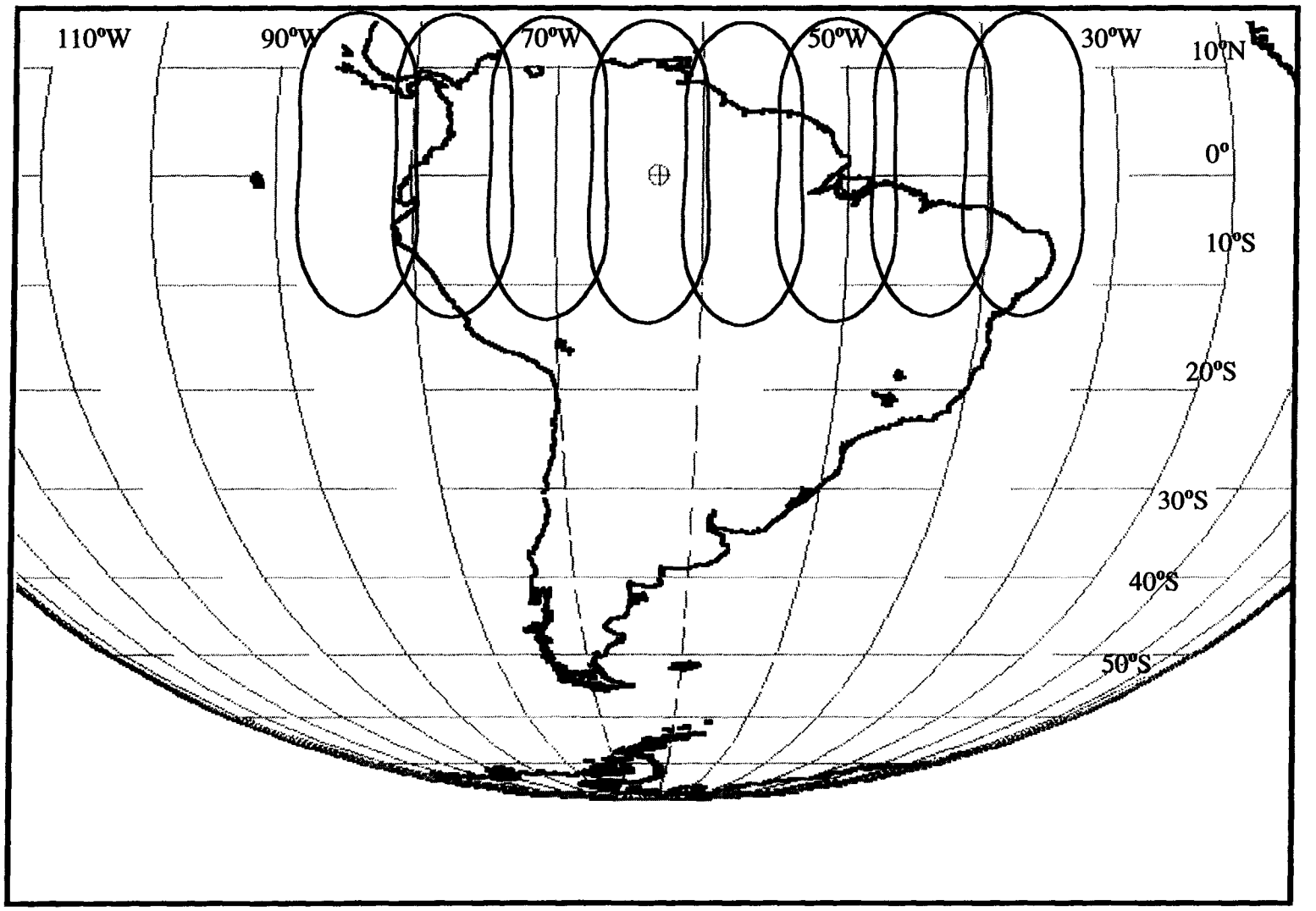

Figure C-12. Ku-Band Beams at 63°W Orbital Position

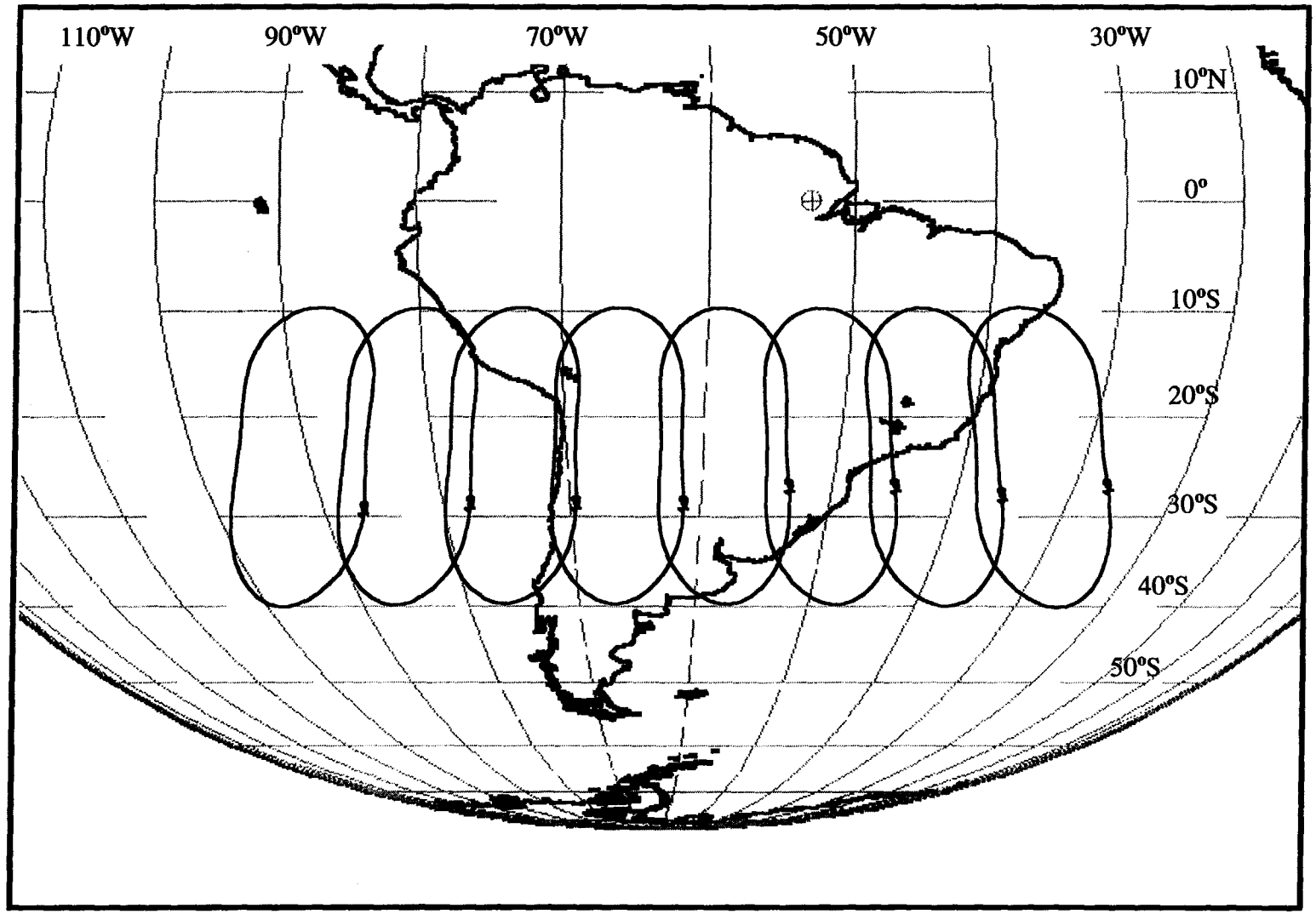

Figure C-13. Ku-Band Beams at 53°W Orbital Position

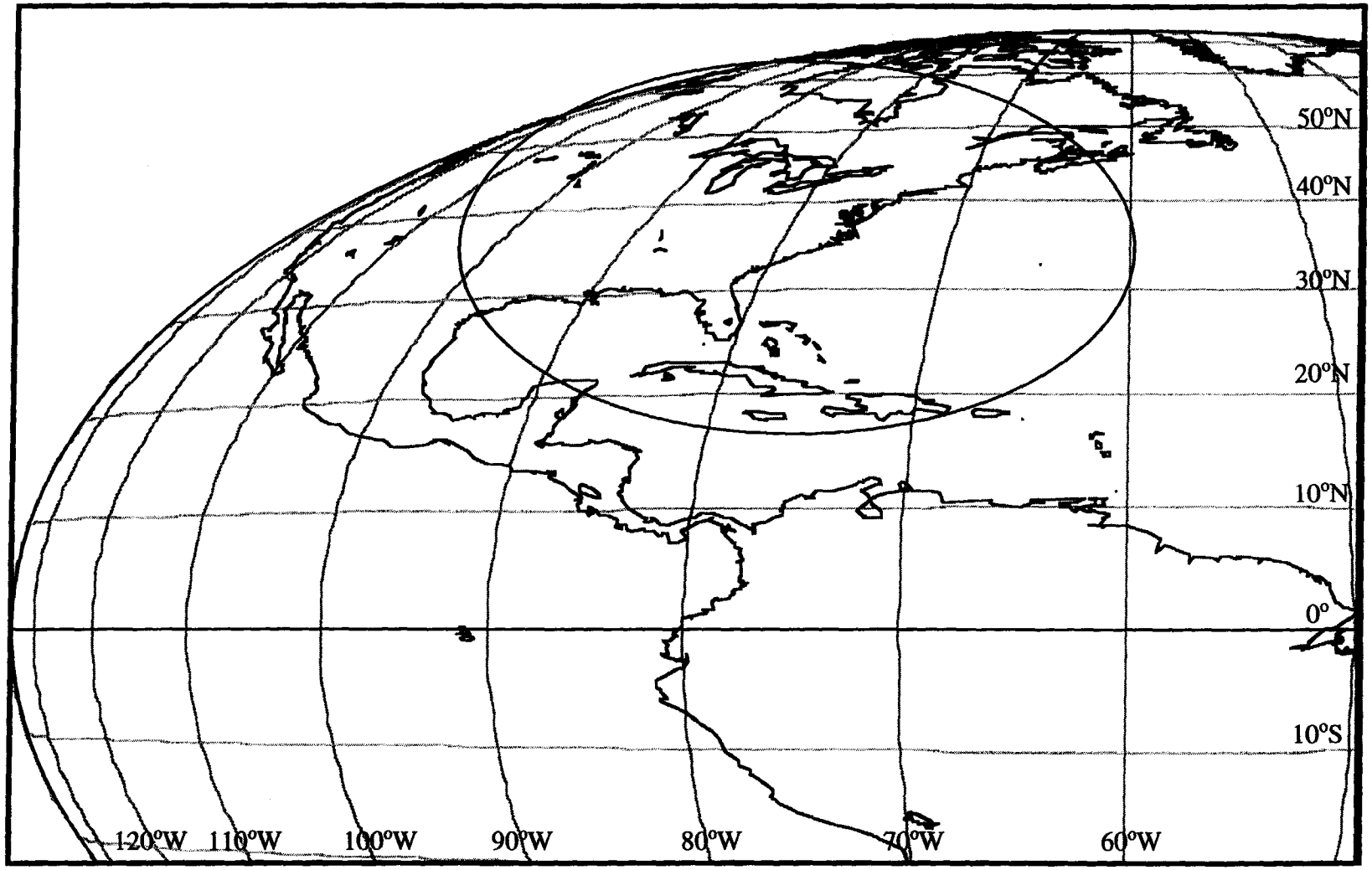

Figure C-14. Receive Ku-Band 6° Beam at 53°W and 63°W Orbital Positions

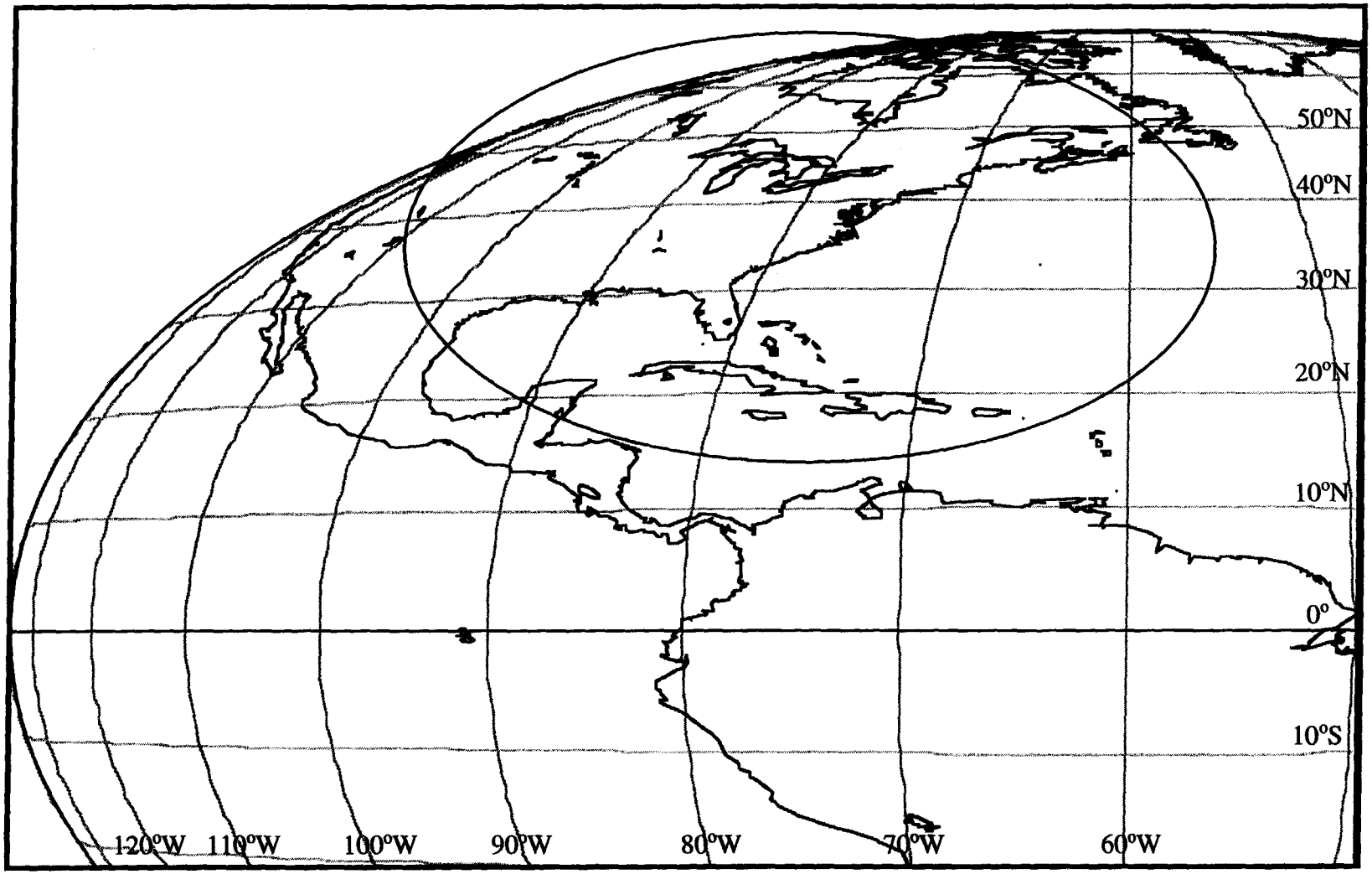

Figure C-15. Transmit Ku-Band 6° Beam at 53°W and 63°W Orbital Positions

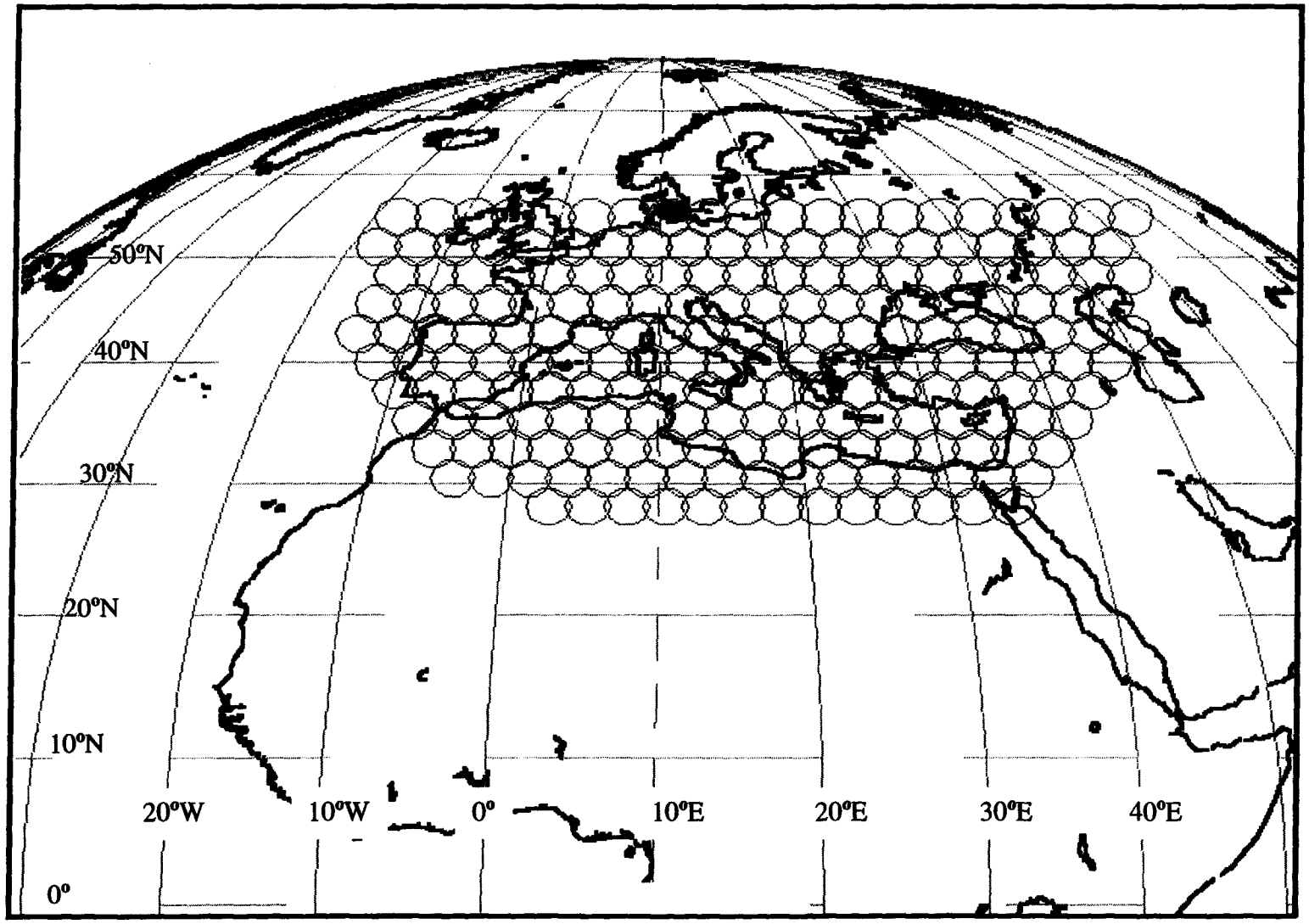

Figure C-16. V-Band Beams at 8.5°E Orbital Position

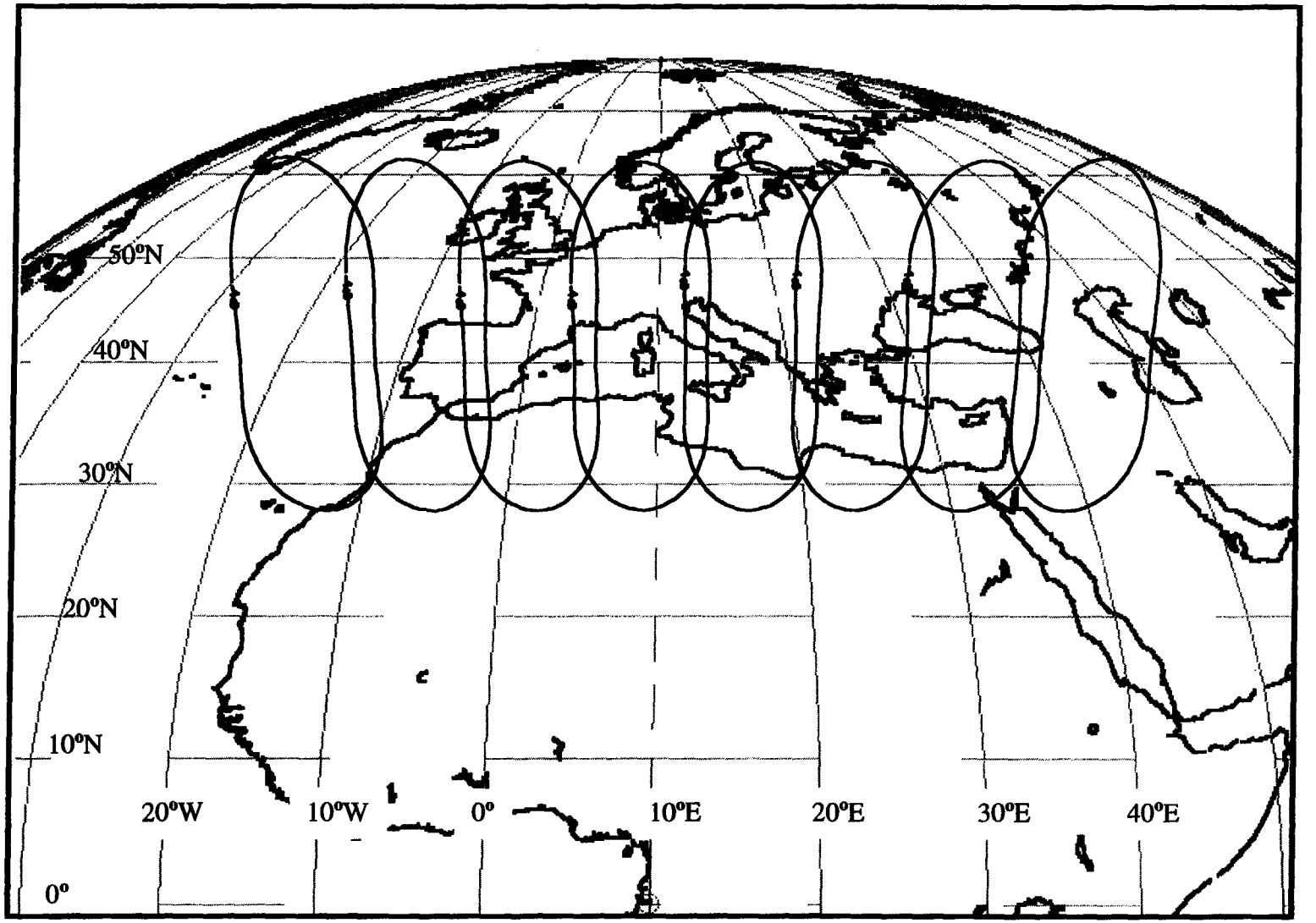

Figure C-17. Ku-Band Beams at 8.5°E Orbital Position

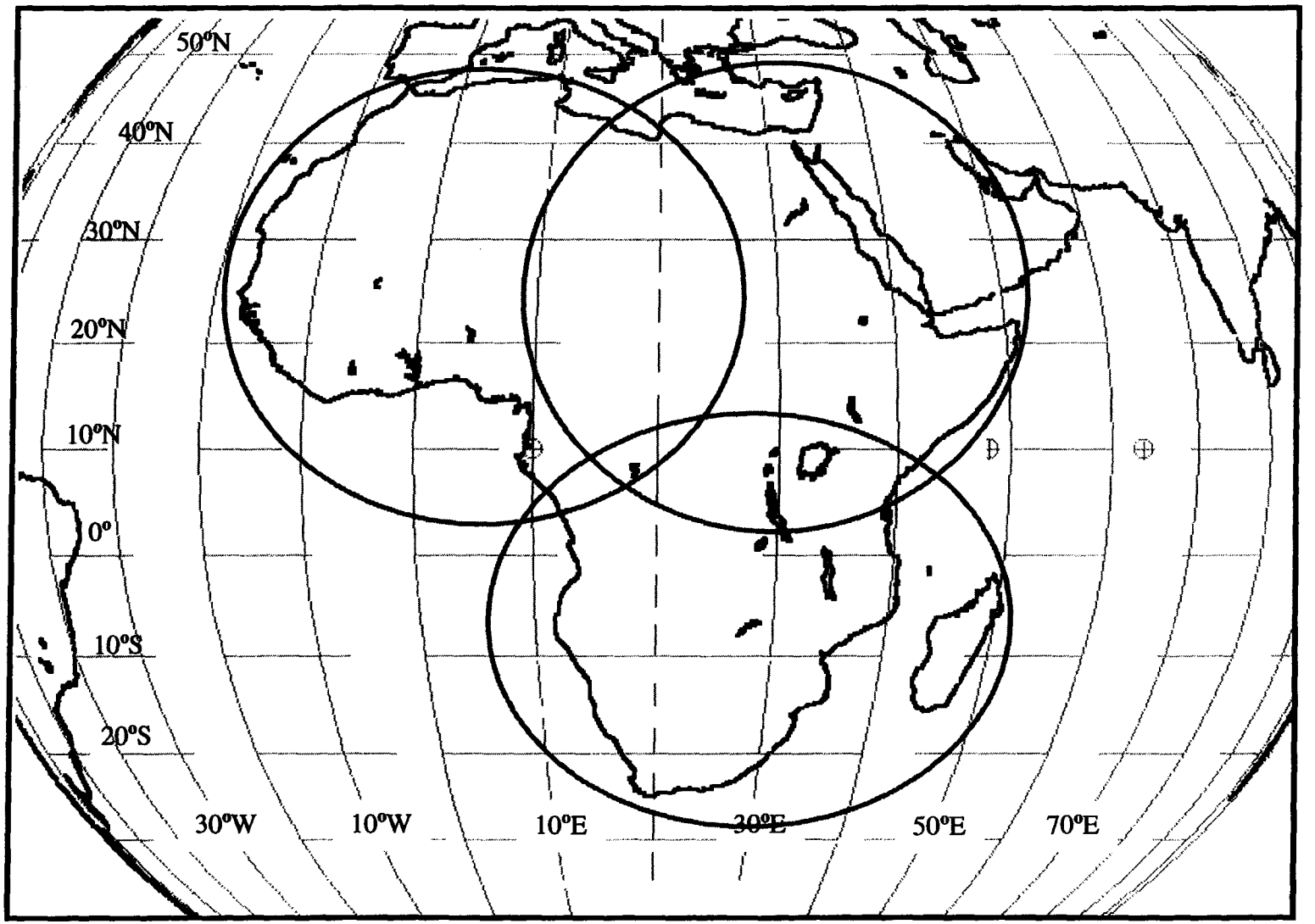

Figure C-18. Receive Ku-Band 6° Beams for 8.5°E, 48°E, and 63.5°E Orbital Positions