BELLCOMM, INC.
1100 Seventeenth Street, N.W. Washington, D.C. 20036

SUBJECT: Launch Azimuths from the Pacific Missile Range - Case 720

DATE: February 28, 1968

FROM: J. J. Schoch

MEMORANDUM FOR FILE

(NASA-CR-93593) LAUNCH AZIMUTHS FROM THE PACIFIC MISSILE RANGE, CASE 720 (Bellcomm, Inc.) 8 p
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Range safety considerations have, so far, limited the south easterly launches to an azimuth of approximately 171°. Without doglegging, this results in an orbital inclination of about 82°. It is the purpose of this memorandum to show where land overflight results if more easterly launch azimuths are used. Assessment of hazards in the immediate vicinity of the launch facility is a much more complicated matter and is not discussed herein.

Figure 1 shows the coast of Southern California. The location of the Pacific Missile Range (at Point Arguello, California) is indicated by an arrow. An azimuth of 170° just clears the western tip of San Miguel Island, California. Figures 2 and 3 are provided to show the rest of the coast line and some pertinent islands further South. Table 1 shows a list of geographical locations that were considered, their latitude and longitude, and their azimuth direction from the Pacific Missile Range. Since the Californian Islands are so close, an azimuth range which spans the width of the island was measured for each of them. For the islands further South, one value of azimuth was obtained from trigonometric calculation. On Figure 4, these points are shown on a plot on which the distance downrange is shown versus azimuth.

An azimuth angle of 143.4° would hit Punta Eugenia, the westernmost tip of the Baja California peninsula (Mex.). This is the easternmost azimuth which clears the Mexican coast. Further downrange this same azimuth would cross the coast of Chile approximately at the town of Concepcion (Chile)--see dotted line on Figure 4. However, the trajectory flies over the Island of Santa Rosa (California). An azimuth of 154.24 is necessary to clear the coast of Chile completely, but it would still fly over the Island of Santa Rosa. The lower orbital inclinations corresponding to these azimuths (60° and 69° respectively) can be attained, however, without land overflight by launching on a 170° azimuth and then doglegging after clearing San Miguel.

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An azimuth in the range of 157 to 158.5 would not hit any of the islands. It crosses between the Islands of San Miguel and Santa Rosa and avoids any other island. This direction is indicated by the heavy black line on Figure 4. It provides a trajectory that is clear of any land for over 7500 miles at which distance it goes over the Palmer Peninsula in Antartica. The passage between the next two islands, i.e., Santa Rosa and Santa Cruz at an azimuth of about 140° would not clear completely the Baja California peninsula. It could therefore only be used for very short distances (500 miles).

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1013-JJS-sjh

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Attachments

REFERENCES

1. The Times Atlas of the World, Vol. V, The Americas.
2. National Geographic Society, Map of the Pacific Ocean.
3. Encyclopedia Brittanica.

TABLE I

LATITUDE, LONGITUDE, AZIMUTH, AND DISTANCE FROM POINT ARGUELLO, CALIF.
(Point Arguello: Lat: 34° 35'N, Long: 120° 38'W)

	Latitude Degrees	Longitude Degrees	Azimuth Degrees	Distance Miles
San Miguel Is., Calif. (U.S.)	34° 02'N	120° 20'W	170-158.5	41.5
Santa Rosa Is., Calif. (U.S.)	34° 00'N	120° 05'W	157-141.5	51
Santa Cruz Is., Calif. (U.S.)	34° 00'N	119° 40'W	137.5-124	68
San Nicolas Is., Calif. (U.S.)	33° 15'N	119° 30'W	149-145	112.5
Santa Barbara Is., Calif. (U.S.)	33° 29'N	119° 01'W	131.5-130.5	119.5
San Clemente Is., Calif. (U.S.)	32° 55'N	118° 30'W	135-132.5	167.5
Guadaloupe Is., (Mex.)	29° 00'N	118" 45'W	163.49	400
Punta Eugenia, Baja Calif., (Mex.)	27° 50'N	115° 05'W	143.40	568
Rocas Alijos Is., (Mex.)	24° 58'N	115° 49'W	154.59	755
Clarion (Revilla Gigedo Is.), (Mex.)	18° 22'N	114° 42'W	160.47	1175
Roca Partita (Revilla Gigedo Is.), (Mex.)	19° 02'N	112° 05'W	152.19	1192
San Benedicto (Revillo Gigedo Is.),(Mex.)	19° 25'N	110° 49'W	147.68	1205
Socorro (Revilla Gigedo Is.), (Mex.)	18° 49'N	111° 01'W	149.12	1238
Clipperton Is., (France)	10° 20'N	109° 13'W	154.02	1820
San Felix Is., (Chile)	26° 23'S	80° 05'W	142.25	4970
San Ambrosio Is., (Chile)	26° 28'S	79° 53'W	142.14	4980
Juan Fernandex Is., (Chile)	33° 30'S	79° 00'W	145.56	5400
Concepcion (Chile)	36° 50'S	73" 03'W	143.4	5800
Southern End of Chilean Coast	54° 00'S	73° 30'W	154.24	6730

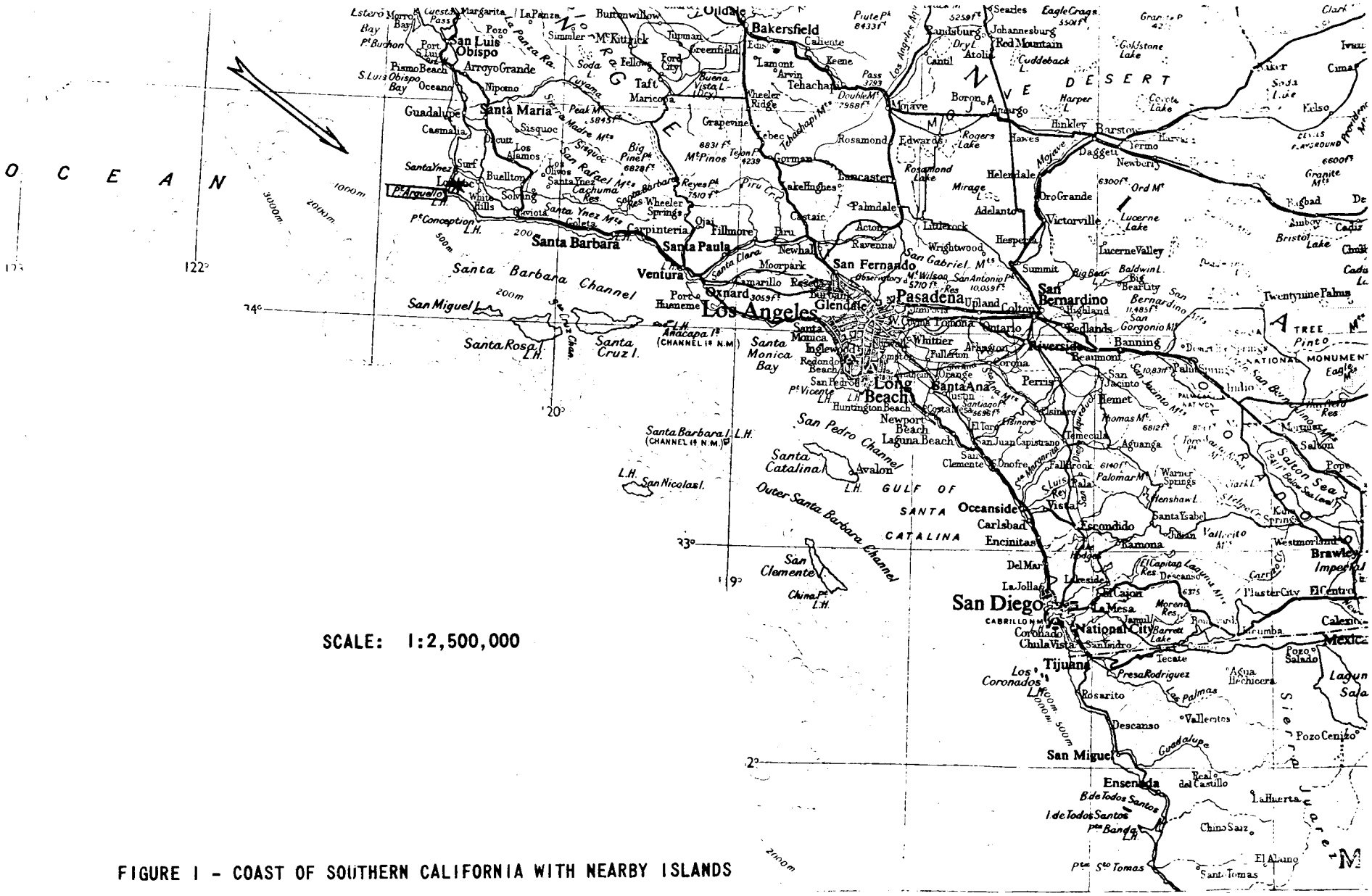

FIGURE 1 - COAST OF SOUTHERN CALIFORNIA WITH NEARBY ISLANDS

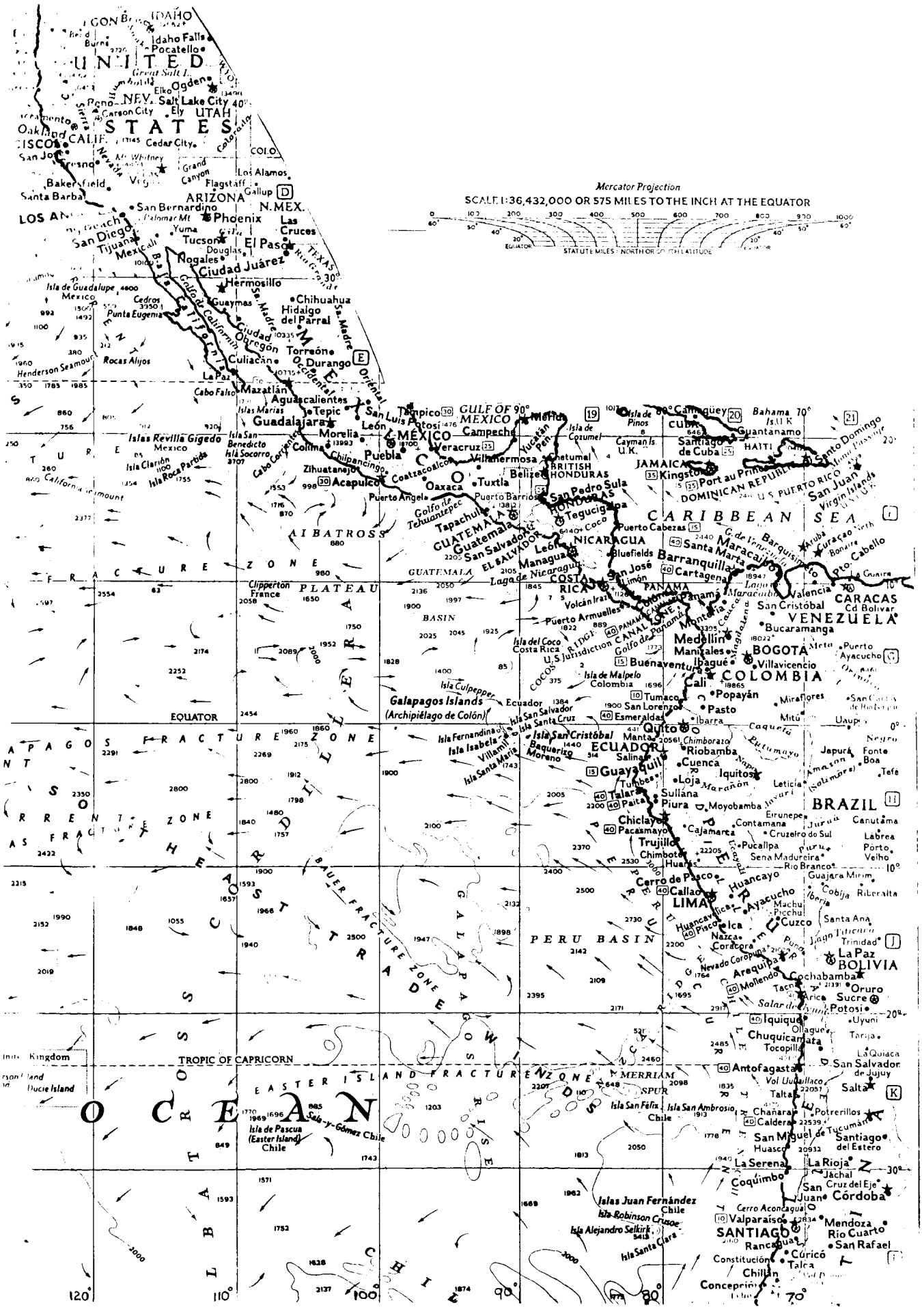

FIGURE 2 - NORTHERN AND CENTRAL PACIFIC COAST

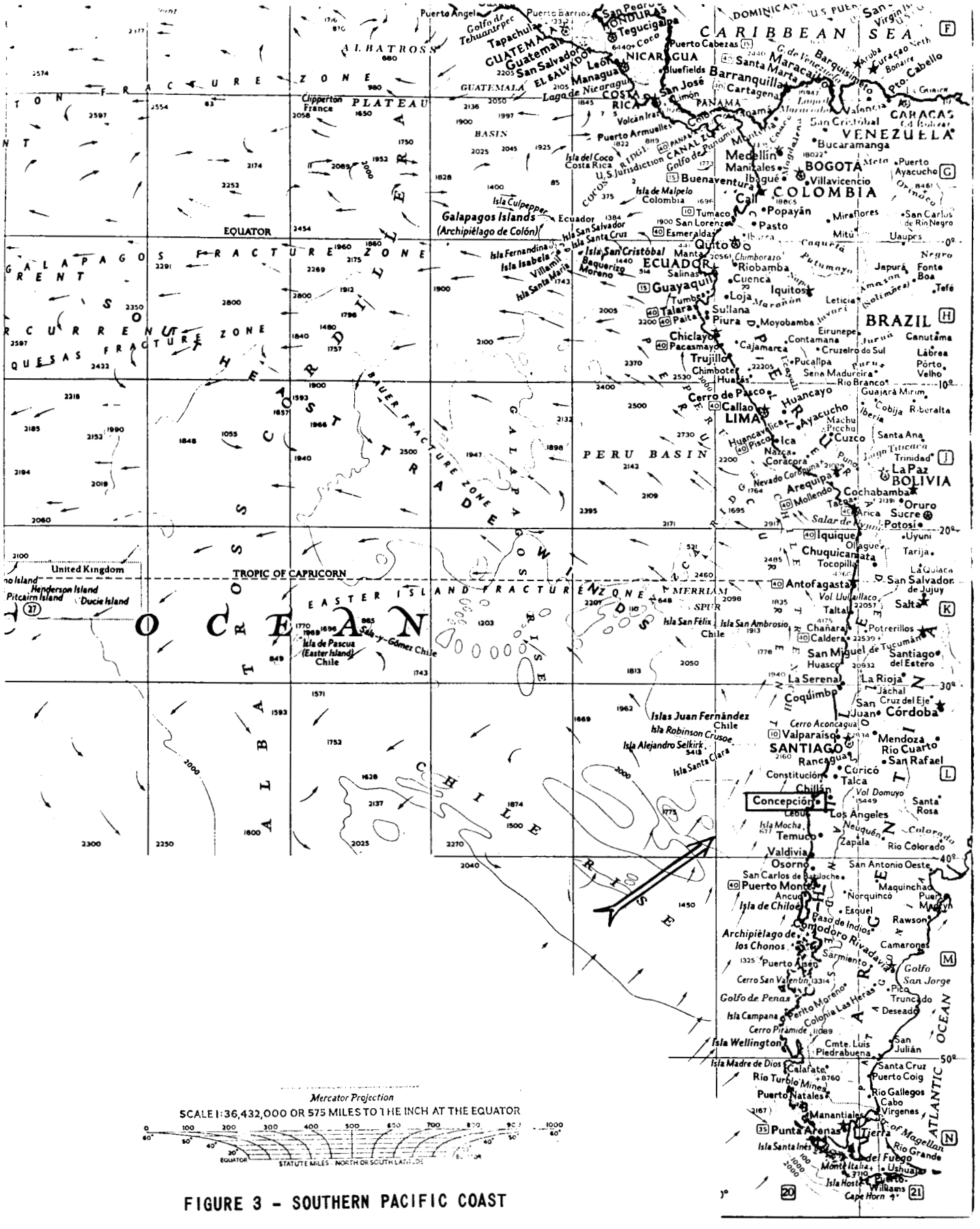

FIGURE 3 - SOUTHERN PACIFIC COAST

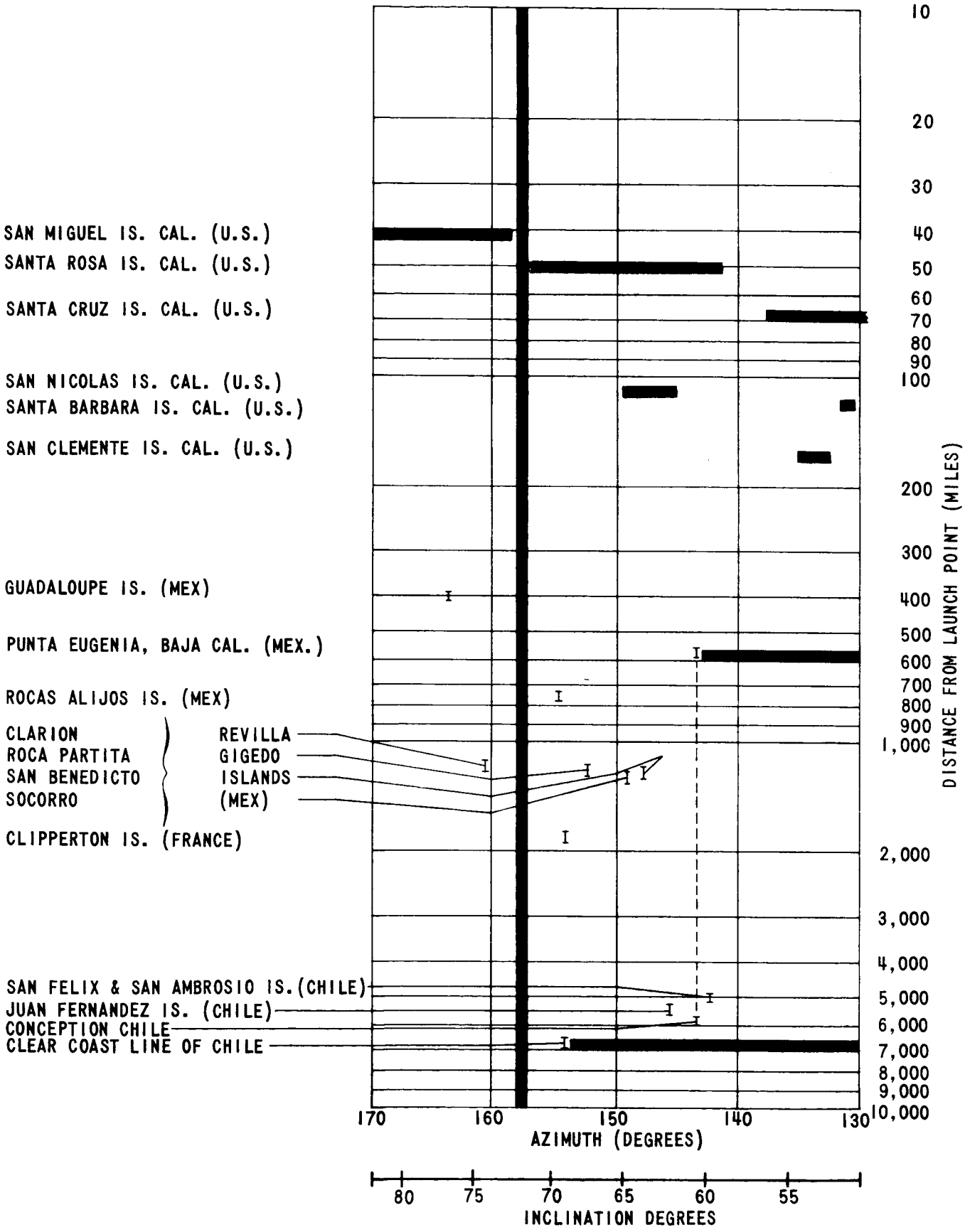

FIGURE 4 - DISTANCE FROM LAUNCH POINT vs. AZIMUTH