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COMMUNICATION PLATFORM PAYLOAD DEFINITION STUDY FINAL REPORT

March 1986
Volume III - Addendum

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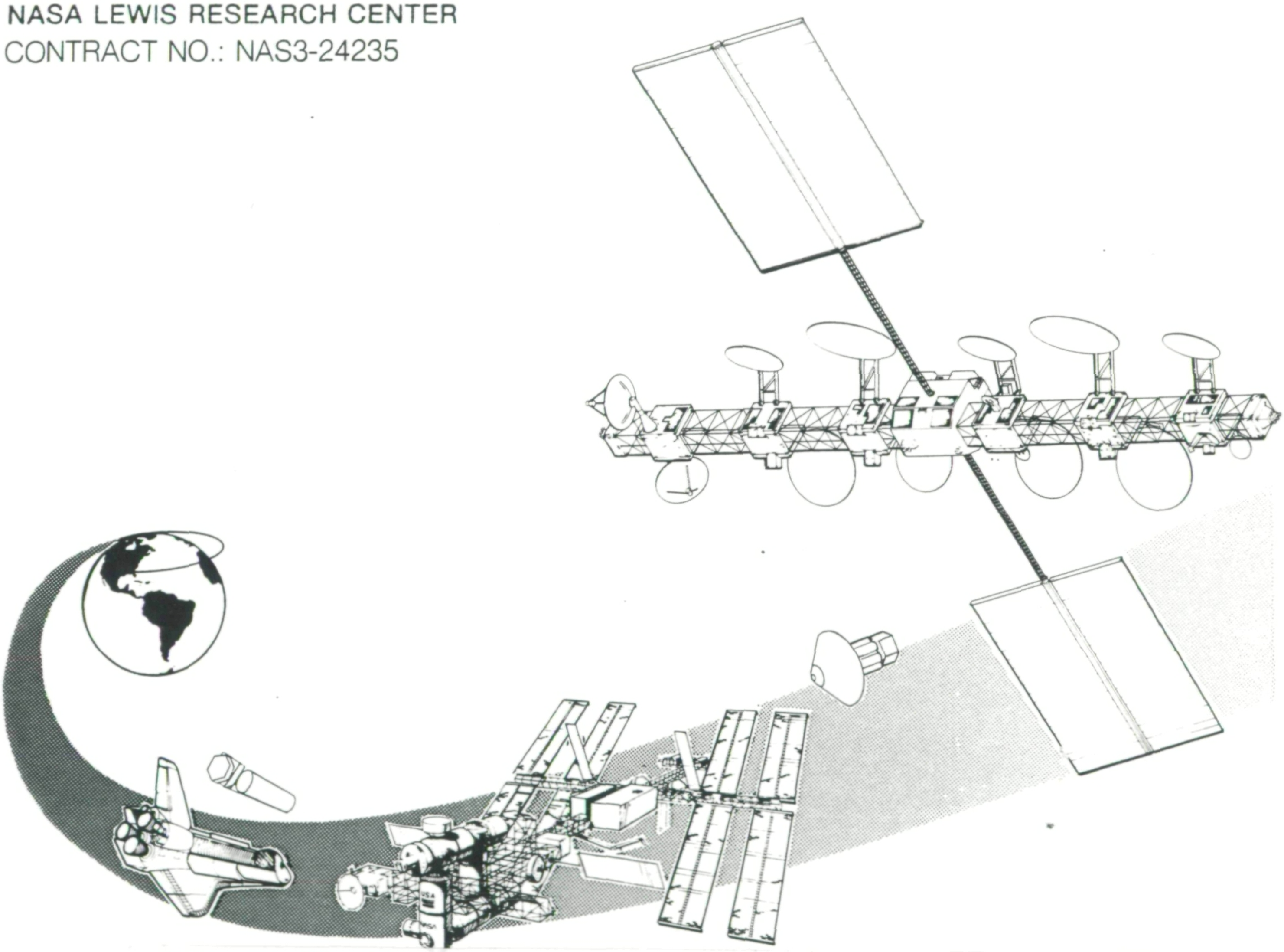

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16. Abstract
This is the Ford Aerospace & Communications Corporation Final Report for the Communication Platform Payload Definition (CPPD) Study program conducted for NASA Lewis Research Center under contract No. NAS3-24235.

This report presents the results of the study effort leading to five potential platform payloads to service CONUS and WARC Region 2 traffic demand as projected to the year 2008. The report addresses establishing the data bases, developing service aggregation scenarios, selecting and developing 5 payload concepts, performing detailed definition of the 5 payloads, costing them, identifying critical technology, and finally comparing the payloads with each other and also with non-aggregated equivalent services.

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APPENDIX A

NASA FSS TRAFFIC MODEL (for year 2008)

A-1 - DESCRIPTION

The various ways in which the NASA provided distribution between SMSAs was processed is described in Section 4.2.3.1.1. The two "intermediate" stages used for traffic (beam to beam being the final stage) were 84x84 and 20x20 matrices, the latter being used for the Ka-band fixed spot beams.

This appendix provides two "mapping" printouts, i.e., which SMSAs are in which region or spot beam. An 84x84 matrix for the total voice trunking traffic in 2008 is included, as well as a 20x20 matrix for year 2008 Ka fixed beam traffic. The latter represents 15,150,000 voice circuits, multiplied by a .6 digital/analog factor, and also includes 1,576,000 equivalent HVC for video coferencing. This total was then multiplied by .73 to obtain the traffic between the 20 fixed beams (see Figure 4.3.9). Distributions for the remaining 27% can be derived from the beam to beam matrix of Appendix G.1.1.

A-2 - MAPPING OF FUTURE SYSTEMS, INC.

1984 NODES TO SMSA CONVERSION

SMSA/FSI REGION MAPPING

```
AK1      3
 FAAR FOAR LIAR
AK2      1
 PIAR
AL1      6
 ANAL BIAL FLAL GAAL HUAL TUAL
AL2      2
 MOAL MNAL
AZ2      2
 PHAZ TUAZ
CA1      3
 CHCA RECA YUCA
CA2     12
 BACA FRCA MOCA SACA SOCA SFCA SJCA SLCA SOCA SRCA VACA VICA
CA3      6
 ANCA LOCA OXCA RICA SNCA STCA
CO2      5
 COCO DECO FOCO GRCO PUCO
CON     11
 BICT BRCT DACT HACT MECT NECT NLCT NOCT NWCT STCT WACT
DEL      1
 WIDE
FL1      4
 FTFL PAFL PEFL TAFL
FL2      3
 GAFL JAFL OCFL
FL3     11
 BRFL DAFL FOFL FRFL LAFL MEFL MIFL ORFL SAFL TMFL WEFL
GA1      3
 ATGA ATGE COGA
GA2      4
 ALGA AUGA MAGA SAGA
ID2      1
 BOID
IL1      7
 BLIL CHIL CIIL KAIL PEIL ROIL SPIL
IL2      1
 DEIL
IN1     11
 ANIN BLIN ELIN FOIN GAIN ININ KOIN LAIN MUIN SOIN TEIN
IN2      1
 EVIN
IO1      1
 DEIA
IO2      5
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```
 CEIA DAIA DUIA IOIW WAIA
KS2      3
 LAKS TOKS WIKS
KY1      1
 OWKY
KY2      2
 LEKY LOKY
LA1      3
 ALLA MOLA SHLA
LA2      4
 BALA LALA LKLA NELA
MAS     10
 BOMA BRMA FAMA FIMA LAMA LOMA NEMA PIMA SPCT WOMA
MD       4
 BAMD CUMD HAMD WADC
ME1      2
 LEME POME
ME2      1
 BAME
MI3     12
 ANMI BAMI BEMI BYMI DEMI FLMI GRMI JAMI KAMI LAMI MUMI SAMI
MN1      1
 DUMN
MN2      3
 MIMN ROMN STMN
MO1      4
 COMO KAMO SLMO STMO
MO2      2
 JOMO SPMO
MS2      3
 BIMS JAMS PAMS
MT1      1
 GRMT
MT2      1
 BIMT
NC1      6
 ASNC BUNC CHNC GRNC HINC SANC
NC2      4
 EANC JANC RANC WINC
ND1      1
 BIND
ND2      2
 FAND GRND
NE2      3
 LINE OMNE SINE
NH       3
 MANH NANH PONH
NJ       8
 ATNJ JENJ LONJ NENJ NWNJ PANJ TRNJ VINJ
NM1      1
```

```
 ALNM
NM2      1
 LANM
NV1      1
 RENV
NV2      1
 LANV
NY1      4
 BINY BUNY ELNY RONY
NY2      5
 ALNY GLNY NANY SYNY UTNY
NY3      3
 NENY NWNY PONY
OH1      8
 CIOH COOH DAOH HAOH LIOH MAOH SPOH TOOH
OH2      7
 AKOH CAOH CLOH LOOH NEOH STOH YOOH
OK1      2
 ENOK LAOK
OK2      2
 OKOK TUOK
OR1      4
 EUOR MEOR POOR SAOR
PA1      6
 ATPA ERPA JOPA PIPA SHPA STPA
PA2      8
 ALPA HAPA LAPA NOPA PHPA REPA WIPA YOPA
RI       1
 PRRI
SC1      3
 ANSC GRSC ROSC
SC2      3
 CHSC COSC FOSC
SD2      1
 SISD
TN1      3
 CLTN METN NATN
TN2      3
 CHTN JOTN KNTN
TX1      1
 ELTX
TX2      1
 AMTX
TX3      3
 ABTX LUTX WITX
TX4      8
 AUTX KITX MITX ODTX SATX SNTX VITX WATX
TX5      4
 BRTX COTX LATX MCTX
TX6      9
```

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 BETX BYTX DATX GATX HOTX LOTX SHTX TETX TYTX
UT1      2
 PRUT SAUT
VA1      3
 DAVA LYVA ROVA
VA2      5
 CHVA NEVA NOVA PEVA RIVA
VT       1
 BUVT
WA1      5
 BEWA BRWA OLWA SEWA TAWA
WA2      3
 RIWA SPWA YAWA
WI1      2
 EAWI WAWI
WI2      9
 APWI GRWI JAWI KEWI LAWI MAWI MIWI RAWI SHWI
WV1      3
 CHWV HUWV PAWV
WV2      1
 WHWV
WY2      1
 CAWY
```

A-3 - 84 x 84 TRAFFIC MATRIX FOR YEAR 2008

Total Voice Circuits -- 2008

AK1		Total =	128318						
	AL1		1434	AL2	666	AZ2	1542	CA1	418
	CA2		4064	CA3	6066	CO2	2802	CON	2996
	DEL		504	FL1	1396	FL2	1244	FL3	5312
	GA1		2370	GA2	1410	ID2	214	IL1	6000
	IL2		96	IN1	5334	IN2	128	IO1	476
	IO2		1832	KY1	154	KY2	1652	LA2	1410
	MAS		2926	MD	3186	ME1	308	ME2	134
	MI3		6524	MN1	282	MN2	2472	MS2	294
	MT1		162	MT2	202	NC1	2910	NC2	1358
	ND1		190	ND2	464	NE2	1296	NH	522
	NJ		3594	NM1	640	NM2	210	NV1	218
	NV2		534	NY1	1684	NY2	2476	NY3	4470
	OH1		5194	OH2	3694	OR1	1044	PA1	2398
	PA2		4254	RI	478	SC1	1010	SC2	1484
	SD2		302	TN1	822	TN2	1912	TX1	546
	TX2		436	TX3	754	TX4	3132	TX5	1298
	TX6		1396	UT1	872	VA1	788	VA2	2072
	VT		166	WA1	1362	WA2	572	WI1	502
	WI2		3812	WV1	1006	WV2	250	WY2	186
AK2		Total =	32568						
	AZ2		434	CA1	76	CA2	1056	CA3	1804
	CO2		674	CON	734	DEL	144	FL1	202
	FL2		344	FL3	1556	GA1	748	GA2	346
	ID2		46	IL1	1776	IL2	82	IN1	1286
	IO1		160	IO2	346	KY2	480	MAS	746
	MD		976	ME1	60	ME2	24	MI3	1726
	MN1		60	MN2	658	MO1	66	MT1	28
	MT2		38	NC1	802	NC2	342	ND1	28
	ND2		88	NE2	440	NH	108	NJ	1012
	NM1		166	NM2	34	NV1	48	NV2	146
	NY1		448	NY2	714	NY3	1448	OH1	1442
	OH2		1006	OR1	260	PA1	624	PA2	1226
	RI		138	SC1	246	SC2	422	SD2	56
	TN2		446	TX1	140	TX2	88	TX3	172
	TX4		790	TX5	284	UT1	222	VA1	170
	VA2		562	VT	28	WA1	342	WA2	122
	WI1		88	WI2	882	WV1	234	WV2	50
	WY2		28						
AL1		Total =	271620						

AK1	1434	AZ2	2536	CA1	780	CA2	7202
CA3	10330	CO2	4270	CON	7530	DEL	1306
FL2	1604	FL3	15346	GA2	122	ID2	380
IL1	12558	IL2	602	IN1	9024	IO1	1090
IO2	3340	KS2	2772	LA1	1246	LA2	1128
MAS	7186	MD	8448	ME1	758	ME2	334
MI3	14940	MN1	540	MN2	4320	MO1	4086
MO2	1560	MT1	302	MT2	362	NC1	3064
NC2	4194	ND1	348	ND2	864	NE2	2908
NH	1290	NJ	9138	NM1	986	NM2	358
NV1	390	NV2	902	NY1	4104	NY2	6090
NY3	11048	OH1	9892	OH2	9386	OK1	1066
OK2	4086	OR1	1904	PA1	6256	PA2	10916
RI	1158	SC1	1448	SC2	1864	SD2	516
TX1	866	TX2	616	TX3	1840	TX4	6334
TX5	2320	TX6	12670	UT1	1464	VA1	2414
VA2	5860	VT	402	WA1	2496	WA2	1064
WI1	990	WI2	7734	WV1	1928	WV2	686
WY2	324						

AL2 Total = 104718

AK1	666	AZ2	928	CA1	356	CA2	2774
CA3	3644	CO2	1614	CON	2840	DEL	446
FL3	5006	GA2	570	ID2	160	IL1	4138
IL2	306	IN1	4164	IN2	244	IO1	384
IO2	1272	KS2	1046	KY1	198	KY2	1348
LA1	212	LA2	140	MAS	2682	MD	2740
ME1	324	ME2	146	MI3	4940	MN1	210
MN2	1446	MO1	2340	MO2	656	MT1	134
MT2	158	NC1	2356	NC2	1550	ND1	152
ND2	358	NE2	1046	NH	534	NJ	3188
NM1	374	NM2	172	NV1	162	NV2	334
NY1	1426	NY2	2090	NY3	3492	OH1	4198
OH2	3090	OK1	488	OK2	1442	OR1	742
PA1	2164	PA2	3696	RI	404	SC1	936
SC2	952	SD2	208	TN1	240	TN2	774
TX1	340	TX2	260	TX3	814	TX4	2806
TX5	1126	TX6	4888	UT1	554	VA1	908
VA2	2070	VT	170	WA1	958	WA2	444
WI1	402	WI2	2746	WV1	1028	WV2	258
WY2	146						

AZ2 Total = 157378

AK1	1542	AK2	434	AL1	2536	AL2	928
CA1	1782	CA2	11074	CA3	5532	CO2	4630
CON	3550	DEL	422	FL1	1502	FL2	1172
FL3	4670	GA1	1508	GA2	1458	ID2	632
IL1	4114	IL2	406	IN1	4660	IN2	424
IO1	552	IO2	2112	KS2	1764	KY1	372
KY2	1026	LA1	1470	LA2	2302	MAS	3294

	MD	2160	ME1	532	ME2	254	MI3	5470
	MN1	406	MN2	1928	MO1	2558	MO2	974
	MS2	1264	MT1	480	MT2	536	NC1	2454
	NC2	1412	ND1	434	ND2	838	NE2	1770
	NH	828	NJ	3198	NV1	740	NY1	1574
	NY2	2112	NY3	2534	OH1	3792	OH2	3056
	OK1	1116	OK2	1790	OR1	2418	PA1	2304
	PA2	3480	RI	410	SC1	1072	SC2	1238
	SD2	468	TN1	1718	TN2	1472	TX2	766
	TX3	2040	TX4	5446	TX5	2172	TX6	6106
	UT1	2072	VA1	984	VA2	1920	VT	278
	WA1	2776	WA2	1534	WI1	764	WI2	3872
	WV1	1082	WV2	330	WY2	578		
CA1	Total =	74090						
	AK1	418	AK2	76	AL1	780	AL2	356
	AZ2	1782	CA3	11760	CO2	1900	CON	1320
	DEL	234	FL1	346	FL2	436	FL3	2190
	GA1	766	GA2	410	ID2	104	IL1	2372
	IL2	96	IN1	1668	IN2	128	IO1	234
	IO2	512	KS2	578	KY1	70	KY2	534
	LA1	372	LA2	988	MAS	1378	MD	1502
	ME1	116	ME2	52	MI3	2620	MN1	120
	MN2	1216	MO1	1278	MO2	222	MS2	316
	MT1	134	MT2	154	NC1	1050	NC2	494
	ND1	86	ND2	214	NE2	712	NH	210
	NJ	1706	NM1	476	NM2	102	NV2	930
	NY1	762	NY2	1226	NY3	2434	OH1	1902
	OH2	1498	OK1	174	OK2	958	OR1	916
	PA1	958	PA2	2004	RI	248	SC1	344
	SC2	546	SD2	110	TN1	888	TN2	746
	TX1	372	TX2	166	TX3	402	TX4	1390
	TX5	452	TX6	2474	UT1	1158	VA1	242
	VA2	854	VT	58	WA1	2436	WA2	824
	WI1	166	WI2	1372	WV1	314	WV2	76
	WY2	102						
CA2	Total =	471536						
	AK1	4064	AK2	1056	AL1	7202	AL2	2774
	AZ2	11074	CA3	7150	CO2	13346	CON	11330
	DEL	1508	FL1	3996	FL2	3562	FL3	15220
	GA1	5000	GA2	4138	ID2	2870	IL1	14480
	IL2	1108	IN1	14220	IN2	1206	IO1	1726
	IO2	5850	KS2	4884	KY1	972	KY2	3470
	LA1	3792	LA2	6888	MAS	10928	MD	8358
	ME1	1530	ME2	734	MI3	18436	MN1	1228
	MN2	7134	MO1	8294	MO2	2502	MS2	3334
	MT1	1678	MT2	1746	NC1	7884	NC2	4292
	ND1	1258	ND2	2490	NE2	5418	NH	2452
	NJ	11324	NM1	3218	NM2	1580	NV2	1656

	NY1	5394	NY2	7726	NY3	11390	OH1	12824
	OH2	10360	OK1	2488	OK2	5640	OR1	11486
	PA1	7456	PA2	12602	RI	1530	SC1	3170
	SC2	3986	SD2	1292	TN1	5674	TN2	4904
	TX1	2724	TX2	1682	TX3	4444	TX4	12742
	TX5	5044	TX6	17348	UT1	7716	VA1	2776
	VA2	6312	VT	794	WA1	14914	WA2	7078
	WI1	2140	WI2	11896	WV1	3152	WV2	926
	WY2	1566						
CA3	Total =	591568						
	AK1	6066	AK2	1804	AL1	10330	AL2	3644
	AZ2	5532	CA1	11760	CA2	7150	CO2	16346
	CON	15258	DEL	1664	FL1	6310	FL2	4764
	FL3	18334	GA1	5718	GA2	6144	ID2	3308
	IL1	15432	IL2	1728	IN1	19236	IN2	1746
	IO1	2164	IO2	9022	KS2	6744	KY1	1610
	KY2	3926	LA1	5804	LA2	8512	MAS	14014
	MD	7980	ME1	2440	ME2	1184	MI3	21958
	MN1	1778	MN2	7262	MO1	9442	MO2	3944
	MS2	5184	MT1	2380	MT2	2496	NC1	9910
	NC2	5922	ND1	1996	ND2	3768	NE2	6890
	NH	3754	NJ	12810	NM1	4084	NM2	3158
	NV1	1464	NY1	6432	NY2	8346	NY3	8436
	OH1	14876	OH2	12232	OK1	4344	OK2	5906
	OR1	13290	PA1	9534	PA2	13678	RI	1622
	SC1	4534	SC2	4940	SD2	2002	TN1	6370
	TN2	5656	TX1	3790	TX2	2662	TX3	7288
	TX4	19322	TX5	8358	TX6	21570	UT1	8584
	VA1	4294	VA2	7836	VT	1272	WA1	14192
	WA2	8122	WI1	3394	WI2	16190	WV1	4616
	WV2	1450	WY2	2556				
CO2	Total =	285256						
	AK1	2802	AK2	674	AL1	4270	AL2	1614
	AZ2	4630	CA1	1900	CA2	13346	CA3	16346
	CON	6000	DEL	832	FL1	2222	FL2	1938
	FL3	8124	GA1	2926	GA2	2298	ID2	946
	IL1	9492	IL2	716	IN1	8784	IN2	756
	IO1	1290	IO2	3966	KS2	3764	KY1	592
	KY2	2138	LA1	2366	LA2	4112	MAS	5748
	MD	4702	ME1	776	ME2	364	MI3	11124
	MN1	774	MN2	4996	MO1	6132	MO2	1802
	MS2	1952	MT1	808	MT2	974	NC1	4456
	NC2	2352	ND1	866	ND2	1638	NE2	4488
	NH	1250	NJ	6146	NM2	914	NV1	872
	NV2	1822	NY1	3008	NY2	4224	NY3	6356
	OH1	7724	OH2	6048	OK1	1884	OK2	4494
	OR1	3616	PA1	4220	PA2	6972	RI	822
	SC1	1754	SC2	2222	SD2	1000	TN1	3608

	TN2	2904	TX1	1590	TX2	122	TX3	2846
	TX4	8026	TX5	2758	TX6	11236	UT1	480
	VA1	1530	VA2	3476	VT	410	WA1	4540
	WA2	2316	WI1	1360	WI2	7590	WV1	1804
	WV2	516						
CON	Total =	375444						
	AK1	2996	AK2	734	AL1	7530	AL2	2840
	AZ2	3550	CA1	1320	CA2	11330	CA3	15258
	CO2	6000	FL1	3678	FL2	4314	FL3	18510
	GA1	6808	GA2	4972	ID2	632	IL1	18714
	IL2	1052	IN1	18006	IN2	1296	IO1	1474
	IO2	4836	KS2	3296	KY1	934	KY2	5082
	LA1	2740	LA2	6112	MI3	29562	MN1	996
	MN2	6916	MO1	7886	MO2	1742	MS2	2736
	MT1	528	MT2	602	NC1	13894	NC2	7710
	ND1	594	ND2	1528	NE2	3926	NM1	1316
	NM2	502	NV1	634	NV2	1338	OH1	21486
	OH2	19236	OK1	1258	OK2	4302	OR1	3180
	PA1	1202	SC1	5244	SC2	6306	SD2	782
	TN1	6642	TN2	7414	TX1	1134	TX2	782
	TX3	2190	TX4	7132	TX5	2718	TX6	12626
	UT1	2214	VA1	4594	VA2	878	WA1	4246
	WA2	1816	WI1	1766	WI2	12942	WV1	5094
	WV2	1316	WY2	520				
DEL	Total =	49338						
	AK1	504	AK2	144	AL1	1306	AL2	446
	AZ2	422	CA1	234	CA2	1508	CA3	1664
	CO2	832	FL1	684	FL2	696	FL3	2688
	GA1	1012	GA2	914	ID2	102	IL1	2514
	IL2	196	IN1	3006	IN2	228	IO1	216
	IO2	868	KS2	516	KY1	194	KY2	766
	LA1	466	LA2	868	ME1	254	ME2	228
	MI3	4328	MN1	166	MN2	874	MO1	1082
	MO2	310	MS2	490	MT1	92	MT2	104
	NC1	1308	NC2	284	ND1	112	ND2	266
	NE2	578	NH	246	NM1	172	NM2	92
	NV1	98	NV2	166	OH1	2418	OK1	240
	OK2	550	OR1	446	SC1	476	SC2	1044
	SD2	138	TN1	952	TN2	1152	TX1	154
	TX2	128	TX3	378	TX4	1120	TX5	470
	TX6	1782	UT1	296	WA1	578	WA2	286
	WI1	326	WI2	2062	WY2	98		
FL1	Total =	146726						
	AK1	1396	AK2	202	AZ2	1502	CA1	346
	CA2	3996	CA3	6310	CO2	2222	CON	3678
	DEL	684	FL3	4496	ID2	186	IL1	5976
	IL2	308	IN1	5038	IN2	466	IO1	494

	IO2	1302	KS2	1250	KY1	290	KY2	1864
	LA1	1028	LA2	606	MAS	3638	MD	4510
	ME1	328	ME2	140	MI3	6810	MN1	234
	MN2	2166	MO1	3238	MO2	660	MT1	134
	MT2	162	NC1	4002	NC2	2054	ND1	134
	ND2	366	NE2	1352	NH	572	NJ	4774
	NM1	544	NM2	158	NV1	198	NV2	516
	NY1	2012	NY2	3230	NY3	6358	OH1	5862
	OH2	4336	OK1	436	OK2	2130	OR1	1002
	PA1	2890	PA2	5692	RI	634	SC1	1002
	SC2	1356	SD2	210	TN1	1902	TN2	1870
	TX1	482	TX2	290	TX3	866	TX4	3366
	TX5	1226	TX6	7210	UT1	786	VA1	998
	VA2	2958	VT	170	WA1	1330	WA2	514
	WI1	384	WI2	3318	WV1	1172	WV2	270
	WY2	134						
FL2	Total =	140656						
	AK1	1244	AK2	344	AL1	1604	AZ2	1172
	CA1	436	CA2	3562	CA3	4764	CO2	1938
	CON	4314	DEL	696	ID2	200	IL1	5046
	IL2	344	IN1	5076	IN2	466	IO1	446
	IO2	1478	KS2	1146	KY1	360	KY2	1626
	LA1	1302	LA2	3230	MAS	4058	MD	4264
	ME1	472	ME2	210	MI3	6474	MN1	264
	MN2	1806	MO1	2602	MO2	670	MS2	1344
	MT1	166	MT2	186	NC1	3024	NC2	1632
	ND1	180	ND2	436	NE2	1222	NH	784
	NJ	4948	NM1	450	NM2	196	NV1	204
	NV2	428	NY1	2058	NY2	3180	NY3	5500
	OH1	5446	OH2	4262	OK1	502	OK2	1558
	OR1	958	PA1	3086	PA2	5688	RI	628
	SC1	952	SD2	244	TN1	2714	TN2	2528
	TX1	410	TX2	290	TX3	870	TX4	2976
	TX5	1222	TX6	5434	UT1	694	VA1	1400
	VA2	3370	VT	246	WA1	1250	WA2	558
	WI1	484	WI2	3396	WV1	1406	WV2	360
	WY2	172						
FL3	Total =	623128						
	AK1	5312	AK2	1556	AL1	15346	AL2	5006
	AZ2	4670	CA1	2190	CA2	15220	CA3	18334
	CO2	8124	CON	18510	DEL	2688	FL1	4496
	GA1	9348	GA2	5300	ID2	922	IL1	19050
	IL2	1498	IN1	20558	IN2	1896	IO1	1822
	IO2	6592	KS2	4908	KY1	1552	KY2	5950
	LA1	5740	LA2	12908	MAS	17238	MD	15498
	ME1	2250	ME2	1030	MI3	25448	MN1	1178
	MN2	7002	MO1	10016	MO2	2970	MS2	6930
	MT1	808	MT2	898	NC1	18232	NC2	10356

	ND1	890	ND2	2032	NE2	5074	NH	3648
	NJ	19538	NM1	1858	NM2	964	NV1	936
	NV2	1748	NY1	8256	NY2	12422	NY3	19508
	OH1	20536	OH2	16482	OK1	2418	OK2	6002
	OR1	4212	PA1	12306	PA2	21876	RI	2476
	SC1	7346	SC2	7608	SD2	1128	TN1	9860
	TN2	10472	TX1	1728	TX2	1322	TX3	4042
	TX4	13352	TX5	5892	TX6	22442	UT1	2922
	VA1	5712	VA2	13040	VT	1146	WA1	5432
	WA2	2590	WI1	2252	WI2	14236	WV1	5664
	WV2	1546	WY2	864				
GA1	Total =	202374						
	AK1	2370	AK2	748	AZ2	1508	CA1	766
	CA2	5000	CA3	5718	CO2	2926	CON	6808
	DEL	1012	FL3	9348	ID2	324	IL1	8374
	IL2	740	IN1	9266	IN2	166	IO1	758
	IO2	2942	KS2	2024	LA1	2398	LA2	3848
	MAS	6156	MD	6006	ME1	828	ME2	378
	MI3	10986	MN1	478	MN2	2720	MO1	4368
	MO2	1338	MS2	246	MT1	296	MT2	334
	NC1	366	NC2	1148	ND1	352	ND2	806
	NE2	2036	NH	1340	NJ	7160	NM1	640
	NM2	346	NV1	322	NV2	574	NY1	3240
	NY2	4502	NY3	6732	OH1	7350	OH2	7264
	OK1	980	OK2	2296	OR1	1422	PA1	5262
	PA2	8286	RI	852	SC1	1004	SD2	462
	TX1	582	TX2	496	TX3	1528	TX4	4754
	TX5	1972	TX6	8196	UT1	1002	VA1	380
	VA2	5134	VT	440	WA1	1830	WA2	904
	WI1	964	WI2	6168	WV1	1040	WV2	732
	WY2	332						
GA2	Total =	162546						
	AK1	1410	AK2	346	AL1	122	AL2	570
	AZ2	1458	CA1	410	CA2	4138	CA3	6144
	CO2	2298	CON	4972	DEL	914	FL3	5300
	ID2	208	IL1	6894	IL2	388	IN1	6406
	IN2	584	IO1	552	IO2	1596	KS2	1332
	KY1	298	KY2	1058	LA1	1396	LA2	3270
	MAS	4744	MD	6044	ME1	466	ME2	200
	MI3	8458	MN1	280	MN2	2370	MO1	3458
	MO2	724	MS2	846	MT1	160	MT2	188
	NC1	324	NC2	440	ND1	170	ND2	446
	NE2	1476	NH	802	NJ	6302	NM1	540
	NM2	176	NV1	216	NV2	522	NY1	2608
	NY2	4114	NY3	7874	OH1	7608	OH2	5692
	OK1	484	OK2	2028	OR1	1088	PA1	3940
	PA2	7524	RI	794	SC1	494	SD2	252
	TN1	1708	TX1	476	TX2	310	TX3	894

	TX4		3204	TX5	1194	TX6	6382	UT1	820
	VA1		390	VA2	3036	VT	242	WA1	1428
	WA2		578	WI1	494	WI2	4044	WV1	862
	WV2		408	WY2	160				
ID2		Total =	32900						
	AK1		214	AK2	46	AL1	380	AL2	160
	AZ2		632	CA1	104	CA2	2870	CA3	3308
	CO2		946	CON	632	DEL	102	FL1	186
	FL2		200	FL3	922	GA1	324	GA2	208
	IL1		1040	IL2	56	IN1	816	IN2	64
	IO1		112	IO2	296	KS2	286	KY1	42
	KY2		232	LA1	188	LA2	416	MAS	638
	MD		616	ME1	66	ME2	32	MI3	1192
	MN1		66	MN2	554	MO1	572	MO2	122
	MS2		156	MT2	122	NC1	472	NC2	230
	ND1		64	ND2	134	NE2	352	NH	116
	NJ		740	NM1	202	NM2	60	NV2	316
	NY1		344	NY2	524	NY3	940	OH1	844
	OH2		666	OK1	108	OK2	406	PA1	446
	PA2		852	RI	104	SC1	166	SC2	240
	SD2		66	TN1	380	TN2	318	TX1	152
	TX2		84	TX3	210	TX4	646	TX5	222
	TX6		1060	VA1	134	VA2	380	VT	34
	WA1		880	WI1	102	WI2	700	WV1	162
	WV2		42	WY2	84				
IL1		Total =	469262						
	AK1		6000	AK2	1776	AL1	12558	AL2	4138
	AZ2		4114	CA1	2372	CA2	14480	CA3	15432
	CO2		9492	CON	18714	DEL	2514	FL1	5976
	FL2		5046	FL3	19050	GA1	8374	GA2	6894
	ID2		1040	KS2	6306	LA1	5188	LA2	8542
	MAS		17056	MD	14202	ME1	2480	ME2	1140
	MN1		2190	MN2	2932	MO1	3446	MO2	3232
	MS2		4912	MT1	1028	MT2	1170	NC1	14442
	NC2		7392	ND1	1412	ND2	3488	NE2	6146
	NH		3972	NJ	18340	NM1	1838	NM2	1008
	NV1		976	NV2	1640	NY1	10242	NY2	12464
	NY3		16408	OH2	4850	OK1	3024	OK2	6798
	OR1		4316	PA1	12752	PA2	21468	RI	2240
	SC1		5694	SC2	6510	SD2	1928	TN1	3042
	TN2		9074	TX1	1586	TX2	1490	TX3	4294
	TX4		11914	TX5	4660	TX6	19154	UT1	3104
	VA1		5628	VA2	10984	VT	1396	WA1	5638
	WA2		2914	WV1	1590	WV2	480	WY2	1172
IL2		Total =	33028						
	AK1		96	AK2	82	AL1	602	AL2	306
	AZ2		406	CA1	96	CA2	1108	CA3	1728

	CO2	716	CON	1052	DEL	196	FL1	308	
	FL2	344	FL3	1498	GA1	740	GA2	388	
	ID2	56	KS2	252	LA1	306	LA2	714	
	MAS	1040	MD	1302	ME1	92	ME2	40	
	MN1	102	MN2	938	MS2	278	MT1	40	
	MT2	50	NC1	1024	NC2	448	ND1	50	
	ND2	144	NE2	236	NH	166	NJ	1366	
	NM1	154	NM2	40	NV1	56	NV2	146	
	NY1	688	NY2	970	NY3	1850	OH2	558	
	OK1	128	OK2	678	OR1	296	PA1	986	
	PA2	1680	RI	180	SC1	326	SC2	482	
	SD2	90	TN2	260	TX1	128	TX2	84	
	TX3	228	TX4	760	TX5	248	TX6	1558	
	UT1	236	VA1	260	VA2	750	VT	50	
	WA1	396	WA2	152	WV1	166	WV2	92	
	WY2	42							
IN1	Total =	467118							
	AK1	5334	AK2	1286	AL1	9024	AL2	4164	
	AZ2	4660	CA1	1668	CA2	14220	CA3	19236	
	CO2	8784	CON	18006	DEL	3006	FL1	5038	
	FL2	5076	FL3	20558	GA1	9266	GA2	6406	
	ID2	816	IO1	1496	KS2	5882	LA1	4314	
	LA2	8882	MAS	16970	MD	18282	ME1	1894	
	ME2	834	MN1	1630	MN2	10660	MO1	6364	
	MO2	3078	MS2	4158	MT1	704	MT2	828	
	NC1	14542	NC2	7478	ND1	886	ND2	2326	
	NE2	7094	NH	3198	NJ	21122	NM1	1848	
	NM2	694	NV1	810	NV2	1734	NY1	9702	
	NY2	14656	NY3	24850	OK1	2042	OK2	7150	
	OR1	3954	PA1	3058	PA2	25942	RI	2640	
	SC1	5476	SC2	7226	SD2	1352	TN1	3394	
	TN2	3218	TX1	1560	TX2	1168	TX3	3290	
	TX4	10268	TX5	3730	TX6	18918	UT1	2974	
	VA1	3658	VA2	12086	VT	1066	WA1	5236	
	WA2	2302	WI1	1130	WI2	64	WY2	752	
IN2	Total =	38332							
	AK1	128	AL2	244	AZ2	424	CA1	128	
	CA2	1206	CA3	1746	CO2	756	CON	1296	
	DEL	228	FL1	466	FL2	466	FL3	1896	
	GA1	166	GA2	584	ID2	64	IO1	240	
	KS2	528	LA1	416	LA2	900	MAS	1240	
	MD	1498	ME1	128	ME2	56	MI3	594	
	MN1	110	MN2	922	MO1	122	MS2	408	
	MT1	50	MT2	60	NC1	1124	NC2	614	
	ND1	60	ND2	162	NE2	590	NH	218	
	NJ	1596	NM1	166	NM2	56	NV1	64	
	NV2	154	NY1	776	NY2	1090	NY3	1984	
	OH2	406	OK1	172	OK2	714	OR1	322	

		PA1	1208	PA2	1948	RI	204	SC1	336
		SC2	656	SD2	98	TX1	140	TX2	102
		TX3	286	TX4	934	TX5	324	TX6	1850
		UT1	252	VA1	388	VA2	958	VT	70
		WA1	428	WA2	178	WI1	206	WI2	372
		WY2	56						
IO1	Total =		52782						
		AK1	476	AK2	160	AL1	1090	AL2	384
		AZ2	552	CA1	234	CA2	1726	CA3	2164
		CO2	1290	CON	1474	DEL	216	FL1	494
		FL2	446	FL3	1822	GA1	758	GA2	552
		ID2	112	IN1	1496	IN2	240	KY1	178
		KY2	668	LA1	506	LA2	896	MAS	1402
		MD	1274	ME1	180	ME2	82	MI3	3196
		MS2	438	MT1	106	MT2	128	NC1	1158
		NC2	578	ND1	154	ND2	170	NH	292
		NJ	1578	NM1	240	NM2	102	NV1	106
		NV2	212	NY1	810	NY2	1094	NY3	1712
		OH1	2414	OH2	1770	OK1	332	OK2	498
		OR1	494	PA1	1162	PA2	1840	RI	208
		SC1	434	SC2	558	TN1	1044	TN2	802
		TX1	194	TX2	176	TX3	470	TX4	1296
		TX5	460	TX6	2196	UT1	396	VA1	386
		VA2	884	VT	98	WA1	652	WA2	310
		WV1	494	WV2	140	WY2	128		
IO2	Total =		172962						
		AK1	1832	AK2	346	AL1	3340	AL2	1272
		AZ2	2112	CA1	512	CA2	5850	CA3	9022
		CO2	3966	CON	4836	DEL	868	FL1	1302
		FL2	1478	FL3	6592	GA1	2942	GA2	1596
		ID2	296	KS2	1338	KY1	74	KY2	1524
		LA1	1362	LA2	3134	MAS	4840	MD	5664
		ME1	444	ME2	192	MI3	4616	MO2	70
		MS2	1178	MT1	222	MT2	284	NC1	4194
		NC2	1884	ND1	302	ND2	790	NH	778
		NJ	6208	NM1	808	NM2	206	NV1	296
		NV2	766	NY1	3150	NY2	4450	NY3	8422
		OH1	6574	OH2	7152	OK1	646	OK2	3348
		OR1	1572	PA1	4266	PA2	7510	RI	838
		SC1	1338	SC2	2012	TN1	3920	TN2	3172
		TX1	646	TX2	436	TX3	1130	TX4	3656
		TX5	1170	TX6	7278	UT1	1292	VA1	1074
		VA2	3232	VT	242	WA1	2114	WA2	820
		WV1	1546	WV2	384	WY2	236		
KS2	Total =		147718						
		AL1	2772	AL2	1046	AZ2	1764	CA1	578
		CA2	4884	CA3	6744	CO2	3764	CON	3296

	DEL	516	FL1	1250	FL2	1146	FL3	4908
	GA1	2024	GA2	1332	ID2	286	IL1	6306
	IL2	252	IN1	5882	IN2	528	IO2	1338
	KY1	366	KY2	1584	LA1	1540	LA2	2744
	MAS	3194	MD	3170	ME1	368	ME2	172
	MI3	7330	MN1	396	MN2	3170	MS2	1184
	MT1	242	MT2	298	NC1	2808	NC2	1364
	ND1	302	ND2	700	NH	614	NJ	3754
	NM1	794	NM2	290	NV1	278	NV2	636
	NY1	1828	NY2	2596	NY3	4432	OH1	5352
	OH2	3920	OR1	1300	PA1	2562	PA2	4384
	RI	500	SC1	1008	SC2	1394	SD2	278
	TN1	2478	TN2	2038	TX1	632	TX2	250
	TX3	430	TX4	4214	TX5	1342	TX6	5090
	UT1	1130	VA1	832	VA2	2104	VT	196
	WA1	1700	WA2	762	WI1	722	WI2	4684
	WV1	1056	WV2	284	WY2	306		
KY1	Total =	30060						
	AK1	154	AL2	198	AZ2	372	CA1	70
	CA2	972	CA3	1610	CO2	592	CON	934
	DEL	194	FL1	290	FL2	360	FL3	1552
	GA2	298	ID2	42	IO1	178	IO2	74
	KS2	366	LA1	274	LA2	734	MAS	940
	MD	1356	ME1	72	ME2	28	MI3	432
	MN1	66	MN2	768	MO1	488	MO2	66
	MS2	266	MT1	28	MT2	38	NC1	552
	NC2	458	ND1	28	ND2	94	NE2	440
	NH	130	NJ	1328	NM1	134	NM2	28
	NV1	46	NV2	130	NY1	624	NY2	928
	NY3	1908	OH2	228	OK1	88	OK2	604
	OR1	248	PA1	940	PA2	1662	RI	176
	SC1	186	SC2	536	SD2	56	TX1	112
	TX2	66	TX3	178	TX4	660	TX5	206
	TX6	1476	UT1	204	VA1	136	VA2	760
	VT	38	WA1	334	WA2	116	WI1	110
	WI2	272	WY2	28				
KY2	Total =	112530						
	AK1	1652	AK2	480	AL2	1348	AZ2	1026
	CA1	534	CA2	3470	CA3	3926	CO2	2138
	CON	5082	DEL	766	FL1	1864	FL2	1626
	FL3	5950	GA2	1058	ID2	232	IO1	668
	IO2	1524	KS2	1584	LA1	1410	LA2	2496
	MAS	4580	MD	4006	ME1	614	ME2	276
	MN1	410	MN2	2366	MO1	1658	MO2	1042
	MS2	1464	MT1	218	MT2	246	NC2	1932
	ND1	274	ND2	652	NE2	1680	NH	996
	NJ	5378	NM1	442	NM2	234	NV1	222
	NV2	398	NY1	2746	NY2	3498	NY3	5146

	OK1	694	OK2	1644	OR1	1010	PA1	876
	PA2	6470	RI	634	SC1	776	SC2	1182
	SD2	380	TX1	390	TX2	346	TX3	1020
	TX4	3006	TX5	1196	TX6	5078	UT1	716
	VA2	2518	VT	338	WA1	1308	WA2	650
	WI1	876	WI2	1864	WY2	246		
LA1	Total =	118244						
	AL1	1246	AL2	212	AZ2	1470	CA1	372
	CA2	3792	CA3	5804	CO2	2366	CON	2740
	DEL	466	FL1	1028	FL2	1302	FL3	5740
	GA1	2398	GA2	1396	ID2	188	IL1	5188
	IL2	306	IN1	4314	IN2	416	IO1	506
	IO2	1362	KS2	1540	KY1	274	KY2	1410
	MAS	2690	MD	2986	ME1	272	ME2	122
	MI3	5518	MN1	226	MN2	1986	MO1	3360
	MO2	206	MT1	142	MT2	170	NC1	2744
	NC2	1278	ND1	154	ND2	378	NE2	1442
	NH	472	NJ	3342	NM1	584	NM2	196
	NV1	196	NV2	502	NY1	1508	NY2	2290
	NY3	4238	OH1	4470	OH2	3252	OK1	220
	OK2	440	OR1	954	PA1	2140	PA2	3944
	RI	448	SC1	946	SC2	1464	SD2	232
	TN1	990	TN2	2134	TX1	528	TX2	374
	TX3	618	TX4	1108	TX5	1124	UT1	780
	VA1	706	VA2	1948	VT	144	WA1	1244
	WA2	508	WI1	390	WI2	3052	WV1	878
	WV2	216	WY2	154				
LA2	Total =	238068						
	AK1	1410	AL1	1128	AL2	140	AZ2	2302
	CA1	988	CA2	6888	CA3	8512	CO2	4112
	CON	6112	DEL	868	FL1	606	FL2	3230
	FL3	12908	GA1	3848	GA2	3270	ID2	416
	IL1	8542	IL2	714	IN1	8882	IN2	900
	IO1	896	IO2	3134	KS2	2744	KY1	734
	KY2	2496	MAS	5712	MD	5018	ME1	768
	ME2	352	MI3	10274	MN1	522	MN2	3180
	MO1	5234	MO2	1764	MT1	366	MT2	414
	NC1	5798	NC2	3006	ND1	412	ND2	920
	NE2	2560	NH	1238	NJ	6340	NM1	972
	NM2	510	NV1	428	NV2	828	NY1	2932
	NY2	4154	NY3	6270	OH1	8158	OH2	6162
	OK1	1484	OK2	3780	OR1	1852	PA1	4392
	PA2	7214	RI	806	SC1	2358	SC2	3108
	SD2	546	TN1	2726	TN2	4020	TX1	922
	TX2	752	TX3	2408	TX4	5350	TX5	3290
	TX6	1444	UT1	1384	VA1	1884	VA2	4014
	VT	400	WA1	2368	WA2	1152	WI1	1002
	WI2	6250	WV1	2102	WV2	572	WY2	416

MAS		Total = 378698						
	AK1	2926	AK2	746	AL1	7186	AL2	2682
	AZ2	3294	CA1	1378	CA2	10928	CA3	14014
	CO2	5748	FL1	3638	FL2	4058	FL3	17238
	GA1	6156	GA2	4744	ID2	638	IL1	17056
	IL2	1040	IN1	16970	IN2	1240	IO1	1402
	IO2	4840	KS2	3194	KY1	940	KY2	4580
	LA1	2690	LA2	5712	MD	2260	MI3	27090
	MN1	1000	MN2	6450	MO1	7302	MO2	1734
	MS2	2694	MT1	552	MT2	622	NC1	12368
	NC2	6988	ND1	634	ND2	1576	NE2	3782
	NM1	1248	NM2	522	NV1	632	NV2	1260
	NY1	1152	OH1	19270	OH2	18644	OK1	1298
	OK2	3966	OR1	3126	PA1	10732	SC1	4792
	SC2	5722	SD2	802	TN1	6052	TN2	6650
	TX1	1082	TX2	772	TX3	2202	TX4	6966
	TX5	2732	TX6	11892	UT1	2134	VA1	4438
	VA2	13420	WA1	4166	WA2	1846	WI1	1816
	WI2	12516	WV1	4700	WV2	1508	WY2	550
MD		Total = 268548						
	AK1	3186	AK2	976	AL1	8448	AL2	2740
	AZ2	2160	CA1	1502	CA2	8358	CA3	7980
	CO2	4702	FL1	4510	FL2	4264	FL3	15498
	GA1	6006	GA2	6044	ID2	616	IL1	14202
	IL2	1302	IN1	18282	IN2	1498	IO1	1274
	IO2	5664	KS2	3170	KY1	1356	KY2	4006
	LA1	2986	LA2	5018	MAS	2260	ME1	3044
	ME2	1308	MI3	18356	MN1	1032	MN2	4730
	MO1	6164	MO2	2024	MS2	3186	MT1	602
	MT2	662	NC1	728	ND1	740	ND2	1698
	NE2	3406	NH	2404	NM1	956	NM2	616
	NV1	588	NV2	888	OH1	5768	OK1	1608
	OK2	2946	OR1	2538	RI	294	SC1	1610
	SC2	4726	SD2	894	TN1	5600	TN2	4104
	TX1	872	TX2	798	TX3	2390	TX4	6838
	TX5	2970	TX6	10250	UT1	1660	VT	946
	WA1	3298	WA2	1760	WI1	2134	WI2	12754
	WY2	650						
ME1		Total = 51790						
	AK1	308	AK2	60	AL1	758	AL2	324
	AZ2	532	CA1	116	CA2	1530	CA3	2440
	CO2	776	DEL	254	FL1	328	FL2	472
	FL3	2250	GA1	828	GA2	466	ID2	66
	IL1	2480	IL2	92	IN1	1894	IN2	128
	IO1	180	IO2	444	KS2	368	KY1	72
	KY2	614	LA1	272	LA2	768	MD	3044
	MI3	3528	MN1	102	MN2	976	MO1	1026

MO2	166	MS2	256	MT1	46	MT2	56
NC1	1458	NC2	722	ND1	46	ND2	146
NE2	474	NJ	56	NM1	178	NM2	40
NV1	72	NV2	194	NY1	646	OH1	2496
OH2	2364	OK1	104	OK2	610	OR1	408
PA1	1696	PA2	884	SC1	488	SC2	696
SD2	68	TN1	840	TN2	878	TX1	152
TX2	84	TX3	216	TX4	796	TX5	266
TX6	1606	UT1	296	VA1	366	VA2	1504
WA1	560	WA2	200	WI1	146	WI2	1412
WV1	442	WV2	120	WY2	40		

ME2 Total = 26450

AK1	134	AK2	24	AL1	334	AL2	146
AZ2	254	CA1	52	CA2	734	CA3	1184
CO2	364	DEL	228	FL1	140	FL2	210
FL3	1030	GA1	378	GA2	200	ID2	32
IL1	1140	IL2	40	IN1	834	IN2	56
IO1	82	IO2	192	KS2	172	KY1	28
KY2	276	LA1	122	LA2	352	MD	1308
MI3	1576	MN1	46	MN2	460	MO1	472
MO2	72	MS2	112	MT1	18	MT2	24
NC1	644	NC2	310	ND1	18	ND2	62
NE2	218	NJ	1052	NM1	84	NM2	16
NV1	32	NV2	92	NY1	720	OH1	1114
OH2	1030	OK1	40	OK2	284	OR1	194
PA1	724	PA2	2002	SC1	210	SC2	310
SD2	32	TN1	386	TN2	396	TX1	72
TX2	38	TX3	94	TX4	364	TX5	116
TX6	746	UT1	138	VA1	150	VA2	646
WA1	264	WA2	88	WI1	60	WI2	630
WV1	184	WV2	48	WY2	16		

MI3 Total = 633844

AK1	6524	AK2	1726	AL1	14940	AL2	4940
AZ2	5470	CA1	2620	CA2	18436	CA3	21958
CO2	11124	CON	29562	DEL	4328	FL1	6810
FL2	6474	FL3	25448	GA1	10986	GA2	8458
ID2	1192	IN2	594	IO1	3196	IO2	4616
KS2	7330	KY1	432	LA1	5518	LA2	10274
MAS	27090	MD	18356	ME1	3528	ME2	1576
MN1	2514	MN2	13208	MO1	13846	MO2	4226
MS2	5382	MT1	1116	MT2	1280	NC1	20472
NC2	10342	ND1	1452	ND2	3726	NE2	8880
NH	5780	NJ	31194	NM1	2254	NM2	1060
NV1	1146	NV2	2134	NY1	3934	NY2	18490
NY3	32070	OK1	2940	OK2	7810	OR1	5394
PA1	1330	PA2	29524	RI	3816	SC1	7594
SC2	8984	SD2	2014	TN1	12998	TN2	12940
TX1	1940	TX2	1588	TX3	4522	TX4	13340

	TX5		5162	TX6	22268	UT1	3836	VA1	5638
	VA2		16044	VT	2064	WA1	7130	WA2	3406
	WI1		1272	WI2	914	WV1	166	WY2	1198
MN1		Total =	40042						
	AK1		282	AK2	60	AL1	540	AL2	210
	AZ2		406	CA1	120	CA2	1228	CA3	1778
	CO2		774	CON	996	DEL	166	FL1	234
	FL2		264	FL3	1178	GA1	478	GA2	280
	ID2		66	IL1	2190	IL2	102	IN1	1630
	IN2		110	KS2	396	KY1	66	KY2	410
	LA1		226	LA2	522	MAS	1000	MD	1032
	ME1		102	ME2	46	MI3	2514	MO1	980
	MO2		172	MS2	202	MT1	56	MT2	72
	NC1		730	NC2	346	ND1	88	NE2	502
	NH		172	NJ	1202	NM1	154	NM2	42
	NV1		64	NV2	154	NY1	624	NY2	882
	NY3		1596	OH1	1608	OH2	1266	OK1	114
	OK2		512	OR1	348	PA1	790	PA2	1428
	RI		166	SC1	240	SC2	350	TN1	592
	TN2		506	TX1	120	TX2	80	TX3	204
	TX4		652	TX5	220	TX6	1216	UT1	270
	VA1		198	VA2	598	VT	56	WA1	472
	WA2		194	WV1	270	WV2	72	WY2	56
MN2		Total =	230286						
	AK1		2472	AK2	658	AL1	4320	AL2	1446
	AZ2		1928	CA1	1216	CA2	7134	CA3	7262
	CO2		4996	CON	6916	DEL	874	FL1	2166
	FL2		1806	FL3	7002	GA1	2720	GA2	2370
	ID2		554	IL1	2932	IL2	938	IN1	10660
	IN2		922	KS2	3170	KY1	768	KY2	2366
	LA1		1986	LA2	3180	MAS	6450	MD	4730
	ME1		976	ME2	460	MI3	13208	MO1	4150
	MO2		1768	MS2	1796	MT1	586	MT2	682
	NC1		4666	NC2	2514	ND1	60	NH	1546
	NJ		6538	NM1	878	NM2	484	NV1	496
	NV2		800	NY1	3562	NY2	4528	NY3	5838
	OH1		9392	OH2	7352	OK1	1370	OK2	2778
	OR1		2218	PA1	5118	PA2	7424	RI	836
	SC1		1912	SC2	2194	TN1	3428	TN2	2928
	TX1		736	TX2	706	TX3	1920	TX4	5100
	TX5		1984	TX6	7618	UT1	1616	VA1	1826
	VA2		3716	VT	538	WA1	2926	WA2	1554
	WV1		2242	WV2	692	WY2	684		
MO1		Total =	270614						
	AK2		66	AL1	4086	AL2	2340	AZ2	2558
	CA1		1278	CA2	8294	CA3	9442	CO2	6132
	CON		7886	DEL	1082	FL1	3238	FL2	2602

	FL3	10016	GA1	4368	GA2	3458	ID2	572
	IL1	3446	IN1	6364	IN2	122	KY1	488
	KY2	1658	LA1	3360	LA2	5234	MAS	7302
	MD	6164	ME1	1026	ME2	472	MI3	13846
	MN1	980	MN2	4150	MS2	2904	MT1	540
	MT2	636	NC1	6636	NC2	3364	ND1	728
	ND2	1682	NE2	516	NH	1652	NJ	7922
	NM1	1184	NM2	600	NV1	546	NV2	986
	NY1	4062	NY2	5312	NY3	7474	OH1	8292
	OH2	9178	OK1	1052	OK2	808	OR1	2382
	PA1	6194	PA2	9128	RI	990	SC1	2642
	SC2	3140	SD2	474	TN1	1866	TN2	3208
	TX1	994	TX2	996	TX3	2856	TX4	7600
	TX5	2782	TX6	11850	UT1	1846	VA1	2390
	VA2	4816	VT	560	WA1	3076	WA2	1562
	WI1	2004	WI2	4612	WV1	3028	WV2	848
	WY2	666						
MO2	Total =	79204						
	AL1	1560	AL2	656	AZ2	974	CA1	222
	CA2	2502	CA3	3944	CO2	1802	CON	1742
	DEL	310	FL1	660	FL2	670	FL3	2970
	GA1	1338	GA2	724	ID2	122	IL1	3232
	IN1	3078	IO2	70	KY1	66	KY2	1042
	LA1	206	LA2	1764	MAS	1734	MD	2024
	ME1	166	ME2	72	MI3	4226	MN1	172
	MN2	1768	MS2	460	MT1	88	MT2	116
	NC1	1682	NC2	758	ND1	106	ND2	278
	NH	282	NJ	2220	NM1	398	NM2	106
	NV1	128	NV2	338	NY1	1040	NY2	1552
	NY3	2958	OH1	3298	OH2	2324	OR1	640
	PA1	1452	PA2	2654	RI	300	SC1	550
	SC2	844	SD2	190	TN1	346	TN2	1332
	TX1	324	TX2	246	TX3	452	TX4	2128
	TX5	634	TX6	2152	UT1	552	VA1	416
	VA2	1222	VT	84	WA1	840	WA2	330
	WI1	296	WI2	2476	WV1	564	WV2	134
	WY2	98						
MS2	Total =	117364						
	AK1	294	AZ2	1264	CA1	316	CA2	3334
	CA3	5184	CO2	1952	CON	2736	DEL	490
	FL2	1344	FL3	6930	GA1	246	GA2	846
	ID2	156	IL1	4912	IL2	278	IN1	4158
	IN2	408	IO1	438	IO2	1178	KS2	1184
	KY1	266	KY2	1464	MAS	2694	MD	3186
	ME1	256	ME2	112	MI3	5382	MN1	202
	MN2	1796	MO1	2904	MO2	460	MT1	118
	MT2	140	NC1	3048	NC2	1384	ND1	128
	ND2	322	NE2	1210	NH	448	NJ	3466

	NM1	480	NM2	148	NV1	172	NV2	434
	NY1	1504	NY2	2350	NY3	4490	OH1	4538
	OH2	3290	OK1	456	OK2	2034	OR1	842
	PA1	2170	PA2	4094	RI	460	SC1	1034
	SC2	1686	SD2	190	TN1	862	TN2	1546
	TX1	426	TX2	278	TX3	854	TX4	3296
	TX5	1166	TX6	2414	UT1	674	VA1	730
	VA2	2064	VT	138	WA1	1102	WA2	440
	WI1	342	WI2	2798	WV1	894	WV2	212
	WY2	122						
MT1	Total =	28632						
	AK1	162	AK2	28	AL1	302	AL2	134
	AZ2	480	CA1	134	CA2	1678	CA3	2380
	CO2	808	CON	528	DEL	92	FL1	134
	FL2	166	FL3	808	GA1	296	GA2	160
	IL1	1028	IL2	40	IN1	704	IN2	50
	IO1	106	IO2	222	KS2	242	KY1	28
	KY2	218	LA1	142	LA2	366	MAS	552
	MD	602	ME1	46	ME2	18	MI3	1116
	MN1	56	MN2	586	MO1	540	MO2	88
	MS2	118	NC1	412	NC2	192	ND1	50
	ND2	112	NE2	322	NH	84	NJ	690
	NM1	160	NM2	32	NV1	88	NV2	208
	NY1	320	NY2	500	NY3	986	OH1	790
	OH2	622	OK1	66	OK2	380	OR1	568
	PA1	394	PA2	812	RI	102	SC1	132
	SC2	210	SD2	54	TN1	352	TN2	294
	TX1	116	TX2	60	TX3	146	TX4	488
	TX5	154	TX6	904	UT1	422	VA1	98
	VA2	336	VT	24	WA1	826	WA2	80
	WI1	74	WI2	602	WV1	124	WV2	32
	WY2	56						
MT2	Total =	32038						
	AK1	202	AK2	38	AL1	362	AL2	158
	AZ2	536	CA1	154	CA2	1746	CA3	2496
	CO2	974	CON	602	DEL	104	FL1	162
	FL2	186	FL3	898	GA1	334	GA2	188
	ID2	122	IL1	1170	IL2	50	IN1	828
	IN2	60	IO1	128	IO2	284	KS2	298
	KY1	38	KY2	246	LA1	170	LA2	414
	MAS	622	MD	662	ME1	56	ME2	24
	MI3	1280	MN1	72	MN2	682	MO1	636
	MO2	116	MS2	140	NC1	472	NC2	222
	ND2	146	NE2	402	NH	98	NJ	760
	NM1	188	NM2	42	NV1	92	NV2	226
	NY1	352	NY2	546	NY3	1048	OH1	894
	OH2	702	OK1	90	OK2	442	OR1	534
	PA1	446	PA2	890	RI	110	SC1	154

	SC2		240	SD2	72	TN1	402	TN2	328
	TX1		134	TX2	78	TX3	184	TX4	584
	TX5		190	TX6	1044	UT1	98	VA1	116
	VA2		382	VT	28	WA1	734	WA2	318
	WI1		96	WI2	724	WV1	154	WV2	38
NC1		Total =	310278						
	AK1		2910	AK2	802	AL1	3064	AL2	2356
	AZ2		2454	CA1	1050	CA2	7884	CA3	9910
	CO2		4456	CON	13894	DEL	1308	FL1	4002
	FL2		3024	FL3	18232	GA1	366	GA2	324
	ID2		472	IL1	14442	IL2	1024	IN1	14542
	IN2		1124	IO1	1158	IO2	4194	KS2	2808
	KY1		552	LA1	2744	LA2	5798	MAS	12368
	MD		728	ME1	1458	ME2	644	MI3	20472
	MN1		730	MN2	4666	MO1	6636	MO2	1682
	MS2		3048	MT1	412	MT2	472	ND1	484
	ND2		1172	NE2	3064	NH	2436	NJ	14258
	NM1		978	NM2	444	NV1	474	NV2	924
	NY1		6798	NY2	9906	NY3	16758	OH1	3320
	OH2		3546	OK1	1200	OK2	3432	OR1	2216
	PA1		2462	PA2	10378	RI	1840	SD2	646
	TN1		3814	TX1	868	TX2	666	TX3	1960
	TX4		6242	TX5	2490	TX6	10966	UT1	1568
	VT		774	WA1	2890	WA2	1328	WI1	1406
	WI2		9920	WY2	440				
NC2		Total =	182124						
	AK1		1358	AK2	342	AL1	4194	AL2	1550
	AZ2		1412	CA1	494	CA2	4292	CA3	5922
	CO2		2352	CON	7710	DEL	284	FL1	2054
	FL2		1632	FL3	10356	GA1	1148	GA2	440
	ID2		230	IL1	7392	IL2	448	IN1	7478
	IN2		614	IO1	578	IO2	1884	KS2	1364
	KY1		458	KY2	1932	LA1	1278	LA2	3006
	MAS		6988	ME1	722	ME2	310	MI3	10342
	MN1		346	MN2	2514	MO1	3364	MO2	758
	MS2		1384	MT1	192	MT2	222	ND1	218
	ND2		544	NE2	1544	NH	1236	NJ	7606
	NM1		528	NM2	202	NV1	240	NV2	520
	NY1		3686	NY2	5956	NY3	11224	OH1	7432
	OH2		5368	OK1	532	OK2	1852	OR1	1170
	PA1		2590	PA2	4100	RI	1128	SD2	296
	TN1		3370	TN2	460	TX1	466	TX2	320
	TX3		926	TX4	3102	TX5	1190	TX6	5704
	UT1		840	VT	378	WA1	1546	WA2	660
	WI1		630	WI2	4766	WV1	88	WV2	166
	WY2		196						
ND1		Total =	30550						

	AK1	190	AK2	28	AL1	348	AL2	152
	AZ2	434	CA1	86	CA2	1258	CA3	1996
	CO2	866	CON	594	DEL	112	FL1	134
	FL2	180	FL3	890	GA1	352	GA2	170
	ID2	64	IL1	1412	IL2	50	IN1	886
	IN2	60	IO1	154	IO2	302	KS2	302
	KY1	28	KY2	274	LA1	154	LA2	412
	MAS	634	MD	740	ME1	46	ME2	18
	MI3	1452	MN1	88	MN2	60	MO1	728
	MO2	106	MS2	128	MT1	50	NC1	484
	NC2	218	NE2	414	NH	88	NJ	808
	NM1	156	NM2	28	NV1	60	NV2	166
	NY1	384	NY2	596	NY3	1204	OH1	996
	OH2	774	OK1	68	OK2	464	OR1	352
	PA1	478	PA2	968	RI	116	SC1	146
	SC2	244	TN1	434	TN2	356	TX1	114
	TX2	64	TX3	148	TX4	508	TX5	154
	TX6	1010	UT1	308	VA1	108	VA2	396
	VT	24	WA1	490	WA2	182	WI1	102
	WI2	822	WV1	146	WV2	34		
ND2	Total =	70024						
	AK1	464	AK2	88	AL1	864	AL2	358
	AZ2	838	CA1	214	CA2	2490	CA3	3768
	CO2	1638	CON	1528	DEL	266	FL1	366
	FL2	436	FL3	2032	GA1	806	GA2	446
	ID2	134	IL1	3488	IL2	144	IN1	2326
	IN2	162	IO1	170	IO2	790	KS2	700
	KY1	94	KY2	652	LA1	378	LA2	920
	MAS	1576	MD	1698	ME1	146	ME2	62
	MI3	3726	MO1	1682	MO2	278	MS2	322
	MT1	112	MT2	146	NC1	1172	NC2	544
	NE2	562	NH	252	NJ	1940	NM1	310
	NM2	72	NV1	126	NV2	322	NY1	954
	NY2	1422	NY3	2708	OH1	2446	OH2	1914
	OK1	182	OK2	974	OR1	706	PA1	1192
	PA2	2302	RI	276	SC1	378	SC2	574
	TN1	992	TN2	832	TX1	236	TX2	146
	TX3	356	TX4	1166	TX5	372	TX6	2216
	UT1	574	VA1	292	VA2	946	VT	74
	WA1	974	WA2	384	WI1	60	WI2	2172
	WV1	392	WV2	98	WY2	106		
NE2	Total =	163116						
	AK1	1296	AK2	440	AL1	2908	AL2	1046
	AZ2	1770	CA1	712	CA2	5418	CA3	6890
	CO2	4488	CON	3926	DEL	578	FL1	1352
	FL2	1222	FL3	5074	GA1	2036	GA2	1476
	ID2	352	IL1	6146	IL2	236	IN1	7094
	IN2	590	KY1	440	KY2	1680	LA1	1442

	LA2	2560	MAS	3782	MD	3406	ME1	474
	ME2	218	MI3	8880	MN1	502	MO1	516
	MS2	1210	MT1	322	MT2	402	NC1	3064
	NC2	1544	ND1	414	ND2	562	NH	776
	NJ	4226	NM1	790	NM2	316	NV1	328
	NV2	678	NY1	2134	NY2	2938	NY3	4644
	OH1	6030	OH2	4516	OK1	572	OK2	1410
	OR1	1528	PA1	2996	PA2	4900	RI	560
	SC1	1154	SC2	1492	TN1	2748	TN2	2114
	TX1	622	TX2	568	TX3	1464	TX4	3930
	TX5	1360	TX6	6568	UT1	1280	VA1	1002
	VA2	2364	VT	260	WA1	2014	WA2	956
	WI1	450	WI2	4926	WV1	1262	WV2	352
	WY2	420						
NH	Total =	83588						
	AK1	522	AK2	108	AL1	1290	AL2	534
	AZ2	828	CA1	210	CA2	2452	CA3	3754
	CO2	1250	DEL	246	FL1	572	FL2	784
	FL3	3648	GA1	1340	GA2	802	ID2	116
	IL1	3972	IL2	166	IN1	3198	IN2	218
	IO1	292	IO2	778	KS2	614	KY1	130
	KY2	996	LA1	472	LA2	1238	MD	2404
	MI3	5780	MN1	172	MN2	1546	MO1	1652
	MO2	282	MS2	448	MT1	84	MT2	98
	NC1	2436	NC2	1236	ND1	88	ND2	252
	NE2	776	NJ	1152	NM1	286	NM2	76
	NV1	122	NV2	302	NY1	702	OH1	4090
	OH2	3916	OK1	190	OK2	952	OR1	666
	PA1	2550	PA2	2160	SC1	832	SC2	1148
	SD2	128	TN1	1350	TN2	1422	TX1	240
	TX2	140	TX3	372	TX4	1324	TX5	456
	TX6	2586	UT1	472	VA1	656	VA2	2548
	WA1	900	WA2	340	WI1	266	WI2	2386
	WV1	778	WV2	220	WY2	76		
NJ	Total =	382166						
	AK1	3594	AK2	1012	AL1	9138	AL2	3188
	AZ2	3198	CA1	1706	CA2	11324	CA3	12810
	CO2	6146	FL1	4774	FL2	4948	FL3	19538
	GA1	7160	GA2	6302	ID2	740	IL1	18340
	IL2	1366	IN1	21122	IN2	1596	IO1	1578
	IO2	6208	KS2	3754	KY1	1328	KY2	5378
	LA1	3342	LA2	6340	ME1	56	ME2	1052
	MI3	31194	MN1	1202	MN2	6538	MO1	7922
	MO2	2220	MS2	3466	MT1	690	MT2	760
	NC1	14258	NC2	7606	ND1	808	ND2	1940
	NE2	4226	NH	1152	NM1	1294	NM2	672
	NV1	720	NV2	1260	OH1	23168	OH2	5992
	OK1	1720	OK2	4070	OR1	3322	SC1	3516

	SC2	7200	SD2	1008	TN1	6840	TN2	7990
	TX1	1152	TX2	932	TX3	2708	TX4	8158
	TX5	3374	TX6	13072	UT1	2220	VA1	852
	WA1	4382	WA2	2132	WI1	2336	WI2	14900
	WV1	5444	WY2	712				
NM1	Total =	61362						
	AK1	640	AK2	166	AL1	986	AL2	374
	CA1	476	CA2	3218	CA3	4084	CON	1316
	DEL	172	FL1	544	FL2	450	FL3	1858
	GA1	640	GA2	540	ID2	202	IL1	1838
	IL2	154	IN1	1848	IN2	166	IO1	240
	IO2	808	KS2	794	KY1	134	KY2	442
	LA1	584	LA2	972	MAS	1248	MD	956
	ME1	178	ME2	84	MI3	2254	MN1	154
	MN2	878	MO1	1184	MO2	398	MS2	480
	MT1	160	MT2	188	NC1	978	NC2	528
	ND1	156	ND2	310	NE2	790	NH	286
	NJ	1294	NV1	210	NV2	478	NY1	630
	NY2	872	NY3	1234	OH1	1598	OH2	1254
	OK1	478	OK2	940	OR1	790	PA1	902
	PA2	1452	RI	170	SC1	398	SC2	494
	SD2	184	TN1	764	TN2	624	TX3	536
	TX4	1682	TX5	790	TX6	2744	UT1	790
	VA1	352	VA2	756	VT	96	WA1	952
	WA2	494	WI1	280	WI2	1532	WV1	402
	WV2	116	WY2	218				
NM2	Total =	29566						
	AK1	210	AK2	34	AL1	358	AL2	172
	CA1	102	CA2	1580	CA3	3158	CO2	914
	CON	502	DEL	92	FL1	158	FL2	196
	FL3	964	GA1	346	GA2	176	ID2	60
	IL1	1008	IL2	40	IN1	694	IN2	56
	IO1	102	IO2	206	KS2	290	KY1	28
	KY2	234	LA1	196	LA2	510	MAS	522
	MD	616	ME1	40	ME2	16	MI3	1060
	MN1	42	MN2	484	MO1	600	MO2	106
	MS2	148	MT1	32	MT2	42	NC1	444
	NC2	202	ND1	28	ND2	72	NE2	316
	NH	76	NJ	672	NV1	72	NV2	262
	NY1	296	NY2	480	NY3	978	OH1	798
	OH2	606	OK1	96	OK2	560	OR1	328
	PA1	384	PA2	796	RI	96	SC1	138
	SC2	238	SD2	42	TN1	420	TN2	328
	TX3	144	TX4	700	TX5	266	TX6	1470
	UT1	332	VA1	96	VA2	346	VT	22
	WA1	420	WA2	150	WI1	60	WI2	550
	WV1	128	WV2	28	WY2	32		

NV1	Total =	29374						
	AK1	218	AK2	48	AL1	390	AL2	162
	AZ2	740	CA3	1464	CO2	872	CON	634
	DEL	98	FL1	198	FL2	204	FL3	936
	GA1	322	GA2	216	IL1	976	IL2	56
	IN1	810	IN2	64	IO1	106	IO2	296
	KS2	278	KY1	46	KY2	222	LA1	196
	LA2	428	MAS	632	MD	588	ME1	72
	ME2	32	MI3	1146	MN1	64	MN2	496
	MO1	546	MO2	128	MS2	172	MT1	88
	MT2	92	NC1	474	NC2	240	ND1	60
	ND2	126	NE2	328	NH	122	NJ	720
	NM1	210	NM2	72	NY1	334	NY2	510
	NY3	888	OH1	814	OH2	648	OK1	116
	OK2	392	OR1	618	PA1	438	PA2	828
	RI	102	SC1	170	SC2	244	SD2	66
	TN1	372	TN2	316	TX1	166	TX2	90
	TX3	228	TX4	696	TX5	252	TX6	1082
	UT1	566	VA1	138	VA2	382	VT	38
	WA1	1002	WA2	424	WI1	102	WI2	678
	WV1	166	WV2	46	WY2	74		
NV2	Total =	55436						
	AK1	534	AK2	146	AL1	902	AL2	334
	CA1	930	CA2	1656	CO2	1822	CON	1338
	DEL	166	FL1	516	FL2	428	FL3	1748
	GA1	574	GA2	522	ID2	316	IL1	1640
	IL2	146	IN1	1734	IN2	154	IO1	212
	IO2	766	KS2	636	KY1	130	KY2	398
	LA1	502	LA2	828	MAS	1260	MD	888
	ME1	194	ME2	92	MI3	2134	MN1	154
	MN2	800	MO1	986	MO2	338	MS2	434
	MT1	208	MT2	226	NC1	924	NC2	520
	ND1	166	ND2	322	NE2	678	NH	302
	NJ	1260	NM1	478	NM2	262	NY1	616
	NY2	844	NY3	1118	OH1	1472	OH2	1192
	OK1	360	OK2	674	OR1	1218	PA1	878
	PA2	1390	RI	166	SC1	390	SC2	466
	SD2	172	TN1	658	TN2	566	TX1	390
	TX2	244	TX3	638	TX4	1728	TX5	686
	TX6	2140	VA1	350	VA2	734	VT	102
	WA1	1344	WA2	716	WI1	278	WI2	1464
	WV1	394	WV2	116	WY2	228		
NY1	Total =	165746						
	AK1	1684	AK2	448	AL1	4104	AL2	1426
	AZ2	1574	CA1	762	CA2	5394	CA3	6432
	CO2	3008	FL1	2012	FL2	2058	FL3	8256
	GA1	3240	GA2	2608	ID2*	344	IL1	10242
	IL2	688	IN1	9702	IN2	776	IO1	810

IO2	3150	KS2	1828	KY1	624	KY2	2746
LA1	1508	LA2	2932	MAS	1152	ME1	646
ME2	720	MI3	3934	MN1	624	MN2	3562
MO1	4062	MO2	1040	MS2	1504	MT1	320
MT2	352	NC1	6798	NC2	3686	ND1	384
ND2	954	NE2	2134	NH	702	NM1	630
NM2	296	NV1	334	NV2	616	OH1	3642
OK1	778	OK2	2032	OR1	1584	SC1	2588
SC2	2958	SD2	490	TN1	3338	TN2	3712
TX1	548	TX2	430	TX3	1232	TX4	3736
TX5	1484	TX6	6154	UT1	1080	VA1	1478
VA2	2320	WA1	2094	WA2	990	WI1	1216
WI2	8238	WV1	490	WY2	328		

NY2 Total = 268260

AK1	2476	AK2	714	AL1	6090	AL2	2090
AZ2	2112	CA1	1226	CA2	7726	CA3	8346
CO2	4224	FL1	3230	FL2	3180	FL3	12422
GA1	4502	GA2	4114	ID2	524	IL1	12464
IL2	970	IN1	14656	IN2	1090	IO1	1094
IO2	4450	KS2	2596	KY1	928	KY2	3498
LA1	2290	LA2	4154	MI3	18490	MN1	882
MN2	4528	MO1	5312	MO2	1552	MS2	2350
MT1	500	MT2	546	NC1	9906	NC2	5956
ND1	596	ND2	1422	NE2	2938	NM1	872
NM2	480	NV1	510	NV2	844	OH1	14640
OH2	7930	OK1	1224	OK2	2676	OR1	2318
SC1	4118	SC2	4438	SD2	728	TN1	4438
TN2	5018	TX1	774	TX2	646	TX3	1894
TX4	5584	TX5	2338	TX6	8686	UT1	1524
VA1	3546	VA2	4884	WA1	3046	WA2	1522
WI1	1722	WI2	10686	WV1	4172	WV2	336
WY2	522						

NY3 Total = 422390

AK1	4470	AK2	1448	AL1	11048	AL2	3492
AZ2	2534	CA1	2434	CA2	11390	CA3	8436
CO2	6356	FL1	6358	FL2	5500	FL3	19508
GA1	6732	GA2	7874	ID2	940	IL1	16408
IL2	1850	IN1	24850	IN2	1984	IO1	1712
IO2	8422	KS2	4432	KY1	1908	KY2	5146
LA1	4238	LA2	6270	MI3	32070	MN1	1596
MN2	5838	MO1	7474	MO2	2958	MS2	4490
MT1	986	MT2	1048	NC1	16758	NC2	11224
ND1	1204	ND2	2708	NE2	4644	NM1	1234
NM2	978	NV1	888	NV2	1118	OH1	22980
OH2	9358	OK1	2476	OK2	3428	OR1	3666
SC1	7778	SC2	7446	SD2	1390	TN1	6412
TN2	7598	TX1	1154	TX2*	1182	TX3	3560
TX4	9696	TX5	4420	TX6	13150	UT1	2246

	VA1	3254	WA1	4712	WA2	2726	WI1	3360
	WI2	17894	WV1	8482	WY2	1066		
OH1	Total =	426920						
	AK1	5194	AK2	1442	AL1	9892	AL2	4198
	AZ2	3792	CA1	1902	CA2	12824	CA3	14876
	CO2	7724	CON	21486	DEL	2418	FL1	5862
	FL2	5446	FL3	20536	GA1	7350	GA2	7608
	ID2	844	IO1	2414	IO2	6574	KS2	5352
	LA1	4470	LA2	8158	MAS	19270	MD	5768
	ME1	2496	ME2	1114	MN1	1608	MN2	9392
	MO1	8292	MO2	3298	MS2	4538	MT1	790
	MT2	894	NC1	3320	NC2	7432	ND1	996
	ND2	2446	NE2	6030	NH	4090	NJ	23168
	NM1	1598	NM2	798	NV1	814	NV2	1472
	NY1	3642	NY2	14640	NY3	22980	OK1	2266
	OK2	5648	OR1	3732	PA2	17900	RI	2702
	SC1	3828	SC2	7198	SD2	1372	TN1	5058
	TN2	692	TX1	1390	TX2	1180	TX3	3444
	TX4	10166	TX5	4026	TX6	16996	UT1	2648
	VA1	322	VA2	8818	VT	1414	WA1	4900
	WA2	2390	WI1	3076	WI2	3642	WY2	864
OH2	Total =	314060						
	AK1	3694	AK2	1006	AL1	9386	AL2	3090
	AZ2	3056	CA1	1498	CA2	10360	CA3	12232
	CO2	6048	CON	19236	FL1	4336	FL2	4262
	FL3	16482	GA1	7264	GA2	5692	ID2	666
	IL1	4850	IL2	558	IN2	406	IO1	1770
	IO2	7152	KS2	3920	KY1	228	LA1	3252
	LA2	6162	MAS	18644	ME1	2364	ME2	1030
	MN1	1266	MN2	7352	MO1	9178	MO2	2324
	MS2	3290	MT1	622	MT2	702	NC1	3546
	NC2	5368	ND1	774	ND2	1914	NE2	4516
	NH	3916	NJ	5992	NM1	1254	NM2	606
	NV1	648	NV2	1192	NY2	7930	NY3	9358
	OK1	1656	OK2	4280	OR1	3018	RI	2670
	SC1	5038	SC2	6332	SD2	1030	TN1	7380
	TN2	2252	TX1	1090	TX2	890	TX3	2562
	TX4	7700	TX5	3048	TX6	12846	UT1	2108
	VA2	2586	VT	1388	WA1	3972	WA2	1904
	WI1	2614	WI2	6638	WY2	666		
OK1	Total =	65078						
	AL1	1066	AL2	488	AZ2	1116	CA1	174
	CA2	2488	CA3	4344	CO2	1884	CON	1258
	DEL	240	FL1	436	FL2	502	FL3	2418
	GA1	980	GA2	484	ID2	108	IL1	3024
	IL2	128	IN1	2042	IN2	172	IO1	332
	IO2	646	KY1	88	KY2	694	LA1	220

	LA2		1484	MAS	1298	MD	1608	ME1	104
	ME2		40	MI3	2940	MN1	114	MN2	1370
	MO1		1052	MS2	456	MT1	66	MT2	90
	NC1		1200	NC2	532	ND1	68	ND2	182
	NE2		572	NH	190	NJ	1720	NM1	478
	NM2		96	NV1	116	NV2	360	NY1	778
	NY2		1224	NY3	2476	OH1	2266	OH2	1656
	OR1		590	PA1	1026	PA2	2058	RI	240
	SC1		366	SC2	628	SD2	126	TN1	1358
	TN2		938	TX1	382	TX4	734	TX5	588
	TX6		1072	UT1	560	VA1	262	VA2	908
	VT		54	WA1	780	WA2	280	WI1	170
	WI2		1578	WV1	360	WV2	80	WY2	72
OK2		Total =	172014						
	AL1		4086	AL2	1442	AZ2	1790	CA1	958
	CA2		5640	CA3	5906	CO2	4494	CON	4302
	DEL		550	FL1	2130	FL2	1558	FL3	6002
	GA1		2296	GA2	2028	ID2	406	IL1	6798
	IL2		678	IN1	7150	IN2	714	IO1	498
	IO2		3348	KY1	604	KY2	1644	LA1	440
	LA2		3780	MAS	3966	MD	2946	ME1	610
	ME2		284	MI3	7810	MN1	512	MN2	2778
	MO1		808	MS2	2034	MT1	380	MT2	442
	NC1		3432	NC2	1852	ND1	464	ND2	974
	NE2		1410	NH	952	NJ	4070	NM1	940
	NM2		560	NV1	392	NV2	674	NY1	2032
	NY2		2676	NY3	3428	OH1	5648	OH2	4280
	OR1		1584	PA1	3070	PA2	4554	RI	510
	SC1		1458	SC2	1702	SD2	648	TN1	2458
	TN2		2274	TX1	816	TX4	3384	TX5	2458
	TX6		3908	UT1	1270	VA1	1302	VA2	2522
	VT		324	WA1	1990	WA2	1074	WI1	1030
	WI2		5638	WV1	1506	WV2	440	WY2	498
OR1		Total =	146034						
	AK1		1044	AK2	260	AL1	1904	AL2	742
	AZ2		2418	CA1	916	CA2	11486	CA3	13290
	CO2		3616	CON	3180	DEL	446	FL1	1002
	FL2		958	FL3	4212	GA1	1422	GA2	1088
	IL1		4316	IL2	296	IN1	3954	IN2	322
	IO1		494	IO2	1572	KS2	1300	KY1	248
	KY2		1010	LA1	954	LA2	1852	MAS	3126
	MD		2538	ME1	408	ME2	194	MI3	5394
	MN1		348	MN2	2218	MO1	2382	MO2	640
	MS2		842	MT1	568	MT2	534	NC1	2216
	NC2		1170	ND1	352	ND2	706	NE2	1528
	NH		666	NJ	3322	NM1	790	NM2	328
	NV1		618	NV2	1218	NY1	1584	NY2	2318
	NY3		3666	OH1	3732	OH2	3018	OK1	590

	OK2	1584	PA1	2124	PA2	3746	RI	466
	SC1	846	SC2	1116	SD2	352	TN1	1616
	TN2	1404	TX1	640	TX2	410	TX3	1060
	TX4	3108	TX5	1190	TX6	4594	UT1	2056
	VA1	730	VA2	1790	VT	214	WA1	64
	WA2	160	WI1	578	WI2	3360	WV1	848
	WV2	246	WY2	416				
PA1	Total =	208430						
	AK1	2398	AK2	624	AL1	6256	AL2	2164
	AZ2	2304	CA1	958	CA2	7456	CA3	9534
	CO2	4220	CON	1202	FL1	2890	FL2	3086
	FL3	12306	GA1	5262	GA2	3940	ID2	446
	IL1	12752	IL2	986	IN1	3058	IN2	1208
	IO1	1162	IO2	4266	KS2	2562	KY1	940
	KY2	876	LA1	2140	LA2	4392	MAS	10732
	ME1	1696	ME2	724	MI3	1330	MN1	790
	MN2	5118	MO1	6194	MO2	1452	MS2	2170
	MT1	394	MT2	446	NC1	2462	NC2	2590
	ND1	478	ND2	1192	NE2	2996	NH	2550
	NM1	902	NM2	384	NV1	438	NV2	878
	OK1	1026	OK2	3070	OR1	2124	RI	1702
	SC1	1750	SC2	4744	SD2	638	TN1	5378
	TN2	3456	TX1	780	TX2	584	TX3	1672
	TX4	5222	TX5	2020	TX6	9068	UT1	1502
	VA2	616	VT	722	WA1	2820	WA2	1272
	WI1	1534	WI2	11022	WY2	404		
PA2	Total =	407238						
	AK1	4254	AK2	1226	AL1	10916	AL2	3696
	AZ2	3480	CA1	2004	CA2	12602	CA3	13678
	CO2	6972	FL1	5692	FL2	5688	FL3	21876
	GA1	8286	GA2	7524	ID2	852	IL1	21468
	IL2	1680	IN1	25942	IN2	1948	IO1	1840
	IO2	7510	KS2	4384	KY1	1662	KY2	6470
	LA1	3944	LA2	7214	ME1	884	ME2	2002
	MI3	29524	MN1	1428	MN2	7424	MO1	9128
	MO2	2654	MS2	4094	MT1	812	MT2	890
	NC1	10378	NC2	4100	ND1	968	ND2	2302
	NE2	4900	NH	2160	NM1	1452	NM2	796
	NV1	828	NV2	1390	OH1	17900	OK1	2058
	OK2	4554	OR1	3746	SC1	4408	SC2	8402
	SD2	1198	TN1	7954	TN2	9186	TX1	1294
	TX2	1084	TX3	3176	TX4	9438	TX5	3936
	TX6	14870	UT1	2496	WA1	4912	WA2	2444
	WI1	2832	WI2	17894	WV1	1682	WY2	852
RI	Total =	55888						
	AK1	478	AK2	138	AL1	1158	AL2	404
	AZ2	410	CA1	248	CA2	1530	CA3	1622

	CO2	822	FL1	634	FL2	628	FL3	2476
	GA1	852	GA2	794	ID2	104	IL1	2240
	IL2	180	IN1	2640	IN2	204	IO1	208
	IO2	838	KS2	500	KY1	176	KY2	634
	LA1	448	LA2	806	MD	294	MI3	3816
	MN1	166	MN2	836	MO1	990	MO2	300
	MS2	460	MT1	102	MT2	110	NC1	1840
	NC2	1128	ND1	116	ND2	276	NE2	560
	NM1	170	NM2	96	NV1	102	NV2	166
	OH1	2702	OH2	2670	OK1	240	OK2	510
	OR1	466	PA1	1702	SC1	776	SC2	852
	SD2	140	TN1	828	TN2	928	TX1	154
	TX2	128	TX3	374	TX4	1092	TX5	466
	TX6	1688	UT1	300	VA1	788	VA2	2020
	WA1	608	WA2	306	WI1	326	WI2	1958
	WV1	790	WV2	272	WY2	104		
SC1	Total =	129110						
	AK1	1010	AK2	246	AL1	1448	AL2	936
	AZ2	1072	CA1	344	CA2	3170	CA3	4534
	CO2	1754	CON	5244	DEL	476	FL1	1002
	FL2	952	FL3	7346	GA1	1004	GA2	494
	ID2	166	IL1	5694	IL2	326	IN1	5476
	IN2	336	IO1	434	IO2	1338	KS2	1008
	KY1	186	KY2	776	LA1	946	LA2	2358
	MAS	4792	MD	1610	ME1	488	ME2	210
	MI3	7594	MN1	240	MN2	1912	MO1	2642
	MO2	550	MS2	1034	MT1	132	MT2	154
	ND1	146	ND2	378	NE2	1154	NH	832
	NJ	3516	NM1	398	NM2	138	NV1	170
	NV2	390	NY1	2588	NY2	4118	NY3	7778
	OH1	3828	OH2	5038	OK1	366	OK2	1458
	OR1	846	PA1	1750	PA2	4408	RI	776
	SD2	210	TN1	1762	TN2	378	TX1	350
	TX2	232	TX3	662	TX4	2282	TX5	846
	TX6	4376	UT1	626	VT	252	WA1	1118
	WA2	472	WI1	434	WI2	3466	WY2	134
SC2	Total =	171146						
	AK1	1484	AK2	422	AL1	1864	AL2	952
	AZ2	1238	CA1	546	CA2	3986	CA3	4940
	CO2	2222	CON	6306	DEL	1044	FL1	1356
	FL3	7608	ID2	240	IL1	6510	IL2	482
	IN1	7226	IN2	656	IO1	558	IO2	2012
	KS2	1394	KY1	536	KY2	1182	LA1	1464
	LA2	3108	MAS	5722	MD	4726	ME1	696
	ME2	310	MI3	8984	MN1	350	MN2	2194
	MO1	3140	MO2	844	MS2	1686	MT1	210
	MT2	240	ND1	244	ND2	574	NE2	1492
	NH	1148	NJ	7200	NM1	494	NM2	238

	NV1		244	NV2	466	NY1	2958	NY2	4438
	NY3		7446	OH1	7198	OH2	6332	OK1	628
	OK2		1702	OR1	1116	PA1	4744	PA2	8402
	RI		852	SD2	318	TN1	2454	TX1	446
	TX2		342	TX3	1022	TX4	3278	TX5	1340
	TX6		5688	UT1	784	VT	360	WA1	1446
	WA2		682	WI1	678	WI2	4592	WV1	540
	WV2		596	WY2	226				
SD2		Total =	36964						
	AK1		302	AK2	56	AL1	516	AL2	208
	AZ2		468	CA1	110	CA2	1292	CA3	2002
	CO2		1000	CON	782	DEL	138	FL1	210
	FL2		244	FL3	1128	GA1	462	GA2	252
	ID2		66	IL1	1928	IL2	90	IN1	1352
	IN2		98	KS2	278	KY1	56	KY2	380
	LA1		232	LA2	546	MAS	802	MD	894
	ME1		68	ME2	32	MI3	2014	MO1	474
	MO2		190	MS2	190	MT1	54	MT2	72
	NC1		646	NC2	296	NH	128	NJ	1008
	NM1		184	NM2	42	NV1	66	NV2	172
	NY1		490	NY2	728	NY3	1390	OH1	1372
	OH2		1030	OK1	126	OK2	648	OR1	352
	PA1		638	PA2	1198	RI	140	SC1	210
	SC2		318	TN1	606	TN2	476	TX1	138
	TX2		92	TX3	222	TX4	702	TX5	216
	TX6		1348	UT1	308	VA1	160	VA2	512
	VT		40	WA1	472	WA2	190	WI2	978
	WV1		220	WV2	56	WY2	60		
TN1		Total =	210760						
	AK1		822	AL2	240	AZ2	1718	CA1	888
	CA2		5674	CA3	6370	CO2	3608	CON	6642
	DEL		952	FL1	1902	FL2	2714	FL3	9860
	GA2		1708	ID2	380	IL1	3042	IN1	3394
	IO1		1044	IO2	3920	KS2	2478	LA1	990
	LA2		2726	MAS	6052	MD	5600	ME1	840
	ME2		386	MI3	12998	MN1	592	MN2	3428
	MO1		1866	MO2	346	MS2	862	MT1	352
	MT2		402	NC1	3814	NC2	3370	ND1	434
	ND2		992	NE2	2748	NH	1350	NJ	6840
	NM1		764	NM2	420	NV1	372	NV2	658
	NY1		3338	NY2	4438	NY3	6412	OH1	5058
	OH2		7380	OK1	1358	OK2	2458	OR1	1616
	PA1		5378	PA2	7954	RI	828	SC1	1762
	SC2		2454	SD2	606	TN2	558	TX1	684
	TX2		630	TX3	1974	TX4	5800	TX5	2270
	TX6		8514	UT1	1182	VA1	1950	VA2	4550
	VT		448	WA1	2086	WA2	1050	WI1	1224
	WI2		7942	WV1	1134	WV2	756	WY2	410

TN2	Total =	187634						
	AK1	1912	AK2	446	AL2	774	AZ2	1472
	CA1	746	CA2	4904	CA3	5656	CO2	2904
	CON	7414	DEL	1152	FL1	1870	FL2	2528
	FL3	10472	ID2	318	IL1	9074	IL2	260
	IN1	3218	IO1	802	IO2	3172	KS2	2038
	LA1	2134	LA2	4020	MAS	6650	MD	4104
	ME1	878	ME2	396	MI3	12940	MN1	506
	MN2	2928	MO1	3208	MO2	1332	MS2	1546
	MT1	294	MT2	328	NC2	460	ND1	356
	ND2	832	NE2	2114	NH	1422	NJ	7990
	NM1	624	NM2	328	NV1	316	NV2	566
	NY1	3712	NY2	5018	NY3	7598	OH1	692
	OH2	2252	OK1	938	OK2	2274	OR1	1404
	PA1	3456	PA2	9186	RI	928	SC1	378
	SD2	476	TN1	558	TX1	560	TX2	474
	TX3	1444	TX4	4398	TX5	1784	TX6	7534
	UT1	990	VA2	2500	VT	472	WA1	1826
	WA2	896	WI1	1032	WI2	6884	WV2	240
	WY2	326						
TX1	Total =	54686						
	AK1	546	AK2	140	AL1	866	AL2	340
	CA1	372	CA2	2724	CA3	3790	CO2	1590
	CON	1134	DEL	154	FL1	482	FL2	410
	FL3	1728	GA1	582	GA2	476	ID2	152
	IL1	1586	IL2	128	IN1	1560	IN2	140
	IO1	194	IO2	646	KS2	632	KY1	112
	KY2	390	LA1	528	LA2	922	MAS	1082
	MD	872	ME1	152	ME2	72	MI3	1940
	MN1	120	MN2	736	MO1	994	MO2	324
	MS2	426	MT1	116	MT2	134	NC1	868
	NC2	466	ND1	114	ND2	236	NE2	622
	NH	240	NJ	1152	NV1	166	NV2	390
	NY1	548	NY2	774	NY3	1154	OH1	1390
	OH2	1090	OK1	382	OK2	816	OR1	640
	PA1	780	PA2	1294	RI	154	SC1	350
	SC2	446	SD2	138	TN1	684	TN2	560
	TX3	222	TX4	1440	TX5	810	TX6	2624
	UT1	566	VA1	302	VA2	670	VT	80
	WA1	778	WA2	382	WI1	220	WI2	1260
	WV1	342	WV2	98	WY2	146		
TX2	Total =	38900						
	AK1	436	AK2	88	AL1	616	AL2	260
	AZ2	766	CA1	166	CA2	1682	CA3	2662
	CO2	122	CON	782	DEL	128	FL1	290
	FL2	290	FL3	1322	GA1	496	GA2	310
	ID2	84	IL1	1490	IL2	84	IN1	1168

IN2	102	IO1	176	IO2	436	KS2	250		
KY1	66	KY2	346	LA1	374	LA2	752		
MAS	772	MD	798	ME1	84	ME2	38		
MI3	1588	MN1	80	MN2	706	MO1	996		
MO2	246	MS2	278	MT1	60	MT2	78		
NC1	666	NC2	320	ND1	64	ND2	146		
NE2	568	NH	140	NJ	932	NV1	90		
NV2	244	NY1	430	NY2	646	NY3	1182		
OH1	1180	OH2	890	OR1	410	PA1	584		
PA2	1084	RI	128	SC1	232	SC2	342		
SD2	92	TN1	630	TN2	474	TX4	788		
TX5	430	TX6	1452	UT1	396	VA1	180		
VA2	506	VT	42	WA1	520	WA2	216		
WI1	130	WI2	934	WV1	226	WV2	60		
WY2	78								

TX3 Total = 107472

AK1	754	AK2	172	AL1	1840	AL2	814
AZ2	2040	CA1	402	CA2	4444	CA3	7288
CO2	2846	CON	2190	DEL	378	FL1	866
FL2	870	FL3	4042	GA1	1528	GA2	894
ID2	210	IL1	4294	IL2	228	IN1	3290
IN2	286	IO1	470	IO2	1130	KS2	430
KY1	178	KY2	1020	LA1	618	LA2	2408
MAS	2202	MD	2390	ME1	216	ME2	94
MI3	4522	MN1	204	MN2	1920	MO1	2856
MO2	452	MS2	854	MT1	146	MT2	184
NC1	1960	NC2	926	ND1	148	ND2	356
NE2	1464	NH	372	NJ	2708	NM1	536
NM2	144	NV1	228	NV2	638	NY1	1232
NY2	1894	NY3	3560	OH1	3444	OH2	2562
OR1	1060	PA1	1672	PA2	3176	RI	374
SC1	662	SC2	1022	SD2	222	TN1	1974
TN2	1444	TX1	222	TX4	110	TX5	1152
TX6	1408	UT1	972	VA1	498	VA2	1478
VT	112	WA1	1362	WA2	552	WI1	336
WI2	2558	WV1	634	WV2	158	WY2	172

TX4 Total = 326402

AK1	3132	AK2	790	AL1	6334	AL2	2806
AZ2	5446	CA1	1390	CA2	12742	CA3	19322
CO2	8026	CON	7132	DEL	1120	FL1	3366
FL2	2976	FL3	13352	GA1	4754	GA2	3204
ID2	646	IL1	11914	IL2	760	IN1	10268
IN2	934	IO1	1296	IO2	3656	KS2	4214
KY1	660	KY2	3006	LA1	1108	LA2	5350
MAS	6966	MD	6838	ME1	796	ME2	364
MI3	13340	MN1	652	MN2	5100	MO1	7600
MO2	2128	MS2	3296	MT1	488	MT2	584
NC1	6242	NC2	3102	ND1	508	ND2	1166

	NE2	3930	NH	1324	NJ	8158	NM1	1682
	NM2	700	NV1	696	NV2	1728	NY1	3736
	NY2	5584	NY3	9696	OH1	10166	OH2	7700
	OK1	734	OK2	3384	OR1	3108	PA1	5222
	PA2	9438	RI	1092	SC1	2282	SC2	3278
	SD2	702	TN1	5800	TN2	4398	TX1	1440
	TX2	788	TX3	110	TX5	684	TX6	2574
	UT1	2626	VA1	1800	VA2	4660	VT	416
	WA1	3958	WA2	1710	WI1	1140	WI2	7814
	WV1	2142	WV2	566	WY2	562		
TX5	Total =	134192						
	AK1	1298	AK2	284	AL1	2320	AL2	1126
	AZ2	2172	CA1	452	CA2	5044	CA3	8358
	CO2	2758	CON	2718	DEL	470	FL1	1226
	FL2	1222	FL3	5892	GA1	1972	GA2	1194
	ID2	222	IL1	4660	IL2	248	IN1	3730
	IN2	324	IO1	460	IO2	1170	KS2	1342
	KY1	206	KY2	1196	LA1	1124	LA2	3290
	MAS	2732	MD	2970	ME1	266	ME2	116
	MI3	5162	MN1	220	MN2	1984	MO1	2782
	MO2	634	MS2	1166	MT1	154	MT2	190
	NC1	2490	NC2	1190	ND1	154	ND2	372
	NE2	1360	NH	456	NJ	3374	NM1	790
	NM2	266	NV1	252	NV2	686	NY1	1484
	NY2	2338	NY3	4420	OH1	4026	OH2	3048
	OK1	588	OK2	2458	OR1	1190	PA1	2020
	PA2	3936	RI	466	SC1	846	SC2	1340
	SD2	216	TN1	2270	TN2	1784	TX1	810
	TX2	430	TX3	1152	TX4	684	TX6	2476
	UT1	978	VA1	624	VA2	1864	VT	140
	WA1	1534	WA2	594	WI1	352	WI2	2760
	WV1	766	WV2	190	WY2	164		
TX6	Total =	508870						
	AK1	1396	AL1	12670	AL2	4888	AZ2	6106
	CA1	2474	CA2	17348	CA3	21570	CO2	11236
	CON	12626	DEL	1782	FL1	7210	FL2	5434
	FL3	22442	GA1	8196	GA2	6382	ID2	1060
	IL1	19154	IL2	1558	IN1	18918	IN2	1850
	IO1	2196	IO2	7278	KS2	5090	KY1	1476
	KY2	5078	LA2	1444	MAS	11892	MD	10250
	ME1	1606	ME2	746	MI3	22268	MN1	1216
	MN2	7618	MO1	11850	MO2	2152	MS2	2414
	MT1	904	MT2	1044	NC1	10966	NC2	5704
	ND1	1010	ND2	2216	NE2	6568	NH	2586
	NJ	13072	NM1	2744	NM2	1470	NV1	1082
	NV2	2140	NY1	6154	NY2	8686	NY3	13150
	OH1	16996	OH2	12846	OK1	1072	OK2	3908
	OR1	4594	PA1	9068	PA2	14870	RI	1688

	SC1		4376	SC2	5688	SD2	1348	TN1	8514
	TN2		7534	TX1	2624	TX2	1452	TX3	1408
	TX4		2574	TX5	2476	UT1	3602	VA1	3624
	VA2		7948	VT	844	WA1	5810	WA2	2830
	WI1		2312	WI2	14094	WV1	4170	WV2	1150
	WY2		1080						
UT1		Total =	107190						
	AK1		872	AK2	222	AL1	1464	AL2	554
	AZ2		2072	CA1	1158	CA2	7716	CA3	8584
	CO2		480	CON	2214	DEL	296	FL1	786
	FL2		694	FL3	2922	GA1	1002	GA2	820
	IL1		3104	IL2	236	IN1	2974	IN2	252
	IO1		396	IO2	1292	KS2	1130	KY1	204
	KY2		716	LA1	780	LA2	1384	MAS	2134
	MD		1660	ME1	296	ME2	138	MI3	3836
	MN1		270	MN2	1616	MO1	1846	MO2	552
	MS2		674	MT1	422	MT2	98	NC1	1568
	NC2		840	ND1	308	ND2	574	NE2	1280
	NH		472	NJ	2220	NM1	790	NM2	332
	NV1		566	NY1	1080	NY2	1524	NY3	2246
	OH1		2648	OH2	2108	OK1	560	OK2	1270
	OR1		2056	PA1	1502	PA2	2496	RI	300
	SC1		626	SC2	784	SD2	308	TN1	1182
	TN2		990	TX1	566	TX2	396	TX3	972
	TX4		2626	TX5	978	TX6	3602	VA1	552
	VA2		1246	VT	156	WA1	2438	WA2	1314
	WI1		472	WI2	2554	WV1	636	WV2	186
VA1		Total =	89340						
	AK1		788	AK2	170	AL1	2414	AL2	908
	AZ2		984	CA1	242	CA2	2776	CA3	4294
	CO2		1530	CON	4594	FL1	998	FL2	1400
	FL3		5712	GA1	380	GA2	390	ID2	134
	IL1		5628	IL2	260	IN1	3658	IN2	388
	IO1		386	IO2	1074	KS2	832	KY1	136
	LA1		706	LA2	1884	MAS	4438	ME1	366
	ME2		150	MI3	5638	MN1	198	MN2	1826
	MO1		2390	MO2	416	MS2	730	MT1	98
	MT2		116	ND1	108	ND2	292	NE2	1002
	NH		656	NJ	852	NM1	352	NM2	96
	NV1		138	NV2	350	NY1	1478	NY2	3546
	NY3		3254	OH1	322	OK1	262	OK2	1302
	OR1		730	RI	788	SD2	160	TN1	1950
	TX1		302	TX2	180	TX3	498	TX4	1800
	TX5		624	TX6	3624	UT1	552	VT	194
	WA1		976	WA2	374	WI1	334	WI2	3120
	WY2		92						
VA2		Total =	219224						

AK1	2072	AK2	562	AL1	5860	AL2	2070
AZ2	1920	CA1	854	CA2	6312	CA3	7836
CO2	3476	CON	878	FL1	2958	FL2	3370
FL3	13040	GA1	5134	GA2	3036	ID2	380
IL1	10984	IL2	750	IN1	12086	IN2	958
IO1	884	IO2	3232	KS2	2104	KY1	760
KY2	2518	LA1	1948	LA2	4014	MAS	13420
ME1	1504	ME2	646	MI3	16044	MN1	598
MN2	3716	MO1	4816	MO2	1222	MS2	2064
MT1	336	MT2	382	ND1	396	ND2	946
NE2	2364	NH	2548	NM1	756	NM2	346
NV1	382	NV2	734	NY1	2320	NY2	4884
OH1	8818	OH2	2586	OK1	908	OK2	2522
OR1	1790	PA1	616	RI	2020	SD2	512
TN1	4550	TN2	2500	TX1	670	TX2	506
TX3	1478	TX4	4660	TX5	1864	TX6	7948
UT1	1246	VT	790	WA1	2358	WA2	1086
WI1	1134	WI2	7888	WY2	354		

VT Total = 26172

AK1	166	AK2	28	AL1	402	AL2	170
AZ2	278	CA1	58	CA2	794	CA3	1272
CO2	410	FL1	170	FL2	246	FL3	1146
GA1	440	GA2	242	ID2	34	IL1	1396
IL2	50	IN1	1066	IN2	70	IO1	98
IO2	242	KS2	196	KY1	38	KY2	338
LA1	144	LA2	400	MD	946	MI3	2064
MN1	56	MN2	538	MO1	560	MO2	84
MS2	138	MT1	24	MT2	28	NC1	774
NC2	378	ND1	24	ND2	74	NE2	260
NM1	96	NM2	22	NV1	38	NV2	102
OH1	1414	OH2	1388	OK1	54	OK2	324
OR1	214	PA1	722	SC1	252	SC2	360
SD2	40	TN1	448	TN2	472	TX1	80
TX2	42	TX3	112	TX4	416	TX5	140
TX6	844	UT1	156	VA1	194	VA2	790
WA1	292	WA2	104	WI1	78	WI2	798
WV1	246	WV2	70	WY2	22		

WA1 Total = 188894

AK1	1362	AK2	342	AL1	2496	AL2	958
AZ2	2776	CA1	2436	CA2	14914	CA3	14192
CO2	4540	CON	4246	DEL	578	FL1	1330
FL2	1250	FL3	5432	GA1	1830	GA2	1428
ID2	880	IL1	5638	IL2	396	IN1	5236
IN2	428	IO1	652	IO2	2114	KS2	1700
KY1	334	KY2	1308	LA1	1244	LA2	2368
MAS	4166	MD	3298	ME1	560	ME2	264
MI3	7130	MN1	472	MN2	2926	MO1	3076
MO2	840	MS2	1102	MT1	826	MT2	734

	NC1		2890	NC2	1546	ND1	490	ND2	974
	NE2		2014	NH	900	NJ	4382	NM1	952
	NM2		420	NV1	1002	NV2	1344	NY1	2094
	NY2		3046	NY3	4712	OH1	4900	OH2	3972
	OK1		780	OK2	1990	OR1	64	PA1	2820
	PA2		4912	RI	608	SC1	1118	SC2	1446
	SD2		472	TN1	2086	TN2	1826	TX1	778
	TX2		520	TX3	1362	TX4	3958	TX5	1534
	TX6		5810	UT1	2438	VA1	976	VA2	2358
	VT		292	WI1	786	WI2	4502	WV1	1136
	WV2		330	WY2	552				
WA2		Total =	89282						
	AK1		572	AK2	122	AL1	1064	AL2	444
	AZ2		1534	CA1	824	CA2	7078	CA3	8122
	CO2		2316	CON	1816	DEL	286	FL1	514
	FL2		558	FL3	2590	GA1	904	GA2	578
	IL1		2914	IL2	152	IN1	2302	IN2	178
	IO1		310	IO2	820	KS2	762	KY1	116
	KY2		650	LA1	508	LA2	1152	MAS	1846
	MD		1760	ME1	200	ME2	88	MI3	3406
	MN1		194	MN2	1554	MO1	1562	MO2	330
	MS2		440	MT1	80	MT2	318	NC1	1328
	NC2		660	ND1	182	ND2	384	NE2	956
	NH		340	NJ	2132	NM1	494	NM2	150
	NV1		424	NV2	716	NY1	990	NY2	1522
	NY3		2726	OH1	2390	OH2	1904	OK1	280
	OK2		1074	OR1	160	PA1	1272	PA2	2444
	RI		306	SC1	472	SC2	682	SD2	190
	TN1		1050	TN2	896	TX1	382	TX2	216
	TX3		552	TX4	1710	TX5	594	TX6	2830
	UT1		1314	VA1	374	VA2	1086	VT	104
	WI1		290	WI2	1954	WV1	458	WV2	122
	WY2		208						
WI1		Total =	65316						
	AK1		502	AK2	88	AL1	990	AL2	402
	AZ2		764	CA1	166	CA2	2140	CA3	3394
	CO2		1360	CON	1766	DEL	326	FL1	384
	FL2		484	FL3	2252	GA1	964	GA2	494
	ID2		102	IN1	1130	IN2	206	KS2	722
	KY1		110	KY2	876	LA1	390	LA2	1002
	MAS		1816	MD	2134	ME1	146	ME2	60
	MI3		1272	MO1	2004	MO2	296	MS2	342
	MT1		74	MT2	96	NC1	1406	NC2	630
	ND1		102	ND2	60	NE2	450	NH	266
	NJ		2336	NM1	280	NM2	60	NV1	102
	NV2		278	NY1	1216	NY2	1722	NY3	3360
	OH1		3076	OH2	2614	OK1	170	OK2	1030
	OR1		578	PA1	1534	PA2	2832	RI	326

	SC1	434	SC2	678	TN1	1224	TN2	1032
	TX1	220	TX2	130	TX3	336	TX4	1140
	TX5	352	TX6	2312	UT1	472	VA1	334
	VA2	1134	VT	78	WA1	786	WA2	290
	WV1	490	WV2	122	WY2	70		
WI2	Total =	371894						
	AK1	3812	AK2	882	AL1	7734	AL2	2746
	AZ2	3872	CA1	1372	CA2	11896	CA3	16190
	CO2	7590	CON	12942	DEL	2062	FL1	3318
	FL2	3396	FL3	14236	GA1	6168	GA2	4044
	ID2	700	IN1	64	IN2	372	KS2	4684
	KY1	272	KY2	1864	LA1	3052	LA2	6250
	MAS	12516	MD	12754	ME1	1412	ME2	630
	MI3	914	MO1	4612	MO2	2476	MS2	2798
	MT1	602	MT2	724	NC1	9920	NC2	4766
	ND1	822	ND2	2172	NE2	4926	NH	2386
	NJ	14900	NM1	1532	NM2	550	NV1	678
	NV2	1464	NY1	8238	NY2	10686	NY3	17894
	OH1	3642	OH2	6638	OK1	1578	OK2	5638
	OR1	3360	PA1	11022	PA2	17894	RI	1958
	SC1	3466	SC2	4592	SD2	978	TN1	7942
	TN2	6884	TX1	1260	TX2	934	TX3	2558
	TX4	7814	TX5	2760	TX6	14094	UT1	2554
	VA1	3120	VA2	7888	VT	798	WA1	4502
	WA2	1954	WV1	4288	WV2	1240	WY2	648
WV1	Total =	96250						
	AK1	1006	AK2	234	AL1	1928	AL2	1028
	AZ2	1082	CA1	314	CA2	3152	CA3	4616
	CO2	1804	CON	5094	FL1	1172	FL2	1406
	FL3	5664	GA1	1040	GA2	862	ID2	162
	IL1	1590	IL2	166	IO1	494	IO2	1546
	KS2	1056	LA1	878	LA2	2102	MAS	4700
	ME1	442	ME2	184	MI3	166	MN1	270
	MN2	2242	MO1	3028	MO2	564	MS2	894
	MT1	124	MT2	154	NC2	88	ND1	146
	ND2	392	NE2	1262	NH	778	NJ	5444
	NM1	402	NM2	128	NV1	166	NV2	394
	NY1	490	NY2	4172	NY3	8482	OK1	360
	OK2	1506	OR1	848	PA2	1682	RI	790
	SC2	540	SD2	220	TN1	1134	TX1	342
	TX2	226	TX3	634	TX4	2142	TX5	766
	TX6	4170	UT1	636	VT	246	WA1	1136
	WA2	458	WI1	490	WI2	4288	WY2	128
WV2	Total =	23606						
	AK1	250	AK2	50	AL1	686	AL2	258
	AZ2	330	CA1	76	CA2	926	CA3	1450
	CO2	516	CON	1316	FL1	270	FL2	360

	FL3	1546	GA1	732	GA2	408	ID2	42
	IL1	480	IL2	92	IO1	140	IO2	384
	KS2	284	LA1	216	LA2	572	MAS	1508
	ME1	120	ME2	48	MN1	72	MN2	692
	MO1	848	MO2	134	MS2	212	MT1	32
	MT2	38	NC2	166	ND1	34	ND2	98
	NE2	352	NH	220	NM1	116	NM2	28
	NV1	46	NV2	116	NY2	336	OK1	80
	OK2	440	OR1	246	RI	272	SC2	596
	SD2	56	TN1	756	TN2	240	TX1	98
	TX2	60	TX3	158	TX4	566	TX5	190
	TX6	1150	UT1	186	VT	70	WA1	330
	WA2	122	WI1	122	WI2	1240	WY2	28

WY2 Total = 29276

AK1	186	AK2	28	AL1	324	AL2	146
AZ2	578	CA1	102	CA2	1566	CA3	2556
CON	520	DEL	98	FL1	134	FL2	172
FL3	864	GA1	332	GA2	160	ID2	84
IL1	1172	IL2	42	IN1	752	IN2	56
IO1	128	IO2	236	KS2	306	KY1	28
KY2	246	LA1	154	LA2	416	MAS	550
MD	650	ME1	40	ME2	16	MI3	1198
MN1	56	MN2	684	MO1	666	MO2	98
MS2	122	MT1	56	NC1	440	NC2	196
ND2	106	NE2	420	NH	76	NJ	712
NM1	218	NM2	32	NV1	74	NV2	228
NY1	328	NY2	522	NY3	1066	OH1	864
OH2	666	OK1	72	OK2	498	OR1	416
PA1	404	PA2	852	RI	104	SC1	134
SC2	226	SD2	60	TN1	410	TN2	326
TX1	146	TX2	78	TX3	172	TX4	562
TX5	164	TX6	1080	VA1	92	VA2	354
VT	22	WA1	552	WA2	208	WI1	70
WI2	648	WV1	128	WV2	28		

Total For Matrix = 15150000

A-4 - 20 NODE WESTERN UNION FIXED K_a-BAND TO SMSA MAPPING

SMSA/FIXED BEAM MAPPING

FX1 42
ALNY ALPA ATNJ BAMD BINY BRCT BICT DACT FAMA FIMA HAPA HACT JENJ LAPA
LONJ MECT NANY NEMA NECT NENJ NWCT NLCT NENY NWNJ NWNY NOPA NOCT PANJ
PHPA PIMA PONY PRRI REPA SPCT STCT TRNJ VINJ WACT WIPA WIDE WOMA YOPA
FX2 33
ANIN ANMI BAMI BEMI BLIN CIIL CIOH COOH DAOH DEMI ELIN FLMI FOIN GAIN
GRMI HAOH ININ JAMI KAMI KAIL KOIN LAIN LAMI LIOH LOOH MAOH MUIN MUMI
NEOH SOIN SPOH TEIN TOOH
FX3 19
BUNC CHWV CHVA CUMD DAVA FANC GRNC GRSC HAMD HINC LYVA NEVA NOVA PEVA
RANC RIVA ROVA SANC WADC
FX4 15
AKOH ATPA BUNY CAOH CLOH ELNY ERPA JOPA PIPA RONY SHPA STPA STOH WHWV
YOOH
FX5 20
APWI BLIL CEIA CHIL DAIA DEIL DUIA GRWI IOIW JAWI KEWI LAWI MAWI MIWI
PEIL RAWI ROIL SHWI SPIL WAIA
FX6 15
ALGA ANSC ANAL ASNC ATGE ATGA AUGA CHNC CHTN COSC COGA GAAL KNTN MAGA
ROSC
FX7 12
AUTX BETX BYTX DATX GATX HOTX KITX LOTX SNTX TYTX VITX WATX
FX8 13
BRFL DAFL FOFL FRFL GAFL JAFL LAFL MEFL OCFL ORFL SAFL TMFL WEFL
FX9 12
BAME BOMA BRMA BUVT GLNY LAMA LEME LOMA MANH NANH POME PONH
FX10 7
CLTN EVIN LEKY LOKY NATN OWKY SLMO
FX11 11
BACA FRCA LOCA MOCA OXCA SLCA SJCA STCA SOCA SOCA VICA
FX12 10
COMO JOMO KAMO LAKS LINE OMNE STMO SPMO TOKS WIKS
FX13 10
ALLA BALA BIMS JAMS MOAL MOLA NELA PAMS PIAR TUAL
FX14 6
DUMN EAWI MIMN ROMN STMN WAWI
FX15 6
BIAL FTFL HUAL MNAL PAFL PEFL
FX16 8
CHCA RECA RENV SACA SFCA SRCA VACA YUCA
FX17 9
BRWA OLWA POOR RIWA SAOR SEWA SPWA TAWA YAWA
FX18 6
ENOK LAOK OKOK SHTX TUOK WITX
FX19 6
CAWY COCO DECO FOCO GRCO PUCO

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EX20    5
FAAR FOAR LIAR METN TETX
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A-5 - 20 NODE TRAFFIC MATRIX

Ka Fixed Trunking (HVC) -- Year 2008

KA FIXED 1	Total = 1300169						
KA FIXED 2	322543	KA FIXED 3	81314	KA FIXED 4	34877	KA FIXED 5	124112
KA FIXED 6	120118	KA FIXED 7	67726	KA FIXED 8	84006	KA FIXED 9	7471
KA FIXED 10	62913	KA FIXED 11	58495	KA FIXED 12	55822	KA FIXED 13	55743
KA FIXED 14	40803	KA FIXED 15	36589	KA FIXED 16	28488	KA FIXED 17	32207
KA FIXED 18	30389	KA FIXED 19	27675	KA FIXED 20	28878		
KA FIXED 2	Total = 1078763						
KA FIXED 1	322543	KA FIXED 3	99595	KA FIXED 4	20678	KA FIXED 5	11703
KA FIXED 6	81393	KA FIXED 7	62392	KA FIXED 8	59771	KA FIXED 9	52231
KA FIXED 10	10300	KA FIXED 11	50808	KA FIXED 12	58871	KA FIXED 13	50027
KA FIXED 14	33491	KA FIXED 15	30325	KA FIXED 16	23543	KA FIXED 17	26478
KA FIXED 18	29956	KA FIXED 19	25774	KA FIXED 20	28884		
KA FIXED 3	Total = 540853						
KA FIXED 1	81314	KA FIXED 2	99595	KA FIXED 4	14207	KA FIXED 5	45810
KA FIXED 6	21229	KA FIXED 7	29345	KA FIXED 8	39152	KA FIXED 9	27641
KA FIXED 10	21985	KA FIXED 11	24260	KA FIXED 12	22225	KA FIXED 13	24658
KA FIXED 14	15267	KA FIXED 15	15939	KA FIXED 16	10765	KA FIXED 17	11819
KA FIXED 18	12387	KA FIXED 19	10673	KA FIXED 20	12582		
KA FIXED 4	Total = 372647						
KA FIXED 1	34877	KA FIXED 2	20678	KA FIXED 3	14207	KA FIXED 5	39312
KA FIXED 6	36216	KA FIXED 7	23624	KA FIXED 8	26080	KA FIXED 9	21896
KA FIXED 10	17249	KA FIXED 11	20439	KA FIXED 12	20408	KA FIXED 13	18954
KA FIXED 14	15616	KA FIXED 15	12549	KA FIXED 16	9363	KA FIXED 17	10534
KA FIXED 18	10666	KA FIXED 19	9534	KA FIXED 20	10445		
KA FIXED 5	Total = 462321						
KA FIXED 1	124112	KA FIXED 2	11703	KA FIXED 3	45810	KA FIXED 4	39312
KA FIXED 6	33581	KA FIXED 7	28742	KA FIXED 8	22095	KA FIXED 9	15871
KA FIXED 10	8312	KA FIXED 11	26868	KA FIXED 12	13985	KA FIXED 13	19272
KA FIXED 14	2026	KA FIXED 15	11207	KA FIXED 16	10758	KA FIXED 17	11950
KA FIXED 18	13806	KA FIXED 19	12364	KA FIXED 20	10547		
KA FIXED 6	Total = 478756						
KA FIXED 1	120118	KA FIXED 2	81393	KA FIXED 3	21229	KA FIXED 4	36216
KA FIXED 5	33581	KA FIXED 7	27534	KA FIXED 8	22947	KA FIXED 9	16143
KA FIXED 10	6054	KA FIXED 11	19718	KA FIXED 12	18893	KA FIXED 13	15928
KA FIXED 14	11370	KA FIXED 15	2036	KA FIXED 16	8391	KA FIXED 17	8966
KA FIXED 18	11015	KA FIXED 19	8604	KA FIXED 20	8620		

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KA FIXED 7      Total =  411000
         KA FIXED 1     67726    KA FIXED 2     62392    KA FIXED 3     29345    KA FIXED 4     23624
         KA FIXED 5     28742    KA FIXED 6     27534    KA FIXED 8     22279    KA FIXED 9     11157
         KA FIXED 10    16536    KA FIXED 11    23355    KA FIXED 12    20160    KA FIXED 13    11705
         KA FIXED 14    10216    KA FIXED 15    12233    KA FIXED 16    10211    KA FIXED 17    10191
         KA FIXED 18     5698    KA FIXED 19    11626    KA FIXED 20     6270

KA FIXED 8      Total =  404229
         KA FIXED 1     84006    KA FIXED 2     59771    KA FIXED 3     39152    KA FIXED 4     26080
         KA FIXED 5     22095    KA FIXED 6     22947    KA FIXED 7     22279    KA FIXED 9     12143
         KA FIXED 10    15090    KA FIXED 11    16222    KA FIXED 12    13051    KA FIXED 13    18772
         KA FIXED 14     7847    KA FIXED 15     7439    KA FIXED 16     6967    KA FIXED 17     7323
         KA FIXED 18     8173    KA FIXED 19     6664    KA FIXED 20     8208

KA FIXED 9      Total =  236484
         KA FIXED 1      7471    KA FIXED 2     52231    KA FIXED 3     27641    KA FIXED 4     21896
         KA FIXED 5     15871    KA FIXED 6     16143    KA FIXED 7     11157    KA FIXED 8     12143
         KA FIXED 10     9520    KA FIXED 11    11862    KA FIXED 12     8132    KA FIXED 13     7781
         KA FIXED 14     6548    KA FIXED 15     4820    KA FIXED 16     4801    KA FIXED 17     5378
         KA FIXED 18     4528    KA FIXED 19     4401    KA FIXED 20     4160

KA FIXED 10     Total =  238116
         KA FIXED 1     62913    KA FIXED 2     10300    KA FIXED 3     21985    KA FIXED 4     17249
         KA FIXED 5      8312    KA FIXED 6      6054    KA FIXED 7     16536    KA FIXED 8     15090
         KA FIXED 9      9520    KA FIXED 11    11313    KA FIXED 12     8769    KA FIXED 13    11036
         KA FIXED 14     8384    KA FIXED 15     3467    KA FIXED 16     5213    KA FIXED 17     5695
         KA FIXED 18     7376    KA FIXED 19     5903    KA FIXED 20     3001

KA FIXED 11     Total =  376490
         KA FIXED 1     58495    KA FIXED 2     50808    KA FIXED 3     24260    KA FIXED 4     20439
         KA FIXED 5     26868    KA FIXED 6     19718    KA FIXED 7     23355    KA FIXED 8     16222
         KA FIXED 9     11862    KA FIXED 10    11313    KA FIXED 12    17160    KA FIXED 13    14528
         KA FIXED 14    10052    KA FIXED 15     7837    KA FIXED 16     5786    KA FIXED 17    23821
         KA FIXED 18    11088    KA FIXED 19    14883    KA FIXED 20     7995

KA FIXED 12     Total =  315155
         KA FIXED 1     55822    KA FIXED 2     58871    KA FIXED 3     22225    KA FIXED 4     20408
         KA FIXED 5     13985    KA FIXED 6     18893    KA FIXED 7     20160    KA FIXED 8     13051
         KA FIXED 9      8132    KA FIXED 10     8769    KA FIXED 11    17160    KA FIXED 13    12621
         KA FIXED 14     8128    KA FIXED 15     7251    KA FIXED 16     7252    KA FIXED 17     7787
         KA FIXED 18     1968    KA FIXED 19    10005    KA FIXED 20     2667

KA FIXED 13     Total =  295558
         KA FIXED 1     55743    KA FIXED 2     50027    KA FIXED 3     24658    KA FIXED 4     18954
         KA FIXED 5     19272    KA FIXED 6     15928    KA FIXED 7     11705    KA FIXED 8     18772
         KA FIXED 9      7781    KA FIXED 10    11036    KA FIXED 11    14528    KA FIXED 12    12621
         KA FIXED 14     6968    KA FIXED 15      291    KA FIXED 16     5954    KA FIXED 17     6107
         KA FIXED 18     7383    KA FIXED 19     6345    KA FIXED 20     1485

KA FIXED 14     Total =  206100
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	KA FIXED 1	40803	KA FIXED 2	33491	KA FIXED 3	15267	KA FIXED 4	15616
	KA FIXED 5	2026	KA FIXED 6	11370	KA FIXED 7	10216	KA FIXED 8	7847
	KA FIXED 9	6548	KA FIXED 10	8384	KA FIXED 11	10052	KA FIXED 12	8128
	KA FIXED 13	6968	KA FIXED 15	4025	KA FIXED 16	4634	KA FIXED 17	5417
	KA FIXED 18	5299	KA FIXED 19	5591	KA FIXED 20	4418		
KA FIXED 15 Total = 172740								
	KA FIXED 1	36589	KA FIXED 2	30325	KA FIXED 3	15939	KA FIXED 4	12549
	KA FIXED 5	11207	KA FIXED 6	2036	KA FIXED 7	12233	KA FIXED 8	7439
	KA FIXED 9	4820	KA FIXED 10	3467	KA FIXED 11	7837	KA FIXED 12	7251
	KA FIXED 13	291	KA FIXED 14	4025	KA FIXED 16	3180	KA FIXED 17	3324
	KA FIXED 18	4505	KA FIXED 19	3295	KA FIXED 20	2428		
KA FIXED 16 Total = 172901								
	KA FIXED 1	28488	KA FIXED 2	23543	KA FIXED 3	10765	KA FIXED 4	9363
	KA FIXED 5	10758	KA FIXED 6	8391	KA FIXED 7	10211	KA FIXED 8	6967
	KA FIXED 9	4801	KA FIXED 10	5213	KA FIXED 11	5786	KA FIXED 12	7252
	KA FIXED 13	5954	KA FIXED 14	4634	KA FIXED 15	3180	KA FIXED 17	13282
	KA FIXED 18	4542	KA FIXED 19	6478	KA FIXED 20	3293		
KA FIXED 17 Total = 205066								
	KA FIXED 1	32207	KA FIXED 2	26478	KA FIXED 3	11819	KA FIXED 4	10534
	KA FIXED 5	11950	KA FIXED 6	8966	KA FIXED 7	10191	KA FIXED 8	7323
	KA FIXED 9	5378	KA FIXED 10	5695	KA FIXED 11	23821	KA FIXED 12	7787
	KA FIXED 13	6107	KA FIXED 14	5417	KA FIXED 15	3324	KA FIXED 16	13282
	KA FIXED 18	4623	KA FIXED 19	6738	KA FIXED 20	3426		
KA FIXED 18 Total = 180887								
	KA FIXED 1	30389	KA FIXED 2	29956	KA FIXED 3	12387	KA FIXED 4	10666
	KA FIXED 5	13806	KA FIXED 6	11015	KA FIXED 7	5698	KA FIXED 8	8173
	KA FIXED 9	4528	KA FIXED 10	7376	KA FIXED 11	11088	KA FIXED 12	1968
	KA FIXED 13	7383	KA FIXED 14	5299	KA FIXED 15	4505	KA FIXED 16	4542
	KA FIXED 17	4623	KA FIXED 19	6189	KA FIXED 20	1296		
KA FIXED 19 Total = 186683								
	KA FIXED 1	27675	KA FIXED 2	25774	KA FIXED 3	10673	KA FIXED 4	9534
	KA FIXED 5	12364	KA FIXED 6	8604	KA FIXED 7	11626	KA FIXED 8	6664
	KA FIXED 9	4401	KA FIXED 10	5903	KA FIXED 11	14883	KA FIXED 12	10005
	KA FIXED 13	6345	KA FIXED 14	5591	KA FIXED 15	3295	KA FIXED 16	6478
	KA FIXED 17	6738	KA FIXED 18	6189	KA FIXED 20	3941		
KA FIXED 20 Total = 152544								
	KA FIXED 1	28878	KA FIXED 2	28884	KA FIXED 3	12582	KA FIXED 4	10445
	KA FIXED 5	10547	KA FIXED 6	8620	KA FIXED 7	6270	KA FIXED 8	8208
	KA FIXED 9	4160	KA FIXED 10	3001	KA FIXED 11	7995	KA FIXED 12	2667
	KA FIXED 13	1485	KA FIXED 14	4418	KA FIXED 15	2428	KA FIXED 16	3293
	KA FIXED 17	3426	KA FIXED 18	1296	KA FIXED 19	3941		

Total For Matrix = 7787462

A-6 - V AND H COORDINATES FOR 316 SMSA's

PRESTORED SMSA CITIES (SHEET 1 OF 7)

	CODE	DESCRIPTIVE NAME	VERTICAL COORDINATE	HORIZONTAL COORDINATE
1	ABTX	ABILENE TX	8698	4513
2	AKOH	AKRON OH	5637	2472
3	ALGA	ALBANY GA	7649	1817
4	ALNY	ALBANY-SCHENECTADY-TROY NY	4639	1629
5	ALNM	ALBUQUERQUE NM	8549	5887
6	ALLA	ALEXANDRIA LA	8409	3168
7	ALPA	ALLENTOWN-BETHLEHEM-EASTON PA-NJ	5166	1585
8	ATPA	ALTOONA PA	5460	1972
9	AMTX	AMARILLO TX	8266	5076
10	ANCA	ANAHEIM-SANTA ANA-GARDEN GROVE CA	9250	7810
11	ANIN	ANDERSON IN	6173	2958
12	ANSC	ANDERSON SC	6961	1894
13	ANMI	ANN ARBOR MI	5602	2908
14	ANAL	ANNISTON AL	7406	2304
15	APWI	APPLETON-OSHKOSH WI	5589	3776
16	ASNC	ASHEVILLE NC	6749	2001
17	ATGE	ATHENS GE	7130	1948
18	ATGA	ATLANTA GA	7260	2083
19	ATNJ	ATLANTIC CITY NJ	5284	1284
20	AUGA	AUGUSTA GA-SC	7089	1674
21	AUTX	AUSTIN TX	9005	3996
22	BACA	BAKERSFIELD CA	8497	8060
23	BAMD	BALTIMORE MD	5510	1575
24	BAME	BANGOR ME	3777	1322
25	BALA	BATON ROUGE LA	8476	2874
26	BAMI	BATTLE CREEK MI	5713	3124
27	BYMI	BAY CITY MI	5368	3085
28	BETX	BEAUMONT-PORT ARTHUR-ORANGE TX	8777	3344
29	BEWA	BELLINGHAM WA	6087	8933
30	BEMI	BENTON HARBOR MI	5850	3281
31	BIMT	BILLINGS MT	6391	6790
32	BIMS	BILOXI-GULFPORT MS	8296	2481
33	BINY	BINGHAMTON NY-PA	4943	1837
34	BIAL	BIRMINGHAM AL	7518	2446
35	BIND	BISMARK ND	5840	5736
36	BLIN	BLOOMINGTON IN	6417	2984
37	BLIL	BLOOMINGTON-NORMAL IL	6358	3483
38	BOID	BOISE CITY ID	7096	7869
39	BOMA	BOSTON MA	4422	1249
40	BRFL	BRADENTON FL	8270	1116
41	BRWA	BREMERTON WA	6349	8940
42	BRCT	BRIDGEPORT CT	4841	1360
43	BICT	BRISTOL CT	4730	1394
44	BRMA	BROCKTON MA	4465	1205
45	BRTX	BROWNSVILLE-HARLINGEN-SAN BENI TX	9820	3663
46	BYTX	BRYAN-COLLEGE STATION TX	8827	3788
47	BUNY	BUFFALO NY	5075	2326

PRESTORED SMSA CITIES (SHEET 2 OF 7)

	CODE	DESCRIPTIVE NAME	VERTICAL COORDINATE	HORIZONTAL COORDINATE
48	BUNC	BURLINGTON NC	6364	1588
49	BUVT	BURLINGTON VT	4270	1808
50	CAOH	CANTON OH	5676	2419
51	CAWY	CASPER WY	6918	6297
52	CEIA	CEDAR RAPIDS IA	6261	4021
53	CHIL	CHAMPAIGN-URBANA-RANTOUL IL	6371	3336
54	CHSC	CHARLESTON-NORTH CHARLESTON SC	7021	1281
55	CHWV	CHARLESTON WV	6152	2174
56	CHNC	CHARLOTTE-GASTONIA NC	6657	1698
57	CHVA	CHARLOTTESVILLE VA	5919	1683
58	CHTN	CHATTANOOGA TN-GA	7098	2366
59	CIIL	CHICAGO IL	5986	3426
60	CHCA	CHICO CA	8057	8668
61	CIOH	CINCINNATI OH-KY	6263	2679
62	CLTN	CLARKSVILLE-HOPKINSVILLE TN-KY	6988	2837
63	CLOH	CLEVELAND OH	5574	2543
64	COCO	COLORADO SPRINGS CO	7679	5813
65	COMO	COLUMBIA MO	6901	3841
66	COSC	COLUMBIA SC	6901	1589
67	COGA	COLUMBUS GA-AL	7556	2045
68	COOH	COLUMBUS OH	5972	2555
69	COTX	CORPUS CHRISTI TX	9475	3739
70	CUMD	CUMBERLAND MD-WV	5650	1916
71	DATX	DALLAS-FORT WORTH TX	8436	4034
72	DACT	DANBURY CT	4829	1423
73	DAVA	DANVILLE VA	6270	1640
74	DAIA	DAVENPORT-ROCK ISLAND-MOLINE IA-IL	6273	3817
75	DAOH	DAYTON OH	6113	2705
76	DAFL	DAYTONA BEACH FL	7791	1032
77	DEIL	DECATUR IL	6478	3413
78	DECO	DENVER-BOULDER CO	7501	5899
79	DEIA	DES MOINES IA	6471	4275
80	DEMI	DETROIT MI	5536	2828
81	DUIA	DUBUQUE IA	6088	3925
82	DUMN	DULUTH-SUPERIOR MN-WI	5352	4530
83	EAWI	EAU CLAIRE WI	5698	4261
84	ELTX	EL PASO TX	9231	5655
85	ELIN	ELKHART IN	5895	3168
86	ELNY	ELMIRA NY	5029	1953
87	ENOK	ENID OK	7783	4505
88	ERPA	ERIE PA	5321	2397
89	EUOR	EUGENE-SPRINGFIELD OR	7128	8954
90	EVIN	EVANSVILLE IN-KY	6729	3019
91	FAMA	FALL RIVER MA-RI	4543	1170
92	FAND	FARGO-MOORHEAD ND-MN	5615	5182
93	FANC	FAYETTEVILLE NC	6501	1385
94	FAAR	FAYETTEVILLE-SPRINGDALE AR	7600	3872

PRESTORED SMSA CITIES (SHEET 3 OF 7)

	CODE	DESCRIPTIVE NAME	VERTICAL COORDINATE	HORIZONTAL COORDINATE
95	FIMA	FITCHBURG-LEOMINSTER MA	4459	1374
96	FLMI	FLINT MI	5461	2993
97	FLAL	FLORENCE AL	7344	2715
98	FOSC	FORENCE SC	6744	1417
99	FOCO	FORT COLLINS CO	7331	5965
100	FOFL	FORT LAUDERDALE-HOLLYWOOD FL	8282	557
101	FRFL	FORT MYERS FL	8359	904
102	FOAR	FORT SMITH AR-OK	7752	3855
103	FTFL	FORT WALTON BEACH FL	8097	2097
104	FOIN	FORT WAYNE IN	5942	2982
105	FRCA	FRESNO CA	8669	8239
106	GAAL	GADSDEN AL	7355	2368
107	GAFL	GAINESVILLE FL	7838	1310
108	GATX	GALVESTON-TEXAS CITY TX	8985	3397
109	GAIN	GARY-HAMMOND-EAST CHICAGO IN	6017	3354
110	GLNY	GLENS FALLS NY	4515	1704
111	GRND	GRAND FORKS ND-MN	5418	5297
112	GRMI	GRAND RAPIDS MI	5628	3261
113	GRMT	GREAT FALLS MT	6120	7281
114	GRCO	GREELEY CO	7345	5895
115	GRWI	GREEN BAY WI	5512	3747
116	GRNC	GREENSBORO-WINSTON-SALEM-HIGH NC	6400	1638
117	GRSC	GREENVILLE-SPARTANBURG SC	6250	1226
118	HAMD	HAGERSTOWN MD	5555	1772
119	HAOH	HAMILTON-MIDDLETOWN OH	6210	2718
120	HAPA	HARRISBURG PA	5363	1733
121	HACT	HARTFORD CT	4687	1373
122	HINC	HICKORY NC	6611	1833
123	HOTX	HOUSTON TX	8938	3536
124	HUWV	HUNTINGTON-ASHLAND WV-KY	6212	2299
125	HUAL	HUNTSVILLE AL	7267	2535
126	ININ	INDIANAPOLIS IN	6272	2992
127	IOIW	IOWA CITY IW	6313	3972
128	JAMI	JACKSON MI	5663	3009
129	JAMS	JACKSON MS	8035	2880
130	JAFL	JACKSONVILLE FL	7649	1276
131	JANC	JACKSONVILLE NC	6412	1131
132	JAWI	JANESVILLE-BELIOT WI	5970	3688
133	JENJ	JERSEY CITY NJ	5006	1409
134	JOTN	JOHNSON CITY-KINGSPORT-BRISTOL TN-VA	6595	2050
135	JOPA	JOHNSTOWN PA	5542	2021
136	JOMO	JOPLIN MO	7421	4015
137	KAMI	KALAMAZOO-PORTAGE MI	5749	3177
138	KAIL	KANKAKEE IL	6149	3381
139	KAMO	KANSAS CITY MO-KS	7027	4203
140	KEWI	KENOSHA WI	5865	3526
141	KITX	KILLEEN-TEMPLE TX	8832	4063

PRESTORED SMSA CITIES (SHEET 4 OF 7)

	CODE	DESCRIPTIVE NAME	VERTICAL COORDINATE	HORIZONTAL COORDINATE
142	KNTN	KNOXVILLE TN	6801	2251
143	KOIN	KOKOMO IN	6135	3063
144	LAWI	LA CROSSE WI	5874	4133
145	LALA	LAFAYETTE LA	8587	2996
146	LAIN	LAFAYETTE-WEST LAFAYETTE IN	6206	3167
147	LKLA	LAKE CHARLES LA	8679	3202
148	LAFL	LAKELAND-WINTER HAVEN FL	8084	1034
149	LAPA	LANCASTER PA	5348	1626
150	LAMI	LANSING-EAST LANSING MI	5584	3081
151	LATX	LAREDO TX	9681	4099
152	LANM	LAS CRUCES NM	9132	5742
153	LANV	LAS VEGAS NV	8665	7411
154	LAKS	LAWRENCE KS	7098	4294
155	LAMA	LAWRENCE-HAVERHILL MA-NH	4373	1311
156	LAOK	LAWTON OK	8178	4451
157	LEME	LEWISTON-AUBURN ME	4042	1391
158	LEKY	LEXINGTON-FAYETTE KY	6459	2562
159	LIOH	LIMA OH	5921	2799
160	LINE	LINCOLN NE	6823	4674
161	LIAR	LITTLE ROCK-NORTH LITTLE ROCK AR	7721	3451
162	LONJ	LONG BRANCH-ASBURY PARK NJ	5073	1348
163	LOTX	LONGVIEW TX	8348	3660
164	LOOH	LORAIN-ELYRIA OH	5623	2608
165	LOCA	LOS ANGELES-LONG BEACH CA	9213	7878
166	LOKY	LOUISVILLE KY-IN	6529	2772
167	LOMA	LOWELL MA-NH	4399	1320
168	LUTX	LUBBOCK TX	8598	4962
169	LYVA	LYNCHBURG VA	6093	1703
170	MAGA	MACON GA	7364	1865
171	MAWI	MADISON WI	5887	3796
172	MANH	MANCHESTER NH	4354	1388
173	MAOH	MANSFIELD OH	5783	2575
174	MCTX	MCALLEN-PHARR-EDINBURG TX	9856	3764
175	MEOR	MEDFORD OR	7503	8892
176	MEFL	MELBOURNE-TITUSVILLE-COCOA FL	7925	903
177	METN	MEMPHIS TN-AR	7471	3125
178	MECT	MERIDEN CT	4740	1358
179	MIFL	MIAMI FL	8351	527
180	MITX	MIDLAND TX	8934	4888
181	MIWI	MILWAUKEE WI	5788	3589
182	MIMN	MINNEAPOLIS-ST PAUL MN-WI	5781	4525
183	MOAL	MOBILE AL	8167	2367
184	MOCA	MODESTO CA	8499	8473
185	MOLA	MONROE LA	8148	3218
186	MNAL	MONTGOMERY AL	7692	2247
187	MUIN	MUNCIE IN	6130	2925
188	MUMI	MUSKEGON-NORTON SHORES-MUSKEGO MI	5622	3370

PRESTORED SMSA CITIES (SHEET 5 OF 7)

	CODE	DESCRIPTIVE NAME	VERTICAL COORDINATE	HORIZONTAL COORDINATE
189	NANH	NASHUA NH	4394	1356
190	NATN	NASHVILLE-DAVIDSON TN	7010	2710
191	NANY	NASSAU-SUFFOLK NY	4961	1355
192	NEMA	NEW BEDFORD MA	4532	1131
193	NECT	NEW BRITAIN CT	4715	1373
194	NENJ	NEW BRUNSWICK-PERTH AMBOY-SAYR NJ	5085	1434
195	NWCT	NEW HAVEN-WEST HAVEN CT	4792	1342
196	NLCT	NEW LONDON-NORWICH CT-RI	4700	1242
197	NELA	NEW ORLEANS LA	8483	2638
198	NENY	NEW YORK NY-NJ	4997	1406
199	NWNJ	NEWARK NJ	5015	1430
200	NEOH	NEWARK OH	5904	2480
201	NWNY	NEWBRGH-MIDDLETOWN NY	4915	1556
202	NEVA.	NEWPORT NEWS-HAMPTON VA	5908	1260
203	NOVA	NORFOLK-VIRGINIA BEACH-PORTSMO VA-NC	5918	1223
204	NOPA	NORTHEAST PENNSYLVANIA PA	5068	1719
205	NOCT	NORWALK CT	4877	1379
206	OCFL	OCALA FL	7909	1227
207	ODTX	ODESSA TX	8982	4930
208	OKOK	OKLAHOMA CITY OK	7947	4373
209	OLWA	OLYMPIA WA	6469	8971
210	OMNE	OMAHA NE-IA	6687	4595
211	ORFL	ORLANDO FL	7954	1031
212	OWKY	OWENSBORO KY	6731	2928
213	OXCA	OXNARD-SIMI VALLEY-VENTURA CA	9205	8050
214	PAFL	PANAMA CITY FL	8057	1914
215	PAWV	PARKERSBURG-MARIETTA WV-OH	5976	2268
216	PAMS	PASCAGOULA-MOSS POINT PATERSON MS	8273	2419
217	PANJ	PATERSON-CLIFTON-PASSAIC NJ	4984	1452
218	PEFL	PENSACOLA FL	8147	2200
219	PEIL	PEORIA IL	6362	3592
220	PEVA	PETERSBURG-COLONIAL HEIGHTS-HO VA	5961	1429
221	PHPA	PHILADELPHIA PA-NJ	5251	1458
222	PHAZ	PHOENIX AZ	9135	6748
223	PIAR	PINE BLUFF AR	7803	3358
224	PIPA	PITTSBURGH PA	5621	2185
225	PIMA	PITTSFIELD MA	4626	1539
226	POME	PORTLAND ME	4121	1334
227	POOR	PORTLAND OR-WA	6799	8914
228	PONH	PORTSMOUTH-DOVER-ROCHESTER NH-ME	3760	1431
229	PONY	POUGHKEEPSIE NY	4821	1526
230	PRRI	PROVIDENCE-WARWICK-PAWTUCKET RI-MA	4550	1219
231	PROT	PROVO-OREM UT	7680	7006
232	PUCO	PUEBLO CO	7787	5742
233	RAWI	RACINE WI	5837	3535
234	RANC	RALEIGH-DURHAM NC	6344	1436
235	REPA	READING PA	5258	1612

PRESTORED SMSA CITIES (SHEET 6 OF 7)

	CODE	DESCRIPTIVE NAME	VERTICAL COORDINATE	HORIZONTAL COORDINATE
236	RECA	REDDING CA	7880	8778
237	RENV	RENO NV	8064	8323
238	RIWA	RICHLAND-KENNEWICK WA	6583	8415
239	RIVA	RICHMOND VA	5906	1472
240	RICA	RIVERSIDE-SAN BERNARDINO-ONTAR CA	9172	7710
241	ROVA	ROANOKE VA	6196	1801
242	ROMN	ROCHESTER MN	5916	4326
243	RONY	ROCHESTER NY	4913	2195
244	ROIL	ROCKFORD IL	6022	3675
245	ROSC	ROCK HILL SC	6730	1692
246	SACA	SACRAMENTO CA	8304	8580
247	SAMI	SAGINAW MI	5404	3074
248	STMN	ST CLOUD MN	5721	4705
249	STMO	ST JOSEPH MO	6913	4301
250	SLMO	ST LOUIS MO-IL	6807	3482
251	SAOR	SALEM OR	6929	8958
252	SLCA	SALINAS-SEASIDE-MONTEREY CA	8722	8560
253	SANC	SALISBURY-CONCORD NC	6601	1679
254	SAUT	SALT LAKE CITY-OGDEN UT	7576	7065
255	SATX	SAN ANGELO TX	8944	4563
256	SNTX	SAN ANTONIO TX	9225	4062
257	SNCA	SAN DIEGO CA	9468	7629
258	SFCA	SAN FRANCISCO-OAKLAND CA	8492	8719
259	SJCA	SAN JOSE CA	8583	8619
260	STCA	SANTA BARBARA-SANTA MARIA-LOMP CA	9171	8150
261	SCCA	SANTA CRUZ CA	8664	8633
262	SRCA	SANTA ROSA CA	8354	8787
263	SAFL	SARASOTA FL	8295	1094
264	SAGA	SAVANNAH GA	7266	1379
265	SEWA	SEATTLE-EVERETT WA	6336	8896
266	SHPA	SHARON PA	5520	2348
267	SHWI	SHEBOYGAN WI	5633	3629
268	SHTX	SHERMAN-DENISON TX	8253	4072
269	SHLA	SHREVEPORT LA	8272	3495
270	SINE	SIOUX CITY NE-IA	6468	4768
271	SISD	SIOUX FALLS SD	6279	4900
272	SOIN	SOUTH BEND IN	5918	3206
273	SPWA	SPOKANE WA	6247	8180
274	SPIL	SPRINGFIELD IL	6539	3513
275	SPMO	SPRINGFIELD MO	7310	3836
276	SPOH	SPRINGFIELD OH	6049	2666
277	SPCT	SPINGFIELD-CHICOPEE-HOLYOKE CT-MA	4620	1408
278	STCT	STAMFORD CT	4897	1388
279	STPA	STATE COLLEGE PA	5360	1933
280	STOH	STEUBENVILLE-WEIRTON OH-WV	5689	2262
281	SOCA	STOCKTON CA	8435	8530
282	SYNY	SYRACUSE NY	4798	1990

PRESTORED SMSA CITIES (SHEET 7 OF 7)

	CODE	DESCRIPTIVE NAME	VERTICAL COORDINATE	HORIZONTAL COORDINATE
283	TAWA	TACOMA WA	6415	8906
284	TAFL	TALLAHASSEE FL	7877	1716
285	TMFL	TAMPA-ST PETERSBURG FL	8173	1147
286	TEIN	TERRE HAUTE IN	6428	3145
287	TETX	TEXARKANA TX-AR	8111	3626
288	TOOH	TOLEDO OH-MI	5704	2820
289	TOKS	TOPEKA KS	7110	4369
290	TRNJ	TRENTON NJ	5164	1440
291	TUAZ	TUCSON AZ	9345	6485
292	TUOK	TULSA OK	7707	4173
293	TUAL	TUSCALOOSA AL	7643	2535
294	TYTX	TYLER TX	8417	3744
295	UTNY	UTICA-ROME NY	4701	1878
296	VACA	VALLEJO-FAIRFIELD-NAPA CA	8422	8699
297	VITX	VICTORIA TX	9245	3748
298	VINJ	VINELAND-MILLVILLE-BRIDGETON NJ	5320	1380
299	VICA	VISALIA-TULARE-PORTERVILLE CA	8746	8139
300	WATX	WACO TX	8706	3993
301	WADC	WASHINGTON DC-MD	5622	1583
302	WACT	WATERBURY CT	4761	1391
303	WAIA	WATERLOO-CEDAR FALLS IA	6208	4167
304	WAWI	WAUSAU WI	5542	4014
305	WEFL	WEST PALM BEACH-BOCA RATON FL	8166	607
306	WHWV	WHEELING WV-OH	5755	2241
307	WIKS	WICHITA KS	7489	4520
308	WITX	WICHITA FALLS TX	8326	4413
309	WIPA	WILLIAMSPORT PA	5200	1873
310	WIDE	WILMINGTON DE-NJ	5326	1485
311	WINC	WILMINGTON NC	6559	1143
312	WOMA	WORCESTER MA	4513	1330
313	YAWA	YAKIMA WA	6533	8607
314	YOPA	YORK PA	5402	1674
315	YOOH	YOUNGSTOWN-WARREN OH	5557	2353
316	YUCA	YUBA CITY CA	8181	8624

A-7 - LATITUDE AND LONGITUDE FOR SMSA CITIES

CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
ABTX	ABILENE TX	32.27	99.45
AKOH	AKRON OH	41.04	81.31
ALGA	ALBANY GA	31.37	84.10
ALNY	ALBANY-SCHENECTADY-TROY NY	42.40	73.49
ALNM	ALBUQUERQUE NM	35.05	106.38
ALLA	ALEXANDRIA LA	31.19	92.29
ALPA	ALLENTOWN-BETHLEHEM-EASTON PA-NJ	40.11	74.36
ATPA	ALTOONA PA	40.32	78.23
AMTX	AMARILLO TX	35.14	101.50
ANCA	ANAHEIM-SANTA ANA-GARDEN GROVE CA	33.50	117.56
ANIN	ANDERSON IN	40.05	85.14
ANSC	ANDERSON SC	34.30	82.39
ANMI	ANN ARBOR MI	42.18	83.43
ANAL	ANNISTON AL	33.38	85.50
APWI	APPLETON-OSHKOSH WI	44.17	88.24
ASNC	ASHEVILLE NC	35.35	82.35
ATGE	ATHENS GE	33.57	83.24
ATGA	ATLANTA GA	33.45	84.23
ATNJ	ATLANTIC CITY NJ	39.23	74.27
AUGA	AUGUSTA GA-SC	33.29	82.00
AUTX	AUSTIN TX	30.18	97.47
BACA	BAKERSFIELD CA	35.25	119.00
BAMD	BALTIMORE MD	39.18	76.38
BAME	BANGOR ME	44.49	68.47
BALA	BATON ROUGE LA	30.30	91.10
BAMI	BATTLE CREEK MI	42.20	85.01
BYMI	BAY CITY MI	43.35	83.52
BETX	BEAUMONT-PORT ARTHUR-ORANGE TX	30.04	94.06
BEWA	BELLINGHAM WA	48.45	122.29
BEMI	BENTON HARBOR MI	42.07	86.27
BIMT	BILLINGS MT	45.47	108.30
BIMS	BILOXI-GULFPORT MS	30.21	89.08
BINY	BINGHAMTON NY-PA	42.06	75.55
BIAL	BIRMINGHAM AL	33.30	86.55
BIND	BISMARCK ND	46.50	100.48
BLIN	BLOOMINGTON IN	39.10	86.31
BLIL	BLOOMINGTON-NORMAL IL	40.29	89.00
BOID	BOISE CITY ID	43.38	115.30
BOMA	BOSTON MA	42.20	71.05
BRFL	BRADENTON FL	27.29	82.33
BRWA	BREMERTON WA	47.34	122.40
BRCT	BRIDGEPORT CT	41.12	73.12
BICT	BRISTOL CT	41.41	72.57
BRMA	BROCKTON MA	48.10	104.55
BRTX	BROWNSVILLE-HARLINGEN-SAN BENI TX	25.54	97.30
BYTX	BRYAN-COLLEGE STATION TX	30.41	96.24
BUNY	BUFFALO NY	42.52	78.55
BUNC	BURLINGTON NC	36.05	79.27
BUVT	BURLINGTON VT	44.28	73.14
CAOH	CANTON OH	40.48	81.23
CAWY	CASPER WY	42.50	106.20
CEIA	CEDAR RAPIDS IA	41.59	91.39
CHIL	CHAMPAIGN-URBANA-RANTOUL IL	40.07	88.14

CHSC	CHARLESTON -NORTH CHARLESTON SC	32.48	79.58
CHWV	CHARLESTON WV	38.23	81.40
CHNC	CHARLOTTE-GASTONIA NC	35.03	80.50
CHVA	CHARLOTTESVILLE VA	38.02	78.29
CHTN	CHATTANOOGA TN-GA	35.02	85.18
CIIL	CHICAGO IL	41.50	87.45
CHCA	CHICO CA	39.46	121.50
CIOH	CINCINNATI OH-KY	39.10	84.30
CLTN	CLARKSVILLE-HOPKINSVILLE TN-KY	36.50	87.30
CLOH	CLEVELAND OH	41.30	81.41
COCO	COLORADO SPRINGS CO	38.50	104.50
COMO	COLUMBIA MO	38.58	92.20
COSC	COLUMBIA SC	34.00	81.00
COGA	COLUMBUS GA-AL	32.28	84.59
COOH	COLUMBUS OH	39.59	83.03
COTX	CORPUS CHRISTITX	27.47	97.26
CUMD	CUMBERLAND MD-WV	39.40	78.47
DATX	DALLAS-FORT WORTH TX	32.47	96.48
DACT	DANBURY CT	41.24	73.26
DAVA	DANVILLE V	36.34	79.25
DAIA	DAVENPORT-ROCK ISLAND-MOLINE IA-IL	41.30	90.34
DAOH	DAYTON OH	39.45	84.10
DAFL	DAYTONA BEACH FL	29.11	81.01
DEIL	DECATUR IL	39.51	88.57
DECO	DENVER-BOULDER CO	39.45	105.00
DEIA	DES MOINES IA	41.35	93.35
DEMI	DETROIT MI	42.23	83.05
DUIA	DUBUQUE IA	42.31	90.41
DUMN	DULUTH-SUPERIOR MN-WI	46.45	92.10
EAWI	EAU CLAIRE WI	44.50	91.30
ELTX	EL PASO TX	31.45	106.30
ELIN	ELKHART IN	41.52	85.56
ELNY	ELMIRA NY	42.06	76.50
ENOK	ENID OK	36.24	97.54
ERPA	ERIE PA	42.07	80.05
EUOR	EUGENE-SPRINGFIELD OR	44.03	123.04
EVIN	EVANSVILLE IN-KY	38.00	87.33
FAMA	FALL RIVER MA-RI	41.42	71.08
FAND	FARGO-MOORHEAD ND-MN	46.52	96.49
FANC	FAYETTEVILLE NC	35.05	78.53
FAAR	FAYETTEVILLE-SPRINGDALE AR	36.03	94.10
FIMA	FITCHBURG-LEOMISTER MA	42.35	71.50
FLMI	FLINT MI	43.03	83.04
FLAL	FLORENCE AL	34.48	87.40
FOSC	FORENCE SC	34.12	79.44
FOCO	FORT COLLINS CO	40.35	105.05
FOFL	FORT LAUDERDALE-HOLLYWOOD FL	26.08	80.08
FRFL	FORT MYERS FL	26.39	81.51
FOAR	FORT SMITH AR-OK	35.22	94.27
FTFL	FORT WALTON BEACH FL	30.25	86.38
FOIN	FORT WAYNE IN	41.05	85.08
FRCA	FRESNO CA	36.41	119.47
GAAL	GADSDEN AL	34.00	86.00
GAFL	GAINESVILLE FL	29.37	82.21

GATX	GALVESTON-TEXAS CITY TX	29.17	94.48
GAIN	GARY-HAMMOND-EAST CHICAGO IN	41.34	87.20
GLNY	GLENS FALLS NY	43.17	73.14
GRND	GRAND FORKS ND-MN	47.57	97.05
GRMI	GRAND RAPIDS MI	42.57	86.40
GRMT	GREATFALLS MT	47.30	111.6
GRCO	GREELEY CO	40.26	104.43
GRWI	GREEN BAY WI	44.32	88.00
GRNC	GREENSBORO-WINSTON -SALEM-HIGH NC	36.03	79.50
GRSC	GREENVILLE-SPARTANBURG SC	34.52	82.25
HAMD	HAGERSTOWN MD	39.39	77.44
HAOH	HAMILTON-MIDDLETOWN OH	39.23	84.33
HAPA	HARRISBURG PA	40.17	76.54
HACT	HARTFORD CT	41.45	72.42
HINC	HICKORY NC	35.44	81.23
HOTX	HOUSTON TX	29.45	95.25
HUWV	HUNTINGTON-ASHLAND WV-KY	38.24	82.26
HUAL	HUNTSVILLE AL	34.44	86.35
ININ	INDIANAPOLIS IN	39.45	86.10
IOIW	IOWA CITY IW	41.39	91.31
JAMI	JACKSON MI	42.15	84.24
JAMS	JACKSON MS	32.20	90.11
JAFL	JACKSONVILLE FL	30.20	81.40
JANC	JACKSONVILLE NC	34.45	77.26
JAWI	JANESVILLE-BELIOT WI	42.42	89.02
JENJ	JERSEY CITY NJ	40.44	74.04
JOTN	JOHNSON CITY-KINGSPORT-BRISTOL TN-VA	36.33	82.34
JOPA	JOHNSONTOWN PA	40.20	78.56
JOMO	JOPLIN MO	48.34	110.47
KAMI	KALAMAZOO-PORTAGE MI	42.17	85.36
KAIL	KANKAKEE IL	41.08	87.52
KAMO	KANSAS CITY MO-KS	39.05	94.37
KEWI	KENOSHA WI	42.34	87.34
KITX	KILLEEN-TEMPLE TX	31.08	97.44
KNTN	KNOXVILLE TN	36.00	83.57
KOIN	KOKOMO IN	40.30	86.09
LAWI	LA CROSSE WI	43.48	91.04
LALA	LAFAYETTE LA	30.12	92.18
LAIN	LAFAYETTE-WEST LAFAYETTE IN	40.25	86.54
LKLA	LAKE CHARLES LA	30.13	93.13
LAFL	LAKELAND-WINTER HAVEN FL	28.02	81.59
LAPA	LANCASTER PA	40.01	76.19
LAMI	LANSING-EAST LANSING MI	42.44	85.34
LATX	LAREDO TX	27.32	99.22
LANM	LAS CRUCES NM	32.18	106.47
LANV	LAS VEGAS NV	36.10	115.10
LAKS	LAWRENCE KS	38.58	95.15
LAMA	LAWRENCE-HAVERHILL MA-NH	42.41	71.12
LAOK	LAWTON OK	34.36	98.25
LEME	LEWISTON-AUBURN ME	44.06	70.14
LEKY	LEXINGTON-FAYETTE KY	38.02	84.30
LIOH	LIMA OH	40.43	84.06
LINE	LINCOLN NE	40.49	96.41
LIAR	LITTLE ROCK-NORTH LITTLE ROCK AR	34.42	92.17

LONJ	LONG BRANCH-ASBURY PARK NJ	40.17	73.59
LOTX	LONGVIEW TX	32.30	94.45
LOOH	LORAIN-ELYRIA OH	41.28	82.11
LOCA	LOS ANGELES-LONG BEACH CA	34.00	118.15
LOKY	LOUISVILLE KY-IN	38.13	85.48
LOMA	LOWELL MA-NH	42.38	71.19
LUTX	LUBBOCK TX	33.35	101.53
LYVA	LYNCHBURG VA	37.24	79.09
MAGA	MACON GA	32.49	83.37
MAWI	MADISON WI	43.04	89.22
MANH	MANCHESTER NH	42.59	71.28
MAOH	MANSFIELD OH	40.46	82.31
MCTX	MCALLEN-PHARR-EDINBURG TX	26.13	98.15
MEOR	MEDFORD OR	42.20	122.52
MEFL	MELBOURNE-TITUSVILLE-COCOA FL	28.04	80.38
METN	MEMPHIS TN-AR	35.10	90.00
MECT	MERIDEN CT	42.32	72.48
MIFL	MIAMI FL	25.45	80.15
MITX	MIDLAND TX	32.00	102.09
MIWI	MILWAUKEE WI	43.03	87.56
MIMN	MINNEAPOLIS-ST PAUL MN-WI	45.00	93.15
MOAL	MOBILE AL	30.40	88.05
MOCA	MODESTO CA	37.37	121.00
MOLA	MONROE LA	32.31	92.06
MNAL	MONTGOMERY AL	32.22	86.20
MUIN	MUNCIE IN	40.11	85.22
MUMI	MUSKEGON-NORTON SHORES-MUSKEGO MI	43.13	86.15
NANH	NASHUA NH	42.44	71.28
NATN	NASHVILLE-DAVIDSON TN	36.10	86.50
NANY	NASSAU-SUFFOLK NY	42.31	73.36
NEMA	NEW BEDFORD MA	41.38	70.55
NECT	NEW BRITAIN CT	41.40	72.47
NENJ	NEW BRUNSWICK-PERTH AMBOY-SAYR NJ	40.29	74.27
NWCT	NEW HAVEN-WEST HAVEN CT	41.18	72.55
NLCT	NEW LONDON-NORWICH CT-RI	41.21	72.06
NELA	NEW ORLEANS LA	30.00	90.03
NENY	NEW YORK NY-NJ	40.40	73.50
NWNJ	NEWARK NJ	40.44	74.11
NEOH	NEWARK OH	40.03	82.25
NWNY	NEWBRGH-MIDDLETOWN NY	41.26	74.26
NEVA	NEWPORT NEWS-HAMPTON VA	36.59	76.26
NOVA	NORFOLK-VIRGINIA BEACH-PORTSMO VA-NC	36.54	76.18
NOPA	NORTHEAST PENNSYLVANIA PA	41.20	75.45
NOCT	NORWALK CT	41.07	73.25
OCFL	OCALA FL	29.11	82.09
ODTX	ODESSA TX	31.50	102.23
OKOK	OKLAHOMA CITY OK	35.28	97.33
OLWA	OLYMPIA WA	47.03	122.53
OMNE	OMAHA NE-IA	41.15	96.00
ORFL	ORLANDO FL	28.33	81.21
OWKY	OWENSBORO KY	37.45	87.05
OXCA	OXNARD-SIMI VALLEY-VENTURA CA	34.11	119.10
PAFL	PANAMA CITY FL	30.10	85.41
PAWV	PARKERSBURG-MARIETTA WV-OH	39.17	81.33

PAMS	PASCAGOULA-MOSS POINT PATERSON MS	30.21	88.32
PANJ	PATERSON-CLIFTON-PASSAIC NJ	40.52	74.08
PEFL	PENSACOLA FL	30.26	87.12
PEIL	PEORIA IL	40.43	89.38
PEVA	PETERSBURG-COLONIAL HEIGHTS-HO VA	37.14	77.24
PHPA	PHILADELPHIA PA-NJ	40.00	75.10
PHAZ	PHOENIX AZ	33.30	112.03
PIAR	PINE BLUFF AR	34.13	92.00
PIPA	PITTSBURGH PA	40.26	80.00
PIMA	PITTSFIELD MA	38.23	75.26
POME	PORTLAND ME	43.41	70.18
POOR	PORTLAND OR-WA	45 32	122.40
PONH	PORTSMOUTH-DOVER-ROCHESTER NH-ME	43.03	70.47
PONY	POUGHKEEPSIE NY	41.43	73.56
PRRI	PROVIDENCE-WAWICK-PAWTUCKET RI-MA	39.42	75.53
PRUT	PROVO-OREM UT	40.15	111.40
PUCO	PUEBLO CO	38.17	104.38
RAWI	RACINE WI	42.42	87.50
RANC	RALEIGH-DURHAM NC	35.46	78.39
REPA	READING PA	40.20	75.55
RECA	REDDING CA	40.35	122.24
RENV	RENO NV	39.32	119.49
RIWA	RICHLAND-KENNEWICK WA	46.17	119.17
RIVA	RICHMOND VA	37.34	77.27
RICA	RIVERSIDE-SAN BERNADINO-ONTAR CA	33.59	117.22
ROVA	ROANOKE VA	37.15	79.58
ROMN	ROCHESTER MN	44.01	92.27
RONY	ROCHETER NY	43.12	77.37
ROIL	ROCKFORD IL	42.16	89.06
ROSC	ROCK HILL SC	34.55	81.01
SACA	SACRAMENTO CA	38.32	121.30
SAMI	SAGINAW MI	43.25	83.54
STMN	ST CLOUD MN	45.34	94.10
STMO	ST JOSEPH MO	39.45	94.51
SLMO	ST LOUIS MO-IL	38.40	90.15
SAOR	SALEM OR	44.57	123.01
SLCA	SALINAS-SEASIDE-MONTEREY CA	36.39	121.40
SANC	SALISBURY-CONCORD NC	35.20	80.30
SAUT	SALT LAKE CITY-OGDEN UT	40.45	111.55
SATX	SAN ANGELO TX	31.28	100.28
SNTX	SAN ANTONIO TX	29.25	98.30
SNCA	SAN DIEGO CA	32.45	117.10
SFCA	SAN FRANCISCO - OAKLAND CA	37.45	122.27
SJCA	SAN JOSE CA	37.20	121.55
STCA	SANTA BARBARA-SANTA MARIA-LOMP CA	34.25	119.41
SCCA	SANTA CRUZ CA	36.58	122.03
SRCA	SANTA ROSA CA	38.26	122.43
SAFL	SARASOTA FL	27.20	82.32
SAGA	SAVANNAH GA	32.04	81.07
SEWA	SEATTLE-EVERETT WA	47.35	122.20
SHPA	SHARON PA	41.16	80.30
SHWI	SHEBOYGAN WI	43.46	87.44
SHTX	SHERMON-DENISON TX	33.39	96.35
SHLA	SHREVEPORT LA	32.30	93.46

SINE	SIOUX CITY NE-IA	42.30	96.28
SISD	SIOUX FALLS SD	43.34	96.42
SOIN	SOUTH BEND IN	41.40	86.15
SPWA	SPOKANE WA	47.40	117.25
SPIL	SPRINGFIELD IL	39.49	89.39
SPMO	SPRINGFIELD MO	37.11	93.19
SPOH	SPRINGFIELD OH	39.55	83.48
SPCT	SPRINGFIELD-CHICOPEE-HOLYOKE CT-MA	42.07	72.35
STCT	STAMFORD CT	41.03	73.32
STPA	STATE COLLEGE PA	40.48	77.52
STOH	STEUBENVILLE-WEIRTON OH-WV	40.22	80.39
SOCA	STOCKTON CA	37.59	121.20
SYNY	SYRACUSE NY	43.03	76.10
TAWA	TACOMA WA	47.16	122.30
TAFL	TALLAHASSEE FL	30.26	84.19
TMFL	TAMPA-ST PETERSBURG FL	27.58	82.38
TEIN	TERRE HAUTE IN	39.27	87.24
TETX	TEXARKANA TX-AR	33.28	94.02
TOOH	TOLEDO OH-MI	41.40	83.35
TOKS	TOPEKA KS	39.02	95.41
TRNJ	TRENTON NJ	40.15	74.43
TUAZ	TUCSON AZ	32.15	110.57
TUOK	TULSA OK	36.07	95.58
TUAL	TUSCALOOSA AL	33.12	87.33
TYTX	TYLER TX	32.22	95.18
UTNY	UTICA-ROME NY	43.06	75.15
VACA	VALLEJO-FAIRFIELD-NAPA CA	38.05	122.14
VITX	VICTORIA TX	28.49	97.01
VINJ	VINELAND-MILLVILLE-RIDGETON NJ	39.29	75.02
VICA	VISALIA-TULARE-PORTERVILLE CA	36.20	119.18
WATX	WACO TX	31.33	97.10
WADC	WASHINGTON DC-MD	38.55	77.00
WACT	WATERBURY CT	41.33	73.03
WAIA	WATERLOO-CEDAR FALLS IA	42.30	92.20
WAWI	WAUSAU WI	44.58	89.40
WEFL	WEST PALM BEACH-BOCA RATON FL	26.42	80.05
WHWV	WHEELING WV-OH	40.05	80.43
WIKS	WICHITA KS	37.43	97.20
WITX	WICHITA FALLS TX	33.55	98.30
WIPA	WILLIAMSPORT PA	41.16	77.03
WIDE	WILMINGTON DE-NJ	39.46	75.31
WINC	WILMINGTON NC	34.14	77.55
WOMA	WORCESTER MA	42.17	71.48
YAWA	YAKIMA WA	46.37	120.30
YOPA	YORK PA	39.57	76.44
YOOH	YOUNGSTOWN-WARREN OH	41.05	80.40
YUCA	YUBA CITY CA	39.09	121.36

APPENDIX B

INTELSAT TRAFFIC MODEL

B-1 - DESCRIPTION

The August 1984 INTELSAT Traffic Data Base (Ref. 9) was entered for the year 1995. Printouts for the AOR and POR for this year follow. Also included are outputs from the "Grouping" program - described in Section 4.2.3.1.1- which are useful in estimating such factors as ISL capacity requirements.

The INTELSAT traffic forecast was used primarily for international/regional payload design for Scenario VI-A, (with Canada on VI-B).

B-2 - ATLANTIC OCEAN REGION (AOR) TRAFFIC MODEL

The following pages are a listing of the AOR voice circuit traffic for 1995 as based upon the Intelsat forecast of August 1984.

The final pages of this section list the grouped country traffic for the AOR for year 1995.

Ford Aerospace & Communications Corporation

AOR Voice Circuits -- 1995

ALGERIA	Total = 174								
	CANADA	20	IRAN	8	NORDIC GRP	57	TURKEY	15
	U.K.	29	U.S.	45				
ANGOLA	Total = 424							
	BRAZIL	17	CONGO	7	FRANCE	41	ITALY	36
	MOZAMBIQUE	10	NORDIC GRP	6	PORTUGAL	209	SPAIN	12
	U.K.	23	U.S.	17	U.S.S.R.	42	ZIMBABWE	4
ARGENTINA	Total = 1901							
	AUSTRIA	22	BELGIUM	19	BOLIVIA	33	BRAZIL	107
	CANADA	62	CHILE	55	COLUMBIA	44	EQUADOR	34
	FRANCE	57	GERMANY,FR	85	GREECE	20	GUATEMALA	14
	ISRAEL	71	ITALY	115	MEXICO	64	NETHERLANDS	46
	NICARAGUA	16	NORDIC GRP	53	PANAMA	19	PARAGUAY	25
	PERU	29	SOUTH AF.	23	SPAIN	255	SWITZERLAND	41
	U.K.	42	U.S. (PR)	15	U.S.	459	VENEZUELA	76
AUSTRIA	Total = 552							
	ARGENTINA	22	BENIN	6	BOLIVIA	6	BRAZIL	29
	CANADA	29	CHILE	8	COLUMBIA	13	EQUADOR	5
	IRAN	42	IRAQ	42	ISRAEL	12	IVORY COAST	7
	JORDAN	11	KENYA	13	KUWAIT	18	MEXICO	16
	NIGERIA	25	PERU	9	SAUDI AR.	40	SENEGAL	5
	SOUTH AF.	36	U.S.	138	VENEZUELA	16	ZIMBABWE	4
BAHAMAS	Total = 320							
	CANADA	14	ITALY	5	SPAIN	10	U.K.	94
	U.S.	197						
BAHRAIN	Total = 315							
	CANADA	7	GERMANY,FR	21	GREECE	10	SPAIN	8
	U.K.	142	U.S.	103	YEMEN,A.R.	24		
BARBADOS	Total = 509							
	CANADA	41	JAMAICA	62	U.K.	245	U.S.	161
BELGIUM	Total = 1593							
	ARGENTINA	19	BENIN	3	BRAZIL	50	CAMEROON	29
	CANADA	89	CONGO	14	GABON	20	GHANA	5
	IRAN	30	ISRAEL	32	IVORY COAST	25	LEBANON	23
	LIBERIA	5	MOZAMBIQUE	3	NIGERIA	28	SAUDI AR.	40

	SENEGAL	24	SOUTH AF.	44	SUDAN	3	TANZANIA	9
	TOGO	11	U.A.E.	30	U.S.	961	UPPER VOLTA	3
	YEMEN,A.R.	6	ZAIRE	72	ZIMBABWE	15		
BENIN	Total =	198						
	AUSTRIA	6	BELGIUM	3	FRANCE	95	GABON	21
	IVORY COAST	7	SENEGAL	14	U.K.	44	U.S.	8
BOLIVIA	Total =	596						
	ARGENTINA	33	AUSTRIA	6	BRAZIL	49	CANADA	10
	CHILE	24	COLUMBIA	18	FRANCE	12	GERMANY,FR	21
	ITALY	30	MEXICO	15	NETHERLANDS	5	PANAMA	10
	SPAIN	45	U.K.	28	U.S.	271	VENEZUELA	19
BRAZIL	Total =	2167						
	ANGOLA	17	ARGENTINA	107	AUSTRIA	29	BELGIUM	50
	BOLIVIA	49	CANADA	53	CHILE	78	COLUMBIA	50
	EQUADOR	32	FRANCE	65	FRANCE (FG)	11	GERMANY,FR	114
	GREECE	31	ISRAEL	37	ITALY	76	LEBANON	21
	MEXICO	50	NETHERLANDS	44	NICARAGUA	25	NIGERIA	16
	NORDIC GRP	75	PANAMA	24	PARAGUAY	30	PERU	48
	PORTUGAL	41	SAUDI AR.	12	SOUTH AF.	18	SPAIN	49
	SWITZERLAND	38	U.K.	68	U.S.	728	U.S.S.R.	3
	VENEZUELA	78						
CAMEROON	Total =	845						
	BELGIUM	29	CANADA	17	CONGO	9	FRANCE	437
	GABON	36	GERMANY,FR	47	GREECE	26	ITALY	23
	IVORY COAST	22	NIGERIA	7	SENEGAL	18	SPAIN	18
	SWITZERLAND	24	U.K.	49	U.S.	83		
CANADA	Total =	3750						
	ALGERIA	20	ARGENTINA	62	AUSTRIA	29	BAHAMAS	14
	BAHRAIN	7	BARBADOS	41	BELGIUM	89	BOLIVIA	10
	BRAZIL	53	CAMEROON	17	CHILE	79	COLUMBIA	47
	COSTA RICA	20	CYPRUS	12	DOM. REP.	38	EQUADOR	32
	EGYPT	20	EL SALVADOR	20	FRANCE	118	FRANCE (MA)	17
	GABON	12	GERMANY,FR	220	GREECE	172	GUATEMALA	19
	HAITI	33	HONDURAS	10	ICELAND	11	IRAN	27
	IRAQ	11	IRELAND	32	ISRAEL	80	ITALY	281
	IVORY COAST	18	JAMAICA	145	JORDAN	11	KENYA	32
	KUWAIT	25	LEBANON	28	LIBYA	12	MALAWI	7
	MOROCCO	138	NETHERLANDS	68	NICARAGUA	9	NIGERIA	30
	NORDIC GRP	78	PANAMA	14	PERU	33	POLAND	33
	PORTUGAL	21	QATAR	7	ROMANIA	13	SAUDI AR.	62
	SENEGAL	12	SOUTH AF.	65	SPAIN	33	SWITZERLAND	68
	TANZANIA	22	TRIN&TOBAGO	61	TUNISIA	9	TURKEY	18
	U.A.E.	31	U.K. (BER)	31	U.K.	751	U.S. (PR)	20
	URUGUAY	18	U.S.S.R.	43	VENEZUELA	59	YUGOSLAVIA	49
	ZAIRE	11	ZIMBABWE	12				

CHAD	Total =	1							
	U.S.	1							
CHILE	Total =	1167							
	ARGENTINA	55	AUSTRIA	8	BOLIVIA	24	BRAZIL	78
	CANADA	79	COLUMBIA	26	EQUADOR	32	FRANCE	59
	GERMANY,FR	47	GREECE	6	GUATEMALA	17	ISRAEL	15
	ITALY	42	MEXICO	21	NETHERLANDS	38	NORDIC GRP	28
	PANAMA	20	PARAGUAY	21	PERU	9	SOUTH AF.	12
	SPAIN	99	SWITZERLAND	28	U.K.	51	U.S.	303
	VENEZUELA	49						
COLUMBIA	Total =	2726							
	ARGENTINA	44	AUSTRIA	13	BOLIVIA	18	BRAZIL	50
	CANADA	47	CHILE	26	COSTA RICA	33	FRANCE	65
	GERMANY,FR	95	GUATEMALA	12	HONDURAS	12	ITALY	64
	MEXICO	86	NETHERLANDS	33	NICARAGUA	10	NORDIC GRP	15
	PANAMA	107	PERU	23	SPAIN	108	SWITZERLAND	25
	U.K.	76	U.S. (PR)	39	U.S.	1720	URUGUAY	5
CONGO	Total =	403							
	ANGOLA	7	BELGIUM	14	CAMEROON	9	FRANCE	243
	GABON	31	GERMANY,FR	11	ITALY	14	IVORY COAST	12
	SENEGAL	16	SPAIN	13	SWITZERLAND	15	U.S.	13
	U.S.S.R.	5						
COSTA RICA	Total =	469							
	CANADA	20	COLUMBIA	33	FRANCE	19	GERMANY,FR	14
	ITALY	27	PERU	9	SPAIN	39	U.K.	20
	U.S.	252	VENEZUELA	36				
CYPRUS	Total =	211							
	CANADA	12	ISRAEL	20	KUWAIT	31	SAUDI AR.	40
	SOUTH AF.	33	U.K.	26	U.S.	49		
DOM. REP.	Total =	557							
	CANADA	38	FRANCE	24	NETHERLANDS	9	SPAIN	36
	U.S.	450						
EQUADOR	Total =	900							
	ARGENTINA	34	AUSTRIA	5	BRAZIL	32	CANADA	32
	CHILE	32	FRANCE	30	GERMANY,FR	17	GUATEMALA	12
	ITALY	31	MEXICO	13	NETHERLANDS	11	NORDIC GRP	10
	PANAMA	27	PERU	3	SPAIN	94	SWITZERLAND	15
	U.K.	19	U.S. (PR)	7	U.S.	436	VENEZUELA	40
EGYPT	Total =	785							
	CANADA	20	IRAQ	50	JORDAN	44	KENYA	7
	KUWAIT	52	NETHERLANDS	62	NIGERIA	7	NORDIC GRP	27

	SAUDI AR.	88	SPAIN	33	SUDAN	37	SWITZERLAND	17
	U.K.	79	U.S.	262				
EL SALVADOR Total =		406						
	CANADA	20	FRANCE	9	GERMANY,FR	15	SPAIN	25
	SWITZERLAND	28	U.K.	17	U.S.	292		
ETHIOPIA Total =		216						
	FRANCE	28	GERMANY,FR	8	GREECE	8	ITALY	42
	IVORY COAST	8	SAUDI AR.	41	U.K.	39	U.S.	42
FRANCE Total =		5845						
	ANGOLA	41	ARGENTINA	57	BENIN	95	BOLIVIA	12
	BRAZIL	65	CAMEROON	437	CANADA	118	CHILE	59
	COLUMBIA	65	CONGO	243	COSTA RICA	19	DOM. REP.	24
	EQUADOR	30	EL SALVADOR	9	ETHIOPIA	28	FRANCE (FG)	24
	GABON	312	GHANA	21	GUATEMALA	21	HAITI	21
	IRAN	89	IRAQ	53	ISRAEL	12	IVORY COAST	86
	JORDAN	28	KENYA	7	KUWAIT	63	LIBERIA	25
	LIBYA	3	MALI	162	MAURITANIA	63	MEXICO	82
	NICARAGUA	12	NIGER	83	NIGERIA	24	PANAMA	18
	PARAGUAY	18	PERU	36	ROMANIA	8	SAUDI AR.	142
	SENEGAL	41	SOUTH AF.	102	SUDAN	15	TANZANIA	12
	TOGO	132	UGANDA	14	U.A.E.	83	U.K. (BER)	15
	U.S. (PR)	17	U.S.	2381	UPPER VOLTA	68	URUGUAY	18
	U.S.S.R.	2	VENEZUELA	75	YEMEN,A.R.	25	ZAIRE	110
	ZIMBABWE	20						
FRANCE (FG) Total =		58						
	BRAZIL	11	FRANCE	24	U.S.	23		
FRANCE (MA) Total =		56						
	CANADA	17	U.S.	39				
GABON Total =		645						
	BELGIUM	20	BENIN	21	CAMEROON	36	CANADA	12
	CONGO	31	FRANCE	312	ITALY	22	IVORY COAST	26
	MOROCCO	7	SENEGAL	40	SWITZERLAND	12	TOGO	25
	U.K.	39	U.S.	42				
GERMANY,FR Total =		4468						
	ARGENTINA	85	BAHRAIN	21	BOLIVIA	21	BRAZIL	114
	CAMEROON	47	CANADA	220	CHILE	47	COLUMBIA	95
	CONGO	11	COSTA RICA	14	EQUADOR	17	EL SALVADOR	15
	ETHIOPIA	8	GHANA	40	GUATEMALA	34	ICELAND	16
	IRAN	61	IRAQ	80	ISRAEL	62	IVORY COAST	5
	JORDAN	54	KUWAIT	90	MALAWI	14	MEXICO	91
	NICARAGUA	10	NIGERIA	67	PANAMA	18	PARAGUAY	36
	PERU	21	QATAR	27	SAUDI AR.	122	SENEGAL	13
	SOUTH AF.	114	TANZANIA	23	TOGO	18	TURKEY	109

	UGANDA	18	U.A.E.	106	U.K.(BER)	20	U.S.(PR)	36	
	U.S.	2298	UPPER VOLTA	14	URUGUAY	22	VENEZUELA	83	
	YEMEN,A.R.	21	ZIMBABWE	10					
GHANA	Total =	235							
	BELGIUM	5	FRANCE	21	GERMANY,FR	40	ITALY	12	
	IVORY COAST	8	KENYA	5	NIGERIA	7	U.K.	89	
	U.S.	48							
GREECE	Total =	1052							
	ARGENTINA	20	BAHRAIN	10	BRAZIL	31	CAMEROON	26	
	CANADA	172	CHILE	6	ETHIOPIA	8	ISRAEL	13	
	IVORY COAST	8	JORDAN	11	KUWAIT	51	MEXICO	6	
	NIGERIA	11	PANAMA	10	QATAR	9	SAUDI AR.	52	
	SENEGAL	10	SOUTH AF.	43	SUDAN	13	U.S.(PR)	9	
	U.S.	482	VENEZUELA	28	ZAIRE	11	ZIMBABWE	12	
GUATEMALA	Total =	552							
	ARGENTINA	14	CANADA	19	CHILE	17	COLUMBIA	12	
	EQUADOR	12	FRANCE	21	GERMANY,FR	34	ISRAEL	9	
	ITALY	18	NETHERLANDS	6	NORDIC GRP	8	SPAIN	41	
	U.K.	20	U.S.(PR)	33	U.S.	288			
HAITI	Total =	329							
	CANADA	33	FRANCE	21	NETHERLANDS	3	SPAIN	7	
	U.S.	265							
HONDURAS	Total =	347							
	CANADA	10	COLUMBIA	12	ITALY	8	SPAIN	12	
	U.S.	274	VENEZUELA	31					
ICELAND	Total =	341							
	CANADA	11	GERMANY,FR	16	NETHERLANDS	7	NORDIC GRP	72	
	SPAIN	22	U.K.	84	U.S.	129			
IRAN	Total =	845							
	ALGERIA	8	AUSTRIA	42	BELGIUM	30	CANADA	27	
	FRANCE	89	GERMANY,FR	61	ITALY	40	KUWAIT	44	
	LEBANON	12	LIBYA	8	NORDIC GRP	40	ROMANIA	3	
	SAUDI AR.	20	TURKEY	43	U.K.	83	U.S.	285	
	YUGOSLAVIA	10							
IRAQ	Total =	666							
	AUSTRIA	42	CANADA	11	EGYPT	50	FRANCE	53	
	GERMANY,FR	80	ITALY	61	JORDAN	40	NORDIC GRP	22	
	SPAIN	32	SWITZERLAND	35	TUNISIA	12	U.K.	72	
	U.S.	152	U.S.S.R.	4					
IRELAND	Total =	484							
	CANADA	32	SAUDI AR.	27	SOUTH AF.	24	U.S.	401	

ISRAEL	Total =	1372							
	ARGENTINA	71	AUSTRIA	12	BELGIUM	32	BRAZIL	37
	CANADA	80	CHILE	15	CYPRUS	20	FRANCE	12
	GERMANY,FR	62	GREECE	13	GUATEMALA	9	ITALY	23
	KENYA	9	MEXICO	12	NORDIC GRP	70	PANAMA	9
	PORTUGAL	10	ROMANIA	15	SOUTH AF.	83	SPAIN	48
	SWITZERLAND	16	TURKEY	14	U.K.	125	U.S. (PR)	9
	U.S.	549	VENEZUELA	17				
ITALY	Total =	3063						
	ANGOLA	36	ARGENTINA	115	BAHAMAS	5	BOLIVIA	30
	BRAZIL	76	CAMEROON	23	CANADA	281	CHILE	42
	COLUMBIA	64	CONGO	14	COSTA RICA	27	EQUADOR	31
	ETHIOPIA	42	GABON	22	GHANA	12	GUATEMALA	18
	HONDURAS	8	IRAN	40	IRAQ	61	ISRAEL	23
	IVORY COAST	13	JORDAN	36	KENYA	22	KUWAIT	33
	LEBANON	46	LIBERIA	28	MAURITANIA	8	MEXICO	92
	MOZAMBIQUE	11	NICARAGUA	15	NIGERIA	118	PANAMA	18
	PARAGUAY	21	PERU	54	SENEGAL	14	SOUTH AF.	88
	SUDAN	29	TANZANIA	22	TOGO	8	UGANDA	9
	U.A.E.	42	U.K. (BER)	14	U.S. (PR)	17	U.S.	980
	UPPER VOLTA	6	URUGUAY	24	VENEZUELA	225	YEMEN,A.R.	58
	ZAIRE	7	ZIMBABWE	35				
IVORY COAST	Total =	483						
	AUSTRIA	7	BELGIUM	25	BENIN	7	CAMEROON	22
	CANADA	18	CONGO	12	ETHIOPIA	8	FRANCE	86
	GABON	26	GERMANY,FR	5	GHANA	8	GREECE	8
	ITALY	13	KENYA	8	LEBANON	18	NIGER	35
	NORDIC GRP	12	SENEGAL	15	SPAIN	14	SWITZERLAND	7
	TOGO	44	TUNISIA	7	U.K.	29	U.S.	49
JAMAICA	Total =	1171						
	BARBADOS	62	CANADA	145	TRIN&TOBAGO	68	U.K. (BER)	19
	U.K.	146	U.S.	731				
JORDAN	Total =	642						
	AUSTRIA	11	CANADA	11	EGYPT	44	FRANCE	28
	GERMANY,FR	54	GREECE	11	IRAQ	40	ITALY	36
	KUWAIT	40	NORDIC GRP	27	ROMANIA	7	SAUDI AR.	21
	SWITZERLAND	12	TUNISIA	12	U.K.	94	U.S.	194
KENYA	Total =	548						
	AUSTRIA	13	CANADA	32	EGYPT	7	FRANCE	7
	GHANA	5	ISRAEL	9	ITALY	22	IVORY COAST	8
	MALAWI	13	NIGERIA	13	NORDIC GRP	21	SAUDI AR.	21
	SUDAN	18	SWITZERLAND	20	U.K.	193	U.S.	116
	YUGOSLAVIA	3	ZAIRE	7	ZIMBABWE	20		

KUWAIT	Total =	1102							
	AUSTRIA	18	CANADA	25	CYPRUS	31	EGYPT	52
	FRANCE	63	GERMANY,FR	90	GREECE	51	IRAN	44
	ITALY	33	JORDAN	40	NETHERLANDS	40	NORDIC GRP	32
	SPAIN	31	SWITZERLAND	42	TUNISIA	7	U.A.E.	72
	U.K.	140	U.S.	284	YEMEN,A.R.	7		
LEBANON	Total =	705						
	BELGIUM	23	BRAZIL	21	CANADA	28	IRAN	12
	ITALY	46	IVORY COAST	18	NORDIC GRP	17	ROMANIA	6
	SAUDI AR.	82	SENEGAL	15	SWITZERLAND	33	U.K.	82
	U.S.	281	VENEZUELA	41				
LIBERIA	Total =	215						
	BELGIUM	5	FRANCE	25	ITALY	28	U.K.	51
	U.S.	106						
LIBYA	Total =	282						
	CANADA	12	FRANCE	3	IRAN	8	NORDIC GRP	53
	TURKEY	21	U.K.	103	U.S.	82		
MALAWI	Total =	273						
	CANADA	7	GERMANY,FR	14	KENYA	13	MOZAMBIQUE	14
	SOUTH AF.	84	U.K.	52	U.S.	69	ZIMBABWE	20
MALI	Total =	162						
	FRANCE	162						
MAURITANIA	Total =	103						
	FRANCE	63	ITALY	8	SPAIN	32		
MEXICO	Total =	1168						
	ARGENTINA	64	AUSTRIA	16	BOLIVIA	15	BRAZIL	50
	CHILE	21	COLUMBIA	86	EQUADOR	13	FRANCE	82
	GERMANY,FR	91	GREECE	6	ISRAEL	12	ITALY	92
	NETHERLANDS	69	NORDIC GRP	36	PANAMA	34	PERU	18
	SPAIN	225	SWITZERLAND	41	U.K.	84	U.S. (PR)	24
	U.S.	5	URUGUAY	15	VENEZUELA	69		
MOROCCO	Total =	448						
	CANADA	138	GABON	7	NORDIC GRP	81	POLAND	4
	U.S.	218						
MOZAMBIQUE	Total =	100						
	ANGOLA	10	BELGIUM	3	ITALY	11	MALAWI	14
	PORTUGAL	41	TANZANIA	9	ZIMBABWE	12		
NETHERLANDS	Total =	1438						
	ARGENTINA	46	BOLIVIA	5	BRAZIL	44	CANADA	68
	CHILE	38	COLUMBIA	33	DOM. REP.	9	EQUADOR	11

	EGYPT	62	GUATEMALA	6	HAITI	3	ICELAND	7
	KUWAIT	40	MEXICO	69	NICARAGUA	14	PANAMA	5
	PERU	19	SIERRA LEONE	3	SURINAM	153	TRIN&TOBAGO	9
	U.K. (BER)	10	U.S.	739	URUGUAY	7	VENEZUELA	38
NICARAGUA	Total =	301						
	ARGENTINA	16	BRAZIL	25	CANADA	9	COLUMBIA	10
	FRANCE	12	GERMANY, FR	10	ITALY	15	NETHERLANDS	14
	SPAIN	33	U.K.	9	U.S.	148		
NIGER	Total =	124						
	FRANCE	83	IVORY COAST	35	NIGERIA	6		
NIGERIA	Total =	1156						
	AUSTRIA	25	BELGIUM	28	BRAZIL	16	CAMEROON	7
	CANADA	30	EGYPT	7	FRANCE	24	GERMANY, FR	67
	GHANA	7	GREECE	11	ITALY	118	KENYA	13
	NIGER	6	NORDIC GRP	44	SPAIN	66	SWITZERLAND	32
	U.K.	263	U.S.	392				
NORDIC GRP	Total =	4017						
	ALGERIA	57	ANGOLA	6	ARGENTINA	53	BRAZIL	75
	CANADA	78	CHILE	28	COLUMBIA	15	EQUADOR	10
	EGYPT	27	GUATEMALA	8	ICELAND	72	IRAN	40
	IRAQ	22	ISRAEL	70	IVORY COAST	12	JORDAN	27
	KENYA	21	KUWAIT	32	LEBANON	17	LIBYA	53
	MEXICO	36	MOROCCO	81	NIGERIA	44	PANAMA	5
	PERU	14	SAUDI AR.	81	SUDAN	5	TANZANIA	15
	TUNISIA	19	U.S.	2960	VENEZUELA	34		
PANAMA	Total =	1018						
	ARGENTINA	19	BOLIVIA	10	BRAZIL	24	CANADA	14
	CHILE	20	COLUMBIA	107	EQUADOR	27	FRANCE	18
	GERMANY, FR	18	GREECE	10	ISRAEL	9	ITALY	18
	MEXICO	34	NETHERLANDS	5	NORDIC GRP	5	PARAGUAY	5
	PERU	14	SPAIN	117	SWITZERLAND	9	U.K.	34
	U.S.	446	VENEZUELA	55				
PARAGUAY	Total =	327						
	ARGENTINA	25	BRAZIL	30	CHILE	21	FRANCE	18
	GERMANY, FR	36	ITALY	21	PANAMA	5	SPAIN	59
	SWITZERLAND	15	U.K.	25	U.S.	72		
PERU	Total =	1160						
	ARGENTINA	29	AUSTRIA	9	BRAZIL	48	CANADA	33
	CHILE	9	COLUMBIA	23	COSTA RICA	9	EQUADOR	3
	FRANCE	36	GERMANY, FR	21	ITALY	54	MEXICO	18
	NETHERLANDS	19	NORDIC GRP	14	PANAMÁ	14	SPAIN	78
	SWITZERLAND	14	U.K.	39	U.S. (PR)	7	U.S.	628
	URUGUAY	7	VENEZUELA	48				

POLAND	Total =	277							
	CANADA	33	MOROCCO	4	U.S.	240			
PORTUGAL	Total =	541							
	ANGOLA	209	BRAZIL	41	CANADA	21	ISRAEL	10
	MOZAMBIQUE	41	SOUTH AF.	62	U.S.	82	U.S.S.R.	2
	VENEZUELA	73						
QATAR	Total =	141						
	CANADA	7	GERMANY,FR	27	GREECE	9	SPAIN	16
	U.S.	82						
ROMANIA	Total =	143						
	CANADA	13	FRANCE	8	IRAN	3	ISRAEL	15
	JORDAN	7	LEBANON	6	U.K.	11	U.S.	80
SAUDI AR.	Total =	2969						
	AUSTRIA	40	BELGIUM	40	BRAZIL	12	CANADA	62
	CYPRUS	40	EGYPT	88	ETHIOPIA	41	FRANCE	142
	GERMANY,FR	122	GREECE	52	IRAN	20	IRELAND	27
	JORDAN	21	KENYA	21	LEBANON	82	NORDIC GRP	81
	SPAIN	123	SUDAN	20	SWITZERLAND	61	TUNISIA	34
	TURKEY	61	U.A.E.	40	U.K.	547	U.S.	1171
	YEMEN,A.R.	21						
SENEGAL	Total =	395						
	AUSTRIA	5	BELGIUM	24	BENIN	14	CAMEROON	18
	CANADA	12	CONGO	16	FRANCE	41	GABON	40
	GERMANY,FR	13	GREECE	10	ITALY	14	IVORY COAST	15
	LEBANON	15	SPAIN	19	TOGO	21	TUNISIA	11
	U.K.	36	U.S.	48	UPPER VOLTA	14	U.S.S.R.	6
	ZAIRE	3						
SIERRA LEONE	Total =	149						
	NETHERLANDS	3	U.K.	146				
SOUTH AF.	Total =	2253						
	ARGENTINA	23	AUSTRIA	36	BELGIUM	44	BRAZIL	18
	CANADA	65	CHILE	12	CYPRUS	33	FRANCE	102
	GERMANY,FR	114	GREECE	43	IRELAND	24	ISRAEL	83
	ITALY	88	MALAWI	84	PORTUGAL	62	SWITZERLAND	40
	U.K.	641	U.S.	741				
SPAIN	Total =	2518						
	ANGOLA	12	ARGENTINA	255	BAHAMAS	10	BAHRAIN	8
	BOLIVIA	45	BRAZIL	49	CAMEROON	18	CANADA	33
	CHILE	99	COLUMBIA	108	CONGO	13	COSTA RICA	39
	DOM. REP.	36	EQUADOR	94	EGYPT	33	EL SALVADOR	25
	GUATEMALA	41	HAITI	7	HONDURAS	12	ICELAND	22

	IRAQ	32	ISRAEL	48	IVORY COAST	14	KUWAIT	31
	MAURITANIA	32	MEXICO	225	NICARAGUA	33	NIGERIA	66
	PANAMA	117	PARAGUAY	59	PERU	78	QATAR	16
	SAUDI AR.	123	SENEGAL	19	TURKEY	40	U.A.E.	33
	U.K. (BER)	10	U.S. (PR)	28	U.S.	429	URUGUAY	34
	VENEZUELA	81	ZAIRE	11				
SUDAN	Total =	241						
	BELGIUM	3	EGYPT	37	FRANCE	15	GREECE	13
	ITALY	29	KENYA	18	NORDIC GRP	5	SAUDI AR.	20
	SWITZERLAND	42	U.K.	44	U.S.	15		
SURINAM	Total =	153						
	NETHERLANDS	153						
SWITZERLAND	Total =	2107						
	ARGENTINA	41	BRAZIL	38	CAMEROON	24	CANADA	68
	CHILE	28	COLUMBIA	25	CONGO	15	EQUADOR	15
	EGYPT	17	EL SALVADOR	28	GABON	12	IRAQ	35
	ISRAEL	16	IVORY COAST	7	JORDAN	12	KENYA	20
	KUWAIT	42	LEBANON	33	MEXICO	41	NIGERIA	32
	PANAMA	9	PARAGUAY	15	PERU	14	SAUDI AR.	61
	SOUTH AF.	40	SUDAN	42	TANZANIA	6	TOGO	12
	U.K. (BER)	14	U.S. (PR)	12	U.S.	1279	URUGUAY	10
	VENEZUELA	35	ZIMBABWE	9				
TANZANIA	Total =	275						
	BELGIUM	9	CANADA	22	FRANCE	12	GERMANY,FR	23
	ITALY	22	MOZAMBIQUE	9	NORDIC GRP	15	SWITZERLAND	6
	U.K.	131	U.S.	26				
TOGO	Total =	318						
	BELGIUM	11	FRANCE	132	GABON	25	GERMANY,FR	18
	ITALY	8	IVORY COAST	44	SENEGAL	21	SWITZERLAND	12
	U.K.	15	U.S.	32				
TRIN&TOBAGO	Total =	557						
	CANADA	61	JAMAICA	68	NETHERLANDS	9	U.K.	140
	U.S.	279						
TUNISIA	Total =	181						
	CANADA	9	IRAQ	12	IVORY COAST	7	JORDAN	12
	KUWAIT	7	NORDIC GRP	19	SAUDI AR.	34	SENEGAL	11
	TURKEY	7	U.S.	56	YUGOSLAVIA	7		
TURKEY	Total =	503						
	ALGERIA	15	CANADA	18	GERMANY,FR	109	IRAN	43
	ISRAEL	14	LIBYA	21	SAUDI AR.	61	SPAIN	40
	TUNISIA	7	U.S.	175				

UGANDA	Total =	212							
	FRANCE	14	GERMANY,FR	18	ITALY	9	U.K.	143	
	U.S.	28							
U.A.E.	Total =	925							
	BELGIUM	30	CANADA	31	FRANCE	83	GERMANY,FR	106	
	ITALY	42	KUWAIT	72	SAUDI AR.	40	SPAIN	33	
	U.K.	218	U.S.	270					
U.K. (ASC)	Total =	4							
	U.S.	4							
U.K. (BER)	Total =	326							
	CANADA	31	FRANCE	15	GERMANY,FR	20	ITALY	14	
	JAMAICA	19	NETHERLANDS	10	SPAIN	10	SWITZERLAND	14	
	U.K.	52	U.S.	141					
U.K.	Total =	16407							
	ALGERIA	29	ANGOLA	23	ARGENTINA	42	BAHAMAS	94	
	BAHRAIN	142	BARBADOS	245	BENIN	44	BOLIVIA	28	
	BRAZIL	68	CAMEROON	49	CANADA	751	CHILE	51	
	COLUMBIA	76	COSTA RICA	20	CYPRUS	26	EQUADOR	19	
	EGYPT	79	EL SALVADOR	17	ETHIOPIA	39	GABON	39	
	GHANA	89	GUATEMALA	20	ICELAND	84	IRAN	83	
	IRAQ	72	ISRAEL	125	IVORY COAST	29	JAMAICA	146	
	JORDAN	94	KENYA	193	KUWAIT	140	LEBANON	82	
	LIBERIA	51	LIBYA	103	MALAWI	52	MEXICO	84	
	NICARAGUA	9	NIGERIA	263	PANAMA	34	PARAGUAY	25	
	PERU	39	ROMANIA	11	SAUDI AR.	547	SENEGAL	36	
	SIERRA LEONE	146	SOUTH AF.	641	SUDAN	44	TANZANIA	131	
	TOGO	15	TRIN&TOBAGO	140	UGANDA	143	U.A.E.	218	
	U.K. (BER)	52	U.S. (PR)	31	U.S.	10185	URUGUAY	24	
	VENEZUELA	63	YEMEN,A.R.	71	ZAIRE	20	ZIMBABWE	191	
U.S. (PR)	Total =	320							
	ARGENTINA	15	CANADA	20	COLUMBIA	39	EQUADOR	7	
	FRANCE	17	GERMANY,FR	36	GREECE	9	GUATEMALA	33	
	ISRAEL	9	ITALY	17	MEXICO	24	PERU	7	
	SPAIN	28	SWITZERLAND	12	U.K.	31	VENEZUELA	16	
U.S.	Total =	40221							
	ALGERIA	45	ANGOLA	17	ARGENTINA	459	AUSTRIA	138	
	BAHAMAS	197	BAHRAIN	103	BARBADOS	161	BELGIUM	961	
	BENIN	8	BOLIVIA	271	BRAZIL	728	CAMEROON	83	
	CHAD	1	CHILE	303	COLUMBIA	1720	CONGO	13	
	COSTA RICA	252	CYPRUS	49	DOM. REP.	450	EQUADOR	436	
	EGYPT	262	EL SALVADOR	292	ETHIOPIA	42	FRANCE	2381	
	FRANCE (FG)	23	FRANCE (MA)	39	GABON	42	GERMANY,FR	2298	
	GHANA	48	GREECE	482	GUATEMALA	288	HAITI	265	
	HONDURAS	274	ICELAND	129	IRAN	285	IRAQ	152	

	IRELAND	401	ISRAEL	549	ITALY	980	IVORY COAST	49
	JAMAICA	731	JORDAN	194	KENYA	116	KUWAIT	284
	LEBANON	281	LIBERIA	106	LIBYA	82	MALAWI	69
	MEXICO	5	MOROCCO	218	NETHERLANDS	739	NICARAGUA	148
	NIGERIA	392	NORDIC GRP	2960	PANAMA	446	PARAGUAY	72
	PERU	628	POLAND	240	PORTUGAL	82	QATAR	82
	ROMANIA	80	SAUDI AR.	1171	SENEGAL	48	SOUTH AF.	741
	SPAIN	429	SUDAN	15	SWITZERLAND	1279	TANZANIA	26
	TOGO	32	TRIN&TOBAGO	279	TUNISIA	56	TURKEY	175
	UGANDA	28	U.A.E.	270	U.K. (ASC)	4	U.K. (BER)	141
	U.K.	10185	URUGUAY	120	U.S.S.R.	138	VENEZUELA	1187
	YEMEN,A.R.	59	YUGOSLAVIA	140	ZAIRE	21	ZIMBABWE	46
UPPER VOLTA	Total =	105						
	BELGIUM	3	FRANCE	68	GERMANY,FR	14	ITALY	6
	SENEGAL	14						
URUGUAY	Total =	324						
	CANADA	18	COLUMBIA	5	FRANCE	18	GERMANY,FR	22
	ITALY	24	MEXICO	15	NETHERLANDS	7	PERU	7
	SPAIN	34	SWITZERLAND	10	U.K.	24	U.S.	120
	VENEZUELA	20						
U.S.S.R.	Total =	245						
	ANGOLA	42	BRAZIL	3	CANADA	43	CONGO	5
	FRANCE	2	IRAQ	4	PORTUGAL	2	SENEGAL	6
	U.S.	138						
VENEZUELA	Total =	2592						
	ARGENTINA	76	AUSTRIA	16	BOLIVIA	19	BRAZIL	78
	CANADA	59	CHILE	49	COSTA RICA	36	EQUADOR	40
	FRANCE	75	GERMANY,FR	83	GREECE	28	HONDURAS	31
	ISRAEL	17	ITALY	225	LEBANON	41	MEXICO	69
	NETHERLANDS	38	NORDIC GRP	34	PANAMA	55	PERU	48
	PORTUGAL	73	SPAIN	81	SWITZERLAND	35	U.K.	63
	U.S. (PR)	16	U.S.	1187	URUGUAY	20		
YEMEN,A.R.	Total =	292						
	BAHRAIN	24	BELGIUM	6	FRANCE	25	GERMANY,FR	21
	ITALY	58	KUWAIT	7	SAUDI AR.	21	U.K.	71
	U.S.	59						
YUGOSLAVIA	Total =	209						
	CANADA	49	IRAN	10	KENYA	3	TUNISIA	7
	U.S.	140						
ZAIRE	Total =	273						
	BELGIUM	72	CANADA	11	FRANCE	110	GREECE	11
	ITALY	7	KENYA	7	SENEGAL	3	SPAIN	11
	U.K.	20	U.S.	21				

ZIMBABWE Total = 364

ANGOLA	4	AUSTRIA	4	BELGIUM	15	CANADA	12
FRANCE	20	GERMANY,FR	10	GREECE	12	ITALY	35
KENYA	20	MALAWI	20	MOZAMBIQUE	12	SWITZERLAND	9
U.K.	191						

Total For Matrix = 135026

B-3 - AOR GROUPED COUNTRY TRAFFIC

Group Distributions (AOR) -- 1995

Group 1	U.S.				
Group 2	CANADA				
Group 3	BAHAMAS	BARBADOS	COSTA RICA	DOM. REP.	EL SALVADOR
	FRANCE (MA)	GUATEMALA	HAITI	HONDURAS	JAMAICA
	MEXICO	NICARAGUA	PANAMA	TRIN&TOBAGO	U.S. (PR)
Group 4	ARGENTINA	BOLIVIA	BRAZIL	CHILE	COLUMBIA
	EQUADOR	FRANCE (FG)	PARAGUAY	PERU	SURINAM
	URUGUAY	VENEZUELA			
Group 5	AUSTRIA	BELGIUM	CYPRUS	FRANCE	GERMANY,FR
	GREECE	IRELAND	ITALY	NETHERLANDS	NORDIC GRP
	POLAND	PORTUGAL	ROMANIA	SPAIN	SWITZERLAND
	TURKEY	U.K.	U.S.S.R.	YUGOSLAVIA	
Group 6	ALGERIA	ANGOLA	BAHRAIN	BENIN	CAMEROON
	CHAD	CONGO	EGYPT	ETHIOPIA	GABON
	GHANA	IRAN	IRAQ	ISRAEL	IVORY COAST
	JORDAN	KENYA	KUWAIT	LEBANON	LIBERIA
	LIBYA	MALAWI	MALI	MAURITANIA	MOROCCO
	MOZAMBIQUE	NIGER	NIGERIA	QATAR	SAUDI AR.
	SENEGAL	SIERRA LEONE	SOUTH AF.	SUDAN	TANZANIA
	TOGO	TUNISIA	UGANDA	U.A.E.	UPPER VOLTA
	YEMEN,A.R.	ZAIRE	ZIMBABWE		
Group 7	ICELAND	U.K. (ASC)	U.K. (BER)		

1

						Totals
3	3827	4	5947	5	24137	
6	6036	7	274			40221

2

						Totals
3	461	4	393	5	2128	
6	726	7	42			3750

3

						Totals
1	3827	2	461	3	442	
4	943	5	2349	6	39	
7	19					8080

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4							Totals
	1	5947	2	393	3	943	
	4	2246	5	4242	6	300	14071
5							Totals
	1	24137	2	2128	3	2349	
	4	4242	5	396	6	12085	
	7	336					45673
6							Totals
	1	5990	2	726	3	39	
	4	300	5	12085	6	3420	22560
7							Totals
	1	274	2	42	3	19	
	5	336					671

Total (one-way) : 135026

B-4 - PACIFIC OCEAN REGION (POR) TRAFFIC MODEL

The following pages are a listing of the POR voice circuit traffic for 1995 as based upon the Intelsat forecast of August 1984.

The final page of this section lists the grouped country traffic for the POR for year 1995.

POR Voice Circuits -- 1995

AUSTRALIA	Total =	3265							
	CANADA	292	CHINA (PEK)	27	CHINA (TAI)	24	FRANCE (NC)	47	
	HONG KONG	389	INDONESIA	91	JAPAN	274	KOREA	49	
	MALAYSIA	188	MEXICO	22	NEW ZEALAND	285	PHILIPPINES	16	
	SINGAPORE	220	THAILAND	41	U.S.-GUAM	10	U.S.-HAW	50	
	U.S.	1240							
CANADA	Total =	889							
	AUSTRALIA	292	CHINA (PEK)	11	CHINA (TAI)	45	HONG KONG	150	
	INDONESIA	24	JAPAN	87	KOREA	38	MALAYSIA	70	
	NEW ZEALAND	12	PHILIPPINES	59	SINGAPORE	77	THAILAND	11	
	U.S.-HAW	13							
CHINA (PEK)	Total =	609							
	AUSTRALIA	27	CANADA	11	HONG KONG	142	JAPAN	49	
	MALAYSIA	20	PHILIPPINES	11	SINGAPORE	98	THAILAND	13	
	U.S.-HAW	4	U.S.	234					
CHINA (TAI)	Total =	1759							
	AUSTRALIA	24	CANADA	45	INDONESIA	48	JAPAN	350	
	KOREA	113	MALAYSIA	117	NEW ZEALAND	9	SINGAPORE	42	
	THAILAND	79	U.S.-GUAM	2	U.S.-HAW	22	U.S.	908	
FIJI	Total =	7							
	U.S.-HAW	7							
FRANCE									
FRANCE (NC)	Total =	160							
	AUSTRALIA	47	HONG KONG	12	JAPAN	6	NEW ZEALAND	14	
	PHILIPPINES	24	SINGAPORE	38	U.S.	19			
GERMANY, FR									
HONG KONG	Total =	2210							
	AUSTRALIA	389	CANADA	150	CHINA (PEK)	142	FRANCE (NC)	12	
	INDONESIA	57	JAPAN	303	KOREA	187	NEW ZEALAND	24	
	THAILAND	23	U.S.-GUAM	8	U.S.-HAW	40	U.S.	875	
INDIA									
INDONESIA	Total =	495							

		AUSTRALIA	91	CANADA	24	CHINA (TAI)	48	HONG KONG	57
		JAPAN	143	KOREA	35	MALAYSIA	29	NEW ZEALAND	9
		THAILAND	5	U.S.-HAW	18	U.S.	36		
ITALY									
JAPAN	Total =	4799							
		AUSTRALIA	274	CANADA	87	CHINA (PEK)	49	CHINA (TAI)	350
		FRANCE (NC)	6	HONG KONG	303	INDONESIA	143	MALAYSIA	154
		MEXICO	63	NEW ZEALAND	32	PHILIPPINES	60	SINGAPORE	384
		THAILAND	95	U.S.-GUAM	15	U.S.-HAW	180	U.S.	2604
KOREA	Total =	2198							
		AUSTRALIA	49	CANADA	38	CHINA (TAI)	113	HONG KONG	187
		INDONESIA	35	MALAYSIA	73	NEW ZEALAND	9	PHILIPPINES	35
		SINGAPORE	83	THAILAND	29	U.S.-GUAM	16	U.S.-HAW	34
		U.S.	1497						
MALAYSIA	Total =	1247							
		AUSTRALIA	188	CANADA	70	CHINA (PEK)	20	CHINA (TAI)	117
		INDONESIA	29	JAPAN	154	KOREA	73	NEW ZEALAND	21
		U.S.-HAW	15	U.S.	560				
MEXICO	Total =	85							
		AUSTRALIA	22	JAPAN	63				
NEW ZEALAND	Total =	645							
		AUSTRALIA	285	CANADA	12	CHINA (TAI)	9	FRANCE (NC)	14
		HONG KONG	24	INDONESIA	9	JAPAN	32	KOREA	9
		MALAYSIA	21	PHILIPPINES	8	SINGAPORE	15	THAILAND	7
		U.S.-HAW	15	U.S.	185				
PHILIPPINES	Total =	863							
		AUSTRALIA	16	CANADA	59	CHINA (PEK)	11	FRANCE (NC)	24
		JAPAN	60	KOREA	35	NEW ZEALAND	8	U.S.-GUAM	8
		U.S.-HAW	40	U.S.	602				
SINGAPORE	Total =	1672							
		AUSTRALIA	220	CANADA	77	CHINA (PEK)	98	CHINA (TAI)	42
		FRANCE (NC)	38	JAPAN	384	KOREA	83	NEW ZEALAND	15
		THAILAND	86	U.S.-HAW	39	U.S.	590		
SRI LANKA									
THAILAND	Total =	695							
		AUSTRALIA	41	CANADA	11	CHINA (PEK)	13	CHINA (TAI)	79
		HONG KONG	23	INDONESIA	5	JAPAN	95	KOREA	29
		NEW ZEALAND	7	SINGAPORE	86	U.S.-HAW	9	U.S.	297
U.K. (BER)									

U.K.									
U.S.-GUAM	Total =	275							
	AUSTRALIA	10	CHINA (TAI)	2	HONG KONG	8	JAPAN	15	
	KOREA	16	PHILIPPINES	8	U.S.-HAW	56	U.S.	160	
U.S.-HAW	Total =	543							
	AUSTRALIA	50	CANADA	13	CHINA (PEK)	4	CHINA (TAI)	22	
	FIJI	7	HONG KONG	40	INDONESIA	18	JAPAN	180	
	KOREA	34	MALAYSIA	15	NEW ZEALAND	15	PHILIPPINES	40	
	SINGAPORE	39	THAILAND	9	U.S.-GUAM	56	U.S.	1	
U.S.	Total =	9807							
	AUSTRALIA	1240	CHINA (PEK)	234	CHINA (TAI)	908	FRANCE (NC)	19	
	HONG KONG	875	INDONESIA	36	JAPAN	2604	KOREA	1497	
	MALAYSIA	560	NEW ZEALAND	185	PHILIPPINES	602	SINGAPORE	590	
	THAILAND	297	U.S.-GUAM	160					

Total For Matrix = 32223

B-5 - POR Grouped Country Traffic

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Group Distributions (POR) -- 1995

Group 1	U.S.-HAW	U.S.			
Group 2	CANADA				
Group 3	MEXICO				
Group 4	CHINA(PEK) MALAYSIA	CHINA(TAI) SINGAPORE	HONG KONG THAILAND	JAPAN	KOREA
Group 5	AUSTRALIA PHILIPPINES	FIJI U.S.-GUAM	FRANCE(NC)	INDONESIA	NEW ZEALAND

								Totals
1								
	1	1	2	13	4	7908		
	5	2428						10350
2								Totals
	1	13	4	489	5	387		889
3								Totals
	4	63	5	22				85
4								Totals
	1	7908	2	489	3	63		
	4	4880	5	1849				15189
5								Totals
	1	2428	2	387	3	22		
	4	1849	5	1024				5710

Total (one-way) : 32223

APPENDIX C

TRAFFIC MODELS FOR CANADA, MEXICO, AND BRAZIL

As part of the study, Ford Aerospace developed some very rough distribution models (in addition to the total traffic requirements from Task 1 - see Section 2) for Canada, Mexico, and Brazil. This was done because of the multiple reuse required in these countries to meet year 2008 demands. Distributions for Canada and Brazil were developed to the province or state level, while Mexico was defined to consist of North, Central, and South regions. See section 2.3 for a description of how the distributions were derived. The subsequent printouts in this Appendix provide the resulting traffic matrices.

C-1 - CANADIAN TRAFFIC MODEL

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Canada Voice -- Year 2008

ALBERTA	Total =	10136						
	ALBERTA	133	BRITISH COL.	804	MANITOBA	404	NEW BRUN.	260
	NEWFNDLND	214	N.W. TERR.	14	NOVA SCOTIA	323	ONTARIO 1	3632
	ONTARIO 2	630	PR. ED. IS.	46	QUEBEC 1	1972	QUEBEC 2	493
	SASKWAN	303	YUKON	7	ISL	901		
BRITISH COL.	Total =	13615						
	ALBERTA	804	BRITISH COL.	360	MANITOBA	542	NEW BRUN.	349
	NEWFNDLND	287	N.W. TERR.	19	NOVA SCOTIA	433	ONTARIO 1	4876
	ONTARIO 2	846	PR. ED. IS.	61	QUEBEC 1	2648	QUEBEC 2	662
	SASKWAN	508	YUKON	10	ISL	1210		
MANITOBA	Total =	6246						
	ALBERTA	404	BRITISH COL.	542	MANITOBA	49	NEW BRUN.	158
	NEWFNDLND	130	N.W. TERR.	9	NOVA SCOTIA	196	ONTARIO 1	2206
	ONTARIO 2	383	PR. ED. IS.	28	QUEBEC 1	1198	QUEBEC 2	300
	SASKWAN	92	YUKON	4	ISL	547		
NEW BRUN.	Total =	3601						
	ALBERTA	260	BRITISH COL.	349	MANITOBA	158	NEWFNDLND	83
	N.W. TERR.	6	ONTARIO 1	1418	ONTARIO 2	246	QUEBEC 1	385
	QUEBEC 2	193	SASKWAN	148	YUKON	3	ISL	352
NEWFNDLND	Total =	3423						
	ALBERTA	214	BRITISH COL.	287	MANITOBA	130	NEW BRUN.	83
	NEWFNDLND	14	N.W. TERR.	5	NOVA SCOTIA	104	ONTARIO 1	1165
	ONTARIO 2	202	PR. ED. IS.	15	QUEBEC 1	633	QUEBEC 2	158
	SASKWAN	122	YUKON	2	ISL	289		
N.W. TERR.	Total =	233						
	ALBERTA	14	BRITISH COL.	19	MANITOBA	9	NEW BRUN.	6
	NEWFNDLND	5	NOVA SCOTIA	7	ONTARIO 1	78	ONTARIO 2	14
	PR. ED. IS.	1	QUEBEC 1	42	QUEBEC 2	11	SASKWAN	8
	ISL	19						
NOVA SCOTIA	Total =	4949						
	ALBERTA	323	BRITISH COL.	433	MANITOBA	196	NEWFNDLND	104
	N.W. TERR.	7	ONTARIO 1	1761	ONTARIO 2	305	QUEBEC 1	956
	QUEBEC 2	239	SASKWAN	184	YUKON	4	ISL	437
ONTARIO 1	Total =	28197						
	ALBERTA	3632	BRITISH COL.	4876	MANITOBA	2206	NEW BRUN.	1418

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	NEWFNDLND	1165	N.W. TERR.	78	NOVA SCOTIA	1761	ONTARIO 2	3094
	PR. ED. IS.	250	QUEBEC 2	2692	SASKWAN	2067	YUKON	40
	ISL	4918						
ONTARIO 2 Total =		9853						
	ALBERTA	630	BRITISH COL.	846	MANITOBA	383	NEW BRUN.	246
	NEWFNDLND	202	N.W. TERR.	14	NOVA SCOTIA	305	ONTARIO 1	3094
	ONTARIO 2	537	PR. ED. IS.	43	QUEBEC 1	1867	QUEBEC 2	467
	SASKWAN	359	YUKON	7	ISL	853		
PR. ED. IS. Total =		703						
	ALBERTA	46	BRITISH COL.	61	MANITOBA	28	NEWFNDLND	15
	N.W. TERR.	1	ONTARIO 1	250	ONTARIO 2	43	QUEBEC 1	136
	QUEBEC 2	34	SASKWAN	26	YUKON	1	ISL	62
QUEBEC 1 Total =		14676						
	ALBERTA	1972	BRITISH COL.	2648	MANITOBA	1198	NEW BRUN.	385
	NEWFNDLND	633	N.W. TERR.	42	NOVA SCOTIA	956	ONTARIO 2	1867
	PR. ED. IS.	136	QUEBEC 2	1023	SASKWAN	1123	YUKON	22
	ISL	2671						
QUEBEC 2 Total =		7555						
	ALBERTA	493	BRITISH COL.	662	MANITOBA	300	NEW BRUN.	193
	NEWFNDLND	158	N.W. TERR.	11	NOVA SCOTIA	239	ONTARIO 1	2692
	ONTARIO 2	467	PR. ED. IS.	34	QUEBEC 1	1023	QUEBEC 2	329
	SASKWAN	281	YUKON	5	ISL	668		
SASKWAN Total =		5781						
	ALBERTA	303	BRITISH COL.	508	MANITOBA	92	NEW BRUN.	148
	NEWFNDLND	122	N.W. TERR.	8	NOVA SCOTIA	184	ONTARIO 1	2067
	ONTARIO 2	359	PR. ED. IS.	26	QUEBEC 1	1123	QUEBEC 2	281
	SASKWAN	43	YUKON	4	ISL	513		
YUKON Total =		119						
	ALBERTA	7	BRITISH COL.	10	MANITOBA	4	NEW BRUN.	3
	NEWFNDLND	2	NOVA SCOTIA	4	ONTARIO 1	40	ONTARIO 2	7
	PR. ED. IS.	1	QUEBEC 1	22	QUEBEC 2	5	SASKWAN	4
	ISL	10						
ISL Total =		13450						
	ALBERTA	901	BRITISH COL.	1210	MANITOBA	547	NEW BRUN.	352
	NEWFNDLND	289	N.W. TERR.	19	NOVA SCOTIA	437	ONTARIO 1	4918
	ONTARIO 2	853	PR. ED. IS.	62	QUEBEC 1	2671	QUEBEC 2	668
	SASKWAN	513	YUKON	10				

Total For Matrix = 122537

C-2 - MEXICO TRAFFIC MODEL

Mexico Voice -- Year 2008

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MEXICO N.     Total =    7700
      MEXICO N.        1540   MEXICO C.      3850   MEXICO S.      2310

MEXICO C.     Total =   19250
      MEXICO N.        3850   MEXICO C.      9625   MEXICO S.      5775

MEXICO S.     Total =   11550
      MEXICO N.        2310   MEXICO C.      5775   MEXICO S.      3465

                  Total For Matrix =  38500
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C-3 - BRAZIL TRAFFIC MODEL

South America Forecast -- 2008

ACRE	Total =	170							
	ALAGOAS	3	AMAZONAS	2	BAHIA	14	CEARA	8	
	DIST. FED.	3	ESP. SANTO	3	GOIAS	8	GUANABARA	5	
	MARANHAO	6	MATO GR.	2	MINAS GER.	23	PARA	4	
	PARAIBA	5	PARANA	10	PERNAMBUCO	10	PIAUI	3	
	RIO DE JAN.	8	RIO GR. N.	3	RIO GR. S.	13	SANTA CAT.	5	
	SAO PAULO	30	SERGIPE	2					
ALAGOAS	Total =	1328							
	ACRE	3	ALAGOAS	24	AMAPA	1	AMAZONAS	13	
	BAHIA	111	CEARA	62	DIST. FED.	26	ESP. SANTO	22	
	GOIAS	61	GUANABARA	36	MARANHAO	46	MATO GR.	17	
	MINAS GER.	181	PARA	29	PARAIBA	37	PARANA	79	
	PERNAMBUCO	76	PIAUI	23	RIO DE JAN.	63	RIO GR. N.	21	
	RIO GR. S.	101	RONDONIA	1	RORAUMA	1	SANTA CAT.	40	
	SAO PAULO	240	SERGIPE	14					
AMAPA	Total =	70							
	ALAGOAS	1	AMAZONAS	1	BAHIA	6	CEARA	3	
	DIST. FED.	1	ESP. SANTO	1	GOIAS	3	GUANABARA	2	
	MARANHAO	3	MATO GR.	1	MINAS GER.	10	PARA	2	
	PARAIBA	2	PARANA	4	PERNAMBUCO	4	PIAUI	1	
	RIO DE JAN.	3	RIO GR. N.	1	RIO GR. S.	5	SANTA CAT.	2	
	SAO PAULO	13	SERGIPE	1					
AMAZONAS	Total =	755							
	ACRE	2	ALAGOAS	13	AMAPA	1	AMAZONAS	8	
	BAHIA	63	CEARA	35	DIST. FED.	15	ESP. SANTO	12	
	GOIAS	35	GUANABARA	21	MARANHAO	26	MATO GR.	10	
	MINAS GER.	103	PARA	16	PARAIBA	21	PARANA	45	
	PERNAMBUCO	43	PIAUI	13	RIO DE JAN.	36	RIO GR. N.	12	
	RIO GR. S.	57	RONDONIA	1	SANTA CAT.	23	SAO PAULO	136	
	SERGIPE	8							
BAHIA	Total =	6263							
	ACRE	14	ALAGOAS	111	AMAPA	6	AMAZONAS	63	
	BAHIA	522	CEARA	291	DIST. FED.	123	ESP. SANTO	104	
	GOIAS	288	GUANABARA	170	MARANHAO	217	MATO GR.	79	
	MINAS GER.	854	PARA	135	PARAIBA	176	PARANA	373	
	PERNAMBUCO	361	PIAUI	110	RIO DE JAN.	297	RIO GR. N.	101	
	RIO GR. S.	475	RONDONIA	6	RORAUMA	3	SANTA CAT.	187	
	SAO PAULO	1131	SERGIPE	66					

CEARA	Total =	3488								
	ACRE	8	ALAGOAS	62	AMAPA	3	AMAZONAS	35		
	BAHIA	291	CEARA	162	DIST. FED.	68	ESP. SANTO	58		
	GOIAS	161	GUANABARA	95	MARANHAO	121	MATO GR.	44		
	MINAS GER.	476	PARA	75	PARAIBA	98	PARANA	208		
	PERNAMBUCO	201	PIAUI	61	RIO DE JAN.	165	RIO GR. N.	56		
	RIO GR. S.	265	RONDONIA	3	RORAUMA	1	SANTA CAT.	104		
	SAO PAULO	630	SERGIPE	37						
DIST. FED.	Total =	1474								
	ACRE	3	ALAGOAS	26	AMAPA	1	AMAZONAS	15		
	BAHIA	123	CEARA	68	DIST. FED.	29	ESP. SANTO	24		
	GOIAS	68	GUANABARA	40	MARANHAO	51	MATO GR.	19		
	MINAS GER.	201	PARA	32	PARAIBA	41	PARANA	88		
	PERNAMBUCO	85	PIAUI	26	RIO DE JAN.	70	RIO GR. N.	24		
	RIO GR. S.	112	RONDONIA	1	RORAUMA	1	SANTA CAT.	44		
	SAO PAULO	266	SERGIPE	16						
ESP. SANTO	Total =	1243								
	ACRE	3	ALAGOAS	22	AMAPA	1	AMAZONAS	12		
	BAHIA	104	CEARA	58	DIST. FED.	24	ESP. SANTO	21		
	GOIAS	57	GUANABARA	34	MARANHAO	43	MATO GR.	16		
	MINAS GER.	169	PARA	27	PARAIBA	35	PARANA	74		
	PERNAMBUCO	72	PIAUI	22	RIO DE JAN.	59	RIO GR. N.	20		
	RIO GR. S.	94	RONDONIA	1	RORAUMA	1	SANTA CAT.	37		
	SAO PAULO	224	SERGIPE	13						
GOIAS	Total =	3457								
	ACRE	8	ALAGOAS	61	AMAPA	3	AMAZONAS	35		
	BAHIA	288	CEARA	161	DIST. FED.	68	ESP. SANTO	57		
	GOIAS	159	GUANABARA	94	MARANHAO	120	MATO GR.	44		
	MINAS GER.	471	PARA	75	PARAIBA	97	PARANA	206		
	PERNAMBUCO	199	PIAUI	61	RIO DE JAN.	164	RIO GR. N.	56		
	RIO GR. S.	262	RONDONIA	3	RORAUMA	1	SANTA CAT.	103		
	SAO PAULO	624	SERGIPE	37						
GUANABARA	Total =	2046								
	ACRE	5	ALAGOAS	36	AMAPA	2	AMAZONAS	21		
	BAHIA	170	CEARA	95	DIST. FED.	40	ESP. SANTO	34		
	GOIAS	94	GUANABARA	56	MARANHAO	71	MATO GR.	26		
	MINAS GER.	279	PARA	44	PARAIBA	57	PARANA	122		
	PERNAMBUCO	118	PIAUI	36	RIO DE JAN.	97	RIO GR. N.	33		
	RIO GR. S.	155	RONDONIA	2	RORAUMA	1	SANTA CAT.	61		
	SAO PAULO	369	SERGIPE	22						
MARANHAO	Total =	2605								
	ACRE	6	ALAGOAS	46	AMAPA	3	AMAZONAS	26		
	BAHIA	217	CEARA	121	DIST. FED.	51	ESP. SANTO	43		
	GOIAS	120	GUANABARA	71	MARANHAO	90	MATO GR.	33		

	MINAS GER.	355	PARA	56	PARAIBA	73	PARANA	155
	PERNAMBUCO	150	PIAUI	46	RIO DE JAN.	123	RIO GR. N.	42
	RIO GR. S.	198	RONDONIA	3	RORAUMA	1	SANTA CAT.	78
	SAO PAULO	470	SERGIPE	28				
MATO GR.	Total =	953						
	ACRE	2	ALAGOAS	17	AMAPA	1	AMAZONAS	10
	BAHIA	79	CEARA	44	DIST. FED.	19	ESP. SANTO	16
	GOIAS	44	GUANABARA	26	MARANHAO	33	MATO GR.	12
	MINAS GER.	130	PARA	21	PARAIBA	27	PARANA	57
	PERNAMBUCO	55	PIAUI	17	RIO DE JAN.	45	RIO GR. N.	15
	RIO GR. S.	72	RONDONIA	1	SANTA CAT.	28	SAO PAULO	172
	SERGIPE	10						
MINAS GER.	Total =	10243						
	ACRE	23	ALAGOAS	181	AMAPA	10	AMAZONAS	103
	BAHIA	854	CEARA	476	DIST. FED.	201	ESP. SANTO	169
	GOIAS	471	GUANABARA	279	MARANHAO	355	MATO GR.	130
	MINAS GER.	1397	PARA	221	PARAIBA	288	PARANA	610
	PERNAMBUCO	590	PIAUI	180	RIO DE JAN.	485	RIO GR. N.	165
	RIO GR. S.	777	RONDONIA	10	RORAUMA	4	SANTA CAT.	306
	SAO PAULO	1850	SERGIPE	108				
PARA	Total =	1623						
	ACRE	4	ALAGOAS	29	AMAPA	2	AMAZONAS	16
	BAHIA	135	CEARA	75	DIST. FED.	32	ESP. SANTO	27
	GOIAS	75	GUANABARA	44	MARANHAO	56	MATO GR.	21
	MINAS GER.	221	PARA	35	PARAIBA	46	PARANA	97
	PERNAMBUCO	93	PIAUI	28	RIO DE JAN.	77	RIO GR. N.	26
	RIO GR. S.	123	RONDONIA	2	RORAUMA	1	SANTA CAT.	48
	SAO PAULO	293	SERGIPE	17				
PARAIBA	Total =	2109						
	ACRE	5	ALAGOAS	37	AMAPA	2	AMAZONAS	21
	BAHIA	176	CEARA	98	DIST. FED.	41	ESP. SANTO	35
	GOIAS	97	GUANABARA	57	MARANHAO	73	MATO GR.	27
	MINAS GER.	288	PARA	46	PARAIBA	59	PARANA	126
	PERNAMBUCO	121	PIAUI	37	RIO DE JAN.	100	RIO GR. N.	34
	RIO GR. S.	160	RONDONIA	2	RORAUMA	1	SANTA CAT.	63
	SAO PAULO	381	SERGIPE	22				
PARANA	Total =	4473						
	ACRE	10	ALAGOAS	79	AMAPA	4	AMAZONAS	45
	BAHIA	373	CEARA	208	DIST. FED.	88	ESP. SANTO	74
	GOIAS	206	GUANABARA	122	MARANHAO	155	MATO GR.	57
	MINAS GER.	610	PARA	97	PARAIBA	126	PARANA	266
	PERNAMBUCO	257	PIAUI	79	RIO DE JAN.	212	RIO GR. N.	72
	RIO GR. S.	339	RONDONIA	4	RORAUMA	2	SANTA CAT.	134
	SAO PAULO	807	SERGIPE	47				

PERNAMBUCO	Total =	4325							
	ACRE	10	ALAGOAS	76	AMAPA	4	AMAZONAS	43	
	BAHIA	361	CEARA	201	DIST. FED.	85	ESP. SANTO	72	
	GOIAS	199	GUANABARA	118	MARANHAO	150	MATO GR.	55	
	MINAS GER.	590	PARA	93	PARAIBA	121	PARANA	257	
	PERNAMBUCO	249	PIAUI	76	RIO DE JAN.	205	RIO GR. N.	70	
	RIO GR. S.	328	RONDONIA	4	RORAUMA	2	SANTA CAT.	129	
	SAO PAULO	781	SERGIPE	46					
PIAUI	Total =	1319							
	ACRE	3	ALAGOAS	23	AMAPA	1	AMAZONAS	13	
	BAHIA	110	CEARA	61	DIST. FED.	26	ESP. SANTO	22	
	GOIAS	61	GUANABARA	36	MARANHAO	46	MATO GR.	17	
	MINAS GER.	180	PARA	28	PARAIBA	37	PARANA	79	
	PERNAMBUCO	76	PIAUI	23	RIO DE JAN.	63	RIO GR. N.	21	
	RIO GR. S.	100	RONDONIA	1	RORAUMA	1	SANTA CAT.	39	
	SAO PAULO	238	SERGIPE	14					
RIO DE JAN.	Total =	3558							
	ACRE	8	ALAGOAS	63	AMAPA	3	AMAZONAS	36	
	BAHIA	297	CEARA	165	DIST. FED.	70	ESP. SANTO	59	
	GOIAS	164	GUANABARA	97	MARANHAO	123	MATO GR.	45	
	MINAS GER.	485	PARA	77	PARAIBA	100	PARANA	212	
	PERNAMBUCO	205	PIAUI	63	RIO DE JAN.	168	RIO GR. N.	57	
	RIO GR. S.	270	RONDONIA	4	RORAUMA	1	SANTA CAT.	106	
	SAO PAULO	642	SERGIPE	38					
RIO GR. N.	Total =	1208							
	ACRE	3	ALAGOAS	21	AMAPA	1	AMAZONAS	12	
	BAHIA	101	CEARA	56	DIST. FED.	24	ESP. SANTO	20	
	GOIAS	56	GUANABARA	33	MARANHAO	42	MATO GR.	15	
	MINAS GER.	165	PARA	26	PARAIBA	34	PARANA	72	
	PERNAMBUCO	70	PIAUI	21	RIO DE JAN.	57	RIO GR. N.	19	
	RIO GR. S.	92	RONDONIA	1	SANTA CAT.	36	SAO PAULO	218	
	SERGIPE	13							
RIO GR. S.	Total =	5697							
	ACRE	13	ALAGOAS	101	AMAPA	5	AMAZONAS	57	
	BAHIA	475	CEARA	265	DIST. FED.	112	ESP. SANTO	94	
	GOIAS	262	GUANABARA	155	MARANHAO	198	MATO GR.	72	
	MINAS GER.	777	PARA	123	PARAIBA	160	PARANA	339	
	PERNAMBUCO	328	PIAUI	100	RIO DE JAN.	270	RIO GR. N.	92	
	RIO GR. S.	432	RONDONIA	6	RORAUMA	2	SANTA CAT.	170	
	SAO PAULO	1029	SERGIPE	60					
RONDONIA	Total =	72							
	ALAGOAS	1	AMAZONAS	1	BAHIA	6	CEARA	3	
	DIST. FED.	1	ESP. SANTO	1	GOIAS	3	GUANABARA	2	
	MARANHAO	3	MATO GR.	1	MINAS GER.	10	PARA	2	
	PARAIBA	2	PARANA	4	PERNAMBUCO	4	PIAUI	1	

	RIO DE JAN.	4	RIO GR. N.	1	RIO GR. S.	6	SANTA CAT.	2
	SAO PAULO	13	SERGIPE	1				
RORAUMA Total =		30						
	ALAGOAS	1	BAHIA	3	CEARA	1	DIST. FED.	1
	ESP. SANTO	1	GOIAS	1	GUANABARA	1	MARANHAO	1
	MINAS GER.	4	PARA	1	PARAIBA	1	PARANA	2
	PERNAMBUCO	2	PIAUI	1	RIO DE JAN.	1	RIO GR. S.	2
	SANTA CAT.	1	SAO PAULO	5				
SANTA CAT. Total =		2242						
	ACRE	5	ALAGOAS	40	AMAPA	2	AMAZONAS	23
	BAHIA	187	CEARA	104	DIST. FED.	44	ESP. SANTO	37
	GOIAS	103	GUANABARA	61	MARANHAO	78	MATO GR.	28
	MINAS GER.	306	PARA	48	PARAIBA	63	PARANA	134
	PERNAMBUCO	129	PIAUI	39	RIO DE JAN.	106	RIO GR. N.	36
	RIO GR. S.	170	RONDONIA	2	RORAUMA	1	SANTA CAT.	67
	SAO PAULO	405	SERGIPE	24				
SAO PAULO Total =		13559						
	ACRE	30	ALAGOAS	240	AMAPA	13	AMAZONAS	136
	BAHIA	1131	CEARA	630	DIST. FED.	266	ESP. SANTO	224
	GOIAS	624	GUANABARA	369	MARANHAO	470	MATO GR.	172
	MINAS GER.	1850	PARA	293	PARAIBA	381	PARANA	807
	PERNAMBUCO	781	PIAUI	238	RIO DE JAN.	642	RIO GR. N.	218
	RIO GR. S.	1029	RONDONIA	13	RORAUMA	5	SANTA CAT.	405
	SAO PAULO	2449	SERGIPE	143				
SERGIPE Total =		795						
	ACRE	2	ALAGOAS	14	AMAPA	1	AMAZONAS	8
	BAHIA	66	CEARA	37	DIST. FED.	16	ESP. SANTO	13
	GOIAS	37	GUANABARA	22	MARANHAO	28	MATO GR.	10
	MINAS GER.	108	PARA	17	PARAIBA	22	PARANA	47
	PERNAMBUCO	46	PIAUI	14	RIO DE JAN.	38	RIO GR. N.	13
	RIO GR. S.	60	RONDONIA	1	SANTA CAT.	24	SAO PAULO	143
	SERGIPE	8						
ARGENTINA Total =		3390						
	ARGENTINA	3390						
BOLIVIA Total =		580						
	BOLIVIA	580						
CHILE Total =		4710						
	CHILE	4710						
COLUMBIA Total =		8960						
	COLUMBIA	8960						
ECUADOR Total =		580						

```
        ECUADOR          580

PERU            Total =    330
        PERU             330

VENEZUELA       Total =   1490
        VENEZUELA       1490

                       Total For Matrix =  95145
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APPENDIX D

TRAFFIC SURVEY BY SATELLITE SYSTEMS ENGINEERING (SSE)

D-1 - SCOPE OF SURVEY

SSE conducted a survey to determine the demand for those data services considered most suitable for transmission via non-FSS. Services included are as follows:

1. Remote Job Entry (RJE).

   This is a process by which an operator can manipulate data for a specific job from a remote site. RJE involves both manipulation of received data and transmission of the output to the originator after processing.

   In the industry survey SSE found that oil and gas companies engaged in gas and oil exploration at remote sites, and institutions of higher education were most likely to use remote job entry data services.

   Interviews with oil and gas exploration companies, such as Geosource/SBS Communications, Inc., Drilling Information Service Company and Schlumberger Services, indicate that these companies have different levels of operation, ranging from strictly domestic to international services to over 95 countries. However, all these companies engage in seismic data collection, manipulation and transmission of data from remote locations. Typically, data is transmitted at 4.8 to 56 kbps using transportable antennas.

   Interviews with the University of Maryland and the National Technological University also revealed a need for remote job entry and time sharing data services (explained below).

The University of Maryland provides instructional services to over 50 countries. It also has 15 locations in the U.S. that provide remote job entry capability using four channels and IBM computers. The University of Maryland expressed a need for providing remote job entry capability to their overseas locations.

The National Technical University plans to offer graduate engineering courses on a national basis. The University will provide interactive timesharing entry and remote job capability to students.

2. <u>Inquiry/Response</u>

This service is transmitted in a real time manner through operator entered inquiries. The industry survey conducted by SSE revealed that the most common application of this service will be made by companies engaged in ticket and reservation systems, such as for airline reservations and stock exchange quotations by brokerage firms such as Piper, Jeffers and Hopward, which SSE interviewed.

3. <u>Timesharing</u>

This process involves the shared use of centrally located computer facilities by several operators. The computer facilities can store, manipulate and transmit data simultaneously among several users generally on a real time basis. Transmission speeds vary from 1.2 to 9.6 kbps.

SSE interviewed Milliper Corporation and Prime Computers, Inc., which provide wide area network coverage for data transmission. At present, market service is provided only to large users. However, in a recent joint venture with Vitalink, Prime Computer hopes to market capability to many users via Vitalink's earth stations.

4. Point of Sale

This will involve payments made by consumers in stores, gas stations, etc., which will automatically be entered into the banking system, rather than being made by credit cards or check. Point of sale terminals will be used for credit authorization, sales transactions and some inquiry functions.

SSE's interviews with the oil and gas company ARCO, supermarket chains such as Safeway and Kroger, and department stores such as Sears, Montgomery Ward and K-Mart, reveal that as these companies have from several thousand operating centers, they will make extensive use of point of sale data services. The minimum capability for data transmission needed is 1.8 kbps, or about 100 characters of information.

In additon to the services mentioned above, SSE found that these companies would also use point of sale terminals for regulation of inventory flow. This application will make use of separate display terminals in each store. Purchase orders will be entered into existing databases. This will allow quantities and type of merchandise to be weighed, and costs could be calculated in terms of retail sales dollars. In the future when home shopping via television becomes widespread, inquiry/response and point of sale services are expected to become integrated.

3. Videotex/Teletext/Viewdata

Videotex is a generic term which subsumes Teletext and Viewdata. Both are electronic text systems which display textual information on a video screen. These systems require a computerized data base and transmission links to provide information to the people who want it. The data base can be alpha-numeric and/or graphic. The information can be transmitted via a telephone line or a satellite. Teletext flashes pages of text on a TV screen. The user, by punching a code, can abstract some specific information from a text. Examples of services are news, sports, weather. Viewdata is an interactive service and will allow people to access a library of information such as restaurant and movie reviews, and of airline schedules. Although Videotex is still in its infancy, its interactive capability will make it possible to have services like home banking, tele-shopping, and advertising, because this service can operate over a wide range of transmission systems, from broadcast to terrestrial lines, or two-way cable systems.

SSE"s interviews with Coca-Cola and Citibank indicate that they are interested in using some Videotex systems for advertising and home banking.

6. Telemonitoring Services

This provides electronic monitoring from a central location. These services are provided by the following companies SSE interviewed:

-- ADT Security and Technicomsystems provide security and alarm systems.

-- National Rural Utilities will provide telemonitoring services for instant meter readings.

-- Railroad companies, such as Norfolk Southern and Southern Pacific, and transportation companies, in addition to mail and package delivery companies like United Parcel Service (UPS) and Federal Express, and long haul and trucking companies such as Leaseway Transportation and Mayflower, will use monitoring services for telemetry, control and dispatch.

7. Secure Voice

SEE's interviews with firms engaged in financial transactions (Citibank--electronic funds transfer; and Piper, Jeffers and Hopward--brokerage services) revealed these companies have a need to prevent interception of messages that might divulge proprietary or sensitive information on their daily transactions. As the trend toward replacement of telephone wires (which require a physical tap) with microwave radio and/or satellite transmission become more prevalent, the need to prevent interception of data will become more urgent. Secured voice services will provide encrypted dedicated private lines.

D-2 - CONCLUSIONS

- From among the data service categories outlined, SSE estimates that in particular inquiry-response, point of sale, and videotext/teletext data services will become more integrated. This is because of the need to provide customers with the ease of product or service selection, purchase, and adjustment of account in one simple process.

- SSE's industry survey also indicates that a great demand exists for telemonitoring and remote job entry services in the long-haul trucking, gas and oil exploration, and railroad industries. Express mail and package delivery companies like United Parcel Service and Federal Express also demonstrated this need. From the interviews and literature survey SSE expects this demand to be satisfied most economically by mobile communications satellites.

- With advancing technological capabilities and proliferation of computer terminals, the demand for timesharing data services will also continue to increase. However, by 1990 and 2000 SSE estimates that a greater percentage of this service will be transmitted via fiber optics because most of the traffic will be urban areas. The satellite addressable demand for this service may decrease in 1990 and 2000.

- SSE's industry survey also reveals that as more and more information is transmitted electronically, the need for secure voice services will increase significantly. This is because of the need for companies to prevent interception of transmission of proprietary information.

- The thrust toward the provision and control of data services from a central location, such as with point of sale and inquiry response services, will give rise to the development of regional or central systems. This means that in the future more data traffic will be long-haul.

- It is estimated that as single cell terrestrial cellular radio systems become more numerous, the pressure for mobile services from "roamer" traffic, with the demand from companies engaged in trucking and dispatch services, will increase. This in turn will provide impetus for the provision of integrated, ubiquitous mobile services. The future trend will be for satellite mobile services to be compatible with terrestrial cellular mobile radio services.

- SSE's review of Western Union's demand forecast and NASA's synthesis, combined with SSE's own demand estimates for data traffic based on interviews with industry experts, shows only a very slight variation in end traffic demand forecasts. SSE, therefore, considers it reasonable to accept NASA's synthesis of traffic demand forecast for the data services listed above for the years 1990 and 2000.

D-3 - LIST OF INDUSTRY SURVEY RESPONDENTS

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APPENDIX E

SATELLITE SYSTEM PROFILES

The following profiles of current and projected satellite systems were prepared by Satellite Systems Engineering (SSE). The summary is as of January 1985.

System Name:	INTELSAT V MCS
Operator:	COMSAT GENERAL for INMARSAT
Number of Satellites:	4 maritime communication subsystem payloads on INTELSAT V spacecraft.
Date of Launch(es):	May 1983, October 1983, March 1984
Orbital Position(s):	60 & 63 East, 53 & 18.5 West
Frequencies:	1.6, 6/1.5, 5 GHz
Total Bandwidth, MHz:	15 MHz,
Number of Transponders:	Two 7.5 MHz channels, capacity about 7 voice circuits per spacecraft
Services Provided:	Telephony, data, facsimile, and telex between costal earth stations and ships at sea.
Probability of Operation:	Already operational

Discussion:

System Name:	MARISAT
Operator:	COMSAT GENERAL for INMARSAT
Number of Satellites:	3 in orbit
Date of Launch(es):	February, June and October 1976
Orbital Position(s):	14.5 West, 72.5 and 176.5 East
Frequencies:	1.6, 6/1.5, 5 6 GHz
Total Bandwidth, MHz:	8 MHz
Number of Transponders:	2 4-MHz wide channels
Services Provided:	Maritime mobile satellite services such as telephony, data, facsimile and telex.
Probability of Operation:	Already operational
Discussion:	Spacecraft formed first commercial maritime mobile service system. Transponders were subsequently leased by INMARSAT. MARISAT also carries a military payload not used by INMARSAT. Capacity only one voice circuit when military payload used.

System Name:	MARECS
Operator:	ESA for INMARSAT
Number of Satellites:	2 in orbit
Date of Launch(es):	December 1981 and November 1984
Orbital Position(s):	24.5 West and 177.5 East
Frequencies:	1.6, 6/1.5, 5 GHz
Total Bandwidth, MHz:	11 MHz
Number of Transponders:	1 5.9 MHz mode ship to shore channel, 1 shore to ship 4.75 MHz channel. Capacity about 35 voice circuits.
Services Provided:	Telephony, data, facsimile and telex services between coastal earth stations and ships at sea.
Probability of Operation:	Already operational
Discussion:	Spacecraft were built by MESN Consortium, headed by British Aerospace and based on OTS/ECS bus.

System Name:	INTELSAT
Operator:	International Telecommunication Satellite Organization
Number of Satellites:	9 in orbit over AOR, 3 in orbit over IOR, 2 in orbit over POR. 8 INTELSAT IV and IV-A spacecraft in orbit were built by Hughes Aircraft Co. 5 INTELSAT V's in orbit by Ford Aerospace. 5 additional under construction by Ford (INTELSAT V-A and V-B series). 5 under construction by Hughes (INTELSAT VI series).
Date of Launch(es):	First INTELSAT V launched December 1980. First INTELSAT V-A in March 1985. 1986 planned for INTELSAT VI.
Orbital Position(a):	1, 3, 18.5, 21.5, 24.5, 27.5, 31. 34.5, 50 and 53 West (AOR), 57, 60 and 63 East (IOR), and 174, 177 and 179 East (POR). 66 East (IOR) and 177 (POR) currently unoccupied. Positions include spare domestic lease and planned international business service location.
Frequencies:	6/4 and 14/11 GHz
Total Bandwidth, MHz:	2000-3000 (Frequency reuse)
Number of Transponders:	12 C-band (INTELSAT IV) 20 C-band (INTELSAT IV-A) 21 C-band, 6 Ku-band (INTELSAT V) 32 C-band, 6 Ku-band (INTELSAT V-A) 38 C-band, 10 Ku-band (INTELSAT VI) per satellite in each series
Services Provided:	telephone, television, teletype and data transmission, domestic leases, international business services, VISTA
Probability of Operation:	already operational
Discussion:	INTELSAT has been providing reliable international telecommunication services by satellite since the early 1960s. INTELSAT V F-4 and F-8 each carry one additional maritime transponder used by INMARSAT.

EMPLOYMENT OF INTELSAT IV, IV-A, AND V SERIES SPACECRAFT IN FEBRUARY 1985, Before launch of first V-A spacecraft

Service Area:	AOR	AOR	AOR	AOR	AOR	AOR	AOR	AOR	AOR	AOR
Service Type:	IBS	IBS	MPI	SPARE	SPARE	PRIMARY	SPARE	MP2	SPARE	SPARE
Location: (East Long.)	307	310	325.5	329	332.5	335.5	338.5	341.5	356	359
Spacecraft Series:	V	IV	V	IV-A	V	V	IV-A	V	IV-A	IV
Number:	F-8	F-1	F-2	F-1	F-4	F-3	F-4	F-6	F-2	F-8

Service Area:	IOR	IOR	IOR	IOR	POR	POR	POR
Service Type:	SPARE	PRIMARY	MP	SPARE	PRIMARY	SPARE/MP	SPARE
Location: (East Long.)	57	60	63	66	174	177	179/180
Spacecraft Series:	V	V	V		IV-A		IV-A
Number:	F-7	F-7	F-5		F-6		F-3

IBS = International Business Service
MP = Major Path

NOTE: INTELSAT V-A F-10 to be positionaed at 332.5, INTELSAT V F-4 to be then moved. INTELSAT V-A F-11 to be positioned at 335.5 East after launch. INTELSAT V F-3 to be moved to 307 East.

Spare position may be used for domestic lease.

Ford Aerospace & Communications Corporation

System Name:	CYGNUS
Operator:	Cygnus Satellite Corp.
Number of Satellites;	2 in orbit and a spare planned
Date of Launch(es):	1987 planned
Orbital Position(s):	43 and 45 West requested in pending aplications to FCC
Frequencies:	14/11-12 GHz
Total Bandwidth, MHz:	1000 (Frequency reuse)
Number of Transponders:	16 active 54 MHz Ku-band transponders per satellite
Services Provided:	voice, video and data transmission
Probability of Operation:	low/medium
Discussion:	Cygnus Satellite still has to obtain authorization, secure financing and show a customer base for its proposed transatlantic services. President Reagan has determined that private international systems are in the U.S. national interest and the FCC is determining how to process these applications. After FCC approval, these systems will still face the difficulty of international coordination; i.e., with INTELSAT, and obtaining foreign PTT correspondents.

System Name:	ISI
Operator:	International Satellite, Inc.
Number of Satellites:	2 in orbit planned
Date of Launch(es):	1987 planned
Orbital Position(s):	56 and 58 West requested in pending application to FCC
Frequencies:	14/11-12 GHz
Total Bandwidth, MHz:	2000 (dual frequency reuse)
Number of Transponders:	32 active 54 MHz Ku-band transponders per satelliate
Services Provided:	video distribution, data transmission, teleconferencing
Probability of Operation:	low/medium
Discussion:	International Satellite still has to obtain authorization and show a customer base for its proposed transatlantic services. President Reagan has determined that private international systems are in the U.S. national interest and the FCC is determining how to process these aapplications. After FCC approval, these systems will still face the difficulty of international coordination; i.e., with INTELSAT, and obtaining foreign PTT correspondents.

System Name:	ORION
Operator:	Orion Satellite Corp.
Number of Satellites:	2 in orbit planned
Date of Launch(es):	1987 planned
Orbital Position(s):	38.5, 37 and 50 West requested in pending application to FCC
Frequencies:	14/11 GHz
Total Bandwidth, MHz	1000 (frequency reuse)
Number of Transponders:	22 acive 36-MHz Ku-band transponders per satellite
Services Provided:	voice, video and data transmission services for private custmers
Probability of Operation:	low/medium
Discussion:	Orion still has to obtain authorization, secure financing, and show a customer base for its proposed tramsatlantic services. President Reagan has determined that private international systems are in the U.S. national interest and the FCC is determining how to process these applications. After FCC approval, these systems will still face the difficulty of international coordination; i.e., with INTELSAT, and obtaining foreign PTT correspondents.

System Name:	UNISAT
Operator:	United Satellites, Ltd.
Number of Satellites:	3 possibly already under construction by British Aerospace-led consortium in England
Date of Launch(es):	1986/87 planned
Orbital Position(s):	31 West authorized for broadcast services
Frequencies:	14/11-12 and 17/11/12 GHz
Total Bandwidth, MHz:	1000 (frequency reuse)
Number of Transponders:	6 active 36-MHz Ku-Band and 2 active DBS transponders per satellite
Services Provided:	telephone, telex, data and direct broadcast satellite services
Probability of Operation:	low/medium
Discussion:	Continued funding of project unclear. On the one hand, the BBC is interested in using the DBS channels. On the other hand, opponents state that the spacecraft will be too expensive and argue for buying from a U.S. spacecraft manufacturer.

System Name:	Pacific Basin Satellite System
Operator:	Pacific Telecommunications Council
Number of Satellites:	1 or 2 in orbit, 1 spare
Date of Launch(es):	1987 planned
Orbital Position(s):	160 possible, 1 FRB not yet notified
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	500
Number of Transponders:	8 to 12 per satellite
Services Provided:	Telephony, telegraphs, data and television distribution
Probability of Operation:	Medium
Discussion:	Pacific Telecommunication Council has studied satellite system. If financing can be obtained a satellite could be launched as early as 1987. systems would have to be internationally coordinated to avoid interference.

System Name:	ALASCOM AURORA
Operator:	Alascom, Inc.
Number of Satellites:	1 in orbit/operational, 3 more planned, including ground spare
Date of Launch(es):	Oct 1982 June 1989 and Feb 1991 planned
Orbital Position(s):	143 West occupied 137 and 141 West requested pending application to FCC
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	1000 (Frequency Reuse)
Number of Transponders:	24 active 36-MHz C-band transponders
Services Provided:	message toll, private line, audio and video transmission; tele-conferencing, teletext and video-text planned.
Probability of Operation:	System already is operational; 60% for 3 satellites
Discussion:	Alascom Inc. is owned by Pacific Telecom. The company purchased RCA Satcom V in 1982 and renamed it AURORA. The ground segment currently comprises over 190 earth stations in Alaska. ALASCOM-3 would actually be a replacement for ALASCOM-1.

	90		95	
LOW	1	24	1	24
HIGH	3	72	3	72

System Name:	AMERICAN SATELLITE
Operator:	American Satellite Company
Number of Satellites:	2 or 3 under construction by RCA Astro-Electronics 2 advanced hybrids planned
Date of Launch(es):	1985, 1986 and 1987 planned 1989 planned for 2nd Gen.
Orbital Position(s):	81 and 128 West authorized by FCC
Frequencies:	6/4 and 14/12 GHz also 30/20 GHz for 2nd Gen
Total Bandwidth, MHz:	1500 with partial frequency reuse 3000 for 2nd Gen.
Number of Transponders:	12 36-MHz and 6 72-MHz C-band, 6 72-MHz Ku-band for first S/C, 24 C-band, 19 Ku-band and 3 Ka-band transponders planned for 2nd Gen.
Services Provided:	voice, video and data transmission, in particular electronic mail, videoconferencing and computer network services planned
Probability of Operation:	Ground segment already operational using Western Union WESTAR satellites
Discussion:	American Satellite has 10 years of operational experience and an extensive network of earth stations installed for its private and government customers. The company is owned by Fairchild Industries and Continental Telecom and has secured a $300 million credit line for its planned satellite system.

System Name:	CABLESAT GENERAL
Operator:	Cablesat General Corp.
Number of Satellites:	2 in orbit and a ground spare planned
Date of Launch(es):	mid-80s planned
Orbital Position(s):	one position each between 60-70 and 140-150 West requested in pending application to FCC
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	1000 (Frequency Reuse)
Number of Transponders:	24 active 36-MHz transponders per satellite
Services Provided:	television and audio broadcast, in particular to cable networks, experimental amateur radio
Probability of Operation:	Low
Discussion:	Cablesat General has received a turnkey proposal from RCA Astro-Electronics to build the satellites but has yet to obtain FCC license. Financing and customer base need to be demonstrated.

System Name:	COLUMBIA COMMUNICATIONS
Operator:	Columbia Communications Corp.
Number of Satellites:	2 planned
Date of Launch(es):	mid 1980s planned
Orbital Position(s):	62.5 and 147.5 West requested in pending application to FCC
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	1000 (Frequency Reuse)
Number of Transponders:	24 active 36-MHz transponders per satellite
Services Provided:	transponder services
Probability of Operation:	low
Discussion:	Columbia Communications plans to raise the required capital for its system by selling all transponders to individual partnerships. The company has yet to demonstrate this kind of financing works.

System Name:	COMSTAR C-BAND
Operator:	AT&T and GTE
Number of Satellites:	3 in orbit, of which two are colocated and nearing retirement
Date of Launch(es):	July 1976, June 1978 and February 1981
Orbital Position(s):	76.5, 76, and 127 West occupied
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	1000 (Frequency Reuse)
Number of Transponders:	24 active 36-MHz C-band transponders per satellite
Services Provided:	telephone, telegraph, data and television transmission
Probability of Operation:	Already in operation
Discussion:	These satellites are to be replaced by AT&T TELSTAR and GTE SPACENET systems, respectively.

System Name:	COMSTAR KU-BAND
Operator:	Comsat General Corp.
Number of Satellites:	3 in orbit planned
Date of Launch(es):	April 1988, August 1988 and January 1989 planned
Orbital Position(s):	93 and 101 West requested in pending application to FCC
Frequencies:	14/12 GHz
Total Bandwidth, MHz:	1000 (Frequency Reuse)
Number of Transponders:	16 active 54-MHz transponders per satellite
Services Provided:	video distribution, private network and transponder services
Probability of Operation:	medium
Discussion:	Comsat General still has to obtain FCC authorization for its system, demonstrate financing and customer base. however, if the DBS industry continues to evolve towards medium power satellites, and STC is delayed further, these satellites could have a bright future.

System Name:	DCBS
Operator:	Palmer Associates
Number of Satellites:	2 in orbit planned initially (Phase I)*
Date of Launch(es):	1987 planned (Phase I)
Orbital Position(s):	119 to 132 West requested in pending application to FCC
Frequencies:	30/20 and 14/12
Total Bandwidth, MHz:	2000 (frequency reuse)
Number of Transponders:	3 Ka-band, undetermined number of Ku-band
Services Provided:	Television distribution, data transmission, videoconferencing probable.
Probability of Operation:	low
Discussion:	Customer base and financing unclear

* 2 more planned for Phase 2 and a platform planned for Phase 3.

Ford Aerospace &
Communications Corporation

System Name:	DIGISAT
Operator:	Digital Telesat, Inc.
Number of Satellites:	3 planned
Date of Launch(es):	1988, 1989 and 1991 planned
Orbital Position(s):	57 and 134 West requested in pending application to FCC
Frequencies:	6/4 and 14/12 GHz
Total Bandwidth, MHz:	1000 (Frequency Reuse)
Number of Transponders:	24 active 36-MHz C or Ku-band transponders per satellite
Services Provided:	voice, video and data transmission for digital networks, in particular cellular mobile radio and paging systems
Probability of Operation:	low
Discussion:	Digital Telesat has to demonstrate its financing and customer base. The system design calls for co-location of a C- and Ku-band satellite at 57 West, inter-satellite links and an additional Ku-band satellite at 134 West.

System Name:	EQUASTAR
Operator:	Equatorial Communication Services, Inc.
Number of Satellites:	2 operational and a spare planned
Date of Launch(es):	1987 and 1988 planned
Orbital Position(s):	93 and 122 West requested in pending application to FCC
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	1000 (Frequency Reuse)
Number of Transponders:	24 active 36-MHz transponders per satellite
Services Provided:	data transmission between spread spectrum networks
Probability of Operation:	ground segment already operational; medium
Discussion:	Equatorial is currently leasing transponder space on Western Union WESTAR satellites. Equatorial still has to demonstrate customer base and financing for its system. Typical example of satellite user/earth station manufacturer wanting to put up own satellite system.

System Name:	FEDNET
Operator:	Federal Express Corp.
Number of Satellites:	2 in orbit plus a ground spare planned
Date of Launch(es):	Jan. and Mar. 1988 planned
Orbital Position(s):	101 and 134 West requested in pending application to FCC
Frequencies:	14/12 GHz
Total Bandwidth, MHz:	2000 (2x frequency reuse)
Number of Transponders:	32 active 56-MHz and 16 active 112-MHz Ku-band transponders per satellite
Services Provided:	low-speed electronic document and data transmission to on-premise terminals
Probability of Operation:	medium/high
Discussion:	Still looking for interim capacity for its ZAP-MAIL electronic mail service.

Ford Aerospace &
Communications Corporation

System Name:	FORDSAT
Operator:	Ford Aerospace Satellite Services, Inc.
Number of Satellites:	3 operational planned
Date of Launch(es):	1988 planned
Orbital Position(s):	73, 93 and 101 West requested in pending application to FCC
Frequencies:	6/4 and 14/12 GHz
Total Bandwidth, MHz:	2000 (Dual frequency reuse)
Number of Transponders:	24 36-MHz C-band and 24 36-MHZ Ku-band transponders per satellite
Services Provided:	transponder services for independent telephone companies, intracity TDMA networks, television distribution
Probability of Operation:	low/medium
Discussion:	Ford has yet to announce a customer base, secure financing and obtain FCC authorization. Ford argues that economics of sale will lower its transponder costs, interconnectivity between C and Ku band make system attractive to users.

System Name:	GALAXY (C-BAND)
Operator:	Hughes Communications Galaxy, Inc.
Number of Satellites:	3 in orbit built by Hughes Aircraft Co. 1 more planned for launch in 1986.
Date of Launch(es):	June 1983, September 1983, and September 1984
Orbital Position(s):	74, 93.5 and 134 West occupied 137 West requested in pending application to FCC
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	1000
Number of Transponders:	24 active 36-MHz C-band transponders per satellite
Services Provided:	telephony (up to 2500 FDM/FM voice channels per transponder), television distribution (to cable operators) and data transmission (1.5 Mb/s and 60 Mb/s digital)
Probability of Operation:	already operational
Discussion:	The Hughes GALAXY system already has several customers for television distribution and telephony and has implemented an earth station network in several major cities in the U.S.

System Name:	GALAXY (KU-BAND)
Operator:	Hughes Communications Galaxy, Inc.
Number of Satellites:	3 in orbit/operational planned
Date of Launch(es):	1987 and 1988 planned
Orbital Position(s):	73, 75 and 93 West requested in pending application to the FCC
Frequencies:	14/12 GHz
Total Bandwidth, MHz:	1000 (Frequency reuse)
Number of Transponders:	16 active Ku-band transponders per satellite
Services Provided:	telephony (up to 4000 FDM/FM voice channels per carrier), data transmission (1.5 Mb/s and up to 80 Mb/s) and video distribution to cable networks
Probability of Operation:	medium
Discussion:	Hughes has to demonstrate customer base and financing for this additional system. Their track record is good.

System Name:	HUGHES KA-BAND
Operator:	Hughes Communications Galaxy, Inc.
Number of Satellites:	2 in orbit planned
Date of Launch(es):	1989 planned
Orbital Position(s):	91 and 93 West requested in pending application to FCC
Frequencies:	30/20
Total Bandwidth, MHz:	2000 (frequency reuse)
Number of Transponders:	32 active 20-W Ka-band TWTA's
Services Provided:	Wideband data transmission, video-conferencing
Probability of Operation:	low/medium
Discussion:	System still requires authorization from FCC. Problem may arise due to FCC allocation of 18 GHz band to former terrestrial 12 GHz users and new DTS applicants. Only 500 MHz of planned satellite downlink band 19.7 to 20.2 GHz currently exclusively allocated to satellite users, the rest (17.7 to 19.7 GHz) must be shared.

System Name:	GSTAR
Operator:	GTE Satellite Corp.
Number of Satellites:	3 built by RCA Astro-Electronics, or in final stages of construction
Date of Launch(es):	First launch planned for April 1985, 1985 to 1987 planned for later launches
Orbital Position(s):	103 and 106 West authorized 101 West requested in pending application to FCC
Frequencies:	14/12 GHz
Total Bandwidth, MHz:	1000 (Frequency reuse)
Number of Transponders:	16 54-MHz Ku-band transponders per satellite
Services Provided:	full transponder audio and video services, end-to-end digital channels and private network services
Probability of Operation:	high
Discussion:	GTE has gained operational expertise with the COMSTAR system and the installation of earth station networks. However, their customer base is unknown, and there must be doubt about the launch of the first satellite unless their marketing improves.

System Name:	MARTIN MARIETTA
Operator:	Martin Marietta Communications Systems, Inc.
Number of Satellites:	2 in orbit planned, plus a ground spare
Date of Launch(es):	September 1988 planned
Orbital Position(s):	73 and 75 West requested in pending application to FCC
Frequencies:	14/12 GHz
Total Bandwidth, MHz:	1000 (Frequency reuse)
Number of Transponders:	8 54-MHz Ku-band CONUS and 10 235-MHz Ku-band SPOT transponders per satellite
Services Provided:	voice, data, facsimile, teleconferencing and video services
Probability of Operation:	medium
Discussion:	The satellite system features frequency reuse through dual polarization and spacial isolation of spot beams. Martin Marietta still needs to show its customer base.

System Name:	RCA SATCOM (C-BAND)
Operator:	RCA American Communications, Inc.
Number of Satellites:	5 operational, 1 more under construction RCA Astro-Electronics, 3 more planned
Date of Launch(es):	March 1976, Nov. 1981, Jan. 1982, April 1983, Sept. 1983 launched; May 1986, June 1989, June 1990 and Sept. 1992 planned.
Orbital Position(s):	67, 72, 83, 131 and 139 authorized by FCC, 61, 63 and 65 West requested in pending application to FCC
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	1000 (Frequency reuse)
Number of Transponders:	24 36-MHz C-band transponders per satellite
Services Provided:	telephony, telegraph, data transmission and television distribution
Probability of Operation:	already operational
Discussion:	RCA is a well established operator and has also installed several earth station networks

System Name:	RCA SATCOM (KU-BAND)
Operator:	RCA American Communications, Inc.
Number of Satellites:	3 under construction by RCA Astro- Electronics, 3 more planned
Date of Launch(es):	March 1985, Oct. 1985 and May 1987 planned for initial system, June 1989, June 1990 and Sept. 1992 planned for follow-on spacecraft
Orbital Position(s):	67, 77 and 87 West authorized by FCC, 61, 63 and 65 West requested in pending application to FCC
Frequencies:	14/12 GHz
Total Bandwidth, MHz:	1000 (Frequency reuse)
Number of Transponders:	16 54-Mhz Ku-band transponders per satellite
Services Provided:	voice and data transmission, radio and television distribution
Probability of Operation:	high
Discussion:	RCA is a well established operator, experienced in the installation of earth station networks.

System Name:	SBS
Operator:	Satellite Business Systems, Inc.
Number of Satellites:	4 in orbit/operational, 2 more under construction by Hughes Aircraft Co., 3 more planned
Date of Launch(es):	Nov. 1980, Sep. 1981, Nov. 1982, Sep. 1984; 1 planned for launch in 1986, 2 planned for launch in 1987, one in 1988 and 1990
Orbital Position(s):	95, 97, 99, 101 and 124 West authorized by FCC
Frequencies:	14/12 GHz
Total Bandwidth, MHz:	500-1000 (Frequency reuse)
Number of Transponders:	SBS 1-4: 10 43-MHz Ku-band transponders per satellite SBS 5: additional 4 110-MHz Ku-band transponders on each satellite SBS 6-9: 19 43-MHz Ku-band per satellite
Services Provided:	digital voice, data, facsimile and videoconferencing, television distribution transponder services
Probability of Operation:	already in operation
Discussion:	SBS is an established operator with an extensive earth station in place.

System Name:	SPACENET
Operator:	GTE Spacenet Corp.
Number of Satellites:	3 built by RCA Astro-Electronics
Date of Launch(es):	May 1984 launched; Nov. 1984, March 1985 and 1986 planned
Orbital Position(s):	69, 91 and 120 West authorized by FCC, 101 West requested in pending application to FCC
Frequencies:	6/4 and 14/12 GHz
Total Bandwidth, MHz:	1500 (Partial frequency reuse)
Number of Transponders:	12 36-MHz and 6 72-MHz C-band and 6 72-MHz Ku-band transponders per satellite
Services Provided:	SPRINT voice and data transmission, switched and private line services
Probability of Operation:	already operational
Discussion:	GTE is a well-established operator and its affiliate GTE Spacenet owns the SPRINT earth station network, which will use space segment on SPACENET.

System Name:	SPOTNET (C-BAND)
Operator:	National Exchange, Inc.
Number of Satellites:	3 planned (2 in orbit and a spare)
Date of Launch(es):	1987 planned
Orbital Position(s):	75 & 101 West
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	1000 (Frequency reuse)
Number of Transponders:	24 36-MHz C-band transponders per satellite
Services Provided:	high density point-to-point trunking, broadcast audio and video services, teleconferencing
Probability of Operation:	low
Discussion:	National Exchange still has to demonstrate it can secure financing and show a customer base.

System Name:	SPOTNET (KU-BAND)
Operator:	National Exchange, Inc.
Number of Satellites:	4 planned (2 colocated pairs in orbit)
Date of Launch(es):	1987 planned
Orbital Position(s):	75 and 101 West requested in pending application to FCC
Frequencies:	14/12 GHz
Total Bandwidth, MHz:	1000 (Frequency reuse)
Number of Transponders:	24 active 36-MHz transponders per satellite
Services Provided:	electronic mail, videoconferencing, teletext
Probability of Operation:	low
Discussion:	National Exchange has yet to demonstrate it has secured financing and show a customer base.

System Name:	TELSTAR
Operator:	American Telephone and Telegraph Co.
Number of Satellites:	2 in orbit/operational, 2 more under construction by Hughes
Date of Launch(es):	July 1983 and Sep. 1984; May 1985 and mid-1988 planned
Orbital Position(s):	76, 88.5 and 96 authorized by FCC, 127 West requested in pending application to FCC
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	1000 (Frequency reuse)
Number of Transponders:	24 active 36-MHz C-band transponders per satellite
Services Provided:	SKYNET audio and television broadcast, 1.5 Mb/s data transmission, transponder lease, up to 3900 voice channels per transponder
Probability of Operation:	already operational
Discussion:	AT&T is a well-established operator servicing an extensive earth station network.

System Name:	USAT
Operator:	U.S. Satellite Systems, Inc.
Number of Satellites:	2 possibly already under construction by Hughes, 3 more planned, including ground spare
Date of Launch(es):	Nov. 1986, March 1987, 2 in 1988/89 planned
Orbital Position(s):	73 and 83 West requested in pending application to FCC
Frequencies:	14/12 GHz
Total Bandwidth, MHz:	1000 (Frequency reuse)
Number of Transponders:	20 active 43-MHz Ku-band transponders per satellite
Services Provided:	digital voice, data and video satellite transmission services
Probability of Operation:	medium
Discussion:	U.S. Satellite Systems has reportedly secured $23 million, but has yet to show a customer base. In 1985, the FCC rescinded the conditional contruction permit for the first two spacecraft. The other applications are still pending.

System Name:	WESTAR (C-BAND)
Operator:	Western Union Telegraph Co.
Number of Satellites:	4 in orbit/operational, a total of 7 in orbit planned
Date of Launch(es):	Oct. 1974, Aug. 1979, Feb. 1982 and June 1982; additional launches planned in 1985, 1988, 1989
Orbital Position(s):	79, 91, 99 & 123 West occupied 87, 93 and 130 West requested in pending application to FCC
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	500-1000 (Frequency reuse)
Number of Transponders:	Westar II & III: 12 active 36-MHz C-band transponders per satellite, all others 24 active C-band transponders
Services Provided:	telephony, telegraph, data transmission, television distribution
Probability of Operation:	already operational
Discussion:	Western Union is a well-established operator with several customers and serves and extensive earth station network. It should be noted that Western Union's supply of available transponders will get a major boost when ASC switches over their dedicated system.

System Name:	WESTAR (KU-BAND)
Operator:	Western Union Telegraph Company
Number of Satellites:	3 in orbit planned
Date of Launch(es):	2 in 1988, 1 in 1989
Orbital Position(s):	87, 91 and 93 West requested in pending application to the FCC
Frequencies:	14/12 GHz
Total Bandwidth, MHz:	1000 (Frequency reuse)
Number of Transponders:	16 active 54-MHz Ku-band transponders per satellite
Services Provided:	transponder lease for audio and video distribution, TELEX, TWX
Probability of Operation:	medium
Discussion:	Western Union is a well-established operator with several customers. However, the customer base for this Ku-band system remains unknown.

System Name:	DBSC
Operator:	Direct Broadcast Satellite Corporation
Number of Satellites:	2 or 3 to be built by Ford Aerospace & Communications Co.
Date of Launch(es):	1988 planned
Orbital Position(s):	101, 148 West requested, but not yet authorized by the FCC.
Frequencies:	17/12 GHz
Total Bandwidth, MHz:	1000
Number of Transponders:	6 active 2000 W. 1/2 CONUS and 12 active 45 W. spot beams
Services Provided:	Direct broadcast satellite services, such as television, stero broadcast, HDTV
Probability of Operation:	low/medium
Discussion:	DBSC still has to demonstrate a customer base. A $177 million contract has been signed with Ford Aerospace, and timely payments are being made.

System Name:	DVSS
Operator:	Dominion Video Satellite Systems, Inc.
Number of Satellites:	2 in orbit and 1 spare planned
Date of Launch(es):	1987 planned
Orbital Position(s):	119 West authorized
Frequencies:	17/12 GHz
Total Bandwidth, MHz:	500
Number of Transponders:	4 active 230 W. TWTA's
Services Provided:	Direct boradcast satellte services such as television and radio broadcasting
Probability of Operation:	low/medium
Discussion:	Company has met due diligence and signed contract with Hughes Aircraft Co. for construction of satellites based on HS-394 bus. System cost is estimated at $250 million. Satellites will have to be co-located in orbit at 119 West or other orbital position obtained from FCC.

System Name:	RCA-DBS
Operator:	RCA American Communications
Number of Satellites:	2 in orbit planned
Date of Launch(es):	late 1989 planned
Orbital Position(s):	to be determined
Frequencies:	17/12 GHz
Total Bandwidth, MHz:	1000
Number of Transponders:	16 100 W. Transponders
Services Provided:	Dirct broadcast satellite services such as HDTV, videotext
Probability of Operation:	low/medium
Discussion:	RCA has postponed its original plan to provide DBS service in the mid-80's.

System Name:	STC-DBS
Operator:	Satellite Television Corporation
Number of Satellites:	2 under construction by RCA Astro-Electronics
Date of Launch(es):	1986 planned
Orbital Position(s):	101 West authorized by FCC
Frequencies:	17/12 GHz
Total Bandwidth, MHz:	500
Number of Transponders:	3 active 200 W. TWTA's
Services Provided:	Direct broadcast satellite services such as television and sound distribution, HDTV
Probability of Operation:	low/medium
Discussion:	COMSAT has reportedly "abandoned" project, status of satellites unclear.

System Name:	USSB-DBS
Operator:	U.S. Satellite Broadcasting Co.
Number of Satellites:	2 in orbit and 1 spare to be built by RCA Astro-Electronics
Date of Launch(es):	1988 planned
Orbital Position(s):	10 and 148 West authorized by FCC
Frequencies:	17/12 GHz
Total Bandwidth, MHz:	500
Number of Transponders:	6 active 200 W. TWTA's
Services Provided:	Direct broadcast satellite services such as television and stereo broadcast, HDTV
Probability of Operation:	low/medium
Discussion:	USSB has met FCC due diligence requirement and signed $100 - 150 millioncontract with RCA to build satellites.

System Name:	HUGHES-DBS
Operator:	Hughes Communications Galaxy, Inc.
Number of Satellites:	2 in orbit planned
Date of Launch(es):	1989 and 1990 planned
Orbital Position(s):	119 West requested pending FCC authorization
Frequencies:	17/12 GHz
Total Bandwidth, MHz:	1000
Number of Transponders:	16 active 100 W. TWTA's
Services Provided:	Direct broadcast satellite services such as television, voice and data transmissions, teleconferencing
Probability of Operation:	low/medium
Discussion:	Construction permit by FCC (2nd round DBS applicant). Design uses HS-394 bus.

System Name:	NCN-DBS
Operator:	National Christian Network
Number of Satellites:	2 in orbit and 1 spare planned
Date of Launch(es):	1987/88 planned
Orbital Position(s):	101, 148 West requested pending FCC authorization
Frequencies:	17/12 GHz
Total Bandwidth, MHz:	500
Number of Transponders:	6 active 230 W. TWTA's
Services Provided:	Direct broadcast satellite services such as television program distribution.
Probability of Operation:	low/medium
Discussion:	Construction permit granted by FCC. (2nd round DBS applicant).

System Name:	SDT-DBS
Operator:	Satellite Development Trust
Number of Satellites:	3 including in orbit spare planned
Date of Launch(es):	1987 planned
Orbital Position(s):	61.5, 148 West requested pending FCC authorization
Frequencies:	17/12 GHz
Total Bandwidth, MHz:	1000
Number of Transponders:	16 active 50 W. TWTA's
Services Provided:	Direct broadcast satellite services such as television distribution
Probability of Operation:	low/medium
Discussion:	Construction permit granted by FCC. (2nd round DBS applicant). Applicant design based on HS-393 bus. Customer base and financing must be demonstrated (due diligence).

System Name:	SSS-DBS
Operator:	Satellite Syndicated Systems, Inc.
Number of Satellites:	2 in orbit and a spare planned
Date of Launch(es):	1989 planned
Orbital Position(s):	101, 148 West requested
Frequencies:	17/12 GHz
Total Bandwidth, MHz:	500
Number of Transponders:	6 active 230 W. TWTA's
Services Provided:	Direct broadcast satellite services such as television, voice and data.
Probability of Operation:	low/medium
Discussion:	Construction permit granted by FCC. (2nd round DBS applicant). Customer base and financing must be demonstrated (due diligence).

System Name:	NEX-DBS
Operator:	National Exchange, Inc.
Number of Satellites:	2 planned
Date of Launch(es):	1988 and 1990 planned
Orbital Position(s):	101 West requested pending FCC authorization
Frequencies:	17/12 GHz
Total Bandwidth, MHz:	1000
Number of Transponders:	16 active 50 W. TWTA's
Services Provided:	Direct broadcast satellite services such as television program distribution and data transmission.
Probability of Operation:	low/medium
Discussion:	Construction permit awarded by FCC. Customer base and financing must be demonstrated (due diligence).

System Name:	ACC-DBS
Operator:	Advanced Communciations Corporation
Number of Satellites:	3 including in orbit spare planned
Date of Launch(es):	1987 and 1988 planned
Orbital Position(s):	101 and 148 West requested pending FCC authorization
Frequencies:	17/12 GHz
Total Bandwidth, MHz:	500
Number of Transponders:	6 active 200 W. TWTA's
Services Provided:	Direct broadcast satellite services such as television program distribution
Probability of Operation:	low/medium
Discussion:	Conditional construction permit authorized by FCC. Customer base an financing must be demonstrated (due diligence).

System Name:	GEOSTAR
Operator:	Geostar Corporation
Number of Satellites:	3 in orbit planned
Date of Launch(es):	1987 planned
Orbital Position(s):	70, 100, 130 West requested pending FCC authoriztion
Frequencies:	1.6 6 GHz/ 2.5 GHz, and 5/6 GHz
Total Bandwidth, MHz:	160 MHZ
Number of Transponders:	10 16 MHz wide channels
Services Provided:	Radiodetermination services, e.g. position location and ancillary voice and message services.
Probability of Operation:	low/medium
Discussion:	Geostar still has to obtain FCC authorization, find customers, provide earth station networks and sace segment.

System Name:	MOBILSAT
Operator:	Mobile Satellite Corp.
Number of Satellites:	2 in orbit plus a ground spare planned
Date of Launch(es):	1987 and 1988 planned
Orbital Position(s):	85 and 125 West requested in pending application to FCC
Frequencies:	1.6/1.5 and 14/12 GHz and UHF
Total Bandwidth, MHz:	20 MHz required at UHF, 30 MHz at L-band and 360 MHz at Ku-band
Number of Transponders:	1 UHF, 1 L-band and 2 Ku-band transponders per satellite
Services Provided:	experimental land and aeronautical mobile voice communications, inter-exchange trunking
Probability of Operation:	low/medium
Discussion:	Mobile Satellite Corp. still has to secure financing, show a customer base and obtain FCC authorization.

System Name:	SKYLINK
Operator:	Skylink Corporation
Number of Satellites:	2 to 3 in orbit planned
Date of Launch(es):	1987 planned
Orbital Position(s):	75, 105 and 135 West requested in pending application to FCC
Frequencies:	800 MHz band
Total Bandwidth, MHz:	
Number of Transponders:	4
Services Provided:	Land mobile radio communications in rural areas
Probability of Operation:	low/medium
Discussion:	This system is similar to proposed Canadian M-SAT system.

System Name:	OMNINET
Operator:	Omninet Corporation
Number of Satellites:	1 - 2 in orbit planned
Date of Launch(es):	N.D.
Orbital Position(s):	N.D.
Frequencies:	800/900 MHz, 1.6/1.5 and 14/12 GHz
Total Bandwidth, MHz:	> 500 probable
Number of Transponders:	N.D.
Services Provided:	Land moblile radio communications
Probability of Operation:	low/medium
Discussion:	Company has not yet filed application to FCC

System Name:	ANIK D (C-BAND)
Operator:	Telesat Canada
Number of Satellites:	2 built by Hughes Aircraft Co. together with Spar Aerospace of Canada.
Date of Launch(es):	August 1982 and November 1984
Orbital Position(s):	104.5 and 111.5 West
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	1000 (Frequency Reuse)
Number of Transponders:	24 active 36-MHz C-Band transponders
Services Provided:	telephony, telegraph, data television transmission
Probability of Operation:	Already in operation
Discussion:	Government owned, several customers, established earth station network. Next generation likely around 1990, with 3-4 planned. 2nd ANIK O is in storage orbit.

System Name:	ANIK C (KU-BAND)
Operator:	Telesat Canada
Number of Satellites:	3 built by Hughes Aircraft Co. together with Spar Aerospace of Canada
Date of Launch(es):	November 1982, June 1983 1985 planned
Orbital Position(s):	105, & 117.5 West occupied, 109 West planned
Frequencies:	14/12 GHz
Total Bandwidth, MHz:	1000 (Frequency Reuse)
Number of Transponders:	16 active 54-MHz Ku-band transponders per satellite
Services Provided:	telephony, telegraph, data and video transmission, including low-power DBS
Probability of Operation:	already in operation

Discussion: Government owned system with several customers and already established earth station network. Due to apparent overplanning ANIK C-1, scheduled for launch in February 185, is up for sale. Telesat says they have no need for any capacity on the satellite. Spacecraft to be launched are placed into storage orbit.

System Name:	Argentine Satellite System
Operator:	Argentine Government
Number of Satellites:	1 or 2 in orbit planned
Date of Launch(es):	late 80's/early 90's possible
Orbital Position(s):	N.D.
Frequencies:	6/4 and/or 14/12 GHz
Total Bandwidth, MHz:	1000 MHz (frequency reuse)
Number of Transponders:	N.D.
Services Provided:	Telephony, data transmission, television distribution
Probability of Operation:	low/medium
Discussion:	System is under study by Argentine Space Agency. Funding as yet unclear, Argentina has an established earth station network and leases transponders from INTELSAT.

System Name:	Andean Satellite System
Operator:	ASETA
Number of Satellites:	1 or 2 planned
Date of Launch(es):	1989 planned
Orbital Position(s):	60 to 75 West
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	500 to 1000
Number of Transponders:	12 to 24
Services Provided:	Telephony, telegraph, data transmission, television distribution
Probability of Operation:	low/medium
Discussion:	This system has also been studied for a long time. After Columbia rejected the bids for proposal for a dedicated national satellite, it revived the then dormant ASETA program.

System Name:	MORELOS
Operator:	Mexican Government
Number of Satellites:	2 built or under final construction by Hughes Aircraft Company
Date of Launch(es):	June and September 1985 planned
Orbital Position(s):	113.5 and 116.5 West planned
Frequencies:	6/4 and 14/12 GHz
Total Bandwidth, MHz:	1500 (Partial frequency reuse)
Number of Transponders:	12 36-MHz and 6 72-MHz C-band, and 4 108-MHz Ku-band transponders per satellite
Services Provided:	television distribution, telephony and data transmission
Probability of Operation:	high
Discussion:	Mexico already has an extensive earth station network in operation and is using transponders leased from INTELSAT for television distribution.

System Name:	PANAMSAT
Operator:	Pan American Satellite Corp.
Number of Satellites:	1 in orbit and a spare planned
Date of Launch(es):	1987 planned
Orbital Position(s):	57 West requested in pending application to the FCC
Frequencies:	6/12 and 6/4 GHz
Total Bandwidth, MHz:	2000 (dual frequency reuse)
Number of Transponders:	12 active 72-MHz C/Ku-band and 24 active 36-MHz C-band transponders per satellite
Services Provided:	Audio and video distribution between eastern U.S. (N.Y. and Miami) and the Carribbean, Central and South America, as well as intra-regional traffic in South and Central America.
Probability of Operation:	low/medium
Discussion:	Pan American Satellite still has to obtain authorization, must coordinate with INTELSAT, secure financing and demonstrate a customer base which would involve at least bilateral agreements. Recent INTELSAT decision to provide better Latin American coverage on advanced INTELSAT V spacecraft may detract potential customers.

System Name:	SATCOL
Operator:	Colombian Government
Number of Satellites:	2 to 3 planned
Date of Launch(es):	late 1980s planned
Orbital Position(s):	76 and 75.4 West planned
Frequencies:	6/4 GHz (possibly also 14/12 GHz)
Total Bandwidth, MHz:	1000-1500 (Frequency reuse)
Number of Transponders:	24 36-MHz C-band transponders per satellite probable, possibly also some Ku-band transponders
Services Provided:	telephony, television distribution, data transmission
Probability of Operation:	low
Discussion:	Program has experienced several delays. Colombia is currently leasing transponders from INTELSAT and has an earth station network for domestic services. Program may have been temporarily filed while ASETA or CONDOR project is pursued, as had been done in the past . See ASETA.

System Name:	SBTS
Operator:	Brazilian Government
Number of Satellites:	2 built by Spar Aerospace, Canada with Hughes Aircraft Co.
Date of Launch(es):	February 1985. Second launch planned for August 1985.
Orbital Position(s):	65 West occupied, 60 West planned
Frequencies:	6/4 GHz
Total Bandwidth, MHz:	1000 (Frequency reuse)
Number of Transponders:	24 active 36-MHz C-band transponders per satellite
Services Provided:	telephone, telegraph and data transmission, television distribution
Probability of Operation:	high
Discussion:	Brazil is already leasing several transponders from INTELSAT and has an extensive earth station network in place.

APPENDIX F

U.S. EARTH STATION POPULATION

The material for this appendix was prepared by the Satellite Systems Engineering (SSE).

F-1 INTRODUCTION

The following report offers various data (quantities, characteristics, distribution etc.) on the current population of earth station in the U.S.

The report is divided into three sections: Section 1 analyses the total earth station population, both licensed and unlicensed, by type, size and geographicial distribution; Section 2 gives more detail on the Receive Only (RO) earth stations; and Section 3 looks at the Transmit Receive (T/R) earth stations.

This analysis is based on a combination of sources: in-house data at SSE; contacts with satellite system operators and resellers, trade associations, industry periodicals and consultants, and users; and extensive use of the FCC data base of licensed earth stations.

As the population of earth stations is growing at a very rapid pace, this analysis is somewhat superficial, and should serve as a general overview of the industry, rather than as an in-depth study. The estimation of "backyard TVRO's" is especially approximate, and the range of guesses as to the installed base varies from 300,000 - 700,000.

F-2 - TOTAL EARTH STATION POPULATION

CHART 1

Total Earth Station Population

(By Service)

		Licensed	Unlicensed	Total
Receive Only	TVRO	5707	506,793[1]	512,500
	Audio/Data RO	710	5890	6,600
Transmit/ Receive	Carrier (i.e. shared use)	575		575
	Dedicated (On Premise)	615		615
Other		98		98
TOTALS		7705	512,683[1]	520,388

1. Of this seemingly `exact` number, 500,000 are unlicensed backyard TVRO's and represent a very approximate estimate.

ASSUMPTIONS

(for Chart 1)

- Data on the licensed earth stations comes from the Facilities and Services Division of the FCC's Common Carrier Bureau, July 1984.
- Data on the unlicensed earth stations comes from a variety of sources listed in the following charts on the specific services.
- The numbers on unlicensed TVRO's are approximate at best as this industry is very loosely structured and growing fast.
- All transmitting earth stations are licensed.
- 90% of all T/R's operating in Alaska are owned by Alascom and are shared usage carriers. Very few T/R's in either Alaska or Hawaii are for private, dedicated use.

SOURCES: See all sources referenced in the following charts.

CHART 2-A

LICENSED EARTH STATIONS IN THE CONUS

(By Type & Region)

REGION	Audio R/O	TVRO	T/R	Other	Total
EASTERN	289	2,337	393	41	3,060
CENTRAL	277	2,245	264	18	2,804
ROCKY MTN.	55	449	77	11	592
WESTERN	78	635	208	23	944
TOTAL	699	5,666	942	93	7,400

CHART 2-B

LICENSED EARTH STATIONS IN ALASKA & HAWAII

	Audio R/O	TVRO	T/R	Other	Total
ALASKA	9	30	235	2	276
HAWAII	2	11	13	3	29
TOTAL	11	41	248	5	305

ASSUMPTIONS

(for Chart 2)

- The East Coast has the heaviest percentage (41%) of all types of licensed earth stations, followed by the central region with 38%. Together, the Rocky Mountain and West Coast areas have 21% of all the licensed earth stations in the Continental U.S.

- In Alaska, because of the large number of earth stations in the Alascom network, there is a much higher percentage of T/R's to RO's than in the CONUS.

- Also, while the licensed earth stations include **all** the Transmit/Receive earth stations, they are only a very small percent at the Receive Only earth stations. See Section 2 for further on RO's.

- The "Other" category consists of earth stations listed at the FCC but with no information on sizes, being a combination of developmental, temporary or earth stations in place since before 1978, when the FCC first asked for such details in license applications.

SOURCES: FCC Common Carrier Bureau;
Earth Station Application Lists.

CHART 3-A

LICENSED EARTH STATIONS IN THE CONUS

(BY TYPE & SIZE)

	TVRO	Audio RO	T/R	Other	Total
under 3.5 m.	188	612	--	26	826
3.6 - 7.0 m.	4,984	87	389	40	5,500
over 7.0 m.	494	--	553	27	1,074
TOTAL	5,666	699	942	93	7,400

CHART 3-B

LICENSED EARTH STATIONS IN ALASKA & HAWAII

(BY TYPE AND SIZE)

	TVRO	Audio RO	T/R	Other	Total
under 3.5 m.	3	--	22	1	26
3.6 - 7.0 m.	18	9	205	2	234
over 7.0 m.	20	2	21	2	45
TOTAL	41	11	248	5	305

"--" = less than 1% of the total.

ASSUMPTIONS

(for Chart 3)

- Please note that because of the very small look angle in Alaska, combined with the problem of being outside the foot print of many of the satellites, the size of the antennas is much larger on the average than for the CONUS earth stations.

- Also, while the licensed earth stations include <u>all</u> the Transmit/Receive earth stations, they are only a very small percent at the Receive Only earth stations. See Section 2 for further on RO's.

- The "Other" category consists of earth stations listed at the FCC but with no information on sizes, being a combination of developmental, temporary or earth stations in place since before 1978, when the FCC first asked for such details in license applications.

SOURCES: FCC Common Carrier Bureau,
Earth Station Application Lists.

F-3 - RECEIVE ONLY EARTH STATION POPULATION

CHART 4

RECEIVE ONLY EARTH STATION TOTALS

(LICENSED AND UNLICENSED)

COMMERCIAL TVRO's	12,500
AUDIO RO's	6,600
BACKYARD TVRO's	500,000

ASSUMPTIONS

(for Chart 4)

- The category of "Commercial TVRO's" includes the services of Broadcast TV (including networks, independent stations and public broadcasting stations), Cable TV, SMATV (Private Cable), Low power TV, Subscription TV, MDS and Videoconferencing. See Chart 5 for further information on these services.

- The category of "Audio RO's" includes radio and data services, which are further broken down in Chart 6.

- "Backyard TVRO's" while mainly those dishes privately owned, also include some commercial ownership such as motels, bars, trailer parks and a few apartment buildings. See Chart 7 for more detail.

SOURCES: See the sources given for the following three charts.

CHART 5

TVRO's

Type	Total #	3.5 m.	3.6-7.0 m.	7.1 m.
Broadcast TV				
Networks & Independents:	900	18	810	72
PBS:	195	--	18	177
Cable TV:	8,500	170	7,650	680
SMATV: (Private Cable)	1,500	1,125	375	--
MDS:	250	-------- Do not know --------		
LPTV:	150	-------- Do not know --------		
STV:	150	-------- Do not know --------		
Videoconferening:	750	--------	750	--------
TOTAL =	12,500			

C-3

ASSUMPTIONS

(for Chart 5)

BROADCAST TV:

(Commercial Networks & Independents:)

- As of August 6, 1984, out of 880 commercial TV stations, approximately 65% have 1 earth station; 30% have 2 earth stations, and a further 5% have 3 or more.

We estimate the total number to be approximately 900 earth stations.

(Public Broadcasting Systems:)

- There are approximately 195 PBS affiliates, with each one having 1 earth station. There are 7 uplinks (T/R) in the network.

SOURCES: Robert Wold Company;
TV Fact Book (TV Week, Publishers);
American Broadcasting Company;
Columbia Broadcasting System;
National Broadcasting Company;
Public Broadcasting System.

CABLE:

- There are an estimated 6,300 total cable systems in the U.S., (all with earth stations), and accounting for the small percent that have more than 1 earth station, there are a total of 8,500 dishes, as of August, 1984.

- As far as which satellites are being looked at by the dishes, the following numbers have been suggested by the NCTA:

SATCOM III R:	approx. 7,600
SATCOM IV:	approx. 1,117
COMSTAR D IV:	approx. 120
WESTAR V:	approx. 641
GALAXY I:	approx. 1,747

These numbers are estimated from which programs are being watched (according to programmer's data). Because several programs are carried on more than one satellite, and because many earth stations have actuators enabling them to change direction easily, these numbers are illustrative only.

(Chart 5 Assumptions Cont'd)

SOURCES: National Cable Television Association;
TV Fact Book (TV Week, Publishers);
Society for Private and Commercial Earth Stations (SPACE)

SMATV: ("Private Cable")

- As of August 1984, the number of households passed by Private Cable systems is nearly 1 million, with an estimated 300,000 subscribers. Of the known Private Cable systems, each one has its own earth station, but very few, if any, have more than one dish. This makes the estimated number of systems (1,500) a fair approximation of the number of earth stations.

- Because the Private Cable systems are constructed for the least possible cost, 75% of them are smaller than 3.5 meters in diameter.

SOURCES: National Satellite Cable Association;
Society for Private and Commercial Earth Stations (SPACE).

MULTIPOINT DISTRIBUTION SYSTEMS (MDS):

- While the number of MDS operating systems is approximately 300, the number of earth stations in use is estimated to be around 250, with some use of microwave relays for program delivery.

SOURCES: Richard Vega and Associates;
MDS Trade Association;
COMBAND Communications.

LOW POWER TV (LPTV):

- As in MDS, the number of earth stations estimated to be used by LPTV Systems (150) is lower than the total estimated systems (400). In Alaska, where there are approximately 200 LPTV stations, distribution is mainly by microwave; and in CONUS, a number of LPTV stations generate their own programs.

SOURCES: LPTV Assocation;
Global Village Research Group.

(Chart 5 Assumptions Cont'd)

SUBSCRIPTION TV (STV):

- The approximate number of STV systems in operation as of August, 1984 is 150, with one dish per system.

SOURCES: STV Association;
Richard Vega Associates.

VIDEOCONFERENCING:

- The largest videoconferencing network is the Hi-Net network with approximately 350 4.6 m. earth stations. Other include PSSC, Hilton, Satellite Age and many others.

SOURCES: HI-Net Network
Robert Wold & Associates;
PSSC;
1984 Satellite Directory

CHART 6

AUDIO RO's

SERVICE	TOTAL
UPI, AP	1,650
NPR, Mutual, State Radios	2,350
ABC, CBS, NBC, RKO	2,100
MUZAC, Bonneville, Reuters, Commodity Reports	500
TOTAL	6,600

ASSUMPTIONS

(for Chart 6)

Audio/Data:

- There are approximately 710 licensed audio/data receive only earth stations, and another 5,890 unlicensed earth stations. The type of service and satellite used is as follows:

WESTAR III, XPONDER 1:	UPI = ~750 E.S. AP = ~900 E.S.
WESTAR III, XPONDER 2:	State Radio = ~1,300 E.S.
WESTAR IV, XPONDERS 1+2:	NPR = ~250 E.S.
SATCOM IR :	ABC, CBS, NBC RKO = ~2,100 E.S.
VARIOUS SATELLITES :	MUZAC, BONNEVILLE, = ~500 E.S. REUTERS, COMMODITY REPORT etc.

- The NPR earth stations are all 4.5 m. (18 uplinks and the rest downlinks only; the AP and UPI earth station are in the 3.0 m. range, and 90% of the remaining earth stations are in the 2.5 m. - 3.5 m. range.

SOURCES: Satellite Audio Report;
National Public Radio.

CHART 7

BACKYARD TVRO's

	Under 3.5 m.	3.6-7.0 m.	Total
Commercial	60,000	15,000	75,000
Private	403,750	21,250	425,000

ASSUMPTIONS

(for Chart 7)

Backyard TVRO's:

o There are an estimated 400,000 - 500,000 backyard TVRO's, with the number growing daily. Of these, 80-85% are for "backyard" use only i.e., for personal use, and the remaining 15-20% are situated at hotel/motels, bars, trailer parks and those apartments and condominiums who choose to stay out of the "legitimate" SMATV industry.

o Note that approximately 20-25% of all Backyard TVRO's have an actuators, and that nearly half of all TVRO's being sold currently are sold with actuators. This means that the satellite direction of the dish can be changed by the push of a button, making an estimate of which satellites are being looked at nearly incalculable.

SOURCES: Society for Private & Commercial Earth Stations (Space)
Satellite Television Technologies, Inc.
Brown & Finn Law Firm;
Satellite Dish Magazine;
Coop's Satellite Digest.

F-4 - TRANSMIT/RECEIVE EARTH STATION POPULATION

CHART 8

Transmit/Receive Earth Station
Shared Usage Only

Carriers

SBS	Amsat	W.U	RCA	GTE	Spacenet	AT&T	Hughes	Total
22	12	20	20	14	11	23	10	132

Voice & Data Resellers

Cylix	ISACOMM	Equatorial	Vitalink	Others	Total
35	23	5	5	50	118

Video Resellers (incl. videoconf.)

Wold	Bonneville	Hughes	Netcom	Others	Total
15	10	10	15	50	100

Grand Total= 350

ASSUMPTIONS

(for Chart 8)

- All data is for CONUS only; the Alaska T/R earth stations are mostly Alascom and Alaska Bush networks.

- The number of earth stations for the carriers represents each carrier's backbone network and includes multiple earth stations at single locations. Virtually all of these earth stations are larger than 7.0 m. (most are in the 10-13 m. range).

- While Cylix and ISACOMM are the largest of the nationwide voice and data resellers, there are a number of regional networks (e.g., TCI, Western Telecommunications, etc.)

- The four companies named as video resellers, e.g., WOLD, Bonneville, Hughes and Netcom, make their living from a combination of part-time uplinking for the TV networks and from videoconferencing. In additon, three are a number of regional companies owning a few uplinks for videoconferencing purposes only.

SOURCES: Direct contacts with carriers and resellers;
1984 Satellite Director (Phillips Publishing)
Satellite Marketing Digest.

CHART 9

Transmit/Receive Earth Station Private Dedicated Use

Carrier Owned ES

SBS	Amsat	Others	Total
110	250	30	390

Reseller Owned ES

Equat.	Vitalink	Others	Total
10	10	10	30

Privately Owned ES

Cable TV	Broadcast TV	Corp. Nets	Total
100	30	20	170

Grand Total = 590

ASSUMPTIONS

(for Chart 9)

- All data is for CONUS only; the Alaska T/R earth stations are mostly Alascom and Alaska bush networks.

- The carrier-owned earth stations are those earth stations situated on customer premises for a customer's dedicated usage, but owned by the carrier and sold as a total package with the satellite capacity. The great majority of dedicated corporate networks fall into this category. Examples include Hercules, Inc. (10 sites - SBS); Gannet (15 sites - Amerisat); Traveller's Insurance (4 sites - Amerisat) and many others.

- Vitalink and Equatorial in the next few months will greatly expand their business with recent FCC approval of their respective types of cheap low speed earth stations.

- Most of the cable and broadcast industry uplinks are located in either California or New York. The 3 televison networks are in the midst of going to an all satellite delivery system and will increase the number of T/R earth stations at their disposal.

- As mentioned previously, virtually all the present private corporate networks have carrier owned earth stations on premises. Two examples of exception to this are Federal Express and Citicorp. This category will grow dramatically with the deregulation of the satellite industry and the dramatically decreasing costs in small, low-speed T/R earth stations.

SOURCES: FCC Common Carrier Bureau
Satellite Marketing Digest
Satellite Directory
Trade Publications
Direct Contacts with carriers, resellers and users.

APPENDIX G

PAYLOAD DETAILS FOR SCENARIO II

G-1 - KA-BAND FSS PAYLOAD

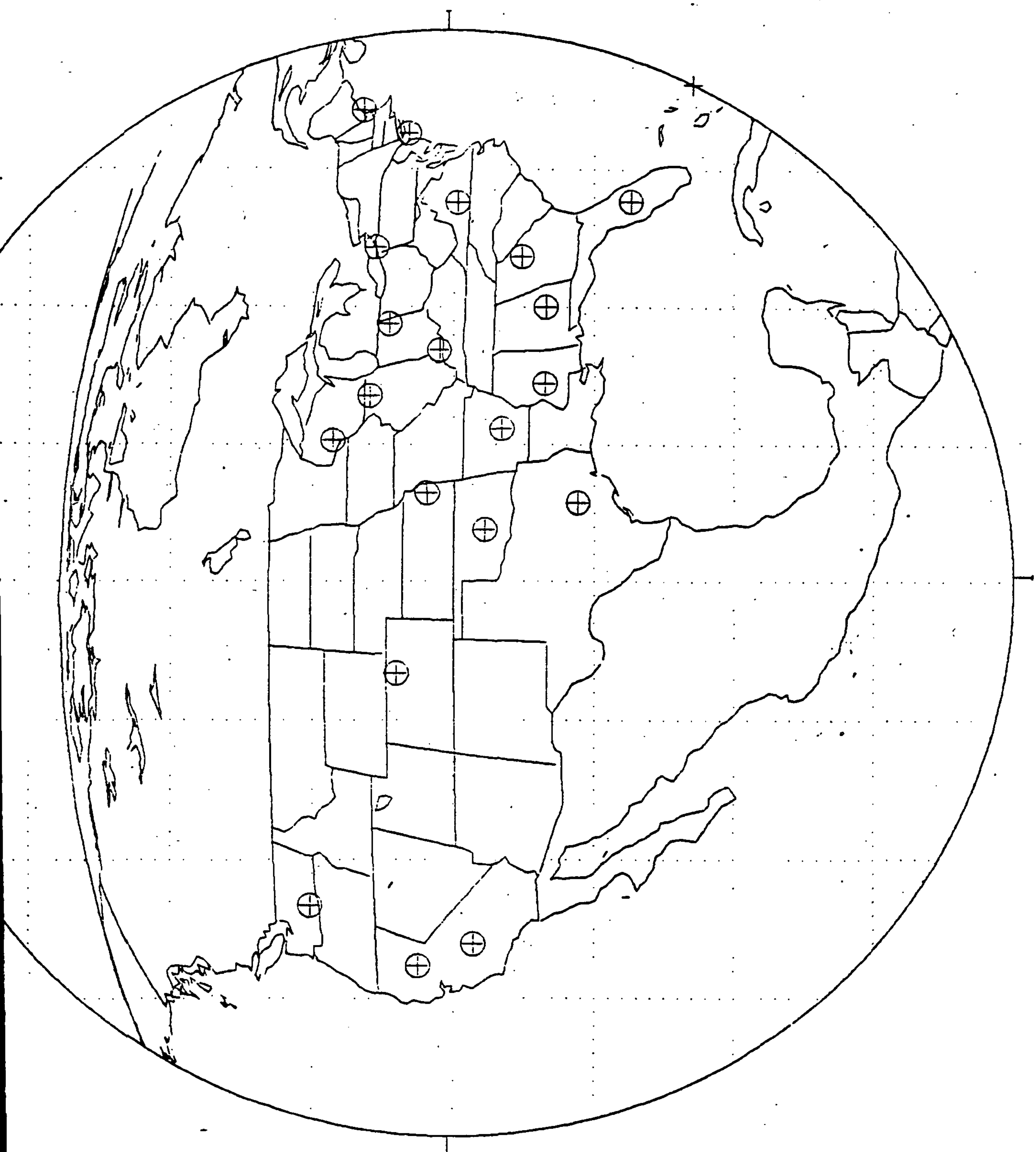
The total trunking digital voice and video conferencing forecasts were scaled by factor of .15 (N=6.7 satellites), and the traffic assigned to both the fixed and scan beams - the resulting Beam to Beam Matrix is included in this appendix. Abbreviations, such as "FX1" or "SCN3" are used to denote each beam. The "class" (KATRK) is used by the SNIPS programs to identify different traffic classes - in this case there was only one.

Also included is the corresponding transponder loading. Each line represents one transponder, identified by a Beam (FX1) and a channel(H-1). The code used for channel identifies is H/V for horizontal/vertical, first digit is the receiver number at that polarization and the last digit identifies the 500 MHz channel number(See Figure 5.2.3-1 of Vol. II). The "TO" column identifies the routing used. Here it is all SS/TDMA, except channel 1 for FX1 and FX2, which are hardwired.

G-1.1 Ka-Band Fixed Beam Locations

Ka-Band Fixed Beam Locations

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
01	NENY	NEW YORK NY-NJ	40.40	73.50
02	FOIN	FORT WAYNE IN	41.05	85.08
03	LYVA	LYNCHBURG VA	37.24	79.09
04	ERPA	ERIE PA	42.07	80.05
05	ROIL	ROCKFORD IL	42.16	89.06
06	ATGE	ATHENS GE	33.57	83.24
07	BYTX	BRYAN-COLLEGE STATION TX	30.41	96.24
08	LAFL	LAKELAND-WINTER HAVEN FL	28.02	81.59
09	POME	PORTLAND ME	43.41	70.18
10	EVIN	EVANSVILLE IN-KY	38.00	87.33
11	VICA	VISALIA-TULARE-PORTERVILLE CA	36.20	119.18
12	LAKS	LAWRENCE KS	38.58	95.15
13	JAMS	JACKSON MS	32.20	90.11
14	EAWI	EAU CLAIRE WI	44.50	91.30
15	MNAL	MONTGOMERY AL	32.22	86.20
16	CHCA	CHICO CA	39.46	121.50
17	YAWA	YAKIMA WA	46.37	120.30
18	OKOK	OKLAHOMA CITY OK	35.28	97.33
19	FOCO	FORT COLLINS CO	40.35	105.05
20	LIAR	LITTLE ROCK-NORTH LITTLE ROCK AR	34.42	92.17



CASE SATELLITE POSITION 101.0 WEST (100W,37N) KA - FIXED
03/26/85 14.370

G-1.2 Beam To Beam Loading For Ka-Band Trunking

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Beam to Beam Matrix
Digital Voice and Video Conferencing
(Year 2008 Equivalent HVC)

Class = KATRK

From:
To:

From	To		To		To		To	
FX1								
	FX2	48123	FX3	12132	FX4	5204	FX5	18517
	FX6	17922	FX7	10105	FX8	12534	FX9	1115
	FX10	9387	FX11	8727	FX12	8329	FX13	8317
	FX14	6088	FX15	5459	FX16	4250	FX17	4805
	FX18	4534	FX19	4129	FX20	4309	SCN2	6217
	SCN3	2218	SCN4	5997	SCN5	11841	SCN6	10209
FX2								
	FX1	48123	FX3	14860	FX4	3085	FX5	1746
	FX6	12144	FX7	9309	FX8	8918	FX9	7793
	FX10	1537	FX11	7581	FX12	8784	FX13	7464
	FX14	4997	FX15	4524	FX16	3513	FX17	3951
	FX18	4469	FX19	3846	FX20	4310	SCN1	1626
	SCN2	2930	SCN4	3909	SCN5	10436	SCN6	8825
FX3								
	FX1	12132	FX2	14860	FX4	2120	FX5	6835
	FX6	3167	FX7	4378	FX8	5841	FX9	4124
	FX10	3280	FX11	3620	FX12	3316	FX13	3679
	FX14	2278	FX15	2378	FX16	1606	FX17	1763
	FX18	1848	FX19	1592	FX20	1877	SCN1	770
	SCN2	150	SCN3	673	SCN4	1881	SCN5	4387
	SCN6	3998						
FX4								
	FX1	5204	FX2	3085	FX3	2120	FX5	5865
	FX6	5403	FX7	3525	FX8	3891	FX9	3267
	FX10	2574	FX11	3050	FX12	3045	FX13	2828
	FX14	2330	FX15	1872	FX16	1397	FX17	1572
	FX18	1591	FX19	1422	FX20	1558	SCN2	1425
	SCN4	1587	SCN5	3902	SCN6	3453		
FX5								
	FX1	18517	FX2	1746	FX3	6835	FX4	5865
	FX6	5010	FX7	4288	FX8	3297	FX9	2368
	FX10	1240	FX11	4009	FX12	2087	FX13	2876
	FX14	302	FX15	1672	FX16	1605	FX17	1783
	FX18	2060	FX19	1845	FX20	1574	SCN1	677
	SCN2	1325	SCN3	65	SCN4	1746	SCN5	3426
	SCN6	4219						
FX6								

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	FX1	17922	FX2	12144	FX3	3167	FX4	5403
	FX5	5010	FX7	4108	FX8	3424	FX9	2408
	FX10	903	FX11	2942	FX12	2819	FX13	2376
	FX14	1697	FX15	304	FX16	1252	FX17	1338
	FX18	1644	FX19	1284	FX20	1286	SCN1	600
	SCN2	314	SCN3	449	SCN4	866	SCN5	3691
	SCN6	3212						
FX7								
	FX1	10105	FX2	9309	FX3	4378	FX4	3525
	FX5	4288	FX6	4108	FX8	3324	FX9	1665
	FX10	2467	FX11	3485	FX12	3008	FX13	1746
	FX14	1524	FX15	1825	FX16	1523	FX17	1521
	FX18	850	FX19	1735	FX20	936	SCN1	375
	SCN2	1116	SCN3	330	SCN4	1513	SCN5	2341
	SCN6	4205						
FX8								
	FX1	12534	FX2	8918	FX3	5841	FX4	3891
	FX5	3297	FX6	3424	FX7	3324	FX9	1812
	FX10	2251	FX11	2420	FX12	1947	FX13	2801
	FX14	1171	FX15	1110	FX16	1039	FX17	1092
	FX18	1219	FX19	994	FX20	1225	SCN1	415
	SCN2	1076	SCN3	290	SCN4	651	SCN5	2965
	SCN6	2628						
FX9								
	FX1	1115	FX2	7793	FX3	4124	FX4	3267
	FX5	2368	FX6	2408	FX7	1665	FX8	1812
	FX10	1420	FX11	1770	FX12	1213	FX13	1161
	FX14	977	FX15	719	FX16	716	FX17	802
	FX18	675	FX19	657	FX20	621	SCN2	790
	SCN3	254	SCN4	908	SCN5	1497	SCN6	1776
FX10								
	FX1	9387	FX2	1537	FX3	3280	FX4	2574
	FX5	1240	FX6	903	FX7	2467	FX8	2251
	FX9	1420	FX11	1688	FX12	1308	FX13	1647
	FX14	1251	FX15	517	FX16	778	FX17	850
	FX18	1100	FX19	881	FX20	448	SCN1	353
	SCN2	788	SCN3	234	SCN4	746	SCN5	2538
	SCN6	1989						
FX11								
	FX1	8727	FX2	7581	FX3	3620	FX4	3050
	FX5	4009	FX6	2942	FX7	3485	FX8	2420
	FX9	1770	FX10	1688	FX12	2560	FX13	2168
	FX14	1500	FX15	1169	FX16	863	FX17	3554
	FX18	1654	FX19	2220	FX20	1193	SCN1	359
	SCN2	975	SCN3	339	SCN4	1056	SCN5	4845
	SCN6	5358						
FX12								
	FX1	8329	FX2	8784	FX3	3316	FX4	3045
	FX5	2087	FX6	2819	FX7	3008	FX8	1947
	FX9	1213	FX10	1308	FX11	2560	FX13	1883

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	FX14	1213	FX15	1082	FX16	1082	FX17	1162
	FX18	294	FX19	1493	FX20	398	SCN1	305
	SCN2	757	SCN3	282	SCN4	974	SCN5	2502
	SCN6	2954						
FX13								
	FX1	8317	FX2	7464	FX3	3679	FX4	2828
	FX5	2876	FX6	2376	FX7	1746	FX8	2801
	FX9	1161	FX10	1647	FX11	2168	FX12	1883
	FX14	1040	FX15	44	FX16	888	FX17	911
	FX18	1102	FX19	947	FX20	222	SCN1	284
	SCN2	894	SCN3	219	SCN4	1005	SCN5	2282
	SCN6	2372						
FX14								
	FX1	6088	FX2	4997	FX3	2278	FX4	2330
	FX5	302	FX6	1697	FX7	1524	FX8	1171
	FX9	977	FX10	1251	FX11	1500	FX12	1213
	FX13	1040	FX15	600	FX16	692	FX17	808
	FX18	791	FX19	834	FX20	659	SCN1	243
	SCN2	527	SCN3	225	SCN4	591	SCN5	1157
	SCN6	1762						
FX15								
	FX1	5459	FX2	4524	FX3	2378	FX4	1872
	FX5	1672	FX6	304	FX7	1825	FX8	1110
	FX9	719	FX10	517	FX11	1169	FX12	1082
	FX13	44	FX14	600	FX16	474	FX17	496
	FX18	672	FX19	492	FX20	362	SCN1	182
	SCN2	525	SCN3	136	SCN4	423	SCN5	1332
	SCN6	1249						
FX16								
	FX1	4250	FX2	3513	FX3	1606	FX4	1397
	FX5	1605	FX6	1252	FX7	1523	FX8	1039
	FX9	716	FX10	778	FX11	863	FX12	1082
	FX13	888	FX14	692	FX15	474	FX17	1982
	FX18	678	FX19	967	FX20	491	SCN1	159
	SCN2	381	SCN3	130	SCN4	475	SCN5	1786
	SCN6	3303						
FX17								
	FX1	4805	FX2	3951	FX3	1763	FX4	1572
	FX5	1783	FX6	1338	FX7	1521	FX8	1092
	FX9	802	FX10	850	FX11	3554	FX12	1162
	FX13	911	FX14	808	FX15	496	FX16	1982
	FX18	690	FX19	1005	FX20	511	SCN1	181
	SCN2	407	SCN3	146	SCN4	507	SCN5	1797
	SCN6	2884						
FX18								
	FX1	4534	FX2	4469	FX3	1848	FX4	1591
	FX5	2060	FX6	1644	FX7	850	FX8	1219
	FX9	675	FX10	1100	FX11	1654	FX12	294
	FX13	1102	FX14	791	FX15	672	FX16	678
	FX17	690	FX19	923	FX20	193	SCN1	164

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	SCN2	434	SCN3	141	SCN4	598	SCN5	1385
	SCN6	1943						
FX19								
	FX1	4129	FX2	3846	FX3	1592	FX4	1422
	FX5	1845	FX6	1284	FX7	1735	FX8	994
	FX9	657	FX10	881	FX11	2220	FX12	1493
	FX13	947	FX14	834	FX15	492	FX16	967
	FX17	1005	FX18	923	FX20	588	SCN1	155
	SCN2	373	SCN3	134	SCN4	473	SCN5	1922
	SCN6	2130						
FX20								
	FX1	4309	FX2	4310	FX3	1877	FX4	1558
	FX5	1574	FX6	1286	FX7	936	FX8	1225
	FX9	621	FX10	448	FX11	1193	FX12	398
	FX13	222	FX14	659	FX15	362	FX16	491
	FX17	511	FX18	193	FX19	588	SCN1	154
	SCN2	451	SCN3	133	SCN4	523	SCN5	1280
	SCN6	1336						
SCN1								
	FX2	1626	FX3	770	FX5	677	FX6	600
	FX7	375	FX8	415	FX10	353	FX11	359
	FX12	305	FX13	284	FX14	243	FX15	182
	FX16	159	FX17	181	FX18	164	FX19	155
	FX20	154	SCN2	191	SCN3	25	SCN4	211
	SCN5	398	SCN6	391				
SCN2								
	FX1	6217	FX2	2930	FX3	150	FX4	1425
	FX5	1325	FX6	314	FX7	1116	FX8	1076
	FX9	790	FX10	788	FX11	975	FX12	757
	FX13	894	FX14	527	FX15	525	FX16	381
	FX17	407	FX18	434	FX19	373	FX20	451
	SCN1	191	SCN2	132	SCN3	79	SCN4	424
	SCN5	902	SCN6	982				
SCN3								
	FX1	2218	FX3	673	FX5	65	FX6	449
	FX7	330	FX8	290	FX9	254	FX10	234
	FX11	339	FX12	282	FX13	219	FX14	225
	FX15	136	FX16	130	FX17	146	FX18	141
	FX19	134	FX20	133	SCN1	25	SCN2	79
	SCN4	161	SCN5	290	SCN6	337		
SCN4								
	FX1	5997	FX2	3909	FX3	1881	FX4	1587
	FX5	1746	FX6	866	FX7	1513	FX8	651
	FX9	908	FX10	746	FX11	1056	FX12	974
	FX13	1005	FX14	591	FX15	423	FX16	475
	FX17	507	FX18	598	FX19	473	FX20	523
	SCN1	211	SCN2	424	SCN3	161	SCN4	556
	SCN5	1419	SCN6	1192				
SCN5								
	FX1	11841	FX2	10436	FX3	4387	FX4	3902

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	FX5	3426	FX6	3691	FX7	2341	FX8	2965
	FX9	1497	FX10	2538	FX11	4845	FX12	2502
	FX13	2282	FX14	1157	FX15	1332	FX16	1786
	FX17	1797	FX18	1385	FX19	1922	FX20	1280
	SCN1	398	SCN2	902	SCN3	290	SCN4	1419
	SCN5	2638	SCN6	4827				
SCN6								
	FX1	10209	FX2	8825	FX3	3998	FX4	3453
	FX5	4219	FX6	3212	FX7	4205	FX8	2628
	FX9	1776	FX10	1989	FX11	5358	FX12	2954
	FX13	2372	FX14	1762	FX15	1249	FX16	3303
	FX17	2884	FX18	1943	FX19	2130	FX20	1336
	SCN1	391	SCN2	982	SCN3	337	SCN4	1192
	SCN5	4827	SCN6	4893				

****

SUMMARY

	KATRK
FX1	230468
FX2	188680
FX3	92553
FX4	65966
FX5	80437
FX6	80563
FX7	71202
FX8	68335
FX9	40508
FX10	42175
FX11	69105
FX12	54797
FX13	51156
FX14	35257
FX15	29618
FX16	32030
FX17	36518
FX18	31652
FX19	33041
FX20	26638
SCN1	8218
SCN2	24565
SCN3	7290
SCN4	30392
SCN5	77786
SCN6	82427
Totals	1591377

G-1.3 Transponder Loading For Ka-Band Trunking

Ford Aerospace & Communications Corporation

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Transponder Loading
Digital Voice and Video Conferncing

From	To	Channel	Class	Circuits
FX1	FX2	H1-1	KATRK	40000
FX1	SS	H1-2	KATRK	40000
FX1	SS	H1-3	KATRK	40000
FX1	SS	H1-4	KATRK	40000
FX1	SS	H1-5	KATRK	40000
FX2	FX1	H2-1	KATRK	40000
FX2	SS	H2-2	KATRK	34833
FX2	SS	H2-3	KATRK	40000
FX2	SS	H2-4	KATRK	35415
FX2	SS	H2-5	KATRK	38432
FX3	SS	V1-2	KATRK	40000
FX3	SS	V1-4	KATRK	22751
FX3	SS	V1-5	KATRK	29802
FX4	SS	V2-3	KATRK	29783
FX4	SS	V2-5	KATRK	36183
FX5	SS	H3-2	KATRK	16888
FX5	SS	H3-5	KATRK	40000
FX6	SS	H4-2	KATRK	39079
FX6	SS	H4-5	KATRK	40000
FX7	SS	V3-4	KATRK	35418
FX7	SS	V3-5	KATRK	35784
FX8	SS	H5-2	KATRK	34014
FX8	SS	H5-5	KATRK	34321
FX9	SS	H6-5	KATRK	40000
FX10	SS	H7-5	KATRK	38099
FX11	SS	H8-3	KATRK	34850
FX11	SS	H8-5	KATRK	34255
FX12	SS	V4-3	KATRK	30492
FX12	SS	V4-5	KATRK	24305
FX13	SS	V5-4	KATRK	28262
FX13	SS	V5-5	KATRK	22894
FX14	SS	H9-5	KATRK	35257
FX15	SS	H10-5	KATRK	29618
FX16	SS	H11-5	KATRK	32030
FX17	SS	H12-5	KATRK	36518
FX18	SS	V6-5	KATRK	31652
FX19	SS	H13-5	KATRK	33041
FX20	SS	V7-5	KATRK	26638
SCN1	SS	C1-1	KATRK	39194
SCN1	SS	C1-2	KATRK	0

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SCN2	SS	C2-1	KATRK	24565
SCN2	SS	C2-2	KATRK	0
SCN3	SS	C3-1	KATRK	34915
SCN3	SS	C3-2	KATRK	0
SCN4	SS	C4-1	KATRK	31876
SCN4	SS	C4-2	KATRK	0
SCN5	SS	C5-1	KATRK	40000
SCN5	SS	C5-2	KATRK	37786
SCN5	SS	C5-3	KATRK	0
SCN6	SS	C6-1	KATRK	40000
SCN6	SS	C6-2	KATRK	40000
SCN6	SS	C6-3	KATRK	2427

Totals

KATRK : 1591377

G-2 - KA-BAND SCAN PAYLOAD

The coverage of the six scan beams, relative to the 84 regions used for most beam design work, is shown. As in Appendix G-1.1, a Beam to Beam Matrix and a Transponder Loading are given; the scale factor used was .143 (7 satellites) although the interconnection shown on the printout is "SS", the routing is in fact through the BBP, but from a loading aspect, this is equivalent to on SS/TDMA switch. Channelization is to the 240 MHz level, i.e., "CI-3" is the third 500 MHz channel in Scan Beam 1, and it is broken down into "CI-3A" and "CI-3B".

G-2.1 Ka-Band Scan Beam Coverage

Ka-Band Scan Beam Coverages
Page 1

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
1	ALNY	ALBANY-SCHENECTADY-TROY NY	42.40	73.49
1	ALPA	ALLENTOWN-BETHLEHEM-EASTON PA-NJ	40.11	74.36
1	ATNJ	ATLANTIC CITY NJ	39.23	74.27
1	BAME	BANGOR ME	44.49	68.47
1	BINY	BINGHAMTON NY-PA	42.06	75.55
1	BOMA	BOSTON MA	42.20	71.05
1	BRCT	BRIDGEPORT CT	41.12	73.12
1	BICT	BRISTOL CT	41.41	72.57
1	BRMA	BROCKTON MA	42.06	71.01
1	BUVT	BURLINGTON VT	44.28	73.14
1	DACT	DANBURY CT	41.24	73.26
1	ELNY	ELMIRA NY	42.06	76.50
1	FAMA	FALL RIVER MA-RI	41.42	71.08
1	FIMA	FITCHBURG-LEOMISTER MA	42.35	71.50
1	GLNY	GLENS FALLS NY	43.17	73.14
1	HAPA	HARRISBURG PA	40.17	76.54
1	HACT	HARTFORD CT	41.45	72.42
1	JENJ	JERSEY CITY NJ	40.44	74.04
1	LAPA	LANCASTER PA	40.01	76.19
1	LAMA	LAWRENCE-HAVERHILL MA-NH	42.41	71.12
1	LEME	LEWISTON-AUBURN ME	44.06	70.14
1	LONJ	LONG BRANCH-ASBURY PARK NJ	40.17	73.59
1	LOMA	LOWELL MA-NH	42.38	71.19
1	MANH	MANCHESTER NH	42.59	71.28
1	MECT	MERIDEN CT	42.32	72.48
1	NANH	NASHUA NH	42.44	71.28
1	NANY	NASSAU-SUFFOLK NY	42.31	73.36
1	NEMA	NEW BEDFORD MA	41.38	70.55
1	NECT	NEW BRITAIN CT	41.40	72.47
1	NENJ	NEW BRUNSWICK-PERTH AMBOY-SAYR NJ	40.29	74.27
1	NWCT	NEW HAVEN-WEST HAVEN CT	41.18	72.55
1	NLCT	NEW LONDON-NORWICH CT-RI	41.21	72.06
1	NENY	NEW YORK NY-NJ	40.40	73.50
1	NWNJ	NEWARK NJ	40.44	74.11
1	NWNY	NEWBRGH-MIDDLETOWN NY	41.26	74.26
1	NOPA	NORTHEAST PENNSYLVANIA PA	41.20	75.45
1	NOCT	NORWALK CT	41.07	73.25
1	PANJ	PATERSON-CLIFTON-PASSAIC NJ	40.52	74.08
1	PHPA	PHILADELPHIA PA-NJ	40.00	75.10
1	PIMA	PITTSFIELD MA	38.23	75.26
1	POME	PORTLAND ME	43.41	70.18
1	PONH	PORTSMOUTH-DOVER-ROCHESTER NH-ME	43.03	70.47
1	PONY	POUGHKEEPSIE NY	41.43	73.56
1	PRRI	PROVIDENCE-WAWICK-PAWTUCKET RI-MA	39.42	75.53
1	REPA	READING PA	40.20	75.55
1	SPCT	SPRINGFIELD-CHICOPEE-HOLYOKE CT-MA	42.07	72.35
1	STCT	STAMFORD CT	41.03	73.32
1	SYNY	SYRACUSE NY	43.03	76.10
1	TRNJ	TRENTON NJ	40.15	74.43

Ka-Band Scan Beam Coverages
Page 2

1	UTNY	UTICA-ROME NY	43.06	75.15
1	VINJ	VINELAND-MILLVILLE-RIDGETON NJ	39.29	75.02
1	WACT	WATERBURY CT	41.33	73.03
1	WIPA	WILLIAMSPORT PA	41.16	77.03
1	WIDE	WILMINGTON DE-NJ	39.46	75.31
1	WOMA	WORCESTER MA	42.17	71.48
1	YOPA	YORK PA	39.57	76.44

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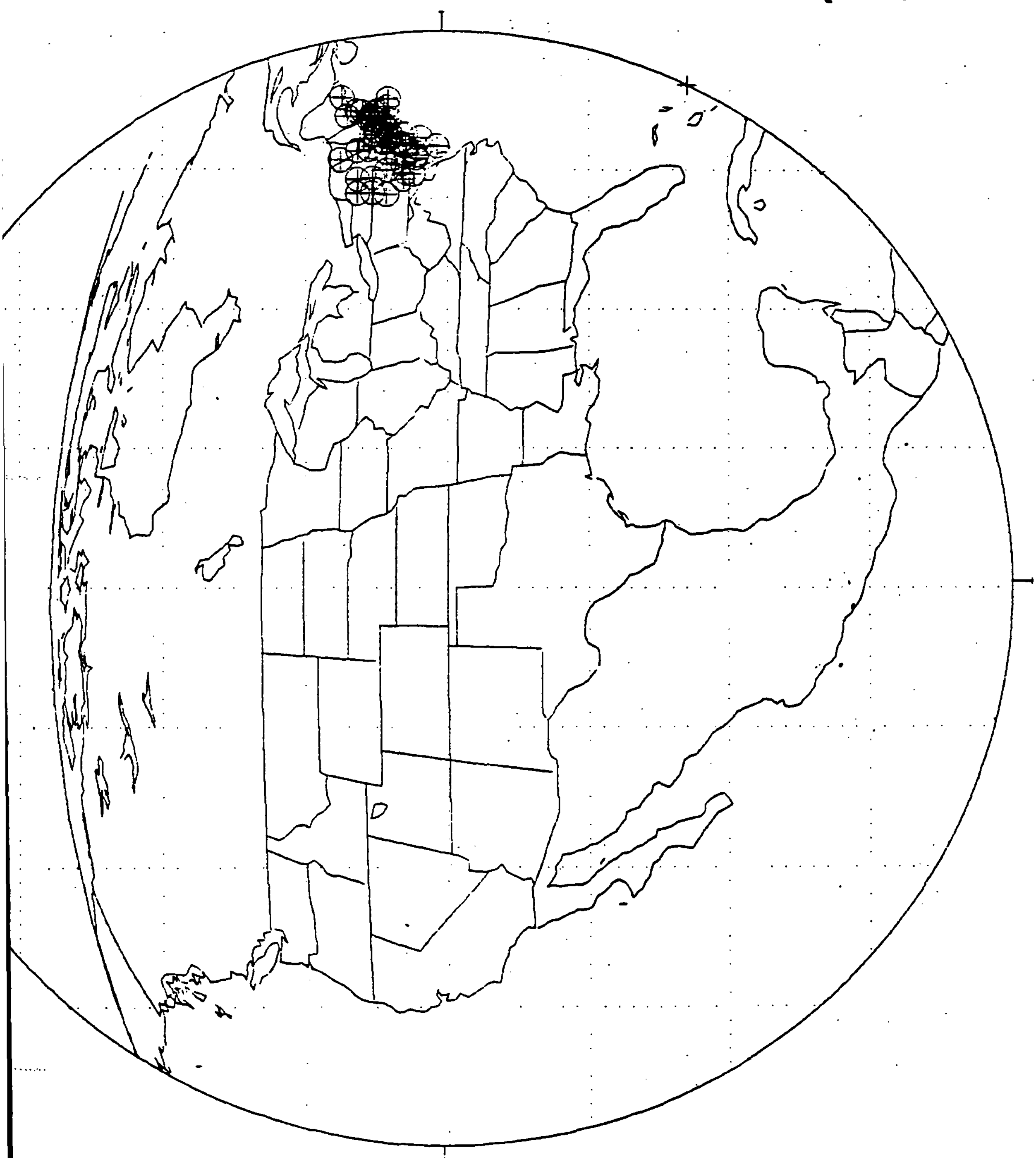
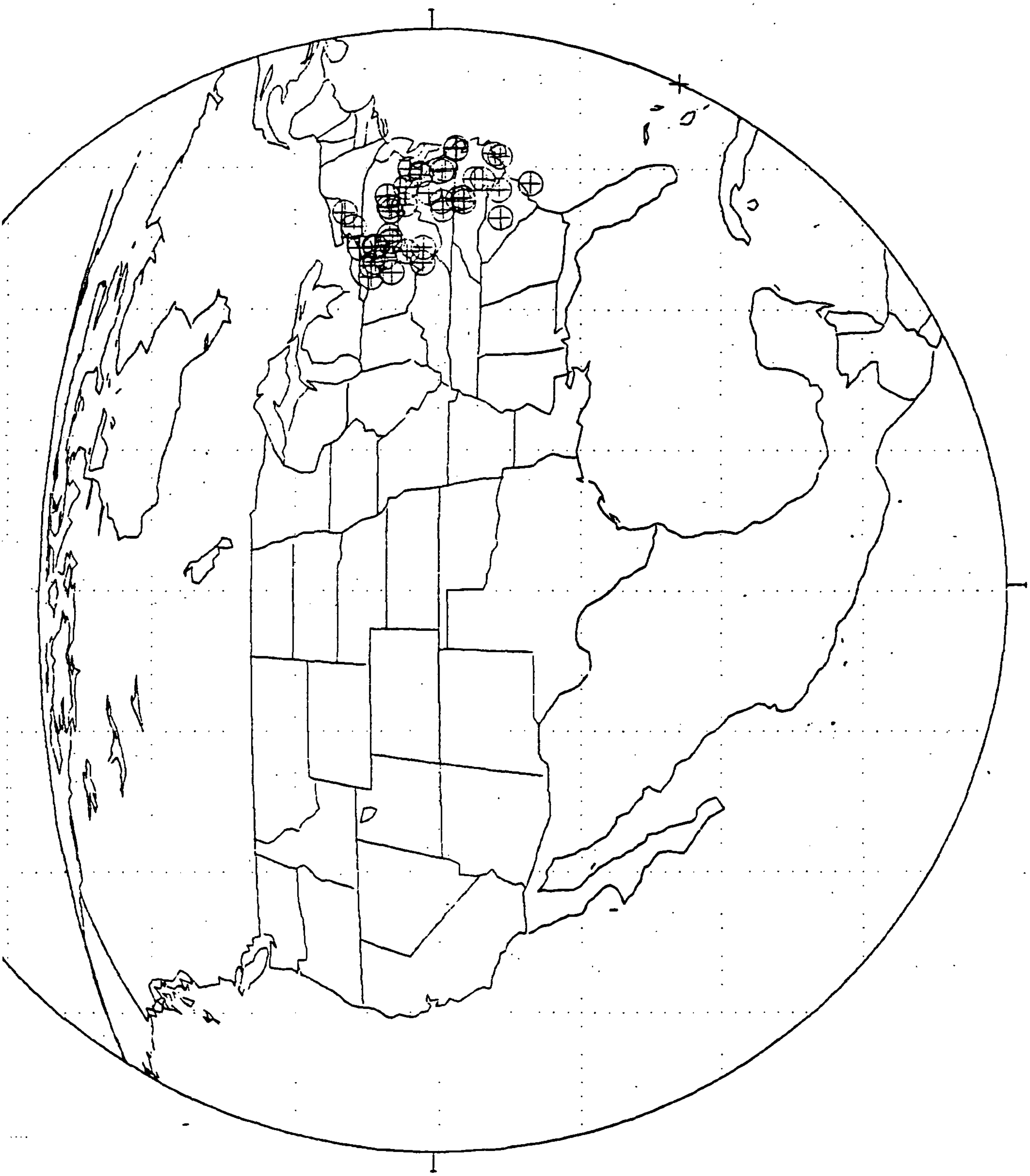


Ka-Band Scan Beam Coverages
Page 3

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
2	AKOH	AKRON OH	41.04	81.31
2	ATPA	ALTOONA PA	40.32	78.23
2	BAMD	BALTIMORE MD	39.18	76.38
2	BUNY	BUFFALO NY	42.52	78.55
2	BUNC	BURLINGTON NC	36.05	79.27
2	CAOH	CANTON OH	40.48	81.23
2	CHSC	CHARLESTON -NORTH CHARLESTON SC	32.48	79.58
2	CHWV	CHARLESTON WV	38.23	81.40
2	CHVA	CHARLOTTESVILLE VA	38.02	78.29
2	CLOH	CLEVELAND OH	41.30	81.41
2	COSC	COLUMBIA SC	34.00	81.00
2	CUMD	CUMBERLAND MD-WV	39.40	78.47
2	DAVA	DANVILLE V	36.34	79.25
2	ERPA	ERIE PA	42.07	80.05
2	FANC	FAYETTEVILLE NC	35.05	78.53
2	FOSC	FORENCE SC	34.12	79.44
2	GRNC	GREENSBORO-WINSTON -SALEM-HIGH NC	36.03	79.50
2	HAMD	HAGERSTOWN MD	39.39	77.44
2	HUWV	HUNTINGTON-ASHLAND WV-KY	38.24	82.26
2	JANC	JACKSONVILLE NC	34.45	77.26
2	JOPA	JOHNSONTOWN PA	40.20	78.56
2	LOOH	LORAIN-ELYRIA OH	41.28	82.11
2	LYVA	LYNCHBURG VA	37.24	79.09
2	NEOH	NEWARK OH	40.03	82.25
2	NEVA	NEWPORT NEWS-HAMPTON VA	36.59	76.26
2	NOVA	NORFOLK-VIRGINIA BEACH-PORTSMO VA-NC	36.54	76.18
2	PAWV	PARKERSBURG-MARIETTA WV-OH	39.17	81.33
2	PEVA	PETERSBURG-COLONIAL HEIGHTS-HO VA	37.14	77.24
2	PIPA	PITTSBURGH PA	40.26	80.00
2	RANC	RALEIGH-DURHAM NC	35.46	78.39
2	RIVA	RICHMOND VA	37.34	77.27
2	ROVA	ROANOKE VA	37.15	79.58
2	RONY	ROCHETER NY	43.12	77.37
2	SHPA	SHARON PA	41.16	80.30
2	STPA	STATE COLLEGE PA	40.48	77.52
2	STOH	STEUBENVILLE-WEIRTON OH-WV	40.22	80.39
2	WADC	WASHINGTON DC-MD	38.55	77.00
2	WHWV	WHEELING WV-OH	40.05	80.43
2	WINC	WILMINGTON NC	34.14	77.55
2	YOOH	YOUNGSTOWN-WARREN OH	41.05	80.40



CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 2 OF KA BAND
03/27/85 8.130

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Ka-Band Scan Beam Coverages
Page 4

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
3	ANIN	ANDERSON IN	40.05	85.14
3	ANMI	ANN ARBOR MI	42.18	83.43
3	APWI	APPLETON-OSHKOSH WI	44.17	88.24
3	BAMI	BATTLE CREEK MI	42.20	85.01
3	BYMI	BAY CITY MI	43.35	83.52
3	BEMI	BENTON HARBOR MI	42.07	86.27
3	BLIN	BLOOMINGTON IN	39.10	86.31
3	BLIL	BLOOMINGTON-NORMAL IL	40.29	89.00
3	CEIA	CEDAR RAPIDS IA	41.59	91.39
3	CHIL	CHAMPAIGN-URBANA-RANTOUL IL	40.07	88.14
3	CIIL	CHICAGO IL	41.50	87.45
3	CIOH	CINCINNATI OH-KY	39.10	84.30
3	COOH	COLUMBUS OH	39.59	83.03
3	DAIA	DAVENPORT-ROCK ISLAND-MOLINE IA-IL	41.30	90.34
3	DAOH	DAYTON OH	39.45	84.10
3	DEIL	DECATUR IL	39.51	88.57
3	DEMI	DETROIT MI	42.23	83.05
3	DUIA	DUBUQUE IA	42.31	90.41
3	DUMN	DULUTH-SUPERIOR MN-WI	46.45	92.10
3	EAWI	EAU CLAIRE WI	44.50	91.30
3	GRWI	GREEN BAY WI	44.32	88.00
3	ELIN	ELKHART IN	41.52	85.56
3	EVIN	EVANSVILLE IN-KY	38.00	87.33
3	FLMI	FLINT MI	43.03	83.04
3	FOIN	FORT WAYNE IN	41.05	85.08
3	GAIN	GARY-HAMMOND-EAST CHICAGO IN	41.34	87.20
3	GRMI	GRAND RAPIDS MI	42.57	86.40
3	HAOH	HAMILTON-MIDDLETOWN OH	39.23	84.33
3	ININ	INDIANAPOLIS IN	39.45	86.10
3	IOIW	IOWA CITY IW	41.39	91.31
3	JAMI	JACKSON MI	42.15	84.24
3	JAWI	JANESVILLE-BELIOT WI	42.42	89.02
3	KAMI	KALAMAZOO-PORTAGE MI	42.17	85.36
3	KAIL	KANKAKEE IL	41.08	87.52
3	KEWI	KENOSHA WI	42.34	87.34
3	KOIN	KOKOMO IN	40.30	86.09
3	LAWI	LA CROSSE WI	43.48	91.04
3	LAIN	LAFAYETTE-WEST LAFAYETTE IN	40.25	86.54
3	LAMI	LANSING-EAST LANSING MI	42.44	85.34
3	LEKY	LEXINGTON-FAYETTE KY	38.02	84.30
3	LIOH	LIMA OH	40.43	84.06
3	LOKY	LOUISVILLE KY-IN	38.13	85.48
3	MAWI	MADISON WI	43.04	89.22
3	MAOH	MANSFIELD OH	40.46	82.31
3	MIWI	MILWAUKEE WI	43.03	87.56
3	MIMN	MINNEAPOLIS-ST PAUL MN-WI	45.00	93.15
3	MUIN	MUNCIE IN	40.11	85.22
3	MUMI	MUSKEGON-NORTON SHORES-MUSKEGO MI	43.13	86.15
3	OWKY	OWENSBORO KY	37.45	87.05
3	PEIL	PEORIA IL	40.43	89.38
3	RAWI	RACINE WI	42.42	87.50

Ka-Band Scan Beam Coverages
Page 5

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
3	ROMN	ROCHESTER MN	44.01	92.27
3	ROIL	ROCKFORD IL	42.16	89.06
3	SAMI	SAGINAW MI	43.25	83.54
3	SHWI	SHEBOYGAN WI	43.46	87.44
3	SOIN	SOUTH BEND IN	41.40	86.15
3	SPIL	SPRINGFIELD IL	39.49	89.39
3	SPOH	SPRINGFIELD OH	39.55	83.48
3	STMN	ST CLOUD MN	45.34	94.10
3	TEIN	TERRE HAUTE IN	39.27	87.24
3	TOOH	TOLEDO OH-MI	41.40	83.35
3	WAIA	WATERLOO-CEDAR FALLS IA	42.30	92.20
3	WAWI	WAUSAU WI	44.58	89.40

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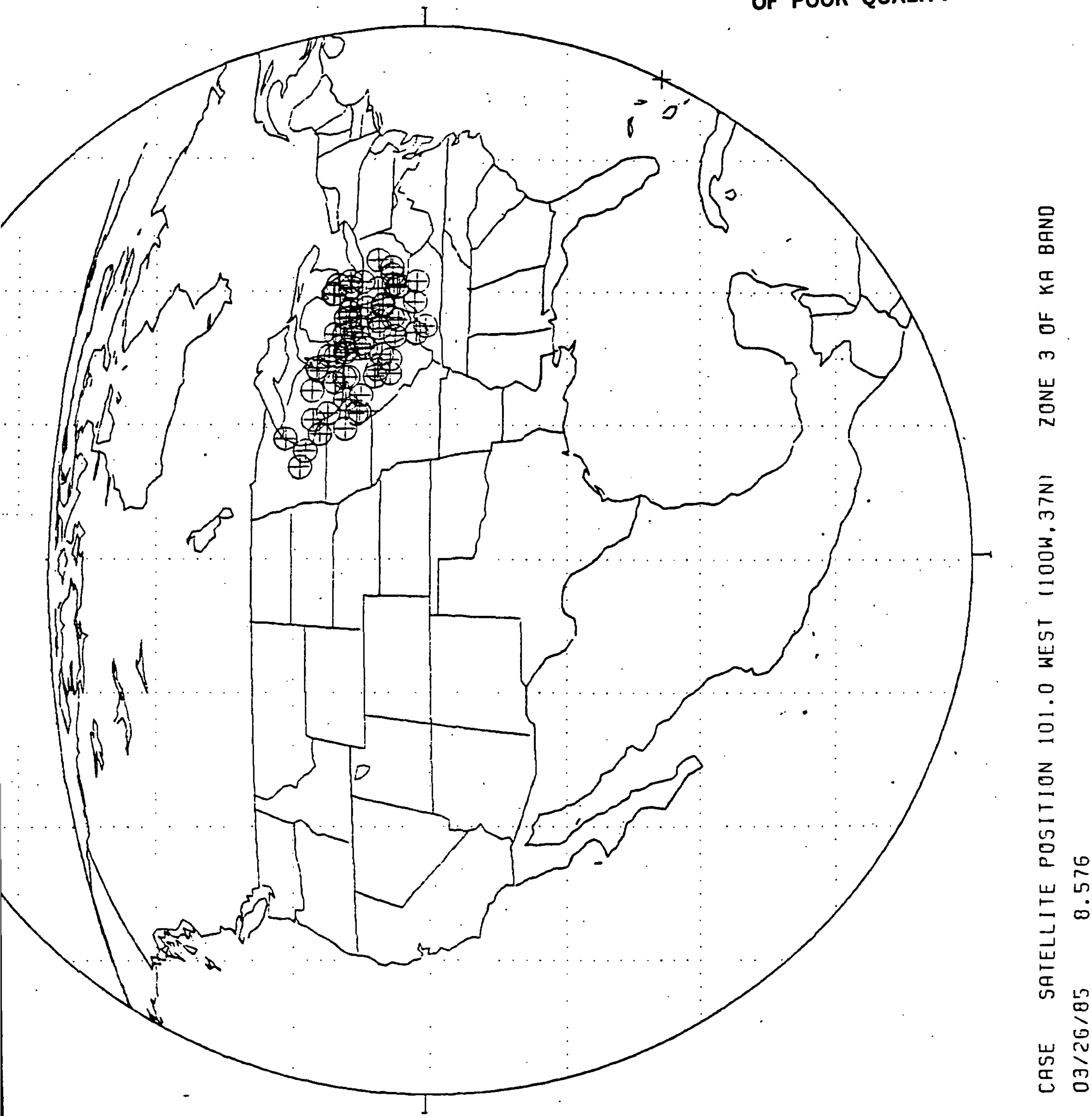
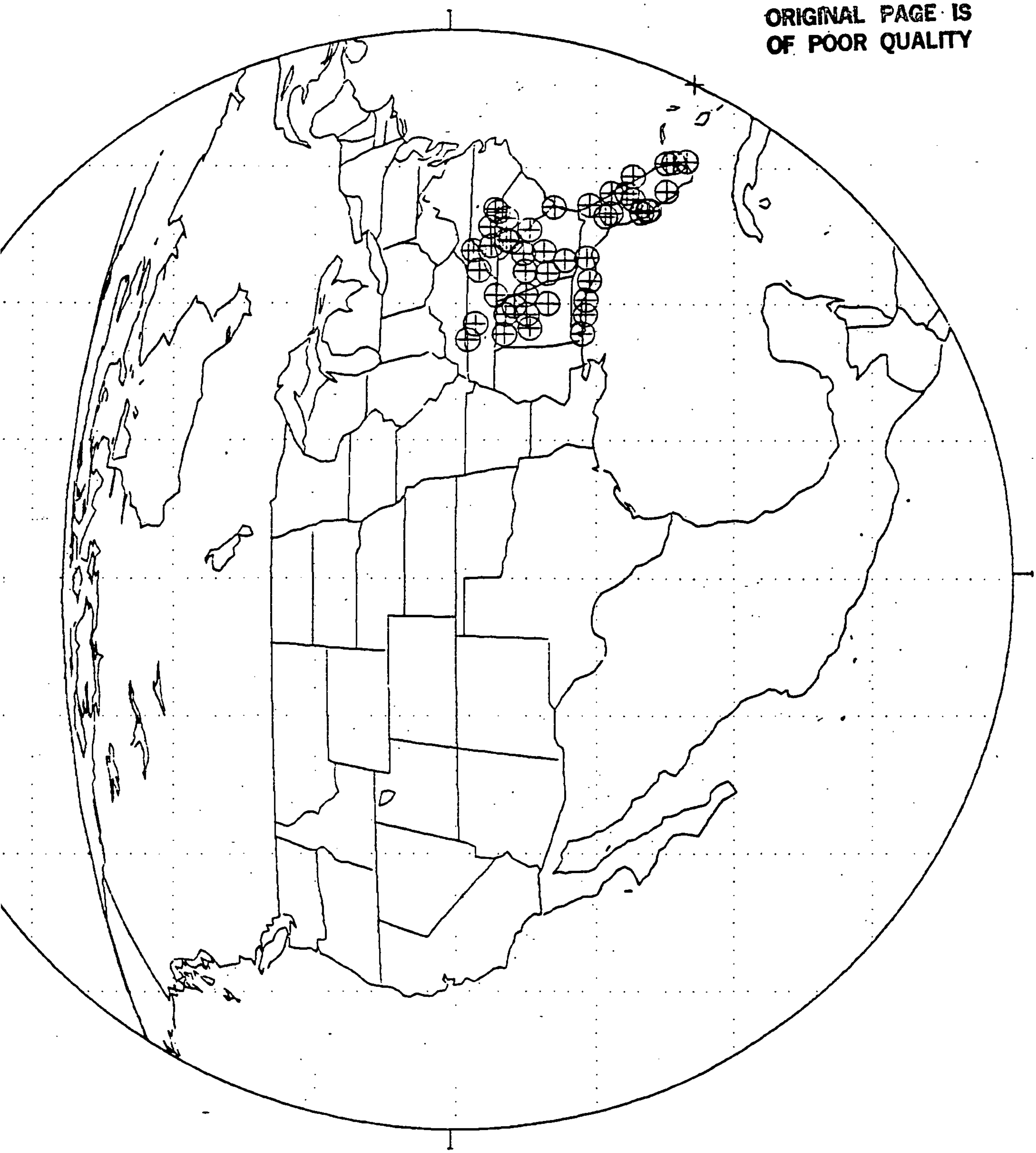


Ka-Band Scan Beam Coverages
Page 6

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
4	ALGA	ALBANY GA	31.37	84.10
4	ANSC	ANDERSON SC	34.30	82.39
4	ANAL	ANNISTON AL	33.38	85.50
4	ASNC	ASHEVILLE NC	35.35	82.35
4	ATGE	ATHENS GE	33.57	83.24
4	ATGA	ATLANTA GA	33.45	84.23
4	AUGA	AUGUSTA GA-SC	33.29	82.00
4	BIAL	BIRMINGHAM AL	33.30	86.55
4	BRFL	BRADENTON FL	27.29	82.33
4	CHNC	CHARLOTTE-GASTONIA NC	35.03	80.50
4	CHTN	CHATTANOOGA TN-GA	35.02	85.18
4	CLTN	CLARKSVILLE-HOPKINSVILLE TN-KY	36.50	87.30
4	COGA	COLUMBUS GA-AL	32.28	84.59
4	DAFL	DAYTONA BEACH FL	29.11	81.01
4	FLAL	FLORENCE AL	34.48	87.40
4	FOFL	FORT LAUDERDALE-HOLLYWOOD FL	26.08	80.08
4	FRFL	FORT MYERS FL	26.39	81.51
4	FTFL	FORT WALTON BEACH FL	30.25	86.38
4	GAAL	GADSDEN AL	34.00	86.00
4	GAFL	GAINESVILLE FL	29.37	82.21
4	GRSC	GREENVILLE-SPARTANBURG SC	34.52	82.25
4	HINC	HICKORY NC	35.44	81.23
4	HUAL	HUNTSVILLE AL	34.44	86.35
4	JAFL	JACKSONVILLE FL	30.20	81.40
4	JOTN	JOHNSON CITY-KINGSPORT-BRISTOL TN-VA	36.33	82.34
4	KNTN	KNOXVILLE TN	36.00	83.57
4	LAFL	LAKELAND-WINTER HAVEN FL	28.02	81.59
4	MAGA	MACON GA	32.49	83.37
4	MEFL	MELBOURNE-TITUSVILLE-COCOA FL	28.04	80.38
4	MIFL	MIAMI FL	25.45	80.15
4	MOAL	MOBILE AL	30.40	88.05
4	MNAL	MONTGOMERY AL	32.22	86.20
4	NATN	NASHVILLE-DAVIDSON TN	36.10	86.50
4	OCFL	OCALA FL	29.11	82.09
4	ORFL	ORLANDO FL	28.33	81.21
4	PAFL	PANAMA CITY FL	30.10	85.41
4	PEFL	PENSACOLA FL	30.26	87.12
4	ROSC	ROCK HILL SC	34.55	81.01
4	SANC	SALISBURY-CONCORD NC	35.20	80.30
4	SAFL	SARASOTA FL	27.20	82.32
4	SAGA	SAVANNAH GA	32.04	81.07
4	TAFL	TALLAHASSEE FL	30.26	84.19
4	TMFL	TAMPA-ST PETERSBURG FL	27.58	82.38
4	TUAL	TUSCALOOSA AL	33.12	87.33
4	WEFL	WEST PALM BEACH-BOCA RATON FL	26.42	80.05

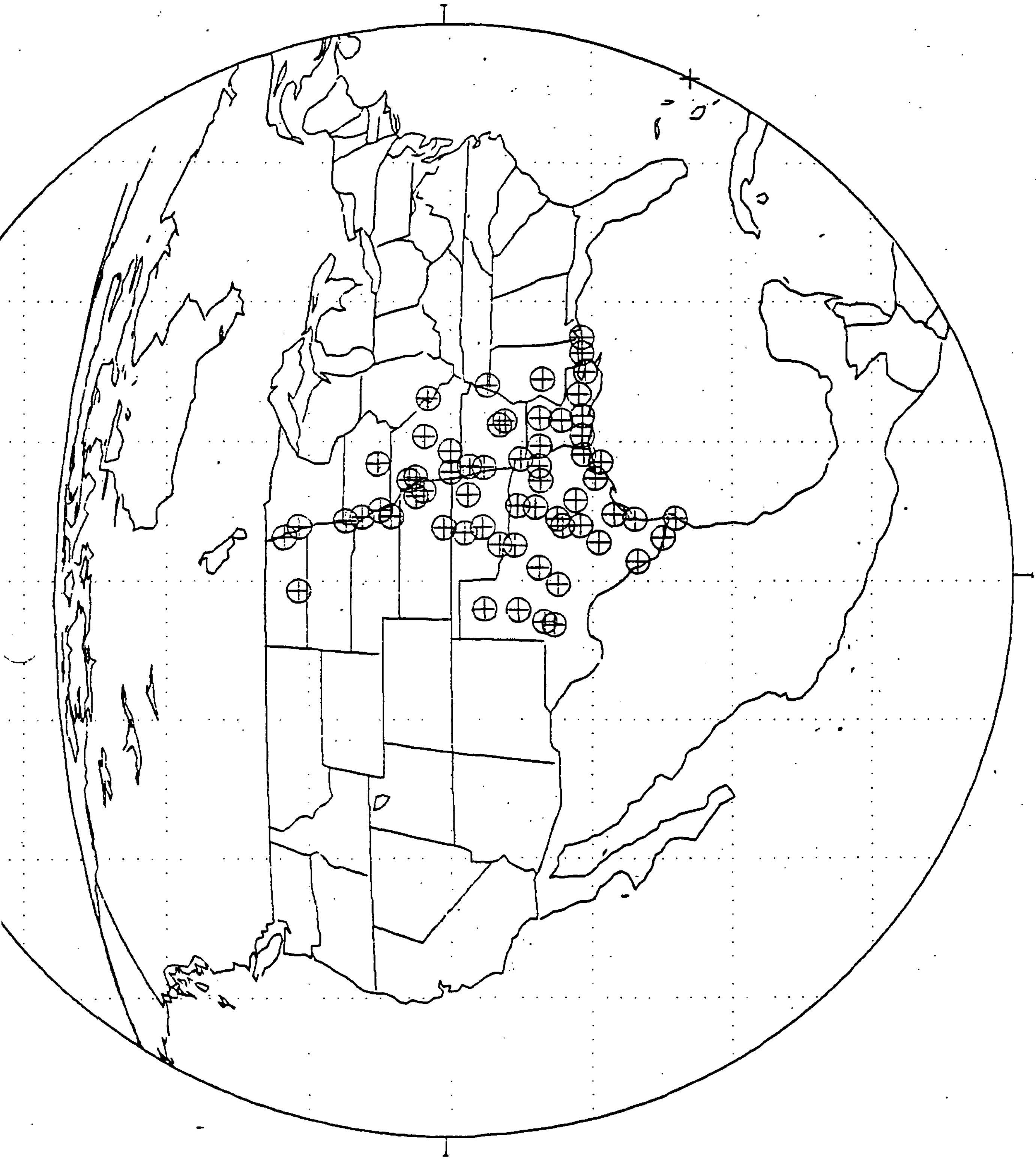
Ford Aerospace &
Communications Corporation



CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 4 OF KA BAND
03/26/85 8.583

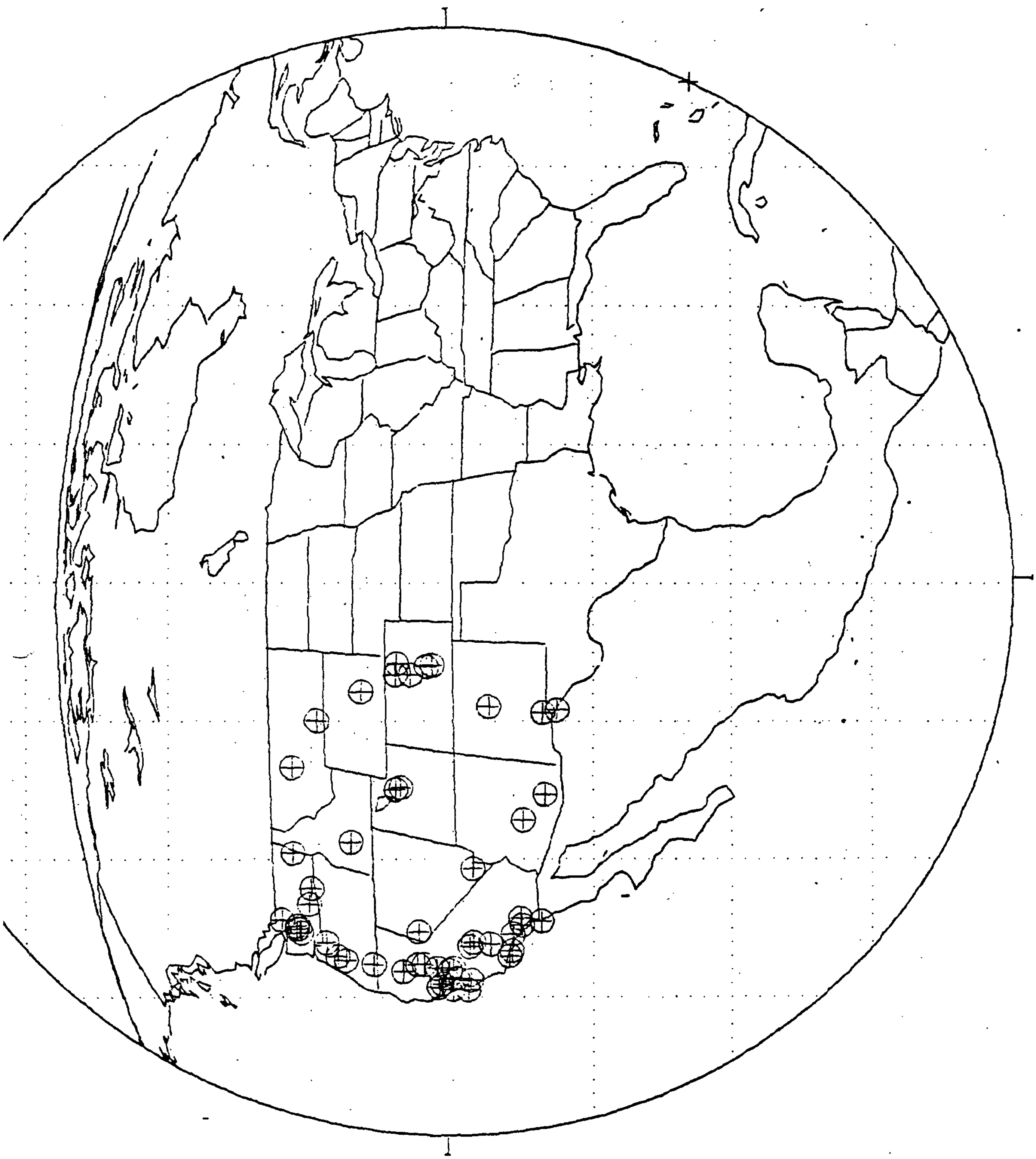
	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
5	ABTX	ABILENE TX	32.27	99.45
5	ALLA	ALEXANDRIA LA	31.19	92.29
5	AMTX	AMARILLO TX	35.14	101.50
5	AUTX	AUSTIN TX	30.18	97.47
5	BALA	BATON ROUGE LA	30.30	91.10
5	BETX	BEAUMONT-PORT ARTHUR-ORANGE TX	30.04	94.06
5	BIMS	BILOXI-GULFPORT MS	30.21	89.08
5	BIND	BISMARCK ND	46.50	100.48
5	BRTX	BROWNSVILLE-HARLINGEN-SAN BENI TX	25.54	97.30
5	BYTX	BRYAN-COLLEGE STATION TX	30.41	96.24
5	COMO	COLUMBIA MO	38.58	92.20
5	COTX	CORPUS CHRISTITX	27.47	97.26
5	DATX	DALLAS-FORT WORTH TX	32.47	96.48
5	DEIA	DES MOINES IA	41.35	93.35
5	ENOK	ENID OK	36.24	97.54
5	FAND	FARGO-MOORHEAD ND-MN	46.52	96.49
5	FAAR	FAYETTEVILLE-SPRINGDALE AR	36.03	94.10
5	FOAR	FORT SMITH AR-OK	35.22	94.27
5	GATX	GALVESTON-TEXAS CITY TX	29.17	94.48
5	GRND	GRAND FORKS ND-MN	47.57	97.05
5	HOTX	HOUSTON TX	29.45	95.25
5	JAMS	JACKSON MS	32.20	90.11
5	JOMO	JOPLIN MO	37.04	94.31
5	KAMO	KANSAS CITY MO-KS	39.05	94.37
5	KITX	KILLEEN-TEMPLE TX	31.08	97.44
5	LALA	LAFAYETTE LA	30.12	92.18
5	LKLA	LAKE CHARLES LA	30.13	93.13
5	LAKS	LAWRENCE KS	38.58	95.15
5	LATX	LAREDO TX	27.32	99.22
5	LAOK	LAWTON OK	34.36	98.25
5	LINE	LINCOLN NE	40.49	96.41
5	LIAR	LITTLE ROCK-NORTH LITTLE ROCK AR	34.42	92.17
5	LOTX	LONGVIEW TX	32.30	94.45
5	LUTX	LUBBOCK TX	33.35	101.53
5	MCTX	MCALLEN-PHARR-EDINBURG TX	26.13	98.15
5	METN	MEMPHIS TN-AR	35.10	90.00
5	MITX	MIDLAND TX	32.00	102.09
5	MOLA	MONROE LA	32.31	92.06
5	NELA	NEW ORLEANS LA	30.00	90.03
5	ODTX	ODESSA TX	31.50	102.23
5	OKOK	OKLAHOMA CITY OK	35.28	97.33
5	OMNE	OMAHA NE-IA	41.15	96.00
5	PAMS	PASCAGOULA-MOSS POINT PATERSON MS	30.21	88.32
5	PIAR	PINE BLUFF AR	34.13	92.00
5	SATX	SAN ANGELO TX	31.28	100.28
5	SNTX	SAN ANTONIO TX	29.25	98.30
5	SHTX	SHERMON-DENISON TX	33.39	96.35
5	SHLA	SHREVEPORT LA	32.30	93.46
5	SINE	SIOUX CITY NE-IA	42.30	96.28
5	SISD	SIOUX FALLS SD	43.34	96.42
5	SPMO	SPRINGFIELD MO	37.11	93.19

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
5	STMO	ST JOSEPH MO	39.45	94.51
5	SLMO	ST LOUIS MO-IL	38.40	90.15
5	TETX	TEXARKANA TX-AR	33.28	94.02
5	TOKS	TOPEKA KS	39.02	95.41
5	TUOK	TULSA OK	36.07	95.58
5	TYTX	TYLER TX	32.22	95.18
5	VITX	VICTORIA TX	28.49	97.01
5	WATX	WACO TX	31.33	97.10
5	WITX	WICHITA FALLS TX	33.55	98.30
5	WIKS	WICHITA KS	37.43	97.20



CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 5 OF KA BAND
03/26/85 8.591

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
6	ALNM	ALBUQUERQUE NM	35.05	106.38
6	ANCA	ANAHEIM-SANTA ANA-GARDEN GROVE CA	33.50	117.56
6	BACA	BAKERSFIELD CA	35.25	119.00
6	BEWA	BELLINGHAM WA	48.45	122.29
6	BIMT	BILLINGS MT	45.47	108.30
6	BOID	BOISE CITY ID	43.38	115.30
6	BRWA	BREMERTON WA	47.34	122.40
6	CAWY	CASPER WY	42.50	106.20
6	CHCA	CHICO CA	39.46	121.50
6	COCO	COLORADO SPRINGS CO	38.50	104.50
6	DECO	DENVER-BOULDER CO	39.45	105.00
6	ELTX	EL PASO TX	31.45	106.30
6	EUOR	EUGENE-SPRINGFIELD OR	44.03	123.04
6	FOCO	FORT COLLINS CO	40.35	105.05
6	FRCA	FRESNO CA	36.41	119.47
6	GRMT	GREATFALLS MT	47.30	111.6
6	GRCO	GREELEY CO	40.26	104.43
6	LANM	LAS CRUCES NM	32.18	106.47
6	LANV	LAS VEGAS NV	36.10	115.10
6	LOCA	LOS ANGELES-LONG BEACH CA	34.00	118.15
6	MEOR	MEDFORD OR	42.20	122.52
6	MOCA	MODESTO CA	37.37	121.00
6	OLWA	OLYMPIA WA	47.03	122.53
6	OXCA	OXNARD-SIMI VALLEY-VENTURA CA	34.11	119.10
6	PHAZ	PHOENIX AZ	33.30	112.03
6	POOR	PORTLAND OR-WA	45 32	122.40
6	PRUT	PROVO=OREM UT	40.15	111.40
6	PUCO	PUEBLO CO	38.17	104.38
6	RECA	REDDING CA	40.35	122.24
6	RENV	RENO NV	39.32	119.49
6	RIWA	RICHLAND-KENNEWICK WA	46.17	119.17
6	RICA	RIVERSIDE-SAN BERNADINO-ONTAR CA	33.59	117.22
6	SACA	SACRAMENTO CA	38.32	121.30
6	SAOR	SALEM OR	44.57	123.01
6	SLCA	SALINAS-SEASIDE-MONTEREY CA	36.39	121.40
6	SAUT	SALT LAKE CITY-OGDEN UT	40.45	111.55
6	SNCA	SAN DIEGO CA	32.45	117.10
6	SFCA	SAN FRANCISCO - OAKLAND CA	37.45	122.27
6	SJCA	SAN JOSE CA	37.20	121.55
6	STCA	SANTA BARBARA-SANTA MARIA-LOMP CA	34.25	119.41
6	SCCA	SANTA CRUZ CA	36.58	122.03
6	SRCA	SANTA ROSA CA	38.26	122.43
6	SEWA	SEATTLE-EVERETT WA	47.35	122.20
6	SPWA	SPOKANE WA	47.40	117.25
6	SOCA	STOCKTON CA	37.59	121.20
6	TAWA	TACOMA WA	47.16	122.30
6	TUAZ	TUCSON AZ	32.15	110.57
6	VACA	VALLEJO-FAIRFIELD-NAPA CA	38.05	122.14
6	VICA	VISALIA-TULARE-PORTERVILLE CA	36.20	119.18
6	YAWA	YAKIMA WA	46.37	120.30
6	YUCA	YUBA CITY CA	39.09	121.36



CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 6 OF KA BAND
03/26/85 8.599

G-2.2 Beam Definition For Ka-Band Scan Beam To SMSA's

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BEAM COVERAGES

Beam: SCN1

CON	DEL	MAS	ME1	ME2
NH	NJ	NY2	NY3	PA2
RI	VT			

Beam: SCN2

MD	NC2	NY1	OH2	PA1
SC2	VA1	VA2	WV1	WV2

Beam: SCN3

IL1	IL2	IN1	IN2	IO2
KY1	KY2	MI3	MN1	MN2
OH1	WI1	WI2		

Beam: SCN4

AL1	AL2	FL1	FL2	FL3
GA1	GA2	NC1	SC1	TN1
TN2				

Beam: SCN5

AK1	AK2	IO1	KS2	LA1
LA2	MO1	MO2	MS2	ND1
ND2	NE2	OK1	OK2	SD2
TX1	TX2	TX3	TX4	TX5
TX6				

Beam: SCN6

AZ2	CA1	CA2	CA3	CO2
ID2	MT1	MT2	NM1	NM2
NV1	NV2	OR1	UT1	WA1
WA2	WY2			

G-2.3 Ka-Band Scan Beam To Beam Loading

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Beam to Beam Matrix
CPS Voice, Data, and Video Conferencing

Class = KACPS

From:
To:

From	To		To		To		To	
SCN1	SCN1	6966	SCN2	120612	SCN3	362895	SCN4	240384
	SCN5	211389	SCN6	153021				
SCN2	SCN1	120612	SCN2	34050	SCN3	177637	SCN4	144295
	SCN5	165076	SCN6	111700				
SCN3	SCN1	362895	SCN2	177637	SCN3	67098	SCN4	244632
	SCN5	281960	SCN6	205518				
SCN4	SCN1	240384	SCN2	144295	SCN3	244632	SCN4	108270
	SCN5	206756	SCN6	134499				
SCN5	SCN1	211389	SCN2	165076	SCN3	281960	SCN4	206756
	SCN5	169432	SCN6	219138				
SCN6	SCN1	153021	SCN2	111700	SCN3	205518	SCN4	134499
	SCN5	219138	SCN6	220424				

****

SUMMARY

	KACPS
SCN1	1095267
SCN2	753370
SCN3	1339740
SCN4	1078836
SCN5	1253751
SCN6	1044300
Totals	6565264

G-2.4 Ka-Band Scan Transponder Loading

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Transponder Loading
CPS Voice, Data, and Video Conferencing

From	To	Channel	Class	Circuits
SCN1	SS	C1-3A	KACPS	480000
SCN1	SS	C1-3B	KACPS	480000
SCN1	SS	C1-4A	KACPS	135267
SCN2	SS	C2-3A	KACPS	480000
SCN2	SS	C2-3B	KACPS	273370
SCN2	SS	C2-4A	KACPS	0
SCN3	SS	C3-3A	KACPS	480000
SCN3	SS	C3-3B	KACPS	480000
SCN3	SS	C3-4A	KACPS	379740
SCN4	SS	C4-3A	KACPS	480000
SCN4	SS	C4-3B	KACPS	480000
SCN4	SS	C4-4A	KACPS	118836
SCN5	SS	C5-4A	KACPS	480000
SCN5	SS	C5-4B	KACPS	480000
SCN5	SS	C5-5A	KACPS	293751
SCN6	SS	C6-4A	KACPS	480000
SCN6	SS	C6-4B	KACPS	480000
SCN6	SS	C6-5A	KACPS	84300

Totals

KACPS : 6565264

G-3 - C/KU-BAND PAYLOAD

A combined run for C and Ku-bands was done. Beam Coverages are defined with each of the 84 regions assigned to the smallest beam - see Section 4 of Vol. II for a description of the concept of nested beams and overflows. The beams Ku-W and Ku-E are nested within Ku-CNS , which in turn is nested within C-CNS. Thus traffic from AK1 to OH1 could be loaded to transponders connected either Ku-W to Ku-CNS, or Ku-CNS to Ku-CNS.

The Beam to Beam Matrix introduces multiple traffic classes. No traffic is originally assigned to ANVC; this class is used to differentiate between Ku and C-band transponders. Overflows from Ku-band to C-band also "overflow" from ANVK to ANVC classes (Analog Voice/C to Analog Voice/K). This is shown in the Transponder Loading.

There are also some channels designated as BDCST; these were manually precalculated (based on the scale factor of .0375, or N=26.7 satellites).

G-3.1 C And Ku-Band FSS Beam Coverage

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BEAM COVERAGES

Beam: C-CNS

Beam: KU-CNS

AL1	AL2	FL1	IN1	IN2
KY1	KY2	LA2	MI3	MS2
OH1	TN1	TN2		

Beam: KU-W

AK1	AK2	AZ2	CA1	CA2
CA3	CO2	ID2	IL1	IL2
IO1	IO2	KS2	LA1	MN1
MN2	MO1	MO2	MT1	MT2
ND1	ND2	NE2	NM1	NM2
NV1	NV2	OK1	OK2	OR1
SD2	TX1	TX2	TX3	TX4
TX5	TX6	UT1	WA1	WA2
WI1	WI2	WY2		

Beam: KU-E

CON	DEL	FL2	FL3	GA1
GA2	MAS	MD	ME1	ME2
NC1	NC2	NH	NJ	NY1
NY2	NY3	OH2	PA1	PA2
RI	SC1	SC2	VA1	VA2
VT	WV1	WV2		

G-3.2 C And Ku-Band Beam To Beam Matrix

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Beam to Beam Matrix
Data and Analog Voice -- Scenario II
(KB/S or HVC)

Class = DATA

From:
To:

From	To		To		To	
C-CNS						
KU-CNS	KU-CNS	4560	KU-W	15529	KU-E	19346
KU-W	KU-CNS	15529	KU-W	34786	KU-E	33290
KU-E	KU-CNS	19346	KU-W	33290	KU-E	24406

****

Class = ANVK

From:
To:

From	To		To		To	
C-CNS						
KU-CNS	KU-CNS	5174	KU-W	17625	KU-E	21974
KU-W	KU-CNS	17625	KU-W	39508	KU-E	37796
KU-E	KU-CNS	21974	KU-W	37796	KU-E	27734

****

Class = ANVC

From:
To:

C-CNS
KU-CNS
KU-W
KU-E

****

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SUMMARY

	DATA	ANVK	ANVC
C-CNS	0	0	0
KU-CNS	39435	44773	0
KU-W	83605	94929	0
KU-E	77042	87504	0
Totals	200082	227206	0

G-3.3 C And Ku-Band Transponder Loading

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Transponder Loading
Data, Analog Voice, and Broadcast Video
Scenario II

From	To	Channel	Class	Circuits
C-CNS		H-1	BDCST	
C-CNS		H-2	BDCST	
C-CNS		H-3	BDCST	
C-CNS		H-4	BDCST	
C-CNS	C-CNS	H-5	ANVC	6000
C-CNS	C-CNS	H-6	ANVC	6000
C-CNS	C-CNS	H-7	ANVC	6000
C-CNS	C-CNS	H-8	ANVC	6000
C-CNS	C-CNS	H-9	ANVC	6000
C-CNS	C-CNS	H-10	ANVC	6000
C-CNS	C-CNS	H-11	ANVC	6000
C-CNS	C-CNS	H-12	ANVC	6000
C-CNS	C-CNS	V-1	ANVC	6000
C-CNS	C-CNS	V-2	ANVC	6000
C-CNS	C-CNS	V-3	ANVC	6000
C-CNS	C-CNS	V-4	ANVC	6000
C-CNS	C-CNS	V-5	ANVC	6000
C-CNS	C-CNS	V-6	ANVC	6000
C-CNS	C-CNS	V-7	ANVC	6000
C-CNS	C-CNS	V-8	ANVC	6000
C-CNS	C-CNS	V-9	ANVC	6000
C-CNS	C-CNS	V-10	ANVC	6000
C-CNS	C-CNS	V-11	ANVC	6000
C-CNS	C-CNS	V-12	ANVC	6000
KU-CNS	SS	H-1	DATA	116477
KU-CNS		H-2	BDCST	
KU-CNS		H-3	BDCST	
KU-CNS		H-4	BDCST	
KU-CNS		H-5	BDCST	
KU-CNS	KU-CNS	H-6	ANVK	9000
KU-CNS	KU-CNS	H-7	ANVK	9000
KU-CNS	KU-CNS	H-8	ANVK	9000
KU-W	SS	V-1	DATA	48819
KU-W	KU-E	V-2	ANVK	9000
KU-W	KU-E	V-3	ANVK	9000
KU-W	KU-E	V-4	ANVK	9000
KU-W	KU-E	V-5	ANVK	9000
KU-W	KU-E	V-6	ANVK	1796
KU-W	KU-W	V-7	ANVK	4614
KU-W		V-8		
KU-E	SS	V-1	DATA	34786

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KU-E	KU-W	V-2	ANVK	9000
KU-E	KU-W	V-3	ANVK	9000
KU-E	KU-W	V-4	ANVK	9000
KU-E	KU-W	V-5	ANVK	9000
KU-E	KU-W	V-6	ANVK	1796
KU-E		V-7		
KU-E		V-8		

Totals

DATA	:	200082
ANVK	:	227206
ANVC	:	0

G-4 - LINK BUDGETS FOR SCENARIO II

TABLE 1 - SCENARIO II - C-BAND (FSS) - LINK BUDGET

MODULATION: CSSB, Suppressed Carrier (6000 HVC/36 MHz)

Mid-band Downlink Freq. =	3.95 GHz	Saturated EIRP = 36.0 dBW
Mid-band Uplink Freq. =	6.15 GHz	SFD =-84.0 dBW/m^2
Uplink Free Space Loss =	200.0 dB	Satellite Gain =161.1 dB
No. of Channels, N =	6000	Satellite G/T = -2.1 dB/K

Transmitter Power	10.0 dBW	10.00 Watts
Transmit Line Loss	1.3 dB	Allocation
Transmitting Antenna Gain	25.0 dBi	Gridded Reflector
Output Backoff	5.0 dB	
Net EIRP	28.7 dBW	
Total Load	22.6 dBm0	-15.2 + 10 Log N
Reference Power EIRP, Pr	6.1 dBW	Net EIRP - Total Load
Free Space Loss	196.1 dB	38700 km; 30° Elev
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Net Path Loss	196.6 dB	
Power Flux Density	-134.0 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	50.1 dBi	10 m dish, 60% eff.
Receive Line Loss	0.1 dB	Allocation
System Noise Temperature	19.4 dB-K	
Receive G/T	30.7 dB/K	(Clear Sky)
Boltzmann's Constant	-228.6 dBW/Hz-K	
Downlink Pr/No	68.8 dB-Hz	
Uplink Pr/No	71.6 dB-Hz	Worst-case
Downlink Interference Pr/Io	68.8 dB-Hz	
Uplink Interference Pr/Io	68.9 dB-Hz	
Intermodulation Pr/IMo	68.9 dB-Hz	14.7 dB = P1/P3
Terrestrial Pr/Io	86.7 dB-Hz	
Cross-polarization Pr/Io	79.6 dB-Hz	
Overall Pr/No	62.2 dB-Hz	
Required Pr/No	61.9 dB-Hz	
	======	
Pr/No Margin	0.3 dB-Hz	

TABLE 2 - SCENARIO II - C-BAND (FSS) - UPLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 6.15 GHz

Transmitter Power	29.0 dBW	800.00 Watts
Transmit Line Loss	0.1 dB	Allocation
Transmitting Antenna Gain	54.0 dBi	10 m dish, 60% eff.
Input Back-Off	3.0 dB	
Net EIRP	79.9 dBW	
Free Space Loss	200.0 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Net Path Loss	200.5 dB	
Power Flux Density	-82.8 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	25.0 dBi	Gridded Reflector
Receive Line Loss	1.3 dB	Allocation
System Noise Temperature	27.1 dB-K	
Receive G/T	-2.1 dB/K	(Clear Sky)
Received Carrier Level	-95.6 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	105.9 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	33.4 dB	Worst-case

TABLE 3 - SCENARIO II - C (FSS) - DOWNLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 3.95 GHz

Transmitter Power	10.0 dBW	10.00 Watts
Transmit Line Loss	1.3 dB	Allocation
Transmitting Antenna Gain	25.0 dBi	Gridded Reflector
Output Back-Off	3.0 dB	
EIRP	30.7 dBW	
Free Space Loss	196.1 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Net Path Loss	196.6 dB	
Power Flux Density	-132.0 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	50.1 dBi	10 m dish, 60% eff.
Receive Line Loss	0.1 dB	Allocation
System Noise Temperature	19.5 dB-K	
Receive G/T	30.6 dB/K	(Clear Sky)
Received Carrier Level	-115.8 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	93.3 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	20.7 dB	
Required C/N	18.0 dB	Studio Reception
Link Margin	2.7 dB	
Overall C/N	20.5 dB	33.4 dB Uplink C/N
Weighted (S/N)w Ratio	51.5 dB	CCIR Type M
Minimum (S/N)w	48.0 dB	Quality: Excellent (TASO)
(S/N)w Margin	3.5 dB	

TABLE 4 - SCENARIO II - Ku-BAND (FSS) - LINK BUDGET

MODULATION: CSSB, Suppressed Carrier (6000 HVC/36 MHz)

Mid-band Downlink Freq. =	11.95 GHz	Saturated EIRP =	39.0 dBW
Mid-band Uplink Freq. =	14.25 GHz	SFD =	-84.0 dBW/m^2
Uplink Free Space Loss =	207.3 dB	Satellite Gain =	171.4 dB
No. of Channels, N =	6000	Satellite G/T =	1.3 dB/K

Transmitter Power	5.4 dBW	3.50 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	35.2 dBi	Gridded Reflector
Output Backoff	5.0 dB	
Net EIRP	34.5 dBW	
Total Load	22.6 dBm0	-15.2 + 10 Log N
Reference Power EIRP, Pr	12.0 dBW	Net EIRP - Total Load
Free Space Loss	205.8 dB	38700 km; 30° Elev.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	209.4 dB	
Power Flux Density	-128.2 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% eff.
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.3 dB-K	
Receive G/T	34.4 dB/K	(Clear Sky)
Boltzmann's Constant	-228.6 dBW/Hz-K	
Downlink Pr/No	65.6 dB-Hz	
Uplink Pr/No	70.5 dB-Hz	Worst-case
Downlink Interference Pr/Io	78.2 dB-Hz	
Uplink Interference Pr/Io	75.9 dB-Hz	
Intermodulation Pr/IMo	68.9 dB-Hz	14.7 dB = P1/P3
Terrestrial Pr/Io	86.6 dB-Hz	
Cross-polarization Pr/Io	85.5 dB-Hz	
Overall Pr/No	62.7 dB-Hz	
Required Pr/No	61.9 dB-Hz	
Pr/No Margin	0.8 dB-Hz	

TABLE 5 - SCENARIO II - Ku (FSS) - UPLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/54 MHz)

Mid-band Frequency = 14.25 GHz

Transmitter Power	29.0 dBW	800.00 Watts
Transmit Line Loss	0.2 dB	Allocation
Transmitting Antenna Gain	58.2 dBi	7 m dish, 60% eff.
Input Back-Off	3.0 dB	
Net EIRP	84.0 dBW	
Free Space Loss	207.3 dB	38700 km; 30^{o} Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	210.9 dB	
Power Flux Density	-78.7 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	29.0 dBi	Gridded Reflector
Receive Line Loss	1.1 dB	Allocation
System Noise Temperature	27.7 dB-K	
Receive G/T	1.3 dB/K	(Clear Sky)
Received Carrier Level	-97.8 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	103.0 dB-Hz	
Receiver IF Bandwidth	73.8 dB-Hz	24 MHz IF Bandwidth
Received C/N	29.2 dB	CONUS, Worst-case

TABLE 6 - SCENARIO II - Ku (FSS) - DOWNLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/54 MHz)

Mid-band Frequency = 11.95 GHz

Transmitter Power	5.4 dBW	3.50 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	35.2 dBi	Gridded Reflector
Output Back-Off	3.0 dB	
Net EIRP	36.5 dBW	
Free Space Loss	205.8 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	0.0 dB	
Net Path Loss	206.4 dB	
Power Flux Density	-126.2 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% eff.
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	
Receive G/T	34.2 dB/K	(Clear Sky)
Received Carrier Level	-113.1 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	93.0 dB-Hz	
Receiver IF Bandwidth	73.8 dB-Hz	24 MHz IF Bandwidth
Received C/N	19.2 dB	
Required C/N	18.0 dB	Studio Reception
Link Margin	1.2 dB	
Overall C/N	18.8 dB	29.2 dB Uplink C/N
Weighted (S/N)w Ratio	50.0 dB	CCIR Type M
Minimum (S/N)w	48.0 dB	Quality: Excellent (TASO)
(S/N)w Margin	2.0 dB	

TABLE 7 - SCENARIO II - Ku-BAND (FSS) - UPLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Information Data Rate = 108 Mb/s

Mid-band Frequency = 14.25 GHz

	Uncoded	Remarks
Transmitter Power	29.0 dBW	800.0 Watts
Transmit Line Loss	0.2 dB	Allocation
Transmitting Antenna Gain	58.2 dBi	7 m dish, 60% efficiency
EIRP	87.0 dBW	
Free Space Loss	207.3 dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	210.9 dB	
Power Flux Density	-75.7 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	29.0 dBi	Gridded Reflector
Receive Line Loss	1.1 dB	Allocation
System Noise Temperature	27.7 dB-K	
Receive G/T	1.3 dB/K	(Clear Sky)
Received Carrier Level	-94.8 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	106.0 dB-Hz	

TABLE 8 - SCENARIO II - Ku-BAND (FSS) - DOWNLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Mid-band Frequency = 11.95 GHz

	Uncoded	Remarks
Transmitter Power	5.4 dBW	3.5 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	35.2 dBi	Gridded Reflector
EIRP	39.5 dBW	
Free Space Loss	205.8 dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	0.0 dB	
Net Path Loss	206.4 dB	
Power Flux Density	-123.2 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% efficiency
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	
Receive G/T	34.2 dB/K	(Clear Sky)
Received Carrier Level	-110.1 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	96.0 dB-Hz	
Information Bit Rate	80.3 dB-Hz	108 Mb/s
Implementation Loss	1.5 dB	Allocation
Required Eb/No	14.0 dB	$BER=10^{-6}$
Required C/kT	95.8 dB-Hz	
C/kT Margin	0.2 dB	

TABLE 9 - SCENARIO II - Ku-BAND (DBS) - UPLINK BUDGET

MODULATION: FM-FDMA Video channel (1 video/24 MHz)

Mid-band Frequency = 17.55 GHz

Transmitter Power	29.0 dBW	800.00 Watts
Transmit Line Loss	0.2 dB	Allocation
Transmitting Antenna Gain	60.0 dBi	7 m dish, 60% eff.
Net EIRP	88.8 dBW	
Free Space Loss	209.1 dB	38700 km; 30^{0} Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	212.7 dB	
Power Flux Density	-73.9 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	29.8 dBi	Solid Reflector
Receive Line Loss	1.1 dB	Allocation
System Noise Temperature	27.9 dB-K	
Receive G/T	1.9 dB/K	(Clear Sky)
Received Carrier Level	-94.1 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	106.6 dB-Hz	
Receiver IF Bandwidth	73.8 dB-Hz	24 MHz IF Bandwidth
Received C/N	32.8 dB	Mountain, Worst-case

TABLE 10 - SCENARIO II - Ku (DBS) - DOWNLINK BUDGET

MODULATION: FM-FDMA Video channel (1 video/24 MHz)

Mid-band Frequency = 12.45 GHz

Transmitter Power	8.1 dBW	6.50 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	31.4 dBi	Solid Reflector
Net EIRP	38.4 dBW	
Free Space Loss	206.1 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	2.0 dB	
Net Path Loss	208.7 dB	
Power Flux Density	-124.3 dBW/m²	(Clear Sky)
Receiving Antenna Gain	57.0 dBi	7 m dish, 60% eff.
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	
Receive G/T	34.5 dB/K	(Clear Sky)
Received Carrier Level	-113.3 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	92.8 dB-Hz	
Receiver IF Bandwidth	73.8 dB-Hz	24 MHz IF Bandwidth
Received C/N	19.0 dB	
Required C/N	18.0 dB	Studio Reception
Link Margin	1.0 dB	
Overall C/N	18.9 dB	32.8 dB Uplink C/N
Weighted (S/N)w Ratio	50.1 dB	CCIR Type M
Minimum (S/N)w	48.0 dB	Quality: Excellent (TASO)
(S/N)w Margin	2.1 dB	

TABLE 11 - SCENARIO II - Ka-BAND (FSS) - UPLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Mid-band Frequency = 28.75 GHz

	Uncoded	Remarks
Transmitter Power	23.0 dBW	200.0 Watts
Transmit Line Loss	1.0 dB	Allocation
Transmitting Antenna Gain	64.3 dBi	7 m dish, 60% efficiency
EIRP	86.3 dBW	
Free Space Loss	213.4 dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	1.0 dB	
Rain Margin	10.0 dB	
Net Path Loss	224.9 dB	
Power Flux Density	-76.4 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	53.0 dBi	Solid Reflector
Receive Line Loss	1.0 dB	Allocation
System Noise Temperature	28.8 dB-K	
Receive G/T	24.2 dB/K	(Clear Sky)
Received Carrier Level	-85.6 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	114.2 dB-Hz	

TABLE 12 - SCENARIO II - Ka-BAND (FSS) - DOWNLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Mid-band Frequency = 18.95 GHz

	Uncoded	Remarks
Transmitter Power	14.8 dBW	30.0 Watts
Transmit Line Loss	1.0 dB	Allocation
Transmitting Antenna Gain	53.0 dBi	Solid Reflector
EIRP	66.8 dBW	
Free Space Loss	209.8 dB	38700 km; 30^{o} Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	1.0 dB	
Rain Margin	10.0 dB	
Net Path Loss	221.3 dB	
Power Flux Density	-96.0 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	60.7 dBi	7 m dish, 60% efficiency
Receive Line Loss	1.0 dB	Allocation
System Noise Temperature	26.0 dB-K	
Receive G/T	34.7 dB/K	(Clear Sky)
Received Carrier Level	-93.8 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	108.9 dB-Hz	
Information Bit Rate	89.8 dB-Hz	960 Mb/s
Implementation Loss	2.0 dB	Allocation
Required Eb/No	14.0 dB	BER=10^{-6}
Required C/kT	105.8 dB	
	======	
C/kT Margin	3.0 dB	

TABLE 13 - SCENARIO II - Ka-BAND (Scan) - UPLINK BUDGET

MODULATION: SS/TDMA/QPSK
CODING: Convolutional, r=1/2, k=7; Viterbi Decoding Algorithm, Q=8

Mid-band Frequency = 28.75 GHz

	Uncoded	Coded		Remarks
Transmitter Power	23.0	23.0	dBW	200.0 W uncoded;200.0 W coded
Transmit Line Loss	1.0	1.0	dB	Allocation
Transmitting Antenna Gain	61.4	61.4	dBi	5 m dish, 60% efficiency
EIRP	83.4	83.4	dBW	
Free Space Loss	213.4	213.4	dB	38700 km; 30^{0} Elev. Angle
Pointing Loss	0.5	0.5	dB	Allocation
Atmospheric Degradation	1.0	1.0	dB	
Rain Margin	0.0	10.0	dB	
Net Path Loss	214.9	224.9	dB	
Power Flux Density	-79.3	-79.3	dBW/m^2	(Clear Sky)
Receiving Antenna Gain	50.8	50.8	dBi	Solid Reflector
Receive Line Loss	1.0	1.0	dB	Allocation
System Noise Temperature	28.8	28.8	dB-K	
Receive G/T	22.0	22.0	dB/K	(Clear Sky)
Received Carrier Level	-80.7	-90.7	dBW	
Boltzmann's Constant	-228.6	-228.6	dBW/Hz-K	
Received C/kT	119.1	109.1	dB-Hz	
Information Bit Rate	86.8	83.8	dB-Hz	480 Mb/s; 240 Mb/s
Implementation Loss	2.0	2.0	dB	Allocation
Required Eb/No	10.5	6.5	dB	Coding Gain=4.0 dB; BER=10^{-6}
Required C/kT	99.3	92.3	dB	
C/kT Margin	19.8	16.8	dB	

TABLE 14 - SCENARIO II - Ka-BAND (Scan) - DOWNLINK BUDGET

MODULATION: SS/TDMA/QPSK
CODING: Convolutional, r=1/2, k=7; Viterbi Decoding Algorithm, Q=8

Mid-band Frequency = 18.95 GHz

	Uncoded	Coded		Remarks
Transmitter Power	8.8	18.8	dBW	7.5 W uncoded; 75.0 W coded
Transmit Line Loss	1.0	1.0	dB	Allocation
Transmitting Antenna Gain	50.8	50.8	dBi	Solid Reflector
EIRP	58.6	68.6	dBW	
Free Space Loss	209.8	209.8	dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5	0.5	dB	Allocation
Atmospheric Degradation	1.0	1.0	dB	
Rain Margin	0.0	10.0	dB	
Net Path Loss	211.3	221.3	dB	
Power Flux Density	-104.2	-94.2	dBW/m^2	(Clear Sky)
Receiving Antenna Gain	61.4	61.4	dBi	5 m dish, 60% efficiency
Receive Line Loss	1.0	1.0	dB	Allocation
System Noise Temperature	26.0	26.0	dB-K	
Receive G/T	35.4	35.4	dB/K	(Clear Sky)
Received Carrier Level	-91.3	-91.3	dBW	
Boltzmann's Constant	-228.6	-228.6	dBW/Hz-K	
Received C/kT	111.3	111.3	dB-Hz	
Information Bit Rate	86.8	83.8	dB-Hz	480 Mb/s; 240 Mb/s
Implementation Loss	2.0	2.0	dB	Allocation
Required Eb/No	10.5	6.5	dB	Coding Gain=4.0 dB; BER=10^{-6}
Required C/kT	99.3	92.3	dB	
	======	======		
C/kT Margin	12.0	19.0	dB	

APPENDIX H

PAYLOAD DETAILS FOR SCENARIO IV

H-1 - LINK BUDGETS FOR SCENARIO IV

The following tables show the projected link budgets for the Ku-Band FSS and Ku-Band DBS services.

TABLE 1 - SCENARIO IV - Ku-BAND (FSS) - UPLINK BUDGET

MODULATION: FM-FDMA Video channel (1 video/24 MHz)

Mid-band Frequency = 14.25 GHz

Transmitter Power	29.0 dBW	800.00 Watts
Transmit Line Loss	0.2 dB	Allocation
Transmitting Antenna Gain	58.2 dBi	7 m dish, 60% eff.
Net EIRP	87.0 dBW	
Free Space Loss	207.3 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	210.9 dB	
Power Flux Density	-75.7 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	29.0 dBi	Gridded Reflector
Receive Line Loss	1.1 dB	Allocation
System Noise Temperature	27.7 dB-K	
Receive G/T	1.3 dB/K	(Clear Sky)
Received Carrier Level	-94.8 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	106.0 dB-Hz	
Receiver IF Bandwidth	73.8 dB-Hz	24 MHz IF Bandwidth
Received C/N	32.2 dB	CONUS, Worst-case

TABLE 2 - SCENARIO IV - Ku (FSS) - DOWNLINK BUDGET

MODULATION: FM-FDMA Video Channel (1 video/24 MHz)

Mid-band Frequency = 11.95 GHz

Transmitter Power	17.0 dBW	50.00 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	29.0 dBi	Gridded Reflector
Net EIRP	44.9 dBW	
Free Space Loss	205.8 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	0.0 dB	
Net Path Loss	206.4 dB	
Power Flux Density	-117.9 dBW/m²	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% eff.
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	
Receive G/T	34.2 dB/K	(Clear Sky)
Received Carrier Level	-104.8 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	101.4 dB-Hz	
Receiver IF Bandwidth	73.8 dB-Hz	24 MHz IF Bandwidth
Received C/N	27.6 dB	
Required C/N	18.0 dB	Studio Reception
Link Margin	9.6 dB	
Overall C/N	26.3 dB	32.2 dB Uplink C/N
Weighted (S/N)w Ratio	57.5 dB	CCIR Type M
Minimum (S/N)w	56.0 dB	Broadcast Quality
(S/N)w Margin	1.5 dB	

TABLE 3 - SCENARIO IV - Ku-BAND (DBS) - UPLINK BUDGET

MODULATION: FM-FDMA Video channel (1 video/24 MHz)

Mid-band Frequency = 17.55 GHz

Transmitter Power	27.0 dBW	500.00 Watts
Transmit Line Loss	0.2 dB	Allocation
Transmitting Antenna Gain	60.0 dBi	7 m dish, 60% eff.
Net EIRP	86.8 dBW	
Free Space Loss	209.1 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	212.7 dB	
Power Flux Density	-76.0 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	32.8 dBi	Solid Reflector
Receive Line Loss	1.1 dB	Allocation
System Noise Temperature	27.9 dB-K	
Receive G/T	4.9 dB/K	(Clear Sky)
Received Carrier Level	-93.1 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	107.6 dB-Hz	
Receiver IF Bandwidth	73.8 dB-Hz	24 MHz IF Bandwidth
Received C/N	33.8 dB	Mountain, Worst-case

TABLE 4 - SCENARIO IV - Ku (DBS) - DOWNLINK BUDGET

MODULATION: FM-FDMA Video channel (1 video/24 MHz)

Mid-band Frequency = 12.45 GHz

Transmitter Power	23.0 dBW	200.0 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	33.7 dBi	Solid Reflector
Net EIRP	55.6 dBW	
Free Space Loss	206.1 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	209.7 dB	
Power Flux Density	-107.1 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	57.0 dBi	7 m dish, 60% eff.
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	
Receive G/T	34.5 dB/K	(Clear Sky)
Received Carrier Level	-97.1 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	109.0 dB-Hz	
Receiver IF Bandwidth	73.8 dB-Hz	24 MHz IF Bandwidth
Received C/N	35.2 dB	
Required C/N	18.0 dB	Studio Reception
	======	
Link Margin	17.2 dB	
Overall C/N	31.4 dB	33.8 dB Uplink C/N
Weighted (S/N)w Ratio	62.7 dB	CCIR Type M
Minimum (S/N)w	56.0 dB	Broadcast Quality
	======	
(S/N)w Margin	6.7 dB	

APPENDIX I

PAYLOAD DETAILS FOR SCENARIO V

I-1 - KU-BAND FSS PAYLOAD

In Scenario V, the Ku- and C-Band runs were made separately, and the overflow from Ku was loaded to C.

Beam coverages are defined, and the acronymns used on the printouts are correlated to beam numbers used in Figures 5.4.2-2 and 5.4.5-2 of Volume II. The C-band beams are also included here for proper assignment of traffic in areas not covered by Ku beams.

Following the transponder loading tables, is an overflow matrix; it is exactly the same format as the original beam to beam matrix, but contains traffic not loaded to the Ku-band transponders.

The first set of printouts is for the case where all broadcast video is carried by Scenario IV platforms. An identical set of printouts is included for the case where broadcast video uses Scenario V channels.

Scale factors used were .114 (N=8.8 satellites) for the case where no broadcast video is assigned, and .0875 (N= 11.4 satellites) if video is carried.

I-1.1 Ku-Band Beam Coverages

KU-BAND BEAMS:

BEAM NO.	BEAM ACRONYMN	BEAM DESCRIPTION
1	NE-AC	Northeastern Section of U.S encircling NE-NYC
2	W-MW	Wisconsin, Iowa, and parts of Missouri/Illinois
3	SE-GC	Gulf Coast and inland section of Southeast
4	NE-NYC	Smaller Northeastern Section centered around New York
5	EONW	Southern Michigan, Ohio, Indiana (split)
6	NW-PC	Northwest quadrant of CONUS
7	SW-OC	Colorado/New Mexico, Arizona, and most of California/Nevada/Utah
8	SW-GC	Texas/Oklahoma
9	SE-AC	South Carolina, Georgia, and Florida

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BEAM COVERAGES

Beam: DUMMY

Beam: NE-AC

MD	ME1	ME2	NH	NY1
NY2	PA1	PA2	VA2	VT
WV2				

Beam: W-MW

IL1	IL2	IO1	IO2	MO1
WI1	WI2			

Beam: SE-GC

AK2	AL1	AL2	FL1	LA1
LA2	MS2			

Beam: NE-NYC

CON	DEL	MAS	NJ	NY3
RI				

Beam: E-MW1

MI3	OH1	OH2

Beam: NW-PC

CA1	ID2	MN1	MN2	MT1
MT2	ND1	ND2	NE2	NV1
OR1	SD2	UT1	WA1	WA2
WY2				

Beam: SW-PC

AZ2	CA2	CA3	CO2	NM1
NM2	NV2	TX2		

Beam: SW-GC

MO2	OK2	TX1	TX3	TX4
TX5	TX6			

Beam: SE-AC

FL2	FL3	GA1	GA2	NC1
NC2	SC1	SC2		

Beam: B1-NE

Beam: B2-NE

VA1	WV1	IN2	KY2	TN2

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Beam: B3-MW
KY1 TN1 AK1 KS2

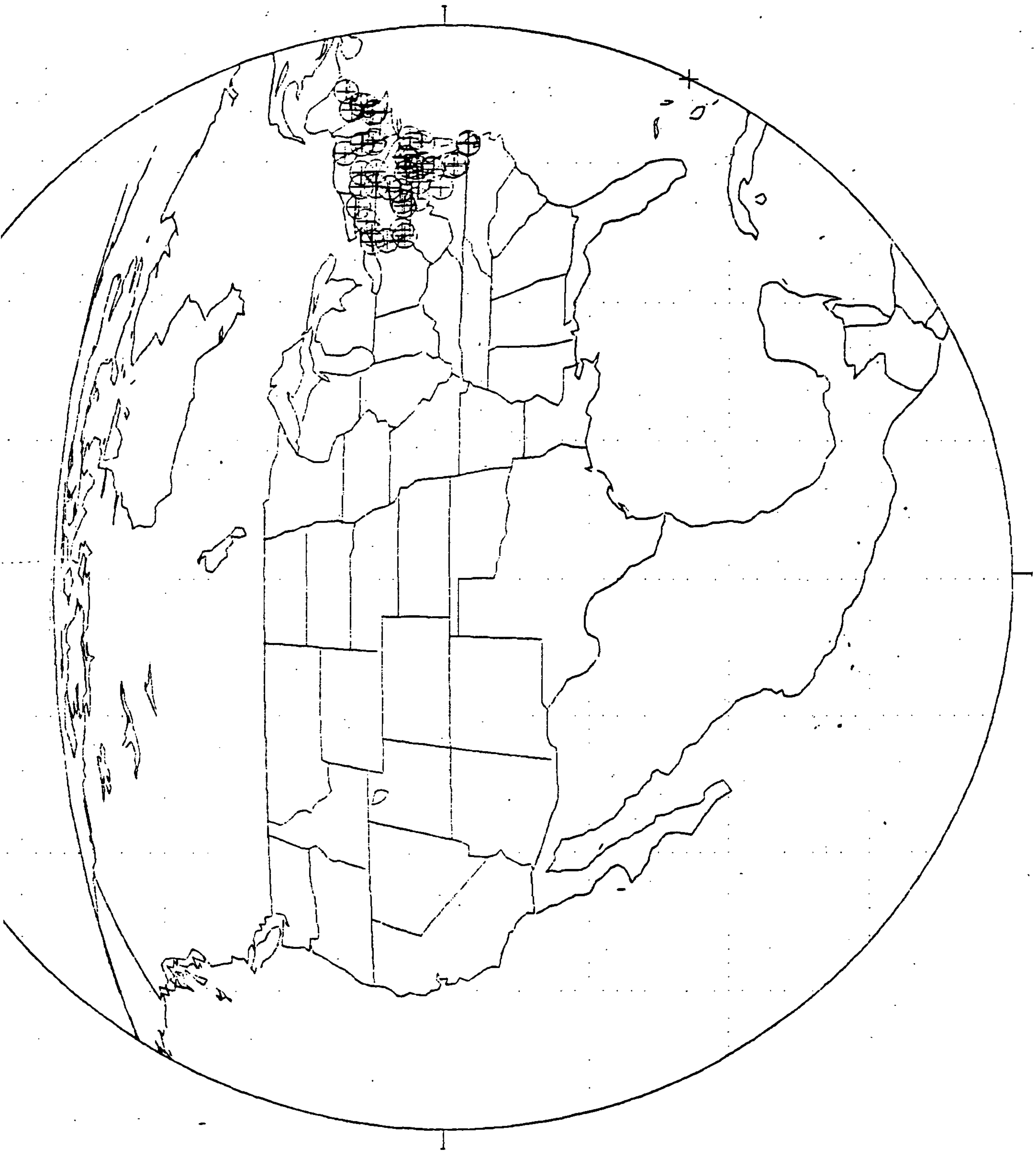
Beam: B4-W
OK1

Beam: E-MW2
IN1

I-1.2 Ku-Band Beam Coverage To SMSA's

Ku-Band Beam Coverages
Page 1

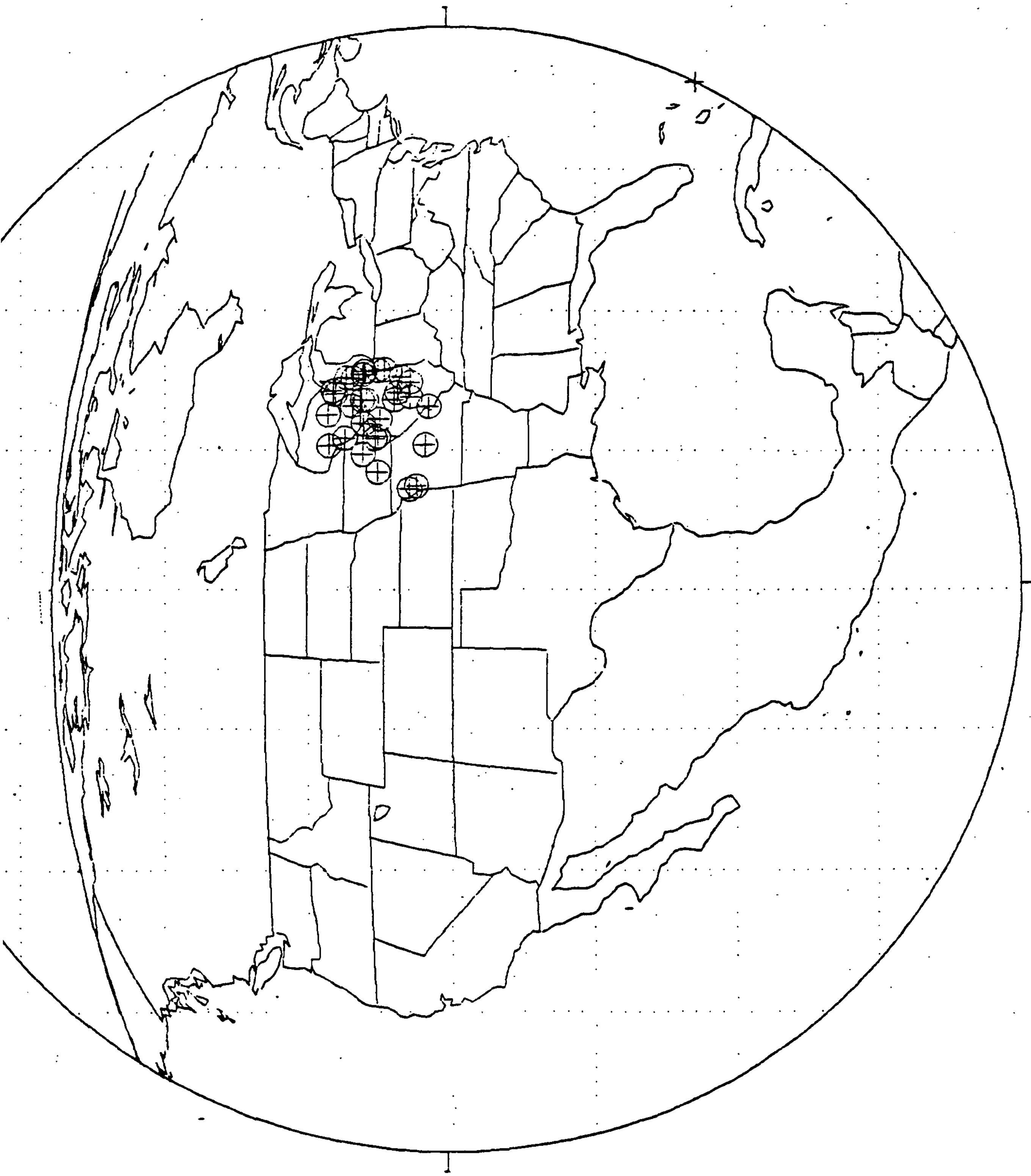
	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
1	ALNY	ALBANY-SCHENECTADY-TROY NY	42.40	73.49
1	ALPA	ALLENTOWN-BETHLEHEM-EASTON PA-NJ	40.11	74.36
1	ATPA	ALTOONA PA	40.32	78.23
1	BAMD	BALTIMORE MD	39.18	76.38
1	BAME	BANGOR ME	44.49	68.47
1	BINY	BINGHAMTON NY-PA	42.06	75.55
1	BUNY	BUFFALO NY	42.52	78.55
1	BUVT	BURLINGTON VT	44.28	73.14
1	CHVA	CHARLOTTESVILLE VA	38.02	78.29
1	CUMD	CUMBERLAND MD-WV	39.40	78.47
1	ELNY	ELMIRA NY	42.06	76.50
1	ERPA	ERIE PA	42.07	80.05
1	GLNY	GLENS FALLS NY	43.17	73.14
1	HAMD	HAGERSTOWN MD	39.39	77.44
1	HAPA	HARRISBURG PA	40.17	76.54
1	JOPA	JOHNSONTOWN PA	40.20	78.56
1	LAPA	LANCASTER PA	40.01	76.19
1	LEME	LEWISTON-AUBURN ME	44.06	70.14
1	MANH	MANCHESTER NH	42.59	71.28
1	NANH	NASHUA NH	42.44	71.28
1	NANY	NASSAU-SUFFOLK NY	42.31	73.36
1	NEVA	NEWPORT NEWS-HAMPTON VA	36.59	76.26
1	NOVA	NORFOLK-VIRGINIA BEACH-PORTSMO VA-NC	36.54	76.18
1	NOPA	NORTHEAST PENNSYLVANIA PA	41.20	75.45
1	PEVA	PETERSBURG-COLONIAL HEIGHTS-HO VA	37.14	77.24
1	PHPA	PHILADELPHIA PA-NJ	40.00	75.10
1	PIPA	PITTSBURGH PA	40.26	80.00
1	POME	PORTLAND ME	43.41	70.18
1	PONH	PORTSMOUTH-DOVER-ROCHESTER NH-ME	43.03	70.47
1	REPA	READING PA	40.20	75.55
1	RIVA	RICHMOND VA	37.34	77.27
1	RONY	ROCHETER NY	43.12	77.37
1	SHPA	SHARON PA	41.16	80.30
1	STPA	STATE COLLEGE PA	40.48	77.52
1	SYNY	SYRACUSE NY	43.03	76.10
1	UTNY	UTICA-ROME NY	43.06	75.15
1	VINJ	VINELAND-MILLVILLE-RIDGETON NJ	39.29	75.02
1	WADC	WASHINGTON DC-MD	38.55	77.00
1	WHWV	WHEELING WV-OH	40.05	80.43
1	WIPA	WILLIAMSPORT PA	41.16	77.03
1	YOPA	YORK PA	39.57	76.44



CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 1 OF KU BAND
03/18/85 15.525

Ku-Band Beam Coverages
Page 2

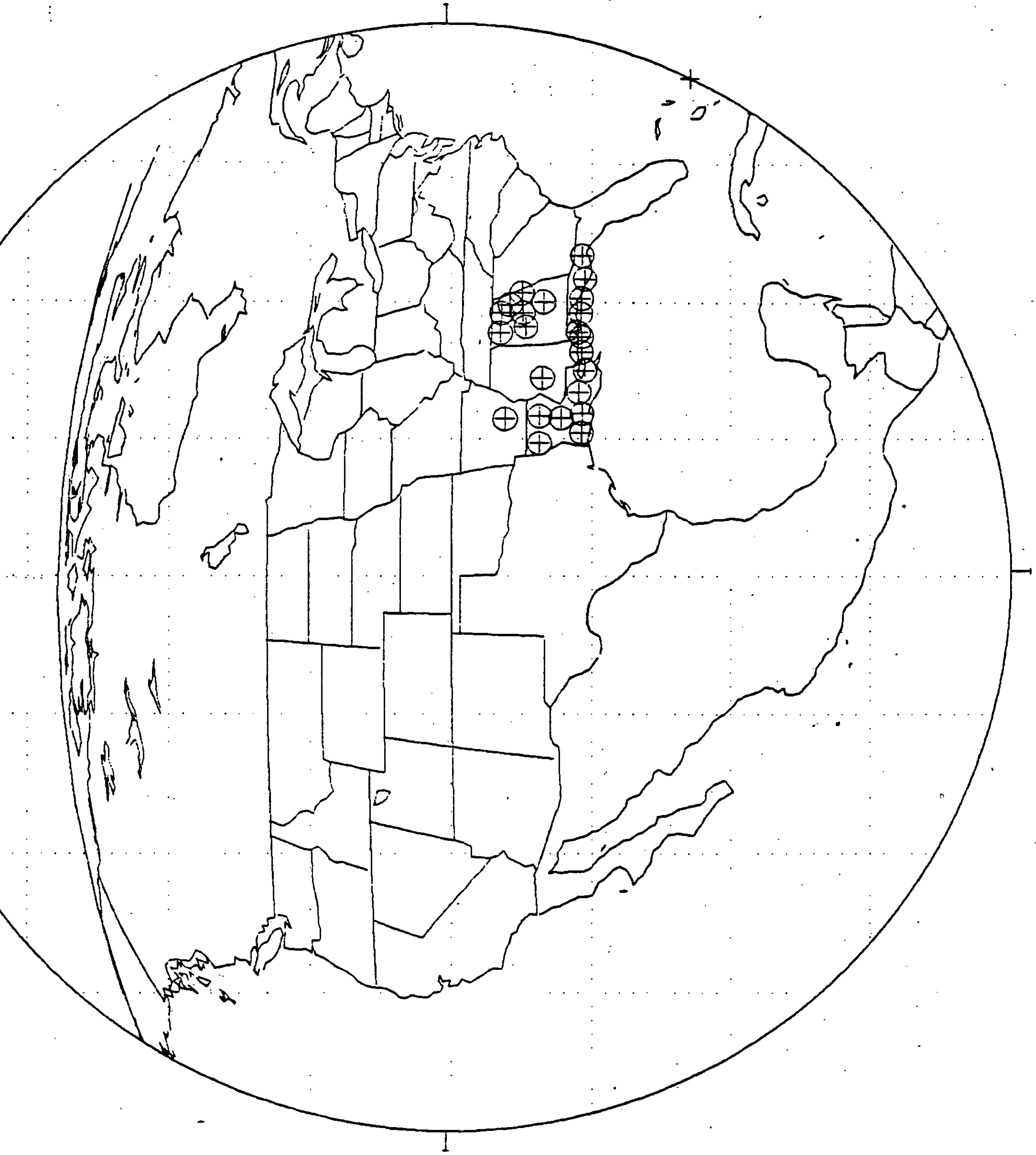
	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
2	APWI	APPLETON-OSHKOSH WI	44.17	88.24
2	BLIL	BLOOMINGTON-NORMAL IL	40.29	89.00
2	CEIA	CEDAR RAPIDS IA	41.59	91.39
2	CHIL	CHAMPAIGN-URBANA-RANTOUL IL	40.07	88.14
2	CIIL	CHICAGO IL	41.50	87.45
2	COMO	COLUMBIA MO	38.58	92.20
2	DAIA	DAVENPORT-ROCK ISLAND-MOLINE IA-IL	41.30	90.34
2	DEIL	DECATUR IL	39.51	88.57
2	DEIA	DES MOINES IA	41.35	93.35
2	DUIA	DUBUQUE IA	42.31	90.41
2	EAWI	EAU CLAIRE WI	44.50	91.30
2	GRWI	GREEN BAY WI	44.32	88.00
2	IOIW	IOWA CITY IW	41.39	91.31
2	JAWI	JANESVILLE-BELIOT WI	42.42	89.02
2	KAIL	KANKAKEE IL	41.08	87.52
2	KAMO	KANSAS CITY MO-KS	39.05	94.37
2	KEWI	KENOSHA WI	42.34	87.34
2	LAWI	LA CROSSE WI	43.48	91.04
2	MAWI	MADISON WI	43.04	89.22
2	MIWI	MILWAUKEE WI	43.03	87.56
2	PEIL	PEORIA IL	40.43	89.38
2	RAWI	RACINE WI	42.42	87.50
2	ROIL	ROCKFORD IL	42.16	89.06
2	SHWI	SHEBOYGAN WI	43.46	87.44
2	SPIL	SPRINGFIELD IL	39.49	89.39
2	STMO	ST JOSEPH MO	39.45	94.51
2	SLMO	ST LOUIS MO-IL	38.40	90.15
2	WAIA	WATERLOO-CEDAR FALLS IA	42.30	92.20
2	WAWI	WAUSAU WI	44.58	89.40



CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 2 OF KU BAND
03/26/85 14.295

Ku-Band Beam Coverages
Page 3

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
3	ALLA	ALEXANDRIA LA	31.19	92.29
3	ANAL	ANNISTON AL	33.38	85.50
3	BALA	BATON ROUGE LA	30.30	91.10
3	BIMS	BILOXI-GULFPORT MS	30.21	89.08
3	BIAL	BIRMINGHAM AL	33.30	86.55
3	FLAL	FLORENCE AL	34.48	87.40
3	FTFL	FORT WALTON BEACH FL	30.25	86.38
3	GAAL	GADSDEN AL	34.00	86.00
3	HUAL	HUNTSVILLE AL	34.44	86.35
3	JAMS	JACKSON MS	32.20	90.11
3	LALA	LAFAYETTE LA	30.12	92.18
3	LKLA	LAKE CHARLES LA	30.13	93.13
3	MOAL	MOBILE AL	30.40	88.05
3	MOLA	MONROE LA	32.31	92.06
3	MNAL	MONTGOMERY AL	32.22	86.20
3	NELA	NEW ORLEANS LA	30.00	90.03
3	PAFL	PANAMA CITY FL	30.10	85.41
3	PAMS	PASCAGOULA-MOSS POINT PATERSON MS	30.21	88.32
3	PEFL	PENSACOLA FL	30.26	87.12
3	PIAR	PINE BLUFF AR	34.13	92.00
3	SHLA	SHREVEPORT LA	32.30	93.46
3	TAFL	TALLAHASSEE FL	30.26	84.19
3	TUAL	TUSCALOOSA AL	33.12	87.33



CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 3 OF KU BAND
03/26/85 14.303

Ford Aerospace & Communications Corporation

Ku-Band Beam Coverages
Page 4

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
4	ATNJ	ATLANTIC CITY NJ	39.23	74.27
4	BOMA	BOSTON MA	42.20	71.05
4	BRCT	BRIDGEPORT CT	41.12	73.12
4	BICT	BRISTOL CT	41.41	72.57
4	BRMA	BROCKTON MA	42.06	71.01
4	DACT	DANBURY CT	41.24	73.26
4	FAMA	FALL RIVER MA-RI	41.42	71.08
4	FIMA	FITCHBURG-LEOMISTER MA	42.35	71.50
4	HACT	HARTFORD CT	41.45	72.42
4	JENJ	JERSEY CITY NJ	40.44	74.04
4	LAMA	LAWRENCE-HAVERHILL MA-NH	42.41	71.12
4	LONJ	LONG BRANCH-ASBURY PARK NJ	40.17	73.59
4	LOMA	LOWELL MA-NH	42.38	71.19
4	MECT	MERIDEN CT	42.32	72.48
4	NEMA	NEW BEDFORD MA	41.38	70.55
4	NECT	NEW BRITAIN CT	41.40	72.47
4	NENJ	NEW BRUNSWICK-PERTH AMBOY-SAYR NJ	40.29	74.27
4	NWCT	NEW HAVEN-WEST HAVEN CT	41.18	72.55
4	NLCT	NEW LONDON-NORWICH CT-RI	41.21	72.06
4	NENY	NEW YORK NY-NJ	40.40	73.50
4	NWNJ	NEWARK NJ	40.44	74.11
4	NWNY	NEWBRGH-MIDDLETOWN NY	41.26	74.26
4	NOCT	NORWALK CT	41.07	73.25
4	PANJ	PATERSON-CLIFTON-PASSAIC NJ	40.52	74.08
4	PIMA	PITTSFIELD MA	38.23	75.26
4	PONY	POUGHKEEPSIE NY	41.43	73.56
4	PRRI	PROVIDENCE-WAWICK-PAWTUCKET RI-MA	39.42	75.53
4	SPCT	SPRINGFIELD-CHICOPEE-HOLYOKE CT-MA	42.07	72.35
4	STCT	STAMFORD CT	41.03	73.32
4	TRNJ	TRENTON NJ	40.15	74.43
4	WACT	WATERBURY CT	41.33	73.03
4	WIDE	WILMINGTON DE-NJ	39.46	75.31
4	WOMA	WORCESTER MA	42.17	71.48

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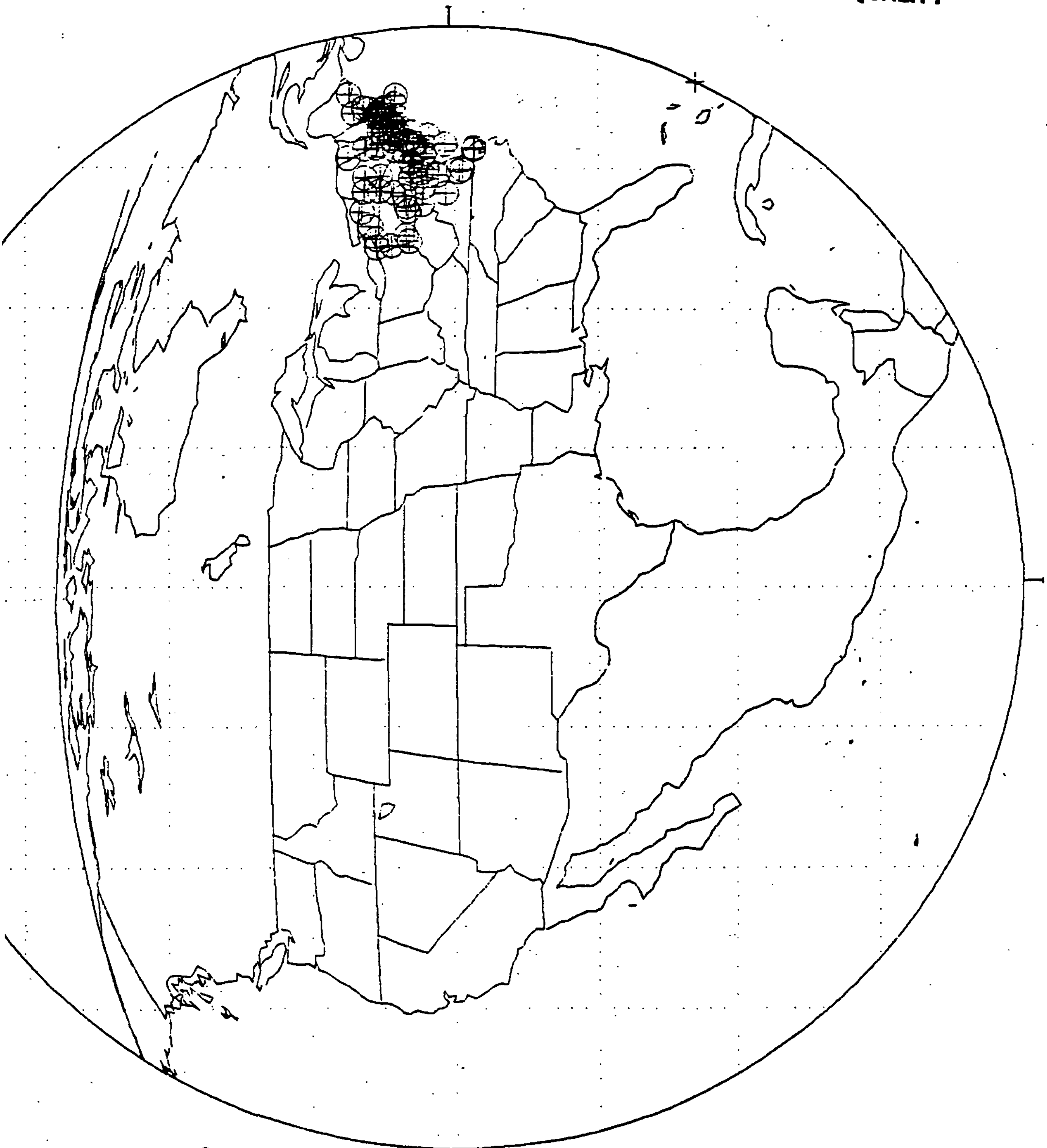
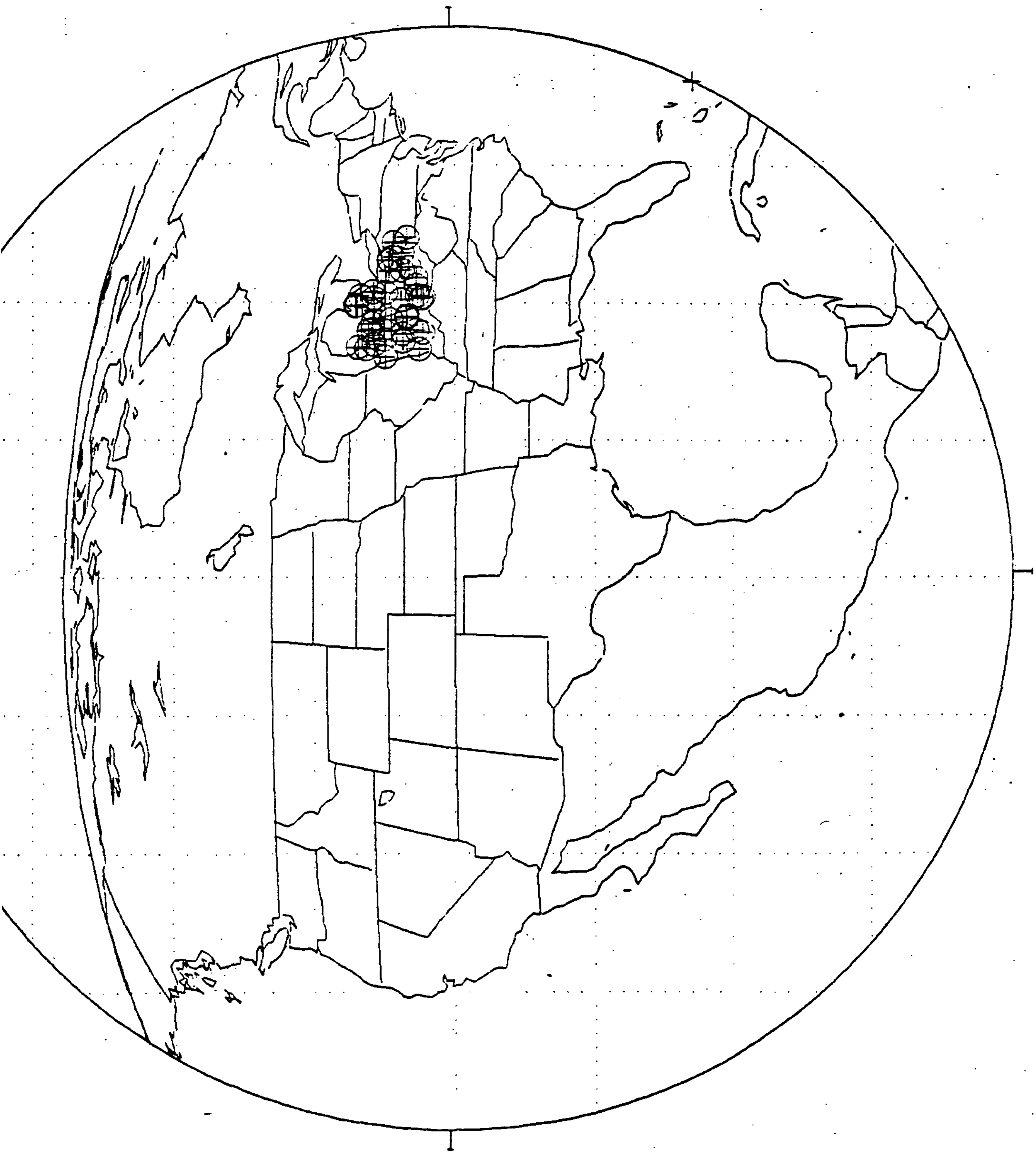


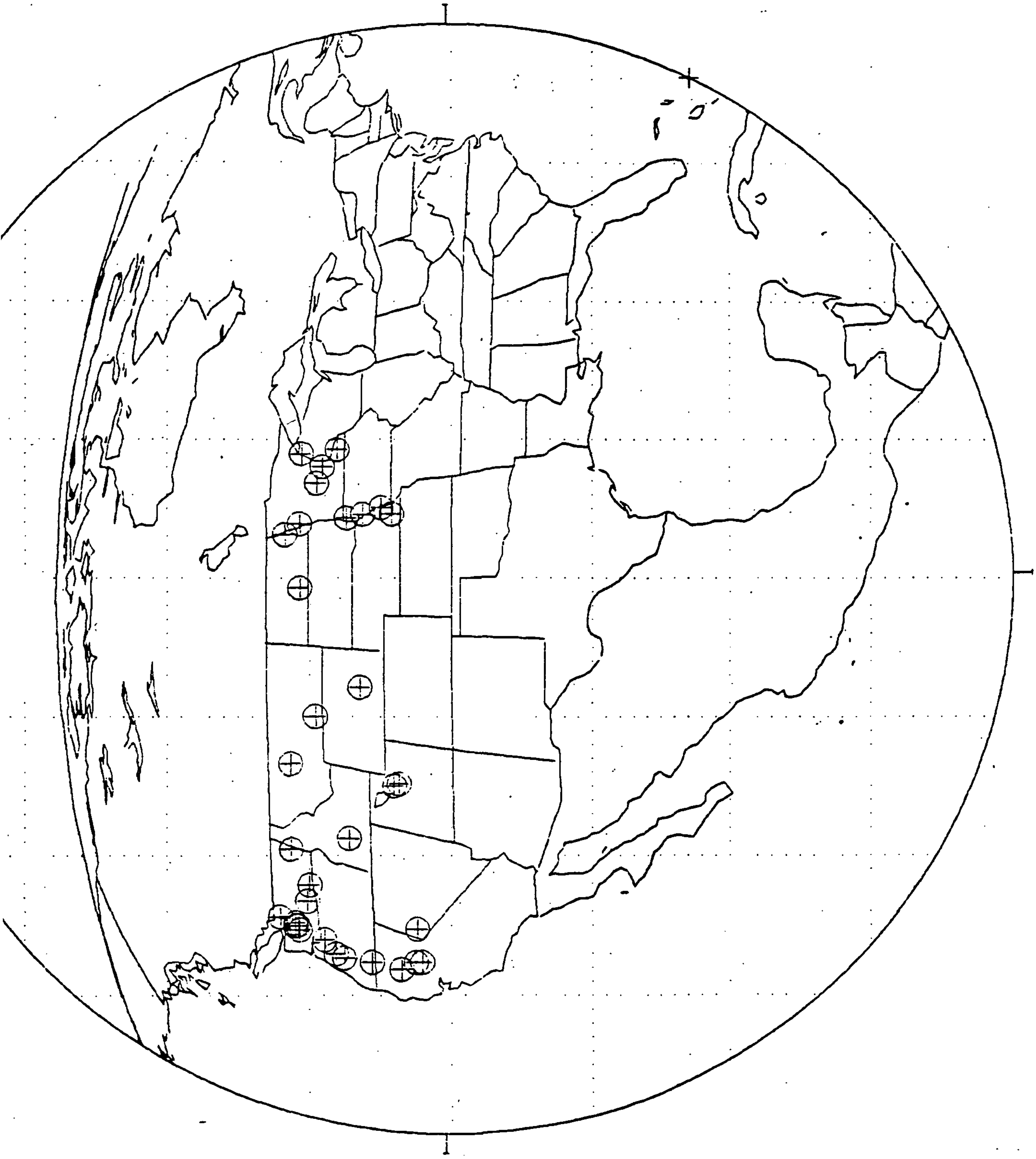
Ku-Band Beam Coverages
Page 5

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
5	AKOH	AKRON OH	41.04	81.31
5	ANIN	ANDERSON IN	40.05	85.14
5	ANMI	ANN ARBOR MI	42.18	83.43
5	BAMI	BATTLE CREEK MI	42.20	85.01
5	BYMI	BAY CITY MI	43.35	83.52
5	BEMI	BENTON HARBOR MI	42.07	86.27
5	BLIN	BLOOMINGTON IN	39.10	86.31
5	CAOH	CANTON OH	40.48	81.23
5	CIOH	CINCINNATI OH-KY	39.10	84.30
5	CLOH	CLEVELAND OH	41.30	81.41
5	COOH	COLUMBUS OH	39.59	83.03
5	DAOH	DAYTON OH	39.45	84.10
5	DEMI	DETROIT MI	42.23	83.05
5	ELIN	ELKHART IN	41.52	85.56
5	FLMI	FLINT MI	43.03	83.04
5	FOIN	FORT WAYNE IN	41.05	85.08
5	GAIN	GARY-HAMMOND-EAST CHICAGO IN	41.34	87.20
5	GRMI	GRAND RAPIDS MI	42.57	86.40
5	HAOH	HAMILTON-MIDDLETOWN OH	39.23	84.33
5	ININ	INDIANAPOLIS IN	39.45	86.10
5	JAMI	JACKSON MI	42.15	84.24
5	KAMI	KALAMAZOO-PORTAGE MI	42.17	85.36
5	KOIN	KOKOMO IN	40.30	86.09
5	LAIN	LAFAYETTE-WEST LAFAYETTE IN	40.25	86.54
5	LAMI	LANSING-EAST LANSING MI	42.44	85.34
5	LIOH	LIMA OH	40.43	84.06
5	LOOH	LORAIN-ELYRIA OH	41.28	82.11
5	MAOH	MANSFIELD OH	40.46	82.31
5	MUIN	MUNCIE IN	40.11	85.22
5	MUMI	MUSKEGON-NORTON SHORES-MUSKEGO MI	43.13	86.15
5	NEOH	NEWARK OH	40.03	82.25
5	SAMI	SAGINAW MI	43.25	83.54
5	SOIN	SOUTH BEND IN	41.40	86.15
5	SPOH	SPRINGFIELD OH	39.55	83.48
5	STOH	STEUBENVILLE-WEIRTON OH-WV	40.22	80.39
5	TEIN	TERRE HAUTE IN	39.27	87.24
5	TOOH	TOLEDO OH-MI	41.40	83.35
5	YOOH	YOUNGSTOWN-WARREN OH	41.05	80.40



CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 5 OF KU BAND
03/26/85 14.318

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
6	BEWA	BELLINGHAM WA	48.45	122.29
6	BIMT	BILLINGS MT	45.47	108.30
6	BIND	BISMARCK ND	46.50	100.48
6	BOID	BOISE CITY ID	43.38	115.30
6	BRWA	BREMERTON WA	47.34	122.40
6	CAWY	CASPER WY	42.50	106.20
6	CHCA	CHICO CA	39.46	121.50
6	DUMN	DULUTH-SUPERIOR MN-WI	46.45	92.10
6	EUOR	EUGENE-SPRINGFIELD OR	44.03	123.04
6	FAND	FARGO-MOORHEAD ND-MN	46.52	96.49
6	GRND	GRAND FORKS ND-MN	47.57	97.05
6	GRMT	GREATFALLS MT	47.30	111.6
6	LINE	LINCOLN NE	40.49	96.41
6	MEOR	MEDFORD OR	42.20	122.52
6	MIMN	MINNEAPOLIS-ST PAUL MN-WI	45.00	93.15
6	OLWA	OLYMPIA WA	47.03	122.53
6	OMNE	OMAHA NE-IA	41.15	96.00
6	POOR	PORTLAND OR-WA	45 32	122.40
6	PRUT	PROVO=OREM UT	40.15	111.40
6	RECA	REDDING CA	40.35	122.24
6	RENV	RENO NV	39.32	119.49
6	RIWA	RICHLAND-KENNEWICK WA	46.17	119.17
6	ROMN	ROCHESTER MN	44.01	92.27
6	SAOR	SALEM OR	44.57	123.01
6	SAUT	SALT LAKE CITY-OGDEN UT	40.45	111.55
6	SEWA	SEATTLE-EVERETT WA	47.35	122.20
6	SINE	SIOUX CITY NE-IA	42.30	96.28
6	SISD	SIOUX FALLS SD	43.34	96.42
6	SPWA	SPOKANE WA	47.40	117.25
6	STMN	ST CLOUD MN	45.34	94.10
6	TAWA	TACOMA WA	47.16	122.30
6	YAWA	YAKIMA WA	46.37	120.30
6	YUCA	YUBA CITY CA	39.09	121.36



CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 6 OF KU BAND
03/26/85 14.326

Ku-Band Beam Coverages
Page 7

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
7	ALNM	ALBUQUERQUE NM	35.05	106.38
7	ANCA	ANAHEIM-SANTA ANA-GARDEN GROVE CA	33.50	117.56
7	BACA	BAKERSFIELD CA	35.25	119.00
7	COCO	COLORADO SPRINGS CO	38.50	104.50
7	DECO	DENVER-BOULDER CO	39.45	105.00
7	ELTX	EL PASO TX	31.45	106.30
7	FOCO	FORT COLLINS CO	40.35	105.05
7	FRCA	FRESNO CA	36.41	119.47
7	GRCO	GREELEY CO	40.26	104.43
7	LANM	LAS CRUCES NM	32.18	106.47
7	LANV	LAS VEGAS NV	36.10	115.10
7	LOCA	LOS ANGELES-LONG BEACH CA	34.00	118.15
7	MOCA	MODESTO CA	37.37	121.00
7	OXCA	OXNARD-SIMI VALLEY-VENTURA CA	34.11	119.10
7	PHAZ	PHOENIX AZ	33.30	112.03
7	PUCO	PUEBLO CO	38.17	104.38
7	RICA	RIVERSIDE-SAN BERNADINO-ONTAR CA	33.59	117.22
7	SACA	SACRAMENTO CA	38.32	121.30
7	SLCA	SALINAS-SEASIDE-MONTEREY CA	36.39	121.40
7	SNCA	SAN DIEGO CA	32.45	117.10
7	SFCA	SAN FRANCISCO - OAKLAND CA	37.45	122.27
7	SJCA	SAN JOSE CA	37.20	121.55
7	STCA	SANTA BARBARA-SANTA MARIA-LOMP CA	34.25	119.41
7	SCCA	SANTA CRUZ CA	36.58	122.03
7	SRCA	SANTA ROSA CA	38.26	122.43
7	SOCA	STOCKTON CA	37.59	121.20
7	TUAZ	TUCSON AZ	32.15	110.57
7	VACA	VALLEJO-FAIRFIELD-NAPA CA	38.05	122.14
7	VICA	VISALIA-TULARE-PORTERVILLE CA	36.20	119.18

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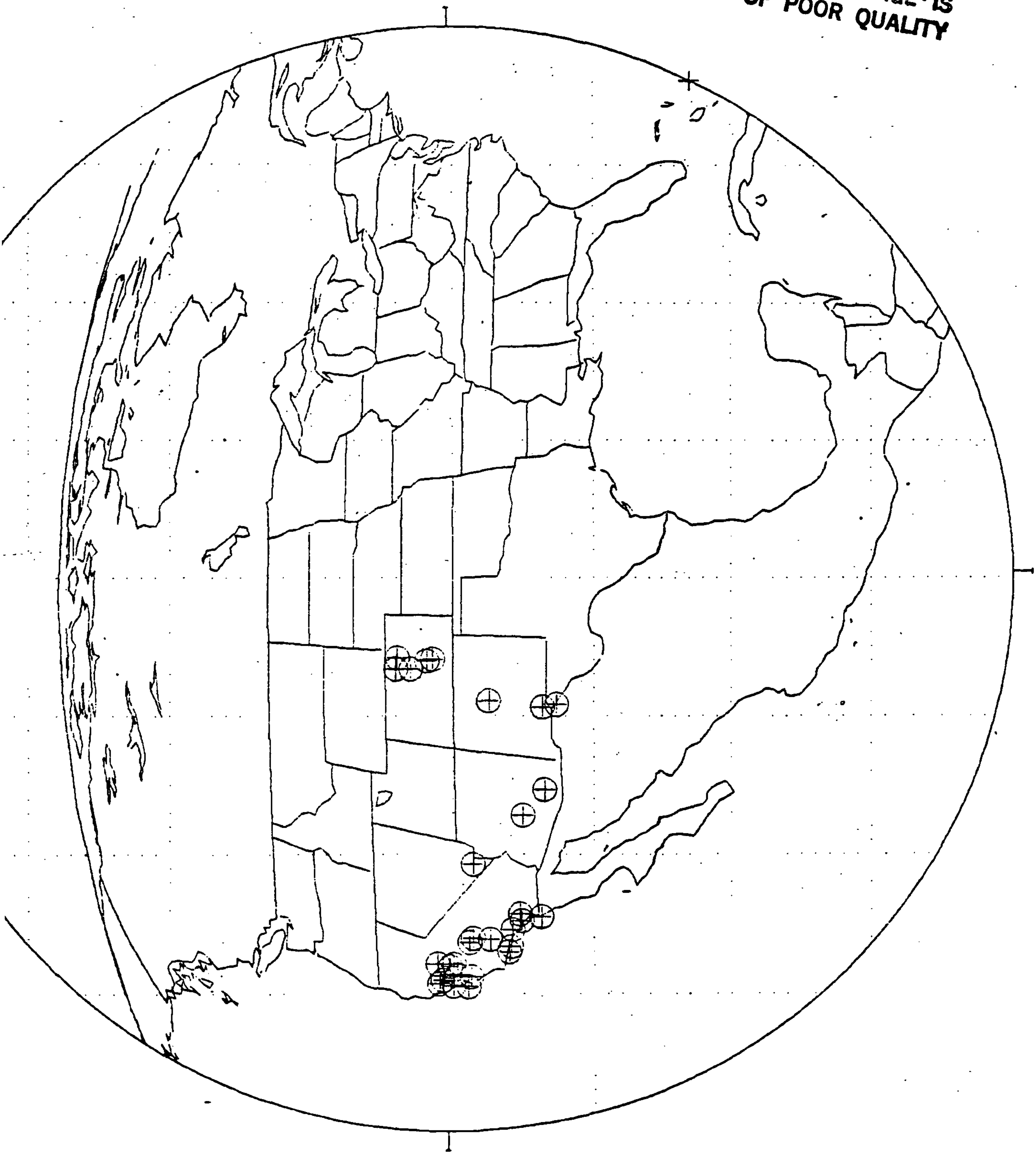

CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 7 OF KU BAND
03/26/85 14.344

C-4

Ford Aerospace & Communications Corporation

Ku-Band Beam Coverages
Page 8

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
8	ABTX	ABILENE TX	32.27	99.45
8	AMTX	AMARILLO TX	35.14	101.50
8	AUTX	AUSTIN TX	30.18	97.47
8	BETX	BEAUMONT-PORT ARTHUR-ORANGE TX	30.04	94.06
8	BRTX	BROWNSVILLE-HARLINGEN-SAN BENI TX	25.54	97.30
8	BYTX	BRYAN-COLLEGE STATION TX	30.41	96.24
8	COTX	CORPUS CHRISTITX	27.47	97.26
8	DATX	DALLAS-FORT WORTH TX	32.47	96.48
8	GATX	GALVESTON-TEXAS CITY TX	29.17	94.48
8	HOTX	HOUSTON TX	29.45	95.25
8	JOMO	JOPLIN MO	37.04	94.31
8	KITX	KILLEEN-TEMPLE TX	31.08	97.44
8	LATX	LAREDO TX	27.32	99.22
8	LOTX	LONGVIEW TX	32.30	94.45
8	LUTX	LUBBOCK TX	33.35	101.53
8	MCTX	MCALLEN-PHARR-EDINBURG TX	26.13	98.15
8	MITX	MIDLAND TX	32.00	102.09
8	ODTX	ODESSA TX	31.50	102.23
8	OKOK	OKLAHOMA CITY OK	35.28	97.33
8	SATX	SAN ANGELO TX	31.28	100.28
8	SNTX	SAN ANTONIO TX	29.25	98.30
8	SHTX	SHERMON-DENISON TX	33.39	96.35
8	SPMO	SPRINGFIELD MO	37.11	93.19
8	TETX	TEXARKANA TX-AR	33.28	94.02
8	TUOK	TULSA OK	36.07	95.58
8	TYTX	TYLER TX	32.22	95.18
8	VITX	VICTORIA TX	28.49	97.01
8	WATX	WACO TX	31.33	97.10
8	WITX	WICHITA FALLS TX	33.55	98.30

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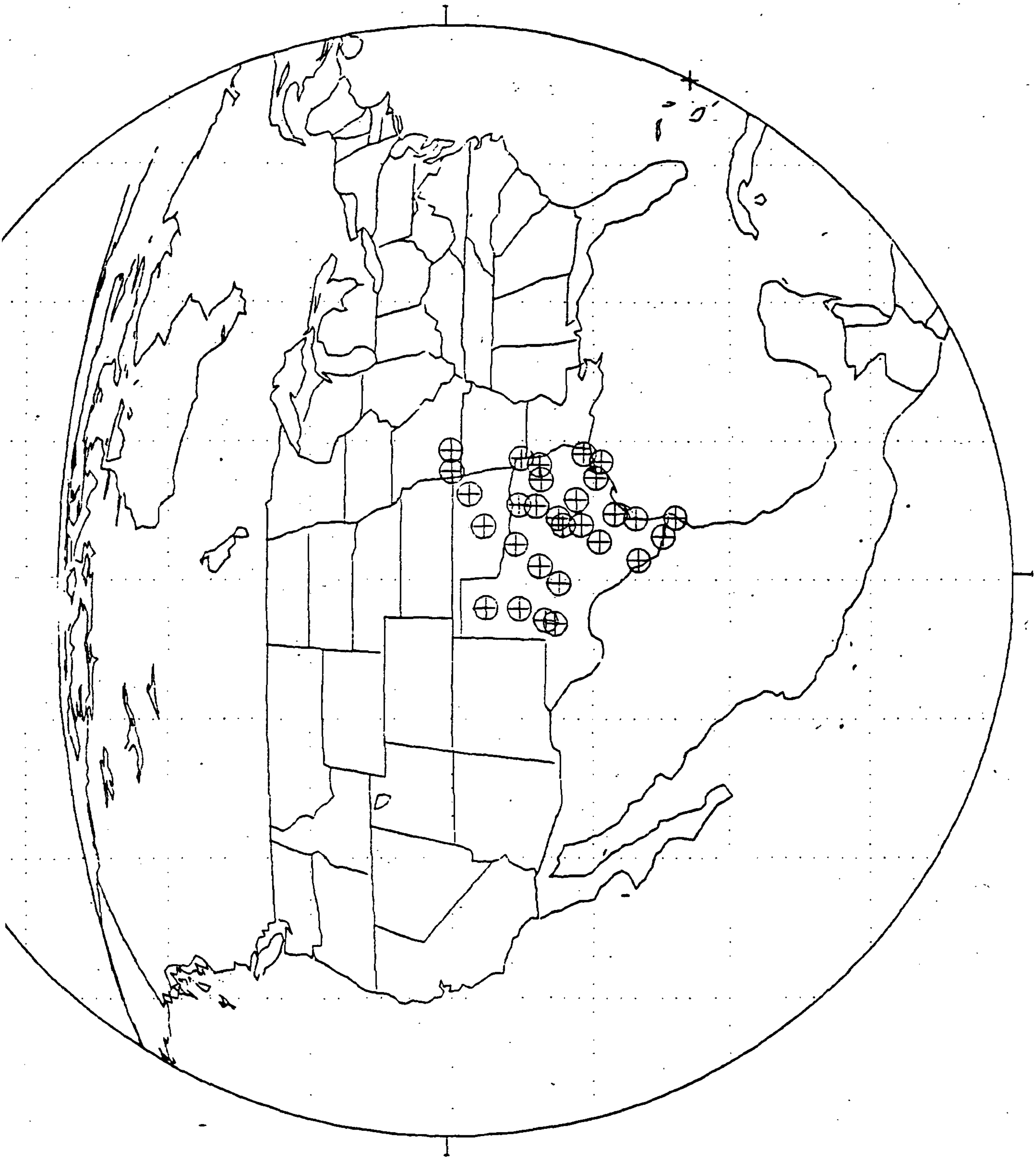
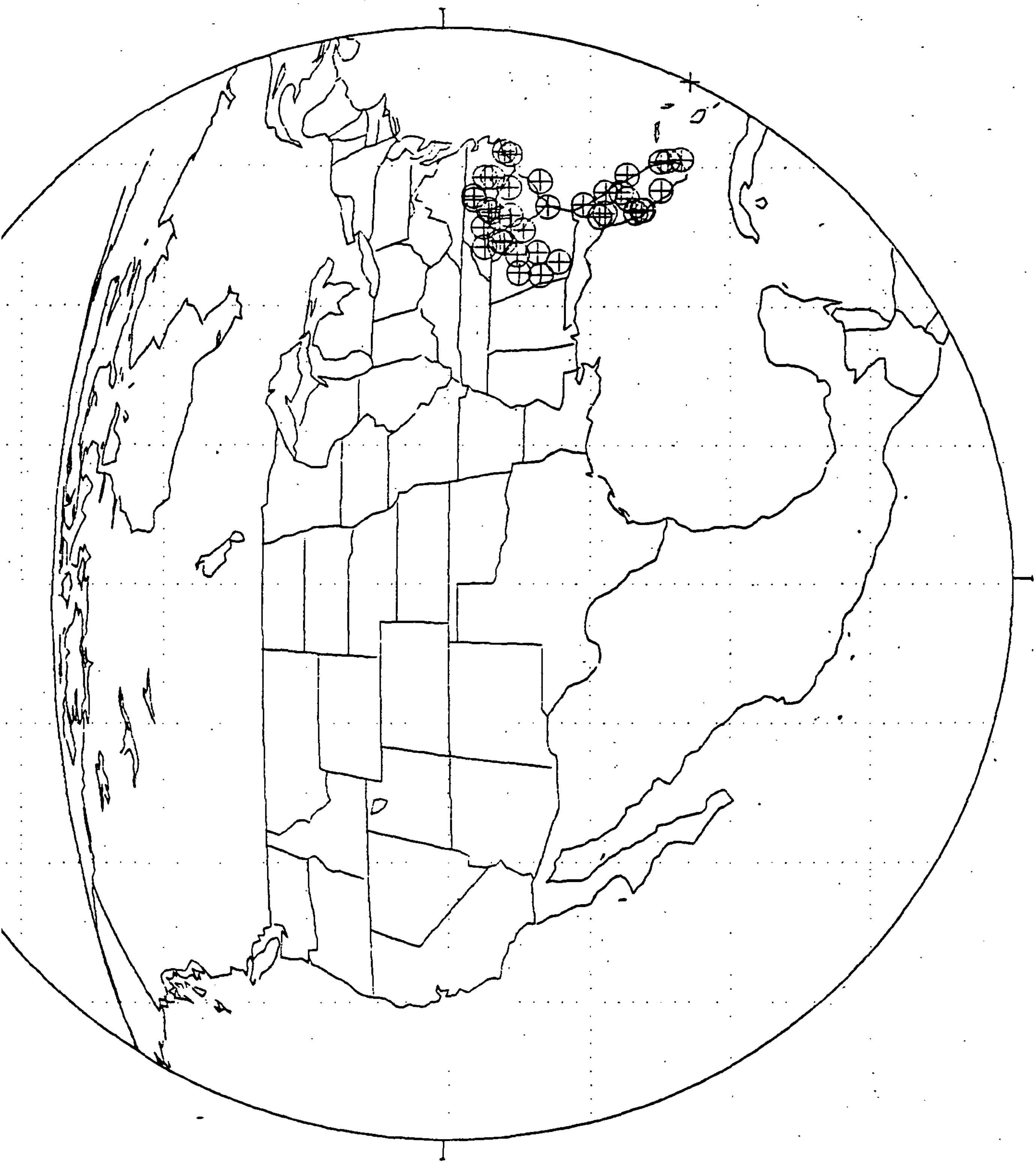


CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 8 OF KU BAND
03/26/85 14.350

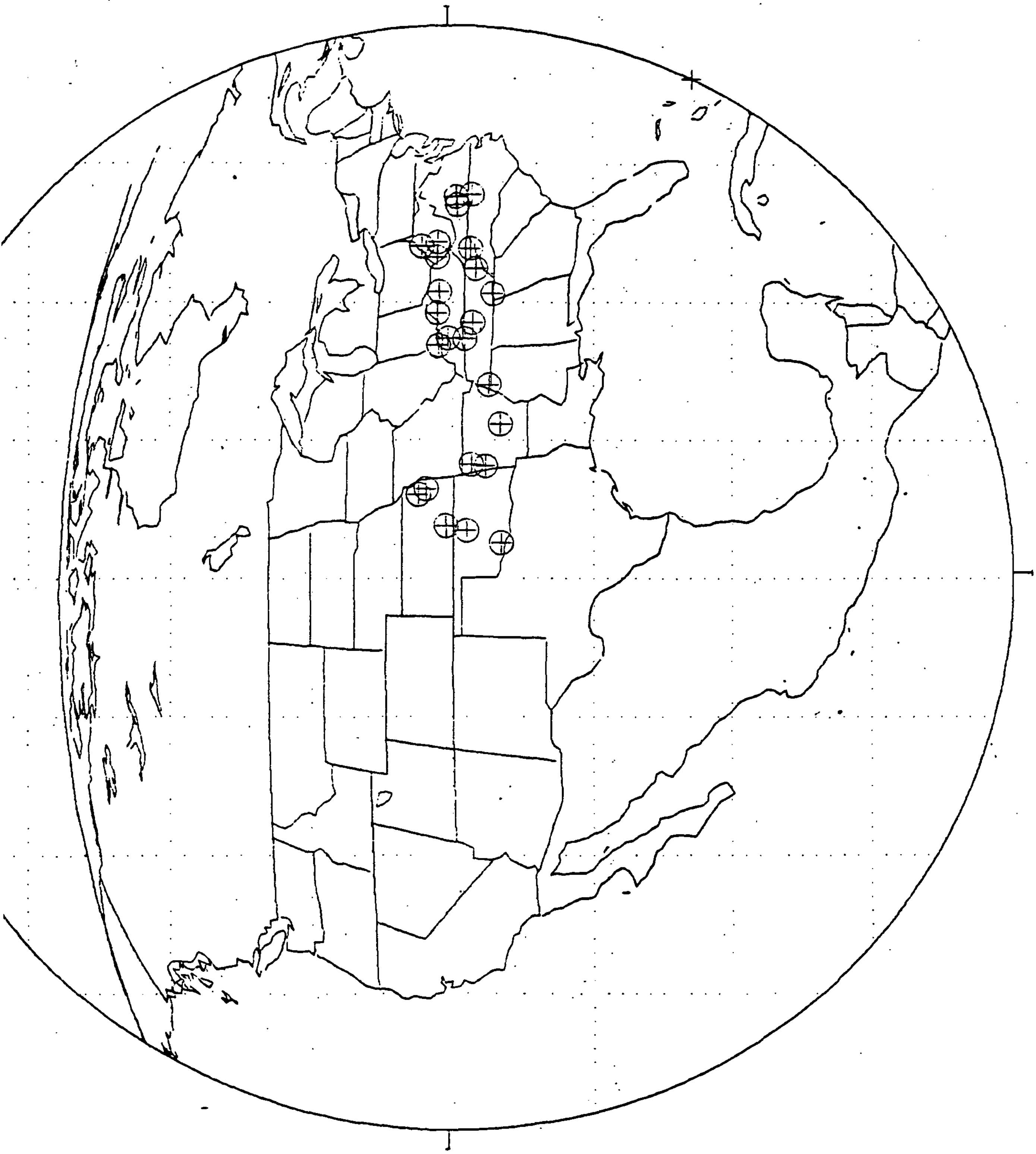
	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
9	ALGA	ALBANY GA	31.37	84.10
9	ANSC	ANDERSON SC	34.30	82.39
9	ASNC	ASHEVILLE NC	35.35	82.35
9	ATGE	ATHENS GE	33.57	83.24
9	ATGA	ATLANTA GA	33.45	84.23
9	AUGA	AUGUSTA GA-SC	33.29	82.00
9	BRFL	BRADENTON FL	27.29	82.33
9	BUNC	BURLINGTON NC	36.05	79.27
9	CHSC	CHARLESTON -NORTH CHARLESTON SC	32.48	79.58
9	CHNC	CHARLOTTE-GASTONIA NC	35.03	80.50
9	COSC	COLUMBIA SC	34.00	81.00
9	COGA	COLUMBUS GA-AL	32.28	84.59
9	DAFL	DAYTONA BEACH FL	29.11	81.01
9	FANC	FAYETTEVILLE NC	35.05	78.53
9	FOSC	FORENCE SC	34.12	79.44
9	FOFL	FORT LAUDERDALE-HOLLYWOOD FL	26.08	80.08
9	FRFL	FORT MYERS FL	26.39	81.51
9	GAFL	GAINESVILLE FL	29.37	82.21
9	GRNC	GREENSBORO-WINSTON -SALEM-HIGH NC	36.03	79.50
9	GRSC	GREENVILLE-SPARTANBURG SC	34.52	82.25
9	HINC	HICKORY NC	35.44	81.23
9	JAFL	JACKSONVILLE FL	30.20	81.40
9	JANC	JACKSONVILLE NC	34.45	77.26
9	LAFL	LAKELAND-WINTER HAVEN FL	28.02	81.59
9	MAGA	MACON GA	32.49	83.37
9	MEFL	MELBOURNE-TITUSVILLE-COCOA FL	28.04	80.38
9	MIFL	MIAMI FL	25.45	80.15
9	OCFL	OCALA FL	29.11	82.09
9	ORFL	ORLANDO FL	28.33	81.21
9	RANC	RALEIGH-DURHAM NC	35.46	78.39
9	ROSC	ROCK HILL SC	34.55	81.01
9	SANC	SALISBURY-CONCORD NC	35.20	80.30
9	SAFL	SARASOTA FL	27.20	82.32
9	SAGA	SAVANNAH GA	32.04	81.07
9	TMFL	TAMPA-ST PETERSBURG FL	27.58	82.38
9	WEFL	WEST PALM BEACH-BOCA RATON FL	26.42	80.05
9	WINC	WILMINGTON NC	34.14	77.55



CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 9 OF KU BAND
03/26/85 14.357

Ku-Band Beam Coverages (UNCOVERED SMSA's)
Page 10

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
0	CHWV	CHARLESTON WV	38.23	81.40
0	CHTN	CHATTANOOGA TN-GA	35.02	85.18
0	CLTN	CLARKSVILLE-HOPKINSVILLE TN-KY	36.50	87.30
0	DAVA	DANVILLE V	36.34	79.25
0	ENOK	ENID OK	36.24	97.54
0	EVIN	EVANSVILLE IN-KY	38.00	87.33
0	FAAR	FAYETTEVILLE-SPRINGDALE AR	36.03	94.10
0	FOAR	FORT SMITH AR-OK	35.22	94.27
0	HUWV	HUNTINGTON-ASHLAND WV-KY	38.24	82.26
0	JOTN	JOHNSON CITY-KINGSPORT-BRISTOL TN-VA	36.33	82.34
0	KNTN	KNOXVILLE TN	36.00	83.57
0	LAKS	LAWRENCE KS	38.58	95.15
0	LAOK	LAWTON OK	34.36	98.25
0	LEKY	LEXINGTON-FAYETTE KY	38.02	84.30
0	LIAR	LITTLE ROCK-NORTH LITTLE ROCK AR	34.42	92.17
0	LOKY	LOUISVILLE KY-IN	38.13	85.48
0	LYVA	LYNCHBURG VA	37.24	79.09
0	METN	MEMPHIS TN-AR	35.10	90.00
0	NATN	NASHVILLE-DAVIDSON TN	36.10	86.50
0	OWKY	OWENSBORO KY	37.45	87.05
0	PAWV	PARKERSBURG-MARIETTA WV-OH	39.17	81.33
0	ROVA	ROANOKE VA	37.15	79.58
0	TOKS	TOPEKA KS	39.02	95.41
0	WIKS	WICHITA KS	37.43	97.20



CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 0 OF KU BAND

03/26/85 14.365 (UNCOVERED AREA)

I-1.3 Ku-Band Beam To Beam (No Broadcast Video)

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Beam to Beam Matrix
Analog Voice and Data -- Scenario V
(HVC or KB/S)

Class = ANVK

From:
To:

NE-AC								
	NE-AC 3142	W-MW 11962	SE-GC 6909	NE-NYC 1807				
	E-MW1 8177	NW-PC 7249	SW-PC 8359	SW-GC 7646				
	SE-AC 12811	B2-NE 3460	B3-MW 3517	B4-W 368				
	E-MW2 4126							
W-MW								
	NE-AC 11962	W-MW 916	SE-GC 5148	NE-NYC 9934				
	E-MW1 3668	NW-PC 4888	SW-PC 7559	SW-GC 6676				
	SE-AC 9153	B2-NE 2580	B3-MW 2098	B4-W 316				
	E-MW2 411							
SE-GC								
	NE-AC 6909	W-MW 5148	SE-GC 416	NE-NYC 5856				
	E-MW1 5399	NW-PC 3318	SW-PC 5017	SW-GC 4216				
	SE-AC 5824	B2-NE 1745	B3-MW 1099	B4-W 188				
	E-MW2 1676							
NE-NYC								
	NE-AC 1807	W-MW 9934	SE-GC 5856	E-MW1 12558				
	NW-PC 6395	SW-PC 7220	SW-GC 6589	SE-AC 13694				
	B2-NE 4473	B3-MW 2904	B4-W 329	E-MW2 3940				
E-MW1								
	NE-AC 8177	W-MW 3668	SE-GC 5399	NE-NYC 12558				
	NW-PC 6107	SW-PC 6545	SW-GC 6282	SE-AC 9799				
	B2-NE 1047	B3-MW 2643	B4-W 312					
NW-PC								
	NE-AC 7249	W-MW 4888	SE-GC 3318	NE-NYC 6395				
	E-MW1 6107	NW-PC 4694	SW-PC 10466	SW-GC 5395				
	SE-AC 5690	B2-NE 2046	B3-MW 1915	B4-W 238				
	E-MW2 2001							
SW-PC								
	NE-AC 8359	W-MW 7559	SE-GC 5017	NE-NYC 7220				
	E-MW1 6545	NW-PC 10466	SW-PC 7346	SW-GC 8720				
	SE-AC 7583	B2-NE 2541	B3-MW 2690	B4-W 490				
	E-MW2 2382							
SW-GC								
	NE-AC 7646	W-MW 6676	SE-GC 4216	NE-NYC 6589				
	E-MW1 6282	NW-PC 5395	SW-PC 8720	SW-GC 2708				
	SE-AC 7802	B2-NE 2529	B3-MW 2009	B4-W 126				
	E-MW2 2184							
SE-AC								

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	NE-AC	12811	W-MW	9153	SE-GC	5824	NE-NYC	13694
	E-MW1	9799	NW-PC	5690	SW-PC	7583	SW-GC	7802
	SE-AC	6146	B2-NE	2261	B3-MW	2852	B4-W	325
	E-MW2	3459						
B1-NE								
B2-NE								
	NE-AC	3460	W-MW	2580	SE-GC	1745	NE-NYC	4473
	E-MW1	1047	NW-PC	2046	SW-PC	2541	SW-GC	2529
	SE-AC	2261	B2-NE	36	B3-MW	697	B4-W	111
	E-MW2	312						
B3-MW								
	NE-AC	3517	W-MW	2098	SE-GC	1099	NE-NYC	2904
	E-MW1	2643	NW-PC	1915	SW-PC	2690	SW-GC	2009
	SE-AC	2852	B2-NE	697	B3-MW	348	B4-W	66
	E-MW2	665						
B4-W								
	NE-AC	368	W-MW	316	SE-GC	188	NE-NYC	329
	E-MW1	312	NW-PC	238	SW-PC	490	SW-GC	126
	SE-AC	325	B2-NE	111	B3-MW	66	E-MW2	93
E-MW2								
	NE-AC	4126	W-MW	411	SE-GC	1676	NE-NYC	3940
	NW-PC	2001	SW-PC	2382	SW-GC	2184	SE-AC	3459
	B2-NE	312	B3-MW	665	B4-W	93		

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Class = DATA

From:
To:

NE-AC								
	NE-AC	2774	W-MW	10538	SE-GC	6093	NE-NYC	1592
	E-MW1	7202	NW-PC	6398	SW-PC	7364	SW-GC	6735
	SE-AC	11283	B2-NE	3047	B3-MW	3095	B4-W	322
	E-MW2	3634						
W-MW								
	NE-AC	10538	W-MW	806	SE-GC	4536	NE-NYC	8752
	E-MW1	3230	NW-PC	4305	SW-PC	6654	SW-GC	5882
	SE-AC	8057	B2-NE	2274	B3-MW	1851	B4-W	277
	E-MW2	363						
SE-GC								
	NE-AC	6093	W-MW	4536	SE-GC	366	NE-NYC	5160
	E-MW1	4756	NW-PC	2924	SW-PC	4418	SW-GC	3716
	SE-AC	5130	B2-NE	1536	B3-MW	972	B4-W	167
	E-MW2	1479						
NE-NYC								
	NE-AC	1592	W-MW	8752	SE-GC	5160	E-MW1	11057
	NW-PC	5628	SW-PC	6356	SW-GC	5805	SE-AC	12058

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	B2-NE	3936	B3-MW	2558	B4-W	290	E-MW2	3469
E-MW1								
	NE-AC	7202	W-MW	3230	SE-GC	4756	NE-NYC	11057
	NW-PC	5388	SW-PC	5768	SW-GC	5532	SE-AC	8631
	B2-NE	922	B3-MW	2328	B4-W	275		
NW-PC								
	NE-AC	6398	W-MW	4305	SE-GC	2924	NE-NYC	5628
	E-MW1	5388	NW-PC	4134	SW-PC	9216	SW-GC	4761
	SE-AC	5020	B2-NE	1803	B3-MW	1688	B4-W	212
	E-MW2	1760						
SW-PC								
	NE-AC	7364	W-MW	6654	SE-GC	4418	NE-NYC	6356
	E-MW1	5768	NW-PC	9216	SW-PC	6472	SW-GC	7686
	SE-AC	6682	B2-NE	2236	B3-MW	2371	B4-W	431
	E-MW2	2099						
SW-GC								
	NE-AC	6735	W-MW	5882	SE-GC	3716	NE-NYC	5805
	E-MW1	5532	NW-PC	4761	SW-PC	7686	SW-GC	2382
	SE-AC	6873	B2-NE	2228	B3-MW	1768	B4-W	111
	E-MW2	1922						
SE-AC								
	NE-AC	11283	W-MW	8057	SE-GC	5130	NE-NYC	12058
	E-MW1	8631	NW-PC	5020	SW-PC	6682	SW-GC	6873
	SE-AC	5414	B2-NE	1990	B3-MW	2511	B4-W	284
	E-MW2	3046						
B1-NE								
B2-NE								
	NE-AC	3047	W-MW	2274	SE-GC	1536	NE-NYC	3936
	E-MW1	922	NW-PC	1803	SW-PC	2236	SW-GC	2228
	SE-AC	1990	B2-NE	32	B3-MW	612	B4-W	97
	E-MW2	276						
B3-MW								
	NE-AC	3095	W-MW	1851	SE-GC	972	NE-NYC	2558
	E-MW1	2328	NW-PC	1688	SW-PC	2371	SW-GC	1768
	SE-AC	2511	B2-NE	612	B3-MW	306	B4-W	58
	E-MW2	586						
B4-W								
	NE-AC	322	W-MW	277	SE-GC	167	NE-NYC	290
	E-MW1	275	NW-PC	212	SW-PC	431	SW-GC	111
	SE-AC	284	B2-NE	97	B3-MW	58	E-MW2	82
E-MW2								
	NE-AC	3634	W-MW	363	SE-GC	1479	NE-NYC	3469
	NW-PC	1760	SW-PC	2099	SW-GC	1922	SE-AC	3046
	B2-NE	276	B3-MW	586	B4-W	82		

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SUMMARY

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	ANVK	DATA
NE-AC	79533	70077
W-MW	65309	57525
SE-GC	46811	41253
NE-NYC	75699	66661
E-MW1	62537	55089
NW-PC	60402	53237
SW-PC	76918	67753
SW-GC	62882	55401
SE-AC	87399	76979
B1-NE	0	0
B2-NE	23838	20989
B3-MW	23503	20704
B4-W	2962	2606
E-MW2	21249	18716
Totals	689042	606990

I-1.4 Transponder Loading (No Broadcast Video)

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Ku Transponder Loading
Analog Voice and Data -- Scenario V
(No Broadcast Video)

From	To	Channel	Class	Circuits
NE-AC	SE-GC	V-1	ANVK	6000
NE-AC	SW-PC	V-2	ANVK	6000
NE-AC	W-MW	V-3	ANVK	6000
NE-AC	SW-GC	V-4	ANVK	6000
NE-AC	W-MW	V-5	ANVK	5962
NE-AC	SE-AC	V-6	ANVK	6000
NE-AC	NW-PC	V-7	ANVK	6000
NE-AC	SW-PC	V-8A	ANVK	2000
NE-AC	NW-PC	V-8B	ANVK	1644
NE-AC	NE-NYC	V-8C	ANVK	1807
NE-AC	NE-AC	V-9A	ANVK	3000
NE-AC	SE-AC	V-9B	ANVK	3000
NE-AC	SS	V-10	DATA	63613
NE-AC	E-MW1	V-11	ANVK	6000
NE-AC	E-MW1	V-12	ANVK	6000
W-MW	SE-AC	V-1	ANVK	6000
W-MW	SW-GC	V-2	ANVK	6000
W-MW	NE-AC	V-3	ANVK	6000
W-MW	SE-GC	V-4	ANVK	5148
W-MW	NE-AC	V-5	ANVK	5962
W-MW	NE-NYC	V-6	ANVK	6000
W-MW	SW-PC	V-7	ANVK	6000
W-MW	W-MW	V-8A	ANVK	916
W-MW	NE-NYC	V-8B	ANVK	2000
W-MW	SE-AC	V-8C	ANVK	2000
W-MW	NE-NYC	V-9A	ANVK	1934
W-MW	E-MW1	V-9B	ANVK	3000
W-MW	SS	V-10	DATA	53123
W-MW	NW-PC	V-11	ANVK	4888
W-MW	SW-PC	V-12	ANVK	1559
SE-GC	NE-AC	V-1	ANVK	6000
SE-GC	SE-AC	V-2	ANVK	5824
SE-GC	NE-NYC	V-3	ANVK	5856
SE-GC	W-MW	V-4	ANVK	5148
SE-GC	E-MW1	V-5	ANVK	6000
SE-GC	SW-PC	V-6	ANVK	5017
SE-GC		V-7		
SE-GC	NW-PC	V-8A	ANVK	2000
SE-GC	SE-GC	V-8B	ANVK	416
SE-GC		V-8C		
SE-GC	NW-PC	V-9A	ANVK	1318

SE-GC		V-9B		
SE-GC	SS	V-10	DATA	38578
SE-GC	SW-GC	V-11	ANVK	4216
SE-GC		V-12		
NE-NYC	E-MW1	H-1	ANVK	6000
NE-NYC	E-MW1	H-2	ANVK	6000
NE-NYC	SE-GC	H-3	ANVK	5856
NE-NYC	NW-PC	H-4	ANVK	6000
NE-NYC	SW-PC	H-5	ANVK	6000
NE-NYC	W-MW	H-6	ANVK	6000
NE-NYC	SW-GC	H-7	ANVK	6000
NE-NYC	E-MW1	H-8A	ANVK	2000
NE-NYC	W-MW	H-8B	ANVK	2000
NE-NYC	NE-AC	H-8C	ANVK	1807
NE-NYC	W-MW	H-9A	ANVK	1934
NE-NYC	SW-GC	H-9B	ANVK	589
NE-NYC	SS	H-10	DATA	59683
NE-NYC	SE-AC	H-11	ANVK	6000
NE-NYC	SE-AC	H-12	ANVK	6000
E-MW1	NE-NYC	H-1	ANVK	6000
E-MW1	NE-NYC	H-2	ANVK	6000
E-MW1	NW-PC	H-3	ANVK	6000
E-MW1	SW-PC	H-4	ANVK	6000
E-MW1	SE-GC	H-5	ANVK	6000
E-MW1	SW-GC	H-6	ANVK	6000
E-MW1	SE-AC	H-7	ANVK	6000
E-MW1	NE-NYC	H-8A	ANVK	2000
E-MW1	SE-AC	H-8B	ANVK	2000
E-MW1	NW-PC	H-8C	ANVK	2000
E-MW1	SE-AC	H-9A	ANVK	3000
E-MW1	W-MW	H-9B	ANVK	3000
E-MW1	SS	H-10	DATA	69336
E-MW1	NE-AC	H-11	ANVK	6000
E-MW1	NE-AC	H-12	ANVK	6000
NW-PC	SW-PC	H-1	ANVK	6000
NW-PC	NW-PC	H-2	ANVK	4694
NW-PC	E-MW1	H-3	ANVK	6000
NW-PC	NE-NYC	H-4	ANVK	6000
NW-PC	SE-AC	H-5	ANVK	5690
NW-PC		H-6		
NW-PC	NE-AC	H-7	ANVK	6000
NW-PC	SE-GC	H-8A	ANVK	2000
NW-PC	NE-AC	H-8B	ANVK	1644
NW-PC	E-MW1	H-8C	ANVK	2000
NW-PC	SE-GC	H-9A	ANVK	1318
NW-PC	SW-PC	H-9B	ANVK	3000
NW-PC	SS	H-10	DATA	49534
NW-PC	W-MW	H-11	ANVK	4888
NW-PC	SW-GC	H-12	ANVK	5395
SW-PC	NW-PC	V-1	ANVK	6000

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SW-PC	NE-AC	V-2	ANVK	6000
SW-PC	SE-AC	V-3	ANVK	6000
SW-PC	E-MW1	V-4	ANVK	6000
SW-PC	NE-NYC	V-5	ANVK	6000
SW-PC	SE-GC	V-6	ANVK	5017
SW-PC	W-MW	V-7	ANVK	6000
SW-PC	NE-AC	V-8A	ANVK	2000
SW-PC	SW-GC	V-8B	ANVK	2000
SW-PC	SW-GC	V-8C	ANVK	2000
SW-PC	SW-GC	V-9A	ANVK	3000
SW-PC	NW-PC	V-9B	ANVK	3000
SW-PC	SS	V-10	DATA	62715
SW-PC	SW-PC	V-11	ANVK	6000
SW-PC	W-MW	V-12	ANVK	1559
SW-GC	SW-GC	H-1	ANVK	2708
SW-GC	W-MW	H-2	ANVK	6000
SW-GC		H-3		
SW-GC	NE-AC	H-4	ANVK	6000
SW-GC		H-5		
SW-GC	E-MW1	H-6	ANVK	6000
SW-GC	NE-NYC	H-7	ANVK	6000
SW-GC	SE-AC	H-8A	ANVK	2000
SW-GC	SW-PC	H-8B	ANVK	2000
SW-GC	SW-PC	H-8C	ANVK	2000
SW-GC	SW-PC	H-9A	ANVK	3000
SW-GC	NE-NYC	H-9B	ANVK	589
SW-GC	SS	H-10	DATA	51294
SW-GC	SE-GC	H-11	ANVK	4216
SW-GC	NW-PC	H-12	ANVK	5395
SE-AC	W-MW	H-1	ANVK	6000
SE-AC	SE-GC	H-2	ANVK	5824
SE-AC	SW-PC	H-3	ANVK	6000
SE-AC	SE-AC	H-4	ANVK	6000
SE-AC	NW-PC	H-5	ANVK	5690
SE-AC	NE-AC	H-6	ANVK	6000
SE-AC	E-MW1	H-7	ANVK	6000
SE-AC	SW-GC	H-8A	ANVK	2000
SE-AC	E-MW1	H-8B	ANVK	2000
SE-AC	W-MW	H-8C	ANVK	2000
SE-AC	E-MW1	H-9A	ANVK	3000
SE-AC	NE-AC	H-9B	ANVK	3000
SE-AC	SS	H-10	DATA	72000
SE-AC	NE-NYC	H-11	ANVK	6000
SE-AC	NE-NYC	H-12	ANVK	6000

Totals

ANVK	:	519428
DATA	:	519876

I-1.5 Ku-Band Beam To Beam Overflow To C-Band

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Beam to Beam Matrix
Overflow from Ku Beams
Scenario V

Class = ANVK

From:
To:

NE-AC								
	NE-AC	142	SE-GC	909	E-MW1	303	SW-PC	1579
	SW-GC	1646	SE-AC	3811	B2-NE	3460	B3-MW	3517
	B4-W	368						
W-MW								
	E-MW1	1079	SW-GC	676	SE-AC	1153	B2-NE	2580
	B3-MW	2098	B4-W	316				
SE-GC								
	NE-AC	909	E-MW1	1075	B2-NE	1745	B3-MW	1099
	B4-W	188						
NE-NYC								
	E-MW1	2498	SE-AC	1694	B2-NE	4473	B3-MW	2904
	B4-W	329						
E-MW1								
	NE-AC	303	W-MW	1079	SE-GC	1075	NE-NYC	2498
	NW-PC	108	SW-PC	2927	SW-GC	2466	SE-AC	2258
	B2-NE	1047	B3-MW	2643	B4-W	312		
NW-PC								
	E-MW1	108	SW-PC	1466	B2-NE	2046	B3-MW	1915
	B4-W	238						
SW-PC								
	NE-AC	1579	E-MW1	2927	NW-PC	1466	SW-PC	1346
	SW-GC	1720	SE-AC	1583	B2-NE	2541	B3-MW	2690
	B4-W	490						
SW-GC								
	NE-AC	1646	W-MW	676	E-MW1	2466	SW-PC	1720
	SE-AC	5802	B2-NE	2529	B3-MW	2009	B4-W	126
SE-AC								
	NE-AC	3811	W-MW	1153	NE-NYC	1694	E-MW1	2258
	SW-PC	1583	SW-GC	5802	SE-AC	146	B2-NE	2261
	B3-MW	2852	B4-W	325				
B1-NE								
B2-NE								
	NE-AC	3460	W-MW	2580	SE-GC	1745	NE-NYC	4473
	E-MW1	1047	NW-PC	2046	SW-PC	2541	SW-GC	2529
	SE-AC	2261	B2-NE	36	B3-MW	697	B4-W	111
	E-MW2	312						
B3-MW								
	NE-AC	3517	W-MW	2098	SE-GC	1099	NE-NYC	2904

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         E-MW1    2643   NW-PC    1915   SW-PC    2690   SW-GC    2009
         SE-AC    2852   B2-NE     697   B3-MW     348    B4-W      66
         E-MW2     665
  B4-W
         NE-AC     368    W-MW     316   SE-GC     188  NE-NYC     329
         E-MW1     312   NW-PC     238   SW-PC     490   SW-GC     126
         SE-AC     325   B2-NE     111   B3-MW      66   E-MW2      93
 E-MW2
         B2-NE     312   B3-MW     665    B4-W      93

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Class =   DATA

From:
         To:

 NE-AC
         B2-NE    3047   B3-MW    3095    B4-W     322
  W-MW
         B2-NE    2274   B3-MW    1851    B4-W     277
 SE-GC
         B2-NE    1536   B3-MW     972    B4-W     167
NE-NYC
         SE-AC     194   B2-NE    3936   B3-MW    2558    B4-W     290
 E-MW1
         B2-NE     922   B3-MW    2328    B4-W     275
 NW-PC
         B2-NE    1803   B3-MW    1688    B4-W     212
 SW-PC
         B2-NE    2236   B3-MW    2371    B4-W     431
 SW-GC
         B2-NE    2228   B3-MW    1768    B4-W     111
 SE-AC
        NE-NYC     194   B2-NE    1990   B3-MW    2511    B4-W     284
 B1-NE
 B2-NE
         NE-AC    3047    W-MW    2274   SE-GC    1536  NE-NYC    3936
         E-MW1     922   NW-PC    1803   SW-PC    2236   SW-GC    2228
         SE-AC    1990   B2-NE      32   B3-MW     612    B4-W      97
         E-MW2     276
 B3-MW
         NE-AC    3095    W-MW    1851   SE-GC     972  NE-NYC    2558
         E-MW1    2328   NW-PC    1688   SW-PC    2371   SW-GC    1768
         SE-AC    2511   B2-NE     612   B3-MW     306    B4-W      58
         E-MW2     586
  B4-W
         NE-AC     322    W-MW     277   SE-GC     167  NE-NYC     290
         E-MW1     275   NW-PC     212   SW-PC     431   SW-GC     111
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E-MW2	SE-AC	284	B2-NE	97	B3-MW	58	E-MW2	82
	B2-NE	276	B3-MW	586	B4-W	82		

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SUMMARY

	ANVK	DATA
NE-AC	15735	6464
W-MW	7902	4402
SE-GC	5016	2675
NE-NYC	11898	6978
E-MW1	16716	3525
NW-PC	5773	3703
SW-PC	16342	5038
SW-GC	16974	4107
SE-AC	21885	4979
B1-NE	0	0
B2-NE	23838	20989
B3-MW	23503	20704
B4-W	2962	2606
E-MW2	1070	944
Totals	169614	87114

I-1.6 Ku-Band Beam To Beam (With Broadcast Video)

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Beam to Beam Matrix
Overflow from Ku Beams
Scenario V
(Broadcast Video)

Class = ANVK

From:	To:							
NE-AC	SE-AC	849	B2-NE	2659	B3-MW	2703	B4-W	283
W-MW	E-MW1	137	B2-NE	1985	B3-MW	1614	B4-W	243
SE-GC	B2-NE	1339	B3-MW	846	B4-W	145		
NE-NYC	B2-NE	3438	B3-MW	2233	B4-W	252		
E-MW1	W-MW	137	SW-PC	870	SW-GC	513	B2-NE	805
	B3-MW	2033	B4-W	240				
NW-PC	B2-NE	1574	B3-MW	1469	B4-W	183		
SW-PC	E-MW1	870	B2-NE	1952	B3-MW	2071	B4-W	377
SW-GC	E-MW1	513	SE-AC	4001	B2-NE	1948	B3-MW	1544
	B4-W	97						
SE-AC	NE-AC	849	SW-GC	4001	B2-NE	1735	B3-MW	2194
	B4-W	249						
B1-NE								
B2-NE	NE-AC	2659	W-MW	1985	SE-GC	1339	NE-NYC	3438
	E-MW1	805	NW-PC	1574	SW-PC	1952	SW-GC	1948
	SE-AC	1735	B2-NE	28	B3-MW	535	B4-W	85
	E-MW2	241						
B3-MW	NE-AC	2703	W-MW	1614	SE-GC	846	NE-NYC	2233
	E-MW1	2033	NW-PC	1469	SW-PC	2071	SW-GC	1544
	SE-AC	2194	B2-NE	535	B3-MW	268	B4-W	51
	E-MW2	512						
B4-W	NE-AC	283	W-MW	243	SE-GC	145	NE-NYC	252
	E-MW1	240	NW-PC	183	SW-PC	377	SW-GC	97
	SE-AC	249	B2-NE	85	B3-MW	51	E-MW2	71
E-MW2	B2-NE	241	B3-MW	512	B4-W	71		

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****

Class = DATA

From:
To:

NE-AC								
	B2-NE	2344	B3-MW	2382	B4-W	249		
W-MW								
	B2-NE	1748	B3-MW	1421	B4-W	213		
SE-GC								
	B2-NE	1183	B3-MW	744	B4-W	128		
NE-NYC								
	B2-NE	3030	B3-MW	1971	B4-W	222		
E-MW1								
	B2-NE	709	B3-MW	1791	B4-W	212		
NW-PC								
	B2-NE	1390	B3-MW	1299	B4-W	162		
SW-PC								
	B2-NE	1722	B3-MW	1821	B4-W	332		
SW-GC								
	B2-NE	1715	B3-MW	1361	B4-W	86		
SE-AC								
	B2-NE	1531	B3-MW	1934	B4-W	218		
B1-NE								
B2-NE								
	NE-AC	2344	W-MW	1748	SE-GC	1183	NE-NYC	3030
	E-MW1	709	NW-PC	1390	SW-PC	1722	SW-GC	1715
	SE-AC	1531	B2-NE	24	B3-MW	472	B4-W	74
	E-MW2	212						
B3-MW								
	NE-AC	2382	W-MW	1421	SE-GC	744	NE-NYC	1971
	E-MW1	1791	NW-PC	1299	SW-PC	1821	SW-GC	1361
	SE-AC	1934	B2-NE	472	B3-MW	234	B4-W	45
	E-MW2	450						
B4-W								
	NE-AC	249	W-MW	213	SE-GC	128	NE-NYC	222
	E-MW1	212	NW-PC	162	SW-PC	332	SW-GC	86
	SE-AC	218	B2-NE	74	B3-MW	45	E-MW2	63
E-MW2								
	B2-NE	212	B3-MW	450	B4-W	63		

****

SUMMARY

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	ANVK	DATA
NE-AC	6494	4975
W-MW	3979	3382
SE-GC	2330	2055
NE-NYC	5923	5223
E-MW1	4598	2712
NW-PC	3226	2851
SW-PC	5270	3875
SW-GC	8103	3162
SE-AC	9028	3683
B1-NE	0	0
B2-NE	18324	16154
B3-MW	18073	15925
B4-W	2276	2004
E-MW2	824	725
Totals	88448	66726

I-1.7 Transponder Loading (Including Broadcast Video)

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Ku Transponder Loading
Analog Voice and Data -- Scenario V
(Broadcast Video)

From	To	Channel	Class	Circuits
NE-AC	SE-GC	V-1	ANVK	5317
NE-AC	SW-PC	V-2	ANVK	6000
NE-AC	W-MW	V-3	ANVK	6000
NE-AC	SW-GC	V-4	ANVK	5876
NE-AC	W-MW	V-5	ANVK	3198
NE-AC	SE-AC	V-6	ANVK	6000
NE-AC	NW-PC	V-7	ANVK	5579
NE-AC	SW-PC	V-8A	ANVK	434
NE-AC	NW-PC	V-8B	ANVK	0
NE-AC	NE-NYC	V-8C	ANVK	1391
NE-AC	NE-AC	V-9A	ANVK	2422
NE-AC	SE-AC	V-9B	ANVK	3000
NE-AC	SS	V-10	DATA	48923
NE-AC	E-MW1	V-11	ANVK	6000
NE-AC	E-MW1	V-12	ANVK	3461
W-MW	SE-AC	V-1	ANVK	6000
W-MW	SW-GC	V-2	ANVK	5138
W-MW	NE-AC	V-3	ANVK	6000
W-MW	SE-GC	V-4	ANVK	3963
W-MW	NE-AC	V-5	ANVK	3198
W-MW	NE-NYC	V-6	ANVK	6000
W-MW	SW-PC	V-7	ANVK	5811
W-MW	W-MW	V-8A	ANVK	704
W-MW	NE-NYC	V-8B	ANVK	1643
W-MW	SE-AC	V-8C	ANVK	1042
W-MW	NE-NYC	V-9A	ANVK	0
W-MW	E-MW1	V-9B	ANVK	3000
W-MW	SS	V-10	DATA	40865
W-MW	NW-PC	V-11	ANVK	3753
W-MW	SW-PC	V-12	ANVK	0
SE-GC	NE-AC	V-1	ANVK	5317
SE-GC	SE-AC	V-2	ANVK	4480
SE-GC	NE-NYC	V-3	ANVK	4507
SE-GC	W-MW	V-4	ANVK	3963
SE-GC	E-MW1	V-5	ANVK	5443
SE-GC	SW-PC	V-6	ANVK	3856
SE-GC		V-7		
SE-GC	NW-PC	V-8A	ANVK	2000
SE-GC	SE-GC	V-8B	ANVK	318
SE-GC		V-8C		
SE-GC	NW-PC	V-9A	ANVK	548

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SE-GC		V-9B		
SE-GC	SS	V-10	DATA	29664
SE-GC	SW-GC	V-11	ANVK	3240
SE-GC		V-12		
NE-NYC	E-MW1	H-1	ANVK	6000
NE-NYC	E-MW1	H-2	ANVK	6000
NE-NYC	SE-GC	H-3	ANVK	4507
NE-NYC	NW-PC	H-4	ANVK	4913
NE-NYC	SW-PC	H-5	ANVK	5548
NE-NYC	W-MW	H-6	ANVK	6000
NE-NYC	SW-GC	H-7	ANVK	5069
NE-NYC	E-MW1	H-8A	ANVK	688
NE-NYC	W-MW	H-8B	ANVK	1643
NE-NYC	NE-AC	H-8C	ANVK	1391
NE-NYC	W-MW	H-9A	ANVK	0
NE-NYC	SW-GC	H-9B	ANVK	0
NE-NYC	SS	H-10	DATA	46054
NE-NYC	SE-AC	H-11	ANVK	6000
NE-NYC	SE-AC	H-12	ANVK	4532
E-MW1	NE-NYC	H-1	ANVK	6000
E-MW1	NE-NYC	H-2	ANVK	6000
E-MW1	NW-PC	H-3	ANVK	6000
E-MW1	SW-PC	H-4	ANVK	6000
E-MW1	SE-GC	H-5	ANVK	5443
E-MW1	SW-GC	H-6	ANVK	6000
E-MW1	SE-AC	H-7	ANVK	6000
E-MW1	NE-NYC	H-8A	ANVK	688
E-MW1	SE-AC	H-8B	ANVK	2000
E-MW1	NW-PC	H-8C	ANVK	239
E-MW1	SE-AC	H-9A	ANVK	2202
E-MW1	W-MW	H-9B	ANVK	3000
E-MW1	SS	H-10	DATA	53326
E-MW1	NE-AC	H-11	ANVK	6000
E-MW1	NE-AC	H-12	ANVK	3461
NW-PC	SW-PC	H-1	ANVK	6000
NW-PC	NW-PC	H-2	ANVK	3600
NW-PC	E-MW1	H-3	ANVK	6000
NW-PC	NE-NYC	H-4	ANVK	4913
NW-PC	SE-AC	H-5	ANVK	4373
NW-PC		H-6		
NW-PC	NE-AC	H-7	ANVK	5579
NW-PC	SE-GC	H-8A	ANVK	2000
NW-PC	NE-AC	H-8B	ANVK	0
NW-PC	E-MW1	H-8C	ANVK	239
NW-PC	SE-GC	H-9A	ANVK	548
NW-PC	SW-PC	H-9B	ANVK	2046
NW-PC	SS	H-10	DATA	38096
NW-PC	W-MW	H-11	ANVK	3753
NW-PC	SW-GC	H-12	ANVK	4156
SW-PC	NW-PC	V-1	ANVK	6000

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SW-PC	NE-AC	V-2	ANVK	6000
SW-PC	SE-AC	V-3	ANVK	5829
SW-PC	E-MW1	V-4	ANVK	6000
SW-PC	NE-NYC	V-5	ANVK	5548
SW-PC	SE-GC	V-6	ANVK	3856
SW-PC	W-MW	V-7	ANVK	5811
SW-PC	NE-AC	V-8A	ANVK	434
SW-PC	SW-GC	V-8B	ANVK	2000
SW-PC	SW-GC	V-8C	ANVK	2000
SW-PC	SW-GC	V-9A	ANVK	2712
SW-PC	NW-PC	V-9B	ANVK	2046
SW-PC	SS	V-10	DATA	48242
SW-PC	SW-PC	V-11	ANVK	5652
SW-PC	W-MW	V-12	ANVK	0
SW-GC	SW-GC	H-1	ANVK	2080
SW-GC	W-MW	H-2	ANVK	5138
SW-GC		H-3		
SW-GC	NE-AC	H-4	ANVK	5876
SW-GC		H-5		
SW-GC	E-MW1	H-6	ANVK	6000
SW-GC	NE-NYC	H-7	ANVK	5069
SW-GC	SE-AC	H-8A	ANVK	2000
SW-GC	SW-PC	H-8B	ANVK	2000
SW-GC	SW-PC	H-8C	ANVK	2000
SW-GC	SW-PC	H-9A	ANVK	2712
SW-GC	NE-NYC	H-9B	ANVK	0
SW-GC	SS	H-10	DATA	39456
SW-GC	SE-GC	H-11	ANVK	3240
SW-GC	NW-PC	H-12	ANVK	4156
SE-AC	W-MW	H-1	ANVK	6000
SE-AC	SE-GC	H-2	ANVK	4480
SE-AC	SW-PC	H-3	ANVK	5829
SE-AC	SE-AC	H-4	ANVK	4724
SE-AC	NW-PC	H-5	ANVK	4373
SE-AC	NE-AC	H-6	ANVK	6000
SE-AC	E-MW1	H-7	ANVK	6000
SE-AC	SW-GC	H-8A	ANVK	2000
SE-AC	E-MW1	H-8B	ANVK	2000
SE-AC	W-MW	H-8C	ANVK	1042
SE-AC	E-MW1	H-9A	ANVK	2202
SE-AC	NE-AC	H-9B	ANVK	3000
SE-AC	SS	H-10	DATA	55526
SE-AC	NE-NYC	H-11	ANVK	6000
SE-AC	NE-NYC	H-12	ANVK	4532

Totals

ANVK : 441474
DATA : 400152

I-2 - C-BAND PAYLOAD

As pointed out in Appendix I-1.1, the C-Band loadings were separate computer runs, using overflows from Ku-Band. The C-Band matrices were derived from the Ku Overflow Matrices presented in Appendix I.1.1. Relative traffic between C/Ku overlaps were used, and overflow data was assumed to be low rate data at 9.6 kb/s for a HVC.

I-2.1 C-Band Beam Coverage

The C-Band beam definitions for Scenario V are as follows:

BEAM NO.	BEAM ACRONYMN	BEAM DESCRIPTION
1	B1-NE	Northeastern-most part of U.S., including New York
2	B2-NE	Larger northeastern section, encircling B1-NE
3	B3-MW	Cental CONUS cut, including midwest/southeast
4	B4-W	Western half of continental U.S. (CONUS)

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BEAM COVERAGES

Beam: B1-NE

CON	NJ	MAS	ME1	ME2
NH	NY2	NY3	RI	VT

Beam: B2-NE

DEL	IN1	IN2	KY2	MD
MI3	NC1	NC2	NY1	OH1
OH2	PA1	PA2	SC1	SC2
VA1	VA2	WV1	WV2	

Beam: B3-MW

AK1	AK2	AL1	AL2	FL1
FL2	FL3	GA1	GA2	IL1
IL2	IO1	IO2	KS2	KY1
LA1	LA2	MN1	MN2	MO1
MO2	MS2	ND2	NE2	OK2
SD2	TN1	TN2	WI1	WI2

Beam: B4-W

AZ2	CA1	CA2	CA3	CO2
ID2	MT1	MT2	ND1	NM1
NM2	NV1	NV2	OK1	OR1
TX1	TX2	TX3	TX4	TX5
TX6	UT1	WA1	WA2	WY2

I-2.2 C-Band Coverage To SMSA's

C-Band Beam Coverages
Page 1

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
1	ALNY	ALBANY-SCHENECTADY-TROY NY	42.40	73.49
1	ATNJ	ATLANTIC CITY NJ	39.23	74.27
1	BAME	BANGOR ME	44.49	68.47
1	BOMA	BOSTON MA	42.20	71.05
1	BRCT	BRIDGEPORT CT	41.12	73.12
1	BICT	BRISTOL CT	41.41	72.57
1	BRMA	BROCKTON MA	42.06	71.01
1	BUVT	BURLINGTON VT	44.28	73.14
1	DACT	DANBURY CT	41.24	73.26
1	FAMA	FALL RIVER MA-RI	41.42	71.08
1	FIMA	FITCHBURG-LEOMISTER MA	42.35	71.50
1	GLNY	GLENS FALLS NY	43.17	73.14
1	HACT	HARTFORD CT	41.45	72.42
1	JENJ	JERSEY CITY NJ	40.44	74.04
1	LAMA	LAWRENCE-HAVERHILL MA-NH	42.41	71.12
1	LEME	LEWISTON-AUBURN ME	44.06	70.14
1	LONJ	LONG BRANCH-ASBURY PARK NJ	42.38	71.19
1	LOMA	LOWELL MA-NH	42.38	71.19
1	MANH	MANCHESTER NH	42.59	71.28
1	MECT	MERIDEN CT	42.32	72.48
1	NANH	NASHUA NH	42.44	71.28
1	NANY	NASSAU-SUFFOLK NY	42.31	73.36
1	NEMA	NEW BEDFORD MA	41.38	70.55
1	NECT	NEW BRITAIN CT	41.40	72.47
1	NENJ	NEW BRUNSWICK-PERTH AMBOY-SAYR NJ	40.29	74.27
1	NWCT	NEW HAVEN-WEST HAVEN CT	41.18	72.55
1	NLCT	NEW LONDON-NORWICH CT-RI	41.21	72.06
1	NENY	NEW YORK NY-NJ	40.40	73.50
1	NWNJ	NEWARK NJ	40.44	74.11
1	NWNY	NEWBRGH-MIDDLETOWN NY	41.26	74.26
1	NOCT	NORWALK CT	41.07	73.25
1	PANJ	PATERSON-CLIFTON-PASSAIC NJ	40.52	74.08
1	PIMA	PITTSFIELD MA	38.23	75.26
1	POME	PORTLAND ME	43.41	70.18
1	PONH	PORTSMOUTH-DOVER-ROCHESTER NH-ME	43.03	70.47
1	PONY	POUGHKEEPSIE NY	41.43	73.56
1	PRRI	PROVIDENCE-WAWICK-PAWTUCKET RI-MA	39.42	75.53
1	SPCT	SPRINGFIELD-CHICOPEE-HOLYOKE CT-MA	42.07	72.35
1	STCT	STAMFORD CT	41.03	73.32
1	SYNY	SYRACUSE NY	43.03	76.10
1	TRNJ	TRENTON NJ	40.15	74.43
1	UTNY	UTICA-ROME NY	43.06	75.15
1	VINJ	VINELAND-MILLVILLE-RIDGETON NJ	39.29	75.02
1	WACT	WATERBURY CT	41.33	73.03
1	WOMA	WORCESTER MA	42.17	71.48

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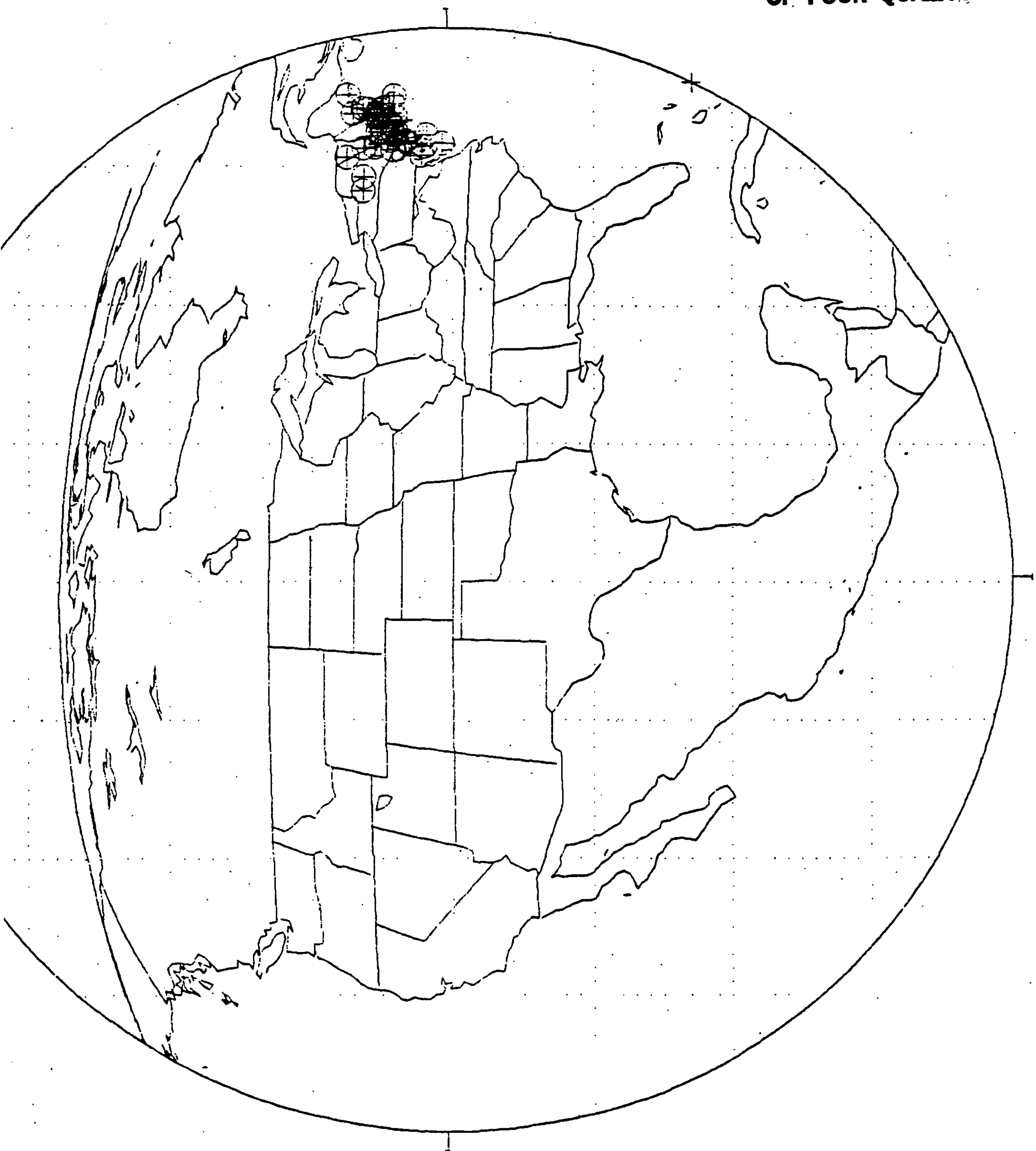

CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 1 OF C BAND
03/18/85 16.123

C-Band Beam Coverages
Page 2

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
2	AKOH	AKRON OH	41.04	81.31
2	ALPA	ALLENTOWN-BETHLEHEM-EASTON PA-NJ	40.11	74.36
2	ATPA	ALTOONA PA	40.32	78.23
2	ANIN	ANDERSON IN	40.05	85.14
2	ANSC	ANDERSON SC	34.30	82.39
2	ANMI	ANN ARBOR MI	42.18	83.43
2	ASNC	ASHEVILLE NC	35.35	82.35
2	BAMD	BALTIMORE MD	39.18	76.38
2	BAMI	BATTLE CREEK MI	42.20	85.01
2	BYMI	BAY CITY MI	43.35	83.52
2	BEMI	BENTON HARBOR MI	42.07	86.27
2	BINY	BINGHAMTON NY-PA	42.06	75.55
2	BLIN	BLOOMINGTON IN	39.10	86.31
2	BUNY	BUFFALO NY	42.52	78.55
2	BUNC	BURLINGTON NC	36.05	79.27
2	CAOH	CANTON OH	40.48	81.23
2	CHSC	CHARLESTON -NORTH CHARLESTON SC	32.48	79.58
2	CHWV	CHARLESTON WV	38.23	81.40
2	CHNC	CHARLOTTE-GASTONIA NC	35.03	80.50
2	CHVA	CHARLOTTESVILLE VA	38.02	78.29
2	CIOH	CINCINNATI OH-KY	39.10	84.30
2	CLOH	CLEVELAND OH	41.30	81.41
2	COSC	COLUMBIA SC	34.00	81.00
2	COOH	COLUMBUS OH	39.59	83.03
2	CUMD	CUMBERLAND MD-WV	39.40	78.47
2	DAVA	DANVILLE V	36.34	79.25
2	DAOH	DAYTON OH	39.45	84.10
2	DEMI	DETROIT MI	42.23	83.05
2	ELIN	ELKHART IN	41.52	85.56
2	ELNY	ELMIRA NY	42.06	76.50
2	ERPA	ERIE PA	42.07	80.05
2	EVIN	EVANSVILLE IN-KY	38.00	87.33
2	FANC	FAYETTEVILLE NC	35.05	78.53
2	FLMI	FLINT MI	43.03	83.04
2	FOSC	FORENCE SC	34.12	79.44
2	FOIN	FORT WAYNE IN	41.05	85.08
2	GAIN	GARY-HAMMOND-EAST CHICAGO IN	41.34	87.20
2	GRMI	GRAND RAPIDS MI	42.57	86.40
2	GRNC	GREENSBORO-WINSTON -SALEM-HIGH NC	36.03	79.50
2	GRSC	GREENVILLE-SPARTANBURG SC	34.52	82.25
2	HAMD	HAGERSTOWN MD	39.39	77.44
2	HAOH	HAMILTON-MIDDLETOWN OH	39.23	84.33
2	HAPA	HARRISBURG PA	40.17	76.54
2	HINC	HICKORY NC	35.44	81.23
2	HUWV	HUNTINGTON-ASHLAND WV-KY	38.24	82.26
2	ININ	INDIANAPOLIS IN	39.45	86.10
2	JAMI	JACKSON MI	42.15	84.24
2	JANC	JACKSONVILLE NC	34.45	77.26
2	JOTN	JOHNSON CITY-KINGSPORT-BRISTOL TN-VA	36.33	82.34
2	JOPA	JOHNSONTOWN PA	40.20	78.56

C-Band Beam Coverages
Page 3

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
2	KAMI	KALAMAZOO-PORTAGE MI	42.17	85.36
2	KNTN	KNOXVILLE TN	36.00	83.57
2	KOIN	KOKOMO IN	40.30	86.09
2	LAIN	LAFAYETTE-WEST LAFAYETTE IN	40.25	86.54
2	LAPA	LANCASTER PA	40.01	76.19
2	LAMI	LANSING-EAST LANSING MI	42.44	85.34
2	LEKY	LEXINGTON-FAYETTE KY	38.02	84.30
2	LIOH	LIMA OH	40.43	84.06
2	LOOH	LORAIN-ELYRIA OH	41.28	82.11
2	LOKY	LOUISVILLE KY-IN	38.13	85.48
2	LYVA	LYNCHBURG VA	37.24	79.09
2	MAOH	MANSFIELD OH	40.46	82.31
2	MUIN	MUNCIE IN	40.11	85.22
2	MUMI	MUSKEGON-NORTON SHORES-MUSKEGO MI	43.13	86.15
2	NEOH	NEWARK OH	40.03	82.25
2	NEVA	NEWPORT NEWS-HAMPTON VA	36.59	76.26
2	NOVA	NORFOLK-VIRGINIA BEACH-PORTSMO VA-NC	36.54	76.18
2	NOPA	NORTHEAST PENNSYLVANIA PA	41.20	75.45
2	PAWV	PARKERSBURG-MARIETTA WV-OH	39.17	81.33
2	PEVA	PETERSBURG-COLONIAL HEIGHTS-HO VA	37.14	77.24
2	PHPA	PHILADELPHIA PA-NJ	40.00	75.10
2	PIPA	PITTSBURGH PA	40.26	80.00
2	RANC	RALEIGH-DURHAM NC	35.46	78.39
2	REPA	READING PA	40.20	75.55
2	RIVA	RICHMOND VA	37.34	77.27
2	ROVA	ROANOKE VA	37.15	79.58
2	RONY	ROCHETER NY	43.12	77.37
2	ROSC	ROCK HILL SC	34.55	81.01
2	SAMI	SAGINAW MI	43.25	83.54
2	SANC	SALISBURY-CONCORD NC	35.20	80.30
2	SHPA	SHARON PA	41.16	80.30
2	SOIN	SOUTH BEND IN	41.40	86.15
2	SPOH	SPRINGFIELD OH	39.55	83.48
2	STPA	STATE COLLEGE PA	40.48	77.52
2	STOH	STEUBENVILLE-WEIRTON OH-WV	40.22	80.39
2	TEIN	TERRE HAUTE IN	39.27	87.24
2	TOOH	TOLEDO OH-MI	41.40	83.35
2	WADC	WASHINGTON DC-MD	38.55	77.00
2	WHWV	WHEELING WV-OH	40.05	80.43
2	WIPA	WILLIAMSPORT PA	41.16	77.03
2	WIDE	WILMINGTON DE-NJ	39.46	75.31
2	WINC	WILMINGTON NC	34.14	77.55
2	YOPA	YORK PA	39.57	76.44
2	YOOH	YOUNGSTOWN-WARREN OH	41.05	80.40

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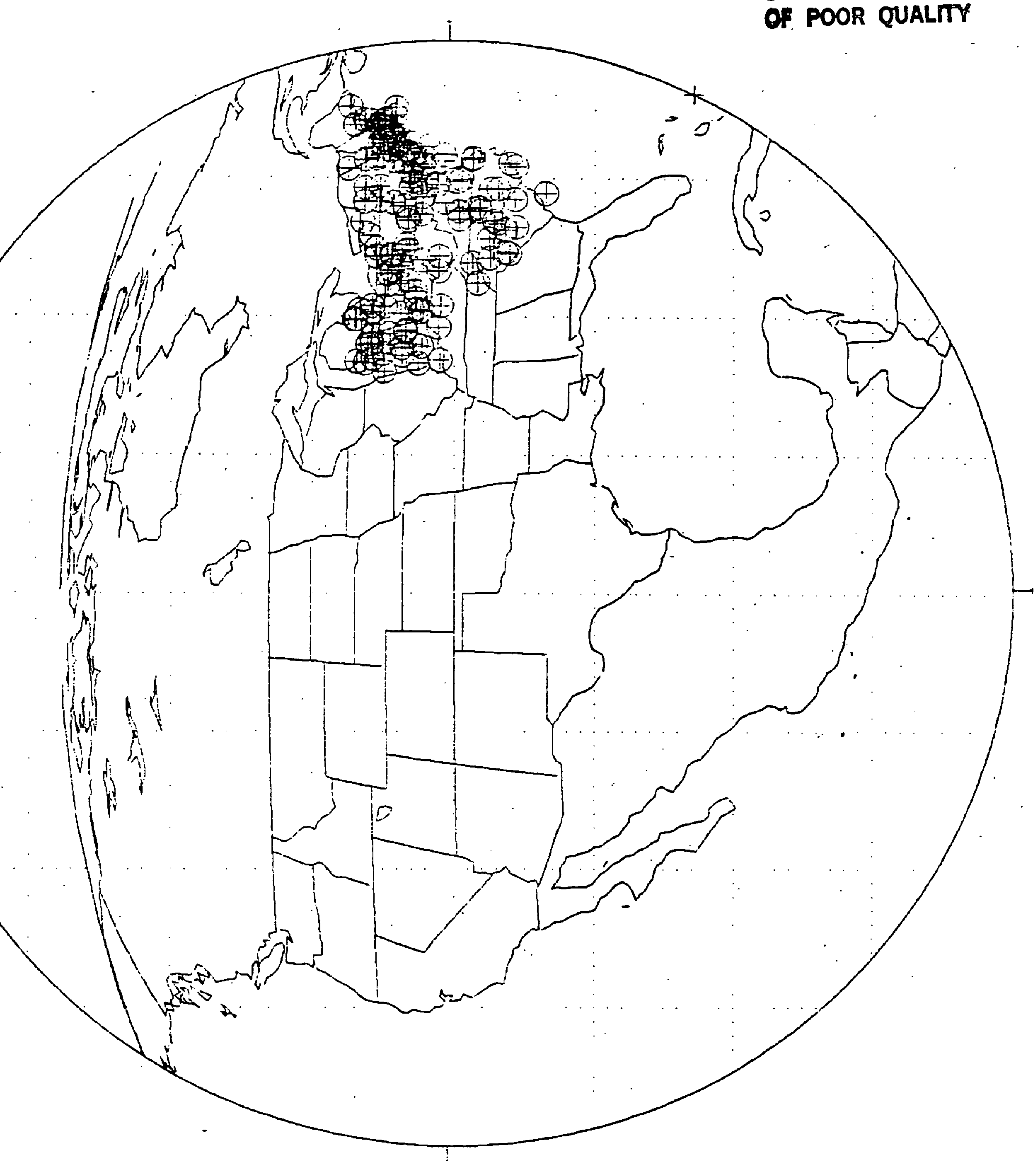
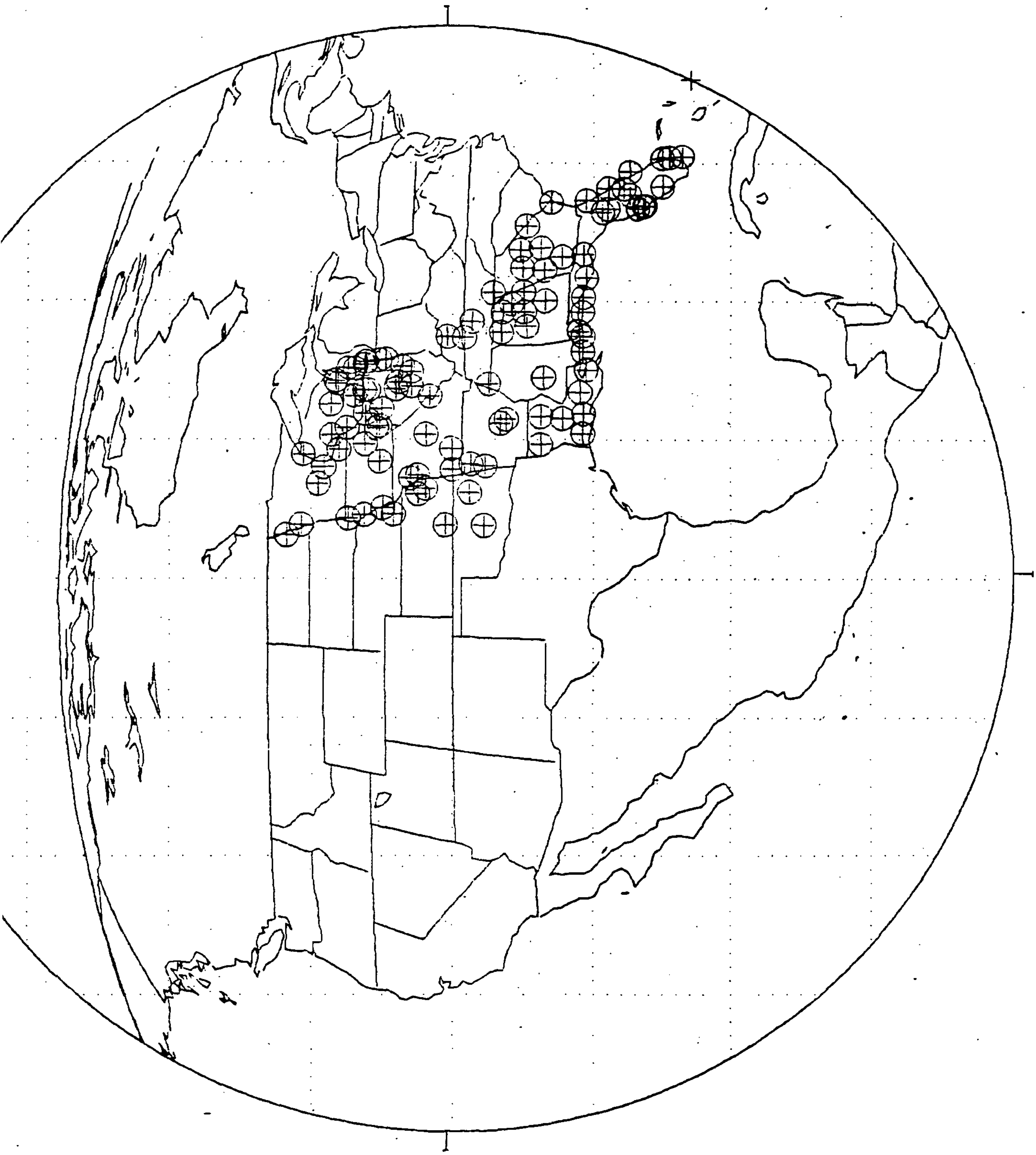


	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
3	ALGA	ALBANY GA	31.37	84.10
3	ALLA	ALEXANDRIA LA	31.19	92.29
3	ANAL	ANNISTON AL	33.38	85.50
3	APWI	APPLETON-OSHKOSH WI	44.17	88.24
3	ATGE	ATHENS GE	33.57	83.24
3	ATGA	ATLANTA GA	33.45	84.23
3	AUGA	AUGUSTA GA-SC	33.29	82.00
3	BALA	BATON ROUGE LA	30.30	91.10
3	BIMS	BILOXI-GULFPORT MS	30.21	89.08
3	BIAL	BIRMINGHAM AL	33.30	86.55
3	BLIL	BLOOMINGTON-NORMAL IL	40.29	89.00
3	BRFL	BRADENTON FL	27.29	82.33
3	CEIA	CEDAR RAPIDS IA	41.59	91.39
3	CHIL	CHAMPAIGN-URBANA-RANTOUL IL	40.07	88.14
3	CHTN	CHATTANOOGA TN-GA	35.02	85.18
3	CIIL	CHICAGO IL	41.50	87.45
3	CLTN	CLARKSVILLE-HOPKINSVILLE TN-KY	36.50	87.30
3	COMO	COLUMBIA MO	38.58	92.20
3	COGA	COLUMBUS GA-AL	32.28	84.59
3	DAIA	DAVENPORT-ROCK ISLAND-MOLINE IA-IL	41.30	90.34
3	DAFL	DAYTONA BEACH FL	29.11	81.01
3	DEIL	DECATUR IL	39.51	88.57
3	DEIA	DES MOINES IA	41.35	93.35
3	DUIA	DUBUQUE IA	42.31	90.41
3	DUMN	DULUTH-SUPERIOR MN-WI	46.45	92.10
3	EAWI	EAU CLAIRE WI	44.50	91.30
3	FAND	FARGO-MOORHEAD ND-MN	46.52	96.49
3	FAAR	FAYETTEVILLE-SPRINGDALE AR	36.03	94.10
3	FLAL	FLORENCE AL	34.48	87.40
3	FOFL	FORT LAUDERDALE-HOLLYWOOD FL	26.08	80.08
3	FRFL	FORT MYERS FL	26.39	81.51
3	FOAR	FORT SMITH AR-OK	35.22	94.27
3	FTFL	FORT WALTON BEACH FL	30.25	86.38
3	GAAL	GADSDEN AL	34.00	86.00
3	GAFL	GAINESVILLE FL	29.37	82.21
3	GRND	GRAND FORKS ND-MN	47.57	97.05
3	GRWI	GREEN BAY WI	44.32	88.00
3	HUAL	HUNTSVILLE AL	34.44	86.35
3	IOIW	IOWA CITY IW	41.39	91.31
3	JAMS	JACKSON MS	32.20	90.11
3	JAFL	JACKSONVILLE FL	30.20	81.40
3	JAWI	JANESVILLE-BELIOT WI	42.42	89.02
3	JOMO	JOPLIN MO	37.04	94.31
3	KAIL	KANKAKEE IL	41.08	87.52
3	KAMO	KANSAS CITY MO-KS	39.05	94.37
3	KEWI	KENOSHA WI	42.34	87.34
3	LAWI	LA CROSSE WI	43.48	91.04
3	LALA	LAFAYETTE LA	30.12	92.18
3	LKLA	LAKE CHARLES LA	30.13	93.13
3	LAFL	LAKELAND-WINTER HAVEN FL	28.02	81.59

C-Band Beam Coverages
Page 5

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
3	LAKS	LAWRENCE KS	38.58	95.15
3	LINE	LINCOLN NE	40.49	96.41
3	LIAR	LITTLE ROCK-NORTH LITTLE ROCK AR	34.42	92.17
3	MAGA	MACON GA	32.49	83.37
3	MAWI	MADISON WI	43.04	89.22
3	MEFL	MELBOURNE-TITUSVILLE-COCOA FL	28.04	80.38
3	METN	MEMPHIS TN-AR	35.10	90.00
3	MIFL	MIAMI FL	25.45	80.15
3	MIWI	MILWAUKEE WI	43.03	87.56
3	MIMN	MINNEAPOLIS-ST PAUL MN-WI	45.00	93.15
3	MOAL	MOBILE AL	30.40	88.05
3	MOLA	MONROE LA	32.31	92.06
3	MNAL	MONTGOMERY AL	32.22	86.20
3	NATN	NASHVILLE-DAVIDSON TN	36.10	86.50
3	NELA	NEW ORLEANS LA	30.00	90.03
3	OCFL	OCALA FL	29.11	82.09
3	OKOK	OKLAHOMA CITY OK	35.28	97.33
3	OMNE	OMAHA NE-IA	41.15	96.00
3	ORFL	ORLANDO FL	28.33	81.21
3	OWKY	OWENSBORO KY	37.45	87.05
3	PAFL	PANAMA CITY FL	30.10	85.41
3	PAMS	PASCAGOULA-MOSS POINT PATERSON MS	30.21	88.32
3	PEFL	PENSACOLA FL	30.26	87.12
3	PEIL	PEORIA IL	40.43	89.38
3	PIAR	PINE BLUFF AR	34.13	92.00
3	RAWI	RACINE WI	42.42	87.50
3	ROMN	ROCHESTER MN	44.01	92.27
3	ROIL	ROCKFORD IL	42.16	89.06
3	STMN	ST CLOUD MN	45.34	94.10
3	STMO	ST JOSEPH MO	39.45	94.51
3	SLMO	ST LOUIS MO-IL	38.40	90.15
3	SAFL	SARASOTA FL	27.20	82.32
3	SAGA	SAVANNAH GA	32.04	81.07
3	SHWI	SHEBOYGAN WI	43.46	87.44
3	SHLA	SHREVEPORT LA	32.30	93.46
3	SINE	SIOUX CITY NE-IA	42.30	96.28
3	SISD	SIOUX FALLS SD	43.34	96.42
3	SPIL	SPRINGFIELD IL	39.49	89.39
3	SPMO	SPRINGFIELD MO	37.11	93.19
3	TAFL	TALLAHASSEE FL	30.26	84.19
3	TMFL	TAMPA-ST PETERSBURG FL	27.58	82.38
3	TOKS	TOPEKA KS	39.02	95.41
3	TUOK	TULSA OK	36.07	95.58
3	TUAL	TUSCALOOSA AL	33.12	87.33
3	WAIA	WATERLOO-CEDAR FALLS IA	42.30	92.20
3	WAWI	WAUSAU WI	44.58	89.40
3	WEFL	WEST PALM BEACH-BOCA RATON FL	26.42	80.05
3	WIKS	WICHITA KS	37.43	97.20



CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 3 OF C BAND
03/26/85 8.598

C-Band Beam Coverages
Page 6

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
4	ABTX	ABILENE TX	32.27	99.45
4	ALNM	ALBUQUERQUE NM	35.05	106.38
4	AMTX	AMARILLO TX	35.14	101.50
4	ANCA	ANAHEIM-SANTA ANA-GARDEN GROVE CA	33.50	117.56
4	AUTX	AUSTIN TX	30.18	97.47
4	BACA	BAKERSFIELD CA	35.25	119.00
4	BETX	BEAUMONT-PORT ARTHUR-ORANGE TX	30.04	94.06
4	BEWA	BELLINGHAM WA	48.45	122.29
4	BIMT	BILLINGS MT	45.47	108.30
4	BIND	BISMARCK ND	46.50	100.48
4	BOID	BOISE CITY ID	43.38	115.30
4	BRWA	BREMERTON WA	47.34	122.40
4	BRTX	BROWNSVILLE-HARLINGEN-SAN BENI TX	25.54	97.30
4	BYTX	BRYAN-COLLEGE STATION TX	30.41	96.24
4	CAWY	CASPER WY	42.50	106.20
4	CHCA	CHICO CA	39.46	121.50
4	COCO	COLORADO SPRINGS CO	38.50	104.50
4	COTX	CORPUS CHRISTITX	27.47	97.26
4	DATX	DALLAS-FORT WORTH TX	32.47	96.48
4	DECO	DENVER-BOULDER CO	39.45	105.00
4	ELTX	EL PASO TX	31.45	106.30
4	ENOK	ENID OK	36.24	97.54
4	EUOR	EUGENE-SPRINGFIELD OR	44.03	123.04
4	FOCO	FORT COLLINS CO	40.35	105.05
4	FRCA	FRESNO CA	36.41	119.47
4	GATX	GALVESTON-TEXAS CITY TX	29.17	94.48
4	GRMT	GREATFALLS MT	47.30	111.6
4	GRCO	GREELEY CO	40.26	104.43
4	HOTX	HOUSTON TX	29.45	95.25
4	KITX	KILLEEN-TEMPLE TX	31.08	97.44
4	LATX	LAREDO TX	27.32	99.22
4	LANM	LAS CRUCES NM	32.18	106.47
4	LANV	LAS VEGAS NV	36.10	115.10
4	LAOK	LAWTON OK	34.36	98.25
4	LOTX	LONGVIEW TX	32.30	94.45
4	LOCA	LOS ANGELES-LONG BEACH CA	34.00	118.15
4	LUTX	LUBBOCK TX	33.35	101.53
4	MCTX	MCALLEN-PHARR-EDINBURG TX	26.13	98.15
4	MEOR	MEDFORD OR	42.20	122.52
4	MITX	MIDLAND TX	32.00	102.09
4	MOCA	MODESTO CA	37.37	121.00
4	ODTX	ODESSA TX	31.50	102.23
4	OLWA	OLYMPIA WA	47.03	122.53
4	OXCA	OXNARD-SIMI VALLEY-VENTURA CA	34.11	119.10
4	PHAZ	PHOENIX AZ	33.30	112.03
4	POOR	PORTLAND OR-WA	45 32	122.40
4	PRUT	PROVO=OREM UT	40.15	111.40
4	PUCO	PUEBLO CO	38.17	104.38
4	RECA	REDDING CA	40.35	122.24
4	RENV	RENO NV	39.32	119.49
4	RIWA	RICHLAND-KENNEWICK WA	46.17	119.17

C-Band Beam Coverages
Page 7

	CODE	DESCRIPTION NAME	LATITUDE	LONGITUDE
4	RICA	RIVERSIDE-SAN BERNADINO-ONTAR CA	33.59	117.22
4	SACA	SACRAMENTO CA	38.32	121.30
4	SAOR	SALEM OR	44.57	123.01
4	SLCA	SALINAS-SEASIDE-MONTEREY CA	36.39	121.40
4	SAUT	SALT LAKE CITY-OGDEN UT	40.45	111.55
4	SATX	SAN ANGELO TX	31.28	100.28
4	SNTX	SAN ANTONIO TX	29.25	98.30
4	SNCA	SAN DIEGO CA	32.45	117.10
4	SFCA	SAN FRANCISCO - OAKLAND CA	37.45	122.27
4	SJCA	SAN JOSE CA	37.20	121.55
4	STCA	SANTA BARBARA-SANTA MARIA-LOMP CA	34.25	119.41
4	SCCA	SANTA CRUZ CA	36.58	122.03
4	SRCA	SANTA ROSA CA	38.26	122.43
4	SEWA	SEATTLE-EVERETT WA	47.35	122.20
4	SHTX	SHERMON-DENISON TX	33.39	96.35
4	SPWA	SPOKANE WA	47.40	117.25
4	SOCA	STOCKTON CA	37.59	121.20
4	TAWA	TACOMA WA	47.16	122.30
4	TETX	TEXARKANA TX-AR	33.28	94.02
4	TUAZ	TUCSON AZ	32.15	110.57
4	TYTX	TYLER TX	32.22	95.18
4	VACA	VALLEJO-FAIRFIELD-NAPA CA	38.05	122.14
4	VITX	VICTORIA TX	28.49	97.01
4	VICA	VISALIA-TULARE-PORTERVILLE CA	36.20	119.18
4	WATX	WACO TX	31.33	97.10
4	WITX	WICHITA FALLS TX	33.55	98.30
4	YAWA	YAKIMA WA	46.37	120.30
4	YUCA	YUBA CITY CA	39.09	121.36

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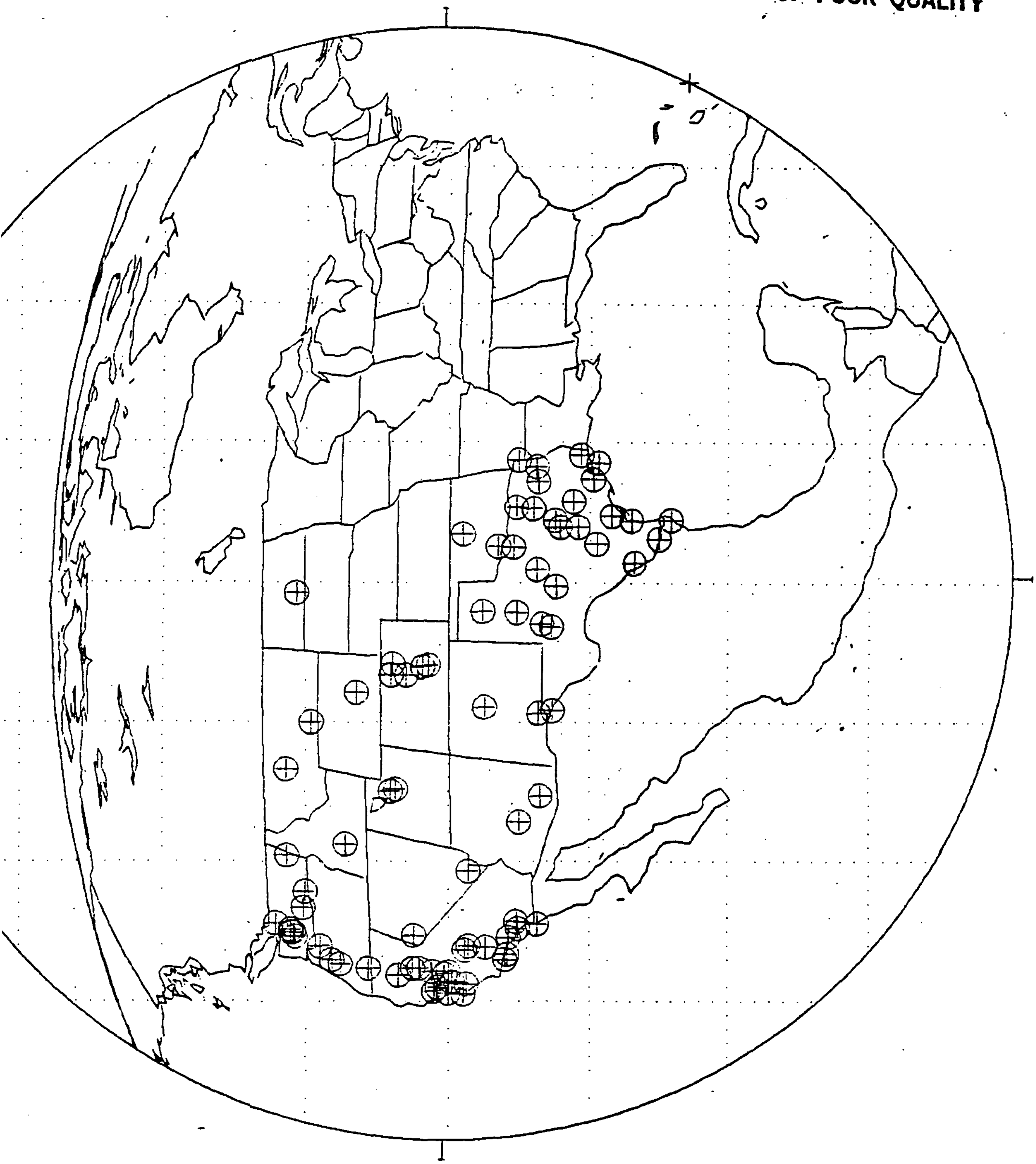

CASE SATELLITE POSITION 101.0 WEST (100W,37N) ZONE 4 OF C BAND
03/26/85 8.606

I-2.3 Beam To Beam Matrix - C-Band (No Broadcast Video)

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Beam to Beam Matrix
Overflow to C Beams
Scenario V

Class = ANVC

From:
To:

From	To		To		To		To	
B1-NE	B2-NE	10491	B3-MW	5017	B4-W	1118		
B2-NE	B1-NE	10491	B2-NE	15961	B3-MW	24676	B4-W	18212
B3-MW	B1-NE	5017	B2-NE	24676	B3-MW	14080	B4-W	10817
B4-W	B1-NE	1118	B2-NE	18212	B3-MW	10817	B4-W	7984

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SUMMARY

	ANVC
B1-NE	16626
B2-NE	69340
B3-MW	54590
B4-W	38131
Totals	178687

I-2.4 C-Band Transponder Loading (No Broadcast Video)

May 30 13:35 1985 5c.x Page 1

C Transponder Loading
Scenario V
(No Broadcast Video)

From	To	Channel	Class	Circuits
B1-NE	B2-NE	H-1	ANVC	6000
B1-NE	B3-MW	H-2	ANVC	5017
B1-NE	B4-W	H-3	ANVC	1118
B1-NE		H-4		
B1-NE		H-5		
B1-NE		H-6		
B1-NE		H-7		
B1-NE		H-8		
B1-NE		H-9		
B1-NE		H-10		
B1-NE	B2-NE	H-11A	ANVC	3000
B1-NE		H-11B		
B1-NE	B2-NE	H-12A	ANVC	1491
B1-NE		H-12B		
B1-NE		H-12C		
B2-NE	B1-NE	V-1	ANVC	6000
B2-NE	B2-NE	V-2	ANVC	6000
B2-NE	B2-NE	V-3	ANVC	6000
B2-NE	B4-W	V-4	ANVC	6000
B2-NE	B3-MW	V-5	ANVC	6000
B2-NE	B3-MW	V-6	ANVC	6000
B2-NE	B3-MW	V-7	ANVC	6000
B2-NE	B3-MW	V-8	ANVC	6000
B2-NE	B4-W	V-9	ANVC	6000
B2-NE	B4-W	V-10	ANVC	6000
B2-NE	B1-NE	V-11A	ANVC	3000
B2-NE	B2-NE	V-11B	ANVC	3000
B2-NE	B1-NE	V-12A	ANVC	1491
B2-NE	B2-NE	V-12B	ANVC	961
B2-NE	B3-MW	V-12C	ANVC	676
B3-MW	B4-W	H-1	ANVC	6000
B3-MW	B1-NE	H-2	ANVC	5017
B3-MW	B3-MW	H-3	ANVC	6000
B3-MW		H-4		
B3-MW	B2-NE	H-5	ANVC	6000
B3-MW	B2-NE	H-6	ANVC	6000
B3-MW	B2-NE	H-7	ANVC	6000
B3-MW	B2-NE	H-8	ANVC	6000
B3-MW	B3-MW	H-9	ANVC	6000
B3-MW		H-10		
B3-MW	B3-MW	H-11A	ANVC	80

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B3-MW	B4-W	H-11B	ANVC	3000
B3-MW	B3-MW	H-12A	ANVC	2000
B3-MW	B4-W	H-12B	ANVC	1817
B3-MW	B2-NE	H-12C	ANVC	676
B4-W	B3-MW	V-1	ANVC	6000
B4-W	B4-W	V-2	ANVC	6000
B4-W	B1-NE	V-3	ANVC	1118
B4-W	B2-NE	V-4	ANVC	6000
B4-W	B4-W	V-5	ANVC	1984
B4-W		V-6		
B4-W		V-7		
B4-W		V-8		
B4-W	B2-NE	V-9	ANVC	6000
B4-W	B2-NE	V-10	ANVC	6000
B4-W		V-11A		
B4-W	B3-MW	V-11B	ANVC	3000
B4-W		V-12A		
B4-W	B3-MW	V-12B	ANVC	1817
B4-W		V-12C		

Totals

ANVC : 178263

I-2.5 C-Band Beam To Beam Overflow From Ku-Band (Including Broadcast Video)

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Beam to Beam Matrix
Overflow to C Beams
Scenario V
(Broadcast Video)

Class = ANVC

From:
To:

B1-NE								
	B2-NE	4823	B3-MW	3051	B4-W	328		
B2-NE								
	B1-NE	4823	B2-NE	7935	B3-MW	14387	B4-W	8795
B3-MW								
	B1-NE	3051	B2-NE	14387	B3-MW	9980	B4-W	6731
B4-W								
	B1-NE	328	B2-NE	8795	B3-MW	6731	B4-W	1256

****

SUMMARY

	ANVC
B1-NE	8202
B2-NE	35940
B3-MW	34149
B4-W	17110
Totals	95401

I-2.6 C-Band Beam To Beam Matrix

(Including Broadcast Video)

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Beam to Beam Matrix
Analog Voice and Data -- Scenario V
(Broadcast Video)
(HVC or KB/S)

Class = ANVK

From:
To:

From	To		To		To		To	
NE-AC								
	NE-AC	2422	W-MW	9198	SE-GC	5317	NE-NYC	1391
	E-MW1	6287	NW-PC	5579	SW-PC	6434	SW-GC	5876
	SE-AC	9849	B2-NE	2659	B3-MW	2703	B4-W	283
	E-MW2	3174						
W-MW								
	NE-AC	9198	W-MW	704	SE-GC	3963	NE-NYC	7643
	E-MW1	2820	NW-PC	3753	SW-PC	5811	SW-GC	5138
	SE-AC	7042	B2-NE	1985	B3-MW	1614	B4-W	243
	E-MW2	317						
SE-GC								
	NE-AC	5317	W-MW	3963	SE-GC	318	NE-NYC	4507
	E-MW1	4152	NW-PC	2548	SW-PC	3856	SW-GC	3240
	SE-AC	4480	B2-NE	1339	B3-MW	846	B4-W	145
	E-MW2	1291						
NE-NYC								
	NE-AC	1391	W-MW	7643	SE-GC	4507	E-MW1	9658
	NW-PC	4913	SW-PC	5548	SW-GC	5069	SE-AC	10532
	B2-NE	3438	B3-MW	2233	B4-W	252	E-MW2	3030
E-MW1								
	NE-AC	6287	W-MW	2820	SE-GC	4152	NE-NYC	9658
	NW-PC	4702	SW-PC	5038	SW-GC	4833	SE-AC	7540
	B2-NE	805	B3-MW	2033	B4-W	240		
NW-PC								
	NE-AC	5579	W-MW	3753	SE-GC	2548	NE-NYC	4913
	E-MW1	4702	NW-PC	3600	SW-PC	8046	SW-GC	4156
	SE-AC	4373	B2-NE	1574	B3-MW	1469	B4-W	183
	E-MW2	1537						
SW-PC								
	NE-AC	6434	W-MW	5811	SE-GC	3856	NE-NYC	5548
	E-MW1	5038	NW-PC	8046	SW-PC	5652	SW-GC	6712
	SE-AC	5829	B2-NE	1952	B3-MW	2071	B4-W	377
	E-MW2	1832						
SW-GC								
	NE-AC	5876	W-MW	5138	SE-GC	3240	NE-NYC	5069
	E-MW1	4833	NW-PC	4156	SW-PC	6712	SW-GC	2080
	SE-AC	6001	B2-NE	1948	B3-MW	1544	B4-W	97
	E-MW2	1680						

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SE-AC								
	NE-AC	9849	W-MW	7042	SE-GC	4480	NE-NYC	10532
	E-MW1	7540	NW-PC	4373	SW-PC	5829	SW-GC	6001
	SE-AC	4724	B2-NE	1735	B3-MW	2194	B4-W	249
	E-MW2	2662						
B1-NE								
B2-NE								
	NE-AC	2659	W-MW	1985	SE-GC	1339	NE-NYC	3438
	E-MW1	805	NW-PC	1574	SW-PC	1952	SW-GC	1948
	SE-AC	1735	B2-NE	28	B3-MW	535	B4-W	85
	E-MW2	241						
B3-MW								
	NE-AC	2703	W-MW	1614	SE-GC	846	NE-NYC	2233
	E-MW1	2033	NW-PC	1469	SW-PC	2071	SW-GC	1544
	SE-AC	2194	B2-NE	535	B3-MW	268	B4-W	51
	E-MW2	512						
B4-W								
	NE-AC	283	W-MW	243	SE-GC	145	NE-NYC	252
	E-MW1	240	NW-PC	183	SW-PC	377	SW-GC	97
	SE-AC	249	B2-NE	85	B3-MW	51	E-MW2	71
E-MW2								
	NE-AC	3174	W-MW	317	SE-GC	1291	NE-NYC	3030
	NW-PC	1537	SW-PC	1832	SW-GC	1680	SE-AC	2662
	B2-NE	241	B3-MW	512	B4-W	71		

****

Class = DATA

From:
To:

NE-AC								
	NE-AC	2128	W-MW	8105	SE-GC	4681	NE-NYC	1226
	E-MW1	5541	NW-PC	4919	SW-PC	5668	SW-GC	5182
	SE-AC	8678	B2-NE	2344	B3-MW	2382	B4-W	249
	E-MW2	2795						
W-MW								
	NE-AC	8105	W-MW	620	SE-GC	3489	NE-NYC	6732
	E-MW1	2484	NW-PC	3311	SW-PC	5122	SW-GC	4524
	SE-AC	6199	B2-NE	1748	B3-MW	1421	B4-W	213
	E-MW2	279						
SE-GC								
	NE-AC	4681	W-MW	3489	SE-GC	282	NE-NYC	3966
	E-MW1	3656	NW-PC	2250	SW-PC	3399	SW-GC	2854
	SE-AC	3951	B2-NE	1183	B3-MW	744	B4-W	128
	E-MW2	1136						
NE-NYC								
	NE-AC	1226	W-MW	6732	SE-GC	3966	E-MW1	8505

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	NW-PC	4330	SW-PC	4887	SW-GC	4467	SE-AC	9272
	B2-NE	3030	B3-MW	1971	B4-W	222	E-MW2	2669
E-MW1								
	NE-AC	5541	W-MW	2484	SE-GC	3656	NE-NYC	8505
	NW-PC	4142	SW-PC	4435	SW-GC	4256	SE-AC	6639
	B2-NE	709	B3-MW	1791	B4-W	212		
NW-PC								
	NE-AC	4919	W-MW	3311	SE-GC	2250	NE-NYC	4330
	E-MW1	4142	NW-PC	3178	SW-PC	7093	SW-GC	3661
	SE-AC	3857	B2-NE	1390	B3-MW	1299	B4-W	162
	E-MW2	1355						
SW-PC								
	NE-AC	5668	W-MW	5122	SE-GC	3399	NE-NYC	4887
	E-MW1	4435	NW-PC	7093	SW-PC	4978	SW-GC	5911
	SE-AC	5136	B2-NE	1722	B3-MW	1821	B4-W	332
	E-MW2	1613						
SW-GC								
	NE-AC	5182	W-MW	4524	SE-GC	2854	NE-NYC	4467
	E-MW1	4256	NW-PC	3661	SW-PC	5911	SW-GC	1832
	SE-AC	5291	B2-NE	1715	B3-MW	1361	B4-W	86
	E-MW2	1478						
SE-AC								
	NE-AC	8678	W-MW	6199	SE-GC	3951	NE-NYC	9272
	E-MW1	6639	NW-PC	3857	SW-PC	5136	SW-GC	5291
	SE-AC	4160	B2-NE	1531	B3-MW	1934	B4-W	218
	E-MW2	2343						
B1-NE								
B2-NE								
	NE-AC	2344	W-MW	1748	SE-GC	1183	NE-NYC	3030
	E-MW1	709	NW-PC	1390	SW-PC	1722	SW-GC	1715
	SE-AC	1531	B2-NE	24	B3-MW	472	B4-W	74
	E-MW2	212						
B3-MW								
	NE-AC	2382	W-MW	1421	SE-GC	744	NE-NYC	1971
	E-MW1	1791	NW-PC	1299	SW-PC	1821	SW-GC	1361
	SE-AC	1934	B2-NE	472	B3-MW	234	B4-W	45
	E-MW2	450						
B4-W								
	NE-AC	249	W-MW	213	SE-GC	128	NE-NYC	222
	E-MW1	212	NW-PC	162	SW-PC	332	SW-GC	86
	SE-AC	218	B2-NE	74	B3-MW	45	E-MW2	63
E-MW2								
	NE-AC	2795	W-MW	279	SE-GC	1136	NE-NYC	2669
	NW-PC	1355	SW-PC	1613	SW-GC	1478	SE-AC	2343
	B2-NE	212	B3-MW	450	B4-W	63		

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SUMMARY

	ANVK	DATA
NE-AC	61172	53898
W-MW	50231	44247
SE-GC	36002	31719
NE-NYC	58214	51277
E-MW1	48108	42370
NW-PC	46433	40947
SW-PC	59158	52117
SW-GC	48374	42618
SE-AC	67210	59209
B1-NE	0	0
B2-NE	18324	16154
B3-MW	18073	15925
B4-W	2276	2004
E-MW2	16347	14393
Totals	529922	466878

I-2.7 C-Band Transponder Loading

(Including Broadcast Video)

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C Transponder Loading
Scenario V
(Broadcast Video)

From	To	Channel	Class	Circuits
B1-NE		H-1		
B1-NE		H-2		
B1-NE		H-3		
B1-NE		H-4		
B1-NE		H-5		
B1-NE		H-6		
B1-NE		H-7		
B1-NE		H-8		
B1-NE		H-9		
B1-NE		H-10		
B1-NE	B3-MW	H-11A	ANVC	3000
B1-NE	B2-NE	H-11B	ANVC	3000
B1-NE	B4-W	H-12A	ANVC	328
B1-NE	B2-NE	H-12B	ANVC	1823
B1-NE		H-12C		
B2-NE		V-1	BDCST	
B2-NE		V-2	BDCST	
B2-NE		V-3	BDCST	
B2-NE		V-4	BDCST	
B2-NE		V-5	BDCST	
B2-NE		V-6	BDCST	
B2-NE	B2-NE	V-7	ANVC	6000
B2-NE	B3-MW	V-8	ANVC	6000
B2-NE	B3-MW	V-9	ANVC	6000
B2-NE	B4-W	V-10	ANVC	6000
B2-NE	B4-W	V-11A	ANVC	2795
B2-NE	B1-NE	V-11B	ANVC	3000
B2-NE	B3-MW	V-12A	ANVC	2000
B2-NE	B1-NE	V-12B	ANVC	1823
B2-NE	B2-NE	V-12C	ANVC	1935
B3-MW		H-1	BDCST	
B3-MW		H-2	BDCST	
B3-MW		H-3	BDCST	
B3-MW		H-4	BDCST	
B3-MW		H-5	BDCST	
B3-MW		H-6	BDCST	
B3-MW	B4-W	H-7	ANVC	6000
B3-MW	B2-NE	H-8	ANVC	6000
B3-MW	B2-NE	H-9	ANVC	6000
B3-MW	B3-MW	H-10	ANVC	6000
B3-MW	B1-NE	H-11A	ANVC	3000

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B3-MW	B3-MW	H-11B	ANVC	3000
B3-MW	B2-NE	H-12A	ANVC	2000
B3-MW	B3-MW	H-12B	ANVC	980
B3-MW	B4-W	H-12C	ANVC	731
B4-W		V-1	BDCST	
B4-W		V-2	BDCST	
B4-W		V-3	BDCST	
B4-W		V-4	BDCST	
B4-W		V-5	BDCST	
B4-W		V-6	BDCST	
B4-W	B3-MW	V-7	ANVC	6000
B4-W		V-8		
B4-W	B4-W	V-9	ANVC	1256
B4-W	B2-NE	V-10	ANVC	6000
B4-W	B2-NE	V-11A	ANVC	2795
B4-W		V-11B		
B4-W	B1-NE	V-12A	ANVC	328
B4-W		V-12B		
B4-W	B3-MW	V-12C	ANVC	731

Totals

ANVC : 94525

I-3 - LINK BUDGETS FOR SCENARIO V

TABLE 1 - SCENARIO V - C-BAND (FSS) - LINK BUDGET

MODULATION: CSSB, Suppressed Carrier (6000 HVC/36 MHz)

Mid-band Downlink Freq. =	3.95 GHz	Saturated EIRP = 36.0 dBW
Mid-band Uplink Freq. =	6.15 GHz	SFD =-84.0 dBW/m^2
Uplink Free Space Loss =	200.0 dB	Satellite Gain =161.1 dB
No. of Channels, N =	6000	Satellite G/T = 1.8 dB/K

Transmitter Power	0.7 dBW	1.18 Watts
Transmit Line Loss	1.3 dB	Allocation
Transmitting Antenna Gain	36.8 dBi	Gridded Reflector
Output Backoff	5.0 dB	
Net EIRP	31.2 dBW	
Total Load	22.6 dBm0	-15.2 + 10 Log N
Reference Power EIRP, Pr	8.6 dBW	Net EIRP - Total Load
Free Space Loss	196.1 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Net Path Loss	196.6 dB	
Power Flux Density	-131.5 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	50.1 dBi	10 m dish, 60% eff.
Receive Line Loss	0.1 dB	Allocation
System Noise Temperature	19.4 dB-K	
Receive G/T	30.7 dB/K	(Clear Sky)
Boltzmann's Constant	-228.6 dBW/Hz-K	
Downlink Pr/No	71.3 dB-Hz	
Uplink Pr/No	78.0 dB-Hz	Beam 4V, Worst-case
Downlink Interference Pr/Io	71.3 dB-Hz	
Uplink Interference Pr/Io	71.4 dB-Hz	
Intermodulation Pr/IMo	68.9 dB-Hz	14.7 dB = P1/P3
Terrestrial Pr/Io	89.2 dB-Hz	
Cross-polarization Pr/Io	82.1 dB-Hz	
Overall Pr/No	64.3 dB-Hz	
Required Pr/No	61.9 dB-Hz	
	======	
Pr/No Margin	2.4 dB-Hz	

TABLE 2 - SCENARIO V - C-BAND (FSS) - UPLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 6.15 GHz

Transmitter Power	29.0 dBW	800.00 Watts
Transmit Line Loss	0.1 dB	Allocation
Transmitting Antenna Gain	54.0 dBi	10 m dish, 60% eff.
Input Back-Off	3.0 dB	
Net EIRP	79.9 dBW	
Free Space Loss	200.0 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Net Path Loss	200.5 dB	
Power Flux Density	-82.8 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	28.9 dBi	Gridded Reflector
Receive Line Loss	1.3 dB	Allocation
System Noise Temperature	27.1 dB-K	
Receive G/T	1.8 dB/K	(Clear Sky)
Received Carrier Level	-91.7 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	109.8 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	37.3 dB	Beam 4V, Worst-case

TABLE 3 - SCENARIO V - C-BAND (FSS) - DOWNLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 3.95 GHz

Transmitter Power	0.7 dBW	1.18 Watts
Transmit Line Loss	1.3 dB	Allocation
Transmitting Antenna Gain	36.8 dBi	Gridded Reflector
Output Back-Off	3.0 dB	
EIRP	33.2 dBW	
Free Space Loss	196.1 dB	38700 km; 30° Elev. Ang.
Polarization Loss	0.0 dB	Allocation
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Net Path Loss	196.6 dB	
Power Flux Density	-129.5 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	50.1 dBi	10 m dish, 60% eff.
Receive Line Loss	0.1 dB	Allocation
System Noise Temperature	19.5 dB-K	
Receive G/T	30.6 dB/K	(Clear Sky)
Received Carrier Level	-113.3 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	95.8 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	23.3 dB	
Required C/N	18.0 dB	Studio Reception
Link Margin	5.3 dB	
Overall C/N	23.1 dB	37.3 dB Uplink C/N
Weighted (S/N)w Ratio	54.1 dB	CCIR Type M
Minimum (S/N)w	48.0 dB	Quality: Excellent (TASO)
(S/N)w Margin	6.1 dB	

TABLE 4 - SCENARIO V - Ku-BAND (FSS) - LINK BUDGET

MODULATION: CSSB, Suppressed Carrier (6000 HVC/36 MHz)

Mid-band Downlink Freq. =	11.95 GHz	Saturated EIRP =	39.0 dBW
Mid-band Uplink Freq. =	14.25 GHz	SFD =	-84.0 dBW/m^2
Uplink Free Space Loss =	207.3 dB	Satellite Gain =	171.4 dB
No. of Channels, N =	6000	Satellite G/T =	5.7 dB/K

Transmitter Power	0.6 dBW	1.15 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	39.9 dBi	Gridded Reflector
Output Backoff	5.0 dB	
Net EIRP	34.4 dBW	
Total Load	22.6 dBm0	-15.2 + 10 Log N
Reference Power EIRP, Pr	11.8 dBW	Net EIRP - Total Load
Free Space Loss	205.8 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	209.4 dB	
Power Flux Density	-128.3 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% eff.
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.3 dB-K	
Receive G/T	34.4 dB/K	(Clear Sky)
Boltzmann's Constant	-228.6 dBW/Hz-K	
Downlink Pr/No	65.5 dB-Hz	
Uplink Pr/No	74.8 dB-Hz	Beam 6, Worst-case
Downlink Interference Pr/Io	78.1 dB-Hz	
Uplink Interference Pr/Io	75.8 dB-Hz	
Intermodulation Pr/IMo	68.9 dB-Hz	14.7 dB = P1/P3
Terrestrial Pr/Io	86.5 dB-Hz	
Cross-polarization Pr/Io	85.3 dB-Hz	
Overall Pr/No	63.1 dB-Hz	
Required Pr/No	61.9 dB-Hz	
Pr/No Margin	1.2 dB-Hz	

TABLE 5 - SCENARIO V - Ku (FSS) - UPLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 14.25 GHz

Transmitter Power	29.0 dBW	800.00 Watts
Transmit Line Loss	0.2 dB	Allocation
Transmitting Antenna Gain	58.2 dBi	7 m dish, 60% eff.
Input Back-Off	3.0 dB	
Net EIRP	84.0 dBW	
Free Space Loss	207.3 dB	38700 km; 30° Elev. Ang.
Pointing Loss	1.0 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	211.4 dB	
Power Flux Density	-78.7 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	33.4 dBi	Gridded Reflector
Receive Line Loss	1.1 dB	Allocation
System Noise Temperature	27.7 dB-K	
Receive G/T	5.7 dB/K	(Clear Sky)
Received Carrier Level	-93.9 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	106.9 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	34.4 dB	Beam 6, Worst-case

TABLE 6 - SCENARIO V - Ku (FSS) - DOWNLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 11.95 GHz

Transmitter Power	0.6 dBW	1.15 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	39.9 dBi	Gridded Reflector
Output Back-Off	3.0 dB	
Net EIRP	36.4 dBW	
Free Space Loss	205.8 dB	38700 km; 30° Elev. Ang.
Pointing Loss	1.0 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	0.0 dB	
Net Path Loss	206.9 dB	
Power Flux Density	-126.3 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% eff.
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	
Receive G/T	34.2 dB/K	(Clear Sky)
Received Carrier Level	-113.7 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	92.4 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	19.8 dB	
Required C/N	18.0 dB	Studio Reception
Link Margin	1.8 dB	
Overall C/N	19.7 dB	34.4 dB Uplink C/N
Weighted (S/N)w Ratio	50.7 dB	CCIR Type M
Minimum (S/N)w	48.0 dB	Quality: Excellent (TASO)
(S/N)w Margin	2.7 dB	

TABLE 7 - SCENARIO V - Ka-BAND (FSS) - UPLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Mid-band Frequency = 28.75 GHz

	Uncoded	Remarks
Transmitter Power	23.0 dBW	200.0 Watts
Transmit Line Loss	1.0 dB	Allocation
Transmitting Antenna Gain	64.3 dBi	7 m dish, 60% efficiency
EIRP	86.3 dBW	
Free Space Loss	213.4 dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	1.0 dB	
Rain Margin	10.0 dB	
Net Path Loss	224.9 dB	
Power Flux Density	-76.4 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	53.0 dBi	Solid Reflector
Receive Line Loss	1.0 dB	Allocation
System Noise Temperature	28.8 dB-K	
Receive G/T	24.2 dB/K	(Clear Sky)
Received Carrier Level	-85.6 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	114.2 dB-Hz	

TABLE 8 - SCENARIO V - Ka-BAND (FSS) - DOWNLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Mid-band Frequency = 18.95 GHz

	Uncoded	Remarks
Transmitter Power	14.8 dBW	30.0 Watts
Transmit Line Loss	1.0 dB	Allocation
Transmitting Antenna Gain	53.0 dBi	Solid Reflector
EIRP	66.8 dBW	
Free Space Loss	209.8 dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	1.0 dB	
Rain Margin	10.0 dB	
Net Path Loss	221.3 dB	
Power Flux Density	-96.0 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	60.7 dBi	7 m dish, 60% efficiency
Receive Line Loss	1.0 dB	Allocation
System Noise Temperature	26.0 dB-K	
Receive G/T	34.7 dB/K	(Clear Sky)
Received Carrier Level	-93.8 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	108.9 dB-Hz	
Information Bit Rate	89.8 dB-Hz	960 Mb/s
Implementation Loss	2.0 dB	Allocation
Required Eb/No	14.0 dB	BER=10^{-6}
Required C/kT	105.8 dB	
	======	
C/kT Margin	3.0 dB	

TABLE 9 - SCENARIO V - Ka-BAND (Scan) - UPLINK BUDGET

MODULATION: SS/TDMA/QPSK
CODING: Convolutional, r=1/2, k=7; Viterbi Decoding Algorithm, Q=8

Mid-band Frequency = 28.75 GHz

	Uncoded	Coded		Remarks
Transmitter Power	23.0	23.0	dBW	200.0 W uncoded;200.0 W coded
Transmit Line Loss	1.0	1.0	dB	Allocation
Transmitting Antenna Gain	61.4	61.4	dBi	5 m dish, 60% efficiency
EIRP	83.4	83.4	dBW	
Free Space Loss	213.4	213.4	dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5	0.5	dB	Allocation
Atmospheric Degradation	1.0	1.0	dB	
Rain Margin	0.0	10.0	dB	
Net Path Loss	214.9	224.9	dB	
Power Flux Density	-79.3	-79.3	dBW/m^2	
Receiving Antenna Gain	50.8	50.8	dBi	Solid Reflector
Receive Line Loss	1.0	1.0	dB	Allocation
System Noise Temperature	28.8	28.8	dB-K	
Receive G/T	22.0	22.0	dB/K	(Clear Sky)
Received Carrier Level	-80.7	-90.7	dBW	
Boltzmann's Constant	-228.6	-228.6	dBW/Hz-K	
Received C/kT	119.1	109.1	dB-Hz	
Information Bit Rate	86.8	83.8	dB-Hz	480 Mb/s; 240 Mb/s
Implementation Loss	2.0	2.0	dB	Allocation
Required Eb/No	10.5	6.5	dB	Coding Gain=4.0 dB; BER=10^{-6}
Required C/kT	99.3	92.3	dB	
C/kT Margin	19.8	16.8	dB	

TABLE 10 - SCENARIO V - Ka-BAND (Scan) - DOWNLINK BUDGET

MODULATION: SS/TDMA/QPSK
CODING: Convolutional, r=1/2, k=7; Viterbi Decoding Algorithm, Q=8

Mid-band Frequency = 18.95 GHz

	Uncoded	Coded		Remarks
Transmitter Power	8.8	18.8	dBW	7.5 W uncoded; 75.0 W coded
Transmit Line Loss	1.0	1.0	dB	Allocation
Transmitting Antenna Gain	50.8	50.8	dBi	Solid Reflector
EIRP	58.6	68.6	dBW	
Free Space Loss	209.8	209.8	dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5	0.5	dB	Allocation
Atmospheric Degradation	1.0	1.0	dB	
Rain Margin	0.0	10.0	dB	
Net Path Loss	211.3	221.3	dB	
Power Flux Density	-104.2	-94.2	dBW/m^2	
Receiving Antenna Gain	61.4	61.4	dBi	5 m dish, 60% efficiency
Receive Line Loss	1.0	1.0	dB	Allocation
System Noise Temperature	26.0	26.0	dB-K	
Receive G/T	35.4	35.4	dB/K	(Clear Sky)
Received Carrier Level	-91.3	-91.3	dBW	
Boltzmann's Constant	-228.6	-228.6	dBW/Hz-K	
Received C/kT	111.3	111.3	dB-Hz	
Information Bit Rate	86.8	83.8	dB-Hz	480 Mb/s; 240 Mb/s
Implementation Loss	2.0	2.0	dB	Allocation
Required Eb/No	10.5	6.5	dB	Coding Gain=4.0 dB; BER=10^{-6}
Required C/kT	99.3	92.3	dB	
	======	======		
C/kT Margin	12.0	19.0	dB	

APPENDIX J

PAYLOAD DETAILS FOR SCENARIO VI-A

J-1 - C-BAND INTERNATIONAL PAYLOAD

Beam coverages and acronymn definitives for this payload are given as the first part of this appendix. Three of the beams (CONUS, AOREUR, PORLAN) are "pseudo beams"; ISLs, of course, do not really cover Europe or Africa. The use of pseudo beams simplifies the payload data base. Conus is a single preudo-beam representing all of the U.S. The NASA total forecasts included circuits routed to gateway stations, so this pseudo-beam represents a portion of the VI-A traffic loaded to U.S. transponders. A scale factor of 1.0 was used, i.e., all requirements can be carried on a single satellite. Traffic loading is provided for year 2008.

J-1.1 Beam Definition And Coverage

The beam definition and associated coverage areas for Scenario VI-A are as follows:

BEAM NO.	BEAM ACRONYMN	BEAM DESCRIPTION
1	CAM-N	Northern portion of Central America
2	CARIB	Caribbean Islands (Haiti, Dominican Republic, etc.)
3	SAM-CI	Caribbean coastland/islands of South America
4	VENEZ	Single country -- Venezuela
5	COLUMB	Single country -- Colombia
6	CAM-S	Southern portion of Central America
7	SAM-MP	Mid-Pacific coastland/inland of South America
8	BRAZIL	Single country -- Brazil
9	SAM-S	Southern portion of South America
10	CONUS	Continental United States (psuedo-beam)
11	AOREUR	ISL to Europe/Africa (psuedo-beam)
12	PORCAN	ISL to Canada/Pacific (pseudo-beam)

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BEAM COVERAGES

Beam: CAM-N

EL SALVADOR	GUATEMALA	HONDURAS	MEXICO	

Beam: CARIB

DOM. REP.	HAITI	JAMAICA	U.S. (PR)	

Beam: SAM-CI

BARBADOS	FRANCE (FG)	FRANCE (MA)	SURINAM	TRIN&TOBAGO

Beam: VENEZ
VENEZUELA

Beam: COLUMB
COLUMBIA

Beam: CAM-S

COSTA RICA	EQUADOR	NICARAGUA	PANAMA	

Beam: SAM-MP

BOLIVIA	PARAGUAY	PERU		

Beam: BRAZIL
BRAZIL

Beam: SAM-S

ARGENTINA	CHILE	URUGUAY		

Beam: CONUS
U.S.

Beam: AOREUR

ALGERIA	ANGOLA	AUSTRIA	BAHAMAS	BAHRAIN
BELGIUM	BENIN	CAMEROON	CHAD	CONGO
CYPRUS	EGYPT	ETHIOPIA	FRANCE	GABON
GERMANY, FR	GHANA	GREECE	ICELAND	IRAN
IRAQ	IRELAND	ISRAEL	ITALY	IVORY COAST
JORDAN	KENYA	KUWAIT	LEBANON	LIBERIA
LIBYA	MALAWI	MALI	MAURITANIA	MOROCCO
MOZAMBIQUE	NETHERLANDS	NIGER	NIGERIA	NORDIC GRP
POLAND	PORTUGAL	QATAR	ROMANIA	SAUDI AR.
SENEGAL	SIERRA LEONE	SOUTH AF.	SPAIN	SUDAN
SWITZERLAND	TANZANIA	TOGO	TUNISIA	TURKEY
UGANDA	U.A.E.	U.K. (ASC)	U.K. (BER)	U.K.
UPPER VOLTA	U.S.S.R.	YEMEN, A.R.	YUGOSLAVIA	ZAIRE
ZIMBABWE				

Beam: PORCAN

AUSTRALIA	CANADA	CHINA (PEK)	CHINA (TAI)	FIJI
FRANCE (NC)	HONG KONG	INDIA	INDONESIA	JAPAN
KOREA	MALAYSIA	NEW ZEALAND	PHILIPPINES	SINGAPORE
SRI LANKA	THAILAND	U.S.-GUAM	U.S.-HAW	

J-1.2 International C-Band Beam To Beam Matrix

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Beam to Beam Matrix
Voice -- Scenario VI-A

Class = ANVC

From:
To:

From								
CAM-N								
	CARIB	156	VENEZ	274	COLUMB	302	CAM-S	161
	SAM-MP	90	BRAZIL	137	SAM-S	358	CONUS	2362
	AOREUR	2810	PORCAN	448				
CARIB								
	CAM-N	156	SAM-CI	357	VENEZ	44	COLUMB	107
	CAM-S	19	SAM-MP	19	SAM-S	41	CONUS	3979
	AOREUR	1160	PORCAN	648				
SAM-CI								
	CARIB	357	BRAZIL	30	CONUS	1380	AOREUR	1570
	PORCAN	325						
VENEZ								
	CAM-N	274	CARIB	44	CAM-S	360	SAM-MP	184
	BRAZIL	214	SAM-S	398	CONUS	3267	AOREUR	2220
	PORCAN	162						
COLUMB								
	CAM-N	302	CARIB	107	CAM-S	411	SAM-MP	112
	BRAZIL	137	SAM-S	205	CONUS	4734	AOREUR	1355
	PORCAN	129						
CAM-S								
	CAM-N	161	CARIB	19	VENEZ	360	COLUMB	411
	CAM-S	148	SAM-MP	110	BRAZIL	222	SAM-S	332
	CONUS	3527	AOREUR	1876	PORCAN	205		
SAM-MP								
	CAM-N	90	CARIB	19	VENEZ	184	COLUMB	112
	CAM-S	110	BRAZIL	348	SAM-S	403	CONUS	2671
	AOREUR	1654	PORCAN	117				
BRAZIL								
	CAM-N	137	SAM-CI	30	VENEZ	214	COLUMB	137
	CAM-S	222	SAM-MP	348	SAM-S	508	CONUS	2003
	AOREUR	2203	PORCAN	145				
SAM-S								
	CAM-N	358	CARIB	41	VENEZ	398	COLUMB	205
	CAM-S	332	SAM-MP	403	BRAZIL	508	SAM-S	302
	CONUS	2427	AOREUR	3897	PORCAN	436		
CONUS								
	CAM-N	2362	CARIB	3979	SAM-CI	1380	VENEZ	3267
	COLUMB	4734	CAM-S	3527	SAM-MP	2671	BRAZIL	2003
	SAM-S	2427	AOREUR	84319	PORCAN	36331		

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AOREUR								
	CAM-N	2810	CARIB	1160	SAM-CI	1570	VENEZ	2220
	COLUMB	1355	CAM-S	1876	SAM-MP	1654	BRAZIL	2203
	SAM-S	3897	CONUS	84193	PORCAN	7989		
PORCAN								
	CAM-N	448	CARIB	648	SAM-CI	325	VENEZ	162
	COLUMB	129	CAM-S	205	SAM-MP	117	BRAZIL	145
	SAM-S	436	CONUS	36334	AOREUR	7989		

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SUMMARY

	ANVC
CAM-N	7098
CARIB	6530
SAM-CI	3662
VENEZ	7123
COLUMB	7492
CAM-S	7371
SAM-MP	5708
BRAZIL	5947
SAM-S	9307
CONUS	147000
AOREUR	110927
PORCAN	46938
Totals	365103

J-1.3 International C-Band Transponder Loading

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Transponder Loading
Voice -- Scenario VI-A

From	To	Channel	Class	Circuits
CAM-N	SS	H-1	ANVC	2800
CAM-N	SS	H-2	ANVC	2800
CAM-N	SS	H-3	ANVC	1498
CAM-N		H-4	VIDEO	
CAM-N		H-5	VIDEO	
CAM-N		H-6	VIDEO	
CAM-N		H-7	VIDEO	
CAM-N		H-8	VIDEO	
CAM-N		H-9		
CAM-N		H-10		
CAM-N		H-11		
CAM-N		H-12		
CARIB	SS	V-1	ANVC	2800
CARIB	SS	V-2	ANVC	2800
CARIB	SS	V-3	ANVC	930
CARIB		V-4	VIDEO	
CARIB		V-5	VIDEO	
CARIB		V-6	VIDEO	
CARIB		V-7	VIDEO	
CARIB		V-8	VIDEO	
CARIB		V-9		
CARIB		V-10		
CARIB		V-11		
CARIB		V-12		
SAM-CI	SS	H-1	ANVC	2800
SAM-CI	SS	H-2	ANVC	862
SAM-CI		H-3	VIDEO	
SAM-CI		H-4	VIDEO	
SAM-CI		H-5	VIDEO	
SAM-CI		H-6	VIDEO	
SAM-CI		H-7	VIDEO	
SAM-CI		H-8		
SAM-CI		H-9		
SAM-CI		H-10		
SAM-CI		H-11		
SAM-CI		H-12		
VENEZ	SS	V-1	ANVC	2800
VENEZ	SS	V-2	ANVC	2800
VENEZ	SS	V-3	ANVC	1523
VENEZ		V-4	VIDEO	

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VENEZ		V-5	VIDEO	
VENEZ		V-6	VIDEO	
VENEZ		V-7	VIDEO	
VENEZ		V-8		
VENEZ		V-9		
VENEZ		V-10		
VENEZ		V-11		
VENEZ		V-12		
COLUMB	SS	H-1	ANVC	2800
COLUMB	SS	H-2	ANVC	2800
COLUMB	SS	H-3	ANVC	1892
COLUMB		H-4	VIDEO	
COLUMB		H-5	VIDEO	
COLUMB		H-6	VIDEO	
COLUMB		H-7	VIDEO	
COLUMB		H-8		
COLUMB		H-9		
COLUMB		H-10		
COLUMB		H-11		
COLUMB		H-12		
CAM-S	SS	V-1	ANVC	2800
CAM-S	SS	V-2	ANVC	2800
CAM-S	SS	V-3	ANVC	1771
CAM-S		V-4	VIDEO	
CAM-S		V-5	VIDEO	
CAM-S		V-6	VIDEO	
CAM-S		V-7	VIDEO	
CAM-S		V-8	VIDEO	
CAM-S		V-9		
CAM-S		V-10		
CAM-S		V-11		
CAM-S		V-12		
SAM-MP	SS	V-1	ANVC	2800
SAM-MP	SS	V-2	ANVC	2800
SAM-MP	SS	V-3	ANVC	108
SAM-MP		V-4	VIDEO	
SAM-MP		V-5	VIDEO	
SAM-MP		V-6	VIDEO	
SAM-MP		V-7	VIDEO	
SAM-MP		V-8		
SAM-MP		V-9		
SAM-MP		V-10		
SAM-MP		V-11		
SAM-MP		V-12		
BRAZIL	SS	V-1	ANVC	2800
BRAZIL	SS	V-2	ANVC	2800
BRAZIL	SS	V-3	ANVC	347
BRAZIL		V-4	VIDEO	
BRAZIL		V-5	VIDEO	
BRAZIL		V-6	VIDEO	

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BRAZIL		V-7	VIDEO	
BRAZIL		V-8		
BRAZIL		V-9		
BRAZIL		V-10		
BRAZIL		V-11		
BRAZIL		V-12		
SAM-S	SS	H-1	ANVC	2800
SAM-S	SS	H-2	ANVC	2800
SAM-S	SS	H-3	ANVC	2800
SAM-S	SS	H-4	ANVC	907
SAM-S		H-5	VIDEO	
SAM-S		H-6	VIDEO	
SAM-S		H-7	VIDEO	
SAM-S		H-8	VIDEO	
SAM-S		H-9	VIDEO	
SAM-S		H-10		
SAM-S		H-11		
SAM-S		H-12		
CONUS	SS	P1-1	ANVC	147000
AOREUR	SS	P2-1	ANVC	110927
PORCAN	SS	P3-1	ANVC	46938

Totals

ANVC : 365103

J-2 - LINK BUDGETS FOR SCENARIO VI-A

TABLE 1-A - SCENARIO VI-A - C-BAND (FSS) INTERNATIONAL - UPLINK BUDGET

MODULATION: FDM-FM-FDMA

Mid-band Frequency = 6.15 GHz

No. of Voice Channels, N = 2,800

Transmitter Power	29.0 dBW	800.00 watts
Transmit Line Losses	0.1 dB	Allocation
Transmitting Antenna Gain	54.0 dBi	10-m dish, 60% eff.
Output Back-Off	5.0 dB	
Net EIRP	77.9 dBW	
Free Space Loss	200.0 dB	38,700 km; 30^{o} Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Rain Margin	0.0 dB	
Net Path Loss	200.5 dB	
Power Flux Density	-84.8 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	24.7 dBi	Gridded Reflector
Receive Line Losses	1.3 dB	Allocation
System Noise Temperature	27.1 dB-K	Referred to antenna output
Receive G/T	-2.4 dB/K	(Clear Sky)
Received Carrier Level	-97.9 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Uplink C/kT	103.6 dB-Hz	
Occupied IF Bandwidth	75.6 dB-Hz	36.0 MHz IF Bandwidth
Received C/N	28.1 dB	

TABLE 1-B - SCENARIO VI-A - C-BAND (FSS) INTERNATIONAL - DOWNLINK BUDGET

MODULATION: FDM-FM-FDMA

Mid-band Frequency = 3.95 GHz

No. of Voice Channels, N = 2,800

Transmitter Power	4.0 dBW	2.50 watts
Transmit Line Losses	1.3 dB	Allocation
Transmitting Antenna Gain	33.6 dBi	Gridded Reflector
Output Back-Off	5.0 dB	
Net EIRP	31.3 dBW	
Free Space Loss	196.1 dB	38,700 km; 30^{0} Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Rain Margin	0.0 dB	
Net Path Loss	196.6 dB	
Power Flux Density	-131.5 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	50.1 dBi	10-m dish, 60% efficiency
Receive Line Losses	0.1 dB	Allocation
System Noise Temperature	19.5 dB-K	Referred to antenna output
Receive G/T	30.6 dB/K	(Clear Sky)
Received Carrier Level	-115.3 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Downlink C/kT	93.9 dB-Hz	
Occupied IF Bandwidth	75.6 dB-Hz	36.0 MHz IF Bandwidth
Downlink C/N	18.3 dB	
Uplink C/N	28.1 dB	
Overall C/N	17.9 dB	
Required Minimum C/N	10.0 dB	Threshold Extension Detector
C/N Margin	8.3 dB	

TABLE 2 - SCENARIO VI-A - C-BAND (FSS) INTERNATIONAL - UPLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 6.15 GHz

Transmitter Power	29.0 dBW	800.00 Watts
Transmit Line Loss	0.1 dB	Allocation
Transmitting Antenna Gain	54.0 dBi	10 m dish, 60% eff.
Input Back-Off	3.0 dB	
Net EIRP	79.9 dBW	
Free Space Loss	200.0 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Net Path Loss	200.5 dB	
Power Flux Density	-82.8 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	33.6 dBi	Gridded Reflector
Receive Line Loss	1.3 dB	Allocation
System Noise Temperature	27.1 dB-K	
Receive G/T	6.5 dB/K	(Clear Sky)
Received Carrier Level	-87.0 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	114.5 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	42.0 dB	Worst-case

TABLE 3 - SCENARIO VI-A - C-BAND (FSS) INTERNATIONAL - DOWNLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 3.95 GHz

Transmitter Power	4.0 dBW	2.50 Watts
Transmit Line Loss	1.3 dB	Allocation
Transmitting Antenna Gain	33.6 dBi	Gridded Reflector
Output Back-Off	3.0 dB	
EIRP	33.3 dBW	
Free Space Loss	196.1 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Net Path Loss	196.6 dB	
Power Flux Density	-129.5 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	50.1 dBi	10 m dish, 60% eff.
Receive Line Loss	0.1 dB	Allocation
System Noise Temperature	19.5 dB-K	
Receive G/T	30.6 dB/K	(Clear Sky)
Received Carrier Level	-113.3 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	95.9 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	23.3 dB	
Required C/N	18.0 dB	Studio Reception
	======	
Link Margin	5.3 dB	
Overall C/N	23.3 dB	42.0 dB Uplink C/N
Weighted (S/N)w Ratio	54.3 dB	CCIR Type M
Minimum (S/N)w	48.0 dB	Quality: Excellent (TASO)
	======	
(S/N)w Margin	6.3 dB	

TABLE 4 - SCENARIO VI-A - C-BAND (MARITIME) - UPLINK BUDGET

FORWARD LINK: Shore-to-Satellite

MODULATION: SCPC/FM (Voice Channel)

Mid-band Frequency = 6.433 GHz

Transmitter Power	19.0 dBW	80.00 Watts/Channel
Transmit Line Loss	0.1 dB	Allocation
Transmitting Antenna Gain	54.4 dBi	10-m dish, 60% eff.
Input Back-Off	3.0 dB	
Net EIRP/Channel	70.3 dBW	
Free Space Loss	200.8 dB	40775 km; 10° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.4 dB	
Net Path Loss	201.7 dB	
Power Flux Density	-92.9 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	18.2 dBi	Solid Reflector
Receive Line Loss	0.4 dB	Allocation
System Noise Temperature	29.7 dB-K	
Receive G/T	-11.5 dB/K	(Clear Sky)
Received Carrier Level	-113.2 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	85.7 dB-Hz	

TABLE 5 - SCENARIO VI-A - L-BAND (MARITIME) - DOWNLINK BUDGET

FORWARD LINK: Satellite-To-Ship

MODULATION: SCPC/FM - Standard A (Voice Channel)

Mid-band Frequency = 1.538 GHz

Transmitter Power	1.0 dBW	1.25 Watts/Channel
Transmit Line Loss	1.5 dB	Allocation
Transmitting Antenna Gain	18.2 dBi	Solid Reflector
Output Back-Off	3.0 dB	
Net EIRP/Channel	14.6 dBW	
Free Space Loss	188.4 dB	40775 km; 10° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.2 dB	
Net Path Loss	189.1 dB	
Power Flux Density	-148.5 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	22.0 dBi	1 m dish, 60% eff.
Receive Line Loss	0.6 dB	Allocation
System Noise Temperature	26.0 dB-K	
Receive G/T	-4.0 dB/K	(Clear Sky)
Received Carrier Level	-152.4 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	50.1 dB-Hz	
Overall C/kT	50.1 dB-Hz	85.7 dB Uplink C/kT

TABLE 6 - SCENARIO VI-A - L-BAND (MARITIME) - UPLINK BUDGET

RETURN LINK: Ship-to-Satellite

MODULATION: SCPC/FM - Standard A (Voice Channel)

Mid-band Frequency = 1.637 GHz

Transmitter Power	13.6 dBW	23.00 Watts/Channel
Transmit Line Loss	0.1 dB	Allocation
Transmitting Antenna Gain	22.5 dBi	1-m dish, 60% eff.
Net EIRP/Channel	36.0 dBW	
Free Space Loss	188.9 dB	40775 km; 10° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.2 dB	
Net Path Loss	189.6 dB	
Power Flux Density	-127.2 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	18.2 dBi	Solid Reflector
Receive Line Loss	0.6 dB	Allocation
System Noise Temperature	27.8 dB-K	
Receive G/T	-9.6 dB/K	(Clear Sky)
Received Carrier Level	-135.4 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	65.4 dB-Hz	

TABLE 7 - SCENARIO VI-A - C-BAND (MARITIME) - DOWNLINK BUDGET

RETURN LINK: Satellite-to-Shore

MODULATION: SCPC/FM - (Voice Channel)

Mid-band Frequency = 3.6105 GHz

Transmitter Power	-18.2 dBW	0.015 Watts/Channel
Transmit Line Loss	1.2 dB	Allocation
Transmitting Antenna Gain	18.2 dBi	Solid Reflector
Net EIRP/Channel	-1.2 dBW	
Free Space Loss	195.8 dB	40775 km; 10° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.4 dB	
Net Path Loss	196.7 dB	
Power Flux Density	-164.4 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	49.4 dBi	10-m dish, 60% eff.
Receive Line Loss	0.1 dB	Allocation
System Noise Temperature	20.5 dB-K	
Receive G/T	28.9 dB/K	(Clear Sky)
Received Carrier Level	-148.5 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	59.5 dB-Hz	
Overall C/kT	58.5 dB-Hz	65.4 dB Uplink C/kT

TABLE 8 - SCENARIO VI-A - TRANSATLANTIC CROSSLINK BUDGET

MODULATION: QPSK

Frequency = 60.0 GHz

	Uncoded	
Transmitter Power	7.0 dBW	5.0 Watts
Transmit Line Loss	1.5 dB	Allocation
Transmitting Antenna Gain	64.0 dBi	3 m Dish, 70% Eff.
EIRP	69.5 dBW	
Free Space Loss	226.4 dB	83330 km, 160° apart
Polarization Loss	0.1 dB	Allocation
Total Path Loss	226.5 dB	
Power Flux Density	-99.9 dBW/m^2	
Receiving Antenna Gain	64.0 dBi	3 m Dish, 70% Eff.
Receive Line Loss	1.5 dB	Allocation
System Noise Temperature	29.1 dB-K	
Receive G/T	34.9 dB/K	
Received Carrier Level	-93.0 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	106.5 dB-Hz	
Information Bit Rate	91.8 dB-Hz	1.5 Gb/s
Implementation Loss	2.0 dB	Allocation
Required Eb/No	10.5 dB	BER = 10^{-6}
Required C/kT	104.3 dB-Hz	
Link Margin	2.2 dB	

APPENDIX K

PAYLOAD DETAILS FOR SCENARIO VI-B

K-1 - C-BAND NON-CONUS PAYLOAD

Non-U.S. domestic requirement loadings are contained in this appendix. Canada, Mexico, and Latin America are each treated separately, so there are three sets of Beams coverage, Beam to Beam Matrices, and Transponder Loadings. The scale factor used was 1.0 in all three cases. Traffic loading is provided for year 2008.

K-1.1 C-Band Beam Coverage

The C-Band beam defnitions for Scenario VI-6 are as follows:

BEAM NO.	BEAM ACRONYMN	BEAM DESCRIPTION
1	CAN-W	Western Canada
2	CAN-C	Central Canada
3	CAN-E	Eastern Canada
4	MEX-N	Northern Mexico (split)
5	MEX-S	Southern Mexico (split)
6	--	Central America/Caribbean
7	SAM-N	Northern South America (split)
8	SAM-S	Southern South America (split)
9	BRAZC	Brazil (Rio/Sao Paulo)

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BEAM COVERAGES

Beam: CAN-W

ALBERTA	BRITISH COL.	N.W. TERR.	SASKWAN	YUKON

Beam: CAN-C

MANITOBA	ONTARIO 2

Beam: CAN-E

NEW BRUN.	NEWFNDLND	NOVA SCOTIA	PR. ED. IS.	QUEBEC 2

Beam: SPOT1
ONTARIO 1

Beam: SPOT2
QUEBEC 1

Beam: ISL
ISL

K-1.2 C-Band Beam To Beam Matrix

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Beam to Beam Matrix
Scenario VI-B -- Canada
(HVC)

Class = DVCC

From:
To:

CAN-W								
	CAN-W	3890	CAN-C	2907	CAN-E	3934	SPOT1	10693
	SPOT2	5807	ISL	2653				
CAN-C								
	CAN-W	2907	CAN-C	1352	CAN-E	2075	SPOT1	5300
	SPOT2	3065	ISL	1400				
CAN-E								
	CAN-W	3934	CAN-C	2075	CAN-E	1995	SPOT1	7286
	SPOT2	3133	ISL	1808				
SPOT1								
	CAN-W	10693	CAN-C	5300	CAN-E	7286	ISL	4918
SPOT2								
	CAN-W	5807	CAN-C	3065	CAN-E	3133	ISL	2671
ISL								
	CAN-W	2653	CAN-C	1400	CAN-E	1808	SPOT1	4918
	SPOT2	2671						

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SUMMARY

	DVCC
CAN-W	29884
CAN-C	16099
CAN-E	20231
SPOT1	28197
SPOT2	14676
ISL	13450
Totals	122537

K-1.3 C-Band Transponder Loading

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Transponder Loading
Scenario VI-B -- Canada

From	To	Channel	Class	Circuits
CAN-W	CAN-C	V-1	DVCC	3000
CAN-W	SPOT1	V-2	DVCC	3000
CAN-W	SPOT1	V-3	DVCC	3000
CAN-W	SPOT1	V-4	DVCC	3000
CAN-W	SPOT1	V-5	DVCC	3000
CAN-W	SPOT1	V-6	DVCC	2653
CAN-W	CAN-W	V-7	DVCC	3000
CAN-W	CAN-E	V-8	DVCC	3000
CAN-W		V-9		
CAN-W	SS	V-10	DVCC	3000
CAN-W	SS	V-11	DVCC	3000
CAN-W	SS	V-12	DVCC	231
CAN-C	CAN-W	H-1	DVCC	3000
CAN-C	CAN-E	H-2	DVCC	3000
CAN-C	CAN-E	H-3	DVCC	3000
CAN-C	CAN-C	H-4	DVCC	3000
CAN-C		H-5		
CAN-C		H-6		
CAN-C	CAN-C	H-7	DVCC	3000
CAN-C	CAN-C	H-8	DVCC	3000
CAN-C	CAN-C	H-9	DVCC	2952
CAN-C	SS	H-10	DVCC	3000
CAN-C	SS	H-11	DVCC	3000
CAN-C	SS	H-12	DVCC	3000
CAN-E	SPOT1	V-1	DVCC	3000
CAN-E	CAN-C	V-2	DVCC	3000
CAN-E	CAN-C	V-3	DVCC	2208
CAN-E	CAN-E	V-4	DVCC	2049
CAN-E		V-5		
CAN-E		V-6		
CAN-E	SPOT1	V-7	DVCC	3000
CAN-E	CAN-W	V-8	DVCC	3000
CAN-E	SPOT1	V-9	DVCC	1286
CAN-E	SS	V-10	DVCC	3000
CAN-E	SS	V-11	DVCC	3000
CAN-E	SS	V-12	DVCC	1697
SPOT1	CAN-E	V-1	DVCC	3000
SPOT1	CAN-W	V-2	DVCC	3000
SPOT1	CAN-W	V-3	DVCC	3000
SPOT1	CAN-W	V-4	DVCC	3000
SPOT1	CAN-W	V-5	DVCC	1725
SPOT1		V-6		
SPOT1	CAN-E	V-7	DVCC	3000
SPOT1		V-8		
SPOT1	CAN-E	V-9	DVCC	1286
SPOT1	SS	V-10	DVCC	3000
SPOT1	SS	V-11	DVCC	3000
SPOT1		V-12		
ISL	SS	---	DVCC	13450

Totals

DVCC : 122537

K-2 - KU-BAND NON-CONUS PAYLOAD

K-2.1 Ku-Band Beam Description

The Ku-Band beam description for Scenario VI-B is as follows:

BEAM NO.	BEAM ACRONYMN	BEAM DESCRIPTION
1	SPOT	Canada (Toronto/Montreal -- split)
2	--	Mexico (2 channels)
3	BRAZK1	Brazil (vertical)
4	BRAZK2	Brazil (horizontal)

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BEAM COVERAGES

Beam: MEX-N1
MEXICO N.

Beam: MEX-N2
MEXICO C.

Beam: MEX-S
MEXICO S.

Beam: MEX-KU

C-5

K-2.2 Ku-Band Mexican Beam To Beam Matrix

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Beam to Beam Matrix
Scenario VI-B -- Mexico
(HVC)

Class = SCPC

From:
To:

From	To					
MEX-N1	MEX-N1	1540	MEX-N2	3850	MEX-S	2310
MEX-N2	MEX-N1	3850	MEX-N2	9625	MEX-S	5775
MEX-S	MEX-N1	2310	MEX-N2	5775	MEX-S	3465
MEX-KU						

****

SUMMARY

	SCPC
MEX-N1	7700
MEX-N2	19250
MEX-S	11550
MEX-KU	0
Totals	38500

K-2.3 Ku-Band Mexican Transponder Loading

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Transponder Loading
Scenario VI-B -- Mexico

From	To	Channel	Class	Circuits
MEX-N1	MEX-N1	H-1	SCPC	1800
MEX-N1	MEX-S	H-2	SCPC	1800
MEX-N1	MEX-N1	H-3	SCPC	1800
MEX-N1	MEX-S	H-4	SCPC	1800
MEX-N1	MEX-N1	H-5	SCPC	1800
MEX-N1	MEX-S	H-6	SCPC	1800
MEX-N1	MEX-N1	H-7	SCPC	1800
MEX-N1	MEX-S	H-8	SCPC	1800
MEX-N1	MEX-N1	H-9	SCPC	1800
MEX-N1	MEX-S	H-10	SCPC	1800
MEX-N1		H-11		
MEX-N1	MEX-S	H-12	SCPC	1800
MEX-S	MEX-S	V-1	SCPC	1800
MEX-S	MEX-N1	V-2	SCPC	1800
MEX-S	MEX-S	V-3	SCPC	1800
MEX-S	MEX-N1	V-4	SCPC	1800
MEX-S	MEX-S	V-5	SCPC	1800
MEX-S	MEX-N1	V-6	SCPC	1800
MEX-S	MEX-S	V-7	SCPC	1800
MEX-S	MEX-N1	V-8	SCPC	1800
MEX-S	MEX-S	V-9	SCPC	700
MEX-S	MEX-N1	V-10	SCPC	1800
MEX-S		V-11		
MEX-S	MEX-N1	V-12	SCPC	1800
MEX-KU		V-11		
MEX-KU		V-12		

Totals

SCPC : 38500

K-2.4 Ku-Band Brazilian Beam Coverage

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BEAM COVERAGES

Beam: SAM-N1

COLUMBIA	ECUADOR	PERU	VENEZUELA	

Beam: SAM-N2

ACRE	AMAPA	AMAZONAS	PARA	RORAUMA

Beam: SAM-S1

ARGENTINA	BOLIVIA	CHILE		

Beam: SAM-S2

ALAGOAS	CEARA	GOIAS	MARANHAO	MATO GR.
PARAIBA	PERNAMBUCO	PIAUI	RIO GR. N.	RONDONIA
SERGIPE				

Beam: BRAZC

BAHIA	DIST. FED.	ESP. SANTO	GUANABARA	MINAS GER.
PARANA	RIO DE JAN.	RIO GR. S.	SANTA CAT.	SAO PAULO

Beam: BRAZK1

Beam: BRAZK2

K-2.5 Brazilian Ku-Band Beam To Beam Matrix

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Beam to Beam Matrix
Scenario VI-B -- South America
(HVC)

Class = SCPC

From:
To:

From	To		To		To	
SAM-N1	SAM-N1	11360				
SAM-N2	SAM-N2	95	SAM-S2	763	BRAZC	1790
SAM-S1	SAM-S1	8680				
SAM-S2	SAM-N2	763	SAM-S2	6245	BRAZC	14651
BRAZC	SAM-N2	1790	SAM-S2	14651	BRAZC	34357
BRAZK1						
BRAZK2						

****

SUMMARY

	SCPC
SAM-N1	11360
SAM-N2	2648
SAM-S1	8680
SAM-S2	21659
BRAZC	50798
BRAZK1	0
BRAZK2	0
Totals	95145

K-2.6 Brazilian Ku-Band Transponder Loading

Ford Aerospace &
Communications Corporation

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Transponder Loading
Scenario VI-B -- South America

From	To	Channel	Class	Circuits
SAM-N1	SAM-N1	V-1	SCPC	1800
SAM-N2	BRAZC	V-2	SCPC	1217
SAM-N1	SAM-N1	V-3	SCPC	1800
SAM-N2	BRAZK1	V-4	SCPC	1431
SAM-N1	SAM-N1	V-5	SCPC	1800
SAM-N2		V-6		
SAM-N1	SAM-N1	V-7	SCPC	1800
SAM-N2		V-8		
SAM-N1	SAM-N1	V-9	SCPC	1800
SAM-N2		V-10		
SAM-N1	SAM-N1	V-11	SCPC	1800
SAM-N1	SAM-N1	V-12	SCPC	560
SAM-S1	SAM-S1	H-1	SCPC	1800
SAM-S2	SAM-S2	H-2	SCPC	1800
SAM-S1	SAM-S1	H-3	SCPC	1800
SAM-S2	SAM-S2	H-4	SCPC	1800
SAM-S1	SAM-S1	H-5	SCPC	1800
SAM-S2	SAM-S2	H-6	SCPC	1800
SAM-S1	SAM-S1	H-7	SCPC	1800
SAM-S2	BRAZC	H-8	SCPC	1800
SAM-S1	SAM-S1	H-9	SCPC	1480
SAM-S2	BRAZC	H-10	SCPC	1800
SAM-S1		H-11		
SAM-S2	BRAZC	H-12	SCPC	1800
BRAZC	BRAZC	V-1	SCPC	1800
BRAZC	SAM-N2	V-2	SCPC	1695
BRAZC	BRAZC	V-3	SCPC	1800
BRAZC	BRAZK2	V-4	SCPC	1800
BRAZC	BRAZC	V-5	SCPC	1800
BRAZC	BRAZK1	V-6	SCPC	1800
BRAZC	BRAZC	V-7	SCPC	1800
BRAZC	SAM-S2	V-8	SCPC	1800
BRAZC	BRAZC	V-9	SCPC	1800
BRAZC	SAM-S2	V-10	SCPC	1800
BRAZC	BRAZC	V-11	SCPC	1504
BRAZC	SAM-S2	V-12	SCPC	1800
BRAZK1	BRAZK1	V-1	SCPC	1800
BRAZK1	BRAZK1	V-2	SCPC	1800
BRAZK1	BRAZK1	V-3	SCPC	1800
BRAZK1	SAM-N2	V-4	SCPC	858
BRAZK1	BRAZK1	V-5	SCPC	1800
BRAZK1	BRAZC	V-6	SCPC	1800
BRAZK1	BRAZK1	V-7	SCPC	1800
BRAZK1	BRAZK1	V-8	SCPC	1800
BRAZK1	BRAZK1	V-9	SCPC	1800
BRAZK1	BRAZK1	V-10	SCPC	1800
BRAZK1	BRAZK1	V-11	SCPC	1800
BRAZK1	BRAZK1	V-12	SCPC	1800
BRAZK2	BRAZK2	H-1	SCPC	1800
BRAZK2	BRAZK2	H-2	SCPC	1800
BRAZK2	BRAZK2	H-3	SCPC	1800
BRAZK2	BRAZC	H-4	SCPC	1800
BRAZK2	BRAZK2	H-5	SCPC	1800
BRAZK2	BRAZK2	H-6	SCPC	1800
BRAZK2	BRAZK2	H-7	SCPC	1800
BRAZK2	BRAZK2	H-8	SCPC	1800
BRAZK2	BRAZK2	H-9	SCPC	1800
BRAZK2	BRAZK2	H-10	SCPC	1800
BRAZK2	BRAZK2	H-11	SCPC	1800
BRAZK2		H-12		

Totals

SCPC : 95145

K-3 - LINK BUDGETS FOR SCENARIO VI-B

TABLE 1-A - SCENARIO VI-B - C-BAND (FSS) - UPLINK BUDGET
MEXICO, CARIBBEAN ISLANDS, AND SOUTH AMERICA

MODULATION: SCPC/FM - 1,800 HVC/36 MHz

Mid-band Frequency = 6.15 GHz
No. of Channels, N = 1,800

E/S Transmitter Power	29.0 dBW	800.0 Watts
Transmit Line Losses	0.1 dB	Allocation
Transmitting Antenna Gain	54.0 dBi	10-m Dish, 60% efficiency
Earth Station EIRP	82.9 dBW	
Output Back-Off	3.0 dB	
Loading Factor	32.6 dB	10 log N
Net EIRP/SCPC Channel	47.4 dBW	
Free Space Loss	200.0 dB	38,700 km; 30^{o} Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Rain Margin	0.0 dB	
Net Path Loss	200.5 dB	
Power Flux Density	-79.8 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	24.7 dBi	Gridded Reflector
Receive Line Losses	1.3 dB	Allocation
System Noise Temperature	27.1 dB-K	Referred to antenna output
Receive G/T	-2.4 dB/K	(Clear Sky)
Received Carrier Level	-128.4 dBW	per SCPC Channel
Boltzmann's Constant	-228.6 dBW/Hz-K	
Uplink C/kT	73.1 dB-Hz	per SCPC Channel
IF BW/ Channel	43.0 dB-Hz	20.0 kHz
Uplink C/N per Channel	30.1 dB	

TABLE 1-B - SCENARIO VI-B -C-BAND (FSS) - DOWNLINK BUDGET
MEXICO, CARIBBEAN ISLANDS, AND SOUTH AMERICA

MODULATION: SCPC/FM - 1,800 HVC/36 MHz

Mid-band Frequency = 3.95 GHz
No. of Channels, N = 1,800

Satellite Transmitter Power	11.1 dBW	13.0 watts
Transmit Line Losses	1.3 dB	Allocation
Transmitting Antenna Gain	26.3 dBi	Solid Reflector
Satellite EIRP	36.1 dBW	
Output Back-Off	3.0 dB	
Loading Factor	32.6 dB	10 log N
VOX Advantage	4.0 dB	40% Activity Factor
Net EIRP/SCPC Channel	4.6 dBW	
Free Space Loss	196.1 dB	38,700 km; 30^{o} Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Rain Margin	0.0 dB	
Net Path Loss	196.6 dB	
Power Flux Density	-126.6 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	50.1 dBi	10-m dish, 60% efficiency
Receive Line Losses	0.1 dB	Allocation
System Noise Temperature	19.5 dB-K	Referred to antenna output
Receive G/T	30.6 dB/K	(Clear Sky)
Received Carrier Level	-141.9 dBW	per SCPC Channel
Boltzmann's Constant	-228.6 dBW/Hz-K	
Downlink C/kT	67.2 dB-Hz	per SCPC Channel
Uplink C/kT	73.1 dB-Hz	per SCPC Channel
Total Channel C/kT	66.2 dB-Hz	
Required Total Channel C/kT	55.0 dB-Hz	51-56 dB-Hz Acceptable
C/kT Margin	11.2 dB	
IF Bandwidth/Channel	43.0 dB-Hz	20.0 kHz
Total C/N per Channel	23.2 dB	

TABLE 2 - SCENARIO VI-B - C-BAND (FSS) - UPLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 6.15 GHz

Transmitter Power	29.0 dBW	800.00 Watts
Transmit Line Loss	0.1 dB	Allocation
Transmitting Antenna Gain	54.0 dBi	10 m dish, 60% eff.
Input Back-Off	3.0 dB	
Net EIRP	79.9 dBW	
Free Space Loss	200.0 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Net Path Loss	200.5 dB	
Power Flux Density	-82.8 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	24.7 dBi	Gridded Reflector
Receive Line Loss	1.3 dB	Allocation
System Noise Temperature	27.1 dB-K	
Receive G/T	-2.4 dB/K	(Clear Sky)
Received Carrier Level	-95.9 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	105.6 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	33.1 dB	Beam 8V, Worst-case

TABLE 3 - SCENARIO VI-B - C-BAND (FSS) - DOWNLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 3.95 GHz

Transmitter Power	11.1 dBW	13.00 Watts
Transmit Line Loss	1.3 dB	Allocation
Transmitting Antenna Gain	26.3 dBi	Gridded Reflector
Output Back-Off	3.0 dB	
EIRP	33.1 dBW	
Free Space Loss	196.1 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.0 dB	
Net Path Loss	196.6 dB	
Power Flux Density	-129.6 dBW/m²	(Clear Sky)
Receiving Antenna Gain	50.1 dBi	10 m dish, 60% eff.
Receive Line Loss	0.1 dB	Allocation
System Noise Temperature	19.5 dB-K	
Receive G/T	30.6 dB/K	(Clear Sky)
Received Carrier Level	-113.4 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	95.7 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	23.2 dB	
Required C/N	18.0 dB	Studio Reception
Link Margin	5.2 dB	
Overall C/N	22.8 dB	33.1 dB Uplink C/N
Weighted (S/N)w Ratio	53.8 dB	CCIR Type M
Minimum (S/N)w	48.0 dB	Quality: Excellent (TASO)
(S/N)w Margin	5.8 dB	

TABLE 4 - SCENARIO VI-B - C-BAND (FSS) - UPLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Information Data Rate = 72 Mb/s

Mid-band Frequency = 6.15 GHz

	Uncoded	Remarks
Transmitter Power	29.0 dBW	800.0 Watts
Transmit Line Loss	0.1 dB	Allocation
Transmitting Antenna Gain	54.0 dBi	10-m dish, 60% efficiency
EIRP	82.9 dBW	
Free Space Loss	200.0 dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	0.0 dB	
Net Path Loss	200.6 dB	
Power Flux Density	-79.8 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	24.7 dBi	Gridded Reflector
Receive Line Loss	1.3 dB	Allocation
System Noise Temperature	27.1 dB-K	
Receive G/T	-2.4 dB/K	(Clear Sky)
Received Carrier Level	-93.0 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	108.5 dB-Hz	

TABLE 5 - SCENARIO VI-B - C-BAND (FSS) - DOWNLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Mid-band Frequency = 3.95 GHz

	Uncoded	Remarks
Transmitter Power	11.1 dBW	13.0 Watts
Transmit Line Loss	1.3 dB	Allocation
Transmitting Antenna Gain	26.3 dBi	Gridded Reflector
EIRP	36.1 dBW	
Free Space Loss	196.1 dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	0.0 dB	
Net Path Loss	196.7 dB	
Power Flux Density	-126.6 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	50.1 dBi	10-m dish, 60% efficiency
Receive Line Loss	0.1 dB	Allocation
System Noise Temperature	19.5 dB-K	
Receive G/T	30.6 dB/K	(Clear Sky)
Received Carrier Level	-110.5 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	98.6 dB-Hz	
Information Bit Rate	78.6 dB-Hz	72 Mb/s
Implementation Loss	2.0 dB	Allocation
Required Eb/No	14.0 dB	$BER=10^{-6}$
Required C/kT	94.6 dB-Hz	
	======	
C/kT Margin	4.1 dB	

TABLE 6 - SCENARIO VI-B - Ku-BAND (FSS) CANADA - LINK BUDGET

MODULATION: CSSB, Suppressed Carrier (3000 HVC/36 MHz)

Mid-band Downlink Freq. =	11.95 GHz	Saturated EIRP =	39.0 dBW
Mid-band Uplink Freq. =	14.25 GHz	SFD =	-84.0 dBW/m^2
Uplink Free Space Loss =	207.3 dB	Satellite Gain =	171.4 dB
No. of Channels, N =	3000	Satellite G/T =	21.1 dB/K

Transmitter Power	-8.2 dBW	0.15 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	48.8 dBi	Gridded Reflector
Output Backoff	5.0 dB	
Net EIRP	34.5 dBW	
Total Load	19.6 dBm0	-15.2 + 10 Log N
Reference Power EIRP, Pr	14.9 dBW	Net EIRP - Total Load
Free Space Loss	205.8 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	209.4 dB	
Power Flux Density	-128.3 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% eff.
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.3 dB-K	
Receive G/T	34.4 dB/K	(Clear Sky)
Boltzmann's Constant	-228.6 dBW/Hz-K	
Downlink Pr/No	68.6 dB-Hz	
Uplink Pr/No	93.2 dB-Hz	
Downlink Interference Pr/Io	81.2 dB-Hz	
Uplink Interference Pr/Io	78.9 dB-Hz	
Intermodulation Pr/IMo	71.9 dB-Hz	14.7 dB = P1/P3
Terrestrial Pr/Io	89.6 dB-Hz	
Cross-polarization Pr/Io	88.4 dB-Hz	
Overall Pr/No	66.4 dB-Hz	
Required Pr/No	61.9 dB-Hz	
Pr/No Margin	4.5 dB-Hz	

TABLE 7 - SCENARIO VI-B - Ku (FSS) CANADA - UPLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 14.25 GHz

Transmitter Power	29.0 dBW	800.00 Watts
Transmit Line Loss	0.2 dB	Allocation
Transmitting Antenna Gain	58.2 dBi	7 m dish, 60% eff.
Input Back-Off	3.0 dB	
Net EIRP	84.0 dBW	
Free Space Loss	207.3 dB	38700 km; 30^{o} Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	210.9 dB	
Power Flux Density	-78.7 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	48.8 dBi	Gridded Reflector
Receive Line Loss	1.1 dB	Allocation
System Noise Temperature	27.7 dB-K	
Receive G/T	21.1 dB/K	(Clear Sky)
Received Carrier Level	-78.0 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	122.8 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	50.3 dB	

TABLE 8 - SCENARIO VI-B - Ku (FSS) CANADA - DOWNLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 11.95 GHz

Transmitter Power	-8.2 dBW	0.15 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	48.8 dBi	Gridded Reflector
Output Back-Off	3.0 dB	
Net EIRP	36.5 dBW	
Free Space Loss	205.8 dB	38700 km; 30° Elev. A
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	0.0 dB	
Net Path Loss	206.4 dB	
Power Flux Density	-126.3 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% eff.
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	
Receive G/T	34.2 dB/K	(Clear Sky)
Received Carrier Level	-113.2 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	92.9 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	20.4 dB	
Required C/N	18.0 dB	Studio Reception
	======	
Link Margin	2.4 dB	
Overall C/N	20.4 dB	50.3 dB Uplink C/N
Weighted (S/N)w Ratio	51.4 dB	CCIR Type M
Minimum (S/N)w	48.0 dB	Quality: Excellent (TASO)
	======	
(S/N)w Margin	3.4 dB	

TABLE 9 - SCENARIO VI-B - Ku-BAND (FSS) CANADA - UPLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Information Data Rate = 72 Mb/s

Mid-band Frequency = 14.25 GHz

	Uncoded	Remarks
Transmitter Power	29.0 dBW	800.0 Watts
Transmit Line Loss	0.2 dB	Allocation
Transmitting Antenna Gain	58.2 dBi	7 m dish, 60% efficiency
EIRP	87.0 dBW	
Free Space Loss	207.3 dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	210.9 dB	
Power Flux Density	-75.7 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	48.8 dBi	Gridded Reflector
Receive Line Loss	1.1 dB	Allocation
System Noise Temperature	27.7 dB-K	
Receive G/T	21.1 dB/K	(Clear Sky)
Received Carrier Level	-75.0 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	125.8 dB-Hz	

TABLE 10 - SCENARIO VI-B - Ku-BAND (FSS) CANADA - DOWNLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Mid-band Frequency = 11.95 GHz

	Uncoded	Remarks
Transmitter Power	-8.2 dBW	0.15 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	48.8 dBi	Gridded Reflector
EIRP	39.5 dBW	
Free Space Loss	205.8 dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	0.0 dB	
Net Path Loss	206.4 dB	
Power Flux Density	-123.3 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% efficiency
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	
Receive G/T	34.2 dB/K	(Clear Sky)
Received Carrier Level	-110.2 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	95.9 dB-Hz	
Information Bit Rate	78.6 dB-Hz	72 Mb/s
Implementation Loss	1.5 dB	Allocation
Required Eb/No	14.0 dB	BER=10^{-6}
Required C/kT	94.1 dB-Hz	
C/kT Margin	1.9 dB	

TABLE 11-A - SCENARIO VI-B -Ku-BAND (FSS) MEXICO - UPLINK BUDGET

MODULATION: SCPC/FM - 1,800 HVC/36 MHz

Mid-band Frequency = 14.25 GHz
No. of Channels, N = 1,800

E/S Transmitter Power	29.0 dBW	800.0 Watts
Transmit Line Losses	0.2 dB	Allocation
Transmitting Antenna Gain	58.2 dBi	7-m Dish, 60% efficiency
Earth Station EIRP	87.0 dBW	
Output Back-Off	3.0 dB	
Loading Factor	32.6 dB	10 log N
Net EIRP/SCPC Channel	51.5 dBW	
Free Space Loss	207.3 dB	38,700 km; 30^{o} Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	210.9 dB	
Power Flux Density	-75.7 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	29.8 dBi	Gridded Reflector
Receive Line Losses	1.1 dB	Allocation
System Noise Temperature	27.7 dB-K	Referred to antenna output
Receive G/T	2.1 dB/K	(Clear Sky)
Received Carrier Level	-129.6 dBW	per SCPC Channel
Boltzmann's Constant	-228.6 dBW/Hz-K	
Uplink C/kT	71.3 dB-Hz	per SCPC Channel
IF BW/ Channel	43.0 dB-Hz	20.0 kHz
Uplink C/N per Channel	28.3 dB	

TABLE 11-B - SCENARIO VI-B - Ku-BAND (FSS) MEXICO - DOWNLINK BUDGET

MODULATION: SCPC/FM - 1,800 HVC/36 MHz

Mid-band Frequency = 11.95 GHz
No. of Channels, N = 1,800

Satellite Transmitter Power	10.4 dBW	11.0 watts
Transmit Line Losses	1.1 dB	Allocation
Transmitting Antenna Gain	29.8 dBi	Gridded Reflector
Satellite EIRP	39.1 dBW	
Output Back-Off	3.0 dB	
Loading Factor	32.6 dB	10 log N
VOX Advantage	4.0 dB	40% Activity Factor
Net EIRP/SCPC Channel	7.6 dBW	
Free Space Loss	205.8 dB	38,700 km; 30^{o} Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	209.4 dB	
Power Flux Density	-123.6 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7-m dish, 60% efficiency
Receive Line Losses	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	Referred to antenna output
Receive G/T	34.2 dB/K	(Clear Sky)
Received Carrier Level	-145.1 dBW	per SCPC Channel
Boltzmann's Constant	-228.6 dBW/Hz-K	
Downlink C/kT	61.0 dB-Hz	per SCPC Channel
Uplink C/kT	71.3 dB-Hz	per SCPC Channel
Total Channel C/kT	60.6 dB-Hz	
Required Total Channel C/kT	55.0 dB-Hz	51-56 dB-Hz Acceptable
	======	
C/kT Margin	5.6 dB	
IF Bandwidth/Channel	43.0 dB-Hz	20.0 kHz
Total C/N per Channel	17.6 dB	

TABLE 12- SCENARIO VI-B - Ku (FSS) MEXICO - UPLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 14.25 GHz

Transmitter Power	29.0 dBW	800.00 Watts
Transmit Line Loss	0.2 dB	Allocation
Transmitting Antenna Gain	58.2 dBi	7 m dish, 60% eff.
Input Back-Off	3.0 dB	
Net EIRP	84.0 dBW	
Free Space Loss	207.3 dB	38700 km; 30° Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	210.9 dB	
Power Flux Density	-78.7 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	29.8 dBi	Gridded Reflector
Receive Line Loss	1.1 dB	Allocation
System Noise Temperature	27.7 dB-K	
Receive G/T	2.1 dB/K	(Clear Sky)
Received Carrier Level	-97.0 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	103.8 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	31.3 dB	

TABLE 13 - SCENARIO VI-B - Ku (FSS) MEXICO - DOWNLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 11.95 GHz

Transmitter Power	10.8 dBW	12.0 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	29.8 dBi	Gridded Reflector
Output Back-Off	3.0 dB	
Net EIRP	36.5 dBW	
Free Space Loss	205.8 dB	38700 km; 30° Elev. A
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	0.0 dB	
Net Path Loss	206.4 dB	
Power Flux Density	-126.3 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% eff.
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	
Receive G/T	34.2 dB/K	(Clear Sky)
Received Carrier Level	-113.2 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	93.0 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	20.4 dB	
Required C/N	18.0 dB	Studio Reception
Link Margin	2.4 dB	
Overall C/N	20.1 dB	31.3 dB Uplink C/N
Weighted (S/N)w Ratio	51.1 dB	CCIR Type M
Minimum (S/N)w	48.0 dB	Quality: Excellent (TASO)
(S/N)w Margin	3.1 dB	

TABLE 14 - SCENARIO VI-B - Ku-BAND (FSS) MEXICO - UPLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Information Data Rate = 72 Mb/s

Mid-band Frequency = 14.25 GHz

	Uncoded	Remarks
Transmitter Power	29.0 dBW	800.0 Watts
Transmit Line Loss	0.2 dB	Allocation
Transmitting Antenna Gain	58.2 dBi	7 m dish, 60% efficiency
EIRP	87.0 dBW	
Free Space Loss	207.3 dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	210.9 dB	
Power Flux Density	-75.7 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	29.8 dBi	Gridded Reflector
Receive Line Loss	1.1 dB	Allocation
System Noise Temperature	27.7 dB-K	
Receive G/T	2.1 dB/K	(Clear Sky)
Received Carrier Level	-94.0 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	106.8 dB-Hz	

TABLE 15 - SCENARIO VI-B - Ku-BAND (FSS) MEXICO - DOWNLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Mid-band Frequency = 11.95 GHz

	Uncoded	Remarks
Transmitter Power	10.8 dBW	12.00 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	29.8 dBi	Gridded Reflector
EIRP	39.5 dBW	
Free Space Loss	205.8 dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	0.0 dB	
Net Path Loss	206.4 dB	
Power Flux Density	-123.3 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% efficiency
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	
Receive G/T	34.2 dB/K	(Clear Sky)
Received Carrier Level	-110.2 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	96.0 dB-Hz	
Information Bit Rate	78.6 dB-Hz	72 Mb/s
Implementation Loss	1.5 dB	Allocation
Required Eb/No	14.0 dB	$BER=10^{-6}$
Required C/kT	94.1 dB-Hz	
C/kT Margin	1.9 dB	

TABLE 16-A - SCENARIO VI-B -Ku-BAND (FSS) BRAZIL - UPLINK BUDGET

MODULATION: SCPC/FM - 1,800 HVC/36 MHz

Mid-band Frequency = 14.25 GHz
No. of Channels, N = 1,800

E/S Transmitter Power	29.0 dBW	800.0 Watts
Transmit Line Losses	0.2 dB	Allocation
Transmitting Antenna Gain	58.2 dBi	7-m Dish, 60% efficiency
Earth Station EIRP	87.0 dBW	
Output Back-Off	3.0 dB	
Loading Factor	32.6 dB	10 log N
Net EIRP/SCPC Channel	51.5 dBW	
Free Space Loss	207.3 dB	38,700 km; 30^{o} Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	210.9 dB	
Power Flux Density	-75.7 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	27.3 dBi	Gridded Reflector
Receive Line Losses	1.1 dB	Allocation
System Noise Temperature	27.7 dB-K	Referred to antenna output
Receive G/T	-0.4 dB/K	(Clear Sky)
Received Carrier Level	-132.1 dBW	per SCPC Channel
Boltzmann's Constant	-228.6 dBW/Hz-K	
Uplink C/kT	68.8 dB-Hz	per SCPC Channel
IF BW/ Channel	43.0 dB-Hz	20.0 kHz
Uplink C/N per Channel	25.8 dB	

TABLE 16-B - SCENARIO VI-B - Ku-BAND (FSS) BRAZIL - DOWNLINK BUDGET

MODULATION: SCPC/FM - 1,800 HVC/36 MHz

Mid-band Frequency = 11.95 GHz
No. of Channels, N = 1,800

Satellite Transmitter Power	13.0 dBW	20.0 watts
Transmit Line Losses	1.1 dB	Allocation
Transmitting Antenna Gain	27.3 dBi	Gridded Reflector
Satellite EIRP	39.2 dBW	
Output Back-Off	3.0 dB	
Loading Factor	32.6 dB	10 log N
VOX Advantage	4.0 dB	40% Activity Factor
Net EIRP/SCPC Channel	7.7 dBW	
Free Space Loss	205.8 dB	38,700 km; 30^{0} Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	209.4 dB	
Power Flux Density	-123.5 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7-m dish, 60% efficiency
Receive Line Losses	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	Referred to antenna output
Receive G/T	34.2 dB/K	(Clear Sky)
Received Carrier Level	-145.0 dBW	per SCPC Channel
Boltzmann's Constant	-228.6 dBW/Hz-K	
Downlink C/kT	61.1 dB-Hz	per SCPC Channel
Uplink C/kT	68.8 dB-Hz	per SCPC Channel
Total Channel C/kT	60.4 dB-Hz	
Required Total Channel C/kT	55.0 dB-Hz	51-56 dB-Hz Acceptable
C/kT Margin	5.4 dB	
IF Bandwidth/Channel	43.0 dB-Hz	20.0 kHz
Total C/N per Channel	17.4 dB	

TABLE 17 - SCENARIO VI-B - Ku (FSS) BRAZIL - UPLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 14.25 GHz

Transmitter Power	29.0 dBW	800.00 Watts
Transmit Line Loss	0.2 dB	Allocation
Transmitting Antenna Gain	58.2 dBi	7 m dish, 60% eff.
Input Back-Off	3.0 dB	
Net EIRP	84.0 dBW	
Free Space Loss	207.3 dB	38700 km; 30^{o} Elev. Ang.
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	3.0 dB	
Net Path Loss	210.9 dB	
Power Flux Density	-78.7 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	27.3 dBi	Gridded Reflector
Receive Line Loss	1.1 dB	Allocation
System Noise Temperature	27.7 dB-K	
Receive G/T	-0.4 dB/K	(Clear Sky)
Received Carrier Level	-99.5 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	101.3 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	28.8 dB	

TABLE 18 - SCENARIO VI-B - Ku (FSS) BRAZIL - DOWNLINK BUDGET

MODULATION: FM-FDMA Video channel (2 video/36 MHz)

Mid-band Frequency = 11.95 GHz

Transmitter Power	13.0 dBW	20.0 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	27.3 dBi	Gridded Reflector
Output Back-Off	3.0 dB	
Net EIRP	36.2 dBW	
Free Space Loss	205.8 dB	38700 km; 30° Elev. A
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	0.0 dB	
Net Path Loss	206.4 dB	
Power Flux Density	-126.5 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% eff.
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	
Receive G/T	34.2 dB/K	(Clear Sky)
Received Carrier Level	-113.4 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	92.7 dB-Hz	
Receiver IF Bandwidth	72.6 dB-Hz	18 MHz IF Bandwidth
Received C/N	20.1 dB	
Required C/N	18.0 dB	Studio Reception
	======	
Link Margin	2.1 dB	
Overall C/N	19.6 dB	28.8 dB Uplink C/N
Weighted (S/N)w Ratio	50.6 dB	CCIR Type M
Minimum (S/N)w	48.0 dB	Quality: Excellent (TASO)
	======	
(S/N)w Margin	2.6 dB	

TABLE 19 - SCENARIO VI-B - Ku-BAND (FSS) BRAZIL - UPLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Information Data Rate = 72 Mb/s

Mid-band Frequency = 14.25 GHz

	Uncoded		Remarks
Transmitter Power	29.0	dBW	800.0 Watts
Transmit Line Loss	0.2	dB	Allocation
Transmitting Antenna Gain	58.2	dBi	7 m dish, 60% efficiency
EIRP	87.0	dBW	
Free Space Loss	207.3	dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5	dB	Allocation
Atmospheric Degradation	0.1	dB	
Rain Margin	3.0	dB	
Net Path Loss	210.9	dB	
Power Flux Density	-75.7	dBW/m^2	(Clear Sky)
Receiving Antenna Gain	27.3	dBi	Gridded Reflector
Receive Line Loss	1.1	dB	Allocation
System Noise Temperature	27.7	dB-K	
Receive G/T	-0.4	dB/K	(Clear Sky)
Received Carrier Level	-96.5	dBW	
Boltzmann's Constant	-228.6	dBW/Hz-K	
Received C/kT	104.3	dB-Hz	

TABLE 20 - SCENARIO VI-B - Ku-BAND (FSS) BRAZIL - DOWNLINK BUDGET

MODULATION: SS/TDMA/8-ary PSK

Mid-band Frequency = 11.95 GHz

	Uncoded	Remarks
Transmitter Power	13.0 dBW	20.00 Watts
Transmit Line Loss	1.1 dB	Allocation
Transmitting Antenna Gain	27.3 dBi	Gridded Reflector
EIRP	39.2 dBW	
Free Space Loss	205.8 dB	38700 km; 30° Elev. Angle
Pointing Loss	0.5 dB	Allocation
Atmospheric Degradation	0.1 dB	
Rain Margin	0.0 dB	
Net Path Loss	206.4 dB	
Power Flux Density	-123.5 dBW/m^2	(Clear Sky)
Receiving Antenna Gain	56.7 dBi	7 m dish, 60% efficiency
Receive Line Loss	0.2 dB	Allocation
System Noise Temperature	22.5 dB-K	
Receive G/T	34.2 dB/K	(Clear Sky)
Received Carrier Level	-110.4 dBW	
Boltzmann's Constant	-228.6 dBW/Hz-K	
Received C/kT	95.7 dB-Hz	
Information Bit Rate	78.6 dB-Hz	72 Mb/s
Implementation Loss	1.5 dB	Allocation
Required Eb/No	14.0 dB	$BER=10^{-6}$
Required C/kT	94.1 dB-Hz	
	======	
C/kT Margin	1.6 dB	