

APPENDIX A: USEFUL GEODETIC/DGPS REFERENCE STATION INFORMATION

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TABLE OF GEODETIC FORMULAE

Listed below are the various Geodetic Formulae used in the computation to define the Fundamental Constants and Spheroidal Parameters:

Flattening:	f	$=$	$\frac{(a-b)}{a}$
Semi Minor Axis:	b	$=$	$a(1-f)$
	b	$=$	$\sqrt{(1-e^2)}a$
	b	$=$	$\frac{a(1-e^2)}{2}$
Major Eccentricity squared:	e^2	$=$	$\frac{a^2-b^2}{a^2}$
Minor Eccentricity squared:	e'^2	$=$	$\frac{a^2-b^2}{b^2}$
Polar Radius of Curvature:	c	$=$	$\frac{a^2}{b}$

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ELLIPSOIDAL PARAMETERS

Tabulated below are the Fundamental Constants for the various defined shapes of the Earth.

Listed in alphabetical order of Spheroids.

Spheroid	Semi Major Axis - a (m)	Semi Minor Axis - b (m)	e ²	1/f
Airy 1830	6377563.396	6356256.912	.006670539	299.325
Airy 1858	6377563.000	6356256.873	.006670428	299.330
Airy (Modified)	6377340.189	6356034.448	.006670540	299.324959
Andrea	6377105.000	6355847.982	.006655556	300.000
A.P.L. ³ (N.N.S.S.) ⁵	6378144.000	6356757.339	.006694990	298.230
Australian National	6378160.000	6356774.719	.006694542	298.250
Bessel 1841	6377397.155	6356078.963	.006674372	299.152815
Bessel (Modified)	6377492.018	6356173.508	.006674372	299.152813
Bouguer Maupertus 1738	6397300.000	6367792.159	.009203817	216.800
Carte de France	6376985.000	6356323.436	.006469544	308.640
Clarke 1858 (Original)	6378293.000	6356620.241	.006784241	294.300
Clarke 1858 (Corrected)	6378293.645	6356617.938	.006785162	294.260
Clarke 1866	6378206.400	6356583.800	.006768658	294.978698
Clarke 1880	6378249.145	6356514.967	.006803481	293.466316
Clarke 1880F.	6378249.200	6356514.998	.006803488	293.465994
Clarke 1880 (Modified)	6378249.145	6356514.870	.006803511	293.464993
Clarke 1885	6378360.706	6356684.771	.006785162	294.260
Danish	6377103.965	6355846.952	.006655556	300.000
Danish (Degree)	6377019.260	6355762.528	.006655556	300.000
Delambre 1800	6375653.000	6356564.218	.005979060	334.000
Duplessis (Reconstituted)	6376523.340	6355863.271	.006469544	308.640
Everest 1830	6377276.345	6356075.414	.006637847	300.801698
Everest (Modified)	6377304.068	6356103.046	.006637846	300.8017
Fisher 1960	6378166.000	6356784.283	.006693422	298.300
Fisher 1960 S. Asia	6378155.000	6356773.320	.006693422	298.300
Fisher 1968	6378150.000	6356768.337	.006693422	298.300
Ghana National	6378295.000	6356746.706	.006745343	296.000
Hayford 1906	6378283.000	6356864.991	.006704641	297.800
Hayford 1910	6378388.000	6356909.000	.006723591	296.959263
Hayford 1910 (Modified) (also International)	6378388.000	6356911.946	.006722670	297.000
Heiskanen 1926	6378397.000	6356920.916	.006722670	297.000
Helmert 1906	6378200.000	6356818.170	.006693422	298.300
Hough 1956	6378270.000	6356794.343	.006722670	297.000
International (also Hayford 1910mod)	6378388.000	6356911.946	.006722670	297.000
I.R.G.G. ⁷ 1967	6378206.400	6356583.800	.006768658	294.978698
I.U.G.G. ⁷ 1967	6378160.000	6356774.719	.006694542	298.250
Jeffreys 1948	6378099.000	6356631.148	.006720411	297.100
Kaula 1961	6378165.000	6356783.287	.006693422	298.300
Kaula 1964	6378160.000	6356774.719	.006694542	298.245
Krasovsky 1936	6378210.000	6356849.635	.006686703	298.600
Krasovsky 1942	6378245.000	6356863.019	.006693422	298.300
Ledersteger 1951	6378298.000	6356822.249	.006722670	297.000

Spheroid	Semi Major Axis - a (m)	Semi Minor Axis - b (m)	e²	1/f
Malayan	6377304.063	6356103.039	.006637847	300.8017
N.N.S.S. ⁵ Guier 65	6378166.000	6356784.284	.006693422	298.300
N.W.L. ² 8D/9D	6378145.000	6356759.769	.006694542	298.250
N.W.L. ² 10D (WGS 72)	6378135.000	6356750.520	.006694318	298.260
Pratt 1863	6378245.000	6356645.798	.006761305	295.300
South American 1969ans	6378160.000	6356774.719	.006694542	298.250
S.A.O. ¹ C-5	6378165.000	6356779.702	.006694542	298.250
S.A.O. ¹ C-6	6378155.000	6356769.736	.006694542	298.250
S.A.O. ¹ C-7	6378142.000	6356757.138	.006694430	298.255
S.A.O. ¹ SE 111	6378140.400	6356755.616	.006694407	298.256
Stowe	6378297.000	6356655.847	.006774360	294.730
Struve	6378298.300	6356657.143	.006774360	294.730
Veis 1964	6378169.000	6356783.689	.006694542	298.250
Walbeck 1819	6376896.000	6355834.847	.006594548	302.780
W.D. Spheroid	6378300.000	6356751.690	.006745343	296.000
W.G.S. ⁴ 72 (NWL 10D)	6378135.000	6356750.520	.006694318	298.260
*W.G.S. ⁴ 84 (GRS 1980)	6378137.000	6356752.314	.006694380	298.257222

*Reference: W.G.S. 84 (GRS 1980) The Fundamental Constants and Geodetic Values are defined as follows:

a = 6 378 137.000 (exact)
 b = 6 356 752.314140347
 e² = 0.006694380022903416
 e = 0.08181919104283185
 1/f = 298.2572221008827
 f = 0.003352810681183637

1. Smithsonian Astrophysical Observatory
2. Naval Weapons Laboratory
3. Applied Physics Laboratory
4. World Geodetic System
5. Navy Navigation Satellite System
6. Geodetic Reference System
7. International Union of Geodesy and Geophysics

GEODETIC DATUMS AND REFERENCE ELLIPSOIDS

Datum	Spheroid	Origin	Latitude	Longitude (E)
Adindan (Ethiopia)	Clarke 1880 Mod.	Station 15 Adindan	22°10'07.110"	31°29'21.608"
American Samoa 1962	Clarke 1866	Betty 13 ECC	-14°20'08.340"	189°17'07.750"
African Arc-Cape S.Afr. 1950	Clarke 1880 Mod.	Buffelsfontein	-33°59'32.000"	25°30'44.622"
Aratu (Petrobras)				
Argentina	International	Campo Inchauste	-35°58'17"	297°49'48"
Ascension Island 1958	International	Mean of three stations	-07°57'	345°37'
Australian Geodetic	Australian National Ellipsoid 1967	Johnston Memorial Cairn	-25°56'54.55"	133°12'30.08"
Bermuda 1957	Clarke 1866	Ft. George B 1937	32°22'44.360"	295°19'01.890"
Berne 1898	Bessel	Berne Observatory	46°57'08.660"	07°26'22.335"
Betio Island, 1966 Secor Astro	International	1966 Secor Astro	01°21'42.03"	172°55'47.90"
Bogota				
Camp Area Astro, 1961-62				
Campo Inchaupé				
Canton Island, Astro 1966	International	1966 Canton Secor Astro	-02°46'28.99"	188°16'43.47"
Christmas Island, Astro 1967	-----	-----	-----	-----
Chua Astro (Brazil-Geodetic)	International	Chua	-19°45'41.16"	311°53'52.44"
Corrego Alegre (Brazil-Mapping)	International	Corrego Alegre	-19°50'15.140"	311°02'17.250"
Djakarta				
Dutch Datum				
Easter Island Astro. 1967				
Eftate				
European 1950	International	Helmert Tower	52°22'51.45"	13°03'58.74"
Gizo, Provisional DOS	International	GUX 1	-09°27'05.272"	159°58'31.752"
Graciosa Island (Azores)	International	SW Base	39°03'54.934"	331°57'36.118"
Guam 1963	Clarke 1866	Togcha Lee No. 7	13°22'38.49"	144°45'51.56"
Heard Astro. 1969				
Hu-Tzu-Shan				
Iben Astro, Navy 1947 (Truk)	Clarke 1866	Iben Astro	07°29'13.05"	151°49'44.42"
Indian	Everest	Kalianpur	24°07'11.26"	77°39'17.57"
Isla Socorra Astro	Clarke 1866	Station 038	18°43'44.93"	249°02'39.28"
Johnston Island 1961	International	Johnston Island 1961	16°44'49.729"	190°29'04.781"

Datum	Spheroid	Origin	Latitude	Longitude (E)
Kusaie, Astro 1962, 1965	International	Allen Sodano Light	05°21'48.80"	162°58'03.28"
Liberia 64 (Revised 78)				
Luzon 1911 (Philippines)	Clarke 1866	Balanacan	13°33'41.000"	121°52'03.000"
Merchich				
Mercury 1960	Fisher 1960	Geocentric		
Mercury - Modified 1968	Fisher 1968	Geocentric		
Midway Astro 1961	International	Midway Astro 1961	28°11'34.50"	182°36'24.28"
M'Poraloko				
Nahrwan Datum 1976				
Nanking 1960	International			
Naparima				
New French				
New Zealand	International	Papatahi	-14°19'08.900"	175°02'51.000"
Nigerian				
North American 1927	Clarke 1866	Meades Ranch	39°13'26.686"	261°27'29.494"
*NAD 1927 (Cape Canaveral)	Clarke 1866	Central	28°29'32.364"	279°25'21.230"
*NAD 1927 (White Sands)	Clarke 1866	Kent 1909	32°30'27.079"	253°31'01.306"
NAD 83	GRS 80	Geocentric		
Old Bavarian	Bessel	Munich	48°08'20.000"	11°34'26.483"
Old Hawaiian	Clarke 1866	Oahu West Base	21°18'13.89"	202°09'04.20"
Ordnance Survey G.B. 1936	Airy	Herstmonceux	50°51'55.271"	00°20'45.882"
Ordnance Survey G.B. 1970				
Pico de las Nieves (Canaries)	International	Pico de las Nieves	27°57'41.273"	344°25'49.476"
Pitcairn Island Astro	-----	-----	-----	-----
Potsdam	Bessel	Helmert Tower	52°22'53.954"	13°04'01.153"
Provisional S. American 1956	International	Lacamoia	08°34'17.17"	296°08'25.12"
Provisional S. Chile 1963	International	Hito XVIII	-64°67'07.76"	291°23'28.76"
Pulkovo 1942	Krassovski 42	Pulkovo Observatory	59°46'18.55"	30°19'42.09"
Qornoq (kornak)				
Russian 1938	Krassovski 38	Pulkovo Observatory		
S.A.O. C-5				
S.A.O. C-6				
S.A.O. C-7				
South American 1969	IUGG 1967	Geocentric	-----	-----
South Asia	Fisher 1960	Geocentric		
Southeast Island (Mahe)				
South Georgia Astro.				
Strasbourg Observatory	-----	-----	-----	-----
Swallow Islands (Solomons)	International	1966 Secor Astro	-10°18'21.42"	166°17'56.79"

Datum	Spheroid	Origin	Latitude	Longitude (E)
Tananarive	International	Tananarive Observatory	-18°55'02.10"	47°33'06.75"
Tokyo	Bessel	Tokyo Observatory (Old)	35°39'17.51"	139°44'40.50"
Trinidad Re (Old)				
Tristan Astro. 1968				
Viti Levu 1961 (Fiji)	Clarke 1880	Monavatu (Lat. Only)	-17°53'28.285"	
		Suva (Long. Only)		178°25'35.835"
Wake-Eniwetok 1960	Hough 1956			
Wake Island, Astronomic 1952	International	Astro 1952	19°16'48.7"	166°38'46.8"
WGS 66				
WGS 72	WGS 72	Geocentric		
WGS 84	GRS 80	Geocentric		
Yacare				
Yof Astro 1967 (Dakar)	Clarke 1880 Mod.	Yof Astro 1967	14°44'41.62"	342°30'52.98"

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GEODETIC DATUM SHIFT WORKING GEODETIC DATUM TO WGS 84

Listed below are the Datum Shift Parameters used in conversion from the Geodetic Datum to WGS 84.

NOTE: These values are not definitive and should be checked/changed in accordance with the local requirements and/or client approval.

Listed in alphabetical order of Datum.

The user should refer to the important notes following this table before using the data.

Geodetic Datum	Spheroid	diff X m.	diff Y m.	diff Z m.	Country/Area
Adindan	Clarke 1880 Mod.	-162	-12	206	Sudan
Aratu (Petrobras)*	International	-181	294	-149	Brazil (offshore)
ARC (Cape) 1950	Clarke 1880 Mod.	-143	-90	-294	Africa
Ascension Island Astro. 1958*	International	-214	91	48	
Austral. Geodetic	Austral. National	-133	-48	148	Australia
Bogota*	International	277	291	-328	Columbia
Bukit Rimpah	Bessel	-384	664	-48	**
Camp Area Astro	International	-104	-129	239	**
Campo Inchaupé	International	-148	136	90	Argentina
Canton Island Astro. 1966*	International	294	-288	-382	
Djakarta	Bessel	-377	681	-50	Indonesia
Eur. Datum 1950	International	-87	-98	-121	Europe
Geod. Datum 1949	International	84	-22	209	
Ghana	WGS 84	0	0	0	
Guam 1963	Clarke 1866	-100	-248	259	
G.Segara	Bessel	-403	684	41	**
G.Serindung	WGS 84	0	0	0	
Herat North	International	-333	-222	114	**
Hjorsey 1955	International	-73	46	-86	
Hu-Tzu-Shan	International	-634	-549	-201	Taiwan **
Indian	Everest 1830	173	750	264	India **
Indian	Everest 1830	208	841	295	Thailand Area**
Ireland (EIRE) 1965	Airy Mod.	506	-122	611	
Johnston Island Astro. 1961*	International	192	-59	-211	
Kertau (Malayan Rev. Triangulat.)	Everest Mod.	-11	851	5	
Liberia 64 (Rev78)	Clarke 1880 Mod.	-90	40	88	Liberia
Local Astro	?	0	0	0	?
Luzon	Clarke 1866	-133	-77	-54	
Luzon*	Clarke 1866	-129	-136	-39	S.Palawan Only
Luzon*	Clarke 1866	-95	-113	-60	NW.Palawan Only
Merchich	Clarke 1880 Mod.	31	146	47	Morocco
Mercury 1960*	Fisher 1960	-25	46	-49	NAD 27 Area
Mercury 1960*	Fisher 1960	13	-88	-5	ED Area
Mercury 1960*	Fisher 1960	18	-132	60	TD Area
Montjong Lowe	WGS 84	0	0	0	
Mod. Mercury 1968*	Fisher 1968	-4	12	-7	NAD 27 Area
Mod. Mercury 1968*	Fisher 1968	-3	1	-6	ED Area
Mod. Mercury 1968*	Fisher 1968	22	34	2	TD Area
M'Poraloko*	Clarke 1880 Mod.	-52	-155	27	Gabon
Nahrwan Datum*	Clarke 1880 Mod.	-	-	378.9	Middle East
Nanking 1960*	International	225.4	158.7	0	
		-131	-347		

Geodetic Datum	Spheroid	diff X m.	diff Y m.	diff Z m.	Country/Area
Naparima	International	-2	374	172	Trinidad
New French*	Clarke 1880 Mod.	-166	-66	313	France
Nigerian (Minna)	Clarke 1880 Mod.	-92	-93	122	Nigeria
N.A.D. 27 (Old)*	Clarke 1866	-22	157	176	North & Central
N.A.D. 27 (New)*	Clarke 1866	-22.5	154	173.4	America
N.A.D. 27	Clarke 1866	-5	135	172	Alaska
N.A.D. 27	Clarke 1866	-4	154	178	Bahamas (excluding San Salvador Island)
N.A.D. 27	Clarke 1866	1	140	165	San Salvador Island
N.A.D. 27	Clarke 1866	-10	158	187	Canada (including Newfoundland)
N.A.D. 27	Clarke 1866	0	125	201	Canal Zone
N.A.D. 27	Clarke 1866	-7	152	178	Caribbean (Barbados, Caicos Islands, Cuba, Dominican Republic, Grand Cayman, Jamaica, Leeward Islands, and Turks Islands)
N.A.D. 27	Clarke 1866	0	125	194	Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua)
N.A.D. 27	Clarke 1866	-9	152	178	Cuba
N.A.D. 27	Clarke 1866	11	114	195	Greenland (Hayes Peninsula)
N.A.D. 27	Clarke 1866	-12	130	190	Mexico
N.A.D. 27	Clarke 1866	-8	160	176	Conus (Mean Value)
Old Hawaiian	Airy	210	-230	-357	Maui **
Old Hawaiian	International	201	-224	-349	Oahu **
Old Hawaiian	International	190	-230	-341	Kauai **
Ordnance Survey G.B. 1936	International	375	-111	431	Gt.Britain-Land
P.S.A.D. 1956 (Old)*	WGS 84	-294	104	-366	S. America
P.S.A.D. 1956 (New)*	International	-288	175	-375	S. America
Qornoq (Kornak)	International	164	138	-189	Greenland
Sierra Leone 1960	Fisher 1960 S.Asia (155)	0	0	0	
S. American (Corrego Alegre)	International	-206	172	-6	
S. American (Chua Astro)	Bessel	-134	229	-29	
South Asia*	Bessel	21	-61	-15	
Tananarive Observatory 1925	?	-189	-242	-91	**
Timbalai	Clarke 1858 corr.	-639	583	-55	
Tokyo	Bessel	-128	481	664	Japan
Tokyo Special	Hough 1956	-128	491	664	?
Trinidad Re (Old)*	Hough 1956	-87	276	462	Trinidad
Voirol	Hough 1956	0	0	0	
Wake-Eniwetok 1960*	International	112	68	-44	Kwajalein Atoll
Wake-Eniwetok 1960*	International	121	62	-22	Wake Island
Wake-Eniwetok 1960*	WGS 72	144	62	-38	Eniwetok Atoll
Wake Island Astro. 1952*		283	-44	141	
Yacare		-155	171	37	Uruguay **
WGS 72		0	0	4.5	***

* Marion Speidel Keen Listed Transformation parameter are referenced to the WGS 72 geodetic datum and not WGS 84.

** Listed Transformation parameters were determined utilizing previously developed WGS 72 to local Geodetic Datum Transformation Parameters. These Parameters are of questionable accuracy due to lack of adequate doppler stations (if any) and/or appropriate information on either Geodetic connections or the local Geodetic System itself.

*** The Transformation achieved using these Parameters is not precise and is an approximation only.

**** No determined Transformation Parameters to date.

UNIVERSAL TRANSVERSE MERCATOR CONSTANTS

The Universal Transverse Mercator grid has the following specifications:

- a. Projection: Transverse Mercator (Gauss-Kruger type), in zones 6° wide.
- b. Spheroid: See Index to Spheroids.
- c. Longitude of origin: Central meridian of each zone.
- d. Latitude of origin: 0° (the Equator).
- e. Unit: Meter.
- f. False northing: 0 meters (10,000,000 for Southern Hemisphere).
- g. False easting: 500,000 meters.
- h. Scale factor at the central meridian: 0.9996.
- i. Zone numbering: Starting with 1 on the zone from 180°W. to 174° W., and increasing eastward to 60 on the zone from 174° E. to 180° E.
- j. Latitude limits of system:
 - North: 84° N.
 - South: 80° S.
- k. Limits of zones and overlap: The zones are bounded by meridians whose longitudes are multiples of 6°W. or E. of Greenwich. On large-scale maps and in trig lists an overlap of approximately 25 miles on either side of the junction is provided for engineer surveyors and for artillery survey and firing. This overlap is never used, however, in giving a grid reference.

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UNIVERSAL TRANSVERSE MERCATOR ZONE TABLE

The following tables show the U.T.M. Zone - Central Meridian (C.M.) and Longitudinal borders of the zones:

West of Greenwich Meridian		Longitudinal Borders	
U.T.M. Zone	Central Meridian (C.M.)	From	To
30	3 Degrees West	0 Degrees West	006 Degrees West
29	9 --- West	006 --- West	012 --- West
28	15 --- West	012 --- West	018 --- West
27	21 --- West	018 --- West	024 --- West
26	27 --- West	024 --- West	030 --- West
25	33 --- West	030 --- West	036 --- West
24	39 --- West	036 --- West	042 --- West
23	45 --- West	042 --- West	048 --- West
22	51 --- West	048 --- West	054 --- West
21	57 --- West	054 --- West	060 --- West
20	63 --- West	060 --- West	066 --- West
19	69 --- West	066 --- West	072 --- West
18	75 --- West	072 --- West	078 --- West
17	81 --- West	078 --- West	084 --- West
16	87 --- West	084 --- West	090 --- West
15	93 --- West	090 --- West	096 --- West
14	99 --- West	096 --- West	102 --- West
13	105 --- West	102 --- West	108 --- West
12	111 --- West	108 --- West	114 --- West
11	117 --- West	114 --- West	120 --- West
10	123 --- West	120 --- West	126 --- West
9	129 --- West	126 --- West	132 --- West
8	135 --- West	132 --- West	138 --- West
7	141 --- West	138 --- West	144 --- West
6	147 --- West	144 --- West	150 --- West
5	153 --- West	150 --- West	156 --- West
4	159 --- West	156 --- West	162 --- West
3	165 --- West	162 --- West	168 --- West
2	171 --- West	168 --- West	174 --- West
1	177 --- West	174 --- West	180 --- West

See accompanying Index to spheroids.

West of Greenwich Meridian		Longitudinal Borders	
U.T.M. Zone	Central Meridian (C.M.)	From	To
31	3 Degrees East	0 Degrees East	006 Degrees East
32	9 --- East	006 --- East	012 --- East
33	15 --- East	012 --- East	018 --- East
34	21 --- East	018 --- East	024 --- East
35	27 --- East	024 --- East	030 --- East
36	33 --- East	030 --- East	036 --- East
37	39 --- East	036 --- East	042 --- East
38	45 --- East	042 --- East	048 --- East
39	51 --- East	048 --- East	054 --- East
40	57 --- East	054 --- East	060 --- East
41	63 --- East	060 --- East	066 --- East
42	69 --- East	066 --- East	072 --- East
43	75 --- East	072 --- East	078 --- East
44	81 --- East	078 --- East	084 --- East
45	87 --- East	084 --- East	090 --- East
46	93 --- East	090 --- East	096 --- East
47	99 --- East	096 --- East	102 --- East
48	105 --- East	102 --- East	108 --- East
49	111 --- East	108 --- East	114 --- East
50	117 --- East	114 --- East	120 --- East
51	123 --- East	120 --- East	126 --- East
52	129 --- East	126 --- East	132 --- East
53	135 --- East	132 --- East	138 --- East
54	141 --- East	138 --- East	144 --- East
55	147 --- East	144 --- East	150 --- East
56	153 --- East	150 --- East	156 --- East
57	159 --- East	156 --- East	162 --- East
58	165 --- East	162 --- East	168 --- East
59	171 --- East	168 --- East	174 --- East
60	177 --- East	174 --- East	180 --- East

See accompanying Index to spheroids.

NOAA TECHNICAL PUBLICATIONS

The United States National Geodetic Survey (NGS), Office of Charting and Geodetic Services, National Ocean Service (NOS), and NOAA work together to maintain the basic national horizontal, vertical, and gravity control networks. These agencies also provide Government-wide leadership in the improvement of geodetic surveying methods and instrumentation, coordinate operations to assure network development, and provide specifications and criteria for survey operations undertaken by Federal, State, and other agencies.

NGS engages in research and development for the improvement of knowledge of the shape of the Earth and its gravity field. The NGS also has the responsibility to procure geodetic data from all sources, process these data, and make them generally available to users through a central data base.

NOAA geodetic publications and relevant geodetic publications of the former U.S. Coast and Geodetic Survey are sold in paper form by the National Geodetic Information Branch. To obtain a price list or to place an order, contact:

National Geodetic Information Branch
N/CG17, Rockwell Building, Room 21
National Geodetic Survey, NOAA
Rockville, MD 20852

When placing an order, make check or money order payable to: National Geodetic Survey. Do not send cash or stamps. Publications can also be charged to Visa, Master Card, or prepaid Government Printing Office Deposit Account. Telephone orders are accepted (area code 301 443-8631).

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An excellent reference source for all Government publications is the National Depository Library Program, a network of about 1,300 designated libraries. Requests for borrowing Depository Library material may be made through your local library. A free listing of libraries in this system is available from the Library Division, U.S. Government Printing Office, Washington, DC 20401 (area code 202 275-1063) or the Marketing Department (area code 202 275-9051).

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State Plane Lambert Conformal Conic Projection

Zone	First Standard Parallel	Second Standard Parallel	Longitude of Origin	Latitude of Origin	False North	False East (US Survey Feet)
Alaska 10	N51 50	N53 50	W176 00	N51 00	0	3,000,000
Arkansas North	N34 56	N36 14	W 92 00	N34 20	0	2,000,000
Arkansas South	N33 18	N34 46	W 92 00	N32 40	0	2,000,000
California 1	N40 00	N41 40	W122 00	N39 20	0	2,000,000
California 2	N38 20	N39 50	W122 00	N37 40	0	2,000,000
California 3	N37 04	N38 26	W120 30	N36 30	0	2,000,000
California 4	N36 00	N37 15	W119 00	N35 20	0	2,000,000
California 5	N34 02	N35 28	W118 00	N33 30	0	2,000,000
California 6	N32 47	N33 53	W116 15	N32 10	0	2,000,000
California 7	N33 52	N34 25	W118 20	N34 08	4,160,926.74	4,186,692.58
Colorado North	N39 43	N40 47	W105 30	N39 20	0	2,000,000
Colorado Central	N38 27	N39 45	W105 30	N37 50	0	2,000,000
Colorado South	N37 14	N38 26	W105 30	N36 40	0	2,000,000
Connecticut	N41 12	N41 52	W 72 45	N40 50	0	600,000
Florida North	N29 35	N30 45	W 84 30	N29 00	0	2,000,000
Iowa North	N42 04	N43 16	W 93 30	N41 30	0	2,000,000
Iowa South	N40 37	N41 47	W 93 30	N40 00	0	2,000,000
Kansas North	N38 43	N39 47	W 98 00	N38 20	0	2,000,000
Kansas South	N37 16	N38 34	W 98 30	N36 40	0	2,000,000
Kentucky North	N37 58	N38 58	W 84 15	N37 30	0	2,000,000
Kentucky South	N36 44	N37 56	W 85 45	N36 20	0	2,000,000
Louisiana North	N31 10	N32 40	W 92 30	N30 40	0	2,000,000
Louisiana South	N29 18	N30 42	W 91 20	N28 40	0	2,000,000
Louisiana Offshore	N26 10	N27 50	W 91 20	N25 40	0	2,000,000
Maryland	N38 18	N39 27	W 77 00	N37 50	0	800,000
Massachusetts						
Mainland	N41 43	N42 41	W 71 30	N41 00	0	600,000
Island	N41 17	N41 29	W 70 30	N41 00	0	200,000
Michigan (current)						
North	N45 29	N47 05	W 87 00	N44 47	0	2,000,000
Central	N44 11	N45 42	W 84 20	N43 19	0	2,000,000

State Plane Lambert Conformal Conic Projection						
Zone	First Standard Parallel	Second Standard Parallel	Longitude of Origin	Latitude of Origin	False North	False East (US Survey Feet)
South	N42 06	N43 40	W 84 20	N41 30	0	2,000,000
Minnesota North	N47 02	N48 38	W 93 06	N46 30	0	2,000,000
Minnesota Central	N45 37	N47 03	W 94 15	N45 00	0	2,000,000
Minnesota South	N43 47	N45 13	W 94 00	N43 00	0	2,000,000
Montana North	N47 00	N49 00	W109 30	N41 15	0	2,000,000
Montana Central	N46 27	N47 53	W109 30	N45 50	0	2,000,000
Montana South	N44 52	N46 24	W109 30	N44 00	0	2,000,000
Nebraska North	N41 51	N42 49	W100 00	N41 20	0	2,000,000
Nebraska South	N40 17	N41 43	W 99 30	N39 40	0	2,000,000
New York						
Long Island	N40 40	N41 02	W 74 00	N40 10	100,000	2,000,000
North Carolina	N34 20	N36 10	W 79 00	N33 45	0	2,000,000
North Dakota North	N47 26	N48 44	W100 30	N47 00	0	2,000,000
North Dakota South	N46 11	N47 29	W100 30	N45 40	0	2,000,000
Ohio North	N40 26	N41 42	W 82 30	N39 40	0	2,000,000
Ohio South	N38 44	N40 02	W 82 30	N38 00	0	2,000,000
Oklahoma North	N35 34	N36 46	W 98 00	N35 00	0	2,000,000
Oklahoma South	N33 56	N35 14	W 98 00	N33 20	0	2,000,000
Oregon North	N44 20	N46 00	W120 30	N43 40	0	2,000,000
Oregon South	N42 20	N44 00	W120 30	N41 40	0	2,000,000
Pennsylvania North	N40 53	N41 57	W 77 45	N40 10	0	2,000,000
Pennsylvania South	N39 56	N40 58	W77 45	N39 20	0	2,000,000
Puerto Rico & Virgin Islands 1	N18 02	N18 26	W 66 26	N17 50	0	
2 (St. Croix)	N18 02	N18 26	W 66 26	N17 50		
Samoa	N14 16		W170 00		0	2,000,000
South Carolina						
North	N33 46	N34 58	W 81 00	N33 00	0	2,000,000
South	N32 20	N33 40	W 81 00	N31 50	0	2,000,000
South Dakota North	N44 25	N45 41	W100 00	N43 50	0	2,000,000
South Dakota South	N42 50	N44 24	W100 20	N42 20	0	2,000,000

State Plane Lambert Conformal Conic Projection

Zone	First Standard Parallel	Second Standard Parallel	Longitude of Origin	Latitude of Origin	False North	False East (US Survey Feet)
Tennessee	N35 15	N36 25	W 86 00	N34 20	100,000	2,000,000
Texas North	N34 39	N36 11	W101 30	N34 00	0	2,000,000
Texas North Central	N32 08	N33 58	W 98 30	N31 40	0	2,000,000
Texas Central	N30 07	N31 53	W100 20	N29 40	0	2,000,000
Texas South Central	N28 23	N30 17	W 99 00	N27 50	0	2,000,000
Texas South	N26 10	N27 50	W 97 30	N25 40	0	2,000,000
Utah North	N40 43	N41 47	W111 30	N40 20	0	2,000,000
Utah Central	N39 01	N40 39	W111 30	N38 20	0	2,000,000
Utah South	N37 13	N38 21	W111 30	N36 40	0	2,000,000
Virginia North	N38 02	N39 12	W 78 30	N37 40	0	2,000,000
Virginia South	N36 46	N37 58	W 78 30	N36 20	0	2,000,000
Washington North	N47 30	N48 44	W120 50	N47 00	0	2,000,000
Washington South	N45 50	N47 20	W120 30	N45 20	0	2,000,000
West Virginia North	N39 00	N40 15	W 79 30	N38 30	0	2,000,000
West Virginia South	N37 29	N38 53	W 81 00	N37 00	0	2,000,000
Wisconsin North	N45 34	N46 46	W 90 00	N45 10	0	2,000,000
Wisconsin Central	N44 15	N45 30	W 90 00	N43 50	0	2,000,000
Wisconsin South	N42 44	N44 04	W 90 00	N42 00	0	2,000,000

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State Plane Transverse Mercator Projection

State Zone	Central Meridian	False Northing (ft)	False Easting (ft)	Scale Factor @ CM	Latitude of Origin
Alabama					
East	85°50'	0	500,000	0.9929960	30°30'
West	87°30'	0	500,000	0.999933	30°00'
Alaska					
Zone 1	---	0			
Zone 2	142°00'	0	500,000	0.999900	54°00'
Zone 3	146°00'	0	500,000	0.999900	54°00'
Zone 4	150°00'	0	500,000	0.999900	54°00'
Zone 5	154°00'	0	500,000	0.999900	54°00'
Zone 6	158°00'	0	500,000	0.999900	54°00'
Zone 7	162°00'		500,000	0.999900	54°00'
Zone 8	166°00'	0	500,000	0.999900	54°00'
Zone 9	170°00'	0	500,000	0.999900	54°00'
Zone 10	---				
Arizona					
East	110°10'	0	500,000	0.999900	31°00'
Central	111°55'	0	500,000	0.999900	31°00'
West	113°45'	0	500,000	0.999933	31°00'
Delaware	75°25'	0	500,000	0.999995	38°00'
Florida					
East	81°00'	0	500,000	0.999941	24°20'
West	82°00'	0	500,000	0.999941	24°20'
Georgia					
East	82°10'	0	500,000	0.999900	30°00'
West	84°10'	0	500,000	0.999900	30°00'
Hawaii					
Zone 1	155°30'	0	500,000	0.999966	18°50'
Zone 2	156°40'	0	500,000	0.999966	20°20'
Zone 3	158°00'	0	500,000	0.999990	21°10'
Zone 4	159°30'	0	500,000	0.999990	21°50'
Zone 5	160°10'	0	500,000	1.0	21°40'

State Plane Transverse Mercator Projection

State Zone	Central Meridian	False Northing (ft)	False Easting (ft)	Scale Factor @ CM	Latitude of Origin
Idaho					
East	112°10'	0	500,000	0.999947	41°40'
Central	114°00'	0	500,000	0.999947	41°40'
West	115°45'	0	500,000	0.999933	41°40'
Illinois					
East	88°20'	0	500,000	0.999975	36°40'
West	90°10'	0	500,000	0.999941	36°40'
Indiana					
East	85°40'	0	500,000	0.999966	37°30'
West	87°05'	0	500,000	0.999966	37°30'
Maine					
East	68°30'	0	500,000	0.999900	43°40'
West	70°10'	0	500,000	0.999966	42°50'
Michigan					
East (1934)	83°40'	0	500,000	0.999943	41°30'
Central (1934)	85°45'	0	500,000	0.999909	41°30'
West (1934)	88°45'	0	500,000	0.999909	41°30'
Mississippi					
East	88°50'	0	500,000	0.999960	29°30'
West	90°20'	0	500,000	0.999941	29°30'
Missouri					
East	90°30'	0	500,000	0.999933	35°50'
Central	92°30'	0	500,000	0.999933	35°50'
West	94°30'	0	500,000	0.999941	36°10'
Nevada					
East	115°35'	0	500,000	0.999900	34°45'
Central	116°40'	0	500,000	0.999900	34°45'
West	118°35'	0	500,000	0.999900	34°45'
New Hampshire	71°40'	0	500,000	0.999966	42°30'
New Jersey	74°30'	0	2,000,000	0.999975	38°50'
New Mexico					

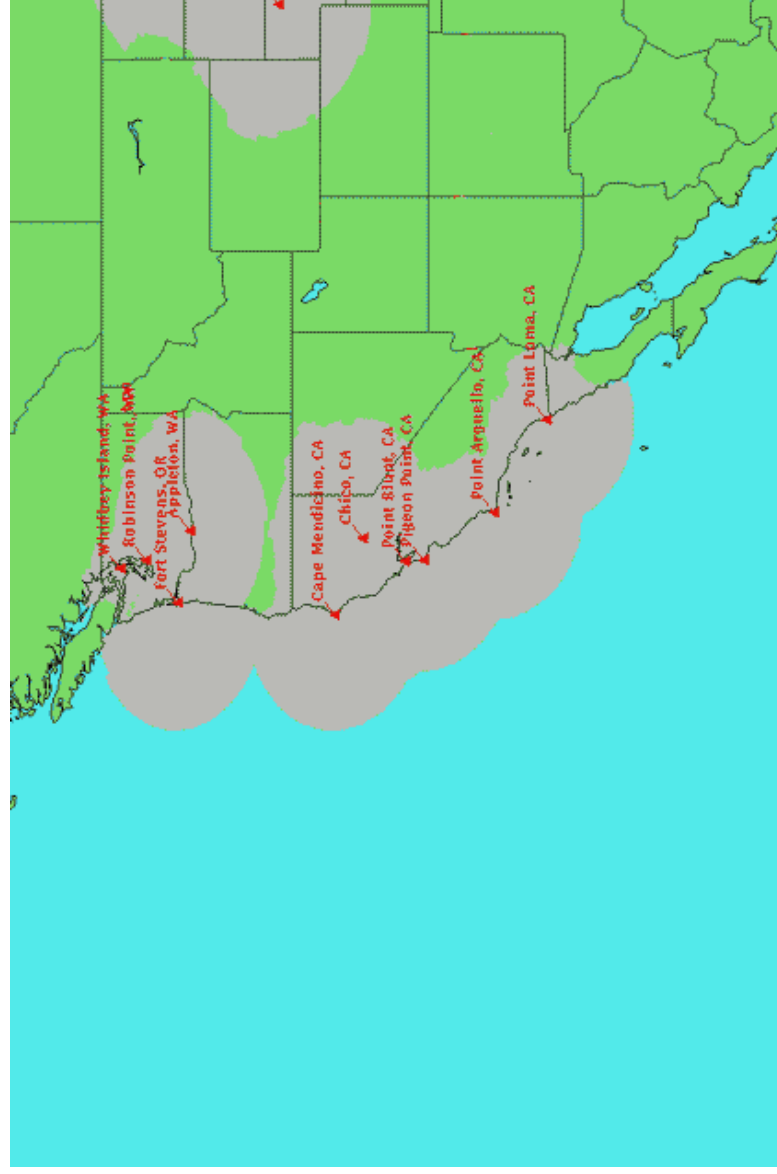
State Plane Transverse Mercator Projection

State Zone	Central Meridian	False Northing (ft)	False Easting (ft)	Scale Factor @ CM	Latitude of Origin
East	104°20'	0	500,000	0.999909	31°00'
Central	106°15'	0	500,000	0.999900	31°00'
West	107°50'	0	500,000	0.999916	31°00'
New York					
East	74°30'	0	500,000	0.999966	38°50'
Central	76°35'	0	500,000	0.999938	40°00'
West	78°35'	0	500,000	0.999938	40°00'
Rhode Island	71°30'	0	500,000	0.999994	41°05'
Vermont	72°30'	0	500,000	0.999964	42°30'
Wyoming					
Zone I	105°10'	0	500,000	0.999941	40°30'
Zone II	107°20'	0	500,000	0.999941	40°30'
Zone III	108°45'	0	500,000	0.999941	40°30'
Zone IV	110°05'	0	500,000	0.999941	40°30'

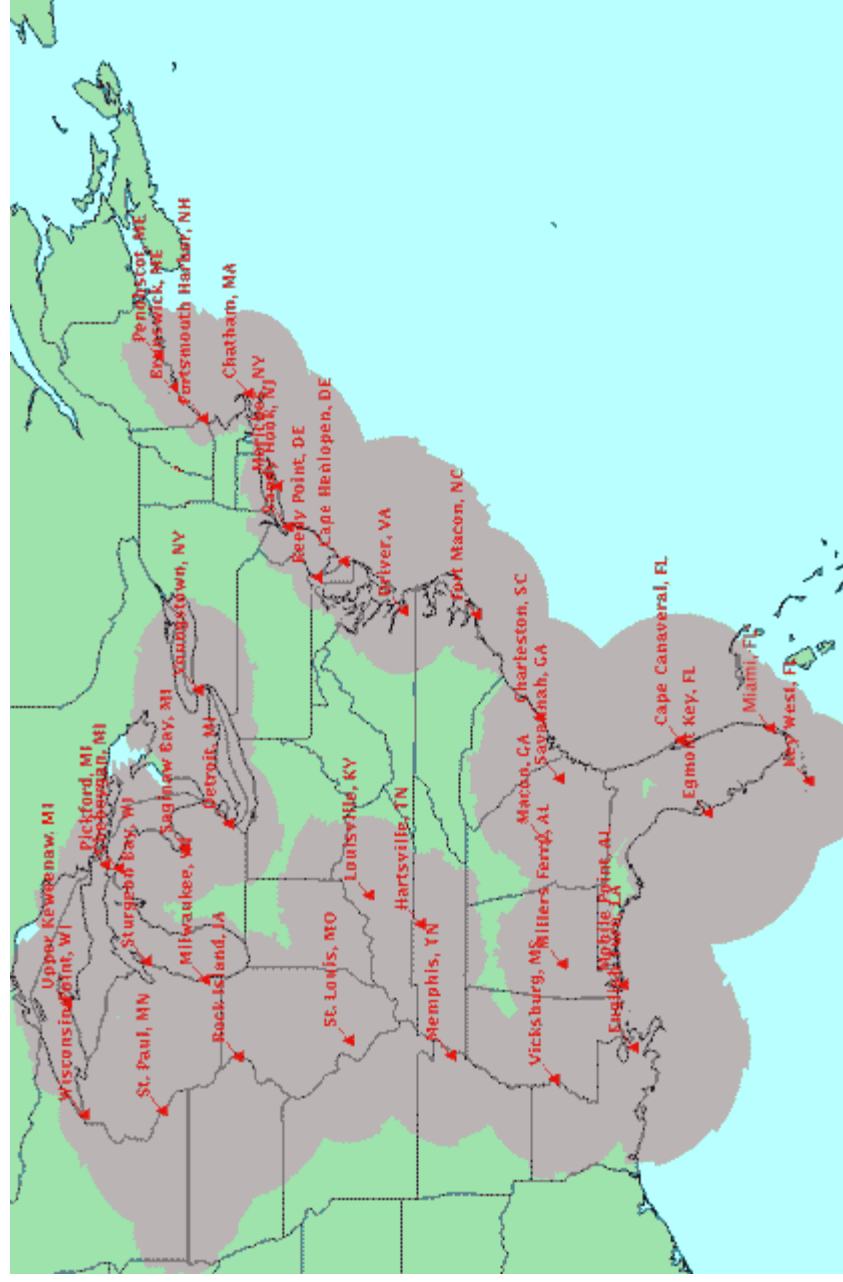
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United States Coast Guard DGPS Reference Station Coverage Maps

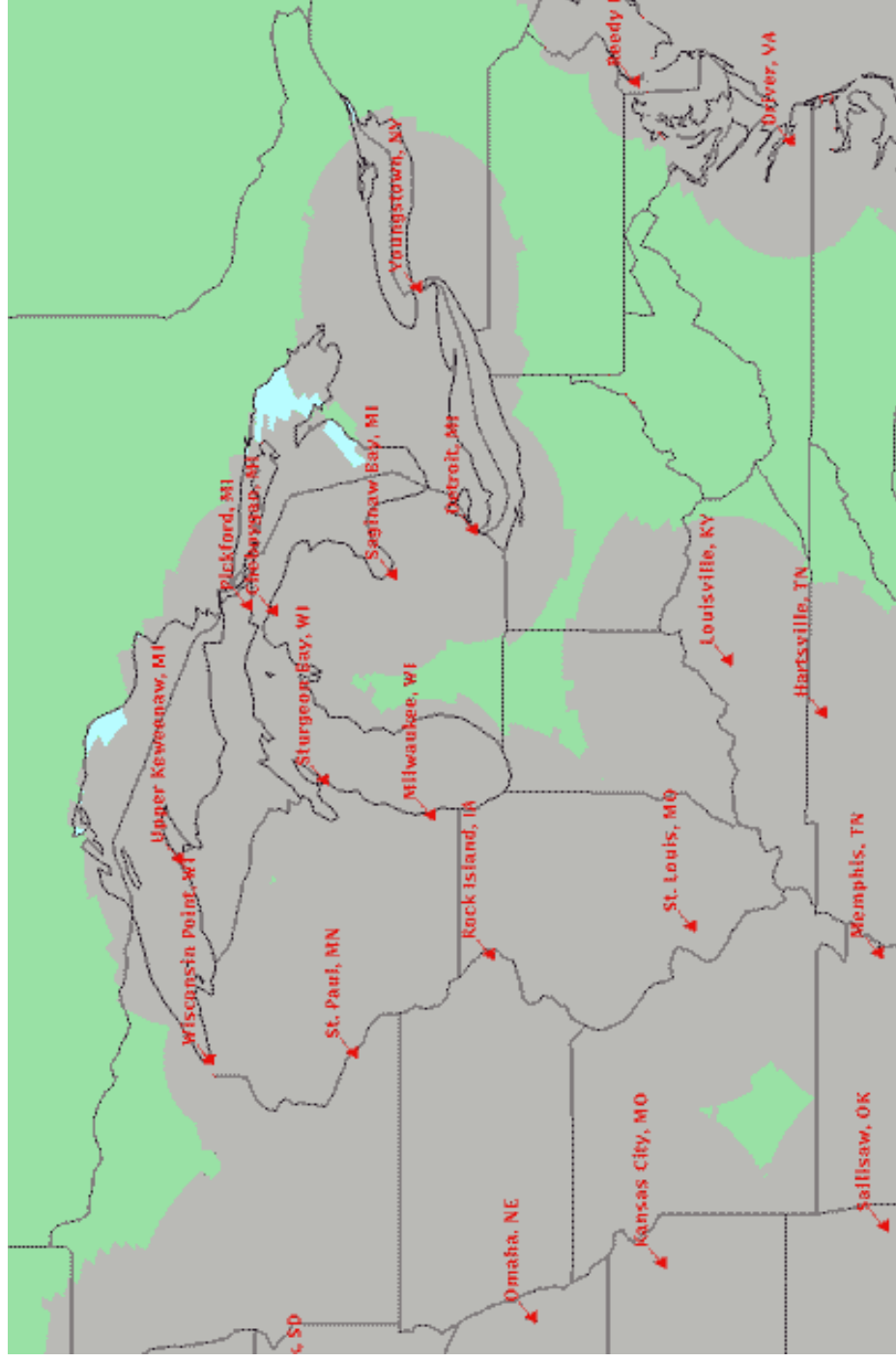
West Coast of United States



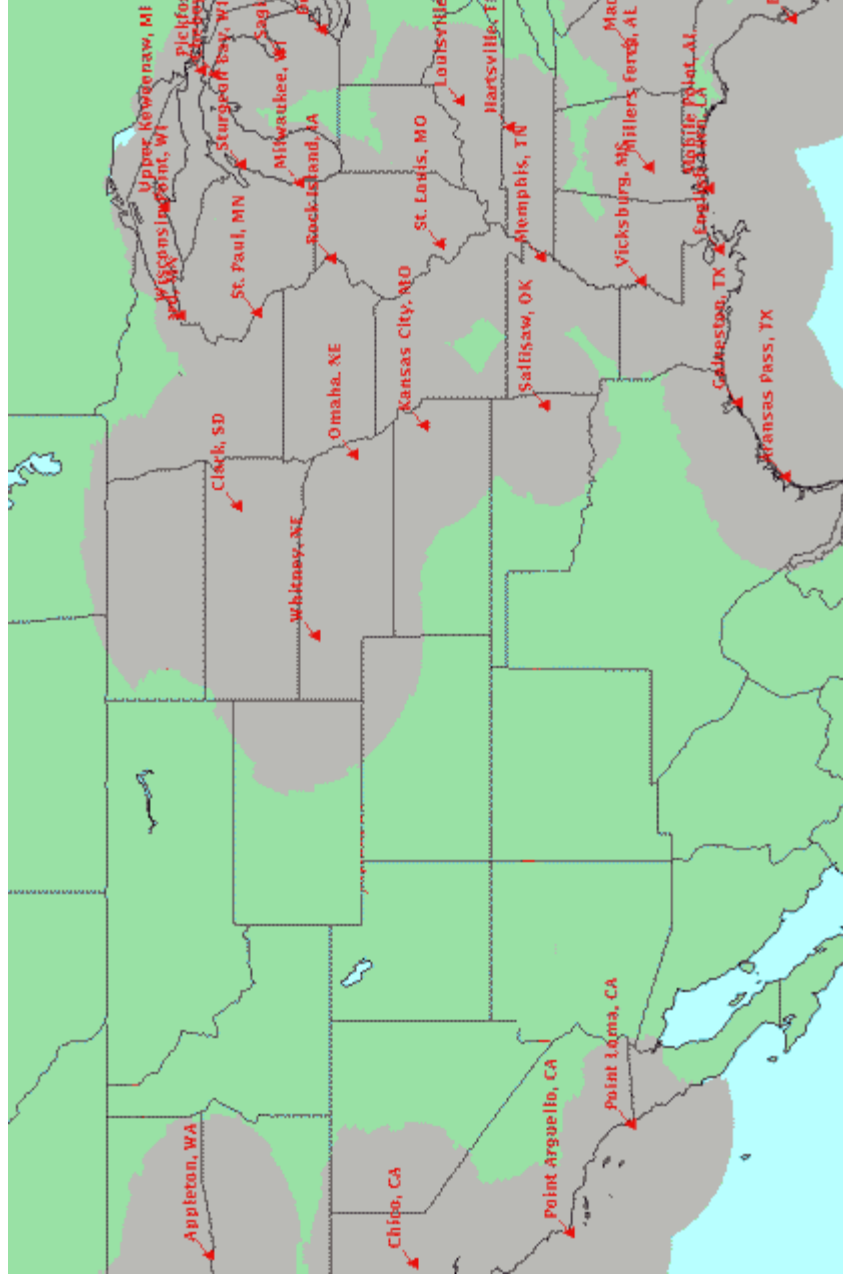
East Coast of the United States



Great Lakes Region of the United States



Central United States



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DGPS BROADCAST SITE STATUS & OPERATING SPECIFICATIONS STATUS AS OF 4/24/00

Users should notify the NIS watchstander at (703)-313-5900 of any observed outages, problems or requests. The Coast Guard DGPS service is available for positioning and navigation. Users may experience service interruptions with out advance notice. Coast Guard DGPS broadcasts should not be used under any circumstances where a sudden system failure or inaccuracy could constitute a safety hazard.

Note: Differential corrections are based on the NAD83 position of the reference station (REFSTA) antenna. Positions obtained using DGPS should be referenced to NAD83 coordinate system only. All sites are broadcasting RTCM Type 9-3 correction messages.

All stations are listed in alphabetical order by city name.

ALEXANDRIA, VA

Status: Engineering Test Site
RBn Antenna Location: 38,45.2N;77, 7.7W
REFSTA Ant Location (A): 38,45.1863N;77, 7.6948W
REFSTA Ant Location (B): 38, 45.1872N;77, 7.6968W
REFSTA RTCM SC-104 ID (A): 40
REFSTA RTCM SC-104 ID (B): 41
REFSTA FIRMWARE VERSION: RC00-1C19
Broadcast Site ID: 820
Transmission Frequency: 305 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 35 NM

Users should note that transmissions from this site may be intermittent and turned off without warning.

ANNETTE ISLAND, AK

Status: Operational
RBn Antenna Location: 55,4.1N;131, 36W
REFSTA Ant Location (A): 55,4.1441N;131, 35.97093W
REFSTA Ant Location (B): 55, 4.13276N;131, 35.95144W
REFSTA RTCM SC-104 ID (A): 278
REFSTA RTCM SC-104 ID (B): 279
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 889
Transmission Frequency: 323 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 170 NM

APPLETON, WA

Status: Operational
RBn Antenna Location: 45,46.53N;121, 19.33W
REFSTA Ant Location (A): 45,46.95769N;121, 19.65281W
REFSTA Ant Location (B): 45, 46.95741N;121, 19.63429W
REFSTA RTCM SC-104 ID (A): 172
REFSTA RTCM SC-104 ID (B): 173
REFSTA FIRMWARE VERSION: RC00-1C19
Broadcast Site ID: 871
Transmission Frequency: 300 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 250 SM

ARANSAS PASS, TX

Status: Operational
RBn Antenna Location: 27,50.3N;97, 3.5W
REFSTA Ant Location (A): 27,50.30083N;97, 3.53698W
REFSTA Ant Location (B): 27, 50.30169N;97, 3.55349W
REFSTA RTCM SC-104 ID (A): 32
REFSTA RTCM SC-104 ID (B): 33
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 816
Transmission Frequency: 304 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 180 NM

BIORKA ISLAND, AK

Status: Operational
RBn Antenna Location: 56,51.5N;135, 32.13W
REFSTA Ant Location (A): 56,51.26931N;135, 32.35636W
REFSTA Ant Location (B): 56, 51.25868N;135, 32.37328W
REFSTA RTCM SC-104 ID (A): 280
REFSTA RTCM SC-104 ID (B): 281
REFSTA FIRMWARE VERSION:
Broadcast Site ID: 890
Transmission Frequency: 305 KHZ
Transmission Rate: 100 BPS
Signal Strength:

BRUNSWICK, ME

Status: Operational
RBn Antenna Location: 43,53.4N;69, 56.8W
REFSTA Ant Location (A): 43,53.38844N;69, 56.79444W
REFSTA Ant Location (B): 43, 53.38191N;69, 56.7981W
REFSTA RTCM SC-104 ID (A): 42
REFSTA RTCM SC-104 ID (B): 43
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 800
Transmission Frequency: 316 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 200 NM

C2CEN, PORTSMOUTH, VA

Status: Engineering Test Site
RBn Antenna Location: 36,52.9N;76, 21.7W
REFSTA Ant Location (A): 36,52.93998N;76, 21.70412W
REFSTA Ant Location (B): 36, 52.94035N;76, 21.72466W
REFSTA RTCM SC-104 ID (A): 42
REFSTA RTCM SC-104 ID (B): 43
REFSTA FIRMWARE VERSION: RC00-IC19
Broadcast Site ID: 821
Transmission Frequency: 313 KHZ
Transmission Rate: 200 BPS
Signal Strength: 75uV at 75 NM

**Users should note that transmissions from this site
may be intermittent and turned off without warning.**

CAPE CANAVERAL, FL

Status: Operational
RBn Antenna Location: 28,27.6N;80, 32.6W
REFSTA Ant Location (A): 28,27.59506N;80, 32.59693W
REFSTA Ant Location (B): 28, 27.62215N;80, 32.57255W
REFSTA RTCM SC-104 ID (A): 18
REFSTA RTCM SC-104 ID (B): 19
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 809
Transmission Frequency: 289 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 200 NM

CAPE HENLOPEN, DE

Status: Operational
RBn Antenna Location: 38,46.6N;75, 5.3W
REFSTA Ant Location (A): 38,46.60679N;75, 5.26105W
REFSTA Ant Location (B): 38, 46.6115N;75, 5.23496W
REFSTA RTCM SC-104 ID (A): 10
REFSTA RTCM SC-104 ID (B): 11
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 805
Transmission Frequency: 298 KHZ
Transmission Rate: 200 BPS
Signal Strength: 75uV at 180 NM

CAPE HINCHINBROOK, AK

Status: Operational
RBn Antenna Location: 60,14.3N;146, 38.8W
REFSTA Ant Location (A): 60,14.24813N;146, 38.81767W
REFSTA Ant Location (B): 60, 14.24604N;146, 38.80669W
REFSTA RTCM SC-104 ID (A): 288
REFSTA RTCM SC-104 ID (B): 289
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 894
Transmission Frequency: 292 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 120 NM

CAPE MENDOCINO, CA

Status: Operational
RBn Antenna Location: 40,26.4N;124, 24.4W
REFSTA Ant Location (A): 40,26.506N;124, 23.77909W
REFSTA Ant Location (B): 40, 26.48393N;124, 23.77879W
REFSTA RTCM SC-104 ID (A): 270
REFSTA RTCM SC-104 ID (B): 271
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 885
Transmission Frequency: 292 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 180 NM

CHARLESTON, SC

Status: Operational
RBn Antenna Location: 32,45.4N;79, 50.5W
REFSTA Ant Location (A): 32,45.45357N;79, 50.57225W
REFSTA Ant Location (B): 32, 45.44787N;79, 50.5904W
REFSTA RTCM SC-104 ID (A): 16
REFSTA RTCM SC-104 ID (B): 17
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 808
Transmission Frequency: 298 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 150 NM

CHATHAM, MA

Status: Operational
RBn Antenna Location: 41,40.3N;69, 57W
REFSTA Ant Location (A): 41,40.27164N;69, 57.0027W
REFSTA Ant Location (B): 41, 40.26596N;69, 56.98455W
REFSTA RTCM SC-104 ID (A): 4
REFSTA RTCM SC-104 ID (B): 5
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 802
Transmission Frequency: 325 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 95 NM

CHEBOYGAN, MI

Status: Operational
RBn Antenna Location: 45,39.2N;84, 27.9W
REFSTA Ant Location (A): 45,39.2091N;84, 27.93836W
REFSTA Ant Location (B): 45, 39.22135N;84, 27.95027W
REFSTA RTCM SC-104 ID (A): 112
REFSTA RTCM SC-104 ID (B): 113
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 836
Transmission Frequency: 292 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 110 SM

CHICO, CA

Status: Operational
RBn Antenna Location: 39,25.8N;121, 36W
REFSTA Ant Location (A): 39,25.95802N;121, 39.89677W
REFSTA Ant Location (B): 39, 25.97251N;121, 39.89205W
REFSTA RTCM SC-104 ID (A): 256
REFSTA RTCM SC-104 ID (B): 257
REFSTA FIRMWARE VERSION: RC00-1C19
Broadcast Site ID: 878
Transmission Frequency: 318 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 250SM

CLARK, SD

Status: Operational
RBn Antenna Location: 44,55.8N;97, 57.6W
REFSTA Ant Location (A): 44,56.13681N;97, 57.640662W
REFSTA Ant Location (B): 44, 56.12209N;97, 57.64124W
REFSTA RTCM SC-104 ID (A): 146
REFSTA RTCM SC-104 ID (B): 147
REFSTA FIRMWARE VERSION: RC00-1C19
Broadcast Site ID: 850
Transmission Frequency: 309 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75 uV

COLD BAY, AK

Status: Operational
RBn Antenna Location: 55,5.5N;162, 31.9W
REFSTA Ant Location (A): 55,11.41638N;162, 42.42832W
REFSTA Ant Location (B): 55, 11.42518N;162, 42.40463W
REFSTA RTCM SC-104 ID (A): 296
REFSTA RTCM SC-104 ID (B): 297
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 898
Transmission Frequency: 289 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 180 NM

DETROIT, MI

Status: Operational
RBn Antenna Location: 42,17.8N;83, 5.7W
REFSTA Ant Location (A): 42,17.84042N;83, 5.7175W
REFSTA Ant Location (B): 42, 17.83364N;83, 5.73171W
REFSTA RTCM SC-104 ID (A): 116
REFSTA RTCM SC-104 ID (B): 117
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 838
Transmission Frequency: 319 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 100 SM

DRIVER, VA

Status: Operational
RBn Antenna Location: 36,57N;76, 33W
REFSTA Ant Location (A): 36,57.51893N;76, 33.39837W
REFSTA Ant Location (B): 36, 57.50929N;76, 33.38688W
REFSTA RTCM SC-104 ID (A): 12
REFSTA RTCM SC-104 ID (B): 13
REFSTA FIRMWARE VERSION: RC00-1C19
Broadcast Site ID: 806
Transmission Frequency: 289 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 130 NM

EGMONT KEY, FL

Status: Operational
RBn Antenna Location: 27,36N;82, 45.6W
REFSTA Ant Location (A): 27,36.02475N;82, 45.61913W
REFSTA Ant Location (B): 27, 36.05126N;82, 45.63576W
REFSTA RTCM SC-104 ID (A): 24
REFSTA RTCM SC-104 ID (B): 25
REFSTA FIRMWARE VERSION: RC00-1C19
Broadcast Site ID: 812
Transmission Frequency: 312 KHZ
Transmission Rate: 200 BPS
Signal Strength: 75uV at 210 NM

ENGLISH TURN, LA

Status: Operational
RBn Antenna Location: 29,52.7N;89, 56.5W
REFSTA Ant Location (A): 29,52.73743N;89, 56.50329W
REFSTA Ant Location (B): 29, 52.75074N;89, 56.52474W
REFSTA RTCM SC-104 ID (A): 28
REFSTA RTCM SC-104 ID (B): 29
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 814
Transmission Frequency: 293 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 170 NM

FORT MACON, NC

Status: Operational
RBn Antenna Location: 34,41.8N;76, 41W
REFSTA Ant Location (A): 34,41.84333N;76, 40.98706W
REFSTA Ant Location (B): 34, 41.85661N;76, 40.99206W
REFSTA RTCM SC-104 ID (A): 14
REFSTA RTCM SC-104 ID (B): 15
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 807
Transmission Frequency: 294 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 130 NM

FORT STEVENS, OR

Status: Operational
RBn Antenna Location: 46,12.3N;123, 57.4W
REFSTA Ant Location (A): 46,12.29295N;123, 57.36477W
REFSTA Ant Location (B): 46, 12.30947N;123, 57.35981W
REFSTA RTCM SC-104 ID (A): 272
REFSTA RTCM SC-104 ID (B): 273
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 886

Transmission Frequency: 287 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 180 NM

GALVESTON, TX

Status: Operational
RBn Antenna Location: 29,19.8N;94, 44.2W
REFSTA Ant Location (A): 29,19.79254N;94, 44.20809W
REFSTA Ant Location (B): 29, 19.80391N;94, 44.2005W
REFSTA RTCM SC-104 ID (A): 30
REFSTA RTCM SC-104 ID (B): 31
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 815
Transmission Frequency: 296 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 180 NM

GUSTAVUS, AK

Status: Operational
RBn Antenna Location: 58,25.1N;135, 41.8W
REFSTA Ant Location (A): 58,25.049N;135, 41.83917W
REFSTA Ant Location (B): 58, 25.06524N;135, 41.8217W
REFSTA RTCM SC-104 ID (A): 284
REFSTA RTCM SC-104 ID (B): 285
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 892
Transmission Frequency: 288 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 170 NM

HARTSVILLE, TN

Status: Operational
RBn Antenna Location: 36,24.61N;86, 5.37W
REFSTA Ant Location (A): 36,21.46215N;86, 5.36999W
REFSTA Ant Location (B): 36, 21.4561N;86, 5.38478W
REFSTA RTCM SC-104 ID (A): 144
REFSTA RTCM SC-104 ID (B): 145
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 858
Transmission Frequency: 317 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75 uV

ISABELA, PR

Status: Operational
RBn Antenna Location: 18,27.7N;67, 4W
REFSTA Ant Location (A): 18,27.77837N;67, 4.01759W
REFSTA Ant Location (B): 18, 27.7913N;67, 4.01031W
REFSTA RTCM SC-104 ID (A): 34
REFSTA RTCM SC-104 ID (B): 35
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 817
Transmission Frequency: 295 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 125 NM

KANSAS CITY, MO

Status: Operational
RBn Antenna Location: 39,7.04N;95, 24.53W
REFSTA Ant Location (A): 39,7.55229N;95, 24.12556W
REFSTA Ant Location (B): 39, 7.55268N;95, 24.08916W
REFSTA RTCM SC-104 ID (A): 164
REFSTA RTCM SC-104 ID (B): 165
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 867
Transmission Frequency: 305 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 100SM

KENAI, AK

Status: Operational
RBn Antenna Location: 60,40.1N;151, 21W
REFSTA Ant Location (A): 60,40.50477N;151, 21.00955W
REFSTA Ant Location (B): 60, 40.48834N;151, 21.00847W
REFSTA RTCM SC-104 ID (A): 292
REFSTA RTCM SC-104 ID (B): 293
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 896
Transmission Frequency: 310 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 170 NM

KEY WEST, FL

Status: Operational
RBn Antenna Location: 24,34.94N;81, 39.18W
REFSTA Ant Location (A): 24,34.93608N;81, 39.18175W
REFSTA Ant Location (B): 24, 34.93819N;81, 39.1675W
REFSTA RTCM SC-104 ID (A): 22
REFSTA RTCM SC-104 ID (B): 23
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 811
Transmission Frequency: 286 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 110 NM

KODIAK, AK

Status: Operational
RBn Antenna Location: 57,37.1N;152, 11.6W
REFSTA Ant Location (A): 57,37.06143N;152, 11.60436W
REFSTA Ant Location (B): 57, 37.05542N;152, 11.6315W
REFSTA RTCM SC-104 ID (A): 294
REFSTA RTCM SC-104 ID (B): 295
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 897
Transmission Frequency: 313 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 180 NM

KOKOLE POINT, HI

Status: Operational
RBn Antenna Location: 21,59N;159, 45.5W
REFSTA Ant Location (A): 21,59.00909N;159, 45.48866W
REFSTA Ant Location (B): 21, 59.02585N;159, 45.49402W
REFSTA RTCM SC-104 ID (A): 260
REFSTA RTCM SC-104 ID (B): 261
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 880
Transmission Frequency: 300 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 300 NM

LOUISVILLE, KY

Status: Operational
RBn Antenna Location: 38,0.6N;85, 17.9W
REFSTA Ant Location (A): 38,0.61772N;85, 17.92857W
REFSTA Ant Location (B): 38, 0.6318N;85, 17.92233W
REFSTA RTCM SC-104 ID (A): 168
REFSTA RTCM SC-104 ID (B): 169
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 869
Transmission Frequency: 290 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 150 SM

MACON, GA

Status: Operational
RBn Antenna Location: 32,41.67371N;83, 33.61953W
REFSTA Ant Location (A): 32,41.71904N;83, 33.63296W
REFSTA Ant Location (B): 32, 41.72335N;83, 33.61694W
REFSTA RTCM SC-104 ID (A): 48
REFSTA RTCM SC-104 ID (B): 49
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 822
Transmission Frequency: 301 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100 uV at 186 SM

MEMPHIS, TN

Status: Operational
RBn Antenna Location: 35,27.9N;90, 12.3W
REFSTA Ant Location (A): 35,27.9459N;90, 12.34071W
REFSTA Ant Location (B): 35, 27.94205N;90, 12.36248W
REFSTA RTCM SC-104 ID (A): 152
REFSTA RTCM SC-104 ID (B): 153
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 861
Transmission Frequency: 310 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 130 SM

MIAMI, FL

Status: Operational
RBn Antenna Location: 25,44N;80, 9.6W
REFSTA Ant Location (A): 25,43.96829N;80, 9.61001W
REFSTA Ant Location (B): 25, 43.96653N;80, 9.63006W
REFSTA RTCM SC-104 ID (A): 20
REFSTA RTCM SC-104 ID (B): 21
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 810
Transmission Frequency: 322 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 75 NM

MILLERS FERRY, AL

Status: Operational
RBn Antenna Location: 32,5.4N;87, 23.5W
REFSTA Ant Location (A): 32,5.41528N;87, 23.50842W
REFSTA Ant Location (B): 32, 5.43106N;87, 23.5329W
REFSTA RTCM SC-104 ID (A): 160
REFSTA RTCM SC-104 ID (B): 161
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 865
Transmission Frequency: 320 KHZ
Transmission Rate: 200 BPS
Signal Strength: 75uV at 150 SM

MILWAUKEE, WI

Status: Operational
RBn Antenna Location: 43,0.1N;87, 53.3W
REFSTA Ant Location (A): 43,0.1517N;87, 53.30645W
REFSTA Ant Location (B): 43, 0.14138N;87, 53.29264W
REFSTA RTCM SC-104 ID (A): 106
REFSTA RTCM SC-104 ID (B): 107
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 833
Transmission Frequency: 297 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 140 SM

MOBILE POINT, AL

Status: Operational
RBn Antenna Location: 30,13.7N;88, 1.4W
REFSTA Ant Location (A): 30,13.65077N;88, 1.44588W
REFSTA Ant Location (B): 30, 13.65101N;88, 1.45433W
REFSTA RTCM SC-104 ID (A): 26
REFSTA RTCM SC-104 ID (B): 27
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 813
Transmission Frequency: 300 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 170 NM

MORICHES, NY

Status: Operational
RBn Antenna Location: 40,47.4N;72, 44.7W
REFSTA Ant Location (A): 40,47.37101N;72, 44.77734W
REFSTA Ant Location (B): 40, 47.36376N;72, 44.79783W
REFSTA RTCM SC-104 ID (A): 6
REFSTA RTCM SC-104 ID (B): 7
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 803
Transmission Frequency: 293 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 130 NM

OMAHA, NE

Status: Operational
RBn Antenna Location: 41,46.7N;95, 55.7W
REFSTA Ant Location (A): 41,46.69653N;95, 55.67836W
REFSTA Ant Location (B): 41, 46.71005N;95, 55.68953W
REFSTA RTCM SC-104 ID (A): 166
REFSTA RTCM SC-104 ID (B): 167
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 868
Transmission Frequency: 298 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 150 SM

PENOBSCOT, ME

Status: Operational
RBn Antenna Location: 44,27.1N;68, 46.3W
REFSTA Ant Location (A): 44,27.102975N;68, 46.33059W
REFSTA Ant Location (B): 44, 27.120789N;68, 46.332671W
REFSTA RTCM SC-104 ID (A): 44
REFSTA RTCM SC-104 ID (B): 45
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 799
Transmission Frequency: 290 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 65 SM

PICKFORD, MI

Status: Operational
RBn Antenna Location: 46,3.9N;84, 21.7W
REFSTA Ant Location (A): 46,3.88482N;84, 21.71027W
REFSTA Ant Location (B): 46, 3.89792N;84, 21.71806W
REFSTA RTCM SC-104 ID (A): 110
REFSTA RTCM SC-104 ID (B): 111
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 835
Transmission Frequency: 309 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 60 SM

PIGEON POINT, CA

Status: Operational
RBn Antenna Location: 37,11.2N;122, 23.4W
REFSTA Ant Location (A): 37,11.22469N;122, 23.39607W
REFSTA Ant Location (B): 37, 11.20933N;122, 23.38592W
REFSTA RTCM SC-104 ID (A): 266
REFSTA RTCM SC-104 ID (B): 267
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 883
Transmission Frequency: 287 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 180 NM

POINT BLUNT, CA

Status: Operational
RBn Antenna Location: 37,51.1899N;122, 25.1439W
REFSTA Ant Location (A): 37,51.1829N;122, 25.13582W
REFSTA Ant Location (B): 37, 51.19319N;122, 25.16276W
REFSTA RTCM SC-104 ID (A): 268
REFSTA RTCM SC-104 ID (B): 269
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 884
Transmission Frequency: 310 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 60 NM

POINT LOMA, CA

Status: Operational
RBn Antenna Location: 32,39.9N;117, 14.6W
REFSTA Ant Location (A): 32,39.92483N;117, 14.58074W
REFSTA Ant Location (B): 32, 39.93658N;117, 14.58965W
REFSTA RTCM SC-104 ID (A): 262
REFSTA RTCM SC-104 ID (B): 263
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 881
Transmission Frequency: 302 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 180 NM

PORTSMOUTH HARBOR, NH

Status: Operational
RBn Antenna Location: 43,4.3N;70, 42.6W
REFSTA Ant Location (A): 43,4.25693N;70, 42.59104W
REFSTA Ant Location (B): 43, 4.26058N;70, 42.57152W
REFSTA RTCM SC-104 ID (A): 2
REFSTA RTCM SC-104 ID (B): 3
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 801
Transmission Frequency: 288 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 100 NM

POTATO POINT, AK

Status: Operational
RBn Antenna Location: 61,3.4N;146, 41.8W
REFSTA Ant Location (A): 61,3.38794N;146, 41.83412W

REFSTA Ant Location (B): 61, 3.38057N;146, 41.79811W
REFSTA RTCM SC-104 ID (A): 290
REFSTA RTCM SC-104 ID (B): 291
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 895
Transmission Frequency: 298 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 100 NM

REEDY POINT, DE

Status: Operational
RBn Antenna Location: 39,33.68N;75, 34.19W
REFSTA Ant Location (A): 39,33.68662N;75, 34.19873W
REFSTA Ant Location (B): 39, 33.70062N;75, 34.19702W
REFSTA RTCM SC-104 ID (A): 170
REFSTA RTCM SC-104 ID (B): 171
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 870
Transmission Frequency: 309 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 70 SM

ROBINSON POINT, WA

Status: Operational
RBn Antenna Location: 47,23.3N;122, 22.5W
REFSTA Ant Location (A): 47,23.25008N;122, 22.48503W
REFSTA Ant Location (B): 47, 23.23194N;122, 22.49946W
REFSTA RTCM SC-104 ID (A): 274
REFSTA RTCM SC-104 ID (B): 275
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 887
Transmission Frequency: 323 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 60 NM

ROCK ISLAND, IL

Status: Operational
RBn Antenna Location: 42,0.3N;90, 14.11W
REFSTA Ant Location (A): 42,0.73636N;90, 13.53673W
REFSTA Ant Location (B): 42, 0.73806N;90, 13.50136W
REFSTA RTCM SC-104 ID (A): 156
REFSTA RTCM SC-104 ID (B): 157
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 863
Transmission Frequency: 311 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 150 SM

SAGINAW BAY, MI

Status: Operational
RBn Antenna Location: 43,37.7N;83, 50.3W
REFSTA Ant Location (A): 43,37.71816N;83, 50.26568W
REFSTA Ant Location (B): 43, 37.70178N;83, 50.26467W
REFSTA RTCM SC-104 ID (A): 114
REFSTA RTCM SC-104 ID (B): 115
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 837
Transmission Frequency: 301 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 85 SM

SALLISAW, OK

Status: Operational
RBn Antenna Location: 35,22N;94, 49W
REFSTA Ant Location (A): 35,22.02434N;94, 48.99516W
REFSTA Ant Location (B): 35, 22.03651N;94, 48.97999W
REFSTA RTCM SC-104 ID (A): 162
REFSTA RTCM SC-104 ID (B): 163
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 866
Transmission Frequency: 299 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100 uV at 100 SM

SANDY HOOK, NJ

Status: Operational
RBn Antenna Location: 40,28.3N;74, 0.7W
REFSTA Ant Location (A): 40,28.28903N;74, 0.69571W
REFSTA Ant Location (B): 40, 28.29046N;74, 0.71141W
REFSTA RTCM SC-104 ID (A): 8
REFSTA RTCM SC-104 ID (B): 9
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 804
Transmission Frequency: 286 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 100 NM

SAVANNAH, GA

Status: Operational
RBn Antenna Location: 32,8.4N;81, 42W
REFSTA Ant Location (A): 32,8.3156N;81, 41.77983W
REFSTA Ant Location (B): 32, 8.3227N;81, 41.79519W
REFSTA RTCM SC-104 ID (A): 36
REFSTA RTCM SC-104 ID (B): 37
REFSTA FIRMWARE VERSION: RC00-1C19
Broadcast Site ID: 818
Transmission Frequency: 319 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 185 SM

ST LOUIS, MO

Status: Operational
RBn Antenna Location: 38,36.7N;89, 45.5W
REFSTA Ant Location (A): 38,36.67847N;89, 45.53318W
REFSTA Ant Location (B): 38, 36.66488N;89, 45.5209W
REFSTA RTCM SC-104 ID (A): 154
REFSTA RTCM SC-104 ID (B): 155
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 862
Transmission Frequency: 322 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 115 SM

ST PAUL, MN

Status: Operational
RBn Antenna Location: 44,18.2N;91, 54.2W
REFSTA Ant Location (A): 44,18.23647N;91, 54.19788W
REFSTA Ant Location (B): 44, 18.22143N;91, 54.19248W
REFSTA RTCM SC-104 ID (A): 158
REFSTA RTCM SC-104 ID (B): 159
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 864
Transmission Frequency: 317 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 150 SM

STURGEON BAY, WI

Status: Operational
RBn Antenna Location: 44,47.7N;87, 18.9W
REFSTA Ant Location (A): 44,47.72863N;87, 18.85942W
REFSTA Ant Location (B): 44, 47.72345N;87, 18.86648W
REFSTA RTCM SC-104 ID (A): 104
REFSTA RTCM SC-104 ID (B): 105
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 832
Transmission Frequency: 322 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 110 SM

UPOLU POINT, HI

Status: Operational
RBn Antenna Location: 20,14.8N;155, 53W
REFSTA Ant Location (A): 20,14.75277N;155, 53.02759W
REFSTA Ant Location (B): 20, 14.77183N;155, 53.01227W
REFSTA RTCM SC-104 ID (A): 258
REFSTA RTCM SC-104 ID (B): 259
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 879
Transmission Frequency: 286 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 170 NM

UPPER KEWEENAW, MI

Status: Operational
RBn Antenna Location: 47,13.6N;88, 37.4W
REFSTA Ant Location (A): 47,13.62344N;88, 37.45902W
REFSTA Ant Location (B): 47, 13.63748N;88, 37.44625W
REFSTA RTCM SC-104 ID (A): 102
REFSTA RTCM SC-104 ID (B): 103
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 831
Transmission Frequency: 298 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 130 SM

VANDENBERG AFB, CA

Status: Operational
RBn Antenna Location: 34,49.517N;120, 33.867W
REFSTA Ant Location (A): 34,49.596434N;120, 33.80945W
REFSTA Ant Location (B): 34, 49.587103N;120, 33.796526W

REFSTA RTCM SC-104 ID (A): 264
REFSTA RTCM SC-104 ID (B): 265
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 882
Transmission Frequency: 321 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 180 NM

VICKSBURG, MS

Status: Operational
RBn Antenna Location: 32,19.9N;90, 55.2W
REFSTA Ant Location (A): 32,19.8848N;90, 55.18705W
REFSTA Ant Location (B): 32, 19.87481N;90, 55.17626W
REFSTA RTCM SC-104 ID (A): 150
REFSTA RTCM SC-104 ID (B): 151
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 860
Transmission Frequency: 313 KHZ
Transmission Rate: 200 BPS
Signal Strength: 100uV at 115 SM

WHIDBEY ISLAND, WA

Status: Operational
RBn Antenna Location: 48,18.8N;122, 41.8W
REFSTA Ant Location (A): 48,18.76266N;122, 41.76763W
REFSTA Ant Location (B): 48, 18.74625N;122, 41.76766W
REFSTA RTCM SC-104 ID (A): 276
REFSTA RTCM SC-104 ID (B): 277
REFSTA FIRMWARE VERSION: RD00-1C19

Broadcast Site ID: 888
Transmission Frequency: 302 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 90 NM

WHITEFISH POINT, MI

Status: Decommissioned
RBn Antenna Location: 46,46.3N;84, 57.5W
REFSTA Ant Location (A): 46,46.2772N;84, 57.48152W
REFSTA Ant Location (B): 46, 46.28634N;84, 57.46617W
REFSTA RTCM SC-104 ID (A): 108
REFSTA RTCM SC-104 ID (B): 109
REFSTA FIRMWARE VERSION: RC00-1C19
Broadcast Site ID: 834
Transmission Frequency: 318 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 80 SM

**THE COAST GUARD INTENDS TO DECOMMISSION THE WHITEFISH POINT
DGPS SITE ON OR ABOUT 1600Z 24 SEP 99. COVERAGE FOR THE
WHITEFISH AREA WILL BE PROVIDED BY THE RECENTLY
COMMISSIONED PICKFORD, MI DGPS SITE.**

WHITNEY, NE

Status: Operational
RBn Antenna Location: 42,44N;103, 19W
REFSTA Ant Location (A): 42,44.35847N;103, 19.72616W
REFSTA Ant Location (B): 42, 44.36916N;103, 19.71349W

REFSTA RTCM SC-104 ID (A): 148
REFSTA RTCM SC-104 ID (B): 149
REFSTA FIRMWARE VERSION: RC00-1C19
Broadcast Site ID: 859
Transmission Frequency: 310 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 280 SM

WISCONSIN POINT, WI

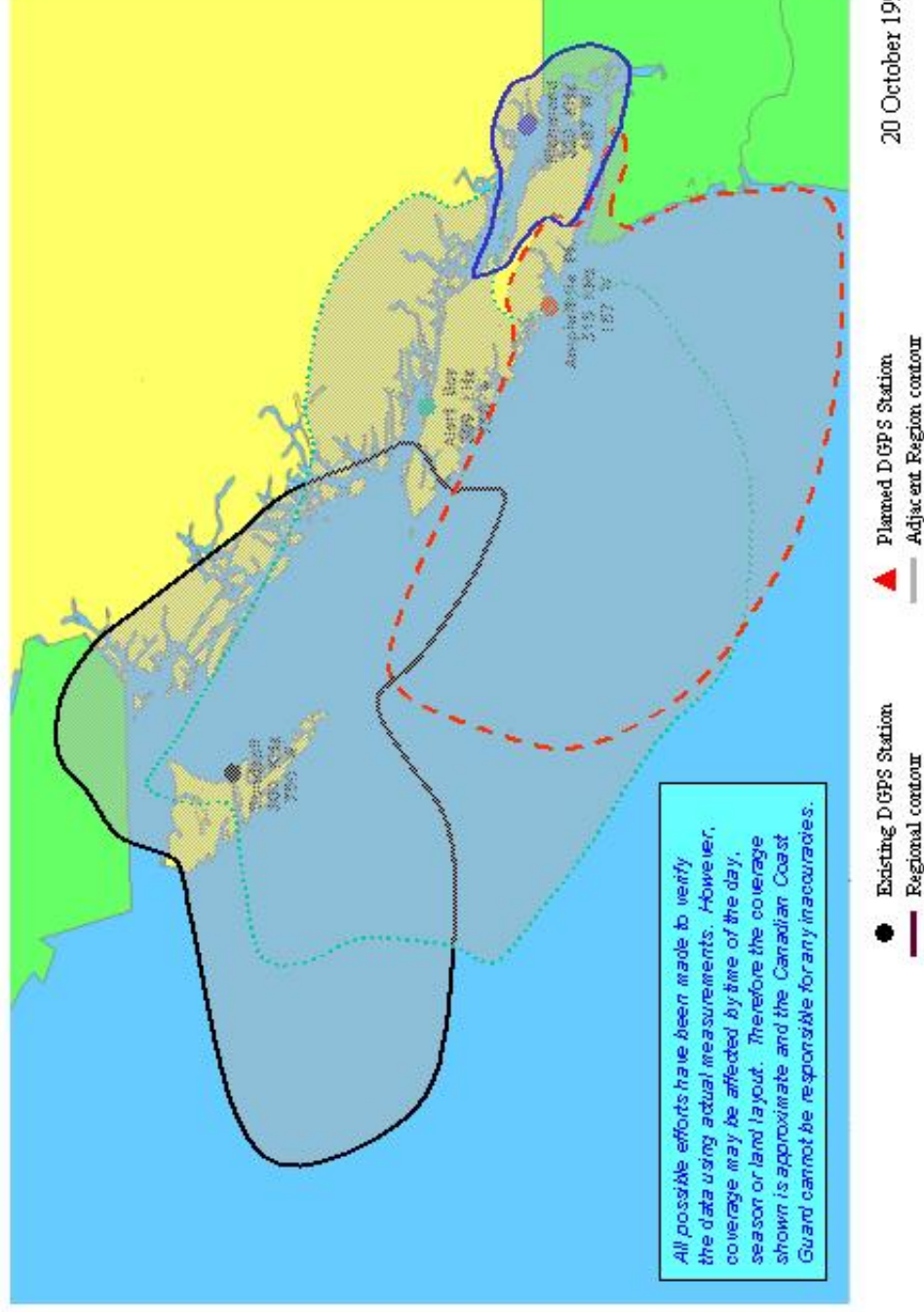
Status: Operational
RBn Antenna Location: 46,42.3N;92, 0.9W
REFSTA Ant Location (A): 46,42.30287N;92, 0.91224W
REFSTA Ant Location (B): 46, 42.3061N;92, 0.93574W
REFSTA RTCM SC-104 ID (A): 100
REFSTA RTCM SC-104 ID (B): 101
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 830
Transmission Frequency: 296 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 40 SM

YOUNGSTOWN, NY

Status: Operational
RBn Antenna Location: 43,13.8N;78, 58.2W
REFSTA Ant Location (A): 43,13.8748N;78, 58.20992W
REFSTA Ant Location (B): 43, 13.87466N;78, 58.18778W
REFSTA RTCM SC-104 ID (A): 118
REFSTA RTCM SC-104 ID (B): 119
REFSTA FIRMWARE VERSION: RD00-1C19
Broadcast Site ID: 839
Transmission Frequency: 322 KHZ
Transmission Rate: 100 BPS
Signal Strength: 75uV at 150 SM

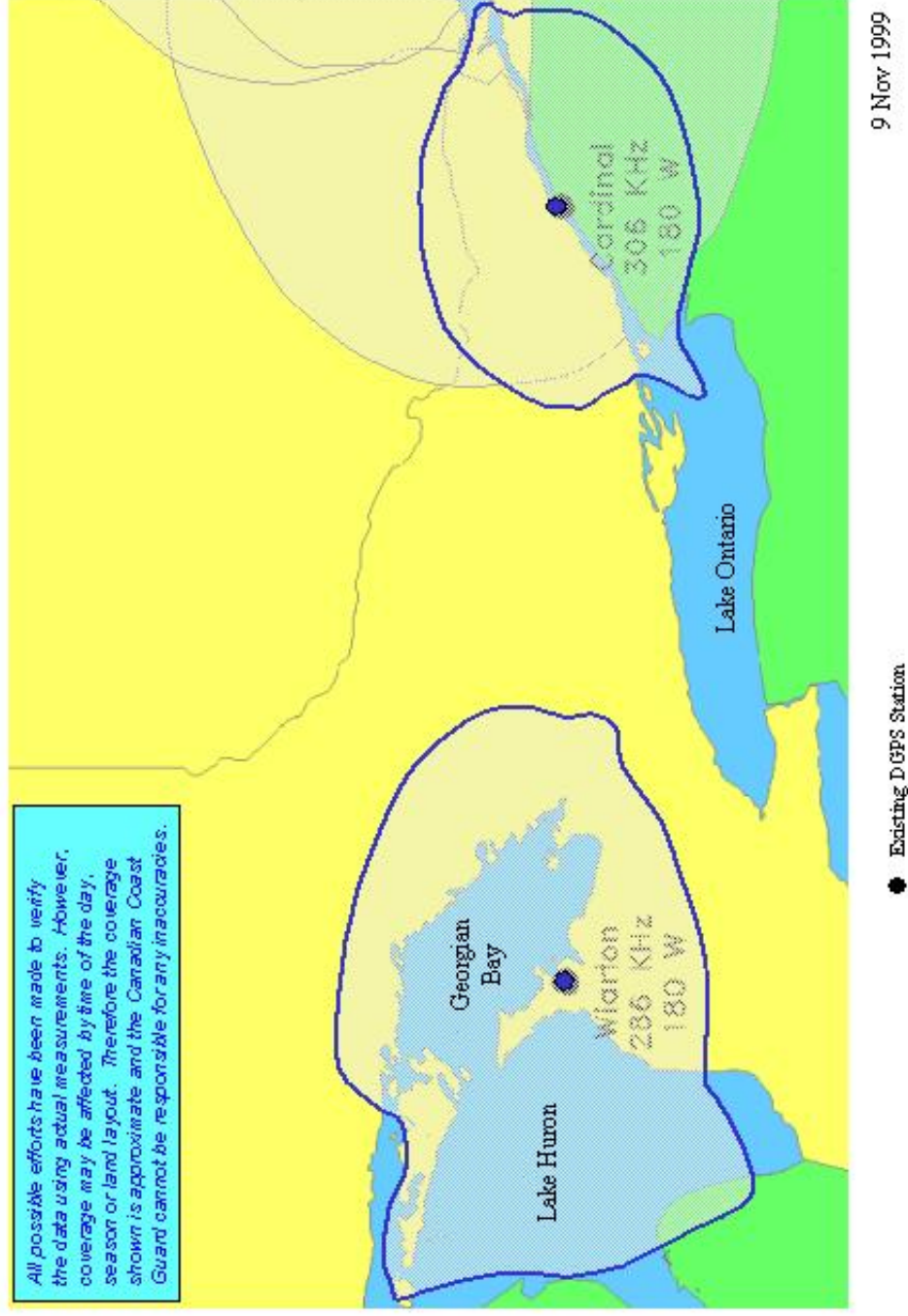
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Pacific Region Stations



Frequency and Transmission rate	Nominal Range	IALA Identification, Ref. Station numbers & Transmitter number	Status
SANDSPIT, BC 53 14N , 131 49W 300khz & 200bps	350km	306,307 & 906	Initial operational service
ALERT BAY, BC 50 35N , 126 55W 309khz & 200bps	450km	300,301 & 909	Initial operational service
RICHMOND, BC 49 11N , 123 07W 320khz & 200bps	170km	304,305 & 907	Initial operational service
AMPHITRITE PT., BC 48 55N , 125 33W 315khz & 200bps	350km	302,303 & 908	Initial operational service.

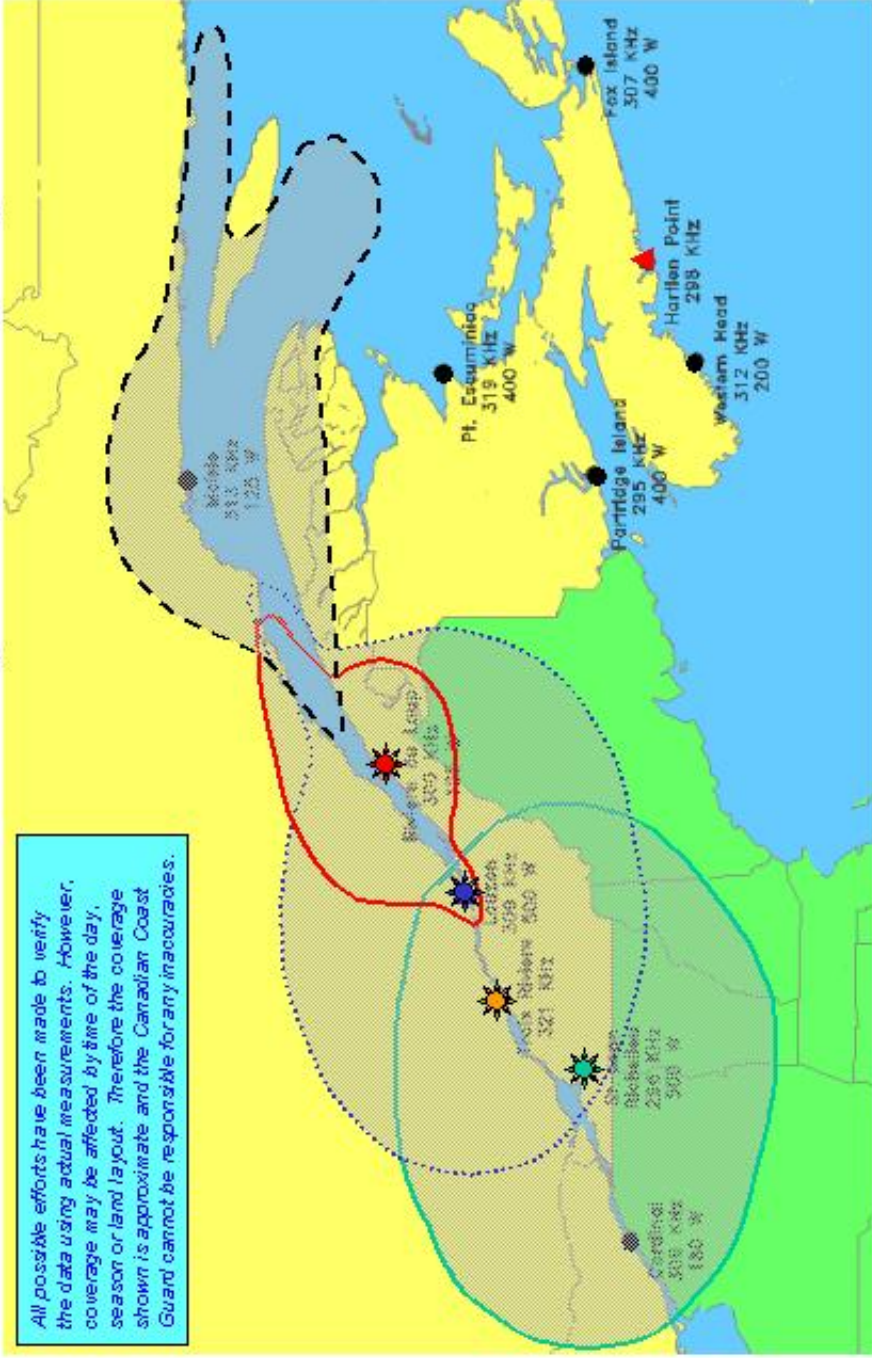
Central/Arctic Region Stations



Frequency and Transmission rate	Nominal Range	IALA Identification, Ref. Station numbers & Transmitter number	Status
CARDINAL, ONT 44 47N 75 25W 306khz & 200bps	300km	308, 309 & 919	Initial operational service.
WIARTON, ONT 44 45N - 81 07W 286khz & 200bps	250km	310, 311 & 918	Initial operational service.

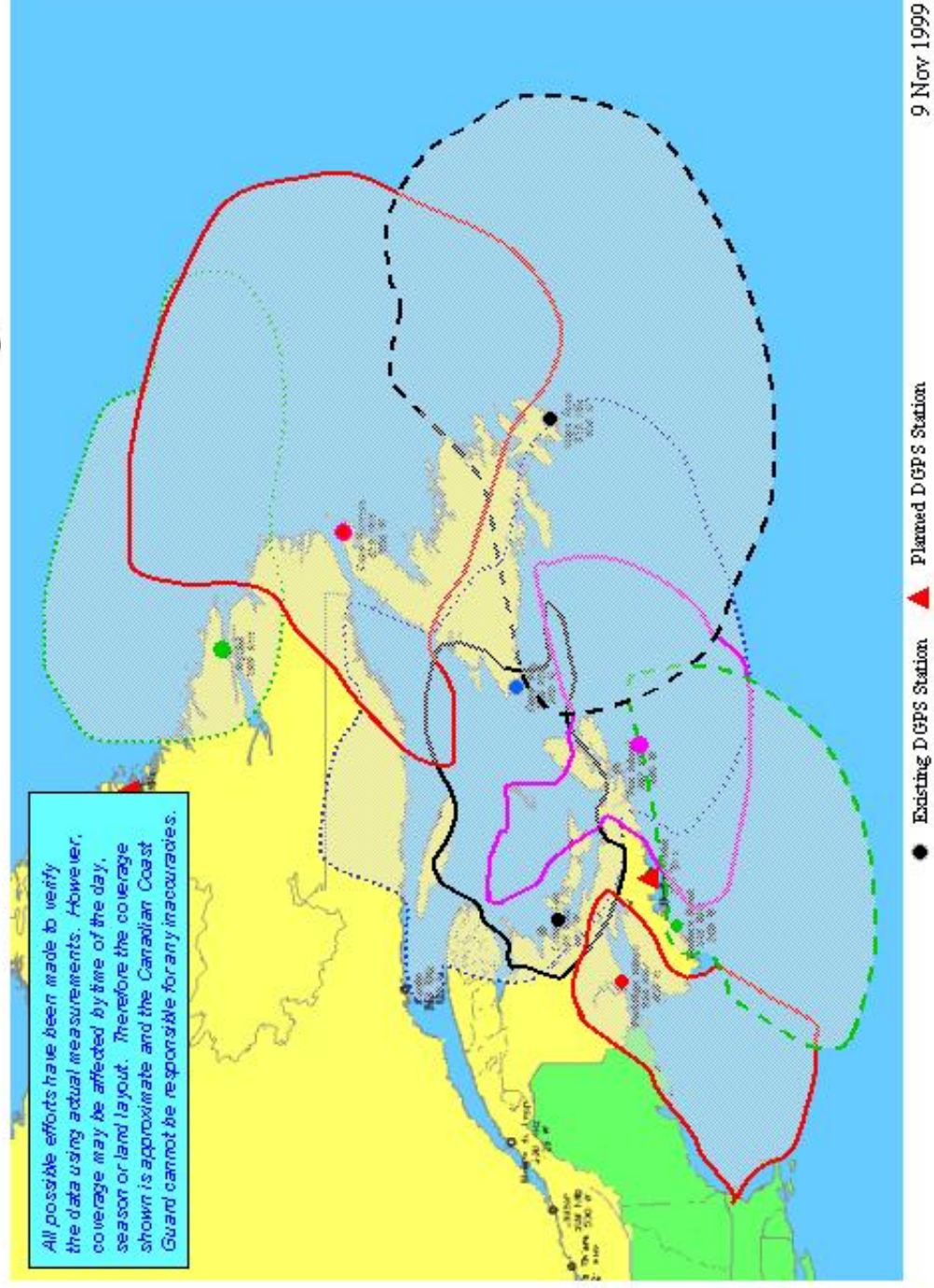
Canadian

All possible efforts have been made to verify the data using actual measurements. However, coverage may be affected by time of day, season or land layout. Therefore the coverage shown is approximate and the Canadian Coast Guard cannot be responsible for any inaccuracies.



Frequency and Transmission rate	Nominal Range	IALA Identification, Ref. Station numbers & Transmitter number	Status
MOISIE, QUE 50 12N - 66 07W 313khz & 200bps	300km	320, 321 & 925	Initial operational service.
RIVIÈRE DU LOUP, QUE 47 46N - 69 36W 300khz & 200bps	300km	318, 319 & 926	Initial operational service.
LAUZON, QUE 46 49N - 71 10W 309khz & 200bps	330km	316, 317 & 927	Initial operational service.
TROIS-RIVIÈRES, QUE 46 23N - 72 27W 321khz & 200bps	170km	314 & 928	Initial operational service. (no backup capability)
ST. JEAN SUR RICHELIEU, QUE 45 19N - 73 19W 296khz & 200bps	330km	312, 313 & 929	Initial operational service.

East Coast DGPS Coverage

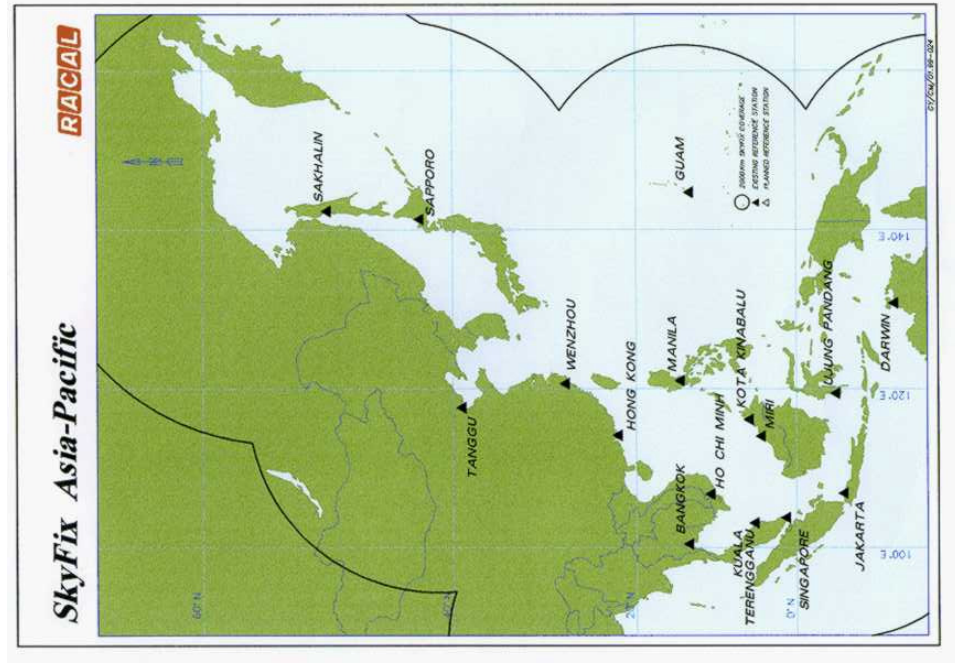


Frequency and Transmission rate	Nominal Range	IALA Identification, Ref. Station numbers & Transmitter number	Status
RIGOLET, NFLD 54 15N - 58 30W 299khz & 200bps	300km	344, 345 & 946	Initial operational service
CAPE NORMAN NFLD 51 30N - 55 49W 310khz & 200bps	350km	342, 343 & 944	Initial operational service.
CAPE RAY, NFLD 47 38N - 59 14W 290khz & 200bps	350km	340, 341 & 942	Initial operational service.
CAPE RACE, NFLD 46 46N - 53 11W 315khz & 200bps	525km	338, 339 & 940	Initial operational service.
POINT ESCUMINAC, NB 47 04N - 64 48W 319khz & 200bps	300km	332, 333 & 936	Initial operational service

Frequency and Transmission rate	Nominal Range	IALA Identification, Ref. Station numbers & Transmitter number	Status
FOX ISLAND, NS 45 20N - 61 05W 307khz & 200bps	300km	336, 337 & 934	Initial operational service.
PARTRIDGE ISLAND, NB 45 14N - 66 03W 295khz & 200hns	300km	326, 327 & 939	Initial operational service
WESTERN HEAD, NS 43 59N - 64 40W 312khz & 200bps	300km	334, 335 & 935	Initial operational service

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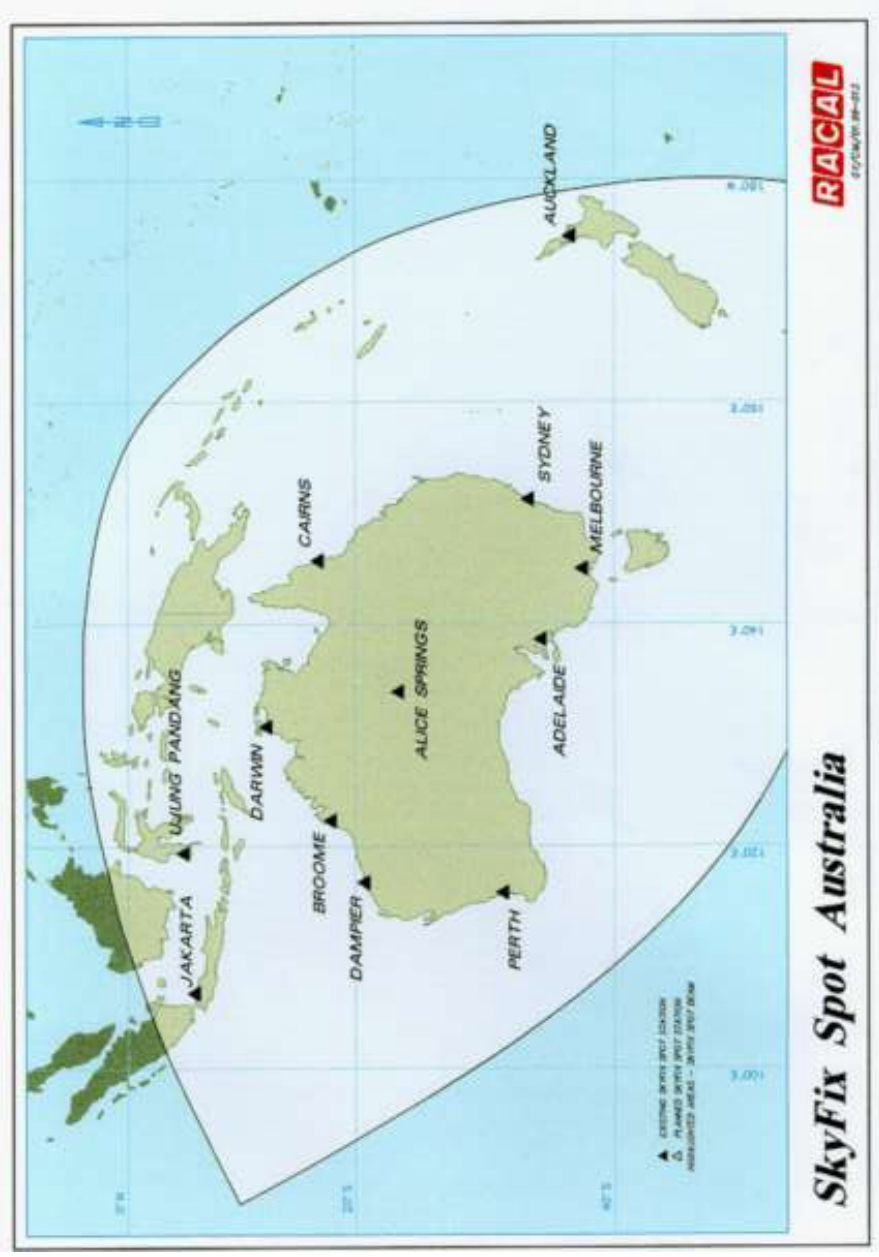
SkyFix and SkyFix Spot Reference Stations



Asia

Station Name	Station ID	Latitude	Longitude
Singapore	0100	01°19' N	103° 40' E
Terengganu	0101	05° 20' N	103° 09' E
Miri	0102	04° 26' N	114° 01' E
Kota Kinabalu	0105	05° 48' N	116° 03' E
Manila	0110	14° 34' N	121° 00' E
Ho Chi Minh City	0115	10° 48' N	106° 41' E
Hong Kong	0120	22° 18' N	114° 10' E
Wenzhou	0135	27° 58' N	120° 45' E
Tanggu	0138	39° 02' N	117° 39' E
Sapporo	0140	43° 05' N	141° 23' E
Ujung Pandang	0150	05° 08' N	119° 25' E
Jakarta	0160	06° 14' N	106° 51' E
Guam	0170	13° 31' N	144° 49' E
Bangkok	0180	13° 43' N	100° 31' E
Shakalin Island	0300	51° 48' N	143° 09' E

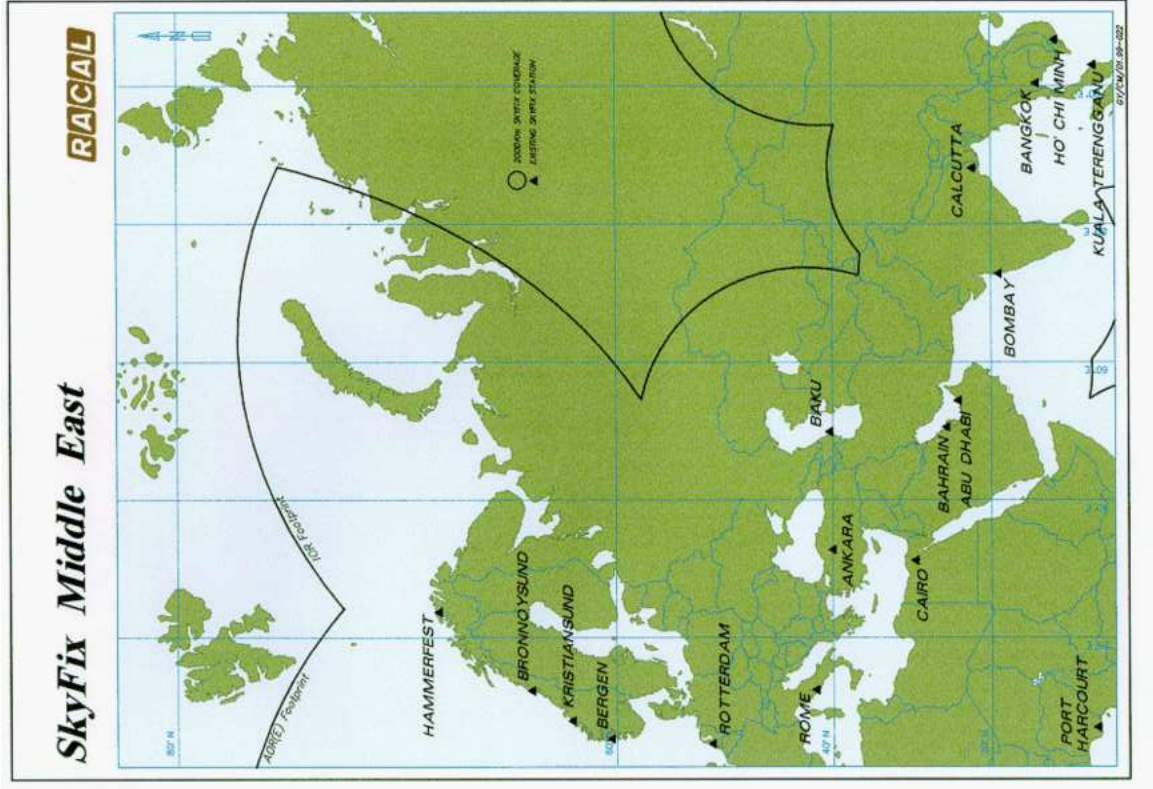


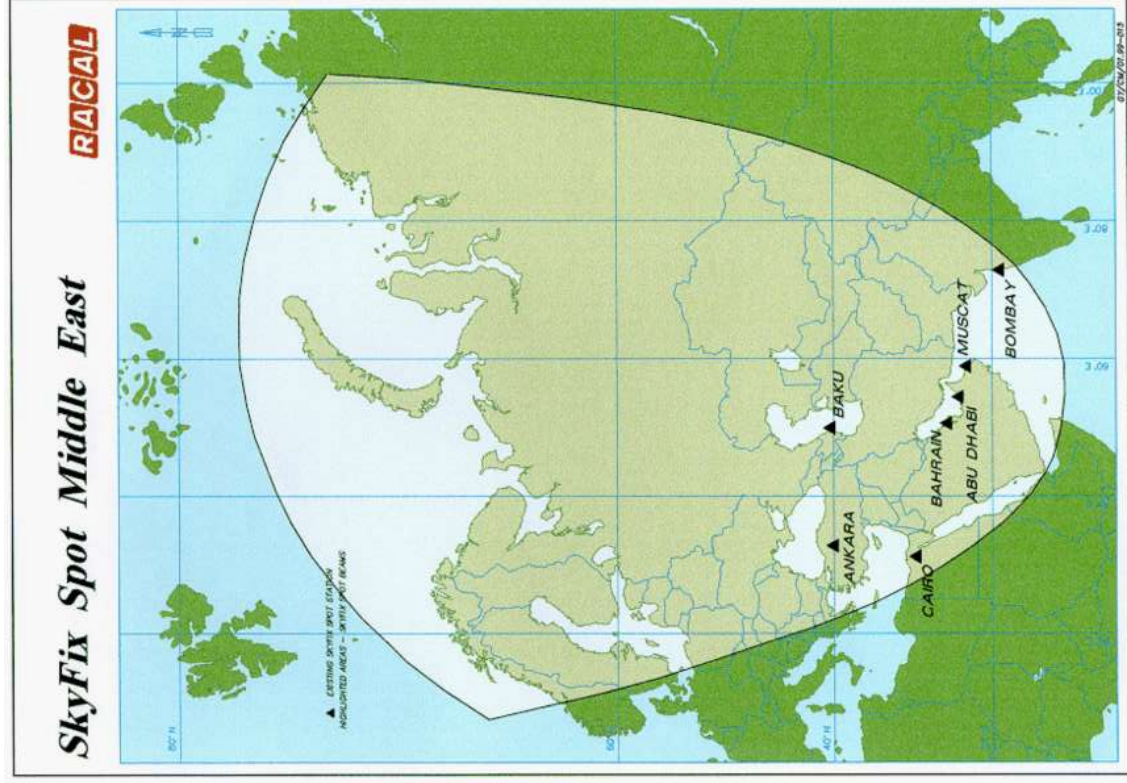


Australia\New Zealand

Station Name	Station ID	Latitude	Longitude
Cairns	0201	16° 54' S	145° 46' E
Darwin	0202	12° 26' S	130° 50' E
Dampier	0203	20° 40' S	116° 42' E
Perth	0204	31° 49' S	115° 53' E
Adelaide	0205	35° 18' S	138° 35' E
Sydney	0206	33° 59' S	151° 14' E
Broome	0207	17° 57' S	122° 13' E
Melbourne	0208	38° 28' S	144° 55' E
Wellington	0250	41° 16' S	174° 46' E

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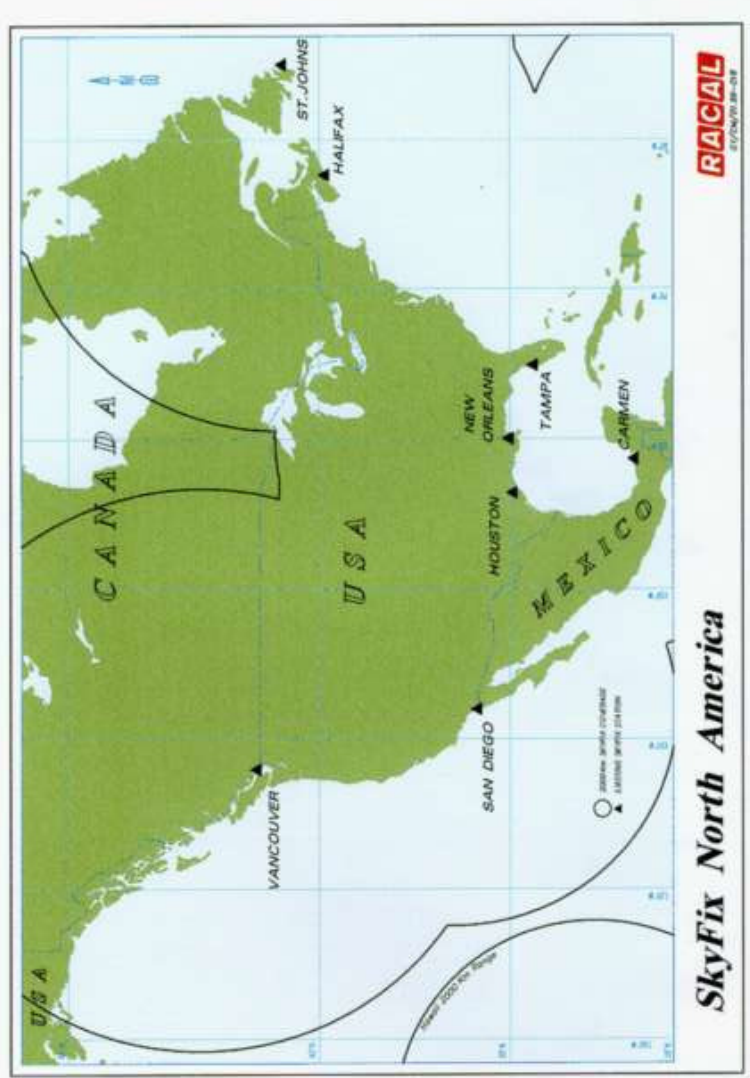




Middle East and CIS

Station Name	Station ID	Latitude	Longitude
Abu Dhabi	0400	24° 23' N	54° 31' E
Baku	0410	40° 23' N	49° 50' E
Bahrain	0420	26° 12' N	50° 36' E
Muscat	0430	23° 35' N	58° 15' E
Bombay	0450	18° 55' N	72° 49' E
Calcutta	0480	22° 34' N	88° 26' E
Cairo	0960	29° 58' N	31° 16' E

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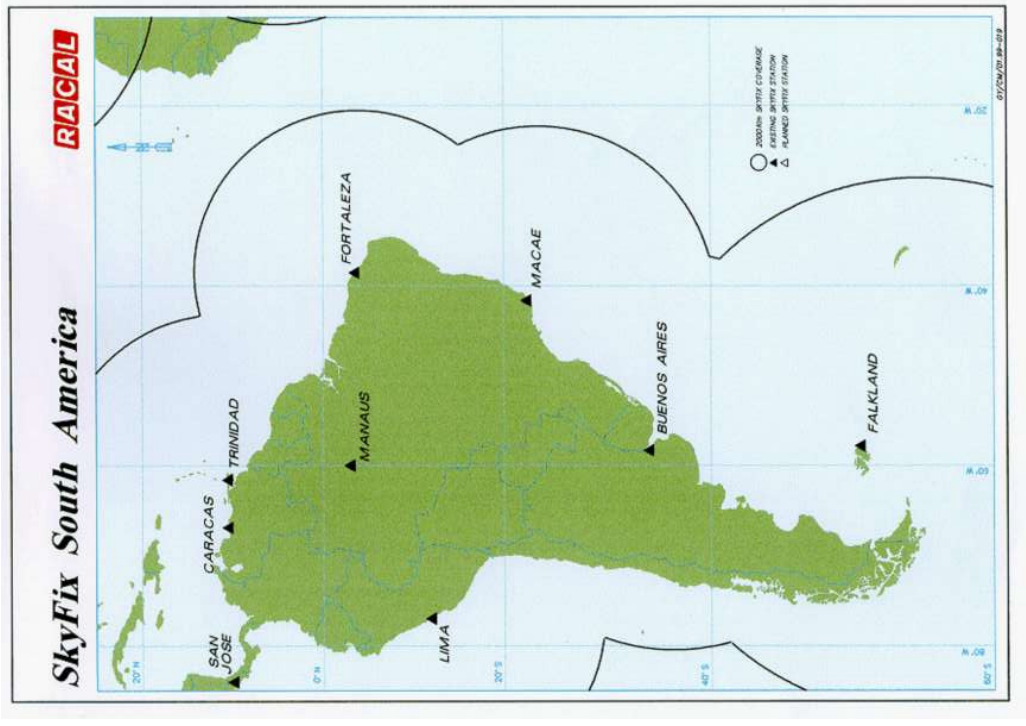


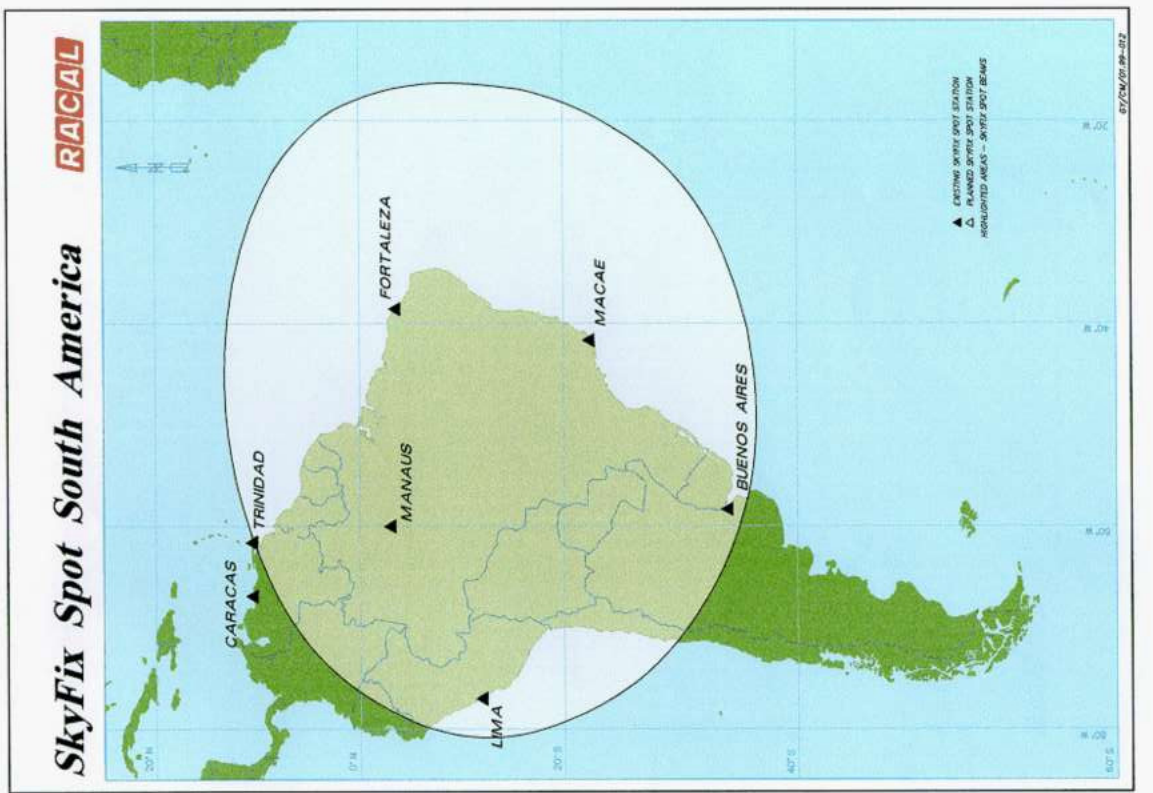


North America and Mexico

Station Name	Station ID	Latitude	Longitude
Houston	0500	29° 44' N	95° 33' E
Vancouver	0505	49° 16' N	123° 04' W
Tampa	0520	27° 57' N	82° 27' W
Halifax	0530	44° 51' N	63° 33' W
San Diego	0535	32° 50' N	117° 08' W
New Orleans	0540	30° 01' N	90° 15' W
St. Johns	0545	47° 34' N	52° 42' W
Carmen	0550	18° 39' N	91° 49' W
Hawaii	0560	21° 18' N	157° 52' W

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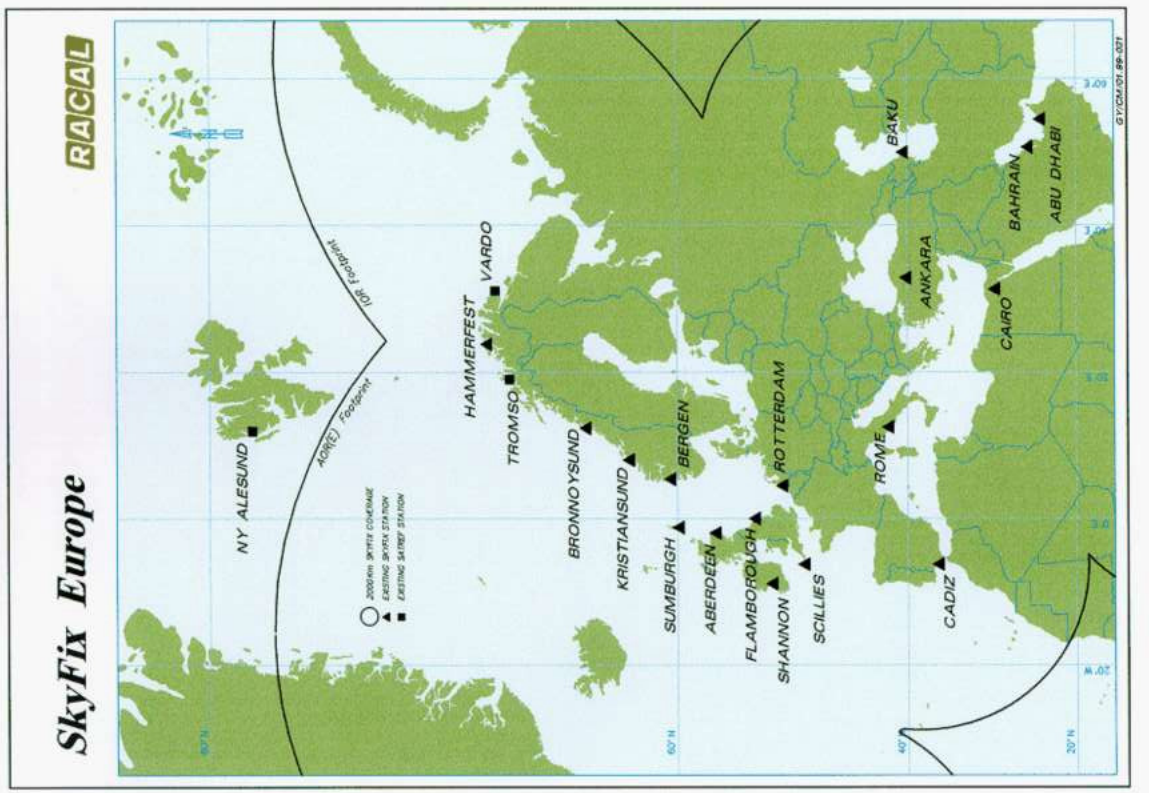


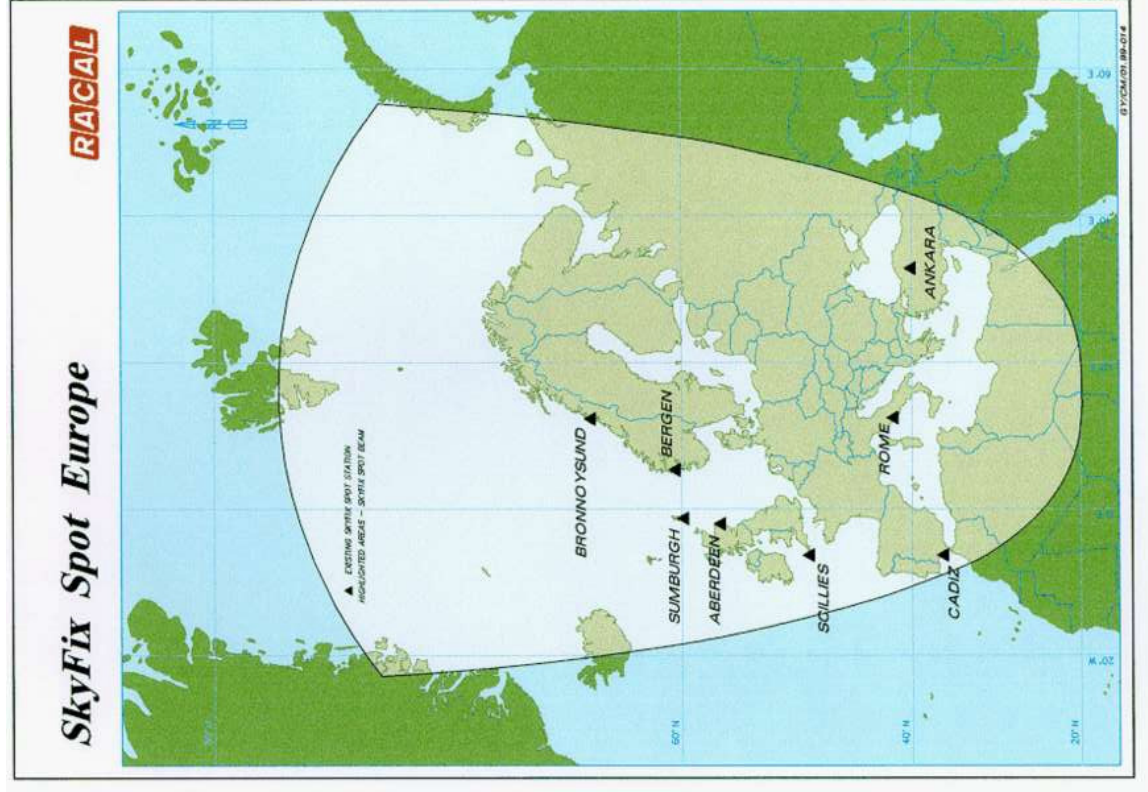


South America

Station Name	Station ID	Latitude	Longitude
Falklands	0600	51° 41' S	57° 52' W
San Jose	0610	09° 56' N	84° 04' W
Macaoe	0620	22° 24' S	41° 49' W
Lima	0630	12° 04' S	77° 02' W
Trinidad	0640	10° 41' N	61° 02' W
Fortaleza	0650	03° 43' S	38° 33' W
Caracas	0660	10° 30' N	66° 51' W
Buenos Aires	0670	34° 36' S	58° 22' W
Manaus	0680	03° 08' S	60° 01' W

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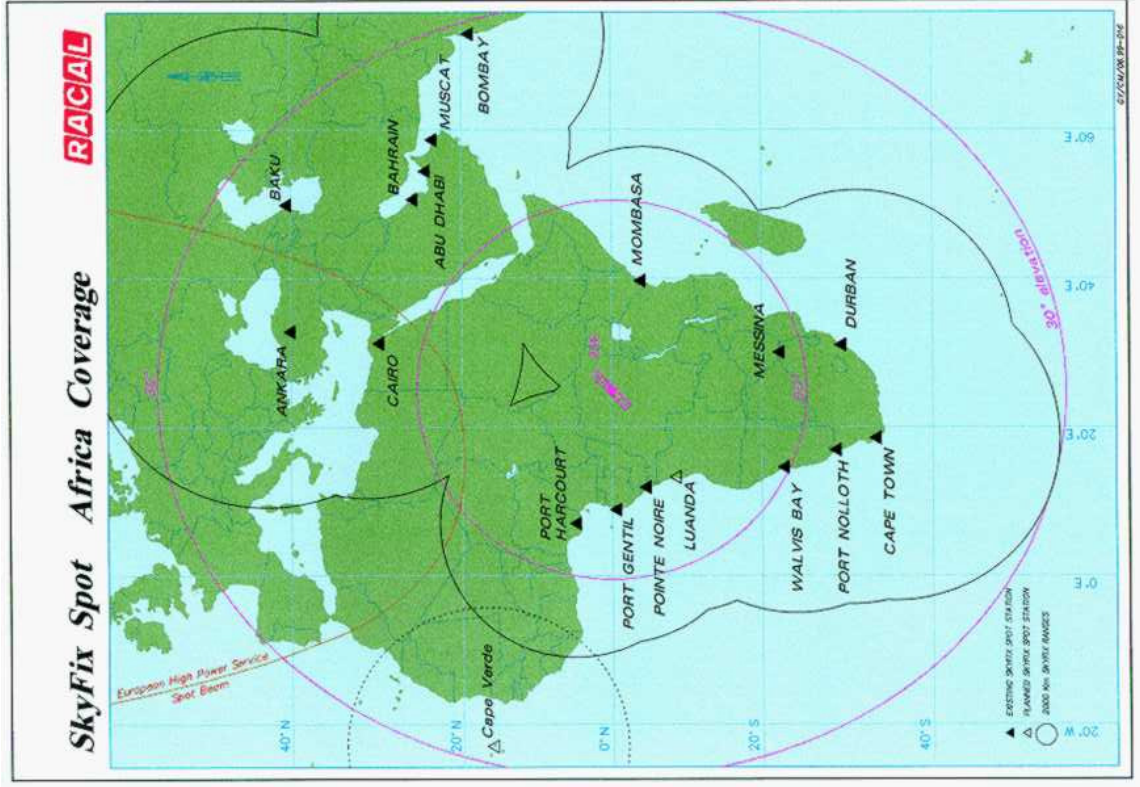


North Sea and Mediterranean

Station Name	Station ID	Latitude	Longitude
Aberdeen	0700	57° 08' N	02° 04' W
Sumburgh	0710	59° 51' N	01° 16' W
Hammerfest	0720	70° 42' N	23° 43' E
Shannon	0725	52° 42' N	08° 55' W
Tromso (SATREF)	0726	69° 40' N	18° 56' E
Vardo (SATREF)	0730	70° 20' N	31° 02' E
Ny Alesund (SATREF)	0733	78° 56' N	11° 52' E
Rotterdam	0740	51° 57' N	04° 25' E
Flambourough	0750	54° 07' N	00° 05' W
Scillies	0760	49° 55' N	06° 17' W
Bronnoysund	0770	65° 28' N	12° 13' E
Bergen	0780	60° 23' N	05° 16' E
Kristiansund	0790	63° 07' N	07° 50' E
Rome	0800	41° 56' N	12° 28' E
Cadiz	0810	36° 32' N	06° 17' W
Ankara	0830	39° 55' N	32° 51' E

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Africa

Station Name	Station ID	Latitude	Longitude
Port Gentil	0900	00° 41' S	08° 46' E
Luanda	0905	08° 49' S	13° 14' E
Port Harcourt	0910	04° 50' N	07° 00' E
Walvis Bay	0920	22° 57' S	14° 30' E
Cape Town	0930	34° 01' S	18° 30' E
Pointe Noire	0940	04° 47' S	11° 52' E
Port Nolloth	0950	28° 46' S	16° 40' E
Durban	0970	29° 53' S	31° 17' E
Messina	0980	22° 21' S	30° 02' E
Mombassa	0990	04° 04' S	39° 40' E

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