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TRIANGULATION IN HAWAII

By

HUGH C. MITCHELL
Senior Mathematician

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CONTENTS

	Page
General statement	1
Historical outline	1
Surveys by the United States Coast and Geodetic Survey	3
Astronomic standards	4
Latitudes	4
Longitudes	5
Azimuths	5
Reductions to Old Hawaiian Datum	5
Office computation	6
Classification of triangulation	7
Accuracy of the Hawaiian triangulation	8
Old Hawaiian Datum	9
Use of horizontal control data	11
Table for polyconic map projection	12
Explanation of tables of geographic positions	18
Lengths	18
Azimuths and back azimuths	18
Accuracy of data indicated in tables	19
"No check" positions	19
How to find the data desired	20
Related publications	20
Astronomic stations	21
Latitude stations	21
Longitude stations	21
Geographic positions of triangulation stations	22
Kauai Island	22
Niihau Island	42
Kaula Island	44
Oahu Island	44
Oahu Island to Hawaii Island	62
Molokai Island	64
Lanai Island	77
Maui Island	79
Kahoolawe Island	100
Hawaii Island	103
Elevations of triangulation stations	136
Table of elevations	137
Descriptions of triangulation stations	137
Marking of stations	138
Standard notes on the marking of stations	139
Special marks	140
Kauai Island	140
Niihau Island	160
Oahu Island	161
Oahu Island to Hawaii Island	177
Molokai Island	180
Lanai Island	185
Maui Island	187
Kahoolawe Island	193
Hawaii Island	194
Conversion tables	220
Feet to meters	220
Meters to feet	224
Sketches	228
Index to triangulation stations	229

ILLUSTRATIONS

Fig.		Page
1.	Triangulation station Punchbowl on Oahu Island, showing permanent signal and instrument platform	138
2.	Standard marks of the United States Coast and Geodetic Survey	139
3.	Index map of the Hawaiian Islands showing boundaries of charts published by the United States Coast and Geodetic Survey	228
4.	Index map of the Hawaiian Islands showing boundaries of sketches, Figures 5 to 17, and showing interisland triangulation connections	228
5.	Niihau Island	228
6.	Kauai Island	228
7.	Oahu Island	228
8.	Honolulu and vicinity	228
9.	Molokai Island	228
10.	Lanai Island	228
11.	Maui Island	228
12.	Kahoolawe Island	228
13.	Hawaii Island, main scheme	228
14.	Hawaii Island, northern part	228
15.	Hawaii Island, western part	228
16.	Hawaii Island, southern part	228
17.	Hawaii Island. eastern part	228

TRIANGULATION IN HAWAII

By HUGH C. MITCHELL, *Senior Mathematician, United States Coast and Geodetic Survey*

GENERAL STATEMENT

This report covers all the triangulation executed in the Hawaiian Islands up to the end of the year 1928. It includes the triangulation begun in 1871 (see p. 3) while the islands were still a kingdom and carried on through the years during which the islands formed a republic. This is called herein the Hawaiian Government Survey. The triangulation executed by the United States Coast and Geodetic Survey dates from 1899. This report also includes a triangulation of the crater of Kilauea Volcano, executed by an officer of the United States Geological Survey in 1920 and triangulation executed by the United States Engineers on Oahu Island, 1913–1920.

The engineer who wishes to make use of the data in this publication should consult the explanation of tables on page 18, especially the paragraph on "How to find the data desired."

HISTORICAL OUTLINE

The Hawaiian Government Survey was inaugurated to meet, in a scientific manner, a need which arose in the transfer of title from a land system comparable with the feudal system of the Middle Ages, with its lords, overlords, and vassals, to a system of fee-simple titles.

The character of the land lines which had to be described in the legal documents recording titles was such that the ordinary methods of land surveying soon created a condition of chaos and made changes necessary. This will be better understood from a brief description of the land lines, which owed their origin to natural and economic causes. As the needs of the people were supplied by food from the sea and from small patches of cultivated land back from the beach, while from the woods came material for canoes and houses, for fish nets and lines, it was quite natural that the lines delimiting the various parcels of land should run directly back from the shore. The common people were given just about what they could occupy and use under a sort of feudal tenure, while the lands of their masters ran well back into the woods, widening out after passing the upper limits of the tenants' lands, and being terminated by the lands of the higher chieftains and kings, usually three or four in number, which swept around the upland limits of the lands of the lesser chiefs and extended to a common corner at the apex of the island.

This change in system of land titles which occurred in 1845–46 was brought about by the Mahele. This was a convention which has been defined as "an endeavor on the part of the Hawaiian chiefs, and especially of Kamehameha III to secure to all parties what, on the ordinary principles of acquiring property, seemed to belong to

them." Under it was secured an equitable division of the lands of the islands among kings, chieftains, and common people, all obtaining fee-simple titles to the lands awarded them.

The boundaries of these lands were very irregular. They followed natural features, such as gulches, streams, and ridges for the larger parcels. The smaller parcels awarded the common people were irregular in shape, bounds being determined partly by occupancy thereof. The survey of such lands to provide description for record titles, and for the compilation of maps, manifestly required stronger controls than those provided by the actual traverse of the boundaries, which because of their very irregular character and short lines would soon, even with the exercise of the utmost caution, accumulate discrepancies which would develop on the plats into overlaps, gaps, and offsets.

In spite of this manifest need, the surveys of these small parcels, or "kuleanas" as they are called, proceeded in almost wholesale lots, and it was not until the government itself got into difficulties—did not know where the lands (grants) to which it had given title were located and therefore could not know what lands still remained of which it could dispose—that the Hawaiian Government Survey came into existence.

In 1870 money was appropriated for a survey of the islands, and Prof. W. D. Alexander, then president of Oahu College, was appointed surveyor general. Professor Alexander continued in this position until 1900, when he became a member of the field force of the United States Coast and Geodetic Survey. To his memory the Hawaiian Government Survey stands as a monument of ability and endeavor.

The purpose of the Hawaiian Government Survey can not be better described than it is in a splendid paper prepared by Mr. Curtis J. Lyons, and published with the report of the surveyor to the Governor of the Territory for the year ending June 30, 1902. Mr. Lyons says in this paper:

> The primary object of the survey, therefore, was to account for all the land in the kingdom by its original title, and indicate such accounting on general maps, and while having no authority to settle such boundaries, to require the surveyors to lay down such boundaries to the best of their ability with the abundant information at their disposal. This was the only means of enabling the government to know what it possessed.
>
> To accomplish the object several things were necessary. First, to execute such triangulation of the country as is well known to be the foundation of every good general survey, furnishing points by which to connect together correctly all work, whether cadastral or boundary work; also topographical work, hydrographic work, and engineering work. To make a reliable or in any way a general map by patching together a number of individual maps is simply impossible.
>
> Second, to put in the amount of topography necessary to identify localities and land limits.
>
> Third, to copy in shape for practical use the individual kuleana surveys of each district to be surveyed, also the surveys of grants. These were indiscriminately contained in large volumes, and were to be found only by means of indexes. It was necessary for a party going into a district to have for use a book containing all the kuleana surveys of said district, arranged according to lands, another containing all grants, and another still of Ahupuaas or ilis that had been surveyed. It was the task to fit all these in place by means of the controlling triangulation. This would practically show the location and limits of the government lands remaining.

While the logical order of executing the survey was recognized at its very inception—that is, to begin with the principal control, then carry out the secondary and detail controls, and finally do the topo-

graphic mapping to serve as the immediate base for the property survey—such an ideal program could not be strictly followed. It was recognized that here as elsewhere the public would demand the production of maps soon after the money for making them was available, and the needs of public business likewise demanded the production of maps at the earliest possible dates.

The survey of the islands was begun in August, 1871, with the measure of a 4-mile base line on the island of Maui, using a 4-meter bar apparatus which had been loaned by the United States Coast and Geodetic Survey. Before entering actively on the execution of the survey Professor Alexander had acquainted himself with the work and methods of the Coast and Geodetic Survey, as well as of other geodetic organizations, including the British Ordnance Survey, the Great Indian Survey, and the New Zealand and Australian Surveys.

In 1871–72 the triangulation was carried by expansion from this first base line over the central part of Maui, and activities were then (1872) transferred to the island of Oahu, where a base line was measured and connected into the triangulation. After this beginning the survey of the islands progressed steadily. In 1875 and the following years, the triangulation of the Maui group was completed and connection made with the already completed triangulation of Oahu. In 1882 the triangulation southward along the western coast of the island of Hawaii was executed, and thence around the entire island. Before 1900 the triangulation of the entire group of islands was completed, with the possible exception of Kauai.

SURVEYS BY THE UNITED STATES COAST AND GEODETIC SURVEY

With the annexation of the islands to the United States in 1898 (the Territory of Hawaii was organized in 1900) a new era in the geodetic survey of the islands was inaugurated. Prior to that time the triangulation had been almost exclusively for the purposes of controlling the topographic and cadastral surveys, but with the annexation of the islands their waters came under the charting jurisdiction of the United States Coast and Geodetic Survey, and at once was begun a program of making hydrographic surveys of the more important harbors and roadsteads, followed by surveys of the deeper inter-island and off-shore waters. In addition to these surveys, which required much revision of and addition to the earlier triangulation executed by the Hawaiian Government Survey, the triangulation of Oahu was completely revised in 1910, and needs arising for an even more accurate triangulation of that island, a complete resurvey of the island, in which many of the older stations were recovered and used, was made in the year 1927. In 1928 a connection was obtained between the triangulation on the island of Oahu and that on the island of Kauai. The triangulation on the latter island had been executed in 1910 by a party of the United States Coast and Geodetic Survey which used some of the stations of an apparently incompleted survey made by the earlier Hawaiian Government Survey. The connection between the islands had been attempted at the time of the 1910 survey, but efforts were fruitless at that time. Improved signal lamps and favorable weather conditions helped in the 1928 determination, but even then it was accomplished with great difficulty.

In the following table are listed the various surveys executed in the islands since their annexation to the United States.

Hawaiian surveys after annexation to the United States

Date	General locality of survey	Chief of party
1899	Maui, Kahoolawe, and Lanai Islands	F. W. Perkins.
1900	Hawaii Island	Do.
1900	Molokai	Do.
1904	Kauai Island, Hanapepe Bay	H. D. King.
1905	Kahoolawe and Maui Islands	J. F. Pratt.
1909	Hawaii Island, Mahukona Harbor	O. B. French.
1910	Kauai Island, general triangulation	Do.
1910	Oahu Island, general triangulation	Do.
1910	Oahu Island, south coast	W. C. Dibrell.
1910	do	L. W. Smith.
1909	Oahu Island, Honolulu	O. B. French.
1912	Maui Island, north coast	J. C. Gauger.
1912	Hawaii Island, Hilo, and northeast coast	E. R. Hand.
1913	Lanai, Maui, Molokai	J. B. Miller.
1913	Oahu Island, Honolulu Harbor	U. S. Engineers.
1913	Hawaii Island, north and northeast coasts	E. R. Hand.
1914	Hawaii Island, southwest, south, and southeast coasts	Do.
1914	Hawaii Island, east coast	Do.
1915	Molokai	Do.
1914–1920	Oahu Island, western part	U. S. Engineers.
1920	Hawaii Island, Kilauea Volcano	U. S. Geological Survey.
1925	Oahu Island, south coast	E. R. Hand.
1925	Molokai Island, anchorages	R. W. Woodworth.
1926	Oahu Island, southeast coast	E. R. Hand.
1926–27	Kauai and Niihau Islands	C. L. Garner, F. G. Engle.
1927	Kauai	Do.
1927	Oahu Island, general triangulation	L. G. Simmons.
1928	Oahu-Kauai connection	Do.
1928	Kauai Island, Hanapepe Bay	K. T. Adams.
1928	Hawaii Island, west coast	T. J. Maher, K. T. Adams.
1927	Lanai Island, west coast	F. G. Engle.
1928	Hawaii	E. R. Hand.
1928	Oahu-Honolulu	J. H. Peters.

ASTRONOMIC STANDARDS

LATITUDES

In all there were six different standards of latitude connected with the Hawaiian Government Survey, as follows:

1. The original Oahu latitude, begun in 1872 by Professor Alexander, and depending on a determination of D. N. Flitner's observatory in Honolulu.
2. The Tupman latitude, begun in 1879 by Professor Alexander and derived from Captain Tupman's determination in 1874 of the latitude of the Transit of Venus pier in Honolulu.
3. The original Maui Base latitude, begun in 1872 by Professor Alexander from his observations at the Maui Base.
4. The Lahaina Courthouse latitude, adopted by Professor Alexander from the determination of the latitude of Lahaina Courthouse in 1883 by Mr. E. D. Preston.
5. The hydrographic adjusted latitude, calculated by Mr. C. J. Lyons for the United States Hydrographic Office from the determinations of latitude at various points in the islands by Mr. E. D. Preston.
6. The Mauna Kea latitude, a study for which was made by Mr. E. D. Preston. (See United States Coast and Geodetic Survey Report, 1893, p. 639.)

These various latitudes showed that the surveyor general desired to obtain for the projections of the various maps of the islands and lands a latitude which would approach very closely the geodetic latitude. It must be remembered, however, that in the very beginning when the triangulation of the islands was discontinuous necessity compelled the adoption of what might be termed temporary latitude standards for the disconnected portions. It was probably the experience of having several different latitude standards for disconnected

portions of the triangulation, and then endeavoring to harmonize the discrepancies which resulted when unions were effected, that led Professor Alexander to seek the help of the United States Coast and Geodetic Survey. As a result leave of absence for six months, later extended to nine months, was granted in December, 1886, to Mr. E. D. Preston of the Coast and Geodetic Survey, in order that he might undertake latitude and gravity observations at a number of stations in the islands. The expense of making these observations was borne by the Hawaiian government, but the complete instrumental equipment was loaned by the Coast and Geodetic Survey. In this campaign 13 latitudes were determined, which with the 4 stations of 1892 and the station at Lahaina, determined in 1883, makes a total of 18 stations whose latitudes were determined by Mr. Preston. (See p. 21.)

The distribution of these stations with reference to the topographic features of the islands was such as was expected to permit a good determination of the latitude component of a geodetic datum. The hydrographic adjusted latitude (see above) was intended to provide such a latitude.

LONGITUDES

There were four standards of longitude connected with the Hawaiian Government Survey:

1. The original Oahu longitude, a determination of the longitude of Flitner's observatory in Honolulu in 1846 by Prof. C. S. Lyman, using lunar culminations and occultations of stars.
2. The Tupman longitude, a determination in 1874 by Captain Tupman of the longitude of the Transit of Venus pier in Honolulu, using in addition to lunar culminations and star occultations, lunar zenith distances. His first calculations gave results in good accord with those obtained by Professor Lyman, but these were later changed when the true positions of the moon were substituted for its predicted positions.
3. The original Maui longitude, determined in 1872 by Professor Alexander by transporting chronometers between Honolulu and Kahului, using Professor Lyman's original Oahu longitude at Honolulu as a base.
4. The hydrographic adjusted longitude, computed by Mr. Lyons from a study of Captin Tupman's report, M. Fleurian's observations, and from repeated round-trip comparisons of chronometers of the steamers *Mariposa* and *Alameda* between Honolulu and San Francisco.

In 1903 following the completion of the trans-Pacific cable from San Francisco to Manila via Honolulu, Midway, and Guam, first-order determinations of the longitudes of those places were made. (See Appendix 4, Report for 1904.) In 1926 as part of the program for an international belt of longitude stations encircling the earth, a first-order determination of the longitude of a station on the southeastern coast of Oahu was made, using wireless signals from the United States and French Indo-China.

AZIMUTHS

Although a number of azimuths were observed in various parts of the islands, the character of the triangulation connecting these azimuth stations was such that it was deemed advisable to hold the astronomic azimuths and adjust the triangulation to them.

REDUCTION TO OLD HAWAIIAN DATUM

The following table, prepared by Mr. J. S. Emerson and based upon unadjusted values, gives the relationship between the various systems of latitudes and longitudes by stating the corrections required to

transfer points on any other system to the standard geodetic datum, called the Old Hawaiian Datum (see p. 9), which was based on the hydrographic adjusted latitude and the Tupman longitude.

Reduction of other latitude systems to hydrographic adjusted latitude

Original Oahu	Tupman	Original Maui	Lahaina Court-house	Mauna Kea
″	″	″	″	″
+23.33	+25.73	−20.00	+10.40	−1.30

Reduction of other longitude systems to Tupman longitude

Original Oahu	Original Maui	Hydro-graphic
′ ″	′ ″	″
+3 02.85	+1 57.36	+13.50

OFFICE COMPUTATION

A special appropriation was made in 1923 and continued through the years 1924, 1925, and 1926, to be used in making a final or office computation of the triangulation of the Hawaiian Government Survey. Under this appropriation Mr. Earl Church was appointed mathematician in charge of the computation and so continued until his resignation in 1924, when his place was taken by the writer. Under Mr. Church's direction the abstracts of horizontal directions made from original records on file in Honolulu were carefully gone over, and lists of horizontal directions prepared and checked. Baseline computations were made; azimuth determinations revised; and a general scheme for the main triangulation around the island of Oahu, across the islands of Molokai, Lanai, Kahoolawe, and Maui, to and around the island of Hawaii was laid out and adjusted. This adjustment was by the angle method, the lengths being controlled by base lines on the islands of Oahu, Molokai, Maui, and Hawaii. There was no connection in length between the triangulation on Oahu and that on Molokai, the connection being through a single closed triangle.

Into this adjusted main scheme were fitted the many adjustments fixing supplementary schemes of triangulation. This involved an unusual amount of preparatory work before the actual adjustments could proceed. It was soon discovered that the computations of these supplementary points could not be standardized. At many stations observations had apparently been made on everything in sight, rather than a concentration of observations on some selected predetermined scheme. This gave a great many more directions than it was advisable to use, and the practice was developed of selecting for adjustment those directions which gave the strongest figures. The not infrequent result was that some of the directions had to be rejected because of too large corrections, and new figures considered. Sometimes several new figures had to be considered successively before one was obtained giving satisfactory results, and

in a few cases the lists of directions were exhausted without discovering a satisfactory figure. This proved a great time consumer and therefore very expensive. The probable causes of this condition were several in number: Eccentric occupation of stations, marked perhaps by cairns, without noting the facts, or with erroneous reduction data recorded; erroneous recording of names of stations observed on; confusion of stations, as for instance on the Island of Hawaii, where very symmetrical cinder cones made splended objects on which to point, but which, lacking identification characteristics, were very difficult to recognize from different stations.

The computation of the triangulation of 1910 around the Island of Kauai was made by Mr. H. S. Rappleye, associate mathematician. Mr. Rappleye's computation placed this triangulation on an independent datum, the Kauai Datum. A few years later the connection between Oahu and Kauai made it possible to place this work on the same datum as was used for the other islands, the Old Hawaiian Datum. The magnitude of the shift produced by the introduction of this standard datum may be indicated by the corrections which it induced at station Kikoo, a main station in the interisland triangulation. At that station the corrections to reduce Kauai Datum positions to Old Hawaiian Datum positions were:

	"
Correction to latitude =	+ 9.75
Correction to longitude =	+ 1.10
Correction to azimuth =	−20.5

Among others employed on the computation of the Hawaiian triangulation many worked under temporary appointments, and served but a short time. Among these may be mentioned the following: Mr. C. A. Bowman, Mr. J. R. Powers, Mr. A. Tomelden, and Miss K. Buckingham. For some years past the writer has had the able assistance of Mr. W. E. Wood, junior mathematician, to whom is due no small measure of the credit for whatever value this volume may possess. The sketches at the end of this volume were prepared by Mr. C. A. Bowman and Mr. Harold W. Murray of the division of charts of this bureau.

Mention must also be made of the valuable assistance rendered by the territorial surveyor, Mr. Walter E. Wall, both in connection with the computation of the triangulation of the Hawaiian Government Survey, wherein he was often called upon for notes from original records stored in his office, and because of great help rendered field parties of the United States Coast and Geodetic Survey at work in the islands, particularly in the 1927 resurvey of the Island of Oahu, and in the remarking of the stations of that survey now under way.

CLASSIFICATION OF TRIANGULATION

Triangulation is divided into different classes according to accuracy. The terms applied to these classes have been standardized by agreement of representatives of various map-making bureaus of the Federal Government. Four classes are now prescribed and defined, viz, first, second, third, and fourth orders. The first three of these correspond, respectively, to the classes primary, secondary, and tertiary as formerly defined by the United States Coast and Geodetic Survey.

The ultimate criterion applied in classifying the different grades of triangulation is the actual error in the length of any line. This is indicated by the discrepancy between the measured length of a base line and its length as computed through the triangulation from the last preceding base. In first-order triangulation such discrepancies must not exceed 1 part in 25,000; in second-order triangulation 1 part in 10,000; and in third-order triangulation 1 part in 5,000. Before making the comparison between the computed and measured lengths the adjustment of the triangulation should be carried through to the point where all conditions save that imposed by the length equation have been satisfied. It is also necessary to take into consideration the accuracy of the base lines.

To secure the accuracy indicated above, certain standards have been adopted for the field work, the most important of which relates to the closing error of the triangles or the discrepancy between the sum of the measured angles of a triangle and 180° plus the spherical excess of the triangle. In first-order triangulation the average closing error must not be greatly in excess of 1″; in second-order triangulation it should not be more than 3″, and in third-order triangulation not more than 6″. The shape of the figures in the triangulation scheme, the frequency of the bases, the size and type of instrument, and the number and kind of observations are all selected with due regard to the accuracy desired.

Under certain conditions the proportionate error in the length of line as specified above may be found to be exceeded in any class of triangulation. Where two points are comparatively close together as compared with the size of the triangulation scheme the distance between those points may be in error in excess of that indicated by the class of triangulation of the scheme. In any class of triangulation the subsidiary stations will be located with a less degree of accuracy than the main scheme stations. Special Publication No. 120 of the United States Coast and Geodetic Survey, Manual of First-Order Triangulation, and Special Publication No. 145, Manual of Second and Third Order Triangulation and Traverse, give detailed instructions relating to the field procedure in the execution of triangulation of these grades. Special Publication No. 28, The Application of the Theory of Least Squares to the Adjustment of Triangulation, and Special Publication No. 138, Manual of Triangulation Computation and Adjustment, treat of the methods of computing the results.

ACCURACY OF THE HAWAIIAN TRIANGULATION

The triangulation of the Hawaiian Islands executed under the Hawaiian Government Survey was in advance of the adoption of uniform standards for securing results of given accuracy, even in this country, and classification of its accuracy is almost impossible. It may be stated in a general way that the main schemes have an accuracy, as indicated by closures of loops around islands, of about third-order, represented by closures of about 1 part in 5,000. The work done since 1900 to furnish control for hydrographic and topographic sheets has been done under instructions governing third-order work, but as this work often depends on lines of the older triangulation, it is probable that its real accuracy, as indicated by accuracy of lines, falls below the stated standard.

The triangulation of the island of Oahu executed in 1927 and the connection between the triangulation of that island and the triangulation of the island of Kauai (1928) is of a much higher order of accuracy. The triangulation of Oahu, 1927, was adjusted in two parts: Loop I extends from the base line at Schofield to the northwest side of the island, thence to the north point, down the east side, and along the south side to Pearl Harbor, thence to a closure at Schofield. Loop II extends from a junction with Loop I, along the southwest side of the island, and thence east to a junction with Loop I at Waialua. The two loops are also tied together about opposite Schofield.

The following statistics are an indication of the accuracy of the work:

	Loop I	Loop II
Number of observed directions	175	100
Average correction to a direction	1. 0″	2. 0″
Probable error of an observed direction	±1. 3″	±2. 6″
Number of closed triangles	71	41
Average closure of triangle	2. 8″	3. 1″,

In the connection between Kauai and Oahu there were 4 triangles with an average closing error of 2.0″; 12 observed directions with an average correction of 0.7″ and a probable error of ±0.8″; and the length closure between the lines held fixed on the two islands was 1 in the sixth place of logarithms, or 1 part in 434,000.

OLD HAWAIIAN DATUM

The geodetic datum adopted for the triangulation of the islands Oahu to Hawaii was based on the hydrographic adjusted latitude (see p. 4) and the Tupman longitude (see p. 5). In 1928 when a connection was effected between the islands of Oahu and Kauai the datum was extended to the latter island, so that in the present volume all geographic positions of stations from the rock Kaula, southwest of Niihau, to the southernmost tip of Hawaii are on this one datum. This was the datum selected in accordance with a recommendation by Mr. J. S. Emerson, of the Hawaiian Government Survey. Its selection was ratified after the United States Coast and Geodetic Survey took up the adjustment of the triangulation of the islands, and it was given the simpler name of the "Old Hawaiian Datum."

In making the office computation of the Hawaiian triangulation it was first considered computing the ideal geodetic datum, by using the latitude determinations made by Mr. Preston and the 1904 first-order determination of the longitude of Honolulu, and allowing for the computed effects of topography and isostatic compensation. For various reasons this was not done. It was desirable to hold, if possible, the geodetic datum already in use, provided it was shown to be not in too great error as compared with the theoretical best datum. As soon as the computation of this theoretically best datum had progressed to a point where its value could be approximately known, it was found that it differed so little from the datum already in use as to make any change unnecessary.

The first step in the computation of the triangulation of a country is the adoption of a spheroid of reference. For the Hawaiian triangulation the Clarke Spheroid of 1866 as expressed in meters was adopted. This is the reference spheroid used in the geodetic survey of North America. After the spheroid of reference has been adopted for a country and all angles and lengths in the triangulation fully fixed, it

is still necessary, before we can proceed with the computation of latitudes, longitudes, and azimuths, to adopt a standard latitude and longitude of a specified station, and a standard azimuth from that station as starting data. In present practice in America, however, no one standard azimuth is adopted, but a number of azimuths, systematically placed throughout the triangulation and reduced to their true geodetic values by the application of the Laplace equation, are held and used as standard. In the Hawaiian triangulation, because of certain weaknesses in the triangulation, the observed astronomic azimuths were held and the triangulation adjusted to them.

The starting data from which the computation of geographic positions is carried ahead may be said to define the geodetic datum.

At the time of its adoption the Old Hawaiian Datum was defined in terms of the coordinates of station Oahu west base, as follows:

	°	′	″
Latitude	21	18	13.89
Longitude	157	50	55.79
Azimuth to station Oahu east base	291	29	36.0

When the 1927 triangulation of Oahu was adjusted it was deemed advisable to hold fixed the old position of station Diamond Head (Leahi) and an azimuth from that station for the reason that this station was a base station for the connection with the triangulation of the Island of Molokai, and it was desired to subject that triangulation and the triangulation of the islands beyond Molokai to as little change as possible. Holding the old positions of Diamond Head and Mauna Loa (Molokai) and permitting Mokapu (Oahu) to swing with the 1927 triangulation adjustment, the line from Mokapu to Mauna Loa was changed but 00.1″ in azimuth, and 0.6 meter (1/108 000) in length, thus making it unnecessary to carry any revision into the triangulation outside of the island of Oahu.

It has been noted that in stations most remote from this standard station a discrepancy of appreciable size occurs between the values given in the adjusted work and the corresponding values in the original computation made under the old Hawaiian government. These discrepancies amount to 1.71″ in latitude and 0.94″ in longitude for the station Ka lae on the southern tip of Hawaii. They are not due to a change in datum, but almost wholly to the adjustment of the triangulation. The older computation was carried through unadjusted figures, some of them of no considerable strength and the new computations were so made as to get the best values obtainable from the observations.

The main object in adopting a geodetic datum for the Hawaiian Islands is to secure the full coordination and correlation of the charts of the island waters, as well as of the surveys and maps of the islands themselves. Since two or more islands are sometimes shown on the same chart, it is quite evident that if the surveys of the islands were not on the same geodetic datum, the relative positions of the islands on the chart would not be true, and it is possible that accurate hydrographic surveys would reveal discrepancies. In any engineering or scientific undertakings involving either a single island or a number of islands it is important that the geographic positions of survey stations which will form the basis of the maps used in the work shall be in full agreement, and this can be accomplished only through the use of a single geodetic datum for the entire area.

USE OF HORIZONTAL CONTROL DATA

That horizontal control data should be based on a single standard geodetic datum may be further shown by considering some of the many uses to which accurate maps and charts are put:

(1) **Cadastral surveys.**—The property survey of a body of land requires that its bounds be located accurately with reference to all neighboring bodies of land, and that no matter from what direction a survey proceeds toward a given corner the resulting location of that corner on the ground will be the same. If a corner located with reference to a geodetic survey be completely destroyed it is possible to replace it within certain limits of accuracy from any two or more of the stations of the survey. Geodetic control makes for economy in placing and maintaining cadastral monuments, and is of particular worth in cadastral surveys of city areas.

(2) **Extensive mapping.**—The topographer needs as initial data for beginning a topographic survey the distance and direction between two points and the geographic position of one of them on the standard datum. If he uses local triangulation or traverse based on this control he will prevent the accumulation of excessive errors as he carries on his mapping operations. Expediency may demand the commencement of mapping operations at widely separated points at the same time. The geodetic control will insure that when any of these mapping operations approach each other and effect a junction no discrepancies due to accumulated errors will be found, but instead a perfect agreement may be expected.

(3) **Boundary lines.**—The boundary lines between political divisions such as cities, counties, states, or nations, if mapped on a unified geodetic control are permanently fixed, due to the possibility of the economical and accurate replacement of lost stations in the same manner as is considered under cadastral surveys above.

(4) **Local intensive surveys.**—Such surveys are required most frequently in connection with extensive improvements over a considerable area or as a basis for city planning, where the needs of a city are being anticipated for a number of years. Here a control of inferior order is needed for determining a great many points in the area under study to serve as a basis for the detail maps required, but in order that the extreme limits of the area under study be fully coordinated this subsidiary control must be based on a main control, which is in itself fully coordinated and correlated. This can be done satisfactorily only on a standard datum.

While it is noted in the foregoing that the azimuth and length of one line and the geographical position of one end of that line constitute the essential data in basing a survey on geodetic control, there is always grave danger in depending on this minimum of data. There may be failure to identify the true station mark at one of the stations, or the mark may have been tampered with or otherwise disturbed in position. This will, of course, introduce an error into the new work based on these stations. It is the present practice in this bureau, unless unusual conditions render it unnecessary, to establish the integrity of the recovered points by using at least three old stations as a basis for new work, the third station serving as a check.

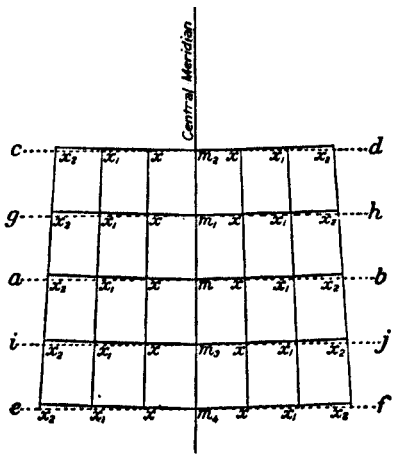
58955°—30——2

In local surveys where the area is of limited extent it is usually desirable to use a system of plane coordinates, the origin being connected to some point of the main-control scheme. This is particularly desirable in city surveys because of the greater simplicity of computations where the plane rectangular system of coordinates is used. Tables for computing plane coordinates from geographic positions are given in United States Coast and Geodetic Survey Special Publication No. 71.

The United States Coast and Geodetic Survey will be glad to give advice on any problem arising out of the use of its control points on any proposed extension of triangulation or traverse from them.

TABLE FOR POLYCONIC MAP PROJECTION

The engineer or surveyor who makes use of the data in this publication may find it desirable to construct a map covering the territory he is surveying. He may wish to show on this map the meridians and parallels so as to be able to plot the positions of the triangulation stations included in the area and show the details of his survey in the correct geographic positions. To enable him to do this with the least possible difficulty the following table, reprinted in an abbreviated form from United States Coast and Geodetic Survey Special Publication No. 5, has been inserted. This table may also be used to interpret in terms of degrees, minutes, and seconds of arc any distance measured along a meridian or parallel. The method of using the table is described below:



NOTE.—In this figure the angle made at the central meridian by the parallels is grossly exaggerated. In an actual projection the parallels appear practically as straight lines.

To make a projection for a large-scale map (1–20,000 and larger) first draw a straight line for a central meridian and a construction line *ab* perpendicular thereto, each to be as central to the sheet as the selected interval of latitude and longitude will permit. (See fig. above.) On the central meridian lay off the distances, mm_2 and mm_4, using the length of 1′ along the meridian, for the latitude in question, as given in the table under "Arcs of the meridian," and multiplying this length by the number of minutes for the interval between the central parallel and the extreme parallels. Through m_2 and m_4 draw straight lines, *cd* and *ef*, parallel to the line *ab*. On the lines *ef*, *ab*, and *cd* lay off the distances mx_2, m_2x_2, and m_4x_2 on both sides of the central meridian taking the values from the table under "Arcs of the parallel," corresponding to the latitude of m, m_2, and m_4, respectively. The value of 1′ as taken from the table must be multiplied by the number of minutes out from the central meridian. Draw straight lines through the points thus determined for the extreme meridians—that is, through the x_2 points.

At the two points designated x_2 on the line ab lay off along the meridians the value of Y as given in the table under "Y-Coordinate of curvature," using as argument the interval in minutes between the central meridian and the extreme meridian. Draw straight lines from these points to the point m for the middle parallel, and from the points of intersection with the extreme meridians lay off distances along these meridians, above and below, equal to the distances mm_2 and mm_4 to locate points in the extreme parallels.

Subdivide each of the three meridians and three parallels already determined into parts corresponding with the projection interval and join the corresponding points of subdivision by straight lines to complete the projection.

The method outlined above may be used for all large-scale maps regardless of the number of meridians and parallels shown. For small-scale maps the method is somewhat more complicated and it becomes necessary to make use of Special Publication No. 5, which may be obtained for 20 cents from the Superintendent of Documents, Washington, D. C.

Polyconic map projection table

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y-coordinate of curvature, lat. 20°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
20 00	29.069	1,744.1	30.750	1,844.98		
1	.066	3.9	0	.98	0 1	0.1
2	.063	3.7	0	.98	2	0.3
3	.060	3.6	0	.99	3	0.8
4	.057	3.4	0	.99	4	1.4
20 05	29.054	1,743.2	30.750	1,844.99	0 5	2.2
6	.051	3.0	0	5.00	6	3.1
7	.048	2.8	0	.00	7	4.3
8	.044	2.7	0	.00	8	5.6
9	.041	2.5	0	.01	9	7.0
20 10	29.038	1,742.3	30.750	1,845.01	0 10	8.7
11	.035	2.1	0	.01	15	19.5
12	.032	1.9	0	.02	20	34.7
13	.029	1.7	0	.02	25	54.2
14	.026	1.6	0	.02	30	78.1
20 15	29.023	1,741.4	30.750	1,845.03	0 35	106.3
16	.020	1.2	1	.03	40	138.8
17	.017	1.0	1	.04	45	175.7
18	.014	0.8	1	.04	50	216.9
19	.010	0.6	1	.04	55	262.5
20 20	29.007	1,740.4	30.751	1,845.05	1 00	312.3
21	.004	0.2	1	.05	05	366.6
22	.001	40.0	1	.05	10	425.1
23	8.998	39.9	1	.06	15	488.0
24	.995	9.7	1	.06	20	555.3
20 25	28.992	1,739.5	30.751	1,845.06	1 25	626.8
26	.989	9.3	1	.07	30	702.8
27	.986	9.1	1	.07	35	783.0
28	.982	9.0	1	.07	40	867.6
29	.979	8.8	1	.08	45	956.5
20 30	28.976	1,738.6	30.751	1,845.08	1 50	1,049.8
31	.973	8.4	1	.09	55	1,147.4
32	.970	8.2	1	.09	2 00	1,249
33	.967	8.0	2	.09	3 00	2,811
34	.964	7.8	2	.10	4 00	4,997
20 35	28.960	1,737.6	30.752	1,845.10		
36	.957	7.4	2	.10		
37	.954	7.2	2	.11		
38	.951	7.1	2	.11		
39	.948	6.9	2	.11		
20 40	28.945	1,736.7	30.752	1,845.12		
41	.942	6.5	2	.12		
42	.938	6.3	2	.12		
43	.935	6.1	2	.13		
44	.932	5.9	2	.13		
20 45	28.929	1,735.7	30.752	1,845.14		
46	.926	5.5	2	.14		
47	.923	5.4	2	.14		
48	.919	5.2	2	.15		
49	.916	5.0	2	.15		
20 50	28.913	1,734.8	30.753	1,845.15		
51	.910	4.6	3	.16		
52	.907	4.4	3	.16		
53	.903	4.2	3	.16		
54	.900	4.0	3	.17		
20 55	28.897	1,733.8	30.753	1,845.17		
56	.894	3.6	3	.18		
57	.891	3.4	3	.18		
58	.887	3.3	3	.18		
59	.884	3.1	3	.19		
20 60	28.881	1,732.9	30.753	1,845.19		

Polyconic map projection table—Continued

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y-coordinate of curvature, lat. 21°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
21 00	28.881	1,732.9	30.753	1,845.19		
1	.878	2.7	3	.20	0 1	0.1
2	.875	2.5	3	.20	2	0.4
3	.871	2.3	3	.20	3	0.8
4	.868	2.1	3	.21	4	1.4
21 05	28.865	1,731.9	30.753	1,845.21	0 5	2.2
6	.862	1.7	4	.21	6	3.2
7	.859	1.5	4	.22	7	4.4
8	.855	1.3	4	.22	8	5.8
9	.852	1.1	4	.23	9	7.3
21 10	28.849	1,730.9	30.754	1,845.23	0 10	9.0
11	.846	0.7	4	.23	15	20.3
12	.842	0.5	4	.24	20	36.1
13	.839	0.4	4	.24	25	56.4
14	.836	0.2	4	.24	30	81.3
21 15	28.833	1,730.0	30.754	1,845.25	0 35	110.7
16	.829	29.8	4	.25	40	144.5
17	.826	9.6	4	.25	45	182.9
18	.823	9.4	4	.26	50	225.8
19	.820	9.2	4	.26	55	273.2
21 20	28.817	1,729.0	30.754	1,845.27	1 00	325.2
21	.813	8.8	4	.27	05	381.6
22	.810	8.6	5	.27	10	442.5
23	.807	8.4	5	.28	15	508.0
24	.804	8.2	5	.28	20	578.0
21 25	28.800	1,728.0	30.755	1,845.28	1 25	652.5
26	.797	7.8	5	.29	30	731.6
27	.794	7.6	5	.29	35	815.1
28	.791	7.4	5	.30	40	903.2
29	.787	7.2	5	.30	45	995.8
21 30	28.784	1,727.0	30.755	1,845.30	1 50	1,092.9
31	.781	6.8	5	.31	55	1,194.5
32	.777	6.6	5	.31	2 00	1,301
33	.774	6.4	5	.31	3 00	2,926
34	.771	6.2	5	.32	4 00	5,202
21 35	28.767	1,726.0	30.755	1,845.32		
36	.764	5.8	5	.33		
37	.761	5.6	5	.33		
38	.758	5.5	6	.33		
39	.754	5.3	6	.34		
21 40	28.751	1,725.1	30.756	1,845.34		
41	.748	4.9	6	.34		
42	.744	4.7	6	.35		
43	.741	4.5	6	.35		
44	.738	4.3	6	.36		
21 45	28.734	1,724.1	30.756	1,845.36		
46	.731	3.9	6	.36		
47	.728	3.7	6	.37		
48	.724	3.5	6	.37		
49	.721	3.3	6	.37		
21 50	28.718	1,723.1	30.756	1,845.38		
51	.714	2.9	6	.38		
52	.711	2.7	6	.39		
53	.708	2.5	6	.39		
54	.704	2.3	7	.39		
21 55	28.701	1,722.1	30.757	1,845.40		
56	.698	1.9	7	.40		
57	.694	1.7	7	.40		
58	.691	1.5	7	.41		
59	.688	1.3	7	.41		
21 60	28.684	1,721.1	30.757	1,845.42		

Polyconic map projection table—Continued

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y-coordinate of curvature, lat. 22°
	1″	1′	1″	1′		
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*
22 00	28.684	1,721.1	30.757	1,845.42		
1	.681	0.9	7	.42	0 1	0.1
2	.678	0.7	7	.42	2	0.4
3	.674	0.5	7	.43	3	0.8
4	.671	0.3	7	.43	4	1.5
22 05	28.668	1,720.1	30.757	1,845.44	0 5	2.3
6	.664	19.9	7	.44	6	3.4
7	.661	9.7	7	.44	7	4.6
8	.657	9.4	7	.45	8	6.0
9	.654	9.2	7	.45	9	7.6
22 10	28.651	1,719.0	30.758	1,845.45	0 10	9.4
11	.647	8.8	8	.46	15	21.1
12	.644	8.6	8	.46	20	37.5
13	.641	8.4	8	.47	25	58.6
14	.637	8.2	8	.47	30	84.4
22 15	28.634	1,718.0	30.758	1,845.47	0 35	114.9
16	.630	7.8	8	.48	40	150.0
17	.627	7.6	8	.48	45	189.9
18	.624	7.4	8	.48	50	234.4
19	.620	7.2	8	.49	55	283.7
22 20	28.617	1,717.0	30.758	1,845.49	1 00	337.6
21	.613	6.8	8	.50	05	396.2
22	.610	6.6	8	.50	10	459.5
23	.607	6.4	8	.50	15	527.5
24	.603	6.2	8	.51	20	600.1
22 25	28.600	1,716.0	30.759	1,845.51	1 25	677.5
26	.596	5.8	9	.52	30	759.5
27	.593	5.6	9	.52	35	846.3
28	.590	5.4	9	.52	40	937.7
29	.586	5.2	9	.53	45	1,033.8
22 30	28.583	1,715.0	30.759	1,845.53	1 50	1,134.6
31	.579	4.8	9	.53	55	1,240.1
32	.576	4.6	9	.54	2 00	1,350
33	.572	4.3	9	.54	3 00	3,037
34	.569	4.1	9	.55	4 00	5,400
22 35	28.566	1,713.9	30.759	1,845.55		
36	.562	3.7	9	.55		
37	.559	3.5	9	.56		
38	.555	3.3	9	.56		
39	.552	3.1	9	.57		
22 40	28.548	1,712.9	30.759	1,845.57		
41	.545	2.7	60	.57		
42	.541	2.5	0	.58		
43	.538	2.3	0	.58		
44	.535	2.1	0	.58		
22 45	28.531	1,711.9	30.760	1,845.59		
46	.528	1.7	0	.59		
47	.524	1.5	0	.60		
48	.521	1.2	0	.60		
49	.517	1.0	0	.60		
22 50	28.514	1,710.8	30.760	1,845.61		
51	.510	0.6	0	.61		
52	.507	0.4	0	.62		
53	.503	0.2	0	.62		
54	.500	10.0	0	.62		
22 55	28.496	1,709.8	30.760	1,845.63		
56	.493	9.6	1	.63		
57	.489	9.4	1	.64		
58	.486	9.2	1	.64		
59	.482	8.9	1	.64		
22 60	28.479	1,708.7	30.761	1,845.65		

Polyconic map projection table—Continued

Latitude	Arc of the parallel		Arc of the meridian		Interval of longitude from central meridian	Y-coordinate of curvature	
	1″	1′	1″	1′		Lat. 23°	Lat. 24°
° ′	*Meters*	*Meters*	*Meters*	*Meters*	° ′	*Meters*	*Meters*
23 00	28.479	1,708.7	30.761	1,845.65			
1	.475	8.5	1	.65	0 1	0.1	0.1
2	.472	8.3	1	.66	2	0.4	0.4
3	.468	8.1	1	.66	3	0.9	0.9
4	.465	7.9	1	.66	4	1.6	1.6
23 05	28.461	1,707.7	30.761	1,845.67	0 5	2.4	2.5
6	.458	7.5	1	.67	6	3.5	3.6
7	.454	7.3	1	.67	7	4.8	4.9
8	.451	7.1	1	.68	8	6.2	6.4
9	.447	6.8	1	.68	9	7.9	8.1
23 10	28.444	1,706.6	30.761	1,845.69	0 10	9.7	10.0
11	.440	6.4	2	.69	15	21.8	22.6
12	.437	6.2	2	.69	20	38.8	40.1
13	.433	6.0	2	.70	25	60.7	62.7
14	.430	5.8	2	.70	30	87.4	90.3
23 15	28.426	1,705.6	30.762	1,845.71	0 35	118.9	122.9
16	.423	5.4	2	.71	40	155.4	160.5
17	.419	5.2	2	.71	45	196.6	203.2
18	.416	4.9	2	.72	50	242.8	250.8
19	.412	4.7	2	.72	55	293.7	303.5
23 20	28.409	1,704.5	30.762	1,845.73	1 00	349.6	361.2
21	.405	4.3	2	.73	05	410.3	423.9
22	.401	4.1	2	.73	10	475.8	491.6
23	.398	3.9	2	.74	15	546.2	564.3
24	.394	3.7	2	.74	20	621.5	642.1
23 25	28.391	1,703.4	30.762	1,845.75	1 25	701.6	724.8
26	.387	3.2	2	.75	30	786.6	812.6
27	.384	3.0	3	.75	35	876.4	905.4
28	.380	2.8	3	.76	40	971.1	1,003.2
29	.377	2.6	3	.76	45	1,070.6	1,016.1
23 30	28.373	1,702.4	30.763	1,845.77	1 50	1,175.0	1,213.9
31	.369	2.2	3	.77	55	1,284.2	1,326.8
32	.366	2.0	3	.77	2 00	1,398	1,445
33	.362	1.7	3	.78	3 00	3,146	3,250
34	.359	1.5	3	.78	4 00	5,593	5,778
23 35	28.355	1,701.3	30.763	1,845.79			
36	.352	1.1	3	.79			
37	.348	0.9	3	.79			
38	.344	0.6	3	.80			
39	.341	0.4	3	.80			
23 40	28.337	1,700.2	30.763	1,845.81			
41	.334	700.0	3	.81			
42	.330	699.8	4	.81			
43	.326	9.6	4	.82			
44	.323	9.4	4	.82			
23 45	28.319	1,699.2	30.764	1,845.83			
46	.316	8.9	4	.83			
47	.312	8.7	4	.83			
48	.308	8.5	4	.84			
49	.305	8.3	4	.84			
23 50	28.301	1,698.1	30.764	1,845.85			
51	.298	7.9	4	.85			
52	.294	7.7	4	.85			
53	.290	7.4	4	.86			
54	.287	7.2	4	.86			
23 55	28.283	1,697.0	30.764	1,845.87			
56	.279	6.8	5	.87			
57	.276	6.6	5	.87			
58	.272	6.3	5	.88			
59	.268	6.1	5	.88			
23 60	28.265	1,695.9	30.765	1,845.89			

EXPLANATION OF TABLES OF GEOGRAPHIC POSITIONS

In the tables of positions the latitude and longitude of each point are given on the Old Hawaiian Datum (see p. 9); also the length and azimuth of each line observed over, whether in one way or both, to other points of the triangulation. No lengths or azimuths are repeated, and for a given line the length and azimuths will be found opposite the position of one or the other of the two stations involved.

The distances between stations are given in both meters and feet. A column is also given of the logarithms of the distances in meters. It must be remembered that it is this logarithm of the distance in meters which is derived first in the computations, the length in meters then being derived from its logarithm, and the length in feet computed from the meters. Where further work of considerable extent is contemplated, an accumulation of error can be avoided by using the logarithm. For convenience in making reductions from feet to meters or from meters to feet, a reduction table is placed near the end of this volume immediately following the descriptions of stations.

LENGTHS

The lengths depend upon measured base lines on the islands Oahu, Kauai, Molokai, Maui, and Hawaii. From these bases the lengths are carried by triangles to the stations throughout the islands. There is no connection in length between the islands of Oahu and Molokai, but through a single closed triangle there is a connection between these islands in latitude, longitude, and azimuth. The lengths as given in the tables are all reduced to sea level. If the actual length of a line reduced only to the horizontal is desired, that is, its actual elevation on the surface of the earth, it may be obtained by adding to the sea level length, as given in meters, the following correction:

$$\text{Correction} = \frac{sh_m}{6{,}370{,}000},$$

in which s is the length of the line in meters, and h_m is the mean elevation of the two ends of the line in meters. This correction is negligible for the greater part of the triangulation contained in this publication.

AZIMUTHS AND BACK AZIMUTHS

The azimuth of a line of triangulation is its true direction reckoned clockwise from true south. The cardinals points of the compass on this system are as follows: South is 0° (or 360°), west 90°, north 180°, and east 270°.

Because of the convergence of meridians the azimuth and back azimuth of a line do not differ by exactly 180°, the amount of the divergence varying with the latitude and the difference of longitude of the two points. To illustrate from the table, page 44, the azimuth from Tantalus to Diamond Head is 357° 44′ 28.5″, and the back azimuth, from Diamond Head to Tantalus, is 177° 44′ 32.5″. The azimuths of the triangulation lines offer a very convenient and accurate means of testing the error of the magnetic needle on a surveyor's transit, and even the azimuth over such short distances as those between a station mark and its reference mark may be used for this purpose with fair accuracy, provided the distance is greater than 100 feet.

ACCURACY OF DATA INDICATED IN TABLES

The rule followed in recent publications of this office has been to give latitudes and longitudes to thousandths of a second for all points the positions of which are fixed by fully adjusted triangulation. Points, the positions of which are given to hundredths of a second only, are marked by footnotes as being determined without check (observed from only two points), or are unadjusted, but a check provided by observations from at least a third station or by an agreement of determinations of elevations from two stations. In a few cases in the present publication the work was of such a character, as indicated by the observations, that only tenths of seconds are given for the positions. The adjusted positions of a number of stations, principally on Maui, are also given only to two places. They may usually be recognized by the additional azimuths given. In the columns giving azimuths, distances and logarithms of distances, the accuracy is indicated to a certain extent by the number of decimal places given, it being understood that in each case two doubtful figures are given. In some cases there is very little doubt of the correctness of the second figure from the right, while in a few cases doubt may be cast on the correctness of the third figure from the right.

"NO CHECK" POSITIONS

It will be noticed that in the list of geographic positions a number of the stations carry notes such as "No check on this position," "Checked by verticals only," or "Unadjusted, but checked by additional observations." It may be well to emphasize these notes by enlarging on their meaning. Where a station carries the footnote, "No check on this position," it means that but two angles of the triangle connecting it with a known line were measured, the third angle of the triangle being concluded. Under such a condition the observations themselves carry no proof that they are free from blunders, or that the same object was observed from the two occupied stations. It is possible where but two angles of a triangle are observed to close the triangle and obtain an intersection which will give an erroneous position. Where "No check" points are established for use in topographic or hydrographic surveys, their use in such surveys will usually check their integrity. Until such a check is obtained, a "No check" position must be used with caution, even with suspicion, and it should never be trusted without some sort of verification.

Where a station is marked "Checked by verticals only," it means a "No check" point as described above, but one whose position is proven free from gross blunder by the agreement of the two elevations determined for it by vertical angles from the two occupied stations, this being accepted as fair proof that the lengths of the triangle are satisfactorily determined.

The stations marked "Unadjusted, but checked by additional observations," are stations determined from at least three known stations, but which for some reason did not justify or demand a least-squares adjustment. For such a station the agreement between unadjusted values of the same length from different triangles was considered ample proof of the absence of blunders, and the geographic

position was computed, using only the one triangle which because of its strength, length of line, and accuracy of the stations on which it is based would seem in the judgment of the mathematician to give the strongest determination.

For any points that come within the categories described above the positions given are sufficiently accurate for all purposes of hydrographic and topographic surveying, provided, of course, in the case of a "No check" point that its integrity has been established.

HOW TO FIND THE DATA DESIRED

Following the index at the back of the book are 15 maps. The first is an index map showing the boundaries and numbers of the charts published in this region by the United States Coast and Geodetic Survey. Following it is an index map on which are given the outlines and numbers of the maps or sketches immediately following which show the location and names of the stations contained in this volume. By means of these detail maps the names of the stations may be found whose positions, etc., are desired, and by using the alphabetical index of stations commencing on page 229 one can find in the appropriately headed columns the pages on which are given the geographic positions, lengths and azimuths of lines, and descriptions of stations, if there be any. If one knows the name of a station instead of its location he may enter the alphabetical index and obtain therefrom the number of the detail sketch on which it is plotted.

RELATED PUBLICATIONS

Engineers and others using the data given in this report for the control of maps and surveys will find it of help to have the following special publications of the United States Coast and Geodetic Survey. These publications may be purchased from the Superintendent of Documents, Washington, D. C., at the prices stated.

Special Publication No. 5, entitled "Tables for a Polyconic Projection of Maps Based on Clarke's Reference Spheroid of 1866." A brief explanation of these tables with data for the range of latitudes covered by the Hawaiian Islands is given on pages 12–17. Price, 25 cents.

Special Publication No. 8, entitled "Formulas and Tables for the Computation of Geographic Positions." This publication contains the data needed to compute the spherical coordinates of triangulation stations if the distances and angles are known and starting data are available. Price, 30 cents.

Special Publication No. 28, entitled "Application of the Theory of Least Squares to the Adjustment of Triangulation." This is a theoretical and practical development of the use of least squares in triangulation adjustment, giving some theoretical material not included in Special Publication No. 138. (See below.) Price, 25 cents.

Special Publication No. 71, entitled "Relation Between Plane Rectangular Coordinates and Geographical Positions." This publication contains tables which will facilitate the use by engineers of plane rectangular coordinates for local surveys. Price, 10 cents.

Special Publication No. 93, entitled "Reconnaissance and Signal Building." Part I of this publication covers the location of stations, the computation of strength of figure, intervisibility of stations, lengths of lines, selection of base sites, etc. In Part II are given general directions for the building of triangulation and hydrographic signals of many different sizes and types. Price, 30 cents.

Special Publication No. 120, entitled "Manual of first-order Triangulation." This publication contains comprehensive directions for the field procedure in the execution of first-order triangulation. Price, 40 cents.

Special Publication No. 138, entitled "Manual of Triangulation Computation and Adjustment." This is a manual for making the least squares adjustment of triangulation. It follows closely the methods in present use in the reduction of

triangulation observations at the office of the United States Coast and Geodetic Survey, Washington, D. C. Price, 50 cents.

Special Publication No. 145, entitled "Manual of Second and Third Order Triangulation and Traverse." This publication contains instructions for the execution of second and third order triangulation and traverse. Price, 60 cents.

ASTRONOMIC STATIONS

Latitude stations

Station	Astronomic latitude			Geodetic						(A−G)
				Latitude			Longitude			
Kauai Island	°	′	″	°	′	″	°	′	″	″
Waimea, 1887	21	57	00.81	21	57	36.39	159	40	11.11	−35.58
Koloa, 1887	21	52	13.17	21	52	57.45	159	28	15.14	−44.28
Hanalei (Pooku), 1887	22	12	56.51	22	12	31.87	159	28	03.24	+24.64
Oahu Island										
Kahuku, 1887	21	43	06.07	21	42	41.55	157	58	59.79	+24.52
Honolulu, 1887	21	18	02.51	21	18	28.06	157	51	44.71	−25.55
Waikiki, C. & G. S., 1892	21	16	24.39	21	16	52.23	157	50	01.18	−27.84
Maui Island										
Lahaina, 1883	20	52	22.80	20	52	32.61	156	40	54.01	−9,81
Haiku, 1887	20	56	02.57	20	55	43.78	156	20	11.20	+18.79
Pakaoao, 1887	20	42	50.66	20	43	01.53	156	15	13.91	−10.87
Kaupo, 1887	20	36	40.75	20	37	20.98	156	08	36.65	−40.23
Hana, 1887	20	45	38.93	20	45	27.13	155	59	03.98	+11.80
Hawaii Island										
Kohala, 1887	20	15	29.33	20	14	58.21	155	46	27.15	+31.12
Kawaihae, 1892	20	02	05.87	20	02	05.67	155	49	26.04	+0.20
Mauna Kea (Waiau), 1892	19	48	51.54	19	48	51.67	155	28	47.08	−0.13
Kalaieha, 1892	19	42	02.45	19	42	14.62	155	27	51.68	−12.17
Hilo, 1887	19	43	11.24	19	43	11.59	155	05	57.66	−0.35
Kailua, 1887	19	38	20.86	19	38	44.41	155	59	48.45	−23.55
Ka lae, 1887	18	53	51.72	18	54	59.36	155	41	03.86	−67.64

Longitude stations

Station	Astronomic longitude			Geodetic						(A−G)	(A−G) × cos φ
				Latitude			Longitude				
Oahu Island	°	′	″	°	′	″	°	′	″	″	″
Honolulu, 1903	157	51	55.98	21	18	23.72	157	51	55.44	+0.54	+0.50
Niu, 1927	157	43	49.62	21	17	08.43	157	44	05.78	−16.16	−15.06

GEOGRAPHIC POSITIONS OF TRIANGULATION STATIONS

Kauai Island

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Principal points	° ′ ″		° ′ ″	° ′ ″				
Kikoo, 1910–1927	22 09 12.676	389.9	291 11 11.2	111 40 55.3	Kawela (Oahu)	5.168563	147,422.2	483,667.7
	159 19 58.963	1,689.5	303 29 50.9	123 57 06.8	Manawahua (Oahu)	5.182829	152,345.3	499,819.5
Keopaweo, 1927	21 56 38.837	1,194.5	295 01 31.3	115 29 22.6	Manawahua (Oahu)	5.158041	143,893.4	472,090.3
	159 21 55.060	1,580.0	188 09 52.6	8 10 36.2	Kikoo	4.369656	23,423.7	76,849.3
Kalepa, 1910–1927	22 00 11.936	367.1	189 51 18.1	9 51 56.0	Kikoo	4.227398	16,881.0	55,383.7
	159 21 39.799	1,141.6	3 49 21.5	183 49 15.8	Keopaweo	3.817489	6,568.8	21,551.1
Kilohana, 1910–1928	21 59 50.667	1,558.4	265 02 58.2	85 04 37.1	Kalepa	3.880913	7,601.7	24,939.9
	159 26 03.829	109.8	309 33 58.0	129 35 31.1	Keopaweo	3.966620	9,260.2	30,381.2
Kai, 1910	21 55 55.774	1,715.4	144 01 10.5	324 00 02.1	Kilohana	3.950801	8,929.0	29,294.6
	159 23 00.951	27.3	156 48 18.8	336 47 50.0	Kauai north base	3.749278	5,614.1	18,418.9
			161 25 17.3	341 24 16.9	Hanahanapuni	4.162795	14,547.7	47,728.6
			183 41 36.2	3 41 38.2	Kauai south base	3.375992	2,376.8	7,797.9
			192 00 36.6	12 01 45.0	Kikoo	4.398978	25,059.8	82,217.0
			196 27 33.2	16 28 03.6	Kalepa	3.914640	8,215.6	26,954.0
Kauai south base, 1910	21 57 12.889	396.4	131 57 21.1	311 56 10.7	Kilohana	3.860931	7,259.9	23,818.5
	159 22 55.615	1,595.8	201 32 55.3	21 33 23.7	Kalepa	3.772389	5,920.9	19,425.5
Kauai north base, 1910	21 58 43.545	1,339.3	124 13 41.7	304 13 02.0	Kilohana	3.564754	3,670.7	12,043.0
	159 24 18.025	517.1	239 04 18.3	59 05 17.5	Kalepa	3.723523	5,290.8	17,358.2
			319 41 53.2	139 42 24.0	Kauai south base	3.562986	3,655.8	11,994.1
Hanahanapuni, 1910	22 03 24.091	741.0	222 33 19.6	42 35 28.9	Kikoo	4.163134	14,559.1	47,766.0
	159 25 42.600	1,221.5	310 18 40.1	130 20 11.1	Kalepa	3.960622	9,133.2	29,964.5
			341 24 16.9	161 25 17.3	Kai	4.162795	14,547.7	47,728.6
			5 18 00.3	185 17 52.3	Kilohana	3.819050	6,592.5	21,628.9
Nonou, 1910–1927	22 03 51.589	1,586.7	2 59 08.1	182 59 03.4	Kalepa	3.830272	6,765.1	22,195.2
	159 21 27.515	788.9	46 56 05.0	226 54 21.3	Kilohana	4.035392	10,849.1	35,594.1
			83 25 01.9	263 23 26.1	Hanahanapuni	3.867031	7,362.6	24,155.5
			194 24 31.1	14 25 04.4	Kikoo	4.008459	10,196.7	33,453.7
Pohakupili, 1910	22 07 04.096	126.0	325 57 22.8	145 58 15.2	Nonou	3.854007	7,145.1	23,441.9
	159 23 47.026	1,347.8	26 05 36.1	206 04 52.6	Hanahanapuni	3.877043	7,534.3	24,718.8
			238 48 34.1	58 50 00.0	Kikoo	3.883036	7,639.0	25,062.3
Kealia, 1910	22 06 37.239	1,145.4	41 17 31.6	221 16 32.9	Nonou	3.831241	6,780.2	22,244.7
	159 18 51.464	1,475.1	63 16 18.4	243 13 43.8	Hanahanapuni	4.120535	13,198.8	43,303.1
			95 35 05.4	275 33 14.2	Pohakupili	3.930002	8,511.4	27,924.5
Puu Ehu, 1910–1927	22 09 35.576	1,094.2	324 32 41.8	144 33 33.1	Kealia	3.828225	6,733.3	22,090.8
	159 21 07.731	221.5	3 04 08.3	183 04 00.8	Nonou	4.025115	10,595.3	34,761.4
			44 25 20.8	224 24 20.8	Pohakupili	3.814426	6,522.7	21,399.9
			289 40 04.3	109 40 30.2	Kikoo	3.320669	2,092.5	6,865.1
Pinnacle, 1910	22 09 11.155	343.1	263 21 24.2	83 22 49.2	Puu Ehu	3.813202	6,504.3	21,339.5
	159 24 53.217	1,524.8	269 40 00.6	89 41 51.5	Kikoo	3.925906	8,431.5	27,662.3
			294 31 28.6	114 33 44.8	Kealia	4.056784	11,396.8	37,391.0
			334 06 21.8	154 06 46.7	Pohakupili	3.637892	4,344.0	14,251.9
Kilauea, 1910–1927	22 13 35.258	1,084.5	327 24 46.4	147 25 48.5	Puu Ehu	3.941940	8,748.6	28,702.7
	159 23 52.181	1,494.4	12 09 00.5	192 08 37.5	Pinnacle	3.919562	8,309.3	27,261.4
Kamoku, 1910–1927	22 11 25.157	773.8	40 05 58.8	220 05 13.1	Pinnacle	3.731405	5,387.7	17,676.1
	159 22 52.103	1,492.5	156 44 04.5	336 43 41.8	Kilauea	3.639081	4,355.9	14,291.0
			269 36 21.4	89 37 40.4	Moloaa	3.777899	5,996.5	19,673.5
			318 24 57.5	138 25 36.9	Puu Ehu	3.653758	4,505.7	14,782.5
Hihimanu, 1910	22 11 17.510	538.6	244 05 31.2	64 07 26.4	Kilauea	3.986878	9,702.4	31,832.0
	159 28 56.918	1,630.5	299 05 19.9	119 06 51.9	Pinnacle	3.902591	7,990.8	26,216.5
Hanalei, 1910–1927	22 13 56.239	1,729.8	273 57 57.5	93 59 59.9	Kilauea	3.968048	9,290.7	30,481.2
	159 29 15.815	452.9	319 21 39.4	139 23 18.5	Pinnacle	4.062695	11,553.0	37,903.5
			353 40 22.2	173 40 29.3	Hihimanu	3.691262	4,912.0	16,115.5
Pooku (Hanalei latitude station), 1910–1927	22 12 31.866	980.1	254 48 54.7	74 50 29.6	Kilauea	3.872169	7,450.2	24,442.9
	159 28 03.245	92.9	318 35 00.0	138 36 11.8	Pinnacle	3.915445	8,230.9	27,004.2
Pali, 1910	22 09 57.297	1,762.3	237 35 15.2	57 37 48.0	Hanalei	4.137325	13,719.1	45,010.1
	159 36 00.243	7.0	258 28 44.4	78 31 24.1	Hihimanu	4.092585	12,376.1	40,603.9
Wainiha, 1910	22 11 14.812	455.6	243 03 19.7	63 05 28.7	Hanalei	4.039976	10,964.2	35,971.7
	159 34 57.115	1,636.1	269 31 13.2	89 33 29.1	Hihimanu	4.013626	10,318.7	33,853.9
			37 11 10.0	217 10 46.2	Pali	3.476035	2,992.5	9,817.9
Ex, 1910	22 10 40.121	1,234.0	250 59 29.3	71 00 10.1	Wainiha	3.515462	3,276.9	10,751.0
	159 36 45.267	1,296.8	315 35 45.5	135 36 02.5	Pali	3.265664	1,843.6	6,048.5
Pihea, 1910–1927	22 09 29.132	896.0	199 52 58.7	19 53 09.1	Ex	3.365835	2,321.9	7,617.8
	159 37 12.831	367.6	247 23 00.1	67 23 27.5	Pali	3.352755	2,253.0	7,391.7
Kalalau, 1910	22 10 39.333	1,209.8	269 10 58.9	89 11 21.3	Ex	3.231458	1,704.0	5,590.5
	159 37 44.739	1,281.7	337 03 04.7	157 03 16.7	Pihea	3.370102	2,344.8	7,692.9

Kauai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
***Principal points*—Continued**	° ′ ″		° ′ ″	° ′ ″				
Na, 1910	22 10 19.549	601.3	27 58 28.9	207 58 18.1	Pihea	3.244485	1,755.8	5,760.5
	159 36 44.085	1,263.0	109 18 11.3	289 17 48.5	Kalalau	3.265087	1,841.1	6,040.3
			176 56 13.7	356 56 13.3	Ex	2.801837	633.6	2,078.7
			240 58 46.1	60 59 26.5	Wainiha	3.544605	3,504.3	11,497.0
			298 34 58.7	118 35 15.3	Pali	3.155477	1,430.5	4,693.2
Kila, 1910	22 08 41.242	1,268.5	202 28 07.3	22 28 27.1	Kalalau	3.594466	3,930.7	12,896.0
	159 38 37.175	1,065.2	238 38 02.7	58 38 34.5	Pihea	3.451830	2,830.3	9,285.7
Awaa, 1910	22 08 58.192	1,789.8	221 59 14.8	41 59 51.7	Kalalau	3.621755	4,185.6	13,732.3
	159 39 22.476	644.0	291 52 47.6	111 53 04.7	Kila	3.145776	1,398.9	4,589.6
Lolo, 1910	22 09 12.719	391.2	249 52 17.0	69 53 52.8	Kalalau	3.889092	7,746.3	25,414.3
	159 41 58.614	1,679.5	275 41 42.8	95 42 41.7	Awaa	3.652847	4,496.2	14,751.3
Makaha, 1910	22 07 30.859	949.1	187 52 38.3	7 52 44.0	Lolo	3.500073	3,162.8	10,376.6
	159 42 13.742	393.8	241 17 56.1	61 19 00.7	Awaa	3.747793	5,594.9	18,355.9
Hale, 1910–1927	22 06 58.810	1,808.8	107 03 29.4	287 02 47.1	Makaha	3.526529	3,361.5	11,028.5
	159 40 21.611	619.4	204 46 17.4	24 46 39.7	Awaa	3.606818	4,044.1	13,268.0
			223 31 30.8	43 32 10.2	Kila	3.638038	4,345.5	14,256.9
			229 28 16.8	49 29 28.0	Pihea	3.852259	7,116.4	23,347.7
Lua, 1910	22 05 35.909	1,104.5	147 30 50.2	327 30 20.6	Makaha	3.622377	4,191.6	13,751.9
	159 40 55.189	1,582.0	200 40 40.8	20 40 53.4	Hale	3.435429	2,725.4	8,941.6
Mana, 1910	22 02 16.923	520.5	222 21 49.2	42 23 44.6	Makaha	4.116322	13,071.4	42,885.1
	159 47 21.077	604.4	241 01 46.6	61 04 11.5	Lua	4.101879	12,643.8	41,482.2
Opae, 1910–1927	22 02 22.593	694.9	88 47 55.1	268 46 07.6	Mana	3.914691	8,216.6	26,957.3
	159 42 34.616	992.7	205 36 35.2	25 37 12.5	Lua	3.819142	6,593.9	21,633.5
Pele, 1910–1926	22 05 01.800	55.4	330 20 34.2	150 22 21.9	Lani	4.221935	16,670.0	54,691.5
	159 40 09.417	270.0	40 22 42.0	220 21 47.4	Opae	3.808027	6,427.3	21,086.9
			128 38 46.1	308 38 28.9	Lua	3.225298	1,680.0	5,511.8
			174 27 12.3	354 27 07.7	Hale	3.558206	3,615.8	11,862.8
			211 36 12.8	31 37 19.3	Pihea	3.984756	9,655.1	31,676.8
Kokole, 1910–1927	21 58 55.454	1,705.6	153 13 59.5	333 13 18.6	Mana	3.841395	6,940.6	22,771.0
	159 45 32.077	920.2	218 36 48.1	38 37 54.6	Opae	3.911402	8,154.6	26,753.9
Lani, 1910–1926	21 57 10.740	330.3	100 27 23.8	280 23 35.6	Kokole	4.250392	17,798.9	58,395.2
	159 35 21.953	629.9	127 43 13.8	307 40 31.8	Opae	4.195496	15,685.4	51,461.2
			150 22 21.9	330 20 34.2	Pele	4.221935	16,670.0	54,691.5
Papai, 1910–1926	21 56 02.408	74.1	109 47 26.3	289 44 13.3	Kokole	4.196999	15,739.8	51,639.7
	159 36 55.828	1,602.2	232 02 05.1	52 02 40.2	Lani	3.533606	3,416.7	11,209.6
Waimea latitude station, 1910	21 57 36.394	1,119.4	275 25 02.8	95 26 50.9	Lani	3.920867	8,334.3	27,343.4
	159 40 11.110	318.8	297 16 38.5	117 17 51.5	Papai	3.799704	6,305.3	20,686.6
Puolo, 1910–1928	21 53 45.131	1,388.1	121 23 21.2	301 19 57.4	Kokole	4.263393	18,339.7	60,169.5
	159 36 26.354	756.5	146 26 25.1	326 24 07.6	Opae	4.281109	19,103.3	62,674.7
			168 40 18.7	348 40 07.7	Papai	3.634083	4,306.1	14,127.6
			196 17 20.7	16 17 44.8	Lani	3.818782	6,588.4	21,615.4
Pohakea, 1910–1928	21 56 44.040	1,354.5	49 58 58.8	229 57 33.6	Puolo	3.932244	8,555.5	28,069.2
	159 32 38.096	1,093.2	99 54 56.7	279 53 55.4	Lani	3.678789	4,773.0	15,659.4
Nomilo, 1910	21 53 23.694	728.7	94 51 00.8	274 49 19.6	Puolo	3.893228	7,820.4	25,657.4
	159 31 54.893	1,575.8	139 36 47.5	319 35 30.3	Lani	3.962345	9,169.5	30,083.6
			168 37 29.1	348 37 13.0	Pohakea	3.798339	6,285.5	20,621.7
Laaukahi, 1910	21 56 32.906	1,012.1	51 14 08.4	231 12 34.2	Nomilo	3.968108	9,292.0	30,485.5
	159 27 42.504	1,219.7	92 19 38.0	272 17 47.6	Pohakea	3.928862	8,489.1	27,851.3
			204 57 12.9	24 57 49.8	Kilohana	3.826664	6,709.1	22,011.4
			235 35 00.3	55 36 16.8	Kauai north base	3.851930	7,111.0	23,330.0
			237 03 44.9	57 06 00.6	Kalepa	4.093290	12,396.2	40,669.9
			261 29 18.9	81 31 06.1	Kauai south base	3.920309	8,323.6	27,308.3
			278 01 51.0	98 03 36.1	Kai	3.911691	8,160.0	26,771.6
Paa, 1910	21 53 38.012	1,169.1	87 16 36.2	267 14 36.7	Nomilo	3.964388	9,212.7	30,225.3
	159 26 34.327	985.4	118 44 34.1	298 42 18.4	Pohakea	4.075742	11,905.3	39,059.3
			160 00 50.9	340 00 25.5	Laaukahi	3.757699	5,724.0	18,779.5
			235 18 41.0	55 20 00.6	Kai	3.871989	7,447.1	24,432.7
Kawelikoa, 1910–1927	21 54 25.884	796.1	73 51 54.6	253 50 48.4	Paa	3.723895	5,295.4	17,373.3
	159 23 37.122	1,065.5	119 01 56.5	299 00 24.8	Laaukahi	3.905978	8,053.4	26,421.9
			200 34 44.2	20 34 57.7	Kai	3.470291	2,953.2	9,689.0
Supplementary points, east coast								
Hokunui, 1910–1927	21 56 09.834	302.5	60 13 25.2	240 13 15.3	Kai	2.939962	870.9	2,857.3
	159 22 34.611	993.2	138 32 29.0	318 31 10.7	Kilohana	3.957343	9,064.5	29,739.1
			191 55 20.5	11 55 41.0	Kalepa	3.881414	7,610.5	24,968.8
Caddie, 1927	22 01 46.101	1,417.9	18 56 48.5	198 56 02.2	Hokunui	4.038801	10,934.6	35,874.6
	159 20 30.894	886.0	34 18 41.0	214 18 15.2	Kalepa	3.544844	3,506.3	11,503.6
			157 11 18.1	337 10 56.9	Nonou	3.621925	4,187.2	13,737.5
Polo, 1927	22 03 28.911	889.2	20 49 26.4	200 48 19.3	Hokunui	4.159795	14,447.6	47,400.2
	159 19 35.636	1,021.8	30 27 03.4	210 26 16.8	Kalepa	3.846789	7,027.3	23,055.4
			102 16 24.0	282 15 42.0	Nonou	3.516236	3,282.7	10,770.0

Kauai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, east coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Lia, 1927	22 05 36.055	1,108.9	57 45 35.1	237 44 28.3	Nonou	3.779702	6,021.5	19,755.5
	159 18 29.880	856.5	148 27 21.0	328 26 21.6	Puu Ehu	3.936772	8,645.1	28,363.1
			159 02 17.0	339 01 43.5	Kikoo	3.853399	7,135.1	23,409.1
			172 09 47.9	352 09 44.8	Kea	3.234304	1,715.2	5,627.3
Kea, 1927	22 06 31.298	962.6	24 04 39.8	204 03 31.5	Kalepa	4.106502	12,779.2	41,926.4
	159 18 38.038	1,090.2	44 41 34.8	224 40 31.1	Nonou	3.839413	6,909.0	22,667.3
			142 53 15.3	322 52 18.9	Puu Ehu	3.851764	7,108.3	23,321.1
			154 57 37.9	334 57 07.5	Kikoo	3.738671	5,478.6	17,974.4
Drift, 1927	22 07 44.436	1,366.7	41 20 58.4	221 19 33.7	Nonou	3.979481	9,538.5	31,294.2
	159 17 47.727	1,367.8	120 49 29.9	300 48 14.6	Puu Ehu	3.824334	6,673.2	21,893.6
Ana, 1927	22 07 59.708	1,836.4	32 09 27.7	212 08 24.7	Nonou	3.954894	9,013.5	29,571.8
	159 18 40.190	1,151.7	124 54 07.7	304 53 12.1	Puu Ehu	3.712185	5,154.5	16,911.1
			134 50 19.2	314 49 49.5	Kikoo	3.502854	3,183.1	10,443.2
Moloaa, 1910–1927	22 11 26.461	813.9	14 08 35.9	194 08 22.2	Kikoo	3.627725	4,243.5	13,922.2
	159 19 22.775	652.4	41 24 23.8	221 23 44.2	Puu Ehu	3.657702	4,546.8	14,917.3
			66 17 14.0	246 15 09.3	Pinnacle	4.014579	10,341.4	33,928.4
			117 11 23.3	297 09 41.4	Kilauea	3.938214	8,673.9	28,457.6
Papaa, 1927	22 10 27.639	850.1	39 11 27.8	219 11 03.0	Kikoo	3.473458	2,974.8	9,759.8
	159 18 53.358	1,528.7	67 25 21.6	247 24 30.9	Puu Ehu	3.620097	4,169.6	13,679.8
			155 01 30.7	335 01 19.6	Moloaa	3.300127	1,995.8	6,547.9
Pine, 1927	22 12 11.558	355.5	318 28 09.5	138 28 25.7	Moloaa	3.267844	1,852.9	6,079.1
	159 20 05.661	162.2	358 00 08.0	178 00 10.5	Kikoo	3.740786	5,505.4	18,062.3
			111 39 20.6	291 37 55.0	Kilauea	3.843849	6,979.9	22,899.9
Ruddy, 1927	22 13 02.604	80.1	343 27 37.8	163 28 05.4	Kikoo	3.867892	7,377.2	24,203.4
	159 21 12.257	351.1	102 22 35.5	282 21 35.0	Kilauea	3.671080	4,689.0	15,383.8
			107 58 04.6	287 57 20.9	Kilauea Landing, stack	3.541748	3,481.4	11,421.9
Pihakapu, 1910 [1]	21 54 35.15	1,081.1	120 09 02	300 07 41	Laaukahi	3.858143	7,213	23,665
	159 24 05.14	147.5	216 36 12	36 36 36	Kai	3.489846	3,089	10,134
Koa, 1910 [1]	21 54 24.57	755.7	74 26 59	254 25 52	Paa	3.727408	5,338	17,513
	159 23 35.16	1,009.2	125 43 45	305 43 44	Kawelikoa	1.840093	69	226
D, 1910 [1]	21 54 24.61	756.9	199 17 26	19 17 39	Kai	3.472814	2,970	9,744
	159 23 35.15	1,008.9	208 13 35	28 13 58	Hokunui	3.565071	3,673	12,051
C, 1910 [1]	21 55 11.17	343.6	30 14 16	210 14 05	Kawelikoa	3.207369	1,612	5,289
	159 23 08.84	253.7	189 22 11	9 22 14	Kai	3.143184	1,391	4,564
B, 1910 [1]	21 55 43.83	1,348.1	33 28 04	213 27 43	Kawelikoa	3.458459	2,874	9,429
	159 22 41.91	1,202.8	123 54 21	303 54 14	Kai	2.818534	658	2,159
A, 1910 [1]	21 55 49.73	1,529.5	105 34 08	285 33 59	Kai	2.840015	692	2,270
	159 22 37.73	1,082.8	188 13 55	8 13 50	Hokunui	2.795618	625	2,051
Point, 1910 [1]	21 56 07.6	233.8	81 57	261 57	Kai	3.41418	2,595	8,514
	159 21 31.4	901.1	92 11	272 11	Hokunui	3.25892	1,815	5,955
Kalanipuu, 1910 [2]	21 56 52.30	1,608.6	124 28 59	304 27 15	Kilohana	3.986466	9,693	31,801
	159 21 25.29	725.7	176 07 16	356 07 11	Kalepa	3.789171	6,154	20,190
Long gray shed, west gable, 1927 [1]	21 57 04.84	148.9	121 30 32	301 28 43	Kilohana	3.989576	9,762.8	32,030.1
	159 21 13.66	392.0	172 34 39	352 34 29	Kalepa	3.763651	5,803.0	19,038.7
Long gray shed, east gable, 1927 [1]	21 57 05.20	159.9	121 21 15	301 19 26	Kilohana	3.990568	9,785.2	32,103.6
	159 21 12.52	359.2	172 14 31	352 14 21	Kalepa	3.763169	5,796.5	19,017.4
Kukii Point Light, 1927	21 57 35.268	1,084.7	45 06 36.3	225 06 02.0	Hokunui	3.570878	3,722.9	12,214.2
	159 21 02.703	77.6	115 45 08.8	295 43 16.1	Kilohana	3.981832	9,590.3	31,464.2
			167 32 52.4	347 32 38.5	Kalepa	3.693267	4,934.8	16,190.3
Ninini Point Light (Nawiliwili Harbor), 1927	21 57 29.157	896.8	57 57 38.2	237 56 47.5	Hokunui	3.662563	4,597.9	15,084.9
	159 20 18.793	539.2	113 45 10.0	293 43 00.9	Kilohana	4.033958	10,813.3	35,476.6
			155 06 17.7	335 05 47.4	Kalepa	3.741910	5,519.6	18,108.9
Wireless pole, 1910	21 57 41.310	1,270.6	56 05 11.6	236 04 17.1	Hokunui	3.702571	5,041.6	16,540.6
	159 20 08.814	252.9	111 21 21.8	291 19 08.9	Kilohana	4.038794	10,934.4	35,873.9
			150 36 27.1	330 35 53.0	Kalepa	3.725705	5,317.5	17,445.8
Rez, 1927	21 57 56.364	1,733.6	51 10 32.1	231 09 39.1	Hokunui	3.718119	5,225.4	17,143.7
	159 20 12.752	365.9	109 15 36.1	289 13 24.7	Kilohana	4.028069	10,667.7	34,998.9
			149 05 18.5	329 04 45.9	Kalepa	3.686664	4,860.3	15,945.8
Derrick, 1927 [1]	21 58 37.60	1,156.5	42 03 35	222 02 42	Hokunui	3.786788	6,120.5	20,080.3
	159 20 11.73	336.5	138 57 37	318 57 04	Kalepa	3.585145	3,847.2	12,622.0
Flat, 1910 [1]	21 58 44.02	1,353.9	135 45 00	315 44 26	Kalepa	3.576951	3,775	12,385
	159 20 07.96	228.4	166 26 36	346 26 07	Nonou	3.988167	9,731	31,926
Mutual wireless pole, Lihue, 1927	21 58 27.929	859.0	12 58 47.5	192 58 34.8	Hokunui	3.639354	4,358.7	14,300.2
	159 22 00.497	14.3	110 02 31.3	290 01 00.2	Kilohana	3.870984	7,429.9	24,376.3
			190 30 49.9	10 30 57.7	Kalepa	3.512361	3,253.6	10,674.5

[1] No check on this position.

[2] Unadjusted, but checked by additional observations.

58955°—30——3

Kauai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, east coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Lihue mill chimney, 1910 [1]	21 58 40.23	1,237.4	9 52 29	189 52 17	Kai	3.710476	5,134	16,844
	159 22 30.27	868.4	207 10 10	27 10 29	Kalepa	3.501123	3,170	10,400
Lihue mill chimney, 1927	21 58 39.648	1,219.5	1 27 56.6	181 27 55.1	Hokunui	3.663632	4,609.3	15,122.3
	159 22 30.503	875.1	109 39 15.8	289 37 56.0	Kilohana	3.812768	6,497.8	21,318.2
			207 07 43.9	27 08 02.9	Kalepa	3.503719	3,189.5	10,464.2
Lihue County Building flagpole, 1927	21 58 41.435	1,274.4	7 49 03	187 48 55	Hokunui	3.672691	4,706.4	15,440.9
	159 22 12.303	353.0	107 47 18	287 45 51	Kilohana	3.843527	6,974.7	22,882.8
			198 31 07	18 31 19	Kalepa	3.467694	2,935.6	9,631.2
Hanamaulu mill chimney, 1927	21 59 56.584	1,740.4	14 56 51.1	194 56 26.8	Hokunui	3.858429	7,218.2	23,681.7
	159 21 29.733	852.9	88 41 18.0	268 39 35.3	Kilohana	3.895671	7,864.5	25,802.1
			148 33 25.3	328 33 21.5	Kalepa	2.743095	553.5	1,815.9
Hanamaulu, southeast gable of warehouse, 1910.	21 59 40.094	1,233.2	36 21 36.0	216 20 29.8	Kai	3.932801	8,566.5	28,105.3
	159 20 03.982	114.2	109 37 01.5	289 36 25.6	Kalepa	3.465047	2,917.7	9,572.5
			162 47 47.8	342 47 16.6	Nonou	3.908361	8,097.7	26,567.2
Ahukini Light, 1910	21 59 44.968	1,383.1	90 59 33.8	270 57 19.2	Kilohana	4.013258	10,310.0	33,825.4
	159 20 04.462	128.0	106 52 39.5	286 52 03.8	Kalepa	3.456017	2,857.7	9,375.6
			162 34 18.8	342 33 47.7	Nonou	3.900394	7,950.5	26,084.3
Ahukini Light, 1927	21 59 49.347	1,517.8	32 12 10.2	212 11 14.9	Hokunui	3.901907	7,978.2	26,175.1
	159 20 06.452	185.1	90 14 43.8	270 12 30.0	Kilohana	4.010784	10,251.4	33,633.1
			104 33 04.0	284 32 29.1	Kalepa	3.441892	2,766.3	9,075.8
Kin, 1910–1927	21 59 44.166	1,358.4	35 21 17.5	215 20 12.4	Kai	3.935107	8,612.1	28,254.9
	159 20 07.306	209.6	107 50 58.0	287 50 23.3	Kalepa	3.445170	2,787.2	9,144.3
			163 11 08.6	343 10 38.6	Nonou	3.900370	7,950.1	26,083.0
Maulu, 1927	21 59 54.312	1,670.5	29 06 32.7	209 05 42.7	Hokunui	3.897724	7,901.8	25,924.5
	159 20 20.661	592.6	89 21 55.3	269 19 46.8	Kilohana	3.993188	9,844.4	32,297.8
			103 26 05.0	283 25 35.4	Kalepa	3.368069	2,333.8	7,656.8
Han, 1910 [1]	22 00 07.03	216.2	93 16 16	273 15 41	Kalepa	3.423035	2,649	8,691
	159 20 07.61	218.3	161 38 57	341 38 27	Nonou	3.861954	7,277	23,875
Fen, 1910 [1]	22 00 52.65	1,619.4	60 30 36	240 30 07	Kalepa	3.405413	2,543	8,343
	159 20 22.62	648.8	161 19 14	341 18 50	Nonou	3.764164	5,810	19,062
Wai, 1910 [1]	22 01 17.00	522.9	45 17 47	225 17 20	Kalepa	3.454047	2,845	9,334
	159 20 29.31	840.6	160 39 34	340 39 12	Nonou	3.702352	5,039	16,532
Dun, 1910 [1]	22 01 39.48	1,214.3	35 17 50	215 17 25	Kalepa	3.518399	3,299	10,823
	159 20 33.34	956.2	159 04 45	339 04 25	Nonou	3.638489	4,350	14,272
Rain, 1910 [1]	22 02 02.92	89.8	31 40 20	211 39 52	Kalepa	3.603234	4,011	13,159
	159 20 26.38	756.5	152 19 35	332 19 12	Nonou	3.576812	3,774	12,382
Din, 1910	22 02 24.660	758.5	29 19 57.9	209 19 27.9	Kalepa	3.670464	4,682.4	15,362.2
	159 20 19.830	568.6	144 01 43.0	324 01 17.7	Nonou	3.519017	3,303.8	10,839.2
			174 05 17.3	354 04 59.4	Puu Ehu	4.124660	13,324.8	43,716.4
Aahoaka, 1927 [1]	22 02 39.94	1,228.4	223 40 39	43 41 06	Nonou	3.483902	3,047.2	9,997.4
	159 22 40.91	1,173.1	338 56 20	158 56 43	Kalepa	3.688235	4,877.9	16,003.6
Ren, 1910 [1]	22 02 48.08	1,478.8	134 21 43	314 21 17	Nonou	3.446226	2,794	9,167
	159 20 17.84	511.6	182 37 07	2 37 14	Kikoo	4.073408	11,842	38,852
Har, 1910 [1]	22 03 15.26	469.4	115 51 31	295 51 01	Nonou	3.408620	2,562	8,405
	159 20 07.10	203.6	181 12 52	1 12 55	Kikoo	4.041218	10,996	36,076
Race, 1910	22 03 22.631	696.1	28 26 33.3	208 25 51.7	Kalepa	3.824126	6,670.0	21,883.2
	159 19 49.047	1,406.3	107 30 50.8	287 30 13.9	Nonou	3.471357	2,960.4	9,712.6
			178 29 17.7	358 29 14.0	Kikoo	4.032222	10,770.2	35,335.2
Waipouli flagstaff, 1910	22 03 29.541	908.6	30 05 14.5	210 04 28.4	Kalepa	3.846568	7,023.7	23,043.6
	159 19 37.042	1,062.1	102 05 22.6	282 04 41.2	Nonou	3.510447	3,239.3	10,627.6
			176 35 38.2	356 35 30.0	Kikoo	4.024180	10,572.6	34,686.9
Waipouli windmill, 1910	22 03 34.674	1,066.5	28 52 08.2	208 51 23.2	Kalepa	3.852486	7,120.1	23,359.9
	159 19 39.953	1,145.5	99 34 50.7	279 34 10.4	Nonou	3.495209	3,127.6	10,261.1
			177 00 02.3	356 59 55.2	Kikoo	4.017462	10,410.3	34,154.5
Ol, 1910 [2]	22 03 40.64	1,250.0	31 25 54	211 25 02	Kalepa	3.876356	7,522	24,678
	159 19 23.04	660.6	95 23 52	275 23 05	Nonou	3.554464	3,585	11,762
Hen, 1910 [2]	22 04 04.10	126.1	30 10 08	210 09 14	Kalepa	3.916928	8,259	27,096
	159 19 15.10	432.9	84 13 01	264 12 12	Nonou	3.581612	3,816	12,520
Kap, 1910 [2]	22 04 33.22	1,021.7	27 38 17	207 37 22	Kalepa	3.957646	9,071	29,760
	159 19 13.10	375.6	71 37 36	251 36 46	Nonou	3.608615	4,061	13,323
Kapaa west tin stack, 1927	22 04 35.106	1,079.8	26 43 36.3	206 42 43.0	Kalepa	3.957223	9,062.0	29,730.9
	159 19 17.715	507.9	70 13 29.5	250 12 40.8	Nonou	3.597122	3,954.8	12,975.0
			172 07 04.7	352 06 49.4	Kikoo	3.935445	8,618.8	28,276.8

[1] No check on this position.

[2] Unadjusted, but checked by additional observations.

Kauai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, east coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Kapaa Church spire, 1910	22 04 40.889	1,257.6	26 00 13.3	205 59 20.5	Kalepa	3.963948	9,203.4	30,194.8
	159 19 19.126	548.3	67 37 05.0	247 36 16.8	Nonou	3.599993	3,981.0	13,061.0
			161 03 08.9	341 02 28.1	Puu Ehu	3.981521	9,583.4	31,441.5
Kapaa derrick, 1910 (Kapaa landing derrick, 1927).	22 04 49.227	1,514.1	27 40 56.4	207 39 57.8	Kalepa	3.983642	9,630.4	31,595.7
	159 19 03.823	109.6	66 43 26.3	246 42 32.3	Nonou	3.651749	4,484.9	14,714.2
			158 02 48.7	338 02 02.1	Puu Ehu	3.977557	9,496.4	31,156.1
Kapaa, gray chimney, 1927 (Stack, 1910)	22 05 05.333	164.0	20 42 43.4	200 41 22.0	Hokunui	4.245685	17,607.0	57,765.6
	159 18 57.618	1,651.8	27 16 23.3	207 15 22.4	Kalepa	4.006548	10,151.9	33,306.7
			62 10 59.0	242 10 02.7	Nonou	3.686571	4,859.3	15,942.6
Gas, 1910	22 05 35.907	1,104.4	28 43 05.2	208 41 53.7	Kalepa	4.055413	11,360.9	37,273.2
	159 18 29.485	845.2	57 51 14.3	237 50 07.4	Nonou	3.780216	6,028.6	19,778.8
			161 32 02.4	341 31 54.2	Kealia	3.298603	1,988.9	6,525.2
Tank post, 1910	22 05 33.361	1,026.1	24 58 44.5	204 57 44.2	Kalepa	4.037646	10,905.5	35,779.1
	159 18 59.246	1,698.3	53 38 21.7	233 37 26.0	Nonou	3.722539	5,278.8	17,318.9
			153 42 18.7	333 41 30.4	Puu Ehu	3.919614	8,310.2	27,264.4
Kealia Catholic Church spire, 1910	22 05 40.387	1,242.2	55 31 25.1	235 30 21.2	Nonou	3.771605	5,910.2	19,390.4
	159 18 37.584	1,077.3	106 12 11.6	286 10 15.2	Pohakupili	3.965468	9,235.7	30,300.8
			167 11 00.8	347 10 55.6	Kealia	3.253654	1,793.3	5,883.5
Kealia gray chimney, 1927 (Masonry chimney, 1910).	22 06 08.253	253.8	25 36 33.2	205 35 24.2	Kalepa	4.084656	12,152.2	39,869.3
	159 18 36.679	1,051.4	49 22 11.4	229 21 07.1	Nonou	3.809828	6,454.0	21,174.5
			145 50 14.6	325 49 17.8	Puu Ehu	3.886899	7,707.2	25,286.0
Kealia black chimney, 1927 (Steel stack, 1910).	22 06 07.889	242.6	25 33 13.1	205 32 04.4	Kalepa	4.084010	12,134.2	39,810.3
	159 18 37.321	1,069.8	49 20 19.6	229 19 15.6	Nonou	3.808393	6,432.7	21,104.6
			145 59 50.8	325 58 54.2	Puu Ehu	3.886840	7,706.2	25,282.8
Kealia Church spire, 1927	22 05 40.788	1,254.5	149 13 15.7	329 12 19.2	Puu Ehu	3.924595	8,406.1	27,579.0
	159 18 37.597	1,077.7	179 31 58.5	359 31 58.4	Kea	3.191350	1,553.6	5,097.1
			303 20 39.0	123 20 42.2	Lia	2.422939	264.8	868.8
Vane, 1910[1]	22 06 09.04	278.0	52 11 38	232 10 27	Nonou	3.838542	6,895	22,621
	159 18 17.51	501.9	100 10 56	280 08 52	Pohakupili	3.982060	9,595	31,480
Pal, 1910[1]	22 06 26.07	801.8	28 30 32	208 29 10	Kalepa	4.117070	13,094	42,959
	159 18 01.92	55.0	51 08 09	231 06 52	Nonou	3.879136	7,571	24,839
Lik, 1910	22 06 42.653	1,311.9	48 59 10.3	228 57 50.9	Nonou	3.903948	8,015.8	26,298.5
	159 17 56.562	1,621.2	93 46 30.3	273 44 18.4	Pohakupili	4.002872	10,066.3	33,025.9
			134 09 46.9	314 08 34.9	Puu Ehu	3.882836	7,635.5	25,050.8
Spald, 1910[1]	22 07 23.79	731.7	86 37 36	266 35 22	Pohakupili	4.010243	10,239	33,592
	159 17 50.41	1,444.7	125 38 42	305 37 28	Puu Ehu	3.842435	6,957	22,825
Kahala Light mast, 1910	22 08 59.660	1,835.0	32 55 11.4	212 53 50.8	Nonou	4.052561	11,286.5	37,029.1
	159 17 53.580	1,535.3	70 40 52.7	250 38 39.6	Pohakupili	4.030779	10,734.4	35,217.8
			101 14 30.0	281 13 16.8	Puu Ehu	3.753710	5,671.7	18,607.9
Kahala Light, 1927	22 08 59.692	1,835.9	96 20 44.0	276 19 56.7	Kikoo	3.558311	3,616.7	11,865.8
	159 17 53.514	1,533.4	147 38 02.0	327 37 39.5	Papaa	3.505514	3,202.7	10,507.5
			150 28 22.4	330 27 48.8	Moloaa	3.715024	5,188.3	17,021.9
Anahola derrick mast, 1910[1]	22 09 02.63	80.9	68 50 36	248 48 33	Pohakupili	4.004030	10,093	33,113
	159 18 18.60	533.0	96 08 24	276 07 46	Kikoo	3.461250	2,892	9,488
Pinnacle Peak (Nye), 1927	22 09 05.734	176.4	16 19 24.6	196 18 47.5	Nonou	4.002935	10,067.8	33,030.8
	159 19 48.821	1,398.9	126 18 29.0	306 18 25.2	Kikoo	2.557022	360.6	1,183.1
			189 46 48.7	9 46 58.5	Moloaa	3.642690	4,392.3	14,410.4
Puu Eu, 1910[1]	22 08 02.46	75.7	173 57 54	353 57 51	Pinnacle	3.327316	2,125	6,972
	159 24 45.42	1,301.6	207 30 10	27 30 53	Kamoku	3.846914	7,029	23,061
Prominent Peak (Prom), 1927	22 09 46.867	1,441.5	00 15 33.7	180 15 33.6	Kikoo	3.021883	1,051.7	3,450.5
	159 19 58.797	1,684.7	80 01 54.4	260 01 28.4	Puu Ehu	3.302199	2,005.4	6,579.4
			198 36 57.7	18 37 11.3	Moloaa	3.509525	3,232.4	10,605.0
Wal, 1910[1]	22 09 40.62	1,249.3	70 41 30	250 40 58	Kikoo	3.414719	2,598	8,524
	159 18 33.38	956.4	156 30 28	336 30 09	Moloaa	3.550208	3,550	11,647
Eat, 1910[1]	22 10 02.52	77.5	78 16 59	258 16 07	Puu Ehu	3.610545	4,079	13,383
	159 18 48.34	1,385.0	159 05 15	339 05 02	Moloaa	3.441502	2,764	9,068
Pap, 1910[1]	22 10 27.96	860.0	39 13 56	219 13 31	Kikoo	3.475576	2,989	9,806
	159 18 52.98	1,517.8	67 21 16	247 20 25	Puu Ehu	3.621534	4,183	13,724
Dan, 1910[2]	22 10 54.22	1,667.7	57 37 12	237 36 22	Puu Ehu	3.654764	4,516	14,816
	159 18 54.62	1,564.7	140 52 30	320 52 19	Moloaa	3.106584	1,278	4,193
Mol, 1910[1]	22 11 46.01	1,415.2	83 04 02	263 02 53	Kamoku	3.724821	5,307	17,411
	159 19 48.21	1,381.0	115 41 39	295 40 07	Kilauea	3.889512	7,754	25,440
Lom, 1910[2]	22 12 07.87	242.1	74 16 17	254 15 16	Kamoku	3.685148	4,843	15,889
	159 20 09.36	268.1	112 51 07	292 49 43	Kilauea	3.840414	6,925	22,720

[1] No check on this position.

[2] Unadjusted, but checked by additional observations.

Kauai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, east coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Church spire, 1927	22 11 52.424	1,612.5	285 40 22.7	105 41 00.2	Moloaa	3.470590	2,955.2	9,695.5
	159 21 02.104	60.3	339 47 07.5	159 47 31.3	Kikoo	3.718992	5,235.9	17,178.1
			75 06 02.9	255 05 21.4	Kamoku	3.513305	3,260.7	10,697.8
Tan, 1910 [1]	22 12 42.49	1,306.9	53 32 00	233 31 18	Kamoku	3.602206	4,001	13,127
	159 20 59.77	1,711.9	108 12 17	288 11 12	Kilauea	3.715819	5,198	17,054
Red, 1910 [1]	22 13 02.81	86.4	40 19 32	220 18 12	Pinnacle	3.970544	9,344	30,656
	159 21 22.18	635.3	103 05 20	283 04 23	Kilauea	3.644475	4,410	14,468
Supplementary points, north coast								
Kilauea landing stack, 1910–1927	22 13 37.511	1,153.8	20 13 25.5	200 12 45.7	Pinnacle	3.941034	8,730.4	28,643.0
	159 23 07.890	226.0	86 52 38.9	266 52 22.1	Kilauea	3.103917	1,270.3	4,167.6
			335 10 14.9	155 11 00.2	Puu Ehu	3.913751	8,198.8	26,898.9
Crest, 1927	22 13 29.421	904.9	267 39 07.8	87 40 05.8	Kilauea	3.643218	4,397.6	14,427.8
	159 26 25.608	733.4	301 59 39.8	122 01 00.5	Kamoku	3.858024	7,211.5	23,659.7
			52 28 41.2	232 27 43.7	Roan	3.740183	5,497.7	18,037.0
			57 40 07.5	237 39 30.6	Pooku (Hanalei latitude station)	3.519776	3,309.6	10,858.2
Roan, 1927	22 11 40.535	1,246.8	114 44 43.2	294 43 42.8	Hinihini	3.702454	5,040.3	16,536.4
	159 28 57.827	1,656.5	172 57 52.4	352 57 45.6	Hanalei	3.623830	4,205.6	13,797.9
			224 43 03.8	44 43 24.3	Pooku (Hanalei latitude station)	3.346735	2,222.0	7,290.0
			248 01 51.6	68 03 47.0	Kilauea	3.974912	9,438.7	30,966.8
			272 33 57.8	92 36 15.9	Kamoku	4.020653	10,487.0	34,406.1
Eeyrie, 1910	22 10 32.800	1,008.9	209 02 48.6	29 03 15.4	Pooku (Hanalei latitude station)	3.622137	4,189.3	13,744.4
	159 29 14.259	408.5	238 40 12.9	58 42 14.6	Kilauea	4.033357	10,798.3	35,427.4
			288 32 46.8	108 34 25.3	Pinnacle	3.897047	7,889.5	25,884.1
Cam, 1927	22 13 32.887	1,011.5	300 10 22.6	120 11 05.2	Pooku (Hanalei latitude station)	3.572123	3,733.6	12,249.3
	159 29 55.934	1,601.9	334 16 51.5	154 17 13.5	Roan	3.583829	3,835.6	12,584.0
			65 11 49.1	245 11 10.6	Hinihini	3.506404	3,209.3	10,529.2
Hinihini, 1910–1927	22 12 49.107	1,510.4	69 31 11.0	249 27 16.6	Lolo	4.278603	18,993.4	62,314.2
	159 31 37.645	1,078.2	243 02 49.4	63 03 43.1	Hanalei	3.658649	4,556.7	14,949.8
			301 27 19.9	121 28 20.6	Hihimanu	3.732194	5,397.5	17,708.3
Niha 2, 1927	22 13 34.141	1,060.1	263 49 47.5	83 51 10.7	Hanalei	3.801789	6,335.6	20,786.0
	159 32 55.767	1,597.1	270 25 11.2	90 26 19.2	Cam	3.711840	5,150.4	16,897.6
			301 45 25.7	121 45 55.2	Hinihini	3.420193	2,631.4	8,633.2
Makana, 1910 [2]	22 13 17.44	536.4	263 02 34	83 04 43	Hanalei	3.994595	9,876	32,402
	159 34 58.12	1,664.6	278 37 12	98 38 28	Hinihini	3.764044	5,808	19,055
Log, 1910 [2]	22 13 06.58	202.4	2 47 20	182 47 18	Kamoku	3.494618	3,123	10,246
	159 22 46.80	1,340.4	115 13 30	295 13 05	Kilauea	3.315939	2,070	6,791
Kilauea Light, 1927	22 14 05.361	164.9	290 01 11.4	110 02 21.1	Ruddy	3.750943	5,635.6	18,489.5
	159 24 17.137	490.8	61 01 26.8	240 59 40.7	Roan	3.963355	9,190.8	30,153.5
			73 17 00.0	253 16 11.3	Crest	3.584508	3,841.6	12,603.6
			88 08 13.4	268 06 20.4	Hanalei	3.932366	8,557.9	28,077.0
Kil, 1910 [1]	22 14 05.83	179.3	6 18 37	186 18 24	Pinnacle	3.959942	9,119	29,918
	159 24 18.24	522.3	65 51 18	245 49 53	Pooku (Hanalei latitude station)	3.848963	7,063	23,173
Cane, 1910 [2]	22 13 41.51	1,276.8	70 40 08	250 38 47	Pooku (Hanalei latitude station)	3.810760	6,468	21,220
	159 24 30.16	863.7	280 01 54	100 02 08	Kilauea	3.043188	1,105	3,625
Wait, 1910 [1]	22 13 36.06	1,109.1	70 58 39	250 57 23	Pooku (Hanalei latitude station)	3.782056	6,054	19,862
	159 24 43.41	1,243.2	270 57 24	90 57 43	Kilauea	3.166562	1,467	4,813
Kilauea mill chimney, 1927	22 12 49.236	1,514.4	222 26 05.6	42 26 22.7	Kilauea	3.282859	1,918.0	6,292.6
	159 24 37.372	1,070.4	310 36 46.2	130 37 26.0	Kamoku	3.599050	3,972.4	13,032.8
			74 11 57.6	254 10 19.2	Roan	3.889512	7,753.8	25,438.9
			111 44 39.5	291 43 58.6	Crest	3.523384	3,337.2	10,948.8
Cut, 1910	22 13 23.288	716.3	68 54 42.6	248 53 48.5	Pooku (Hanalei latitude station)	3.642887	4,394.3	14,417.0
	159 25 40.100	1,148.5	263 12 02.6	83 12 43.4	Kilauea	3.493113	3,112.5	10,211.6
			311 53 58.0	131 55 40.9	Puu Ehu	4.020555	10,484.7	34,398.6
Honono, 1927	22 13 39.138	1,203.8	271 05 55.9	91 07 17.2	Kilauea	3.789528	6,159.3	20,207.6
	159 27 27.210	779.2	297 35 40.5	117 37 24.5	Kamoku	3.949010	8,892.2	29,173.8
			35 26 10.2	215 25 36.0	Roan	3.650991	4,477.0	14,688.3
Cres, 1910 [2]	22 13 43.62	1,341.7	272 23 55	92 25 16	Kilauea	3.786542	6,117	20,069
	159 27 25.59	732.8	332 28 48	152 29 46	Pinnacle	3.975384	9,449	31,001
Lan, 1910 [1]	22 13 57.59	1,771.4	274 38 17	94 40 08	Kilauea	3.927762	8,468	27,782
	159 28 46.88	1,342.5	322 45 44	142 47 12	Pinnacle	4.043930	11,064	36,299
Mc., 1910–1927	22 13 06.443	198.2	79 31 01.3	259 30 23.3	Hinihini	3.466741	2,929.1	9,609.9
	159 29 57.083	1,634.9	182 19 13.3	2 19 13.8	Cam	2.910634	814.0	2,670.6
			327 16 56.1	147 17 18.5	Roan	3.496997	3,140.5	10,303.5
Derrick (Der), 1927 [1]	22 12 56.53	1,738.7	321 11 14	141 11 39	Roan	3.477068	2,999.6	9,841.2
	159 30 03.46	99.1	85 10 02	265 09 27	Hinihini	3.432527	2,707.2	8,881.9

[1] No check on this position.

[2] Unadjusted, but checked by additional observations.

Kauai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, north coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Ware, 1910 [1]	22 12 58.83	1,809.5	84 07 32	264 06 54	Hinihini	3.465303	2,919	9,577
	159 29 56.25	1,611.1	331 23 28	151 23 51	Hihimanu	3.550187	3,550	11,647
Staff, 1927 [1]	22 12 46.50	1,430.2	320 52 44	140 53 06	Roan	3.417480	2,615.0	8,579.4
	159 29 55.43	1,587.7	91 34 30	271 33 52	Hinihini	3.466689	2,928.8	9,608.9
Dev, 1910 [1]	22 12 38.90	1,196.5	96 22 18	276 21 41	Hinihini	3.451797	2,830	9,285
	159 29 59.45	1,702.8	324 24 55	144 25 19	Hihimanu	3.488299	3,078	10,098
Black flagpole, 1927 [1]	22 12 27.45	844.3	305 02 56	125 03 23	Roan	3.400120	2,512.6	8,243.4
	159 30 09.63	275.8	104 48 19	284 47 46	Hinihini	3.416198	2,607.3	8,554.1
Jap school flagstaff, 1910 [1]	22 12 23.75	730.5	107 31 22	287 30 49	Hinihini	3.413501	2,591	8,501
	159 30 11.37	325.7	313 41 06	133 41 34	Hihimanu	3.469746	2,949	9,675
Bridge, 1910 [1]	22 12 37.41	1,150.7	114 30 34	294 30 24	Hinihini	2.938018	867	2,844
	159 31 10.10	289.3	302 46 58	122 47 49	Hihimanu	3.656874	4,538	14,888
Wes, 1927	22 13 01.083	33.3	60 43 57.5	240 43 48.8	Hinihini	2.877027	753.4	2,471.8
	159 31 14.699	421.0	246 33 10.1	66 33 39.9	Cam	3.390729	2,458.8	8,066.9
			302 16 58.6	122 17 50.3	Roan	3.666298	4,637.6	15,215.2
West, 1910 [1]	22 13 01.03	31.7	308 53 16	128 54 08	Hihimanu	3.705079	5,071	16,637
	159 31 14.70	421.0	60 50 38	240 50 29	Hinihini	2.876526	753	2,470
East, 1927 [1]	22 13 11.52	354.3	260 13 05	80 13 55	Cam	3.587805	3,870.8	12,699.4
	159 32 09.13	261.5	307 23 54	127 24 06	Hinihini	3.054991	1,135.0	3,723.7
Niha, 1910 [1]	22 13 32.05	985.8	263 12 52	83 14 15	Hanalei	3.799777	6,306	20,689
	159 32 54.48	1,560.3	300 58 16	120 58 45	Hinihini	3.409368	2,567	8,422
Tit, 1927 [1]	22 13 07.16	220.2	260 13 06	80 15 02	Hanalei	3.949380	8,899.8	29,198.8
	159 34 22.07	632.1	276 42 58	96 44 00	Hinihini	3.675948	4,741.9	15,557.4
Flat, 1927 [1]	22 13 17.42	535.8	263 02 26	83 04 35	Hanalei	3.994765	9,880.2	32,415.3
	159 34 58.28	1,669.1	278 36 22	98 37 38	Hinihini	3.764314	5,811.8	19,067.5
Haena, 1910 [1]	22 13 35.42	1,089.4	266 15 47	86 17 57	Hanalei	3.994451	9,873	32,392
	159 34 59.84	1,713.8	283 48 32	103 49 48	Hinihini	3.775497	5,963	19,564
Kailiu, 1927	22 13 35.379	1,088.2	283 46 21.5	103 47 38.0	Hinihini	3.776238	5,973.6	19,598.4
	159 35 00.216	6.2	56 02 19.8	235 59 41.8	Lolo 2	4.159994	14,454.2	47,421.8
Supplementary points, west coast								
Lolo 2, 1927	22 09 12.708	390.9						
	159 41 58.615	1,679.5						
Maka, 1927	22 08 30.495	938.0	18 02 06.6	198 01 39.5	Cavern	3.824151	6,670.4	21,884.5
	159 44 00.901	25.8	23 17 43.2	203 17 11.0	Kalolo	3.792721	6,204.7	20,356.6
			32 52 13.8	212 51 03.7	Nohili 2	3.993500	9,851.4	32,320.8
Makaha 2, 1927	22 07 30.841	948.6	287 02 16.3	107 02 58.5	Hale	3.526499	3,361.2	11,027.5
	159 42 13.740	393.8	42 23 33.8	222 21 38.3	Mana 2	4.116168	13,066.8	42,870.0
			52 35 42.8	232 33 52.3	Nohili 2	4.025250	10,598.6	34,772.2
Kalolo, 1927	22 05 25.203	775.2	328 52 20.6	148 52 25.7	Cavern	2.876197	752.0	2,467.2
	159 45 26.500	759.6	29 33 14.9	209 32 31.9	Mana 2	3.823078	6,653.9	21,830.3
			48 18 57.1	228 18 19.2	Nohili 2	3.588072	3,873.2	12,707.3
Cavern, 1927	22 05 04.275	131.5	35 30 37.4	215 29 49.3	Mana 2	3.800705	6,319.8	20,734.2
	159 45 12.940	371.0	59 30 40.8	239 29 57.8	Nohili 2	3.580686	3,807.9	12,493.1
Nohili 2, 1927	22 04 01.449	44.6	244 51 12.0	64 53 44.6	Hale	4.108823	12,847.6	42,150.8
	159 47 07.390	211.9	2 23 39.7	182 23 36.8	Coral	3.731242	5,385.7	17,669.6
			6 54 04.6	186 53 59.5	Mana 2	3.509998	3,235.9	10,616.4
Mana 2, 1927	22 02 17.002	522.9	234 11 13.4	54 13 51.0	Hale	4.170869	14,820.7	48,624.2
	159 47 20.949	600.8	268 47 07.0	88 48 54.4	Opae	3.914493	8,212.8	26,944.8
			355 40 42.1	175 40 44.3	Coral	3.337403	2,174.7	7,134.8
Coral, 1927	22 01 06.496	199.8	253 46 10.1	73 47 55.3	Opae	3.923304	8,381.2	27,497.3
	159 47 15.234	436.9	323 42 36.9	143 43 15.5	Kokole	3.698972	5,000.0	16,404.2
Thorn, 1927	22 00 16.194	498.1	239 19 04.0	59 20 29.7	Opae	3.882035	7,621.4	25,004.5
	159 46 23.183	665.0	329 26 31.9	149 26 51.0	Kokole	3.459957	2,883.7	9,460.9
Kala, 1927	22 10 54.568	1,678.4	307 26 50.3	127 27 35.5	Pihea	3.635606	4,321.2	14,177.1
	159 39 12.564	359.9	56 38 34.2	236 37 31.5	Lolo 2	3.755601	5,696.4	18,688.9
Milo, 1910	22 08 17.740	545.6	260 52 37.1	80 54 19.1	Awaa	3.895379	7,859.2	25,784.7
	159 43 53.284	1,526.9	296 48 35.8	116 49 13.3	Makaha	3.504658	3,196.4	10,486.9
			35 11 37.8	215 10 25.0	Nohili	3.983905	9,636.2	31,614.8
Toe, 1910 [1]	22 05 26.36	810.8	29 35 53	209 35 10	Mana	3.826104	6,700	21,982
	159 45 25.67	735.9	48 07 25	228 06 47	Nohili	3.591212	3,901	12,799
Hon, 1910 [1]	22 05 03.40	104.6	27 06 48	207 06 14	Mana	3.759846	5,752	18,871
	159 45 49.66	1,423.7	49 25 52	229 25 23	Nohili	3.465212	2,919	9,577
Mos, 1910 [1]	22 04 42.77	1,315.5	22 38 44	202 38 20	Mana	3.686665	4,860	15,945
	159 46 15.82	453.5	49 15 36	229 15 17	Nohili	3.286976	1,936	6,452

[1] No check on this position.

Kauai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance: Log (meters)	Distance: Meters	Distance: Feet
Supplementary points, west coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Nohili, 1910	22 04 01.678	51.6	232 33 17.3	52 35 07.5	Makaha	4.024715	10,585.6	34,729.6
	159 47 06.990	200.4	244 51 36.9	64 54 09.3	Hale	4.108373	12,834.3	42,107.2
			254 46 08.0	74 48 27.8	Lua	4.043203	11,045.9	36,239.8
			291 18 07.6	111 19 49.9	Opae	3.923427	8,383.5	27,504.9
			343 52 29.8	163 53 05.4	Kokole	3.991404	9,804.0	32,165.3
			7 08 46.9	187 08 41.6	Mana	3.511507	3,247.2	10,653.5
Nan, 1910 [2]	22 03 04.02	123.6	182 31 03	2 31 04	Nohili	3.249252	1,775	5,823
	159 47 09.71	278.4	279 09 37	99 11 21	Opae	3.902581	7,991	26,217
Bull, 1910 [2]	22 02 43.48	1,337.3	186 44 32	6 44 36	Nohili	3.384140	2,422	7,946
	159 47 16.91	484.9	274 31 24	94 33 11	Opae	3.909579	8,120	26,640
Post 2, 1910 [1]	22 01 22.99	707.1	178 17 54	358 17 54	Mana	3.219962	1,659	5,443
	159 47 19.35	555.0	257 19 58	77 21 45	Opae	3.922679	8,369	27,457
Northwest gable, north house, 1910	22 00 56.018	1,722.9	170 10 28.0	350 10 22.3	Mana	3.402342	2,525.5	8,285.7
	159 47 06.049	173.5	179 43 44.8	359 43 44.4	Nohili	3.756670	5,710.4	18,734.9
			251 06 05.1	71 07 46.9	Opae	3.915253	8,227.2	26,992.1
Southwest gable, south house, 1910 [2]	22 00 54.70	1,682.4	169 44 17	349 44 11	Mana	3.409963	2,570	8,432
	159 47 05.11	146.6	323 57 15	143 57 50	Kokole	3.656639	4,536	14,882
Windmill, 1910	22 00 50.903	1,565.6	176 06 06.8	356 06 01.5	Nohili	3.769474	5,881.3	19,295.6
	159 46 53.046	1,521.4	249 09 15.7	69 10 52.6	Opae	3.899270	7,929.9	26,016.7
			326 48 25.9	146 48 56.2	Kokole	3.627670	4,243.0	13,920.6
Aug, 1910 [2]	22 00 29.62	911.0	170 57 28	350 57 14	Nohili	3.819835	6,604	21,667
	159 46 30.79	883.1	242 49 47	62 51 16	Opae	3.881533	7,613	24,977
Ric, 1910 [2]	22 00 09.58	294.7	169 21 06	349 20 48	Nohili	3.861169	7,264	23,832
	159 46 20.18	578.8	237 40 42	57 42 07	Opae	3.883900	7,654	25,111
Ken, 1910 [2]	21 59 40.46	1,244.4	168 09 13	348 08 51	Nohili	3.914306	8,209	26,932
	159 46 08.21	235.5	230 50 37	50 51 58	Opae	3.897589	7,899	25,915
Rope, 1910 [2]	21 59 10.66	327.9	166 25 52	346 25 24	Nohili	3.964170	9,208	30,210
	159 45 51.64	1,481.4	223 44 19	43 45 34	Opae	3.912337	8,172	26,811
Supplementary points, south coast								
Kekaha mill chimney, 1910–1927	21 58 15.799	485.7	104 32 22.3	284 31 20.9	Kokole	3.686813	4,862.0	15,951.4
	159 42 48.027	1,377.9	120 58 27.6	300 57 07.1	Thorn	3.857203	7,197.9	23,615.1
			182 54 01.5	2 54 06.5	Opae	3.880848	7,600.6	24,936.3
			324 15 44.6	144 15 52.2	Oomano	2.998441	996.4	3,269.0
Waimea mill chimney, 1910 [1]	21 57 35.20	1,082.6	228 07 05	48 07 16	Ahu	3.061652	1,153	3,783
	159 40 30.19	866.2	274 50 46	94 52 41	Lani	3.948234	8,876	29,121
Waimea mill chimney, 1926 [1]	21 57 34.88	1,072.8	274 46 57	94 48 52	Lani	3.948204	8,876	29,121
	159 40 30.20	866.5	294 48 09	114 49 29	Papai	3.831044	6,777	22,234
			314 52 01	134 52 58	Makaweli mill chimney	3.790187	6,169	20,239
			107 38 56	287 38 05	Kekaha mill chimney	3.618073	4,150	13,615
Ahu, 1910	21 58 00.217	6.7	280 46 25.9	100 48 10.0	Lani	3.910077	8,129.7	26,672.2
	159 40 00.280	8.2	304 23 06.9	124 24 15.8	Papai	3.807150	6,414.3	21,044.2
Wharf, 1926	21 57 24.52	754.2	313 52 00	133 52 55	Makaweli mill chimney	3.764918	5,820	19,094
	159 40 24.07	690.6	110 53 42	290 52 48	Kekaha mill chimney	3.645584	4,422	14,508
			151 05 22	331 05 20	Waimea mill chimney (1926)	2.561144	364	1,194
Cane, 1926	21 57 56.58	1,740.2	324 30 10	144 30 56	Makaweli mill chimney	3.789956	6,165	20,226
	159 40 02.61	74.9	31 58 52	211 58 44	Wharf	3.065440	1,163	3,816
			49 52 02	229 51 51	Waimea mill chimney (1926)	3.015181	1,036	3,399
			97 06 51	277 04 49	Kekaha mill chimney	3.679721	4,783	15,692
Flood, 1926	21 58 20.54	631.7	310 46 58	130 47 09	Cane	3.052343	1,128	3,701
	159 40 32.38	929.0	322 23 23	142 24 21	Makaweli mill chimney	3.861305	7,266	23,839
			352 07 15	172 07 18	Wharf	3.240420	1,739	5,705
			357 27 12	177 27 12	Waimea mill chimney (1926)	3.147918	1,406	4,613
			87 51 01	267 50 10	Kekaha mill chimney	3.590525	3,895	12,779
Point, 1926	21 57 56.57	1,739.9	325 18 45	145 19 30	Makaweli mill chimney	3.785602	6,104	20,026
	159 39 58.90	1,689.9	53 23 52	233 23 40	Waimea mill chimney (1926)	3.048696	1,119	3,671
			90 15 42	270 15 41	Cane	2.026527	106	348
Wahiawa, 1904–1910	21 54 51.246	1,576.2	104 12 25.7	284 10 33.1	Papai	3.950728	8,927.5	29,289.6
	159 31 54.256	1,557.2	125 45 26.7	305 44 09.2	Lani	3.865930	7,344.0	24,094.4
Makaweli mill chimney, 1910–1926	21 55 13.372	411.3	139 00 36.9	318 59 47.0	Waimea latitude station	3.765541	5,828.3	19,121.7
	159 37 57.872	1,660.9	231 05 46.5	51 06 44.7	Lani	3.759597	5,749.1	18,861.8
			315 55 50.4	135 56 24.6	Puolo	3.577149	3,777.0	12,391.7
N, 1910	21 53 43.065	1,324.6	4 47 27.7	184 47 27.0	Nomilo	2.776593	597.9	1,961.6
	159 31 53.153	1,525.8	90 28 42.4	270 27 00.5	Puolo	3.894459	7,842.6	25,730.3
			136 50 17.5	316 48 59.6	Lani	3.942421	8,758.3	28,734.5
Nak, 1910 [2]	21 58 43.37	1,333.9	109 02 14	289 02 00	Kokole	3.056844	1,140	3,740
	159 44 54.52	1,564.1	210 45 02	30 45 55	Opae	3.894672	7,846	25,741

[1] No check on this position.

[2] Unadjusted, but checked by additional observations.

Kauai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, south coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Kau, 1910 [2]	21 58 36.49	1,122.3	106 31 44	286 31 18	Kokole	3.311934	2,051	6,729
	159 44 23.54	675.3	204 11 14	24 11 55	Opae	3.882177	7,624	25,013
Keikei, 1927	21 58 29.170	897.2	107 17 27.7	287 16 53.8	Kokole	3.434670	2,720.6	8,925.8
	159 44 01.528	43.8	199 08 38.4	19 09 10.9	Opae	3.880807	7,599.9	24,934.0
Bone, 1910 [1]	21 58 29.15	896.6	107 18 59	287 18 25	Kokole	3.434337	2,719	8,921
	159 44 01.61	46.2	199 09 34	19 10 07	Opae	3.880880	7,601	24,938
Palm, 1910 [1]	21 58 29.53	908.3	103 58 22	283 57 40	Kokole	3.518952	3,303	10,837
	159 43 40.34	1,157.4	194 43 50	14 44 15	Opae	3.869935	7,412	24,318
Oomano, 1927	21 57 49.496	1,522.3	110 59 47.6	290 58 38.6	Kokole	3.753144	5,664.3	18,583.6
	159 42 27.743	796.0	114 23 57.8	294 23 22.7	Keikei	3.470485	2,954.5	9,693.2
			178 39 21.3	358 39 18.7	Opae	3.924381	8,402.0	27,565.6
Point 2, 1910 [2]	21 57 49.69	1,528.3	275 34 53	95 37 32	Lani	4.068826	12,269	40,253
	159 42 27.53	789.9	289 06 12	109 08 16	Papai	4.003187	10,074	33,051
Die, 1910 [2]	21 57 47.96	1,475.1	275 40 40	95 43 09	Lani	4.061841	11,530	37,828
	159 42 01.82	52.2	290 16 34	110 18 28	Papai	3.971338	9,361	30,712
Lone tree, 1926	21 57 43.69	1,343.8	225 45 38	45 45 54	Flood	3.210752	1,625	5,331
	159 41 12.95	371.6	258 52 52	78 53 19	Cane	3.313186	2,057	6,749
			292 48 06	112 48 24	Wharf	3.182247	1,521	4,990
Bat, 1910 [1]	21 57 40.20	1,236.4	253 30 25	73 30 52	Ahu	3.336377	2,170	7,119
	159 41 12.79	367.0	292 10 36	112 12 12	Papai	3.901096	7,963	26,125
North gable, green roof, 1926 [1]	21 57 44.70	1,374.8	189 19 46	9 19 49	Flood	3.048064	1,117	3,665
	159 40 38.69	1,110.1	250 33 33	70 33 47	Cane	3.040549	1,098	3,602
Tall tree, 1926	21 57 33.40	1,027.3	183 57 13	3 57 14	Flood	3.162347	1,453	4,767
	159 40 35.87	1,029.2	233 14 20	53 14 33	Cane	3.076015	1,191	3,907
			308 53 49	128 53 53	Wharf	2.638648	435	1,427
Flagpole near store, 1926 [1]	21 57 31.08	955.9	168 13 32	348 13 28	Flood	3.191445	1,554	5,098
	159 40 21.33	612.0	214 23 54	34 24 01	Cane	2.978018	951	3,120
War, 1910	21 57 24.077	740.5	211 37 17.5	31 37 26.4	Ahu	3.115725	1,305.3	4,282.5
	159 40 24.140	692.6	272 41 34.5	92 43 27.5	Lani	3.938544	8,680.5	28,479.3
			292 46 55.9	112 48 13.7	Papai	3.811836	6,483.9	21,272.6
Episcopal Church spire, 1926	21 57 41.46	1,275.2	162 55 54	342 55 49	Flood	3.099527	1,258	4,127
	159 40 19.52	560.1	226 11 30	46 11 37	Cane	2.827461	672	2,205
			231 49 57	51 50 05	Point	2.876311	752	2,467
Dead snag, 1926 [1]	21 57 47.07	1,447.7	115 52 46	295 52 38	Cane	2.826549	671	2,201
	159 39 41.58	1,193.0	120 27 00	300 26 53	Point	2.760961	577	1,893
Cliff, 1926 [1]	21 57 41.82	1,286.3	124 49 01	304 48 53	Cane	2.900695	796	2,612
	159 39 39.84	1,143.1	129 41 02	309 40 55	Point	2.851634	711	2,333
Waimea church, 1904 [1]	21 57 27.95	859.7	273 53 50	93 55 31	Lani	3.889742	7,758	25,453
	159 39 51.69	1,483.1	297 31 29	117 32 35	Papai	3.755196	5,691	18,671
Fort, 1926	21 57 18.72	575.8	156 28 18	336 28 07	Flood	3.316805	2,074	6,804
	159 40 03.52	101.0	181 17 20	1 17 21	Cane	3.066307	1,165	3,822
			186 29 35	6 29 37	Point	3.068810	1,172	3,845
Rocky, 1926 [1]	21 57 06.61	203.3	134 30 15	314 30 08	Wharf	2.895404	786	2,579
	159 40 04.53	130.0	160 38 31	340 38 21	Flood	3.382065	2,410	7,907
Herd, 1926 [1]	21 56 47.12	1,449.3	138 42 36	318 42 23	Wharf	3.185020	1,531	5,023
	159 39 48.86	1,402.0	156 30 46	336 30 30	Flood	3.495980	3,133	10,279
Maka, 1910	21 56 28.534	877.6	152 54 11.9	332 53 53.1	Ahu	3.500731	3,167.6	10,392.4
	159 39 09.997	286.9	258 46 03.8	78 47 29.0	Lani	3.824208	6,671.3	21,887.4
			281 46 53.1	101 47 43.2	Papai	3.594743	3,933.2	12,904.2
Koki, 1910 [1]	21 55 18.95	582.8	151 15 37	331 15 02	Ahu	3.752607	5,657	18,560
	159 38 25.48	731.3	236 51 03	56 52 12	Lani	3.798624	6,290	20,636
Kani, 1910 [1]	21 54 33.17	1,020.2	218 34 17	38 35 07	Lani	3.792334	6,199	20,338
	159 37 36.65	1,051.9	306 12 37	126 13 03	Puolo	3.398117	2,501	8,205
Paw, 1910 [1]	21 54 18.14	557.9	239 26 18	59 27 57	Pohakea	3.945915	8,829	28,966
	159 37 03.04	87.3	313 57 18	133 57 32	Puolo	3.165126	1,463	4,800
Dry, 1910 [1]	21 54 12.58	386.9	202 52 23	22 52 52	Lani	3.774333	5,947	19,511
	159 36 42.52	1,220.5	236 23 59	56 25 30	Pohakea	3.925348	8,421	27,628
Kaiole, 1910 [2]	21 53 53.97	1,659.9	171 30 29	351 30 21	Papai	3.601416	3,994	13,104
	159 36 35.28	1,012.7	199 10 10	19 10 37	Lani	3.806679	6,407	21,020
Bay, 1910–1928	21 53 48.407	1,488.8	77 34 38.0	257 34 32.0	Puolo	3.670524	4,683.0	15,364.1
	159 36 10.422	299.2	162 27 18.5	342 27 01.5	Papai	3.635741	4,322.6	14,181.7
			192 35 52.3	12 36 10.4	Lani	3.804594	6,376.7	20,920.9

[1] No check on this position.

[2] Unadjusted, but checked by additional observations.

Kauai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, south coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Cave, 1904	21 54 11.096	341.3	155 46 31.5	335 46 11.5	Papai	3.574520	3,754.2	12,316.9
	159 36 02.152	61.8	191 47 30.4	11 47 45.5	Lani	3.751617	5,644.4	18,518.3
			260 08 29.0	80 10 01.6	Wahiawa	3.858636	7,221.6	23,692.9
Lava, 1904	21 53 57.584	1,771.1	157 38 40.0	337 38 19.4	Papai	3.618179	4,151.3	13,619.7
	159 36 00.809	23.2	190 37 45.0	10 37 59.5	Lani	3.781367	6,044.6	19,831.3
			256 51 33.1	76 53 05.1	Wahiawa	3.861340	7,266.7	23,840.8
Stole, 1910 [1]	21 54 00.50	15.4	158 17 25	338 17 06	Papai	3.605921	4,036	13,241
	159 36 03.81	109.4	191 35 59	11 36 15	Lani	3.776200	5,973	19,596
Southeast corner old government wharf, 1910. [1]	21 54 21.99	676.3	186 01 29	6 01 35	Lani	3.717591	5,219	17,123
	159 35 41.04	1,178.0	230 13 34	50 14 42	Pohakea	3.834450	6,830	22,408
Sand, 1904 [1]	21 54 24.80	762.8	140 44 55	320 44 23	Papai	3.588493	3,877	12,720
	159 35 30.35	871.1	182 42 10	2 42 13	Lani	3.708370	5,109	16,762
McBryde Landing, large warehouse; northwest gable, 1904.	21 54 13.346	410.5	142 19 20.5	322 18 46.8	Papai	3.627209	4,238.5	13,905.8
	159 35 25.556	733.5	181 05 07.8	1 05 09.2	Lani	3.736956	5,457.0	17,903.5
			259 06 33.4	79 07 52.3	Wahiawa	3.790697	6,175.9	20,262.1
Catholic Church spire, Eleele, 1904	21 54 34.716	1,067.8	133 13 30.0	313 12 52.7	Papai	3.595333	3,938.5	12,921.6
	159 35 15.826	454.2	177 54 05.6	357 54 03.4	Lani	3.681421	4,802.0	15,754.6
			264 58 02.9	84 59 18.2	Wahiawa	3.746007	5,571.9	18,280.5
Old, 1904	21 54 06.775	208.4	143 27 24.6	323 26 50.3	Papai	3.646109	4,427.0	14,524.2
	159 35 23.976	688.2	180 35 16.5	0 35 17.3	Lani	3.752696	5,658.4	18,564.3
			257 11 15.5	77 12 33.8	Wahiawa	3.790496	6,173.0	20,252.6
Eleele landing flagstaff, 1910–1928	21 54 06.565	201.9	69 44 27.9	249 44 04.6	Puolo	3.279572	1,903.6	6,245.4
	159 35 24.143	693.0	143 33 22.7	323 32 48.4	Papai	3.646340	4,429.4	14,532.1
			180 38 08.0	0 38 08.8	Lani	3.753196	5,664.9	18,585.6
Haw, 1910 [1]	21 53 56.34	1,732.8	82 35 32	262 34 58	Puolo	3.426928	2,673	8,770
	159 34 54.03	1,550.9	217 05 45	37 06 36	Pohakea	3.810709	6,467	21,217
Reef, 1910 [2]	21 53 48.20	1,482.4	137 05 18	317 04 28	Papai	3.751012	5,637	18,494
	159 34 42.10	1,208.5	169 35 52	349 35 37	Lani	3.801647	6,334	20,781
Wahiawa stables, north cupola, 1904 [1]	21 54 26.20	805.0	123 23 33	303 22 35	Papai	3.730589	5,378	17,644
	159 34 19.37	556.0	160 27 54	340 27 31	Lani	3.729968	5,370	17,618
Wall, 1910 [1]	21 53 44.38	1,365.0	131 41 16	311 40 14	Papai	3.805108	6,384	20,945
	159 34 09.70	278.4	161 54 36	341 54 09	Lani	3.824588	6,677	21,906
Government flag, 1910 [1]	21 53 48.11	1,479.7	88 49 39	268 48 41	Puolo	3.647978	4,446	14,587
	159 33 51.50	1,478.3	201 16 09	21 16 36	Pohakea	3.763928	5,807	19,052
McBryde sugar mill, northwest stack, 1904	21 54 01.755	54.0	123 43 01.1	303 41 48.7	Papai	3.825226	6,686.9	21,938.6
	159 33 42.010	1,205.9	153 44 27.1	333 43 49.8	Lani	3.811689	6,481.7	21,265.4
			243 47 24.0	63 48 04.2	Wahiawa	3.537462	3,447.2	11,309.7
McBryde new sugar mill, stack, 1928	21 54 02.506	77.1	84 09 33.4	264 08 38.4	Bay	3.628973	4,255.7	13,962.2
	159 33 42.935	1,232.4	92 27 56.9	272 27 19.2	Eleele landing flagstaff	3.463561	2,907.8	9,540.0
			200 31 48.8	20 32 13.0	Pohakea	3.724710	5,305.3	17,405.8
Mac, 1910 [2]	21 53 34.68	1,066.6	93 53 44	273 52 43	Puolo	3.676049	4,743	15,561
	159 33 41.51	1,191.6	156 33 14	336 32 37	Lani	3.859961	7,244	23,766
Bry, 1910 [2]	21 53 25.99	799.3	257 15 25	77 15 55	N	3.376818	2,381	7,812
	159 33 14.07	403.9	271 46 36	91 47 05	Nomilo	3.356771	2,274	7,461
Hid, 1910 [1]	21 53 25.92	797.2	249 10 31	69 10 49	N	3.171171	1,483	4,865
	159 32 41.44	1,189.6	272 56 05	92 56 22	Nomilo	3.126484	1,338	4,390
Ioleau, 1904–1910	21 55 12.626	388.3	111 21 23.5	291 19 31.1	Papai	3.967468	9,278.3	30,440.6
	159 31 54.717	1,570.4	132 39 32.9	312 38 15.6	Lani	3.907729	8,085.9	26,528.5
			180 38 20.3	0 38 20.5	Wahiawa	3.074782	1,187.9	3,897.3
Gov, 1910–1926 [2]	21 53 24.17	743.4	89 16 17	269 16 02	Nomilo	3.060775	1,150	3,773
	159 31 14.83	425.7	157 03 50	337 03 35	Wahiawa	3.463697	2,909	9,544
Wind, 1910–1926	21 53 23.44	720.9	90 13 34	270 13 07	Nomilo	3.312979	2,056	6,745
	159 30 43.28	1,242.4	106 45 19	286 44 53	N	3.321121	2,095	6,873
Law, 1910 [2]	21 53 16.14	496.4	94 36 51	274 36 14	Nomilo	3.460940	2,890	9,482
	159 30 14.54	417.4	135 36 42	315 36 05	Wahiawa	3.612181	4,094	13,432
Horn, 1910–1926 [1]	21 53 16.91	520.1	210 40 55	30 41 42	Laaukahi	3.845719	7,010	22,999
	159 29 47.16	1,353.8	263 18 05	83 19 17	Paa	3.746114	5,573	18,284
Post, 1910–1926 [1]	21 53 05.10	156.9	200 30 59	20 31 30	Laaukahi	3.834080	6,825	22,392
	159 29 05.86	168.2	256 53 23	76 54 19	Paa	3.649931	4,466	14,652
Small white house, 1910–1926	21 53 04.869	149.8	194 34 14.1	14 34 35.7	Laaukahi	3.820284	6,611.3	21,690.6
	159 28 40.464	1,161.6	241 38 23.3	61 40 30.0	Kai	4.044234	11,072.2	36,326.0
			254 16 14.5	74 17 01.5	Paa	3.575381	3,761.7	12,341.5
Koloa church spire, 1910–1926 [1]	21 53 50.40	1,550.1	244 03 48	64 05 31	Kai	3.945526	8,821	28,940
	159 27 37.37	1,072.7	281 52 57	101 53 20	Paa	3.267013	1,849	6,066

[1] No check on this position.

[2] Unadjusted, but checked by additional observations.

Kauai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, south coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
East Gable, 1910-1926	21 52 55.883	1,718.7	187 55 43.1	7 55 55.2	Laaukahi	3.828617	6,739.3	22,110.5
	159 28 14.900	427.7	238 26 03.1	58 28 00.3	Kai	4.024249	10,574.2	34,692.2
			245 49 27.9	65 50 05.4	Paa	3.500310	3,164.5	10,382.2
Nuk, 1910 [1]	21 52 43.95	1,351.7	182 53 00	2 53 05	Laaukahi	3.848250	7,051	23,133
	159 27 54.86	1,575.0	234 16 12	54 16 42	Paa	3.454523	2,848	9,344
High Gable, 1910-1926	21 52 35.545	1,093.2	175 42 12.3	355 42 05.2	Laaukahi	3.864570	7,321.0	24,019.0
	159 27 23.390	671.5	216 14 33.7	36 14 52.0	Paa	3.376983	2,382.2	7,815.6
			230 43 10.5	50 44 48.5	Kai	3.988107	9,729.9	31,922.2
Makahuena Point Light, 1910	21 52 21.523	662.0	169 15 56.9	349 15 37.8	Laaukahi	3.895944	7,869.4	25,818.2
	159 26 51.427	1,476.5	225 06 02.2	45 07 28.2	Kai	3.970230	9,337.5	30,634.8
			235 32 59.8	55 34 12.3	Kawelikoa	3.830156	6,763.3	22,189.3
Al, 1910 [2]	21 53 05.38	165.5	148 56 58	328 56 08	Laaukahi	3.872208	7,451	24,445
	159 25 28.58	820.5	232 15 26	52 16 07	Kawelikoa	3.606978	4,046	13,274

Niihau Island

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Principal points								
Paniau, 1926	21 56 30.414	935.4	249 50 53.5	70 00 15.9	Pele	4.661106	45,825.4	150,345.5
	160 05 10.073	289.1	268 31 21.0	88 42 29.2	Lani	4.710330	51,325.1	168,389.1
Lehua, 1926	22 01 19.592	602.6	261 12 02.4	81 21 45.9	Pele	4.654068	45,088.7	147,928.5
	160 06 03.722	106.7	278 08 49.4	98 20 18.8	Lani	4.727429	53,386.2	175,151.2
			350 10 46.5	170 11 06.6	Paniau	3.955515	9,026.4	29,614.1
Kal, 1926	21 54 20.162	620.1	221 18 59.1	41 21 27.0	Lehua	4.235055	17,181.3	56,369.0
	160 12 39.239	1,126.3	252 42 46.4	72 45 34.1	Paniau	4.130304	13,499.1	44,288.3
Kaeo, 1926	21 54 11.308	347.8	92 07 12.6	272 05 36.4	Kal	3.869651	7,407.1	24,301.5
	160 08 21.357	613.0	196 40 50.2	16 41 42.1	Lehua	4.138361	13,751.8	45,117.4
			232 03 33.2	52 04 44.6	Paniau	3.842616	6,960.1	22,834.9
Kawaewae (Kaw), 1926	21 50 58.566	1,801.3	188 02 27.6	8 02 39.0	Kal	3.796710	6,262.0	20,544.6
	160 13 09.756	280.1	234 23 00.0	54 24 47.5	Kaeo	4.007880	10,183.1	33,409.1
Kawaihoa (Hoa), 1926	21 47 03.885	119.5	169 07 51.7	349 07 33.7	Kaw	3.866278	7,349.8	24,113.5
	160 12 21.491	617.4	177 49 32.7	357 49 26.1	Kal	4.128010	13,428.0	44,055.0
			202 22 20.1	22 24 40.9	Lehua	4.454309	28,464.9	93,388.6
			207 39 59.3	27 41 28.6	Kaeo	4.171572	14,844.7	48,703.0
Supplementary points								
Gam, 1926	21 59 23.998	738.1	39 55 10.8	219 52 21.8	Kaw	4.306689	20,262.3	66,477.2
	160 05 36.933	1,059.5	52 23 01.0	232 20 23.2	Kal	4.184770	15,302.8	50,205.9
			167 48 21.1	347 48 11.1	Lehua	3.560795	3,637.4	11,933.7
House, north gable, 1926 [1]	22 00 23.73	729.9	356 02 43	176 02 45	Gam	3.265160	1,841	6,400
	160 05 41.36	1,186.3	159 31 55	339 31 47	Lehua	3.263418	1,834	6,017
Black, 1926 [1]	21 59 13.18	405.4	202 00 23	22 00 43	Lehua	3.622612	4,194	13,760
	160 06 58.52	1,678.8	261 54 03	81 54 33	Gam	3.373627	2,364	7,756
Pin, 1926	21 57 30.398	935.0	60 26 19.9	240 24 05.8	Kal	4.073828	11,853.0	38,887.7
	160 06 40.043	1,148.9	188 24 20.6	8 24 34.2	Lehua	3.852839	7,125.9	23,378.9
			207 23 24.7	27 23 48.3	Gam	3.594971	3,935.2	12,910.7
Cloth, 1926 [1]	21 56 25.45	782.8	29 04 06	209 02 54	Kaw	4.060760	11,502	37,736
	160 09 55.15	1,582.6	50 42 59	230 41 58	Kal	3.784268	6,085	19,964
Sand, 1926	21 55 47.24	1,453.0	305 19 19	125 20 13	Kaeo	3.707765	5,102	16,739
	160 10 46.39	1,331.3	24 52 36	204 51 42	Kaw	3.990607	9,786	32,106
			50 25 05	230 24 23	Kal	3.623531	4,203	13,789
Rock, 1926 [1]	21 53 45.53	1,400.3	243 58 33	63 59 01	Kal	3.385292	2,428	7,966
	160 13 55.26	1,586.2	345 43 27	165 43 44	Kaw	3.724169	5,299	17,385
Highest tree, Robinson's yard, 1926 [1]	21 53 19.51	600.0	230 18 18	50 21 14	Gam	4.244552	17,561	57,615
	160 13 27.97	802.9	353 07 06	173 07 13	Kaw	3.640114	4,366	14,324
Derrick, 1926	21 52 13.640	419.5	250 01 51	70 04 00	Kaeo	4.025561	10,606	34,797
	160 14 08.648	248.3	323 46 51	143 47 13	Kaw	3.456662	2,862	9,390
			342 05 34	162 06 14	Hoa	4.000505	10,012	32,848
Barn, south gable, 1926	21 52 13.30	409.1	249 50 19	69 52 28	Kaeo	4.022836	10,540	34,580
	160 14 06.05	173.7	324 52 45	144 53 06	Kaw	3.448687	2,810	9,219
			342 28 53	162 29 32	Hoa	3.999081	9,979	32,739
Rob, 1926 [1]	21 50 55.79	1,715.9	347 21 02	167 21 22	Hoa	3.863918	7,310	23,983
	160 13 17.21	494.2	13 12 30	193 12 12	Lake	3.787620	6,132	20,118
Lake, 1926 [1]	21 47 41.68	1,281.9	219 31 57	39 34 06	Kaeo	4.191489	15,541	50,987
	160 14 05.99	172.1	291 09 52	111 10 31	Hoa	3.507749	3,219	10,561
Bluff, 1926	21 51 13.71	421.7	209 55 39	29 56 20	Kaeo	3.799566	6,303	20,679
	160 10 10.91	313.3	26 01 22	206 00 34	Hoa	3.931969	8,550	28,051
			84 49 37	264 48 31	Kaw	3.712344	5,156	16,916

[1] No check on this position.

[2] Unadjusted, but checked by additional observations.

Kaula Island

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
	° ′ ″		° ′ ″	° ′ ″				
Kaula Island, highest point, 1926	21 39 28.83	886.1	228 34 32	48 44 25	Lehua	4.785546	61,030	200,229
	160 32 39.34	1,131.1	231 26 55	51 34 20	Kal	4.643916	44,047	144,511
			248 08 35	68 16 06	Hoa	4.576288	37,695	123,671

Oahu Island

Principal points								
Diamond Head (Leahi), 1872–1927	21 15 46.334	1,425.0						
	157 48 52.184	1,504.5						
Tantalus (Puu Ohia), 1872–1927	21 20 08.929	274.6	357 44 28.5	177 44 32.5	Diamond Head	3.907530	8,082.2	26,516.4
	157 49 03.233	93.2						
Halawa Barrel, 1927	21 23 32.967	1,013.9	309 18 11.5	129 19 48.4	Tantalus	3.995801	9,903.8	32,492.7
	157 53 29.182	840.6	330 54 07.3	150 55 48.1	Diamond Head	4.215417	16,421.7	53,876.9
Kapuai New, 1927	21 22 46.559	1,431.9	265 40 55.2	85 44 56.4	Halawa Barrel	4.281125	19,104.0	62,677.0
	158 04 30.521	879.2						
Waipio Uka, 1873–1927	21 27 04.336	133.4	297 24 29.9	117 27 08.8	Halawa Barrel	4.149563	14,111.2	46,296.5
	158 00 44.078	1,269.2	39 27 10.8	219 25 48.1	Kapuai New	4.011385	10,265.6	33,679.7
Mauna Una, 1874–1927	21 28 08.522	262.1	285 33 41.6	105 35 11.7	Waipio Uka	3.866441	7,352.6	24,122.7
	158 04 50.075	1,441.7	356 44 38.7	176 44 45.9	Kapuai New	3.996421	9,917.9	32,539.0
Station Z, 1927	21 31 10.764	331.0	20 36 08.3	200 35 32.1	Waipio Uka	3.908296	8,096.5	26,563.3
	157 59 05.134	147.8	31 09 24.3	211 07 25.3	Kapuai New	4.258096	18,117.4	59,440.2
			60 34 24.3	240 32 17.9	Mauna Una	4.056975	11,401.8	37,407.4
Schofield west base, 1927	21 29 20.774	638.9	305 02 38.3	125 03 54.4	Waipio Uka	3.863675	7,305.9	23,969.4
	158 04 11.815	340.1	26 22 03.1	206 21 49.0	Mauna Una	3.394474	2,480.1	8,136.8
Schofield east base, 1927	21 29 01.076	33.1	334 57 06.7	154 57 28.1	Waipio Uka	3.598021	3,963.0	13,001.9
	158 01 42.350	1,219.1	73 21 31.8	253 20 23.0	Mauna Una	3.751343	5,640.8	18,506.5
			98 01 21.8	278 00 27.1	Schofield west base	3.637991	4,345.014	14,256.27
Maili, 1874–1927	21 31 29.447	905.6	272 49 57.1	92 52 24.1	Station Z	4.062361	11,544.1	37,874.3
	158 05 45.761	1,317.0	313 10 45.0	133 12 35.6	Waipio Uka	4.075985	11,912.0	39,081.3
			345 27 21.1	165 27 41.5	Mauna Una	3.805089	6,383.9	20,944.5
Halemano, 1927	21 32 31.685	974.5	292 36 07.1	112 37 23.3	Station Z	3.811083	6,472.7	21,235.8
	158 02 32.763	942.8	26 02 02.6	206 01 12.2	Mauna Una	3.954581	9,007.0	29,550.5
			70 59 37.0	250 58 26.1	Maili	3.768974	5,874.5	19,273.3
Puu Iki, 1927	21 32 30.317	932.4	269 42 16.5	89 44 06.4	Halemano	3.934766	8,605.3	28,232.6
	158 07 31.809	915.3	301 31 15.7	121 31 54.7	Maili	3.553908	3,580.2	11,746.0
O'Reilly, 1927	21 33 36.649	1,127.1	303 57 49.5	123 58 27.4	Halemano	3.553378	3,575.8	11,731.6
	158 04 15.829	455.4	33 29 20.5	213 28 47.5	Maili	3.671227	4,690.6	15,389.1
			70 07 17.0	250 06 05.0	Puu Iki	3.777917	5,996.8	19,674.5
Waialua 2, 1927	21 35 31.891	980.8	304 09 13.9	124 10 20.7	O'Reilly	3.800142	6,311.6	20,707.3
	158 07 17.363	499.5	4 15 26.1	184 15 20.8	Puu Iki	3.748173	5,599.8	18,372.0
Dillingham, 1927	21 35 02.616	80.5	260 47 18.3	80 48 29.3	Waialua 2	3.750534	5,630.3	18,472.1
	158 10 30.570	879.4	283 45 36.3	103 47 54.0	O'Reilly	4.045347	11,100.6	36,419.2
			308 38 46.3	128 40 30.9	Maili	4.020967	10,494.6	34,431.0
			312 18 56.1	132 20 01.7	Puu Iki	3.842389	6,956.5	22,823.1
Pupukea, 1875–1927	21 39 36.887	1,134.5	18 13 23.4	198 12 20.3	Maili	4.198168	15,782.2	51,778.8
	158 02 54.269	1,560.3	57 17 27.8	237 14 39.7	Dillingham	4.193134	15,600.3	51,182.0
Lak, 1927	21 40 00.482	14.8	31 18 02.1	211 15 59.9	Maili	4.264605	18,391.0	60,337.8
	158 00 13.762	395.7	62 43 05.1	242 39 17.8	Dillingham	4.300264	19,964.8	65,501.2
			81 04 18.9	261 03 19.6	Pupukea	3.669459	4,671.5	15,326.4
Kawela, 1875–1927	21 40 01.000	30.8	277 31 05.4	97 31 07.0	Lak	2.085945	121.9	399.9
	158 00 17.965	516.5	80 38 14.5	260 37 16.8	Pupukea	3.658465	4,554.8	14,943.5
Waialee, 1875–1927	21 41 08.435	259.4	315 10 05.9	135 10 32.6	Lak	3.469350	2,946.8	9,668.0
	158 01 26.023	748.1	316 39 53.2	136 40 18.3	Kawela	3.455039	2,851.3	9,354.6
			42 01 31.6	222 00 59.0	Pupukea	3.578641	3,790.0	12,434.4
Opana, 1927	21 41 21.359	656.9	341 27 25.7	161 27 36.4	Lak	3.418898	2,623.6	8,607.6
	158 00 42.782	1,229.9	343 53 47.9	163 53 57.0	Kawela	3.410338	2,572.4	8,439.6
			72 16 11.5	252 15 55.5	Waialee	3.115628	1,305.1	4,281.8
Punki, 1875–1927	21 40 27.393	842.5	68 41 09.9	248 40 42.6	Lak	3.357295	2,276.6	7,469.1
	157 58 59.993	1,724.8	119 19 40.0	299 19 02.0	Opana	3.530097	3,389.2	11,119.4
Kahuku New 1927	21 42 46.288	1,423.6	9 05 43.6	189 05 34.8	Punki	3.636106	4,326.2	14,193.5
	157 58 36.206	1,040.6	28 48 47.4	208 48 11.3	Lak	3.764902	5,819.7	19,093.5
			54 19 51.8	234 19 05.0	Opana	3.651167	4,478.9	14,694.5
Keana, 1927	21 40 43.491	1,337.6	83 28 28.4	263 27 32.9	Punki	3.638624	4,351.4	14,276.2
	157 56 29.620	851.5	136 04 21.2	316 03 34.4	Kahuku New	3.719698	5,244.4	17,206.0
Laie 1, 1927	21 39 06.507	200.1	110 19 16.2	290 17 49.9	Punki	3.855365	7,167.5	23,515.4
	157 55 06.203	178.4	141 12 10.9	321 11 40.1	Keana	3.582907	3,827.4	12,557.1

Oahu Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
***Principal points*—Continued**	° ′ ″		° ′ ″	° ′ ″				
Waiahilahila, 1927	21 35 43.046	1,323.9	141 25 01.7	321 23 32.3	Puuki	4.048804	11,189.3	36,710.2
	157 54 57.270	1,647.4	154 12 08.6	334 10 47.9	Kahuku New	4.160149	14,459.4	47,438.9
			163 58 11.9	343 57 37.9	Keana	3.982922	9,614.4	31,543.2
			177 38 58.2	357 38 55.0	Laie 1	3.796770	6,262.8	20,547.2
Turnover, 1927	21 32 28.581	879.0	140 21 19.9	320 20 16.5	Waiahilahila	3.890315	7,768.1	25,485.8
	157 52 04.971	143.0	156 56 12.9	336 55 06.2	Laie 1	4.123930	13,302.4	43,643.0
Ohulehule, 1875–1927	21 30 56.464	1,736.6	156 04 24.1	336 03 34.0	Waiahilahila	3.984213	9,643.0	31,637.1
	157 52 41.311	1,189.0	164 32 52.9	344 31 59.6	Laie 1	4.194159	15,637.2	51,303.0
			200 15 33.7	20 15 47.0	Turnover	3.479997	3,019.9	9,907.8
Kualoa, 1927	21 31 50.735	1,560.4	63 38 48.5	243 38 05.6	Ohulehule	3.575106	3,759.3	12,333.6
	157 50 44.267	1,273.9	116 37 25.2	296 36 55.6	Turnover	3.414596	2,597.7	8,522.6
			150 40 06.9	330 38 30.5	Laie 1	4.186820	15,375.2	50,443.5
Heeia, 1872–1927	21 26 52.935	1,628.0	143 52 37.2	323 51 27.7	Ohulehule	3.967241	9,273.4	30,424.5
	157 49 31.362	903.0	167 05 51.8	347 05 25.1	Kualoa	3.972953	9,396.2	30,827.4
Mokapu, 1872–1927	21 27 26.763	823.1	21 02 53.6	201 01 08.9	Diamond Head	4.363219	23,079.1	75,718.7
	157 44 04.676	134.6	83 42 18.4	263 40 18.9	Heeia	3.976059	9,463.7	31,048.8
			113 28 13.7	293 25 04.5	Ohulehule	4.209791	16,210.3	53,183.3
			125 14 07.4	305 11 41.0	Kualoa	4.148564	14,078.7	46,189.9
			138 32 32.5	318 28 29.5	Laie 1	4.458344	28,730.6	94,260.3
Waimanalo, 1927	21 19 25.393	780.9	63 26 40.7	243 23 51.1	Diamond Head	4.177744	15,057.2	49,400.2
	157 41 05.012	144.4	133 21 52.9	313 18 48.3	Heeia	4.302220	20,054.9	65,796.8
			160 44 26.0	340 43 20.5	Mokapu	4.195425	15,682.9	51,453.0
Lanipo, 1927	21 20 05.754	177.0	152 29 37.3	332 28 14.7	Heeia	4.149839	14,120.1	46,325.7
	157 45 44.880	1,293.3	192 00 30.6	12 01 07.2	Mokapu	4.141976	13,866.8	45,494.7
			278 44 07.5	98 45 49.3	Waimanalo	3.911689	8,160.0	26,771.6
			34 05 40.9	214 04 32.9	Diamond Head	3.983772	9,633.2	31,604.9
			90 59 18.7	270 58 06.6	Tantalus	3.757138	5,716.6	18,755.2
Koko Head 3, 1927	21 15 58.198	1,789.8	88 08 59.9	268 06 39.3	Diamond Head	4.048594	11,183.9	36,692.5
	157 42 24.464	705.3	123 52 39.5	303 50 14.7	Tantalus	4.141158	13,840.7	45,409.0
			142 49 16.6	322 48 03.8	Lanipo	3.980314	9,556.8	31,354.3
			199 45 50.7	19 46 19.5	Waimanalo	3.830665	6,771.2	22,215.2
Manawahua, 1875–1927	21 23 22.453	690.5	287 57 33.9	107 58 17.0	Kapuai New	3.553742	3,578.8	11,741.4
	158 06 28.701	826.8						
Kahe, 1875–1927	21 21 17.764	546.3	211 28 40.7	31 29 10.4	Manawahua	3.652889	4,496.6	14,752.6
	158 07 50.214	1,446.8						
Kum, 1927	21 28 52.946	1,628.4	208 21 33.3	28 22 06.4	Maili	3.737976	5,469.9	17,945.8
	158 07 16.041	461.8	288 00 12.9	108 01 06.3	Mauna Una	3.645293	4,418.7	14,497.0
Kaua, 1927	21 26 40.713	1,252.1	153 22 45.1	333 22 19.2	Kum	3.657933	4,549.2	14,925.2
	158 06 05.232	150.7	183 36 38.9	3 36 46.0	Maili	3.949276	8,897.7	29,191.9
			218 42 04.4	38 42 31.9	Mauna Una	3.539147	3,460.6	11,353.7
Paheehee New, 1927	21 26 54.954	1,690.1	235 49 23.3	55 50 31.3	Kum	3.810326	6,461.4	21,198.8
	158 10 21.731	625.7	273 22 50.9	93 24 24.7	Kaua	3.869155	7,398.7	24,273.9
			314 13 39.9	134 15 05.0	Manawahua	3.971626	9,367.6	30,733.5
			337 10 08.6	157 11 03.9	Kahe	4.051192	11,251.0	36,912.7
Makaha, 1927	21 28 13.827	425.2	260 33 55.3	80 35 27.5	Kum	3.866232	7,349.1	24,111.2
	158 11 27.875	802.5	287 07 00.5	107 08 58.5	Kaua	3.987710	9,721.0	31,893.0
			321 51 44.0	141 52 08.2	Paheehee New	3.489111	3,084.0	10,118.1
Lahilahi, 1927	21 27 48.594	1,494.5	253 20 21.3	73 20 54.3	Makaha	3.432555	2,707.4	8,882.5
	158 12 57.968	1,669.0	290 07 54.2	110 08 51.4	Paheehee New	3.680463	4,791.4	15,719.8
Keaau 2, 1927	21 29 35.943	1,105.4	320 50 22.8	140 50 49.0	Makaha	3.512811	3,256.9	10,685.3
	158 12 39.316	1,131.7	9 14 20.6	189 14 13.8	Lahilahi	3.524385	3,344.9	10,974.1
Kepuhi New, 1927	21 29 19.526	600.5	252 42 44.6	72 43 05.2	Keaau 2	3.230275	1,699.3	5,575.1
	158 13 35.683	1,027.2	298 46 05.7	118 46 52.5	Makaha	3.623006	4,197.6	13,771.6
			338 46 48.7	158 47 02.5	Lahilahi	3.477121	3,000.0	9,842.5
Lolo, 1927	21 31 01.524	46.9	357 01 20.2	177 01 21.9	Keaau 2	3.420886	2,635.6	8,647.0
	158 12 44.072	1,268.4	25 20 34.2	205 20 15.3	Kepuhi New	3.540448	3,470.9	11,387.4
Makua 2, 1927	21 31 17.660	543.1	288 22 38.8	108 22 57.8	Lolo	3.196945	1,573.8	5,163.4
	158 13 35.966	1,035.1	332 28 04.9	152 28 25.6	Keaau 2	3.547498	3,527.8	11,574.1
			359 52 18.6	179 52 18.7	Kepuhi New	3.560293	3,633.2	11,919.9
Moku, 1927	21 32 50.543	1,554.4	24 42 32.1	204 42 12.4	Lolo	3.567113	3,690.7	12,108.6
	158 11 50.468	1,452.2	46 44 52.4	226 44 13.7	Makua 2	3.619991	4,168.6	13,676.5
			209 30 08.1	29 30 37.5	Dillingham	3.669067	4,667.3	15,312.6
			274 45 51.2	94 47 26.1	Puu Iki	3.873255	7,468.9	24,504.2
Kealia, 1927	21 33 15.156	466.1	230 15 29.0	50 16 19.8	Dillingham	3.713508	5,170.2	16,962.6
	158 12 48.766	1,403.1	294 17 06.5	114 17 27.9	Moku	3.264902	1,840.4	6,038.0
			358 07 02.5	178 07 04.2	Lolo	3.614064	4,112.1	13,491.1
			20 36 06.5	200 35 49.2	Makua 2	3.586640	3,860.5	12,665.7

Oahu Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Camp, 1927	21 34 16.883	519.2	246 54 34.0	66 55 16.2	Dillingham	3.554768	3,587.3	11,769.3
	158 12 25.280	727.3	339 19 54.3	159 20 07.1	Moku	3.453019	2,838.0	9,311.0
			19 35 37.6	199 35 29.0	Kealia	3.304298	2,015.1	6,611.2
Kaupakuhale, 1927	21 32 33.806	1,039.7	96 13 45.8	276 12 45.6	Moku	3.676702	4,750.1	15,584.3
	158 09 06.363	183.1	152 06 32.9	332 06 02.0	Dillingham	3.714196	5,178.4	16,989.5
			272 15 13.1	92 15 47.8	Puu Iki	3.435040	2,723.0	8,933.7
Punchbowl (Puowaina), 1873–1928	21 18 55.327	1,701.5	326 16 28.3	146 17 17.2	Diamond Head	3.844348	6,987.9	22,926.1
	157 51 06.758	194.8	154 20 19.4	334 19 27.6	Halawa Barrel	3.976513	9,473.6	31,081.3
			237 32 32.6	57 33 17.6	Tantalus	3.625155	4,218.5	13,840.2
Ewa Church, 1873–1927	21 23 42.327	1,301.8	153 59 51.6	333 59 13.1	Waipio Uka	3.839652	6,912.8	22,679.7
	157 58 58.825	1,694.5						
Makapuu Point, 1872, 1927	21 18 41.476	1,275.6	46 36 50.8	226 35 43.9	Koko Head 3	3.863860	7,309.0	23,979.6
	157 39 20.216	582.6	71 56 12.1	251 52 44.5	Diamond Head	4.239170	17,344.8	56,905.4
			114 05 59.9	294 05 21.8	Waimanalo	3.519624	3,308.4	10,854.3
			130 40 39.0	310 36 56.2	Heela	4.365556	23,203.6	76,127.1
			153 07 07.9	333 05 24.2	Mokapu	4.258023	18,114.4	59,430.3
Old main-scheme points								
Oahu east base, 1872	21 17 38.438	1,182.1	347 00 54.3	167 01 04.3	Diamond Head	3.548774	3,538.1	11,607.9
	157 49 19.759	569.5	111 30 10.9	291 29 36.1	Oahu west base	3.473498	2,975.1	9,760.8
Oahu west base, 1872–1910	21 18 13.889	427.1	222 30 43.7	42 31 24.6	Tantalus	3.681248	4,800.1	15,748.3
	157 50 55.796	1,608.2	321 51 15.2	141 52 00.0	Diamond Head	3.761157	5,769.8	18,929.8
Honouliuli, 1873	21 22 21.598	664.2	188 31 30.2	8 31 46.7	Waipio Uka	3.944126	8,792.8	28,847.7
	158 01 29.347	845.5	240 11 49.5	60 12 44.4	Ewa Church	3.698672	4,996.6	16,393.0
Kapuai (old station), 1927	21 22 46.439	1,428.2	155 31 56	335 31 56	Kapuai New	0.607455	4.050	13.287
	158 04 30.463	877.6						
Paheehee, 1875	21 26 54.908	1,688.7	314 14 41.1	134 16 06.1	Manawahua	3.971402	9,362.7	30,717.5
	158 10 21.543	620.3	337 11 30.2	157 12 25.4	Kahe	4.051062	11,247.7	36,901.8
Paheehee (U. S. E.), 1927	21 26 54.996	1,691.4	75 19 41	255 19 41	Paheehee New	0.711638	5.148	16.890
	158 10 21.558	620.7						
Keaau (old station), 1875–1927	21 19 36.022	1,107.9	44 29 53	224 29 53	Keaau 2	0.531479	3.400	11.155
	158 12 39.233	1,130.6						
Makua (U. S. E), 1927	21 31 19.318	594.1	289 19 34.1	109 19 54.0	Lolo	3.218364	1,653.3	5,424.2
	158 13 38.282	1,101.8	307 25 06.9	127 25 07.8	Makua 2	1.923912	83.9	275.3
			331 54 10.2	151 54 31.8	Keaau 2	3.556780	3,604.0	11,824.1
Kahanahaiki (U. S. E.), 1914–1919	21 32 48.033	1,477.3	49 02 37.2	229 01 57.1	Makua (U. S. E.)	3.619304	4,162.0	13,654.8
	158 11 49.065	1,411.8	110 18 59.2	290 18 40.1	Keawaula (U. S. E.)	3.203575	1,598.0	5,242.8
Mokulaia (U. S.E.), 1914–1919	21 34 59.606	1,833.2	284 22 20.2	104 24 27.3	O'Reilly	4.011412	10,266.3	33,682.0
	158 10 01.477	42.5	311 17 06.1	131 18 40.1	Maili	3.990938	9,793.5	32,130.8
Kahuku, 1875–1910	21 42 44.844	1,379.2	24 05 43.3	204 05 14.3	Kawela	3.741936	5,520.0	18,110.2
	157 58 59.583	1,712.5	54 50 45.2	234 49 51.1	Waialee	3.711712	5,148.9	16,892.7
Laie (Laie 2), 1875–1927	21 39 06.202	190.7	111 14 26.2	291 13 03.7	Puuki	3.838606	6,896.1	22,625.0
	157 55 16.418	472.1	268 10 23.4	88 10 27.2	Laie 1	2.468173	293.9	964.2
			354 57 43.9	174 57 50.9	Waiahilahila	3.797434	6,272.4	20,578.7
Papau, 1910	21 36 44.616	1,372.2	154 58 58.0	334 57 51.6	Kahuku	4.087320	12,227.0	40,114.7
	157 55 59.682	1,716.6	195 56 36.4	15 56 52.4	Laie 2	3.655984	4,528.8	14,858.2
Puna, 1910	21 34 31.972	983.3	125 26 18.1	305 25 04.7	Papau	3.847418	7,037.5	23,088.9
	157 52 40.329	1,160.2	151 58 55.9	331 57 58.4	Laie 2	3.980206	9,554.5	31,346.7
Konahuanui, 1872	21 21 23.323	717.3	12 57 39.6	192 57 09.5	Diamond Head	4.026723	10,634.6	34,890.3
	157 47 29.451	848.5	49 45 01.8	229 44 27.7	Tantalus	3.549093	3,540.7	11,616.4
Koko Head, 1872–1927	21 16 02.200	67.7	16 47 00.4	196 46 59.9	Koko Head 3	2.109140	128.57	421.82
	157 42 23.176	668.1						
Supplementary points, southern part of island.								
Koko Head 2, 1925	21 16 07.534	231.7	26 09 50.4	206 09 49.4	Koko Head	2.261899	182.8	599.7
	157 42 20.381	587.6	86 42 58.5	266 40 36.4	Diamond Head	4.053630	11,314.4	37,120.7
Ridge, 1910–1925	21 17 57.760	1,776.4	358 13 18.9	178 13 20.2	Koko Head 2	3.530396	3,391.5	11,126.9
	157 42 24.031	692.7	70 09 29.7	250 07 08.8	Diamond Head	4.075431	11,896.8	39,031.4
Waialae, 1927	21 18 13.298	409.0	130 46 02.5	310 45 10.4	Tantalus	3.736141	5,446.8	17,870.0
	157 46 40.076	1,155.1	299 24 19.1	119 25 51.8	Koko Head 3	3.927318	8,459.0	27,752.6
			40 07 22.8	220 06 34.8	Diamond Head	3.771603	5,910.2	19,390.4
			99 33 35.6	279 31 58.6	Punchbowl	3.891761	7,794.0	25,570.8
Koko Crater, 1927	21 17 17.631	542.2	37 02 35.6	217 02 12.4	Koko Head 3	3.485790	3,060.5	10,041.0
	157 41 20.512	591.3	186 29 08.8	6 29 14.4	Waimanalo	3.597097	3,954.5	12,974.1
			233 21 23.2	53 22 06.9	Makapuu Point	3.635588	4,321.0	14,176.5
Tower, radio, 1925	21 17 16.793	516.5	38 12 19.7	218 11 57.0	Koko Head	3.465270	2,919.2	9,577.4
	157 41 20.549	592.3	77 57 41.2	257 54 57.3	Diamond Head	4.124294	12,313.6	43,679.7

Oahu Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, southern part of island—Continued	° ′ ″		° ′ ″	° ′ ″				
Koko Head datum point, 1925 [1]	21 15 47.08	1,447.9	89 53 40	269 51 27	Diamond Head	4.025151	10,596.2	34,764.4
	157 42 44.65	1,287.3	102 08 24	282 06 27	Kaimuki	3.978897	9,525.7	31,252.2
Maunalua Bay datum point, 1925	21 16 12.843	395.0	85 34 07.8	265 31 55.9	Diamond Head	4.021547	10,508.7	34,477.3
	157 42 48.773	1,406.0	97 30 10.7	277 28 15.0	Kaimuki	3.967226	9,273.1	30,423.5
Mast (most westerly radio mast), 1925	21 16 49.879	1,534.0	345 48 58.3	165 49 03.0	Koko Head	3.179675	1,512.4	4,961.9
	157 42 36.030	1,038.6	79 48 10.5	259 45 54.1	Diamond Head	4.042128	11,018.6	36,150.2
R. C. A., tank at receiving station, 1925	21 17 06.815	209.6	18 34 54.9	198 34 47.2	Koko Head 2	3.284070	1,923.4	6,310.4
	157 41 59.121	1,704.2	155 22 46.9	335 22 37.9	Ridge	3.236400	1,723.5	5,654.5
Lucas, 1925	21 17 10.595	325.8	306 25 42.9	126 26 18.8	Koko Head	3.549224	3,541.8	11,620.1
	157 44 02.025	58.4	308 21 45.3	128 22 20.7	Koko Head 3	3.554744	3,587.1	11,768.7
			72 48 06.0	252 46 20.7	Diamond Head	3.942352	8,756.9	28,729.9
Niu Longitude, 1927	21 17 08.430	259.3	73 00 38.9	252 58 55.0	Diamond Head	3.936199	8,633.7	28,325.7
	157 44 05.785	166.8	306 28 36.8	126 29 13.6	Koko Head 3	3.560234	3,632.7	11,918.3
Ult, 1925	21 16 37.299	1,147.1	280 43 00.9	100 44 12.6	Koko Head	3.763389	5,799.5	19,027.2
	157 45 40.832	1,177.1	74 08 53.8	254 07 44.3	Diamond Head	3.758519	5,734.8	18,814.9
Wailupe cupola, 1925	21 16 44.329	1,363.3	282 28 31.0	102 29 44.7	Koko Head	3.777646	5,993.0	19,662.0
	157 45 46.146	1,330.2	71 36 52.5	251 35 45.0	Diamond Head	3.752206	5,652.0	18,543.3
Wailupe flagstaff, 1925	21 16 46.666	1,435.2	70 52 08.3	250 51 01.0	Diamond Head	3.752727	5,658.8	18,565.6
	157 45 46.743	1,347.5	92 22 34.1	272 21 43.0	Kaimuki	3.609266	4,066.9	13,342.8
Northmost high mast, 1925	21 16 45.570	1,401.5	282 48 33.4	102 49 47.2	Koko Head	3.778969	6,011.3	19,722.1
	157 45 46.500	1,340.4	71 12 53.7	251 11 46.3	Diamond Head	3.752396	5,654.5	18,551.5
Barn, 1925	21 17 18.992	584.1	59 48 54.9	239 47 53.2	Diamond Head	3.753288	5,666.1	18,589.5
	157 46 02.298	66.2	77 08 04.0	257 07 18.5	Kaimuki	3.569156	3,708.1	12,165.7
Gable, 1925	21 17 19.990	614.8	59 25 44.1	239 24 42.7	Diamond Head	3.752950	5,661.7	18,575.1
	157 46 03.100	89.4	76 35 23.9	256 34 38.7	Kaimuki	3.567333	3,692.6	12,114.8
Tank, 1925 [1]	21 17 20.84	640.9	59 12 25	239 11 23	Diamond Head	3.754044	5,676.0	18,622.0
	157 46 03.06	88.2	76 11 58	256 11 13	Kaimuki	3.568180	3,699.8	12,138.4
Black Point datum point, 1925	21 15 55.416	1,704.3	85 00 27.8	264 59 47.6	Diamond Head	3.505950	3,205.9	10,518.0
	157 47 01.407	40.6	132 23 16.5	312 22 52.5	Kaimuki	3.412883	2,587.5	8,489.2
Carter flagstaff, 1925 [1]	21 15 31.42	966.3	103 24 10	283 23 45	Diamond Head	3.296528	1,979.4	6,494.1
	157 47 45.40	1,308.9	264 09 55	84 11 52	Koko Head	3.970246	9,337.8	30,635.8
Diamond Head Lighthouse, 1925 [1]	21 15 31.97	983.2	152 37 56	332 37 53	Diamond Head	2.696591	497.3	1,631.6
	157 48 44.25	1,275.8	264 20 14	84 22 33	Koko Head 2	4.046144	11,121.0	36,486.1
Konahuanui 2, 1927	21 21 23.449	721.2	114 38 56.6	294 34 06.4	Waipio Uka	4.400989	25,176.1	82,598.6
	157 47 29.380	846.5	145 24 13.4	325 21 49.8	Kaaumakua	4.299216	19,916.6	65,343.0
			160 53 00.4	340 52 15.9	Heeia	4.030398	10,725.0	35,186.9
			207 48 31.3	27 49 46.0	Mokapu	4.101531	12,633.7	41,449.1
			12 58 01.3	192 57 31.2	Diamond Head	4.026897	10,638.9	34,904.5
			49 43 26.1	229 42 51.9	Tantalus	3.549592	3,544.8	11,629.9
Supplementary points, Honolulu and vicinity								
Kaimuki, 1872–1927	21 16 52.132	1,603.3	32 21 51.1	212 21 34.9	Diamond Head	3.379419	2,395.6	7,859.6
	157 48 07.704	222.1	126 17 34.0	306 16 28.9	Punchbowl	3.806342	6,402.4	21,005.2
			165 11 28.4	345 11 08.2	Tantalus	3.796603	6,260.4	20,539.3
Kalepeamoa, 1927	21 18 05.269	162.0	140 57 54.5	320 57 15.6	Tantalus	3.689882	4,896.5	16,064.6
	157 47 16.218	467.5	215 23 05.6	35 23 38.8	Lanipo	3.657561	4,545.3	14,912.4
			294 54 29.8	114 56 15.7	Koko Head 3	3.967256	9,273.8	30,425.8
			32 55 30.7	212 54 55.9	Diamond Head	3.706733	5,090.2	16,700.1
Rocky Hill, 1872–1927	21 18 23.877	734.3	111 48 02.9	291 47 32.4	Punchbowl	3.415786	2,604.9	8,546.2
	157 49 42.838	1,234.7	343 13 35.7	163 13 54.1	Diamond Head	3.704184	5,060.4	16,602.3
Round Top, 1927	21 18 59.891	1,841.9	87 04 09.3	267 03 34.7	Punchbowl	3.437750	2,740.0	8,989.5
	157 49 31.809	916.7	201 11 52.2	21 12 02.6	Tantalus	3.357429	2,277.3	7,471.4
			349 08 10.2	169 08 24.6	Diamond Head	3.782564	6,061.3	19,886.1
Kaimuki Fire Station, 1925	21 16 53.677	1,650.8	31 48 54.0	211 48 37.8	Diamond Head	3.386897	2,437.2	7,996.0
	157 48 07.618	219.6	125 56 06.4	305 55 01.3	Punchbowl	3.804572	6,376.3	20,919.6
Sacred Heart Academy, 1925	21 17 20.946	644.2	319 40 55.6	139 41 05.1	Kaimuki	3.065284	1,162.2	3,813.0
	157 48 33.790	974.0	10 19 44.5	190 19 37.8	Diamond Head	3.470943	2,957.6	9,703.4
Mauumea, 1927 [1]	21 17 20.36	626.2	118 35 33	298 34 26	Punchbowl	3.785663	6,104.7	20,028.5
	157 48 00.77	22.2	160 51 13	340 50 50	Tantalus	3.739408	5,487.9	18,004.9
Elks Club, flagstaff near center of roof, 1925	21 15 52.251	1,606.9	184 55 41.1	4 55 49.7	Tantalus	3.898904	7,923.3	25,995.0
	157 49 26.853	774.2	280 19 00.6	100 19 13.2	Diamond Head	3.006873	1,016.0	3,333.3
Dillingham (center of house), 1925	21 15 52.499	1,614.6	148 40 15.0	328 39 31.9	Punchbowl	3.818420	6,582.9	21,597.4
	157 49 07.992	230.4	292 35 18.8	112 35 24.6	Diamond Head	2.693394	493.6	1,619.4
Moana Hotel, flagstaff, 1925–1927	21 16 47.042	1,446.7	149 21 39.8	329 21 10.3	Punchbowl	3.661404	4,585.7	15,044.9
	157 49 45.669	1,316.5	191 08 30.2	11 08 45.7	Tantalus	3.801281	6,328.2	20,761.8
			320 26 44.5	140 27 03.9	Diamond Head	3.384071	2,421.4	7,944.2

[1] No check on this position.

Oahu Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance: Log (meters)	Distance: Meters	Distance: Feet
***Supplementary points, Honolulu and vicinity*—Continued**	° ′ ″		° ′ ″	° ′ ″				
Moana Hotel, flagstaff, 1909[1]	21 16 47.17	1,450.7	149 21 53	329 21 23	Punchbowl	3.660952	4,580.9	15,029.2
	157 49 45.76	1,319.1	320 27 23	140 27 42	Diamond Head	3.384921	2,426.2	7,960.0
Royal Hawaiian Hotel, 1927	21 16 50.249	1,545.4	151 29 42.3	331 29 15.9	Punchbowl	3.641227	4,377.5	14,361.8
	157 49 54.270	1,564.4	193 31 58.9	13 32 17.5	Tantalus	3.798294	6,284.8	20,619.4
			317 40 37.7	137 41 00.2	Diamond Head	3.424629	2,658.5	8,722.1
Waikiki latitude eccentric, 1891	21 16 52.384	1,611.0	195 36 50.0	15 37 11.3	Tantalus	3.797705	6,276.3	20,591.5
	157 50 01.856	53.5	315 19 10.3	135 19 35.5	Diamond Head	3.455857	2,856.6	9,372.0
Waikiki, 1927	21 17 15.152	466.0	145 54 30.8	325 54 04.5	Punchbowl	3.570579	3,720.3	12,205.7
	157 49 54.402	1,568.1	195 25 25.4	15 25 44.0	Tantalus	3.743833	5,544.1	18,189.3
			326 42 24.6	146 42 47.2	Diamond Head	3.514252	3,267.8	10,721.1
Kumulae, 1925	21 17 45.166	1,389.0	338 51 02.8	158 51 20.6	Diamond Head	3.593118	3,918.5	12,855.9
	157 49 41.222	1,188.2	131 11 54.1	311 11 23.0	Punchbowl	3.515373	3,276.2	10,748.7
Library, University of Hawaii, 1925	21 18 12.347	379.7	318 49 47.6	138 50 14.8	Kaimuki	3.515481	3,277.0	10,751.3
	157 49 22.540	649.7	348 58 18.6	168 58 29.6	Diamond Head	3.660388	4,575.0	15,009.8
Central Union Church, spire, 1925	21 18 07.238	222.6	332 12 46.1	152 13 14.9	Diamond Head	3.690024	4,898.1	16,069.8
	157 50 11.386	328.2	132 49 31.3	312 49 11.2	Punchbowl	3.337622	2,175.8	7,138.4
Makiki, 1927[1]	21 18 52.06	1,601.1	216 53 42	36 54 05	Tantalus	3.470726	2,956.1	9,698.5
	157 50 04.82	138.9	339 51 55	159 52 21	Diamond Head	3.784157	6,083.5	19,958.9
Lunalilo Home, spire, 1925	21 18 42.286	1,300.5	109 12 00.6	289 11 46.0	Punchbowl	3.086232	1,219.6	4,001.3
	157 50 26.793	772.2	222 06 01.2	42 06 31.6	Tantalus	3.555278	3,591.5	11,783.1
Punchbowl east, 1927	21 18 57.002	1,753.0	233 02 34.5	53 03 11.7	Tantalus	3.565813	3,679.7	12,072.5
	157 50 45.274	1,304.8	330 55 26.5	150 56 07.6	Diamond Head	3.826662	6,709.1	22,011.4
			85 14 39.9	265 14 32.1	Punchbowl	2.793312	621.3	2,038.4
Pauoa, 1927[1]	21 20 15.26	469.3	40 06 53	220 06 27	Punchbowl	3.507070	3,214.2	10,545.3
	157 49 54.90	1,582.0	277 26 43	97 27 02	Tantalus	3.176521	1,501.5	4,926.2
Waolani, 1927	21 21 04.809	147.9	304 23 25.2	124 23 56.9	Tantalus	3.483194	3,042.2	9,981.0
	157 50 30.354	874.6	343 52 55.7	163 53 31.4	Diamond Head	4.008385	10,194.9	33,447.8
			14 45 37.3	194 45 24.0	Punchbowl	3.614682	4,118.0	13,510.5
Wyllie, 1927	21 20 15.651	481.3	273 03 14.3	93 04 03.1	Tantalus	3.587899	3,871.7	12,702.4
	157 51 17.398	501.3	333 11 00.0	153 11 52.7	Diamond Head	3.967556	9,280.2	30,446.8
			352 55 19.6	172 55 23.4	Punchbowl	3.396069	2,489.3	8,167.0
St. Andrews Cathedral, highest tower, 1925	21 18 47.329	1,455.6	253 38 50.9	73 39 01.4	Punchbowl	2.941404	873.8	2,866.8
	157 51 35.850	1,033.2						
Dome, American Factors Building, 1925	21 18 40.894	1,257.7	253 28 12.4	73 28 31.2	Punchbowl	3.193232	1,560.4	5,119.4
	157 51 58.662	1,690.7	314 57 14.5	134 58 22.2	Diamond Head	3.880643	7,597.0	24,924.5
Aloha tower, 1925–1928	21 18 36.751	1,130.2	241 53 06.0	61 54 13.0	Tantalus	3.779420	6,017.6	19,742.7
	157 52 07.419	213.8	251 54 01.5	71 54 23.5	Punchbowl	3.264645	1,839.3	6,034.4
			312 57 08.7	132 58 19.6	Diamond Head	3.885942	7,690.3	25,230.6
Post office, southeast tower, flagstaff, 1925	21 18 32.562	1,001.4	239 19 14.5	59 19 29.4	Punchbowl	3.137443	1,372.3	4,502.3
	157 51 47.709	1,375.0	315 17 14.4	135 18 18.2	Diamond Head	3.856891	7,192.7	23,598.0
Post office, northwest tower, small instrument cupola, 1925.	21 18 33.724	1,037.1	241 07 30.6	61 07 45.8	Punchbowl	3.138594	1,375.9	4,514.1
	157 51 48.564	1,399.7	315 20 51.8	135 21 55.9	Diamond Head	3.859465	7,235.4	23,738.1
Hawaiian Electric Co., southeast stack, 1925	21 18 33.562	1,032.2	246 15 31.1	66 15 50.3	Punchbowl	3.220840	1,662.8	5,455.4
	157 51 59.571	1,716.9	313 35 08.7	133 36 16.8	Diamond Head	3.872644	7,458.4	24,469.8
Hawaiian Electric Co., northwest stack, 1925	21 18 34.299	1,054.8	247 09 32.0	67 09 51.3	Punchbowl	3.221718	1,666.2	5,466.5
	157 52 00.037	1.1	313 38 26.3	133 39 34.5	Diamond Head	3.874118	7,483.7	24,552.8
Judiciary Building, flagstaff, 1909	21 18 31.370	964.8	236 28 39.7	56 28 53.7	Punchbowl	3.125217	1,334.2	4,377.3
	157 51 45.352	1,307.1	315 28 07.4	135 29 10.3	Diamond Head	3.852412	7,118.9	23,355.9
Hackfeld Building, flagstaff, 1909	21 18 40.902	1,257.9	253 28 09.7	73 28 28.5	Punchbowl	3.192973	1,559.5	5,116.5
	157 51 58.632	1,689.8	314 57 36.4	134 58 44.1	Diamond Head	3.880618	7,596.6	24,923.2
Transit of Venus, 1875	21 18 22.738	699.3	235 28 16.7	55 29 16.6	Tantalus	3.760642	5,762.9	18,907.1
	157 51 47.993	1,383.2	313 29 46.6	133 30 50.4	Diamond Head	3.844301	6,987.2	22,923.8
Honolulu Longitude Monument, 1903	21 18 23.719	729.5	236 53 16.7	56 54 19.3	Tantulus	3.772650	5,924.5	19,437.3
	157 51 55.441	1,597.9	312 29 19.5	132 30 26.3	Diamond Head	3.855202	7,164.8	23,506.5
Wireless pole, top, 1909	21 18 23.256	715.2	235 18 11.9	55 18 29.8	Punchbowl	3.238766	1,732.9	5,685.4
	157 51 56.191	1,619.5	312 17 16.7	132 18 23.5	Diamond Head	3.855589	7,171.2	23,527.5
Immigration Building, flagstaff, 1925	21 18 13.669	420.4	231 09 24.9	51 09 44.9	Punchbowl	3.310232	2,042.8	6,702.1
	157 52 01.966	56.7	309 37 27.4	129 38 36.3	Diamond Head	3.851475	7,103.5	23,305.4
Allen and Robinson warehouse, 1925	21 17 53.929	1,658.5	205 13 11.8	25 13 23.0	Punchbowl	3.319585	2,087.3	6,848.1
	157 51 37.618	1,084.3	309 26 25.5	129 27 25.6	Diamond Head	3.790697	6,175.9	20,262.1

[1] No check on this position.

Oahu Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, Honolulu and vicinity—Continued	° ′ ″		° ′ ″	° ′ ″				
Crematory chimney (red brick), 1925	21 18 03.627	111.5	223 02 53.0	43 03 11.7	Punchbowl	3.337629	2,175.9	7,138.8
	157 51 58.293	1,680.2	308 11 40.6	128 12 48.2	Diamond Head	3.834241	6,827.2	22,398.9
Pumping station chimney, 1909	21 18 04.787	147.2	222 29 55.1	42 30 13.0	Punchbowl	3.323917	2,108.2	6,916.7
	157 51 56.176	1,619.2	308 44 56.0	128 46 02.8	Diamond Head	3.832612	6,801.6	22,314.9
U. S. E. "Seawall," 1909	21 18 01.450	44.6	227 16 26.3	47 16 48.9	Punchbowl	3.387793	2,442.3	8,012.8
	157 52 09.010	259.7	306 12 30.6	126 13 42.1	Diamond Head	3.847125	7,032.7	23,073.1
Sand Island Light, 1927	21 18 19.376	595.9	238 49 20.5	58 50 30.8	Tantalus	3.813581	6,510.0	21,358.2
	157 52 16.519	476.1	241 11 20.3	61 11 45.6	Punchbowl	3.360698	2,294.6	7,528.2
Honolulu Lighthouse, 1925	21 18 17.402	535.2	240 07 44.7	60 08 10.3	Punchbowl	3.369615	2,342.2	7,684.4
	157 52 17.230	496.6						
Front range lighthouse, 1909	21 18 17.409	535.4	240 07 47.5	60 08 13.1	Punchbowl	3.369543	2,341.8	7,683.1
	157 52 17.218	496.3	308 09 39.8	128 10 54.2	Diamond Head	3.876099	7,517.9	24,665.0
Black beacon, No. 7, 1909	21 18 08.189	251.8	236 13 18.7	56 13 46.0	Punchbowl	3.416266	2,607.8	8,555.8
	157 52 21.968	633.2	305 47 48.9	125 49 05.1	Diamond Head	3.872548	7,456.7	24,464.2
Red beacon, No. 8, 1909	21 18 05.317	163.5	232 49 09.8	52 49 35.4	Punchbowl	3.405725	2,545.2	8,350.4
	157 52 17.121	493.5	305 52 35.8	125 53 50.2	Diamond Head	3.862832	7,291.8	23,923.2
Black beacon, No. 5, 1909	21 18 00.359	11.0	234 05 39.2	54 06 08.6	Punchbowl	3.459831	2,882.9	9,458.3
	157 52 27.781	800.7	303 32 31.2	123 33 49.5	Diamond Head	3.872597	7,457.6	24,467.1
Red beacon, No. 6, 1909	21 17 57.646	1,772.8	230 59 47.7	51 00 15.3	Punchbowl	3.450079	2,818.9	9,248.3
	157 52 22.767	656.2	303 37 24.8	123 38 41.2	Diamond Head	3.862786	7,291.0	23,920.6
Black beacon, No. 3, 1909	21 17 51.815	1,593.5	231 20 53.7	51 21 24.5	Punchbowl	3.495216	3,127.6	10,261.1
	157 52 31.510	908.2	301 23 16.3	121 24 35.9	Diamond Head	3.869652	7,407.2	24,301.8
Red beacon, No. 4, 1909	21 17 49.759	1,530.3	228 37 27.9	48 37 56.7	Punchbowl	3.484439	3,051.0	10,009.8
	157 52 26.201	755.2	301 35 32.3	121 36 50.0	Diamond Head	3.859951	7,243.5	23,764.7
Sand Island south base, 1927	21 18 09.962	306.4	237 21 52.7	57 22 20.1	Punchbowl	3.412862	2,587.4	8,488.8
	157 52 22.361	644.5	237 28 12.3	57 29 24.7	Tantalus	3.832882	6,805.8	22,328.7
			306 05 02.3	126 06 18.6	Diamond Head	3.874939	7,497.9	24,599.4
Rear range lighthouse, 1909 [1]	21 18 37.04	1,139.1	252 29 51	72 30 13	Punchbowl	3.272029	1,870.8	6,137.8
	157 52 08.66	249.6	53 49 12	233 49 05	U. S. E. north base	2.828434	673.6	2,210.0
U. S. E. north base, 1909	21 18 24.105	741.3	247 34 52.4	67 35 21.7	Punchbowl	3.401096	2,518.2	8,261.8
	157 52 27.532	793.5	308 00 06.9	128 01 25.1	Diamond Head	3.896468	7,878.9	25,849.4
Quarantine flagstaff, 1909	21 18 33.275	1,023.3	256 36 11.7	76 36 47.6	Punchbowl	3.466617	2,928.3	9,607.3
	157 52 45.599	1,314.2	307 20 02.4	127 21 27.1	Diamond Head	3.927549	8,463.5	27,767.3
Quarantine Island, flagstaff, 1925–1928	21 18 36.280	1,115.8	258 29 46.9	78 30 23.2	Punchbowl	3.468149	2,938.7	9,641.4
	157 52 46.675	1,345.2	307 42 02.0	127 43 27.2	Diamond Head	3.931679	8,544.3	28,032.4
Kalihi Channel datum point, 1925	21 18 27.273	838.8	260 02 57.3	80 03 59.4	Punchbowl	3.698737	4,997.3	16,395.3
	157 53 57.545	1,658.5						
Rad, 1925	21 18 46.236	1,421.9	267 04 05.5	87 05 14.5	Punchbowl	3.739123	5,484.3	17,993.1
	157 54 16.804	484.3	300 34 42.7	120 36 40.6	Diamond Head	4.036255	10,870.6	35,664.6
Pineapple tank (Hawaiian Pineapple Co.) Honolulu, 1928.	21 19 12.513	384.8	282 56 01.0	102 56 30.0	Punchbowl	3.373047	2,360.7	7,745.1
	157 52 26.593	766.4	333 19 24.4	153 19 31.4	Aloha Tower	3.090211	1,230.9	4,038.4
American Cannery, water tower, 1927	21 19 12.556	386.1	253 03 26.3	73 04 38.2	Tantalus	3.774712	5,952.7	19,529.8
	157 52 20.842	600.6	283 56 01.1	103 56 28.0	Punchbowl	3.342389	2,199.8	7,217.2
			316 30 31.5	136 31 47.3	Diamond Head	3.941541	8,740.6	28,676.5
Red gas tank, center, 1925	21 19 11.045	339.7	281 42 11.2	101 42 40.6	Punchbowl	3.376995	2,382.3	7,815.9
	157 52 27.700	798.3						
Kalihi Fire Station, 1925	21 20 04.657	143.2	268 48 06.3	88 49 26.4	Tantalus	3.802238	6,342.2	20,807.7
	157 52 43.277	1,247.1	307 28 01.6	127 28 36.7	Punchbowl	3.544650	3,504.7	11,498.3
Oahu Pen., 1925	21 19 57.863	1,779.5	267 15 52.5	87 17 22.8	Tantalus	3.855171	7,164.3	23,504.9
	157 53 11.570	333.4						
Fort Shafter, flagstaff, 1909	21 20 58.234	1,790.9	313 47 33.6	133 48 23.3	Punchbowl	3.737292	5,461.2	17,917.3
	157 53 23.544	678.4	320 47 39.0	140 49 17.6	Diamond Head	4.092603	12,376.6	40,605.6
Mill chimney, 1909	21 20 23.449	721.2	306 27 16.4	126 28 02.7	Punchbowl	3.658998	4,560.3	14,961.6
	157 53 14.031	404.3	318 27 36.0	138 29 11.1	Diamond Head	4.056290	11,383.9	37,348.7
Station G, 1925	21 18 52.059	1,601.0	269 16 47.6	89 18 30.5	Punchbowl	3.911636	8,159.0	26,768.3
	157 55 49.836	1,436.3						
Pearl Harbor entrance datum point, 1925	21 18 45.519	1,399.9	268 27 35.4	88 29 58.7	Punchbowl	4.055774	11,370.4	37,304.4
	157 57 41.144	1,185.8						

[1] No check on this position.

Oahu Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, southern part of island	° ′ ″		° ′ ″	° ′ ″				
Gilbert, 1927	21 19 56.284	1,731.0	131 41 39.6	311 41 04.0	Kahe	3.576076	3,767.7	12,361.2
	158 06 12.570	362.2	175 48 30.9	355 48 25.0	Manawahua	3.803296	6,357.6	20,858.2
Barbers Point Light, 1927	21 17 58.078	1,786.1	159 53 58.7	339 53 30.3	Kahe	3.815558	6,539.7	21,455.7
	158 06 32.210	928.4	180 34 49.9	0 34 51.1	Manawahua	3.998978	9,976.5	32,731.2
Supplementary points, southwest coast								
Lookout tower, 1910	21 22 32.106	987.4	174 19 29.7	354 19 19.1	Waipio Uka	3.924984	8,413.6	27,603.6
	158 00 15.183	437.4	225 31 17.7	45 31 45.5	Ewa Church	3.488912	3,082.6	10,113.5
Kapu, 1910	21 24 25.463	783.1	276 11 24.5	96 13 58.9	Ewa Church	4.088574	12,262.4	40,230.9
	158 06 02.006	57.8	317 52 38.2	137 53 59.7	Ewa mill chimney (old)	3.982833	9,612.4	31,536.7
Mailiili, 1875	21 26 07.992	245.8	207 56 12.7	27 56 22.4	Paheehee	3.213039	1,633.2	5,358.3
	158 10 48.116	1,385.6	304 15 28.4	124 17 03.1	Manawahua	3.956222	9,041.1	29,662.3
Mailiili, 1927 [1]	21 26 08.05	247.6	207 48 20	27 48 30	Paheehee New	3.212404	1,630.8	5,350.4
	158 10 48.15	1,386.6						
Waianae mill chimney, 1927	21 26 51.257	1,576.4	176 58 59.1	356 58 57.4	Makaha	3.405336	2,542.9	8,342.8
	158 11 23.226	668.8	242 14 55.2	62 16 25.7	Kum	3.905294	8,040.7	26,380.2
Burns (U. S. E.), 1914–1919	21 27 56.822	1,747.6	304 33 45.0	124 34 20.1	Paheehee (U. S. E.)	3.525217	3,351.3	10,995.1
	158 11 57.407	1,652.8						
Kepu (U. S. E.), 1914–1919	21 28 52.101	1,602.4	299 10 33.4	119 11 12.1	Burns (U. S. E.)	3.542435	3,486.9	11,439.9
	158 13 43.152	1,242.3	326 20 37.4	146 20 53.9	Lahilahi (U. S. E.)	3.370371	2,346.2	7,697.5
Kepuhi, 1875–1910	21 28 52.257	1,607.2	234 10 57.5	54 11 21.3	Keaau	3.362233	2,302.7	7,554.8
	158 13 43.896	1,253.6	301 46 02.4	121 47 16.5	Paheehee	3.835895	6,853.2	22,484.2
Burns, 1927	21 29 35.085	1,079.0	267 33 57.4	87 34 05.3	Keaau 2	2.793592	621.7	2,039.7
	158 13 00.895	25.8	313 01 07.1	133 01 41.2	Makaha	3.563814	3,662.8	12,017.0
			358 31 35.7	178 31 36.8	Lahilahi	3.515373	3,276.2	10,748.7
			64 27 41.9	244 27 29.2	Kepuhi New	3.045270	1,109.9	3,641.4
Makaha (U. S. E.), 1914–1919	21 29 33.833	1,040.5	13 08 15.0	193 08 06.1	Burns (U. S. E.)	3.486252	3,063.7	10,051.5
	158 11 33.220	956.2	37 01 15.9	217 00 44.9	Lahilahi (U. S. E.)	3.607818	4,053.4	13,298.5
Eshleman (U. S. E.), 1914–1919 [1]	21 29 41.26	1,269.0	12 27 59	192 27 50	Burns (U. S. E.)	3.517133	3,289.5	10,792.3
	158 11 32.74	942.4	35 18 47	215 18 16	Lahilahi (U. S. E.)	3.627972	4,245.9	13,930.1
Ohikilolo, 1927	21 31 09.139	281.1	187 10 41.2	7 10 47.4	Kealia	3.591765	3,906.3	12,815.9
	158 13 05.730	164.9	290 35 33.8	110 35 41.7	Lolo	2.823390	665.9	2,184.7
			345 08 35.7	165 08 45.3	Keaau 2	3.472085	2,965.4	9,729.0
			14 20 48.7	194 20 37.7	Kepuhi New	3.541541	3,479.7	11,416.3
Keawaula (Army), 1927	21 33 06.071	186.7	1 15 32.8	181 15 31.7	Lolo	3.583357	3,831.4	12,570.2
	158 12 41.147	1,184.0	25 19 21.8	205 19 01.7	Makua 2	3.566858	3,688.6	12,101.7
			141 52 58.7	321 52 55.9	Kealia	2.550418	355.2	1,165.4
Kealia (U. S. E.), 1914–1919	21 35 06.875	211.4	273 34 11.7	93 34 57.4	Mokuleia (U. S. E.)	3.554375	3,584.1	11,758.8
	158 12 05.823	167.5	312 20 53.6	132 21 59.6	Kaupakuhale	3.844306	6,987.2	22,923.8
Kaena Point Light, 1927	21 34 38.983	1,198.9	312 42 27.2	132 43 59.6	Lolo	3.993796	9,858.2	32,343.1
	158 16 55.772	1,604.5	317 06 43.7	137 07 57.1	Makua 2	3.926822	8,449.3	27,720.7
			321 36 48.1	141 38 22.2	Keaau 2	4.075115	11,888.2	39,003.2
			329 37 01.4	149 38 14.8	Kepuhi New	4.056444	11,387.9	37,361.8
Kaena Point (U. S. E.), 1914–1919	21 34 38.988	1,199.1	314 16 55.6	134 18 20.0	Ohikilolo	3.965760	9,241.9	30,321.1
	158 16 55.625	1,600.3	329 38 09.4	149 39 22.8	Kepuhi New	4.056368	11,385.9	37,355.2
Kaena, 1875	21 34 38.368	1,180.0	321 34 16.0	141 35 50.1	Keaau	4.074305	11,866.0	38,930.4
	158 16 55.245	1,589.3	332 38 13.3	152 39 23.5	Kepuhi	4.078627	11,984.7	39,319.8
Supplementary points, northwest coast								
Mokuleia, 1927	21 34 54.733	1,683.3	335 27 42.3	155 28 07.6	Kaupakuhale	3.678010	4,764.4	15,631.2
	158 10 15.125	435.1	35 41 25.3	215 40 50.3	Moku	3.672327	4,702.5	15,428.1
			55 17 33.5	235 16 37.1	Kealia	3.730586	5,377.6	17,643.0
			118 37 27.1	298 37 21.5	Dillingham	2.704289	506.2	1,660.8
Pump, 1910	21 34 38.995	1,199.3	223 57 27.7	43 57 37.5	Mok	3.044791	1,108.6	3,637.1
	158 11 01.252	36.0	247 34 48.3	67 36 27.1	Ena	3.922083	8,357.6	27,419.9
Kawaihapai, 1927	21 35 05.134	157.9	299 26 04.2	119 26 06.0	Dillingham	2.197454	157.6	517.1
	158 10 35.340	1,016.6	331 10 57.7	151 11 30.4	Kaupakuhale	3.725236	5,311.7	17,426.8
			27 34 34.8	207 34 07.2	Moku	3.669295	4,669.8	15,320.8
Mok, 1910	21 35 04.943	152.0	242 47 11.7	62 50 58.9	Kawela	4.299557	19,932.3	65,394.6
	158 10 34.502	992.5	308 33 58.6	128 35 44.7	Maili	4.026438	10,627.7	34,867.7
Wind, 1910	21 35 06.129	188.5	327 02 31.7	147 03 26.9	Maili	3.899907	7,941.6	26,055.1
	158 08 15.885	457.0	89 28 58.0	269 28 07.0	Mok	3.600730	3,987.8	13,083.3
Waialua mill chimney, 1910–1927	21 34 36.919	1,135.4	330 14 27.0	150 15 09.1	Maili	3.822250	6,641.3	21,789.0
	158 07 40.304	1,159.5	356 24 27.0	176 24 30.1	Puu Iki	3.591214	3,901.3	12,799.5
			33 11 12.6	213 10 41.0	Kaupakuhale	3.655534	4,524.1	14,842.8

[1] No check on this position.

Oahu Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance: Log (meters)	Distance: Meters	Distance: Feet
Supplementary points, northwest coast—Continued	° ′ ″		° ′ ″	° ′ ″				
Waialua (U. S. E.), 1914–1919	21 35 30.919	950.9	306 15 05.9	126 16 07.2	O'Reilly	3.773933	5,942.0	19,494.7
	158 07 02.373	68.3	79 25 17.8	259 24 11.9	Mokuleia (U. S. E.)	3.719449	5,241.4	17,196.2
Protestant Church, 1910	21 35 37.924	1,166.4	218 32 52.4	38 34 07.4	Pupukea	3.973069	9,398.7	30,835.6
	158 06 17.971	516.9	353 05 02.1	173 05 13.9	Maili	3.886376	7,698.0	25,255.9
Haleiwa Hotel, southwest flagstaff, 1910	21 35 45.159	1,388.9	220 21 02.1	40 22 19.7	Pupukea	3.970970	9,353.4	30,686.9
	158 06 24.891	716.0	351 51 03.7	171 51 18.1	Maili	3.900076	7,944.7	26,065.2
Ena (Puena, 1927), 1910–1927	21 36 22.577	694.4	351 29 17.2	171 29 34.4	Maili	3.959787	9,115.6	29,906.8
	158 06 32.645	939.0	71 04 12.5	251 02 43.5	Mok	3.866602	7,355.3	24,131.5
Puaena, 1875	21 36 19.068	586.4	351 30 45.8	171 31 02.8	Maili	3.954527	9,005.9	29,546.9
	158 06 31.947	918.9	68 00 42.4	247 59 20.3	Mokuleia	3.840354	6,924.0	22,716.5
Dub, 1910	21 36 34.574	1,063.3	219 33 00.5	39 33 59.9	Pupukea	3.861708	7,272.9	23,861.2
	158 05 35.333	1,016.2	1 49 54.2	181 49 50.4	Maili	3.972623	9,389.1	30,804.1
Kawailoa, 1927 [1]	21 36 09.68	297.7	9 20 49	189 20 39	O'Reilly	3.678499	4,769.8	15,648.9
	158 03 48.90	1,406.6	79 02 30	259 01 14	Waialua 2	3.785885	6,107.8	20,038.7
Schofield Post, flag, 1927	21 29 34.413	1,058.4	48 54 01.7	228 53 23.2	Mauna Una	3.604005	4,018.0	13,182.4
	158 03 04.908	141.3	127 23 39.2	307 22 40.2	Maili	3.765425	5,826.7	19,116.4
			246 44 59.8	66 46 27.7	Station Z	3.875674	7,510.6	24,641.0
Schofield laundry, stack, 1927	21 29 31.533	969.8	46 43 50.0	226 43 15.5	Mauna Una	3.571051	3,724.4	12,219.1
	158 03 15.881	457.1	130 03 35.0	310 02 40.0	Maili	3.750943	5,635.6	18,489.5
			247 03 56.6	67 05 28.5	Station Z	3.894090	7,835.9	25,708.3
Peahinaia, 1875	21 33 28.899	888.8	42 23 34.5	222 21 40.0	Mauna Una	4.125095	13,338.1	43,760.1
	157 59 37.719	1,085.3	70 53 15.5	250 51 00.4	Maili	4.049596	11,209.8	36,777.5
Cain (U. S. E.), 1914–1919	21 37 41.671	1,281.6	17 43 30.4	197 42 43.7	Maili	4.079832	12,018.0	39,429.1
	158 03 38.623	1,110.8	64 04 52.5	244 03 48.4	Puena	3.745473	5,565.1	18,258.2
Paumalu (U. S. E.), 1914–1919	21 39 02.388	73.4	25 04 37.1	205 03 13.8	Maili	4.186919	15,378.7	50,455.0
	158 01 59.275	1,704.4	61 43 34.4	241 40 36.8	Mokuleia (U. S. E.)	4.197303	15,750.8	51,675.7
Waimea, 1910	21 38 43.755	1,345.7	13 47 33.2	193 46 51.3	Maili	4.138416	13,753.6	45,123.3
	158 03 51.824	1,490.2	46 48 40.2	226 47 40.9	Puena	3.802381	6,344.3	20,814.6
Ka, 1910–1927	21 40 03.074	94.5	133 05 50.0	313 05 22.4	Waialee	3.468704	2,942.4	9,653.5
	158 00 11.284	324.4	159 23 26.5	339 23 14.9	Opana	3.410332	2,572.4	8,439.6
			249 56 54.7	69 57 21.1	Puuki	3.338819	2,181.8	7,158.1
Supplementary points, northeast and east coasts								
Wireless pole, 1910	21 41 09.239	284.2	350 14 40.2	170 14 58.1	Papau	3.916884	8,258.2	27,093.8
	157 56 48.374	1,390.6	70 46 45.0	250 45 30.0	Ka	3.790863	6,178.2	20,269.6
Kahuku mill chimney, 1927	21 40 55.523	1,707.7	313 21 43.0	133 22 28.6	Laie 1	3.688660	4,882.7	16,019.3
	157 57 09.660	277.7	72 16 25.0	252 15 17.0	Lak	3.744837	5,557.0	18,231.6
			74 44 56.8	254 44 16.1	Puuki	3.516907	3,287.8	10,786.7
Mormon Church, spire, 1910 [1]	21 39 01.66	51.1	263 32 30	83 32 46	Laie (Laie 2)	3.094463	1,243.0	4,078.1
	157 55 59.37	1,707.1	0 08 11	180 08 11	Papau	3.624796	4,215.0	13,828.7
Kaipapau, 1927	21 37 14.393	442.7	134 30 29.2	314 29 11.8	Puuki	3.927841	8,469.2	27,786.0
	157 55 29.910	860.2	191 10 57.0	11 11 05.8	Laie 1	3.545910	3,514.9	11,531.8
			341 31 14.7	161 31 26.7	Waiahilahila	3.471602	2,962.1	9,718.2
Kapaka, 1910	21 36 20.404	627.5	324 31 42.5	144 32 12.9	Puna	3.612293	4,095.4	13,436.3
	157 54 02.994	86.1	102 30 30.5	282 29 47.5	Papau	3.536420	3,438.9	11,282.5
Old Catholic Church, spire, 1910	21 35 30.179	928.2	155 16 03.3	335 15 24.1	Laie (Laie 2)	3.864226	7,315.2	24,000.0
	157 53 29.979	862.3	321 27 15.0	141 27 33.3	Puna	3.359757	2,289.6	7,511.8
Protestant Church, spire, 1910	21 35 22.885	703.8	319 21 02.4	139 21 19.6	Puna	3.314819	2,064.5	6,773.3
	157 53 27.134	780.5	119 48 23.8	299 47 27.7	Papau	3.703959	5,057.8	16,593.8
Large chimney, 1910 [1]	21 31 32.31	993.7	305 08 11	125 10 27	Mokapu	4.117780	13,115.4	43,029.4
	157 50 17.19	494.7	351 16 06	171 16 23	Heeia	3.939161	8,692.8	28,519.6
Mokolii Island, 1926	21 30 45.818	1,409.1	301 09 58.5	121 12 07.3	Mokapu	4.072733	11,823.1	38,789.6
	157 49 56.046	1,613.1	354 19 58.0	174 20 07.0	Heeia	3.857178	7,197.4	23,613.5
Kaaumakua, 1927	21 30 16.405	504.5	62 58 07.3	242 56 40.1	Waipio Uka	4.113555	12,988.4	42,612.8
	157 54 02.268	65.3	286 50 27.2	106 54 06.1	Mokapu	4.254716	17,977.0	58,979.5
			308 43 44.1	128 45 23.3	Heeia	3.999962	9,999.1	32,805.4
Red church, spire, 1910 [1]	21 29 53.45	1,643.9	327 16 40	147 18 20	Kailua	4.164696	14,611.5	47,937.9
	157 51 13.83	398.1	332 00 36	152 01 13	Heeia	3.798421	6,286.7	20,625.6
White church, spire, 1910 [1]	21 29 53.22	1,636.8	289 52 56	109 55 34	Mokapu	4.121578	13,230.6	43,407.4
	157 51 16.80	483.6	331 17 41	151 18 19	Heeia	3.800805	6,321.3	20,739.1
Waiahole, 1926	21 28 43.636	1,342.0	281 36 03.3	101 38 29.5	Mokapu	4.069542	11,736.6	38,505.8
	157 50 43.980	1,266.1	328 26 32.0	148 26 58.6	Heeia	3.601552	3,995.3	13,107.9

[1] No check on this position.

[2] Checked by verticals only.

58955°—30——5

Oahu Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, northeast and east coasts—Continued	° ′ ″		° ′ ″	° ′ ″				
Kapapa Island, 1926	21 28 47.693	1,466.8	289 36 40.0	109 38 08.8	Mokapu	3.869893	7,411.3	24,315.2
	157 48 07.151	205.9	34 29 30.5	214 28 59.6	Heeia	3.631637	4,281.9	14,048.2
Kekepa Island, 1926	21 27 54.289	1,669.7	280 35 09.8	100 36 07.3	Mokapu	3.663200	4,604.7	15,107.3
	157 46 41.882	1,205.8	68 52 03.4	248 51 01.4	Heeia	3.718654	5,231.8	17,164.7
Kahaluu Landing, 1926	21 27 59.827	1,840.0	275 29 25.3	95 31 39.3	Mokapu	4.024985	10,592.2	34,751.2
	157 50 10.872	313.0	331 03 24.5	151 03 38.9	Heeia	3.371220	2,350.8	7,712.6
Pond, 1926	21 26 43.391	1,334.5	101 05 17.0	281 04 58.0	Heeia	3.183719	1,526.6	5,008.5
	157 48 39.334	1,132.6	260 24 43.6	80 26 24.1	Mokapu	3.904177	8,020.0	26,312.3
Heeia Mill, stack, 1910	21 25 59.553	1,831.6	251 06 52.9	71 08 32.5	Mokapu	3.918678	8,292.4	27,206.0
	157 48 37.179	1,070.6	326 25 24.4	146 26 07.3	Kailua	3.786926	6,122.5	20,086.9
Moku o Loe Island, 1926	21 26 12.202	375.3	109 14 26.9	289 13 41.3	Heeia	3.580087	3,802.7	12,476.0
	157 47 26.675	768.1	248 28 22.7	68 29 36.6	Mokapu	3.796026	6,252.1	20,512.1
Pahu, 1910	21 25 32.547	1,001.0	335 39 52.2	155 40 16.7	Kailua	3.670901	4,687.1	15,377.6
	157 47 46.683	1,344.4	129 21 48.6	309 21 10.4	Heeia	3.590905	3.898.6	12,790.7
Kaneohe, 1926	21 24 40.879	1,257.2	133 27 22.3	313 26 27.9	Heeia	3.771271	5,905.7	19,375.6
	157 47 02.478	71.4	225 05 38.2	45 06 43.2	Mokapu	3.859016	7,228.0	23,713.9
Kailua, 1872-1927	21 23 13.683	420.8	344 43 50.3	164 44 10.2	Lanipo	3.777505	5,991.1	19,655.8
	157 46 39.633	1,141.7	143 45 00.0	323 43 57.3	Heeia	3.922331	8,362.4	27,435.6
			209 49 12.0	29 50 08.6	Mokapu	3.952888	8,972.0	29,435.6
			306 02 45.8	126 04 47.6	Waimanalo	4.076519	11,926.7	39,129.5
Podmore, 1926	21 23 19.475	599.0	168 14 25.9	348 14 05.8	Mokapu	3.890332	7,768.4	25,486.8
	157 43 09.688	279.1	322 16 19.8	142 17 43.3	Makapuu Point	4.033747	10,808.0	35,459.2
Papaa, 1910	21 25 32.169	989.4	216 21 05.6	36 21 38.5	Mokapu	3.641089	4,376.1	14,357.3
	157 45 34.766	1,001.2	23 41 18.9	203 40 55.2	Kailua	3.667533	4,650.9	15,258.8
Venice, 1926	21 26 24.260	746.1	97 51 10.7	277 49 49.4	Heeia	3.810483	6,463.7	21,206.3
	157 45 48.985	1,410.6	237 22 29.4	57 23 07.6	Mokapu	3.552173	3,565.9	11,699.1
Post, 1926	21 26 45.806	1,408.8	92 00 44.7	271 59 25.0	Heeia	3.797820	6,278.0	20,597.1
	157 45 53.466	1,539.5	248 05 17.5	68 05 57.3	Mokapu	3.528426	3,376.2	11,076.7
Sheriff, 1926	21 26 49.993	1,537.5	91 03 08.5	271 02 05.4	Heeia	3.696188	4,968.1	16,299.5
	157 46 38.852	1,118.7	255 42 01.8	75 42 58.2	Mokapu	3.660960	4,581.0	15,029.5
Hawaiiloa Hill, 1926	21 27 04.107	126.3	87 07 38.4	267 06 11.8	Heeia	3.834249	6,827.3	22,399.2
	157 45 34.551	994.9	254 55 31.2	74 56 04.1	Mokapu	3.428120	2,679.9	8,792.3
Pyramid Rock, highest part, 1926	21 27 55.469	1,705.9	285 02 57.3	105 03 39.0	Mokapu	3.531337	3,398.9	11,151.2
	157 45 58.676	1,689.4	72 34 31.1	252 33 13.8	Heeia	3.807442	6,418.6	21,058.4
Mokolea Rock, highest part, 1926	21 26 06.385	196.4	356 36 50.4	176 36 54.3	Podmore	3.711152	5,142.2	16,870.7
	157 43 20.231	582.6	152 37 54.5	332 37 38.3	Mokapu	3.444614	2,783.6	9,132.5
Flagpole (G. P. Wilcox), 1926	21 24 56.981	1,752.5	195 12 32.7	15 12 48.6	Mokapu	3.678862	4,773.8	15,662.0
	157 44 48.173	1,387.4	316 35 10.3	136 35 46.3	Podmore	3.615724	4,127.9	13,543.0
Flat, 1926	21 24 09.262	284.9	73 15 55.5	253 14 43.5	Kailua	3.773269	5,932.9	19,464.9
	157 43 22.394	645.0	168 40 00.6	348 39 45.2	Mokapu	3.792037	6,194.9	20,324.4
Alala, 1910	21 23 46.364	1,425.9	79 52 43.2	259 51 32.0	Kailua	3.756931	5,713.9	18,746.4
	157 43 24.363	701.8	118 30 56.9	298 28 42.9	Heeia	4.080135	12,026.4	39,456.6
Papa, 1910	21 23 19.169	589.5	88 24 41.2	268 23 24.7	Kailua	3.781438	6,045.6	19,834.6
	157 43 09.841	283.5	120 54 46.4	300 52 27.1	Heeia	4.107359	12,804.4	42,009.1
Mokulua Island, 1926	21 23 41.646	1,280.8	70 12 12.2	250 11 48.2	Podmore	3.303830	2,012.9	6,604.0
	157 42 03.938	113.4	153 20 22.5	333 19 38.3	Mokapu	3.889162	7,747.5	25,418.3
Olomana, 1910	21 21 51.680	1,589.4	134 58 07.3	314 57 35.3	Kailua	3.552526	3,568.8	11,708.6
	157 45 11.980	345.1	141 07 57.0	321 06 22.3	Heeia	4.075614	11,901.8	39,047.8
Militres, 1926	21 20 49.897	1,534.5	161 35 10.3	341 34 51.0	Podmore	3.685611	4,848.5	15,907.1
	157 42 16.520	476.0	307 51 04.9	127 52 09.0	Makapuu Point	3.808558	6,435.1	21,112.5
Derrick, Waimanalo wharf, 1926 [1]	21 20 05.13	157.8	156 40 14	336 39 42	Podmore	3.813537	6,509.3	21,355.9
	157 41 40.20	1,158.4	302 31 14	122 32 05	Makapuu Point	3.679851	4,784.7	15,697.8
Manana Island, 1926	21 19 51.716	1,590.5	135 33 51.5	315 32 32.3	Podmore	3.951829	8,950.1	29,363.8
	157 39 32.154	926.6	150 43 32.0	330 41 52.6	Mokapu	4.205366	16,046.0	52,644.3
Makapuu Point Light, 1927	21 18 47.013	1,445.8	122 17 54.1	302 15 10.0	Kailua	4.186346	15,358.4	50,388.4
	157 39 08.959	258.2	129 50 33.0	309 46 46.1	Heeia	4.368122	23,341.1	76,578.3
			151 57 39.7	331 55 51.9	Mokapu	4.257986	18,112.8	59,425.1

[1] *No check on this position.*

Oahu Island to Hawaii Island

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Principal points	° ′ ″		° ′ ″	° ′ ″				
Mauna Loa, 1872–1926	21 08 43.505	1,338.0	100 56 49.6	280 42 37.0	Leahi	4.840195	69,214.2	227,080.3
	157 09 35.118	1,013.3	120 10 49.2	299 58 17.4	Mokapu	4.838417	68,931.4	226,152.4
Kaunakakai, 1925	21 05 21.719	667.9	113 54 39.3	293 51 44.4	Mauna Loa	4.185410	15,325.3	50,279.8
	157 01 29.552	853.0						
Middle Hill (Kaulapuu), 1915	21 09 11.153	343.0	85 35 18.4	265 33 01.2	Mauna Loa	4.041648	11,006.5	36,110.5
	157 03 14.782	426.5	336 42 31.9	156 43 09.8	Kaunakakai	3.885455	7,681.7	25,202.4
Molokai south base	21 07 54.871	1,687.5	246 34 45.1	66 35 52.8	Middle Hill	3.771169	5,904.3	19,371.0
	157 06 22.565	651.1	299 06 07.7	119 07 53.2	Kaunakakai	3.985854	9,679.5	31,756.8
Molokai north base	21 08 52.708	1,621.0	264 56 58.9	84 58 19.3	Middle Hill	3.810109	6,458.2	21,188.3
	157 06 57.753	1,666.3	304 23 53.1	124 25 51.3	Kaunakakai	4.059973	11,480.8	37,666.6
			330 16 46.7	150 16 59.4	Molokai south base	3.311348	2,048.1	6,719.5
Kanepuu, 1879	20 52 23.560	724.5	148 55 53.8	328 52 08.2	Mauna Loa	4.546482	35,195.1	115,469.3
	156 59 05.628	162.7	166 56 23.2	346 54 53.9	Middle Hill	4.502580	31,811.2	104,367.2
			170 09 07.8	350 08 16.3	Kaunakakai	4.385414	24,289.2	79,688.8
Puu Papai, 1925	21 03 57.941	1,781.9	21 54 37.6	201 52 51.3	Kanepuu	4.362004	23,014.6	75,507.1
	156 54 08.518	245.9	101 27 46.4	281 25 07.9	Kaunakakai	4.113576	12,989.0	42,614.7
			108 13 34.9	288 08 01.4	Mauna Loa	4.449439	28,147.4	92,346.9
Pohoula, 1879–1927	20 50 53.436	1,643.3	113 40 32.2	293 39 14.3	Kanepuu	3.839156	6,904.9	22,653.8
	156 55 26.855	776.4	143 22 30.8	323 17 27.0	Mauna Loa	4.613063	41,026.4	134,600.8
			185 21 17.7	5 21 45.7	Puu Papai	4.384387	24,231.9	79,500.8
Paupau, 1879–1912	20 53 27.898	857.9	80 50 40.5	260 44 39.3	Pohoula	4.472647	29,692.5	97,416.1
	156 38 32.880	950.3	86 52 57.4	266 45 38.0	Kanepuu	4.552496	35,685.8	117,079.2
			117 43 45.8	297 32 38.1	Mauna Loa	4.783209	60,702.8	199,155.8
			125 41 03.4	305 35 28.4	Puu Papai	4.521845	33,254.1	109,101.2
Puu Manu, 1879–1927	20 46 47.214	1,451.9	131 29 53.6	311 27 29.8	Kanepuu	4.193588	15,616.7	51,235.8
	156 52 20.980	606.8	144 38 25.8	324 37 19.8	Pohoula	3.967814	9,285.7	30,464.8
			242 43 35.0	62 48 29.6	Paupau	4.430193	26,927.3	88,344.0
Hekili, 1879–1925	20 48 40.036	1,231.2	82 29 45.8	262 24 24.3	Puu Manu	4.421788	26,411.2	86,650.7
	156 37 15.653	452.6	165 50 55.7	345 50 28.2	Paupau	3.960458	9,129.7	29,953.0
Puu Olai, 1879–1905	20 38 22.363	687.7	109 34 11.0	289 25 15.1	Puu Manu	4.667642	46,520.2	152,625.0
	156 27 05.487	158.8	137 07 29.1	317 03 53.3	Hekili	4.413839	25,932.2	85,079.2
Kahoolawe, 1871–1905	20 34 04.508	138.6	128 32 46.0	308 26 46.3	Puu Manu	4.576117	37,680.5	123,623.4
	156 35 22.071	639.3	173 02 42.2	353 02 02.2	Hekili	4.433357	27,124.2	88,990.0
			241 06 04.7	61 08 59.5	Puu Olai	4.215396	16,420.9	53,874.2
Maui south base, 1871	20 50 47.639	1,465.0	20 26 28.0	200 24 07.6	Kahoolawe	4.517424	32,917.3	107,996.2
	156 28 45.152	1,305.4	352 49 28.5	172 50 03.8	Puu Olai	4.363604	23,099.6	75,785.9
Piiholo, 1871	20 51 19.622	603.4	43 50 04.3	223 43 51.4	Kahoolawe	4.644345	44,090.5	144,653.6
	156 17 47.778	1,381.2	87 04 11.5	267 00 17.5	Maui south base	4.279438	19,030.0	62,434.3
Puu Pane, 1871	20 48 27.170	835.5	104 33 19.4	284 29 54.4	Maui south base	4.236075	17,221.7	56,501.5
	156 19 08.582	248.2	203 46 17.2	23 46 45.9	Piiholo	3.763067	5,795.2	19,013.1
Puu Io, 1879	20 40 31.938	982.1	59 47 56.5	239 46 33.1	Puu Olai	3.898647	7,918.6	25,979.6
	156 23 09.086	263.0	121 32 41.2	301 27 41.5	Hekili	4.458262	28,725.1	94,242.3
			152 50 21.8	332 48 22.7	Maui south base	4.328053	21,284.0	69,829.3
			205 26 50.1	25 28 15.3	Puu Pane	4.209146	16,186.2	53,104.2
Maui north base, 1871–1912	20 53 59.807	1,839.2	27 35 30.3	207 34 52.2	Maui south base	3.823979	6,667.7	21,875.6
	156 26 58.331	1,685.8	287 10 23.0	107 13 39.2	Piiholo	4.221637	16,658.5	54,653.8
			306 57 59.8	127 00 47.0	Puu Pane	4.230494	17,001.8	55,780.1
Kolekole, 1876	20 42 37.791	1,162.1	65 26 12.1	245 19 12.8	Kahoolawe	4.578486	37,886.6	124,299.6
	156 15 32.368	936.6	166 17 30.6	346 16 42.6	Piiholo	4.217973	16,518.6	54,194.8
			136 37 45.8	316 33 42.2	Maui north base	4.460427	28,868.7	94,713.4
Puu Loa, 1876–1913	20 04 39.066	1,201.3	122 00 18.9	301 42 53.1	Kahoolawe	5.012194	102,847.6	337,425.8
	155 45 10.893	316.5	143 04 54.4	322 54 19.6	Kolekole	4.943237	87,748.0	287,886.6
Puako, 1873–1928	19 58 45.932	1,412.4	151 17 03.7	331 08 10.6	Kolekole	4.965419	92,346.2	302,972.5
	155 49 59.084	1,717.7	217 37 52.1	37 39 30.8	Puu Loa	4.137159	13,713.8	44,992.7
Puu Pa, 1873	19 59 35.010	1,076.6	83 30 11.9	263 27 36.6	Puako	4.123660	13,294.1	43,615.7
	155 42 24.750	719.5	152 41 39.5	332 40 42.6	Puu Loa	4.022134	10,522.9	34,523.9
Nohonaohae, 1873	19 55 22.003	676.6	112 15 19.0	292 12 19.0	Puako	4.219444	16,574.6	54,378.5
	155 41 11.446	332.9	164 40 55.2	344 40 30.2	Puu Pa	3.906687	8,066.5	26,464.8
Holoholoku, 1873	19 58 46.605	1,433.1	34 13 37.5	214 12 47.3	Nohonaohae	3.881304	7,608.6	24,962.5
	155 38 44.295	1,287.8	103 05 06.7	283 03 51.4	Puu Pa	3.818197	6,579.6	21,586.6
			133 59 08.2	313 56 55.9	Puu Loa	4.193438	15,611.3	51,218.1
Hokuula, 1873	20 02 06.630	203.9	1 29 01.7	181 28 57.9	Nohonaohae	4.095040	12,446.3	40,834.2
	155 41 00.365	10.6	27 45 09.9	207 44 41.0	Puu Pa	3.721655	5,268.1	17,283.8
			327 15 01.5	147 15 48.0	Holoholoku	3.864076	7,312.7	23,991.7

Oahu Island to Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Hawaii west base, 1872	20 01 48.444	1,489.7	106 36 43.8	286 36 21.7	Hokuula	3.291455	1,956.4	6,418.6
	155 39 55.858	1,623.5	339 35 23.7	159 35 48.1	Holoholoku	3.775678	5,965.9	19,573.1
Hawaii east base, 1873	20 01 21.460	659.9	21 57 52.7	201 57 30.1	Holoholoku	3.710483	5,134.3	16,844.8
	155 37 38.240	1,111.4	101 43 35.2	281 42 48.1	Hawaii west base	3.611185	4,084.9	13,401.9
			103 18 44.6	283 17 35.4	Hokuula	3.780784	6,036.5	19,804.8

Molokai Island

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Principal points, south central part								
Puu Luahine, 1925	21 07 56.598	1,740.6	11 33 29.1	191 33 16.9	Kaunakakai	3.686784	4,861.7	15,950.4
	157 00 55.804	1,610.2	119 46 01.3	299 45 11.2	Middle Hill	3.664569	4,619.2	15,154.8
Makakupaia	21 06 58.867	1,810.4	316 31 23.7	136 32 29.3	Puu Papai	3.884599	7,666.5	25,152.5
	156 57 11.246	324.5	68 10 27.3	248 08 54.3	Kaunakakai	3.904792	8,031.4	26,349.7
			105 20 00.6	285 18 39.7	Puu Luahine	3.827300	6,718.9	22,043.6
			111 12 57.8	291 10 46.8	Middle Hill	4.051197	11,251.2	36,913.3
			139 55 31.2	319 54 19.3	Kilohana	3.951052	8,934.1	29,311.3
Kakalahale	21 07 31.79	977.7	116 07 51	296 07 31	Puu Luahine	3.238736	1,733	5,686
	157 00 01.89	54.5	265 47 06	85 48 36	Kaulahuki	3.862695	7,289	23,914
			281 36 31	101 37 33	Makakupaia	3.701351	5,027	16,493
			32 18 58	212 18 27	Kaunakakai	3.675130	4,733	15,528
Onini, 1915	21 04 31.541	970.0	107 00 52.3	286 59 49.4	Kaunakakai	3.722332	5,276.3	17,310.7
	156 58 34.753	1,003.2	208 00 25.8	28 00 55.9	Makakupaia	3.710286	5,132.0	16,837.2
			277 38 38.9	97 40 14.5	Puu Papai	3.889563	7,754.7	25,441.9
Puu Kolekole	21 06 19.588	602.4	357 07 37.8	177 07 40.3	Puu Papai	3.639647	4,361.6	14,309.7
	156 54 16.091	464.4	66 01 14.7	245 59 41.6	Onini	3.912327	8,172.0	26,811.0
			103 26 54.9	283 25 51.8	Makakupaia	3.715774	5,197.3	17,051.5
Kaapahu, 1925	21 05 40.308	1,239.6	34 27 04.7	214 26 37.6	Puu Papai	3.581787	3,817.6	12,524.9
	156 52 53.709	1,550.2	77 53 32.7	257 51 30.0	Onini	4.002975	10,068.7	33,033.7
			116 56 14.1	296 55 44.5	Puu Kolekole	3.426016	2,667.0	8,750.0
Kalapamoa	21 05 51.751	1,591.5	48 49 02.2	228 48 12.1	Puu Papai	3.725481	5,314.7	17,436.6
	156 51 49.961	1,442.1	79 10 33.1	259 10 10.1	Kaapahu	3.272606	1,873.3	6,146.0
			101 28 53.9	281 28 01.3	Puu Kolekole	3.633826	4,303.5	14,119.1
Kalaeloa, 1915	21 03 10.158	312.4	105 36 10.1	285 35 04.3	Puu Papai	3.737720	5,466.6	17,935.0
	156 51 06.134	177.1	146 05 03.1	326 04 24.4	Kaapahu	3.745444	5,564.7	18,256.9
			165 43 08.2	345 42 52.5	Kalapamoa	3.709953	5,128.1	16,824.4
Ohianui	21 05 03.430	105.5	351 32 01.6	171 32 08.0	Kalaeloa	3.546775	3,521.9	11,554.8
	156 51 24.093	695.4	113 40 46.3	293 40 14.0	Kaapahu	3.450926	2,824.4	9,266.4
Kaluaaha	21 05 14.138	434.8	30 46 23.2	210 45 54.9	Kalaeloa	3.647134	4,437.5	14,558.7
	156 49 47.495	1,370.9	108 07 34.6	288 06 50.6	Kalapamoa	3.570456	3,719.3	12,202.4
Mapulehu, 1925	21 04 13.071	402.0	68 19 38.7	248 18 38.1	Kalaeloa	3.719090	5,237.1	17,182.1
	156 48 17.561	506.9	106 03 21.4	286 02 14.4	Ohianui	3.748406	5,602.8	18,391.9
			125 53 14.2	305 52 41.9	Kaluaaha	3.505711	3,204.1	10,512.1
Ahaino	21 05 50.141	1,542.0	7 04 26.3	187 04 21.6	Mapulehu	3.478298	3,008.1	9,869.1
	156 48 04.728	136.5	46 47 39.6	226 46 34.3	Kalaeloa	3.856445	7,185.3	23,573.8
			69 32 09.3	249 31 32.3	Kaluaaha	3.500528	3,166.1	10,387.4
			90 26 51.8	270 25 30.8	Kalapamoa	3.812979	6,501.0	21,328.7
Supplementary points, south central part								
Kalamaula	21 07 30.60	941.1	138 47 34	318 47 00	Middle Hill	3.613922	4,111	13,488
	157 01 40.92	1,180.8	238 26 21	58 26 38	Puu Luahine	3.184062	1,528	5,013
			355 16 05	175 16 09	Kaunakakai	3.599562	3,977	13,048
Fly, 1900	21 05 06.794	208.9	161 55 52.6	341 55 22.0	Middle Hill	3.897899	7,904.9	25,934.7
	157 01 49.803	1,437.6	196 36 49.6	16 37 09.1	Puu Luahine	3.736370	5,449.7	17,879.6
			231 51 31.8	51 51 39.1	Kaunakakai	2.871111	743.2	2,438.3
Rock, 1900	21 06 28.998	891.8	197 53 39.8	17 53 59.9	Middle Hill	3.719368	5,240.4	17,192.9
	157 04 10.592	305.7	293 59 19.4	114 00 17.4	Kaunakakai	3.706520	5,087.7	16,691.9
			301 52 49.6	121 53 40.3	Fly	3.679950	4,785.8	15,701.4
Cab, 1900[1]	21 06 24.67	758.7	290 10 36	110 11 42	Kaunakakai	3.748989	5,610	18,405
	157 04 32.00	923.6	297 05 09	117 06 07	Fly	3.720851	5,258	17,251
Black, 1900	21 06 19.166	589.4	208 57 49.2	28 58 25.7	Middle Hill	3.781443	6,045.6	19,834.6
	157 04 56.255	1,623.6	286 29 07.3	106 30 21.7	Kaunakakai	3.793931	6,222.0	20,413.3
			292 27 35.4	112 28 42.5	Fly	3.765191	5,823.6	19,106.3
Cane, 1900	21 05 12.817	394.2	83 05 47.7	263 05 28.6	Fly	3.187672	1,540.5	5,054.1
	157 00 56.819	1,640.1	106 09 38.4	286 09 26.6	Kaunakakai	2.992849	983.7	3,227.4
			180 19 59.0	0 19 59.4	Puu Luahine	3.702167	5,036.9	16,525.2
Bill, 1900	21 05 33.774	1,038.7	159 32 27.8	339 31 56.6	Middle Hill	3.853423	7,135.5	23,410.4
	157 01 48.336	1,395.1	199 02 22.3	19 02 41.2	Puu Luahine	3.667139	4,646.6	15,244.7
			304 21 47.1	124 21 53.8	Kaunakakai	2.817437	656.8	2,154.9

[1] No check on this position.

Molokai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, south central part—Continued	° ′ ″		° ′ ″	° ′ ″				
Pipe, 1900 [1]	21 05 51.82	1,593.6	18 42 48	198 42 44	Kaunakakai	2.990107	977	3,205
	157 01 18.69	539.4	32 58 02	212 57 51	Fly	3.217628	1,651	5,417
Noon, 1900 [1]	21 05 49.26	1,514.9	206 31 20	26 31 44	Puu Luahine	3.641161	4,377	14,360
	157 02 03.54	102.2	343 06 54	163 06 59	Fly	3.135070	1,365	4,478
Flag, 1900 [1]	21 05 23.27	715.6	285 23 12	105 23 14	Kaunakakai	2.254866	180	591
	157 01 35.56	1,026.4	39 03 25	219 03 20	Fly	2.814603	653	2,142
Nut, 1900 [1]	21 05 56.96	1,751.7	299 33 05	119 33 29	Kaunakakai	3.341839	2,197	7,208
	157 02 35.77	1,032.4	319 18 10	139 18 26	Fly	3.308501	2,035	6,676
Kaunakakai front range light, 1900 [1]	21 05 29.07	894.0	313 20 02	133 20 05	Kaunakakai	2.517791	329	1,079
	157 01 37.85	1,092.5	26 43 23	206 43 19	Fly	2.884798	767	2,516
Kaunakakai rear range light, 1900 [1]	21 05 33.18	1,020.4	336 34 16	156 34 18	Kaunakakai	2.584506	384	1,260
	157 01 34.84	1,005.6	28 01 05	208 01 00	Fly	2.963413	919	3,015
A, 1900	21 05 03.198	98.3	197 36 33.5	17 36 54.6	Puu Luahine	3.747794	5,594.9	18,355.9
	157 01 54.462	1,572.0	230 34 10.7	50 34 12.3	Fly	2.240827	174.1	571.2
			279 34 33.4	99 35 45.2	Onini	3.766888	5,846.4	19,181.1
B, 1900	21 05 05.046	155.2	197 11 06.2	17 11 26.6	Puu Luahine	3.742134	5,522.5	18,118.4
	157 01 52.350	1,511.1	232 04 26.0	52 04 34.2	Kaunakakai	2.921294	834.2	2,736.9
D, 1900	21 05 11.004	338.4	160 45 43.0	340 45 10.8	Middle Hill	3.893345	7,822.5	25,664.3
	157 01 45.447	1,311.8	195 42 36.1	15 42 54.0	Puu Luahine	3.723482	5,290.3	17,356.6
			234 18 33.4	54 18 39.1	Kaunakakai	2.751956	564.9	1,853.3
E, 1900	21 05 14.582	448.4	44 41 30.0	224 41 27.0	Fly	2.527531	336.9	1,105.3
	157 01 41.594	1,200.6	159 43 07.6	339 42 34.0	Middle Hill	3.889666	7,756.5	25,447.8
			194 51 06.4	14 51 22.9	Puu Luahine	3.712214	5,154.8	16,912.0
Nat, 1925	21 06 06.661	204.8	118 50 25.3	298 49 52.5	Puu o Kahanui	3.477696	3,004.0	9,855.6
	157 03 02.622	75.7	227 15 41.6	47 16 27.4	Puu Luahine	3.697443	4,982.4	16,346.4
Shack (Kaunakakai Harbor), 1925	21 05 03.416	105.1	134 27 31.5	314 27 06.7	Nat	3.443602	2,777.2	9,111.5
	157 01 53.942	1,557.0	126 20 41.4	306 19 43.8	Puu o Kahanui	3.757977	5,727.7	18,791.6
			197 29 00.5	17 29 21.5	Puu Luahine	3.746945	5,584.0	18,320.2
Kaunakakai wireless mast, 1914	21 05 22.082	679.1	277 38 41.8	97 38 42.9	Kaunakakai	1.924150	84.0	275.6
	157 01 32.435	936.2	281 23 39.6	101 26 19.2	Puu Papai	4.116369	13,072.8	42,889.7
			359 08 10.2	179 08 13.6	Kaena	4.257304	18,084.4	59,331.9
Makolelau	21 03 50.61	1,556.4	107 15 17	287 14 26	Onini	3.627878	4,245	13,927
	156 56 14.31	413.1	239 45 58	59 47 10	Kaapahu	3.826181	6,702	21,988
			266 26 35	86 27 20	Puu Papai	3.560929	3,639	11,939
Tom	21 04 51.00	1,568.4	22 23 34	202 23 24	Makolelau	3.302904	2,009	6,591
	156 55 47.81	1,380.1	82 55 41	262 54 41	Onini	3.686283	4,856	15,932
Kanehale	21 03 36.83	1,132.7	101 45 20	281 44 55	Makolelau	3.318405	2,082	6,831
	156 55 03.72	107.4	150 50 39	330 50 23	Tom	3.417007	2,612	8,570
			247 49 43	67 50 03	Puu Papai	3.235738	1,721	5,646
Kamalo	21 03 07.32	225.1	138 50 26	318 50 09	Puu Papai	3.315494	2,068	6,785
	156 53 21.38	617.3	165 02 52	345 02 32	Puu Kolekole	3.786761	6,120	20,079
			189 38 00	9 38 10	Kaapahu	3.678714	4,772	15,656
Kamalo 2, 1925 [1]	21 03 07.32	225.1	138 50 20	318 50 03	Puu Papai	3.315506	2,068	6,785
	156 53 21.37	617.0	189 37 56	9 38 06	Kaapahu	3.678713	4,772	15,656
Keawanui, 1925 [1]	21 03 18.07	555.7	103 29 19	283 28 15	Puu Papai	3.721052	5,261	17,260
	156 51 11.31	326.5	145 57 27	325 56 50	Kaapahu	3.722593	5,280	17,323
Shack (Kamalo Harbor), 1925 [1]	21 02 53.29	1,638.9	127 00 38	307 00 05	Puu Papai	3.518922	3,303	10,837
	156 52 37.15	1,072.6	252 54 30	72 55 01	Keawanui	3.413764	2,593	8,507
John, 1925 [1]	21 03 13.50	415.2	111 42 48	291 42 05	Puu Papai	3.567678	3,696	12,126
	156 52 09.59	276.9	265 13 18	85 13 39	Keawanui	3.227463	1,688	5,538
Son, 1925 [1]	21 03 21.36	656.9	151 06 03	331 05 55	Puu Papai	3.108870	1,285	4,216
	156 53 47.01	1,357.2	300 15 41	120 15 50	Kamalo 2	2.932903	857	2,812
Manawai	21 03 25.52	784.8	70 37 08	250 36 51	Kalaeloa	3.153293	1,423	4,669
	156 50 19.63	566.7	148 17 12	328 16 49	Ohianui	3.548976	3,540	11,614
			195 31 05	15 31 17	Kaluaaha	3.539935	3,467	11,375
Kaluaaha Church, 1925 [1]	21 04 14.06	432.4	283 23 55	103 24 06	Mahilikua	2.970500	934	3,064
	156 49 23.37	674.6	47 25 01	227 24 41	Manawai	3.343579	2,206	7,238
Mahilikua, 1925	21 04 07.01	215.6	63 15 54	243 15 23	Manawai	3.452760	2,836	9,304
	156 48 51.89	1,497.9	142 08 02	322 07 42	Kaluaaha	3.417461	2,615	8,579
			259 21 14	79 21 26	Mapulehu	3.003579	1,008	3,307

No check on this position.

Molokai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, south central part—Continued	° ′ ″		° ′ ″	° ′ ″				
Pukoo, 1925	21 05 33.40	1,027.2	351 19 47	171 19 52	Mapulehu	3.397731	2,499	8,199
	156 48 30.61	883.5	13 01 09	193 01 02	Mahilikua	3.435616	2,727	8,947
			75 03 45	255 03 17	Kaluaaha	3.361137	2,297	7,536
			235 24 58	55 25 07	Ahaino	2.957770	907	2,976
Principal points, east end								
Honomuni, 1925	21 05 12.008	369.3	56 57 30.9	236 56 56.1	Mapulehu	3.521633	3,323.8	10,904.8
	156 46 41.043	1,184.7	115 54 05.2	295 53 35.1	Ahaino	3.428958	2,685.1	8,809.4
Waialua	21 06 40.124	1,233.9	351 06 33.6	171 06 38.9	Honomuni	3.438197	2,742.8	8,998.7
	156 46 55.729	1,608.3	52 20 21.5	232 19 56.7	Ahaino	3.400648	2,515.6	8,253.3
Moanui	21 07 42.500	1,307.0	39 10 25.4	219 10 05.9	Waialua	3.393466	2,474.4	8,118.1
	156 46 01.570	45.3	45 48 50.1	225 48 05.8	Ahaino	3.695227	4,957.1	16,263.4
Honouli	21 07 37.299	1,147.1	63 57 04.4	243 56 19.5	Waialua	3.602410	4,003.2	13,133.8
	156 44 51.106	1,474.8	94 30 04.1	274 29 38.7	Moanui	3.309553	2,039.6	6,691.6
Mokuhooniki	21 08 08.728	268.4	54 01 35.7	234 00 02.2	Honomuni	3.966105	9,249.2	30,345.1
	156 42 21.718	626.7	54 48 30.3	234 46 22.0	Mapulehu	4.099326	12,569.7	41,239.1
			66 43 20.7	246 41 17.1	Ahaino	4.032513	10,777.4	35,358.9
			70 59 57.5	250 58 18.7	Waialua	3.922392	8,363.6	27,439.6
			77 22 10.8	257 21 16.9	Honouli	3.645198	4,417.7	14,493.7
			82 45 54.3	262 44 35.0	Moanui	3.805844	6,395.1	20,981.3
Puu o Hoku, 1915	21 08 17.212	529.3	275 16 18.5	95 16 53.8	Mokuhooniki	3.452908	2,837.3	9,308.7
	156 43 59.633	1,720.7	50 25 52.8	230 25 34.2	Honouli	3.284848	1,926.9	6,321.8
			73 07 41.8	253 06 57.8	Moanui	3.565486	3,676.9	12,063.3
Halawa	21 08 33.555	1,032.0	279 32 58.7	99 33 36.0	Puu o Hoku	3.481151	3,028.0	9,934.4
	156 45 43.118	1,244.1	319 03 23.6	139 03 42.3	Honouli	3.359900	2,290.3	7,514.1
			18 43 58.8	198 43 52.1	Moanui	3.219576	1,658.0	5,439.6
Kalanikaula, 1915	21 09 26.348	810.3	314 50 37.5	134 51 07.5	Mokuhooniki	3.529541	3,384.9	11,105.3
	156 43 44.892	1,295.2	11 18 45.2	191 18 39.9	Puu o Hoku	3.336116	2,168.3	7,113.8
Kawaikapu	21 09 57.859	1,779.4	288 21 57.6	108 22 34.1	Kalanikaula	3.487836	3,074.9	10,088.2
	156 45 26.044	751.3	321 08 44.9	141 09 16.1	Puu o Hoku	3.599278	3,974.5	13,039.7
			10 45 32.0	190 45 25.9	Halawa	3.421447	2,639.0	8,658.1
Kepookoholua	21 09 56.228	1,729.2	262 45 22.9	82 45 27.8	Kawaikapu	2.599878	398.0	1,305.8
	156 45 39.730	1,146.2	2 12 07.7	182 12 06.5	Halawa	3.405579	2,544.4	8,347.8
Kanupa	21 10 01.448	44.5	272 57 59.2	92 58 25.8	Kawaikapu	3.328363	2,129.9	6,987.8
	156 46 39.775	1,147.5	275 17 30.9	95 17 52.6	Kepookoholua	3.240464	1,739.7	5,707.7
			282 04 05.0	102 05 08.1	Kalanikaula	3.712610	5,159.5	16,927.5
			304 44 42.9	124 45 40.7	Puu o Hoku	3.750009	5,623.5	18,449.8
			328 50 03.9	148 50 24.4	Halawa	3.499528	3,158.8	10,363.5
Supplementary points, east end								
Kupeke	21 04 32.22	990.9	61 46 43	241 46 29	Mapulehu	3.095280	1,245	4,085
	156 47 39.55	1,141.7	163 07 48	343 07 39	Ahaino	3.398652	2,504	8,215
			234 04 24	54 04 45	Honomuni	3.319213	2,086	6,844
Puu Mano, 1915	21 06 02.02	62.1	353 09 57	173 10 00	Honomuni	3.190071	1,549	5,082
	156 46 47.43	1,368.9	37 49 58	217 49 26	Mapulehu	3.627575	4,242	13,917
			80 42 15	260 41 47	Ahaino	3.354249	2,261	7,418
			168 26 50	348 26 47	Waialua	3.077744	1,196	3,924
			228 52 41	48 53 23	Honouli	3.648937	4,456	14,619
Waialua Sea, 1915	21 05 57.63	1,772.3	51 14 17	231 13 55	Honomuni	3.350434	2,241	7,352
	156 45 40.50	1,168.9	93 59 58	273 59 34	Puu Mano	3.286964	1,936	6,352
Kumimi	21 06 40.33	1,240.3	47 30 08	227 29 50	Waialua Sea	3.288604	1,944	6,378
	156 44 50.85	1,467.5	179 45 45	359 45 45	Honouli	3.243541	1,752	5,748
			237 42 45	57 43 39	Mokuhooniki	3.706750	5,090	16,699
			70 42 24	250 41 42	Puu Mano	3.552028	3,565	11,696
Lupehu, 1915	21 07 11.75	361.4	42 52 56	222 52 45	Kumimi	3.120080	1,318	4,324
	156 44 19.76	570.2	130 59 21	310 59 09	Honouli	3.078508	1,198	3,930
			242 46 15	62 46 58	Mokuhooniki	3.583280	3,831	12,569
Puu Kahea	21 08 11.15	342.9	267 51 28	87 52 31	Puu o Hoku	3.699670	5,008	16,430
	156 46 53.07	1,531.3	286 28 18	106 29 02	Honouli	3.564692	3,670	12,041
			300 39 34	120 39 52	Moanui	3.237474	1,728	5,669
			1 34 04	181 34 03	Waialua	3.447225	2,800	9,186
Kapuupoi	21 09 44.28	1,361.8	341 51 01	161 51 13	Mokuhooniki	3.490305	3,092	10,144
	156 42 55.10	1,589.6	34 48 52	214 48 29	Puu o Hoku	3.513398	3,261	10,699
			68 59 52	248 59 34	Kalanikaula	3.187148	1,539	5,049
			95 29 08	275 28 13	Kawaikapu	3.640933	4,375	14,354
Lamaloa	21 10 27.13	834.4	294 28 46	114 29 22	Kapuupoi	3.502334	3,179	10,430
	156 44 35.40	1,021.2	322 03 37	142 03 55	Kalanikaula	3.374750	2,370	7,776
			58 22 03	238 21 44	Kawaikapu	3.234519	1,716	5,630
Apuu	21 10 32.160	989.0	305 28 04.7	125 28 40.2	Kalanikaula	3.542546	3,487.8	11,442.9
	156 45 23.349	673.6	66 48 48.0	246 48 20.4	Kanupa	3.379945	2,398.5	7,869.1

Molokai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, east end—Continued	° ′ ″		° ′ ″	° ′ ″				
Puu Lehua	21 10 27.648	850.3	263 59 40.8	83 59 57.3	Apuu	3.122780	1,326.7	4,352.7
	156 46 09.088	262.2	306 24 59.8	126 25 15.3	Kawaikapu	3.188400	1,543.1	5,062.7
			47 41 34.1	227 41 23.0	Kanupa	3.078111	1,197.0	3,927.2
Lelemako	21 10 25.264	777.0	263 58 45.3	83 58 54.0	Puu Lehua	2.844574	699.2	2,294.0
	156 46 33.191	957.5	293 30 36.5	113 31 00.7	Kawaikapu	3.324794	2,112.5	6,930.8
			300 04 06.5	120 04 25.8	Kepookoholua	3.250942	1,782.1	5,846.8
Puahaunui	21 10 45.328	1,394.0	321 17 32.6	141 17 38.0	Puu Lehua	2.843097	696.8	2,286.1
	156 46 24.193	697.9	22 48 52.6	202 48 49.3	Lelemako	2.825703	669.4	2,196.2
Kaunupahu	21 09 45.73	1,406.4	264 24 38	84 25 25	Kawaikapu	3.583808	3,835	12,582
	156 47 38.36	1,106.7	264 36 12	84 36 55	Kepookoholua	3.536250	3,438	11,280
			303 43 10	123 43 52	Halawa	3.601803	3,998	13,117
Kauhiahua	21 10 01.14	35.1	319 39 53	139 40 22	Halawa	3.548174	3,533	11,591
	156 47 02.38	68.7	65 27 44	245 27 31	Kaunapahu	3.057319	1,141	3,743
Pohakuloa	21 09 50.63	1,557.1	250 00 12	70 00 23	Kauhiahua	2.975620	945	3,100
	156 47 33.17	956.9	266 58 50	86 59 31	Kepookoholua	3.515513	3,277	10,751
			44 48 00	224 47 58	Kaunapahu	2.326964	212	696
Humu	21 10 14.66	450.9	279 07 09	99 07 41	Kauhiahua	3.418708	2,622	8,602
	156 48 32.13	926.9	293 29 01	113 29 23	Pohakuloa	3.268236	1,855	6,086
			299 50 01	119 50 20	Kaunapahu	3.252452	1,788	5,866
Principal points, north central part								
Kilohana	21 10 41.131	1,264.9	8 10 07.3	188 09 58.3	Puu Luahine	3.708576	5,111.8	16,771.0
	157 00 30.633	883.7	59 42 32.6	239 41 33.4	Middle Hill	3.739157	5,484.8	17,994.7
Puu Kapele	21 11 47.783	1,469.5	318 53 35.9	138 54 28.5	Middle Hill	3.805648	6,392.2	20,971.7
	157 05 40.445	1,166.6	282 54 11.4	102 56 03.3	Kilohana	3.962302	9,168.6	30,080.6
			50 04 41.8	230 03 17.1	Mauna Loa	3.945904	8,828.8	28,965.8
Kalawao	21 12 44.711	1,375.0	44 25 50.0	224 25 03.3	Kilohana	3.726043	5,321.6	17,459.3
	156 58 21.489	619.7	82 08 54.8	262 06 16.1	Puu Kapele	4.106553	12,780.7	41,931.3

Keolewa	21 10 40.258	1,238.1	90 32 00.5	270 31 24.1	Kilohana	3.464007	2,910.8	9,549.8
	156 58 49.733	1,434.6	99 57 46.6	279 55 18.3	Puu Kapele	4.080178	12,027.6	39,460.6
			192 00 51.0	12 01 01.3	Kalawao	3.592527	3,913.2	12,838.6
Waialeia	21 09 21.952	675.1	109 05 41.7	289 04 13.6	Kilohana	3.872049	7,448.2	24,436.3
	156 56 26.642	768.6	120 15 56.2	300 15 04.5	Keolewa	3.679346	4,779.1	15,679.4
			152 01 30.7	332 00 49.2	Kalawao	3.848866	7,061.0	23,166.0
Puu Kaeo	21 08 21.191	651.7	85 11 56.7	265 10 04.6	Puu Luahine	3.954608	9,007.6	29,552.4
	156 55 44.738	1,290.9	117 34 06.7	297 32 23.5	Kilohana	3.968645	9,303.5	30,523.2
			147 05 55.5	327 05 40.4	Waialeia	3.347454	2,225.6	7,301.8
Kaulahuki	21 07 49.156	1,511.7	56 36 20.5	236 35 51.2	Makakupaia	3.448649	2,809.6	9,217.8
	156 55 49.962	1,441.7	65 11 21.9	245 09 19.6	Kaunakakai	4.033368	10,798.6	35,428.4
			91 30 03.4	271 28 13.2	Puu Luahine	3.945877	8,828.3	28,964.2
			123 09 49.5	303 08 08.2	Kilohana	3.985512	9,671.9	31,731.9
			159 39 16.6	339 39 03.4	Waialeia	3.483407	3,043.7	9,985.9
			188 41 53.1	8 41 55.0	Puu Kaeo	2.998549	996.7	3,270.0
			337 36 55.3	157 37 31.7	Puu Papai	3.885918	7,689.9	25,229.3
Mokapu	21 11 11.736	360.9	2 54 29.5	182 54 26.2	Puu Kaeo	3.720298	5,251.7	17,230.0
	156 55 35.504	1,024.1	23 36 16.6	203 35 58.2	Waialeia	3.566381	3,684.5	12,088.2
			120 51 22.6	300 50 22.7	Kalawao	3.746345	5,576.3	18,294.9
Leinaopapio	21 10 32.778	1,008.1	133 24 33.4	313 23 39.7	Kalawao	3.771223	5,905.0	19,373.3
	156 55 52.744	1,521.5	202 32 29.6	22 32 35.8	Mokapu	3.113013	1,297.2	4,255.9
			356 43 58.5	176 44 01.4	Puu Kaeo	3.607820	4,063.4	13,298.5
Haupu	21 10 11.737	361.0	98 46 52.9	278 46 00.4	Leinaopapio	3.627590	4,242.2	13,918.0
	156 53 27.411	790.8	119 01 41.9	298 59 55.7	Kalawao	3.986759	9,699.7	31,823.1
Kaneiamoa	21 10 11.306	347.7	90 37 57.8	270 37 42.7	Haupu	3.080975	1,205.0	3,953.4
	156 52 45.645	1,316.8	115 59 00.8	295 56 59.5	Kalawao	4.032414	10,774.9	35,350.7
Waiehu	21 10 11.242	345.7	90 02 19.0	270 01 35.4	Kaneiamoa	3.541748	3,481.4	11,421.9
	156 50 44.967	1,297.2	109 44 30.9	289 41 45.9	Kalawao	4.145765	13,988.3	45,893.3
Kikipua	21 10 41.567	1,278.4	76 58 42.5	256 57 52.0	Waiehu	3.616667	4,136.8	13,572.2
	156 48 25.256	728.6	88 49 23.2	268 46 41.4	Leinaopapio	4.110976	12,911.5	42,360.5
			94 17 49.8	274 15 14.2	Mokapu	4.095012	12,445.5	40,831.6
			102 26 57.3	282 23 21.7	Kalawao	4.245745	17,609.4	57,773.5
Puu Alii	21 07 54.26	1,668.7	105 27 35	285 26 57	Puu Kaeo	3.492422	3,108	10,197
	156 54 00.94	27.1	122 41 07	302 40 15	Waialeia	3.698505	4,995	16,388
Kaunuohua	21 07 03.95	121.5	119 27 26	299 26 33	Puu Kaeo	3.684070	4,831	15,850
	156 53 18.94	546.6	141 56 11	321 55 56	Puu Alii	3.293437	1,965	6,447
Olokui flag	21 08 07.69	236.5	62 29 08	242 28 21	Kaunuohua	3.627585	4,242	13,917
	156 51 08.57	247.3	85 15 48	265 14 46	Puu Alii	3.698164	4,991	16,375

Molokai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Principal points, north central part—Contd.	° ′ ″		° ′ ″	° ′ ″				
Kamakou	21 06 37.57	1,155.4	114 32 34	294 32 12	Kaunuohua	3.290703	1,953	6,407
	156 52 17.38	501.6	128 17 12	308 16 34	Puu Alii	3.580567	3,807	12,490
			215 37 09	35 37 34	Olokui flag	3.532664	3,409	11,184
Wailau	21 06 19.32	594.2	114 06 06	294 05 50	Kamakou	3.138086	1,374	4,508
	156 51 33.92	979.0	192 22 35	12 22 44	Olokui flag	3.532980	3,412	11,194
			304 24 10	124 25 20	Mapulehu	3.836962	6,870	22,539
Puu Lua Wailau	21 06 38.39	1,180.6	82 32 39	262 31 43	Wailau	3.654636	4,515	14,813
	156 48 58.81	1,697.3	89 45 25	269 44 14	Kamakou	3.758231	5,731	18,802
			95 59 19	275 57 45	Kaunuohua	3.877857	7,548	24,764
			126 15 32	306 14 45	Olokui flag	3.666862	4,644	15,236
			313 32 53	133 33 12	Ahaino	3.333168	2,154	7,067
			345 04 49	165 05 04	Mapulehu	3.665107	4,625	15,174
Supplementary points, north central part								
Oleleuwe	21 10 24.51	753.8	331 26 10	151 26 41	Puu Luahine	3.714257	5,179	16,991
	157 02 21.62	623.7	34 12 33	214 12 14	Middle Hill	3.435843	2,728	8,950
Pohakunui	21 11 15.70	482.8	1 36 10	181 36 09	Middle Hill	3.583387	3,832	12,572
	157 03 11.07	319.3	102 54 26	282 53 32	Puu Kapele	3.645443	4,420	14,501
			278 12 48	98 14 23	Keolewa	3.881773	7,617	24,990
			317 49 02	137 49 20	Oleleuwe	3.327183	2,124	6,968
Puu Lua	21 10 43.09	1,325.2	102 48 50	282 47 55	Pokohanui	3.655447	4,523	14,839
	157 00 38.16	1,100.8	271 35 35	91 36 14	Keolewa	3.495410	3,129	10,266
Puu o Kamao	21 10 43.11	1,325.8	60 05 19	240 05 06	Oleleuwe	3.059492	1,147	3,763
	157 01 47.16	1,360.4	112 29 51	292 29 21	Pohakunui	3.418223	2,620	8,596
			270 00 32	90 00 57	Puu Lua	3.298969	1,991	6,532
Puu Anoano	21 10 07.74	238.0	342 21 12	162 21 28	Puu Luahine	3.626551	4,232	13,884
	157 01 40.26	1,161.4	57 27 39	237 27 05	Middle Hill	3.509842	3,235	10,613
Kauluwai	21 09 40.07	1,232.3	358 48 04	178 48 05	Puu Luahine	3.502814	3,183	10,443
	157 00 58.11	1,676.5	124 58 52	304 58 36	Puu Anoano	3.171479	1,484	4,869

Hahaeule	21 09 50.24	1,545.1	15 00 17	195 00 05	Puu Luahine	3.558505	3,618	11,870
	157 00 23.34	673.3	72 40 55	252 40 42	Kauluwai	3.021523	1,051	3,448
			76 20 54	256 19 52	Middle Hill	3.706732	5,090	16,699
			103 37 52	283 37 24	Puu Anoano	3.358595	2,283	7,490
Kaluaolohe	21 08 41.01	1,261.2	281 27 42	101 28 20	Puu Kaeo	3.486645	3,067	10,062
	156 57 28.89	833.6	299 11 10	119 11 46	Kaulahuki	3.514543	3,270	10,728
			77 07 24	257 06 09	Puu Luahine	3.787071	6,125	20,095
Kaohu	21 09 55.02	1,692.1	329 05 16	149 05 33	Kaluaolohe	3.423670	2,653	8,704
	156 58 16.12	465.0	51 40 58	231 40 01	Puu Luahine	3.768840	5,873	19,268
Kaluahauoni	21 09 22.33	686.7	326 55 20	146 55 35	Puu Kaeo	3.351036	2,244	7,362
	156 56 27.18	784.2	54 29 11	234 28 48	Kaluaolohe	3.339939	2,187	7,175
			107 44 22	287 43 43	Kaohu	3.518473	3,300	10,827
Puu Olelo	21 10 11.83	363.8	218 14 17	38 14 26	Keolewa	3.046593	1,113	3,652
	156 59 13.62	392.9	287 18 26	107 18 46	Kaohu	3.239888	1,737	5,699
			312 44 37	132 45 14	Kaluaolohe	3.614308	4,114	13,497
			35 20 20	215 19 44	Puu Luahine	3.707382	5,098	16,726
Kaupikiawa	21 11 47.138	1,449.7	135 01 21.0	315 00 58.9	Kalawao	3.398481	2,503.1	8,212.3
	156 57 20.141	580.9	289 49 50.4	109 50 28.2	Mokapu	3.506305	3,208.5	10,526.6
			312 12 27.9	132 12 59.5	Leinaopapio	3.531946	3,403.7	11,167.0
Kauhako	21 11 24.761	761.5	175 45 04.5	355 45 02.3	Kalawao	3.391915	2,465.6	8,089.2
	156 58 15.155	437.1	274 57 45.9	94 58 43.6	Mokapu	3.664873	4,622.5	15,165.7
			291 15 24.0	111 16 15.5	Leinaopapio	3.644245	4,408.0	14,461.9
Mokohola	21 10 28.98	891.3	279 10 11	99 10 53	Waiehu	3.534127	3,421	11,224
	156 52 42.03	1,212.5	10 51 36	190 51 35	Kaneiamoa	2.743054	553	1,814
			67 57 10	247 56 53	Haupu	3.149973	1,412	4,633
Pauwoaka	21 09 52.52	1,615.2	111 43 44	291 40 57	Kalawao	4.155910	14,319	46,978
	156 50 40.27	1,161.8	166 45 53	346 45 52	Waiehu	2.772063	592	1,942
			248 49 18	68 50 07	Kikipuu	3.620851	4,177	13,704
Principal points, west end								
Laina (Kaa), 1926	21 12 42.389	1,303.6	278 38 47.5	98 41 05.6	Puu Kapele	4.047125	11,146.2	36,568.8
	157 12 02.494	71.9	293 05 04.4	113 08 15.0	Middle Hill	4.218813	16,550.6	54,299.8
			329 56 08.9	149 57 02.1	Mauna Loa	3.928805	8,488.0	27,847.7
Kaeo, 1926	21 12 58.520	1,799.7	278 42 46.2	98 43 26.7	Laina	3.514914	3,272.8	10,737.5
	157 13 54.663	1,576.4	316 18 59.7	136 20 33.4	Mauna Loa	4.035132	10,842.6	35,572.8
Kakaako, 1925	21 09 14.487	445.5	157 19 14.6	337 18 38.5	Kaeo	3.873177	7,467.5	24,499.6
	157 12 14.824	427.7	183 11 00.9	3 11 05.3	Laina	3.806430	6,403.7	21,009.5
			281 40 29.3	101 41 26.9	Mauna Loa	3.672593	4,705.4	15,437.6
Napunkulua, 1915	21 09 45.890	1,411.3	183 29 51.5	3 29 56.0	Kaeo	3.773432	5,935.2	19,472.4
	157 14 07.219	208.3	213 31 48.4	33 32 33.4	Laina	3.813717	6,512.0	21,364.8
			286 34 47.8	106 35 28.4	Kakaako	3.529352	3,383.4	11,100.4

Molokai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Principal points, west end—Continued	° ′ ″		° ′ ″	° ′ ″				
Kahekupapau	21 08 16.484	506.9	135 34 24.6	315 33 50.9	Napuukulua	3.585511	3,850.4	12,632.5
	157 12 33.794	975.1	197 03 21.7	17 03 28.6	Kakaako	3.270880	1,865.9	6,121.7
Pohakuloa, 1885–1925	21 07 37.737	1,160.6	181 22 50.8	1 22 52.0	Napuukulua	3.595752	3,942.3	12,934.0
	157 14 10.512	303.3	246 52 27.1	66 53 02.0	Kahekupapau	3.482101	3,034.6	9,956.0
Kopala, 1925	21 07 55.940	1,720.4	80 54 29.3	260 53 45.6	Pohakuloa	3.549054	3,540.4	11,615.5
	157 12 09.363	270.2	131 52 06.3	311 51 57.5	Kahekupapau	2.976180	946.6	3,105.6
Waieli, 1885–1925	21 06 15.692	482.6	186 28 41.5	6 28 45.1	Pohakuloa	3.404734	2,539.4	8,331.3
	157 14 20.440	589.9	230 48 43.4	50 49 30.6	Kopala	3.688412	4,879.9	16,010.1
Kahualewa, 1925	21 06 45.239	1,391.3	77 46 00.3	257 45 08.0	Waieli	3.632035	4,285.8	14,061.0
	157 11 55.313	1,596.3	169 26 18.0	349 26 12.9	Kopala	3.344752	2,211.8	7,256.5
Amikopala, 1925	21 07 52.188	1,605.0	17 00 45.8	197 00 37.9	Kahualewa	3.333069	2,153.1	7,064.0
	157 11 33.484	966.2	96 21 51.3	276 21 38.3	Kopala	3.017751	1,041.7	3,417.6
Pukauahi, 1925	21 06 45.628	1,403.2	89 43 15.7	269 42 45.5	Kahualewa	3.383559	2,418.6	7,935.0
	157 10 31.508	909.3	138 51 31.9	318 51 09.6	Amikopala	3.434283	2,718.2	8,918.0
Kukui	21 08 28.133	865.2	112 00 54.7	292 00 10.6	Kakaako	3.580241	3,804.0	12,480.3
	157 10 12.590	363.3	246 22 51.6	66 23 05.1	Mauna Loa	3.071900	1,180.0	3,871.4
			64 39 46.6	244 39 17.5	Amikopala	3.412074	2,582.7	8,473.4
Kaana	21 07 45.441	1,397.5	53 14 16.6	233 13 45.8	Pukauahi	3.487584	3,073.2	10,082.7
	157 09 06.198	178.8	92 48 09.8	272 47 16.7	Amikopala	3.628912	4,255.1	13,960.3
			124 25 40.1	304 25 16.2	Kukui	3.365946	2,322.4	7,619.4
			154 57 17.9	334 57 07.4	Mauna Loa	3.294693	1,971.0	6,466.5
Puu o Kahanui, 1925	21 06 53.772	1,653.7	120 54 48.7	300 54 09.5	Molokai south base	3.563252	3,658.1	12,001.6
	157 04 33.803	975.5	208 21 04.8	28 21 33.3	Middle Hill	3.681332	4,801.0	15,751.3
Puu Iloli, 1915	21 06 28.858	887.5	206 37 26.0	26 37 52.5	Molokai south base	3.471156	2,959.1	9,708.3
	157 07 08.524	246.0	233 29 13.6	53 30 37.8	Middle Hill	3.923801	8,390.8	27,528.8
			260 15 20.7	80 16 16.4	Puu o Kahanui	3.656143	4,530.5	14,863.8
Puu o Holehua	21 07 17.166	527.9	245 26 21.1	65 26 52.7	Molokai south base	3.445629	2,790.2	9,154.2
	157 07 50.510	1,457.6	320 47 52.3	140 48 07.4	Puu Iloli	3.282644	1,917.1	6,289.7
			111 42 51.2	291 42 23.9	Kaana	3.371216	2,350.8	7,712.6
Kaluakawahine	21 06 37.572	1,155.5	139 52 58.6	319 52 36.6	Kaana	3.436088	2,729.5	8,955.0
	157 08 05.246	151.4	199 15 01.5	19 15 06.8	Puu o Holehua	3.110516	1,289.8	4,231.6
			279 17 39.6	99 18 00.0	Puu Iloli	3.219786	1,658.8	5,442.2
Supplementary points, west end								
Hauakea	21 09 34.00	1,045.6	307 52 30	127 52 50	Molokai north base	3.315657	2,069	6,788
	157 07 54.34	1,567.7	319 01 05	139 01 38	Molokai south base	3.606190	4,038	13,248
			61 53 46	241 53 10	Mauna Loa	3.518023	3,296	10,814
			128 59 56	308 58 27	Laina	3.964201	9,209	30,213
W. C. 1, 1926	21 12 07.55	232.2	342 52 35	162 52 53	Hauakea	3.693831	4,941	16,211
	157 08 44.77	1,291.2	13 02 02	193 01 43	Mauna Loa	3.808962	6,441	21,132
			100 39 01	280 37 50	Laina	3.763599	5,802	19,035
Puu o Kaiaka, 1925	21 11 03.93	120.9	212 52 14	32 52 43	Kaeo	3.622845	4,196	13,766
	157 15 13.63	393.2	321 23 48	141 24 12	Napuukulua	3.487265	3,071	10,075
Pohakumauliuli	21 11 55.53	1,707.8	223 14 43	43 15 06	Kaeo	3.424817	2,660	8,727
	157 14 57.85	1,668.5	16 00 37	196 00 31	Puu o Kaiaka	3.217728	1,651	5,417
Kahenawai	21 12 58.59	1,801.9	270 03 40	90 04 05	Kaeo	3.303828	2,013	6,604
	157 15 04.46	128.6	354 22 55	174 22 58	Pohakumauliuli	3.289780	1,949	6,394
			4 17 24	184 17 21	Puu o Kaiaka	3.548550	3,536	11,601
Puu Koai	21 09 40.95	1,259.4	215 13 50	35 14 27	Pohakumauliuli	3.704774	5,067	16,624
	157 16 39.19	1,130.6	224 02 26	44 02 57	Puu o Kaiaka	3.550273	3,550	11,647
			268 00 24	88 01 19	Napuukulua	3.642180	4,387	14,393
			311 26 42	131 27 36	Pohakuloa	3.757684	5,724	18,779
W. C. 17	21 08 56.26	1,730.2	225 31 21	45 31 39	Puu Koai	3.292655	1,962	6,437
	157 17 27.71	799.5	255 12 27	75 13 39	Napuukulua	3.776884	5,983	19,629
			292 59 06	113 00 17	Pohakuloa	3.791083	6,181	20,279
Kaupoa, 1925	21 08 01.68	51.7	192 47 54	12 47 59	W. C. 17	3.235860	1,721	5,646
	157 17 40.93	1,181.0	276 54 09	96 55 25	Pohakuloa	3.786488	6,116	20,066
Kihaapilani, 1926	21 06 20.88	642.1	187 12 48	7 12 53	Kaupoa	3.494791	3,125	10,253
	157 17 54.53	1,573.8	249 54 19	69 55 40	Pohakuloa	3.837799	6,883	22,582
			271 28 06	91 29 23	Waieli	3.791043	6,181	20,279
Punakua	21 06 03.66	112.6	102 33 01	282 32 31	Kihaapilani	3.386980	2,438	7,999
	157 16 32.08	925.9	234 41 19	54 42 10	Pohakuloa	3.699511	5,006	16,424
			264 25 53	84 26 40	Waieli	3.581755	3,817	12,523
Southwest Point Lighthouse [1]	21 06 16.71	513.9	210 11 05	30 11 28	Kaupoa	3.572229	3,734	12,251
	157 18 46.00	1,327.6	265 03 59	85 04 18	Kihaapilani	3.173510	1,491	4,892
Puu Hakina	21 05 55.23	1,698.5	97 03 15	277 02 49	Punakua	3.324555	2,111	6,926
	157 15 19.48	562.2	249 43 56	69 44 18	Waieli	3.259222	1,816	5,958

[1] No check on this position.

589 55°—30——6

Molokai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, west end—Continued	° ′ ″		° ′ ″	° ′ ″				
Hale o Lono	21 05 26.15	804.2	115 28 32	295 28 02	Punakua	3.428501	2,682	8,799
	157 15 08.18	236.1	159 57 59	339 57 55	Puu Hakina	2.978631	952	3,123
			222 07 30	42 07 47	Waieli	3.312646	2,054	6,739
Na Puu Kulua 2, 1925 [1]	21 09 45.87	1,410.7	62 32 52	242 31 35	Kaupoa	3.841900	6,949	22,799
	157 14 07.24	208.9	183 30 10	3 30 15	Kaeo	3.773471	5,936	19,475
Port, 1925 [1]	21 11 41.34	1,271.4	221 13 11	41 13 37	Kaeo	3.499079	3,156	10,354
	157 15 06.76	195.0	334 11 28	154 11 49	Na Puu Kulua 2	3.595993	3,945	12,943
Pap, 1925 [1]	21 10 24.92	766.4	198 46 19	18 46 29	Port	3.394891	2,483	8,146
	157 15 34.46	994.1	211 21 05	31 21 41	Kaeo	3.742869	5,532	18,150
			295 30 17	115 30 48	Na Puu Kulua 2	3.445305	2,788	9,147
Derrick, 1925-26 [1]	21 11 08.49	261.1	214 49 37	34 50 06	Kaeo	3.615155	4,122	13,524
	157 15 16.30	470.2	321 53 45	141 54 10	Na Puu Kulua 2	3.509022	3,229	10,594
			21 21 20	201 21 14	Pap	3.158001	1,439	4,721
Oke, 1925 [1]	21 10 44.12	1,356.9	210 05 01	30 05 31	Kaeo	3.679155	4,777	15,673
	157 15 17.69	510.3	311 23 11	131 23 36	Na Puu Kulua 2	3.432838	2,709	8,888
			39 19 16	219 19 10	Pap	2.882734	763	2,503
Eve, 1925 [1]	21 11 29.13	895.9	214 11 42	34 12 06	Kaeo	3.521618	3,324	10,905
	157 14 59.43	1,714.2	334 37 48	154 38 06	Na Puu Kulua 2	3.545860	3,514	11,529
Hock, 1925 [1]	21 11 19.14	588.6	175 42 19	355 42 18	Port	2.835576	685	2,247
	157 15 04.99	143.9	213 33 57	33 34 22	Kaeo	3.564455	3,668	12,034
White, 1925	21 05 34.813	1,070.6	125 15 44.2	305 15 22.0	Waiele	3.338010	2,177.8	7,145.0
	157 13 18.828	543.4	228 03 16.1	48 03 45.2	Kahualewa	3.510608	3,240.5	10,631.5
Wharf, 1925	21 05 32.263	992.2	91 43 09.5	271 42 36.8	White	3.418537	2,621.4	8,600.4
	157 11 48.047	1,386.8	106 53 56.4	286 53 01.5	Waiele	3.662448	4,596.7	15,081.0
			174 39 42.9	354 39 40.3	Kahuslewa	3.352965	2,254.1	7,395.3
Waieli, 1914 [1]	21 06 19.35	595.1	277 00 09	97 07 26	Puu Papai	4.548603	35,367	116,033
	157 14 24.51	707.4	311 17 06	131 21 46	Kaena	4.477868	30,052	98,596
X	21 06 23.26	715.3	104 03 42	284 03 08	Pukauahi	3.452100	2,832	9,291
	157 08 56.32	1,625.5	173 33 45	353 33 41	Kaana	3.405406	2,543	8,343
W. C. 27	21 05 50.49	1,552.7	203 24 22	23 24 30	Kaluakawahine	3.198056	1,578	5,177
	157 08 26.96	778.1	242 27 59	62 28 27	Puu Iloli	3.407039	2,553	8,376
W. C. 26	21 05 48.80	1,500.7	124 25 45	304 25 14	Pukauahi	3.490196	3,092	10,144
	157 09 03.15	90.9	190 31 59	10 32 02	X	3.032665	1,078	3,537
			228 04 59	48 05 20	Kaluakawahine	3.351304	2,245	7,365
			267 08 45	87 08 58	W. C. 27	3.019317	1,045	3,428

Lanai Island

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
Supplementary points								
Puu Pehe, 1914	20 44 20.462	629.2	205 44 30.5	25 44 57.2	Puu Manu	3.699867	5,010.3	16,438.0
	156 53 36.216	1,047.8	246 33 05.9	66 38 34.0	Launiupoko	4.464179	29,119.2	95,535.2
			300 49 40.7	120 56 06.6	Kahoolawe	4.567078	36,904.4	121,077.2
Kaea, 1914	20 44 09.564	294.1	243 38 48.2	63 40 48.2	Puu Manu	4.038536	10,927.9	35,852.6
	156 57 59.538	1,722.5	267 28 05.8	87 29 39.0	Puu Pehe	3.882274	7,625.6	25,018.3
			295 16 17.0	115 24 15.7	Kahoolawe	4.638268	43,477.8	142,643.4
Kaena, 1914	20 55 34.101	1,048.7	179 24 01.5	359 23 59.2	Kaunakakai	4.257010	18,072.2	59,291.9
	157 01 23.000	664.6	218 58 52.4	39 01 28.0	Puu Papai	4.299698	19,938.8	65,415.9
Wahie, 1914 [1]	20 55 35.12	1,080.0	194 26 58	14 27 48	Puu Papai	4.203279	15,969	52,392
	156 56 26.55	767.2	268 56 26	89 01 38	Kekaa	4.401288	25,193	82,654
Gil (large cairn), 1914 [1]	20 55 04.63	142.4	180 29 12	0 29 14	Puu Papai	4.214887	16,402	53,812
	156 54 13.34	385.5	266 15 07	86 19 31	Kekaa	4.330130	21,386	70,164
Mo (windmill), 1914	20 52 42.319	1,301.4	250 48 30.8	70 51 55.5	Kekaa	4.244269	17,549.7	57,577.6
	156 51 23.399	820.8	263 13 40.3	83 17 40.4	Laina	4.292082	19,592.1	64,278.4
			279 29 55.9	99 34 39.5	Launiupoko	4.368085	23,339.1	76,571.7
White building, 1914 [1]	20 51 15.48	476.1	238 29 49	58 32 39	Kekaa	4.208066	16,146	52,972
	156 49 51.22	1,480.7	253 21 07	73 24 33	Laina	4.239928	17,375	57,004
Smoke, 1900 [1]	20 51 04.20	129.2	252 23 04	72 26 31	Laina	4.245404	17,596	57,730
	156 49 55.50	1,604.5	272 21 32	92 25 42	Launiupoko	4.308574	20,350	66,765
Smoke (church spire), 1914	20 51 02.399	73.8	236 24 00.9	56 26 45.1	Kekaa	4.203368	15,972.3	52,402.5
	156 49 35.205	1,017.8	251 36 47.3	71 40 06.9	Laina	4.231847	17,054.8	55,954.0
			272 16 14.9	92 20 18.0	Launiupoko	4.295833	19,762.1	64,836.2

[1] No check on this position.

Lanai Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance: Log (meters)	Distance: Meters	Distance: Feet
Supplementary points—Continued	° ′ ″		° ′ ″	° ′ ″				
Ip (wharf), 1914	20 50 00.006	0.2	228 08 37.6	48 11 05.7	Kekaa	4.207380	16,120.6	52,889.0
	156 48 50.326	1,455.1	243 53 14.6	63 56 18.1	Laina	4.219566	16,579.3	54,393.9
			266 28 54.9	86 32 41.9	Launiupoko	4.266794	18,483.9	60,642.6
Wash, 1900	20 47 32.914	1,012.2	219 47 07.7	39 49 44.5	Kekaa	4.298528	19,885.1	65,239.7
	156 49 15.170	438.7	232 51 18.3	52 54 30.5	Laina	4.291747	19,577.0	64,228.9
			253 33 09.4	73 37 05.1	Launiupoko	4.300708	19,985.2	65,568.1
			293 41 09.8	113 49 00.2	Puu Olai	4.623614	42,035.3	137,910.8
Pum (windmill), 1914 [1]	20 46 40.58	1,247.9	230 56 11	50 59 35	Laina	4.328662	21,314	69,928
	156 49 47.83	1,383.4	250 07 42	70 11 50	Launiupoko	4.330110	21,385	70,161
Ak (cairn), 1914 [1]	20 46 09.68	297.7	229 51 25	49 54 55	Laina	4.348473	22,309	73,192
	156 50 05.29	153.0	248 15 45	68 19 58	Launiupoko	4.346247	22,195	72,818
Mauna Oune, 1914 [1]	20 47 55.14	1,695.7	237 05 03	57 08 35	Laina	4.311737	20,499	67,254
	156 50 10.65	308.0	256 31 32	76 35 48	Launiupoko	4.329587	21,359	70,075
Gale, 1927	20 52 16.180	497.6	289 10 21.5	109 11 51.6	Pohoula	3.888923	7,743.2	25,404.1
	156 59 39.837	1,151.5	308 32 30.9	128 35 06.9	Puu Manu	4.210278	16,228.5	53,243.0
Wind, 1927	20 52 04.089	125.7	286 43 55.8	106 45 24.8	Pohoula	3.877459	7,541.5	24,742.4
	156 59 36.670	1,060.0	307 42 03.8	127 44 38.7	Puu Manu	4.202132	15,926.9	52,253.5
Kaholo, 1927	20 45 27.363	841.5	173 50 13.1	353 49 56.5	Gale	4.101929	12,645.3	41,487.1
	156 58 52.871	1,529.5	174 04 31.2	354 04 15.7	Wind	4.088699	12,265.9	40,242.4
			257 45 27.6	77 47 46.6	Puu Manu	4.064402	11,598.5	38,052.7
Kaapa, 1927	20 51 56.344	1,732.7	262 10 59.1	82 11 53.9	Gale	3.652192	4,489.4	14,729.0
	157 02 13.705	396.2	266 59 19.9	87 00 15.8	Wind	3.657591	4,545.6	14,913.4
			334 05 37.4	154 06 48.7	Kaholo	4.123766	13,297.4	43,626.6
Manui, 1927	20 47 55.490	1,706.4	148 08 37.2	328 07 40.6	Kaapa	3.940575	8,721.2	28,612.8
	156 59 34.471	996.9	178 53 30.7	358 53 28.8	Gale	3.904089	8,018.4	26,307.0
			179 31 24.8	359 31 24.0	Wind	3.883397	7,645.3	25,083.0
Kau, 1927	20 47 02.788	85.7	153 37 22.4	333 36 27.4	Kaapa	4.003348	10,077.4	33,062.3
	156 59 38.823	1,122.9	179 49 33.8	359 49 33.5	Gale	3.983972	9,637.7	31,619.7
			180 23 05.5	0 23 06.3	Wind	3.966892	9,266.0	30,400.2
Kaumalapau, north wireless pole, 1927 [1]	20 47 22.26	684.5	150 30 32	330 29 33	Kaapa	3.986061	9,684.1	31,771.9
	156 59 28.78	832.4	177 58 32	357 58 28	Gale	3.956378	9,044.4	29,673.2
Kaumalapau, south wireless pole, 1927 [1]	20 47 21.22	652.6	150 31 42	330 30 43	Kaapa	3.987627	9,719.1	31,886.7
	156 59 28.29	818.2	177 53 32	357 53 28	Gale	3.957939	9,076.9	29,779.8
Kaumalapau, red light, 1927	20 47 20.352	625.9	152 42 17.4	332 41 23.5	Kaapa	3.980074	9,551.6	31,337.2
	156 59 42.180	1,219.9	180 25 36.6	0 25 37.4	Gale	3.958934	9,097.8	29,848.4
			181 02 44.7	1 02 46.6	Wind	3.940870	8,727.1	28,632.2
Kaumalapau, white light, 1927	20 47 10.324	317.5	153 08 58.8	333 08 04.0	Kaapa	3.993849	9,859.4	32,347.0
	156 59 39.655	1,146.9	179 58 05.7	359 58 05.6	Gale	3.973398	9,405.8	30,858.9
			180 32 50.1	0 32 51.1	Wind	3.955900	9,034.4	29,640.4
Cairn on hill, 1927 [1]	20 46 08.59	264.2	158 33 05	338 32 23	Pohoula	3.973674	9,411.8	30,878.5
	156 53 27.81	804.4	238 25 44	58 26 08	Puu Manu	3.355786	2,268.7	7,443.2
Water tank, 1927 [1]	20 48 02.35	72.3	201 32 16	21 32 41	Pohoula	3.752553	5,656.6	18,558.4
	156 56 38.68	1,118.6	287 12 40	107 14 11	Puu Manu	3.892263	7,803.0	25,600.3
Nana, 1927	20 49 40.418	1,242.9	348 47 07.3	168 47 26.2	Kaholo	3.899463	7,933.5	26,028.5
	156 59 46.210	1,336.1	353 59 40.9	173 59 45.0	Manui	3.511167	3,244.6	10,645.0
			134 26 11.8	314 25 19.3	Kaapa	3.776068	5,971.3	19,590.8
Lost, 1927 [1]	20 51 01.47	45.2	344 11 33	164 12 09	Kaholo	4.028492	10,678.1	35,033.1
	157 00 33.42	966.2	120 12 40	300 12 04	Kaapa	3.525615	3,354.4	11,005.2
Kaa, 1927	20 51 46.934	1,443.4	103 51 43.3	283 51 28.9	Kaapa	3.082069	1,208.0	3,963.2
	157 01 33.133	957.8	254 38 18.2	74 38 58.6	Gale	3.531004	3,396.3	11,142.7
			338 20 16.2	158 21 13.1	Kaholo	4.098958	12,559.1	41,204.3

Maui Island

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance: Log (meters)	Distance: Meters	Distance: Feet
Principal points, west Maui								
Kekaa, 1881	20 55 49.645	1,526.7	68 49 42.7	248 44 53.2	Pohoula	4.400996	25,176.5	82,599.9
	156 41 54.782	1,582.9	306 45 13.4	126 46 25.5	Paupau	3.862320	7,283.2	23,895.0
Laina, 1879–1912	20 53 57.076	1,755.3	77 56 55.9	257 51 31.1	Pohoula	4.430555	26,949.8	88,417.8
	156 40 15.211	439.6	140 16 21.1	320 15 45.5	Kekaa	3.653355	4,501.5	14,768.7
			286 52 21.2	106 52 57.7	Paupau	3.490046	3,090.6	10,139.7
Launiupoko, 1879–1925	20 50 36.559	1,124.3	74 00 34.9	253 55 33.3	Puu Manu	4.407182	25,537.7	83,784.9
	156 38 12.195	352.6	173 31 36.8	353 31 29.5	Paupau	3.724519	5,303.0	17,398.3
			335 28 21.2	155 28 41.4	Hekili	3.595355	3,938.7	12,922.2

[1] No check on this position.

Maui Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Principal points, west Maui—Continued	° ′ ″		° ′ ″	° ′ ″				
Lahaina Courthouse, 1912	20 52 28.912	889.1	62 14 39.7	242 10 34.5	Puu Manu	4.352926	22,538.6	73,945.4
	156 40 51.386	1,485.3	245 37 00.2	65 37 49.6	Paupau	3.642970	4,395.1	14,419.6
			306 53 30.1	126 54 26.7	Launiupoko	3.760017	5,754.6	18,879.9
Manini (Puu Kolii)	20 55 54.92	1,689.0	28 31 12	208 30 47	Laina	3.615364	4,124	13,530
	156 39 07.07	204.3	88 05 27	268 04 27	Kekaa	3.685617	4,849	15,909
Waikulu, 1882	20 58 02.11	64.9	23 00 09	202 59 48	Manini	3.628318	4,249	13,940
	156 38 09.60	277.3	57 57 25	237 56 04	Kekaa	3.885127	7,676	25,184
Hawea, 1882–1912	21 00 22.99	707.0	321 37 33	141 38 16	Waikulu	3.742397	5,526	18,130
	156 40 08.35	241.1	20 05 40	200 05 02	Kekaa	3.951861	8,951	29,367
Malo, 1882–1912	21 01 31.88	980.4	355 14 00	175 14 07	Waikulu	3.811130	6,473	21,237
	156 38 28.22	814.9	53 46 34	233 45 58	Hawea	3.554438	3,585	11,762
Keahikauo	20 58 21.70	667.3	77 31 05	257 30 32	Waikulu	3.445059	2,786	9,140
	156 36 35.42	1,023.1	150 53 09	330 52 29	Malo	3.825730	6,695	21,965
Kahakuloa (Koae), 1882–1912	21 00 15.45	475.1	291 56 41	112 01 16	Haiku	4.380060	23,992	78,714
	156 32 53.46	1,543.9	306 08 27	126 11 39	Puu Nene	4.283746	19,220	63,058
			318 22 22	138 24 29	Maui north base	4.188941	15,450	50,689
Honokahau (O), 1882	21 01 54.97	1,690.5	9 17 41	189 17 28	Keahikauo	3.822555	6,646	21,804
	156 35 58.26	1,682.3	80 41 37	260 40 43	Malo	3.642274	4,388	14,396
			299 49 35	119 50 42	Kahakuloa	3.789015	6,152	20,184
Q	21 00 24.15	742.7	39 53 48	219 53 09	Keahikauo	3.690900	4,908	16,102
	156 34 46.44	1,341.2	143 24 28	323 24 03	Honokahau	3.541431	3,479	11,414
			274 41 04	94 41 45	Kahakuloa	3.515058	3,274	10,741
R, 1912	21 01 03.09	95.0	5 22 40	185 22 38	Q	3.080209	1,203	3,947
	156 34 42.54	1,228.5	126 07 13	306 06 46	O	3.432454	2,707	8,881
			294 56 24	114 57 03	Kahakuloa	3.540847	3,474	11,398
S	20 59 05.64	173.4	129 47 38	309 47 02	Q	3.576703	3,773	12,379
	156 33 06.06	175.0	142 21 28	322 20 54	R	3.659161	4,562	14,967
			189 36 59	9 37 03	Kahakuloa	3.337971	2,178	7,146
T	20 58 48.93	1,504.7	108 49 46	288 49 27	S	3.201879	1,592	5,223
	156 32 13.90	401.5	123 37 03	303 36 08	Q	3.723475	5,290	17,356
			156 45 32	336 45 18	Kahakuloa	3.461747	2,896	9,501
U	20 57 00.22	6.8	167 52 43	347 52 27	Kahakuloa	3.788216	6,141	20,148
	156 32 08.82	254.8	177 29 06	357 29 04	T	3.524565	3,346	10,978
Supplementary points, west Maui								
Pohakuloa [1]	20 47 46.57	1,432.1	329 39 28	149 41 32	Puu Olai	4.303215	20,101	65,948
	156 32 56.24	1,626.4	102 22 32	282 21 00	Hekili	3.885360	7,680	25,197
Olowalu, stack, 1900	20 48 46.405	1,427.0	161 02 48.7	341 02 34.4	Launiupoko	3.554092	3,581.7	11,751.0
	156 37 31.957	924.1	316 36 12.7	136 39 54.4	Puu Olai	4.421563	26,397.5	86,605.8
			326 39 17.2	146 41 57.0	Molokini	4.375455	23,738.6	77,882.4
Olowalu mill flagstaff	20 48 47.29	1,454.3	161 12 17	341 12 03	Launiupoko	3.550191	3,550	11,647
	156 37 32.64	943.8	208 13 37	28 13 44	Kilea	3.053280	1,131	3,711
			294 25 10	114 25 16	Hekili	2.731926	539	1,768
Kilea, 1925	20 49 19.68	605.2	2 02 50	182 02 49	Hekili	3.086311	1,220	4,003
	156 37 14.15	409.1	144 37 55	324 37 34	Launiupoko	3.462320	2,899	9,511
Libau	20 51 11.45	352.1	16 49 20	196 49 07	Kilea	3.555200	3,591	11,781
	156 36 38.21	1,104.6	68 27 27	248 26 54	Launiupoko	3.465595	2,921	9,583
			141 41 57	321 41 16	Paupau	3.728151	5,348	17,546
Kauaula Makai	20 51 22.70	698.1	172 26 15	352 26 07	Laina	3.680249	4,789	15,712
	156 39 53.40	1,543.7	211 09 03	31 09 31	Paupau	3.653111	4,499	14,760
			295 52 07	115 52 43	Launiupoko	3.512134	3,252	10,669
Lahaina Protestant Church	20 52 21.91	673.8	190 47 29	10 47 36	Laina	3.474104	2,979	9,774
	156 40 34.51	997.5	240 00 01	60 00 44	Paupau	3.608446	4,059	13,317
			308 12 48	128 13 39	Launiupoko	3.719060	5,237	17,182
Turtons mill chimney	20 52 54.02	1,661.3	203 02 51	23 03 01	Laina	3.323705	2,107	6,913
	156 40 43.76	1,264.8	254 35 49	74 36 36	Paupau	3.593674	3,924	12,874
Stack, 1900 [1]	20 52 27.09	833.1	181 14 11	1 14 12	Laina	3.442150	2,768	9,081
	156 40 17.28	499.5	313 13 28	133 14 12	Launiupoko	3.695727	4,963	16,283
Pioneer mill stack, 1900	20 52 53.779	1,653.9	159 16 06.0	339 15 40.7	Kekaa	3.762149	5,782.9	18,972.7
	156 40 43.934	1,269.8	203 05 45.1	23 05 55.4	Laina	3.325553	2,116.2	6,942.9
			313 53 02.6	133 53 56.7	Launiupoko	3.784383	6,086.7	19,969.4
Church, Lahaina, 1900 [1]	20 52 39.29	1,208.3	161 13 08	341 12 43	Kekaa	3.791227	6,183	20,285
	156 40 45.88	1,326.1	200 19 58	20 20 09	Laina	3.406750	2,551	8,369
Pa (Lahaina wireless pole), 1914	20 53 07.813	240.3	169 34 21.4	349 34 10.0	Kekaa	3.704183	5,060.4	16,602.3
	156 41 23.085	667.2	194 02 51.5	14 02 52.4	Site	2.518856	330.3	1,083.7
			232 19 05.9	52 19 30.1	Laina	3.394202	2,478.6	8,131.9
			310 07 11.3	130 08 19.3	Launiupoko	3.858358	7,217.0	23,677.8

[1] No check on this position.

Maui Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, west Maui—Contd.	° ′ ″		° ′ ″	° ′ ″				
Wreck, 1900	20 53 07.262	223.3	173 09 37.4	353 09 30.0	Kekaa	3.701530	5,029.6	16,501.3
	156 41 34.052	984.2	236 04 59.8	56 05 28.0	Laina	3.438661	2,745.8	9,008.5
			308 26 53.1	128 28 05.1	Launiupoko	3.872254	7,451.7	24,447.8
Tree, 1900 [1]	20 53 37.47	1,152.3	333 47 06	153 47 40	Launiupoko	3.792479	6,201	20,344
	156 39 46.95	1,356.9	126 25 31	306 25 21	Laina	3.006576	1,015	3,330
Site, 1914	20 53 18.232	560.7	167 55 34.6	347 55 22.3	Kekaa	3.677767	4,761.8	15,622.7
	156 41 20.311	587.0	237 35 05.0	57 35 28.3	Laina	3.348051	2,228.7	7,312.0
Al, 1914 [1]	20 53 39.40	1,211.7	5 56 33	185 56 33	Site	2.815836	654	2,146
	156 41 17.97	519.4	165 07 38	345 07 25	Kekaa	3.617461	4,144	13,596
Raw, 1914 [1]	20 54 28.93	889.7	297 03 34	117 03 58	Laina	3.333050	2,153	7,064
	156 41 21.55	622.8	359 03 12	179 03 13	Site	3.337349	2,174	7,133
Bud, 1914 [1]	20 55 09.30	286.0	307 02 57	127 03 33	Laina	3.566547	3,686	12,093
	156 41 57.00	1,647.1	342 45 06	162 45 19	Site	3.553449	3,576	11,732
Kekaalaau	20 57 33.49	1,029.9	69 37 33	249 35 47	Kekaa	3.962224	9,167	30,075
	156 36 57.37	1,657.3	112 52 23	292 51 57	Waikulu	3.354989	2,265	7,431
			160 19 27	340 17 54	Malo	3.891317	7,786	25,545
Nakalele Head light, 1912	21 01 53.261	1,637.9	302 48 21.1	122 49 19.1	Kahakuloa	3.744356	5,550.8	18,211.2
	156 35 35.011	1,011.0	314 18 23.3	134 19 35.4	Olai	3.909399	8,117.1	26,630.9
			335 47 02.1	155 47 52.3	Waihee	3.994073	9,864.5	32,363.8
Middle of roof, 1912	20 58 42.186	1,297.3	161 13 16.4	341 13 04.4	Kahakuloa	3.481363	3,029.4	9,939.0
	156 32 19.697	568.9	219 06 45.1	39 06 47.2	Olai	2.422898	264.8	868.8
			27 05 42.3	207 05 22.5	Waihee	3.544731	3,505.3	11,500.3
House on mountain, east gable, 1899 [1]	20 58 37.58	1,155.7	312 39 34	132 41 28	Maui north base	4.100452	12,602	41,345
	156 32 19.01	549.1	331 10 10	151 11 08	Wailuku	3.990390	9,781	32,090
Gay 1	20 54 19.18	589.8	271 34 13	91 37 05	Puu Nene	4.142422	13,881	45,541
	156 31 56.53	1,633.7	273 56 23	93 58 10	Maui north base	3.936436	8,638	28,340
			319 36 55	139 38 04	Maui south base	3.931426	8,539	28,015
Gay 2	20 55 22.70	698.1	279 11 00	99 13 58	Puu Nene	4.164939	14,620	47,966
	156 32 15.79	456.3	285 30 45	105 32 38	Maui north base	3.978702	9,521	31,237
			324 14 45	144 16 01	Maui south base	4.017942	10,422	34,193
Principal points, east Maui, north								
Haleakala 1, 1871	20 43 00.951	29.2	121 21 27.2	301 16 37.9	Maui south base	4.441087	27,611.3	90,588.1
	156 15 09.593	277.6	145 26 25.9	325 25 01.3	Puu Pane	4.085764	12,183.3	39,971.4
			163 23 46.5	343 22 50.4	Piiholo	4.204208	16,003.2	52,503.8
Haiku, 1871	20 55 23.420	720.2	60 40 32.2	240 37 26.1	Maui south base	4.238122	17,303.0	56,768.3
	156 20 03.343	96.6	77 55 08.0	257 52 39.8	Maui north base	4.088665	12,264.9	40,239.1
			332 24 06.2	152 24 54.5	Piiholo	3.927347	8,459.6	27,754.5
Hanakauhi, 1877	20 44 17.418	535.6	69 02 46.0	249 01 08.1	Kolekole	3.932573	8,562.0	28,090.5
	156 10 56.048	1,621.5	72 14 20.7	252 12 50.9	Haleakala 1	3.886690	7,703.5	25,273.9
			137 29 48.8	317 27 22.6	Piiholo	4.245934	17,617.1	57,798.8
Puu Nianiau	20 46 32.131	988.1	9 18 18.9	189 18 04.4	Kolekole	3.863476	7,302.6	23,958.6
	156 14 51.563	1,491.4	150 03 06.9	330 02 04.3	Piiholo	4.008786	10,204.4	33,478.9
			301 17 27.9	121 18 51.4	Hanakauhi	3.901652	7,973.6	26,160.1
Haleakala 2, 1885	20 42 17.056	524.5	94 14 15.1	274 12 29.5	Kolekole	3.937442	8,658.5	28,407.1
	156 10 33.962	982.8	99 37 10.2	279 35 32.7	Haleakala	3.907904	8,089.2	26,539.3
			170 12 20.6	350 12 12.8	Hanakauhi	3.574741	3,756.1	12,323.1
Pakihi (Kaluanui), 1883	20 44 00.945	29.1	46 51 53.9	226 51 12.2	Haleakala 2	3.669517	4,672.2	15,328.7
	156 08 36.140	1,045.6	80 48 49.6	260 46 30.3	Haleakala 1	4.061925	11,532.5	37,836.2
			97 08 25.8	277 07 36.3	Hanakauhi	3.610588	4,079.3	13,383.5
Palaha, 1877	20 44 01.182	36.3	45 39 08.1	225 38 28.0	Haleakala 2	3.660905	4,580.4	15,027.5
	156 08 40.769	1,179.5	80 40 10.8	260 37 53.1	Haleakala 1	4.056962	11,401.5	37,406.4
			273 07 03.1	93 07 04.7	Pakihi	2.127574	134.1	440.0
Ulalena, 1877	20 52 10.539	324.1	70 23 16.6	250 22 22.5	Piiholo	3.668700	4,663.4	15,299.8
	156 15 15.823	457.4	125 32 03.8	305 30 21.3	Haiku	4.009005	10,209.5	33,495.7
			332 40 43.4	152 42 15.7	Hanakauhi	4.214170	16,374.6	53,722.3
			356 08 33.3	176 08 41.9	Puu Nianiau	4.018306	10,430.5	34,220.7
Huelo	20 54 55.162	1,696.4	9 50 15.2	189 49 42.2	Puu Nianiau	4.195904	15,700.2	51,509.7
	156 13 18.823	543.9	33 44 47.4	213 44 05.7	Ulalena	3.784481	6,088.1	19,974.0
			348 06 22.4	168 07 13.2	Hanakauhi	4.301941	20,042.0	65,754.5
Okohola, 1877	20 51 59.014	1,814.9	1 59 20.9	181 59 14.9	Hanakauhi	4.152403	14,203.8	46,600.3
	156 10 39.008	1,127.6	36 00 34.4	215 59 04.6	Puu Nianiau	4.094298	12,425.0	40,764.4
			139 33 16.5	319 32 19.5	Huelo	3.852415	7,118.9	23,355.9
Alaea, 1877	20 44 29.885	919.0	84 14 15.6	264 13 29.2	Hanakauhi	3.581422	3,814.4	12,514.4
	156 08 44.872	1,298.2	166 33 55.9	346 33 15.4	Okohola	4.152310	14,200.7	46,590.1
			344 09 18.1	164 09 21.2	Pakihi	2.966204	925.1	3,035.1

[1] No check on this position.

Maui Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Principal points, east Maui, north—Contd.	° ′ ″		° ′ ″	° ′ ″				
Opikoula, 1877	20 49 49.153	1,511.6	31 46 00.4	211 44 45.8	Alaea	4.062465	11,546.9	37,883.5
	156 05 14.748	426.4	113 05 25.1	293 03 29.7	Okohola	4.008158	10,189.6	33,430.4
Wai Ale, 1883	20 44 15.417	474.1	75 52 03.6	255 51 42.0	Pakihi	3.260637	1,822.4	5,979.0
	156 07 35.060	1,014.3	102 25 37.0	282 25 12.3	Alaea	3.315583	2,068.2	6,785.4
			201 34 02.9	21 34 52.7	Opikoula	4.042827	11,036.4	36,208.6
Olopawa, 1878	20 46 17.044	524.1	68 32 57.6	248 31 01.1	Wai Ale	4.009471	10,220.5	33,531.8
	156 02 06.262	181.1	140 07 31.5	320 06 24.6	Opikoula	3.929448	8,500.6	27,889.1
Honokalani, 1878	20 48 00.455	14.0	37 36 14.2	217 35 44.1	Olopawa	3.603560	4,013.8	13,168.6
	156 00 41.586	1,202.6	112 57 04.2	292 55 27.1	Opikoula	3.933338	8,577.0	28,139.7
Pukaulua, 1878	20 47 43.863	1,348.9	50 26 59.4	230 26 19.7	Olopawa	3.622472	4,192.5	13,754.9
	156 00 14.500	419.3	123 04 52.4	303 04 42.8	Honokalani	2.970736	934.8	3,066.9
			334 07 11.0	154 07 35.9	Kauiki	3.669651	4,673.6	15,333.3
Kauiki (Hana lat. sta.), 1878	20 45 27.126	834.2	81 32 31.3	261 29 30.3	Wai Ale	4.174606	14,948.8	49,044.5
	155 59 03.980	115.1	106 14 28.7	286 13 24.1	Olopawa	3.739703	5,491.6	18,017.0
Supplementary points, Kahului and vicinity								
Kahului, 1899–1912	20 52 56.290	1,731.1	238 18 21.4	58 19 00.5	Maui north base	3.570368	3,718.5	12,199.8
	156 28 47.808	1,381.8	358 53 17.8	178 53 18.8	Maui south base	3.597379	3,957.1	12,982.6
Wailuku, 1899–1912	20 53 58.929	1,812.2	269 39 07.7	89 40 03.9	Maui north base	3.658121	4,551.1	14,931.4
	156 29 35.805	1,034.8	324 14 19.4	144 14 36.5	Kahului	3.375451	2,373.8	7,788.0
			346 01 16.2	166 01 34.3	Maui south base	3.782628	6,062.2	19,899.1
Tall (tallest of 8 stacks), 1899	20 54 17.613	541.7	44 27 21.9	224 26 03.8	Maui south base	3.956402	9,044.9	29,674.8
	156 25 06.040	174.5	80 25 39.4	260 24 59.4	Maui north base	3.517338	3,291.1	10,797.6
			85 47 53.0	265 46 15.8	Wailuku	3.893060	7,817.4	25,647.6
Stack "A," 1899	20 53 26.944	828.6	30 53 35.2	210 52 59.1	Maui south base	3.756540	5,708.7	18,729.3
	156 27 03.768	108.9	102 37 31.0	282 36 36.8	Wailuku	3.653483	4,502.8	14,772.9
			188 50 17.8	8 50 19.8	Maui north base	3.009779	1,022.8	3,355.6
East (eastern of 2 stacks), 1899	20 52 54.868	1,687.4	38 25 15.5	218 24 37.2	Maui south base	3.698419	4,993.7	16,383.5
	156 26 57.813	1,671.0	113 20 41.0	293 19 44.6	Wailuku	3.696629	4,973.1	16,315.9
			179 34 16.8	359 34 16.6	Maui north base	3.300401	1,997.1	6,552.2
Western of 2 stacks (West), 1899 [1]	20 52 54.76	1,684.0	38 24 56	218 24 18	Maui south base	3.698014	4,989.0	16,368.1
	156 26 57.93	1,674.4	113 23 42	293 22 46	Wailuku	3.696486	4,971.5	16,310.7
Last, 1899	20 53 59.726	1,836.8	269 52 06.5	89 52 20.1	Maui north base	3.042835	1,103.7	3,621.1
	156 27 36.519	1,055.4	46 34 05.5	226 33 40.0	Kahului	3.452927	2,837.4	9,309.0
			89 35 54.6	269 35 12.0	Wailuku	3.537505	3,447.5	11,310.7
Beach, 1899	20 53 58.560	1,800.9	268 36 58.0	88 37 17.7	Maui north base	3.201881	1,591.8	5,222.4
	156 27 53.393	1,543.1	39 23 53.8	219 23 34.4	Kahului	3.394105	2,478.0	8,129.9
			90 13 29.6	270 12 53.1	Wailuku	3.471262	2,959.8	9,710.6
Bat, 1899	20 53 58.483	1,798.5	268 42 19.5	88 42 41.8	Maui north base	3.256833	1,806.5	5,926.8
	156 28 00.822	23.8	35 22 40.8	215 22 24.0	Kahului	3.370272	2,345.7	7,695.9
			90 17 26.7	270 16 52.8	Wailuku	3.438558	2,745.1	9,006.2
Dock, 1899	20 53 52.081	1,601.6	263 28 30.7	83 28 56.4	Maui north base	3.320558	2,092.0	6,863.5
	156 28 10.248	296.2	32 19 26.7	212 19 13.3	Kahului	3.307569	2,030.3	6,661.1
			94 52 19.0	274 51 48.5	Wailuku	3.394734	2,481.6	8,141.7
Hobsons flagstaff, 1899	20 53 55.145	1,695.9	265 23 46.6	85 24 08.6	Maui north base	3.252250	1,787.5	5,864.5
	156 27 59.982	1,733.5	37 22 17.9	217 22 00.8	Kahului	3.357444	2,277.4	7,471.8
			92 24 39.2	272 24 05.0	Wailuku	3.442759	2,771.8	9,093.8
Kirklands flagstaff, 1899	20 53 48.073	1,478.4	258 49 38.2	78 50 00.8	Maui north base	3.270196	1,862.9	6,111.9
	156 28 01.569	45.3	40 00 22.0	220 00 05.5	Kahului	3.317841	2,078.9	6,820.5
			96 59 36.5	276 59 02.9	Wailuku	3.438365	2,743.9	9,002.3
Mill, 1899	20 53 50.649	1,557.6	95 35 17.0	275 34 44.8	Wailuku	3.417796	2,617.0	8,585.9
	156 28 05.685	164.3	261 45 50.9	81 46 14.9	Maui north base	3.293771	1,966.8	6,452.7
			36 04 01.5	216 03 46.4	Kahului	3.315560	2,068.0	6,784.8
Rail, 1899	20 53 36.290	1,116.0	254 52 28.8	74 53 01.9	Maui north base	3.442883	2,772.6	9,096.4
	156 28 30.943	894.3	21 37 05.3	201 36 59.3	Kahului	3.121616	1,323.2	4,341.2
			110 22 41.4	290 22 18.3	Wailuku	3.300967	1,999.7	6,560.7
Lad, 1899	20 53 47.709	1,467.2	263 19 10.6	83 19 49.9	Maui north base	3.505272	3,200.9	10,501.6
	156 28 48.335	1,396.9	359 26 54.1	179 26 54.3	Kahului	3.199029	1,581.4	5,188.3
			104 07 11.3	284 06 54.4	Wailuku	3.150649	1,414.6	4,641.1
Fly, 1899	20 54 01.616	49.7	270 52 57.0	90 53 41.3	Maui north base	3.554735	3,587.0	11,768.3
	156 29 02.433	70.3	348 07 03.8	168 07 09.0	Kahului	3.312379	2,053.0	6,735.6
			85 06 14.5	265 06 02.6	Wailuku	2.985879	968.0	3,175.8
Waikapu church, 1899	20 51 38.091	1,171.4	204 29 57.8	24 30 22.1	Wailuku	3.677591	4,759.8	15,616.1
	156 30 44.102	1,274.9	234 24 53.3	54 25 34.7	Kahului	3.616288	4,133.2	13,560.3
			294 16 43.0	114 17 25.4	Maui south base	3.576638	3,772.6	12,377.3

[1] No check on this position.

Maui Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, Kahului and vicinity—Continued	° ′ ″		° ′ ″	° ′ ″				
Red spire, 1899 [1]	20 53 45.41	1,396.5	239 07 56	59 08 05	Wailuku	2.908752	810	2,657
	156 29 59.88	1,730.6	265 10 00	85 11 05	Maui north base	3.721438	5,265	17,274
Red, 1899 [1]	20 54 27.29	839.2	283 15 44	103 16 28	Maui north base	3.566166	3,683	12,083
	156 29 02.36	68.2	47 56 18	227 56 06	Wailuku	3.114586	1,302	4,272
Luke, 1912	20 53 00.628	19.3	250 32 58.1	70 34 01.7	Maui north base	3.737810	5,467.8	17,938.9
	156 29 56.727	1,639.6	333 09 42.6	153 10 08.0	Maui south base	3.661182	4,583.3	15,037.0
Hay, 1912	20 55 28.751	884.2	297 56 43.3	117 57 47.0	Maui north base	3.766042	5,835.0	19,143.7
	156 29 56.689	1,638.1	0 00 49.4	180 00 49.4	Luke	3.658507	4,555.2	14,944.9
Waihee, 1912	20 57 00.709	21.8	185 55 04.3	5 55 12.1	Kahakuloa	3.779667	6,021.0	19,753.9
	156 33 14.959	432.2	296 15 49.7	116 17 00.6	Hay	3.805409	6,388.6	20,959.9
			297 03 25.6	117 05 40.1	Maui north base	4.087156	12,222.4	40,099.7
			322 11 01.3	142 12 12.1	Luke	3.970570	9,344.8	30,658.7
Hak, 1912	20 59 17.983	553.0	319 24 54.6	139 26 38.3	Maui north base	4.109965	12,881.5	42,262.1
	156 31 48.304	1,395.2	335 24 54.2	155 25 34.1	Hay	3.889417	7,752.1	25,433.3
			30 40 11.9	210 39 40.8	Waihee	3.690901	4,908.0	16,102.3
			133 12 11.4	313 11 48.1	Kahakuloa	3.411895	2,581.6	8,469.8
Olai, 1905–1912	20 58 48.866	1,502.8	156 46 55.6	336 46 41.5	Kahakuloa	3.462007	2,897.4	9,505.9
	156 32 13.913	401.9	219 33 26.5	39 33 35.7	Hak	3.065004	1,161.5	3,810.7
			27 56 05.1	207 55 43.2	Waihee	3.575735	3,764.7	12,351.4
Hen, 1912	20 54 38.403	1,181.0	149 55 30.6	329 55 19.5	Hay	3.252665	1,789.2	5,870.1
	156 29 25.659	741.5	285 34 11.3	105 35 03.9	Maui north base	3.645426	4,420.0	14,501.3
Tug, 1912	20 55 46.278	1,423.2	303 00 39.7	123 01 41.9	Maui north base	3.778776	6,008.6	19,713.2
	156 29 52.676	1,522.1	339 29 31.5	159 29 41.1	Hen	3.348024	2,228.6	7,311.7
			111 23 51.9	291 22 39.6	Waihee	3.797739	6,276.8	20,593.1
Pond, 1912	20 56 59.628	1,833.7	334 11 49.1	154 12 05.8	Hay	3.491947	3,104.2	10,184.4
	156 30 43.450	1,255.3	90 26 33.8	270 25 39.6	Waihee	3.641208	4,377.3	14,361.2
			156 14 20.7	336 13 57.5	Hak	3.667364	4,649.0	15,252.6
Stack (f), 1912	20 53 18.683	574.6	84 57 15.4	264 55 58.0	Luke	3.799318	6,299.7	20,668.3
	156 26 19.617	567.0	122 32 00.3	302 30 42.8	Hay	3.871569	7,439.9	24,409.1
			138 30 09.2	318 29 55.4	Maui north base	3.227525	1,688.6	5,540.0
Stack (leaning), 1912	20 52 54.307	1,670.1	38 21 31.0	218 20 53.0	Maui south base	3.696126	4,967.4	16,297.2
	156 26 58.525	1,691.6	92 10 12.0	272 09 08.5	Luke	3.712173	5,154.3	16,910.4
			180 09 36.8	0 09 36.9	Maui north base	3.304127	2,014.3	6,608.6
Puu Nene mill, north stack, 1912	20 52 15.526	477.5	41 36 51.7	221 36 22.1	Maui south base	3.558094	3,614.9	11,859.9
	156 27 22.113	639.2	107 14 59.3	287 14 04.3	Luke	3.670183	4,679.3	15,352.0
			192 05 50.2	12 05 58.7	Maui north base	3.515845	3,279.8	10,760.5
Puu Nene mill, south stack, 1912	20 52 14.479	445.3	41 12 22.7	221 11 53.9	Maui south base	3.550162	3,549.5	11,645.3
	156 27 24.272	701.6	107 51 32.8	287 50 38.5	Luke	3.665538	4,629.5	15,188.6
			193 01 55.8	13 02 05.1	Maui north base	3.521763	3,324.8	10,908.1
Puu Nene mill, cupola, 1912	20 52 14.798	455.1	42 20 54.7	222 20 24.6	Maui south base	3.559489	3,626.5	11,897.9
	156 27 20.653	597.0	107 21 26.0	287 20 30.5	Luke	3.674524	4,726.3	15,506.2
			191 17 49.0	11 17 57.0	Maui north base	3.517611	3,293.1	10,804.1
Waikapu stack, 1912	20 51 26.673	820.3	196 51 59.0	16 52 09.8	Luke	3.479902	3,019.3	9,905.8
	156 30 27.035	781.5	232 00 43.3	52 01 57.7	Maui north base	3.883832	7,653.0	25,108.2
			292 10 07.0	112 10 43.2	Maui south base	3.502508	3,180.6	10,435.0
Kahului, breakwater light, 1912 (rebuilt 1915)	20 54 06.376	196.1	275 15 16.9	95 15 44.0	Maui north base	3.343223	2,204.1	7,231.3
	156 28 14.275	412.5	55 40 41.7	235 40 05.2	Luke	3.554555	3,585.5	11,763.4
			130 34 01.7	310 33 25.1	Hay	3.590585	3,895.7	12,781.1
Kahului Harbor front range light, 1912, (rebuilt 1922).	20 53 44.107	1,356.4	65 04 48.1	245 04 12.6	Luke	3.501439	3,172.8	10,409.4
	156 28 23.176	669.8	130 09 25.7	310 09 01.3	Hen	3.413206	2,589.4	8,495.4
			138 13 12.2	318 12 36.7	Hay	3.635063	4,315.8	14,159.4
Kahului Harbor front range beacon, 1912	20 54 18.229	560.6	278 06 55.0	98 07 44.0	Maui north base	3.603120	4,009.8	13,155.5
	156 29 15.686	453.3	26 25 51.9	206 25 37.2	Luke	3.425692	2,665.0	8,743.4
			151 21 07.4	331 20 52.7	Hay	3.392928	2,471.3	8,107.9
			155 05 00.9	335 04 57.3	Hen	2.835121	684.1	2,244.4
Kahului Harbor rear range beacon, 1912	20 54 10.984	337.8	159 50 28.5	339 50 17.6	Hay	3.406138	2,547.6	8,358.3
	156 29 26.305	760.2	181 16 05.1	1 16 05.3	Hen	2.926050	843.4	2,767.1
			274 35 16.0	94 36 08.8	Maui north base	3.632483	4,290.3	14,075.8
Kahului bank cupola, 1912 [1]	20 53 42.31	1,301.2	67 48 58	247 48 19	Luke	3.530744	3,394	11,135
	156 28 07.97	230.3	136 11 01	316 10 22	Hay	3.656750	4,537	14,885
Kahului electric light stack, 1912	20 54 18.220	560.3	278 34 52.2	98 35 38.5	Maui north base	3.578864	3,792.0	12,440.9
	156 29 08.070	233.2	30 30 53.6	210 30 36.2	Luke	3.442434	2,769.7	9,086.9
			140 41 13.8	320 41 07.5	Hen	3.904324	8,022.8	2,632.2
			147 04 11.1	327 03 53.7	Hay	3.412344	2,584.3	8,478.7
Waikapu [1]	20 52 48.08	1,478.6	243 46 17	63 47 13	Maui north base	3.698301	4,992	16,378
	156 29 33.29	962.2	256 03 06	76 05 06	Puu Nene	4.001385	10,032	32,913

[1] No check on this position.

Maui Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
***Supplementary points, Kahului and vicinity*—Continued**	° ′ ″		° ′ ″	° ′ ″				
Wailuku mill stack, 1912	20 53 52.909	1,627.1	184 48 03.1	4 48 06.1	Hay	3.470971	2,957.8	9,704.0
	156 30 05.256	151.9	267 44 29.5	87 45 36.1	Maui north base	3.732910	5,406.4	17,737.5
			351 16 56.9	171 16 59.9	Luke	3.211265	1,626.5	5,336.3
Wailuku chimney	20 53 36.19	1,113.0	259 30 44	79 34 25	Haiku	4.259319	18,168	59,606
	156 30 21.60	624.3	262 56 33	82 57 46	Maui north base	3.772267	5,919	19,419
			331 43 23	151 43 57	Maui south base	3.769791	5,886	19,311
Wailuku yellow spire, 1899	20 53 21.374	657.3	232 57 45.2	52 58 04.1	Wailuku	3.282747	1,917.6	6,291.3
	156 30 28.769	831.5	284 48 08.4	104 48 44.4	Kahului	3.479764	3,018.3	9,902.5
			327 38 21.5	147 38 58.5	Maui south base	3.747931	5,596.7	18,361.8
Waiehu church buff spire, 1912	20 55 09.943	305.8	245 54 03.4	65 54 19.4	Hay	3.151281	1,416.7	4,648.0
	156 30 41.444	1,197.6	288 29 05.4	108 30 25.1	Maui north base	3.832435	6,798.8	22,305.7
			341 59 42.4	161 59 58.4	Luke	3.621332	4,181.5	13,718.8
Waihee church, yellow spire, 1912	20 56 12.250	376.7	300 20 40.5	120 22 06.4	Maui north base	3.906300	8,059.4	26,441.5
	156 30 58.994	1,704.5	306 36 46.8	126 37 09.0	Hay	3.350808	2,242.9	7,358.6
			110 46 52.4	290 46 03.7	Waihee	3.623401	4,201.5	13,784.4
Waihee mill stack (chimney), 1912	20 56 02.194	67.5	299 39 18.0	119 40 39.6	Maui north base	3.881061	7,604.3	24,948.4
	156 30 46.990	1,357.7	305 16 55.9	125 17 13.8	Hay	3.250549	1,780.5	5,841.5
			112 50 04.2	292 49 11.2	Waihee	3.666373	4,638.5	15,218.1
Pump stack, 1912 [1]	20 48 45.55	1,400.8	126 38 40	306 37 38	Maui south base	3.798793	6,292	20,643
	156 25 50.53	1,461.2	137 47 35	317 46 08	Luke	4.024988	10,592	34,751
Paia stack, 1912	20 54 34.896	1,073.2	56 15 20.7	236 13 11.8	Maui south base	4.099524	12,575.5	41,258.1
	156 22 43.457	1,255.8	76 59 10.9	256 56 36.5	Luke	4.109008	12,853.1	42,168.9
			81 40 41.4	261 39 10.6	Maui north base	3.871825	7,444.3	24,423.5
Church, 1899 [1]	20 55 48.88	1,503.2	67 48 33	247 46 51	Maui north base	3.948197	8,876	29,121
	156 22 13.97	403.7	75 11 21	255 08 43	Wailuku	4.120841	13,208	43,333
Supplementary points, east Maui, north								
Puu Nene, 1912	20 54 06.622	203.6	53 46 02.4	233 44 19.5	Maui south base	4.014918	10,349.5	33,955.0
	156 23 56.396	1,629.8	87 43 35.0	267 42 30.1	Maui north base	3.721160	5,262.1	17,264.1
			250 39 49.7	70 41 13.0	Haiku	3.853506	7,136.8	23,414.7
			295 42 59.5	115 45 10.9	Piiholo	4.072907	11,827.9	38,805.4
			321 25 45.9	141 27 28.4	Puu Pane	4.125458	13,349.3	43,796.8
Puu o Koha	20 49 33.392	1,026.9	101 31 55.2	281 29 37.3	Maui south base	4.058419	11,439.8	37,532.1
	156 22 17.443	504.4	135 16 16.1	315 14 36.1	Maui north base	4.062015	11,534.9	37,844.1
			161 12 18.0	341 11 42.8	Puu Nene	3.948221	8,876.1	29,121.0
			247 15 09.3	67 16 45.3	Piiholo	3.927024	8,453.3	27,733.9
			290 26 31.4	110 27 38.5	Puu Pane	3.765559	5,828.5	19,122.3
			10 18 50.2	190 18 27.5	Puu o Kali	4.015465	10,362.5	33,997.6
Puu Koa	20 50 01.47	45.2	79 44 22	259 43 23	Puu o Koha	3.685096	4,843	15,889
	156 19 32.64	943.7	231 35 11	51 35 48	Piiholo	3.587568	3,869	12,694
			346 30 42	166 30 50	Puu Pane	3.474523	2,982	9,783
Olinda	20 48 32.67	1,004.7	100 34 55	280 32 52	Puu o Koha	4.007974	10,185	33,415
	156 16 31.18	901.6	156 40 13	336 39 45	Piiholo	3.747534	5,592	18,346
			198 00 33	18 01 00	Ulalena	3.847907	7,045	23,113
Kalahaku	20 43 48.86	1,502.5	176 17 46	356 17 42	Puu Nianiau	3.701708	5,032	16,509
	156 14 40.32	1,166.6	262 16 47	82 18 07	Hanakauhi	3.816106	6,548	21,483
			29 53 38	209 53 27	Haleakala 1	3.230240	1,699	5,574
Kuiki	20 43 15.98	491.4	63 51 20	243 50 35	Haleakala 2	3.613994	4,111	13,488
	156 08 26.42	764.4	163 22 09	343 22 04	Palaha	3.161585	1,451	4,760
			168 30 09	348 30 06	Pakihi	3.149545	1,411	4,629
Lorrins Hill	20 44 36.58	1,124.9	337 05 48	157 05 51	Wai Ale	2.849071	706	2,316
	156 07 44.56	1,289.1	83 16 32	263 16 10	Puu Alaea	3.244737	1,757	5,764
			204 15 24	24 16 18	Opikoula	4.023001	10,544	34,593
Luahine (Kauhikoa)	20 53 45.501	1,399.3	94 33 38.3	274 31 57.4	Puu Nene	3.913510	8,194.3	26,884.1
	156 19 13.756	397.6	154 33 12.7	334 32 55.0	Haiku	3.523078	3,334.9	10,941.3
			331 00 38.9	151 01 09.5	Piiholo	3.709995	5,128.6	16,826.1
Kamole	20 52 53.25	1,637.6	109 18 26	289 17 06	Puu Nene	3.834833	6,836	22,428
	156 20 13.40	387.3	227 00 27	47 00 49	Lauhine	3.372310	2,357	7,733
			304 21 52	124 22 44	Piiholo	3.707564	5,100	16,732
Kapuai, 1877	20 54 22.868	703.3	260 33 51.5	80 35 05.4	Huelo	3.782800	6,064.6	19,896.9
	156 16 45.848	1,325.0	327 24 04.4	147 24 36.1	Ulalena	3.683964	4,830.2	15,847.1
			17 37 30.4	197 37 08.3	Piiholo	3.771791	5,912.8	19,398.9
			74 57 36.7	254 56 43.9	Luahine	3.646042	4,426.3	14,522.0
			108 04 50.3	288 03 39.8	Haiku	3.778385	6,003.2	19,695.5
Kuloli	20 55 11.92	366.6	336 15 53	156 16 02	Kapuai	3.216957	1,648	5,407
	156 17 08.80	254.3	94 01 06	274 00 04	Haiku	3.703804	5,056	16,588

[1] No check on this position.

Maui Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, east Maui, north—Continued	° ′ ″		° ′ ″	° ′ ″				
Kuiaha	20 54 51.82	1,593.6	107 59 32	287 58 55	Haiku	3.497919	3,147	10,325
	156 18 19.76	571.0	253 12 55	73 13 20	Kuloli	3.330731	2,142	7,028
			288 09 30	108 10 04	Kapuai	3.455771	2,856	9,370
Pauwela	20 56 56.87	1,748.9	309 05 57	129 06 46	Kuloli	3.708977	5,117	16,788
	156 19 26.21	757.2	20 28 23	200 28 10	Haiku	3.486782	3,067	10,062
Opane	20 56 53.20	1,636.1	2 30 33	182 30 31	Kuloli	3.493813	3,118	10,230
	156 17 04.08	117.9	91 34 47	271 33 56	Pauwela	3.613628	4,108	13,478
Halehaku	20 56 15.34	471.8	35 25 49	215 25 18	Kapuai	3.627840	4,245	13,927
	156 15 20.70	598.1	58 01 36	238 00 57	Kuloli	3.566125	3,682	12,080
			111 18 11	291 17 34	Opane	3.505625	3,206	10,518
Honokala	20 55 13.09	402.6	291 35 39	111 35 56	Huelo	3.175476	1,498	4,915
	156 14 07.02	202.9	19 30 30	199 30 06	Ulalena	3.774934	5,956	19,541
			71 24 35	251 23 38	Kapuai	3.685090	4,843	15,889
			131 57 49	311 57 23	Halehaku	3.456842	2,863	9,393
Honopou	20 56 14.98	460.7	339 53 34	159 53 42	Honokala	3.306799	2,027	6,650
	156 14 31.13	899.5	48 28 36	228 27 48	Kapuai	3.716010	5,200	17,060
Kaualua	20 53 50.37	1,549.0	39 40 31	219 40 00	Ulalena	3.600793	3,988	13,084
	156 13 47.73	1,379.4	167 38 42	347 38 35	Honokala	3.415695	2,604	8,543
			202 44 48	22 44 58	Huelo	3.334608	2,161	7,090
Puu Kukai, 1877-1912	20 53 51.19	1,574.2	89 24 19	269 23 49	Kaualua	3.384171	2,422	7,946
	156 12 23.94	691.9	141 07 32	321 07 12	Huelo	3.402632	2,527	8,291
			297 36 43	117 38 16	Pauwalu	3.928195	8,476	27,808
Haleniki	20 53 02.28	70.1	137 06 25	317 05 35	Puu Kukai	3.312687	2,054	6,739
	156 11 35.53	1,026.9	291 38 40	111 39 55	Pauwalu	3.817900	6,575	21,571
			319 58 39	139 58 59	Okohola	3.404961	2,541	8,337
Pauwalu, 1877-1912	20 51 43.39	1,334.4	96 08 01	276 07 06	Okohola	3.653518	4,503.2	14,774.2
	156 08 04.12	119.1	298 09 40	118 12 17	Honokalani	4.161852	14,516.2	47,625.2
			305 38 56	125 39 56	Opikoula	3.780060	6,026.4	19,771.6
			314 06 20	134 08 27	Olapawa	4.158820	14,415.2	47,293.9
Wailua Iki	20 50 28.83	886.6	130 42 17	310 41 47	Keanae Uka	3.512476	3,254	10,676
	156 07 47.68	1,378.5	168 17 30	348 17 24	Pauwalu	3.369525	2,342	7,684
Keanae Uka	20 51 37.84	1,163.7	104 41 11	284 40 40	Okohola	3.409845	2,569	8,428
	156 09 13.02	376.4	265 05 55	85 06 19	Pauwalu	3.300861	1,999	6,558
			295 52 13	115 53 37	Opikoula	3.884045	7,657	25,121
Kaliae	20 50 23.92	735.6	107 16 20	287 16 16	Wailua Iki	2.706299	509	1,670
	156 07 30.88	892.8	158 32 23	338 32 13	Pauwalu	3.419292	2,626	8,615
			285 11 20	105 12 09	Opikoula	3.610520	4,079	13,383
Hanawi, 1877	20 49 27.89	857.7	127 46 00	307 44 59	Keanae Uka	3.814674	6,526	21,411
	156 06 14.55	420.7	142 45 52	322 45 13	Pauwalu	3.718859	5,234	17,172
			249 16 46	69 17 08	Opikoula	3.266895	1,849	6,066
			309 14 49	129 16 19	Olopawa	3.967259	9,274	30,426
Honomaele	20 48 00.90	27.7	270 14 30	90 15 09	Honokalani	3.505924	3,206	10,518
	156 02 32.43	937.8	346 39 56	166 40 05	Olopawa	3.516196	3,282	10,768
Heleleikeoha	20 48 37.36	1,148.9	282 01 02	102 02 07	Honokalani	3.736183	5,447	17,871
	156 03 45.82	1,325.0	326 16 53	146 17 28	Olopawa	3.714965	5,188	17,021
Kiolea	20 48 52.32	1,608.9	283 09 26	103 10 50	Honokalani	3.845202	7,002	22,972
	156 04 37.34	1,079.7	317 32 04	137 32 58	Olopawa	3.811076	6,473	21,237
Puu Hinai	20 47 13.79	424.1	151 59 53	331 59 33	Kiolea	3.535551	3,432	11,260
	156 03 41.62	1,203.8	177 17 32	357 17 31	Heleleikeoha	3.410424	2,573	8,442
			254 34 55	74 35 59	Honokalani	3.732454	5,401	17,720
			302 19 07	122 19 41	Olopawa	3.513713	3,264	10,709
Nanualele	20 46 05.724	176.0	4 03 12.2	184 03 11.2	Kauiki	3.075532	1,190.0	3,904.2
	155 59 01.072	31.0	93 43 38.5	273 42 32.9	Olopawa	3.729809	5,368.0	17,611.5
Puu o Ka Haula	20 45 30.177	928.0	110 34 39.6	290 33 52.5	Olopawa	3.612980	4,101.8	13,457.3
	155 59 53.500	1,547.6	171 35 46.8	351 35 39.4	Pukaulua	3.618654	4,155.8	13,634.5
			234 12 45.1	54 13 03.6	Nanualele	3.271715	1,869.5	6,133.5
			273 44 42.6	93 45 00.1	Kauiki	3.157017	1,435.5	4,709.6
Principal points, east Maui, south								
Puu o Kali, 1879	20 44 01.869	57.5	143 08 49.8	323 06 54.9	Maui south base	4.193063	15,597.8	51,173.8
	156 23 21.569	624.0	221 52 38.3	41 54 08.0	Puu Pane	4.039792	10,959.6	35,956.6
			356 47 48.5	176 47 52.9	Puu Io	3.810631	6,465.9	21,213.5
Polipoli, 1879	20 40 27.911	858.3	72 01 56.3	251 59 31.4	Puu Olai	4.096985	12,502.2	41,017.6
	156 20 14.692	425.2	91 24 50.7	271 23 49.1	Puu Io	3.703208	5,049.0	16,564.9
			140 35 33.8	320 34 27.7	Puu o Kali	3.930278	8,516.8	27,942.2
			187 23 26.9	7 23 50.3	Puu Pane	4.172073	14,861.8	48,759.1
			191 57 52.6	11 58 44.6	Piiholo	4.311484	20,487.3	67,215.4
			243 56 05.3	63 57 44.9	Kolekole	3.958775	9,094.4	29,837.2
Puu Mahoe, 1879	20 38 06.367	195.8	94 12 48.5	274 11 27.0	Puu Olai	3.826924	6,713.1	22,024.6
	156 23 14.226	411.9	230 02 34.8	50 03 38.1	Polipoli	3.831166	6,779.0	22,240.8

58955°—30——7

Maui Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Principal points, east Maui, south—Con.	° ′ ″		° ′ ″	° ′ ″				
Puu Kanaloa, 1879	20 36 21.010	646.1	139 37 39.5	319 37 00.9	Puu Olai	3.690085	4,898.7	16,071.8
	156 25 15.878	459.8	227 23 05.5	47 23 48.3	Puu Mahoe	3.679948	4,785.7	15,701.1
Pimoe, 1879	20 36 49.124	1,510.7	80 02 08.1	260 01 08.3	Puu Kanaloa	3.698299	4,992.3	16,378.9
	156 22 26.071	754.9	149 35 28.5	329 35 11.5	Puu Mahoe	3.440011	2,754.3	9,036.4
			209 28 20.0	29 29 06.3	Polipoli	3.888105	7,728.7	25,356.6
Lualailua, 1879	20 36 58.694	1,805.0	87 27 55.9	267 26 35.4	Pimoe	3.821267	6,626.2	21,739.5
	156 18 37.447	1,084.2	156 22 22.0	336 21 47.7	Polipoli	3.846507	7,022.7	23,040.3
Shore D, 1881	20 35 12.124	372.8	111 32 23.6	291 30 51.7	Pimoe	3.910045	8,129.2	26,670.6
	156 18 04.925	142.6	163 58 09.2	343 57 57.7	Lualailua	3.532736	3,409.9	11,187.3
Ka Lae o Ka Ilio, 1885	20 37 18.029	554.4	76 50 41.8	256 47 20.9	Shore D	4.229864	16,977.1	55,699.0
	156 08 34.080	986.7	88 04 48.7	268 01 16.2	Lualailua	4.242538	17,479.9	57,348.6
			159 19 53.8	339 19 11.5	Haleakala 2	3.992494	9,828.6	32,246.0
			179 06 20.2	359 06 17.9	Palaha	4.093398	12,399.3	40,680.0
Maneoneo, 1881	20 37 47.346	1,456.0	84 07 50.5	264 04 54.2	Lualailua	4.163463	14,570.1	47,802.1
	156 10 16.873	488.5	286 50 52.4	106 51 28.6	Ka Lae o Ka Ilio	3.492715	3,109.7	10,202.4
Shore N	20 37 53.673	1,650.6	274 04 39.1	94 05 12.3	Maneoneo	3.436668	2,733.2	8,967.2
	156 11 51.039	1,477.6	280 52 15.4	100 53 24.8	Ka Lae o Ka Ilio	3.763938	5,806.8	19,051.1
Naholoku, 1882	20 40 07.829	240.8	29 24 43.8	209 24 14.2	Maneoneo	3.695408	4,959.2	16,270.3
	156 08 52.754	1,527.0	51 22 13.8	231 21 11.0	Shore N	3.820021	6,607.2	21,677.1
			354 05 17.7	174 05 24.3	Ka Lae o Ka Ilio	3.720126	5,249.6	17,223.1
Mokuia, 1881–1912	20 38 42.564	1,308.9	60 44 15.7	240 43 19.2	Ka Lae o Ka Ilio	3.725664	5,317.0	17,444.2
	156 05 53.874	1,559.6	116 51 57.5	296 50 54.4	Naholoku	3.763729	5,804.0	19,042.0
Naopu Mauka	20 39 10.774	331.3	2 45 48.3	182 45 47.8	Mokuia	2.938786	868.5	2,849.4
	156 05 52.428	1,517.6	53 28 28.6	233 27 31.6	Ka Lae o Ka Ilio	3.765242	5,824.3	19,108.6
Kalepa, 1912	20 38 53.134	1,634.0	61 45 43.8	241 44 37.5	Ka Lae o Ka Ilio	3.790963	6,179.6	20,274.2
	156 05 26.046	754.0	68 01 40.5	248 01 30.7	Mokuia	2.938872	868.7	2,850.1
			125 23 17.2	305 23 07.9	Naopu Mauka	2.971630	936.8	3,073.5
Kipahulu Protestant Church, 1881	20 39 14.657	450.7	67 53 57.2	247 52 09.7	Ka Lae o Ka Ilio	3.978937	9,526.6	31,255.2
	156 03 29.223	845.9	76 44 41.6	256 43 50.6	Mokuia	3.633679	4,302.1	14,114.5
			78 55 53.8	258 55 12.6	Kalepa	3.537303	3,445.9	11,305.4
			88 21 25.3	268 20 34.8	Naopu Mauka	3.617744	4,147.1	13,605.9
Kieiei	20 40 10.784	331.6	51 38 46.7	231 38 09.9	Kalepa	3.585215	3,847.8	12,624.0
	156 03 41.810	1,210.1	63 59 21.9	243 58 35.8	Naopu Mauka	3.623990	4,207.2	13,803.1
			348 04 49.2	168 04 53.6	Kipahulu Protestant Church	3.246510	1,764.1	5,787.7
Kipahulu Catholic Church	20 39 31.57	970.8	49 20 02	229 19 55	Kipahulu Protestant Church	2.902113	798	2,618
	156 03 08.31	240.5	141 11 45	321 11 33	Kieiei	3.189604	1,547	5,075
Ohai, 1877	20 40 24.75	761.1	36 57 50	216 57 35	Kipahulu Catholic Church	3.311006	2,046	6,713
	156 02 25.79	746.5	78 57 42	258 57 15	Kieiei	3.350569	2,242	7,356
Pualu	20 40 35.29	1,085.2	292 45 43	112 45 52	Ohai	2.923195	838	2,749
	156 02 52.49	1,519.2	62 10 24	242 10 06	Kieiei	3.207949	1,614	5,295
Mopua, 1881–1912	20 40 55.91	1,719.3	3 04 14	183 04 14	Ohai	2.982079	960	3,150
	156 02 24.02	695.2	52 25 37	232 25 27	Pualu	3.016904	1,040	3,412
Makaliihanau, 1878–1912	20 41 33.80	1,039.4	41 41 11	221 40 48	Ohai	3.453782	2,843	9,327
	156 01 20.46	592.1	57 39 01	237 38 38	Mopua	3.337891	2,177	7,142
Makahahana	20 42 25.26	776.8	1 00 52	181 00 52	Makaliihanau	3.199375	1,583	5,194
	156 01 19.50	564.3	34 12 10	214 11 47	Mopua	3.521378	3,322	10,899
Haou, 1878	20 41 47.78	1,469.3	75 20 53	255 20 33	Makaliihanau	3.230074	1,699	5,574
	156 00 23.68	685.3	125 30 56	305 30 37	Makahahana	3.297605	1,984	6,509
Puuiki, 1878–1912	20 42 18.26	561.5	32 16 41	212 16 34	Haou	3.044839	1,109	3,638
	156 00 03.22	93.2	95 34 22	275 33 55	Makahahana	3.345898	2,218	7,277
Keakaamanu, 1878–1912	20 43 46.43	1,427.8	339 54 20	159 54 32	Puuiki	3.460465	2,887	9,472
	156 00 37.50	1,085.0	25 57 35	205 57 20	Makahahana	3.433460	2,713	8,901
Iwi o Pele, 1878	20 44 03.86	118.7	16 41 51	196 41 39	Puuiki	3.530233	3,390	11,122
	155 59 29.55	854.9	74 45 09	254 44 45	Keakaamanu	3.309082	2,037	6,683
			165 22 24	345 22 15	Puu o Ka Haula	3.438273	2,743	8,999
			196 06 50	16 06 58	Kauiki	3.425742	2,665	8,743
Supplementary points, Maalaea Bay and vicinity								
Puu Hele	20 48 55.624	1,710.5	221 08 14.8	41 08 51.8	Maui south base	3.660321	4,574.3	15,007.5
	156 30 29.241	845.5	272 30 43.0	92 34 44.9	Puu Pane	4.294515	19,762.2	64,889.6
			306 07 08.1	126 09 39.9	Puu o Kali	4.185188	15,317.5	50,254.2
			320 33 19.3	140 35 55.3	Puu Io	4.302150	20,051.6	65,786.0
			343 08 51.8	163 10 04.0	Puu Olai	4.308498	20,346.9	66,754.8

Maui Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
***Supplementary points, Maalaea Bay and vicinity*—Continued**	° ′ ″		° ′ ″	° ′ ″				
Puu Hele 2, 1900	20 48 55.628	1,710.7	221 08 16.1	41 08 53.1	Maui south base	3.660312	4,574.2	15,007.2
	156 30 29.241	845.5	343 08 52.5	163 10 04.6	Puu Olai	4.308501	20,347.0	66,755.1
			357 41 34.3	177 41 44.3	Molokini	4.303964	20,135.6	66,061.5
Maalaea, 1900	20 47 11.921	366.6	201 57 23.3	21 57 39.1	Puu Hele 2	3.536394	3,438.7	11,281.8
	156 31 13.704	396.4	336 11 17.9	156 12 45.7	Puu Olai	4.250386	17,798.6	58,394.2
			352 56 10.5	172 56 36.2	Molokini	4.231963	17,059.4	55,969.0
Kihei, 1900	20 46 52.627	1,618.4	356 40 06.4	176 40 17.5	Puu Olai	4.196404	15,718.2	51,568.8
	156 27 37.040	1,071.4	14 20 07.7	194 19 16.7	Molokini	4.226888	16,861.2	55,318.8
			95 25 11.2	275 23 54.3	Maalaea	3.798961	6,294.5	20,651.2
			127 13 38.2	307 12 37.0	Puu Hele 2	3.796134	6,253.7	20,517.3
			164 45 32.9	344 45 08.6	Maui south base	3.874530	7,490.8	24,576.1
Sand, 1900	20 44 23.313	716.9	355 59 11.5	175 59 21.0	Puu Olai	4.046388	11,127.3	36,506.8
	156 27 32.389	937.0	20 08 59.8	200 08 07.3	Molokini	4.097259	12,510.0	41,043.2
			129 00 58.2	308 59 39.8	Maalaea	3.915836	8,238.3	27,028.5
			148 35 28.8	328 34 26.1	Puu Hele 2	3.991801	9,813.0	32,194.8
Shed, 1900 [1]	20 46 45.28	1,392.5	328 50 47	148 52 40	Puu Olai	4.256934	18,069	59,281
	156 32 28.38	820.9	345 11 20	165 12 12	Molokini	4.221775	16,664	54,672
Bold, 1900–1912	20 46 53.412	1,642.5	270 11 24.3	90 12 48.3	Kihei	3.836062	6,855.9	22,493.1
	156 31 34.077	985.6	303 25 19.6	123 26 45.2	Sand	3.923120	8,377.6	27,485.5
			333 40 22.0	153 41 57.1	Puu Olai	4.243846	17,532.6	57,521.5
Lau, 1900	20 47 41.753	1,284.0	315 52 55.9	135 54 08.4	Sand	3.929363	8,498.9	27,883.5
	156 30 56.890	1,645.3	27 55 41.6	207 55 35.6	Maalaea	3.016326	1,038.3	3,406.5
			199 23 17.4	19 23 27.2	Puu Hele 2	3.381737	2,408.4	7,901.6
Lew, 1900	20 47 53.016	1,630.3	289 52 28.2	109 53 31.3	Kihei	3.737223	5,460.4	17,914.7
	156 30 34.586	1,000.2	41 50 14.4	221 50 00.5	Maalaea	3.229467	1,696.2	5,564.9
			184 35 23.8	4 35 25.7	Puu Hele 2	3.285935	1,931.7	6,337.6
Camp, 1900	20 48 02.202	67.7	298 08 28.0	118 09 17.2	Kihei	3.656622	4,535.5	14,880.2
	156 29 55.315	1,599.7	55 42 28.9	235 42 01.1	Maalaea	3.438411	2,744.2	9,003.3
			149 09 34.1	329 09 22.1	Puu Hele 2	3.281851	1,913.6	6,278.2
Road, 1900	20 47 54.032	1,661.6	302 53 07.8	122 53 43.7	Kihei	3.541260	3,477.4	11,408.8
	156 29 18.005	520.7	68 50 54.1	248 50 13.0	Maalaea	3.554851	3,588.0	11,771.6
			132 36 10.1	312 35 44.8	Puu Hele 2	3.446928	2,798.5	9,181.4
Kihei stack (Pipe), 1900	20 47 20.055	616.7	343 29 58.0	163 30 01.1	Kihei	2.944343	879.7	2,886.1
	156 27 45.679	1,321.1	87 37 46.5	267 36 32.7	Maalaea	3.779716	6,021.7	19,756.2
			121 51 49.1	301 50 51.0	Puu Hele 2	3.745762	5,568.8	18,270.3
Kihei mill, 1900	20 47 01.326	40.8	38 49 34.8	218 49 32.2	Kihei	2.535822	343.4	1,126.6
	156 27 29.596	856.0	92 53 19.4	272 51 59.9	Maalaea	3.812238	6,489.9	21,292.3
			124 05 26.9	304 04 23.1	Puu Hele 2	3.797450	6,272.6	20,579.4
Fish, 1900	20 45 56.614	1,741.0	110 51 41.9	290 50 27.4	Maalaea	3.813332	6,506.3	21,346.1
	156 27 43.492	1,258.1	138 57 36.0	318 56 37.2	Puu Hele 2	3.863303	7,299.7	23,949.1
			186 11 00.3	6 11 02.6	Kihei	3.238696	1,732.6	5,684.4
Red, 1900	20 45 19.735	606.9	118 30 59.5	298 29 41.6	Maalaea	3.859073	7,228.9	23,716.8
	156 27 34.082	985.9	142 39 49.0	322 38 46.8	Puu Hele 2	3.921751	8,351.2	27,398.9
			178 17 03.1	358 17 02.0	Kihei	3.456049	2,857.9	9,376.3
Patch, 1900	20 42 28.099	864.1	1 37 48.1	181 37 45.5	Puu Olai	3.878518	7,559.9	24,802.8
	156 26 58.059	1,680.0	32 53 22.0	212 52 17.4	Molokini	3.989733	9,766.4	32,041.9
			139 44 13.1	319 42 42.5	Maalaea	4.058432	11,440.2	37,533.4
Supplementary points, east Maui, south								
Ship, 1900	20 40 54.904	1,688.4	5 44 16.1	185 44 10.4	Puu Olai	3.673442	4,714.6	15,467.8
	156 26 49.206	1,424.1	146 35 13.3	326 33 39.7	Maalaea	4.142761	13,891.9	45,577.0
			156 42 54.0	336 41 36.1	Puu Hele 2	4.206705	16,095.5	52,806.7
Hunt, 1904 [1]	20 40 54.89	1,688.0	5 44 05	185 43 59	Puu Olai	3.673403	4,714	15,466
	156 26 49.22	1,424.5	46 10 55	226 09 47	Molokini	3.886764	7,705	25,279
Wailea [1]	20 40 50.91	1,565.6	275 12 34	95 13 52	Puu Io	3.807106	6,414	21,043
	156 26 49.77	1,440.5	5 41 20	185 41 15	Puu Olai	3.661892	4,591	15,062
Nahuna	20 39 29.92	920.1	253 10 12	73 11 28	Puu Io	3.818961	6,591	21,624
	156 26 47.06	1,362.2	291 47 09	111 48 21	Puu Mahoe 2	3.806278	6,401	21,001
			14 24 03	194 23 56	Puu Olai	3.331405	2,145	7,037
Stone, 1904 [1]	20 39 29.94	920.7	14 21 25	194 21 18	Puu Olai	3.331453	2,145	7,037
	156 26 47.11	1,363.7	64 09 24	244 08 15	Molokini	3.795516	6,245	20,489
Rough, 1904 [1]	20 39 07.72	237.4	23 26 44	203 26 36	Puu Olai	3.181925	1,520	4,987
	156 26 44.59	1,290.8	70 17 50	250 16 40	Molokini	3.781558	6,047	19,839
Hut, 1904 [1]	20 38 50.47	1,552.1	19 51 30	199 51 26	Puu Olai	2.963239	919	3,015
	156 26 54.71	1,583.8	74 23 43	254 22 37	Molokini	3.748738	5,607	18,396
School, 1904 [1]	20 38 46.32	1,424.4	35 51 01	215 50 54	Puu Olai	2.958552	909	2,982
	156 26 47.10	1,363.5	76 11 52	256 10 43	Molokini	3.762513	5,788	18,989

[1] No check on this position.

Maui Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, east Maui, south—Continued	° ′ ″		° ′ ″	° ′ ″				
Cone, 1900	20 38 29.251	899.5	19 43 47.5	199 43 46.6	Puu Olai	2.352225	225.0	738.2
	156 27 02.863	82.9	80 35 19.1	260 34 16.3	Molokini	3.718893	5,234.7	17,174.2
			155 42 34.4	335 41 05.7	Maalaea	4.246403	17,636.1	57,861.1
Big, 1904	20 38 12.967	398.8	39 11 18.2	219 09 26.8	Grey	4.162093	14,524.2	47,651.5
	156 27 16.439	475.9	55 23 46.6	235 21 22.5	Blow	4.158759	14,413.2	47,287.3
			85 44 28.3	265 43 30.3	Molokini	3.679826	4,784.4	15,696.8
Mid, 1904 [1]	20 38 03.78	116.2	89 13 08	269 12 03	Molokini	3.727650	5,341	17,523
	156 26 56.76	1,643.3	156 09 11	336 09 08	Puu Olai	2.795630	625	2,051
Gable, 1904 [1]	20 37 53.16	1,634.8	92 36 41	272 35 33	Molokini	3.746249	5,575	18,291
	156 26 48.87	1,414.9	151 49 44	331 49 38	Puu Olai	3.008065	1,019	3,343
End, 1904	20 37 51.147	1,572.9	43 15 56.8	223 13 55.9	Grey	4.162486	14,537.4	47,694.8
	156 26 49.300	1,427.3	93 15 14.5	273 14 07.0	Molokini	3.745535	5,565.9	18,260.8
			153 58 51.2	333 58 45.5	Puu Olai	3.028680	1,068.3	3,504.9
Coco, 1904	20 37 17.084	525.4	48 02 03.2	227 59 54.5	Grey	4.154235	14,263.8	46,797.2
	156 26 27.135	785.6	102 24 24.2	282 23 08.9	Molokini	3.802556	6,346.8	20,822.8
			151 03 15.7	331 03 02.2	Puu Olai	3.360603	2,294.1	7,526.6
Lava, 1904	20 36 47.636	1,464.9	50 17 11.7	230 15 05.6	Grey	4.130674	13,510.6	44,326.0
	156 26 34.480	998.4	110 45 37.4	290 44 24.7	Molokini	3.806291	6,401.6	21,002.6
			162 52 24.0	342 52 13.1	Puu Olai	3.484047	3,048.2	10,000.6
Bed, 1904	20 36 28.732	883.6	52 01 33.9	231 59 28.7	Grey	4.116773	13,085.0	42,929.7
	156 26 37.180	1,076.6	115 45 25.3	295 44 13.5	Molokini	3.816872	6,559.5	21,520.6
			275 45 11.5	95 45 40.1	Puu Kanaloa, 1904	3.373518	2,363.3	7,753.6
Kanahena Point light, 1900 [1]	20 36 10.45	321.4	118 07 02	298 05 44	Molokini	3.859820	7,241	23,757
	156 26 20.64	597.7	162 15 03	342 14 47	Puu Olai	3.629332	4,259	13,973
Puu Kanaloa, 1904	20 36 21.022	646.5	110 30 15.4	290 28 35.0	Molokini	3.945340	8,817.4	28,928.4
	156 25 15.975	462.6	139 39 00.6	319 38 22.0	Puu Olai	3.689900	4,896.7	16,065.3
Lighthouse, 1904	20 36 10.456	321.5	118 06 48.4	298 05 30.8	Molokini	3.859870	7,242.2	23,760.5
	156 26 20.603	596.6	162 14 18.4	342 14 02.6	Puu Olai	3.629357	4,259.5	13,974.7
			260 08 48.8	80 09 11.6	Puu Kanaloa, 1904	3.278618	1,899.4	6,231.6
For, 1904 [1]	20 35 27.85	856.4	118 24 06	298 22 20	Molokini	3.997022	9,932	32,585
	156 24 59.48	1,722.5	163 43 13	343 43 07	Puu Kanaloa, 1904	3.231353	1,704	5,591
It, 1904 [1]	20 35 17.41	535.4	119 49 12	299 47 25	Molokini	4.006264	10,145	33,284
	156 24 57.21	1,656.7	164 28 44	344 28 37	Puu Kanaloa, 1904	3.307550	2,030	6,660
Nupawei Kukuio Piikea [1]	20 40 58.00	1,783.6	58 51 54	238 51 38	Puu Io	3.190383	1,550	5,085
	156 22 23.24	672.6	163 22 56	343 22 35	Puu o Kali	3.770909	5,901	19,360
Plantation flagstaff [1]	20 39 01.78	54.7	77 05 37	257 04 33	Puu Olai	3.734296	5,424	17,795
	156 24 02.87	83.1	321 46 00	141 46 14	Puu Mahoe 2	3.284280	1,924	6,312
Keonenelu	20 39 21.77	669.5	30 01 12	210 00 56	Puu Mahoe 1	3.427825	2,678	8,786
	156 22 27.95	809.1	77 12 09	257 10 32	Puu Olai	3.915898	8,239	27,031
			151 06 33	331 06 19	Puu Io	3.391730	2,465	8,087
			242 11 24	62 12 11	Polipoli	3.639531	4,360	14,304
Puu Mahoe 2	20 38 12.63	388.4	311 32 03	131 32 06	Puu Mahoe 1	2.463026	290	951
	156 23 21.74	629.4	92 39 24	272 38 06	Puu Olai	3.811879	6,485	21,276
			216 12 49	36 13 07	Keonenelu	3.420864	2,636	8,648
Puu Naio	20 37 11.57	355.8	230 58 29	50 58 55	Puu Mahoe 1	3.427562	2,676	8,780
	156 24 26.05	754.2	281 13 54	101 14 37	Pimoe	3.549214	3,542	11,621
			42 51 51	222 51 34	Puu Kanaloa	3.326563	2,121	6,959
Puu Ouli	20 39 00.33	10.1	33 59 28	213 58 55	Pimoe	3.687191	4,866	15,965
	156 20 52.11	1,508.5	68 02 18	248 01 28	Puu Mahoe 1	3.647010	4,436	14,554
			201 54 28	21 54 41	Polipoli	3.462825	2,903	9,524
			313 48 27	133 49 15	Lualailua	3.732635	5,403	17,726
Kaimaloo	20 38 34.41	1,058.2	251 36 54	71 37 23	Puu Ouli	3.402737	2,528	8,294
	156 22 14.98	433.7	5 39 56	185 39 52	Pimoe	3.512379	3,254	10,676
			63 18 31	243 18 10	Puu Mahoe 1	3.283274	1,920	6,299
Pohakea	20 36 20.23	622.1	138 20 09	318 19 59	Pimoe	3.075281	1,189	3,901
	156 21 58.77	1,701.7	258 31 15	78 32 26	Lualailua	3.774374	5,948	19,514
			262 48 16	82 48 59	Hokukano	3.553259	3,575	11,729
Hokukano	20 36 34.78	1,069.6	95 48 48	275 47 55	Pimoe	3.639448	4,360	14,304
	156 19 56.28	1,629.6	160 08 43	340 08 23	Puu Ouli	3.677506	4,759	15,613
			175 44 55	355 44 49	Polipoli	3.856663	7,189	23,586
			252 08 23	72 08 51	Lualailua	3.379867	2,398	7,867
Shore A	20 35 04.87	149.8	131 07 39	311 06 54	Pimoe	3.687961	4,875	15,994
	156 20 19.25	557.5	193 31 41	13 31 49	Hokukano	3.453908	2,844	9,331
			220 06 00	40 06 37	Lualailua	3.660519	4,576	15,013

[1] No check on this position.

Maui Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, east Maui, south—Continued	° ′ ″		° ′ ″	° ′ ″				
Kaonoulu [1]	20 44 35.15	1,080.9	34 58 50	214 57 46	Puu Io	3.960339	9,127	29,944
	156 20 08.30	240.1	79 38 18	259 37 10	Puu o Kali	3.754691	5,684	18,648
Puu Pane 2	20 39 34.51	1,061.3	264 36 53	84 39 06	Naholoku	4.039549	10,953	35,935
	156 15 09.51	275.3	290 06 56	110 09 16	Ka Lae o Ka Ilio	4.086106	12,193	40,003
			291 14 34	111 16 18	Maneoeo	3.958568	9,090	29,823
			32 11 41	212 10 40	Shore D	3.979288	9,534	31,279
			51 29 22	231 28 10	Lualailua	3.886154	7,694	25,243
Uma	20 38 30.96	952.1	246 02 26	66 03 20	Puu Pane 2	3.682501	4,814	15,794
	156 17 41.49	1,201.1	29 43 36	209 43 16	Lualailua	3.514200	3,267	10,718
Picos	20 37 20.36	626.1	81 40 55	261 40 00	Lualailua	3.662966	4,602	15,098
	156 16 00.17	4.9	126 30 42	306 30 07	Uma	3.562218	3,649	11,972
			199 34 02	19 34 20	Puu Pane 2	3.641307	4,378	14,363
Mawini (Puu), 1882	20 38 50.58	1,555.4	335 13 35	155 13 51	Picos	3.485082	3,055	10,023
	156 16 44.39	1,285.0	69 57 07	249 56 47	Uma	3.245404	1,760	5,774
			243 48 08	63 48 41	Puu Pane 2	3.485838	3,061	10,043
Inez	20 37 04.96	152.5	34 29 07	214 28 38	Shore D	3.624219	4,209	13,809
	156 16 42.63	1,234.3	86 41 23	266 40 42	Lualailua	3.522455	3,330	10,925
			147 12 31	327 12 01	Uma	3.497790	3,146	10,322
Waiopai (Puu)	20 39 53.52	1,645.8	298 30 41	118 32 28	Ka Lae o Ka Ilio	4.000552	10,013	32,851
	156 13 37.96	1,098.8	319 58 14	139 58 52	Shore N	3.682408	4,813	15,791
			77 34 02	257 33 29	Puu Pane 2	3.433561	2,714	8,904
Kaniakani	20 40 16.30	501.3	272 38 35	92 39 44	Naholoku	3.750340	5,628	18,465
	156 12 06.98	202.0	311 38 32	131 39 47	Ka Lae o Ka Ilio	3.916381	8,249	27,064
			325 09 44	145 10 23	Maneoeo	3.746672	5,580	18,307
Kaumikaohu [1]	20 40 59.23	1,821.4	4 42 45	184 42 38	Ka Lae o Ka Ilio	3.834126	6,825	22,392
	156 08 14.71	425.7	34 51 46	214 51 33	Naholoku	3.284724	1,926	6,319
Kauhakamoa	20 40 47.26	1,453.3	332 33 42	152 33 49	Naholoku	3.135553	1,366	4,482
	156 09 14.51	420.0	349 41 24	169 41 38	Ka Lae o Ka Ilio	3.815571	6,540	21,457
			77 44 05	257 42 00	Puu Pane 2	4.021855	10,516	34,501
Kaupo Catholic Church	20 38 13.55	416.7	3 45 00	183 44 59	Ka Lae o Ka Ilio	3.233228	1,711	5,614
	156 08 30.22	874.9	169 29 02	349 28 54	Naholoku	3.553213	3,574	11,726
			258 50 20	78 51 15	Mokuia	3.663996	4,613	15,134
Kaupo Protestant Church	20 38 26.56	816.8	132 06 42	312 05 59	Naholoku	3.666942	4,645	15,239
	156 06 53.72	1,555.2	232 31 59	52 32 20	Naopu Mauka	3.349321	2,235	7,333
			254 08 23	74 08 44	Mokuia	3.255486	1,801	5,909
Kaapahu	20 39 36.92	1,135.4	244 54 53	64 55 20	Kieiei	3.390404	2,457	8,061
	156 04 58.69	1,698.9	284 48 02	104 48 33	Kipahulu Protestant Church	3.427922	2,679	8,789
			30 27 47	210 27 37	Kalepa	3.193671	1,562	5,125
Popoloa	20 40 05.48	168.5	263 59 26	83 59 44	Kieiei	3.193005	1,560	5,118
	156 04 35.40	1,024.7	292 28 00	112 28 30	Kipahulu Catholic Church	3.435832	2,728	8,950
			309 12 29	129 12 52	Kipahulu Protestant Church	3.393062	2,472	8,110
Kaukukanaka [1]	20 39 44.50	1,368.5	57 12 58	237 12 51	Kipahulu Catholic Church	2.865883	734	2,408
	156 02 46.98	1,359.9	116 59 27	296 59 08	Kieiei	3.250664	1,781	5,843
Paehala	20 40 34.24	1,052.9	29 05 24	209 05 22	Ohai	2.523478	334	1,096
	156 02 20.19	584.4	91 59 26	271 59 15	Pualu	2.970977	935	3,068
Waieli	20 40 34.63	1,064.9	91 16 49	271 16 38	Pualu	2.965180	923	3,028
	156 02 20.60	596.2	171 25 36	351 25 35	Mopua	2.820849	662	2,172
			223 43 43	43 43 45	Makaliihanau	3.401059	2,518	8,261
Koali	20 41 11.34	348.7	50 31 26	230 31 28	Waieli	3.249364	1,776	5,827
	156 01 33.25	962.3	72 06 34	252 06 16	Mopua	3.188640	1,544	5,066
			208 10 20	28 10 25	Makaliihanau	2.894050	784	2,572
Kawaloa	20 41 31.51	969.0	70 08 38	250 08 01	Mopua	3.508117	3,222	10,571
	156 00 39.31	1,137.6	93 23 11	273 22 57	Makaliihanau	3.076685	1,193	3,914
			222 07 12	42 07 17	Haou	2.828857	674	2,211
Alau flag [1]	20 43 53.23	1,636.9	34 59 29	214 58 56	Haou	3.672930	4,709	15,449
	155 58 50.37	1,457.3	57 55 15	237 54 23	Makahahana	3.706970	5,093	16,709
Pahuolona	20 44 18.79	577.8	222 44 17	42 44 41	Kauiki	3.456549	2,861	9,386
	156 00 11.11	321.4	290 54 14	110 54 29	Iwi o Pele	3.109545	1,287	4,222
			37 29 44	217 29 35	Keakaamanu	3.098389	1,254	4,114
Kaihuakala	20 44 44.18	1,358.6	243 18 36	63 19 10	Puu o Ka Haula	3.498322	3,150	10,335
	156 01 30.79	890.8	289 27 33	109 28 17	Iwi o Pele	3.570572	3,720	12,205
			319 01 29	139 01 48	Keakaamanu	3.371397	2,352	7,717

[1] No check on this position.

Kahoolawe Island

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Principal points	° ′ ″		° ′ ″	° ′ ″				
Molokini, 1883-1905	20 38 01.39	42.7	226 11 54	46 14 15	Puu o Kali	4.204702	16,021	52,562
	156 30 01.24	35.9	248 46 16	68 48 42	Puu Io	4.107124	12,797	41,985
			262 46 03	82 47 06	Puu Olai	3.710026	5,129	16,827
			290 28 19	110 30 00	Puu Kanaloa	3.945478	8,820	28,937
Kahoolawe hydrographic, 1900	20 34 05.425	166.8	196 35 10.3	16 36 38.2	Maalaea	4.402055	25,238.0	82,801.7
	156 35 22.801	660.4	232 03 19.0	52 05 12.2	Molokini	4.072064	11,804.9	38,729.9
			241 13 22.7	61 16 17.7	Puu Olai	4.215525	16,425.7	53,890.0
Blow, 1904	20 33 46.661	1,434.9	103 59 41.9	283 59 15.2	Kahoolawe	3.356004	2,269.9	7,447.2
	156 34 06.027	174.6	222 07 48.1	42 09 14.3	Molokini	4.023844	10,564.4	34,660.0
			235 07 59.1	55 10 27.1	Puu Olai	4.171385	14,838.3	48,682.0
			252 47 27.6	72 50 34.0	Puu Kanaloa, 1904	4.205952	16,067.6	52,715.1
Grey, 1904	20 32 06.815	209.6	138 48 20.2	318 47 47.6	Blow	3.610741	4,080.8	13,388.4
	156 32 33.235	962.8	201 58 33.7	21 59 27.2	Molokini	4.070361	11,758.7	38,578.3
			219 23 58.3	39 25 53.6	Puu Olai	4.174602	14,948.7	49,044.2
			238 17 34.7	58 20 08.4	Puu Kanaloa, 1904	4.172682	14,882.7	48,827.7
Quick, 1904	20 32 26.068	801.6	172 13 56.0	352 13 51.0	Kahoolawe	3.485046	3,055.2	10,023.6
	156 35 07.814	226.4	215 49 53.7	35 50 15.4	Blow	3.485306	3,057.1	10,029.8
Dig, 1904	20 32 07.086	217.9	119 19 24.1	299 19 11.5	Quick	3.076270	1,192.0	3,910.8
	156 34 31.939	925.3	158 05 40.3	338 05 22.7	Kahoolawe	3.590172	3,892.0	12,769.0
			193 46 17.7	13 46 26.8	Blow	3.498694	3,152.8	10,343.8
			270 07 59.5	90 08 41.2	Grey	3.536408	3,438.8	11,282.1
Eat, 1904	20 31 20.688	636.2	145 56 43.8	325 56 32.1	Dig	3.236075	1,722.2	5,650.3
	156 33 58.650	1,699.2	177 16 28.8	357 16 26.2	Blow	3.652634	4,494.0	14,744.1
Lump, 1904	20 30 51.980	1,598.4	187 00 51.1	7 00 55.4	Quick	3.464665	2,915.2	9,564.3
	156 35 20.103	582.4	211 08 10.7	31 08 27.6	Dig	3.431110	2,698.4	8,853.0
			249 29 07.9	69 29 36.5	Eat	3.401341	2,519.7	8,266.7
Black, 1904	20 31 29.754	915.0	231 26 59.3	51 27 25.6	Quick	3.443895	2,779.0	9,117.4
	156 36 22.840	661.7	302 34 41.7	122 35 03.7	Lump	3.333873	2,157.1	7,077.1
South Crater, 1904	20 32 44.161	1,358.0	218 42 34.3	38 42 58.3	Kahoolawe	3.500586	3,166.5	10,388.8
	156 36 30.443	881.9	283 04 54.0	103 05 23.0	Quick	3.390478	2,457.4	8,062.3
			354 30 04.2	174 30 06.9	Black	3.361485	2,298.7	7,541.7
Goat, 1904	20 31 02.935	90.3	216 41 21.6	36 41 49.6	South Crater	3.589069	3,882.1	12,736.5
	156 37 50.514	1,463.5	252 00 29.4	72 01 00.1	Black	3.426618	2,670.7	8,762.1
South Hill, 1904	20 31 18.066	555.6	239 56 53.5	59 57 48.9	South Crater	3.723298	5,288.1	17,349.4
	156 39 08.455	245.0	281 38 21.4	101 38 48.8	Goat	3.362779	2,305.6	7,564.3
End, 1904	20 32 01.188	36.5	254 42 03.5	74 43 02.0	South Crater	3.699924	5,011.0	16,440.3
	156 39 17.299	501.2	349 03 48.6	169 03 51.7	South Hill	3.130524	1,350.6	4,431.1
Hot, 1904	20 32 39.970	1,229.1	268 08 42.5	88 09 30.9	South Crater	3.601667	3,996.4	13,111.5
	156 38 48.331	1,400.1	35 07 58.4	215 07 48.3	End	3.163835	1,458.3	4,784.4
Red, 1904	20 32 53.905	1,657.6	274 20 33.8	94 21 21.5	South Crater	3.596705	3,951.0	12,962.6
	156 38 46.444	1,345.4	7 16 06.3	187 16 05.6	Hot	2.635473	432.0	1,417.3
			28 52 17.6	208 52 06.8	End	3.267455	1,851.2	6,073.5
Cob, 1904	20 33 06.751	207.6	253 52 20.1	73 53 34.6	Kahoolawe	3.806049	6,398.1	20,991.1
	156 38 54.279	1,572.3	279 27 31.7	99 28 22.2	South Crater	3.625727	4,224.0	13,858.2
			330 07 18.6	150 07 21.4	Red	2.658587	455.6	1,494.7
Craft, 1904	20 32 06.909	212.5	250 06 35.9	70 07 09.9	Hot	3.475534	2,989.1	9,806.7
	156 40 25.361	734.7	275 05 42.7	95 06 06.6	End	3.296572	1,979.6	6,494.7
See, 1904	20 32 35.324	1,086.3	252 05 55.2	72 06 31.4	Cob	3.497627	3,145.0	10,318.2
	156 40 37.599	1,089.2	259 55 53.3	79 56 32.3	Red	3.514572	3,270.2	10,729.0
			294 17 02.0	114 17 30.2	End	3.406895	2,552.1	8,373.0
			337 55 00.2	157 55 04.5	Craft	2.974501	943.0	3,093.8
Aid, 1904	20 34 06.989	214.9	271 18 08.5	91 18 49.0	Kahoolawe	3.524096	3,342.7	10,966.8
	156 37 17.452	505.5	56 33 34.9	236 33 00.9	Cob	3.526487	3,361.1	11,027.2
Cloud, 1904	20 34 56.459	1,736.2	294 28 26.8	114 29 09.3	Kahoolawe	3.586065	3,855.4	12,648.9
	156 37 23.222	672.5	353 43 50.0	173 43 52.0	Aid	3.184810	1,530.4	5,021.0
			38 01 12.8	218 00 40.8	Cob	3.631669	4,282.2	14,049.2
Supplementary points								
Crack, 1904 [1]	20 36 25.35	779.6	249 35 59	69 37 36	Molokini	3.928302	8,478	27,815
	156 34 35.72	1,034.3	270 26 35	90 29 52	Puu Kanaloa, 1904	4.209746	16,209	53,179
Low, 1904	20 35 43.824	1,347.7	241 02 45.1	61 04 18.3	Molokini	3.941614	8,742.1	28,681.4
	156 34 25.461	737.3	249 02 10.0	69 04 45.0	Puu Olai	4.134817	13,640.1	44,750.9
			28 13 47.8	208 13 27.9	Kahoolawe	3.539872	3,466.3	11,372.4
Band, 1904 [1]	20 35 52.08	1,601.6	236 11 35	56 12 47	Molokini	3.854245	7,149	23,455
	156 33 26.42	765.1	266 23 23	86 26 15	Puu Kanaloa, 1904	4.153199	14,230	46,686

[1] No check on this position.

Kahoolawe Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points—Continued	° ′ ″		° ′ ″	° ′ ″				
Egg, 1904	20 35 42.941	1,320.5	232 39 33.0	52 40 40.8	Molokini	3.846386	7,020.8	23,034.1
	156 33 14.017	405.9	245 18 25.9	65 20 35.6	Puu Olai	4.069798	11,743.5	38,528.5
			265 08 29.0	85 11 17.2	Puu Kanaloa, 1904	4.142796	13,893.0	45,580.6
Bert, 1904 [1]	20 35 17.91	550.8	241 01 13	61 03 17	Puu Olai	4.068691	11,714	38,432
	156 32 59.44	1,721.3	261 44 58	81 47 41	Puu Kanaloa, 1904	4.132280	13,561	44,491
Noon, 1904 [1]	20 34 46.55	1,431.5	234 51 23	54 53 18	Puu Olai	4.061986	11,534	37,841
	156 32 31.28	905.9	257 00 02	77 02 35	Puu Kanaloa, 1904	4.111810	12,936	42,441
Cone, 1904	20 34 21.332	656.0	211 34 50.0	31 35 40.6	Molokini	3.900051	7,944.2	26,063.6
	156 32 24.945	722.5	231 16 46.7	51 18 39.2	Puu Olai	4.073851	11,853.6	38,889.7
			3 19 21.1	183 19 18.2	Grey	3.617374	4,143.6	13,594.5
Change, 1904 [1]	20 33 46.09	1,417.4	230 10 18	50 12 22	Puu Olai	4.122858	13,270	43,537
	156 32 57.50	1,665.5	250 21 28	70 24 11	Puu Kanaloa, 1904	4.151971	14,190	46,555
Bench, 1904 [1]	20 32 49.16	1,511.8	226 24 25	46 26 36	Puu Olai	4.172167	14,865	48,770
	156 33 17.38	503.5	244 55 49	64 58 39	Puu Kanaloa, 1904	4.187219	15,389	50,489
Hump, 1904 [1]	20 31 58.51	1,799.3	217 05 34	37 07 22	Puu Olai	4.170297	14,801	48,560
	156 32 13.84	400.9	236 16 34	56 19 01	Puu Kanaloa, 1904	4.162797	14,548	47,730
Kid, 1904 [1]	20 30 39.12	1,203.0	207 37 25	27 37 33	South Hill	3.130911	1,352	4,436
	156 39 30.09	871.8	255 45 03	75 45 38	Goat	3.473710	2,977	9,767
Hope, 1904 [1]	20 30 19.62	603.3	224 37 26	44 37 47	South Hill	3.402345	2,525	8,284
	156 40 09.69	280.8	251 42 45	71 43 34	Goat	3.628054	4,247	13,934
Err, 1904 [1]	20 31 37.71	1,159.7	231 12 58	51 13 25	See	3.451556	2,828	9,278
	156 41 53.71	1,556.0	250 40 01	70 40 32	Craft	3.433359	2,712	8,898
Reef, 1904	20 33 29.840	917.6	259 14 41.1	79 15 54.1	Aid	3.787282	6,127.5	20,103.3
	156 40 45.296	1,312.0	282 26 45.5	102 27 24.5	Cob	3.517611	3,293.1	10,804.1
			352 25 27.7	172 25 27.9	See	3.228200	1,691.2	5,548.5
Shy, 1904	20 33 39.162	1,204.3	264 43 34.8	84 45 17.5	Kahoolawe	3.929593	8,503.4	27,898.2
	156 40 14.419	417.6	293 13 58.0	113 14 26.2	Cob	3.402475	2,526.2	8,288.0
			18 52 54.2	198 52 46.2	See	3.316970	2,074.8	6,807.1
Tray, 1904	20 33 51.562	1,585.6	266 59 09.5	87 00 41.6	Kahoolawe	3.881038	7,603.9	24,947.1
	156 39 44.243	1,281.5	290 15 22.5	110 16 30.5	South Crater	3.776993	5,984.0	19,632.5
			313 35 40.4	133 35 58.0	Cob	3.300671	1,998.3	6,556.1
Oar, 1904	20 34 10.790	331.8	271 52 39.5	91 53 50.6	Kahoolawe	3.768295	5,865.4	19,243.4
	156 38 44.472	1,288.1	272 39 03.8	92 39 34.4	Aid	3.401931	2,523.1	8,277.9
			8 12 30.9	188 12 27.5	Cob	3.298792	1,989.7	6,527.9
Dry, 1904	20 34 28.422	874.0	278 10 30.6	98 11 32.6	Kahoolawe	3.713165	5,166.1	16,949.1
	156 38 18.625	539.4	290 24 07.6	110 24 29.1	Aid	3.276548	1,890.4	6,202.1
			22 21 10.6	202 20 58.1	Cob	3.433859	2,715.6	8,909.4
Wet, 1904	20 34 57.294	1,761.9	292 44 23.8	112 45 10.8	Kahoolawe	3.623061	4,198.2	13,773.6
	156 37 35.752	1,035.4	341 05 13.6	161 05 20.1	Aid	3.213576	1,635.2	5,364.8
			33 47 20.8	213 46 53.3	Cob	3.611734	4,090.1	13,418.9

Hawaii Island

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Principal points								
Hualalai 2, 1882	19 41 30.811	947.4	187 30 03.9	7 30 52.8	Puako	4.506562	32,104.2	105,328.5
	155 52 23.240	676.9	217 23 03.8	37 26 51.4	Nohonaohae	4.507577	32,179.3	105,574.9
Anahulu, 1882–1928	19 51 19.632	603.7	4 49 38.3	184 49 20.5	Hualalai 2	4.259354	18,170.0	59,612.7
	155 51 30.741	894.4	190 59 18.3	10 59 49.5	Puako	4.145504	13,979.9	45,865.7
			247 29 45.9	67 33 16.5	Nohonaohae	4.289937	19,495.6	63,961.8
Kuili, 1882–1928	19 48 12.133	373.1	250 16 58.8	70 20 06.6	Anahulu	4.233268	17,110.7	56,137.4
	156 00 44.350	1,290.8	310 12 04.1	130 14 53.4	Hualalai 2	4.281232	19,108.7	62,692.5
Keahole, 1882–1913	19 43 40.429	1,243.2	211 14 51.5	31 15 50.4	Kuili	3.990030	9,773.0	32,063.6
	156 03 38.534	1,122.1	281 25 30.0	101 29 17.7	Hualalai 2	4.302454	20,065.7	65,832.2
Keahuolu, 1882–1928	19 39 10.335	317.8	157 43 09.6	337 42 30.3	Keahole	3.953056	8,975.4	29,446.8
	156 01 41.668	1,213.9	255 06 09.1	75 09 17.1	Hualalai 2	4.226085	16,830.0	55,216.4
Puu Ohau, 1883–1928	19 30 53.218	1,636.3	153 31 13.1	333 29 45.5	Keahuolu	4.232457	17,078.8	56,032.7
	155 57 20.270	591.0	203 48 29.8	23 50 09.5	Hualalai 2	4.331037	21,430.7	70,310.6
Puu Ahinui, 1890	19 15 05.545	170.5	156 20 26.2	336 18 00.9	Puu Ohau	4.502665	31,817.4	104,387.6
	155 50 02.359	68.9	175 11 17.6	355 10 30.7	Hualalai 2	4.689454	48,916.4	160,486.6
Kailua (north meridian astronomical latitude station), 1887–1928.	19 38 44.410	1,365.5	103 35 34.9	283 34 56.8	Keahuolu	3.530612	3,393.2	11,132.5
	155 59 48.454	1,411.7	248 26 54.3	68 29 24.1	Hualalai 2	4.144314	13,941.7	45,740.4
			343 23 38.3	163 24 28.4	Puu Ohau	4.179503	15.118.3	49,600.6
Hanamalo, 2, 1890–1913	19 09 34.489	1,060.4	174 14 06.3	354 13 21.3	Puu Ohau	4.596793	39,517.8	129,651.3
	155 55 04.131	120.7	220 52 49.0	40 54 28.3	Puu Ahinui	4.129226	13,465.6	44,178.4

[1] No check on this position.

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Ohepuupuu, 1890–1914	19 08 16.868	518.6	171 22 33.7	351 22 29.6	Hanamalo 2	3.382716	2,413.9	7,919.6
	155 54 51.744	1,512.2	213 55 10.4	33 56 45.5	Puu Ahinui	4.180263	15,144.8	49,687.6
Kaapuna, 1890	19 15 12.476	383.6	40 17 47.2	220 15 45.4	Ohepuupuu	4.224017	16,750.1	54,954.3
	155 48 41.056	1,198.9	47 08 09.2	227 06 03.2	Hanamalo 2	4.183882	15,271.5	50,103.2
			84 52 30.0	264 52 03.2	Puu Ahinui	3.377283	2,383.9	7,821.2
Pualehua, 1890	19 15 27.581	848.0	44 41 54.1	224 39 26.7	Ohepuupuu	4.270076	18,624.1	61,102.6
	155 47 23.491	686.0	51 07 26.3	231 04 54.7	Hanamalo 2	4.237782	17,289.6	56,724.3
			78 24 58.8	258 24 33.2	Kaapuna	3.364030	2,312.2	7,585.9
Puu Hoomaha, 1890	19 14 28.755	884.1	54 00 27.8	233 57 30.8	Ohepuupuu	4.288816	19,445.4	63,797.1
	155 45 53.379	1,559.0	60 40 25.8	240 37 24.6	Hanamalo 2	4.266200	18,458.7	60,559.9
			124 30 17.6	304 29 47.9	Pualehua	3.504240	3,193.3	10,476.7
Hanakeaumoe, 1890–1914	19 06 22.449	690.2	171 29 00.9	351 28 55.0	Ohepuupuu	3.551113	3,557.2	11,670.6
	155 54 33.717	985.5	206 13 41.8	26 15 10.9	Puu Ahinui	4.253616	17,931.5	58,830.3
			212 17 13.7	32 19 09.5	Kaapuna	4.285122	19,280.7	63,256.8
			216 50 51.4	36 53 12.8	Pualehua	4.321198	20,950.7	68,735.8
			225 27 09.7	45 30 00.6	Puu Hoomaha	4.328866	21,323.9	69,960.2
Puu o Keokeo	19 13 01.223	37.6	54 45 42.3	234 42 27.5	Hanakeaumoe	4.327078	21,236.3	69,672.8
	155 44 40.315	1,177.6	63 56 59.8	243 53 38.9	Ohepuupuu	4.298611	19,888.9	65,252.2
			70 48 02.8	250 44 37.7	Hanamalo 2	4.285593	19,301.6	63,325.3
			141 35 27.8	321 35 03.7	Puu Hoomaha	3.535891	3,434.7	11,268.7
Na Puu a Pele, 1891–1914	19 01 49.761	1,530.0	146 03 43.9	326 02 40.8	Hanakeaumoe	4.004613	10,106.8	33,158.7
	155 51 20.675	604.6	195 23 59.8	15 25 17.6	Pualehua	4.416358	26,083.0	85,574.0
			202 16 21.2	22 18 08.5	Puu Hoomaha	4.401757	25,221.7	82,748.2
			209 31 30.6	29 33 41.8	Puu o Keokeo	4.375309	23,730.6	77,856.1
Akihi, 1890	19 05 40.945	1,258.9	68 53 27.6	248 50 02.2	Na Puu a Pele	4.294718	19,711.4	64,669.8
	155 40 51.848	1,515.6	153 45 34.7	333 44 19.7	Puu o Keokeo	4.178798	15,093.8	49,520.2
Ka lae (astronomic latitude station), 1887–1914.	18 54 59.358	1,825.0	124 59 37.4	304 56 16.8	Na Puu a Pele	4.342779	22,018.1	72,237.7
	155 41 03.857	112.9	169 14 16.5	349 13 05.8	Puu o Keokeo	4.529689	33,860.2	111,089.7
			181 01 10.4	1 01 14.3	Akihi	4.295117	19,729.5	64,729.2
Palahemo, 1898–1914	18 55 56.057	1,723.5	54 36 56.1	234 36 28.9	Ka lae	3.478602	3,010.3	9,876.3
	155 39 39.988	1,170.0	173 20 15.8	353 19 52.4	Akihi	4.257811	18,105.6	59,401.5
Kipaepae, 1898–1914	19 02 18.258	561.4	38 28 33.9	218 26 50.1	Palahemo	4.176307	15,007.5	49,237.1
	155 34 20.869	610.2	118 36 58.7	298 34 51.0	Akihi	4.114587	13,019.3	42,714.2
Kapuna 2, 1898–1914	19 05 05.667	174.2	19 48 39.2	199 47 31.5	Palahemo	4.254316	17,960.4	58,925.1
	155 36 11.954	349.5	24 37 12.5	204 35 37.5	Ka lae	4.311832	20,503.7	67,269.2
			97 33 52.4	277 32 20.8	Akihi	3.916640	8,253.5	27,078.4
			327 44 35.5	147 45 11.8	Kipaepae	3.784350	6,086.2	19,967.8
Kaiholena, 1897–1914	19 10 42.605	1,310.0	11 26 57.4	191 26 33.9	Kapuna 2	4.024072	10,569.9	34,678.1
	155 35 00.182	5.3	355 45 36.4	175 45 49.3	Kipaepae	4.191715	15,549.4	51,015.0
Kamehame, 1897–1914	19 08 53.192	1,635.5	41 57 29.8	221 55 28.3	Kipaepae	4.212847	16,324.8	53,558.9
	155 28 07.613	222.5	63 43 29.2	243 40 50.6	Kapuna 2	4.198394	15,790.4	51,805.7
			105 36 40.1	285 34 24.7	Kaiholena	4.097455	12,515.7	41,061.9
Kahaha, 1897	19 16 08.936	274.8	16 27 35.7	196 26 11.1	Kipaepae	4.425378	26,630.4	87,369.9
	155 30 02.827	82.5	27 53 19.2	207 51 17.5	Kapuna 2	4.363039	23,069.5	75,687.2
			40 53 38.2	220 52 00.3	Kaiholena	4.122894	13,270.7	43,539.0
			345 53 36.9	165 54 14.8	Kamehame	4.140321	13,814.1	45,321.8
Puu Huluhulu, 1891–1920	19 22 29.285	900.4	61 12 40.0	241 05 14.1	Kaiholena	4.653501	45,029.9	147,735.6
	155 12 29.452	859.5	69 13 32.3	249 07 43.8	Kahaha	4.517174	32,898.3	107,933.8
Kulani, 1891	19 31 25.518	784.6	37 48 02.1	217 42 26.1	Kaiholena	4.684265	48,335.4	158,580.4
	155 18 06.205	180.9	329 12 00.1	149 13 52.2	Puu Huluhulu	4.283122	19,192.1	62,966.1
West Heiheiahulu, 1896–1914	19 25 40.895	1,257.4	75 22 29.0	255 18 12.6	Puu Huluhulu	4.366942	23,277.8	76,370.6
	154 59 37.623	1,097.6	108 11 52.0	288 05 42.4	Kulani	4.531771	34,022.9	111,623.5
Alala, 1877–1912	19 50 19.562	601.5	29 45 28.8	209 41 38.6	Kulani	4.603732	40,154.3	131,739.6
	155 06 42.629	1,240.5	344 44 42.3	164 47 05.0	W. Heiheiahulu	4.673230	47,122.7	154,601.7
Halai, 1877–1912	19 43 11.653	358.3	44 23 28.2	224 19 23.5	Kulani	4.482406	30,367.3	99,630.0
	155 05 57.576	1,676.6	174 18 36.6	354 18 21.3	Alala	4.121329	13,223.0	43,382.5
			341 03 44.9	161 05 52.0	W. Heiheiahulu	4.533442	34,154.0	112,053.6
Red Hill, 1877	19 51 07.225	222.2	272 31 01.4	92 37 22.3	Alala	4.514338	32,684.2	107,231.4
	155 25 24.770	720.7	293 13 58.3	113 20 33.4	Halai	4.568064	36,988.3	121,352.4
Honohina, 1877–1912	19 54 58.958	1,812.9	329 43 57.0	149 44 55.6	Alala	3.997662	9,946.3	32,632.2
	155 09 34.917	1,015.5	343 46 26.7	163 47 40.5	Halai	4.355068	22,650.0	74,310.9
			75 35 04.1	255 29 41.1	Red Hill	4.455385	28,535.5	93,620.2
Haiku, 1877–1913	19 56 04.101	126.1	70 35 57.7	250 30 55.2	Red Hill	4.438144	27,424.8	89,976.2
	155 10 35.730	1,039.1	318 33 14.6	138 33 35.3	Honohina	3.426865	2,672.2	8,767.0
Puu Ohai, 1877–1913	19 56 44.553	1,370.0	66 51 53.1	246 47 09.6	Red Hill	4.420903	26,357.4	86,474.2
	155 11 31.745	923.1	307 21 47.9	127 22 07.0	Haiku	3.311652	2,049.5	6,724.1

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Principal points—Continued	° ′ ″		° ′ ″	° ′ ″				
Papaaloa, 1877–1913	19 58 16.658	512.2	56 47 17.5	236 43 21.6	Red Hill	4.381780	24,086.8	79,024.8
	155 13 52.158	1,516.4	304 44 32.4	124 45 20.3	Puu Ohai	3.696261	4,968.9	16,302.1
Humuula, 1877–1913	20 00 06.360	195.6	42 12 40.5	222 09 44.4	Red Hill	4.349740	22,373.8	73,404.7
	155 16 48.130	1,399.1	303 23 32.5	123 24 32.6	Papaaloa	3.787308	6,127.8	20,104.3
			304 30 37.3	124 32 44.4	Haiku	4.118682	13,142.6	43,118.7
Kaholo, 1877–1913	20 01 02.756	84.7	33 12 59.6	213 10 39.1	Red Hill	4.340124	21,883.9	71,797.4
	155 78 32.753	952.0	299 41 19.7	119 41 55.5	Humuula	3.544167	3,500.8	11,485.5
Paauhau, 1877–1913	20 04 01.082	33.3	290 47 57.8	110 50 47.8	Kaholo	4.188235	15,425.3	50,607.8
	155 26 48.869	1,420.0	292 25 53.9	112 29 19.7	Humuula	4.276283	18,892.2	61,982.2
			354 07 43.0	174 08 11.7	Red Hill	4.378780	23,921.0	78,480.8
Papalekoki, 1877	19 52 38.541	1,185.1	103 26 02.0	283 21 55.1	Nohonaohae	4.336247	21,689.4	71,159.3
	155 29 06.082	176.9	107 17 01.0	287 09 53.6	Puako	4.581505	38,150.9	125,166.7
			190 45 21.3	10 46 08.2	Paauhau	4.329673	21,363.5	70,090.1
			229 52 36.7	49 56 12.8	Kaholo	4.381545	24,073.8	78,982.1
			237 16 40.4	57 20 52.1	Humuula	4.406503	25,497.8	83,654.0
			293 33 04.7	113 34 19.9	Red Hill	3.846617	7,024.5	23,046.2
Kuilei, 1877–1913	20 05 14.602	449.0	290 56 31.3	110 57 41.1	Paauhau	3.800883	6,322.4	20,742.7
	155 30 12.084	351.1	342 12 38.5	162 14 16.7	Red Hill	4.437161	27,362.8	89,772.8
			355 16 43.1	175 17 05.7	Papalekoki	4.367870	23,327.6	76,534.0
Waipio, 1877–1913	20 07 28.878	888.0	290 43 03.9	110 45 12.9	Kuilei	4.066769	11,661.9	38,260.7
	155 36 27.527	799.5	334 51 56.5	154 54 27.5	Papalekoki	4.480520	30,235.7	99,198.3
Kaala, 1877	20 03 15.031	462.2	19 04 01.6	199 03 02.3	Nohonaohae	4.187211	15,389.0	50,488.7
	155 38 18.591	540.2	202 27 13.4	22 27 51.5	Waipio	3.926671	8,446.4	27,711.2
			320 35 41.3	140 38 49.9	Papalekoki	4.403469	25,320.3	83,071.7
Puu Io, 1876	19 59 05.988	184.1	324 00 21.3	144 02 02.7	Papalekoki	4.167981	14,722.5	48,302.1
	155 34 03.503	101.8	61 03 21.3	241 00 55.3	Nohonaohae	4.152974	14,222.4	46,661.3
			85 50 14.9	265 48 39.0	Holoholoku	3.913017	8,185.0	26,853.6
			135 56 18.8	315 54 51.5	Kaala	4.027720	10,659.1	34,979.7
Puu Pili, 1881	20 07 05.094	156.6	24 33 10.9	204 31 48.2	Puako	4.227205	16,873.5	55,359.1
	155 45 57.913	1,682.3	343 04 39.6	163 04 55.7	Puu Loa	3.671499	4,693.5	15,398.6
Keawanui, 1881–1913	20 06 35.085	1,078.9	265 40 57.4	85 43 22.8	Puu Pili	4.090447	12,315.4	40,404.8
	155 53 00.686	19.9	284 37 35.2	104 40 16.6	Puu Loa	4.149432	14,106.9	46,282.4
			339 53 51.3	159 54 53.5	Puako	4.186430	15,361.4	50,398.2
Kehena, 1881–1913	20 08 20.895	642.5	280 13 42.6	100 16 15.3	Puu Pili	4.117248	13,099.3	42,976.6
	155 53 21.711	630.6	295 32 38.1	115 35 26.8	Puu Loa	4.198809	15,805.5	51,855.2
			349 22 07.0	169 22 14.2	Keawanui	3.519890	3,310.5	10,861.2
Puu o Nale, 1881–1913	20 12 13.420	412.7	32 11 45.8	212 10 52.3	Kehena	3.926796	8,448.8	27,719.1
	155 50 46.713	1,356.1	318 29 29.7	138 31 09.2	Puu Pili	4.102366	12,658.0	41,528.8
			325 03 56.3	145 05 51.8	Puu Loa	4.231444	17,039.0	55,902.1
Kauhola, 1881–1913	20 14 58.199	1,789.6	56 04 33.1	236 03 03.4	Puu o Nale	3.957904	9,076.2	29,777.5
	155 46 27.299	792.3	356 38 32.4	176 38 42.5	Puu Pili	4.163552	14,573.1	47,811.9
Ridge, 1910–29	20 10 30.506	938.1	238 11 59.1	58 12 59.8	Puu o Nale	3.778651	6,006.9	19,707.6
	155 53 42.564	1,235.9	351 21 34.5	171 21 41.7	Kehena	3.605447	4,031.3	13,226.0
Cast, 1910	20 11 41.766	1,284.3	259 42 24.5	79 43 28.3	Puu o Nale	3.736560	5,452.0	17,887.1
	155 53 51.489	1,494.9	353 15 18.7	173 15 21.8	Ridge	3.343712	2,206.5	7,239.2
Puu Ula, 1913	20 13 59.443	1,827.9	39 25 20.1	219 24 38.7	Cast	3.738785	5,480.1	17,979.3
	155 51 51.625	1,498.5	329 58 13.3	149 58 35.7	Puu o Nale	3.575837	3,765.6	12,354.3
Kepuhi, 1913	20 16 03.449	106.1	10 35 30.2	190 35 14.4	Puu o Nale	3.857095	7,196.1	23,609.2
	155 50 01.152	33.4	40 03 46.9	220 03 08.7	Puu Ula	3.697408	4,982.1	16,345.4
			287 54 20.3	107 55 34.3	Kauhola	3.814423	6,522.6	21,399.6
Supplementary points, northwest coast								
Nunulu, 1913	20 12 25.266	776.9	81 07 05.2	261 06 37.5	Puu o Nale	3.372601	2,358.3	7,737.2
	155 49 26.454	768.0	227 52 05.1	47 53 07.1	Kauhola	3.845805	7,011.4	23,003.2
Kapaaiki, 1913	20 14 18.970	583.3	63 44 01.2	243 42 36.8	Nunulu	3.897493	7,897.6	25,910.7
	155 45 22.505	653.2	122 40 51.8	302 40 29.4	Kauhola	3.349122	2,234.2	7,330.0
Niulii, 1913	20 13 10.387	319.4	80 04 50.5	260 03 16.1	Nunulu	3.905473	8,044.0	26,391.0
	155 44 53.512	1,553.4	140 36 52.8	320 36 20.4	Kauhola	3.632425	4,289.7	14,073.8
			158 14 52.3	338 14 42.3	Kapaaiki	3.356157	2,270.7	7,449.8
Akokoa, 1913	20 13 21.795	670.2	76 28 40.7	256 28 23.3	Niulii	3.176122	1,500.1	4,921.6
	155 44 03.268	94.9	127 23 57.7	307 23 30.3	Kapaaiki	3.461647	2,895.0	9,498.0
Island, highest point, 1913 [1]	20 11 43.53	1,338.5	121 02 40	301 01 47	Niulii	3.714338	5,180	16,995
	155 42 20.62	598.7	135 24 15	315 23 40	Akokoa	3.627752	4,244	13,924
Stack, Niulii, 1913	20 13 35.815	1,101.3	21 42 07.7	201 42 04.0	Niulii	2.925097	841.6	2,761.1
	155 44 42.792	1,242.1	139 01 24.7	319 01 11.0	Kapaaiki	3.244965	1,757.8	5,767.0
			290 35 34.9	110 35 48.6	Akokoa	3.088352	1,225.6	4,021.0

[1] No check on this position.

58955°—30——8

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance: Log (meters)	Distance: Meters	Distance: Feet
Supplementary points, northwest coast—Con.	° ′ ″		° ′ ″	° ′ ″				
Stack, Kauhola, 1913	20 14 13.422	412.7	52 56 33.1	232 55 40.6	Nunulu	3.741788	5,518.1	18,104.0
	155 46 54.768	1,589.7	210 04 18.7	30 04 28.2	Kauhola	3.201695	1,591.1	5,220.1
			298 50 11.4	118 50 53.3	Niulii	3.604025	4,018.1	13,182.7
Kauhola Point Light, 1910	20 14 58.794	1,807.9	336 25 35.2	156 25 35.3	Kauhola	1.300142	20.0	65.6
	155 46 27.574	800.3	55 57 07.0	235 55 37.4	Puu o Nale	3.958076	9,079.8	29,789.3
			107 47 40.5	287 46 26.6	Kepuhi	3.813542	6,509.4	21,356.3
Kauhola Point Light, 1913	20 14 58.564	1,800.8	47 44 41.0	227 43 39.0	Nunulu	3.845668	7,009.2	22,996.0
	155 46 27.751	805.4	55 58 13.2	235 56 43.5	Puu o Nale	3.957682	9,071.6	29,762.4
			107 52 03.1	287 50 49.2	Kepuhi	3.813356	6,506.6	21,347.1
			302 44 06.3	122 44 28.7	Kapaaiki	3.352449	2,251.4	7,386.5
			310 31 17.3	130 31 17.3	Kauhola	1.239080	17.3	56.8
			320 33 55.0	140 34 27.4	Niulii	3.634150	4,306.8	14,129.9
Alauahihi	20 15 47.615	1,464.2	21 32 36.5	201 32 05.5	Puu o Nale	3.850100	7,081.1	23,231.9
	155 49 17.149	497.7	287 07 29.5	107 08 28.3	Kauhola	3.712502	5,158.2	16,923.2
			340 11 27.7	160 12 36.4	Puu Pili	4.232417	17,077.2	56,027.4
Stack, Union, 1913	20 14 32.393	996.1	18 00 38.6	198 00 23.4	Nunulu	3.613902	4,110.6	13,486.2
	155 48 42.674	1,238.6	40 07 17.6	220 06 34.7	Puu o Nale	3.747263	5,588.1	18,333.6
			290 45 02.9	110 46 22.2	Niulii	3.852098	7,113.7	23,338.9
Hoea mill chimney, west stack, 1910	20 15 55.533	1,707.7	256 18 58.9	76 19 10.8	Kepuhi	3.012497	1,029.2	3,376.6
	155 50 35.610	1,033.4	2 42 06.5	182 42 02.6	Puu o Nale	3.834908	6,837.7	22,433.4
			31 43 12.2	211 42 45.9	Puu Ula	3.622889	4,196.5	13,768.0
Stack, Hoea, 1913	20 15 55.534	1,707.7	2 50 00.9	182 49 56.9	Puu o Nale	3.834959	6,838.5	22,436.0
	155 50 35.069	1,017.7	31 54 08.2	211 53 41.7	Puu Ula	3.623750	4,204.8	13,795.2
			256 06 30.4	76 06 42.1	Kepuhi	3.005992	1,013.9	33,264.4
Mahu, 1913	20 14 00.394	12.1	270 25 17.5	90 26 04.1	Puu Ula	3.592555	3,913.4	12,839.2
	155 54 06.446	187.1	299 33 31.8	119 34 40.8	Puu o Nale	3.823874	6,666.1	21,870.4
Honoipu, 1913	20 14 44.472	1,367.5	35 09 03.8	215 08 52.4	Mahu	3.219511	1,657.7	5,438.6
	155 53 33.565	974.2	295 04 26.9	115 05 02.1	Puu Ula	3.514116	3,266.8	10,717.8
			318 47 39.4	133 48 37.0	Puu o Nale	3.826765	6,710.7	22,016.7
Rail, 1910–1929	20 11 47.381	1,457.0	262 30 34.3	82 31 46.8	Puu o Nale	3.788912	6,150.5	20,178.8
	155 54 16.762	486.6	283 14 23.0	103 14 31.7	Cast	2.877253	753.8	2,473.1
			337 12 50.9	157 13 02.7	Ridge	3.408917	2,564.0	8,412.1
Mahukona Harbor, south day beacon, 1910–1929.	20 11 01.98	60.9	178 56 33	358 56 33	Rail	3.145028	1,396	4,580
	155 54 15.87	460.8	210 03 16	30 03 25	Cast	3.150341	1,414	4,639
			315 00 48	135 00 59	Ridge	3.136145	1,368	4,488
Mahukona Harbor, north day beacon, 1910–1929.	20 11 24.60	756.4	188 18 48	8 18 49	Rail	2.849991	708	2,323
	155 54 20.29	589.1	237 44 06	57 44 16	Cast	2.995109	989	3,245
			326 38 04	146 38 17	Ridge	3.299217	1,992	6,535
Mahukona Harbor schoolhouse flagstaff, 1910	20 11 16.21	498.5	171 45 20	351 45 18	Rail	2.986124	969	3,179
	155 54 11.98	347.8	217 07 23	37 07 30	Cast	2.993724	986	3,235
			328 42 40	148 42 50	Ridge	3.216045	1,645	5,397
Mahukona Harbor wharf derrick, 1910–1929	20 11 13.25	407.4	171 32 02	351 32 00	Rail	3.025790	1,061	3,481
	155 54 11.38	330.4	213 22 00	33 22 07	Cast	3.021212	1,050	3,445
			327 31 01	147 31 11	Ridge	3.192579	1,558	5,112
Mahukona Harbor, church spire, 1910	20 11 17.76	546.1	170 13 54	350 13 52	Rail	2.965820	924	3,031
	155 54 11.36	329.8	218 00 24	38 00 31	Cast	2.971722	937	3,074
			330 04 50	150 05 00	Ridge	3.224380	1,676	5,499
Mahukona Harbor, light mast, 1910–1929	20 11 01.88	57.8	178 17 00	358 16 59	Rail	3.146104	1,400	4,593
	155 54 15.32	444.8	209 25 21	29 25 29	Cast	3.148694	1,408	4,619
			315 24 18	135 24 30	Ridge	3.131815	1,355	4,446
Mahukona Harbor, Flag "A," 1910 [1]	20 10 29.84	917.6	177 30 27	357 30 26	Rail	3.377813	2,387	7,831
	155 54 13.19	383.0	268 40 17	88 40 28	Ridge	2.949114	889	2,917
Mahukona Light, 1929	20 11 00.505	15.5	178 18 27.0	358 18 26.5	Rail	3.158990	1,442.1	4,731.3
	155 54 15.295	444.1	314 08 40.9	134 08 52.2	Ridge	3.122037	1,324.5	4,345.5
Kaihuoa	20 08 19.098	587.3	90 57 13.4	270 56 33.8	Kehena	3.523610	3,339.0	10,954.7
	155 51 26.763	777.3	189 09 59.4	9 10 13.2	Puu o Nale	3.863247	7,298.7	23,945.8
			301 46 02.0	121 48 11.1	Puu Loa	4.108737	12,845.1	42,142.6
Lahikiola	20 09 03.726	114.6	140 17 20.6	320 16 23.1	Puu o Nale	3.879871	7,583.5	24,880.2
	155 47 59.817	1,737.1	193 50 19.5	13 50 51.5	Kauhola	4.050234	11,226.2	36,831.3
			315 50 58.1	135 51 40.1	Puu Pili	3.706175	5,083.6	16,678.4
Kapaakea	20 05 35.495	1,091.5	149 54 54.7	329 54 42.1	Keawanui	3.325865	2,117.7	6,947.8
	155 52 24.142	701.4	256 11 05.4	76 13 18.1	Puu Pili	4.062699	11,553.1	37,903.8
			277 49 41.4	97 52 10.2	Puu Loa	4.104021	12,706.4	41,687.6
Waiele, 1928	20 04 45.904	1,411.5	303 28 30.0	123 29 23.0	Puu Kamalii 2	3.731074	5,383.6	17,662.7
	155 52 00.688	20.0	342 17 10.7	162 17 52.3	Puako	4.065191	11,619.6	38,122.0
			7 37 46.7	187 37 21.9	Anaehoomalu	4.202844	15,953.1	52,339.5

[1] No check on this position.

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, northwest coast—Con.	° ′ ″		° ′ ″	° ′ ″				
Puu Kamalii	20 03 09.391	288.8	6 45 45.8	186 45 34.5	Puako	3.911585	8,158.0	26,765.0
	155 49 26.041	756.7	219 49 40.5	39 50 52.0	Puu Pili	3.974927	9,439.0	30,967.8
			249 35 08.6	69 36 36.1	Puu Loa	3.898179	7,910.0	25,951.4
Puu Kamalii 2, 1928	20 03 09.317	286.5	6 44 28.2	186 44 16.9	Puako	3.911444	8,155.4	26,756.5
	155 49 26.156	760.1	27 14 42.3	207 13 24.6	Anaehoomalu	4.159658	14,443.0	47,385.1
Puuki, 1872	20 02 06.244	192.0	38 24 25.1	218 23 41.7	Puu Pa	3.773348	5,934.0	19,468.5
	155 40 17.939	521.4	90 33 16.8	270 33 02.3	Hokuula	3.090983	1,233.1	4,045.6
			286 31 03.3	106 31 58.0	Hawaii east base	3.684975	4,841.4	15,883.8
			310 27 31.8	130 27 39.4	Hawaii west base	2.926056	843.4	2,767.1
			336 04 57.2	156 05 29.2	Holoholoku	3.827062	6,715.2	22,031.5
Kawaihae Lighthouse	20 02 39.081	1,201.7	6 38 54.2	186 38 25.7	Anahulu	4.322920	21,033.9	69,008.7
	155 50 07.034	204.4	34 50 25.0	214 46 47.9	Kuili	4.511459	32,468.3	106,523.1
			221 29 35.7	41 31 01.2	Puu Pili	4.038326	10,922.6	35,835.2
			310 46 24.5	130 49 27.5	Nohonaohae	4.313214	20,569.0	67,483.5
			358 09 05.0	178 09 07.7	Puako	3.855699	7,173.0	23,533.4
Kawaihae Light, 1913–1928	20 02 40.450	1,243.8	233 57 15.7	53 57 30.1	Puu Kamalii 2	3.178569	1,508.6	4,949.5
	155 50 08.131	236.3	357 54 40.4	177 54 43.5	Puako	3.858306	7,216.2	23,675.1
			24 16 36.0	204 15 32.7	Anaehoomalu	4.117701	13,113.0	43,021.6
Kawaihae Wireless, 1913–1928 [1]	20 02 38.68	1,189.4	246 38 50	66 40 31	Puu Loa	3.970548	9,344	30,656
	155 50 06.16	179.0	358 21 15	178 21 17	Puako	3.854901	7,160	23,491
Kohala Summit, 1873	20 05 20.636	634.6	305 50 37.9	125 53 45.6	Puu Io	4.293605	19,661.0	64,504.5
	155 43 11.716	340.4	327 18 33.5	147 20 05.0	Holoholoku	4.158203	14,394.7	47,226.6
			327 22 58.9	147 23 43.9	Hokuula	3.850158	7,082.0	23,234.9
			349 14 27.1	169 15 08.2	Nohonaohae	4.272694	18,736.7	61,472.0
Pack, 1928	19 58 31.334	963.5	115 07 18.6	295 07 07.3	Puako	3.024249	1,057.4	3,469.2
	155 49 26.153	760.3	179 59 57.9	359 59 57.9	Puu Kamalii 2	3.931860	8,547.9	28,044.2
Hand, 1928	19 56 04.578	140.8	113 27 15.5	293 27 09.6	Anaehoomalu	2.739956	549.5	1,802.8
	155 52 56.188	1,634.0	205 02 44.3	25 03 56.1	Puu Kamalii 2	4.158885	14,417.3	47,300.8
			226 03 26.1	46 04 26.5	Puako	3.854364	7,151.0	23,461.2
Anaehoomalu, 1928	19 56 11.690	359.5	41 40 22.4	221 37 49.2	Kuili	4.295255	19,734.9	64,746.9
	155 53 13.522	393.2	204 27 39.8	24 28 43.5	Kawaihae Lighthouse	4.116862	13,087.7	42,938.6
			229 59 50.2	50 00 56.5	Puako	3.868033	7,379.6	24,211.2
			274 07 37.3	94 11 43.4	Nohonaohae	4.323353	21,054.9	69,077.6
			341 34 55.0	161 35 30.0	Anahulu	3.976126	9,465.1	31,053.4
Keamuku, 1882	19 49 51.107	1,571.5	43 11 29.0	223 08 41.4	Hualalai 2	4.324119	21,092.1	69,199.7
	155 44 07.581	220.6	148 08 52.3	328 06 52.6	Puako	4.287006	19,364.5	63,531.7
			206 43 17.6	26 44 17.4	Nohonaohae	4.056608	11,392.2	37,375.9
Puu Ka Pele, 1882	19 46 13.350	410.5	70 34 41.3	250 29 56.2	Hualalai 2	4.416234	26,075.6	85,549.7
	155 38 18.893	550.0	123 25 55.0	303 23 56.9	Keamuku	4.084882	12,158.6	39,890.3
Ahumoa, 1882	19 48 44.650	1,372.9	28 56 20.9	208 55 51.0	Puu Ka Pele	3.725577	5,315.9	17,440.6
	155 36 50.532	1,470.7	99 08 53.1	279 06 24.9	Keamuku	4.109981	12,881.9	42,263.4
			148 09 39.5	328 08 10.7	Nohonaohae	4.157888	14,384.3	47,192.5
Napukalua, 1882	19 44 56.047	1,723.4	75 57 30.3	255 52 38.8	Hualalai 2	4.413916	25,936.8	85,094.3
	155 37 59.323	1,727.2	166 31 19.6	346 31 13.0	Puu Ka Pele	3.388154	2,444.3	8,019.3
			195 53 50.9	15 54 14.2	Ahumoa	3.863854	7,308.9	23,979.3
Puu Hinai	19 54 18.076	555.8	22 21 08.9	202 19 16.1	Hualalai 2	4.406650	25,506.4	83,682.2
	155 46 50.190	1,459.8	56 06 00.6	236 04 25.2	Anahulu	3.992752	9,834.5	32,265.4
			107 25 00.9	287 22 50.3	Anaehoomalu	4.067563	11,683.2	38,330.6
			146 18 32.4	326 17 28.0	Puako	3.995637	9,900.0	32,480.2
			258 42 02.2	78 43 57.5	Nohonaohae	4.002015	10,046.5	32,960.9
			300 24 43.2	120 28 06.9	Ahumoa	4.306133	20,236.4	66,392.3
			315 01 38.9	135 04 32.4	Puu Ka Pele	4.323453	21,059.7	69,093.4
			330 02 16.4	150 03 11.7	Keamuku	3.976566	9,474.7	31,084.9
Waawaa, 1882	19 46 31.796	977.7	163 38 35.2	343 38 05.0	Anahulu	3.964928	9,224.2	30,263.1
	155 50 01.459	42.5	180 10 30.8	0 10 31.6	Puako	4.353611	22,574.1	74,061.9
			201 12 22.4	21 13 27.3	Puu Hinai	4.186957	15,380.0	50,459.2
			223 22 58.5	43 25 58.4	Nohonaohae	4.351054	22,441.6	73,627.1
			239 13 46.1	59 15 46.0	Keamuku	4.078641	11,985.1	39,321.1
			259 54 01.7	79 58 29.5	Ahumoa	4.368861	23,380.9	76,708.8
			271 33 20.2	91 37 17.9	Puu Ka Pele	4.310904	20,459.9	67,125.5
Puu Kea, 1882	19 45 48.826	1,501.3	21 22 02.0	201 21 54.6	Napukalua	3.241205	1,742.6	5,717.2
	155 37 37.516	1,092.2	72 56 35.6	252 51 36.6	Hualalai 2	4.431103	26,983.8	88,529.3
			93 31 34.8	273 27 23.1	Waawaa	4.336406	21,697.3	71,185.2
			122 03 03.2	302 02 49.2	Puu Ka Pele	3.152636	1,421.1	4,662.4
Nawai, 1928	19 51 19.307	593.7	215 54 18.9	35 55 35.1	Anaehoomalu	4.045366	11,101.1	36,420.9
	155 56 57.389	1,669.8	269 55 27.0	89 57 18.0	Anahulu	3.977907	9,504.0	31,181.0
			48 56 27.7	228 55 10.8	Kuili	3.942524	8,760.4	28,741.4
Akahipuu, 1928	19 45 18.336	563.8	27 20 18.1	207 19 10.3	Keahuolu	4.105075	12,737.2	41,788.6
	155 58 20.878	607.8	71 59 05.3	251 57 18.0	Keahole	3.987961	9,726.6	31,911.4
			141 59 56.9	321 59 08.4	Kuili	3.831383	6,782.4	22,251.9
			227 02 13.2	47 04 32.2	Anahulu	4.212366	16,306.7	53,499.6

[1] No check on this position.

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, northwest coast—Con.	° ′ ″		° ′ ″	° ′ ″				
Kaupulehu	19 43 07.550	232.2	59 18 24.4	239 16 02.4	Keahuolu	4.154768	14,281.3	46,854.6
	155 54 40.118	1,168.3	122 02 31.8	302 01 17.3	Akahipuu	3.879798	7,582.2	24,875.9
			131 28 08.9	311 26 05.8	Kuili	4.150681	14,147.5	46,415.6
			306 43 26.2	126 44 12.4	Hualalai 2	3.696687	4,973.8	16,318.2
Lava Cone, 1913	19 45 53.08	1,632.2	332 54 12	152 54 18	Akahipuu	3.079242	1,200	3,937
	155 58 39.65	1,154.3	64 53 58	244 52 17	Keahole	3.982748	9,611	31,532
			139 40 37	319 39 55	Kuili	3.748847	5,609	18,402
Makalawena Church, 1913 [1]	19 47 39.91	1,227.2	240 55 47	60 56 08	Kuili	3.309567	2,040	6,693
	156 01 45.60	1,327.3	306 08 11	126 09 20	Akahipuu	3.868062	7,380	24,213
Supplementary points, west coast								
Keahole Point Light, 1913–1928	19 43 51.672	1,588.9	213 54 47.0	33 55 49.6	Kuili	3.984598	9,651.6	31,665.3
	156 03 49.367	1,437.5	254 24 55.7	74 26 46.6	Akahipuu	3.996887	9,928.6	32,574.1
			317 37 14.2	137 37 17.9	Keahole	2.670232	468.0	1,535.4
Keahole Point Light, 1928 [1]	19 43 51.77	1,591.9	254 25 46	74 27 37	Akahipuu	3.996790	9,926.4	32,566.9
	156 03 49.32	1,436.1	336 44 42	156 45 25	Keahuolu	3.973979	9,418.4	30,900.2
Auhaukeae	19 38 19.174	589.6	120 02 34.5	300 02 19.0	Kailua	3.190336	1,550.0	5,085.3
	155 59 02.398	69.9	243 06 23.0	63 08 37.5	Hualalai 2	4.115125	13,035.4	42,767.0
Kahelo, 1882–1928	19 37 24.050	739.5	127 40 32.4	307 39 43.5	Keahuolu	3.728188	5,348.0	17,545.9
	155 59 16.371	477.0	159 16 46.8	339 16 36.0	Kailua	3.421907	2,641.8	8,667.3
			193 30 18.2	13 30 22.9	Auhaukeae	3.241343	1,743.2	5,719.1
			237 45 04.4	57 47 23.6	Hualalai 2	4.153122	14,227.3	46,677.4
Keauhou, 1883	19 33 55.891	1,718.5	10 30 06.7	190 29 54.7	Puu Ohau	3.756825	5,712.5	18,741.8
	155 56 44.560	1,298.8	145 21 14.9	325 20 23.8	Kahelo	3.891024	7,780.8	25,527.5
			208 32 53.6	28 34 21.4	Hualalai 2	4.202109	15,926.1	52,250.9
Puu Loa 2, 1883	19 33 27.667	850.7	12 19 56.8	192 19 44.8	Puu Ohau	3.686739	4,861.1	15,948.5
	155 56 44.661	1,301.9	180 11 38.5	0 11 38.5	Keauhou	2.938432	867.8	2,847.1
			207 08 01.0	27 09 28.8	Hualalai 2	4.222583	16,694.9	54,773.2

Kailua Church (Hi), 1928	19 38 34.402	1,057.8	328 09 05.7	148 10 06.8	Keauhou 2	4.003499	10,080.9	33,073.8
	155 59 47.061	1,371.1	342 04 51.6	162 05 24.9	Point	3.973945	9,417.7	30,897.9
			343 12 16.4	163 13 05.5	Puu Ohau	4.170611	14,811.9	48,595.4
			74 17 44.5	254 17 35.9	Kailua Light	2.889065	774.6	2,541.3
Kailua east oil tank, 1928	19 38 32.134	988.1	325 50 52.4	145 51 58.7	Keauhou 2	4.011275	10,263.0	33,671.2
	156 00 02.231	65.0	339 24 43.8	159 25 22.3	Point	3.977611	9,497.5	31,159.7
			341 29 45.4	161 30 39.7	Puu Ohau	4.172587	14,879.5	48,817.2
Kailua west oil tank, 1928	19 38 31.886	980.4	325 48 52.4	145 49 58.7	Keauhou 2	4.011056	10,257.8	33,654.1
	156 00 02.301	67.0	339 23 04.0	159 23 42.5	Point	3.977317	9,491.1	31,138.7
			341 28 45.0	161 29 39.3	Puu Ohau	4.172394	14,872.8	48,795.2
Kailua Light, 1913	19 38 27.878	857.2	320 06 58.5	140 07 17.2	Kahelo	3.407827	2,558	8,392
	156 00 12.656	368.7	340 13 25.9	160 14 23.7	Puu Ohau	4.171886	14,855	48,737
			116 43 34.7	296 43 04.8	Keahuolu	3.462890	2,903	9,524
Kailua Light, 1928	19 38 27.583	848.1	319 59 10.2	139 59 29.1	Kahelo	3.406642	2,550.6	8,368.1
	156 00 12.655	368.7	340 12 43.8	160 13 41.5	Puu Ohau	4.171635	14,846.9	48,710.2
			116 53 08.0	296 52 38.0	Keahuolu	3.463506	2,907.4	9,538.7
Holualoa stack, 1913	19 38 06.445	198.2	355 48 01.0	175 48 12.3	Puu Ohau	4.125702	13,356.8	43,821.4
	155 57 53.818	1,568.0	61 32 54.9	241 32 27.1	Kahelo	3.437093	2,735.9	8,976.0
			106 29 48.3	286 28 31.8	Keahuolu	3.840279	6,922.8	22,712.6
			135 39 43.2	315 37 47.3	Keahole	4.159226	14,428.7	47,338.2
Holualoa store, 1913	19 36 45.331	1,393.8	1 47 46.6	181 47 42.8	Puu Ohau	4.034715	10,832.2	35,538.6
	155 57 08.625	251.3	107 44 31.4	287 43 48.5	Kahelo	3.591969	3,908.1	12,821.8
			119 16 53.8	299 15 22.2	Keahuolu	3.959977	9,119.6	29,919.9
Lanakila Church, 1913	19 32 17.312	532.3	20 18 32.0	200 18 08.3	Keawekaheka	3.775725	5,966.6	19,575.4
	155 55 52.176	1,521.1	44 48 39.3	224 48 09.9	Puu Ohau	3.561645	3,644.6	11,957.3
			141 17 12.8	321 15 15.6	Keahuolu	4.211640	16,279.5	53,410.3
			147 45 27.4	327 44 18.9	Kahelo	4.047366	11,152.3	36,588.8
Point, 1928	19 33 42.970	1,321.2	345 10 25.7	165 10 41.5	Puu Ohau	3.732332	5,399.2	17,713.9
	155 58 07.655	223.1	148 13 45.9	328 12 34.1	Keahuolu	4.073400	11,841.3	38,849.3
			157 24 24.3	337 23 42.4	Kailua Light	3.976774	9,479.2	31,099.7
Keauhou 2, 1928	19 33 55.888	1,718.4	10 30 02.6	190 29 50.6	Puu Ohau	3.756816	5,712.4	18,741.4
	155 56 44.565	1,299.0	80 41 24.7	260 40 56.9	Point	3.389925	2,454.3	8,052.1
			138 10 18.7	318 08 39.0	Keahuolu	4.113221	12,978.4	42,580.0
			145 21 18.6	325 20 27.7	Kahelo	3.891024	7,780.8	25,527.5
Bright, 1928	19 38 01.708	52.5	64 18 26.2	244 17 58.5	Kahelo	3.426594	2,670.5	8,761.5
	155 57 53.781	1,567.0	101 07 51.3	281 07 04.7	Kailua Light	3.615274	4,123.6	13,528.8
			107 38 33.4	287 37 16.8	Keahuolu	3.843017	6,966.5	22,855.9
Square, 1928	19 38 11.209	344.7	69 36 43.6	249 35 58.6	Kahelo	3.619221	4,161.2	13,652.2
	155 57 02.505	73.0	95 12 05.6	275 11 01.7	Kailua Light	3.745294	5,562.8	18,250.6
			102 36 48.9	282 35 15.0	Keahuolu	3.920842	8,333.8	27,341.8

[1] No check on this position.

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, west coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Target, 1928	19 33 28.912	889.0	174 23 21.2	354 23 20.7	Point	2.637825	434.3	1,424.9
	155 58 06.198	180.7	250 46 42.5	70 47 09.8	Keauhou 2	3.401387	2,519.9	8,267.4
			344 22 20.0	164 22 35.3	Puu Ohau	3.696443	4,971.0	16,309.0
Signal, 1928	19 34 04.768	146.6	276 30 54.9	96 31 22.3	Keauhou 2	3.381122	2,405.0	7,890.4
	155 58 06.543	190.7	347 05 51.3	167 06 06.7	Puu Ohau	3.782201	6,056.2	19,869.4
			2 46 04.5	182 46 04.1	Point	2.826745	671.0	2,201.4
Church spire, 1928	19 32 41.205	1,267.0	33 56 07.4	213 55 41.7	Puu Ohau	3.602267	4,001.9	13,129.6
	155 56 03.647	106.3	117 43 19.4	297 42 37.9	Point	3.611018	4,083.4	13,397.0
			152 33 15.6	332 33 01.9	Keauhou 2	3.412900	2,587.6	8,489.5
Onouli, 1883	19 30 34.640	1,065.1	98 48 06.4	278 47 24.1	Puu Ohau	3.572363	3,735.6	12,255.9
	155 55 13.658	398.2	144 31 21.3	324 29 11.3	Keahuolu	4.289502	19,476.1	63,897.8
			193 49 13.3	13 50 10.5	Hualalai 2	4.317612	20,778.4	68,170.5
Keawekaheka, 1891-1928	19 29 15.324	471.2	170 36 18.7	350 36 13.0	Puu Ohau	3.484436	3,051.0	10,009.8
	155 57 03.189	93.0	232 37 49.8	52 38 26.4	Onouli	3.604070	4,018.6	13,184.4
Makolehale, 1883	19 29 55.619	1,710.2	77 24 24.1	257 23 20.7	Keawekaheka	3.754256	5,678.8	18,631.2
	155 53 53.141	1,549.6	117 04 19.6	297 03 52.8	Onouli	3.421045	2,636.6	8,650.2
Lae o Kanoni, 1884-1928	19 26 03.889	119.6	150 55 23.3	330 54 45.9	Keawekaheka	3.828360	6,735.3	22,097.4
	155 55 10.945	319.3	197 39 42.8	17 40 08.7	Makolehale	3.873774	7,477.8	24,533.4
Kalapa, 1884-1928	19 25 18.855	579.8	108 10 55.5	288 10 07.4	Lae o Kanoni	3.647300	4,439.2	14,564.3
	155 52 46.369	1,352.8	167 06 45.2	347 06 22.9	Makolehale	3.941008	8,729.9	28,641.3
Lae Loa, 1884-1913	19 24 04.499	138.3	169 05 12.6	349 05 04.5	Lae o Kanoni	3.572706	3,738.6	12,265.7
	155 54 46.682	1,362.1	236 55 03.0	56 55 43.0	Kalapa	3.622120	4,189.1	13,743.7
Kalua o Lapauwila, 1884-1913	19 18 14.740	453.2	168 12 54.9	348 12 29.4	Lae Loa	4.040834	10,985.9	36,042.9
	155 53 29.783	869.5	185 32 50.9	5 33 05.3	Kalapa	4.117332	13,101.8	42,984.8
Waikukuu, 1884	19 18 41.513	1,276.4	63 16 47.9	243 16 29.4	Kalua o Lapauwila	3.262598	1,830.6	6,005.9
	155 52 33.775	986.0	178 16 39.0	358 16 34.8	Kalapa	4.087170	12,222.8	40,101.0
Kipahoehoe, 1884	19 15 13.153	404.4	176 12 44.1	356 12 39.9	Kalua o Lapauwila	3.747839	5,595.5	18,357.9
	155 53 17.122	500.0	191 10 24.4	11 10 38.7	Waikukuu	3.814932	6,530.3	21,424.8
Lae o Heku, 1913	19 15 36.685	1,127.9	192 01 36.2	12 01 47.9	Kalua o Lapauwila	3.696253	4,968.8	16,301.8
	155 54 05.246	153.2	297 14 21.1	117 14 37.0	Kipahoehoe	3.198852	1,580.7	5,186.0
Wahe Pele	19 13 51.581	1,585.9	160 41 09.0	340 40 56.2	Lae o Heku	3.534584	3,424.4	11,234.9
	155 53 26.461	772.8	186 12 23.8	6 12 26.9	Kipahoehoe	3.401895	2,522.9	8,277.2
Napohakuloloa, 1913	19 14 03.624	111.4	183 02 40.2	3 02 41.9	Lae o Heku	3.457184	2,865.4	9,400.9
	155 54 10.457	305.4	286 04 22.0	106 04 36.5	Wahe Pele	3.126229	1,337.3	4,387.5
Milolii, 1884-1913	19 11 23.136	711.3	12 50 17.2	192 49 53.5	Hanakeaumoe	3.976903	9,482.1	31,109.2
	155 53 21.637	632.1	24 41 35.6	204 41 06.0	Ohepuupuu	3.799571	6,303.3	20,680.1
			41 52 45.2	221 52 11.5	Hanamalo 2	3.651890	4,486.3	14,718.8
			163 52 56.6	343 52 40.5	Napohakuloloa	3.710658	5,136.4	16,851.7
			178 13 53.8	358 13 52.2	Wahe Pele	3.659567	4,566.3	14,981.3
Kapukawaa, 1884-1913	19 11 26.465	813.7	13 36 30.3	193 36 21.1	Hanamalo 2	3.549286	3,542.3	11,621.7
	155 54 35.607	1,040.3	188 38 37.2	8 38 45.4	Napohakuloloa	3.689100	4,887.6	16,035.4
			272 42 27.2	92 42 51.5	Milolii	3.335150	2,163.5	7,098.1
Kalama Umi	19 29 25.776	792.6	20 19 02.8	200 18 36.6	Lae o Kanoni	3.820809	6,619.3	21,716.8
	155 53 52.157	1,521.0	86 42 25.5	266 41 21.8	Keawekaheka	3.746639	5,580.1	18,307.4
			178 12 35.0	358 12 34.7	Makolehale	2.962871	918.1	3,012.1
			345 48 46.0	165 49 08.0	Kalapa	3.893818	7,831.0	25,692.2
Napoopoo Light, 1913-1928	19 28 56.778	1,745.8	316 56 03.3	136 57 14.8	Kalapa	3.962384	9,170.3	30,086.2
	155 56 21.008	612.7	338 58 08.8	158 58 32.1	Lae o Kanoni	3.755510	5,695.2	18,685.0
			114 52 21.8	294 52 07.7	Keawekaheka	3.132207	1,355.8	4,448.2
Napoopoo Light, 1928	19 28 56.605	1,740.5	316 54 50.2	136 56 01.6	Kalapa	3.962183	9,166.1	30,072.4
	155 56 20.990	612.1	338 57 17.0	158 57 40.3	Lae o Kanoni	3.755117	5,690.1	18,668.3
			337 11 53.6	157 12 04.3	Palemano	3.386641	2,435.8	7,991.5
Captain Cook's Monument, 1928	19 29 04.199	129.1	319 25 28.3	139 26 36.0	Kalapa	3.960041	9,121.0	29,924.5
	155 56 09.727	283.7	342 48 47.4	162 49 07.0	Lae o Kanoni	3.763665	5,803.2	19,039.3
			346 03 24.3	166 03 31.3	Palemano	3.407249	2,554.2	8,379.9
Napoopoo church, 1913-1928	19 28 21.934	674.4	324 15 23.8	144 16 10.0	Kalapa	3.841052	6,935.1	22,752.9
	155 55 05.233	152.6	2 14 53.8	182 14 51.9	Lae o Kanoni	3.628167	4,247.8	13,936.3
			115 31 00.3	295 30 20.9	Keawekaheka	3.581112	3,811.6	12,505.2
Napoopoo school flagpole, 1913-1928	19 28 25.050	770.2	337 34 54.8	157 35 21.8	Kalapa	3.791896	6,192.9	20,317.9
	155 54 07.324	213.6	23 09 06.7	203 08 45.5	Lae o Kanoni	3.673981	4,720.4	15,486.8
			106 46 51.1	286 45 52.4	Keawekaheka	3.728896	5,356.7	17,574.4
Coffee, 1913-1928	19 28 16.735	514.6	330 15 36.5	150 16 12.2	Kalapa	3.799255	6,298.8	20,665.3
	155 54 33.471	976.2	14 58 57.9	194 58 45.4	Lae o Kanoni	3.626178	4,228.4	13,872.7
			112 25 39.0	292 24 49.0	Keawekaheka	3.674248	4,723.3	15,496.4
Tobacco, 1913-1928	19 25 08.872	272.8	204 38 04.6	24 38 06.2	Kalapa	2.528480	337.7	1,107.9
	155 52 51.193	1,493.5	112 32 27.9	292 31 41.4	Lae o Kanoni	3.644830	4,414.0	14,481.6
			135 53 06.1	315 51 42.1	Keawekaheka	4.023538	10,556.9	34,635.4

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, west coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Palemano, 1928	19 27 43.577	1,339.9	309 55 15.2	129 56 15.9	Kalapa	3.840919	6,933.0	22,746.0
	155 55 48.626	1,418.3	340 16 17.4	160 16 30.0	Lae o Kanoni	3.512722	3,256.3	10,683.4
Keokea, 1928	19 25 02.649	81.5	145 26 15.5	325 26 00.7	Lae o Kanoni	3.359182	2,286.6	7,502.0
	155 54 26.478	772.5	260 18 49.7	80 19 23.0	Kalapa	3.471702	2,962.8	9,720.5
Palianihi, 1884–1913	19 23 00.219	6.7	145 23 02.5	325 22 47.0	Lae Loa	3.380509	2,401.6	7,879.2
	155 53 59.923	1,748.6	354 16 32.0	174 16 42.0	Kalua o Lapauwila	3.945551	8,821.7	28,942.5
Pahoehoe, 1884	19 20 24.915	766.1	13 25 05.5	193 24 54.7	Kalua o Lapauwila	3.614352	4,114.8	13,500.0
	155 52 57.076	1,666.0	158 59 28.1	338 59 07.3	Palianihi	3.708871	5,115.3	16,782.4
			181 58 46.1	1 58 49.7	Kalapa	3.956327	9,043.3	29,669.6
			347 55 24.4	167 55 32.1	Waikukuu	3.512056	3,251.3	10,667.0
Haleili, 1884	19 20 15.300	470.4	21 26 57.6	201 26 44.8	Waikukuu	3.491115	3,098.2	10,164.7
	155 51 54.966	1,604.4	99 15 55.2	279 15 34.7	Pahoehoe	3.264071	1,836.8	6,026.2
			144 16 58.8	324 16 17.5	Palianihi	3.795601	6,246.0	20,492.1
Kaholo flag, 1884	19 20 24.243	745.4	8 39 46.5	188 39 39.6	Kalua o Lapauwila	3.605068	4,027.8	13,214.5
	155 53 09.003	262.8	162 47 09.5	342 46 52.6	Palianihi	3.700772	5,020.8	16,472.4
			266 36 10.2	86 36 14.1	Pahoehoe	2.542500	348.7	1,144.0
			341 57 55.7	161 58 07.3	Waikukuu	3.521382	3,321.9	10,898.6
Pukaana, church spire, 1884 [1]	19 23 07.35	226.0	336 36 54	156 37 18	Pahoehoe	3.735703	5,441	17,851
	155 54 11.07	323.0	340 08 20	160 08 40	Kaholo flag	3.726908	5,332	17,493
Hoikeana, church spire, 1884	19 18 57.003	1,752.7	161 00 16.3	341 00 05.9	Kaholo flag	3.452843	2,836.9	9,307.4
	155 52 37.367	1,090.9	167 59 08.0	347 59 01.5	Pahoehoe	3.441473	2,763.6	9,066.9
			207 12 25.7	27 12 39.7	Haleili	3.432471	2,706.9	8,880.9
S. Mowae	19 09 47.728	1,467.5	32 14 42.3	212 13 57.6	Hanakeaumoe	3.872858	7,462.0	24,481.6
	155 52 17.509	511.6	58 12 53.1	238 12 02.5	Ohepuupuu	3.724489	5,302.6	17,396.9
			75 57 27.5	255 57 04.5	Puu Nahaha	3.324646	2,111.8	6,928.5
			85 13 42.7	265 12 48.0	Hanamalo 2	3.688924	4,885.7	16,029.2
Puu Nahaha, 1884–1914	19 09 31.059	955.0	18 25 34.0	198 25 12.3	Hanakeaumoe	3.786212	6,112.4	20,053.8
	155 53 27.620	807.1	47 08 41.1	227 08 13.5	Ohepuupuu	3.525513	3,353.6	11,002.6
			92 08 46.3	272 08 14.6	Hanamalo 2	3.450568	2,822.1	9,258.8
			210 14 03.0	30 15 10.5	Puu Ahinui	4.075720	11,904.7	39,057.3
Barn, 1914	19 09 57.046	1,754.0	32 09 34.8	212 08 48.2	Hanakeaumoe	3.891728	7,793.4	25,568.8
	155 52 11.797	344.7	56 37 19.8	236 36 27.3	Ohepuupuu	3.747998	5,597.6	18,364.8
			82 09 57.0	262 09 00.4	Hanamalo 2	3.706128	5,083.1	16,676.8
Kalihi [1]	19 08 18.81	578.4	61 54 52	241 53 37	Hanakeaumoe	3.880646	7,597	24,924
	155 50 44.41	1,297.8	89 32 13	269 30 52	Ohepuupuu	3.859032	7,228	23,714
Ahulea [1]	19 05 20.69	636.1	182 24 56	2 24 57	Hanakeaumoe	3.278904	1,901	6,237
	155 54 36.46	1,065.8	318 33 27	138 34 31	Na Puu a Pele	3.937023	8,650	28,379
La Ula, 1890	19 14 25.049	770.2	44 02 38.6	223 59 57.4	Hanakeaumoe	4.314613	20,635.4	67,701.3
	155 46 22.915	669.3	262 28 35.5	82 28 45.2	Puu Hoomaha	2.939583	870.1	2,854.7
			310 41 34.6	130 42 08.4	Puu o Keokeo	3.596890	3,952.7	12,968.1
Namanuikehau, 1890	19 12 44.830	1,378.4	179 05 57.0	359 05 56.4	La Ula	3.488806	3,081.8	10,110.9
	155 46 21.256	620.9	260 17 42.1	80 18 15.3	Puu o Keokeo	3.475862	2,991.3	9,814.0
Ohialele	19 14 07.131	219.3	217 11 46.6	37 11 51.3	La Ula	2.839678	691.6	2,269.0
	155 46 37.231	1,087.4	300 40 47.8	120 41 26.3	Puu o Keokeo	3.598896	3,971.0	13,028.2
			349 33 04.6	169 33 09.9	Namanuikehau	3.410467	2,573.2	8,442.2
Puu Ohohia	19 11 11.139	342.5	59 48 02.9	239 45 11.8	Hanakeaumoe	4.246348	17,633.9	57,853.9
	155 45 52.306	1,528.1	163 38 25.2	343 38 15.7	Namanuikehau	3.477454	3,002.3	9,850.0
			171 28 21.7	351 28 11.6	La Ula	3.780232	6,028.8	19,779.5
			211 51 03.8	31 51 27.5	Puu o Keokeo	3.600417	3,984.9	13,073.8
Hapaimanu	19 10 37.622	1,156.8	63 43 03.6	243 40 05.5	Hanakeaumoe	4.248050	17,703.1	58,080.9
	155 45 30.671	896.1	75 14 19.2	255 11 15.1	Ohepuupuu	4.229335	16,956.5	55,631.4
			198 25 28.1	18 25 44.6	Puu o Keokeo	3.667821	4,653.9	15,268.7
Ihuanu	19 09 56.705	1,743.5	323 53 05.7	143 54 10.0	Akihi	3.988257	9,733.2	31,933.0
	155 44 08.102	236.7	19 54 28.2	199 53 17.6	Puu Ki	4.268071	18,538.3	60,821.1
			40 12 09.6	220 09 48.0	Na Puu a Pele	4.292189	19,597.0	64,294.5
Halepohaha	19 08 44.994	1,383.4	22 03 11.4	202 02 02.5	Puu Ki	4.215574	16,427.6	53,896.2
	155 44 13.041	381.1	44 24 58.5	224 22 38.6	Na Puu a Pele	4.252078	17,868.1	58,622.3
			313 53 29.6	133 54 35.5	Akihi	3.911739	8,160.9	26,774.6
Puu Ki, 1914	19 00 29.758	914.9	111 13 10.9	291 12 00.2	Na Puu a Pele	3.832447	6,799.0	22,306.4
	155 47 43.937	1,285.0	231 31 45.3	51 33 59.8	Akihi	4.187123	15,385.9	50,478.6
			300 39 21.2	120 40 51.4	Puu Hou	3.974242	9,424.1	30,918.9
			310 56 16.2	130 58 26.2	Ka lae	4.190272	15,497.9	50,846.0
Puu Hou, 1887–1914	18 57 53.415	1,642.3	195 20 48.0	15 21 32.0	Akihi	4.173385	14,906.8	48,906.7
	155 43 06.812	199.3	326 05 03.1	146 05 43.0	Ka lae	3.809446	6,448.3	21,155.8
Umi's Ahu, 1887–1914	18 58 19.961	613.7	75 03 10.5	255 02 36.5	Puu Hou	3.500155	3,163.4	10,378.6
	155 41 22.336	653.4	183 45 38.5	3 45 48.4	Akihi	4.133155	13,588.0	44,580.0
			325 54 23.8	145 54 57.0	Palahemo	3.727740	5,342.4	17,527.5
			354 59 22.3	174 59 28.3	Ka lae	3.791787	6,191.4	20,313.0

[1] No check no this position.

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, west coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Ka lae Light, 1914	18 54 56.270	1,730.1	175 12 02.9	355 11 57.1	Umi's Ahu	3.798284	6,284.7	20,619.1
	155 41 04.361	127.6	188 50 38.7	8 50 38.9	Ka lae	1.982578	96.1	315.3
Supplementary points, southeast coast			233 19 35.9	53 20 03.3	Palahemo	3.488274	3,078.0	10,098.4
Mahana, 1898-1914	18 56 47.791	1,469.4	34 42 30.5	214 42 18.3	Palahemo	3.286649	1,934.9	6,348.1
	155 39 02.335	68.3	168 57 01.2	348 56 25.5	Akihi	4.222780	16,702.4	54,797.8
Kamilo, 1898-1914	18 58 24.869	764.6	58 31 10.0	238 30 15.9	Mahana	3.756975	5,714.5	18,748.3
	155 36 15.767	461.2	148 57 32.7	328 56 02.7	Akihi	4.194533	15,650.7	51,347.3
			205 05 18.6	25 05 56.0	Kipaepae	3.898928	7,923.7	25,996.3
Haao	19 05 21.301	654.9	95 24 48.5	275 23 37.0	Akihi	3.807156	6,414.4	21,044.6
	155 37 13.391	391.5	284 58 51.3	104 59 11.3	Kapuna 2	3.269326	1,859.2	6,099.7
			318 07 24.7	138 08 21.0	Kipaepae	3.878378	7,557.5	24,794.9
			352 29 58.9	172 30 17.6	Kamilo	4.111064	12,914.1	42,369.0
Olokuana	19 04 13.430	412.9	158 02 45.9	338 01 32.5	Puu o Keokeo	4.242986	17,497.9	57,407.7
	155 40 56.359	1,647.7	182 48 19.6	2 48 21.1	Akihi	3.430398	2,694.0	8,838.6
			252 14 16.9	72 15 29.9	Haao	3.835317	6,844.1	22,454.4
Puu Enuhe, 1894-1914	19 10 46.67	1,435.0	12 32 29	192 31 51	Kipaepae	4.204488	16,014	52,539
	155 32 21.95	641.3	32 40 30	212 39 15	Kapuna 2	4.095319	12,454	40,859
			88 27 36	268 26 44	Kaiholena	3.665080	4,625	15,174
			202 17 33	22 18 19	Kahaha	4.029779	10,710	35,138
			231 31 58	51 35 15	Kamakaia	4.346171	22,191	72,805
			295 08 13	115 09 37	Kamehame	3.914338	8,210	26,936
Alili, 1894	19 13 14.28	439.2	27 29 27	207 29 00	Puu Enuhe	3.708955	5,116	16,785
	155 31 01.12	32.7	327 43 17	147 44 14	Kamehame	3.977458	9,494	31,148
Pili, 1894	19 09 03.114	95.7	71 17 34.3	251 17 24.2	Kamehame	2.978161	951.0	3,120.1
	155 27 36.790	1,075.1	110 55 33.0	290 53 59.4	Puu Enuhe	3.950358	8,919.9	29,264.7
			142 18 19.2	322 17 12.1	Alili	3.989490	9,760.9	32,023.9
Kauhao, 1894	19 16 11.517	354.1	21 03 46.0	201 03 22.3	Alili	3.766375	5,839.5	19,158.4
	155 29 49.270	1,438.7	24 04 02.8	204 03 12.5	Puu Enuhe	4.038961	10,938.6	35,887.7
			78 40 04.2	258 40 00.2	Kahaha	2.606135	403.8	1,324.8
			343 37 16.9	163 38 00.4	Pili	4.137633	13,728.8	45,041.9
			347 34 09.6	167 34 43.0	Kamehame	4.139892	13,800.4	45,276.8
Puu Ula, 1894	19 12 25.529	784.9	24 17 31.9	204 17 00.3	Pili	3.834290	6,827.9	22,401.2
	155 26 00.665	19.4	29 36 27.4	209 35 45.7	Kamehame	3.875563	7,508.7	24,634.8
			74 45 13.5	254 43 08.1	Puu Enuhe	4.062444	11,546.3	37,881.5
			78 40 19.1	258 37 21.5	Kaiholena	4.206183	16,076.2	52,743.3
			99 42 23.2	279 40 44.3	Alili	3.949563	8,903.5	29,210.9
			134 10 28.7	314 09 09.4	Kahaha	3.993852	9,859.4	32,347.0
			136 09 11.5	316 07 56.2	Kauhao	3.983914	9,636.4	31,615.4
Honuapo, 1914	19 05 18.042	554.7	186 12 32.3	6 12 44.6	Puu Enuhe	4.007054	10,163.7	33,345.4
	155 32 59.577	1,741.6	232 12 12.5	52 13 48.1	Kamehame	4.033310	10,797.2	35,423.8
Church, Honuapo, 1914	19 05 25.49	783.7	188 58 27	8 58 44	Puu Enuhe	3.999891	9,997	32,798
	155 33 15.33	448.1	234 36 32	54 38 13	Kamehame	4.042590	11,030	36,188
			296 26 57	116 27 02	Honuapo	2.711204	514	1,686
Puu Ulaula, 1914	19 12 25.498	784.0	29 36 31.1	209 35 49.4	Kamehame	3.875504	7,507.6	24,631.2
	155 26 00.677	19.8	74 45 28.4	254 43 23.0	Puu Enuhe	4.062422	11,545.7	37,879.5
Stack, Honuapo, 1914	19 05 38.45	1,182.2	187 44 37	7 44 52	Puu Enuhe	3.980639	9,564	31,378
	155 33 06.06	177.1	235 31 06	55 32 44	Kamehame	4.024491	10,580	34,711
			343 11 28	163 11 30	Honuapo	2.816491	655	2,149
Church, Punaluu, 1914	19 08 12.989	399.4	146 48 11.9	326 47 37.1	Puu Enuhe	3.751814	5,647.0	18,526.9
	155 30 36.130	1,055.9	226 01 03.8	46 02 34.2	Puu Ulaula	4.048542	11,182.6	36,688.2
			254 05 43.7	74 06 32.4	Kamehame	3.654442	4,512.8	14,805.7
Hill, 1914	19 08 45.201	1,389.8	146 59 05.9	326 58 38.6	Puu Enuhe	3.648752	4,454.0	14,612.8
	155 30 58.890	1,720.9	232 07 30.3	52 09 08.3	Puu Ulaula	4.042813	11,036.0	36,207.3
			267 10 53.8	87 11 50.0	Kamehame	3.699939	5,011.2	16,440.9
Stack, Pahala, 1914	19 12 01.440	44.3	261 18 37.3	81 19 31.9	Puu Ulaula	3.690218	4,900.2	16,076.7
	155 28 46.500	1,358.4	348 53 30.9	168 53 43.7	Kamehame	3.770738	5,898.5	19,352.0
			69 56 41.9	249 55 31.1	Puu Enuhe	3.826148	6,701.1	21,985.2
Kauhao, 1914	19 16 11.493	353.4	316 08 06.9	136 09 22.2	Puu Ulaula	3.983904	9,636.2	31,614.8
	155 29 49.265	1,438.6	347 34 09.1	167 34 42.5	Kamehame	4.139867	13,799.6	45,274.2
			24 04 11.1	204 03 20.8	Puu Enuhe	4.038936	10,938.0	35,885.8
Puu Kapukapu, 1914	19 16 44.440	1,366.4	66 08 13.5	246 04 50.6	Puu Ulaula	4.293551	19,658.5	64,496.3
	155 15 45.242	1,321.0	87 41 05.8	267 36 27.2	Kauhao	4.392103	24,666.2	80,925.7
Keaiwa cairn, 1914 [1]	19 11 30.07	924.6	84 43 26	264 40 44	Puu Enuhe	4.159914	14,452	47,415
	155 24 09.42	275.2	117 40 27	297 39 50	Puu Ulaula	3.564666	3,670	12,041
Kamakaia S., 1914 [1]	19 18 15.17	466.4	30 08 04	210 06 53	Puu Ulaula	4.094486	12,430	40,781
	155 22 27.05	789.7	73 36 33	253 34 07	Kauhao	4.129045	13,460	44,160

[1] No check on this position.

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, southeast coast—Con.	° ′ ″		° ′ ″	° ′ ″				
Uwekahuna, 1896-1920	19 25 27.790	854.5	52 17 22.3	232 13 10.4	Kahaha	4.448243	28,070.0	92,093.0
	155 17 22.352	652.1	123 00 49.0	302 57 16.6	Puu Ulaula	4.345551	22,159.0	72,700.0
			173 22 10.9	353 21 56.3	Kulani	4.044283	11,073.5	36,330.3
			302 41 46.4	122 43 23.7	Puu Huluhulu	4.006757	10,156.8	33,322.8
Kamakaia, 1897	19 18 15.354	472.1	29 57 08.6	209 55 16.4	Kamehame	4.299856	19,946.0	65,439.5
	155 22 26.825	783.2	57 42 48.6	237 38 40.4	Kaiholena	4.415580	26,036.3	85,420.8
			73 44 46.9	253 42 16.3	Kahaha	4.142077	13,870.0	45,505.2
			159 03 39.4	339 01 48.8	Puu Ulaula	4.433861	27,155.7	89,093.3
			213 44 24.8	33 46 05.7	Uwekahuna	4.203905	15,992.1	52,467.4
			245 51 01.7	65 54 19.5	Puu Huluhulu	4.281137	19,104.6	62,679.0
Ohale, 1897-1920	19 21 14.977	460.5	61 02 12.3	241 00 19.3	Kamakaia	4.056885	11,399.5	37,399.9
	155 16 45.195	1,319.1	135 15 55.3	315 12 10.9	Puu Ulaula	4.446219	27,939.5	91,664.8
			172 03 40.4	352 03 28.1	Uwekahuna	3.894793	7,848.6	25,749.9
			252 58 03.2	72 59 28.0	Puu Huluhulu	3.892397	7,805.4	25,608.2
Supplementary points, Kilauea Volcano crater								
Ahua Kamokukolau, 1920	19 22 56.874	1,748.7	19 07 04.2	199 06 51.8	Ohale	3.520603	3,315.9	10,878.9
	155 16 07.985	233.0	154 56 32.8	334 56 08.1	Uwekahuna	3.709486	5,122.5	16,806.1
Koae, 1920	19 21 31.433	966.5	207 15 01.2	27 15 43.8	Uwekahuna	3.912492	8,175.1	26,821.1
	155 19 30.661	894.8	246 02 29.8	66 03 37.0	Ahua Kamokukolau	3.811030	6,471.9	21,233.2
			275 58 25.2	95 59 20.0	Ohale	3.686247	4,855.6	15,930.4
Observatory, 1920	19 25 55.838	1,716.9	8 06 58.8	188 06 49.8	Ahua Kamokukolau	3.744947	5,558.4	18,236.2
	155 15 41.092	1,198.7	73 43 47.2	253 43 13.5	Uwekahuna	3.488175	3,077.3	10,096.1
Nose, 1920	19 23 13.215	406.3	34 35 20.3	214 34 55.8	Koae	3.579931	3,801.3	12,471.4
	155 18 16.722	487.9	277 36 43.2	97 37 25.9	Ahua Kamokukolau	3.578643	3,790.0	12,434.4
			323 41 27.2	143 41 57.5	Ohale	3.654294	4,511.2	14,800.5
Sand Hill, 1920	19 23 46.460	1,428.5	46 55 24.1	226 55 11.7	Nose	3.175116	1,496.6	4,910.1
	155 17 39.258	1,145.5	188 59 40.7	8 59 46.3	Uwekahuna	3.498925	3,154.5	10,349.4
			299 47 07.0	119 47 37.3	Ahua Kamokukolau	3.486970	3,068.8	10,068.2
Aa, 1920	19 23 00.342	10.5	261 25 12.3	81 25 42.1	Nose	3.423964	2,654.4	8,708.6
	155 19 46.670	1,361.9	350 18 06.4	170 18 11.7	Koae	3.443003	2,773.3	9,098.7
Cone Peak, 1920	19 23 41.437	1,274.1	58 58 15.5	238 57 51.7	Aa	3.389340	2,451.0	8,041.3
	155 18 34.695	1,012.4	264 32 31.7	84 32 50.1	Sand Hill	3.210837	1,624.9	5,331.0
			328 51 01.4	148 51 07.4	Nose	3.005993	1,013.9	3,326.4
Cracks, 1920	19 24 07.824	240.6	54 49 46.2	234 49 33.1	Cone Peak	3.148764	1,408.5	4,621.1
	155 17 55.235	1,611.6	324 38 09.8	144 38 15.1	Sand Hill	2.906063	805.5	2,642.7
Pali, 1920	19 24 18.657	573.7	20 33 58.7	200 33 53.8	Cone Peak	3.087193	1,222.3	4,010.2
	155 18 19.979	582.9	294 45 56.4	114 46 04.6	Cracks	2.900411	795.1	2,608.6
			309 47 57.0	129 48 10.5	Sand Hill	3.189355	1,546.5	5,073.8
South Rim, 1920	19 24 48.883	1,503.1	1 48 15.4	181 48 14.7	Sand Hill	3.283368	1,920.3	6,300.2
	155 17 37.186	1,084.9	22 38 37.3	202 38 31.3	Cracks	3.136052	1,367.9	4,487.9
			53 20 20.3	233 20 06.1	Pali	3.192140	1,556.5	5,106.6
			199 53 07.9	19 53 12.8	Uwekahuna	3.104551	1,272.2	4,173.9
Spit, 1920	19 24 06.447	198.2	60 12 56.7	240 12 44.5	Sand Hill	3.092396	1,237.1	4,058.7
	155 17 02.462	71.8	91 34 40.4	271 34 22.9	Cracks	3.187629	1,540.4	5,053.8
			142 10 25.7	322 10 14.2	South Rim	3.217998	1,652.0	5,419.9
North Rim, 1920	19 25 06.212	191.0	29 51 50.5	209 51 47.0	South Rim	2.788453	614.4	2,015.7
	155 17 26.700	779.0	46 45 15.5	226 44 57.8	Pali	3.329214	2,134.1	7,001.6
			190 49 10.5	10 49 11.9	Uwekahuna	2.829633	675.5	2,216.2
			338 57 03.0	158 57 11.0	Spit	3.294246	1,969.0	6,460.0
Beggar, 1920	19 24 38.152	1,173.1	22 25 21.8	202 25 17.2	Spit	3.023078	1,054.6	3,460.0
	155 16 48.675	1,420.1	127 52 28.3	307 52 15.7	North Rim	3.147793	1,405.4	4,610.9
			147 13 48.7	327 13 37.5	Uwekahuna	3.258923	1,815.2	5,955.4
			219 31 59.1	39 32 21.6	Observatory	3.490981	3,097.3	10,161.7
Supplementary points, east coast								
Heiheiahulu, 1896	19 25 39.024	1,199.9	75 33 53.6	255 29 36.2	Puu Huluhulu	4.368220	23,346.4	76,595.6
	154 59 34.680	1,011.7	108 14 41.5	288 08 30.9	Kulani	4.533040	34,122.4	111,949.9
			123 50 40.8	303 50 39.8	W. Heiheiahulu	2.014341	103.4	339.2
Heiheiahulu, 1914	19 25 39.019	1,199.8	123 54 13.3	303 54 12.2	W. Heiheiahulu	2.014629	103.4	339.2
	154 59 34.680	1,011.7	247 16 39.9	67 18 05.3	Kaliu	3.909064	8,110.8	26,610.2
Hanae, 1891	19 22 32.578	1,001.7	144 12 40.1	324 11 53.0	Heiheiahulu (1896)	3.849281	7,067.7	23,187.9
	154 57 12.999	379.3	200 41 44.9	20 42 23.2	Kaliu	3.976614	9,475.8	31,088.5
Hakuma, 1891	19 21 01.317	40.5	172 37 19.4	352 37 06.8	Heiheiahulu (1896)	3.935009	8,610.1	28,248.3
	154 58 56.780	1,657.2	208 38 50.3	28 40 03.0	Kaliu	4.123824	13,299.2	43,632.5
			227 10 50.9	47 11 25.3	Hanae	3.615829	4,128.8	13,545.9
Hakuma, 1914	19 20 57.313	1,762.2	172 22 56.5	352 22 43.3	Heiheiahulu (1914)	3.941458	8,738.9	28,670.9
	154 58 54.970	1,604.4	208 11 47.1	28 12 59.1	Kaliu	4.126530	13,382.3	43,905.1

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, east coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Kupapau, 1914	19 19 56.195	1,727.8	194 55 40.9	14 56 12.9	Heiheiahulu (1914)	4.037800	10,909.4	35,791.9
	155 01 11.013	321.5	244 40 04.6	64 40 49.7	Hakuma	3.642769	4,393.1	14,413.0
Pulama, 1914	19 21 21.536	662.2	276 36 36.9	96 37 49.8	Hakuma	3.810247	6,460.2	21,194.8
	155 02 34.840	1,016.8	316 59 55.4	137 00 23.2	Kupapau	3.554819	3,587.7	11,770.6
Laeapuki, 1914	19 18 10.942	336.4	219 53 07.0	39 54 02.6	Pulama	3.882983	7,638.1	25,059.3
	155 05 22.661	661.6	246 12 47.6	66 14 10.9	Kupapau	3.904576	8,027.4	26,336.6
Panau, 1914	19 19 22.610	695.2	242 04 38.2	62 05 56.5	Pulama	3.892734	7,811.5	25,628.2
	155 06 31.331	914.6	263 40 58.8	83 42 44.8	Kupapau	3.973454	9,407.1	30,863.1
			317 42 11.2	137 42 33.8	Laeapuki	3.474073	2,979.0	9,773.6
Olaa, 1896	19 36 10.364	318.7	71 06 51.6	251 01 58.2	Kulani	4.431408	27,002.8	88,591.7
	155 03 29.900	871.3	122 10 03.2	302 03 47.9	Aahuwela	4.583365	38,314.7	125,704.1
			167 52 43.3	347 51 38.4	Alala	4.426644	26,708.2	87,625.2
			340 31 51.9	160 33 10.5	Heiheiahulu (1896)	4.313619	20,588.2	67,546.5
			340 42 13.4	160 43 31.0	W. Heiheiahulu	4.311871	20,505.5	67,275.1
Kaloli, 1896–1914	19 37 30.638	942.1	12 11 58.6	192 11 04.6	W. Heiheiahulu	4.348824	22,326.7	73,250.2
	154 56 55.895	1,628.6	73 11 26.7	253 04 21.2	Kulani	4.587594	38,689.6	126,934.1
			77 53 06.6	257 50 54.4	Olaa	4.069791	11,743.3	38,527.8
			112 14 36.8	292 06 08.5	Aahuwela	4.676067	47,431.5	155,614.8
			144 10 33.7	324 07 15.8	Alala	4.464938	29,170.1	95,702.2
Anapuka, 1896	19 43 33.413	1,027.4	25 48 53.0	205 47 36.9	Olaa	4.179893	15,131.9	49,645.2
	154 59 43.782	1,274.9	86 30 01.5	266 27 55.6	Halai	4.037642	10,905.4	35,778.8
			99 52 16.0	279 44 43.2	Aahuwela	4.597708	39,601.2	129,924.9
			135 42 28.8	315 40 07.2	Alala	4.241879	17,453.4	57,261.7
			336 19 11.0	156 20 07.5	Kaloli	4.085635	12,179.7	39,959.6
Keokea, 1878	19 44 30.989	952.9	48 23 24.8	228 18 11.6	Kulani	4.560378	36,339.4	119,223.5
	155 02 34.290	998.4	62 37 11.2	242 28 38.5	Puu Ulaula	4.699681	50,081.9	164,310.4
			67 36 42.2	247 35 33.5	Halai	3.806334	6,402.3	21,004.9
			98 22 01.4	278 15 25.7	Aahuwela	4.536786	34,418.0	112,919.7
			146 00 56.7	325 59 32.5	Alala	4.111530	12,928.0	42,414.6
Mokuola, 1878–1912	19 44 00.837	25.7	62 41 42.3	242 41 08.3	Halai	3.518026	3,296.3	10,814.6
	155 04 16.992	494.8	160 00 15.1	339 59 25.7	Alala	4.093177	12,393.0	40,659.4
			252 46 09.1	72 46 43.8	Keokea	3.495653	3,130.8	10,271.6
Haaheo, 1878–1912	19 44 50.166	1,542.6	12 11 50.4	192 11 42.8	Halai	3.491236	3,099.1	10,167.6
	155 05 35.091	1,021.7	145 15 49.0	325 14 29.3	Kauku	4.079548	12,010.1	39,403.1
			276 22 58.3	96 23 59.4	Keokea	3.724033	5,297.0	17,378.6
			303 42 04.4	123 42 20.8	Mokuola	3.436706	2,733.4	8,967.8
Hilo middle base	19 43 30.731	944.9	74 56 08.1	254 55 42.9	Halai	3.353439	2,256.5	7,403.2
	155 04 42.749	1,244.8	219 00 44.1	39 00 52.9	Mokuola	3.076061	1,191.4	3,908.8
Hilo west base	19 43 39.866	1,225.8	53 37 00.5	233 36 46.9	Halai	3.165041	1,462.3	4,797.6
	155 05 17.148	499.3	249 47 08.1	69 47 28.5	Mokuola	3.271044	1,866.6	6,124.0
			285 39 38.6	105 39 50.2	Hilo middle base	3.017156	1,040.3	3,413.1
Kapoho, 1896–1914	19 30 02.439	75.0	62 57 41.2	242 54 40.1	Heiheiahulu (1896)	4.250461	17,801.7	58,404.4
	154 50 31.160	908.6	63 15 05.0	243 12 02.9	W. Heiheiahulu	4.251690	17,852.1	58,569.8
			93 06 24.8	272 57 12.0	Kulani	4.684168	48,324.6	158,545.0
			116 31 32.6	296 27 12.0	Olaa	4.404207	25,363.4	83,213.1
			131 59 46.0	311 54 35.2	Halai	4.559901	36,299.5	119,092.6
			140 52 51.7	320 50 42.8	Kaloli	4.249627	17,767.5	58,292.2
Kaliu, 1891–1914	19 27 20.860	641.4	67 18 08.2	247 16 42.7	Heiheiahulu (1896)	3.909061	8,110.8	26,610.2
	154 55 18.187	530.5	67 54 26.4	247 52 59.9	W. Heiheiahulu	3.912124	8,168.2	26,798.5
			138 39 31.6	318 36 47.1	Olaa	4.336319	21,693.0	71,171.1
			171 21 58.5	351 21 25.6	Kaloli	4.277942	18,964.5	62,219.4
			239 17 48.9	59 19 24.5	Kapoho	3.988296	9,734.1	31,936.0
Honuaula, 1901	19 29 00.670	20.6	46 05 54.1	226 05 17.8	Kaliu	3.645951	4,425.4	14,519.0
	154 53 28.867	841.8	59 51 23.7	239 49 21.8	Heiheiahulu (1896)	4.091335	12,340.6	40,487.5
			60 17 10.9	240 15 08.0	W. Heiheiahulu	4.092939	12,386.2	40,637.1
			127 02 47.9	306 59 26.8	Olaa	4.341324	21,944.4	71,995.9
			158 57 34.7	338 56 25.3	Kaloli	4.225353	16,801.7	55,123.6
			249 51 50.4	69 52 49.7	Kapoho	3.741878	5,519.2	18,107.6
Honuaula, 1914	19 29 02.14	65.8	158 18 08	338 16 57	Kaloli	4.226055	16,829	55,213
	154 53 22.36	652.1	249 37 00	69 37 57	Kapoho	3.726372	5,326	17,474
			47 20 06	227 19 28	Kaliu	3.662228	4,594	15,072
Sand hill, 1901	19 33 24.812	762.9	330 02 19.3	150 03 00.4	Kapoho	3.856245	7,182.0	23,562.9
	154 52 34.166	995.9	11 06 44.4	191 06 26.1	Honuaula (1901)	3.917870	8,276.9	27,155.1
			134 45 06.4	314 43 38.5	Kaloli	4.030943	10,738.5	35,231.2
Sand hill, 1914	19 33 24.77	761.6	330 02 25	150 03 06	Kapoho	3.856140	7,180	23,556
	154 52 34.13	994.9	23 09 19	203 08 25	Kaliu	4.085256	12,169	39,924
			134 45 11	314 43 43	Kaloli	4.031013	10,740	35,236
Church, Kalapana, 1914[1]	19 21 16.21	498.4	22 22 00	202 21 57	Hakuma	2.798072	628	2,060
	154 58 46.78	1,365.3	91 25 16	271 24 00	Pulama	3.823349	6,658	21,844

[1] No check on this position.

58955°—30——9

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, east coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Kamaili, 1891	19 24 40.954	1,259.3	49 58 16.7	229 57 23.1	Hanae	3.787899	6,136.2	20,131.8
	154 54 31.988	933.3	164 40 25.0	344 40 09.6	Kaliu	3.707409	5,098.1	16,726.0
Pohoiki, 1914	19 28 44.802	1,377.6	75 34 46.1	255 32 51.6	Kaliu	4.015059	10,352.8	33,965.8
	154 49 34.428	1,004.1	145 16 46.8	325 16 27.8	Kapoho	3.463056	2,904.4	9,528.9
Kumukahi, 1914	19 31 11.325	348.2	16 13 17.4	196 13 02.4	Pohoiki	3.671359	4,692.0	15,393.7
	154 48 49.484	1,442.8	54 27 38.3	234 27 04.3	Kapoho	3.561523	3,643.5	11,953.7
Stack, Pahoa, 1914	19 29 47.181	1,450.7	179 41 08.9	359 41 07.9	Kaloli	4.153833	14,250.6	46,753.8
	154 56 53.213	1,551.7	267 34 14.9	87 36 22.4	Kapoho	4.047295	11,150.5	36,582.9
			328 21 47.6	148 22 19.4	Kaliu	3.722969	5,284.1	17,336.3
Stack, Olaa, 1914	19 38 03.522	108.3	276 27 50.1	96 29 32.7	Kaloli	3.952404	8,962.0	29,402.8
	155 02 01.519	44.3	306 17 17.9	126 21 09.1	Kapoho	4.397495	24,974.4	81,936.8
			329 13 41.2	149 15 56.3	Kaliu	4.361614	22,994.0	75,439.5
Leleiwi, 1912	19 44 22.635	696.0	77 23 16.3	257 21 23.4	Halai	3.999290	9,983.7	32,754.9
	155 00 23.004	669.8	134 49 24.0	314 47 15.5	Alala	4.192406	15,574.2	51,096.4
Ban, 1900	19 44 08.818	271.1	70 23 34.1	250 22 37.9	Halai	3.711343	5,144.5	16,878.2
	155 03 11.155	324.8	89 17 07.1	269 16 44.4	Reef	3.291974	1,958.7	6,426.2
			151 42 25.8	331 41 14.1	Alala	4.113368	12,982.8	42,594.4
Grove, 1900	19 43 50.155	1,542.2	73 02 34.7	253 01 49.7	Halai	3.608290	4,057.8	13,313.0
	155 03 44.287	1,289.6	117 33 19.2	297 35 07.7	Reef	3.049623	1,121.0	3,677.8
			156 34 10.0	336 33 09.6	Alala	4.115637	13,050.8	42,817.5
Reef, 1900	19 44 07.020	215.9	59 28 45.9	239 28 12.4	Halai	3.525283	3,351.8	10,996.7
	155 04 18.420	536.4	120 43 36.1	300 43 10.2	Haaheo	3.414444	2,596.8	8,519.7
			159 52 56.1	339 52 07.2	Alala	4.086366	12,200.2	40,026.8
			256 19 55.1	76 20 30.3	Keokea	3.494185	3,120.2	10,236.9
Wharf, 1900 [1]	19 43 51.21	1,574.7	66 21 33	246 21 00	Halai	3.481815	3,033	9,951
	155 04 22.18	645.8	192 40 26	12 40 27	Reef	2.697491	498	1,634
Dock, 1900 [1]	19 43 42.88	1,318.5	70 07 22	250 06 51	Halai	3.450704	2,823	9,262
	155 04 26.41	769.0	197 23 51	17 23 54	Reef	2.890999	778	2,552
White, 1900 [1]	19 43 33.98	1,044.9	75 26 43	255 26 12	Halai	3.436375	2,731	8,960
	155 04 26.79	780.1	193 29 29	13 29 32	Reef	3.018990	1,045	3,428
Hack, 1900	19 43 35.320	1,086.1	68 06 01.9	248 05 40.9	Halai	3.290238	1,950.9	6,400.6
	155 04 55.415	1,613.6	153 20 47.7	333 20 34.3	Haaheo	3.410791	2,575.1	8,448.5
			227 51 29.2	47 51 41.7	Reef	3.162190	1,452.8	4,766.4
Stand, 1900 [1]	19 43 31.48	968.0	151 16 52	331 16 36	Haaheo	3.440750	2,759	9,052
	155 04 49.56	1,443.2	219 40 41	39 40 51	Reef	3.152279	1,420	4,659
Cupola, 1900	19 43 32.861	1,010.4	67 31 24.6	247 31 06.2	Halai	3.231874	1,705.6	5,595.8
	155 05 03.454	100.6	158 49 08.5	338 48 57.8	Haaheo	3.406416	2,549.3	8,363.8
			231 18 14.6	51 18 29.8	Reef	3.225337	1,680.1	5,512.1
Foreign church	19 43 35.446	1,089.9	149 48 43.7	329 47 21.3	Kauku	4.148491	14,076.4	46,182.3
	155 05 27.024	786.9	174 09 48.9	354 09 46.2	Haaheo	3.363521	2,309.5	7,577.1
			249 02 49.5	69 03 13.0	Mokuola	3.339166	2,183.6	7,164.0
			251 14 09.8	71 15 08.2	Keokea	3.725230	5,311.7	17,426.8
Tower, square, church, 1900	19 43 32.638	1,003.6	50 49 30.5	230 49 21.3	Halai	3.009217	1,021.5	3,351.4
	155 05 30.383	884.7	243 13 28.4	63 13 52.7	Reef	3.370519	2,347.0	7,700.1
			250 42 18.8	70 43 18.3	Keokea	3.734982	5,432.3	17,822.5
Catholic Church, northwest tower, 1900	19 43 43.756	1,345.5	172 53 46.3	352 53 43.3	Haaheo	3.313409	2,057.8	6,751.3
	155 05 26.350	767.3	250 06 51.5	70 07 14.4	Reef	3.322912	2,103.3	6,900.6
			253 49 30.4	73 50 28.5	Keokea	3.717353	5,216.2	17,113.5
Bill, 1900	19 44 08.925	274.4	25 08 15.3	205 08 05.7	Halai	3.288970	1,945.2	6,381.9
	155 05 29.200	850.2	262 24 11.9	82 25 11.0	Keokea	3.710776	5,137.8	16,856.3
			271 37 26.9	91 37 50.8	Reef	3.314235	2,061.7	6,764.1
Mill (tallest of 3 stacks), 1900	19 44 28.130	865.0	16 08 05.3	196 07 57.4	Halai	3.388807	2,448.0	8,031.5
	155 05 34.215	996.2	177 50 39.6	357 50 39.3	Haaheo	2.831279	678.1	2,224.7
			286 23 10.5	106 23 36.1	Reef	3.361798	2,300.4	7,547.2
Stack, Wainaku, 1912	19 44 28.475	875.6	16 19 53.0	196 19 45.0	Halai	3.391188	2,461.4	8,075.4
	155 05 33.807	984.4	169 29 28.3	349 29 05.0	Alala	4.040599	10,979.9	36,023.2
			271 07 18.9	91 09 04.0	Leleiwi	3.956709	9,051.3	29,695.8
Haaheo church	19 44 52.630	1,618.3	7 31 59.9	187 31 55.1	Halai	3.495812	3,131.9	10,275.2
	155 05 43.475	1,265.8	146 01 36.1	326 00 19.1	Kauku	4.072245	11,809.9	38,746.3
			170 17 02.6	350 16 42.5	Alala	4.008568	10,199.2	33,461.9
			302 18 25.9	122 18 55.1	Mokuola	3.474133	2,979.4	9,774.9
At, 1900 [1]	19 44 56.94	1,750.8	278 39 24	98 40 25	Keokea	3.723960	5,296	17,375
	155 05 34.12	993.4	304 51 07	124 51 33	Reef	3.429072	2,686	8,812
Paukaa Lighthouse	19 45 55.582	1,709.1	1 37 00.3	181 36 59.6	Haaheo	3.303684	2,012.3	6,602.0
	155 05 33.141	964.8	166 00 44.8	346 00 21.1	Alala	3.922483	8,365.3	27,445.2
			296 32 07.8	116 33 08.2	Keokea	3.764967	5,820.6	19,096.4

[1] *No check on this position.*

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, east coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Paukaa Point Light, 1912	19 45 55.739	1,713.9	8 04 04.6	188 03 56.3	Halai	3.707216	5,095.8	16,718.5
	155 05 33.015	961.1	165 58 49.1	345 58 25.5	Alala	3.922286	8,361.5	27,432.7
			287 35 01.3	107 36 46.1	Leleiwi	3.976299	9,468.9	31,065.9
Green light, 1900	19 45 55.603	1,709.7	1 35 51.9	181 35 51.2	Haaheo	3.303823	2,012.9	6,604.0
	155 05 33.163	965.4	8 01 36.6	188 01 28.3	Halai	3.706815	5,091.1	16,703.1
			166 00 56.2	346 00 32.6	Alala	3.922441	8,364.5	27,442.5
			296 32 18.4	116 33 18.9	Keokea	3.765031	5,821.4	19,099.0
			326 54 06.5	146 54 31.7	Reef	3.600468	3,985.4	13,075.4
Pipe, 1900	19 46 55.342	1,701.7	161 56 01.3	341 55 37.4	Alala	3.819897	6,605.4	21,671.2
	155 05 32.232	938.2	310 34 57.9	130 35 58.1	Keokea	3.833902	6,821.8	22,381.2
			337 26 56.2	157 27 21.2	Reef	3.748505	5,604.1	18,386.1
Der, 1900 [1]	19 46 56.01	1,722.2	310 46 39	130 47 39	Keokea	3.834181	6,826	22,395
	155 05 31.83	926.5	337 38 24	157 38 49	Reef	3.749619	5,618	18,432
Stack, Papaikou, 1912 [1]	19 46 55.37	1,702.6	161 55 59	341 55 35	Alala	3.819841	6,604	21,667
	155 05 32.24	938.5	297 32 06	117 33 51	Leleiwi	4.006639	10,154	33,314
Temple, 1912 [1]	19 47 38.49	1,183.5	162 34 34	342 34 26	Alala	3.715260	5,191	17,031
	155 05 49.22	1,432.6	302 21 46	122 23 46	Leleiwi	4.050965	11,245	36,893
Church, white spire and cross, 1900	19 48 12.907	396.9	156 30 03.3	336 29 43.5	Alala	3.628066	4,246.8	13,933.0
	155 05 44.434	1,293.3	320 56 35.3	140 57 39.7	Keokea	3.943813	8,786.4	28,826.7
			341 40 19.5	161 40 48.6	Reef	3.901165	7,964.6	26,130.5
Steeple, Catholic Church, 1900 [1]	19 48 12.93	397.6	156 30 05	336 29 45	Alala	3.627978	4,246	13,930
	155 05 44.45	1,293.7	307 06 07	127 07 56	Leleiwi	4.069480	11,735	38,501
Onomea Arch, 1912	19 48 50.110	1,540.8	3 21 53.9	183 21 46.8	Halai	4.018081	10,425.1	34,203.0
	155 05 36.562	1,064.1	145 03 03.3	325 02 40.8	Alala	3.525810	3,355.9	11,010.1
			312 00 22.1	132 02 08.2	Leleiwi	4.089426	12,286.4	40,309.6
Gable, 1912	19 49 46.039	1,415.7	4 00 58.8	184 00 48.8	Halai	4.084817	12,156.7	39,884.1
	155 05 28.337	824.6	115 29 51.2	295 29 25.8	Alala	3.379318	2,395.1	7,857.9
			318 11 48.7	138 13 32.0	Leleiwi	4.125064	13,337.2	43,757.1
School, 1912	19 50 02.469	75.9	0 08 04.2	180 08 03.8	Halai	4.101477	12,632.1	41,443.8
	155 05 56.558	1,645.8	111 24 45.2	291 24 29.5	Alala	3.158359	1,440.0	4,724.4
			317 05 16.4	137 07 09.3	Leleiwi	4.154237	14,263.9	46,797.5
Supplementary points, north coast								
Kauku, 1877–1912	19 50 11.101	341.3	76 00 20.3	255 56 04.9	Aahuwela	4.354390	22,614.7	74,195.1
	155 09 30.269	880.8	93 36 01.7	273 30 37.8	Red Hill	4.444470	27,827.2	91,296.4
			104 01 08.7	283 56 52.6	Kalepa	4.354341	22,612.1	74,186.5
			179 07 30.0	359 07 28.5	Honohina	3.947060	8,852.4	29,043.2
			266 56 20.0	86 57 17.0	Alala	3.688868	4,885.0	16,026.9
			310 47 54.5	130 50 15.5	Keokea	4.204100	15,999.3	52,491.0
			334 20 49.4	154 22 01.5	Halai	4.155538	14,306.7	46,937.9
Laimi, 1877–1912	19 51 56.453	1,735.9	57 54 17.9	237 53 17.6	Kauku	3.785011	6,095.5	19,998.3
	155 06 32.808	954.5	87 25 18.5	267 18 54.1	Red Hill	4.518107	32,969.1	108,166.1
			97 54 20.1	277 48 30.0	Kihe	4.480596	30,241.0	99,215.7
			136 39 36.0	316 38 34.1	Honohina	3.887460	7,717.2	25,318.8
Station B, 1902	19 53 28.757	884.2	18 17 23.5	198 17 00.0	Kauku	3.806248	6,401.0	21,000.6
	155 08 21.236	617.7	142 18 38.1	322 18 13.1	Honohina	3.544703	3,505.1	11,499.6
			311 58 34.1	131 59 11.0	Laimi	3.627704	4,243.3	13,921.6
			333 44 45.1	153 45 18.6	Alala	3.812007	6,486.4	21,280.8
East (of 2 stacks), 1900	19 50 44.846	1,379.0	4 41 27.0	184 41 13.7	Halai	4.145570	13,982.0	45,872.6
	155 05 18.309	532.8	72 25 20.2	252 24 51.5	Alala	3.410563	2,573.7	8,443.9
			337 26 22.8	157 27 18.4	Keokea	4.095086	12,447.6	40,838.5
			351 53 12.6	171 53 32.9	Reef	4.091891	12,356.4	40,539.3
West (of 2 stacks), 1900 [1]	19 50 44.62	1,372.0	72 29 54	252 29 25	Alala	3.408518	2,562	8,405
	155 05 18.67	543.3	351 50 03	171 50 23	Reef	4.091702	12,351	40,522
Alia Lighthouse (Pepeekeo Point), 1900	19 51 01.886	58.0	65 00 06.9	244 59 34.2	Alala	3.488412	3,079.0	10,101.7
	155 05 06.728	195.8	339 43 54.8	159 44 46.4	Keokea	4.107631	12,812.4	42,035.3
			353 42 28.1	173 42 44.4	Reef	4.108360	12,833.9	42,105.9
Alia Point Light (Pepeekeo Point), 1912	19 51 01.802	55.4	5 46 28.7	185 46 11.7	Halai	4.162272	14,530.2	47,671.2
	155 05 07.371	214.5	64 53 51.7	244 53 19.3	Alala	3.485857	3,061.0	10,042.6
			325 59 34.6	146 01 10.9	Leleiwi	4.170378	14,804.0	48,569.5
Stack, Pepeekeo, 1912	19 50 44.866	1,379.6	4 41 34.2	184 41 20.9	Halai	4.145588	13,982.6	45,874.6
	155 05 18.291	532.2	72 24 50.6	252 24 21.9	Alala	3.410677	2,574.4	8,446.2
			323 48 31.4	143 50 11.4	Leleiwi	4.163177	14,560.5	47,770.6
Mango, 1912	19 52 09.84	302.6	55 17 31	235 16 30	Kauku	3.806934	6,411	21,033
	155 06 29.15	848.1	133 54 31	313 53 28	Honohina	3.875027	7,499	24,603
Honomu, 1912	19 52 24.378	749.6	51 12 44.0	231 11 44.4	Kauku	3.815632	6,540.8	21,459.3
	155 06 35.061	1,020.0	132 15 53.2	312 14 52.0	Honohina	3.849327	7,068.5	23,190.6

[1] No check on this position.

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, north coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Stack, Honomu, 1912	19 52 46.161	1,419.4	44 28 14.9	224 27 20.3	Kauku	3.824817	6,680.6	21,917.9
	155 06 49.437	1,438.2	130 18 59.7	310 18 03.4	Honohina	3.800180	6,312.2	20,709.3
			328 01 14.4	148 01 19.4	Honomu	2.897427	789.6	2,590.5
White, 1912 [1]	19 52 40.66	1,250.3	332 11 26	152 11 29	Honomu	2.752714	566	1,857
	155 06 44.14	1,284.1	130 34 26	310 33 28	Honohina	3.815534	6,539	21,453
Hoist, 1912 [1]	19 54 12.70	390.5	22 51 12	202 50 35	Kauku	3.906411	8,061	26,447
	155 07 42.68	1,241.4	329 25 01	149 26 24	Honomu	3.587501	3,868	12,690
Pipe, 1912 [1]	19 54 12.57	386.5	22 46 22	202 45 45	Kauku	3.905932	8,053	26,421
	155 07 43.15	1,255.1	329 13 41	149 14 04	Honomu	3.587930	3,872	12,703
Cocoanut, 1912	19 54 23.610	726.0	15 56 02.7	195 55 36.8	Kauku	3.907117	8,074.5	26,491.1
	155 08 14.091	409.9	114 49 02.5	294 48 35.1	Honohina	3.413293	2,590.0	8,497.4
			321 50 15.1	141 50 48.9	Honomu	3.668630	4,662.6	15,297.2
Kaiaakea, 1901	19 56 57.550	1,769.6	69 22 33.3	249 22 20.9	Puu Ohai	3.054807	1,134.5	3,722.1
	155 10 55.231	1,606.0	115 18 56.4	295 17 56.1	Papaaloa	3.755152	5,690.5	18,669.6
			340 57 46.7	160 57 53.4	Haiku	3.240196	1,738.6	5,704.1
Vieira, 1901	19 56 36.854	1,133.2	21 54 04.0	201 53 59.3	Haiku	3.035613	1,085.5	3,561.3
	155 10 21.807	634.1	96 38 34.8	276 38 11.0	Puu Ohai	3.311213	2,047.4	6,717.2
			123 13 03.5	303 12 52.1	Kaiaakea	3.065098	1,161.7	3,811.3
Honomainoa, 1901	19 57 22.627	695.8	13 45 30.6	193 45 27.3	Puu Ohai	3.081108	1,205.3	3,954.4
	155 11 21.887	636.4	110 49 36.5	290 48 45.3	Papaaloa	3.669731	4,674.5	15,336.3
			129 42 20.4	309 41 45.7	Kaiwilahilahi	3.586939	3,863.1	12,674.2
			308 51 15.7	128 51 36.2	Vieira	3.350914	2,243.4	7,360.2
			314 51 03.2	134 51 12.3	Kaiaakea	3.038754	1,093.3	3,586.9
			330 55 47.7	150 56 03.5	Haiku	3.441314	2,762.6	9,063.6
Ridge, 1902	19 59 36.658	1,127.2	122 44 23.5	302 44 06.8	Humuula	3.227619	1,689.0	5,541.3
	155 15 59.258	1,722.6	303 38 49.2	123 39 32.6	Papaaloa	3.647290	4,439.0	14,563.6
Kaiwilahilahi, 1877	19 58 42.878	1,318.5	60 00 30.8	240 00 14.3	Papaaloa	3.207581	1,612.8	5,291.3
	155 13 04.114	119.6	108 00 04.3	287 59 04.4	Ridge	3.728642	5,353.6	17,564.3
			111 31 27.6	291 30 11.0	Humuula	3.845100	7,000.0	22,965.8
			323 33 45.9	143 34 17.3	Puu Ohai	3.655360	4,522.3	14,836.9
Waipunalei, 1902	20 00 06.677	205.3	89 46 58.8	269 46 29.2	Humuula	3.401705	2,521.8	8,273.6
	155 15 21.379	621.5	302 50 45.0	122 51 32.0	Kaiwilahilahi	3.676701	4,750.1	15,584.3
			322 31 06.3	142 31 36.8	Papaaloa	3.629711	4,263.0	13,986.2
C, 1902	20 00 53.099	1,632.8	21 36 25.2	201 36 18.5	Humuula	3.189150	1,545.8	5,071.5
	155 16 28.549	829.8	303 57 43.9	123 58 53.8	Kaiwilahilahi	3.855276	7,166.0	23,510.5
			306 10 03.3	126 10 26.2	Waipunalei	3.383566	2,418.6	7,935.0
			340 05 14.5	160 05 24.5	Ridge	3.397940	2,500.0	8,202.1
Haole, 1902	19 57 51.204	1,574.5	106 17 31.0	286 16 59.4	Papaaloa	3.445731	2,790.8	9,156.1
	155 12 20.023	582.2	141 06 25.2	321 06 10.1	Kaiwilahilahi	3.309967	2,041.6	6,698.1
			297 27 51.7	117 28 11.3	Honomainoa	3.279929	1,905.1	6,250.3
Lone Hale, 1902	19 57 19.032	585.2	1 53 22.3	181 53 21.9	Puu Ohai	3.025631	1,060.8	3,480.3
	155 11 30.542	888.1	113 17 27.4	293 16 39.1	Papaaloa	3.651537	4,482.7	14,707.0
			124 30 52.4	304 30 35.7	Haole	3.242049	1,746.0	5,728.3
			246 17 18.0	66 17 20.9	Honomainoa	2.439138	274.9	901.9
Kaiwilahilahi 2, 1913	19 58 42.902	1,319.2	59 59 14.3	239 58 57.9	Papaaloa	3.207703	1,613.3	5,293.0
	155 13 04.111	119.5	323 34 09.3	143 34 40.8	Puu Ohai	3.655412	4,522.8	14,838.6
Manowaeopae 3, 1913	19 59 15.749	484.3	300 01 28.1	120 01 48.6	Kaiwilahilahi 2	3.305001	2,018.4	6,622.0
	155 14 04.219	122.7	349 04 35.9	169 04 40.0	Papaaloa	3.267298	1,850.5	6,071.2
Laupahoehoe, 1913	19 59 48.977	1,506.0	307 40 09.0	127 40 39.9	Kaiwilahilahi 2	3.521718	3,324.4	10,906.8
	155 14 34.623	1,006.5	319 08 13.7	139 08 24.1	Manowaeopae 3	3.130652	1,351.0	4,432.4
Barnard, 1913	19 59 34.574	1,063.2	241 52 03.7	61 52 13.4	Laupahoehoe	2.972828	939.4	3,082.0
	155 15 03.119	90.7	288 40 31.8	108 40 51.9	Manowaeopae 3	3.257074	1,807.5	5,930.1
			319 15 56.7	139 16 20.9	Papaaloa	3.499918	3,161.7	10,373.0
Church spire, 1901	19 56 20.260	623.0	119 52 31.8	299 52 16.6	Puu Ohai	3.176010	1,499.7	4,920.3
	155 10 47.024	1,367.5	152 08 24.5	332 08 12.6	Honomainoa	3.336299	2,169.2	7,116.8
			168 14 39.9	348 14 37.1	Kaiaakea	3.068632	1,171.2	3,842.5
			235 10 02.8	55 10 11.4	Vieira	2.951025	893.4	2,931.1
			326 32 01.4	146 32 05.3	Haiku	2.774966	595.6	1,954.1
Kahuku flag, 1901	19 56 06.355	195.4	87 11 25.2	267 11 08.7	Haiku	3.149913	1,412.3	4,633.5
	155 09 47.226	1,373.4	103 49 01.1	283 48 40.7	Church spire	3.253041	1,790.8	5,875.3
			128 31 29.0	308 31 05.8	Kaiaakea	3.402712	2,527.6	8,292.6
Smoke, 1913	19 58 39.69	1,220.5	62 14 01	242 13 45	Papaaloa	3.181815	1,520	4,987
	155 13 05.90	171.5	129 33 46	309 33 16	Laupahoehoe	3.524459	3,345	10,974
			207 45 49	27 45 50	Kaiwilahilahi 2	2.048171	112	367
Belfry, 1913	19 59 42.38	1,303.2	220 04 52	40 04 54	Laupahoehoe	2.423366	265	869
	155 14 40.49	1,177.0	303 07 44	123 08 17	Kaiwilahilahi 2	3.524538	3,346	10,978
			307 49 49	127 50 01	Manowaeopae 3	3.125540	1,335	4,380

[1] No check on this position.

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, north coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Yellow, 1913	19 59 45.25	1,391.4	185 42 09	5 42 09	Laupahoehoe	2.061684	115	377
	155 14 35.02	1,018.0	305 57 10	125 57 41	Kaiwilahilahi 2	3.513867	3,265	10,712
			315 22 18	135 22 29	Manowaeopae 3	3.105339	1,274	4,180
Stack, Ookala, 1913	20 01 12.784	393.1	82 37 58.3	262 37 30.2	Kaholo	3.380803	2,403.3	7,884.8
	155 17 10.752	312.5	91 57 38.0	271 56 06.6	Koholalele	3.889901	7,760.7	25,461.6
			116 29 30.1	296 27 28.7	Pohakuhaku	4.060799	11,502.7	37,738.4
Stack, Kukaiau, 1913	20 02 37.020	1,138.4	43 04 17.6	223 03 52.0	Koholalele	3.503050	3,184.6	10,448.1
	155 20 22.784	662.1	118 17 44.7	298 16 49.1	Pohakuhaku	3.728748	5,354.9	17,568.5
			312 11 02.4	132 11 40.1	Kaholo	3.635086	4,316.0	14,160.1
Water, 1913	20 01 27.454	844.2	152 07 44.4	332 07 15.3	Pohakuhaku	3.723514	5,290.7	17,357.9
	155 21 39.934	1,160.7	277 56 16.1	97 57 20.2	Kaholo	3.739825	5,493.2	18,022.3
			340 10 07.7	160 10 08.5	Koholalele	2.299084	199.1	653.2
Landing, 1913	20 03 03.947	121.4	21 32 38.7	201 32 24.0	Koholalele	3.530378	3,391.4	11,126.6
	155 20 54.761	1,591.4	114 18 30.8	294 17 46.1	Pohakuhaku	3.618486	4,154.2	13,629.2
			312 04 25.2	132 05 13.8	Kaholo	3.745126	5,560.7	18,243.7
Stack, Paauilo, 1913[1]	20 03 15.56	478.5	121 05 37	301 05 11	Pahakuhaku	3.418228	2,620	8,596
	155 21 47.85	1,390.5	305 45 07	125 46 14	Kaholo	3.844324	6,988	22,926
Pohakuhaku, 1913	20 03 59.548	1,831.1	304 28 29.6	124 30 02.9	Kaholo	3.982307	9,600.8	31,498.6
	155 23 05.054	146.9	332 24 42.1	152 25 12.0	Koholalele	3.739411	5,488.0	18,005.2
Worship, 1913	20 03 18.353	564.4	223 12 26.3	43 12 40.4	Pohakuhaku	3.240029	1,737.9	5,701.8
	155 23 46.002	1,336.8	294 35 35.1	114 37 22.4	Kaholo	4.000573	10,013.2	32,851.6
			313 56 49.9	133 57 33.9	Koholalele	3.714591	5,183.1	17,004.9
Stack, Paauhau, 1913	20 05 25.600	787.2	295 27 36.1	115 28 41.7	Pohakuhaku	3.789117	6,153.4	20,188.3
	155 26 16.258	472.3	300 56 40.6	120 59 19.5	Kaholo	4.196121	15,708.0	51,535.3
			312 49 59.2	132 51 34.7	Koholalele	4.043124	11,043.9	36,233.2
Puu Liolio, 1877	20 03 15.723	483.5	123 20 45.2	303 19 39.5	Kuilei	3.822936	6,651.8	21,823.4
	155 27 00.824	23.9	193 59 11.1	13 59 15.2	Paauhau	3.157568	1,437.4	4,715.9
Kaao, 1877	20 04 39.748	1,222.3	105 18 10.7	285 17 24.4	Kuilei	3.608797	4,062.5	13,328.4
	155 27 57.210	1,662.2	300 54 34.0	120 54 57.5	Paauhau	3.364454	2,314.5	7,593.5
			327 37 05.7	147 37 25.1	Puu Liolio	3.485643	3,059.4	10,037.4
Ahualoa, 1877	20 05 16.320	501.8	87 55 39.8	267 55 22.6	Kuilei	3.164105	1.459.2	4,787.4
	155 29 21.892	636.0	294 33 36.8	114 34 05.9	Kaao	3.432196	2,705.2	8,875.3
Kawela, 1877	20 05 58.666	1,804.0	300 18 19.4	120 19 08.4	Kaao	3.681980	4,808.2	15,774.9
	155 30 20.083	583.4	350 16 05.7	170 16 08.4	Kuilei	3.138228	1,374.8	4,510.5
Au, 1877–1928	20 06 06.200	190.6	34 14 24.4	214 14 11.7	Kuilei	3.283128	1,919.2	6,296.6
	155 29 34.915	1,014.3	79 59 24.0	259 59 08.6	Kawela	3.124650	1,332.4	4,371.4
			313 07 05.0	133 07 38.6	Kaao	3.589842	3,889.0	12,759.2
			319 29 37.9	139 30 30.9	Puu Liolio	3.838458	6,893.8	22,617.4
			346 08 38.2	166 08 42.7	Ahualoa	3.198597	1,579.8	5,183.1
Isaac, 1877	20 05 41.643	1,280.5	19 10 46.6	199 10 38.8	Kaao	3.304301	2,015.1	6,611.2
	155 27 34.425	1,000.1	79 43 05.0	259 42 10.9	Kuilei	3.667941	4,655.2	15,272.9
			102 10 45.9	282 10 04.5	Au	3.553989	3,580.9	11,748.3
Kamakamaka, 1913	20 06 24.795	762.4	6 04 44.0	186 04 41.3	Kuilei	3.336590	2,170.7	7,121.7
	155 30 04.172	121.2	68 40 07.7	248 39 24.8	Anuenue	3.590529	3,895.2	12,779.5
			113 09 12.8	293 07 59.3	U. S. L. H.	3.829745	6,756.9	22,168.3
U. S. L. H., 1913–1929	20 07 51.158	1,573.1	82 05 01.0	262 04 02.7	Waipio	3.696313	4,969.5	16,304.1
	155 33 38.069	1,105.7	327 35 21.3	147 35 51.9	Anuenue	3.683430	4,824.3	15,827.7
Anuenue, 1929	20 05 38.704	1,190.1	259 01 21.5	79 01 59.0	Kawela	3.508531	3,225.0	10,580.7
	155 32 09.065	263.4	259 18 04.1	79 18 57.0	Au	3.658709	4,557.3	14,951.7
			282 17 48.9	102 18 29.1	Kuilei	3.541384	3,478.4	11,412.1
			347 29 18.8	167 30 21.4	Papalekoki	4.390448	24,572.4	80,617.9
			114 17 53.8	294 16 25.0	Waipio	3.915771	8,237.0	27,024.2
Paauhau church, 1877	20 04 14.730	452.9	0 32 36.9	180 32 36.7	Puu Liolio	3.258767	1,814.5	5,953.1
	155 27 00.231	6.7	114 55 36.8	294 55 17.2	Kaao	3.261390	1,825.5	5,989.2
			321 48 27.1	141 48 31.0	Paauhau	2.727556	534.0	1,752.0
Stack, Honokaa, 1913–1928	20 05 48.252	1,483.7	73 13 39.5	253 12 58.9	Kuilei	3.554432	3,584.5	11,760.1
	155 28 13.961	405.6	87 33 00.7	267 31 39.9	Anuenue	3.834842	6,836.6	22,429.7
			109 20 39.0	289 20 01.1	Kamakamaka	3.530627	3,393.3	11,132.9
Kukuihaele Light, 1913–1929	20 07 51.348	1,579.0	87 54 48.5	267 54 46.6	U. S. L. H.	2.204868	160.3	525.9
	155 33 32.555	945.6	293 43 31.6	113 44 43.3	Kamakamaka	3.820347	6,612.2	21,693.5
			329 15 37.6	149 16 06.3	Anuenue	3.676268	4,745.3	15,568.5
Lift, 1913–1929	20 07 49.637	1,526.3	253 47 35.1	73 47 37.0	U. S. L. H.	2.224360	167.6	549.9
	155 33 43.611	1,266.7	292 14 54.8	112 16 10.2	Kamakamaka	3.838051	6,887.3	22,596.1
			325 41 45.4	145 42 17.9	Anuenue	3.687857	4,873.7	15,989.8

[1] No check on this position.

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance Log (meters)	Distance Meters	Distance Feet
Supplementary points, north coast—Contd.	° ′ ″		° ′ ″	° ′ ″				
Stack, Kukuihaele, 1913	20 07 45.985	1,414.0	218 14 50.4	38 14 51.9	U. S. L. H.	2.306550	202.6	664.7
	155 33 42.386	1,231.1	291 29 16.2	111 30 31.2	Kamakamaka	3.833305	6,812.5	22,350.7
			307 17 48.7	127 19 01.0	Kuilei	3.885390	7,680.5	25,198.4
			325 17 17.2	145 17 49.3	Anuenue	3.677698	4,761.0	15,620.0
Supplementary points, interior								
Aahuwela, 1891	19 47 12.806	393.8	141 00 01.0	320 58 53.0	Red Hill	3.967376	9,276.3	30,434.0
	155 22 04.132	120.3	257 52 14.2	77 57 26.5	Alala	4.438174	27,426.7	89,982.4
			284 43 00.5	104 48 27.2	Halai	4.463907	29,100.9	95,475.2
			346 36 13.0	166 37 33.0	Kulani	4.476266	29,941.0	98,231.4
Puu Ulaula, 1891	19 32 00.128	3.9	200 14 32.8	20 16 32.4	Aahuwela	4.475874	29,914.0	98,142.8
	155 27 59.702	1,740.6	241 44 49.3	61 52 13.4	Halai	4.640557	43,707.6	143,397.3
			273 29 30.6	93 32 49.0	Kulani	4.238948	17,336.0	56,876.5
Puu Oo, 1891	19 43 55.697	1,712.6	206 12 57.4	26 13 32.1	Aahuwela	3.829696	6,756.1	22,165.6
	155 23 46.666	1,358.8	336 42 49.7	156 44 44.1	Kulani	4.399836	25,109.4	82,379.8
Kole, 1891	19 45 02.081	64.0	234 44 18.0	54 45 24.1	Aahuwela	3.842877	6,964.3	22,848.7
	155 25 19.491	567.5	307 03 27.0	127 03 58.3	Puu Oo	3.529808	3,386.9	11,111.9
South Base 1, 1891	19 45 42.884	1,318.6	38 58 25.5	218 57 54.5	Puu Oo	3.627280	4,239.2	13,908.1
	155 22 15.096	439.5	186 35 04.6	6 35 08.3	Aahuwela	3.444572	2,783.4	9,131.9
North Base 1, 1891	19 45 52.472	1,613.5	37 18 11.5	217 18 08.9	South Base 1	2.568957	370.6	1,215.9
	155 22 07.380	214.9	182 11 34.0	2 11 35.1	Aahuwela	3.393048	2,472.0	8,110.2
Loaloa 1, 1891	19 46 04.776	146.9	16 54 20.9	196 54 06.9	Puu Oo	3.617869	4,148.3	13,609.9
	155 23 05.236	152.4	63 45 08.2	243 44 22.8	Kole	3.639300	4,358.1	14,298.2
			220 22 21.3	40 22 42.0	Aahuwela	3.438677	2,745.9	9,008.8
			282 39 28.8	102 39 48.4	North Base 1	3.237103	1,726.2	5,663.4
			294 45 22.3	114 45 39.3	South Base 1	3.206130	1,607.4	5,273.6
Kahiliku, 1892	19 41 29.623	910.8	156 31 02.3	336 30 29.4	Kole	3.852660	7,123.0	23,369.4
	155 23 42.004	1,223.4	178 16 08.7	358 16 07.1	Puu Oo	3.652596	4,493.6	14,742.8
			195 06 27.9	15 07 01.0	Aahuwela	4.038639	10,930.5	35,861.1
Kalaieha Puu, 1891	19 42 26.272	807.8	202 14 29.9	22 14 52.6	Kole	3.714009	5,176.2	16,982.2
	155 26 26.786	780.1	239 27 49.5	59 28 43.5	Puu Oo	3.733448	5,413.1	17,759.5
			289 56 27.8	109 57 23.3	Kahiliku	3.708030	5,105.4	16,750.0
Lepeamoa, 1891	19 45 25.700	790.2	279 56 28.0	99 57 16.1	Kole	3.623660	4,204.0	13,792.6
	155 27 41.717	1,214.5	316 06 36.9	136 07 57.8	Kahiliku	4.003058	10,070.7	33,040.3
			338 25 09.9	158 25 35.2	Kalaieha Puu	3.773269	5,932.9	19,464.9
Omaokoili, 1891	19 42 54.780	1,684.4	219 58 12.1	39 58 57.2	Lepeamoa	3.782169	6,055.8	19,868.1
	155 29 55.337	1,611.5	244 00 18.4	64 01 51.5	Kole	3.951099	8,935.1	29,314.6
			278 12 11.2	98 13 21.5	Kalaieha Puu	3.787908	6,136.3	20,132.2
North Base '92, 1892	19 42 16.381	503.7	108 01 09.3	288 00 27.3	Omaokoili	3.581852	3,818.1	12,526.5
	155 27 50.654	1,475.2	220 49 01.6	40 49 52.6	Kole	3.828217	6,733.1	22,090.2
			262 53 53.3	82 54 21.6	Kalaieha Puu	3.391177	2,461.4	8,075.4
South Base '92, 1892	19 41 48.567	1,493.4	122 03 29.7	302 02 52.1	Omaokoili	3.583917	3,836.3	12,586.3
	155 28 03.687	107.4	203 55 55.3	23 55 59.7	North Base '92	2.971131	935.7	3,069.9
Huikau, 1891	19 42 49.376	1,518.3	54 22 13.0	234 21 42.8	South Base '92	3.506422	3,209.4	10,529.5
	155 26 34.120	993.6	65 31 43.1	245 31 17.3	North Base '92	3.388968	2,448.9	8,034.4
			91 38 01.3	271 36 53.5	Omaokoili	3.768046	5,862.0	19,232.2
			343 15 50.7	163 15 53.2	Kalaieha Puu	2.870312	741.8	2,433.7
Mawai, 1891	19 40 27.423	843.2	110 53 18.5	290 51 27.6	Kalaieha Puu	4.011006	10,256.7	33,650.5
	155 20 57.742	1,682.0	142 28 36.5	322 27 39.5	Puu Oo	3.907176	8,075.6	26,494.7
			171 11 15.0	351 10 52.6	Aahuwela	4.100855	12,614.1	41,384.8
Lilinoe (new), 1892	19 48 44.99	1,383.4	20 09 15	200 08 30	Omaokoili	4.059685	11,471	37,634
	155 27 39.62	1,153.1	350 06 17	170 06 39	Huikau	4.045316	11,100	36,417
Waiau Crater, 1892	19 48 44.23	1,360.0	10 03 02	190 02 40	Omaokoili	4.037920	10,912	35,800
	155 28 49.94	1,453.5	269 20 09	89 20 33	Lilinoe (new)	3.311052	2,047	6,716
Peak A (Poliahu), 1892	19 49 26.92	827.8	298 04 20	118 04 48	Lilinoe (new)	3.437671	2,739	8,986
	155 29 02.68	78.0	344 14 03	164 14 07	Waiau Crater	3.134899	1,364	4,475
Peak B, 1892	19 49 00.11	3.4	43 27 17	223 27 12	Waiau Crater	2.827775	673	2,208
	155 28 34.04	990.7	134 42 16	314 42 06	Peak A	3.069056	1,172	3,845
South Azimuth Station, 1892	19 48 48.61	1,494.7	31 43 37	211 43 36	Waiau Crater	2.199776	158	518
	155 28 47.08	1,370.2	158 55 44	338 55 39	Peak A	3.101279	1,263	4,144
			227 00 48	47 00 53	Peak B	2.714772	519	1,703
Mauna Kea (Waiau) Latitude Station, 1892	19 48 51.67	1,588.8	157 17 04	337 16 58	Peak A	3.070130	1,175	3,855
	155 28 47.08	1,370.2	235 38 20	55 38 25	Peak B	2.662412	460	1,509
			359 55 44	179 55 44	South Azimuth Station	1.973712	94	308
Summit, 1892	19 49 26.23	806.5	34 37 17	214 37 11	Peak B	2.989435	976	3,202
	155 28 14.99	436.2	90 53 25	270 53 09	Peak A	3.142352	1,388	4,554

Hawaii Island—Continued

Station	Latitude and longitude	Seconds in meters	Azimuth	Back azimuth	To station	Distance		
						Log (meters)	Meters	Feet
Supplementary points, interior—Continued	° ′ ″		° ′ ″	° ′ ″				
Mauna Kea, 1892	19 49 42.812	1,316.4	69 24 15	249 23 59	Peak A	3.142551	1,389	4,557
	155 28 18.014	524.2	113 52 25.0	293 45 02.0	Puako	4.616633	41,365.0	135,711.7
			126 31 09.9	306 26 21.5	Puu Pa	4.486129	30,628.7	100,487.7
			165 29 24.5	345 29 08.4	Papalekoki	3.746775	5,581.8	18,313.0
			242 44 48.8	62 45 47.9	Red Hill	3.753591	5,670.1	18,602.7
			350 12 59	170 13 00	Summit	2.713937	518	1,699
Kihe, 1876	19 54 10.895	335.0	27 45 34.7	207 44 59.9	Red Hill	3.804954	6,382.0	20,938.3
	155 23 42.607	1,239.3	73 13 18.7	253 11 28.6	Papalekoki	3.992501	9,828.8	32,246.7
			163 23 41.5	343 22 37.8	Paauhau	4.277348	18,938.6	62,134.4
			215 24 47.0	35 26 32.7	Kaholo	4.191515	15,542.3	50,991.7
			227 46 28.4	47 48 49.8	Humuula	4.211401	16,270.5	53,380.8
			266 31 46.8	86 36 35.3	Honohina	4.392695	24,699.9	81,036.3
Koholalele, 1877–1913	20 01 21.362	656.9	15 21 34.4	195 20 51.8	Kihe	4.137562	13,726.6	45,034.7
	155 21 37.609	1,093.1	19 17 27.9	199 16 10.5	Red Hill	4.301170	20,006.4	65,637.7
			39 04 10.2	219 01 37.2	Papalekoki	4.315983	20,700.6	67,915.2
			118 30 53.4	298 29 06.8	Paauhau	4.012535	10,292.8	33,769.0
			276 04 09.2	96 05 12.5	Kaholo	3.732658	5,403.3	17,727.3
Kole (N), 1877	19 53 15.239	468.6	71 58 30.9	251 57 51.3	Papalekoki	3.561783	3,645.7	11,960.9
	155 27 06.914	201.1	212 37 36.4	32 39 29.7	Koholalele	4.249245	17,751.9	58,241.0
			253 55 32.1	73 56 42.6	Kihe	3.791300	6,184.4	20,290.0
Kaluamakani, 1876	19 54 31.383	965.0	273 32 19.6	93 34 18.3	Kihe	4.006877	10,159.6	33,332.0
	155 29 31.227	908.2	299 08 40.6	199 09 28.7	Kole (N)	3.681833	4,806.5	15,769.3
			348 05 44.1	168 05 52.7	Papalekoki	3.549741	3,546.0	11,633.8
Apakuie, 1877	19 56 08.825	271.4	20 31 45.1	200 31 20.7	Kole (N)	3.755836	5,699.5	18,699.1
	155 25 58.205	1,692.7	40 12 39.6	220 11 35.6	Papalekoki	3.927675	8,465.9	27,775.2
			64 12 00.6	244 10 48.0	Kaluamakani	3.837708	6,881.9	22,578.4
			312 35 33.1	132 36 19.3	Kihe	3.728963	5,357.5	17,577.1
Laumaia B, 1877	19 56 43.633	1,341.7	17 32 27.8	197 32 10.4	Kihe	3.692459	4,925.6	16,160.1
	155 22 51.569	1,499.6	23 18 46.2	203 17 54.0	Red Hill	4.051667	11,263.3	36,953.0
			49 13 22.2	229 11 54.3	Kole (N)	3.991623	9,809.0	32,181.7
			55 20 22.7	235 18 15.2	Papalekoki	4.122077	13,245.8	43,457.3
			70 44 06.6	250 41 50.4	Kaluamakani	4.090395	12,313.9	40,399.9
			78 51 09.6	258 50 06.0	Apakuie	3.742873	5,531.9	18,149.2
Kalepa, 1876	19 53 08.800	270.6	123 46 16.5	303 45 43.2	Kihe	3.535965	3,435.3	11,270.6
	155 22 04.433	129.0	215 36 04.3	35 37 52.2	Humuula	4.198501	15,794.3	51,818.5
			254 54 21.7	74 58 16.2	Haiku	4.316890	20,743.9	68,057.3
			261 07 59.2	81 12 14.3	Honohina	4.343662	22,062.9	72,384.7
Punohu, 1876	19 58 41.247	1,268.3	70 41 40.6	250 38 15.8	Nohonaohae	4.267300	18,505.5	60,713.5
	155 31 10.932	317.8	98 37 51.5	278 36 52.6	Puu Io	3.705388	5,074.4	16,648.3
			124 07 44.7	304 05 18.4	Kaala	4.176469	15,013.1	49,255.5
			297 15 11.8	117 16 58.6	Apakuie	4.009876	10,230.0	33,562.9
			339 19 13.3	159 19 47.3	Kaluamakani	3.914454	8,212.1	26,942.5
			341 57 39.9	161 58 22.5	Papalekoki	4.069266	11,729.1	38,481.2

ELEVATIONS OF TRIANGULATION STATIONS

Elevations from observed vertical angles were computed for the triangulation executed on the Island of Oahu in the year 1927. In that survey the list of observed vertical angles is nearly as complete as is the list of observed horizontal angles, most of the lines of the main scheme having vertical angles observed at both ends, while nearly every supplementary station has at least one of its lines with a vertical angle observed at one end.

All of the stations of the two main-scheme loops except stations Kualoa and Turnover, and including the supplementary stations Gilbert and Salt Lake, were combined in a single net for the adjustment of the elevations determined by vertical angles. In all 48 stations are thus connected up by 130 lines, of which all but 6 were observed over from both directions (reciprocal observations).

Starting data consisted of elevations above mean sea level determined by means of spirit leveling for the three stations: Gilbert, Schofield west base, and Schofield east base.

After the main net had been adjusted, the elevations determined therein were used as a basis for computing the elevations of some 36 additional or supplementary stations. These were sometimes computed through a small adjustment, though usually a simple weighted mean was taken for each station. Sometimes only one determination was available, giving a "no check" elevation. The stations are thus divided into three groups, depending on the accuracy of the determination of their elevations. In class 1 are placed those stations having elevations determined by spirit leveling. These elevations have an accuracy represented by a probable error of ±0.01 meter. In the second class are placed those stations whose elevations were determined in the main adjustment. In order to know the accuracy of these determinations, the probable error of station Laie 1 was computed, it being one of the stations most distant from the stations of class 1, and therefore properly regarded as being determined with the least accuracy of any in its class. The probable error of Laie 1, ±0.75 meter, may therefore be properly regarded as a limiting value, and all elevations in class 2 may be regarded as having an accuracy represented by probable errors ranging between ±0.75 meter and ±0.2 or ±0.3 meter. Class 3 includes all stations not in class 1 or class 2. In this group are elevations of an accuracy ranging from the major limit of class 2, that is, a probable error of ±0.75 meter, to a probable error estimated at 2 or 3 meters for "no check" elevations determined by single observations.

The datum for all elevations is mean sea level.

Table of elevations, Island of Oahu

Station	Point to which elevation refers	Elevation		Station	Point to which elevation refers	Elevation	
		Meters	Feet			Meters	Feet
Class 1				*Class 2*—Con.			
Gilbert	Station mark	20.147	66.10	Makua 2	Station mark	293.51	962.96
Schofield east base.	do	255.484	838.20	Lolo	do	656.53	2,153.97
Schofield west base.	do	278.135	912.51	Moku	do	644.18	2,113.45
				Kealia	do	590.61	1,937.69
				Camp	do	323.57	1,061.58
				Kaupakuhale	do	479.76	1,574.01
Class 2				*Class 3*			
Waipio Uka	Station mark	219.14	718.96	Barbers Point Light.	Platform	11.89	39.01
Mauna Una	do	539.15	1,768.86	Burns	Station mark	523.96	1,719.03
Kapuai New	do	319.15	1,047.08	Ewa Church	do	26.26	86.15
Station Z	do	436.49	1,432.05	Ka [1]	Ground	323.7	1,062.0
Halawa Barrel	do	352.69	1,157.12	Kailua	do	305.83	1,003.38
Tantalus	do	614.75	2,016.89	Kaaumakua	do	814.97	2,673.78
Diamond Head (Leahi).	do	232.83	763.88	Kaimuki	do	92.76	304.33
Lanipo	do	800.35	2,625.81	Kaipaupau [1]	do	192.7	632.2
Koko Head 3	do	195.57	641.63	Kalepeamoa	do	340.51	1,117.16
Waimanalo	do	420.70	1,380.25	Kawaihapai (Army).[1]	do	4.4	14.4
Heeia	do	220.48	723.36	Kawailoa	do	186.86	613.06
Mokapu	do	209.32	686.74	Koko Crater	do	368.68	1,209.58
Ohulehule	do	690.47	2,265.82	Konahuanui 2	Station mark	948.07	3,110.46
Laie 1	do	12.98	42.59	Keawaula [1]	Ground	598.0	1,961.9
Waiahilahila	do	389.48	1,277.82	Kualoa	do	491.57	1,612.76
Kahuku New	do	6.37	20.90	Lak [1]	do	457.2	1,500.0
Keana	do	15.37	50.43	Makapuu Point	Station mark	197.35	647.47
Puuki	do	199.09	653.18	Makiki [1]	Ground	123.9	406.5
Lak	do	337.04	1,105.77	Mauumea [1]	do	101.7	333.7
Opana	do	162.56	533.33	Mokuleia [1]	do	7.1	23.3
Waialee	do	163.12	535.17	Sand Island Lighthouse.[1]	do	2.6	8.5
Kawela	do	333.47	1,094.06	Ohikilolo	do	474.29	1,556.07
Pupukea	do	169.07	554.69	Pavoa [1]	do	365.7	1,199.8
Dillingham	do	4.02	13.19	Puena [1]	Station mark	4.3	14.1
O'Reilly	do	217.74	714.37	Punchbowl	do	152.47	500.23
Puu Iki	do	349.24	1,145.80	Punchbowl east	do	132.31	434.09
Waialua 2	do	4.11	13.48	Rocky Hill	Ground	90.52	296.98
Maili	do	460.25	1,510.00	Round Top	do	320.61	1,051.87
Halemano	do	322.14	1,056.89	Sand Island south base.[1]	do	2.0	6.6
Kum	do	783.99	2,572.14	Turnover	Station mark	633.18	2,077.36
Kaua	do	953.61	3,128.64	Waielae	Ground	414.81	1,360.92
Paheehee New	do	198.47	651.15	Waolani	do	432.54	1,419.09
Manawahua	do	740.92	2,430.84	Waikiki [1]	do	0.8	2.6
Kahe	do	84.66	277.76	Wyllie	do	161.06	528.41
Makaha	do	399.91	1,312.04				
Lahilahi	do	70.31	230.68				
Keaau 2	do	690.67	2,265.97				
Kepuhi New	do	389.69	1,278.51				

[1] No check on this elevation.

DESCRIPTIONS OF TRIANGULATION STATIONS

The descriptions may be conveniently consulted by reference to the illustrations near the end of the volume or to the alphabetical index following the illustrations. All azimuths given in the descriptions are reckoned continuously from true south around by west to 360°, south being 0°, west 90°, north 180°, and east 270°. Where magnetic azimuths are given they are indicated as such.

In general, except where the contrary is specifically stated, surface and underground marks are not in contact, so that a disturbance of the surface mark will not necessarily affect the underground mark. The underground mark should be resorted to only where there is evidence that the surface mark has been disturbed.

The names and dates given in each description, immediately after the name of the island, refer to the chiefs of party by whom the sta-

tion was established and subsequently visited or reoccupied and the corresponding dates. In a number of cases the date of establishment is left blank, not being available in the records at hand, and there are a number of stations of the Hawaiian Government Survey for which no descriptions are available at the Washington office. It may be that for some of these stations descriptions may be obtained from the custodian of the original notes of that survey, the Territorial Surveyor, Honolulu, Hawaii.

Any person who finds that one of the stations herein described has been disturbed, or that the description no longer fits the facts, is requested to send such information to the officer in charge of the United States Coast and Geodetic Survey field station, fifth floor, Aloha tower, Honolulu, for transmission to the Washington office of this bureau.

MARKING OF STATIONS

The standard disk station and reference marks referred to in the following descriptions and notes consist of a disk and shank cast in one piece, as shown in Figure 2. The disk of the station mark is 90 millimeters in diameter, with a hole in its center surrounded by a 20 millimeter equilateral triangle and with an inscribed legend as shown in the illustration. Since March, 1921, the word "Director" has replaced the word "Superintendent" in the legend. In the earlier forms the shank, 25 millimeters in diameter and 80 millimeters long, had a slit at its lower end into which a wedge could be inserted, so that when driven into a drill hole in the rock, it would bulge and hold the mark firmly in place. Later forms of the shank dispensed with the slit and had grooves cut around it instead so that when set in cement in a drill hole it would remain firmly fixed. The best manner of setting the mark is to have the disk countersunk in the rock. The name of the station and the year in which it was established are stamped on the station mark.

The standard disk reference mark, also shown in Figure 2, is the same size and shape as the station mark, but has an arrow in its upper face in place of the triangle, and a somewhat different legend as indicated in the illustration. When properly set the arrow of the reference mark points directly at the station mark.

Other forms of marks used by the United States Coast and Geodetic Survey are also shown in Figure 2. At a number of the stations marks have been placed by the United States Geological Survey. Such marks are simply referred to as standard marks of that organization. They are usually similar in form to the marks of the United States Coast and Geodetic Survey, though not always of the same material. They may be identified by the legend cast in the face of the mark.

The following notes on the marking of stations have been made as general as possible in order that it may not be necessary in the field to take note of small and unimportant variations. This permits the shortening of the written description without loss of clearness. Before the adoption of the standard station marks, stations were usually marked and referenced with any material suited to the purpose which could be easily obtained. For such stations the descriptions of the marks are made as complete as the original records permit.

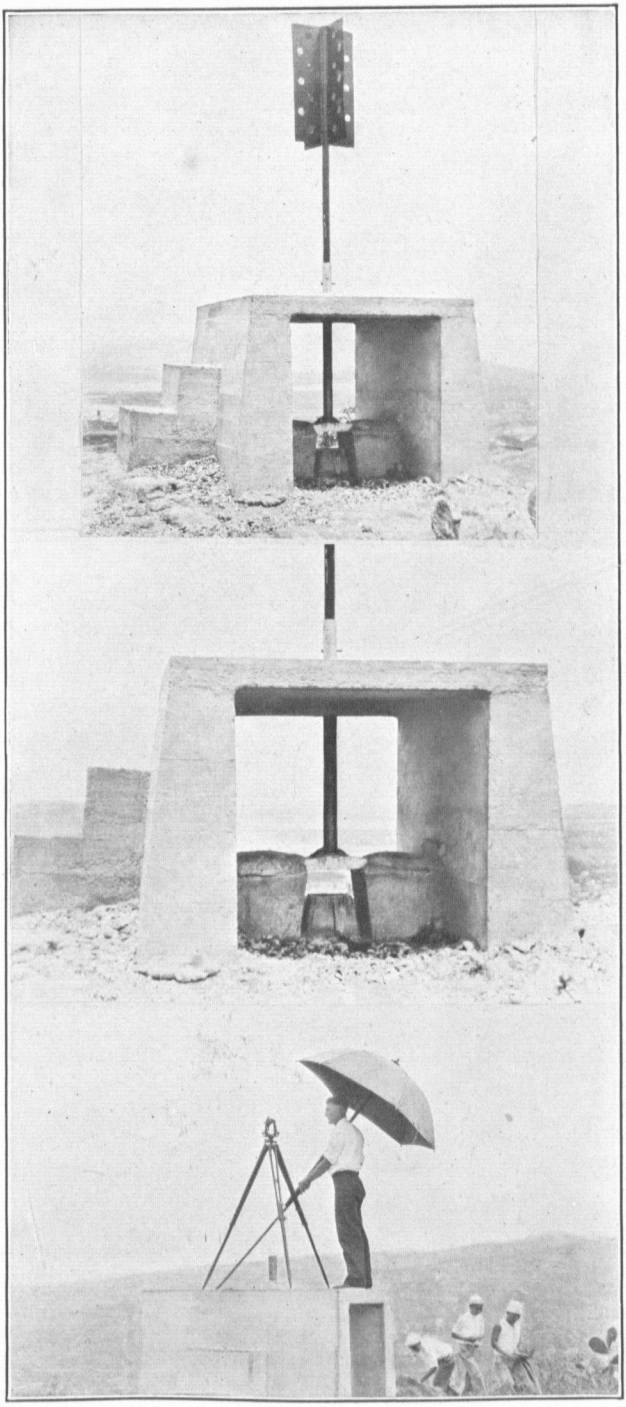


FIGURE 1.—THREE VIEWS OF TRIANGULATION STATION PUNCHBOWL

These show the new type of observing platform and signal which is being placed at the main stations of the Hawaiian triangulation.

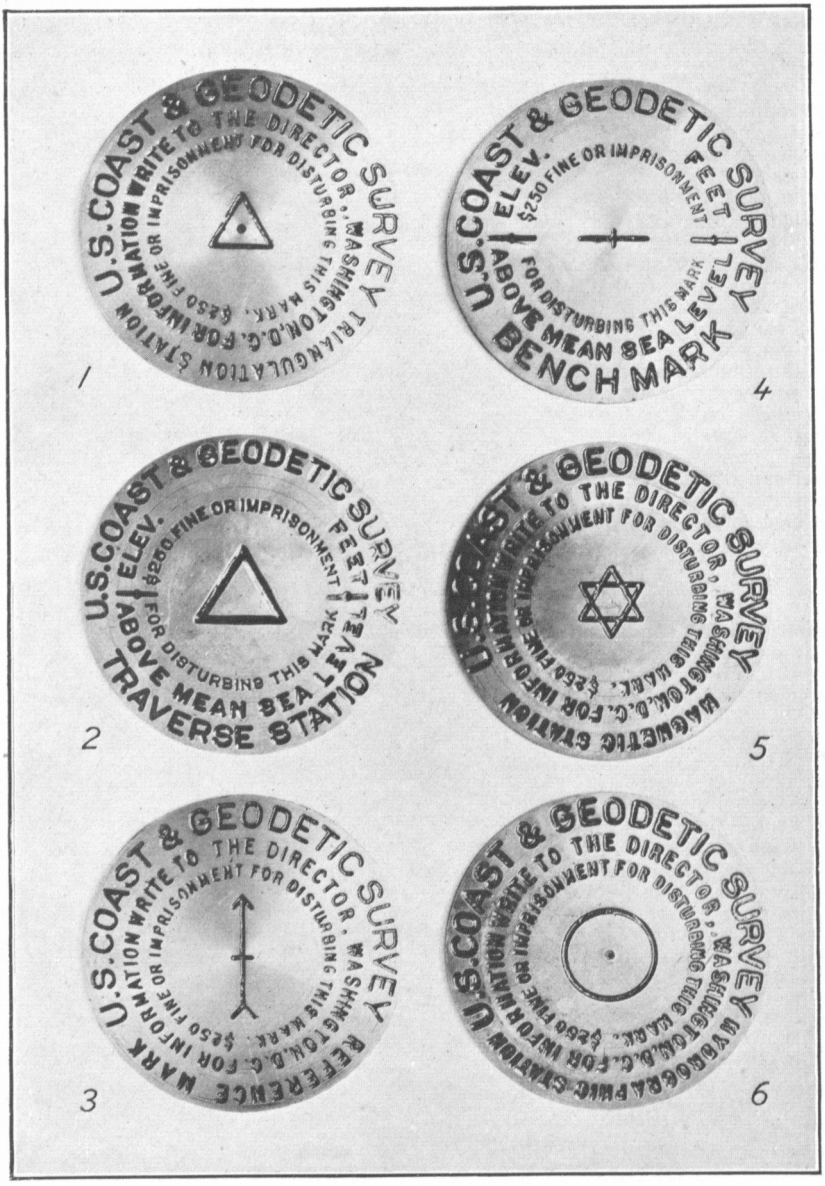


FIGURE 2.—STANDARD MARKS OF THE UNITED STATES COAST AND GEODETIC SURVEY

1. Triangulation station mark.
2. Traverse station mark.
3. Reference mark.
4. Bench mark.
5. Magnetic station mark.
6. Hydrographic station mark.

STANDARD NOTES ON THE MARKING OF STATIONS

Surface marks

Note 1.—A standard disk triangulation station mark set in the top of (*a*) a square block or post of concrete, (*b*) a concrete cylinder, (*c*) an irregular mass of concrete.

Note 2.—A standard disk triangulation station mark wedged in a drill hole in outcropping bedrock, (*a*) and surrounded by a triangle chiseled in the rock, (*b*) and surrounded by a circle chiseled in the rock, (*c*) at the intersection of two lines chiseled in the rock.

Note 3.—A standard disk triangulation station mark set in concrete in depression in outcropping bedrock.

Note 4.—A standard disk triangulation station mark wedged in drill hole in bowlder.

Note 5.—A standard disk triangulation station mark set in concrete in depression in bowlder.

Note 6.—A standard disk triangulation station mark set in concrete at the center of the top of a tile (*a*) which is embedded in the ground, (*b*) which is surrounded by a mass of concrete, (*c*) which is fastened by means of concrete to the upper end of a long wooden pile driven into the marsh, (*d*) which is set in a block of concrete and projects from 12 to 20 inches above the block.

Note 6½.—A standard disk triangulation station mark set in the top of a concrete truncated pyramid projecting about 1 foot above the surface of the ground. The pyramid, about 8 inches square on top, is from 1½ to 2½ feet square at the base, depending on its length. The length is from 3 to 6½ feet according to the depth it was necessary to go to secure a good foundation. The 6½-foot pyramids were set in beach lines liable to shift, and reach down to rock. Each pyramid is reinforced for its full length with an iron rod or pipe in each corner.

Underground marks

Note 7.—A block of concrete 3 feet below the ground containing at the center of its upper surface (*a*) a standard disk triangulation station mark, (*b*) a copper bolt projecting slightly above the concrete, (*c*) an iron nail with top projecting above the concrete, (*d*) a glass bottle with neck projecting a little above the concrete, (*e*) an earthenware jug with mouth projecting a little above the concrete.

Note 8.—In bedrock, (*a*) a standard disk triangulation station mark wedged in a drill hole, (*b*) a standard disk triangulation station mark set in concrete in a depression, (*c*) a copper bolt set in cement in a drill hole or depression, (*d*) an iron spike set point up in cement in a drill hole or depression.

Note 9.—In a bowlder 3 feet below the surface of the ground, (*a*) a standard disk triangulation station mark wedged in a drill hole, (*b*) a standard disk triangulation station mark set in concrete in a depression, (*c*) a copper bolt set with cement in a drill hole or depression, (*d*) an iron spike set with cement in a drill hole or depression.

Note 10.—Embedded in earth 3 feet below the surface of the ground, (*a*) a bottle in an upright position, (*b*) an earthenware jug in an upright position, (*c*) a brick in a horizontal position with drill hole in its upper surface.

Reference marks

Note 11.—A standard disk reference mark with arrow pointing toward the station set at the center of the top of (*a*) a square block or post of concrete, (*b*) a concrete cylinder, (*c*) an irregular mass of concrete.

Note 12.—A standard disk reference mark with the arrow pointing toward the station, (*a*) wedged in drill hole in outcropping bedrock, (*b*) set in concrete in a depression in outcropping bedrock, (*c*) wedged in a drill hole in a bowlder, (*d*) set in concrete in a depression in a bowlder.

Note 13.—A standard disk reference mark with the arrow pointing toward the station set in concrete at the center of the top of a tile, (*a*) which is embedded in the ground, (*b*) which is surrounded by a mass of concrete, (*c*) which is fastened by means of concrete to the upper end of a long wooden pile driven into the marsh, (*d*) which is set in a block of concrete and projects from 12 to 20 inches above the block.

SPECIAL MARKS

During the year 1929 a number of stations on Oahu Island were re-marked with special types of combination marks and signals, designed for permanence and for convenience of occupation. These marks were placed through the cooperation of the United States Engineers, the Territorial surveyor, and the United States Coast and Geodetic Survey. They are described in the following note:

Note 14.—There are five different types of marks, as described below. The signal part proper is similar for the different types, and consists of a galvanized-iron pipe 2 inches in diameter and of varying lengths, carrying at its top a double target of sheet steel (see fig. 1). Each of the two parts of the target is 3 feet long (high) and 22⅜ inches wide, so cut and welded to the pipe as to contain its center line and be symmetrical about it. A number of 2-inch holes cut in the target reduce the wind resistance. The pipe and lower part of the target are painted yellow; the upper part of the target is red. The signal pipe is held in position by a sleeve, usually of 2½-inch pipe, which is plumbed above the station mark. The mark itself may be the original mark, or a bronze disk replacing the original mark. The sleeve pipe rests on a specially cast socket placed above and independent of the station mark. In types A, B, D, and X the station mark is accessible from above with plummet. Types A, B, and C have reinforced concrete platforms which are designed to support both instrument and observer. The details of construction in which these various types differ are briefly described as follows:

A.—The concrete platform is supported on two walls of rubble masonry or concrete (see fig. 1), 1½ feet thick, 5½ feet long, and 4 feet high, placed 2½ feet apart. The platform is 4 inches thick, the sleeve pipe is 4 feet long, and the socket supporting the signal is 6 inches above the mark. The signal pole (pipe) is 10 feet long.

B.—The concrete platform rests on the ground and is about flush with the surface of the ground. The socket is 3 inches above the station mark and is attached to the under side of the platform. A 3 by 3 inch passage extends the entire distance under the concrete platform in order to permit illumination of the bronze disk. The sleeve pipe is supported by a reinforced concrete post projecting 2 feet above the platform. The total length of the signal pipe is 8 feet.

C.—The concrete platform is usually flush with the surface of the ground, though for some of the older stations around Honolulu it may project up to 12 inches. The sleeve pipe is set in a reinforced concrete block which extends 3 feet downward from the bottom of the platform. The sleeve projects 2 feet above the platform. The bottom of the target is 8 feet above the platform.

E.—The details of this marking are not known.

X.—This type has no concrete platform. The bronze tablet is set in the top of a concrete-filled soil pipe, about even with the surface of the ground. A small concrete block is cast around the top of the soil pipe, and carries the socket and a short sleeve into which the bottom of the signal pipe fits. The signal pipe is 10 feet long, and is held in place by guys of ½-inch galvanized cable, fitted with turnbuckles and attached to pipes or spikes anchored in the ground or in rocks.

KAUAI ISLAND

Principal points

Kikoo (Kauai Island, O. B. French, 1910; F. G. Engle, 1927; L. G. Simmons, 1927).—In northeast Kauai, on a rounding peak of the same name, near the east end of the Anahola Mountains, and about 500 yards west of Konanao, the "Conical Peak." Station is in the highest part of a small, triangular, gently sloping area on summit. In 1910 summit was covered with heavy growth of lantana. Approached by a very short and comparatively easy but quite steep trail leading up one of the spurs running off to the northeast. Station marked by cross in brass rod in cylindrical concrete post 6 by 24 inches set flush with surface of ground and wedged in with stones. Three reference marks set in 1910 were as follows: No. 1, black bottle set in ground with neck projecting 1 inch and protected by three stakes; it is 35.4 feet south of the station, there being a thatch shack between it and the station. No. 2, a black bottle set in ground with neck projecting 1 inch and protected by three stakes; it is 21.9 feet west of station.

For notes in regard to marking of stations, see p. 139.

No. 3, a cross cut in top of a sharp stone projecting 6 inches above ground; it is 9.9 feet north of station. Two reference marks set in 1927 consisted of bronze disk reference marks set in field bowlders at the following distances and azimuths from the station: 5.692 meters (18.67 feet), 169° 00′; 4.062 meters (13.33 feet), 60° 38′.

Keopaweo (Kauai Island, L. G. Simmons, 1927).—Near eastern coast of Kauai Island, on hill of same name, about 2½ miles south of Lihue, and ½ mile directly south of point where Huleia River enters Nawiliwili Bay. A good trail leads from the mouth of the river up to the saddle of the ridge between Kalanipuu hill (at eastern end of ridge) and Keopaweo. Turn west (to right) here and proceed up to station along backbone of ridge. Station is on first prominent summit reached along this ridge. It shows up from Nawiliwili Harbor as a distinct conical peak on summit of ridge. First determined by party of C. L. Garner (1927) for hydrographic purposes and marked with "ahu" (cairn) of rocks. Redetermined in 1927 by L. G. Simmons in triangulation between Oahu and Kauai and marked according to note 2, a standard disk station mark in outcropping bedrock. Two standard reference disks, note 12a, were set as follows: No. 1 in bedrock on side of hill almost directly toward station Aahoaka, and 4.95 meters (16.2 feet) from station; No. 2 on north edge of ridge west of station, and distant therefrom 12.72 meters (41.7 feet).

Kalepa (Kauai Island, O. B. French, 1910; C. L. Garner, 1927; L. G. Simmons, 1927).—On peak at south end of a ridge along east coast of Kauai, 1½ miles northwest of Hanamaulu Bay, and just above the village of Hanamaulu. The station is in the middle of a very distinct peak which is quite rocky, but has lantana on top and grass on its sides. It is identical with the Hawaiian Government Survey station of same name. The original mark (gas pipe) was replaced in 1910 with a standard United States Geological Survey bench mark plate, set in cement. Signal pole was placed over mark and supported by "ahu" (cairn). Reference marks set in 1910 were as follows: No. 1, five nails driven in brace of post of wire fence about 100 feet distant, in azimuth 199° 07′; No. 2, cross cut in rock which projects from ground distant 9.675 meters (31.74 feet) in azimuth 347° 11′; No. 3, United States Geological Survey bench mark "706" on stone 20 feet distant in azimuth 329° 51′. This bench mark consists of a ½-inch nodule on top of stone projecting above surface; it has ring of white paint around it and is marked with letters "U. S. B. M." In 1927 reference mark No. 1 described above was not found. Two standard disk reference marks were set in 1927. One in the cross in stone of R. M. No. 2 (1910); the other in rock outcrop 4.163 meters (13.66 feet) from station in azimuth 8° 05′. Both were stamped "1927."

Kilohana (Kauai Island, O. B. French, 1910; C. L. Garner, 1927; L. G. Simmons, 1928).—In southwest Kauai, on the west rim of Kilohana Crater, about 4 miles west-northwest of Lihue, and about ¾ mile west of Eisenberg's "Mountain House." Station is on highest part of rim, and at top of steep slope. Reached from Lihue by road leading up to and past the "Mountain House," and from Koloa by road leaving main road about 1 mile east of "Half Way Bridge." In 1928 old trail to Eisenberg's house reported as usable for cars. The old mark (gas pipe) of the Hawaiian Government Survey was replaced in 1910 by a standard bronze bench mark disk of the United States Geological Survey set in a 10-inch concrete cylinder projecting 1 inch above the ground. In 1928 the only 1910 reference mark remaining was a group of 5 nails driven in a blaze in a 10-inch tree, 40 meters west of station. Its azimuth from the station is 51° 08′. Two other reference marks were placed in 1927, consisting of standard disk reference marks in bowlders at the following distances and azimuths from the station: 13.28 meters (43.6 feet), 329° 09′; 12.88 meters (42.3 feet), 102° 41′.

Kai (Kauai Island, O. B. French, 1910).—On Hokulei Peak, a prominent peak on the southeast coast of Kauai, and about 3 miles southwest of Nawiliwili. Station is at the west end of the open space on the summit and overlooks the Huleia River, Grove farm, and Kipu Kai. It is approached by a trail leading up the ridge from the mouth of the Huleia River and thence along the ridge past Hokunui. Marked by a brass bolt in the center of circular concrete pier, 6 inches by 2 feet in size, with top flush with surface of ground. Three reference marks consist of bottles set in ground with 2 inches of neck projecting.

Kauai south base (Kauai Island, O. B. French, 1910).—In southeastern Kauai, in a pasture about 2 miles southwest of Nawiliwili and ½ mile north of the Huleia

For notes in regard to marking of stations, see p. 139.

River, at top of a steep grassy slope running back from the river, 2½ meters from wire fence between pasture and cane field, about 200 meters from road, and 300 meters from fork in road. Marked by subsurface mark consisting of a 20d nail set in a cylindrical block of concrete 8 by 8 inches molded in place. Top of concrete is about 2.4 feet below surface. Surface mark is a ½-inch brass bolt with cross in top set in a block of concrete which was molded in a 7-inch by 2-foot joint of stovepipe. Top of pipe a little below surface, but mortar and cement continued to surface. Bolt projects ¼ inch. Reference marks were as follows: No. 1, five nails driven in a post, four as a square with fifth in center, 25 meters, 40° 20′; No. 2, five nails driven in fence post, 35 meters, 212° 10′.

Kauai north base (Kauai Island, O. B. French, 1910).—In southeast Kauai, about 2 miles west of Lihue, 1 mile north of the Koloa road, and ½ mile west of the residence of A. Wilcox. Marked as follows: Subsurface mark is 20d nail set in an 8 by 8 inch block of concrete. The surface mark is separated from the subsurface mark by 1½ inches of soil. It consists of a ½-inch brass bolt with cross in top set in a block of concrete molded in joint of 7 by 24 inch stovepipe. Pipe sets a little below surface of ground and is covered over with neat cement mortar. Reference marks were as follows: No. 1 is bottle in ground with 2 inches of neck projecting set in line of wire fence and near post; it is 34.9 feet from station, in azimuth 357° 12′. No. 2 is bottle set in line of fence with 2 inches of neck projecting, 27.0 feet from station, in azimuth 204° 31′. No. 3 similar to No. 2, 10.1 feet, in azimuth 54° 36′.

Hanahanapuni (Kauai Island, O. B. French, 1910).—On a low rounded heavily wooded hill of the same name, 4 miles north of Kilohana Crater. Station is on southeast rim of large shallow crater. The station mark is a forest reserve monument of the Territorial government. It consists of a 3-inch gas pipe set in the ground and projecting 1½ feet. Fitting over this is a 4-inch pipe, 4 feet long, painted white.

Nonou (Kauai Island, O. B. French, 1910; C. L. Garner, 1927).—Near east coast of Kauai, on a conspicuous peak of same name, 1 mile north of Wailua River, on a flat spot on highest point of peak. Reached by turning west on a by-road from the main road ¼ mile north of the Wailua race track; continue by roads through cane fields to base of spur which runs out to east; cross irrigation ditch, walk through cane field, and up steep path to grove of ironwood trees. Walk on top of stone fence up hillside until ridge is reached. Clear going will will be found on ridge the rest of the way to the top. Marked by a standard United States Geological Survey bronze disk set in concrete, above which is an "ahu" (cairn). Reference marks are standard reference disks set in crosses cut in rock, at the following distances and azimuths from the station: No. 1, 9.895 meters (32.46 feet), 332° 46′; No. 2, 5.615 meters (18.42 feet), 43° 47′.

Pohakupili (Kauai Island, O. B. French, 1910).—In northeastern part of Kauai, on a very sharp peak of the same name, about 5½ miles mauka (inland) from Kealia. The peak is about ½ mile east of the main ridge of Mokuleiea Mountain hence it is not conspicuous from the coast, but is more so as one approaches it. Approached by the road from Kealia to Spalding's residence and thence through the fields by a private road which leads to the plantation power house. The trail leads off from this road ½ mile south of the power house. Station is on the middle of three large rocks, and is marked by standard United States Geological Survey bronze tablet. Reference marks are as follows: No. 1, bottle buried in ground, 10.0 feet, 80° 04′; No. 2, cross cut in face of large rock, 12.25 feet, 86° 26′; No. 3, cross cut in face of rock, 15.25 feet, 268° 01′; No. 4, bottle buried in ground, 14.25 feet, 268° 12′. The bottles were left with their necks projecting 2 inches, and have piles of small stones around them.

Kealia (Kauai Island, O. B. French, 1910).—Near the eastern coast of Kauai, about 1 mile north of Kealia Mill, on the south side of the main road, in waste land between the road and the top of the gulch, and about 100 meters from house of a Portuguese at bend in road. Station marked by 6-inch concrete cylinder with brass bolt in center. Reference marks are as follows: No. 1, five nails driven in telephone pole 5 feet from ground, and 21 feet from station in azimuth 123° 22′; No. 2, bottle set in ground with neck flush with surface and protected by 3 stakes; it is in fence line and 8.6 feet from station in azimuth 216° 25′; No. 3, bottle set in ground in fence line with neck flush with surface and protected by three stakes; it is 41.7 feet from station in azimuth 218° 37′; No. 4, bottle set in ground with neck flush with surface and protected by three stakes; it is 11.3 feet from station in azimuth 22° 48′.

For notes in regard to marking of stations, see p. 139.

Puu Ehu (Kauai Island, O. B. French, 1910; C. L. Garner, 1927).—In the northeastern part of Kauai, about 3 miles west-northwest of Anahola, and almost at the summit of the highest peak of the Anahola Mountain. The station is on a little knob which from the valley to the south seems to be the summit, but the real summit is about 100 feet to the northwest and 25 feet higher. Approached by a trail leading directly up the side of the mountain from a hou tree on the Anahola River just south of the station. Marked by a standard United States Geological Survey tablet set in cement. In 1927 reference marks Nos. 1 and 3 of 1910 were recovered. They are as follows: No. 1, bottle set in ground with neck projecting and protected by three guard stakes. It is under a leaning tree stump, and is 21.6 feet from station in azimuth 200° 58′. No. 3 is a bottle set in slope about 5 feet below station and protected by three guard stakes. Neck projects 2 inches. It is 12.4 feet from station in azimuth 60° 24′. In 1927 standard reference disks were set in rock outcrop at the following distances and azimuths from the station: No. 1, 1.873 meters (6.15 feet), 356° 54′; No. 2, 1.017 meters (3.34 feet), 306° 03′; No. 3, 1.701 meters (5.58 feet), 18° 08′.

Pinnacle (Kauai Island, O. B. French, 1910).—In northeast Kauai, at the east end of Namahana Ridge, on the westerly of two conspicuous peaks. It is not the highest peak of the ridge. The summit was cleared of underbrush (1910); the station stands near the middle. Approached by trail leading up the spur from the "mauka" (inland) end of the low ridge 1½ miles south-southwest of Kilauea and thence along the top of the main ridge. Marked by cross cut in a small rock set in the ground flush with surface. Reference marks were set as follows: No. 1, five nails driven in near the top of a 4-inch lihue stump 2 feet above ground, distant 15.4 feet in azimuth 354° 16′; No. 2, five nails driven in stump similar to No. 1, and 2½ feet above ground, 11.7 feet, 34° 59′; No. 3, five nails driven in stump similar to No. 1, and 3 feet above ground, 19.4 feet, 161° 56′.

Kilauea (Kauai Island, O. B. French, 1910; F. G. Engle, 1927).—On the northeast coast of Kauai, on a conspicuous hill about 1 mile southeast of Lae o Kilauea, and 1½ miles northeast of the village of Kilauea. The old government survey station was lost; the new (1910) station marked by a ¾-inch by 5-inch grate bar, which was replaced by the United States Geological Survey with a standard bronze disk set in concrete. Reference marks set in 1910 were as follows: No. 1, cross cut in rock about 5 feet back from edge of bluff and 44.7 feet from station in azimuth 112° 57′; No. 2, cross cut in rock at edge of bluff, 12.8 feet, 225° 43′; No. 3, cross cut in rock at edge of bluff, 19.6 feet, 284° 09′. Reference marks set in 1927 were standard reference disks in bedrock near edge of cliff and at the following distances and azimuths from station: No. 1, 6.617 meters (21.71 feet), 309° 52′; No. 2, 9.878 meters (32.41 feet), 113° 08′.

Kamoku (Kauai Island, O. B. French, 1910; C. L. Garner, 1927).—Near the northeast coast of Kauai, on a low but conspicuous round-topped hill in the land of Pilaa, about 1 mile south of the main road and 2½ miles south-southeast of Kilauea. The hill is clear except for a group of trees on top surrounding the grave of Christian H. Bertelman. The 1910 description gives the station mark as a 2-inch iron pipe projecting 1 foot above surface of ground. The 1927 description states that the station is marked by a United States Geological Survey station mark. Reference marks set in 1910 and recovered in 1927 were crosses in small stones at the following distances and azimuths from the station: 3.0 feet, 56°; 3.1 feet, 183°; and 3.1 feet, 298°. In 1927 the first two of these were found split, and a standard reference disk was set in the third mark. In 1927 a standard reference disk was set in the corner of the stone fence surrounding the Bertelman grave; it is 9.731 meters (31.93 feet) from the station in azimuth 237° 27′. The marble monument over the Bertelman grave is 9.782 meters (32.09 feet) from the station, in azimuth 207° 51′.

Hihimanu (Kauai Island, O. B. French, 1910).—On the lower Hihimanu (Kaukaopua), about 2 miles southeast of the village of Hanalei. The station is on the west point of a double summit which appears as a single one from below on account of trees and brush, and is identical with the Hawaiian Government Survey station, the original mark, a 1½-inch gas pipe, remaining in place. It projects about 1 foot above the ground. Approached by a trail leading up a spur to the northeast; this trail leaves the Hanalei valley road about ¼ mile above the Chinese temple. Reference marks are as follows: No. 1, bottle set in ground with neck projecting 2 inches, distant 27.4 feet, in azimuth 187° 15′; No. 2, bottle set in ground, with 3 inches of neck projecting, distant 20.1 feet, in azimuth 278° 41′; No. 3, bottle set in ground with 3 inches of neck projecting, distant 13.6 feet, in azimuth 58° 25′. It is near an 18-inch lihue tree.

For notes in regard to marking of stations, see p. 139.

Hanalei (Kauai Island, O. B. French, 1910; F. G. Engle, 1927).—On the north coast of Kauai, on a rounding grassy point about 2 miles northeast of Hanalei, and 2 miles north-northwest of the stables at the top of Hanalei Hill. Point is at the end of a gulch or small ravine through which a ditch has been cut, and which is crossed by a fence about ¼ mile above station. Station is identical with Hawaiian Government Survey station and was marked in 1910 by a 2-inch gas pipe driven in the ground; in 1927 a standard disk station mark was set in this pipe and a mound of rocks cemented around it. The 1910 reference marks were not recovered in 1927, but two new reference marks were set; they are standard reference disks and were set in out-cropping bedrock, as follows: No. 1, in the slope of the hill, 11.51 meters (37.8 feet) from station in azimuth 115° 45′; No. 2, near the bluff line and path leading to the station, 73.36 meters (240.7 feet) from the station in azimuth 290° 16′.

Pooku (Hanalei Latitude Station) (Kauai Island, O. B. French, 1910; F. G. Engle, 1927).—Also called Crows Nest Latitude Station. Near the north coast of Kauai, on a low flat-topped hill overlooking the Hanalei Valley, and 2 miles east of the village of Hanalei. Station is at the south edge of the practically level summit, which is overgrown with lantana and lauhala. Marked by a brick pier with hole in center. In 1927 a standard disk station mark was set in this hole. The pier is 1½ by 2½ feet in plan, and about 1½ feet above the ground. In 1927 standard reference disks were set at the following distances and azimuths from the station: No. 1, 10.345 meters (33.94 feet), 142° 15′; No. 2, 29.235 meters (95.92 feet), 136° 59′; No. 3, 17.663 meters (57.95 feet), 185° 46′.

Pali (Kauai Island, O. B. French, 1910).—In northwest Kauai, on middle of three sharp peaks at the edge of the Wainihi Pali, about ¼ mile north of the east end of the Kaunuohua Ridge. Station is on highest part of summit at its north side, and is approached by trail from east end of Kaunuohua Ridge across an open marshy spot, thence up over the first peak. These peaks along the "pali" are all covered with an exceedingly dense and tangled mat of lihue and other underbrush. Marked by a bottle set in the ground with neck flush with the clay surface from which the humus and roots have been cleared. Reference marks are as follows: No. 1, a ¾ by 15 inch iron rod driven in cleared ground, with 2 inches projecting. It is 1.6 feet from station in azimuth 177°; No. 2, similar to No. 1, distant 2.6 feet azimuth 19½°.

Wainiha (Kauai Island, O. B. French, 1910).—In northwest Kauai, on the summit of the Wainiha Pali called Palikea, at the point where the "pali" turns sharply from a northeasterly direction to north, just above the power house. Station is in the middle of a small rounding bushy summit; there is another summit of same elevation 50 or 75 meters to the north which has a conspicuous tree on it. Approached down the "pali" from the east end of the Kaunuohua Ridge (Station *Pali*); very difficult. There is also said to be an old native trail leading up the "pali" from the power house. Station marked by bottle set in ground with neck flush with surface. Reference marks were set as follows: No. 1, lihue stump, 3 inches diameter, 2½ feet high, approximately west, 2.2 feet; No. 2, lihue stump, 3 inches diameter, 2½ feet high, approximately east, 2.7 feet.

Ex (Kauai Island, O. B. French, 1910).—On a hill in the middle of the Na Pali district, and about 2 miles north of Pihea. From this hill the ridge drops abruptly some 500 feet, then continues out at this lower level for a mile or so to the pali at the coast. Station is on the highest and most northern part of the summit, and is about 25 meters north of spot of bare soft red rock. It is approached by the trail from the Kaunuohua Ridge leading down to and past Na. Marked by a bottle set in the clay from which the top soil has been stripped. Reference marks are as follows: No. 1, iron rod, ¾ by 15 inches, driven in cleared earth with 2 inches projecting, distant 2.8 feet, in azimuth 105°; No. 2, 5 nails driven in the top of an 8-inch lihue stump, 3 feet high, distant 6.6 feet, in azimuth 198°; No. 3, iron rod ¾ by 15 inches, driven in cleared earth with 2 inches projecting, distant 2.8 feet, in azimuth 15°.

Pihea (Kauai Island, O. B. French, 1910; F. G. Engle, 1927).—In northwest Kauai, on the most westerly of the three peaks called Pihea, at the northwest end of the Alakai Swamp. It is about 6 miles from the Puu Ka Pele, from which the three summits appear as one. The summit was originally timbered but in 1910 was cleared. In 1927 the trees and brush were cleared off in the directions of stations *Hale* and *Kala*. Pihea is reached by taking the trail to Kalalau Lookout; a trail was then cut eastward and then northeast along the Kaunuohua Ridge. The last 2 miles are extremely bad going. Marked by a ¾ by 15 inch iron rod, driven flush with ground. In 1927 a standard disk station mark was

For notes in regard to marking of stations, see p. 139.

set directly above this iron rod in a cement mound. Reference mark No. 1, 1910, is lost. Other reference marks are as follows: No. 2, a ¾ by 15 inch iron rod driven in the ground with 2 inches projecting, and protected by three guard stakes, is 1.574 meters (5.16 feet) from station in azimuth 310° 20′; No. 3, a ¾ by 15 inch iron rod driven in the ground with 2 inches projecting, is close to a lihue stump and is protected by three guard stakes. It is 1.371 meters (4.50 feet) from station, in azimuth 22° 53′.

Kalalau (Kauai Island, O. B. French, 1910).—On northwest coast of Kauai, on Mount Alealau, on a very bold point at the "makai" (seaward) end of the "pali" which runs along the east side of the Kalalau canyon. Approached by a trail along the "pali" from Pihea. Station is on highest point of summit and was marked by a ¾ by 15 inch iron rod driven into the solid earth. Reference marks were as follows: No. 1, a bottle buried with 1½ inches of neck projecting; it is alongside lihue stump and is protected with guard stakes; it is 7.1 feet from station in azimuth 351° 10′; No. 2, a cross cut in soft rock which outcrops on the slopes, 8.7 feet, 82° 39′; No. 3, cross cut in soft surface rock (similar to No. 2), 18.1 feet, 216° 57′; and No. 4, cross cut in soft rock (similar to No. 2), 20.3 feet, 234° 44′.

Na (Kauai Island, O. B. French, 1910).—In northwest part of Kauai, on a low summit of the ridge which runs north through the Na Pali district. Approached by a trail leading along the ridge over numerous hills from the main trail along the Kaunuohua Ridge; the trail leaves this latter on the easterly of the three summits called Pihea about 250 meters east of the station. Station marked by a ¾ by 15 inch iron rod driven flush with the surface of the ground (clay), from which moss, roots, and humus had been stripped. Reference marks were established as follows: No. 1, iron rod ¾ by 15 inches driven into cleared ground with 2 inches projecting; it is 1.3 feet from station, in azimuth 225°; No. 2, nail driven into a nearly vertical cut in large lihue root at edge of cleared spot, 3.5 feet, 91°; No. 3, five nails driven into smoothed-off top of 10-inch lihue stump 3½ feet from ground, 9.4 feet, 19° 59′.

Kila (Kauai Island, O. B. French, 1910).—In northwest Kauai, on Puu o Kila, a peak of the Kaunuohua Ridge, about 5 miles northeast of Puu Ka Pele, from which place it shows as a rounding summit with a thin growth of tall trees which stand out against the sky. Station is near the center of the rather flat summit. Marked by cross in top of a stone 4 by 6 by 15 inches set to project 3 inches above the surface. Just alongside and south of it is another stone 18 by 36 by 6 inches which leans against a log. Reference marks, crosses cut in rocks on surface of ground, were at the following distances and azimuths from the station: No. 1, 21.9 feet, 212° 35′; No. 2, 26.0 feet, 278° 39′; No. 3, 35.5 feet, 112° 44′.

Awaa (Kauai Island, O. B. French, 1910).—On a conspicuous peak about 1 mile northwest of Puu o Kila, and northeast of Halemanu. Peak sometimes called Awaawaapuhi, from the valley of that name which is to the southwest and west. Station marked by a ¾-inch drill hole at the center of a cross in a rock which projects about 1 foot above the surface, and is about 10 meters "makai" (seaward) from the highest part of the summit. Reference marks are crosses cut in large rocks at the following azimuths and distances from the station: No. 1, cross in large outcropping country rock, 321° 09′, 27.6 feet; No. 2, cross in large bowlder, 140° 50′, 16.8 feet; No. 3, cross in flat rock which projects slightly above the surface, 223° 08′, 17.5 feet.

Lolo (Kauai Island, O. B. French, 1910).—Near northwest coast of Kauai, well out on the ridge just west of the Nualolo Canyon. Station is 5 miles from the "pali," and is close to (not identical with) the old station used by the United States Geological Survey. Approached by trail leading up over the Kaunaohua Ridge from the paddock east of Halemanu, and thence down the canyon and out the ridge. Marked by a ¾ by 15 inch iron rod driven in flush with ground. The ground is bare at this point and below. Reference marks are as follows: No. 1, cross cut in soft rock, 41.9 feet from the station in azimuth 46° 56′; No. 2, cross cut in rock on surface, 92.1 feet, 113° 27′; No. 3, cross cut in rock on surface, 30.1 feet, 274° 35′. The old geological survey station, marked by a small stone at center of "ahu" (cairn) is 17.2 feet from station in azimuth 282° 24′. In 1927, station was searched for and not found. The old reference marks, crosses cut in rocks, were recovered, but no center mark. A new station was established in this location, marked by a bowlder, and called *Lolo 2* (see description thereof).

Makaha (Kauai Island, O. B. French, 1910.)—On west side of Kauai, on a hump in the Makaha Ridge, about 2 miles west-northwest of Halemanu, and

For notes in regard to marking of stations, see p. 139.

2 miles "mauka" (landward) from the "palis" along the shore. Station is on "makai" (seaward) slope and is identical with that used by the United States Geological Survey. The point is practically bare, having only scattering bushes and a few scrubby koa trees. Approached by the trail down the Milolii Ridge. Leave this trail about ½ mile above signal and cross canyon by climbing down slide on east side and following pig trail on west. Station marked by ¾ by 15 inch iron rod driven flush with ground. Reference marks were blazes on koa trees at following distances and azimuths from station: No. 1, 41.4 feet, 265° 36′; No. 2, 39.3 feet, 280° 50′; No. 3, 71.2 feet, 45° 55′. In 1927 station was searched for and not found. Reference marks Nos. 1 and 2, blazed in trees, were found, but in bad condition. A new station was established closely in the position of the old and called *Makaha 2* (see description thereof).

Hale (Kauai Island, O. B. French, 1910; F. G. Engle, 1927).—About 2 miles north of Pele, on a peak called Halemanu, in an open space on the summit. Station marked by drill hole in center of cross on top of large bowlder. In 1927 a standard disk station mark was placed in this hole. Reference marks established in 1910 were crosses cut in bowlders. In 1927 standard reference disks were placed in each of these marks. They are at the following distances and azimuths from the station: No. 1, 3.597 meters (11.80 feet), 42° 27′; No. 2, 1.440 meters (4.72 feet), 180° 27′; No. 3, 11.496 meters (37.72 feet), 326° 54′.

Lua (Kauai Island, O. B. French, 1910).—In western part of Kauai, on a wooded hill of the same name, on the highest part and near the middle of its slightly rounding summit. Most of the trees (koa) have been cleared from the top, but those on the sides give the hill the appearance of being uncleared. Approached by cow path leading from the road to Halemanu. Marked by a ¾ by 15 inch iron rod driven flush with the ground. Reference marks were set as follows: No. 1, five nails (four in square with one at center) driven into top of a 1-inch koa stump which was previously flattened off, 29.6 feet from station in azimuth 110° 58′; No. 2, five nails (same as No. 1) driven into top of koa stump, 10.0 feet, 187° 50′; No. 3, cross cut in rock on surface, 62.4 feet, 276° 47′.

Mana (Kauai Island, O. B. French, 1910).—On west coast of Kauai, on a low sand hill 1½ miles north of the ford at the outlet to the big pond and 2 miles south of "Barking Sands." Station is on loose rocks in top of sand dune and is marked by a drill hole in flat rock. Reference marks were established as follows: No. 1, cross in rock 12.0 feet from station in azimuth 203° 40′; No. 2, cross cut in small rock 6 by 6 by 10 inches set flush with ground at edge of sod, 128.5 feet, 23° 32′; No. 3, cross in rock, 42.2 feet, 117° 26′. In 1927 station was searched for and not found. Crumbly sandstone is in the vicinity. A 2-inch iron pipe was found, and a new station established over it and called *Mana 2* (see description thereof). A standard disk station mark was placed in the pipe and it was surrounded with stones and concrete.

Opae (Kauai Island, O. B. French, 1910; F. G. Engle, 1927).—In the western uplands of Kauai, on Puu Opae. Station may be reached by traveling Knutzen's old wagon road, which starts near a shack west of the Knutzen estate and goes up the Pulehu Ridge, and ends at the new Puu Ka Pele macadam road about 1 mile south of Puu Ka Pele. With truck it is best to leave the truck where this road joins the public road, 1 mile south of Puu Ka Pele, hike along the old road to Opae, and afterwards continue south and meet the truck at the lower end of the road near Knutzen's. Station is identical with old Government survey station "Puu Opae," the original mark for which was said to be a 3-inch galvanized iron pipe set in cement and surrounded by a cairn of stones. In 1910 the mark at center was a small stone with cross in center set between four larger stones which project 8 inches above the surface. In 1927 a standard disk station mark was set directly over the cross in the center stone and three of the four surrounding stones, being recovered, were cemented into the station. In 1927 standard reference disks were cemented into the crosses in the rocks which formed the earlier reference marks. They are at the following distances and azimuths from the station: No. 1, 6.257 meters (20.53 feet), 75° 59′; No. 2, on opposite side of fence which crosses hill just south of station, 11.036 meters (36.21 feet), 355° 12′; No. 3, 3.451 meters (11.32 feet), 258° 55′.

Pele (Kauai Island, O. B. French, 1910; C. L. Garner, 1926).—In western Kauai, on the high conical peak named Puu Ka Pele, about 13 kilometers due north of Waimea. This is identical with station Puu Ka Pele of the Hawaiian Government Survey, and was marked by a 3-inch galvanized iron pipe set upright in a mass of cement, and surrounded by a cairn. In 1926 a standard triangulation disk marked "Kapele, 1926" was cemented into the pipe, and a

For notes in regard to marking of stations, see p. 139.

standard disk reference mark was set in rock outcrop 13.70 meters (4.9 feet) from the station in azimuth 143° 23′. A United States Geological Survey bench mark stamped "3655" is 7.89 meters (25.9 feet) from the station in azimuth 282° 36′.

Kokole (Kauai Island, O. B. French, 1910; F. G. Engle, 1927).—On the southwest coast of Kauai, on the sand beach, 67.78 meters (222.4 feet) back from and 5 feet above high-water mark. Center of Kokole Light is 7.556 meters (24.79 feet) from the station in azimuth 182° 48′. Station is identical with old station at this point, the original mark, a 1-inch gas pipe, being replaced in 1910 by a brass bolt with cross in top set in a 6-inch cylinder of concrete. A bronze disk set in concrete platform of lighthouse is 6.439 meters (21.13 feet) from station in azimuth 183° 59′. A 1½-inch pipe in sand dune is 14.85 meters (48.72 feet) from station in azimuth 277° 43′; and another similar mark in sand dune is distant 73.61 meters (241.5 feet) in azimuth 115° 55′. Reference mark No. 2 of 1910 was recovered in 1927; it is a 1-inch gas pipe driven into the middle of a sand dune with 6 inches projecting; its distance and azimuth from the station are as follows: 46.22 feet, 97° 51′.

Lani (Kauai Island, H. D. King, 1904; O. B. French, 1910; C. L. Garner, 1926).—In the southern part of Kauai, on Puulani, a conspicuous bare, conical red hill, about 3 miles north of Eleele. The station, which is identical with the old Hawaiian Government Survey station, is at the center of the summit, and is approached by a road leading from Hanapepe village up through the cane fields and along the edge of the gulch of the west fork of the Hanapepe River. Marked originally by a 3-inch galvanized iron pipe set in cement; re-marked by standard United States Geological Survey bronze tablet set in concrete flush with surface of ground. Reference marks are as follows: No. 1, cross cut in rock at surface, 32.8 feet from station in azimuth 316° 18′; No. 2, cross cut in rock, 60.2 feet in azimuth 193° 41′; No. 3, cross cut in rock, 28.8 feet in azimuth 261° 22′. All reference marks are some 10 feet lower than station and distances given were measured on the slope. In 1926, reference mark No. 1, or No. 3 (not known which), was re-marked with United States Coast and Geodetic Survey standard disk reference mark.

Papai (Kauai Island, H. D. King, 1904; O. B. French, 1910; C. L. Garner, 1926).—Identical with the Hawaiian Government Survey station "Puu o Papai," near the south coast of Kauai, on the west slope of Puu o Papai Crater and near its top. It is about 1½ miles "mauka" (inland) from Makaweli. Station is in a cane field, and about 100 feet west of a road which runs approximately north and south. Marked by concrete pier 10 inches square, projecting 1½ feet above ground, and centered with 1½ inch (2-inch in old description) gas pipe. Reference marks are as follows: No. 1, corner of concrete basin alongside of road and at head of wooden pipe line leading north, distant 136.1 feet on line 27° 34′ from Pohakea. No. 2, cross cut in top of large stone (3 cubic feet) lying on surface of ground, distant 27.1 feet, on line 57° 10′ from Pohakea. No. 3, five nails driven in the west side of fence post at edge of road, distant 111.5 feet, on line 98° 12′ from Pohakea. In 1926 only reference mark No. 1 was recovered.

Waimea Latitude Station (Kauai Island, O. B. French, 1910).—Station occupied by W. D. Alexander in 1903, and situated in the Waimea village, southwest coast of Kauai, at the remains of the pier occupied by the British Transit of Venus party in 1874, being due east of that pier a distance of 11.8 feet. Its recovery in 1910 is slightly uncertain, as the latitude pier was not recovered, but what presumably were the remains of the Transit of Venus pier were recovered, and latitude station reproduced therefrom, a concrete cylinder being set there with top about flush with surface.

Puolo (Kauai Island, O. B. French, 1910; C. L. Garner, 1926; K. T. Adams, 1928).—On south coast of Kauai, on Puolo Point, at the west side of Hanapepe Bay. Station is on the extreme southeast point of rocky ground, about 25 meters southwest of Hanapepe Lighthouse, near an old wall and small rectangular stone inclosure, and is about 10 meters back from and 5 feet above high water mark. Approached from Hanapepe village by the road leading south from the main road ¾ mile west of the village. This road runs along the edge of the bay but some distance back from it and ends in a trail just to the northeast of the station. Marked by a drill hole in a rock, and by an "ahu" (cairn) which was placed around the center pole. Reference marks were as follows: No. 1, cross cut in rock at surface of ground, 15.5 feet, azimuth 203° 26′; No. 2, cross cut in rock on surface, 25.1 feet, 291° 50′; No. 3, cross cut in rock on surface, 26.2 feet, 108° 50′. Near corner of old stone wall is 37.3 feet from station in azimuth 178° 16′;

For notes in regard to marking of stations, see p. 139.

the east corner of the small stone rectangular inclosure is 58.6 feet distant in azimuth 102° 14′.

Pohakea (Kauai Island, O. B. French, 1910; K. T. Adams, 1928).—In southern part of Kauai, about 4 miles northeast of Eleele, on a peak of same name. Identical with Hawaiian Government Survey station "Pohakea". There are three conspicuous treeless peaks close together at this point, the station being on the lowest and slightly flat-topped one towards the sea. Approached by a road which follows up the east side of Hanapepe Canyon from where main road turns east; a trail branching off to the right leads up the valley to within 1 mile of the station. Station marked by 2-inch gas pipe set in an "ahu" (cairn). Reference marks are as follows: No. 1, drill hole in soft rock at top of small precipice, about 15 feet from station in azimuth 357° 49′; No. 2, cross cut in soft rock at edge of precipice, about 20 feet, 104° 15′. Reported in 1928 that reference marks had been destroyed by weathering.

Nomilo (Kauai Island, O. B. French, 1910).—On south coast of Kauai, on a rounding bare hill about midway between Koloa and Eleele, and just west of the Nomilo Fishpond, which is just back of Makaokahai Point. The station is about 50 meters toward the sea from the highest point, on gently sloping ground, and is identical with the station of the Hawaiian Government Survey. Marked by a 1¼-inch gas pipe driven into the gravelly soil. Reference marks were as follows: No. 1, cross cut in outcropping rock, distant along slope from station 37.8 feet, azimuth 304° 54′; No. 2, cross cut in outcropping rock, 30.8 feet, 327° 43′; No. 3, cross cut in rock 28.7 feet, 161° 54′.

Laaukahi (Kauai Island, O. B. French, 1910).—In southern Kauai, about 2½ miles north of Koloa, on the highest peak at a sharp turn in the ridge. Station is near center of top of peak and is marked by a 3-inch gas pipe projecting 1.5 feet with an old 2 by 4 inch post alongside. These marks were set by the Hawaiian Government Survey. Reference marks are as follows: No. 1, stake with nail in top, about 13 meters from station in azimuth 44° 07′; No. 2, stake, 5 meters distant in azimuth 164° 34′; No. 3, stake, 4 meters distant, in azimuth 277° 01′.

Paa (Kauai Island, O. B. French, 1910).—In southern part of Kauai, about 2 miles southeast of Koloa, on a conspicuous round-topped hill. Identical with a Hawaiian Government Survey station, but not with their station Paa, which is on lower ground about 1 mile to the south. Hill is identified by the steel irrigation pipe line running up its north side. Station is in the lantana near the east edge of the rounding summit, and near the rim of a small crater. Approached by road to stables at foot of hill, thence by trail along pipe line. Marked by 4 by 6 inch post set in ground and projecting about 1 foot. Reference marks are stakes at the following azimuths: 133° 00′; 200° 27′; and 242° 54′.

Kawelikoa (Kauai Island, O. B. French, 1910; C. L. Garner, 1927).—On the southeast coast of Kauai, at the middle of the highest and "mauka" (landward) of the two peaks of the rocky promontory south of the land of Kipu Kai known as Lae Kawelikoa. The point is quite bare and well defined. The mark, put in by the Hawaiian Government Survey, consists of a cross cut in the top of a stone 3 by 6 by 18 inches in size (approximately) which was set in the ground like a post. In 1910 the upper part of this stone was disturbed and broken, but was repaired and reset, it is believed, within 1 inch of its original position. Reference marks were crosses cut in rocks. No. 1 is 10 feet from the station in azimuth 64° 44′; No. 2 distant 15 feet in azimuth 270° 21′. In 1927 station and reference marks found as described. A standard disk station mark was set in the old station mark, and standard reference disks added to old reference marks.

Supplementary points, east coast

Hokunui (Kauai Island, O. B. French, 1910; C. L. Garner, 1927).—In southeastern Kauai, on a very sharp conical peak on the ridge 2½ miles southwest of Nawiliwili, called Hokunui or Cone Peak. Station is at the center of sharp grassy summit, and is approached by a trail which leads up across the saddle to the ridge from the mouth of Huleia River. This trail crosses another spur and then goes up the east side of the ridge to the top and along the top to Hokunui. Station marked in 1910 by a 2-inch gas pipe and "ahu" (cairn); in 1927 a standard disk station mark was set in this pipe. The 1910 reference mark lost. In 1927 standard reference disks were set in rock outcrop at the following distances and azimuths from the station: No. 1, 2.560 meters (8.40 feet), 156° 40′; No. 2, 4.415 meters (14.48 feet), 238° 44′.

Caddie (Kauai Island, C. L. Garner, 1927).—On the eastern shore of Kauai, half way between Hanamaulu and Wailua. Reached from the main highway

For notes in regard to marking of stations, see p. 139.

by passing through the gateway of the golf links, across the links, and southeast over the sand dunes. Station is on a high sand dune next to the beach. Marked according to note 1a, standard disk in concrete post, while two reference marks, similar to the center mark (note 1a) were placed on adjacent sand dunes, at the following distances and azimuths from the station: No. 1, 13.176 meters (43.23 feet), 1° 04′; No. 2, 8.150 meters (26.74 feet), 88° 07′. These sand dunes all have some grass on them.

Polo (Kauai Island, C. L. Garner, 1927.)—On east coast of Kauai, 1 mile northeast of Wailua. Reached by going through the by-road north of Wailua race track to the stables; then turning south into the pasture. Station is located on the shore edge of the pasture several meters south of a fence surrounding a plot of trees. Marked according to note 4, standard disk in bowlder. Reference mark, note 12c, a standard reference disk in bowlder, is 9.550 meters (31.33 feet) from station in azimuth 259° 53′. The azimuth of flagstaff at the race course, distant about 100 meters, is 115° 59′.

Lia (Kauai Island, C. L. Garner, 1927).—On eastern coast of Kauai, on the headland south of the beach at Kealia, east of the main highway south of Kealia, and reached by crossing over a railway cut, on to a grassy area. Station is about 10 meters back from coastal slope. Marked according to note 2, except that the disk was a topographic mark, set in outcropping bedrock. Reference mark, standard reference disk, note 12a, in outcropping bedrock, is 6.410 meters (21.03 feet) from station in azimuth 132° 43′.

Kea (Kauai Island, C. L. Garner, 1927).—Near eastern coast of Kauai, several meters west of the town limits of Kealia, and 2 meters south of the macadam road between Kealia and Halaula. Marked according to note 4, a standard disk in bowlder. A reference mark, note 12c, standard reference disk in bowlder, is 6.022 meters (19.76 feet) from station in azimuth 309° 11′.

Drift (Kauai Island, C. L. Garner, 1927).—On the eastern shore of Kauai between Kahala Lighthouse and Kealia. It is reached by a dirt road which goes along the northern bank of the Kamalomaloo stream, leaving the main road at a point 1½ miles south of Anahola, and leading to the sea. When railroad track is reached follow it north for about ½ mile, when station will be found on a large rock outcrop between two spurs of track. Marked according to note 2, a standard disk in outcropping bedrock. Three reference marks, note 12a, standard reference disks in outcropping bedrock, were set at the following distances and azimuths from the station: No. 1, 5.450 meters (17.88 feet), 57° 07′; No. 2, 5.195 meters (17.04 feet), 301° 00′; and No. 3, 11.570 meters (37.96 feet), 175° 21′.

Ana (Kauai Island, F. G. Engle, 1927).—On eastern coast of Kauai, about ½ mile southeast of Anahola. Reached by a dirt road which branches east from the main highway at a point about 1½ miles south of Anahola and runs along the north bank of Kamalomaloo stream to a group of plantation buildings. Turn north here on a road through the cane to where it branches and crosses a ditch. The station will be found in a triangular clearing between two branches of an irrigation ditch and amid a large pile of bowlders. Marked by a standard disk in bowlder, note 4. Reference mark is a standard reference disk in a bowlder, note 12c, on the north side of culvert over ditch. It is 5.520 meters (18.11 feet) from station in azimuth 290° 41′.

Moloaa (Kauai Island, O. B. French, 1910; F. G. Engle, 1927).—On the northeast coast of Kauai, about 1 mile south of Moloaa Harbor, on level bare land at top of bluff about 100 feet high, 100 feet back from edge of bluff, and 150 feet from high-water mark. Ground about station is covered with irregular chunks of lava. Approached by a road which leaves the main road at a point directly west of Papaa Harbor and winds through the lantana. Station marked by a United States Geological Survey bench mark, marked 223 feet above sea level. In 1927 three bronze reference disks were set in large rocks on the edge of the cliff. Nos. 2 and 3 are placed in crosses cut in rock at top of bluff, on the slope between level ground and top of bluff, and not likely to be disturbed by cultivation. These crosses were reference marks established in 1910. The following are the distances and azimuths to the reference marks from the station: No. 1, 46.520 meters (152.62 feet), 136° 33′; No. 2, 41.445 meters (135.97 feet), 152° 39′; No. 3, 37.785 meters (123.97 feet), 221° 58′.

Papaa (Kauai Island, F. G. Engle, 1927).—On northeast coast of Kauai, on a very large rock outcrop, located on washed-out ground, 20 meters east of a grassy meadow, and south of Papaa Bay. Reached by taking a road on the south side of the gulley to Papaa Bay, alongside pineapple fields to a meadow; go through fence, across meadow, to shore. Marked according to note 2, standard disk in

For notes in regard to marking of stations, see p. 139.

outcropping bedrock. Reference mark, note 4, a standard reference disk in bowlder, is 11.390 meters (37.37 feet) from station in azimuth 214° 30′.

Pine (Kauai Island, F. G. Engle, 1927).—On the northeast coast of Kauai on the north side of Moloaa Bay. Reached by a road starting at the top of the grade on the main highway north of the valley of Moloaa stream. This road passes three pineapple fields down a plateaulike point to lantana land. Follow south edge of this lantana land along a border of ironwood trees to the point. The station is beyond the ironwood trees on eroded land. Marked according to note 4, standard disk in bowlder. Reference marks, note 12c, standard reference disks in bowlders, are at the following distances and azimuths from station: No. 1, 12.835 meters (42.11 feet), 336° 51′; No. 2, 7.498 meters (24.60 feet), 252° 58′.

Ruddy (Kauai Island, F. G. Engle, 1927).—On northeast coast of Kauai and reached by taking a road north from the main highway in the Waipake district, and on the east side of Waipake stream. At the end of the road continue north along the high ground, and about ⅕ mile from the sea cross the valley and stream and continue north to a red eroded point. Station marked according to note 2, a standard disk in outcropping bedrock. Reference marks, standard reference disks in outcropping bedrock, note 12a, are at the following distances and azimuths from the station: No. 1, 6.499 meters (21.32 feet), 139° 02′; No. 2, 13.325 meters (43.72 feet), 193° 39′; No. 3, 12.955 meters (42.50 feet), 261° 52′.

Long gray shed, west gable (Kauai Island, C. L. Garner, 1927).—On eastern coast of Kauai; the west gable of a long shed located in old construction camp near outer breakwater, Nawiliwili Harbor.

Kukii Point Light (Kauai Island, F. G. Engle, 1927).—On southeast coast of Kauai, at the north side of the entrance to Nawiliwili Harbor; a pyramidal white concrete tower, about 22 feet in height.

Ninini Point Light (Nawiliwili Harbor Light) (Kauai Island, C. L. Garner, 1927; F. G. Engle, 1927).—On Ninini Point, at north side of entrance to Nawiliwili Bay, east coast of Kauai; a white mast about 30 feet high with cabin at base.

Rez (Kauai Island, C. L. Garner, 1927).—On eastern coast of Kauai, on a stone wall paralleling a road from Nawiliwili to the shore north of the lighthouse on Ninini Point, on the opposite side of the road from a reservoir, about 100 feet west of it, and on higher ground. A pole signal.

Derrick (Kauai Island, C. L. Garner, 1927).—On the east coast of Kauai, in an open pasture between Nawiliwili and Hanamaulu, the top of a tripod-masted derrick about 50 feet high. This derrick was not in operation during 1927, and being mounted on skids is liable to be shifted. Inquiry as to this should be made before using.

Flat (Kauai Island, O. B. French, 1910).—On east coast of Kauai, about 1 mile south of point on south side of entrance to Hanamaulu Bay, 10 meters back from and about 25 feet above high-water mark. Station is in middle of top of flat rock 5 by 12 feet and 3 feet high, and is marked by a drill hole in middle of cross. Reference mark is cross cut in triangular flat topped rock 20 feet to the west.

Mutual wireless pole, Lihue (Kauai Island, C. L. Garner, 1927).—In southeastern Kauai, in Lihue, near main road to Nawiliwili, the tall jointed and guyed metal pole of the Mutual Wireless Co.

Lihue mill chimney (Kauai Island, C. L. Garner, 1927).—In southeastern part of Kauai, in Lihue; the yellow brick chimney of the Lihue sugar mill.

Lihue County building flagpole (Kauai Island, C. L. Garner, 1927).—In southeastern Kauai, in Lihue, the flagstaff on the center of the front part of the county building.

Hanamaulu mill chimney (Kauai Island, C. L. Garner, 1927).—In eastern Kauai, the black metal stack on old Hanamaulu sugar mill.

Ahukini Light (Kauai Island, C. L. Garner, 1927).—On eastern shore of Kauai, at the north end of breakwater at entrance to Hanamaulu Bay, an unwatched concrete lighthouse.

Kin (Kauai Island, O. B. French, 1910; F. G. Engle, 1927).—On the east coast of Kauai on Ahukini Wharf. Station was flag nailed to west upright of mast or framework of sugar chute on wharf. In 1927 the west upright of mast or framework of sugar chute at Ahukini was still standing.

Maulu (Kauai Island, C. L. Garner, 1927).—On eastern coast of Kauai, on northeast point of entrance to Hanamaulu Bay. It is on a large flat rock outcrop about 3 feet back from bluff line, about 45 feet above sea level, and 30 feet north of shore line. Reached by truck from Hanamaulu by going east along

For notes in regard to marking of stations, see p. 139.

road past grammar school to the end at a railroad cut on north side of Hanamaulu Bay; a path continues east to a stone wall on northeast point of bay. The station is about 100 yards east of this wall and near a grove of trees. Marked according to note 2, a standard disk in outcropping bedrock. Reference marks set according to note 12, standard reference disks, were in large rock outcrops several feet above the surrounding ground. They are at the following distances and azimuths from the station: No. 1, 6.815 meters (22.36 feet), 127° 59′; No. 2, 4.336 meters (14.23 feet), 178° 38′.

Han (Kauai Island, O. B. French, 1910).—On east coast of Kauai, on rounding point at north side of entrance to Hanamaulu Bay, about 15 feet back from and 10 feet above high-water mark. Marked by ¾-inch drill hole near outer end of flat topped rock, 7 by 10 feet in size. The station is 3.2 feet west of flag No. 2 of Moraine's survey of Hanamaulu Bay.

Fen (Kauai Island, O. B. French, 1910).—On east coast of Kauai, about 1 mile north of Hanamaulu Bay, and near the mouth of a small stream, on sand beach, about 25 feet back from and 3 feet above high-water mark. Marked by pole signal. Reference mark a stake in small sand mound 18.1 feet south of signal.

Wai (Kauai Island, O. B. French, 1910).—On the east coast of Kauai, about 2 miles north of Hanamaulu Bay, 15 feet back from and 2 feet above high-water mark. Marked by fence post. Reference marks are as follows: No. 1, five tacks, four as a square with fifth at center, in the top of a sawed-off 8 by 8 inch post, 7.7 feet southeast ("makai"); No. 2, stake with galvanized nail projecting 4 inches above top of sand dune, 56.4 feet northwest ("mauka").

Dun (Kauai Island, O. B. French, 1910).—On east coast of Kauai, about 2½ miles north of Hanamaulu Bay. Station consists of 6-foot pole nailed to fence post on sand dune about 50 meters back from and 15 feet above high-water mark. It is near "makai" (seaward) end of fence running east from main road, at a point near two Japanese houses called Kahaluu. Reference mark is a stake projecting 3 inches above top of dune, and 13.1 feet northeast of station.

Rain (Kauai Island, O. B. French, 1910).—On the east coast of Kauai, about 2½ miles above Hanamaulu Bay, on a dune about 25 meters back from and 20 feet above high-water mark. Marked by stake, with three stakes for reference marks as follows: 13.5 feet northwest; 11.6 feet northeast; 14.0 feet southwest.

Din (Kauai Island, O. B. French, 1910).—On the east coast of Kauai, 2 miles southeast of Nonou, 50 meters back from and 20 feet above high-water mark, and at the outer end of the most northerly of four large piles of stones which extend out from a stone wall in front of a cane field. Marked by cross in 1 foot cube of rock.

Aahoaka (Kauai Island, C. L. Garner, 1927).—In eastern part of Kauai, on the highest point of an isolated cone-like hill south of the Wailua railroad, and 2 miles inshore. Marked by a pole.

Har (Kauai Island, O. B. French, 1910).—On the east coast of Kauai, on a high point of shore line ½ mile north of Wailua River, and 200 meters east of north end of coconut grove. It is in a pasture and about 20 meters back from and 20 feet above high-water mark. Marked by a cross cut in a flat rock. Reference mark 5 nails driven into top of fence post 34 meters northeast.

Race (Kauai Island, O. B. French, 1910).—On the east coast of Kauai, near the southeast corner of the old Olohena race track just below Waipouli. Station is a furlong post, 4 by 4 inches by 9 feet. A similar post exactly opposite and on the inside of the track was marked by four nails as a square with a fifth nail in the center. In 1927 it was reported that the post had rotted away and the post itself found lying close to its original position. The reference mark was found as described.

Ol (Kauai Island, O. B. French, 1910).—On the east coast of Kauai, near the village of Waipouli, and just back (south) of Japanese temple. Marked by flagpole nailed to fence post 8 meters back from and 2 feet above high-water mark. Reference marks are five nails in the top and near side of two posts of a hitching rack distant 8 and 10 meters north-northwest (approximate). In 1927 station could not be identified. An old fence stands in this vicinity, but there is no hitching rack there now, and none of the present Hawaiian residents remember there ever having been one.

Hen (Kauai Island, O. B. French, 1910).—On the east coast of Kauai, halfway between the villages of Waipouli and Kapaa, and about 1 mile south of the brick chimney at Kapaa. It is at the "makai" (seaward) end of a board fence running east from the main road, and about ½ mile above Japanese temple.

For notes in regard to marking of stations, see p. 139.

Marked by signal pole nailed to fence post. Reference mark is stake with nail in top, projecting 6 inches above ground, and 10 meters distant on line with brick chimney.

Kap (Kauai Island, O. B. French, 1910).—On the east coast of Kauai, near the village of Kapaa, ¼ mile below landing, and ½ mile south of brick chimney. Marked by signal pole. Reference mark a stake about 5 meters distant in line with Nonou. In 1927 station was searched for and not found.

Kapaa, west tin stack (Kauai Island, C. L. Garner, 1927).—At Kapaa, eastern shore of Kauai; the western of two small sheet metal stacks on roof of a pineapple cannery.

Kapaa derrick (Kauai Island, O. B. French, 1910; C. L. Garner, 1927).—On eastern shore of Kauai, at Kapaa; the mast of a derrick on an abandoned wharf. Identical with *Kapaa Landing derrick, 1927.*

Kapaa, gray chimney (Kauai Island, O. B. French, 1910; C. L. Garner, 1927).—At Kapaa, eastern coast of Kauai; a large gray brick chimney, the only part left of an old mill. Identical with station *Stack, 1910.*

Gas (Kauai Island, O. B. French, 1910).—On east coast of Kauai, 1 mile below Kealia, on the outer end of a sharp point, just south of mouth of stream. It is 10 meters back from and 20 feet above high-water mark. Marked by 1½-inch gas pipe set in ground, and projecting 6 inches. In 1927 station was searched for and not found.

Kealia gray chimney (Kauai Island, O. B. French, 1910; C. L. Garner, 1927).—On eastern coast of Kauai, in Kealia; a gray brick chimney located in the back of and at the same sugar mill as *Kealia black chimney.* Identical with *Masonry chimney, 1910.*

Kealia black chimney (Kauai Island, O. B. French, 1910; C. L. Garner, 1927).—On eastern coast of Kauai, in Kealia, the large black metal stack on a sugar mill. Identical with *Steel stack, 1910.*

Pal (Kauai Island, O. B. French, 1910).—On east coast of Kauai, about ½ mile northeast of Kealia Landing, at the top of a steep rocky slope, 20 meters back from and 40 feet above high-water mark. Marked by pole set against large rock and braced by pile of rocks wedged against another rock below. It is midway between crosses cut in upper and lower rocks. Station is about 30 meters from fence to west, and about 50 meters from end of this fence at railroad. In 1927 station was searched for and not found.

Lik (Kauai Island, O. B. French, 1910).—On east coast of Kauai, on a rounding point ¾ mile northeast of Kealia Landing, about 100 meters northeast of wooden railway bridge, and 25 meters southwest of railway switch. Station is 30 meters back from and 15 feet above high-water mark. Marked by signal pole nailed to fence post into which were driven 4 nails in form of square with a fifth nail at its center. Reference mark is two crosses in small rock (2 cubic feet) at top of railway cut and 14 meters south-southwest from station. In 1927 station was searched for and not found. Land is washed out where reference mark stood.

Kahala light (Kauai Island, F. G. Engle, 1927).—On the east coast of Kauai, on the southeast side of Anahola Bay, and about 40 feet above high water, a white, pyramidal skeleton tower 18 feet high.

Prominent Peak (Prom) (Kauai Island, F. G. Engle, 1927).—In northeastern part of Kauai, a prominent, pinnacle, conelike peak, about ½ mile north of Kikoo. To a ship unfamiliar with Kauai, and sailing along its north coast, *Prom* is likely to be confused with Puu Konanae.

Wal (Kauai Island, O. B. French, 1910).—On northeast coast of Kauai, near north point (Kuaehu) of Anahola Bay, back from the brow of the bluff. This is a Hawaiian Government Survey point. Marked by flag in "ahu" (cairn) of rock. In 1927 station was searched for and not found. A single rock with drill hole in top and an arrow on one face was found It was loose in position.

Eat (Kauai Island, O. B. French, 1910).—On northeast coast of Kauai, at the top of bluff on a rounding point 1½ miles northwest of Kahala Point. Marked by flag in pile of rocks. In 1927 station was searched for and not found. There is no pile of rocks in the vicinity.

Pap (Kauai Island, O. B. French, 1910).—On east coast of Kauai, on the point southeast of Papaa Harbor. Marked by pole in crack between two rocks at top of slope. In 1927 station was searched for and not found.

Dan (Kauai Island, O. B. French, 1910).—Flag in pile of rocks at top of bluff north of entrance to Papaa Harbor, northeast coast of Kauai.

Mol (Kauai Island, O. B. French, 1910).—Flag in "ahu" of rocks on bare point at east side of Moloaa Bay.

For notes in regard to marking of stations, see p. 139.

Lom (Kauai Island, O. B. French, 1910).—On northeast coast of Kauai, on point northwest of Moloaa Bay.

Tan (Kauai Island, O. B. French, 1910).—On northeast coast of Kauai, on point 1½ miles northwest of Moloaa Bay, a fence post.

Supplementary points, north coast

Kilauea landing stack (Kauai Island, O. B. French, 1910; F. G. Engle, 1927).—On northeast coast of Kauai, at Kilauea Landing. Station is black iron stack of hoisting engine on wharf.

Crest (Kauai Island, F. G. Engle, 1927).—On the north coast of Kauai, on the west side of Kalihiwai Bay, about 1 mile northwest of the village of Kalihiwai. Station is about 200 feet above high water on brow of hill with grass covered top. Approached by a paved road which leaves the main highway on the west side of the bay and parallels the coast. Marked by a standard station disk cemented in a 1½-inch pipe driven flush with the ground. Three reference marks, note 12c, standard reference disks in bowlders, were set at the following distances and azimuths from the station: No. 1, 13.13 meters (43.1 feet), 121° 18′; No. 2, 8.05 meters (26.4 feet), 74° 47′; No. 3, 11.37 meters (37.3 feet), 193° 28′.

Roan (Kauai Island, F. G. Engle, 1927).—In northern part of Kauai, on a sharp knob on the western of two ridges which run in a general northeasterly direction from the mountains, about 2 miles southeast of the village of Hanalei, and approximately two-thirds of the distance to the top of the ridge. From the east, the station appears as a red knob. Approached from the Hanalei valley road which leaves the government highway on the south side of the Hanalei River bridge. A trail leads from the Chinese cemetery up the western ridge. Marked by a standard disk station mark cemented in the top of a 1½-inch gas pipe projecting about ½ foot above surface of ground. Reference marks are standard disks cemented in bottles, set at the following distances and azimuths from the station: No. 1, 3.01 meters (9.9 feet), 201° 03′; No. 2, 4.04 meters (13.2 feet), 358° 53′.

Cam (Kauai Island, F. G. Engle, 1927).—On north coast of Kauai, eastern side of Hanalei Bay, on a point called Puu Poa about 1 mile north of the village of Hanalei. Station is about 140 feet above high water, the ground dropping off abruptly to the water. Approached to within a half mile by a road which branches off from the government highway about 1 mile east of the village of Hanalei, or it may be reached by following up the coast from the mouth of the Hanalei River. Marked according to note 4, a standard disk in bowlder. Two reference marks were set, note 12c, standard reference disks in bowlders, at the following distances and azimuths from the station: No. 1, 4.07 meters (13.4 feet), 69° 44′; No. 2, 4.29 meters (14.1 feet), 188° 27′.

Hinihini (Kauai Island, O. B. French, 1910; F. G. Engle, 1927).—Identical with the Hawaiian Government Survey station on Puu Hinihini, on the summit at the "makai" (seaward) end of a ridge, between the lands of Waipa and Lumahai; about ½ mile west of Hanalei Bay and 2 miles west of the village, from which it may be seen very plainly. Marked by a 1½-inch gas pipe driven in the ground. Reference marks are as follows: No. 1, bottle set in ground with neck projecting 2 inches, distant 15.6 feet in azimuth 328° 55′; No. 2, bottle set in ground with neck projecting 2 inches, distant 14.7 feet, in azimuth 167° 50′; No. 3, bottle set in the ground with 2 inches of neck projecting, distant 23.4 feet, azimuth 226° 25′. In 1927 the station mark and all reference marks were recovered as described. A standard disk station mark was cemented in the iron pipe marking the station.

Niha 2 (Kauai Island, F. G. Engle, 1927).—On north coast of Kauai, on west side of Wainiha Bay, on a sandy point named Kepuhi, about 1 mile northwest of the village of Wainiha, and ¼ mile from the government highway. Station is about 10 meters from high-water line and is marked by a standard disk station mark driven in the top of a wooden post which projects 1 foot above surface. Reference mark No. 1 is a standard disk set in top of a wooden post which projects 1 foot above ground; it is 5.626 meters (18.46 feet) from station in azimuth 148° 26′. Reference mark No. 2, a standard reference disk in bowlder, note 12c, is 3.934 meters (12.91 feet) from station in azimuth 253° 46′.

Log (Kauai Island, O. B. French, 1910).—On northeast coast of Kauai, about ¾ mile east of Kilauea Landing. Marked by stake.

For notes in regard to marking of stations, see p. 139.

Kilauea light (Kauai Island, F. G. Engle, 1927).—On northeast corner of Kauai, on Lae o Kilauea, a bluff rock point. Lighthouse is a white conical tower about 50 feet high. Light is about 216 feet above high water.

Kil (Kauai Island, O. B. French, 1910).—On the northeast coast of Kauai, on Lae o Kilauea, very close to the proposed location of lighthouse. Station is old survey station and is marked by 1-inch gas pipe.

Cane (Kauai Island, O. B. French, 1910).—Flag on point, ½ mile west of Kilauea.

Wait (Kauai Island, O. B. French, 1910).—On north coast of Kauai, on a conspicuous point about 1½ miles east of the top of the bluff where the road enters the deep cut at the top of the hill east of Kalihiwai.

Kilauea mill chimney (Kauai Island, F. G. Engle, 1927).—In northeastern part of Kauai; a black steel stack at the Kilauea sugar mill.

Cut (Kauai Island, O. B. French, 1910).—At top of bluff where the road enters the deep cut at the top of the hill east of Kalihiwai Bay. Center marked by stone 8 inches square with cross in top. This is one of the old boundary monuments.

Honono (Kauai Island, F. G. Engle, 1927).—On the north coast of Kauai, about midway between Kalihiwai and Hanalei Bays, on a promontory near the sea named Ka lae Honono. The top is covered with brush and is about 190 feet above high water. Station approached by a paved road which leaves the main highway on the west side of Kalihiwai Bay and parallels the coast. Station is approximately ½ mile west of church. Marked according to note 4, a standard disk in bowlder. Reference mark No. 1, a standard reference disk in concrete block, note 11a, is 2.09 meters (6.9 feet) from station in azimuth 19° 24′. Reference mark No. 2 is a standard disk cemented in a 1½-inch gas pipe driven flush with ground. It is 3.55 meters (11.6 feet) from station in azimuth 221° 27′.

Cres (Kauai Island, O. B. French, 1910).—Flag on conspicuous rocky point (Honono Point) 2 miles east of Hanalei, at the south end of a crescent shaped bight in the shore. The pole was wedged into the crack in a large rock near the brow of the point.

Lan (Kauai Island, O. B. French, 1910).—On north coast of Kauai, on Lae o Kaweonui. Center marked by stake driven in ground in the lantana.

Mc (Kauai Island, O. B. French, 1910; F. G. Engle, 1927).—On the north coast of Kauai, on a bluff about 1 mile north of and overlooking the village of Hanalei; on the north side of the mouth of Hanalei River, on a ridge which runs in an east and west direction, and about 115 meters west of a lone house on the ridge. The mark found in 1927 was a 1-inch square wooden stake, over which a flag was erected. This is a survey mark used by local surveyors. No marks were set in 1927.

Derrick (**Der**) (Kauai Island, F. G. Engle, 1927).—On north coast of Kauai Island, eastern side of Hanalei Bay; the upright part of the derrick on the outer end of the concrete dock.

Ware (Kauai Island, O. B. French, 1910).—On the north coast of Kauai, a whitewashed square warehouse at the landing at Hanalei.

Staff (Kauai Island, F. G. Engle, 1927).—On the north coast of Kauai, on east side of Hanalei Bay, east of the road leading to wharf. Station is large white flagpole on property of A. S. Wilcox.

Dev (Kauai Island, O. B. French, 1910).—On a dune in front of the hotel at Hanalei, and about 5 meters from high-water mark. Marked by a stake.

Black flagpole (Kauai Island, F. G. Engle, 1927).—On north coast of Kauai, on east side of Hanalei Bay, a black jointed flagpole.

Wes (Kauai Island, F. G. Engle, 1927).—On north shore of Kauai, on west side of Hanalei Bay, on a knoll covered with grass and brush. Station is about 1½ miles northwest of the village of Hanalei, and is between the government highway and the coast. Marked according to note 4, a standard disk in bowlder. Reference marks, note 12c, standard reference disks in bowlders, were set at the following distances and azimuths from the station: No. 1, 3.54 meters (11.6 feet), 294° 36′; No. 2, 5.44 meters (17.8 feet), 335° 47′; No. 3, 6.42 meters (21.1 feet), 31° 25′.

West (Kauai Island, O. B. French, 1910).—On north coast of Kauai, on a sharp nose at the west side of Hanalei Bay, 75 feet above the water. Marked by stake.

East (Kauai Island, F. G. Engle, 1927).—On the north coast of Kauai, on east side of Wainiha Bay, between the bay and Lumahai River, on Lae o Kolokolo, on a red bluff about 100 feet above high water. Approached from the government highway on the west side of the river. Marked by a standard disk station

For notes in regard to marking of stations, see p. 139.

mark cemented in a 1½-inch gas pipe which projects about 1 foot above surface of ground. Reference mark No. 1, standard reference disk in concrete block, note 11a, is 6.145 meters (20.16 feet) from the station in azimuth 323° 24′. Reference mark No. 2 is a standard disk cemented in a 1½-inch gas pipe driven flush with ground. It is 6.495 meters (21.31 feet) from station, in azimuth 241° 51′.

Niha (Kauai Island, O. B. French, 1910).—On north coast of Kauai, on a sandy point 1 mile northwest of Wainiha Landing, and 5 meters from high-water mark. Marked by pole set alongside local land boundary monument.

Tit (Kauai Island, F. G. Engle, 1927).—On north coast of Kauai, a high tit on the seaward end of a prominent ridge about midway between Wainiha Bay and Kailiu Point. The point is easily seen from Hanalei Bay, but fades into background when directly offshore from station. Not marked.

Flat (Kauai Island, F. G. Engle, 1927).—On northwest coast of Kauai, the highest part of the rounding top of a prominent peak just back of Kailiu Point. It is the outer peak on the seaward end of the ridge. Determination shows it to be the peak on which station *Makana 1910* is located. Peak was located as a hydrographic signal, and no marks placed.

Kailiu (Kauai Island, F. G. Engle, 1927).—On northwest corner of Kauai, on Kailiu Point, on top of a sandy, grass-covered mound near high-water line. Station is on highest point, near western end of sandy point, and not far from the beginning of the napali or cliff coast. There are some houses about 100 meters inshore from station. Station marked by oval-shaped stone partly embedded in sand. Reference marks, note 12c, standard reference disks in bowlders which are partly embedded in sand, are at the following azimuths from station: No. 1, 24° 29′; No. 2, 76° 09′.

Supplementary points, west coast

Lolo 2 (Kauai Island, F. G. Engle, 1927).—Near northwestern coast of Kauai, on ridge just west of the Nualolo Canyon, 5 miles from the "pali," and close to but not identical with the old station used by the United States Geological Survey. Station is very close to location of old station *Lolo 1910*, the center mark of which had been destroyed, but the reference marks recovered, though they had apparently suffered some very slight displacement. Station is in small plot of grass; the surrounding ground has been eroded. Reached by the Nualolo trail over the Kaunuohua Ridge; this trail is marked and kept up by the forest rangers. Marked according to note 4, standard disk in bowlder. Reference marks are standard reference disks (note 12c) set in the cross reference marks of 1910. These are at the following distances and azimuths from the station: No. 1, in soft rock, 12.743 meters (41.81 feet), 49° 54′; No. 2, in soft rock, 28.100 meters (92.19 feet), 114° 07′; No. 3, in rock on surface, 9.172 meters (30.09 feet), 272° 22′. The old Geological Survey station, marked by a small stone at center of "ahu" (cairn) is 17.2 feet from station in azimuth 282° 24′.

Maka (Kauai Island, F. G. Engle, 1927).—On the west coast of Kauai, on the shingle beach at Makaha Point. Best reached by small boat in smooth weather. In rougher weather a landing can be made in the lee of a shelf 1½ miles northeast of Makaha Point. Marked according to note 5, a standard disk in concrete in bowlder. Two reference marks, note 12c, standard reference disks in bowlders, are at the following distances and azimuths from station: No. 1, 16.85 meters (55.3 feet), 277° 36′; No. 2, 14.65 meters (48.1 feet), 333° 49′.

Makaha 2 (Kauai Island, F. G. Engle, 1927).—In western part of Kauai, on a hump in the Makaha Ridge about 2 miles north-northwest of Halemanu and 2 miles "mauka" (inland) from "palis" along shore. The point is practically bare. It is reached by taking a trail which leaves the main road about ¼ mile southwest of Hale. Take first fork to the left and continue down the Makaha Ridge. Do not take Milolii trail. Station is close to location of station *Makaha* of 1910, the center mark of which was not recovered. Marked according to note 4, standard disk in bowlder. There are five reference marks, Nos. 1, 2, and 3 being standard reference disks in bowlders, note 12c, at the following distances and azimuths from the station: No. 1, 2.847 meters (9.34 feet), 288° 21′; No. 2, 2.770 meters (9.09 feet), 2° 44′; and No. 3, 7.864 meters (25.8 feet), 113° 44′. Nos. 4 and 5, identical with reference marks Nos. 1 and 2 of the 1910 station, are blazes on koa trees at the following distances and azimuths from the station: No. 4, 41.30 feet, 263° 27′; No. 5, 39.25 feet, 277° 39′.

For notes in regard to marking of stations, see p. 139.

Kalolo (Kauai Island, F. G. Engle, 1927).—On western coast of Kauai, on a dune of the Lapa Dunes. It is reached by following the road past the Barking Sands, northeast through the pasture lands and cane fields as far as it goes. Station is about 50 meters from this road. It is marked by a 2-inch pipe set in a mass of concrete and rocks. A reference mark, note 11c, standard reference disk in concrete mass, was set 8.752 meters (28.71 feet) from station in azimuth 211° 29′.

Cavern (Kauai Island, F. G. Engle, 1927).—On the western coast of Kauai, about 1½ miles northeast of Barking Sands, in a black rock outcrop in a group of large black rocks on a hillside. It is 50 feet above and southeast of a burial cave in the hillside. It is reached by taking the road just inshore from the dunes of the Barking Sands northeast, crossing the railroad tracks and continuing to a reservoir and group of shacks. The station is a short climb from this reservoir. Marked according to note 2a, a standard disk in outcropping bedrock surrounded by a chiseled triangle. A reference mark, note 12c, standard reference disk in bowlder, was set 6.875 meters (22.56 feet) from the station in azimuth 214° 06′.

Nohili 2 (Kauai Island, F. G. Engle, 1927).—On the western coast of Kauai, on the highest point of the Barking Sands. Station is reached by the Barking Sands road from Mana; turn to the right as the shore is approached. The road leads to a pavilion at the base of the dunes of the Barking Sands; station is 300 meters north of this pavilion. Marked according to note 6a, a bronze disk being placed in a 2-inch pipe which was already in place, and a sheet iron cylinder about 8 inches in diameter placed around it and filled with concrete. Reference mark, note 13a, a standard reference disk in a tile was placed 5.717 meters (18.76 feet) from station in azimuth 31° 20′.

Mana 2 (Kauai Island, F. G. Engle, 1927).—On western coast of Kauai, 1 mile west of Mana, on a low sand hill about 150 meters south of a pasture fence and near a clump of algeroba trees. Reached by taking the Barking Sands road from Mana and turning left when the road approaches the shore. Station is 42.50 meters from mean high water. Marked according to note 6a, a standard disk being cemented into a 2-inch iron pipe which was found already in place. A pile of rocks was placed around it and the mass cemented together. The rock in which the station and reference marks were set is a light crumbly sandstone. The reference marks, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from the station: No. 1, 3.959 meters (12.99 feet), 46° 49′; No. 2, 4.335 meters (14.22 feet), 170° 46′.

Coral (Kauai Island, F. G. Engle, 1927).—On southwest coast of Kauai, in Waieli, on a sandy headland about 240 feet northwest of two abandoned concrete footings projecting into the sea, and about 200 meters northwest of the mouth of an irrigation canal. It is best reached by taking the road to Barking Sands, and when the shore is approached turning south; the road crosses the ditch at Waieli about 500 meters inshore from this station. Station is set in a mass of rocks and concrete projecting 1 foot above the ground, about 6 feet above mean sea level, and 24.3 meters inshore from mean high water. Marked according to note 1c, a standard disk in irregular mass of concrete. Two reference marks, standard reference disks in irregular masses of concrete, note 11c, were set at the following distances and azimuths from the station: No. 1, 17.350 meters (56.92 feet), 330° 04′; No. 2, 13.612 meters (44.66 feet), 272° 22′. The azimuth of a tall ironwood tree about ¼ mile distant is 266° 24′.

Thorn (Kauai Island, F. G. Engle, 1927).—On southwest coast of Kauai, 1½ miles west of Kaunalewa, in black volcanic rock, on a low sand dune about 10 feet above sea level and 100 meters inshore, in a district of rolling sand dunes, sandy pasture, and algeroba trees. There is no trail; cut across to the shore from the road which runs to Waieli. Marked according to note 4, a standard disk in bowlder.

Kala (Kauai Island, F. G. Engle, 1927).—On the west coast of Kauai, Kalalau Valley locality, about 12 feet back from bluff line, on a black rock projecting ½ foot above surface of ground. There are many large black bowlders in surrounding field. The station is reached by landing in a small boat on the sandy beach at the southeastern end of the valley, following a path northeasterly across Kalalau stream to a cabin, thence across the lantana in a northwesterly direction for about 200 meters. Station is marked according to note 3, standard disk in concrete in outcropping bedrock. Reference marks are standard reference disks (note 12c) in very large bowlders projecting about 4 feet above the ground. They are at the following distances and azimuths from the station: No. 1, 5.185 meters (17.01 feet), 243° 41′; No. 2, 4.294 meters (14.09 feet) 316° 53′.

For notes in regard to marking of stations, see p. 139.

Toe (Kauai Island, O. B. French, 1910).—On west coast of Kauai, on a knoll on sand ridge, 2½ miles northeast of Nohili, 75 meters back from, and 60 feet above high-water mark. Marked by stake.

Hon (Kauai Island, O. B. French, 1910).—On west coast of Kauai on a hill in the sand ridge about 2 miles northeast of Nohili, 100 meters back from and 75 feet above high-water mark. Marked by stake.

Mos (Kauai Island, O. B. French, 1910).—On west coast of Kauai, 1 mile northeast of Nohili, on a sand hill near the salt pond at a point in the shore line. It is 100 meters back from high-water line and 75 feet above it. Marked by stake.

Nohili (Kauai Island, O. B. French, 1910).—On west coast of Kauai, on the highest summit of the sand ridge where the shore line turns from north to northeast. The station is near the old Hawaiian Government Survey station, the 1-inch pipe marking the latter having been pulled out or undercut and drifted loose. This pipe was driven in to mark the new station. In 1910 the old Barking Sands flag was still standing on a summit about 100 meters to the south. Reference marks were set as follows: No. 1, cross cut in stone set in the sand, distance 38.8 feet, azimuth 17° 14′; No. 2, cross cut in stone set in the sand, 27.4 feet, 83° 07′; No. 3, cross cut in stone set in the sand, 20.9 feet, 207° 00′. In 1927 a 2-inch pipe found in the vicinity, but not on highest point of sand dune, proved not to be original station. No reference marks were found. A new station was established over the 2-inch pipe and called *Nohili 2* (see description thereof).

Nan (Kauai Island, O. B. French, 1910).—On west coast of Kauai, on sand dune 1 mile south of Nohili, 30 meters back from and 12 feet above high-water mark. Marked by stake.

Bull (Kauai Island, O. B. French, 1910).—On a sand hill 1 kilometer north of station *Mana*, 30 meters back from and 15 feet above high-water mark. Marked by stake.

Post 2 (Kauai Island, O. B. French, 1910).—On the western coast of Kauai, on the beach 1 mile south of Mana, 15 meters back from and 10 feet above high-water mark. Marked by an 8 by 8 inch sawed-off fence post.

Aug (Kauai Island, O. B. French, 1910).—On low dune 2 miles northwest of Kokole, 75 meters back from and 10 feet above high-water mark. Marked by stake.

Ric (Kauai Island, O. B. French, 1910).—On southwest coast of Kauai, on a dune 2 miles northwest of Kokole Light, 60 meters back from and 8 feet above high-water mark. Marked by stake.

Ken (Kauai Island, O. B. French, 1910).—On southwest coast of Kauai, on a sand dune 1¼ miles northwest of Kokole Point Lighthouse, 75 meters back from and 10 feet above high-water mark. Marked by stake.

Rope (Kauai Island, O. B. French, 1910).—On west coast of Kauai, ¾ mile northwest of Kokole Point Light, and 30 meters back from high-water line. Marked by stake.

Supplementary points, south coast

Kekaha mill chimney (Kauai Island, O. B. French, 1910; C. L. Garner, 1926; F. G. Engle, 1927).—The light colored brick chimney (in 1926 and 1927, reported painted silver color) of the sugar mill at Kekaha. Cornerstone bears date "1898."

Waimea mill chimney (Kauai Island, C. L. Garner, 1926).—On the southwest coast of Kauai, in Waimea, being the most conspicuous object there. A light colored brick chimney about 100 feet high, built in 1914. The chimney observed on in 1910 has been destroyed.

Wharf (Kauai Island, C. L. Garner, 1926).—On the south coast of Kauai, at Waimea, being the inshore gable of the shed on the wharf.

Cane (Kauai Island, C. L. Garner, 1926).—Near Waimea, about 100 yards below cane field, and 40 yards west of pipe line which runs to reservoir on slope above Waimea. Station is about 106 meters west of Signal Point. Marked according to note 3.

Flood (Kauai Island, C. L. Garner, 1926).—On the slope above Waimea, about 1 mile north by west of Waimea mill chimney, about 60 feet below Kekaha ditch, and 100 feet east of edge of gulch. Marked according to note 3.

Point (Kauai Island, C. L. Garner, 1926).—A station of the Hawaiian Territorial survey, on the edge of a bluff line overlooking Waimea Valley in southwest Kauai. Marked by ¾-inch iron pipe about 2 feet long set in cement.

Wahiawa (Kauai Island, H. D. King, 1904; O. B. French, 1910).—Near south coast of Kauai, on gently sloping ground, at the brow of a hill of the same name,

For notes in regard to marking of stations, see p. 139.

facing the sea, and 2 miles north of Nomilo. This ridgelike summit is sometimes called Puu Kapalei by the natives, and it commands an extensive view. There is a spring in a ravine about 600 feet west of the station, which is directly south of the McBryde residence. Identical with Hawaiian Government Survey station. In 1904 station reported as being marked by iron stake with three rocks each marked with a cross and each about 6 feet from the center. In 1910 the station was reported marked with a 3-inch gas pipe with fence post set alongside of it, the whole being covered by an "ahu."

Makaweli mill chimney (Kauai Island, O. B. French, 1910; C. L. Garner, 1926).—On the southern coast of Kauai, a red brick chimney, the most conspicuous object in the vicinity of Makaweli.

Nak (Kauai Island, O. B. French, 1910).—On southwest coast of Kauai, on sand dune ¾ mile east of Kokole Point Light. Marked by stake.

Kau (Kauai Island, O. B. French, 1910).—About 2 miles west of Kekaha and, 10 meters back from high-water mark. Marked by stake.

Keikei (Kauai Island, F. G. Engle, 1927).—On southwest coast of Kauai, 2 miles west of Kekaha, on a sandy hummock about 100 meters inshore, and 200 meters east of fence line and mouth of Nakeikei Elima ditch. A sandy road going through algeroba pasture lands, starting as a left-hand branch from the center of Kekaha village, passes within about 500 meters of station. Station marked by a bronze hydrographic disk wedged in a drill hole in a black rock or bowlder.

Bone (Kauai Island, O. B. French, 1910).—On small dune, 1 mile west of Kekaha, and 2 meters back from high-water mark. Marked by stake.

Oomano (Kauai Island, F. G. Engle, 1927).—On southwest coast of Kauai, in the beach settlement of Kekaha. Reached by taking the macadam road to the beach which branches off from the main highway about ½ mile east of the center of Kekaha village; when the beach is reached go east along the beach about 140 meters to the station. Station is 10.45 meters from mean high-water mark, is in a pile of limestone rock and concrete which protrudes ½ foot above the sandy soil, and is marked according to note 1c, a standard disk in irregular mass of concrete. Reference mark, note 12c, a standard reference disk in bowlder, is 11.142 meters (36.56 feet) from station in azimuth 118° 22′.

Point 2 (Kauai Island, O. B. French, 1910).—On southwest coast of Kauai, on a low flat point ¾ mile southeast from Kekaha mill, and close to high-water mark. Marked by stake.

Die (Kauai Island, O. B. French, 1910).—On sand beach, 2 miles west of Waimea, and just above high-water mark. Marked by stake.

Bat (Kauai Island, O. B. French, 1910).—On sand beach about ½ mile west of Waimea, 15 meters from high-water mark, and 10 meters from very small bathhouse. Marked by wooden stake.

War (Kauai Island, O. B. French, 1910).—On south coast of Kauai, the "makai" (seaward) gable of the Waimea wharf.

Maka (Kauai Island, O. B. French, 1910).—On south coast of Kauai, a flagpole on pier at Makaweli Landing.

Koki (Kauai Island, O. B. French, 1910).—On south coast of Kauai, on open grassy point about 1 mile west of Makaweli mill, and near high-water mark. Marked by stake.

Kani (Kauai Island, O. B. French, 1910).—On a rounding rocky point, 1½ miles southeast of Makaweli mill, 30 meters back from and 15 feet above high-water mark. Marked by drill hole in rock, and an "ahu" (cairn).

Paw (Kauai Island, O. B. French, 1910).—On southern coast of Kauai, on a rocky slope 1½ miles west of Port Allen, 15 meters back from and 15 feet above high-water mark. Marked by drill hole in rock.

Dry (Kauai Island, O. B. French, 1910).—On sand dune in bight, 1 mile west of Port Allen, 5 meters back from and 5 feet above high-water mark. Marked by stake.

Kaiole (Kauai Island, O. B. French, 1910).—Old frame house on rocky point, about 400 meters northwest of station *Puolo*, and 40 meters from high-water mark.

Bay (Kauai Island, O. B. French, 1910; C. L. Garner, 1926; K. T. Adams, 1928).—On rocky point, at west side of Port Allen, 10 meters back from and 5 feet above high-water mark. Marked by drill hole in rock, and small "ahu" (cairn). Recovered in 1928 and cairn enlarged.

Cave (Kauai Island, H. D. King, 1904).—On a bluff at northwesterly corner of Hanapepe Bay, on north shore of arm of bay, about 20 meters from edge of

For notes in regard to marking of stations, see p. 139.

bluff, 10 meters from road around edge of cane field, road being about 20 feet above water level. Station marked by braced pole.

Lava (Kauai Island, H. D. King, 1904).—On south coast of Kauai, on the most southerly point on western shore of Hanapepe Bay, at about 20 feet elevation, 20 meters from edge of bluff, and 80 meters from water on rocky shore to eastward. There is a road about 100 meters to the westward. Station marked by signal pole sunk 1 foot into ground.

Sand (Kauai Island, H. D. King, 1904).—On south coast of Kauai, on a bluff at the mouth of the Hanapepe River, about 450 meters north by west from the Eleele dock, and at the end of a railroad running along the bluff from the dock. Station is about 10 meters from edge of bluff and about 35 feet above high water. Marked by large tripod structure used by the McBryde plantation for raising sand onto bluff from sandy beach on western shore of river.

Old (Kauai Island, H. D. King, 1904).—On south coast of Kauai, on eastern shore of Hanapepe Bay, about 200 meters southeast from Eleele dock, on a bluff about 25 feet above sea level. Station is about 20 meters from edge of bluff, and 20 meters from the western end of the most westerly house of the Japanese plantation camp. Marked by large pile of stones about 2 feet high, with tripod signal on top.

Eleele Landing flagstaff (Kauai Island, O. B. French, 1910; K. T. Adams, 1928).—On southern coast of Kauai, at Eleele Landing; a tall conspicuous flagpole painted white. It is the only flagpole near the landing, and stands just back of the breakwater and a few feet east of the last warehouse building.

Haw (Kauai Island, O. B. French, 1910).—On south coast of Kauai, on rocky point at west side of Wahiawa Harbor, 8 meters back from and 25 feet above high-water mark.

Reef (Kauai Island, O. B. French, 1910).—On the south coast of Kauai, at east point (Weli) of Wahiawa Harbor, 5 meters back from and 20 feet above high-water mark.

Wall (Kauai Island, O. B. French, 1910).—On south coast of Kauai, on a rounding rocky point 2 miles east of Port Allen, 10 meters back from and 50 feet above high-water mark. Flag pole wedged in crack in rocks.

McBryde sugar mill, northwest stack (Kauai Island, H. D. King, 1904).—Locality visited in 1928 and stack not seen. Believed to have been torn down.

McBryde new sugar mill, stack (Kauai Island, K. T. Adams, 1928).—Near southern coast of Kauai, 1¾ miles east of Port Allen; the new stack at McBryde's new sugar mill, built in 1928. It is 225 feet tall, and 24 feet in diameter at its base, which is roughly 200 feet above sea level. It is the most prominent stack in the vicinity and when seen from seaward presents the appearance of a tall white lighthouse.

Mac (Kauai Island, O. B. French, 1910).—On high rocky point, about 2½ miles west of *Nomilo*.

Bry (Kauai Island, O. B. French, 1910).—On a low rocky point 1½ miles west of *Nomilo*.

Hid (Kauai Island, O. B. French, 1910).—On south coast of Kauai, on a low point ¾ mile west of *Nomilo*.

Ioleau (Kauai Island, H. D. King, 1904; O. B. French, 1910).—On a conspicuous cone-shaped hill of same name about 2 miles east of the McBryde plantation. Hill is clear of trees and brush, and station is on the highest part of the slightly flattened summit. Marked by 1½-inch gas pipe.

Gov (Kauai Island, O. B. French, 1910; C. L. Garner, 1926).—On south coast of Kauai, on bold rocky point about 1 mile west of Lawai Bay. Marked by a pole set in a crack in the rock, about 1 foot "makai" (seaward) of a cross which was evidently an old survey station.

Wind (Kauai Island, O. B. French, 1910; C. L. Garner, 1926).—On south coast of Kauai, on a very bold rocky point about 500 meters west of Lawai Bay. Marked by a cross cut in rock.

Law (Kauai Island, O. B. French, 1910).—On south coast of Kauai, on high rocky point at east side of entrance to Lawai Harbor. Marked by signal pole set in crack in rocks.

Horn (Kauai Island, O. B. French, 1910; C. L. Garner, 1926).—On south coast of Kauai, on point just west of Kukuiula Bay, and about 25 meters northwest of the "Spouting Horn." Signal pole was set in "ahu" (cairn) of rock at pile of lava made by clearing fields. A small cross was cut in a large rock (3 cu. ft.) 1.7 feet west.

For notes in regard to marking of stations, see p. 139.

Post (Kauai Island, O. B. French, 1910; C. L. Garner, 1926).—On the south coast of Kauai, on a rocky point 1 mile west of Koloa Landing, and just inside high-water mark. Marked in 1910 by an old 6 by 6 inch post. In 1926 a plane table traverse was run to this station from station *Horn* and a mark found consisting of a badly corroded 4-inch iron pipe set in concrete and projecting about 2 feet. It was believed to be a re-marking of the original station by a local survey.

Small white house (Kauai Island, O. B. French, 1910; C. L. Garner, 1926).—On south coast of Kauai, on the landward side of the road, ½ mile west of Koloa Landing, a hip-roofed weather-beaten house showing signs of whitewash.

Koloa church spire (Kauai Island, O. B. French, 1910; C. L. Garner, 1926).—In the southern part of Kauai, in the town of Koloa. Locally known as the Philippine Church.

East gable (Kauai Island, O. B. French, 1910; C. L. Garner, 1926).—On south coast of Kauai. East gable of warehouse, on top of low bluff east of Koloa Landing. In 1926 only the foundation stones of the old building remained.

Nuk (Kauai Island, O. B. French, 1910).—On south coast of Kauai, ½ mile southeast of Koloa Landing, on a rocky point (Nukomoi), and about 125 meters southeast of a small house. Marked by signal pole set in crack in rocks. A cross cut in the rock on one side of crack is 1.8 feet "makai" (seaward) from signal, and on line with the middle of Haupu.

High gable (Kauai Island, O. B. French, 1910; C. L. Garner, 1926).—On south coast of Kauai, 1 mile eastward of Koloa Landing, and near the beach, the southeast gable of an old 2-story house.

Makahuena Point Light (Kauai Island, O. B. French, 1910).—In 1926 the station was reported as destroyed, the concrete foundations of the old lighthouse being found 96 meters to the northwest of the present lighthouse.

NIIHAU ISLAND

Principal points

Paniau (Niihau Island, C. L. Garner, 1926).—A Hawaiian Government Survey station, on the highest point of Niihau, near the eastern line of cliffs, about 2,070 meters south of the precipice at the northern edge of the central plateau, and 4,880 meters north of Pueo Point. In 1926 a standard Coast and Geodetic Survey disk was cemented into the center of the concrete monument previously established, and two standard disk reference marks were cemented into drill holes in the rock at the following distances and azimuths: No. 1, 11.98 meters (39.30 feet), 232° 20′; No. 2, 6.02 meters (19.75 feet), 155° 54′. A corner fence post is 9.70 meters (31.82 feet) distant, in azimuth 334° 40′.

Lehua (Niihau Island, C. L. Garner, 1926).—On the highest point of Lehua Island, the small island close to and northwest of Niihau Island. Marked by a standard brass disk cemented into a 1½-inch pipe securely driven into ground. Two standard reference marks were set. No. 1, 14.180 meters (46.52 feet), from station in azimuth 92°, magnetic; No. 2, 21.555 meters (70.72 feet), in azimuth 283°, magnetic.

Kal (Niihau Island, C. L. Garner, 1926).—On the outer point of the two high rocky promontories about 2¾ miles north of Nonopapa Landing. Station is about 6 feet from the extreme point of the cliff. Marked according to note 2. Two reference marks, note 12b, were established as follows: No. 1, distant 13.384 meters (43.91 feet), in azimuth 296° 24′; No. 2, distant 10.99 meters (36.06 feet), in azimuth 338° 58′.

Kaeo (Niihau Island, C. L. Garner, 1926).—On the south and highest point of Kaeo Cone, a 2-peaked cone-shaped mountain situated in the central portion of the island of Niihau and rising gently from a low plateau. Station marked by a standard disk station mark cemented into a drill hole in a large firmly embedded rock. Two reference marks were established: No. 1, a standard brass disk cemented in rock, and 3.567 meters (11.70 feet), from station in azimuth 81° 49′; No. 2, a tack cemented into a drill hole in the rock, and distant 1.255 meters (4.12 feet), in azimuth 136° 54′. The two disks were stamped "Kaeo" and "1926."

Kawaewae (Kaw) (Niihau Island, C. L. Garner, 1926).—On northeast shoulder of hill by same name, 1½ miles south-southeast from Nonopapa Landing.

Kawaihoa (Hoa) (Niihau Island, C. L. Garner, 1926).—On the highest point of prominent hill at the extreme southern end of Niihau Island. The remains of a stake were found about eight-tenths of a meter north of the station; this stake

For notes in regard to marking of stations, see p. 139.

was probably the remains of a Hawaiian Government Survey station mark. Station marked according to note 2. Reference marks, note 12a, were placed about 8 meters north, and about 35 meters southwest along the ridge.

Supplementary points

Gam (Niihau Island, C. L. Garner, 1926).—On the north end of Niihau Island, on highest point of the low rounded hill which is the highest ground to the north of the line of cliffs extending across the island. Best reached by landing on the Lehua side of the island. Marked according to note 2. Reference marks, note 12b, were set at the following distances and azimuths from the station: No. 1, 6.923 meters (22.71 feet), 210° 42′; No. 2, 8.060 meters (26.44 feet), 126° 58′.

Black (Niihau Island, C. L. Garner, 1926).—On the edge and highest point of a black bluff which is the western end of a chain of small undulating hills on the north end of Niihau Island, 2 miles south-southwest of Lehua. Marking not known.

Pin (Niihau Island, C. L. Garner, 1926).—The highest point of black rock detached hill about 3½ miles south by west, from Lehua Island and at the foothills of the mountain mass. Easily identified from near by. Not marked.

Sand (Niihau Island, C. L. Garner, 1926).—On northwest shore of Niihau Island, on the highest point of the highest sand dune, bare on its northwest side. About 7 miles southwest of Lehua Island. Not marked.

Rock (Niihau Island, C. L. Garner, 1926).—Center of a large single detached rock, 8 by 20 feet; 4 feet above high water, 500 meters off shore, and 1½ miles above Nonopapa Landing.

Derrick (Niihau Island, C. L. Garner, 1926).—At Nonopapa Landing, the top of the derrick pole at the southwest point of cement dock.

Barn, south gable (Niihau Island, C. L. Garner, 1926).—South gable of long dark shed running parallel to the beach at Nonopapa Landing.

Bluff (Niihau Island, C. L. Garner, 1926).—On the east side of Niihau Island, near the south end (low part of island), on the most northerly of a series of low but prominent cliffs, approximately 5 miles north of Cape Kawaihoa, 6½ miles southwest from Pueo Point, and 3½ miles east of Kawaewae Hill. There is a detached pinnacle close to the cliff containing the station. Station marked according to note 3, by a standard triangulation disk set in cement in a depression of the bedrock.

OAHU ISLAND

Principal Points

Diamond Head (Leahi) (Oahu Island, Hawaiian Government Survey, 1872; O. B. French, 1909; W. C. Dibrell, 1910; E. R. Hand, 1925; L. G. Simmons, 1927).—On the southeast coast of Oahu, on the southwest corner and highest point of Diamond Head, just south of Kaimuki. Marked by an iron pin driven into the ground, around which was later placed a concrete pier, 6 feet square, with pipe set vertically over pin. A metal drum was made to set into hole of vertical pipe, to serve as a target. Reference marks according to note 11c, standard reference disks in irregular concrete masses, were set at the following distances and azimuths from the station: No. 1, 3.239 meters (10.63 feet), 326° 56′; No. 2, 52.28 meters (171.52 feet), 167° 59′. Re-marked according to note 14C in 1929.

Tantalus (Puu Ohia) (Oahu Island, Hawaiian Government Survey, 1872; O. B. French, 1909; E. R. Hand, 1925; L. G. Simmons, 1927).—In the southeastern part of Oahu, on the summit of Puu Ohia (Tantalus Hill), about 3½ miles northeast of the center of the Honolulu business district. Car can be driven to within 300 feet (in elevation) of station. Marked by a granite post sunk nearly level with ground, with cross cut in top. Around this has been placed a concrete pier 6 feet square with 3-inch galvanized pipe set vertically over center. Reference marks, note 13a, standard reference disks in concrete in tile, are at the following distances and azimuths from station: No. 1, 7.055 meters (23.15 feet), 352° 19′; No. 2, 4.360 meters (14.30 feet), 80° 03′. Re-marked according to note 14A in 1929.

Halawa barrel (Oahu Island, L. G. Simmons, 1927).—In southern Oahu, 2½ miles east-northeast of Aiea, at upper end of first ridge southeast of and running parallel to North Halawa Gulch. Station can be approached within ¼ mile by truck. The road which leads up this ridge turns north off the main road just

For notes in regard to marking of stations, see p. 139.

below the junction of the north and south Halawa Gulches where the combined gulch intersects the road. Marked according to note 6a, standard disk station mark in concrete in tile. Reference marks, note 13a, standard reference disks in concrete in tiles, were set at the following distances and azimuths from the station: No. 1, 4.389 meters (14.40 feet), 146° 36′; No. 2, 8.399 meters (27.56 feet), 48° 09′. Re-marked according to note 14A in 1929.

Kapuai New (Oahu Island, L. G. Simmons, 1927).—In southern part of Oahu, on the summit of Puu Kapuai, about 4 miles west of and a little south of Waipahu. The foot of the hill may be approached by a pineapple road, turning off the main Waianae road, to the north, a few hundred yards toward Waianae from the Ewa-Waianae junction of the main road. Marked according to note 2a, a standard disk in outcropping bedrock surrounded by a chiseled triangle. Reference marks set according to note 12a, standard reference disks in outcropping bedrock are at the following distances and azimuths from the station: No. 1, 6.618 meters (21.71 feet), 154° 58′; No. 2, 8.640 meters (28.35 feet), 263° 34′. Re-marked according to note 14A in 1929.

Waipio Uka (Oahu Island, Hawaiian Government Survey, 1873; O. B. French, 1910; L. G. Simmons, 1927).—Station also known by name of **Waipio Mauka.** About 4 miles north of Waipahu, about 8,000 feet north of where the road (main Schofield Road) to Waialua crosses the deep Kipapa Gulch, and about ⅓ mile east of that road, on summit of low prominent hill. To reach by car, turn to right off Schofield road at the summit between Kipapa and Waikakalaua Gulches, and drive up to station, crossing an irrigation ditch just below station. Originally marked by concrete post with cross in top. In 1927 the concrete post was surrounded with concrete and a standard disk station mark centered over cross, note 1a. Reference marks, note 11a, standard reference disks in concrete blocks, are at the following distances and azimuths from station: No. 1, 99.900 meters (327.76 feet), 0° 48′; No. 2, 150.34 meters (493.24 feet), 119° 16′. Remarked according to note 14A in 1929.

Mauna Una (Oahu Island, Hawaiian Government Survey, 1874; L. G. Simmons, 1927).—On an eastern lateral ridge running off from Waianae Range, the first large ridge south of Schofield Barracks, and north of Kaua Peak. Station is near the eastern lower end of ridge and just above pineapple field. The old mark, a concrete post with cross in top was recovered in 1927 and a standard disk station mark, note 1a, centered over cross in top of large concrete pier which was built over and around the old station. Reference marks, note 13a, standard reference disks in concrete in tiles, are at the following distances and azimuths from station: No. 1, 3.997 meters (13.11 feet), 310° 22′; No. 2, 9.264 meters (30.39 feet), 238° 27′. Re-marked according to note 14A in 1929.

Station Z (Oahu Island, L. G. Simmons, 1927).—In central part of Oahu, about 3 miles east and a little north of Wahiawa. Best reached by driving up the road which lies just north of and parallels the first gulch north of Wahiawa. Follow this road to end (in an easterly direction), where there is a small house and garage. Follow the edge of the cliff to the south about 200 yards to the second point in the cliff, to the station. Established and marked by the United States Engineers, the mark being a rectangular brass plate cemented in a 5-inch iron pipe embedded in ground. In 1927 it was re-marked with standard disk station mark, note 1c, set in cement poured over old mark. Reference marks, note 13a, standard reference disks in concrete in tile, are at the following distances and azimuths from station: No. 1, 17.924 meters (58.81 feet), 18° 16′; No. 2, 11.470 meters (37.63 feet), 86° 17′. Re-marked according to note 14A in 1929.

Schofield west base (Oahu Island, L. G. Simmons, 1927).—On the central plateau, about 23 miles from Honolulu, about 150 feet south of the southern edge of the Schofield Reservation, southeast of the Nineteenth Infantry Barracks, at the western edge of the tangent of the Oahu Railway & Land Co. tracks entering the reservation at Wheeler Field, about 225 feet west of point of tangency of curve, 24 feet south of tracks and on the edge of an old pineapple field. Marked according to note 1a, a standard disk station mark in concrete block. The underground mark, note 7a, is a standard disk station mark in concrete block 3 feet below surface of ground. Reference marks, note 11a, standard reference disks in concrete blocks, are at the following distances and azimuths from station: No. 1, 65.950 meters (216.37 feet), 281° 13′; No. 2, 44.855 meters (147.16 feet), 191° 36′. Re-marked according to note 14A in 1929.

Schofield east base (Oahu Island, L. G. Simmons, 1927).—On the central plateau, about 23 miles from Honolulu, about ½ mile south of Wahiawa, about 150 yards east of the railroad tracks, Oahu Railway & Land Co., running into

For notes in regard to marking of stations, see p. 139.

Wahiawa, on the continuation of the tangent going into the Schofield Reservation at Wheeler Field, 20 feet west of the road in front of the yardmaster's house. Marked according to note 1a, a standard disk station mark in concrete post. An underground mark was set according to note 7a, a standard disk station mark in concrete block 3 feet below surface of ground. Reference marks, note 11a, standard reference disks in concrete blocks, are at the following distances and azimuths from station: No. 1, 20.834 meters (68.35 feet), 346° 34′; No. 2, 18.288 meters (60.00 feet), 106° 31′. Re-marked according to note 14A in 1929.

Maili (Oahu Island, Hawaiian Government Survey, 1874; O. B. French, 1910; L. G. Simmons, 1927).—On one of the lower summits of a ridge which extends west by south to the summit of Mount Kaala, the highest part of the Waianae Mountains. It is the highest part of the ridge from which one can see both the northern and southern parts of the island. Best approached from firing range of Schofield, whence, after crossing Mohiakea Gulch, a trail leads to station. Old station mark was concrete post, 6 inches square, with cross in top. In 1927 station was marked according to note 1a, a standard disk station mark being set in a concrete pier which was built over and around the old mark without disturbing it. Reference marks, note 12a, standard reference disks in outcropping bedrock are at the following distances and azimuths from station: No. 1, 13.605 meters (44.64 feet), 92° 02′; No. 2, 12.435 meters (40.80 feet), 10° 17′. Re-marked according to note 14A in 1929.

Halemano (Oahu Island, L. G. Simmons, 1927).—Northwest of center of Oahu, about 3 miles north-northwest from Wahiawa, and ½ mile north of a small pineapple settlement, reached by pineapple road, on a low bank between irrigation ditch and road. Marked by a United States Engineers' rectangular plate set in concrete in a 5-inch pipe. Two reference marks were set as follows: No. 1, a standard reference disk in concrete post, note 11a, is 30.754 meters (100.90 feet) from station in azimuth 168° 13′; No. 2, similar disk in concrete mass, note 11c, is 5.873 meters (19.27 feet) from station in azimuth 162° 59′. Re-marked according to note 14A in 1929.

Puu Iki (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu, in Waialua District, on the north slope of the Waianae Range, on the high point of the north end of the large broad ridge (bare) directly south of the Waialua sugar mills, and about 2½ miles distant from the mill building. Take the left-hand dirt road at the junction of the Haleiwa and Waialua Roads, and drive past an old abandoned church to begin the climb. Marked according to note 6a, a standard disk station mark in concrete in top of tile. Reference marks were set as follows: No. 1, note 12a, standard reference disk in outcropping bedrock, 42.395 meters (139.09 feet), from station in azimuth 321° 27′; No. 2, note 13a, standard reference disk in concrete in tile, 11.161 meters (36.62 feet) from station in azimuth 246° 38′. Re-marked according to note 14A in 1929.

O'Reilly (Oahu Island, L. G. Simmons, 1927).—A United States Engineers' point, originally determined by them. Station is 3 miles southeast of Waialua, 4 miles north of Schofield Barracks, on a bank along edge of pineapple irrigation ditch, about 200 feet south of where road crosses ditch, and about ½ mile northwest of a small pond. Marked by United States Engineer plate set in concrete in 5-inch iron pipe, and stamped "O'Reilly." Reference marks are standard disks in concrete posts, note 11a, at the following distances and azimuths from the station: No. 1, 29.338 meters (96.25 feet), 211° 48′; No. 2, 9.430 meters (30.94 feet), 311° 53′. Re-marked according to note 14A in 1929.

Waialua 2 (Oahu Island, L. G. Simmons, 1927).—On western coast of Oahu, in Waialua District, on outermost point of peninsula between Waialua and Kaiaka Bays, about 160 feet northwest of a Japanese frame house, about 1¼ miles west and south of Haleiwa. Station marked according to note 1a, a standard disk station mark set in coral. Reference marks, note 12a, standard reference disks set in coral, are at the following distances and azimuths from the station: No. 1, 20.609 meters (67.61 feet), 53° 00′; No. 2, 16.225 meters (53.23 feet), 124° 13′. Re-marked according to note 14A in 1929.

Dillingham (Oahu Island, L. G. Simmons, 1927).—In Waialua District, western coast of Oahu, about 1½ miles east of Kawaihapai railroad station, ½ mile west of Mokuleia railroad station, on edge of bank or dune in pasture of Dillingham ranch, on shore line, about 100 yards west of small boathouse and 200 yards east of fence line marking western limits of pasture. Marked according to note 1a, standard disk in concrete block. Reference marks, note 11a, standard reference disks in concrete blocks, were set at the following distances and azimuths from station: No. 1, 21.675 meters (71.11 feet), 23° 58′; No. 2, 45.960 meters, (150.79 feet), 319° 03′. Re-marked according to note 14A in 1929.

For notes in regard to marking of stations, see p. 139.

Pupukea (Oahu Island, Hawaiian Government Survey, 1875; O. B. French, 1910; L. G. Simmons, 1927).—On the sea end of the most prominent ridge about 2 miles northeast of the Waimea River and about ¼ mile from steep part of the bluff which borders the sea. Best reached by following the road from Waimea to top of hill, and taking left hand road just after reaching steep part of hill, thence following road along top of bluff some two miles. This road makes long slants inland to get around gulches. After passing the second such gulch turn off to right to reach station, which is about ¼ mile from where road emerges from gulch. Station is short distance from top of ridge. Marked by concrete post 5 inches square with cross in top. Over this was built (in 1927) a concrete pier with standard disk station mark centered over old mark. Reference marks are as follows: No. 1, standard disk reference mark in concrete in tile, note 13a, 2.463 meters (8.08 feet) from station in azimuth 138° 41′; No. 2, an 8-inch concrete cylinder with cross in top, 2.942 meters (9.65 feet) from station in azimuth 238° 42′. Re-marked according to note 14A in 1929.

Lak (Oahu Island, L. G. Simmons, 1927).—In northern part of Oahu, on the first bare summit about 120 yards south of Kawela. Marked according to note 6a, a standard disk station mark set in concrete in top of tile. Reference marks, note 13a, standard reference disks in concrete in tiles, were set at the following distances and azimuths from the station: No. 1, 7.905 meters (25.93 feet), 321° 20′; No. 2, 2.533 meters (8.31 feet), 77° 08′. Re-marked according to note 14A in 1929.

Kawela (Oahu Island, Hawaiian Government Survey, 1875; O. B. French, 1910; L. G. Simmons, 1927).—In the northern part of Oahu, in the Koolau Range, 3½ miles west-southwest of Kahuku Mill, on the most southerly of three bare summits, on the east side of a gulch which comes to the ocean about ½ mile east of Waialee Industrial School. Marked originally by an iron pin; present mark is United States Engineers' brass plate cemented in 5-inch iron pipe embedded in ground. Reference mark is standard reference mark in concrete in tile, note 13a, 5.900 meters (19.36 feet) from station, in azimuth 282° 19′.

Waialee (Oahu Island, Hawaiian Government Survey, 1875; O. B. French, 1910; L. G. Simmons, 1927).—On northern coast of Oahu, in the land of Waialee, about 3½ miles west of Kahuku, on the highest point at north end of a ridge about ⅜ mile south of Waialee Industrial School. Car can be driven to station over pineapple roads. Originally marked by concrete post with cross in top. In 1927 a standard disk station mark was set in center of cross, note 1b. Reference marks, note 12c, standard reference disks in bowlders, are at the following distances and azimuths from station: No. 1, 15.125 meters (49.62 feet), 50° 26′; No. 2, 19.950 meters (65.45), 344° 09′. Re-marked according to note 14A in 1929.

Opana (Oahu Island, L. G. Simmons, 1927).—In northern part of Oahu, in Opana District, about 1 mile east of Waialee Industrial School, near edge of bluff behind the school on highest part of Opana Ridge. The United States Engineers' mark was recovered. It was a brass plate cemented in a 5-inch pipe. The plate was replaced with a standard disk station mark, note 6a. Reference marks were set as follows: No. 1, note 12d, a standard reference disk in concrete in bowlder, 34.815 meters (114.22 feet), from station in azimuth 252° 25′; No. 2, note 12c, standard reference disk in bowlder, 50.790 meters (166.63 feet) from station in azimuth 2° 39′. Re-marked according to note 14A in 1929.

Puuki (Oahu Island, Hawaiian Government Survey, 1875; O. B. French, 1910; L. G. Simmons, 1927).—In northern part of Oahu, in land of Kahuku, on hill of same name, about 2¼ miles west of Kahuku Mill, and just north of a conical summit with rough rocks on top. It is the highest hill in the immediate neighborhood. Originally marked with redwood post and cairn of stones. In 1910 the mark recovered was concrete post with cross in top. In 1927 station re-marked according to note 1b, a standard disk station mark being set in center of cross in top of 10-inch concrete cylinder. Reference marks are as follows: No. 1, note 13a, standard reference disk in concrete in tile, 9.040 meters (29.66 feet) from station in azimuth 5° 30′; No. 2, note 12c, 9.952 meters (32.65 feet) from station in azimuth 213° 22′. Re-marked according to note 14A in 1929.

Kahuku New (Oahu Island, L. G. Simmons, 1927).—On north point of Oahu, about 3 miles northwest of Kahuku Mill, about ¼ mile northwest of Radio Corporation of America power plant, and on a sand dune about 75 feet from water's edge. Marked with a United States Engineers' brass plate set in 8-inch square concrete block. Reference mark No. 1 is a standard disk cemented in the concrete anchor of the north guy of the third tower west of the power house of the Radio Corporation of America plant. It is 348.47 meters (1143.3 feet)

For notes in regard to marking of stations, see p. 139.

from station in azimuth 14° 20′. Reference mark No. 2 is a standard disk cemented in concrete sewer outlet at water's edge east of station. It is 125.76 meters (412.6 feet) from station in azimuth 267° 56′. Re-marked according to note 14A in 1929.

Keana (Oahu Island, L. G. Simmons, 1927).—On north coast of Oahu, about ¾ mile east-southeast from Kahuku sugar mill, in center of western edge of long sand dune directly behind Kahuku ball park, just east of Kahuku. Marked according to note 6a, a standard disk station mark set in concrete in top of tile. Reference marks, note 13a, standard reference disks in concrete in tiles, are at the following distances and azimuths from station: No. 1, 14.500 meters (47.57 feet), 51° 50′; No. 2, 39.432 meters (129.37 feet) 129° 03′. Re-marked according to note 14A in 1929.

Laie 1 (Oahu Island, L. G. Simmons, 1927).—On the northeast coast of Oahu, near the outer end of Laie Point, about ¼ mile from the old *Laie* station (see description thereof), probably ¾ mile east-southeast from Laie settlement. This station was established by the United States Engineers, and was marked by a United States Engineers' brass plate cemented in a 5-inch pipe. In 1927 this was covered with a cap of concrete and a standard disk station mark centered in top. Re-marked according to note 14A in 1929.

Waiahilahila (Oahu Island, L. G. Simmons, 1927).—In northeastern part of Oahu, on summit of prominent hill of same name, about 1 mile south-southwest of Hauula railroad station. Hill comes to sharp peak at top with no room for placing reference marks. Station marked according to note 6a, a standard disk station mark set in concrete in top of tile which is embedded in ground. Remarked according to note 14X in 1929.

Turnover (Oahu Island, L. G. Simmons, 1927).—In eastern part of Oahu, on top of a high ridge just south of Kahana Bay. To reach station, turn left (coming from Honolulu) off main road onto dirt road, just before crossing the concrete bridge at Kahana Bay. Follow this road to a little red church a few hundred yards distant, climb ridge directly behind church to top of main ridge; turn right (southwesterly) and follow main ridge to station, which is in a more or less open place just before ridge commences to drop down at its westerly end. Marked by United States Engineers with rectangular brass plate set in concrete in 5-inch iron pipe embedded in ground. Re-marked according to note 14X in 1929.

Ohulehule (Oahu Island, Hawaiian Government Survey, 1875; O. B. French, 1910; L. G. Simmons, 1927).—On eastern coast of Oahu, on summit of prominent conical peak known as Puu Ohulehule, which is located about halfway between the sea and the Koolau Range, and is on the ridge which divides the Koolauloa and Koolaupoko districts. A very difficult climb, probably best made from the north side of the dividing ridge. Coming from Honolulu turn left off main road into dirt road just before crossing the concrete bridge at Kahana Bay. Follow this road up to a small settlement of laborers' houses and begin hike from there on road leading toward the peak. Station originally marked by iron stake and redwood post. This was later replaced by a 2-inch pipe embedded in concrete, the whole embedded in the ground. Pipe projects a few inches above ground. It supports a tall pipe signal which is at a slant necessitating correction for eccentricity. Re-marked according to note 14X in 1929.

Kualoa (Oahu Island, L. G. Simmons, 1927).—On east coast of Oahu, about 2½ miles north-northeast of Waikane on the most easterly of the high peaks along the ridge dividing the Kualoa and Kaaawa districts, and about ½ mile from shore. Marked according to note 6a, standard disk in tile. Reference mark is standard reference disk in tile, note 13a, set 5.785 meters (18.98 feet) from station in azimuth 32° 42′. Re-marked according to note 14E in 1929.

Heeia (Oahu Island, Hawaiian Government Survey, 1872; O. B. French, 1910; E. R. Hand, 1926; L. G. Simmons, 1927).—On eastern coast of Oahu in Heeia, on summit of hill called Maelieli, directly between Libbyville and Heeia, about 1½ miles northwest of Heeia, and 1¼ miles southeast of Libbyville. It is the most prominent summit just west of Kaneohe Bay, some 7 miles from the Pali. Easiest ascent is probably made from north side of hill at the little bay just before reaching Libbyville. Station is about 2 feet northwest of fence corner, and was originally marked by an iron stake 3½ feet long, but the mark recovered in 1910 was a concrete post with cross in top. In 1925 no mark could be found, but the Army had erected over the station a large signal of 6 by 6 inch timbers, which showed up conspicuously from anywhere along the road between Heeia and Kahaluu Landing. In 1927 this large signal was found down, and the only thing found in the way of a mark was an iron stake, underground, and at correct distance and direction from fence corner. It was replaced with a new mark,

For notes in regard to marking of stations, see p. 189.

note 6a, consisting of a standard disk station mark set in concrete in top of 5-inch soil pipe set in ground and surrounded with concrete. Reference marks were set according to note 13a, standard reference disks in concrete in tiles, at the following distances and azimuths from station: No. 1, 4.238 meters (13.90 feet), 312° 24′; No. 2, 18.853 meters (61.85 feet), 170° 29′. Re-marked according to note 14A in 1929.

Mokapu (Oahu Island, Hawaiian Government Survey, 1872; O. B. French, 1910; E. R. Hand, 1925; L. G. Simmons, 1927).—On southeastern coast of Oahu, at the northeast corner of Mokapu Peninsula, and about 100 feet south of the highest part of Ulupau Head. A trail leads up southwest of the station. Originally marked by an iron stake set in the rock with melted lead. Later re-marked by a United States Engineers' plate set in a cylinder of concrete. In 1927 this was replaced with a large concrete pier in the top of which was placed a standard disk station mark, note 1a. Reference marks, note 12a, standard reference disks in outcropping bedrock are at the following distances and azimuths from station: No. 1, 6.898 meters (22.63 feet), 340° 31′; No. 2, 4.348 meters (14.27 feet), 216° 28′. Re-marked according to note 14A in 1929.

Waimanalo (Oahu Island, L. G. Simmons, 1927).—In southeastern Oahu, on the summit of the Koolau Range, about 3¼ miles east-southeast of the Waimanalo sugar mill. Reached by driving to the summit of the Makapuu Lighthouse road from Honolulu, which is at the foot of Koko Crater, thence following this ridge to the north up to the summit of the Koolau Range, when the station will be found on the highest part of the first peak to the left (west). Marked according to note 6a, a standard disk station mark set in concrete in tile embedded in earth. Reference marks were as follows: No. 1, note 12a, standard reference disk in outcropping bedrock, 12.643 meters (41.48 feet) from station in azimuth 187° 54′; No. 2, note 13a, standard reference disk in concrete in tile, 4.684 meters (15.37 feet) from station in azimuth 313° 45′. A forest reserve pipe is 1.533 meters (5.03 feet) from station in azimuth 185° 08′. Re-marked according to note 14X in 1929.

Lanipo (Oahu Island, L. G. Simmons, 1927).—In southeastern Oahu, on summit of Koolau Range, about 100 yards west of the highest point of Puu Lanipo, on a flat spot on the ridge. It is best reached by driving to the highest point on Wilhelmina Rise (above Kaimuki) and taking on foot the ridge which leads directly off this rise up to the summit of the Koolau Range. After reaching the divide of the range, turn east (right) and go on up to the station, distant ½ mile or less. Station established by United States Engineers, and marked by them with a United States Engineers' rectangular brass plate, set in concrete in a 5-inch pipe embedded in ground. Reference marks, note 13a, standard reference disks in concrete in tiles, were set at the following distances and azimuths from station: No. 1, 1.822 meters (5.98 feet), 230° 36′; No. 2, 8.800 meters (28.87 feet), 88° 05′. Re-marked according to note 14X in 1929.

Koko Head 3 (Oahu Island, L. G. Simmons, 1927).—In southeastern Oahu, about 140 yards south along the ridge from old Koko Head station which is on the highest point in the ridge of Koko Head proper. (See description thereof.) Station is approached from the north end of ridge. Station marked according to note 6a, standard disk station mark set in concrete in tile. The old *Koko Head* station (1872), marked by a 2 by 3 inch brass plate marked "U. S. Engrs." set in concrete in a 6-inch iron pipe, is 128.57 meters (421.82 feet) from station in azimuth 196° 47′. Reference mark, note 13a, a standard reference disk in concrete in tile, is 21.135 meters (69.34 feet) from station in azimuth 144° 23′. Re-marked according to note 14A in 1929.

Manawahua (Oahu Island, Hawaiian Government Survey, 1875; O. B. French, 1910; L. G. Simmons, 1927).—In southwestern Oahu, at the southern end of the Waianae Range, on Puu Manawahua, on the bare central one of three rounded hills. Originally marked by redwood post and cairn of stones. This was later replaced by a concrete post 3 inches square and 18 inches long, with nail in top. The accuracy of this replacement is not known. In 1927 station was re-marked according to note 6a, a standard disk station mark set in concrete in tile. Reference marks, note 13a, standard reference disks in concrete in tiles, are at the following distances and azimuths from station: No. 1, 13.900 meters (45.60 feet), 252° 36′; No. 2, 31.690 meters (103.97 feet), 93° 45′. *Manawahua (U. S. E.)* was established very closely in position of old station, and it is possible that it is the station recovered and remarked in 1927. Re-marked according to note 14A in 1929.

Kahe (Oahu Island, Hawaiian Government Survey, 1875; L. G. Simmons, 1927).—On summit of ridge near boundary between the Ewa and Waianae dis-

For notes in regard to marking of stations, see p. 139.

tricts, the most southerly ridge leading off west from the Waianae Range, overlooking the shore road to Waianae, and about 700 feet from the sea. Originally marked by concrete post and cairn of stones, which in 1927 was replaced with a new mark, note 6a, a standard disk station mark in concrete in tile. Reference mark No. 1, note 12a, a standard reference disk in outcropping bedrock, is 20.258 meters (66.46 feet) from station in azimuth 249° 22′. Reference mark No. 2, a standard reference disk set in drill hole in concrete base, is 7.552 meters (24.78 feet) from station in azimuth 17° 39′. Re-marked according to note 14A in 1929.

Kum (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu, in the Waianae Range, on first prominent knoll with rock comb along the top, north of Kolekole Pass. Marked according to note 2, standard disk station mark in outcropping bedrock. Reference marks, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 5.138 meters (16.86 feet), 113° 07′; No. 2, 21.68 meters (71.10 feet), 359° 54′. Re-marked according to note 14X in 1929.

Kaua (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu, on the peak of Puu Kaua in the Waianae Range. The easiest ascent to the station is made by following the ridge on the eastern side of the range, which is at right angles to the range, and leads directly to the peak. Marked according to note 6a, a standard disk set in concrete in top of a 5-inch soil pipe projecting 8 to 12 inches above surface of ground. Reference mark is a standard reference disk set in concrete in top of 5-inch soil pipe projecting 8 to 12 inches above surface of ground; it is 6.073 meters (19.92 feet) from station in azimuth 10° 46′. Re-marked according to note 14X in 1929.

Paheehee New (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu, on Puu Paheehee, at eastern end of ridge directly east of Waianae, just before it drops down to the saddle, about 1¼ miles east of Waianae. Marked according to note 2, a standard disk station mark in outcropping bedrock. Station *Paheehee* (*U. S. E.*) was found, marked by brass plate in concrete in 5-inch pipe; it is 5.148 meters (16.89 feet) from station in azimuth 255° 20′. Reference marks, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 9.124 meters (29.93 feet), 74° 40′; No. 2, 2.928 meters (9.61 feet), 107° 59′. Re-marked according to note 14A in 1929.

Makaha (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu, about 1¾ miles north of Waianae, on first ridge north of Waianae leading west from Waianae Range on a prominent rise in ridge, very near halfway along the ridge from the western end to where it becomes precipitous. Marked according to note 2, a standard disk station mark in outcropping bedrock. Reference marks, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 3.556 meters (11.67 feet), 97° 51′; No. 2, 15.132 meters (49.65 feet), 229° 36′. Re-marked according to note 14X in 1929.

Lahilahi (Oahu Island, L. G. Simmons, 1927).—On western coast of Oahu, about 2 miles northwest of Waianae, on the summit of Mauna Lahilahi, next to shore line, a prominent small rocky hill standing by itself. Marked according to note 5, a standard disk station mark in concrete on bowlder. Reference marks, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 2.776 meters (9.11 feet), 44° 29′; No. 2, 14.050 meters (46.10 feet), 266° 12′.

Keaau 2 (Oahu Island, L. G. Simmons, 1927).—In the western part of Oahu, about 1½ miles from the sea, on the crest of a very sharp ridge separating the Keaau and Makaha valleys, the second ridge from and 3½ miles north of Waianae. The old territorial station, marked by a redwood post and cairn of stones, is lost. *Keaau* (*U. S. E.*) was recovered; it is marked by a copper bolt set in concrete in a 2-inch pipe. *Keaau 2* is marked according to note 2, a standard disk station mark in outcropping bedrock. The distances and azimuths to reference marks are as follows: To *Keaau* (*U. S. E.*), 3.400 meters (11.15 feet), 224° 30′; to reference mark, note 12a, a standard reference disk in outcropping bedrock, 1.135 meters (3.72 feet), 141° 12′. Re-marked according to note 14X in 1929.

Kepuhi New (Oahu Island, L. G. Simmons, 1927).—Territorial survey station could not be recovered. *Kepuhi New* (*U. S. E.*) recovered and used as station. It is about 3½ miles north and west of Waianae, on west end of second ridge north of Waianae, about ½ mile back from shore line, and on same ridge as *Keaau 2*. (See description thereof.) Marked by a United States Engineers' brass plate, rectangular in form, cemented in bedrock. Reference marks, note

For notes in regard to marking of stations, see p. 139.

12a, standard reference disks in outcropping bedrock, were set at the following distances and azimuths from station: No. 1, 5.208 meters (17.09 feet), 193° 42′; No. 2, 2.642 meters (8.67 feet), 103° 15′. Re-marked according to note 14X in 1929.

Lolo (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu, on a prominent rise of first ridge south of Makua railroad station, the same ridge on which is situated station *Makua 2* (see description thereof), about 1¾ miles south and east of Makua railroad station, and 1½ miles back from the shore line. Marked according to note 2, a standard disk station mark in outcropping bedrock. Reference marks, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from the station: No. 1, 43.678 meters (143.30 feet), 280° 29′; No. 2, 1.134 meters (3.72 feet), 357° 00′. Re-marked according to note 14X in 1929.

Makua 2 (Oahu Island, L. G. Simmons, 1927).—On western coast of Oahu, about 1 mile south of Makua railroad station, on the first ridge south of Makua railroad station, on west end of ridge, and about ½ mile back from shore line. The old Army station, *Makua (U. S. E.)*, is about 70 yards up the ridge, in azimuth 127° 25′. Station marked according to note 2, a standard disk station mark in outcropping bedrock. Reference marks, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 8.786 meters (28.83 feet), 318° 55′; No. 2, 5.420 meters (17.78 feet), 283° 32′. There is a 2-inch gas pipe 12.430 meters (40.78 feet) from station in azimuth 318° 23′. Re-marked according to note 14X in 1929.

Moku (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu on the divide of the Waianae Range, near the boundary between Mokuleia and Kawaihapai districts, and about 50 yards northwest of the highest point. Best reached from the Waialua side of the range. Marked according to note 6a, a standard disk station mark set in concrete in top of tile. Reference marks were set as follows: No. 1, note 4, standard disk in bowlder, is in azimuth 172° 57′ from station. No. 2, note 13a, standard reference disk in concrete in tile, is 5.681 meters (18.64 feet), from station in azimuth 76° 39′. Re-marked according to note 14A in 1929.

Kealia (Oahu Island, L. G. Simmons, 1927).—Near the western point of Oahu, on the divide of the Waianae Range, about 5 miles back from Kaena Point, on the summit of a prominent knoll on top of range near center of the Kealia district intercepted by the Waianae Range. Station is best reached from the Waialua side of range. Marked according to note 6a, a standard disk station mark in concrete in tile. Reference marks, note 13a, standard reference disks in concrete in tiles are at the following distances and azimuths from station: No. 1, 58.487 meters (191.89 feet), 41° 31′; No. 2, 19.025 meters (62.42 feet), 91° 23′. Re-marked according to note 14X in 1929.

Camp (Oahu Island, L. G. Simmons, 1927).—In Waialua district, on the north slope of Waianae Range, about 1¼ miles south and west of Kawaihapai railroad station, on the end of a ridge west of a lone ranch house about 140 feet north of or below a fence line. Best reached by first gulch east of station. Marked according to note 6a, standard disk station mark in cement in tile Reference marks set according to note 13a, standard reference disks in concrete in tiles, are at the following distances and azimuths from the station: No. 1. 13.465 meters (44.18 feet), 260° 27′; No. 2, 21.490 meters (70.51 feet), 124° 11′, Re-marked according to note 14A in 1929.

Kaupakuhale (Oahu Island, L. G. Simmons, 1927).—In western part of Oahu, on the summit of a prominent hill on the Waialua slope of the Waianae Range, of same name as station, about 2¾ miles south and a little east of Mokuleia railroad station. Station marked according to note 6a, a standard disk in concrete in tile. Reference marks were set according to note 13a, standard reference disks in concrete in tiles, at the following distances and azimuths from the station: No. 1, 4.845 meters (15.90 feet), 4° 51′; No. 2, 4.995 meters (16.39 feet), 129° 47′. Re-marked according to note 14A in 1929.

Punchbowl (Puowaina) (Oahu Island, Hawaiian Government Survey, 1873; O. B. French, 1909; E. R. Hand, 1925; L. G. Simmons, 1927; J. H. Peters, 1928).—This is the same as station *Puowaina*, its name in the earlier surveys. Near southeast coast of Oahu, just northeast of Honolulu, on the highest point of Punchbowl Hill, and on west side of crater. One can go to within 50 yards of station in car. Marked by iron pin set in solid rock around which was later built a concrete pier about 6 feet square with iron pipe set vertically over mark. There is also a heavy signal over mark, maintained permanently for use in fire-control

For notes in regard to marking of stations, see p. 139.

orientation. Reference marks are as follows: No. 1, note 11c, a standard reference disk in concrete gun base, 6.910 meters (22.67 feet) from station in azimuth 333° 58′; No. 2, note 12a, a standard reference disk in outcropping bedrock, 4.15 meters (13.62 feet) from station in azimuth 73° 10′. Re-marked according to note 14A in 1929.

Ewa church (Oahu Island, Hawaiian Government Survey, 1873; O. B. French, 1910; E. R. Hand, 1925; L. G. Simmons, 1927).—In the southern part of Oahu, on a hill north of Pearl Harbor, north of Manana Peninsula, just north of Middle Loch, about ½ mile northwest of Pearl City Junction on the railroad, and about ¼ mile north of the nearest point to railroad to Ewa and Waianae, on a low rise, in the southwest corner of grounds of the old church (no longer in existence), now a graveyard, at Waiawa. There is a considerable grove of algeroba trees at this place. Station is 5 meters southeast of one tree, 5 meters east of west fence of grounds, along which is a hedge with cane fields beyond. About 1 mile before reaching Waipahu, on the main road from Honolulu, is found an easy bend marked by whitewashed stones; from this point a private road runs directly to the station, which is on a bluff to the northwest of this road. Station marked by a deep cross cut in a concrete post projecting 1 foot above the ground. In 1927 this mark was found and added to by digging down some 18 inches and pouring concrete over and around old mark. A standard bronze disk, note 1a, was then placed in center of cross. For reference marks, two concrete posts about 5 inches on side, and centered with cross in top, were set as follows: No. 1, 3.420 meters (11.22 feet) from station, in azimuth 45° 35′; No. 2, across the graveyard to the north, 82.680 meters (271.26 feet) from station in azimuth 195° 17′. Re-marked according to note 14A in 1929.

Makapuu Point (Oahu Island, Hawaiian Government Survey, 1872; O. B, French, 1910; E. R. Hand, 1925; L. G. Simmons, 1927).—On southeast coast of Oahu, on Makapuu Point, on a small saddle just south of its highest point, and above and west of the residence of the lighthouse keepers. Originally described as being marked by a copper bolt set in the rock and a cairn of rocks. In 1910 the cairn of rocks was standing and the mark not examined. In 1925 the remains of cairn were found, in center of which were the remains of old signal pole. Lower end of pole was in a natural crevice of the flat rock, in bottom of which was found bolt leaded into rock. But this bolt was of iron, not of copper. Original description probably in error. In 1927 the station was re-marked according to note 1c, a standard disk station mark being set in an irregular mass of concrete which was poured over the old bolt. Reference marks set in 1927, note 12a, standard reference disks in outcropping bedrock, are at the following distances and azimuths from station: No. 1, 16.753 meters (54.96 feet), 75° 09′; No. 2, 11.750 meters (38.55 feet), 326° 39′. Re-marked according to note 14A in 1929.

Old main scheme points

Oahu east base (Oahu Island, Hawaiian Government Survey, 1872).—At the northern foot of Mooiliili ridge, a few rods above the government road. Marked by cross lines on copper bolt in top of granite post surrounded by brick pier. Reported in 1910 as lost.

Oahu west base (Oahu Island, Hawaiian Government Survey, 1872; O. B. French, 1910).—In the southeastern suburb of Honolulu, in lot No. 53, east of King Street, in grant 294 to R. Armstrong. Marked by a granite post set in a pier of solid masonry, in top of which is copper bolt marked with cross lines.

Honouliuli (Oahu Island, Hawaiian Government Survey, 1873).—On high ground, now included in the Ewa plantation, about 500 feet west of the shore of West Loch, Pearl Harbor. Marked by a granite post. In 1910 reported by O. B. French as being in cane field, and undoubtedly lost.

Paheehee (Oahu Island, Hawaiian Government Survey, 1875).—On summit of ridge in Waianae Kai, southeast of Pokai village, about 8,000 feet east of Kaneilio Point. Marked by copper bolt in center of cross cut in rock, with cairn of stones over it.

Keaau (Oahu Island, Hawaiian Government Survey, 1875; L. G. Simmons, 1927).—On the crest of a very sharp ridge, 2,200 feet high, separating the Keaau and Makaha Valleys, and about 1½ miles from the sea. Marked by redwood post and cairn of stones.

Makua (U. S. E.) (Oahu Island, L. G. Simmons, 1927).—The old Army mark of 1914 was recovered in 1927. It consists of a 2-inch gas pipe driven in the ground, and is about 70 yards up the ridge from *Makua 2*, in azimuth 127° 25′. (See description of *Makua 2*.)

For notes in regard to marking of stations, see p. 139.

Kahuku (Oahu Island, Hawaiian Government Survey, 1875; O. B. French, 1910).—On the summit of a sand dune near the north point of Oahu, in line with a long stone wall running due south. It is 200 feet from a Y cut in the rock north of station and 300 feet from a similar cut in the rock to the south; both marks being exactly in line with *Puuki* station. In 1910 recovered cylindrical concrete post with cross in top, on prominent sand dune. Brick latitude pier still in place. Concrete post marking triangulation station not in original position, having been replaced only approximately by J. S. Emmerson. Is probably some 8 or 9 feet out of position.

Laie (Oahu Island, Hawaiian Government Survey, 1875; O. B. French, 1910; L. G. Simmons, 1927).—In the land of Laie, on a sandstone promontory, near a transverse dyke of harder rock. Station is east of highest part of ridge, but is on a commanding point. Marked by a concrete post with cross in top. In 1927 station recovered as described, and called *Laie 2* in records.

Papau (Oahu Island, O. B. French, 1910).—More than a mile back from the shore, on the eastern brow of the last and highest summit, but one, of the Kaipapau ridge. It is the farthest summit to the west from which station *Puna* can be seen. Station is just off the top of the hill, avoiding bad brush on its top. Marked by ½-inch drill hole in a small stone set with top just above ground.

Puna (Oahu Island, O. B. French, 1910).—On the north side of Kahana Bay, in a small opening of the low brush, some 40 feet from the road toward the sea. An angle in the fence which borders the land side of the road is in line with the lowest gap in the mountains toward the west, the point where the north slope of the near ridge cuts the south slope of the more distant mountains. Kahana Bay is open except for a small part of its northwest corner. Station marked by a small stone about 8 by 6 inches and 4 inches thick with cross cut in top set some 6 inches below surface of ground. Above this is an irregular stone with ½-inch drill hole in top, projecting some 3 or 4 inches above ground.

Konahuanui (Oahu Island, Hawaiian Government Survey, 1872).—On the southernmost of the two highest peaks south of Nuuanu Pali, above the ridge that separates the head of Manoa Valley from that of Nuuanu Valley. Marked by an iron stake.

Koko Head (Oahu Island, Hawaiian Government Survey, 1872; W. C. Dibrell, 1910; E. R. Hand, 1925; L. G. Simmons, 1927).—On southeast coast of Oahu, on the highest point of the lower hill of Koko Head proper, also called Kuamookane, west of the crater. Marked originally by an iron stake and a cairn of of stones. Now marked by a 6-inch iron pipe set in the ground, and filled with concrete in which is imbedded a 2 by 3 inch brass plate marked "U. S. Engrs."

Supplementary stations, southern part

Ridge (Oahu Island, W. C. Dibrell, 1910; E. R. Hand, 1925).—In the southeastern part of Oahu, on a knob on a ridge. This ridge is true north from the top of Koko Head across Koapa Fish Pond, into which pond the base of the ridge projects. The prominent knob where the station is may be identified as follows: Diamond Head bears S. 65° W.; station *Koko Head* bears S. 11° E.; and the narrow, deep opening to the sea, that is immediately north of the steep hill having a radio tower on top, bears east. Marked by a drill hole 2 inches deep in the rock, surrounded by a triangle 5 inches on side. A cairn of rocks was placed over the station.

Koko Crater (Oahu Island, L. G. Simmons, 1927).—In the extreme southeastern part of Oahu, between Koko Head and Makapuu Point. Re-marked according to note 14E in 1929.

Tower, radio (Oahu Island, E. R. Hand, 1925).—Radio tower on top of high conical hill on southeast coast of Oahu, between Koko Head and Makapuu Point. (Belongs to Radio Corporation of America.)

Koko head datum point (Oahu Island, E. R. Hand, 1925).—On southeast coast of Oahu, southwest of Koko Head at the southernmost part of Oahu, on a low ledge, and facing west, a slanting structure like a billboard painted with one black and two white horizontal stripes.

Maunalua Bay datum point (Oahu Island, E. R. Hand, 1925).—On southeast coast of Oahu, on edge of reef west side of Koko Head, and set in concrete block, a square target painted red and white like a leveling rod.

Mast (most westerly radio mast) (Oahu Island, E. R. Hand, 1925).—On the southeast coast of Oahu, in the lowlands north of Koko Head, on the property of the Radio Corporation of America, the most westerly and nearest to shore of

For notes in regard to marking of stations, see p. 139.

line of tall radio masts. Not now used for aerials, being replaced by the "Beverly" antennæ.

R. C. A. tank at receiving station (Oahu Island, E. R. Hand, 1925).—On southeast coast of Oahu, north-northeast of Koko Head, at the buildings of the Radio Corporation of America, a tall water tank, gray, with red top. Visible only from the southwest.

Lucas (Oahu Island, E. R. Hand, 1925).—In southeast Oahu, about 2 miles west of Wailupe Naval Radio Station, on edge of ridge between Kuliouou and Niu valleys, where abrupt cliff meets the seaward slope. Marked by standard brass disk.

Niu longitude (Oahu Island, E. J. Brown, 1927).—On southern coast of Oahu, at Niu, about 7½ miles east of Honolulu, on the Charles Lucas dairy ranch, 100 meters west of the Lucas residence, and 4 meters north of a stone wall on the north side of road. Marked by a standard bronze tablet set in concrete. Tablet is stamped "Niu Longitude 1927."

Wailupe cupola (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, at Wailupe Naval Radio Station, a low square cupola on a dark red building (receiving station) out over water.

Wailupe flagstaff (Oahu Island, E. R. Hand, 1925).—The flagstaff at Wailupe Naval Radio Station, southeastern Oahu.

Northmost high mast (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, at the Wailupe Naval Radio Station, the most northerly of two radio masts.

Barn (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, high up on slope above the Wailupe Naval Radio Station, the west gable of large, most easterly building of the Honolulu Canning Co.

Gable (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, on slope high up above the Wailupe Naval Radio Station, the west gable of the large, most westerly building of the Honolulu Canning Co.

Tank (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, on the slope high up above Wailupe Naval Radio Station, the black water tank in group of buildings of the Honolulu Canning Co.

Black Point datum point (Oahu Island, E. R. Hand, 1925).—On southeastern coast of Oahu, on edge of reef east of Black Point, a pavilion built out on edge of reef. Has sign on one side, "Waterhouse Trust Co."

Carter flagstaff (Oahu Island, E. R. Hand, 1925).—On southeastern coast of Oahu, just a little west of the southernmost point of Black Point in lawn in front of a large ornate residence (Carter's), a tall white flagstaff. Base of flagstaff not far above sea level.

Konahuanui 2 (Oahu Island, L. G. Simmons, 1927).—On the southernmost of the high peaks just south of the Nuuanu Pali, near the south end of the long ridge forming the top of this hill, about 25 feet south of the rain gauge. The quickest approach is up the Nuuanu Pali road to the south side of reservoir and then head for the second ridge to the south leading up the mountain side. Take this ridge up to near the summit of the main ridge, where the old Konahuanui trail is reached; this trail is then easily followed to the north and up to the peak. Marked according to note 6a, a standard disk station mark set in concrete in top of tile. Reference marks, note 13a, standard reference disks in concrete in tiles, were set at the following distances and azimuths from station: Reference mark north, 10.682 meters (35.05 feet), 242° 44′; reference mark south, 7.035 meters (23.08 feet), 22° 27′. Re-marked according to note 14X in 1929.

Supplementary points, Honolulu and vicinity

Kaimuki (Oahu Island, Hawaiian Government Survey, 1872; E. R. Hand, 1925, L. G. Simmons, 1927).—In southeastern part of Oahu, on Telegraph Hill, south of the entrance to Palolo Valley. Marked by a granite post 6 inches square, which was later surrounded by a concrete pier 6 feet square. In 1910 it was reported lost, a reservoir having been built on the site, but in 1925 it was reported as recovered, being on top of the covered reservoir which is on Telegraph Hill, Kaimuki, behind the fire station, Pahoa and Kokohead Streets. The mark was then described as a symmetrical block of concrete about 5 feet square, from the center of which a galvanized iron pipe projected about 1 foot. A metal drum, to serve as a target, was made to mount into top of pipe. It is easily removable.

For notes in regard to marking of stations, see p. 139.

Kalepeamoa (Oahu Island, L. G. Simmons, 1927).—In southeastern part of Oahu, on the highest (north) point of Wilhelmina Rise, just north of Kaimuki. Station can be approached to within short distance by car. This is an old station, the original mark, a 2-inch iron pipe driven in the ground, was replaced by a standard disk set in concrete pier, note 1a, while an underground mark was also set according to note 7a, a standard disk in concrete block 3 feet underground. Re-marked according to note 14A in 1929.

Rocky Hill (Oahu Island, Hawaiian Government Survey, 1872; E. R. Hand, 1925, L. G. Simmons, 1927).—In southeastern part of Oahu, on summit of hill at entrance to Manoa Valley, in Punahou. This hill is in the grounds of the Punahou School. Marked originally by an iron pin driven down nearly level with the ground. Later this mark was surrounded by a concrete pier, 6 feet square, with an iron pipe in center set vertically over the pin.

Kaimuki fire station (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, north of Diamond Head, the tall, slender, square, yellow tower of the Kaimuki Fire Station; it has red pyramidal roof. Shows when approaching from either east or west in the center of the gentle rise behind Diamond Head; appears on north side of small steep mound containing reservoir.

Sacred Heart Academy (Oahu Island, E. R. Hand, 1925).—On southeastern Oahu, about 1 mile inland between Honolulu and Diamond Head, the cupola on Sacred Heart Convent. Cupola is white, with black dome and white cross, and is surrounded by square white rail.

Elks Club (Oahu Island, E. R. Hand, 1925).—On southeastern coast of Oahu, on shore on west side of Diamond Head, a great yellow structure built partly over water, its seaward side being partly inclosed with glass. Station is small flagstaff on top of building. It is surrounded by a little square railing. Must not be confused with a tall flagpole which stands in the club yard.

Dillingham (Oahu Island, E. R. Hand, 1925).—On southwest slope of Diamond Head, the center of gable roof, midway between two great, squat, end towers, of cement structure (residence), tinted pink with red tile roof.

Moana Hotel flagstaff (Oahu Island, E. R. Hand, 1925; L. G. Simmons, 1927).—On southeastern coast of Oahu, on beach west of Diamond Head. Moana Hotel is a very extensive building, light gray in color, and has a great semicircular window at sea end of gable roof. Station is flagpole in exact center of roof of building.

Moana Hotel flagstaff (Oahu Island, O. B. French, 1909).—The flagstaff on Moana Hotel, on the beach west of Diamond Head. In 1925 and again in 1927 a position was determined for a flagstaff located in the exact center of the roof of Moana Hotel. The position determined in 1909 differs considerably from the later determinations, and it is probable that a change in the position of the flagstaff occurred between 1909 and 1925.

Waikiki latitude, eccentric (Oahu Island, E. D. Preston, 1891).— Position refers to the trigonometric station which is 4.58 meters (15.0 feet) north and 19.38 meters (63.6 feet) west of the Coast and Geodetic Survey latitude pier at Waikiki, about 2 miles southeast of Honolulu, and about 400 feet from the seashore. The latitude pier of the observatory of the International Geodetic Association is 9.45 meters (31.0 feet) north and 9.39 meters (30.8 feet) west of the Coast and Geodetic Survey latitude pier.

Kumulae (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, well inland between Honolulu and Diamond Head, the residence of Joseph Kumalae. Station is flagstaff in center of square white tower with low pyramidal roof, and two windows on each side. An iron rail surrounds the flagstaff.

Library, University of Hawaii (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, back in the valley between Honolulu and Diamond Head, on the library building of the University of Hawaii, a low white square structure of classical design, the highest of a group of three white buildings. Library has a line of pillars on front face. Station is exact center of building, as determined by intersection of diagonals.

Central Union Church (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, well inland, midway between Punchbowl and Diamond Head, a spire, unusually tall and slender arising from a cylindrical tower which itself rests upon a square tower. Has brilliant gold ornament on top.

Lunalilo Home (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, on southeast side of Punchbowl, a spire rising from pyramidal tower; gray, with arched opening on each side.

St. Andrews Cathedral (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, on southwestern slope of Punchbowl, tower of heavy design, square,

For notes in regard to marking of stations, see p. 139.

yellow, each corner built out cylindrically, with one raised higher than the other three.

Dome, American Factors Building (Oahu Island, E. R. Hand, 1925).—In southeastern Oahu, a large green tiled dome with flagpole, between Honolulu Harbor and Punchbowl.

Aloha Tower (Oahu Island, E. R. Hand, 1925; L. G. Simmons, 1927; J. H. Peters, 1928)).—In Honolulu, at Pier 10, the great square tower, rising 190 feet above sea level, and surmounted by a 40-foot staff. Tower has light, time ball, and four clock faces.

Post office southeast tower (Oahu Island, E. R. Hand, 1925).—Flagstaff on massive square yellow tower, the southeastern of twin towers, rising from the Federal Building.

Post office northwest tower (Oahu Island, E. R. Hand, 1925).—Slender cupola on massive square yellow tower, the northwestern of twin towers rising from the Federal Building. On this cupola are an anemometer and other Weather Bureau instruments.

Hawaiian Electric Co., southeast stack (Oahu Island, E. R. Hand, 1925).—In Honolulu, the southeastern of the twin stacks of the Hawaiian Electric Co., gray stacks 220 feet in height.

Hawaiian Electric Co., northwest stack (Oahu Island, E. R. Hand, 1925).—In Honolulu, the northwestern of the twin stacks of the Hawaiian Electric Co., gray stacks 220 feet in height.

Transit of Venus (Oahu Island, Hawaiian Government Survey, 1875).—In a lot belonging to the estate of the late Queen Dowager Kapiolani, on the south side of Punchbowl Street, near the sea. Marked by transit pier of solid masonry, which is about 10 feet north of the altazimuth pier.

Honolulu longitude monument (Oahu Island, Edwin Smith, 1903).—In the grounds of the United States Navy station, 88.97 meters (291.9 feet) north and 505.97 meters (1,660.0 feet) east of harbor light. Station marked by a concrete pier 14 by 26 inches in cross section, and 3 feet high, resting on a concrete foundation 3 by 4 feet in cross section, which in turn rests upon coral rock 2½ feet below surface of ground. North of the center of the pier, and 3.435 meters (11.27 feet) therefrom is a galvanized iron pipe 2½ feet long set in cement, with its center marked by a copper bolt.

Immigration Building, flagstaff (Oahu Island, E. R. Hand, 1925).—On east side of entrance of Honolulu Harbor, on the immigration station building, a tall slender cupola, yellow, surmounted by a flagstaff, the whole rising from a dark green pyramidal roof.

Allen and Robinson warehouse (Oahu Island, E. R. Hand, 1925).—In Honolulu, at Kenalo Basin, the east gable of large long warehouse, dark gray.

Crematory chimney (Oahu Island, E. R. Hand, 1925).—On east side of Honolulu Harbor entrance, on building of city crematory, a tall, bright red chimney.

United States Engineers north base (Oahu Island, O. B. French, 1909).—On made ground about ¼ mile northwest of the lighthouse at the entrance to Honolulu Harbor. Marked by concrete post.

Quarantine Island flagstaff (Oahu Island, E. R. Hand, 1925; J. H. Peters, 1928).—In southeastern Oahu, on west side of entrance to Honolulu Harbor, on Quarantine Island, in the east end of a dense grove of ironwood trees, the flagstaff of the United States Public Health Service station.

Kalihi Channel datum point (Oahu Island, E. R. Hand, 1925).—On southern coast of Oahu, on west side of entrance to Kalihi Channel, a vertical board made fast to three concrete piles.

Rad (Oahu Island, E. R. Hand, 1925).—On southern coast of Oahu, just west of Kalihi Channel, on Mokuoeo Island, center of large house with sloping roof at east end of island.

Red gas tank (Oahu Island, E. R. Hand, 1925).—In southern Oahu, on west side of Honolulu, center of large red gas tank. A very conspicuous object even from as far away as Barbers Point.

Kalihi fire station (Oahu Island, E. R. Hand, 1925).—On southern shore of Oahu, about 2 miles northwest of Honolulu, the tower of the Kalihi fire station, a tall slender square yellow tower with red pyramidal roof. It shows up well inland between Honolulu and Ahua Point, and is distinguishable from a similar tower nearer town, by the fact that it has iron balconies, one on each side immediately below windows.

Oahu Pen. (Oahu Island, E. R. Hand, 1925).—In southern Oahu, about 2 miles northwest of Honolulu, the tower of the Oahu jail, square, flat on top, cement color, with two narrow windows in each side.

For notes in regard to marking of stations, see p. 139.

Supplementary points, southern part

Station G (Oahu Island, E. R. Hand, 1925).—On southern coast of Oahu, the artillery fire control station on Ahua Point. Station is an inconspicuous green house on iron frame.

Pearl Harbor entrance datum point (Oahu Island, E. R. Hand, 1925).—On south coast of Oahu, east side of Pearl Harbor entrance, a platform on concrete pile with vertical boarding.

Gilbert (Oahu Island, L. G. Simmons, 1927).—Identical with station *Gilbert* (*U. S. E.*), which was also used as a bench mark in the precise level net of Oahu, 1927. At Gilbert siding along Oahu Railway & Land Co., about 35 feet south of main track, and 60 feet toward Ewa from west switch stand, and just inside fence line. Marked by a United States Engineers' rectangular bronze plate set in 4-inch soil pipe, and stamped "Gilbert." Re-marked according to note 14A in 1929.

Supplementary points, southwest coast

Kapu (Oahu Island, O. B. French, 1910).—On highest point of ridge of Waianae Mountains about ½ mile north of Von Hott's house. From Honouliuli or Ewa Mill a good road reaches to within 2 miles of the house, with trail remainder of the way. A foot trail from the house to and beyond the station is cut on or near the top of the ridge, crossing several lower summits before reaching the station which is on the south end of a short rounding ridge. The north end of this ridge is very steep, and the trail is cut along its west side, the first place where it is so made after leaving the house. Marked by a ½-inch drillhole in a rotten rock in place.

Mailiili (Oahu Island, Hawaiian Government Survey, 1875; L. G. Simmons, 1927).—No descriptions are available for the stations of this name determined in 1875 and 1927, and it is not known definitely if the two are identical. The two determinations agree so closely that it seems probable that there is but one station there. It is possible, however, that a pinnacle was the point observed on, and it may have altered slightly during the years. Both determinations are therefore given.

Kepuhi (Oahu Island, Hawaiian Government Survey, 1875; O. B. French, 1910).—On projecting point near north side of Makaha Bay, west of government road, on a stone platform said to be an ancient "heiau." Marked by concrete post.

Burns (Oahu Island, L. G. Simmons, 1927).—Identical with *Burns* (*U. S. E*). In Waianae district, on the second ridge north of Waianae, on the summit of a small rise in the ridge halfway between stations *Kepuhi New* and *Keaau 2*, and on same general ridge as these two. (See descriptions thereof.) Marked by United States Engineers' rectangular brass plate set in concrete in 5-inch pipe embedded in ground.

Kaena (Oahu Island, Hawaiian Government Survey, 1875).—About 800 feet back from the extremity of Kaena Point, the extreme northwest point of Oahu, in the center of a small area, surrounded by stone walls, said to have been a "heiau." Marked by a concrete post projecting about 6 inches above the ground.

Supplementary points, northwest coast

Mokuleia (Oahu Island, L. G. Simmons, 1927).—No description is available for this station, but its position agrees so closely with that for the station established in 1874 that they may be taken to be identical. The station of 1874 was described as being on a sand hill near the shore and marked by a concrete post.

Pump (Oahu Island, O. B. French, 1910).—Center of tall slender black smokestack on the pumping station near west side of the Waialua sugar plantation.

Mok (Oahu Island, O. B. French, 1910).—On a sand hill on the most prominent point about ½ mile west of Mokuleia railway station and about 100 meters west of an old barn. A roadway crosses the railroad and runs along the fence which is just east of old barn. Marked temporarily; permanent marks to be put in by county surveyor.

Wind (Oahu Island, O. B. French, 1910).—Center of supporting post of a large windmill near the shore about northwest of Puuiki railroad station.

Waialua (U. S. E.) (Oahu Island, United States Engineers, 1914).—No description available for this point or for *Waialua (Army)*, a "no check" point of 1927. The 1927 position reported in error, and the position of only *Waialua (U. S. E.)* is given.

For notes in regard to marking of stations, see p. 139.

Waialua mill chimney (Oahu Island, O. B. French, 1910; L. G. Simmons, 1927).—Center of large steel smokestack on Waialua sugar mill. This was called station *Mill* in 1910.

Ena (Puena) (Oahu Island, O. B. French, 1910; L. G. Simmons, 1927).—The station *Puaena* of 1875 was not recovered in 1910, but a new station, called *Ena*, was established in approximately the same location. Between 1914 and 1920 the United States Engineers had a station in the same position as the 1910 station, but no description of their station is available, other than the report in 1927 that the Army mark was recovered and used. The 1927 description tallies so closely with 1910 description, and the positions determined in 1910, 1914–1920, and 1927 are so closely in agreement that it seems reasonably certain that the same station was used in each of these years, and for it the position determined in 1910, being the strongest, is given. The station is on the northwest coast of Oahu, about 0.6 mile north of Haleiwa Hotel, on north side of Waialua Bay, about halfway out on Puena Point, and on south side of point. Marked by a 1-inch pipe cemented in a block of concrete 3 feet square. Reference marks were standard reference disks in outcropping bedrock, note 12a, set at the following distances and azimuths from the station: No. 1, 32.78 meters (107.6 feet), 91° 21′; No. 2, 42.33 meters (138.9 feet), 180° 25′. Re-marked according to note 14A in 1929.

Puaena (Oahu Island, Hawaiian Government Survey, 1875).—On the east side of Waialua harbor, on a projecting point. Marked by concrete post. Destroyed by storm in 1880.

Dub (Oahu Island, O. B. French, 1910).—The northeastern and higher of two stacks on the pumping station on the east side of Waialua sugar plantation.

Kawailoa (Oahu Island, L. G. Simmons, 1927).—In northwestern part of Oahu, about 2¼ miles east-southeast of Kawailoa railroad station of the Oahu Railway & Land Co., back in a pineapple patch. Approached from Kawailoa railroad station by taking road leading up and by the pineapple settlement to a point about 200 yards from station where irrigation ditch crosses road. Station is on this ditch, about 200 yards to the left or north of road. Marked according to note 1a, a standard disk in concrete post. Reference mark, a standard reference disk, note 11a, is 220.13 meters (722.21 feet) from the station. Remarked according to note 14A in 1929.

Peahinaia (Oahu Island, Hawaiian Government Survey, 1875).—On a high point, on a ridge back of Waialua, on the boundary of Kawailoa, near the corner of the lands of Helemano and Paalaa. Marked by an iron stake.

Waimea (Oahu Island, Hawaiian Government Survey, O. B. French, 1910).—On bluff east of Waimea Valley, south of the Government road, near an ancient "heiau." Marked by concrete post and cairn of stones.

Ka (Oahu Island, O. B. French, 1910; L. G. Simmons, 1927).—On the summit of low hill just northeast of the high hill next to and southeast of Kawela. Can be approached by following trail around north side of this hill. No record of original marking of station. Present marking a United States Engineers brass plate cemented in 5-inch iron pipe embedded in ground.

Supplementary points, northeast and east coasts

Kaipapau (Oahu Island, L. G. Simmons, 1927).—Near the northeast coast of Oahu. Re-marked according to note 14A in 1929.

Kapaka (Oahu Island, O. B. French, 1910).—On the most prominent point about ½ mile south of Hauula railway station, about 100 feet from the road and 50 feet from the beach. Marked by a short cross in top of an irregular-shaped stone, set with top just below surface of ground.

Mokolii Island (Oahu Island, E. R. Hand, 1926).—Off the east coast of Oahu, at the north end of Kaneohe Bay, close inshore, off Kualoa Point, on the highest point of the steep-sided, conical island of that name. Station is a heavy concrete pier at apex of island. Probably erected by Territorial surveyors.

Kaaumakua (Oahu Island, L. G. Simmons, 1927).—About east of center of island of Oahu, on the summit of Puu Kaaumakua, on the divide of the Koolau Range. It is reached by the Schofield-Waikane trail and is about ¼ mile south of where the trail crosses the divide. Marked by standard disk station mark in tile, note 6a. Reference mark, a standard reference disk in tile, note 13a, is 3.55 meters (11.6 feet) from station in azimuth 145° 08′. Re-marked according to note 14X in 1929.

For notes in regard to marking of stations, see p. 139.

Waiahole (Oahu Island, E. R. Hand, 1926).—On the eastern coast of Oahu, near the shore of Kaneohe Bay, and back from the main highway where it runs along the shore of the bay, between Libbyville and Waikane, and at a point where the concrete road bends sharply around the end of the ridge between the Waiahole and Kaalaea Valleys. Station is at the most southeasterly part of curve, back from the road and up the slope about 65 feet. The telephone wires cut across the end of the ridge, passing almost directly over the station. Marked according to note 5; the rock in which the mark is placed is about 4 feet high and is the only rock in the vicinity.

Kapapa Island (Oahu Island, E. R. Hand, 1926).—Off the eastern coast of Oahu, in the middle of the entrance to Kaneohe Bay, on Kapapa Island, stands a low, nondescript, part stone house. The house stands solitary in the middle of the island. Its center was determined.

Kekepa Island (Oahu Island, E. R. Hand, 1926).—On east coast of Oahu Island, in southeastern part of Kaneohe Bay, about ¾ mile west of north end of Mokapu Peninsula, a huge symmetrical coral rock, with sides deeply undercut so that the rock from almost any direction presents the appearance of a turtle. The formation is sometimes referred to as "Turtle Island." Station is exact center of rock, not marked.

Kahaluu Landing (Oahu Island, E. R. Hand, 1926).—On eastern coast of Oahu, west shore of Kaneohe Bay, at Kahaluu Landing (Libbyville). Station is east gable (one facing Mokapu Peninsula) of the great white wharf shed on the outermost end of wharf. There are two wharf sheds of equal size.

Pond (Oahu Island, E. R. Hand, 1926).—On east coast of Oahu, in the exact center of the long, humped-up, narrow, steep-sided point that juts out into Kaneohe Bay, 1 mile north of Heeia Landing and 1 mile east of the high hill on which Heeia triangulation station is located. There is an immense fish pond between this point and Heeia. The main highway is west of the station which is on the highest part of the rise in the center of the point. Marked by a 2-inch galvanized iron pipe, which was presumably established for private land surveys.

Moku o Loe Island (Oahu Island, E. R. Hand, 1926).—On the eastern coast of Oahu, in the southern end of Kaneohe Bay, the center and highest point of the gently sloping, grassy island of the same name. Marked by a small tree.

Pahu (Oahu Island, O. B. French, 1910).—On the prominent hill just southeast of the old mill at Heiia and northeast of the courthouse at Kaurohe. Marked by a cross in top of a square concrete post.

Kaneohe (Oahu Island, E. R. Hand, 1926).—On the eastern coast of Oahu, close to the shore at the southern end of Kaneohe Bay. A road from the vicinity of Kailua Beach crosses Mokapu Peninsula and continues west closely following the shore at the south end of Kaneohe Bay, where it abruptly leaves the bay and goes straight out to the Honolulu-Kaneohe road, going through a deep cut. Station is on the north bank of this cut, at the highest part of the rise, and on the side of the road toward Kaneohe village. It is about 100 meters from the water of a fish pond. From the station the radio towers at Heeia naval radio and the triangulation station *Heeia* are in range. Best reached from Honolulu road, turning off to right (pineapple field road) just before reaching road to Kaneohe Coral Gardens. Marked by a 2-inch galvanized iron pipe set in concrete. This is a private land survey mark.

Kailua (Oahu Island, Hawaiian Government Survey, 1872; O. B. French, 1910; E. R. Hand, 1926; L. G. Simmons, 1927).—In southeastern part of Oahu, on the highest summit of the low hills between the Pali and Mokapu, and about 2 miles from the Pali, in the land of Kailua, called Ulumawao. Best reached by going along the Waimanalo road for about ½ mile from where it leaves the main road to the Pali, thence following the prominent ridge to the summit plainly visible ahead. Marked by a 1½-inch iron pipe projecting some 5 inches above ground and surrounded by stones. Re-marked according to note 14C in 1929.

Podmore (Oahu Island, E. R. Hand, 1926).—On the southeast coast of Oahu, on top of sharp hill midway between Wailea and Alala Points, and 600 meters back from the beach. It is above the recently subdivided residential district of Lanakai, the dividing line between lots 2 and 3 (M. R. Kellem owns the latter) would if continued from the beach up the hill pass 100 meters north of the station. Mark is a short section of 1½-inch galvanized iron pipe set vertically in rock with concrete; a smoothed spot in the concrete is marked "Podmore, 5/27/15." This is a private survey mark.

Venice (Oahu Island, E. R. Hand, 1926).—On eastern shore of Oahu, in the southeastern part of Kaneohe Bay, west of the neck of Mokapu Peninsula, being the westerly gable of old white shed standing on piling out in water.

For notes in regard to marking of stations, see p. 139.

Post (Oahu Island, E. R. Hand, 1926).—On the east coast of Oahu, on Mokapu Peninsula, in the grassy flat at the base of and southwest of Hawaiiloa Hill, 130 meters from the water on the west. It is true east of the point on the south end of the peninsula to the west of where Sheriff Davis's house stands. Marked by a heavy log, about 2 feet in diameter, set on end in the grassy flat. The log was found already in place, its purpose not known.

Sheriff (Oahu Island, E. R. Hand, 1926).—On east coast of Oahu, on the extreme south point of the westerly extension of Mokapu Peninsula, and 10 feet from the water's edge to the south. Point is very conspicuous, being surrounded by coconut trees. Station is flagpole in yard of Sheriff Davis's property.

Hawaiiloa Hill (Oahu Island, E. R. Hand, 1926).—On the eastern coast of Oahu, in the western part of Mokapu Peninsula, on a steep, conical hill, which occupies a prominent position. For many years there has been a concrete monument on top of this hill; it is the mark sighted on. Identical with *Loa*, 1910.

Pyramid Rock (Oahu Island, E. R. Hand, 1926).—On the east coast of Oahu, at the northwest corner of Mokapu Peninsula, the highest point of the high, symmetrical pyramid rock (really a mound of tightly massed rocks).

Mokolea Rock (Oahu Island, E. R. Hand, 1926).—On southeast coast of Oahu, in Kailua Bay, south of Mokapu Point. Station is highest point of a steep, sharp rock of same name.

Flagpole (G. P. Wilcox) (Oahu Island, E. R. Hand, 1926).—On southeast coast of Oahu, on shore of Kailua Bay, 1,340 meters south from Kapoho Point, and 80 yards from the beach. It is at the south end of an extensive ironwood grove, and is in the yard of G. P. Wilcox. Station is a white flagpole (hinged type) set in a concrete foundation.

Flat (Oahu Island, E. R. Hand, 1926).—On southeast coast of Oahu, on the flat coral islet that lies just off Alala Point. Station is on the most southerly point of this islet, the point closest to the mainland. It is 10 feet from the water, and is marked according to note 3.

Mokulua Island (Oahu Island, E. R. Hand, 1926).—Off the southeast coast of Oahu, on top of the more northerly of the two islands (Mokulua Islands) that lie northeast of Wailea Point. This island is very steep and rocky, and is higher than the smooth grassy sloped island south of it. The top is well defined, and appears as a shaft, roughly cubical.

Militres (Oahu Island, E. R. Hand, 1926).—On southeast coast of Oahu, on the shore of Waimanalo Bay, in the Waimanalo Military Reservation, 5 meters from high-water mark, 320 meters north of the reservation fence where it cuts the shore, which is about 1 mile northeast of Waimanalo Landing. Because of the shifting sand a special type of mark was placed consisting of a 7-foot pyramid (truncated) of concrete cast in place, about 18 inches square at base and 6 inches square at top, which projects 1 foot. Throughout the entire length of the monument, marking the center, is a 1-inch iron bar.

Derrick (Oahu Island, E. R. Hand, 1926).—On the southeast coast of Oahu, at Waimanalo Landing. Station is the vertical shaft of the derrick on the outer end of the concrete pier.

Manana Island (Oahu Island, E. R. Hand, 1926).—Near the southeastern point of Oahu, on Manana Island, a small island just north of Makapuu Point. Station is a small cairn on top of island.

OAHU ISLAND TO HAWAII ISLAND

Principal points

Mauna Loa (Molokai Island, Hawaiian Government Survey, 1872; C. L. Garner, 1926).—On the summit of Mauna Loa, in the center of the western part of Molokai. In 1926 the station was searched for and no trace of the original mark, a copper bolt, recovered. A concrete reservoir stands on the top of the hill, in excavating for which the station was probably destroyed. There is a United States Geological Survey bench mark near the highest part of the summit.

Kaunakakai (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915; R. W. Woodworth, 1925).—On southern coast of Molokai at Kaunakakai village, east end of wharf, between the house of wireless operator and Mr. Dern's house, and between the road on the north and beach on south, but slightly closer to the road. Center marked by granite post with cross in top.

Middle Hill (Kaulapuu) (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915).—In central Molokai, on a prominent symmetrical hill in the great saddle of Molokai, between Mauna Loa at the west end of island and the moun-

For notes in regard to marking of stations, see p. 139.

tains at the east end. Station is about midway between the north and south coasts. Originally marked by a copper triangle buried under redwood post and cairn of stones. Three reference marks were made on rocks, each 6 feet from the station, and bearing, respectively, north, S. 60° W., and S. 60° E. from the station. (Not visited in 1915, but above taken from 1915 record.)

Kanepuu (Lanai Island, Hawaiian Government Survey, 1879).—On Mount Kanepuu, a rounded summit in the northwestern part of Lanai, District of Kaa, about 3,600 meters east of the western line of the precipices along the western shore. Marked by redwood post and stone cairn. Reported destroyed.

Puu Papai (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915; R. W. Woodworth, 1925).—On the southern coast of Molokai, in the ridge of the prominent hogback hill which is almost on the shore, and trends at right angles to it, at a point 2 miles west of Kamalo Wharf. Station is not on the most conspicuous part of the hill as seen from offshore, but is 280 meters south of the top of the hogback. Subsurface mark is copper triangle placed in first marking of station; surface mark placed in 1915 is a concrete monument with bronze disk in top, note 6½. The post projects some 6 inches above the ground.

Pohoula (Lanai Island, Hawaiian Government Survey, 1879; F. G. Engle, 1927).—In the central part of Lanai, District of Paomai, Land of Paomai, on the summit of a red bluff about 1,700 meters north of Koele Ranch. Reached by road turning northeast near house of Mr. Gibson, and running back to cemetery on top of bluff. Station is 300 meters southwest of cemetery. Marked by drill hole surrounded by triangle in top of stone. Reference marks (1927) are drill holes in stones which project several inches above ground. They are at the following distances and azimuths from the station: No. 1, 12.228 meters (40.12 feet), 220° 56′; No. 2, 9.570 meters (31.40 feet), 355° 57′.

Paupau (Maui Island, Hawaiian Government Survey, 1879; J. C. Gauger, 1912).—Near the western coast of West Maui, in Lahaina District, on a conspicuous hill of the same name about 1 mile east of Lahainaluna. Station is on western summit near grave of D. Malo. Marked by a 4-inch iron pipe projecting 4 feet above the ground and surmounted by an iron plate bearing the letters "T. H. F. R." (Territory of Hawaii Forest Reserve). A tripod signal stands about 15 meters south of the station, and should not be confused with the station. There is no mark under the tripod, but the tripod may last a number of years.

Puu Manu (Lanai Island, Hawaiian Government Survey, 1879; F. G. Engle, 1927).—In southeastern part of Lanai, in Kaohai District, on Puu Manu, the crest of the main ridge about 600 meters southwest of the government road. In 1927 this road was said to be in poor but passable condition. Station marked by concrete post surrounded by large cairn of rocks. Reference marks (1927) are drill holes in large bowlders, at the following distances and azimuths from the station: No. 1, 4.970 meters (16.31 feet), 110° 50′; No. 2, 15.25 meters (50.0 feet), 305° 54′; No. 3, 12.42 meters (40.7 feet), 27° 24′.

Hekili (Maui Island, Hawaiian Government Survey, 1879; J. C. Gauger, 1912; R. W. Woodworth, 1925).—On western coast of West Maui, in Lahaina District, land of Olowalu, about 500 meters east from the Olowalu Mill, 50 meters back from the shore line, in a dense growth of algeroba and opium trees which make it (in 1925) unoccupiable and invisible from any other station, or from along the shore line. Marked by a concrete post with cross in top set flush with surface, and surrounded by a cairn of stones.

Puu Olai (Maui Island, Hawaiian Government Survey, 1879; J. F. Pratt, 1905).—On the southwest coast of East Maui, in Honuaula District, on the highest point of the conspicuous hill known as Puu Olai or Millers Hill, about 1 mile southwest from Makena Bay. It is on the southeast summit, east of the main crater. Marked by concrete post about 8 inches square set in ground and projecting about 2 inches above surface.

Kahoolawe (Kahoolawe Island, Hawaiian Government Survey, 1871; J. F. Pratt, 1905).—On the summit of the conspicuous peak near the eastern end of Kahoolawe. Marked by a bottle buried neck down a few inches below the surface of ground. Small volcanic stones are heaped over the mark.

Maui south base (Maui Island, Hawaiian Government Survey, 1871).—About the center of the Wailuku Peninsula, about 2 miles east-southeast of Waikapu village, south of the road from Waikapu to Kula, east of a range of sand hills, and on the summit of rising ground. Marked by copper bolt with cross lines on it set in a granite post which is inclosed in a pier of masonry.

Piiholo (Maui Island, Hawaiian Government Survey, 1871).—In north central part of Maui, on summit of conspicuous hill of same name, in Hamakualoa District, 6½ miles south of the northernmost point of East Maui. Marked

For notes in regard to marking of stations, see p. 139.

by granite post 3½ feet long set in ground top level with surface and having cross cut in top. It was surrounded by four redwood posts 6 by 6 inches in size.

Puu Pane (Maui Island, Hawaiian Government Survey, 1871).—In Central Maui, in Kula District, on summit of hill of same name in Aapueo, Kula; above the government road and south of a grove of "Hau-hele" trees. Marked by a granite post 3½ feet long with cross cut in top sunk level with ground and surrounded by four posts 6 by 6 inches in size.

Puu Io (Maui Island, Hawaiian Government Survey, 1879).—In the southwest part of East Maui, Kula District, on the summit of the hill Puu Io, near its west end and just below the government road in the land of Paeahu. Marked by a concrete post.

Maui north base (Maui Island, Hawaiian Government Survey, 1871; J. C. Gauger, 1912).—On northwest coast of Maui, in Wailuku District, a little over a mile east of Kahului. Reached by following the Kahului railroad track toward Paia until within 200 meters of the switch leading to the Puu Nene mill, and the station will be found 80 meters south of the track and just south of a sand-hill ridge. Marked by a granite post projecting 3 feet above surface with copper bolt in top.

Kolekole (Maui Island, Hawaiian Government Survey, 1876).—In central part of East Maui, in Honuala District, on a high point in the rocky ridge southwest of the highest point of Haleakala. Marked by an iron stake let into the rock and covered with a cairn of stones.

Puu Loa (Hawaii Island, Hawaiian Government Survey, 1876; E. R. Hand, 1913).—In northern part of Hawaii, in Kohala District, on Puu Loa about 6 miles east-northeast from Kawaihae, in an ancient stone fort, and 75 feet north of a very large pile of stones. In 1913 description given as follows: Mountain is about 8 miles out on the road from Waimea toward Kohala; when Kawaihae wireless bears S. 55° W. the hill will be found on the upper side of the road and on the opposite bearing. The original description of the marks was as follows: Mark is a hard "ala" stone, marked with a triangle on its flat side, under a mamane post to which a flagpole had been bolted, set 4 feet deep in a platform of stones, 10 feet on a side. The recovery of 1913 was as follows: A very large but irregular pile of stones is on the highest point of Puu Loa; on the top of this pile a thin wall had been built for a windshield, and in the lee of this, on the southwest side and 6 feet lower, were found two stones, each marked with an equilateral triangle, 5 inches on side, stones were side by side, 1 foot apart, triangles up. One stone was circular and had drill hole in center of triangle; the other was irregular, larger, and had no drill hole. Between the stones was found what may have been the original flagpole. A United States Geological Survey tablet has been placed in the stone with drill hole. A rectangular pile of stones about 6 feet high and 12 feet long is 22 meters distant on bearing S. 55° W.

Puako (Hawaii Island, Hawaiian Government Survey, 1873; E. R. Hand, 1913; K. T. Adams, 1928).—On the northwestern coast of Hawaii, in South Kohala District, a short distance north of the village of Puako, on the highest point of a slight rise, 370 meters, N. 18° W. from the stack of an abandoned sugar mill at Puako (in 1928 no longer standing), 100 meters from the shore and 30 meters east of the trail between Puako and Kawaihae. It was marked by a concrete post set in the ground, over which was built a small cairn. A telephone pole a little way down the slope bears N. 87° E. In 1928 when the station was visited the cairn over the mark was removed and the mark found to be about 3 feet north of the center of the cairn. At that time two reference marks were established. No. 1, almost on line of telephone poles, is a standard disk reference mark cemented in the top of an outcropping rock on the edge of the slope leading to the gulley, about 8 inches above the surface of the ground and 23.330 meters (76.54 feet) from the station in azimuth 10° 04′. No. 2 is a standard disk reference mark cemented into the top of an outcropping rock 1 foot above the surface of the ground on the edge of the knoll, 4.652 meters (15.26 feet) from the station, in azimuth 160° 36′.

Puu Pa (Hawaii Island, Hawaiian Government Survey, 1873).—In the northern part of Hawaii, on hill of same name, 3 miles southwest of Waimea village. Station is on west summit of hill and is marked by a granite post.

Nohonaohae (Hawaii Island, Hawaiian Government Survey, 1873).—In the northern part of Hawaii, southern part of Waimea District, in Waikoloa, on a conspicuous hill, Mount Nohonaohae. Marked by an iron bolt let into the rock. A cairn of stones was built over the station.

For notes in regard to marking of stations, see p. 139.

Holoholoku (Hawaii Island, Hawaiian Government Survey, 1873).—In the northern part of Hawaii, about 4 miles south-southeast from Waimea village, on the summit of a conspicuous conical hill in the plain. Marked by an iron stake driven in the "scoria," with four redwood posts set up around it to support signal.

Hokuula (Hawaii Island, Hawaiian Government Survey, 1873).—In northern part of Hawaii, northwest of the village of Waimea, on Mount Hokuula, on the east side of the crater toward Imiola Church. Marked by an iron pin adjoining a mamane post.

Hawaii west base (Hawaii Island, Hawaiian Government Survey, 1872).—In the southern part of Hawaii, in Waimea village, between 300 and 400 feet north of Imiola Church, in E. W. Lyon's lot. Marked by a granite post.

Hawaii east base (Hawaii Island, Hawaiian Government Survey, 1873).—In the northern part of Hawaii, on the old road between Waimea village and Mana, on the eastern edge of the plain. Marked by a granite post.

MOLOKAI ISLAND

Principal points, south-central part

Puu Luahine (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915; R. W. Woodworth, 1925).—In central Molokai, on the higher and more westerly of two red hills seen about 3 miles north of Kaunakakai village. The hill is most symmetrical and shows up prominently against the skyline. It appears to be elongated in an east and west direction, and a cairn marking station is seen plainly at its western end.

Onini (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915).—On southern coast of Molokai, on the slope close to the shore, 50 meters above road and 3½ miles east of Kaunakakai Wharf. Between mileposts 12 and 13 and on the upper side of the road there is an apiary, from the main shed of which the station bears N. 66° E., 100 meters. Subsurface mark is a bottle. Surface mark is a concrete monument with bronze disk in top, note 6½. View of station from sea interrupted by algeroba trees growing along shore.

Kaapahu (Molokai Island, Hawaiian Government Survey; R. W. Woodworth, 1925).—In southeastern part of Molokai, on a prominent knob atop a high ridge which runs due north from Kamalo, rising between the deep valleys of Kamalo and Kapualei. Marked by a 4 by 4 inch redwood post, over which is a 6-foot cairn of stones. From Kamalo this cairn is readily distinguishable without the aid of glasses.

Kalaeloa (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915).—On the southeastern coast of Molokai, on the low flat island a little over 1½ miles east of Kamalo Wharf. This island is connected with shore by fish pond walls. A small shed with a mark of white paint bears N. 60° W., 150 meters. Station is very close to water line on east and is marked with concrete monument and bronze disk in top, note 6½. In 1925 concrete post found washed out and lying near water's edge, the shore line having apparently receded very much since the station was established. The small shed (witness mark) also reported as gone.

Mapulehu (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915; R. W. Woodworth, 1925).—On southeastern coast of Molokai, 585 meters S. 78° W. from the end of Pukoo Wharf; not more than 5 feet from water, on a small sharp point formed by a semicircle of protecting stones which permitted the beach on either side to be cut back by wave action; and 380 meters southwest from the front range pole (private) of Pukoo. There is a stream bed directly west of the station, and a large unpainted house, with red roof, near which stands a low windmill, bears N. 63° W. from the station, 310 meters. Subsurface mark is a bottle set below low water. Surface mark is a concrete monument with standard United States Coast and Geodetic Survey bronze disk in top, note 6½. The post projects about 1 foot above surface of ground.

Supplementary points, south-central part

Nat (Molokai Island, R. W. Woodworth, 1925).—On the southern shore of Molokai, about 1½ miles west of Kaunakakai Wharf, and about ½ mile west of the only coconut grove in the vicinity. Station is on a stretch of marshy tide-flat about 1 foot above ordinary high water and 40 meters south from the tree line. Marked by a standard United States Coast and Geodetic Survey bronze disk set in top of a 6-inch square concrete post which projects one foot

For notes in regard to marking of stations, see p. 139.

above surface of ground. Kaunakakai wireless mast is distant about 1½ miles, in azimuth 297° 47′ from the station.

Kamalo 2 (Molokai Island, R. W. Woodworth, 1925).—On the southern coast of Molokai, west of Kamalo, and near the east end of the Kamahuehue fish pond. Station marked by a ¾-inch iron pipe set firmly in the ground alongside the remains of a wooden post, which is possibly the original station mark. The pipe projects about 1 foot above the ground. The reference marks are two standard United States Coast and Geodetic Survey disks cemented into the near-by inshore walls of the fishpond. No. 1 is 8.52 meters (28.0 feet) from station in azimuth 281° 35′; and No. 2, 7.45 meters (24.4 feet), 45° 01′.

Keawanui (Molokai Island, R. W. Woodworth, 1925).—On the southern coast of Molokai, on the sand shore at the end of the Keawanui fishpond wall where the wall joins the long spit extending to the south. Station is the center of a 2-inch iron pipe projecting 1 foot above the larger triangular concrete base in which it is set. This mark is one of several permanent marks placed in the vicinity by the Board of Harbor Commissioners in a recent survey of the harbor bordering Keawanui Pond on the west. Reference mark No. 1 is a standard bronze tablet with arrow pointing toward station set in the center of top of an irregular mass of concrete, note 11c; it is 9.013 meters (29.57 feet) from station in azimuth 159° 42′. Reference mark No. 2 is a standard bronze tablet with arrow pointing towards the station set in the center of the top of a square block or post of concrete, note 11a. It is 9.372 meters (30.75 feet) from station in azimuth 306° 47′.

Shack (Molokai Island, R. W. Woodworth, 1925).—On southern shore of Molokai, at the sea end of Kamalo Wharf, the south extremity of the ridge of the single small shack.

Kaluaaha Church (Molokai Island, Hawaiian Government Survey, R. W. Woodworth, 1925).—The prominent spire of the large concrete Protestant Church located near the shore road 1½ miles west from Pukoo Wharf near Kaopeahina Fish Pond.

Mahilikua (Molokai Island, Hawaiian Government Survey; R. W. Woodworth, 1925).—In 1925 this station was searched for and not found, and it seemed probable that the land originally surrounding the station had been carried away by wave action, and the station lost through erosion.

Pukoo (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915; R. W. Woodworth, 1925).—On the southeastern coast of Molokai, back from the village of Pukoo, on top of a grass-covered knob on the ridge running back from Pukoo Fish Pond, the first ridge east of the one along which runs the Wailua foot trail. Station is at the apex of the triangle formed by two great converging gulches which become one just above the station, and whose base is flat ground at sea level. This triangle shows smooth grass-covered slope of light green against the dark green of the gulches on either side and the timber seen above the apex across the remarkably deep gulch formation. Pineapple cultivation is being started on the lower slopes of the hill, and a road is under construction which will lead some half way up the hill. Subsurface mark is a bottle. Surface mark is a concrete monument with standard bronze disk, note 6½.

Principal points, east end

Honomuni (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915; R. W. Woodworth, 1925).—On southeast coast of Molokai, on Honomuni Point, a flat grassy point about 1½ miles east from Pukoo Wharf. An isolated clump of lauhala trees very plainly marks this point. Station is on fence line, about 40 meters back from high-water mark. From the small conical unpainted steeple close to and just below the government road the station bears N. 68° E., 410 meters; from the nearer of the two red houses on the beach and belonging to Bowen it bears S. 35° W., 475 meters; and from the cottage of Kiohinu (a native) it bears S. 30° E., 100 meters. Subsurface mark is a bottle. Surface mark is a concrete monument with standard United States Coast and Geodetic Survey bronze disk, note 6½.

Mokuhooniki (Molokai Island, Hawaiian Government Survey).—Near eastern end of Molokai, on island of same name, 1¾ miles south of Cape Halawa, and 1 mile from mainland. Not visited in 1915. Old Hawaiian Government survey mark an iron bolt let into the rock.

Puu o Hoku (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915).—On eastern shore of Molokai, on a poorly defined, flat, grassy hill, 2 miles southwest from Cape Halawa, and ½ mile back from shore. It is 40 to 50

For notes in regard to marking of stations, see p. 139.

meters from the main road, in the sharp bend where the road comes up out of a great gulch and turns northwest toward Brown's house and the village of Halawa. Station not on highest point, but 2 feet below it and 30 meters south of it. Subsurface mark is a bottle. Surface mark is concrete monument with standard bronze disk in top, note 6½.

Kalanikaula (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915).—On the eastern shore of Molokai, on highest point of a well defined, grassy hill above and southeast of the village of Halawa. This hill shows up from the sea as a knob at the right end of a ridge trending south-southwest. There is a large kukui grove (light green) on this ridge, seen from the sea. It is about 200 meters from the station, and bears south-southwest. Station marked underground by a bottle. Surface mark is standard disk in concrete monument described in note 6½.

Supplementary points, east end

Puu Mano (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915).—On the southeastern coast of Molokai, just above and north of the shore road and the locality known as Honomuni, which is 2 miles east of Pukoo. Station is on a very prominent, domelike hill, grass covered. It may be identified from the shore as follows: From the two red houses on the beach, belonging to Bowen, it bears N. 35° W., 1,270 meters; from the small conical unpainted steeple close to and just below government road it bears north 1,330 meters. Subsurface mark is a bottle. Surface mark a concrete monument and bronze station mark in top, note 6½. The lower slopes of this hill are under cultivation for pineapples, and a good road leads up the hill almost to the station.

Waialua Sea (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915).—On southeastern coast of Molokai, on the sand point at Waialua village and gulch, at high-water line. About 120 meters west of station is a creek and bridge, while a church, cream colored and having a spire with slat ventilators, is on the far side of the road from the station, distant 260 meters, N. 10° W. Subsurface mark is a bottle. Surface mark is concrete monument with bronze station mark in top, note 6½.

Lupehu (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915).—Near southeastern coast of Molokai, on a small but well defined hill about 100 meters from the sea, and about midway between the gulch known as Honoulimaloo (dry), and the one where the government road leaves the sea, bending in toward Halawa village. The sharp pinnacle, painted, standing on water's edge outside of government road on the west side of Honoulimaloo Gulch (cove) bears S. 25° W. from the station, distant 660 meters. Subsurface mark is a short length of pipe set upright. Surface mark is concrete monument and standard bronze disk as described in note 6½. Station covered by a painted cairn; 20 meters east of the station is a telephone pole.

Principal points, west end

Laina (Kaa) (Molokai Island, Hawaiian Government Survey; C. L. Garner, 1926).—On the highest point of a prominent conical reddish hill in the northwestern part of the island. It is the higher and more easterly of the two prominent cone-shaped hills in the vicinity. The marks recovered were post set in ground and cairn of rocks. It was re-marked with a standard United States Coast and Geodetic Survey triangulation disk set in a pad of cement.

Kaeo (Molokai Island, Hawaiian Government Survey; R. W. Woodworth, 1925; C. L. Garner, 1926).—Near the northwest corner of Molokai, atop of a hill of the same name, rising prominently 2 miles east of Ilio Point, and ½ mile south of the north shore of the island. In 1925 three crosses were recovered cut in immovable deeply sunken rock, at the following distances, which agreed within 0.1 foot with the distances given in the original description. Nos. 1 to 2, 14.7 feet; Nos. 2 to 3, 12.96 feet; and Nos. 3 to 1, 16.6 feet. A half foot underground and less than 1 foot north of the center mark position were found a ⅝ by 12 inch iron bolt, and the steel tip of a surveyor's rod. A new mark was placed consisting of a standard United States Coast and Geodetic Survey bronze disk set in the top of a concrete post 8 inches square and projecting ½ foot above the ground. Over this was placed a low cairn of rocks. The distances from the reference crosses are: From No. 1, 12.87 feet; from No. 2, 6.4 feet; from No. 3, 6.9 feet.

Kakaako (Molokai Island, Hawaiian Government Survey; R. W. Woodworth, 1925).—This station has been destroyed by the cultivation of the surrounding fields for pineapple growth.

For notes in regard to marking of stations, see p. 139.

Napuukulua (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915).—In the western end of Molokai, on the lower and northwestern of two hills of same name, in the center of a small "heiau" (temple) about 2,900 meters from the west shore of the island. These two hills show up prominently against the sky from the vicinity of the great sand beach which is 3 miles south of Ilio Point, and are 3 miles east of the center of beach. Marked by post and cairn, and three reference marks, each a cross on rock, at following distances from station: No. 1, 18.5 feet; No. 2, 15.7 feet; and No. 3, 18.3 feet. The distances between reference marks are as follows: Nos. 1 to 2, 31.2 feet; Nos. 2 to 3, 27.5 feet; and Nos. 3 to 1, 32 feet. In 1925 the center post could not be found, but the three reference crosses on heavy bowlders were readily found, but the distances between them showed such discrepancies that a new mark which was put in was called *Na Puu Kulua 2*. (See description of that station.)

Pohakuloa (Molokai Island, Hawaiian Government Survey, 1885; R. W. Woodworth, 1925).—In southwest Molokai, on a hill of the same name, halfway between the Ka Lae o Kaau Lighthouse and the summit of Mauna Loa. It is within the Libby-McNeill-Libby pineapple plantation, at the westerly limit of their fields, near a cattle corral. Station marked by a cross cut on a medium sized rock. No reference marks were found in 1925, when it was reported that the ground around the station mark showed considerable evidences of erosion and stream flow, indicating that the station may have shifted position to westward. It was further reported that the station would soon be removed as the field was being put under cultivation and the few rocks in it removed.

Kopala (Molokai Island, Hawaiian Government Survey; R. W. Woodworth, 1925).—This station has been destroyed in the cultivation of the surrounding fields for pineapple growth.

Waieli (Molokai Island, Hawaiian Government Survey 1885; E. R. Hand, 1915; R. W. Woodworth, 1925).—Near southern coast of western Molokai, on prominent hill of same name, 5 miles east of Laau Point and 1 mile back from shore. In 1915 no center marks were found, and the point was reproduced from reference marks which were crosses cut in immovable rock outcroppings. The new mark is a concrete monument with bronze disk in top, note 6½. The distances to the reference marks are: No. 1, 6.7 feet; No. 2, 4.2 feet; and No. 3, 10.76 feet. The distances between the marks are: Nos. 1 to 2, 8.57 feet; Nos. 2 to 3, 14.08 feet; and Nos. 3 to 1, 15.57 feet.

Kahualewa (Molokai Island, Hawaiian Government Survey; R. W. Woodworth, 1925).—On top and point of a narrow flat-topped ridge on the west side of Onopalani Gulch, in such a position as to see the outer half of the dock at Kolo Harbor. In 1925 a United States Geological Survey signal pole was found in position, and a 1-inch iron pipe driven firmly into the ground, projecting 1 foot above it.

Amikopala (Molokai Island, Hawaiian Government Survey; R. W. Woodworth, 1925.)—This station has been destroyed in the cultivation of the surrounding fields for pineapple growth.

Pukauahi (Molokai Island, Hawaiian Government Survey; R. W. Woodworth, 1925).—In southwest Molokai. In 1925 station searched for and it made certain that the pile of stones marking the station had been removed.

Puu o Kahanui (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915; R. W. Woodworth, 1925).—On southern coast of Molokai, on a knoll 3¾ miles west along coast from Kaunakakai wharf, and 1 mile east of the deep cove where small mangrove is planted, 1,040 meters up from the sea, and 450 meters above government road. From the station the end of Kaunakakai Wharf bears S. 65° E.; and a prominent square house, red, with pyramidal roof, located down on the beach and belonging to a native named Kahinu or Kanihu bears S. 25° W. Station is on an old grave. Underground mark is a bottle. Surface mark is concrete post 1 foot square, projecting 1 foot above surface of ground, with standard United States Coast and Geodetic Survey bronze disk in top, note 6½. Over the mark a semicircular cairn was erected and painted white.

Puu Iloli (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915).—On southern coast of Molokai, on small hill of same name, 400 meters from shore, 160 meters above road, at a point 6¼ miles west from Kaunakakai. It is 1¼ miles west of deep cove where mangrove is planted, and at base where the steep slopes of Mauna Loa join the comparatively gentle slopes which lie west of Kaunakakai. In 1915 a large whitewashed cairn was found over the station, so marks were not searched for.

For notes in regard to marking of stations, see p. 139.

Supplementary points, west end

W. C. 1 (Molokai Island, Hawaiian Government Survey; C. L. Garner, 1926).—On the north coast of Molokai, almost due north of Mauna Loa. In 1926 the exact position of the station could not be recovered because the original marking, "a pile of stone," was inadequate, there being many loose rocks in the vicinity, none of which could be identified as marking the station. However, a cairn of rocks approximately where the station must have been was whitewashed.

Puu o Kaiaka (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915; R. W. Woodworth, 1925).—On western coast of Molokai, on the most southerly of two 100-foot knobs about 60 meters apart on hill of same name, about 2½ miles south of Ilio Point, and at northeast end of beach 2 miles long. A derrick and loading platform for the near-by pineapple plantation is located on the western extremity of the same hill. Station is at the seaward or west end of a stone inclosure (fish lookout) about 20 by 30 feet in size. No center mark was found in 1915, but the three reference crosses were found, and a ring of paint placed around each. These marks were at the following distances from station: No. 1, to north, 3 feet; No. 2, to east and at end of stone wall, 5 feet; and No. 3, to west, 5 feet. The distances between reference marks were as follows: Nos. 1 to 2, 7.1 feet; Nos. 2 to 3, 7.9 feet; and Nos. 3 to 1, 8 feet. Paint was placed on corner of wall to serve as hydrographic signal. In 1925 the three reference marks were recovered, but the distances between them did not agree with the distances given in the earlier descriptions, the new distances being as follows: Nos. 1 to 2, 7.09 feet; Nos. 2 to 3, 8.14 feet; and Nos. 3 to 1, 7.21 feet. A new mark put in consisted of a standard United States Coast and Geodetic Survey bronze disk, stamped 1925, and set in a mass of concrete, bed rock, and bowlders. Its distances from the reference marks are as follows: No. 1, 3.0 feet; No. 2, 5.01 feet; and No. 3, 4.96 feet.

Kaupoa (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915; R. W. Woodworth, 1925).—On western coast of Molokai, on knoll about 2⅓ miles north of Laau Point, and 600 meters east by south from end of point, the outermost point seen from the extreme end of Laau Point. Knoll is smooth, of very gentle slope, and grass covered. Center mark a cross cut in rock. A semicircular cairn was erected on seaward side of mark and whitewashed. A road, leading from the south side of the Libby pineapple plantation, strikes the shore a half mile north of the station.

Kihaapilani (Molokai Island, Hawaiian Government Survey; E. R. Hand, 1915; R. W. Woodworth, 1925; C. L. Garner, 1926).—Old Hawaiian Government Survey station. Near southwest point of Molokai, on a small sharp hill of same name about 1 mile east of Laau Point. Hill is eroded on north side showing red, but remainder is grass covered. In 1915 the Laau Point Light bore S. 60° W. 1,040 meters. Around the station is a wall which was whitewashed, as were many bowlders lying about. In 1915 no post was found, only a short section of pipe embedded in the dirt was in approximate position with regard to three reference marks on heavy bowlders. Mark was set by them, as follows: No. 1, 6.22 feet; No. 2, 4.35 feet; No. 3, 6.0 feet. Distances between reference marks as follows: Nos. 1 to 2, 10.64 feet; Nos. 2 to 3, 8.05 feet; and Nos. 3 to 1, 8.4 feet. In 1925 station re-marked with standard United States Coast and Geodetic Survey station mark set in a concrete monument standing 1 foot above ground.

Na Puu Kulua 2 (Molokai Island, R. W. Woodworth, 1925).—In the same position, very closely, as *Napuukulua*, which was searched for and only the reference marks found, the center post being completely gone. The three reference marks, crosses on heavy bowlders, showed such discrepancies in the distances between them as compared with the original distances that a new mark put in was called *Na Puu Kulua 2*, and the old station considered lost. The station is on the northwestern of the two hills of the same name standing together 1½ miles inland from the west coast of Molokai. These hills show up prominently from the vicinity of Papohaku beach, and the ruins of the "heiau" (temple) on the northwest hill, in the center of which is the station, show up square and boxlike against the horizon. Station marked by a standard disk station mark set in top of an iron pipe which is firmly embedded in a mass of concrete and the large rocks of the temple, the mark being flush with the top of the temple. The present distances between the reference marks are: Nos. 1 to 2, 31.65 feet; Nos. 2 to 3, 24.05 feet; and Nos. 3 to 1, 33.14 feet. The azimuths and distances of these marks from the new station are as follows: No. 1, 156° 17′, 5.565 meters (18.26 feet); No. 2, 292° 35′, 4.870 meters (15.98 feet); and No. 3, 22° 43′, 5.485 meters (18.00 feet).

For notes in regard to marking of stations, see p. 139.

Port (Molokai Island, R. W. Woodworth, 1925).—On western coast of Molokai, 25 feet above high water on the southerly side of the rocky point ½ mile north of Puu o Kaiaka (the hill on which the loading tower is situated), and ¼ mile north of a frame house, the only one in the vicinity. Station is 5 feet lower in elevation than the highest part of the point, and is marked according to note 3, a standard bronze tablet set in concrete in a depression in outcropping bedrock. Three reference marks, all standard bronze tablets with arrows pointing toward the station, were set in concrete in depressions in outcropping bedrock, note 12b, at the following distances and azimuths from the station: No. 1, 13.92 meters (45.7 feet), 350° 07′; No. 2, 18.20 meters (59.7 feet), 153° 45′; No. 3, 14.01 meters (46.0 feet), 246° 00′.

Pap (Molokai Island, R. W. Woodworth, 1925).—On the western end of Molokai, on the back of the long sand ridge built up between Papohaku beach and a long grass meadow, about ¾ mile south of the rocky bluff at Puu o Kaiaka. Station is 200 meters south of the northerly limit of the meadow, in such location that the high-water line of the aforementioned bluff is in range with the 100-foot cliff a half mile farther north. Marked by a concrete post, 1 foot square, with standard disk in top, see note 1a. Both post and disk are marked "1925." Post projects about 4 inches above ground.

Derrick (Molokai Island; R. W. Woodworth, 1925; C. L. Garner, 1926).—On the western end of Molokai Island, at the north end of Papohaku beach, the center of the highest crossbeam at the top of the loading tower on the bluff at the north end of the beach.

Eve (Molokai Island, R. W. Woodworth, 1925).—On west coast of Molokai, the south eaves of the only house along Papohaku beach.

White (Molokai Island, R. W. Woodworth, 1925).—On southwest coast of Molokai, about 1½ miles west from Kolo Wharf, atop of the most prominent sand dune in the vicinity, 19 feet above and 15 meters back from high-water mark. No keawi trees grow within 8 meters of station. Mark is a standard United States Coast and Geodetic Survey bronze disk set in top of concrete post 6 inches square projecting 1 foot above surrounding sand. Reference marks, standard bronze tablets with arrows pointing toward station, note 12b, were placed in the immovable bedrock fringing the beach, the distance between the marks being 24.075 meters (78.99 feet). The distances between the station and the reference marks were measured on the slope, the station end of the tape being held 5 feet above the mark. Azimuths and distances were: No. 1, 22.605 meters (74.16 feet) (on slope), 320° 11′; No. 2, 24.078 meters (79.00 feet) (on slope), 26° 09′.

Wharf (Molokai Island, R. W. Woodworth, 1925).—On southwest coast of Molokai, at Kolo, a pole erected against the face of the Libby-McNeill Dock. The exact location was on the outer or east-and-west face of the dock, flush against the east side of a pile at a distance of 6.0 meters from the west face of the dock.

LANAI ISLAND

Supplementary points

Gale (Lanai Island, F. G. Engle, 1927).—About 6 feet back from edge of red earth bluff which overlooks the western shore of Lanai. Station reached by turning south from the government road at a point east of the hill called Kanepuu, along a fence line near a pineapple field to the stretch of eroded ground, and continuing west to edge of bluff. Marked according to note 4, standard disk in bowlder which projects several inches above the ground. Two reference marks, note 12c, standard reference disks in bowlders, were set at the following distances and azimuths from the station: No. 1, 6.545 meters (21.47 feet), 196° 04′; No. 2, 6.860 meters (22.51 feet) 295° 06′.

Wind (Lanai Island, F. G. Engle, 1927).—On western coast of Lanai, on nub of earth and large rocks which projects sharply from the hillside. It is a little below the bluff-line, and is reached by walking southeast from station *Gale*. (See description of *Gale*.) It is not visible from *Gale*. Marked according to note 5, standard disk in concrete in bowlder. Two reference marks, note 12c, standard reference disks in concrete in bowlders, were set at the following distances and azimuths from the station: No. 1, 2.87 meters (9.42 feet), 227° 44′; No. 2, 2.493 meters (8.18 feet), 111° 14′.

Kaholo (Lanai Island, J. B. Miller, 1914; F. G. Engle, 1927).—On the southwest coast of Lanai Island. Marked by 500-pound bowlder, with ⅞-inch drill hole in center of equilateral cement triangle approximately 8 inches on side, and marked "C. & G. S. 1914." Reference marks, note 12c, standard reference disks in

For notes in regard to marking of stations, see p. 139.

bowlders, are at the following distances and azimuths from the station: No. 1, 13.91 meters (45.6 feet), 356° 38′; No. 2, 3.08 meters (10.1 feet), 97° 42′.

Kaapa (Lanai Island, F. G. Engle, 1927).—On west coast of Lanai, about 6 miles north by west of Kaumalapau Harbor, on a double rocky point about ½ mile south of Kaapahu Hill. Station is about 1 mile southwest of water tank and just west of a narrow cove which forms the mouth of a gulch. Approached by road running northwest from Lanai City. Station marked according to note 4, standard disk in bowlder, while two reference marks, note 12c, standard reference disks in bowlders, were set at the following distances and azimuths from the station: No. 1, 23.84 meters (78.2 feet), 113° 49.5′; No. 2, 21.10 meters (69.2 feet), 219° 36.5′.

Manui (Lanai Island, F. G. Engle, 1927).—On west coast of Lanai, on rocky point on south side of Kalamaiki Gulch, about ⅔ mile north of Kaumalapau Harbor. Station is about 10 meters back from edge of cliff and about 30 feet above high water. Best approached by landing in small bight between Kalamanui and Kalamaiki Gulches. Marked according to note 4, standard disk in bowlder. Reference marks, note 12c, standard reference disks in bowlders, were set at the following distances and azimuths from station: No. 1, 8.98 meters (29.46 feet), 329° 06′; No. 2, 12.56 meters (41.21 feet), 16° 37′.

Kau (Lanai Island, F. G. Engle, 1927).—On west coast of Lanai, on a rocky cliff on south side of entrance to Kaumalapau Harbor, and about 235 meters south of lighthouse. Station is about 8 meters from edge of cliff and 100 feet above high water, and is best approached by landing in cove just south of lighthouse. Marked according to note 4, standard disk in bowlder. Two reference marks, note 12c, standard reference disks in bowlders, were set at the following distances and azimuths from the station: No. 1, 6.08 meters (19.9 feet), 208° 08′; No. 2, 16.53 meters (54.2 feet), 303° 25′.

Kaumalapau north wireless pole (Lanai Island, F. G. Engle, 1927).—At Kaumalapau, above Kaumalapau Harbor, and about 180 feet above mean sea level. Station is jointed pole about 30 feet high, held by guy wires.

Kaumalapau south wireless pole (Lanai Island, F. G. Engle, 1927).—At Kaumalapau, above Kaumalapau Harbor, and about 180 feet above mean sea level. Station is jointed pole about 30 feet high, held by guy wires.

Kaumalapau red light (Lanai Island, F. G. Engle, 1927).—On west coast of Lanai Island, north side of entrance to Kaumalapau Harbor, on end of breakwater. Station is automatic red light on cement post.

Kaumalapau white light (Lanai Island, F. G. Engle, 1927).—On west coast of Lanai, on bluff at south side of entrance to Kaumalapau Harbor, about 110 feet above mean sea level. Station is white light on post, the lower part of which is surrounded by a white shed.

Nana (Lanai Island, F. G. Engle, 1927).—About 5 miles north of Kaumalapau Harbor, on highest point of westernmost (outermost) needle rock in Honopu Bay, west coast of Lanai. Marked according to note 3, standard disk in concrete in outcropping bedrock. Reference mark is standard reference disk (note 12b), stamped "Nana," and set in concrete in bedrock. Distance and azimuth from station to reference mark not known.

Lost (Lanai Island, F. G. Engle, 1927).—On highest part of pinnacle rock, connected with shore at low water, lying close to point, about 2 miles north of needle pinnacles in Honopu Bay, west coast of Lanai. Marked according to note 3, standard disk in concrete in outcropping bedrock. Two reference marks, note 12b, standard reference disks were set in concrete in outcropping bedrock, but their distances and azimuths from the station are not known. Station and reference disks are stamped with year and name of station.

Kaa (Lanai Island, F. G. Engle, 1927).—On west coast of Lanai, about 10 miles north of Kaumalapau Harbor, on top of a steep bluff, near edge of bluff, at about 250 feet elevation. Visible to the northward across a deep ravine and distant about 1½ miles is a prominent point marked "Kaapaku" on the Geological Survey map. Station is difficult of access from the southward. The most feasible approach would probably be from the northward if landing can be effected there, or by following ridge inland and down to station. Station marked according to note 5, standard disk in concrete in large black bowlder. Two reference marks, note 12d, standard reference disks in concrete in large black bowlders, were set at the following distances and azimuths from the station: (No record found of this data.) Station and reference disks were stamped with year and name of station.

For notes in regard to marking of stations, see p. 139.

MAUI ISLAND

Principal points, West Maui

Kekaa (Maui Island, Hawaiian Government Survey, 1881).—On western shore of West Maui, in Kaanapali District, on a rocky promontory known as Black Rock or Shaws Hill, about 6,500 meters north of Lahaina Courthouse. Marked by a concrete post.

Laina (Maui Island, Hawaiian Government Survey, 1879; J. C. Gauger, 1912).—On western coast of West Maui, in the Lahaina District, on the northern rim of the crater of Puu Laina, about 1½ miles northeast of Lahaina. Marked by a 1-inch galvanized iron pipe set in a block of concrete.

Launiupoko (Maui Island, Hawaiian Government Survey, 1879; J. C. Gauger, 1912; R. W. Woodworth, 1925).—On western coast of West Maui, in Lahaina District, about 3 miles southeast of Lahaina Landing, on south side of Launiupoko Valley, on the southwest side of and 10 feet below the summit of the conspicuous chalky hill called Puu Mahanalua Nui or Launiupoko Hill. Marked by concrete post with cross in top set flush with surface of ground and surmounted by a cairn of stones.

Lahaina Couthouse (Maui Island, Hawaiian Government Survey, J. C. Gauger, 1912).—On western coast of Maui, in Lahaina District, station is a lofty flagpole in front of courthouse building in Lahaina.

Waikulu (Maui Island, Hawaiian Government Survey, 1882).—In northwestern part of West Maui, on a hill in the central part of Kaanapali District, about 5 kilometers from the west coast and 5,525 meters southeast of Hawea on the northwest cape of Maui. Mark, no record.

Hawea (Maui Island, Hawaiian Government Survey, 1882; J. C. Gauger, 1912).—On northwest coast of West Maui, in the Kaanapali District, on Hawea Point, about 30 meters northeast of Hawea Point Light. Marked by a redwood fence post projecting 4 feet above the ground. Hawea Point Light is distant 29.56 meters (97.0 feet) in azimuth 54° 30′.

Malo (Maui Island, Hawaiian Government Survey, 1882; J. C. Gauger, 1912).—On northwest coast of Maui, on Cape Lipoa, in the northern part of Kaanapali District, in land of Honolua, on top of a grassy knoll 250 meters from the shore on Lipoa Point. Marked by a 3-inch galvanized iron pipe set in a block of concrete.

Keahikauo (Maui Island, Hawaiian Government Survey).—In northern part of West Maui, on a hill of the same name in the Honokahau range, in Kaanapali District, about due south of the extreme north point of West Maui and distant from it nearly 8 kilometers. Mark, no record.

Kahakuloa (Koae) (Maui Island, Hawaiian Government Survey, 1882; J. C. Gauger, 1912).—On northeast coast of West Maui, in Kaanapali District, on the summit of Koae, the conspicuous hill forming Kahakuloa Point. The station is a trifle below and about 5 meters westward from the highest point on the hill. Marked by a 2-inch galvanized iron pipe filled with concrete and projecting 1 foot above the surface. A cairn of stones was built over the point. This is presumably the station established by the Hawaiian Government Survey in 1882, though the present marking is of much more recent date.

Honokahau (O) (Maui Island, Hawaiian Government Survey, 1882).—On the northern shore of West Maui, Kaanapali District, land of Honokahau, on a bluff near the northernmost point of the island. Mark, no record.

R (Maui Island, Hawaiian Government Survey; J. C. Gauger, 1912).—On northwest coast of Maui, in the Kaanapali District, about 2 miles northwest of Kahakuloa, on top of and near the edge of a prominent eroding red bluff just south of the trail to Honokahau. Marked by a 3-inch galvanized iron pipe filled with concrete and projecting 8 inches above surface of ground.

Supplementary points, West Maui

Kilea (Maui Island, Hawaiian Government Survey; J. C. Gauger, 1912; R. W. Woodworth, 1925).—Near western coast of Maui, on cemetery hill at entrance to Olowalu Valley, near Hekili Point, back of Olowalu plantation, ½ mile northeast of Olowalu Mill. Station is on the west side of the graves on the hill, and is marked by a nail in a 4 by 4 inch redwood post set flush with surface of ground, and a cairn of stones piled over it. Old description gives mark as iron pin.

For notes in regard to marking of stations, see p. 139.

Nakalele Head Light (Maui Island, J. C. Gauger, 1912).—On northwest coast of Maui, in the Kaanapali District, on Nakalele Point. The station is the center of the small rectangular house inclosing the light. The light may not be centrally placed in the house.

Principal Points, East Maui, north

Haleakala 1 (Maui Island, Hawaiian Government Survey, 1871).—In central part of East Maui, Kula District, on Pakaoao or White Hill, near the southwest corner of Haleakala Crater, close to the brink of the precipice. It is 32 feet south of an old station occupied in 1869. Marked by a copper triangle let into the rock, and covered with a cairn of stones.

Haiku (Maui Island, Hawaiian Government Survey, 1871).—In the northern part of East Maui, in Hamakualoa District, on the summit of Puu o Umi, in the land of Haiku adjoining the Maliko canyon, and about 7,000 feet from the sea. Marked by a concrete post sunk level with the ground, and surrounded by four redwood posts.

Hanakauhi (Maui Island, Hawaiian Government Survey, 1877).—In eastern part of East Maui, in Koolau District, on the north side of Haleakala Crater, on the summit of the ridge east of Koolau Gap. Marked by a pillar of stones 10 feet high on an ancient platform. Destroyed in 1884.

Puu Nianiau (Maui Island, Hawaiian Government Survey).—Near center of East Maui, in Kula District, on summit of high hill east of road leading from Makawao to the summit of Mount Haleakala, 2 miles from the brink of the crater. Marked by iron stake and cairn of stones.

Haleakala 2 (Maui Island, Hawaiian Government Survey, 1885).—In central part of East Maui, in Kaupo District, on the south wall of Haleakala Crater, west of the Kaupo Gap, on high point of the ridge. 143 feet east of it is a station on the Nuu boundary. Marked by cross cut in rock with pillar of stones over it.

Pakihi (Kaluanui) (Maui Island, Hawaiian Government Survey, 1883).—In eastern part of East Maui, on northeast side of Haleakala Crater, 134 meters east of Pohaku Palaha near the brink of the great Kipahulu Valley. Marked by an iron stake projecting about 2 inches above ground and a cairn of stones.

Palaha (Maui Island, Hawaiian Government Survey, 1877).—In eastern part of East Maui, in Koolau District, at northeast corner of Haleakala Crater, near the edge of the precipice, on a large flat rock which is the center where the eight districts of East Maui meet; called Pohaku Palaha. Marked by a pillar of stones.

Ulalena (Maui Island, Hawaiian Government Survey, 1877).—In northern Maui, on the summit of a prominent wooded hill in Honopou, in the district of Hamakualoa, about 5 miles due south of the seashore at Halehaku. Marked by a rock with a cross directly under a scaffold and platform 16 feet high, the observing table being set on the trunk of a large tree cut off 19 feet above the ground. In 1912 reported lost, and *Ulalena 2* established. No position is available for this station.

Huelo (Maui Island, Hawaiian Government Survey).—On northern coast of East Maui, on a bluff in land of same name, in Hamakualoa District, near the sea "pali." Marked by a concrete post, which was reported plowed up in 1880.

Okohola (Maui Island, Hawaiian Government Survey, 1877).—Near northeast coast of East Maui, in Koolau District, on the summit of a hill about 1,500 feet above the government road and 3,700 feet from the sea, adjoining an ancient burial place, on the west side of Honomanu Valley. Marked by a concrete post.

Alaea (Maui Island, Hawaiian Government Survey, 1877).—In east central part of East Maui, on a hill of the same name, in Koolau District, on the northeast slope of Mount Haleakala, about 7 miles due south of Pauwalu. Marked by redwood post and cairn of stones.

Opikoula (Maui Island, Hawaiian Government Survey, 1877).—On northeast coast of East Maui, in Koolau District, Nahiku subdistrict, near the edge of the sea cliff. Marked by a 4-inch iron pipe set in concrete and covered with cairn.

Wai Ale (Maui Island, Hawaiian Government Survey, 1883).—East of the central part of East Maui, in Hana District, on the northeastern slope of Mount Haleakala, north of the Kipahulu Valley, on the brow of a "pali" overlooking the Pond of Wai Anapanapa (Sparkling Water). Marked by a concrete post, with redwood post signal.

Olopawa (Maui Island, Hawaiian Government Survey, 1878).—Near eastern end of East Maui, on summit of hill of same name, in northern part of Hana District, 3 miles inshore, in land of Kaeleku, and 2½ miles from the sea. Mark, a concrete post.

For notes in regard to marking of stations, see p. 139.

Honokalani (Maui Island, Hawaiian Government Survey, 1878).—On eastern coast of East Maui, in northern part of Hana District, near the shore and near Keakulikuli Point. Marked by block of concrete sunk in ground and covered with cairn.

Pukaulua (Maui Island, Hawaiian Government Survey, 1878).—On eastern coast of East Maui, in northeastern part of Hana District, land of Honokalani, on a rocky point near the sea. Marked by an iron pin let into the rock and covered with cairn of stones.

Kauiki (Hana lat. sta.) (Maui Island, Hawaiian Government Survey, 1878).—Near the extreme eastern end of East Maui, on summit of hill of same name, in Hana District, south of Pueokahi Harbor. Marked by brick pier used by latitude party in 1887.

Supplementary points, Kahului and vicinity

Kahului (Maui Island, F. W. Perkins, 1899; J. C. Gauger, 1912).—On northwest coast of Maui, in Wailuku District, on the most northeastern of the permanent sandstone hills lying between Kahului and Wailuku. Traveling sand-dunes surround the signal hill, but the latter is the most conspicuous hill in the vicinity. Marked by a bronze nail cemented into a 12 by 12 inch block of concrete projecting about 3 inches above the ground.

Wailuku (Maui Island, F. W. Perkins, 1899; J. C. Gauger, 1912).—On northwest coast of Maui, in Wailuku District, on the sandstone ridge on the east side of Iao Valley, about 465 meters southwest from the rear range day beacon which is on the same ridge. The station is on a little rise in the ridge, and is marked by a bronze nail driven into the sandstone, and covered with a small cairn of stones.

Luke (Maui Island, J. C. Gauger, 1912).—On northern coast of Maui, in Wailuku District, about ½ mile southeast from Wailuku, on the highest sandstone hill adjacent to and due north of the H. C. & S. Co.'s water reservoirs. This is a plantation survey point. Marked by a 5-inch draintile pipe cemented flange down into the sandstone with about 5 inches projecting above surface. Filled with cement, and centered with standard brass station mark. Reference mark is a 2-inch galvanized iron pipe cemented into the rock with 1 foot projecting above surface. It is 9.04 meters (29.7 feet) from station in azimuth 312° 11′.

Hay (Maui Island, J. C. Gauger, 1912).—On the northern coast of Maui, in Wailuku District, on the highest point of the sandstone ridge 1 mile southeast of Waihee village, about 400 meters back from shore, and opposite the Chinese cemetery lying on the east side of the main road between Wailuku and Waihee. Station previously established by plantation engineers. Marked by a 5-inch draintile pipe cemented flange end down into the sandstone rock with about 5 inches projecting above the surface. Pipe is filled with cement and center marked by standard brass disk station mark.

Waihee (Maui Island, J. C. Gauger, 1912).—In northwestern Maui, in Kaanapali District, on the summit of the most prominent hill in the ridge on the northwest side of Waihee Valley. Station may be reached by following any one of the first three ridges northwest of the Waihee stream. Pack animals can follow the cattle trails for nearly two-thirds of the distance up the hill, but the final climb is through an almost impenetrable growth of ferns, vines, and tropical growth. The station is on the northern shoulder of the summit about 10 meters back from the abrupt downward slope. Subsurface mark is a bottle set in concrete 2½ feet below the surface of ground. Surface mark is a 5-inch draintile pipe set flange down in a block of concrete and projecting 5 inches above surface. The pipe is filled with cement, and centered with a standard bronze station mark.

Hak (Maui Island, J. C. Gauger, 1912).—On northeastern coast of West Maui, in Kaanapali District, on the top and near the extreme end of the narrow ridge forming Mokeehia Point, and about 10 meters back from the precipitous slope to the shore line. Marked by a 5-inch draintile pipe cemented flange down into the sandstone with about 5 inches projecting above surface. Pipe is filled with concrete and centered with standard bronze disk.

Olai (Maui Island, J. F. Pratt, 1905; J. C. Gauger, 1912).—On northeast coast of West Maui, in Kaanapali District, on summit of Puu Olai, a prominent hill about 1¾ miles southeast of Kahakuloa village. Marked by standard bronze disk in top of concrete block flush with surface of ground. Reference mark is cross chiseled in native rock; it is 7.98 meters (26.2 feet) from station, in azimuth 151° 59′.

Hen (Maui Island, J. C. Gauger, 1912).—On northwest coast of Maui, in Wailuku District, on top of a small hillock on north side of Iao Creek, about

For notes in regard to marking of stations, see p. 139.

270 meters back from beach, and 65 meters east from an unimproved wagon road or trail. Marked by a 5-inch draintile pipe set flange end down in a block of concrete, and projecting 5 inches from ground. The pipe is filled with concrete and centered with standard bronze disk. Reference mark is standard bronze disk securely fastened to a large bowlder on east side of hill; it is 4.585 meters (15.04 feet) from station in azimuth 296° 57′.

Tug (Maui Island, J. C. Gauger, 1912).—On northwest coast of Maui, in Wailuku District, near the end of a sandstone ridge southeast of Waihee village and 550 meters north by east of station *Hay*, and 80 meters back from the beach. It is on the spur which approaches nearest the shore line and commands a view of the coast line both north and south of the station. This is a plantation survey station. Marked by a 5-inch draintile pipe cemented flange end down into the sandstone rock with about 5 inches projecting above surface. Pipe is filled with concrete and centered with standard bronze disk.

Pond (Maui Island, J. C. Gauger, 1912).—On northwest coast of Maui, in Wailuku District, on the slope near the outer end of the sandstone ridge on the south side of Waihee Creek, about 65 meters back from the beach. Marked by a 5-inch draintile pipe set in a block of cement and projecting 5 inches above surface of ground. Pipe is filled with concrete and is centered with a standard bronze disk.

Supplementary points, East Maui, north

Puu Nene (Maui Island, Hawaiian Government Survey; J. C. Gauger, 1912).—Near the north coast of Maui in Wailuku District, on the summit of Puu Nene hill lying north of the road from Wailuku to Makawao. Territorial records gave the station mark as a granite post, but in 1912 the mark recovered was a 4 by 4 inch redwood post. It was replaced with a draintile set flange down in a block of concrete with its top projecting about 1 inch above the surface. The pipe was filled with concrete and center marked by standard bronze disk station mark.

Puu o Koha (Maui Island, Hawaiian Government Survey).—In Kula, Maui, in western part of Kalialinui, on summit of hill. Marked by concrete post.

Luahine (Kauhikoa) (Maui Island, Hawaiian Government Survey).—In northern Maui, on summit of hill of same name. Marked by concrete post.

Kapuai (Maui Island, Hawaiian Government Survey, 1877).—In northern part of East Maui, on summit of hill of same name, 3 miles inshore, in Hamakualoa District, in land of Peahi, west of the Halehaku Gulch, and near a graveyard. Marked by concrete post.

Puu Kukai (Maui Island, Hawaiian Government Survey, 1877; J. C. Gauger, 1912).—On northeast coast of East Maui, in Hamakualoa District, on summit of a brush-covered hill near the shore in Papaaea Nui, about 450 meters back from the shore. Marked by a 2-inch galvanized iron pipe set in a block of concrete.

Pauwalu (Maui Island, Hawaiian Government Survey, 1877; J. C. Gauger, 1912).—On northeast coast of Maui, in Koolau District, 1 meter south-southwest from the base of the Pauwalu Point Light. The light bears N. 38° E., 1.61 meters (5.3 feet). Marked (in 1912) by concrete post with cross in top, sunk nearly flush with surface of ground.

Wailua Iki (Maui Island, Hawaiian Government Survey).—On northeast coast of Maui, on ridge east of Wailua River, a little "mauka" (inland) of the government road. Marked by redwood post.

Keanae Uka (Maui Island, Hawaiian Government Survey).—Near northeast coast of East Maui, in Koolau District, back of Keanae, about 700 feet inland from the government road, on a high ridge near a white tomb. Marks, a concrete post with cross in top, and a cairn.

Hanawi (Maui Island, Hawaiian Government Survey, 1877).—Near the northeast coast of East Maui, in Koolau District, on a hill east of the Hanawi River, above Nahiku, in land of Honolulu Nui, at the west corner of Grant 3190. Marked by a 4-inch iron pipe set in concrete, and covered with a cairn.

Principal points, East Maui, south

Puu o Kali (Maui Island, Hawaiian Government Survey, 1879).—In the western part of East Maui, in Kula District, on the boundary between Waiohuli and Keokea, and on the south side of the crater of Puu o Kali. Marked by concrete post.

Polipoli (Maui Island, Hawaiian Government Survey, 1879).—In Honuaula District, in southern Maui, near the south end of a hill of the same name. This

For notes in regard to marking of stations, see p. 139.

hill forms part of the high ridge which runs southwest from the highest point of Haleakala to Ulupalakua. Marked by copper triangle buried, with iron pin and redwood post above it.

Puu Mahoe (Maui Island, Hawaiian Government Survey, 1879).—In southeastern part of East Maui, in Honuaula District, on the southern summit of Puu Mahoe (Twin Hills), in Kaunuahane, on southwestern slope of Haleakala, about 4 miles from the sea. Marked by copper triangle buried, with redwood post and cairn of stones above it.

Puu Kanaloa (Maui Island, Hawaiian Government Survey, 1879).—On summit of hill of same name, in southwestern part of East Maui, in Honuaula District, in land of Keoneoio, and near the shore. Marked by a copper triangle, buried, with redwood post and cairn of stones above. Searched for and not found in 1904.

Pimoe (Maui Island, Hawaiian Government Survey, 1879).—In southeastern part of East Maui, on summit of hill of same name, in Honuaula District, in the land of Kanaio, about 3,500 feet south of the main road. Marked by copper triangle buried, with redwood post and cairn over it.

Lualilua (Maui Island, Hawaiian Government Survey, 1879).—Near the southern coast of East Maui, on southwestern summit of a hill of same name, in Kahikinui District, 2¼ miles from the sea. Marked by copper triangle buried with redwood post and cairn over it. Four reference stones were placed around it, each 5 feet distant.

Shore D (Maui Island, Hawaiian Government Survey, 1881).—On the southern coast of East Maui, in eastern part of Kahikinui District, south of Lualilua Hill. Marked by iron stake and cairn of stones.

Ka Lae o Ka Ilio (Maui Island, Hawaiian Government Survey, 1885).—On southern shore of Maui, in Kaupo District, near the end of a long rocky point of same name, 1 mile due south of the Catholic Church building, in the land of Kaalelehinale. Marked by an iron stake let into the rock, and inclosed by a block of concrete.

Maneoneo (Maui Island, Hawaiian Government Survey, 1881).—Near southern coast of East Maui, in western part of Kaupo District, on a hill a little east of Nuu Harbor. Marked by an iron pin and cairn of stones with four reference stones marked with crosses each 5 feet distant.

Naholoku (Maui Island, Hawaiian Government Survey, 1882).—In southern part of East Maui, in Kaupo District, on a hill about ¾ mile below the Kaupo Gap, and 3 miles back from the sea. Marked by an iron stake with top nearly level with ground and a cairn of stones.

Mokuia (Maui Island, Hawaiian Government Survey, 1881; J. C. Gauger, 1912).—On southeastern coast of East Maui, in Kaupo District, in land of Mokuia on top of bluff about 120 meters westward from rocky spur that juts out from shore line in this vicinity. Station is 20 meters back from edge of "pali" directly adjacent to rock projecting 1 foot above surface of ground and having a triangle lightly chisled on its northern face. Marked (in 1912) by a 2-inch galvanized iron pipe set in block of concrete.

Naopu Mauka (Maui Island, Hawaiian Government Survey).—Near southeastern coast of Maui, on ridge in land of same name, west of Kalepa Valley, and 3,079 feet "mauka" (inland) from Kalepa triangulation station. Marked by redwood post.

Kalepa (Maui Island, Hawaiian Government Survey; J. C. Gauger, 1912).—On southeastern coast of Maui, in Kaupo District, on the west side of Kalepa Valley, on top of bluff near sea "pali." Marked (in 1912) by a 2-inch galvanized iron pipe set in a block of cement.

Kipahulu Protestant Church (Maui Island, Hawaiian Government Survey, 1881).—In the district of Kipahulu, Land of Halemano, about 175 feet south of the Protestant Church, and near the brink of the sea "pali." Center marked by copper triangle buried in ground, over which was placed an iron pipe in vertical position with a horizontal cross piece. Three bottles were buried pointing toward the mark.

Kieiei (Maui Island, Hawaiian Government Survey).—Near southeastern coast of Maui, in Kipahulu, on southern boundary of Alaenui, 1 mile inland, on rising ground at north end of rocky ridge. Marked by redwood post, a buried copper triangle and also sulphur let into rock, and by a pile of rocks.

Kipahulu Catholic Church (Maui Island, Hawaiian Government Survey).—On southeastern coast of Maui, on platform of ancient heiau, in Grant 1657, in Kakalahale, 2.8 feet west of wall, 12.8 feet east of corner of stone house, and south-

For notes in regard to marking of stations, see p. 139.

east of the church. Marked by an iron bolt let into the pavement with top even with surface.

Ohai (Maui Island, Hawaiian Government Survey, 1877).—On southeastern coast of Maui, on summit of ridge in land of Puuokohola in South Hana near the sea "pali." Marked by iron stake and pile of stones.

Pualu (Maui Island, Hawaiian Government Survey).—Near southeastern coast of Maui, in land of same name, in South Hana, in Grant No. 1761 to Nakila, 2,500 feet inland. Marked by iron pin and pile of stones.

Mopua (Maui Island, Hawaiian Government Survey, 1881; J. C. Gauger, 1912).—On southeastern coast of Maui, southern part of Hana District, on the summit of Mopua Hill, about 2,200 feet from the sea. Marked (in 1912) by a 2-inch galvanized iron pipe set in a block of concrete.

Makaliihanau (Maui Island, Hawaiian Government Survey, 1878; J. C. Gauger, 1912).—On southeastern coast of Maui, in Hana District, in the land of Muolea, on the southern edge of the summit of a prominent hill lying about 200 meters north of the road. Marked (in 1912) by a 2-inch galvanized iron pipe set in a block of concrete.

Makahahana (Maui Island, Hawaiian Government Survey).—In southern part of Hana District, land of Pukuilua, on the summit of a swell of land about 7,000 feet from the sea. Marked by a redwood post.

Haou (Maui Island, Hawaiian Government Survey, 1878).—Near eastern end of East Maui in southern part of Hana District, in land of same name, near the sea, and just below the government road below the schoolhouse. Marked by cross cut in rock sunk in ground.

Puuiki (Maui Island, Hawaiian Government Survey, 1878; J. C. Gauger, 1912).—On eastern coast of Maui, in land of Hana, on the rising ground about 70 meters southeast from Puuiki Catholic Church. It is below the old and above the new government roads. Marked (in 1912) by a 2-inch galvanized iron pipe set in block of concrete.

Keakaamanu (Maui Island, Hawaiian Government Survey, 1878; J. C. Gauger, 1912).—At the eastern end of Maui, in Hana District, on the summit of a conspicuous hill on the southern boundary of the land of Haneoo. The hill can be most readily approached from the northeast. Marked (in 1912) by a 2-inch galvanized iron pipe set in a block of concrete.

Iwi o Pele (Maui Island, Hawaiian Government Survey, 1878).—Near extreme eastern end of East Maui, on summit of hill of same name, near the southern end, in eastern Hana, in the land of Haneoo. Marked by redwood post, reported missing.

Supplementary points, Maalaea Bay and vicinity

Puu Hele (Maui Island, Hawaiian Government Survey).—In the southern part of Wailuku District, on summit of Puu Hele, near a small cemetery, east of the road from Wailuku to Maalaea Landing, and 6,000 feet north of Maalaea Bay. Marked by a concrete post.

Bold (Maui Island, F. W. Perkins, 1900; J. C. Gauger, 1912).—A hydrographic signal of 1900 near shore of Maalaea Bay. A large bowlder about 4 feet high lying above the government road about 100 meters northwest of McGregors Light. The bowlder is by far the largest isolated rock in this vicinity.

Supplementary points, East Maui—south

Hunt (Maui Island, J. F. Pratt, 1904).—On western shore of Maui, about 20 meters from shore line at a point of a ridge which extends to the water about 1½ miles north of Makena Bay. Marked by a 3 by 4 inch signal pole with rocks piled around its base. In 1905 this was determined as a "No check" point, and was reported to be identical with Hawaiian Government Survey station *Wailea;* the old signal being found standing. The old position was also a "No check" determination, and the two positions differ considerably.

Wailea (Maui Island, Hawaiian Government Survey).—See description of station *Hunt*, above.

Puu Kanaloa (Maui Island, J. F. Pratt, 1904).—On southwestern coast of Maui, on the highest point of the southern crest of the conspicuous hill known as Puu o Kanaloa just north of the native settlement in La Perouse Bay. Not identical with the Hawaiian Government Survey station which could not be recovered. Marked by a bottle buried about 16 inches below surface of ground.

Hokukano (Maui Island, Hawaiian Government Survey).—Back from the southern coast of Maui, on summit of hill in Auwahi, Kahikinui. Marked by

For notes in regard to marking of stations, see p. 139.

an iron pin. Four reference stones were placed around the station each 5 feet distant from it.

Puu Pane 2 (Maui Island, Hawaiian Government Survey).—Near southern coast of East Maui, on a hill of same name, in Kahikinui District, about 3½ miles from the shore. Marked by iron stake and cairn of stones, with four reference rocks each 5 feet distant.

Mawini (Puu) (Maui Island, Hawaiian Government Survey, 1882).—In western part of West Maui, on a hill in the Kaanapali District, nearly due east 4,849 meters from Kekaa or Black Rock. Mark, no record.

Pahuolona (Maui Island, Hawaiian Government Survey).—Near eastern end of Maui, in Aleamai, Hana, above road. Marked by concrete post. Reported lost.

Kaihuakala (Maui Island, Hawaiian Government Survey).—Near eastern end of East Maui, in central part of Hana District, southwest of Kauiki Hill, on the summit of a wooded hill, 2½ miles from the sea. Mark reported lost.

KAHOOLAWE ISLAND

Principal points

Molokini (Molokini Island, Hawaiian Government Survey, 1883; J. F. Pratt, 1905).—On Molokini Island, between Maui and Kahoolawe, on the highest point of the island, very near the edge of the bluff, and 266 meters from the northwest point of the island. Marked by an iron bar set in the rock with melted lead. In 1925 the Lighthouse Service found an iron bar reduced in section by corrosion to ⅜-inch square, but is was set in sulphur, not lead. Over it was placed a concrete block, 14 inches square and 12 inches high, with 1-inch threaded brass rod centered over iron bar. Top of brass rod projects 2 inches above concrete and is 15 inches above top of iron bar. A new wooden light tower is 17.2 feet from station in azimuth 221° 24′.

Blow (Kahoolawe Island, J. F. Pratt, 1904).—On the eastern end of Kahoolawe Island, on a bare red hill a little south of the highest point of the island. The left tangent to the point on opposite side of Becks Cove bears S. 57° 30′ E. (mag.). Marked by bottle buried neck down, bottom of bottle being about 1 foot below surface of ground.

Grey (Kahoolawe Island, J. F. Pratt, 1904).—On the southeast peninsula of Kahoolawe Island, about ¾ mile east of beach in Becks Cove, and about 550 meters from its east end and 35 meters south from edge of bluff. Marked only by 4 by 4 inch pole signal.

Quick (Kahoolawe Island, J. F. Pratt, 1904).—In the southeastern part of Kahoolawe, on a bare red hill. Marked only by a 2 by 4 inch pole signal.

Dig (Kahoolawe Island, J. F. Pratt, 1904).—In southeastern part of Kahoolawe, on a bare red terrace on a hillside about 1 mile west from the beach in Becks Cove. Marked only by a 2 by 4 inch pole signal.

Eat (Kahoolawe Island, J. F. Pratt, 1904).—On a rocky hill near the southeast point of Kahoolawe Island, about 1 mile southwest from the beach in Becks Cove. The tangent to the cliff on the southeast point of the island bears S. 75° E. (mag.). Marked only by a 2 by 4 inch pole signal.

Lump (Kahoolawe Island, J. F. Pratt, 1904).—On the southern shore of Kahoolawe Island, on a hilltop at the point southeast of the eastern of the two deep coves on the south side of the island, and 220 meters from the edge of the bluff. The bluff at the southeast point of the island bears N. 79° 30′ E. (mag.). Marked by a cross cut in the flat face of a rock buried 16 inches below surface of ground.

Black (Kahoolawe Island, J. F. Pratt, 1904).—On south coast of Kahoolawe, on the western side of the eastern of the two deep coves on southern side of island, on highest point of bluff and about 50 meters from its edge. Marked only by 2 by 4 inch pole signal.

South crater (Kahoolawe Island, J. F. Pratt, 1904).—On a rocky red hilltop on the divide of the island. Marked by a spike driven into a block of wood buried about 18 inches below surface of ground.

Goat (Kahoolawe Island, J. F. Pratt, 1904).—Near the south side of Kahoolawe, on a rocky grassy hilltop about 200 meters from the edge of the bluff, between and somewhat nearer the most western of the two deep coves on that side of the island. Marked by flagpole driven in the ground with small stones piled around its base.

For notes in regard to marking of stations, see p. 139.

South Hill (Kahoolawe Island, J. F. Pratt, 1904).—In southwestern part of Kahoolawe, on the highest point of a rocky grassy hilltop 500 meters from the head of the first large cove to the eastward of Smugglers Cove, and west of the ravine at the head of the cove. Marked only by a 2 by 4 inch pole signal.

End (Kahoolawe Island, J. F. Pratt, 1904).—In the southwestern part of Kahoolawe, on the highest part and near the southern point of a crescent shaped hilltop concave towards the west, about 2¾ miles from Kealaikahiki Point and 1 mile from the first large cove to the east of Smugglers Cove. Marked only by a 2 by 4 inch pole signal.

Hot (Kahoolawe Island, J. F. Pratt, 1904).—In the western part of Kahoolawe, on a bare red hilltop at the western end of a depression about 800 meters long. Marked only by flagpole driven into ground, with small stones piled around base.

Red (Kahoolawe Island, J. F. Pratt, 1904).—In the western part of Kahoolawe, on a bare red hill overlooking a portion of the northern shore line, distant about 1 mile from the nearest shore line, and about 300 meters from the shallow opening at the northwest end of a large depression. Marked by flagpole driven into ground with small stones piled around is base.

Cob (Kahoolawe Island, J. F. Pratt, 1904).—In the western part of Kahoolawe, a flagpole was driven into a crack in the top of a large bowlder on a hillside overlooking a large portion of the northern shore and distant about ¾ mile from it. No other mark.

Craft (Kahoolawe Island, J. F. Pratt, 1904).—In western part of Kahoolawe, on a rocky grassy terrace about 1¾ miles N. 75° E. (true) from Kealaikahiki Point. Marked only by a 2 by 4 inch pole signal.

See (Kahoolawe Island, J. F. Pratt, 1904).—Near the western end of Kahoolawe, about 1¾ miles northeasterly from Kealaikahiki Point, 1,150 meters southeast from the nearest shore line, on the western part of a rocky grassy hilltop. Marked only by flagpole driven into ground, with small stones piled around it.

Aid (Kahoolawe Island, J. F. Pratt, 1904).—Near the northern shore of Kahoolawe, on a hillside about ⅓ mile from the northwest shore line. Marked by signal pole with stones piled around its base.

Cloud (Kahoolawe Island, J. F. Pratt, 1904).—On the northern side of Kahoolawe about 80 feet above high water, and about 200 meters from nearest shore line. Marked only by a 2 by 4 inch pole signal.

Supplementary points

Low (Kahoolawe Island, J. F. Pratt, 1904).—In the northern part of Kahoolawe, on the northern part of the remains of an old crater, and about 120 meters from an opening through the rim of the crater. Marked by a flagpole driven in the ground with small stones placed around its base.

Err (Kahoolawe Island, J. F. Pratt, 1904).—Near the western end of Kahoolawe on a terrace about 50 feet above high water mark, 150 meters from nearest shore line, and about 500 meters east of Kealaikahiki Point. Marked only by a 2 by 4 inch pole signal.

HAWAII ISLAND

Principal points

Hualalai 2 (Hawaii Island, Hawaiian Government Survey, 1882).—On the western side of the summit of Mount Hualalai, western part of Hawaii. Marked by a copper triangle underground, and 3-inch pipe set vertically over same. Also by a large stone cairn.

Anahulu (Hawaii Island, Hawaiian Government Survey, 1882; E. R. Hand, 1913; K. T. Adams, 1928).—Near west coast of Hawaii, in North Kona District, on the northernmost shoulder of the Puu Anahulu range of hills, about 11.5 miles north of Mount Hualalai, and immediately south of the great lava flow of 1859. This north end is of even contour, steep, and has a noticeably scalloped appearance, and shows up a bright yellow as compared with the surrounding lava flats. Marked by a copper triangle about 26 inches below surface of ground, with four reference marks cut in rocks, 11.5 feet from it. Over station an immense stone cairn was erected, 7 feet high, and painted white. It can be seen with naked eye from all parts of Kawaihae Bay. In 1928 cairn reported as being only 2½ feet high.

Kuili (Hawaii Island, Hawaiian Government Survey, 1882; E. R. Hand, 1913; K. T. Adams, 1928).—On the northwest coast of North Kona, in the land

For notes in regard to marking of stations, see p. 139.

of Awakee, 6 miles northeast of Keahole Point, the most westerly point of Hawaii; about 3,800 meters north of the lava flow of 1801, on the summit of the well-known Kuili Hill. Seen from Kawaihae this hill appears to be the extreme end of the point; it is a symmetrical sugar-loaf hill, and is connected by a low saddle to another hill to the southwest. Marked by a square hole inside a triangle cut in a stone set flush with the surface of the ground. The underground mark placed when the station was established, a copper triangle, was not searched for in 1913. Reference mark is near edge of grave, white cement, bearing N. 50° W. about 6 meters.

Keahole (Hawaii Island, Hawaiian Government Survey, 1882; E. R. Hand, 1913).—In North Kona District, on Keahole Point, the extreme western point of Hawaii, 470 meters S. 54° E. of lighthouse and about 90 meters inshore. Station is on a prominent mound of lava, which is between the sea and a pit of sunken lava which is about 12 meters wide, 50 meters long, and 15 feet below station mark. The seaward side of wall of a stone house, with one side torn out, bears N. 85° E. from the station, distant 16¾ meters. Marked by a copper bolt in center of triangle cut in solid rock, and surrounded by three other triangles, also cut in rock, each 0.915 meter (3.00 feet) distant.

Keahuolu (Hawaii Island, Hawaiian Government Survey, 1882; E. R. Hand, 1913; T. J. Maher, 1928).—In Kona District, west coast of Hawaii, 2 miles west-northwest from Kailua wharf, on a large wide rounding point, where the shore line turns from southeast and northwest toward northeast. Station is on highest lava mound, quite prominent, on this point; about 300 meters from the sea to the south and 350 meters from sea to west. A house in center of prominent cocoanut grove is 1,250 meters distant, S. 80° E. Station marked by an iron bolt let into the rock on a ledge in a crevice 2.5 feet below general surface of the flow. In 1928 a standard hydrographic disk was cemented in place above the bolt, the lug on the disk resting on the bolt. On each side of the fissure at a distance of 0.61 meter (2.0 feet) from the station a cross was cut in the rock, on bearings S. 51° E., and N. 51° W. In 1928 an arrow 18 inches long was cut in the rock, 5.6 meters (18.4 feet) south (mag.) from the station; and a standard reference disk was cemented in rock 7.93 meters (26.0 feet) from the station in range with cocoanut grove. In 1913 a small cairn was built over the station.

Puu Ohau (Hawaii Island, Hawaiian Government Survey, 1883; E. R. Hand, 1913; T. J. Maher, 1928).—On west coast of Hawaii, Kona District, on Puu Ohau, a conspicuous hill about 1½ miles north of Kealekekua Bay, 305 meters from the sea. There is an ancient stone platform about 5 meters west of the station, and across a deep volcanic pit, on opposite side of rim but much lower, is a tomb of white mortar. It bears S. 30° W. from station, distant 150 meters. Care must be taken not to mistake tomb for cairn, painted white, which was left over station (1913). Station marked by earthenware bottle 2 feet below surface of ground. Surface mark is stone marked with triangle, while three stones marked with crosses are each 0.76 meter (2.5 feet) from station. In 1928 surface and witness marks found as described; subsurface mark not investigated. Additional witness marks established as follows: Cross cut in large bowlder, distant 3.9 meters (13 feet), on bearing N. 80° W. (mag.); triangle blazed on tree, distant 11.2 meters, (37 feet), on bearing S. 41° E. (mag.). Station may be reached over lava trail from Cooks Monument. In smooth weather landing may be made at base of Puu Ohau in small bight, on shore of which is a shack.

Puu Ahinui (Hawaii Island, Hawaiian Government Survey, 1890).—In the southern part of Hawaii, in South Kona, on the land of Kaapuna, on Puu Ahinui, in an open space or "kipuka" in the forest, about 7,300 meters from the sea, and about 400 meters south of trail through ohia forest. Marked by a large triangle cut in solid rock, and by a large stone cairn.

Kailua (north meridian astronomic latitude station) (Hawaii Island, Hawaiian Government Survey, 1887, E. R. Hand, 1913; T. J. Maher, 1928).—On west coast of Hawaii, Kona District, in land of Moeauoa, northeast of Kailua Bay, in yard of what was in 1913 the Kailua sisal mill, being in the continued line of east side (tank side) of building, and 31.9 meters from corner of foundation. In 1928 this mill was reported as having been moved 2 miles further north, but the foundations of the old building remain in good condition. Kailua Church tower bears S. 16° E. about 300 meters from the station. Station is 1 meter south of a brick pier erected by the British Transit of Venus expedition in 1874. In 1913 the station and the remains of the brick pier were recovered. This is not the pier actually used by the British expedition. It is said that two piers were built and the other one used; it was not recovered, but is said to be under the Ikeda Hotel.

For notes in regard to marking of stations, see p. 139.

Station marked by triangle cut in rock; re-marked in 1928 by standard disk station mark. In 1928 two standard reference disks were set as follows: No. 1, cemented in lava rock 6 feet north of yard, and near road; it is 21.39 meters (70.2 feet) from station on bearing N. 65° W. (mag.); No. 2, cemented in southeast corner of foundation of former sisal mill; it is 32.3 meters (106 feet) from station on bearing N. 25° E. (mag.).

Hanamalo 2 (Hawaii Island, Hawaiian Government Survey, 1890; E. R. Hand, 1913).—*On west coast of Hawaii, in South Kona, land of Okoe, 3 miles south of* Hoopuloa, on Cape Hanamalo (or Point Hanamalo), close to the water. Marked by a triangle cut in the solid rock in the "aa" (lava); it is 8.78 meters (28.8 feet) southeast of the position of *Hanamalo 1*. The action of the waves made the change necessary. A large cairn was placed over the station and painted white.

Ohepuupuu (Hawaii Island, Hawaiian Government Survey, 1890; E. R. Hand, 1914).—On southwest coast of Hawaii, in South Kona, land of Kapua, ½ mile south of the shacks at Kapua Bay, which is just south of Okoe Bay, and 430 meters east of the shingle beach cove which is on the north side of the great point. *It is near the shore, south of Ahole cocoanut grove, 32 feet southwest of trail leading* over the "aa" (lava), and 600 or 700 feet southeast of the ancient "holua" (slide) of Heeia. Marked by a triangle cut in a large stone on top of an ancient grave on highest point of the "aa." In 1914 a large cairn was erected over the station and painted white.

Puu Hoomaha (Hawaii Island, Hawaiian Government Survey, 1890).—In southern Hawaii, South Kona, land of Kipahoehoe, on the summit of Puu Hoomaha, just above the forest belt, on an old "pahoehoe" flow, and 250 feet north of an "aa" flow. Marked by a large triangle cut in the solid rock.

Hanakeaumoe (Hawaii Island, Hawaiian Government Survey, 1890; E. R. Hand, 1914).—On southwest coast of Hawaii, in South Kona, land of Kapua, about 3⅓ miles south of Okoe Bay, between Kanewaa Point and Ahuloa (or Kamoi) Point, and 660 meters inside the cliffs. Station is on a sharp mound which rises abruptly some 15 meters above a level expanse of "aa" lava, and is noticeable for a long way up and down the coast. Marked by a cross cut in the rock. Over it a cairn was erected and painted white.

Puu o Keokeo (Hawaii Island, Hawaiian Government Survey).—In southern part of Hawaii, in extreme western part of Ka-u District, on Mount Keokeo, on the highest point on the east corner of the mountain, composed of light pumice stone. Marked by a tin can placed underground, and over it a hard stone with a triangle cut in it, and around it three similar stones set as supports for the tripod feet.

Na Puu a Pele (Hawaii Island, Hawaiian Government Survey, 1891; E. R. Hand, 1914).—On southwest coast of Hawaii, in the extreme southwest part of Ka-u District, in Manuka, on the largest and most westerly of a chain of cinder cones on the coast, and about 12 miles west-northwest from Ka lae, the south point of Hawaii. Marked by a cross cut in a beach-worn stone buried 1 foot below the surface of the ground. Above it is placed a similar stone marked with a triangle, and above all a large stone cairn.

Akihi (Hawaii Island, Hawaiian Government Survey, 1890).—In southern part of Hawaii, in southern Ka-u, on a lofty peak, Mount Akihi, in the Kahuku forest, east of the lava flow of 1868, and about 13 miles north of Ka lae, the most southern point of Hawaii. Station is on southeasterly rim of deep crater. Marked by cross cut in rock set deep in ground, and by stone cairn 9 feet in diameter. Reference marks are crosses in three stones, distant 1.5 meters.

Ka lae (astronomic latitude station) (Hawaii Island, Hawaiian Government Survey, 1887; E. R. Hand, 1914).—On the south point of Hawaii, Ka lae, between the Ka lae Light and the light keeper's house. Identical with latitude station. Marked by a cross on a brick pier 3 feet high, with a stone marked with a cross in a circle 2.25 meters (7.4 feet) north of it, and another stone similarly marked 1.37 meters (4.5 feet) south of it. A large cairn is built over and around the pier.

Palahemo (Hawaii Island, Hawaiian Government Survey, 1898; E. R. Hand, 1914).—In southern Ka-u, in Kanaoa, about 2 miles northeast of Ka lae, the southern point of Hawaii, on a smooth grassy hill about 600 meters from the sea. Hill also called Pohakuloa or Puu Ulaula. Marked by drill hole inside triangle cut in a rough "aa" lava bowlder. Over this a cairn was built.

Kipaepae (Hawaii Island, Hawaiian Government Survey, 1898; E. R. Hand, 1914).—On the southern coast of Hawaii, on southern Ka-u, on the slope, 3½ miles south by west from Honuapo Wharf, 780 meters in from the edge of the

For notes in regard to marking of stations, see p. 139.

180-foot cliffs, and 1,450 meters N. 17° E. from the point where these cliffs turn inshore, north of a lava flat, and about 90 meters north of a stone wall on the upper or mauka side of a pasture. Marked by a cross cut in the solid rock, over which is a 10-foot cairn with 12-foot base, terraced, and painted white.

Kapuna 2 (Hawaii Island, Hawaiian Government Survey, 1898; E. R. Hand, 1914).—In southern part of Hawaii, in southern Ka-u, near the top of the rounded grass-topped hill known as Puu Hoomaha, and shown on chart as Kapuna Mountain, just northeast of Waiohinu village. There is a grove of eucalyptus trees whose center is approximately 120 meters from the station, and whose left tangent is on range with this station and station *Kipaepae*, the bearing from *Kipaepae* being N. 42° W. Marked by a 5-inch iron pipe set deep into the ground, and surrounded by stones set in cement, a stone cairn being placed above it.

Kaiholena (Hawaii Island, Hawaiian Government Survey, 1897; E. R. Hand, 1914).—In the southern part of Hawaii, in central Ka-u, on the summit of Kaiholena Mountain, a steep, sharp-ridged, wooded hogback, behind Puu Enuhe and Makanau Hill. Marked by a triangle cut in a large stone, and three logs planted vertically in the ground as an instrument support, and covered with a pile of hapuu logs, 18 feet in diameter. Not searched for in 1914, when part of above description was written.

Kamehame (Hawaii Island, Hawaiian Government Survey, 1897; E. R. Hand, 1914).—On the southern coast of Hawaii, in southern Ka-u, in the land of Moaula, on the summit of the first cinder cone, Kamehame Hill, on the shore east-northeast of Punaluu and distant therefrom 2½ miles. Originally marked by a triangle cut in the rock. In 1914 a standard bronze disk was set inside this triangle. A cairn at the station is 14 feet through at base and 12 feet high, with terraced sides. It is but 4 or 5 feet from the eroding edge of the cliff. A reference mark was accordingly set in 1914, a very large bowlder was placed in a pit on crest of the hill and marked with drill hole and crows foot; the drill hole is 10.9 meters (36 feet) from the station in azimuth 170° 42.9′. Cairn was whitewashed.

Puu Huluhulu (Hawaii Island, Hawaiian Government Survey, 1891; United States Geological Survey, 1920).—In southeastern part of Hawaii, in southern Puna, about 3 miles southeast of the Volcano House at Kilauea, on the western and highest peak on the sharp rim of the Puu Huluhulu crater. Marked by a triangle cut in a stone set firmly in the ground, and three large stones to support instrument. Also by a stone pyramid 13 feet high.

Kulani (Hawaii Island, Hawaiian Government Survey, 1891).—Southeast of the center of Hawaii, on the summit of Kulani Cone, a conspicuous hill at the junction of the lands of Waiakea, Olaa, and Keauhou. Marked by a copper bolt set in a block of concrete, and a huge "ahu" of hapuu logs.

West Heiheiahulu (Hawaii Island, Hawaiian Government Survey, 1896; E. R. Hand, 1914).—In the eastern part of Hawaii, on the west edge of the crater on top of Mount Heiheiahulu, 5 miles north by west from Kalapana; the east edge, nearer the sea, is a few feet higher. On this east edge station *Heiheiahulu* (see description) was established in 1914; it is S. 63° E., about 100 meters across the crater from station. Station marked by cross cut in a solid beach-worn stone set in cement on a raised foundation of stones, 16½ feet in diameter. Above the station is a conical cairn 8½ feet high.

Alala (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1912).—On east coast of Hawaii, Hilo District, land of Makahanaloa, on the prominent sugar-loaf hill which rises abruptly and symmetrically from the comparatively smooth slope just behind Pepeekeo. There are two other hills of equal height about ⅓ mile to the south-southwest. There is a plantation camp, group of small white shacks and one large stable, at foot of hill on north side. Station may be identified by the following bearings: To Pepeekeo sugar mill stack, N. 61° E., long barn-like structure (station *School*) S. 80° W., Leleiwi Point, S. 56° W. Entire hill is covered with cane. Marked by United States Geological Survey copper mark set in concrete flush with the ground and surrounded by bowlders.

Halai (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1912).—On the eastern coast of Hawaii, on the summit of a hill of the same name behind Hilo, and but a short distance out. Hill is a symmetrical sugar-loaf and is generally cane covered. It may be identified as follows: When standing at the circular pavilion in the public park on the beach at Hilo, one looks up a street running at right angles to the beach, the hill is seen at the head of this street. Station originally marked by granite block, but in 1912 mark described as block of cement, about 6 feet square, placed on highest point of hill; in center of block

For notes in regard to marking of stations, see p. 139.

is galvanized iron pipe about 9 feet tall, at the top of which is a galvanized iron drum about 16 inches in diameter. The pipe is jointed so that the upper section with drum may be removed permitting the placing of an instrument over the lower part.

Red Hill (Hawaii Island, Hawaiian Government Survey, 1877).—In the northern part of Hawaii, on a prominent peak on the northeast slope of Mauna Kea. Marked by a copper triangle underground, with a large stone cairn over it. Visible from the Volcano House.

Honohina (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1912).—On east coast of Hawaii, in North Hilo, land of Opea, on a small hill called Kuula, and east of a gulch. Just south of Honohina there is a steady rise in the ground on the southwest side of the main road, terminating in a sharp tit some distance inland; this tit can not be seen from any place along the road. It is reached by taking the trail which leaves the main road at right angles at a point about 200 meters from the house of Mr. Lucas, employed on the Honohina plantation; Mr. Lucas's house is on the main road, about 1 mile out (southeast) of Honohina, and the trail branches off between his house and Honohina. Follow the trail up hill through cane till camp is on left, turn to right along trail, crossing a small brook (possibly a flume later) about 100 meters beyond which is a forked road, at which point turn to right to climb the tit above mentioned. The station is on this tit, and is marked by a copper tablet marked "U. S. G. S." set in concrete and covered with a cairn of stones. The old underground mark was a copper triangle buried 3 feet underground.

Haiku (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1913).—On northeast coast of Hawaii, in the land of Haiku, directly inshore from the village of Haiku, which is just east of the railroad station of Ninole. Station is 980 meters from the government road. A trail leads from Haiku to the station. Marked by a copper tablet of the United States Geological Survey set in a concrete cylinder.

Puu Ohai (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1913).—On northeast coast of Hawaii, in North Hilo District, land of Pohakupuka, on a not very pronounced cane-covered hill between Maulua Gulch and the railroad station of Ninole. Station bears S. 27° W. from a church which is 1,200 meters east of Maulua Gulch, on the road, and 200 meters from the sea. It is reached by leaving the government road at the plantation's road which goes "mauka" (inland) just a short distance east of the east end of the railroad tunnel. Follow this road past Kaiakea Camp (Papaaloa plantation) and when the church and a mango grove bear N. 27° E. turn up to top of hill about 200 meters above road. Marked by a buried copper triangle, above which is a concrete cylinder flush with the ground in the center of which is a United States Geological Survey disk.

Papaaloa (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1913).—On northeast coast of Hawaii, North Hilo District, land of Papaaloa, on the high flat-topped hill immediately behind the Papaaloa and about ¾ mile from the road. To reach the station take the road or trail at plantation stables, near hospital, and go directly up the hill; the trail will turn to right and go under a flume, then continue again to top of hill. Just before top is reached the trail forks and goes either side of station, which will be found at highest point of hill. Station originally marked by a buried copper triangle; later by a cylinder of concrete, with top, 1 foot in diameter, level with ground. A United States Geological Survey tablet set in the concrete marks the center. A large pile of stones surrounds it.

Humuula (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1913).—On northeast coast of Hawaii, in East Hamakua, land of Humuula, on the northwest side of Kaawalii Gulch, about 1,350 meters above the government road, on a conspicuous round-topped, cane-covered hill called Puu Lanai. It appears to be the highest point on the northwest side of gulch when viewed from the cliff edge or road. It is reached by following one of the trails leading from the government road up the hill on the northwest side of the gulch. Marked by a copper triangle underground, over which is a concrete post 1 foot in diameter with a copper plate of the United States Geological Survey in top.

Kaholo (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1913).—On northeastern coast of Hawaii, in Hamakua District, on a not very well defined hill close to the government road and on its upper side, between Ookala and Kukaiau post offices, and 1½ miles from the former in a direct line. It is a short distance east of the Keehia public school, a small and shabby building on

For notes in regard to marking of stations, see p. 139.

the upper side of the road. To reach station, start at this school and proceed toward Ookala (or eastward) about 330 meters, where there is a private road going directly up the hill; turn along this private road for 190 meters, then turn at right angles to the left (or N. 65° E.) and go 75 meters through the cane to station. Marked by a copper plate of the United States Geological Survey set in concrete inside an iron pipe about 8 inches in diameter; pipe is of thin iron and has ragged edges projecting a few inches above ground. Station is surrounded by a great pile of bowlders.

Paauhau (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1913).—On northern coast of Hawaii, in Hamakua District, in land of Paauhau, 150 meters northwest of the Weha-Paauhau Gulch, on a poorly defined flat-topped hill which rises gently to the southeast of the plantation camp called "Paauhau Mauka" and which is about ⅓ mile from the station. "Paauhau Mauka" is about ¾ mile above the main government road, about 1¼ miles inshore from the Paauhau mill, and between Honokaa and Paauilo post offices. To reach station, proceed along the government road from either Honokaa or Paauilo post office until the road is reached which turns down to Paauhau post office and mill; 150 meters from this road intersection toward Paauilo post office (or to the northeast) is a road leading up the mountain; 400 meters up this road is the camp "Paauhau Mauka." Continue along, crossing the plantation railroad, and about 140 meters beyond the tracks is a road turning left to a yellow house, occupied in 1913 by Dr. S. R. Brown, Paahau plantation. Follow this road until it turns into a yard, proceed along outside of fence in front of house and along trail into cane in same direction as fence; in all go about 430 meters from the road intersection, then turn to left at right angles and proceed 50 meters to station. From the station "Paauhau Mauka" bears N. 35° W., distant about ⅓ mile; Doctor Brown's house bears N. 15° E. distant about 275 meters. Original mark was a granite post set in concrete. Now marked by concrete cylinder, 6 inches in diameter, its top flush with ground, and centered with a copper plate, United States Geological Survey. A cairn was built over the station.

Papalekoki (Hawaii Island, Hawaiian Government Survey, 1877).—In the northern part of Hawaii, on the northern slope of Mauna Kea, on the north brow of the summit called Papalekoki, between the summits of Mauna Kea and Kaluamakani. Station marked by a copper triangle underground, with an immense cairn over it.

Kuilei (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1913).—On the northern coast of Hawaii, in the northern part of Kamakua, land of Kawela, a little west of Kuilei Gulch, and a short distance above the trail to Waimea, on a not very pronounced hill directly inshore from Kamakamaka Point; the point, station *Kamakamaka*, and this station are about in line on bearing N. 6° W. Station is 3,150 meters from the point, about ½ mile above the government road, and about midway between the post offices of Honokaa and Kukuihaele. From the station the inshore (left) tangent of the island off Kohala coast, about 15 miles distant, and the base of the cliffs between Waipio and Waimanu are on range, and bear N. 70° W. Also Honokaa mill and plantation camp "New Stables" on main road west of Honokaa post office are on range, and bear N. 61° E. To reach station start at plantation camp and go west along government road a short distance, turning up hill at first road, a private plantation road, into "Field 10," which name is marked on gate. Keep to this road for 200 meters, then turn to the right along the first trail branching off, following it for about 375 meters, or until the island range previously described is reached, then turn left into the cane field, 100 meters to top of hill. Station marked by an equilateral triangle of white concrete about 2.8 feet on side; in its center is a tablet of the United States Geological Survey, alongside of which a cast-iron pipe 5 inches in diameter and 2 feet high is set in the concrete. Station was covered by a large pile of stones. The old mark was a copper triangle underground and cylindrical block of concrete with drill hole in center, and the letters "H. G. S. 1881" in its top.

Waipio (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1913).—Near the north coast of Hawaii, on the north side of Waipio Valley, about 8 meters from the edge of the gulch which drops down precipitously to the rice fields, and 600 meters from the edge of the cliffs above the sea. To reach the station start up the zigzag trail which goes to the top from the beach at Waipio Valley, and upon reaching the top, turn "mauka" or inshore along the edge of the gulch. Station is at head of old wood slide. Marked originally by copper tube and a copper cylinder buried 3 feet deep, with an ohia post at surface.

For notes in regard to marking of stations, see p. 139.

In 1913 mark described as a concrete cylinder set upright, with United States Geological Survey plate in center. The station is surrounded by a cairn of stones.

Kaala (Hawaii Island, Hawaiian Government Survey, 1877).—In the northern part of Hawaii, on the northeastern summit of Mount Kaala, overlooking the Waipio Valley, and about 30 feet south of an olapa tree. Marked by three triangular pits, 3 feet on a side; the center marked with charcoal and a copper tube marked "H. G. S."

Puu Io (Hawaii Island, Hawaiian Government Survey, 1876).—In northern part of Hawaii, on Puu Io, at the foot of Mauna Kea, on the brow of the hill to the northeast (not on the summit). Marked by a mamane post and a cairn of stones. A rock marked with two crosses is N. 40° E. from the station, distant 8 feet.

Puu Pili (Hawaii Island, Hawaiian Government Survey, 1881).—In the northern part of Hawaii, in the central part of North Kohala, on Puu Pili. Marked by a stand for the instrument consisting of four ohia posts and by three bottles buried, radiating horizontally from the station, and ginger planted over them.

Keawanui (Hawaii Island, Hawaiian Government Survey, 1881; E. R. Hand, 1913).—On northwest coast of Hawaii, west coast of Kohala, on a rocky promontory just inside a prominent point (Malaea Point) which is midway between Kawaihae Light and Mohukona Light, and at a place where the shore line runs northeast for almost 300 meters. Out on this point is a high rock pinnacle touched up with paint; the next paint spot to the southeast along the shore is the symbol, cross inside circle, and is 700 meters distant; 360 meters southeast of this symbol is paint on a cairn. The station is directly east 330 meters from pinnacle on point. Marked originally by three lines of bottles radiating from center and three coral blocks marked with triangles, over which was a large stone cairn inside a small stone inclosure. In 1913 bottles were found disarranged and mostly broken. The three coral stones were apparently undisturbed, forming a triangle a little less than 1 meter on a side.

Kehena (Hawaii Island, Hawaiian Government Survey, 1881; O. B. French, 1910; E. R. Hand, 1913).—On northwest coast of Hawaii, west coast of Kohala District, in the land of Kaiholena, between Keawanui and Mahukona, and ½ mile from the sea. Point may best be found in the following manner: Identify the most prominent point, about 4 miles south of Mahukona south beacon, and here will be found a paint spot on an old house with domelike appearance; go north along the coast to another paint spot (white paint on round bowlder), immediately east of which is a small mound, from which the cairn over the station will be seen, N. 68° E., 640 meters distant. Center marked by a rock with ½-inch drill hole in top. Three stones, each marked with cross, are each distant about 1 meter from station.

Puu o Nale (Hawaii Island, Hawaiian Government Survey, 1881; E. R. Hand, 1913).—In northern part of Hawaii, in central part of northwest Kohala, on the summit of Puu o Nale, a very conspicuous and well-known, high, smooth, grassy hill. Hill is very symmetrical, sugar-loaf type, steep sides. It is about 200 meters west of the road which runs to Waimea; it is 4.0 miles inshore from Mahukona and bears N. 62° E. from it; it is 4½ miles from the coast on the north. The hill on which station Puu Ula is situated bears N. 38° W., and there is a prominent hill, much lower than Puu o Nale, to the west of and about midway of the line between Puu o Nale and Puu Ula. Puu o Nale bears S. 56° E. from Honoipu Landing; S. 10° E. from Hoea Mill; S. 45° W. from Kauhola Point Light. Station marked by a United States Geological Survey tablet in top of a post of dressed granite, 7 inches square.

Kauhola (Hawaii Island, Hawaiian Government Survey, 1881; E. R. Hand, 1913).—On the northern coast of Hawaii, at the northeast point of Kohala District, on a high promontory known as Kauhola Point. Station is out on the low flat grass-covered end of the point, a short distance south-southeast of the light, about 30 meters from the cliff edge on the west, and 25 meters from the edge on the north. The nearest corner of the light building is 15.30 meters (50 feet) distant, on bearing N. 54° W. The near corner of an astronomical pier of brick, about 3½ feet high, resembling section of chimney, is 4.07 meters (13.4 feet) from station, on bearing N. 75° E. Station marked by a post of dressed granite 6 inches square, and projecting about one foot above the ground. It leans a trifle toward the west. In its top is a plate of the United States Geological Survey.

Ridge (Hawaii Island, O. B. French, 1910; E. R. Hand, 1913; K. T. Adams, 1929).—On northwest coast of Hawaii, western coast of Kohala, about 1,100 meters south of Mahukona south beacon, and 900 meters directly east or inland. The point on the shore where one turns inland is indicated by a triangle painted

For notes in regard to marking of stations, see p. 139.

on the rocks. The station is on top of the most prominent ridge about ½ mile south of Mohukona, and on the most northern point visible from Kehena along the coast. Marked by a drill hole in the solid rock. A cairn was left over the station.

Puu Ula (Hawaii Island, E. R. Hand, 1913).—In northern part of Hawaii, and northwest Kohala District, on the summit of Puu Ula, a very large, isolated, and prominent conical hill, sharp and symmetrical. This hill is unmistakable, showing up from seaward from south clear around to N. 80° E. It bears S. 80° E. from Honoipu Landing (abandoned); Hoea Mill (Hawi Mill & Plantation Co.) bears N. 20° E. Station marked by cylinder of concrete 5 inches in diameter and extending about 3 inches above ground; in its top is a hole in center of triangle. Station covered with cairn of stones. Marked by Territorial Survey, but determined by United States Coast and Geodetic Survey.

Kepuhi (Hawaii Island, E. R. Hand, 1913).—On north point of Hawaii, on Hoea Point (Kepuhi Point?) which is the headland seen to the westward from Kauhola Point Light; it is directly east from Hoea Mill of the Hawi Mill & Plantation Co. Station is not out on end of point, which consists of a flat rock about 30 to 40 feet high, but is back from the outermost end about 80 meters, up a terrace of earth, showing a distinct bluff line behind the regular cliffs. From the station Hoea Mill stack bears S. 64° W. Station is about 6 meters southeast from the cliff edge and about 3 meters southwest from the terrace bluff. Mark is a cylinder of concrete about 5 inches in diameter, projecting 8 inches above the surface. Traces of the iron pipe in which it was cast still show. In top of the cylinder is a triangle with small hole. This mark placed by the Territorial Survey; its position determined independently by the United States Coast and Geodetic Survey.

Supplementary points, northwest coast

Nunulu (Hawaii Island, E. R. Hand, 1913).—In the northern part of Hawaii, north central part of Kohala District, on the high land 2 miles above the government road, at a point south of the "Kohala Club" buildings. As seen from the vicinity of the club, the station is on the skyline; a conspicuous clump of bamboo will be seen against the skyline bearing S. 20° W. from the church which adjoins the club property, and the station bears S. 23° W., distant 125 meters from this clump. Station is close to a junction of wire fences. The fence post at the first angle southeast of this junction is 7.94 meters (26.0 feet) from station in bearing N. 35° W., from this corner, which is southeast of the junction, the fence runs S. 28° W. Another post along this line is 9.25 meters (30.3 feet) from station, in bearing S. 80° W. The station is reached by taking the road which goes "mauka" from the main road at a point a short distance east of the church which adjoins the club; a telephone line goes along this road; follow this telephone line and when the bamboo clump above referred to bears about west by north turn west and cross the gulch (Nunula Gulch) to the slight rise which will be seen south of the bamboo clump. Station marked underground by neck of bottle. Surface mark is center of iron nut in top of concrete cylinder flush with surface of ground and extending downward about 2½ feet.

Kapaaiki (Hawaii Island, E. R. Hand, 1913).—On north coast of Hawaii, northeast coast of Kohala District, out on the end of the flat grassy point on the west side of Keokea Harbor, about 15 meters from the cliff edge on the east and west, and about 10 meters from the cliff edge on the north. From the station Kauhola Point Light bears N. 70° W.; and Niulii stack, S. 49° E. Marked by hole in center of triangle on top of a concrete cylinder about 10 inches in diameter, and projecting 1½ feet above the ground. Cylinder surrounded by the iron form in which it was cast. This mark placed by the Territorial Survey, but position determined independently by United States Coast and Geodetic Survey party in 1913.

Niulii (Hawaii Island, E. R. Hand, 1913).—On north coast of Hawaii,northeast shore of Kohala, on a well-defined hill about ½ mile south of Niulii sugar mill. There is a wall of stone which crosses this hill; on the southwest side cane is planted; on the northeast side is a pasture, and the land slopes abruptly down toward the main road and mill. Kohala Mill stack bears N. 70° W. from the station. A small church which is on a branch road (Pololu Gulch road) going "mauka" (inland) and a short distance from where this road joins the main road, bears N. 16° W. Niulii stack bears N. 11° E. Station is 95 meters west of the aforementioned branch road, and is marked by the upper end of an iron axle set up in concrete at the highest point of the above mentioned wall of stones; the

For notes in regard to marking of stations, see p. 139.

axle projects about 2½ feet above the ground, and a cairn of stones is built around it to its top.

Akokoa (Hawaii Island, E. R. Hand, 1913).—On the north coast of Hawaii, out on the extreme end of Akokoa Point, which is the most easterly of the points of the Kohala District, being at a place where the shore line turns abruptly to the south, meeting the high cliff line that extends almost in a straight line to Kukuihaele Landing, Hamokua. Station is 10 meters from cliff edge to east; 8 meters from cliff edge north; and 11 meters from cliff edge west. Marked by a cylinder of concrete with rounded top level with ground, and 1½ feet in diameter. Cylinder extends to depth of about 2½ feet.

Island (Hawaii Island, E. R. Hand, 1913).—Off the north coast of Hawaii, the highest point on larger and higher of the two islands just off Honokea Gulch, which gulch is the dividing line between Hamakua and Kohala Districts. There is a third island or islet, which is little more than a pinnacle of rock.

Stack, Niulii (Hawaii Island, E. R. Hand, 1913).—On north coast of Hawaii, northeast coast of Kohala District, at Niulii, behind Keokea Harbor, the main stack of the Niulii Mill & Plantation Co. It is the most easterly of the five mills in Kohala.

Stack, Kauhola (Hawaii Island, E. R. Hand, 1913).—On north coast of Hawaii, northern part of Kohala, behind Kauhola Point, on a bearing S. 28° W. from Kauhola Point Light, the brick stack at the mill of the Kohala Sugar Co.

Kauhola Point Light (Hawaii Island, E. R. Hand, 1913).—On north coast of Hawaii, northeast shore of Kohala, out on the end of the long flat grass-covered Kauhola Point. Point is perfectly level, covered with short grass; it is about 30 feet in elevation. The light is hoisted to top of a support which stands immediately behind a small white shed, gray trimmed, with gable roof painted red. Light is 35 feet above ground.

Stack, Union (Hawaii Island, E. R. Hand, 1913).—In the northern part of Hawaii, and of Kohala District, about 1 mile inland and about 2 miles west by north from the brick stack of the Kohala Sugar Co.'s mill (see description elsewhere). Station is the stack on the sugar mill of the Union Mill Co.

Stack, Hoea (Hawaii Island, E. R. Hand, 1913).—On the northern end of Hawaii and of Kohala District, close to the sea near Upolu Point, the most easterly of two stacks of equal height and size on the sugar mill of Hawi Mill & Plantation Co.

Mahu (Hawaii Island, E. R. Hand, 1913).—On north coast of Hawaii, on northwest coast of Kohala, on the very low rounded rock point which is the most westerly, 1 mile south of Honoipu Landing (the buildings at the landing may be removed but conspicuous foundations will remain). Station is 20 meters from the water on the west, and about 10 meters west of the line where soil meets rocks. A fisherman's shanty, part wood and part stone, with gable roof, is seen across a narrow bight of the sea, 150 meters, S. 18° E. Four sisal plants about the same distance as the shack bear S. 30° E. Puu Ula bears N. 78° E.; Puu o Nale, the southerly of two hills of equal height and similar appearance, bears S. 70° E. Station marked by a 1¼-inch pipe set upright in cement which is flush with the rock, the pipe projecting 2 feet above. The highest point, cement covered, of a very large detached rock, the highest on the point, is distant 9.95 meters (32.6 feet), on bearing N. 70° E. It has paint on it.

Honoipu (Hawaii Island, E. R. Hand, 1913).—On northwest coast of Hawaii, and of Kohala, the sea gable of the Honoipu landing house, on the edge of the bluff at Honoipu. The seaward side of building is red; roof, ends, and back are black. This building and all others adjacent are to be moved and the landing abandoned; the foundations, however, will remain and form a very conspicuous mark from seaward. Station mark is on outer edge of foundation at seaward end, midway between the corners, and directly under gable.

Rail (Hawaii Island, O. B. French, 1910; E. R. Hand, 1913; K. T. Adams, 1929.)—In northern part of Hawaii, west cost of Kohala, on the most prominent point of ridge about ½ mile north of Mahukona. Marked by drill hole in solid rock. Reached by following along the railroad until it passes through a rock cut some 15 or 20 feet in height on side toward sea, when the station will be found on the first prominent point of ridge immediately to the north. A cairn was left over the station.

Mahukona Harbor south day beacon (Hawaii Island, O. B. French, 1910; E. R. Hand, 1913; K. T. Adams, 1929).—At Mahukona, west coast of Kohala, northern part of Hawaii, at south end of harbor shore line; a truncated, white-washed cairn of stones 45.3 meters (149 feet) north by west of the present light

For notes in regard to marking of stations, see p. 139.

(1929), approximately 12 feet in diameter at base, 2.5 feet in diameter at top, and 15 feet in height. Placed as an aid to navigation. This marks the position of the original light, discontinued in 1907.

Mahukona Harbor north day beacon (Hawaii Island, O. B. French, 1910; E. R. Hand, 1913; K. T. Adams, 1929).—At Mahukona, west coast of Kohala, northern part of Hawaii, at northern end of harbor shore line; a truncated, white-washed cairn of stone approximately 12 feet in diameter at the base, 13 feet high and 3 feet in diameter at top. Placed as an aid to navigation.

Mahukona Harbor schoolhouse flagstaff (Hawaii Island, O. B. French, 1910).—In 1928 it was reported that this schoolhouse had been destroyed.

Mahukona Harbor wharf derrick (Hawaii Island, O. B. French, 1910; K. T. Adams, 1929).—On northwest coast of Hawaii, on the north side of the concrete landing dock at Mahukona Harbor. Base of derrick is about 3 feet above water. Derrick is of iron approximately 35 feet in height, with swinging member of same length.

Mahukona Harbor church spire (Hawaii Island, O. B. French, 1910).—This church reported in 1929 as having been destroyed.

Mahukona Harbor light mast (Hawaii Island, O. B. French, 1910; K. T. Adams, 1929).—At the south end of Mahukona Harbor, northwest coast of Hawaii. This light mast was discontinued as a light in 1915, and the mast has been removed, but six concrete piers mark its location. The mast stood on the center pier, and its approximate position is marked by an iron bolt in the center of that pier. It is 41.3 meters (135 feet) north of the north face of the present (1929) light.

Mahukona Light (Hawaii Island, K. T. Adams, 1929.)—In the northern part of Hawaii, west coast of Kohala, 800 meters south of the landing at Mahukona, about 40 meters inshore, 42.2 meters (138 feet) S. 0° 57′ E. of the foundation of *Mahukona Light mast*, 1910, and 48.8 meters (160 feet) south by east of *Mahukona Harbor south day beacon* (the original Mahukona Light, discontinued in 1907). The light established in 1915, is on a concrete tower tapering from about 6 feet at its base to 2½ feet at its top, which is surmounted by a 5½-foot platform. The tower rests on a 9-foot concrete base. The focal plane of the light is about 20 feet above the ground.

Waiele (Hawaii Island, K. T. Adams, 1928).—On the northwest coast of Hawaii, about 3.2 miles northwest of Kawaihae Light, on the point on north side of Kamilo Bay, about 30 meters back from and 8 meters above high water line, and 18 meters toward the sea from the back wall, 1.5 meters high, of an old Hawaiian inclosure of stones, rectangular in shape. About 45 meters inland from the station an old trail runs parallel with the shore. The station is at the most northern point along the shore from which one can see Puu Kamalii. Marked by a standard disk station mark, note 2a, set in solid rock, flush with the surface of the ground. The exposed portion of the rock is about 1 meter in diameter. Two standard reference disks, note 12a, were set in the following-described locations, and at the following distances and azimuths from the station: No. 1, in solid lava rock toward the sea from and below the station, 11.3 meters (37.07 feet), 72° 26′; No. 2, inland from station and covered by a stone cairn, 56.46 meters (185.24 feet), 237° 58′.

Puu Kamalii 2 (Hawaii Island, K. T. Adams, 1928).—Near northwest coast of Hawaii, on highest point of Puu Kamalii, which is 670 feet in elevation, and 1,530 meters N. 46° E. (true) from the dock at Kawaihae. The station mark, which was found already in place by the 1928 party, had apparently been set by a party from another survey, and consisted of a 1¼-inch galvanized pipe projecting 1½ feet above a small mound of rock and cement, on which was inscribed "Puu Kamalii, Mar. 1924." In 1928, standard disk reference marks were set according to note 12a, at the following distances and azimuths from the station: No. 1, 11.8 meters (38.7 feet), 256° 39′; No. 2, 9.8 meters (32.2 feet), 106° 42′.

Kawaihae Light (Hawaii Island, E. R. Hand, 1913; K. T. Adams, 1928).—On the northwest coast of Hawaii, at the north end of the village of Kawaihae, and about 230 meters north-northwest along the shore from the wharf. This is the third light which has been erected at Kawaihae. The first light, prior to and during 1905, was exhibited from the old masonry conical frustum now standing between the present light and the radio mast. The second and third lights were identical in position. The lens lantern first exhibited in 1906 was supported on an open skeleton pyramidal wooden tower, which was replaced in 1914 with the present concrete tower. The present tower is 34 feet in height. The 1913

For notes in regard to marking of stations, see p. 139.

determination of the geographical position of this light was apparently in error by several meters and is superseded by the 1928 determination.

Kawaihae wireless (Hawaii Island, E. R. Hand, 1913; K. T. Adams, 1928.)—On northwest coast of Hawaii, at Kawaihae, the wireless mast owned but no longer operated by the Mutual Telephone Co., of Honolulu. The position of this point, determined without check, is in doubt by several meters, and should not be used on large scale maps or charts.

Pack (Hawaii Island, K. T. Adams, 1928).—Near northwest coast of Hawaii, in South Kohala District, at an approximate elevation of 225 feet, in a large outcropping of rock on top of a small rounded rocky knoll about 1,800 meters due east of Puako Point, and about 1,000 meters due east of the town of Puako. The country around this station is very uniform in character, consisting of rolling hills partially covered with algeroba bushes. The station can best be recovered from station *Puako*. Marked by a bronze hydrographic disk set in the outcropping bedrock.

Hand (Hawaii Island, K. T. Adams, 1928).—On the northwest coast of Hawaii, about 8.1 miles south by west of Kawaihae Light, on Anaehoomalu Point, south side of Honokaope Bay, and about 200 meters back from high water line. An old lava flow surrounds the station and extends several miles inland. Station is on a knoll about 15 meters above the main lava flow. Two rock cairns, 1 meter high, stand 3 meters north of the station. There are a few trees along the shore line 0.5 mile to the south, 0.3 mile to the north, and also on a sand beach about 200 meters northwest of the station. Station marked by a standard hydrographic disk station mark set in a small white rock cemented together with Portland cement and sand.

Anaehoomalu (Hawaii Island, Hawaiian Government Survey; E. R. Hand, 1913; K. T. Adams, 1928).—In western part of Hawaii, South Kohala District, on extreme northwest part of the rounded point on the south side of Honokaope Bay, 4 miles southwest from Puako village and bay. Station is on rough "aa" lava, between 20 and 30 meters inshore, and 535 meters N. 77° W. from a prominent lava tit, 75 feet high, which is seen across the sand from the station. From offshore the station is identified not only by this tit, but also by a large area of yellow sand forming a beach and extending inshore over 300 meters in a southwesterly direction. Marked underground by a smooth stone in the top of which is a drill hole surrounded by a triangle. Around it were placed 11 tin cans, the very traces of which had almost wholly disappeared in 1928. Two reference crosses cut in stones, each 3 feet from the station and 5 feet apart, had become very indistinct in 1928, due to disintegration. In 1928 a surface mark was placed, consisting of a standard disk station mark set in a mass of concrete about 2 feet in diameter, and having a top thickness of about 3 inches. The space over the underground mark was nearly filled with stones and the concrete poured over them to unite them with the more solid rock. Two reference marks were also placed at the same time, standard bronze disks at the following distances and azimuths from the station: No. 1, 12.1 meters (40 feet), 264° 41′; No. 2, 11.6 meters (38 feet), 22° 15′.

Keamuku (Hawaii Island, Hawaiian Government Survey, 1882).—In the western part of Hawaii, due west of Mauna Kea, northeast of Mount Hualalai, on an eminence northwest of the end of the Keamuku lava flow. Marked underground by a copper bolt driven into a rock *in situ*, and on the surface by four crosses cut in rocks each 7 feet distant from the station.

Ahumoa (Hawaii Island, Hawaiian Government Survey, 1882).—In central part of Hawaii, on prominent hill of same name, west of Mauna Kea. Marked by a triangle cut in a large rock *in situ*, with a drill hole 4½ inches deep in its center, in which are a pair of spectacle rims. Three reference crosses were cut in the rock at distances of 4, 5, and 11.2 feet, and a stone cairn was erected over the station, 8 feet in diameter and 6 feet high.

Nawai (Hawaii Island, K. T. Adams, 1928).—On the northwest coast of Hawaii, on Mano Point, south side of Kiholo Bay, at an elevation of about 50 feet, on a large bowlder or lava cinder, which is on the highest and most prominent point looking from the northwest. It is nearly in the center of a lava "aa" flow, 3 meters west of the trail which crosses the flow, and about 200 meters back from the shore line. Station is 1,050 meters, N. 77° W. (true) of the southwest end of a small sand beach, and 2,780 meters, S. 78° W. (true) of the outlet of a fish pond at the east side of a deep bight in east side of Kiholo Bay. Marked with a standard disk station mark according to note 5, while two standard disk reference marks, note 12c, were set at the following distances and azimuths from

For notes in regard to marking of stations, see p. 139.

the station: No. 1, 12.82 meters (42.1 feet), 340° 02′; No. 2, 14.64 meters (48.0 feet), 79° 28′.

Akahipuu (Hawaii Island, Hawaiian Government Survey, E. R. Hand, 1913; T. J. Maher, 1928).—On west coast of Hawaii, in North Kona, northwest of Mount Hualalai, on the sharp, steep hill which rises abruptly, and immediately behind or east of the house of John Maguire (or McGuire), which is on the main Government road about 8 miles from Kailua toward Waimea. This hill is above the main road, and inside the bend where it turns from northeast and southwest to north and south. Station originally marked by a copper triangle, buried, over which was placed a stone marked with a triangle. Three witness stones marked with crosses were placed 10, 19, and 20 feet from the center; the last being the corner of a house foundation. In 1913 the center and first two witness marks were recovered, nothing remaining of the foundation stone. Reference mark No. 1, cross on stone, is 2.94 meters (9.6 feet) from station on bearing N. 65° E. Reference mark No. 2, cross on stone, is 5.83 meters (19.1 feet) from center on bearing S. 65° W. In 1928 station was recovered as described. Subsurface mark not investigated. A standard triangulation disk was cemented in center stone. A standard reference disk was cemented in outcropping rock, 6.1 meters (20 feet) from station in direction of Keahole Point Light. A triangle was blazed on a tree, about 20 feet from ground; tree is inshore from and at lower elevation than station. A large cairn was built over the station. Trees now (1928) cut off lines of sight in all directions except to southward. Mr. Stillman at Maguire's ranch can give full information as to locality.

Lava Cone (Hawaii Island, E. R. Hand, 1913).—In North Kona, northwest of Mount Hualalai, a steep lava cone, black and bare, below the Government road near John Maguire's house, and 1,200 meters northwest of station Akahipuu. It is the source of the lava flow, probably of 1801, which ran down to the north side of Keahole Point, and may be identified by following with the eye to the inshore and upper apex of this roughly triangular area of black, and comparatively recent lava. Not marked.

Makalawena Church (Hawaii Island, E. R. Hand, 1913).—On west coast of Hawaii, 5 miles north-northeast of Keahole Point, at Makalawena village, the church just inside the beach. It has a red roof, red steeple, and is painted green with white trimmings.

Supplementary points, west coast

Keahole Point Light (Hawaii Island, E. R. Hand, 1913).—On the extreme end of Keahole Point, the most westerly point of Hawaii. In 1928 it was reported that this light was no longer standing, but that its location was preserved by a concrete pier with iron bolt projecting from its top. Cut in the concrete are the words: "Light mast of 1913." A new light stands 3.18 meters (10.4 feet) N. 24° E. from this bolt. (See description of *Keahole Point Light, 1928*.)

Keahole Point Light (Hawaii Island, T. J. Maher, 1928).—On the westernmost point of Hawaii Island, on the Kona coast. Light consists of a group flashing light mounted on a square concrete tower which tapers from about 6 feet at the base to about 2½ feet at its top. Light is 20 feet above ground, and 43 feet above high water. It is 3.18 meters (10.4 feet), N. 24° E. (true) from the location of the 1913 light, which is preserved by a concrete pier with iron bolt in center and is marked with the words "Light mast of 1913." An iron box mounted on a concrete base in the ruins of what was probably the old keeper's house stands 160 meters, east by north (true) of the light, while the present keeper's house is 565 meters northeast by east (true) of the light.

Kahelo (Hawaii Island, Hawaiian Government Survey, 1882; E. R. Hand, 1913; T. J. Maher, 1928).—On west coast of Hawaii, in North Kona District, at Kailua, about 2,000 meters south of the courthouse, and immediately south of Kahului Bay, about 70 meters north of the well-marked shore trail, and about 230 meters inshore from the point. Kahului Bay will be recognized as the third yellow sand cove south of the courthouse, the first being close to the south side of the courthouse. Station is at the head of an ancient "holua" or toboggan slide, made of rough rock, and now resembling an abandoned roadway. The slide slopes to the west, toward the shore. Station marked by large triangle cut in rock. In 1928 station recovered as described, between road and beach. There is a slight break in the stone wall which parallels the road, where the old toboggan slide leads to the beach. At this place a tree on the outside of the road was blazed, and two nails driven in the blaze. Numerous small branches have

For notes in regard to marking of stations, see p. 139.

been cut from this tree. A reference mark was cemented in the road, on west side near fence or wall, and to southward of tree. It is approximately 67 meters from station. Inshore from the station, and distant 3.89 meters (12.8 feet) therefrom, a standard reference disk was cemented in the rocks. Station was remarked with standard triangulation disk. In 1913 a large cairn, painted white, was left over the station.

Kailua Church (**Hi**) (Hawaii Island, E. R. Hand, 1913; T. J. Maher, 1928).—On west coast of Hawaii, Kona District, at Kailua, the spire of immense stone church. It has a red roof, with square tower at north end, on which is an octagonal tower, surmounted by spire. The square tower has railings around it. Entire tower painted red with white trimmings. The 1928 determination of position (which was well checked) differs considerably from the 1913 determination, which was without check. It is reported that there has been no change in the church.

Kailua Light (Hawaii Island, E. R. Hand, 1913).—On west coast of Hawaii, Kona District, on Kubailimoku Point, just west of Kailua Bay. The light, fixed red, is hoisted to top of pole, at the base of which is service house, white, trimmed in gray. Keeper's house is on northwest side, close by. It is white, trimmed with gray, and has dark red roof.

Holualoa stack (Hawaii Island, E. R. Hand, 1913).—In Kona District, on west coast of Hawaii, up a hill about midway between Kailua and Holualoa, the large high iron stack of the Kona Development Co. It bears S. 86° E. from the large stone church, with red roof and tower, at Kailua.

Holualoa store (Hawaii Island, E. R. Hand, 1913).—On west side of Hawaii, Kona District, 3¾ miles, S. 67° E. from Kailua wharf, on west side of government road, at junction of the middle road of the three which run down to Kailua. Station is sea gable of the very large unpainted building known as the Kimura Store, owned by Y. Kimura, Japanese. Store sets on a shoulder, and is visible over a wide water area. It is two stories high, but the back is built down a slope and appears as a 3-story building.

Lanakila Church (Hawaii Island, E. R. Hand, 1913).—Near the western coast of Hawaii, about 50 meters below the main government road between Kealakekua and Holualoa, and a short distance north of the village of Kainaliu, on a rise commanding an extensive view, the spire of the Lanakila Church. Church is painted a yellowish gray, with steeple of same color. Church has two windows at south end, three on seaward side, with door and steeple at north end.

Point (Hawaii Island, T. J. Maher, 1928).—On the west coast of Hawaii, Kona District, on south side of entrance to Keauhou Bay, just southward of a crevice in the rock. This crevice extends in an east and west direction, and just east of the station it bends in a southerly direction. The most northerly part of the crevice is about 18 inches higher than the station. Station is marked according to note 2, a standard disk in outcropping bedrock. Reference marks, note 12a, standard reference disks in outcropping bedrock, were set at the following distances and azimuths from the station: No. 1, 3.92 meters (12.9 feet), 342° 54′; No. 2, 10 meters (approximate), 55° 23′. A cross cut in a stone is 1.89 meters (6.2 feet) from station in azimuth 158° 50′. Station and reference mark 1 are in range with Puu Ohau. Station and reference marks form a range which passes just westward of the south point of entrance; extended to Kailua Bay it passes eastward of the wharf and just westward of red house at eastern end of bay. From the station three houses on hill eastward of Keauhou Bay are on range. Station is inshore from western edge of point, to avoid Puu Ohau being cut out by a high point about ¼ mile to southward.

Keauhou 2 (Hawaii Island, T. J. Maher, 1928).—On the west coast of Hawaii, Kona District, about 1½ miles east by south from Keauhou Bay, on a hill which does not show very prominently from off shore. Station is on cone-shaped nub, on side of ridge. It is reached by a trail which leads from the dock at Keauhou Bay east to the residence of Harry Haanio; there the trail turns south for about ½ mile. From offshore the hill on which the station is located appears to the southward of a prominent cultivated field, light green in color, which shows up well against a higher, dark background. To the southward about ½ mile is another hill similar to the one with the station and of about the same elevation; on it is a station probably established by the Territorial Survey, with marks similar to those at *Keauhou 2*, which is probably of similar origin. *Keauhou 2* is closely in the same position as the old station *Keauhou*, and is marked by a 1½-inch galvanized pipe projecting about 18 inches from a mass of lava rocks cemented together. The words "Keauhou Aug. 1924, J. H." are cut in the cement. A cross cut in a large bowlder is distant 4.45 meters (14.6 feet) from station, in azimuth S. 5° W. (mag.).

For notes in regard to marking of stations, see p. 139.

Bright (Hawaii Island, T. J. Maher, 1928).—On west coast of Hawaii Island, Kona District, west of Kailua Bay, a white house to the southward of station *Stack*. It has a porch on its northeast side and shows prominently from offshore.

Square (Hawaii Island, T. J. Maher, 1928).—On west coast of Hawaii Island, in Kona District, west of Kailua Bay. Situated close to the main government road, station is gable at south end of shed or covering for water tanks, which appears as a long wooden barnlike structure.

Target (Hawaii Island, T. J. Maher, 1928).—On western coast of Hawaii Island, on south side of entrance to Keauhou Bay and to the southward of station *Point* on low lava point. Marked by the Territorial Survey with cement base with piece of ½-inch galvanized iron pipe projecting above its top. Further description may be obtained from Territorial Survey.

Signal (Hawaii Island, T. J. Maher, 1928).—On western coast of Hawaii Island, on lava point at north side of entrance to Keauhou Bay. This is a Territorial station, and is marked by a cement base with piece of ½-inch galvanized iron pipe projecting about 12 inches above its surface. Further description may be obtained from Territorial Survey.

Keawekaheka (Hawaii Island, Hawaiian Government Survey, 1891; E. R. Hand, 1913; E. R. Hand, 1928).—On the west coast of Hawaii, in South Kona District, on Keawekaheka Point, 50 meters from the water to the south, and 40 meters from the water to the west. It is about 1,340 meters from Napoopoo Light, which is seen just a few feet north of a line to Napoopoo Church. Marked by a drill hole and triangle cut in rock, and also 4 crosses cut in the rock equidistant from it. An iron bolt mentioned in original description as being 1 meter southwest of station was not found in 1913. A cairn was built over the station in 1913 and painted white. In 1928 the cairn was found, built substantially as it was in 1913. It had, however, been taken down and rebuilt since that year, as shown by the painting on the stones not being continuous. The cairn was not disturbed in 1928, and mark not seen.

Lae o Kanoni (Hawaii Island, Hawaiian Government Survey, 1884; E. R. Hand, 1913; E. R. Hand, 1928)—On the west coast of Hawaii, South Kona District, north of Honaunau Bay, 1,200 meters north-northwest from the "City of Refuge" which is on the south side of the bay, and 330 meters from the water on the west. A bolt referred to in original description as being 4 meters southwest of station was not found in 1913. At that time the station was marked by a drill hole and triangle cut in the solid rock and surrounded by four crosses equidistant from it. The whole surmounted by a large cairn, painted white. In 1928 the cairn had been removed, and the mark consisted of a 2½-inch pipe set in a concrete dome rising about two feet above base of original cairn. Name of station is marked in the concrete.

Kalapa (Hawaii Island, Hawaiian Government Survey, 1884; E. R. Hand, 1913; E. R. Hand, 1928).—In Kona, on highest part of prominent hill in Keokea called Kalapa, about 1,200 feet "mauka" (inland) from the government road, and immediately north of the big buildings of the Kona Tobacco Co. The sea gable of packing house bears S. 15° W., distant about 300 meters; the boarding house bears S. 3° E., about 300 meters; the nearer of two "mauka" (inland) drying barns bears S. 80° E., about 320 meters. In 1928 station was recovered. Reported difficult because top of hill heavily overgrown with guava and other bushes. The Kona Tobacco Co. is no longer operating, and the whole place has a run-down appearance. Station marked by 1½-inch iron pipe set upright in a truncated pyramid of concrete, with the legend "Kalapa, 1921, JBM, Primary" scratched thereon. In 1913 two of the four original reference marks were recovered; they were crosses cut in stones, 3.25 feet to the north, and 3.47 feet to the south of the station.

Lae Loa (Hawaii Island, Hawaiian Government Survey, 1884; E. R. Hand, 1913).—On west coast of Hawaii, Kona District, on the outermost part of the great rounding point 1½ miles south of Honaunau Bay, 1½ miles northwest from Hookena, and about 25 meters from waters edge on west. Marked by an iron bolt driven into a crack in the rock, and sourrounded by four equidistant crosses, the lines connecting these crosses diagonally intersecting at the station. A large cairn was erected over the station and painted white.

Kalua o Lapauwila (Hawaii Island, Hawaiian Government Survey, 1884; E. R. Hand, 1913).—On western coast of Hawaii, Kona District, on the rim of the crater which is directly on the coast 5½ miles south of Hookena. No other formation along the coast similar to this except at Puu Ohau, many miles to the north. It shows up as a crescent, steep-sided, and open toward the sea. The original station mark, an iron bolt, was not found in 1913, apparently having

For notes in regard to marking of stations, see p. 139.

been destroyed by a slide. There was recovered a stone marked with drill hole and triangle set in the cinders very close to a recent slide. The position of this stone checked out with that of the triangulation station as closely as plane table tests would permit, showing it to be of sufficient accuracy for topographic and hydrographic work, but not for triangulation.

Lae o Heku (Hawaii Island, Hawaiian Government Survey; E. R. Hand, 1913).—On west coast of Hawaii, Kona District, on Heku Point, about 4⅕ miles north of Hoopuloa, and ½ mile southwest from the former shipping point called Kaapuna. Kaapuna may be recognized from offshore by the large 2-story house, unpainted, and the great piles of corded firewood, and behind, on the slope, the traces of the slide by which the wood was brought down. Marked by a copper triangle in the loose "*aa*" (lava) clinkers ½ foot below the surface, with four beach-worn stones placed around it at distances of 2 feet. It is 25 feet from the edge of the "pali." In 1913 the stones were recovered; triangle not dug for. A cairn was placed over the station; it shows above a wall which was built around it, the wall being nearly circular with vertical sides, 2½ feet high and 11 feet across.

Napohakuloloa (Hawaii Island, Hawaiian Government Survey; E. R. Hand, 1913).—On west coast of Hawaii, Kona District, 2½ miles north of Hoopuloa, and up on the 100-foot cliff, about 40 meters from the edge, and 360 meters S. 24° E. from the great arched rock, 60 feet high, seen offshore. Station is on north edge of a decided lava mound about 5 meters in diameter and standing about 10 feet above the general level. From up and down the coast this mound shows up well against sky, but from the west, on account of background, is not so easily seen. Marked by two galvanized-iron bolts set in drill hole and four crosses cut in very conspicuous solid rock overlooking the surrounding "pahoehoe" flow. A large cairn was built over station and painted white.

Milolii (Hawaii Island, Hawaiian Government Survey, 1884; E. R. Hand, 1913).—On western coast of Hawaii, South Kona District, land of Hoopuloa, high up on the slope, at the edge of the woods, east of a point midway between the villages of Milolii and Hoopuloa. The wharf at Hoopuloa is 2,100 meters N. 70° W., and the church at Milolii is 2,100 meters, S. 66° W. from the station. Marked by an iron bolt set into solid rock, on the highest point available, commanding an extensive view. Four crosses were cut 0.7 meter (2 feet) from it on a large jagged "*aa*" (lava) rock. A large cairn, about 8 feet high, was erected over the station and painted white.

Kapukawaa (Hawaii Island, Hawaiian Government Survey, 1884; E. R. Hand, 1913).—On west coast of Hawaii, South Kona District, 1,030 meters south of Hoopuloa Wharf, about 10 meters from the water, and just inshore from the "Kapukawaa Rock" out in the sea, and 152 meters west of the trail between Hoopalua and Milolii. Marked by three galvanized-iron bolts with circular heads set in drill holes in rock on "*aa*" (lava), and by four crosses cut in the rock, the lines connecting them diagonally intersecting at the station. A large cairn was erected over the station and painted white.

Napoopoo Light (Hawaii Island, E. R. Hand, 1913; E. R. Hand, 1928).—On west side of Hawaii Island, Kona District, at Napoopoo, on the south end of the point which juts out into Kealakekua Bay on its northwest side. The light determined in 1913 has been removed, but its position is marked by a copper bolt in concrete, with appropriate lettering scratched in the stone. The new light at this point—one of the standard square white towers—is 18 feet true south from the position of the old light.

Napoopoo Light (Hawaii Island, E. R. Hand, 1928).—On western coast of Hawaii, north side of Kealakekua Bay, the usual type of unwatched light; a square structure, tapering, and painted white. There is a small railed platform about the lamp. Height about 33 feet. Must not be confused with old light, which was on a pole, determined in 1913. New light is 18 feet true south from position of old light.

Captain Cook's monument (Hawaii Island, E. R. Hand, 1928).—On west coast of Hawaii, a well-known and conspicuous monument standing at the north end of Kealakekua Bay. It is an obelisk of concrete, built in 1874, and stands in a tiny grass plot on the shore, inside a square inclosure formed by cannon upright in cement, with heavy chain pendent from gun to gun.

Napoopoo Church (Hawaii Island, E. R. Hand, 1913; E. R. Hand, 1928).—On western coast of Hawaii, Kona District, at Napoopoo, the steeple of the large stone church. It is high up on a rise, faces the sea, and shows up white; very prominent.

Napoopoo School (Hawaii Island, E. R. Hand, 1913; E. R. Hand, 1928).—On western coast of Hawaii, Kona District, 1¼ miles east of wharf at Napoopoo, on

For notes in regard to marking of stations, see p. 139.

the public school, a 1-story building, originally a dark red color, with galvanized roof. Building conspicuous because of large number of windows. In 1928 building no longer red but brown, and roof no longer shows up bright. Building no longer conspicuous because of color, painted roof, and numerous other buildings about. Station is flagpole on east side of building, midway between ends, and may be seen from the shore, showing over the roof. On school days a flag will be flying.

Coffee (Hawaii Island, E. R. Hand, 1913; E. R. Hand, 1928).—On the western shore of Hawaii, Kona District, on the large and prominent white building with brilliant red roof, up on high land a little less than 1 mile east by south from Napoopoo Wharf. This was formerly a pineapple cannery, but is now used by the Captain Cook Coffee Co. Station is vertical shaft of conveyor which stands a few meters in front of the sea end of the building, or between it and the sea. It has a little rain shed on top painted red. In 1928 reported that another conveyor had been built, on the north side of the building; that it was a little higher than the first one, but unpainted, and that the first one (station) was easily distinguished.

Tobacco (Hawaii Island, E. R. Hand, 1913; E. R. Hand, 1928).—On the west coast of Hawaii, Kona District, over 2 miles inshore east by south from Honaunau Bay, the sea gable of the Kona Tobacco Co. It is the building nearest the sea, and may be identified from the sea by its many windows; on the north side there are 20 in top row, 7 in bottom; on south side 7 in top row, and 6 in bottom; and at sea end, 18 in top row, 6 in lower row, while in the gable there is a large square ventilator of slats. In 1928 reported that Kona Tobacco Co. no longer existed, and buildings were beginning to assume weather-beaten appearance.

Palemano (Hawaii Island, E. R. Hand, 1928).—On western coast of Hawaii, on Palemano Point, south side of Kealakekua Bay, south of the low, flat extent of rock which forms this feature, and about 20 meters from the sea on the west. Point is almost as level as a floor, composed of "pahoehoe" or smooth lava, and is awash at storm high water, and is therefore free of all loose stones. Thirty meters true east from the station are the remains of an ancient "heiau" or temple. Marked by a prominent dome of concrete built up from the smooth lava to a height of 2 feet, with a 2-inch gas pipe protruding from its top. This is an old Territorial survey station.

Keokea (Hawaii Island, E. R. Hand, 1928).—On western coast of Hawaii, in the district of Keokea, Kona, by the sea, about 1 mile south of Honaunau Bay (City of Refuge), at the head of an indentation sometimes known as Pukakio Bay, 150 meters east-northeast from the point where the ancient but well-marked trail climbs the low cliff on the way south from the City of Refuge, and 50 meters back southeast from the same cliff that trends north and south. Station is on top of a prominent lava bubble which rises abruptly from the surrounding flat to an elevation of 120 feet. Marked by a standard disk station mark.

Palianihi (Hawaii Island, Hawaiian Government Survey, 1884; E. R. Hand, 1913).—On west coast of Hawaii, South Kona District, at Hookena, about 8 feet back from edge of cliff. Station marked by a square drill hole in rock, surrounded by four crosses cut in rock equidistant from center. The following bearings are from the station: Extreme southeast corner of wharf, 140 meters, S. 36° W.; post office, 175 meters, S. 66° W.; steeple of Pukaana church, 410 meters, N. 69° W. Station is 383 feet south of tomb near government road.

Puu Nahaha (Hawaii Island, Hawaiian Government Survey, 1884; E. R. Hand, 1914).—Near southwest coast of Hawaii, in South Kona, Land of Okoe, east of Hanamalo Point, almost 1½ miles east by north from Okoe Bay, and just to the right of a line from the shed at the bay to the huge barn (station *Barn*) showing conspicuously about 3 miles inside on the same bearing, on a prominent bare rocky shoulder which commands a view in every direction. Marked by a square headed iron bolt let into the rock inside a triangle cut in the rock. Four crosses each 0.46 meter (1.5 feet) from the center were cut in the rock. A huge cairn was erected over the station and painted white.

Barn (Hawaii Island, E R. Hand, 1914).—Near southwest coast of Hawaii, about 3 miles east by north from Okoe Bay, an immense barn (120 by 40 feet) formerly owned by W. R. Castle and used for tobacco drying, but now part of the Mrs. Allen estate, and controlled by Robert McWayne of Hoopuloa. Station is the south-southeast gable of barn.

Puu Ki (Hawaii Island, Hawaiian Government Survey; E. R. Hand, 1914).—On the southwest coast of Hawaii, 8½ miles west-northwest from Ka lae, the south point of the island, in the land of Kahuku, about ½ mile south of Pohue coconut grove, on the highest point (southeast rim) of the extinct volcano called Puu

For notes in regard to marking of stations, see p. 139.

Ki, the highest hill in the vicinity. Marked by a triangle cut in a rock set even with the surface of the ground in gravel. A small cairn is over the station.

Puu Hou (Hawaii Island, Hawaiian Government Survey, 1887; E. R. Hand, 1914).—On southwest coast of Hawaii, in southeastern Ka-u, on the summit of Puu Hou, a large isolated hill 3½ miles northwest of Ka lae, the south point of the island. Erosion by the sea at the base of the hill has completely removed all trace of the station, but plane table tests showed that the peak of the hill remaining, which is very sharp and some 13 feet lower than the station, is probably within 5 meters of the station, and would serve for off-shore hydrography.

Umi's Ahu (Hawaii Island, Hawaiian Government Survey, 1887; E. R. Hand, 1914).—In southern part of Hawaii, in district of Ka-u, about 4 miles north of Ka lae, the south point of the island, on the original site of King Umi's "ahu," on a hill commanding a fine view in every direction. It is about 300 meters in from the edge of the cliff which starts at Ka lae, trends north, and leaves the coast line some 2½ miles up. It is 2 miles, N. 66° E. from Puu Hou, and from the sea in this vicinity it will show against the skyline as a low grassy mound, rising slightly above the even line of the slope toward Ka lae. Marked by a drill hole surrounded by a triangle with 1-foot sides cut in the rock. Above this is an extremely slender conical cairn, painted white.

Supplementary points, southeast coast

Mahana (Hawaii Island, Hawaiian Government Survey, 1898; E. R. Hand, 1914).—In southern Ka-u, in Kamaoa, on a prominent smooth grassy hill 3 miles northeast of Ka lae, the south point of Hawaii, and 740 meters N. 28° W. from top of eroded hill which is at the head of a deep bay. Marked by a cross and a drill hole in a rock set in the ground, and covered by a stone cairn 8 feet high.

Kamilo (Hawaii Island, Hawaiian Government Survey, 1898; E. R. Hand, 1914).—On southern coast of Hawaii, in southern Ka-u, on Kamilo Point, about ¾ mile east of Kaalualu Bay, and about 150 meters inside the high-water line. Marked by a drill hole and cross cut in the solid rock. Over the mark is built a large cairn, 10 feet high, and 12 feet in diameter at base, terraced, with vertical sides, and painted white. Its top is 21 feet above mean high water.

Puu Enuhe (Hawaii Island, Hawaiian Government Survey, 1894; E. R. Hand, 1914).—In the southern part of Hawaii, in southern Ka-u, on the summit of Puu Enuhe, a hill northwest of Punaluu Landing. Station is not on highest point of hill, but about 10 feet below it and 114 meters N. 60° E. from a small bushy tree which is almost at the highest part. This hill is roughly a truncated pyramid, its flat top sloping toward the sea, and the position of the station may be approximated, from a distance, as follows: As seen from Punaluu its position is one-fourth the distance along its flat top from its west end. From Honuapo the small lone tree on its summit resembles a cairn, and the station appears about 100 meters east from it along the skyline. Palaha Mill stack is seen over the edge of the hill, across a gully, above the ground, and to the left of the summit, on a bearing N. 57° E. Punaluu warehouse bears S. 50° E. Marked by a standard bronze disk station mark set in center of original mark, a triangle cut in a long stone set in the ground, surrounded by three similar unmarked stones for instrument tripod supports. Spot is further marked by a pile of decayed tree fern logs.

Honuapo (Hawaii Island, E. R. Hand, 1914).—On southern coast of Hawaii, on the first point east of Honuapo Wharf, and across the entrance to the lagoon upon which the old landing and derrick (abandoned) are situated. The old derrick bears N. 70° W. 220 meters. The taller of two stacks on sugar mill (station *Stack, Honuapo*) of Hutchinson Sugar Plantation Co. bears N. 25° W. 660 meters. Marked by a standard bronze station disk set flush in the surface of the lava. Above it was built a cairn 9 feet high, whitewashed. There was an old cairn on this spot for a number of years previous which was used as a beacon. The new cairn will serve both as a triangulation mark and as a beacon; its elevation is 21 feet above mean high water.

Puu Ulaula (Hawaii Island, E. R. Hand, 1914).—In southern Hawaii, on the highest point of a hill of same name 6½ miles northeast of Punaluu, and 1⅔ miles in from the sea. It stands isolated, is rather sharp, and has a slender conical cairn on top. About 1⅓ miles to the southwest is another hill (Puu Kolekole), rough lava, but much lower. Puu Kolekole, Puu Ulaula and station *Kamehame* are on range. Station marked by standard bronze station mark.

For notes in regard to marking of stations, see p. 139.

Church, Honuapo (Hawaii Island, E. R. Hand, 1914).—The steeple of the Catholic Church at Honuapo. This church faces the sea, is on the upper side of the government road to Naalehu, bears N. 25° W. from the end of the wharf, and N. 74° W. from the whitewashed beacon at station Honuapo.

Stack, Honuapo (Hawaii Island, E. R. Hand, 1914).—In southern part of Hawaii, at Honuapo, the taller of two stacks at the sugar mill of the Hutchinson sugar plantation. In 1914 it was learned that a new stack was contemplated to replace this one. The new stack was to be 90 feet high and 6½ feet in diameter, and approximately N. 14° W., distant 24 feet.

Church, Punaluu (Hawaii Island, E. R. Hand, 1914).—In southern part of Hawaii, the steeple of the church at Punaluu. Church is of dull gray appearance and is very old.

Hill (Hawaii Island, E. R. Hand, 1914).—In southern Hawaii, on the hill northwest of Punaluu warehouse, 1,300 meters distant. Mark is a truncated pyramid of concrete, white.

Stack, Pahala (Hawaii Island, E. R. Hand, 1914).—In southern part of Hawaii. at Pahala, the higher and more easterly of the two stacks at the sugar mill belonging to the Hawaiian Agricultural Co.

Kauhao (Hawaii Island, E. R. Hand, 1914).—In southern part of Hawaii, about 4 miles north by west from Pahala, and at a point where a well-known and conspicuous ridge, very narrow and steep, and trending about southeast and northwest, joins the main slope at right angles. This locality is called Ipuu. Reached by taking the homestead road which leaves the main road at Pahala, and proceeding north about 4 miles, when the ridge will be seen on the left distant about ½ or ¾ mile. Proceed along the top of this ridge, crossing a slight saddle, and when this very narrow ridge begins to merge with the main slope, the station will be seen about 400 or 500 feet back in the same general direction as the line of the ridge. Marked by a truncated pyramid of concrete, with short iron pipe; pyramid is white, about 2½ feet at base, and rests on a foundation of concrete and rock.

Puu Kapukapu (Hawaii Island, E. R. Hand, 1914).—On the southeastern coast of Hawaii, on the summit of the prominent hill of that name at the old Keauhou Landing, below Kilauea Volcano. Marked by a standard bronze disk set in heavy rock sunk in the ground and covered with a cairn.

Keaiwa cairn (Hawaii Island, E. R. Hand, 1914).—In southern part of Hawaii, near the edge of the low cliffs at a small point 2⅓ miles below Puu Ulaula (hill), which bears N. 72° W. (mag.) from the station. Marked by a large cairn, whitewashed.

Uwekahuna (Hawaii Island, Hawaiian Government Survey, 1896; United States Geological Survey, 1920).—In southeastern part of Hawaii, on the highest point of the rim on the western side of the crater of Kilauea, about 30 feet from the edge of the precipice. Marked by a cross cut in a stone set in the ground, and by a huge stone cairn.

Kamakaia S. (Hawaii Island, E. R. Hand, 1914).—In southeastern part of Hawaii, about midway between the volcano of Kilauea and Puu Ulaula, the most southern of two hills, equal in size and height. A large cairn surmounts the hill. These hills are seen on the skyline from Honuapo Landing.

Ohale (Hawaii Island, Hawaiian Government Survey, 1897; United States Geological Survey, 1920).—In southeast Hawaii, on a rock hill about 4 miles south of Halemaumau. Marked by a flagpole in the center of a large terraced cairn of rock. A bench mark southeast of the station is 18.7 feet from the station in azimuth 49° 42′.

Supplementary points, Kilauea Volcano crater

Ahua Kamokukolau (Hawaii Island, United States Geological Survey, 1920).—In southeast Hawaii, 2½ miles southeast of Halemaumau, on top of a small sand-covered knob of "pahoehoe" lava. Mark, a bronze tablet cemented in solid rock.

Koae (Hawaii Island, United States Geological Survey, 1920).—In southeast Hawaii, on highest point of cone named Koae, marked by a flagpole in the center of a large rock cairn. Because of the loose and shifting nature of the cindery top of the hill the reference mark was placed at the foot of the hill, being a bronze tablet cemented in solid rock, 155.16 feet from the station, in azimuth 57° 09′. The reference mark is 82 feet lower in elevation than top of cairn.

Observatory (Hawaii Island, United States Geological Survey, 1920).—In southeast Hawaii, at the Hawaiian Volcano Observatory, Kilauea Volcano, in

For notes in regard to marking of stations, see p. 139.

the center of the top of the concrete pier projecting up through the floor of the front porch of the observatory building. Mark, a bronze tablet cemented in the concrete.

Nose (Hawaii Island, United States Geological Survey, 1920).—In southeast Hawaii, 2 miles southwest of Halemaumau, about in line with and halfway between Halemaumau and Puu Koae, at the lower end of a low ridge of "pahoehoe" lava on top of a small rocky knob. Mark, a bronze tablet cemented in solid rock.

Sand Hill (Hawaii Island, United States Geological Survey, 1920.)—In southeast Hawaii, 1 mile southwest of Halemaumau, on the southwest rim of Kilauea, on the southwest part of a flat-topped low hill of volcanic sand. Mark, a bronze tablet cemented in sunken rock, and a small cairn of rock centered over it.

Aa (Hawaii Island, United States Geological Survey, 1920).—In southeast Hawaii, 3¼ miles southwest of Halemaumau, and 1½ miles southeast of Kau road, in the highest part of an old sand-covered ridge of "aa" lava. Mark, a bronze tablet set in solid rock on top of a rock mound.

Cone Peak (Hawaii Island, United States Geological Survey, 1920).—In southeast Hawaii, 4 miles southwest of Volcano House, on highest point of rock ridge. Old mark of iron spike driven in lava rock replaced by bronze tablet stamped "3653", and covered by mound of rock.

Cracks (Hawaii Island, United States Geological Survey, 1920).—In southeast Hawaii, ¾ mile southwest of Halemaumau, beside the largest of the volcanic cracks extending southwest from the rim of the crater. Mark, a bronze tablet in the top of a large bowlder standing about 18 inches above ground.

Pali (Hawaii Island, United States Geological Survey, 1920).—In southeast Hawaii, 1¼ miles west of Halemaumau, at the place where the "pali" running southwest from Uwekahuna gradually disappears into a low rounded ridge. Station is on low knob of "pahoehoe" lava. Mark, a bronze tablet cemented in solid rock.

South rim (Hawaii Island, United States Geological Survey, 1920).—In southeastern Hawaii, on the top of a small rise on the extreme edge of Kilauea Crater, and a little north of west of Halemaumau. Mark, a bronze tablet cemented in solid rock.

Spit (Hawaii Island, United States Geological Survey, 1920).—In southeastern Hawaii, about 300 feet from the west end of the point of volcanic sand running out into Kilauea Crater, and about 800 feet southwest of the road running to Halemaumau, which follows out on this point of sand. It is about ½ mile south of Halemaumau. Mark, a bronze tablet cemented in top of a large bowlder.

North Rim (Hawaii Island, United States Geological Survey, 1920).—In southeast Hawaii, on a rocky knob on the extreme edge of Kilauea Crater, about northwest of Halemaumau. Mark, a bronze tablet cemented in solid rock.

Beggar (Hawaii Island, United States Geological Survey, 1920).—In southeast Hawaii, on the floor of Kilauea Crater, about ½ mile east of Halemaumau, about 1,000 feet southeast of small stone corral on Volcano House trail, on top of a low "pahoehoe" mound.

Supplementary points, east coast

Heiheiahulu (Hawaii Island, E. R. Hand, 1914).—In the eastern part of Hawaii, on the east edge of rim of crater on top of Mount Heiheiahulu, 5 miles north by west from Kalapana. This is the highest point of the entire rim; the old station, *West Heiheiahulu* (see description) across the crater is lower, bears N. 63° W., and is distant about 100 meters. Mark is a survey tablet set in a block of concrete, over which is a cairn about 4 feet high.

Hakuma (Hawaii Island, E. R. Hand, 1914).—On east coast of Hawaii, on Hakuma Point, ½ mile south of the village of Kalapana. On a flat grassy meadow, about 7 meters from the cliff edge to the southeast and about 3 meters southwest of a stone wall which runs inshore from the cliff edge; part of wall has been removed. Station marked by a survey tablet set in smooth lava outcrop, and surrounded by a circular patch of cement. It is surrounded by a large hollow cairn, 12 feet in diameter and 6 feet high, whitewashed. Reference mark is a cairn inshore and at highest point of meadow; it is near edge of lava cliff which faces inshore and probably marks a Territorial Survey station; it is distant 135 meters, bearing N. 33° W. The spire of the protestant church at Kalapana bears N. 12° E., 655 meters.

Kupapau (Hawaii Island, E. R. Hand, 1914).—On east coast of Hawaii, on Kupapau Point, 3 miles southwest along the coast from the village of Kalapana.

For notes in regard to marking of stations, see p. 139.

Station is up in the line of large rocks which have been thrown back by storm surf; it is about 22 meters from the sea, and 160 meters from the sharp point to the northeast where the shore turns abruptly in, to form bay. Marked by a survey tablet set in a rock which is roughly 3 by 3 by 2½ feet, and which is cemented firmly to rocks below.

Pulama (Hawaii Island, E. R. Hand, 1914).—On eastern coast of Hawaii, 4 miles west from Kalapana, 2¼ miles northwest from Kupapau Point, up on the steep slope, 50 meters below timber line. A black lava flow is between the station and Kupapau Point. Position of station may be determined as follows: There is an isolated house belonging to Joe Canario above the trail, and 330 meters to southwest in the lava flow is a grave with a galvanized iron roof. From the station the northeast part of Kupapau Point will be seen between the house and grave; and the coconut grove at Laeapuki will bear S. 20° W. Also from the station the house will be on range with a small lagoon in the bay just above Kupapau Point. Marked by a survey tablet set in a patch of cement down in a fissure in a natural rock pile some 4 feet high. Reference mark is a tablet set in highest part of above rock pile; it is 1.2 feet higher than the station, and is 0.54 meters (1.8 feet) therefrom, bearing S. 34° W.

Laeapuki (Hawaii Island, E. R. Hand, 1914).—On eastern coast of Hawaii, about 8 miles southwest along coast from Kalapana, and 1½ miles southwest from the coconut grove and grass house (the last grove southwest of Kalapana) at Laeapuki. Station is directly below and S. 33° E. from the isolated house situated high up on slope (house of Pea, a native). It is on a mound rising from the smooth barren lava, near the point seen from Laeapuki, is 55 meters from the sea on the east, and 170 meters from the point which bears S. 17° W. Marked by survey tablet set in mound, and covered by a small cairn, painted.

Panau (Hawaii Island, E. R. Hand, 1914).—On the east coast of Hawaii, in the area known locally as Panau, up on the high shoulder seen southwest along the coast from the village of Kalapana, and 9 miles distant. The land around the station is smooth lava, grass covered, with a very few ohia trees; it slopes gently toward the sea for a few hundred feet, then drops abruptly to the flat lava behind the coast line. To reach station go to the house of Pea, a native, 50 meters above the old Volcano-Kalapana trail; from this house the station bears S. 29° W., 1,120 meters. Marked by a survey tablet set in cement on top of a prominent lava mound, about 10 feet above the general level. A tall tree stump is on mound, between station and reference mark, which is a tablet set in the mound, 4.45 meters (14.6 feet) from the station, bearing N. 30° W.

Olaa (Hawaii Island, Hawaiian Government Survey, 1896).—In eastern part of Hawaii, on a grassy knoll a short distance west of the road from Hilo to the Volcano, near the 11-mile post. Marked by a copper bolt set with cement into the solid rock.

Kaloli (Hawaii Island, Hawaiian Government Survey, 1896; E. R. Hand, 1914).—On eastern coast of Hawaii, Puna District, between Hilo and Cape Kumukahi, on the outermost point of Kaloli Point, a low flat rounded point. Originally marked by an iron bolt let into the rock; this was replaced with a survey tablet, and an irregular shaped cairn placed over station.

Keokea (Hawaii Island, Hawaiian Government Survey, 1878).—On eastern shore of Hawaii, at Keokea Point, east of Hilo Bay, on a grassy islet. The surf breaks all around it. Marked by an iron pin let into the rock.

Mokuola (Hawaii Island, Hawaiian Government Survey, 1878; E. R. Hand, 1912).—On eastern coast of Hawaii, in Hilo Harbor, on the outermost point of Cocoanut Island, in the sand at the very edge of the grass line. Marked by a granite block about 5 inches square set in a foundation of lava bowlders, forming an equilateral triangle about 1 foot high and 4 feet on side, top finished smooth with cement. The granite block projects slightly above the cement surface. The whole mark now tilts slightly to seaward, and may have suffered some change. Although resting in sand, the mark is protected from seaward by a flat ledge of lava a few feet away, which forms a protecting arm.

Haaheo (Hawaii Island, Hawaiian Government Survey, 1878; E. R. Hand, 1912).—On east shore of Hawaii, just north of Hilo, in edge of town, and near edge of cliffs. Station is 15 feet inshore from top of railroad cut which parallels seacoast; it is between railroad cut and government road and about 300 feet east of latter, on the first prominent rise north of Wainaku sugar mill; cliff face and railroad cut give hill appearance, from seaward, of having been sliced away. To reach station start at railroad crossing at Wainaku sugar mill and go north along track 700 meters, then climb to top of rise on west side of cut. Station marked

For notes in regard to marking of stations, see p. 139.

by a concrete base from which rises a galvanized iron pipe, terminating in a galvanized iron drum, the drum and upper part of pipe being demountable so that an instrument may be set over station.

Kapoho (Hawaii Island, Hawaiian Government Survey, 1896; E. R. Hand, 1914).—On eastern point of Hawaii, not far from Cape Kumukahi, on the most southerly and highest part of the semicircular crater of Kapoho, which is close to the village of Kapoho, Puna District. Marked by a cross cut in a solid beach-worn stone set in cement, and covered with a cairn.

Kaliu (Hawaii Island, Hawaiian Government Survey, 1891; E. R. Hand, 1914).—In the eastern part of Hawaii, southwest of Cape Kumukahi, on the summit of Kaliu Hill, which is 3 miles inshore (northwest) from Kalepa Point. Hill has grassy top and wooded sides. Station is at highest point of grassy area in a raised square, apparently a natural formation. Station reached by proceeding down old plantation road, turning to the left at a water shed and tanks; the road joins the Kalapana-Pahoa road 4 miles out of Pahoa. Station marked by a cross on a stone set in concrete, a few inches down in the sod.

Honuaula (Hawaii Island, E. R. Hand, 1914).—Near eastern point of Hawaii, on the rim of Honuaula Crater, which lies a little south of west from Cape Kumukahi, and in the forks where the road from Pahoa branches to Pohoiki and Kapoho. The station is the more northerly and seaward of two wooded tits of almost equal height on the rim of the crater. These twin tits are very conspicuous from the sea on all sides.

Sand Hill (Hawaii Island, E. R. Hand, 1914).—On eastern shore of Hawaii, 5 miles northwest of Cape Kumakahi, the higher of two bare cinder cones.

Church, Kalapana (Hawaii Island, E. R. Hand, 1914).—On the eastern coast of Hawaii, at Kalapana, the spire of the Protestant Church. The church faces the sea, and the spire is surmounted by a yellow ball. In 1914 it was the largest building in the village.

Pohoiki (Hawaii Island, E. R. Hand, 1914).—On eastern shore of Hawaii, on a rounding point which is the outermost point to the south as seen from Cape Kumukahi; it is a short distance northeast of the village of Pohoiki. From station the highest point of rim of Kapoho crater bears N. 44° W. Station marked by survey tablet set in a huge block of "pahoehoe" lava (smooth) which is itself flush with top and in center of circular cairn of "aa" lava (rough), 10 feet in diameter. A rim was built up halfway round and the cairn whitewashed. Cairn is about 50 meters from high-water mark and at north edge of old "aa" lava flow.

Kumukahi (Hawaii Island, E. R. Hand, 1914).—On Cape Kumukahi, the most easterly point of Hawaii, and near the site of a proposed lighthouse. Several symmetrical cairns (Kings' Pillars), probably built by old-time natives, are on the shore 400 meters N. 85° E. from the station. A deep pit or well, built in connection with the proposed light bears S. 30° E., 23 meters. Reference mark is a crow's-foot and drill hole surrounded by a patch of cement; mark is on exact line to station *Kapoho*, being 6.38 meters, (20.9 feet) from center, bearing S. 43° W. Mark is a copper survey tablet set in the center of a small area of smooth lava; it was surrounded by a rim of cement 2 feet in diameter.

Stack, Pahoa (Hawaii Island, E. R. Hand, 1914).—In the eastern part of Hawaii, Puna District, town of Pahoa; the stack on the lumber mill of the Hawaii Hardwood Co.

Stack, Olaa (Hawaii Island, E. R. Hand, 1914).—In the eastern part of Hawaii, Puna District, south of Hilo, in Olaa village; stack of sugar mill. Mill is a large gray structure with cupola in center of higher part, the part nearer the railroad being lower.

Leleiwi (Hawaii Island, E. R. Hand, 1912).—On east coast of Hawaii, on Leleiwi Point, 3 miles east of Hilo breakwater. From this point there are three similar points in line, bearing north, the first two close by and equally spaced from the point on which the station stands, and the other distant several hundred meters. On the other side the outermost point bears southwest. The point is about 20 meters long and about 6 meters wide at its widest part where the station is placed; it becomes very narrow where it joins the mainland. Its top is flat, its sides vertical, and its height about 10 feet above high water. Marked by a United States Geological Survey copper plate set in cement flush with flat surface of lava. It is 8.8 meters (29 feet) from extreme end of point; 1.0 meter north of deep crack which runs about east and west, and 1.75 meters (5.7 feet) west of another crack which runs north and south.

Temple (Hawaii Island, E. R. Hand, 1912).—On east side of Hawaii, about ½ mile north of Papaikou, 400 meters from the sea, and midway between the

For notes in regard to marking of stations, see p. 139.

railroad and the wagon road, and in the angle formed by their crossing 100 meters to the north, a Japanese temple, Buddhist, two stories high and about 10 meters square. This building is on the inshore side of and close to the railroad; it is unpainted, of characteristic Japanese architecture, and its roof ridge parallels the coast. The station is its south gable.

Onomea Arch (Hawaii Island, E. R. Hand, 1912).—On east coast of Hawaii, on the well-known and very conspicuous "Onomea Arch" which is at a large sharp point between Papaikou and Pepeekeo. Just inshore from a point directly over the arch proper is a sharp conical hill with two small trees on it. The larger tree is double, and the station mark is a 6-inch triangle cut base down, on the east side of the east branch of this double tree. A flag was placed in the tree directly above this triangle. Reference mark is a cross cut on a small tree facing triangle and at an equal height. It is 1.43 meters (4.7 feet) from station, bearing S. 33° E.

Gable (Hawaii Island, E. R. Hand, 1912).—On east coast of Hawaii, standing isolated in a cane field about 200 meters from the cliffs, on north side of deep gulch, and midway between Onomea Arch and Pepeekeo is a small, new, white cottage, green trimmings; it faces the sea, has a galvanized iron roof which extends out over the porch and has a break in it. Station is the south end of the gable roof of this cottage. A small unpainted house stands several hundred feet north of the station. The house with station may be recognized from seaward by the conspicuous white slats nailed horizontally on the posts which support the house some distance above the ground; steps are at the north end of the house.

School (Hawaii Island, E. R. Hand, 1912).—On east coast of Hawaii, 1 mile south of Pepeekeo, close to the sea, and surrounded by cane fields, a public school building, a long large barnlike structure. Station is the southeast gable. The southeast end was (in 1912) rusted red, the other end, pointed away from the sea was uncolored as was also a short ell inshore from the northwest end. School is on seaward side of main road, and has a flagstaff from which the flag is generally flying. A large red-roofed structure, a Japanese school, lies immediately to the northwest of the station.

Supplementary points, north coast

Kauku (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1912).—On east coast of Hawaii, on the conspicuous isolated mountain which lies directly inshore (S. 35° W.) from the town of Hakalau. This mountain is heavily wooded at top, its lower slopes are covered with cane; it is unmistakable, showing up prominently along coast. Station is on highest point of mountain, a perfectly flat area covered with ferns, and commanding a view of the coast from northwest to east. Reached by taking the road going inland at Pepeekeo store, passing two plantation camps; road goes directly to foot of mountain. The highest tree on the summit is 30 meters from the station, bearing S. 47° W. Station marked by tablet marked "U. S. G. S." set in concrete. A cairn of smooth stones was erected over the station.

Laimi (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1912).—On east coast of Hawaii in North Hilo, land of Laimi, on main road between Honomu and Pepeekeo, at No. 1 camp of the Honomu plantation. It is about 60 meters (estimated) S. 10° W. from the camp flagpole. The station was marked by a large stone marked with a cross, in center of which is an iron bolt in drill hole. In 1912 it was reported that it was believed that the true position of this station had been permanently lost, and that the mark was 1 meter or more out of place. When standing at camp flagpole the station would appear midway between porch post and corner of nearest house.

Mango (Hawaii Island, E. R. Hand, 1912) —On east coast of Hawaii, on south side of gulch at Honomu, about 200 meters from south side and 350 meters from sea; an immense isolated mango tree, round and of dense dark green foliage. There is no other tree of this size in the vicinity.

Honomu (Hawaii Island, E. R. Hand, 1912).—On east coast of Hawaii, in the cane field about ½ mile southeast of Honomu Sugar Mill, on the north side of Honomu Gulch, on a very slight knoll which is about 80 meters southwest from the railroad cut, and about 20 meters northwest from the steep side of the gulch, at edge of cane. Inshore or to the southwest the land is fairly level, and soon begins to rise. The following bearings are from the station: Mill stack, N. 41° W.; gable (cupola) of freight hoist at cliff edge, N. 32° W.; large

For notes in regard to marking of stations, see p. 139.

isolated mango tree across gulch, S. 30° E.; flagstaff on Japanese school on public road, S. 67° W.; and railroad cut on other side of gulch, S. 59° E. Station is reached from Honomu store by proceeding towards Hilo on public road, passing at about ⅓ mile a Japanese school and temple on the seaward side of the road, and a short distance beyond turning seaward through a gate and following trail to bridge which crosses railroad cut. Return 80 meters from edge of bridge back along trail, and follow along parallel to the railroad cut until the land begins to fall towards gulch, when the station knoll will be reached. Subsurface mark is a soda water bottle, bottom up (neck cracked) 3 feet below surface of ground. Five inches above the bottle is the bottom of the surface mark, a conical mass of concrete in which is a 1½ inch galvanized-iron pipe, projecting three feet above surface of ground.

Hoist (Hawaii Island, E. R. Hand, 1912).—On east coast of Hawaii, at Hakalau, the southeast gable of the immense white building which stands at the very corner where gulch breaks through cliff. There is a group of connected building, but this is the highest. It shelters the gear which hoists freight from ships by means of a car running on a cable.

Pipe (Hawaii Island, E. R. Hand, 1912).—On east coast of Hawaii, at Hakalau, the very slender stack rising from the group of buildings standing at the corner where gulch breaks through cliff. It is 13 meters due west of station *Hoist*, described above.

Cocoanut (Hawaii Island, E. R. Hand, 1912).—On east coast of Hawaii, about midway between the Hakalau Gulch and the next one, ½ mile northwest, and about 350 meters inshore, the tallest of four palms. It is between the sea and the public road and about 350 meters from the latter. This must not be confused with another group of coconut trees several hundred feet farther inland.

Kaiwilahilahi (Hawaii Island, Hawaiian Government Survey, 1877).—Station generally believed lost. *Kaiwilahilahi 2* established in 1913 in same location.

Kaiwilahilahi 2 (Hawaii Island, E. R. Hand, 1913).—On northeastern coast of Hawaii, in North Hilo district, land of Kaiwilahilahi, on top of the cliffs about 25 meters from the edge at the point just next to Papaaloa and toward Hilo (southeast). This spot is flat and generally covered with high cane; a group of white cottages, red roofs, very symmetrically laid out, will be seen on this point, and station is directly between them and cliff edge. Station marked by a cement cylinder, 5 inches in diameter, with United States Geological Survey tablet in top which is flush with ground and surrounded by pile of stones. Water tank at houses aforementioned bears S. 37° W., distant 80 meters. Slender stack in same group of houses (station *Smoke*) is 112 meters south.

Manowaeopae 3 (Hawaii Island, E. R. Hand, 1913).—Established by Hawaiian Government Survey. On northeast coast of Hawaii, on the extreme edge of the bluff about 150 meters east of Laupahoehoe railroad station, which is not at the town of that name but on top of the cliffs about ¾ mile to the east. About 30 meters east of the station, between it and Papaaloa, is a deep but narrow gulch. The flagstaff of the railroad station bears S. 85° E. and it and the near or east corner of the roof are exactly on range from the station, which may be found by following this range closely till it cuts the cliff edge, where the station will be found distant 1 meter from edge. Marked by a truncated cone of concrete extending down into the ground about 2½ feet. Bottom of cone is 1.9 feet in diameter, top about 5 inches. Centered with a 1-inch galvanized iron pipe protruding about 5 inches above the concrete.

Laupahoehoe (Hawaii Island, E. R. Hand, 1913).—Established by Hawaiian Government Survey. On northeast coast of Hawaii, at Laupahoehoe, out on the flat rocky point close to the sea. Station is outside of wall which surrounds lighthouse and is 18 meters from it. The northeast corner of the light building (in 1913) bears S. 85° W. distant 32.5 meters (107 feet). The northeast gable of police station (station *Yellow*) bears S. 5° E., distant 110 meters. Marked by a concrete cylinder about 10 inches in diameter set upright among the stones, centered with a very small triangle.

Barnard (Hawaii Island, E. R. Hand, 1913).—On northeast coast of Hawaii, on north side of gulch at Laupahoehoe, on highest point overlooking the town. Station is on extreme edge, above railroad, and is seen on range with the flagstaff of the store and post office when one stands just inside the turnstile at the gate of Barnards Hotel. The bearing of this line is S. 76° W. From below the station appears to be on a slight mound in the bluff line. Also from the station the flagstaff of the Japanese temple and a point on the ridgepole of the store and post office about 2 feet north of flagpole are on range. Reached by taking the main

For notes in regard to marking of stations, see p. 139.

road up toward Ookala, and when at top of cliffs and turning into first gulch, a camp (Waipunalei) with flagpole will be seen on left side of road; here take a trail that goes through the cane east or back toward Laupahoehoe; trail crosses railroad and later reaches railroad cut; turn to right or south along edge of bluff until on the range mentioned. Marked by a ¾-inch galvanized iron pipe, slightly inclining to the north, and protruding 7 inches from a mass of concrete 1.5 feet in diameter and extending 2.5 feet into ground.

Smoke (Hawaii Island, E. R. Hand, 1913).—On northeast coast of Hawaii, the slender smoke stack in the center of the group of buildings just east of Papaaloa, known as Kaiwilahilahi Camp. See description of station *Kaiwilahilahi*.

Belfry (Hawaii Island, E. R. Hand, 1913).—On northeast coast of Hawaii, at Laupahoehoe, the center of square tower at end of church away from the sea. Church is painted yellow; there is a much smaller church of same style of architecture farther inshore and facing the sea.

Yellow (Hawaii Island, E. R. Hand, 1913).—On northeast coast of Hawaii, on the point at Laupahoehoe, between the light and the small boat landing; the southeast gable of the police station, a plain yellow building.

Water (Hawaii Island, E. R. Hand, 1913).—Near northeastern coast of Hawaii, in eastern part of Hamakua District, on the same hogback (double) as *Koholalele* triangulation station (see its description), between Paauilo and Kukaiau post offices. Station is center of large unpainted octagonal water tank, with 8-sided pyramidal roof of galvanized iron. It stands at seaward end of the western half of the double hogback, and is partly surrounded by bushes.

Landing (Hawaii Island, E. R. Hand, 1913).—On northeast coast of Hawaii, at Koholalele Landing, which is between Paauilo and Kukaiau sugar mills, the east end, at gable, of large freight house. The building stands on the west side of the inclined railway which runs down to derrick and small-boat landing. The north, west, and south sides are white; the east end, or station end, is black. This east end, which is directly at track, is supported on nine 6 by 8 inch uprights, each resting on a stone set in the ground. The central stone, being directly under the station, serves as a mark. There is talk of removing all the buildings at this landing because of the new railroad. These foundation stones should permit the recovery of the station, which is well situated for an offshore hydrographic signal. Landing is easily made at concrete pier.

Pohakuhaku (Hawaii Island, E. R. Hand, 1913).—On northeast coast of Hawaii, about 1½ miles west-northwest from Paauilo sugar mill, on a pronounced rise crowned with a great quantity of jagged rock and outcroppings, and about 25 meters back from the edge of the cliff; this is the highest point of the cliffs in this vicinity. This is a rounded point, and to the west-northwest the shore line curves inward, forming a cove across which the stack of Paauhau sugar mill is seen, bearing N. 75° W. Station marked by cross cut deeply into the rock outcrop. It is about 3 feet above the grassy slope, and is surrounded by a white-washed cairn of stones built up to a height of 5 feet. A triangle cut in the outcrop is 0.7 meter from the station, bearing N. 65° E.

Worship (Hawaii Island, E. R. Hand, 1913).—On northeast coast of Hawaii, on the main road between Paauilo and Paauhau, and 60 meters above it, the spire of the Catholic Church. The church is a yellow building, has a roof of rusty red, and faces the west. Steeple is surmounted by a cross and is of very odd design.

Au (Hawaii Island, Hawaiian Government Survey, 1877; K. T. Adams, 1928).—On the north coast of Hawaii, near Honokaa. Reached from Honokaa by going west along the Honokaa Sugar Co. railroad, and after crossing four bridges, continuing on along the railroad for approximately 1,000 feet to the first ridge reached just before coming to a deep cut in the railroad embankment. Follow up this ridge to a sugar-cane flume just above which will be found the station. A cane field is on the east side of the ridge, and a ditch runs down the ridge 10 feet west of the station. A wooden flume runs along the face of the hill 100 feet below the station. There are no trees on this ridge, but a ridge with ironwood trees on it is ¼ mile to the east. *Honokaa stack* bears S. 80° E. Station marked by a 3-inch gas pipe projecting 2 feet above the center of a concrete base which is 3 feet square and stands 1 foot above the ground.

Kamakamaka (Hawaii Island, E. R. Hand, 1913).—On north coast of Hawaii, directly inshore from Kamakamaka Point and distant 990 meters from it, on a prominent hill, cane covered. The plantation camp named Kawela lies just to the west of a line from the point to the top of the hill and is distant 275 meters. The flagstaff in center of camp bears N. 14° W. from station, and the *Kukuihaele*

For notes in regard to marking of stations, see p. 139.

stack bears N. 80° W.; the shack on the end of Kamakamaka Point bears N. 4° W., and *Honokaa stack* bears S. 80° W. The station is reached by railroad from either Honokaa or Kukuihaele to the camp, or by boat to Kamakamaka Point, thence up the abandoned inclined railway to the camp. Station marked underground by an iron cylinder about 4½ inches in diameter and 2½ inches high, resting on solid rock 2 feet below surface of ground; it is set in concrete. About 2 inches of soil separate it from the surface mark, the sharp corner of a pyramidal rock, painted white, set in concrete and projecting about 6 inches above the ground. A cairn of stones was built over the station.

U. S. L. H. (Hawaii Island, E. R. Hand, 1913; K. T. Adams, 1929).—A station established by the Lighthouse Department, on north coast of Hawaii, at Kukuihaele, on edge of cliff midway between the derrick landing house and the cable landing house. At this point there is a group of very large and conspicuous stones; cane is planted all around. Station is 5 meters from cliff edge and is marked by a galvanized iron pipe cemented in an upright position in a crevice of the largest of the stones. Pipe projects 1½ feet above the cement surface, which is marked with the letters "U. S. L. H."

Anuenue (Hawaii Island, Hawaiian Government Survey; E. R. Hand, 1913; K. T. Adams, 1929).—Near the northern coast of Hawaii, in Northern Hamakua, in the land of Auhuhu, adjoining Kapulena, on highest point of a well-defined steep hill, 1 mile above the government road between Honokaa and Kukuihaele post offices, and 2¾ miles from the latter. This wooded hill is the most northerly of all the wooded area, jutting out conspicuously from the dense growth behind, to the southward. From the hill *Honokaa stack* bears N. 76° E.; and *Kukuihaele stack*, N. 46° W. Station reached from Camp 12 which is directly on government road by going "mauka" (inland) toward the wooded top which shows against the sky line and is the highest point seen; the station hill is immediately behind this hill, being part of it, slightly higher. Station marked by concrete post evidently cast in mold of corrugated roof iron, about 1 foot in diameter, and having a United States Geological Survey plate in center. It is covered by a cairn of stones 3 feet high.

Stack, Honokaa (Hawaii Island, E. R. Hand, 1913; K. T. Adams, 1928).—In the northern part of Hawaii Island, about ½ mile inland, and about 1¾ miles north by east of Honokaa village. Station is the mill stack of the Honokaa Sugar Co., and is of iron, painted black.

Kukuihaele Light (Hawaii Island, E. R. Hand, 1913; K. T. Adams, 1929).—On north coast of Hawaii, 100 meters inshore or south of the most northerly point of land at Kukuihaele; an automatic gas light, white. The engine building of the derrick landing is between the light and the point. Light is 310 meters east of station *Lift* (see below), and is a white structure standing 16 feet high, on a concrete base; the lower part of the structure is a tank about 7 feet high and 3½ feet square; the top is iron latticework. In 1929 it was reported that derrick landing had been abandoned, and that the derrick building and boom had been removed, leaving only the concrete base.

Lift (Hawaii Island, E. R. Hand, 1913; K. T. Adams, 1929).—On the north coast of Hawaii, at Kukuihaele; the seaward gable of the freight hoist building. This gable is over the immense door through which the cable passes when run out athwartship of steamer. Gable is on highest part of building; there is a very long and low wing extending out on west side, paralleling the cliff.

Stack, Kukuihaele (Hawaii Island, E. R. Hand, 1913).—In 1929 station not recovered. The stack and buildings have been removed, and only the concrete foundations remain.

Supplementary points, interior

Aahuwela (Hawaii Island, Hawaiian Government Survey, 1891).—In the northern part of Hawaii, on the summit of peak called Aahuwela, on the southeast slope of Mauna Kea. Station is on southwest side of crater. Marked by a buried copper triangle, over which is a concrete block 2½ feet long, set with its top level with the surface of the ground, and an iron bolt at its center.

Puu Oo (Hawaii Island, Hawaiian Government Survey, 1891).—In the central part of Hawaii, on south side of the summit of the hill, Puu Oo, near the southeastern foot of Mauna Kea. Marked by a triangle cut in the rock, and a cairn of stones.

Omaokoili (Hawaii Island, Hawaiian Government Survey, 1891).—In the central part of Hawaii, on a hill of the same name, near the southwest foot of Mauna Kea. Marked by a triangle cut in a rock imbedded in the ground, with three ridges of imbedded rocks radiating from the center.

For notes in regard to marking of stations, see p. 139.

Peak A (Poliahu) (Hawaiian Government Survey, 1892).—On the most conspicuous, but not the highest peak of Mauna Kea. Marked by a tall stone cairn, with tin box containing records of six parties since 1885.

Mauna Kea (Waiau) Latitude station (Hawaii Island, Hawaiian Government Survey, 1892).—On Mauna Kea, between 35 and 40 feet southeast of Lake Waiau, in one of the summit craters. Marked by a pier 3 by 2½ feet, and 3 feet high, built of stone and cement, with a cross cut in the stone on top.

Mauna Kea (Hawaii Island, Hawaiian Government Survey, 1892).—On Mauna Kea, on the highest point visible from Waimea, 514.8 meters north of and 49 feet lower than the highest summit. Marked by an iron stake, and a cairn of stones.

Kihe (Hawaii Island, Hawaiian Government Survey, 1876).—In northern part of Hawaii, on northeast slope of Mauna Kea, on northwest side of Kihe crater. Marked by a mamane post in the center of a platform of stone, 5 feet high and 8 feet square. A cross cut on a stone *in situ* bears 38° (magnetic), distant 96 feet.

Koholalele (Hawaii Island, Hawaiian Government Survey, 1877; E. R. Hand, 1913).—Near northeastern coast of Hawaii, in the central part of Hamakua district, on the eastern summit of Puu Piele, a conspicuous hogback hill trending north and south which is seen ¾ mile above the government road, between the post offices of Kukaiau and Paauilo. The lower or seaward end of this hill is covered with bushes. To reach the station start at the large schoolhouse, red, trimmed with white, and go along the government road toward Kukaiau, passing the road down to Paauilo mill; a few yards farther on take the trail which leads up the hill. When on top the hill will be seen to consist of two parallel hogbacks; the station is on the highest point of the east hogback. The hill is on range with the Paauilo sugar mill and the red and white schoolhouse. Station marked by a concrete cylinder about 8 inches in diameter projecting some 4 inches above surface of ground with copper plate of the United States Geological Survey in top. It is surrounded by a pile of small bowlders. Reference mark is station *Water*, an octagonal water tank on the lower end of the west hogback. It is about 80 meters from station bearing N. 29° W.

Kaluamakani (Hawaii Island, Hawaiian Government Survey, 1876).—In the northern part of Hawaii, on a hill of the same name, on the northern slope of Mauna Kea. Station is on northern brow of the hill. Marked by a copper tube buried in an ancient graveyard, and covered with cairn of stones. Three triangular holes were drilled in the lava, 7 feet north, 7 feet south, and 6 feet east of the station. A circular wall surrounds the station.

Apakuie (Hawaii Island, Hawaiian Government Survey, 1877).—In northern part of Hawaii, on the northeastern slope of Mauna Kea, on the western summit of peak called Apakuie. Marked by a tin can buried at the intersection of three rows of stones sunk in the ground. A triangle cut in the rock on Holuokawai Cave bears 115° 20′ (magnetic), distant 910 feet.

Kalepa (Hawaii Island, Hawaiian Government Survey, 1876).—In northern part of Hawaii, on the summit of Puu Kalepa, on the northeast slope of Mauna Kea. Marked by a piece of copper tubing buried about 1 foot below the surface of the ground, in the center of a triangle of stones set in the ground.

Punohu (Hawaii Island, Hawaiian Government Survey, 1876).—In the northern part of Hawaii, on the northern slope of Mauna Kea, on the extreme west summit of the hill, Punohu, and 272 feet west of a post on the Paauhau boundary marked "Paauhau." Marked by a mamane post, with three triangular pits, 1 foot deep and each 3 feet on side distant 3 feet from station. A channel from each pit to center was filled with charcoal.

For notes in regard to marking of stations, see p. 139.

CONVERSION TABLES

Lengths—Feet to meters (from 1 to 1,000 units)

[Reduction factor: 1 foot = 0.3048006096 meter]

Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
0	0.0	50	15.24003	100	30.48006	150	45.72009	200	60.96012
1	0.30480	1	15.54483	1	30.78486	1	46.02489	1	61.26492
2	0.60960	2	15.84963	2	31.08966	2	46.32969	2	61.56972
3	0.91440	3	16.15443	3	31.39446	3	46.63449	3	61.87452
4	1.21920	4	16.45923	4	31.69926	4	46.93929	4	62.17932
5	1.52400	5	16.76403	5	32.00406	5	47.24409	5	62.48412
6	1.82880	6	17.06883	6	32.30886	6	47.54890	6	62.78893
7	2.13360	7	17.37363	7	32.61367	7	47.85370	7	63.09373
8	2.43840	8	17.67844	8	32.91847	8	48.15850	8	63.39853
9	2.74321	9	17.98324	9	33.22327	9	48.46330	9	63.70333
10	3.04801	60	18.28804	110	33.52807	160	48.76810	210	64.00813
1	3.35281	1	18.59284	1	33.83287	1	49.07290	1	64.31293
2	3.65761	2	18.89764	2	34.13767	2	49.37770	2	64.61773
3	3.96241	3	19.20244	3	34.44247	3	49.68250	3	64.92253
4	4.26721	4	19.50724	4	34.74727	4	49.98730	4	65.22733
5	4.57201	5	19.81204	5	35.05207	5	50.29210	5	65.53213
6	4.87681	6	20.11684	6	35.35687	6	50.59690	6	65.83693
7	5.18161	7	20.42164	7	35.66167	7	50.90170	7	66.14173
8	5.48641	8	20.72644	8	35.96647	8	51.20650	8	66.44653
9	5.79121	9	21.03124	9	36.27127	9	51.51130	9	66.75133
20	6.09601	70	21.33604	120	36.57607	170	51.81610	220	67.05613
1	6.40081	1	21.64084	1	36.88087	1	52.12090	1	67.36093
2	6.70561	2	21.94564	2	37.18567	2	52.42570	2	67.66574
3	7.01041	3	22.25044	3	37.49047	3	52.73051	3	67.97054
4	7.31521	4	22.55525	4	37.79528	4	53.03531	4	68.27534
5	7.62002	5	22.86005	5	38.10008	5	53.34011	5	68.58014
6	7.92482	6	23.16485	6	38.40488	6	53.64491	6	68.88494
7	8.22962	7	23.46965	7	38.70968	7	53.94971	7	69.18974
8	8.53442	8	23.77445	8	39.01448	8	54.25451	8	69.49454
9	8.83922	9	24.07925	9	39.31928	9	54.55931	9	69.79934
30	9.14402	80	24.38405	130	39.62408	180	54.86411	230	70.10414
1	9.44882	1	24.68885	1	39.92888	1	55.16891	1	70.40894
2	9.75362	2	24.99365	2	40.23368	2	55.47371	2	70.71374
3	10.05842	3	25.29845	3	40.53848	3	55.77851	3	71.01854
4	10.36322	4	25.60325	4	40.84328	4	56.08331	4	71.32334
5	10.66802	5	25.90805	5	41.14808	5	56.38811	5	71.62814
6	10.97282	6	26.21285	6	41.45288	6	56.69291	6	71.93294
7	11.27762	7	26.51765	7	41.75768	7	56.99771	7	72.23774
8	11.58242	8	26.82245	8	42.06248	8	57.30251	8	72.54255
9	11.88722	9	27.12725	9	42.36728	9	57.60732	9	72.84735
40	12.19202	90	27.43205	140	42.67209	190	57.91212	240	73.15215
1	12.49682	1	27.73686	1	42.97689	1	58.21692	1	73.45695
2	12.80163	2	28.04166	2	43.28169	2	58.52172	2	73.76175
3	13.10643	3	28.34646	3	43.58649	3	58.82652	3	74.06655
4	13.41123	4	28.65126	4	43.89129	4	59.13132	4	74.37135
5	13.71603	5	28.95606	5	44.19609	5	59.43612	5	74.67615
6	14.02083	6	29.26086	6	44.50089	6	59.74092	6	74.98095
7	14.32563	7	29.56566	7	44.80569	7	60.04572	7	75.28575
8	14.63043	8	29.87046	8	45.11049	8	60.35052	8	75.59055
9	14.93523	9	30.17526	9	45.41529	9	60.65532	9	75.89535

Lengths—Feet to meters (from 1 to 1,000 units)—Continued

Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
250	76.20015	**300**	91.44018	**350**	106.68021	**400**	121.92024	**450**	137.16027
1	76.50495	1	91.74498	1	106.98501	1	122.22504	1	137.46507
2	76.80975	2	92.04978	2	107.28981	2	122.52985	2	137.76988
3	77.11455	3	92.35458	3	107.59462	3	122.83465	3	138.07468
4	77.41935	4	92.65939	4	107.89942	4	123.13945	4	138.37948
5	77.72416	5	92.96419	5	108.20422	5	123.44425	5	138.68428
6	78.02896	6	93.26899	6	108.50902	6	123.74905	6	138.98908
7	78.33376	7	93.57379	7	108.81382	7	124.05385	7	139.29388
8	78.63856	8	93.87859	8	109.11862	8	124.35865	8	139.59868
9	78.94336	9	94.18339	9	109.42342	9	124.66345	9	139.90348
260	79.24816	**310**	94.48819	**360**	109.72822	**410**	124.96825	**460**	140.20828
1	79.55296	1	94.79299	1	110.03302	1	125.27305	1	140.51308
2	79.85776	2	95.09779	2	110.33782	2	125.57785	2	140.81788
3	80.16256	3	95.40259	3	110.64262	3	125.88265	3	141.12268
4	80.46736	4	95.70739	4	110.94742	4	126.18745	4	141.42748
5	80.77216	5	96.01219	5	111.25222	5	126.49225	5	141.73228
6	81.07696	6	96.31699	6	111.55702	6	126.79705	6	142.03708
7	81.38176	7	96.62179	7	111.86182	7	127.10185	7	142.34188
8	81.68656	8	96.92659	8	112.16662	8	127.40665	8	142.64669
9	81.99136	9	97.23139	9	112.47142	9	127.71146	9	142.95149
270	82.29616	**320**	97.53620	**370**	112.77623	**420**	128.01626	**470**	143.25629
1	82.60097	1	97.84100	1	113.08103	1	128.32106	1	143.56109
2	82.90577	2	98.14580	2	113.38583	2	128.62586	2	143.86589
3	83.21057	3	98.45060	3	113.69063	3	128.93066	3	144.17069
4	83.51537	4	98.75540	4	113.99543	4	129.23546	4	144.47549
5	83.82017	5	99.06020	5	114.30023	5	129.54026	5	144.78029
6	84.12497	6	99.36500	6	114.60503	6	129.84506	6	145.08509
7	84.42977	7	99.66980	7	114.90983	7	130.14986	7	145.38989
8	84.73457	8	99.97460	8	115.21463	8	130.45466	8	145.69469
9	85.03937	9	100.27940	9	115.51943	9	130.75946	9	145.99949
280	85.34417	**330**	100.58420	**380**	115.82423	**430**	131.06426	**480**	146.30429
1	85.64897	1	100.88900	1	116.12903	1	131.36906	1	146.60909
2	85.95377	2	101.19380	2	116.43383	2	131.67386	2	146.91389
3	86.25857	3	101.49860	3	116.73863	3	131.97866	3	147.21869
4	86.56337	4	101.80340	4	117.04343	4	132.28346	4	147.52350
5	86.86817	5	102.10820	5	117.34823	5	132.58827	5	147.82830
6	87.17297	6	102.41300	6	117.65304	6	132.89307	6	148.13310
7	87.47777	7	102.71781	7	117.95784	7	133.19787	7	148.43790
8	87.78258	8	103.02261	8	118.26264	8	133.50267	8	148.74270
9	88.08738	9	103.32741	9	118.56744	9	133.80747	9	149.04750
290	88.39218	**340**	103.63221	**390**	118.87224	**440**	134.11227	**490**	149.35230
1	88.69698	1	103.93701	1	119.17704	1	134.41707	1	149.65710
2	89.00178	2	104.24181	2	119.48184	2	134.72187	2	149.96190
3	89.30658	3	104.54661	3	119.78664	3	135.02667	3	150.26670
4	89.61138	4	104.85141	4	120.09144	4	135.33147	4	150.57150
5	89.91618	5	105.15621	5	120.39624	5	135.63627	5	150.87630
6	90.22098	6	105.46101	6	120.70104	6	135.94107	6	151.18110
7	90.52578	7	105.76581	7	121.00584	7	136.24587	7	151.48590
8	90.83058	8	106.07061	8	121.31064	8	136.55067	8	151.79070
9	91.13538	9	106.37541	9	121.61544	9	136.85547	9	152.09550

Lengths—Feet to meters (from 1 to 1000 units)—Continued

Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
500	152.40030	550	167.64034	600	182.88037	650	198.12040	700	213.36043
1	152.70511	1	167.94514	1	183.18517	1	198.42520	1	213.66523
2	153.00991	2	168.24994	2	183.48997	2	198.73000	2	213.97003
3	153.31471	3	168.55474	3	183.79477	3	199.03480	3	214.27483
4	153.61951	4	168.85954	4	184.09957	4	199.33960	4	214.57963
5	153.92431	5	169.16434	5	184.40437	5	199.64440	5	214.88443
6	154.22911	6	169.46914	6	184.70917	6	199.94920	6	215.18923
7	154.53391	7	169.77394	7	185.01397	7	200.25400	7	215.49403
8	154.83871	8	170.07874	8	185.31877	8	200.55880	8	215.79883
9	155.14351	9	170.38354	9	185.62357	9	200.86360	9	216.10363
510	155.44831	560	170.68834	610	185.92837	660	201.16840	710	216.40843
1	155.75311	1	170.99314	1	186.23317	1	201.47320	1	216.71323
2	156.05791	2	171.29794	2	186.53797	2	201.77800	2	217.01803
3	156.36271	3	171.60274	3	186.84277	3	202.08280	3	217.32283
4	156.66751	4	171.90754	4	187.14757	4	202.38760	4	217.62764
5	156.97231	5	172.21234	5	187.45237	5	202.69241	5	217.93244
6	157.27711	6	172.51715	6	187.75718	6	202.99721	6	218.23724
7	157.58192	7	172.82195	7	188.06198	7	203.30201	7	218.54204
8	157.88672	8	173.12675	8	188.36678	8	203.60681	8	218.84684
9	158.19152	9	173.43155	9	188.67158	9	203.91161	9	219.15164
520	158.49632	570	173.73635	620	188.97638	670	204.21641	720	219.45644
1	158.80112	1	174.04115	1	189.28118	1	204.52121	1	219.76124
2	159.10592	2	174.34595	2	189.58598	2	204.82601	2	220.06604
3	159.41072	3	174.65075	3	189.89078	3	205.13081	3	220.37084
4	159.71552	4	174.95555	4	190.19558	4	205.43561	4	220.67564
5	160.02032	5	175.26035	5	190.50038	5	205.74041	5	220.98044
6	160.32512	6	175.56515	6	190.80518	6	206.04521	6	221.28524
7	160.62992	7	175.86995	7	191.10998	7	206.35001	7	221.59004
8	160.93472	8	176.17475	8	191.41478	8	206.65481	8	221.89484
9	161.23952	9	176.47955	9	191.71958	9	206.95961	9	222.19964
530	161.54432	580	176.78435	630	192.02438	680	207.26441	730	222.50445
1	161.84912	1	177.08915	1	192.32918	1	207.56922	1	222.80925
2	162.15392	2	177.39395	2	192.63399	2	207.87402	2	223.11405
3	162.45872	3	177.69876	3	192.93879	3	208.17882	3	223.41885
4	162.76353	4	178.00356	4	193.24359	4	208.48362	4	223.72365
5	163.06833	5	178.30836	5	193.54839	5	208.78842	5	224.02845
6	163.37313	6	178.61316	6	193.85319	6	209.09322	6	224.33325
7	163.67793	7	178.91796	7	194.15799	7	209.39802	7	224.63805
8	163.98273	8	179.22276	8	194.46279	8	209.70282	8	224.94285
9	164.28753	9	179.52756	9	194.76759	9	210.00762	9	225.24765
540	164.59233	590	179.83236	640	195.07239	690	210.31242	740	225.55245
1	164.89713	1	180.13716	1	195.37719	1	210.61722	1	225.85725
2	165.20193	2	180.44196	2	195.68199	2	210.92202	2	226.16205
3	165.50673	3	180.74676	3	195.98679	3	211.22682	3	226.46685
4	165.81153	4	181.05156	4	196.29159	4	211.53162	4	226.77165
5	166.11633	5	181.35636	5	196.59639	5	211.83642	5	227.07645
6	166.42113	6	181.66116	6	196.90119	6	212.14122	6	227.38125
7	166.72593	7	181.96596	7	197.20590	7	212.44602	7	227.68606
8	167.03073	8	182.27076	8	197.51080	8	212.75083	8	227.99086
9	167.33553	9	182.57557	9	197.81560	9	213.05563	9	228.29566

Lengths—Feet to meters (from 1 to 1,000 units)—Continued

Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
750	228.60046	800	243.84049	850	259.08052	900	274.32055	950	289.56058
1	228.90526	1	244.14529	1	259.38532	1	274.62535	1	289.86538
2	229.21006	2	244.45009	2	259.69012	2	274.93015	2	290.17018
3	229.51486	3	244.75489	3	259.99492	3	275.23495	3	290.47498
4	229.81966	4	245.05969	4	260.29972	4	275.53975	4	290.77978
5	230.12446	5	245.36449	5	260.60452	5	275.84455	5	291.08458
6	230.42926	6	245.66929	6	260.90932	6	276.14935	6	291.38938
7	230.73406	7	245.97409	7	261.21412	7	276.45415	7	291.69418
8	231.03886	8	246.27889	8	261.51892	8	276.75895	8	291.99898
9	231.34366	9	246.58369	9	261.82372	9	277.06375	9	292.30378
760	231.64846	810	246.88849	860	262.12852	910	277.36855	960	292.60859
1	231.95326	1	247.19329	1	262.43332	1	277.67336	1	292.91339
2	232.25806	2	247.49809	2	262.73813	2	277.97816	2	293.21819
3	232.56287	3	247.80290	3	263.04293	3	278.28296	3	293.52299
4	232.86767	4	248.10770	4	263.34773	4	278.58776	4	293.82779
5	233.17247	5	248.41250	5	263.65253	5	278.89256	5	294.13259
6	233.47727	6	248.71730	6	263.95733	6	279.19736	6	294.43739
7	233.78207	7	249.02210	7	264.26213	7	279.50216	7	294.74219
8	234.08687	8	249.32690	8	264.56693	8	279.80696	8	295.04699
9	234.39167	9	249.63170	9	264.87173	9	280.11176	9	295.35179
770	234.69647	820	249.93650	870	265.17653	920	280.41656	970	295.65659
1	235.00127	1	250.24130	1	265.48133	1	280.72136	1	295.96139
2	235.30607	2	250.54610	2	265.78613	2	281.02616	2	296.26619
3	235.61087	3	250.85090	3	266.09093	3	281.33096	3	296.57099
4	235.91567	4	251.15570	4	266.39573	4	281.63576	4	296.87579
5	236.22047	5	251.46050	5	266.70053	5	281.94056	5	297.18059
6	236.52527	6	251.76530	6	267.00533	6	282.24536	6	297.48539
7	236.83007	7	252.07010	7	267.31013	7	282.55017	7	297.79020
8	237.13487	8	252.37490	8	267.61494	8	282.85497	8	298.09500
9	237.43967	9	252.67971	9	267.91974	9	283.15977	9	298.39980
780	237.74448	830	252.98451	880	268.22454	930	283.46457	980	298.70460
1	238.04928	1	253.28931	1	268.52934	1	283.76937	1	299.00940
2	238.35408	2	253.59411	2	268.83414	2	284.07417	2	299.31420
3	238.65888	3	253.89891	3	269.13894	3	284.37897	3	299.61900
4	238.96368	4	254.20371	4	269.44374	4	284.68377	4	299.92380
5	239.26848	5	254.50851	5	269.74854	5	284.98857	5	300.22860
6	239.57328	6	254.81331	6	270.05334	6	285.29337	6	300.53340
7	239.87808	7	255.11811	7	270.35814	7	285.59817	7	300.83820
8	240.18288	8	255.42291	8	270.66294	8	285.90297	8	301.14300
9	240.48768	9	255.72771	9	270.96774	9	286.20777	9	301.44780
790	240.79248	840	256.03251	890	271.27254	940	286.51257	990	301.75260
1	241.09728	1	256.33731	1	271.57734	1	286.81737	1	302.05740
2	241.40208	2	256.64211	2	271.88214	2	287.12217	2	302.36220
3	241.70688	3	256.94691	3	272.18694	3	287.42697	3	302.66701
4	242.01168	4	257.25171	4	272.49174	4	287.73178	4	302.97181
5	242.31648	5	257.55652	5	272.79655	5	288.03658	5	303.27661
6	242.62129	6	257.86132	6	273.10135	6	288.34138	6	303.58141
7	242.92609	7	258.16612	7	273.40615	7	288.64618	7	303.88621
8	243.23089	8	258.47092	8	273.71095	8	288.95098	8	304.19101
9	243.53569	9	258.77572	9	274.01575	9	289.25578	9	304.49581

Lengths—Meters to feet (from 1 to 1,000 units)

[Reduction factor: 1 meter = 3.280833333 feet]

Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet
0		50	164.04167	100	328.08333	150	492.12500	200	656.16667
1	3.28083	1	167.32250	1	331.36417	1	495.40583	1	659.44750
2	6.56167	2	170.60333	2	334.64500	2	498.68667	2	662.72833
3	9.84250	3	173.88417	3	337.92583	3	501.96750	3	666.00917
4	13.12333	4	177.16500	4	341.20667	4	505.24833	4	669.29000
5	16.40417	5	180.44583	5	344.48750	5	508.52917	5	672.57083
6	19.68500	6	183.72667	6	347.76833	6	511.81000	6	675.85167
7	22.96583	7	187.00750	7	351.04917	7	515.09083	7	679.13250
8	26.24667	8	190.28833	8	354.33000	8	518.37167	8	682.41333
9	29.52750	9	193.56917	9	357.61083	9	521.65250	9	685.69417
10	32.80833	60	196.85000	110	360.89167	160	524.93333	210	688.97500
1	36.08917	1	200.13083	1	364.17250	1	528.21417	1	692.25583
2	39.37000	2	203.41167	2	367.45333	2	531.49500	2	695.53667
3	42.65083	3	206.69250	3	370.73417	3	534.77583	3	698.81750
4	45.93167	4	209.97333	4	374.01500	4	538.05667	4	702.09833
5	49.21250	5	213.25417	5	377.29583	5	541.33750	5	705.37917
6	52.49333	6	216.53500	6	380.57667	6	544.61833	6	708.66000
7	55.77417	7	219.81583	7	383.85750	7	547.89917	7	711.94083
8	59.05500	8	223.09667	8	387.13833	8	551.18000	8	715.22167
9	62.33583	9	226.37750	9	390.41917	9	554.46083	9	718.50250
20	65.61667	70	229.65833	120	393.70000	170	557.74167	220	721.78333
1	68.89750	1	232.93917	1	396.98083	1	561.02250	1	725.06417
2	72.17833	2	236.22000	2	400.26167	2	564.30333	2	728.34500
3	75.45917	3	239.50083	3	403.54250	3	567.58417	3	731.62583
4	78.74000	4	242.78167	4	406.82333	4	570.86500	4	734.90667
5	82.02083	5	246.06250	5	410.10417	5	574.14583	5	738.18750
6	85.30167	6	249.34333	6	413.38500	6	577.42667	6	741.46833
7	88.58250	7	252.62417	7	416.66583	7	580.70750	7	744.74917
8	91.86333	8	255.90500	8	419.94667	8	583.98833	8	748.03000
9	95.14417	9	259.18583	9	423.22750	9	587.26917	9	751.31083
30	98.42500	80	262.46667	130	426.50833	180	590.55000	230	754.59167
1	101.70583	1	265.74750	1	429.78917	1	593.83083	1	757.87250
2	104.98667	2	269.02833	2	433.07000	2	597.11167	2	761.15333
3	108.26750	3	272.30917	3	436.35083	3	600.39250	3	764.43417
4	111.54833	4	275.59000	4	439.63167	4	603.67333	4	767.71500
5	114.82917	5	278.87083	5	442.91250	5	606.95417	5	770.99583
6	118.11000	6	282.15167	6	446.19333	6	610.23500	6	774.27667
7	121.39083	7	285.43250	7	449.47417	7	613.51583	7	777.55750
8	124.67167	8	288.71333	8	452.75500	8	616.79667	8	780.83833
9	127.95250	9	291.99417	9	456.03583	9	620.07750	9	784.11917
40	131.23333	90	295.27500	140	459.31667	190	623.35833	240	787.40000
1	134.51417	1	298.55583	1	462.59750	1	626.63917	1	790.68083
2	137.79500	2	301.83667	2	465.87833	2	629.92000	2	793.96167
3	141.07583	3	305.11750	3	469.15917	3	633.20083	3	797.24250
4	144.35667	4	308.39833	4	472.44000	4	636.48167	4	800.52333
5	147.63750	5	311.67917	5	475.72083	5	639.76250	5	803.80417
6	150.91833	6	314.96000	6	479.00167	6	643.04333	6	807.08500
7	154.19917	7	318.24083	7	482.28250	7	646.32417	7	810.36583
8	157.48000	8	321.52167	8	485.56333	8	649.60500	8	813.64667
9	160.76083	9	324.80250	9	488.84417	9	652.88583	9	816.92750

Lengths—Meters to feet (from 1 to 1,000 units)—Continued

Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet
250	820.20833	**300**	984.25000	**350**	1,148.29167	**400**	1,312.33333	**450**	1,476.37500
1	823.48917	1	987.53083	1	1,151.57250	1	1,315.61417	1	1,479.65583
2	826.77000	2	990.81167	2	1,154.85333	2	1,318.89500	2	1,482.93667
3	830.05083	3	994.09250	3	1,158.13417	3	1,322.17583	3	1,486.21750
4	833.33167	4	997.37333	4	1,161.41500	4	1,325.45667	4	1,489.49833
5	836.61250	5	1,000.65417	5	1,164.69583	5	1,328.73750	5	1,492.77917
6	839.89333	6	1,003.93500	6	1,167.97667	6	1,332.01833	6	1,496.06000
7	843.17417	7	1,007.21583	7	1,171.25750	7	1,335.29917	7	1,499.34083
8	846.45500	8	1,010.49667	8	1,174.53833	8	1,338.58000	8	1,502.62167
9	849.73583	9	1,013.77750	9	1,177.81917	9	1,341.86083	9	1,505.90250
260	853.01667	**310**	1,017.05833	**360**	1,181.10000	**410**	1,345.14167	**460**	1,509.18333
1	856.29750	1	1,020.33917	1	1,184.38083	1	1,348.42250	1	1,512.46417
2	859.57833	2	1,023.62000	2	1,187.66167	2	1,351.70333	2	1,515.74500
3	862.85917	3	1,026.90083	3	1,190.94250	3	1,354.98417	3	1,519.02583
4	866.14000	4	1,030.18167	4	1,194.22333	4	1,358.26500	4	1,522.30667
5	869.42083	5	1,033.46250	5	1,197.50417	5	1,361.54583	5	1,525.58750
6	872.70167	6	1,036.74333	6	1,200.78500	6	1,364.82667	6	1,528.86833
7	875.98250	7	1,040.02417	7	1,204.06583	7	1,368.10750	7	1,532.14917
8	879.26333	8	1,043.30500	8	1,207.34667	8	1,371.38833	8	1,535.43000
9	882.54417	9	1,046.58583	9	1,210.62750	9	1,374.66917	9	1,538.71083
270	885.82500	**320**	1,049.86667	**370**	1,213.90833	**420**	1,377.95000	**470**	1,541.99167
1	889.10583	1	1,053.14750	1	1,217.18917	1	1,381.23083	1	1,545.27250
2	892.38667	2	1,056.42833	2	1,220.47000	2	1,384.51167	2	1,548.55333
3	895.66750	3	1,059.70917	3	1,223.75083	3	1,387.79250	3	1,551.83417
4	898.94833	4	1,062.99000	4	1,227.03167	4	1,391.07333	4	1,555.11500
5	902.22917	5	1,066.27083	5	1,230.31250	5	1,394.35417	5	1,558.39583
6	905.51000	6	1,069.55167	6	1,233.59333	6	1,397.63500	6	1,561.67667
7	908.79083	7	1,072.83250	7	1,236.87417	7	1,400.91583	7	1,564.95750
8	912.07167	8	1,076.11333	8	1,240.15500	8	1,404.19667	8	1,568.23833
9	915.35250	9	1,079.39417	9	1,243.43583	9	1,407.47750	9	1,571.51917
280	918.63333	**330**	1,082.67500	**380**	1,246.71667	**430**	1,410.75833	**480**	1,574.80000
1	921.91417	1	1,085.95583	1	1,249.99750	1	1,414.03917	1	1,578.08083
2	925.19500	2	1,089.23667	2	1,253.27833	2	1,417.32000	2	1,581.36167
3	928.47583	3	1,092.51750	3	1,256.55917	3	1,420.60083	3	1,584.64250
4	931.75667	4	1,095.79833	4	1,259.84000	4	1,423.88167	4	1,587.92333
5	935.03750	5	1,099.07917	5	1,263.12083	5	1,427.16250	5	1,591.20417
6	938.31833	6	1,102.36000	6	1,266.40167	6	1,430.44333	6	1,594.48500
7	941.59917	7	1,105.64083	7	1,269.68250	7	1,433.72417	7	1,597.76583
8	944.88000	8	1,108.92167	8	1,272.96333	8	1,437.00500	8	1,601.04667
9	948.16083	9	1,112.20250	9	1,276.24417	9	1,440.28583	9	1,604.32750
290	951.44167	**340**	1,115.48333	**390**	1,279.52500	**440**	1,443.56667	**490**	1,607.60833
1	954.72250	1	1,118.76417	1	1,282.80583	1	1,446.84750	1	1,610.88917
2	958.00333	2	1,122.04500	2	1,286.08667	2	1,450.12833	2	1,614.17000
3	961.28417	3	1,125.32583	3	1,289.36750	3	1,453.40917	3	1,617.45083
4	964.56500	4	1,128.60667	4	1,292.64833	4	1,456.69000	4	1,620.73167
5	967.84583	5	1,131.88750	5	1,295.92917	5	1,459.97083	5	1,624.01250
6	971.12667	6	1,135.16833	6	1,299.21000	6	1,463.25167	6	1,627.29333
7	974.40750	7	1,138.44917	7	1,302.49083	7	1,466.53250	7	1,630.57417
8	977.68833	8	1,141.73000	8	1,305.77167	8	1,469.81333	8	1,633.85500
9	980.96917	9	1,145.01083	9	1,309.05250	9	1,473.09417	9	1,637.13583

Lengths—Meters to feet (from 1 to 1,000 units)—Continued

Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet
500	1,640.41667	**550**	1,804.45833	**600**	1,968.50000	**650**	2,132.54167	**700**	2,296.58333
1	1,643.69750	1	1,807.73917	1	1,971.78083	1	2,135.82250	1	2,299.86417
2	1,646.97833	2	1,811.02000	2	1,975.06167	2	2,139.10333	2	2,303.14500
3	1,650.25917	3	1,814.30083	3	1,978.34250	3	2,142.38417	3	2,306.42583
4	1,653.54000	4	1,817.58167	4	1,981.62333	4	2,145.66500	4	2,309.70667
5	1,656.82083	5	1,820.86250	5	1,984.90417	5	2,148.94583	5	2,312.98750
6	1,660.10167	6	1,824.14333	6	1,988.18500	6	2,152.22667	6	2,316.26833
7	1,663.38250	7	1,827.42417	7	1,991.46583	7	2,155.50750	7	2,319.54917
8	1,666.66333	8	1,830.70500	8	1,994.74667	8	2,158.78833	8	2,322.83000
9	1,669.94417	9	1,833.98583	9	1,998.02750	9	2,162.06917	9	2,326.11083
510	1,673.22500	**560**	1,837.26667	**610**	2,001.30833	**660**	2,165.35000	**710**	2,329.39167
1	1,676.50583	1	1,840.54750	1	2,004.58917	1	2,168.63083	1	2,332.67250
2	1,679.78667	2	1,843.82833	2	2,007.87000	2	2,171.91167	2	2,335.95333
3	1,683.06750	3	1,847.10917	3	2,011.15083	3	2,175.19250	3	2,339.23417
4	1,686.34833	4	1,850.39000	4	2,014.43167	4	2,178.47333	4	2,342.51500
5	1,689.62917	5	1,853.67083	5	2,017.71250	5	2,181.75417	5	2,345.79583
6	1,692.91000	6	1,856.95167	6	2,020.99333	6	2,185.03500	6	2,349.07667
7	1,696.19083	7	1,860.23250	7	2,024.27417	7	2,188.31583	7	2,352.35750
8	1,699.47167	8	1,863.51333	8	2,027.55500	8	2,191.59667	8	2,355.63833
9	1,702.75250	9	1,866.79417	9	2,030.83583	9	2,194.87750	9	2,358.91917
520	1,706.03333	**570**	1,870.07500	**620**	2,034.11667	**670**	2,198.15833	**720**	2,362.20000
1	1,709.31417	1	1,873.35583	1	2,037.39750	1	2,201.43917	1	2,365.48083
2	1,712.59500	2	1,876.63667	2	2,040.67833	2	2,204.72000	2	2,368.76167
3	1,715.87583	3	1,879.91750	3	2,043.95917	3	2,208.00083	3	2,372.04250
4	1,719.15667	4	1,883.19833	4	2,047.24000	4	2,211.28167	4	2,375.32333
5	1,722.43750	5	1,886.47917	5	2,050.52083	5	2,214.56250	5	2,378.60417
6	1,725.71833	6	1,889.76000	6	2,053.80167	6	2,217.84333	6	2,381.88500
7	1,728.99917	7	1,893.04083	7	2,057.08250	7	2,221.12417	7	2,385.16583
8	1,732.28000	8	1,896.32167	8	2,060.36333	8	2,224.40500	8	2,388.44667
9	1,735.56083	9	1,899.60250	9	2,063.64417	9	2,227.68583	9	2,391.72750
530	1,738.84167	**580**	1,902.88333	**630**	2,066.92500	**680**	2,230.96667	**730**	2,395.00833
1	1,742.12250	1	1,906.16417	1	2,070.20583	1	2,234.24750	1	2,398.28917
2	1,745.40333	2	1,909.44500	2	2,073.48667	2	2,237.52833	2	2,401.57000
3	1,748.68417	3	1,912.72583	3	2,076.76750	3	2,240.80917	3	2,404.85083
4	1,751.96500	4	1,916.00667	4	2,080.04833	4	2,244.09000	4	2,408.13167
5	1,755.24583	5	1,919.28750	5	2,083.32917	5	2,247.37083	5	2,411.41250
6	1,758.52667	6	1,922.56833	6	2,086.61000	6	2,250.65167	6	2,414.69333
7	1,761.80750	7	1,925.84917	7	2,089.89083	7	2,253.93250	7	2,417.97417
8	1,765.08833	8	1,929.13000	8	2,093.17167	8	2,257.21333	8	2,421.25500
9	1,768.36917	9	1,932.41083	9	2,096.45250	9	2,260.49417	9	2,424.53583
540	1,771.65000	**590**	1,935.69167	**640**	2,099.73333	**690**	2,263.77500	**740**	2,427.81667
1	1,174.93083	1	1,938.97250	1	2,103.01417	1	2,267.05583	1	2,431.09750
2	1,778.21167	2	1,942.25333	2	2,106.29500	2	2,270.33667	2	2,434.37833
3	1,781.49250	3	1,945.53417	3	2,109.57583	3	2,273.61750	3	2,437.65917
4	1,784.77333	4	1,948.81500	4	2,112.85667	4	2,276.89833	4	2,440.94000
5	1,788.05417	5	1,952.09583	5	2,116.13750	5	2,280.17917	5	2,444.22083
6	1,791.33500	6	1,955.37667	6	2,119.41833	6	2,283.46000	6	2,447.50167
7	1,794.61583	7	1,958.65750	7	2,122.69917	7	2,286.74083	7	2,450.78250
8	1,797.89667	8	1,961.93833	8	2,125.98000	8	2,290.02167	8	2,454.06333
9	1,801.17750	9	1,965.21917	9	2,129.26083	9	2,293.30250	9	2,457.34417

Lengths—Meters to feet (from 1 to 1,000 units)—Continued

Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters	Feet
750	2,460.62500	800	2,624.66667	850	2,788.70833	900	2,952.75000	950	3,116.79167
1	2,463.90583	1	2,627.94750	1	2,791.98917	1	2,956.03083	1	3,120.07250
2	2,467.18667	2	2,631.22833	2	2,795.27000	2	2,959.31167	2	3,123.35333
3	2,470.46750	3	2,634.50917	3	2,798.55083	3	2,962.59250	3	3,126.63417
4	2,473.74833	4	2,637.79000	4	2,801.83167	4	2,965.87333	4	3,129.91500
5	2,477.02917	5	2,641.07083	5	2,805.11250	5	2,969.15417	5	3,133.19583
6	2,480.31000	6	2,644.35167	6	2,808.39333	6	2,972.43500	6	3,136.47667
7	2,483.59083	7	2,647.63250	7	2,811.67417	7	2,975.71583	7	3,139.75750
8	2,486.87167	8	2,650.91333	8	2,814.95500	8	2,978.99667	8	3,143.03833
9	2,490.15250	9	2,654.19417	9	2,818.23583	9	2,982.27750	9	3,146.31917
760	2,493.43333	810	2,657.47500	860	2,821.51667	910	2,985.55833	960	3,149.60000
1	2,496.71417	1	2,660.75583	1	2,824.79750	1	2,988.83917	1	3,152.88083
2	2,499.99500	2	2,664.03667	2	2,828.07833	2	2,992.12000	2	3,156.16167
3	2,503.27583	3	2,667.31750	3	2,831.35917	3	2,995.40083	3	3,159.44250
4	2,506.55667	4	2,670.59833	4	2,834.64000	4	2,998.68167	4	3,162.72333
5	2,509.83750	5	2,673.87917	5	2,837.92083	5	3,001.96250	5	3,166.00417
6	2,513.11833	6	2,677.16000	6	2,841.20167	6	3,005.24333	6	3,169.28500
7	2,516.39917	7	2,680.44083	7	2,844.48250	7	3,008.52417	7	3,172.56583
8	2,519.68000	8	3,683.72167	8	2,847.76333.	8	3,011.80500	8	3,175.84667
9	2,522.96083	9	2,687.00250	9	2,851.04417	9	3,015.08583	9	3,179.12750
770	2,526.24167	820	2,690.28333	870	2,854.32500	920	3,018.36667	970	3,182.40833
1	2,529.52250	1	2,693.56417	1	2,857.60583	1	3,021.64750	1	3,185.68917
2	2,532.80333	2	2,696.84500	2	2,860.88667	2	3,024.92833	2	3,188.97000
3	2,536.08417	3	2,700.12583	3	2,864.16750	3	3,028.20917	3	3,192.25083
4	2,539.36500	4	2,703.40667	4	2,867.44833	4	3,031.49000	4	3,195.53167
5	2,542.64583	5	2,706.68750	5	2,870.72917	5	3,034.77083	5	3,198.81250
6	2,545.92667	6	2,709.96833	6	2,874.01000	6	3,038.05167	6	3,202.09333
7	2,549.20750	7	2,713.24917	7	2,877.29083	7	3,041.33250	7	3,205.37417
8	2,552.48833	8	2,716.53000	8	2,880.57167	8	3,044.61333	8	3,208.65500
9	2,555.76917	9	2,719.81083	9	2,883.85250	9	3,047.89417	9	3,211.93583
780	2,559.05000	830	2,723.09167	880	2,887.13333	930	3,051.17500	980	3,215.21667
1	2,562.33083	1	2,726,37250	1	2,890.41417	1	3,054.45583	1	3,218.49750
2	2,565.61167	2	2,729.65333	2	2,893.69500	2	3,057.73667	2	3,221.77833
3	2,568.89250	3	2,732.93417	3	2,896.97583	3	3,061.01750	3	3,225.05917
4	2,572.17333	4	2,736.21500	4	2,900.25667	4	3,064.29833	4	3,228.34000
5	2,575.45417	5	2,739.49583	5	2,903.53750	5	3,067.57917	5	3,231.62083
6	2,578.73500	6	2,742.77667	6	2,906.81833	6	3,070.86000	6	3,234.90167
7	2,582.01583	7	2,746.05750	7	2,910.09917	7	3,074.14083	7	3,238.18250
8	2,585.29667	8	2,749.33833	8	2,913.38000	8	3,077.42167	8	3,241.46333
9	2,588.57750	9	2,752.61917	9	2,916.66083	9	3,080.70250	9	3,244.74417
790	2,591.85833	840	2,755.90000	890	2,919.94167	940	3,083.98333	990	3,248.02500
1	2,595.13917	1	2,759.18083	1	2,923.22250	1	3,087.26417	1	3,251.30583
2	2,598.42000	2	2,762.46167	2	2,926.50333	2	3,090.54500	2	3,254.58667
3	2,601.70083	3	2,765.74250	3	2,929.78417	3	3,093.82583	3	3,257.86750
4	2,604.98167	4	2,769.02333	4	2,933.06500	4	3,097.10667	4	3,261.14833
5	2,608.26250	5	2,772.30417	5	2,936.34583	5	3,100.38750	5	3,264.42917
6	2,611.54333	6	2,775.58500	6	2,939.62667	6	3,103.66833	6	3,267.71000
7	2,614.82417	7	2,778.86583	7	2,942.90750	7	3,106.94917	7	3,270.99083
8	2,618.10500	8	2,782.14667	8	2,946.18833	8	3,110.23000	8	3,274.27167
9	2,621.38583	9	2,785.42750	9	2,949.46917	9	3,113.51083	9	3,277.55250

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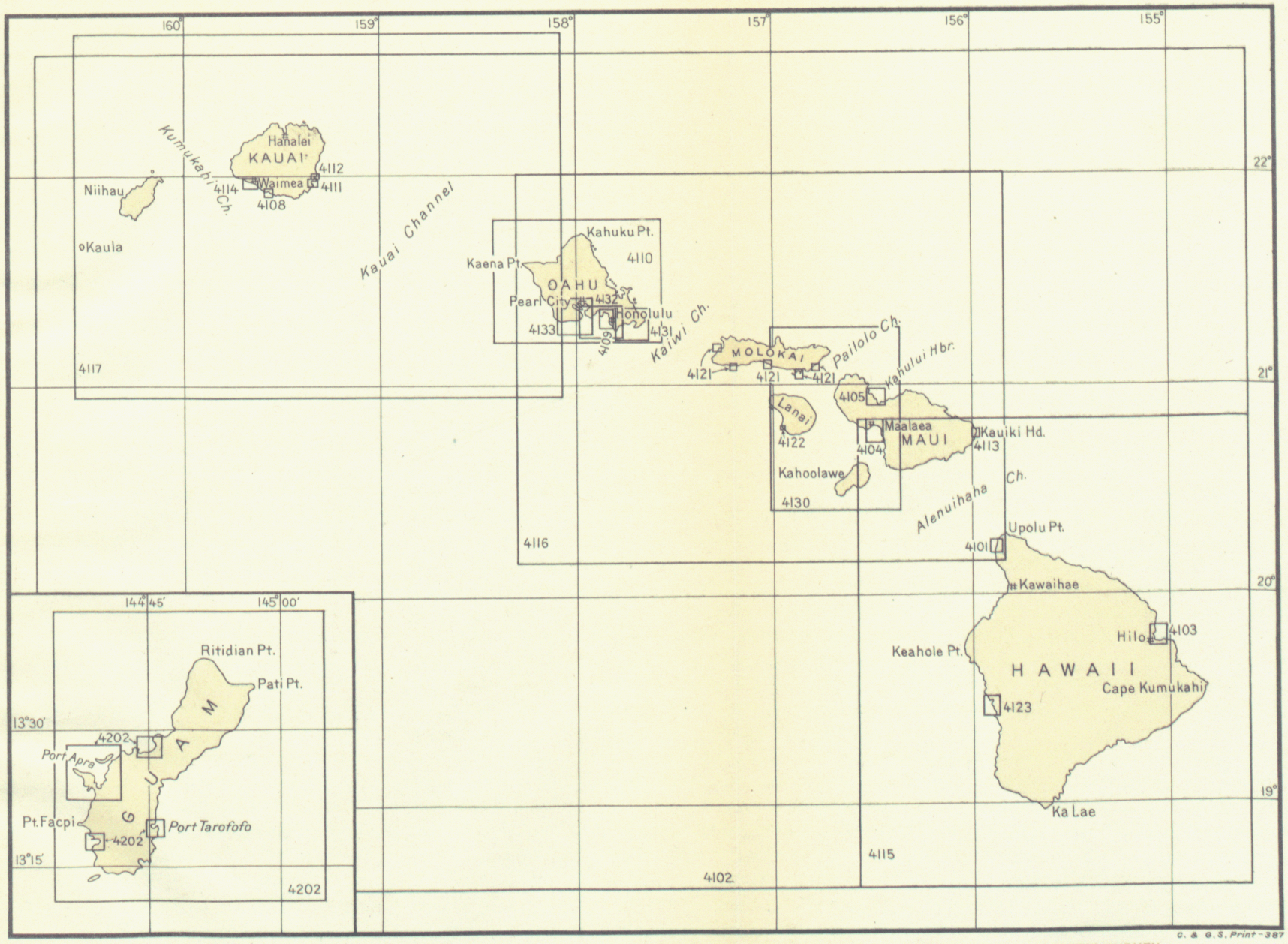


FIG. 3 – INDEX MAP OF THE HAWAIIAN ISLANDS SHOWING BOUNDARIES OF CHARTS PUBLISHED BY THE UNITED COAST AND GEODETIC SURVEY

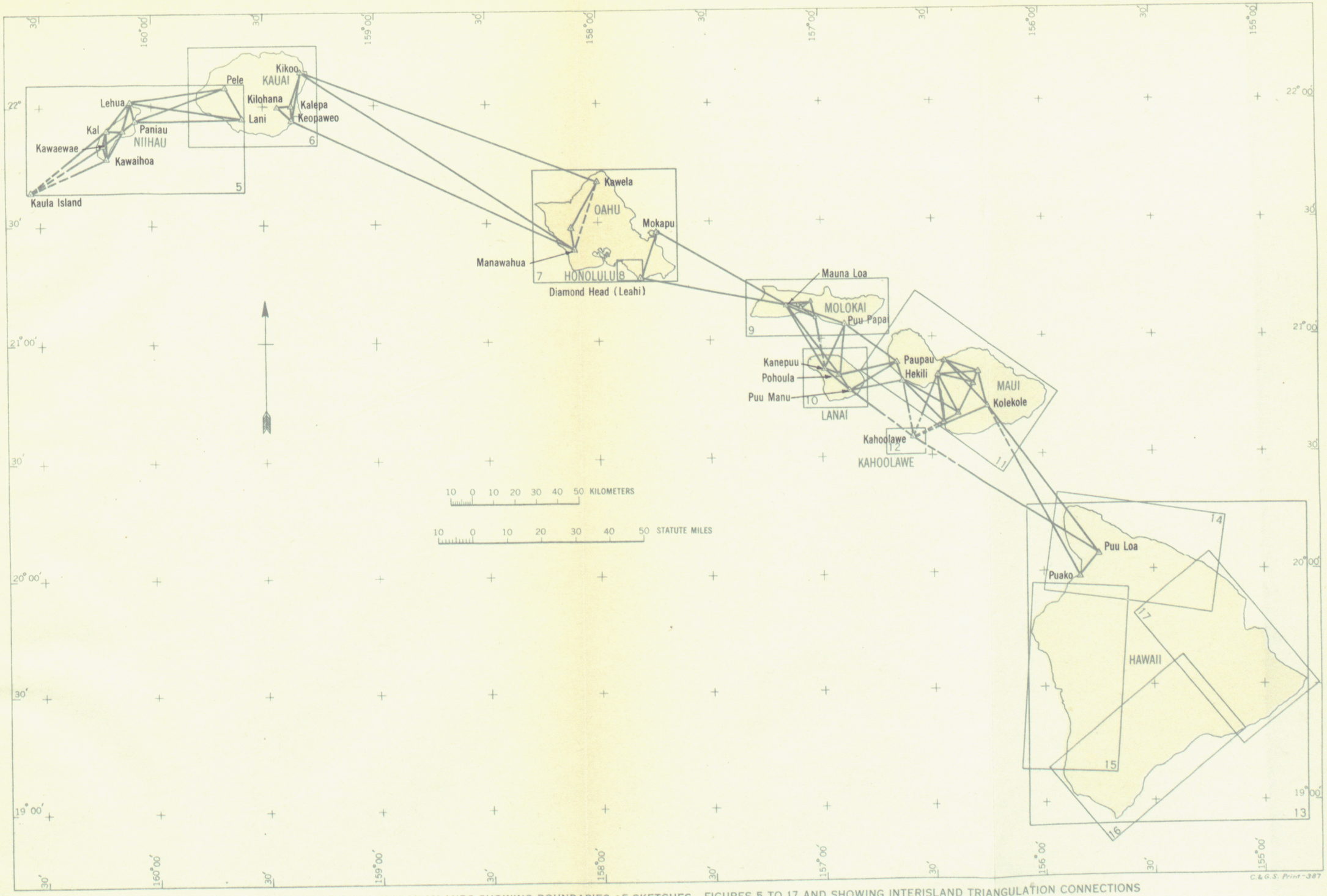


FIG. 4 – INDEX MAP OF THE HAWAIIAN ISLANDS SHOWING BOUNDARIES OF SKETCHES. FIGURES 5 TO 17 AND SHOWING INTERISLAND TRIANGULATION CONNECTIONS

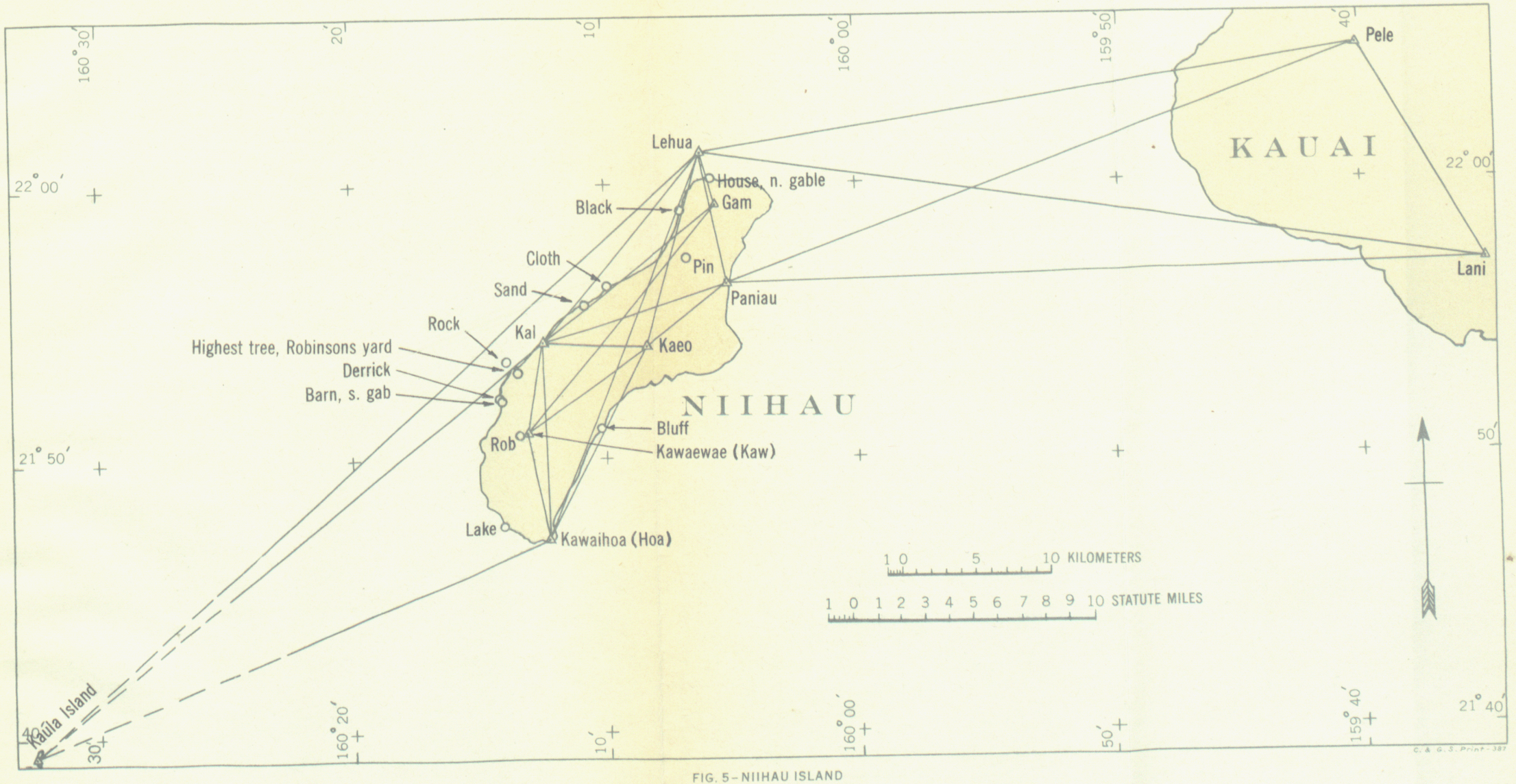


FIG. 5 – NIIHAU ISLAND

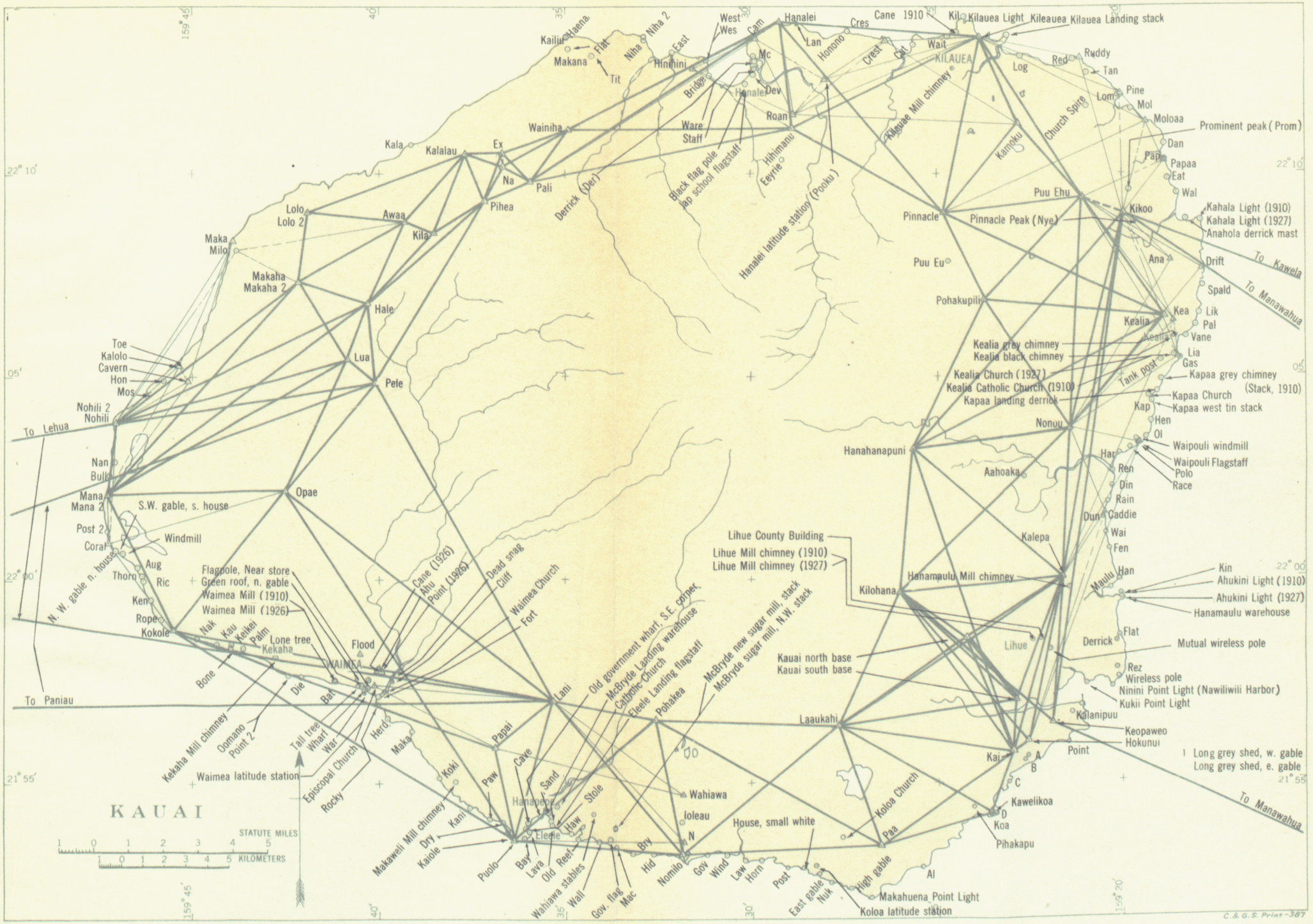


FIG. 6 – KAUAI ISLAND

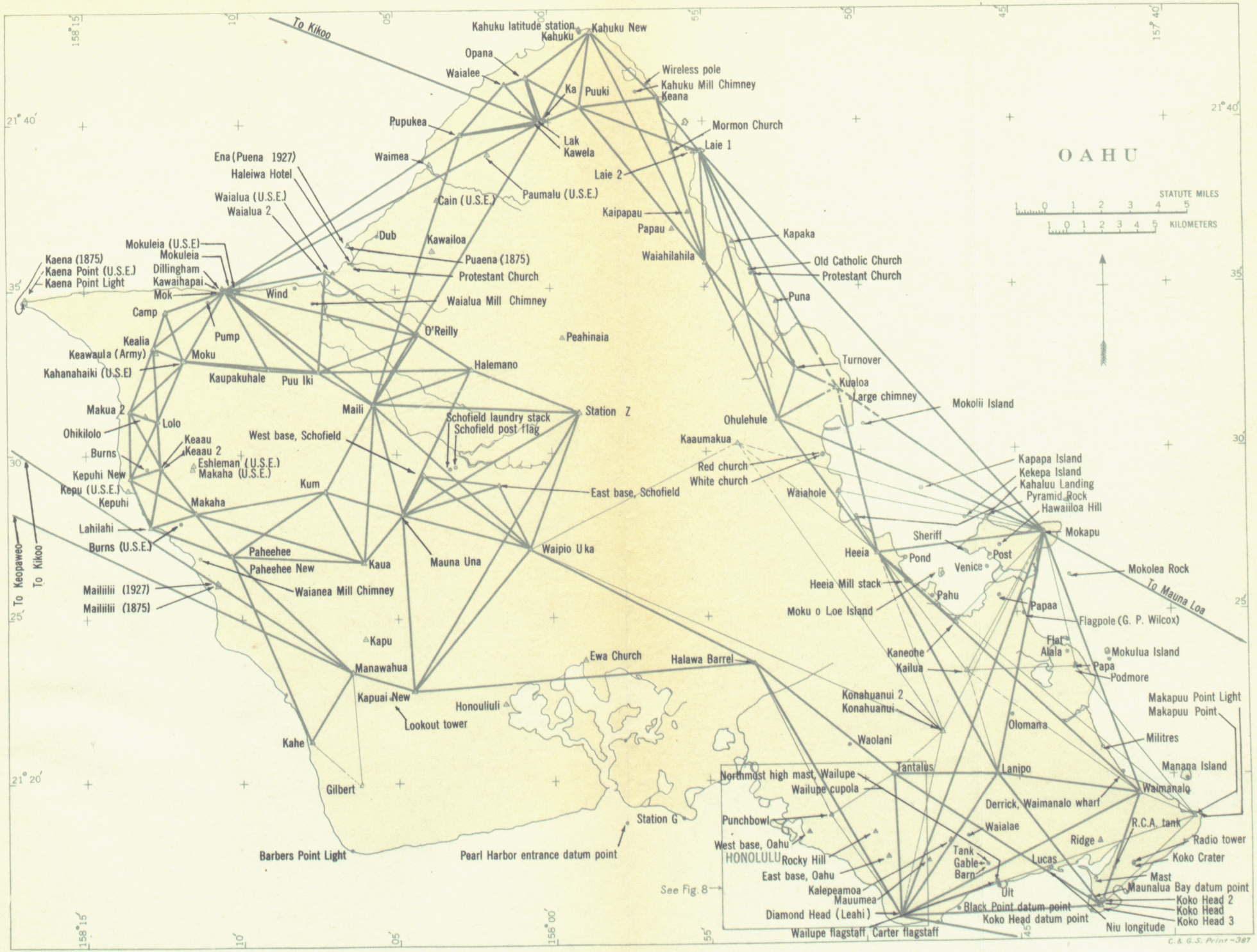


FIG. 7 – OAHU ISLAND

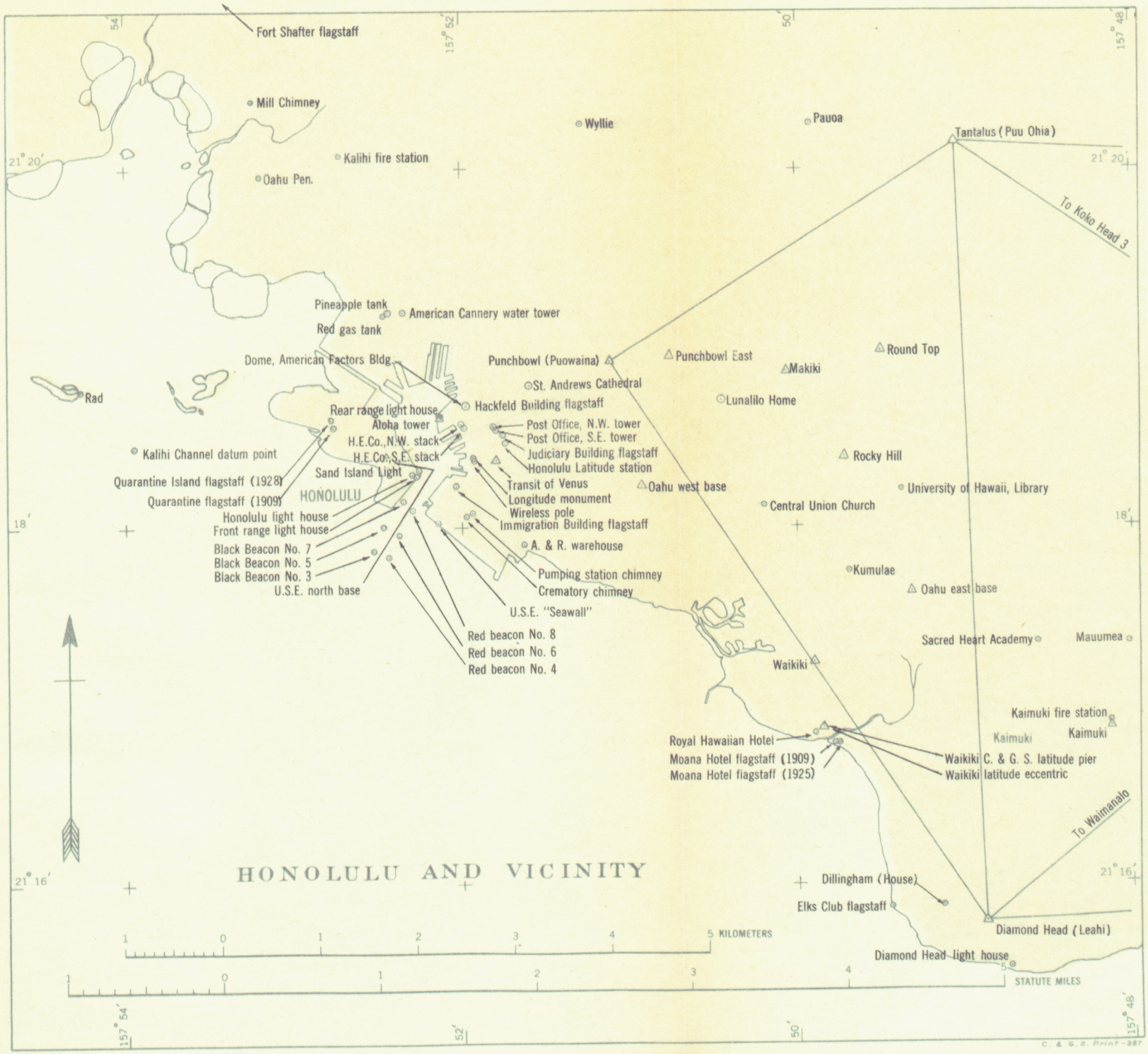
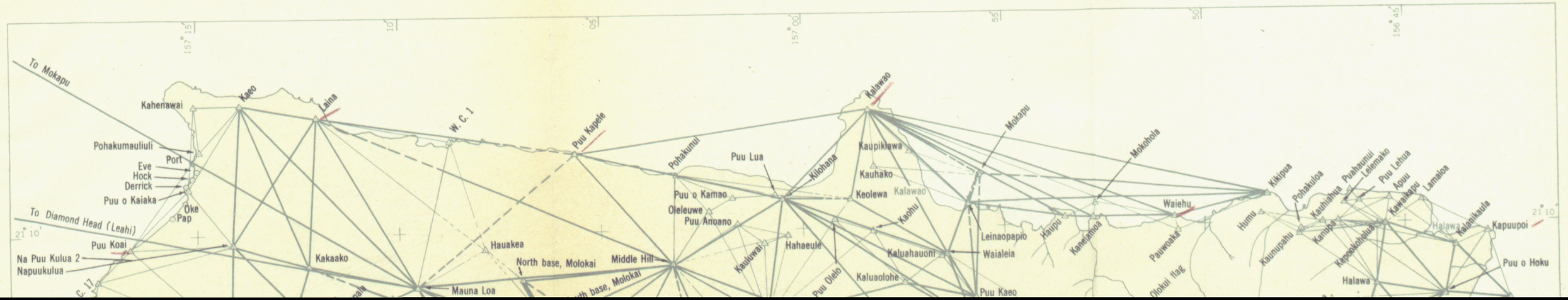


FIG. 8 – HONOLULU AMD VICINITY


To Mokapu
To Diamond Head (Leahi)
157° 15'
10'
05'
157° 00'
55'
50'
156° 45'
21° 10'
Kahenawai
Kaeo
Laina
W. C. 1
Puu Kapele
Kalawao
Mokapu
Mokohola
Pohakumauliuli
Port
Eve
Hock
Derrick
Puu o Kaiaka
Oke
Pap
Puu Koai
Na Puu Kulua 2
Napuukulua
C. 17
Kakaako
Hauakea
North base, Molokai
Middle Hill
Mauna Loa
Pohakunui
Puu Lua
Kilohana
Puu o Kamao
Oleleuwe
Puu Anoano
Kauluwai
Hahaeule
Puu Olelo
Kaupikiawa
Kauhako
Keolewa
Kalawao
Kaohu
Kaluahauoni
Kaluaolohe
Leinaopapio
Waialeia
Puu Kaeo
Haupu
Kaneiamoa
Pauwoaka
Olokui Hag
Waiehu
Kikipua
Humu
Kaunupahu
Pohakuloa
Kauhiahua
Puahaunui
Lelemako
Puu Lehua
Apuu
Kawaikapu
Lamaloa
Kanupa
Kepookohiuka
Halawa
Kalamikaula
Kapuupoi
Puu o Hoku

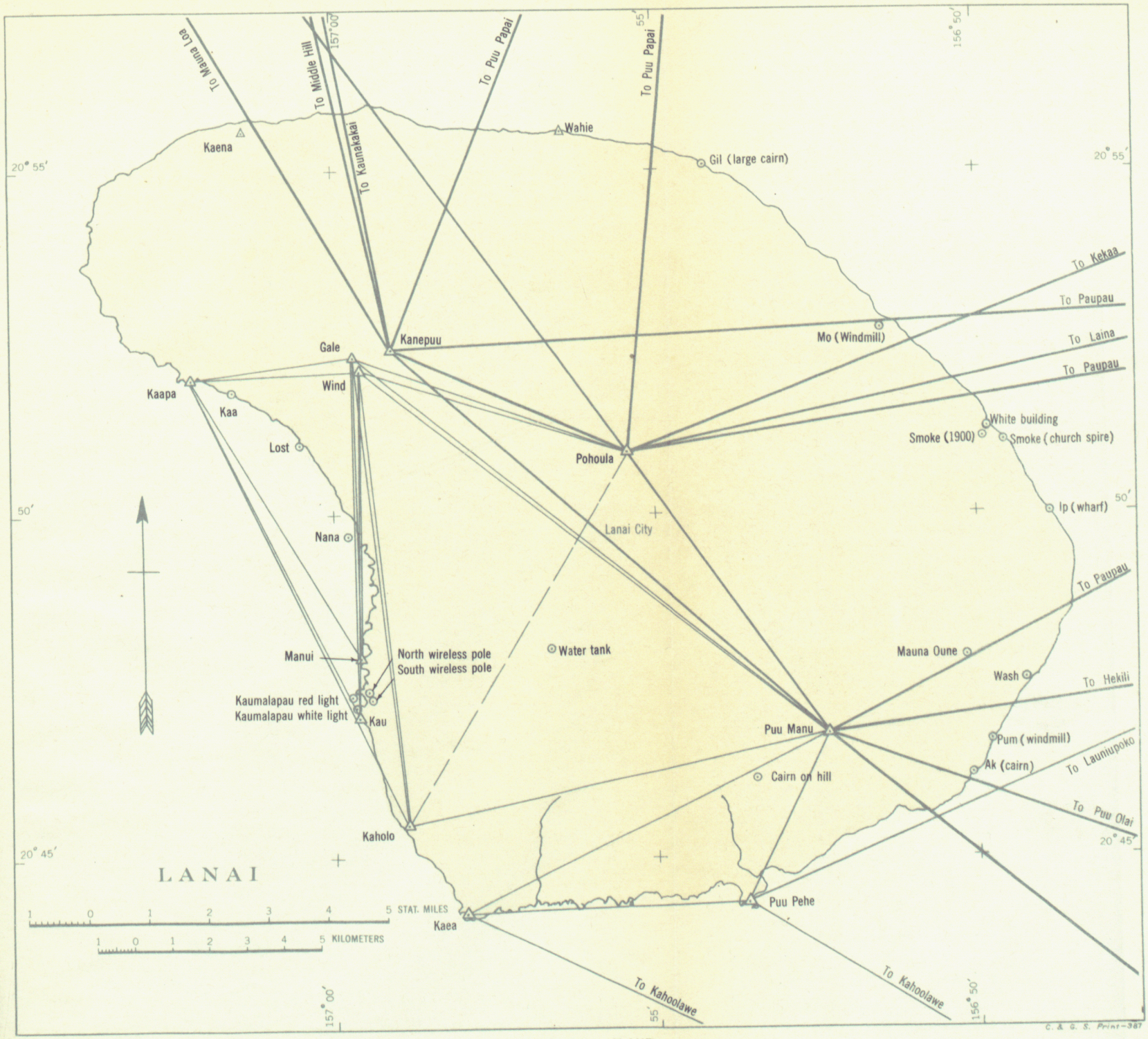


FIG. 10 – LANAI ISLAND

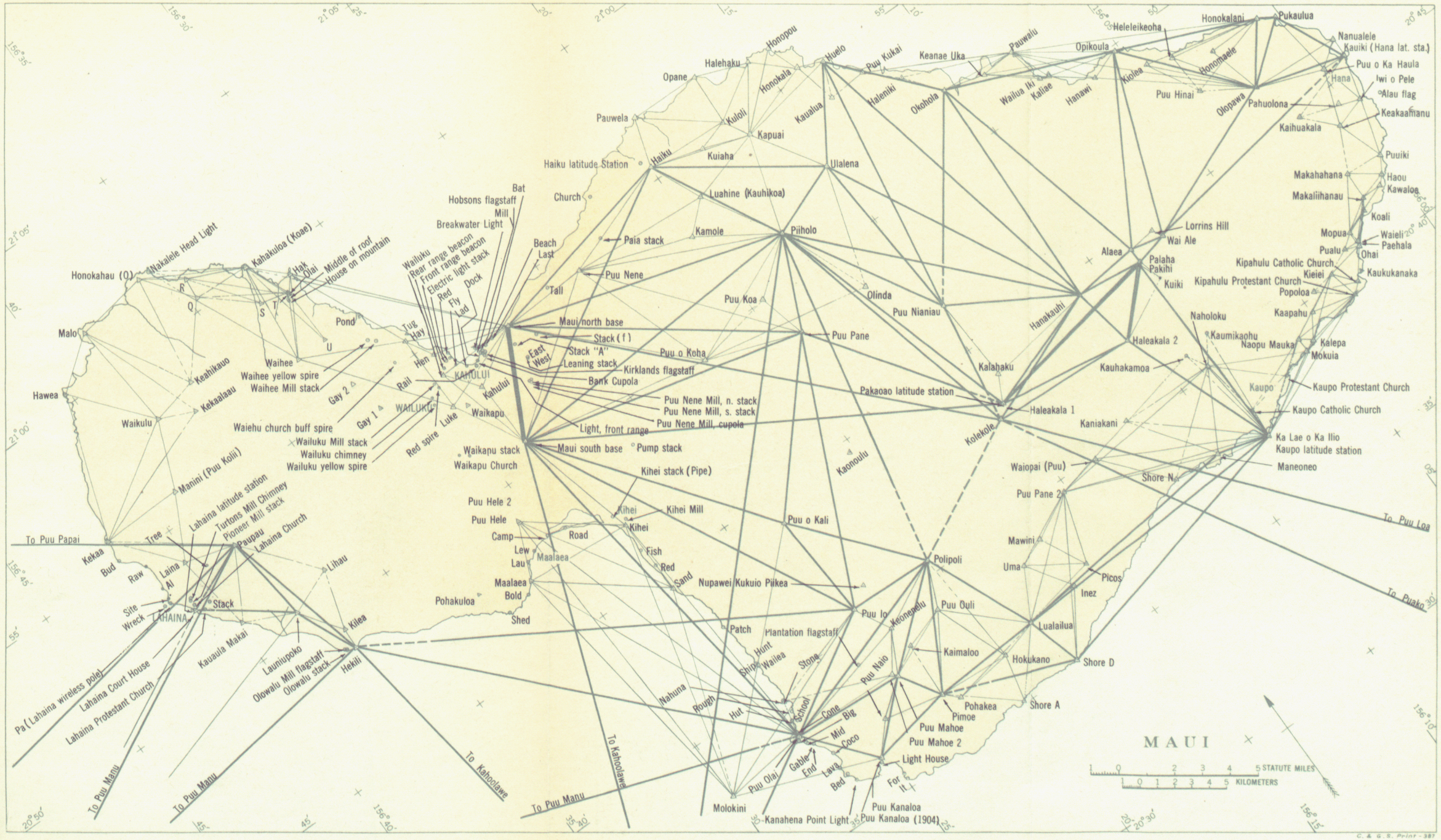


FIG. 11 – MAUI ISLAND

C. & G. S. Print - 387

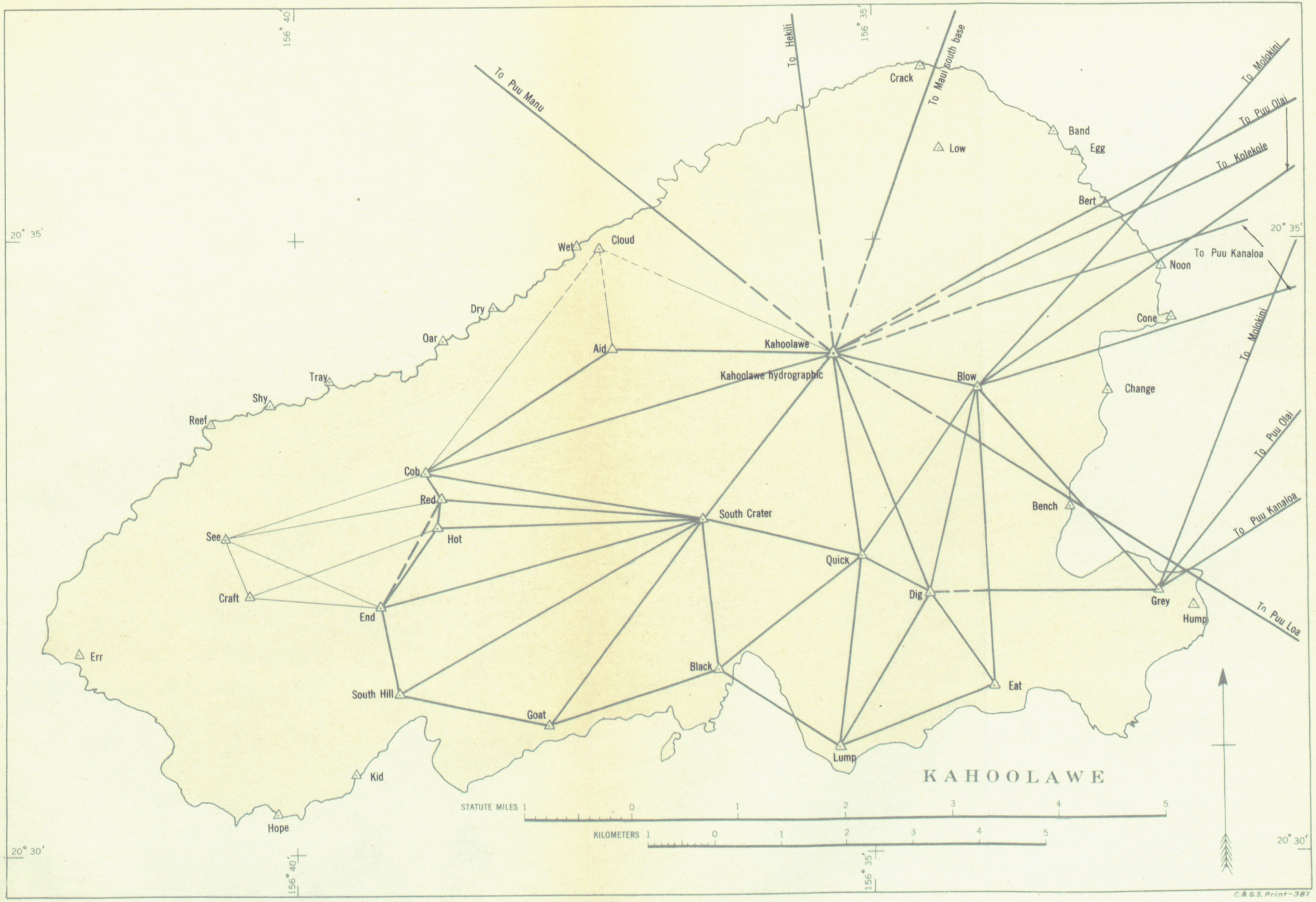


FIG. 12 – KAHOOLAWE ISLAND

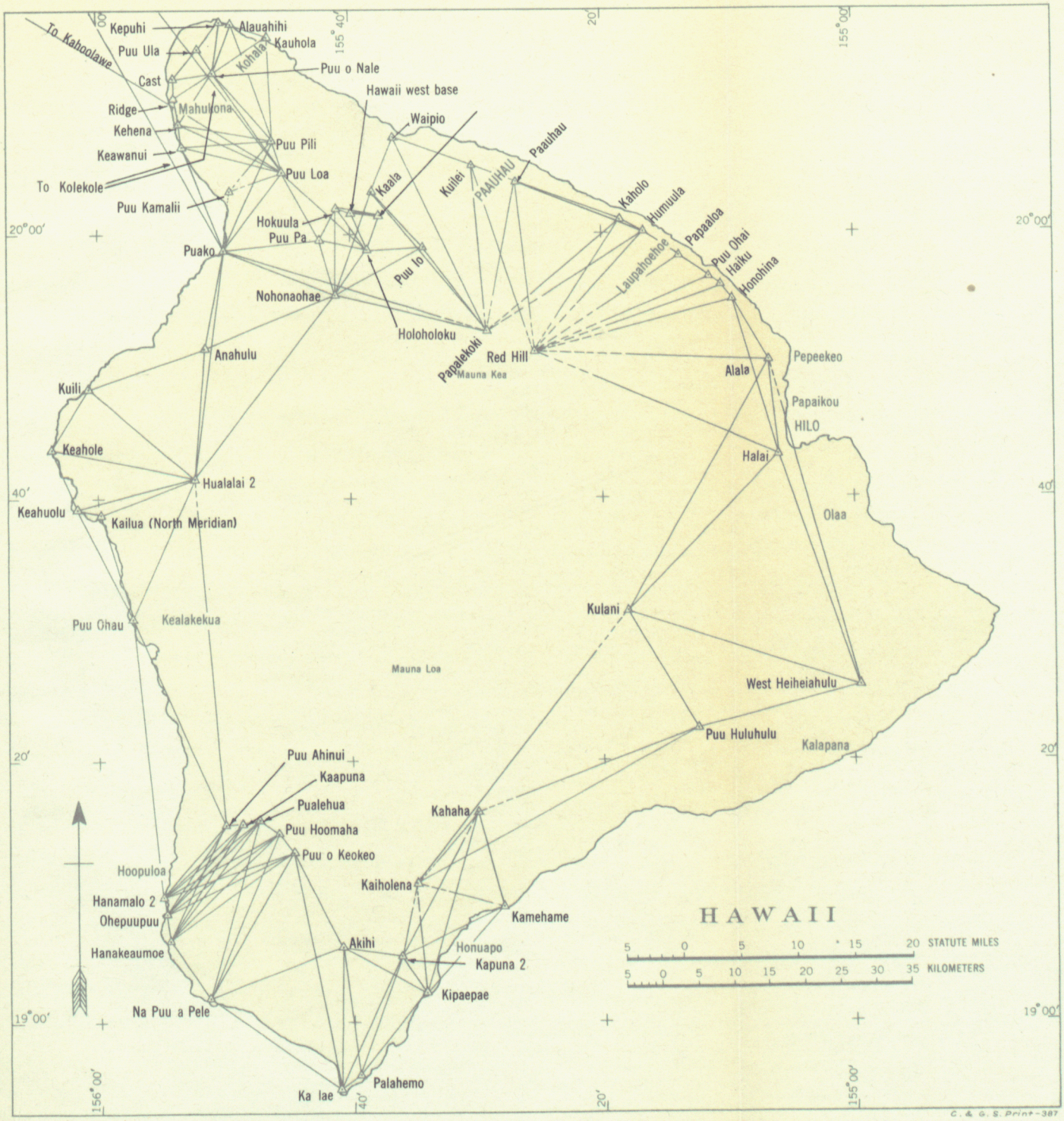


FIG. 13 – HAWAII ISLAND. MAIN SCHEME

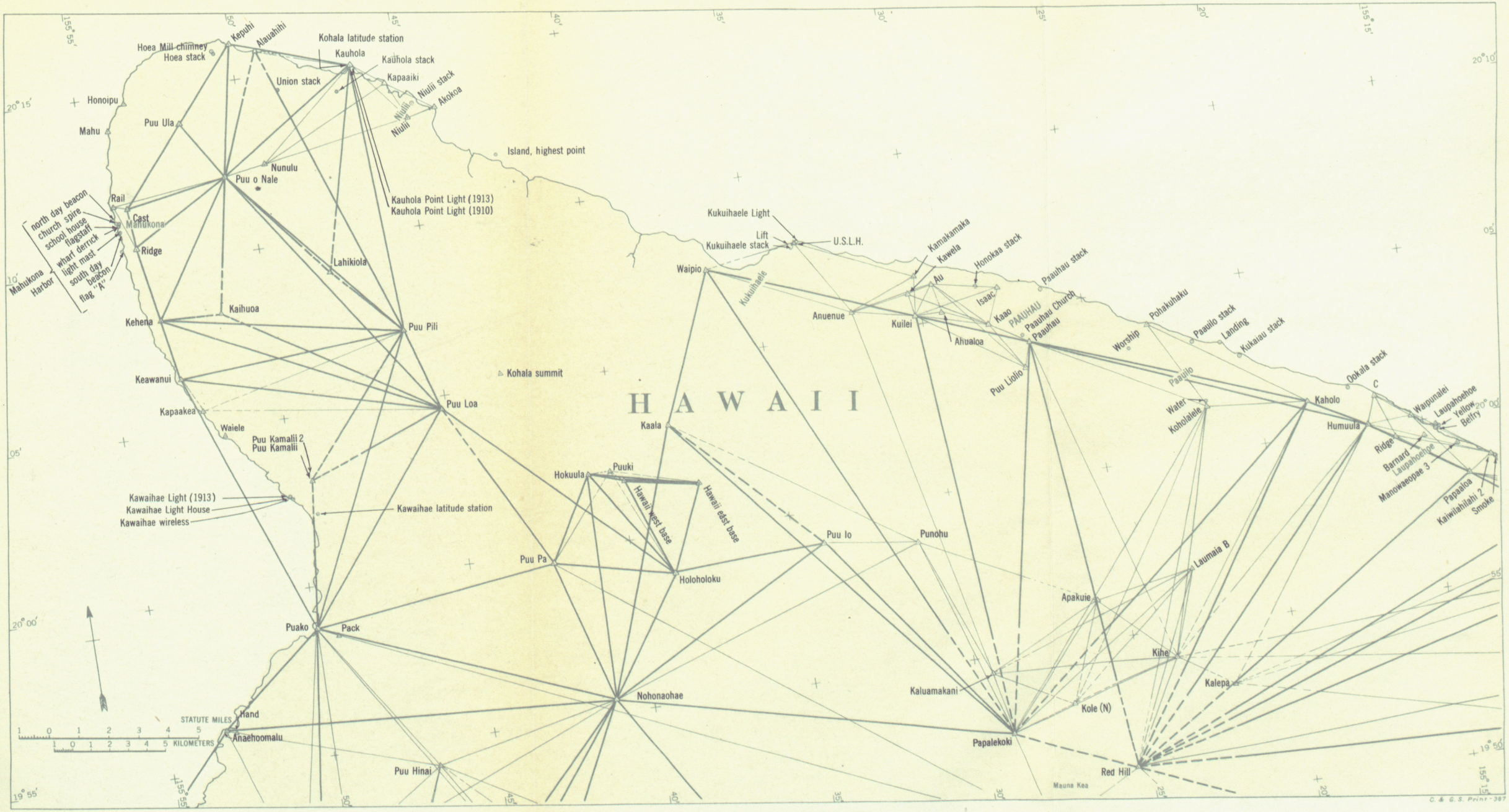


FIG. 14 – HAWAII ISLAND, NORTHERN PART

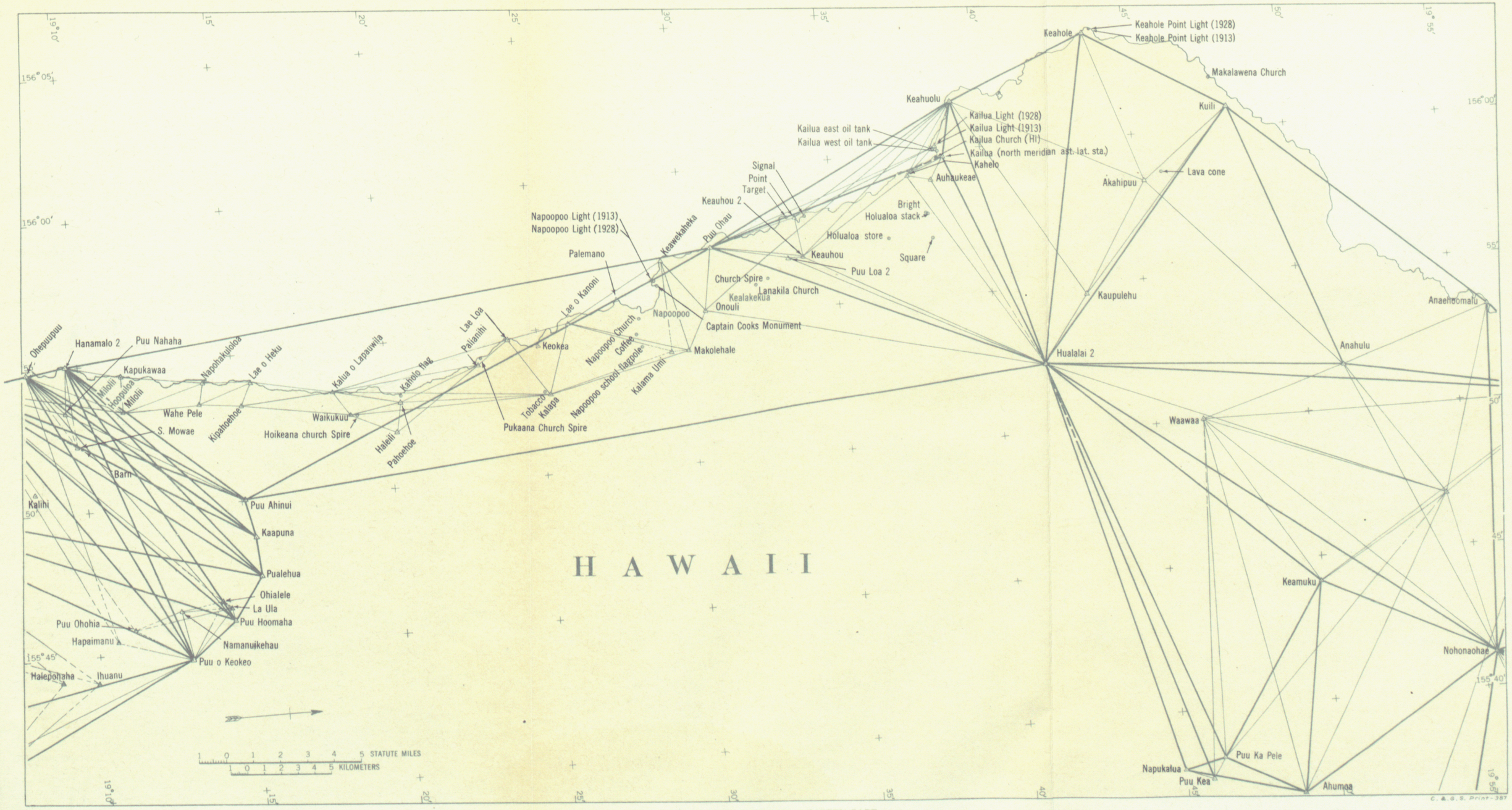


FIG. 15 – HAWAII ISLAND, WESTERN PART

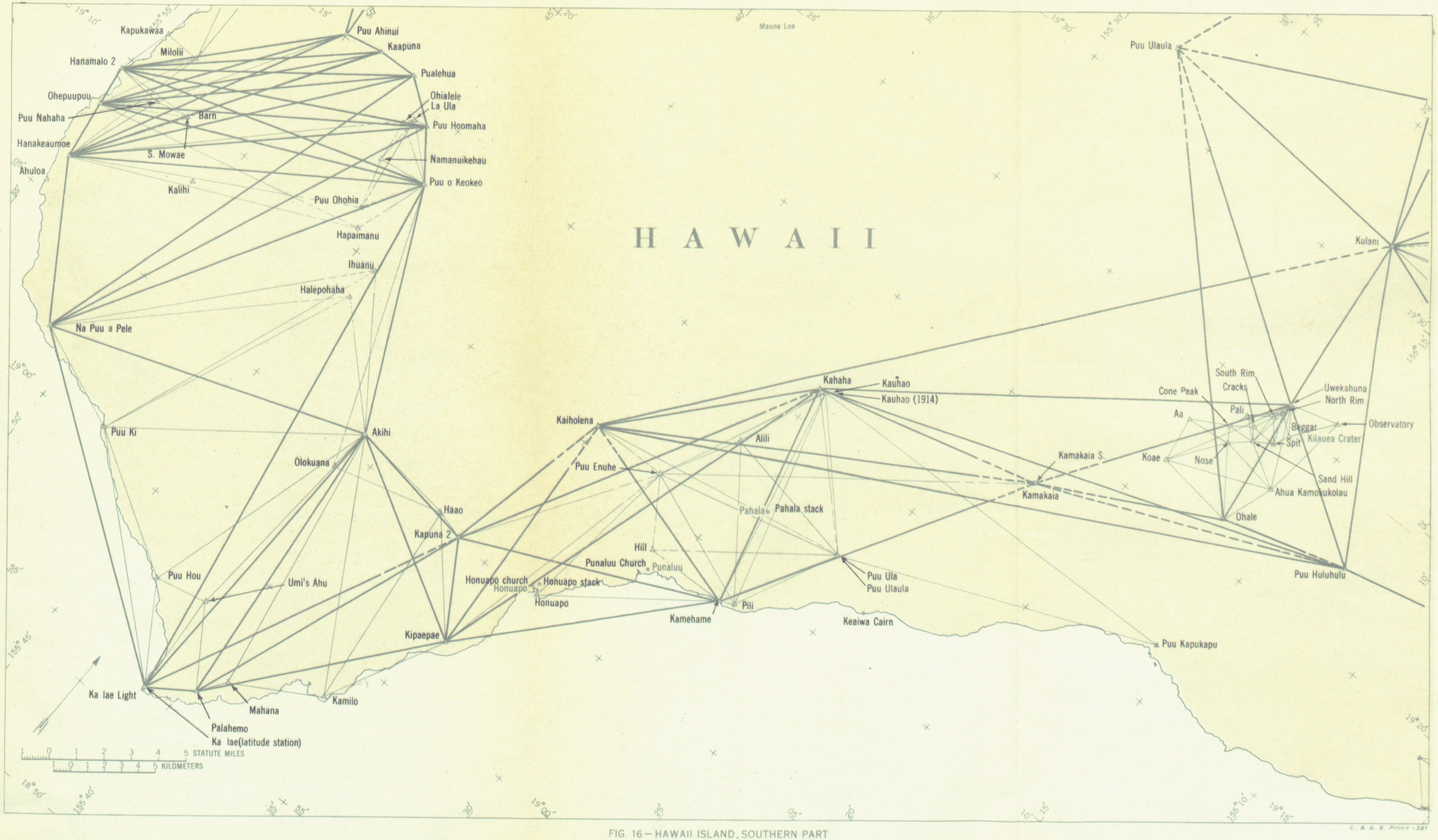


FIG. 16 — HAWAII ISLAND, SOUTHERN PART

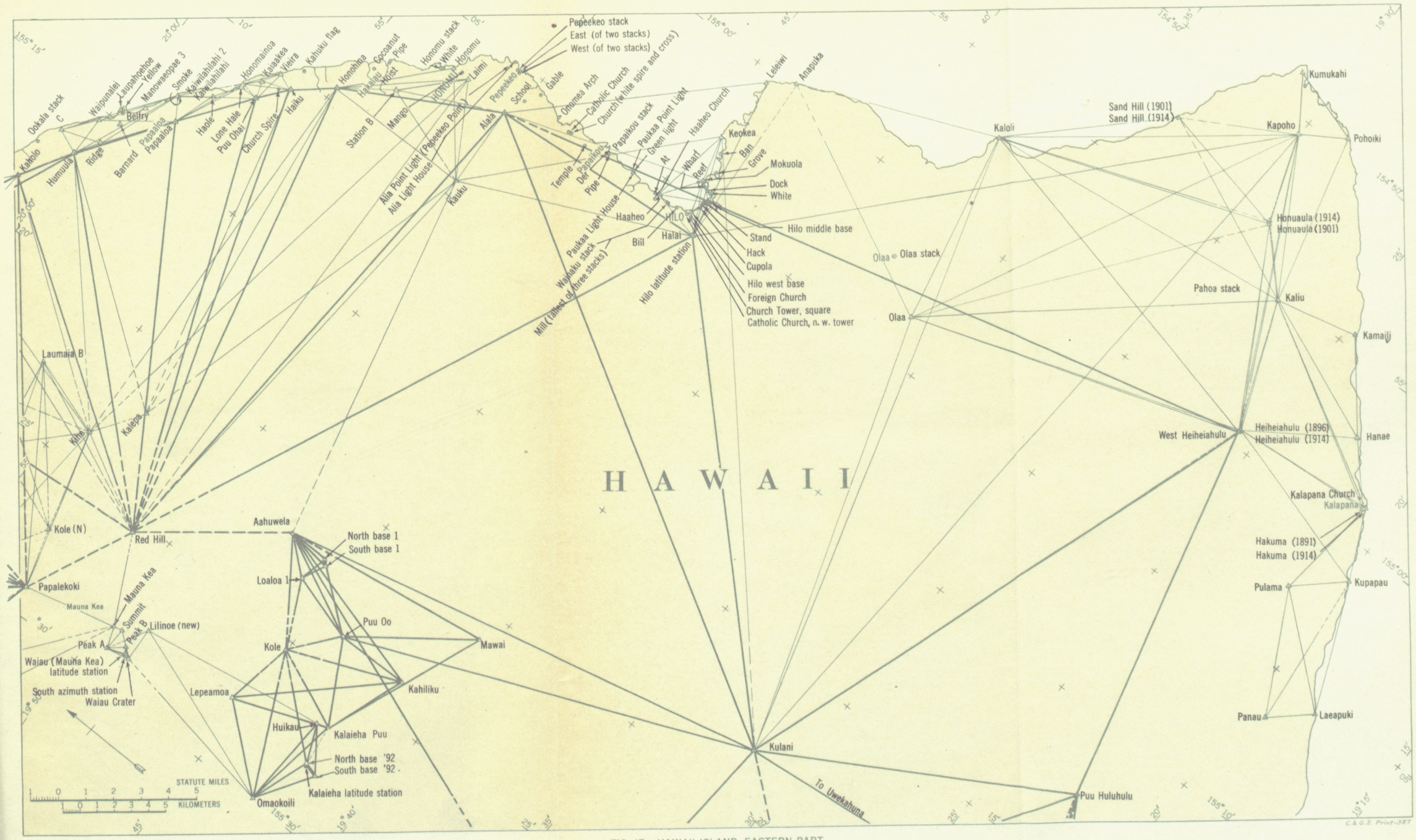


FIG. 17— HAWAII ISLAND EASTERN PART

INDEX TO TRIANGULATION STATIONS

Station	Position	Description	Sketch
	Page	*Page*	*Figure*
A (Kauai)	27		6
A (Molokai)	66		9
Aa	121	212	16
Aahoaka	29	151	6
Aahuwela	132	218	17
Ahaino	65		9
Ahu	37		6
Ahua Kamokukolau	120	211	16
Ahualoa	131		14
Ahukini Light (1910)	28		6
Ahukini Light (1927)	28	150	6
Ahuloa	117		16
Ahumoa	111	204	15
Aid	101	194	12
Ak (cairn)	78		10
Akahipuu	111	205	15
Akihi	104	196	13, 16
Akokoa	107	202	14
Al (Kauai)	42		6
Al (Maui)	82		11
Alaea	83	188	11
Alala (Hawaii)	105	197	13, 17
Alala (Oahu)	61		7
Alau flag	99		11
Alauahihi	108		13, 14
Alia Lighthouse (1900) (Pepeekeo Point)	127		17
Alia Point Light (1912) (Pepeekeo Point)	127		17
Alili	118		16
Allen and Robinson warehouse	53	173	8
Aloha tower	53	173	8
American Cannery water tower	55		8
American Factors Building, dome	53	173	8
Amikopala	74	183	9
Ana	26	149	6
Anaehoomalu	111	204	14, 15
Anahola derrick mast	31		6
Anahulu	103	194	13, 15
Anapuka	122		17
Anuenue	131	218	14
Apakuie	134	219	14
Apuu	69		9
At	126		17
Au	131	217	14
Aug	36	157	6
Auhaukeae	112		15
Awaa	24	145	6
B (Kauai)	27		6
B (Molokai)	66		9
B, Station	127		17
Ban	124		17
Band	101		12
Barbers Point Light	56		7
Barn (Hawaii)	117	209	15, 16
Barn (Oahu)	50	171	7
Barn, south gable	43	161	5
Barnard	129	216	14, 17
Bat (Kauai)	38	158	6
Bat (Maui)	85		11
Bay	39	158	6
Beach	85		11
Beacon, black, No. 3	54		8
Beacon, black, No. 5	54		8
Beacon, black, No. 7	54		8
Beacon, Kahului Harbor, front range	87		11
Beacon, Kahului Harbor, rear range	87		11
Beacon, Mahukona Harbor, north day	109	203	14
Beacon, Mahukona Harbor, south day	109	202	14
Beacon, red, No. 4	54		8
Beacon, red, No. 6	54		8
Beacon, red, No. 8	54		8
Bed	96		11
Beggar	121	212	16
Belfry	129	217	14, 17
Bench	102		12
Bert	102		12
Big	96		11
Bill (Hawaii)	125		17
Bill (Molokai)	65		9
Black (Niihau)	43	161	5
Black (Molokai)	65		9
Black (Kahoolawe)	100	193	12
Black Beacon No. 3	54		8
Black Beacon No. 5	54		8
Black Beacon No. 7	54		8
Black flagpole	34	154	6
Black Point datum point	51	171	7
Blow	100	193	12
Bluff	43	161	5
Bold	94	192	11
Bone	38	158	6
Bridge	34		6
Bright	113	207	15
Bry	41	159	6
Bud	82		11
Buff spire, Waiehu church	88		11
Bull	36	157	6
Burns	56	174	7
Burns (U. S. E.)	56		7
C (Hawaii)	129		14, 17
C (Kauai)	27		6
Cab	65		9
Caddie	25	148	6
Cain (U. S. E.)	58		7
Cairn on hill	79		10
Cam	32	153	6
Camp (Maui)	94		11
Camp (Oahu)	48	168	7
Cane (1910) (Kauai)	33	154	6
Cane (1926) (Kauai)	37	157	6
Cane (Molokai)	65		9
Captain Cook's Monument	115	208	15
Carter flagstaff	51	171	7
Cast	107		13, 14
Catholic Church, Eleele	40		6
Hilo, northwest tower	125		17
Kaupo	99		11
Kealia (1910)	30		6
Kipahulu	93	191	11
Old	59		7
Steeple	126		17
Cave	40	158	6
Cavern	35	156	6
Central Union Church	52	172	8
Change	102		12

Station	Position	Description	Sketch
	Page	*Page*	*Figure*
Chimney, crematory (Garbage)	54	173	8
Hanamaula mill	28	150	6
Hoea mill	108		14
Kapaa, gray	30	152	6
Kealia, black (Steel stack, 1910)	30	152	6
Kealia, gray (Masonry chimney, 1910)	30	152	6
Kekaha mill	37	157	6
Kilauea mill	33	154	6
Large	59		7
Lihue mill (1910)	28		6
Lihue mill (1927)	28	150	6
Makaweli mill	37	158	6
Mill	55		8
Pumping station, Honolulu	54		8
Turtons mill	81		11
Waialua mill (Mill, 1910)	57	175	7
Waianea mill	56		7
Waihee (Mill stack, 1912)	88		11
Wailuku	88		11
Waimea mill (1910)	37		6
Waimea mill (1926)	37	157	6
Church (Maui)	88		11
Church, Catholic, Eleele	40		6
Hilo, northwest tower	125		17
Kaupo	99		11
Kealia (1910)	30		6
Kipahulu	93	191	11
Old	59		7
Steeple	126		17
Church, Central Union	52	172	8
Episcopal (Kauai)	39		6
Foreign	125		17
Haaheo	125		17
Hoikeana	116		15
Honuapo	119	211	16
Kailua (Hi)	113	206	15
Kalapana	123	214	17
Kaluaaha	67	181	9
Kapaa	30		6
Kealia (1927)	30		6
Koloa	41	160	6
Lahaina	81		11
Lahaina, Protestant	81		11
Lanakila	113	206	15
Mahukona Harbor	109	203	14
Makalawena	112	205	15
Mormon	59		7
Napoopoo	115	208	15
Paauhau	131		14
Protestant, East Oahu	59		7
Haleiwa	58		7
Kaupo	99		11
Kipahulu	93	191	11
Lahaina	81		11
Pukaana	116		15
Punaluu	119	211	16
Red (spire)	59		7
Spire (1901) (Hawaii)	129		17
Spire (1928) (Hawaii)	114		15
Spire (Kauai)	32		6
Spire (smoke)	77		10
Tower, square	125		17
Waiehee	88		11
Waiehu	88		11
Waikapu	85		11
Waimea	39		6
White, spire	59		7
White spire and cross	126		17
Cliff	39		6
Cloth	43		5
Cloud	101	194	12
Cob	101	194	12
Coco	96		11
Cocoanut	128	216	17
Coffee	115	209	15
Cone (Kahoolawe)	102		12
Cone (Maui)	96		11
Cone Peak	121	212	16
Cook's monument	115	208	15
Coral	35	156	6
Crack	101		12
Cracks	121	212	16
Craft	101	194	12
Crematory chimney, Honolulu	54	173	8
Cres	33	154	6
Crest	32	153	6
Crows Nest latitude station (Pooku)	23	144	6
Cupola	125		17
Cut	33	154	6
D (Kauai)	27		6
D (Molokai)	66		9
Dan	31	152	6
Dead snag	39		6
Der	126		17
Der (derrick)	33	154	6
Derrick (Der)	33	154	6
Derrick (Kauai)	27	150	6
Derrick (Molokai)	76	185	9
Derrick (Niihau)	43	161	5
Derrick, Anahola	31		6
Kapaa (landing derrick, 1910)	30	152	6
Mahukona Harbor wharf	109	203	14
Waimanalo wharf	61	177	7
Dev	34	154	6
Diamond Head (Leahi)	44	161	4, 7, 8
Diamond Head Lighthouse	51		8
Die	38	158	6
Dig	100	193	12
Dillingham (center of house)	51	172	8
Dillingham (main scheme station)	45	163	7
Din	29	151	6
Dock (Hawaii)	124		17
Dock (Maui)	85		11
Dome, American Factors Building, Honolulu	53	173	8
Drift	26	149	6
Dry (Kahoolawe)	103		12
Dry (Kauai)	39	158	6
Dub	58	175	7
Dun	29	151	6
E	66		9
East (Kauai)	34	154	6
East (Maui)	85		11
East (of two stacks)	127		17
East base, Hawaii	64	180	14
East base, Oahu	48	169	7, 8
East base, Schofield	44	162	7
East gable (Kauai)	42	160	6
Eat (Kahoolawe)	100	193	12
Eat (Kauai)	31	152	6
Eeyrie	32		6
Egg	102		12
Eleele Catholic Church	40		6
Eleele Landing flagstaff	40	159	6
Elks Club, Honolulu	51	172	8
Ena (1910) (Puena, 1927)	58	175	7
End (Kahoolawe)	101	194	12
End (Maui)	96		11
Episcopal Church (Kauai)	39		6
Err	102	194	12
Eshleman (U. S. E.)	57		7
Eve	76	185	9
Ewa Church	48	169	7
Ex	23	144	6
Fen	29	151	6
Fish	95		11
Flag	66		9
Flag, Olokui	71		9
Flag, Schofield Post	58		7

Station	Position	Description	Sketch
	Page	*Page*	*Figure*
Flagpole, Lihue County Building	28	150	6
G. P. Wilcox	61	177	7
Napoopoo school	115	208	15
Near store	38	------	6
Flagstaff, Carter	51	171	7
Eleele Landing	40	159	6
Fort Shafter	55	------	8
Hackfeld Building	53	------	8
Hobsons	85	------	11
Immigration Building	53	173	8
Jap school	34	------	6
Judiciary Building	53	------	8
Kirklands	85	------	11
Mahukona Harbor schoolhouse	109	203	14
Moana Hotel (1909)	52	172	8
Moana Hotel (1925)	51	172	8
Olowalu Mill	81	------	11
Plantation	97	------	11
Quarantine (1909)	55	------	8
Quarantine Island (1925–1928)	55	173	8
Wailupe	50	171	7
Waipouli	29	------	6
Flat (1910)	27	150	6
Flat (1927)	34	155	6
Flat (Oahu)	61	177	7
Flood	37	157	6
Fly (Maui)	85	------	11
Fly (Molokai)	65	------	9
For	97	------	11
Foreign church	125	------	17
Fort	39	------	6
Fort Shafter flagstaff	55	------	8
Front range beacon, Kahului Harbor	87	------	11
Front range light, Kahului Harbor	87	------	11
Front range lighthouse, Honolulu	54	------	8
G, Station	55	174	7
Gable (Hawaii)	126	215	17
Gable (Maui)	96	------	11
Gable (Oahu)	50	171	7
Gale	78	185	10
Gam	43	161	5
Gas	30	152	6
Gay 1	82	------	11
Gay 2	83	------	11
Gil (large cairn)	77	------	10
Gilbert	56	174	7
Goat	101	193	12
Gov	41	159	6
Government flag	41	------	6
Green light	126	------	17
Green roof, north gable	38	------	6
Grey	100	193	12
Grove	124	------	17
Haaheo	123	213	17
Haaheo Church	125	------	17
Haao	118	------	16
Hack	125	------	17
Hackfeld Building flagstaff	53	------	8
Haena	34	------	6
Hahaeule	73	------	9
Haiku (Hawaii)	105	198	13, 17
Haiku (Maui)	83	188	11
Haiku latitude station	21	------	11
Hak	86	189	11
Hakuma (1891)	121	------	17
Hakuma (1914)	121	212	17
Halai	105	197	13, 17
Halawa	68	------	9
Halawa Barrel	44	161	7
Hale	24	146	6
Hale o Lono	76	------	9
Haleakala 1	83	188	11
Haleakala 2	83	188	11
Halehaku	90	------	11
Haleili	116	------	15
Haleiwa Hotel	58	------	7
Halemano	45	163	7
Haleniki	90	------	11
Halepohaha	117	------	15, 16
Han	28	151	6
Hana latitude station (Kauiki)	21, 84	189	11
Hanae	121	------	17
Hanahanapuni	22	142	6
Hanakauhi	83	188	11
Hanakeaumoe	104	196	13, 16
Hanalei	23	144	6
Hanalei latitude station (Pooku)	21, 23	144	6
Hanamalo 2	103	196	13, 15, 16
Hanamaulu Mill chimney	28	150	6
Hanamaulu warehouse	28	------	6
Hanawi	91	190	11
Hand	110	204	14
Haole	129	------	17
Haou	93	192	11
Hapaimanu	117	------	15, 16
Har	29	151	6
Hauakea	75	------	9
Haupu	71	------	9
Haw	40	159	6
Hawaii east base	64	180	14
Hawaii west base	64	180	13, 14
Hawaiian Electric Co., northwest stack	53	173	8
Hawaiian Electric Co., southeast stack	53	173	8
Hawaiiloa Hill	61	177	7
Hawea	80	187	11
Hay	86	189	11
Heela	46	165	7
Heela mill stack	60	------	7
Heiheiahulu (1896)	121	------	17
Heiheiahulu (1914)	121	212	17
Hekili	63	178	4, 11
Heleleikeoha	91	------	11
Hen (Kauai)	29	151	6
Hen (Maui)	86	189	11
Herd	39	------	6
Hi (Kailua Church)	113	206	15
Hid	41	159	6
High gable	42	160	6
Highest tree, Robinsons yard	43	------	5
Hihimanu	23	143	6
Hill (1914)	119	211	16
Hilo Catholic Church, northwest tower	125	------	17
Hilo latitude station	21	------	17
Hilo middle base	123	------	17
Hilo west base	123	------	17
Hinihini	32	153	6
Hoa (Kawaihoa)	43	160	4, 5
Hobsons flagstaff	85	------	11
Hock	76	------	9
Hoea mill chimney (1910)	108	------	14
Hoea stack (1913)	108	202	14
Hoikeana church	116	------	15
Hoist	128	216	17
Hokukano	97	192	11
Hokunui	25	148	6
Hokuula	63	180	13, 14
Holoholoku	63	180	13, 14
Holualoa stack	113	206	15
Holualoa store	113	206	15
Hon	35	157	6
Honohina	105	198	13, 17
Honoipu	108	202	14
Honokaa stack	131	218	14
Honokahau (O)	80	187	11
Honokala	90	------	11
Honokalani	84	189	11
Honolulu:			
A. and R. warehouse	53	173	8
Aloha tower	53	173	8

Station	Position	Description	Sketch
Honolulu—Continued.			
American Cannery water tower	Page 55	Page	Figure 8
Central Union Church	52	172	8
Crematory chimney	54	173	8
Dome, American Factors Building	53	173	8
Elks Club	51	172	8
Hackfeld Building flagstaff	53		8
Hawaiian Electric Co., northwest stack	53	173	8
Hawaiian Electric Co., southeast stack	53	173	8
Immigration Building flagstaff	53	173	8
Judiciary Building flagstaff	53		8
Kalihi fire station	55	173	8
Kumulae	52	172	8
Latitude station	21		8
Lighthouse	54		8
Lighthouse, front range	54		8
Lighthouse, rear range	55		8
Longitude monument	21, 53	173	8
Lunalilo Home	52	172	8
Moana Hotel flagstaff (1909)	52	172	8
Moana Hotel flagstaff (1925)	51	172	8
Oahu Pen	55	173	8
Pineapple tank	55		8
Post office, northwest tower	53	173	8
Post office, southeast tower	53	173	8
Pumping station chimney	54		8
Quarantine flagstaff (1909)	55		8
Quarantine Island flagstaff (1925–1928)	55	173	8
Red gas tank	55	173	8
Royal Hawaiian Hotel	52		8
Sacred Heart Academy	51	172	8
St. Andrews Cathedral	53	172	8
Transit of Venus	53	173	8
University of Hawaii, Library	52	172	8
Wireless pole	53		8
Honomaele	91		11
Honomainoa	128		17
Honomu	127	215	17
Honomu stack	128		17
Honomuni	68	181	9
Honono	33	154	6
Honopou	90		11
Honouli	68		9
Honouliuli	48	169	7
Honuapo	119	210	16
Honuapo church	119	211	16
Honuapo stack	119	210	16
Honuaula (1901)	123		17
Honuaula (1914)	123	214	17
Hope	102		12
Horn	41	159	6
Hot	101	194	12
House (Dillingham)	51	172	8
House, north gable	43		5
House on mountain	82		11
House, small white	41	160	6
Hualalai 2	103	194	13, 15
Huelo	83	188	11
Huikau	133		17
Hump	102		12
Humu	70		9
Humuula	106	198	13, 14, 17
Hunt	95	192	11
Hut	95		11
Ihuanu	117		15, 16
Immigration Building flagstaff	53	173	8
Inez	98		11
Ioleau	41	159	6
Ip (wharf)	78		10
Isaac	131		14
Island, highest point	107	202	14
It	97		11
Iwi o Pele	93	192	11
Jap school flagstaff	34		6
John	67		9
Judiciary Building flagstaff	53		8
Ka	59	175	7
Ka lae (astronomic lat. sta.)	21, 104	196	13, 16
Ka lae Light	118		16
Ka Lae o K Ilio	92	191	11
Ka Ilio (Ka Lae o)	92	191	11
Kaa (Lanai)	79	186	10
Kaa (Laina) (Molokai)	73	182	9
Kaala	106	200	13, 14
Kaana	74		9
Kaao	131		14
Kaapa	78	186	10
Kaapahu (Maui)	99		11
Kaapahu (Molokai)	64	180	9
Kaapuna	104		13, 15, 16
Kaaumakua	59	175	7
Kaea	77		10
Kaena (Lanai)	77		10
Kaena (Oahu)	57	174	7
Kaena Point Light	57		7
Kaena Point (U. S. E.)	57		7
Kaeo (Molokai)	73	182	9
Kaeo (Niihau)	42	160	5
Kahaha	105		13, 16
Kahakuloa (Koae)	80	187	11
Kahala Light (1927)	31	152	6
Kahala Light mast (1910)	31		6
Kahaluu Landing	60	176	7
Kahanahaiki (U. S. E.)	49		7
Kahe	47	166	7
Kahekupapau	74		9
Kahelo	112	205	15
Kahenawai	75		9
Kahiliku	132		17
Kaholo (Hawaii)	106	198	13, 14, 17
Kaholo (Lanai)	78	185	10
Kaholo flag	116		15
Kahoolawe	63	178	4, 12
Kahoolawe hydrographic	100		12
Kahualewa	74	183	9
Kahuku	49	170	7
Kahuku flag	129		17
Kahuku latitude station	21		7
Kahuku mill chimney	59		7
Kahuku New	45	164	7
Kahului	84	189	11
Kahului bank, cupola	87		11
Kahului Breakwater Light	87		11
Kahului electric-light stack	87		11
Kahului Harbor front range beacon	87		11
Kahului Harbor front range light	87		11
Kahului Harbor rear range beacon	87		11
Kai	22	141	6
Kalaakea	128		17
Kaiholena	105	197	13, 16
Kaihuakala	99	193	11
Kaihuoa	109		14
Kailiu	35	155	6
Kailua (north meridian ast. lat. sta.)	21, 103	195	13, 15
Kailua (Oahu)	60	176	7
Kailua Church (Hi)	113	206	15

Station	Position	Description	Sketch
	Page	*Page*	*Figure*
Kailua east oil tank	113	------	15
Kailua Light (1913)	113	206	15
Kailua Light (1928)	113	------	15
Kailua west oil tank	113	------	15
Kaimaloo	97	------	11
Kaimuki	51	171	8
Kaimuki fire station	51	172	8
Kaiole	39	158	6
Kaipapau	59	175	7
Kaiwilahilahi	128	216	17
Kaiwilahilahi 2	129	216	14, 17
Kakaako	73	182	9
Kakalahale	64	------	9
Kal	42	160	4, 5
Kala	35	156	6
Kalaeloa	65	180	9
Kalahaku	89	------	11
Kalaieha latitude station	21	------	17
Kalaieha Puu	133	------	17
Kalalau	23	145	6
Kalamaula	65	------	9
Kalama Umi	115	------	15
Kalanikaula	68	182	9
Kalanipuu	27	------	6
Kalapa	114	207	15
Kalapamoa	65	------	9
Kalapana Church	123	214	17
Kalawao	70	------	9
Kalepa (Hawaii)	135	219	14, 17
Kalepa (Kauai)	22	141	4, 6
Kalepa (Maui)	92	191	11
Kalepeamoa	51	172	7
Kaliae	91	------	11
Kalihi	117	------	15, 16
Kalihi Channel datum point	55	173	8
Kalihi fire station	55	173	8
Kaliu	123	214	17
Kaloli	122	213	17
Kalolo	35	156	6
Kaluaaha	65	------	9
Kaluaaha Church	67	181	9
Kaluahauoni	73	------	9
Kaluakawahine	75	------	9
Kaluamakani	134	219	14
Kalua o Lapauwila	114	207	15
Kaluanui (Pakihi)	83	188	11
Kaluaolohe	73	------	9
Kamalli	124	------	17
Kamakaia	120	------	16
Kamakaia S	119	211	16
Kamakamaka	131	217	14
Kamakou	72	------	9
Kamalo	67	------	9
Kamalo 2	67	181	9
Kamalo Harbor (shack)	67	181	9
Kamehame	105	197	13, 16
Kamilo	118	210	16
Kamoku	23	143	6
Kamole	89	------	11
Kanahena Point Light	96	------	11
Kanehale	67	------	9
Kaneiamoa	71	------	9
Kaneohe	60	176	7
Kanepuu	62	178	4, 10
Kani	39	158	6
Kaniakani	98	------	11
Kanupa	69	------	9
Kaohu	73	------	9
Kaonoulu	98	------	11
Kap	29	152	6
Kapaa Church	30	------	6
Kapaa derrick (1910) (Kapaa landing derrick, 1927)	30	152	6
Kapaa gray chimney (1927) (Stack, 1910)	30	152	6
Kapaa west tin stack	29	152	6
Kapaalki	107	201	14
Kapaakea	109	------	14
Kapaka	59	175	7
Kapapa Island	60	176	7
Kapoho	123	214	17
Kapu	56	174	7
Kapuai (Maui)	89	190	11
Kapuai (old station) (Oahu)	48	------	------
Kapuai New	44	162	7
Kapukawaa	115	208	15, 16
Kapuna 2	105	197	13, 16
Kapuupoi	69	------	9
Kau (Kauai)	38	158	6
Kau (Lanai)	78	186	10
Kaua	47	167	7
Kauai north base	22	142	6
Kauai south base	22	141	6
Kaualua	90	------	11
Kauaula Makai	81	------	11
Kauhakamoa	99	------	11
Kauhako	73	------	9
Kauhao (1894)	118	------	16
Kauhao (1914)	119	211	16
Kauhiahua	70	------	9
Kauhikoa (Luahine)	89	190	11
Kauhola	107	200	13, 14
Kauhola Point Light (1910)	108	------	14
Kauhola Point Light (1913)	108	202	14
Kauhola stack	108	202	14
Kauiki (Hana lat. sta.)	84	189	11
Kauku	127	215	17
Kaukukanaka	99	------	11
Kaula Island	44	------	4, 5
Kaulahuki	71	------	9
Kaulapuu (Middle Hill)	62	177	9
Kauluwai	72	------	9
Kaumalapau north wireless pole	79	186	10
Kaumalapau red light	79	186	10
Kaumalapau south wireless pole	79	186	10
Kaumalapau white light	79	186	10
Kaumikaohu	98	------	11
Kaunakakai	62	177	9
Kaunakakai front range light	66	------	9
Kaunakakai Harbor shack	67	------	9
Kaunakakai rear range light	66	------	9
Kaunakakai wireless mast	67	------	9
Kaunuohua	71	------	9
Kaunupahu	70	------	9
Kaupakuhale	48	168	7
Kaupikiawa	73	------	9
Kaupo latitude station	21	------	11
Kaupo Catholic Church	99	------	11
Kaupo Protestant Church	99	------	11
Kaupoa	75	184	9
Kaupulehu	112	------	15
Kaw (Kawaewae)	43	160	4, 5
Kawaewae (Kaw)	43	160	4, 5
Kawaihae latitude station	21	------	14
Kawaihae Light (1913)	110	203	14
Kawaihae Lighthouse	110	------	14
Kawaihae wireless	110	204	14
Kawaihapai	57	------	7
Kawaihoa (Hoa)	43	160	4, 5
Kawaikapu	68	------	9
Kawailoa	58	175	7
Kawaloa	99	------	11
Kawela (Hawaii)	131	------	14
Kawela (Oahu)	45	164	4, 7
Kawelikoa	25	148	6
Kea	26	149	6
Keaau (old station)	49	169	7
Keaau 2	47	167	7
Keahikauo	80	187	11
Keahole	103	195	13, 15
Keahole Point Light (1913)	112	205	15
Keahole Point Light (1928)	112	205	15
Keahuolu	103	195	13, 15
Keaiwa Cairn	119	211	16
Keakaamanu	93	192	11
Kealia (Kauai)	23	142	6
Kealia (Oahu)	47	168	7

Station	Position	Description	Sketch
	Page	*Page*	*Figure*
Kealia (U. S. E.)	57	------	------
Kealia black chimney (1927) (Steel stack, 1910)	30	152	6
Kealia Catholic Church (1910)	30	------	6
Kealia Church (1927)	30	------	6
Kealia gray chimney (1927) (Masonry chimney, 1910)	30	152	6
Keamuku	111	204	15
Keana	45	165	7
Keanae Uka	91	190	11
Keauhou	112	------	15
Keauhou 2	113	206	15
Keawanui (Hawaii)	107	200	13, 14
Keawanui (Molokai)	67	181	9
Keawaula (Army)	57	------	7
Keawekaheka	114	207	15
Kehena	107	200	13, 14
Keikei	38	158	6
Kekaa	79	187	11
Kekaalaau	82	------	11
Kekaha mill chimney	37	157	6
Kekepa Island	60	176	7
Ken	36	157	6
Keokea (Hawaii east coast)	122	213	17
Keokea (Hawaii west coast)	116	209	15
Keolawa	71	------	9
Keonenelu	97	------	11
Keopaweo	22	141	4, 6
Kepookoholua	69	------	9
Kepu (U. S. E.)	56	------	7
Kepuhi (Hawaii)	107	201	13, 14
Kepuhi (Oahu)	56	174	7
Kepuhi New	47	167	7
Kid	102	------	12
Kieiei	93	191	11
Kihaapilani	75	184	9
Kihe	134	219	14, 17
Kihei	94	------	11
Kihei mill	95	------	11
Kihei stack (pipe)	95	------	11
Kikipua	71	------	9
Kikoo	22	140	4, 6
Kil	33	154	6
Kila	24	145	6
Kilauea	23	143	6
Kilauea landing stack	32	153	6
Kilauea Light	33	154	6
Kilauea mill chimney	33	154	6
Kilea	81	187	11
Kilohana (Kauai)	22	141	4, 6
Kilohana (Molokai)	70	------	9
Kin	28	150	6
Kiolea	91	------	11
Kipaepae	105	196	13, 16
Kipahoehoe	114	------	15
Kipahulu Catholic Church	93	191	11
Kipahulu Protestant Church	93	191	11
Kirklands flagstaff	85	------	11
Koa	26	------	6
Koae	120	211	16
Koae (Kahakuloa)	80	187	11
Koali	99	------	11
Kohala latitude station	21	------	14
Kohala summit	110	------	14
Koholalele	134	219	14
Koki	39	158	6
Koko Crater	49	170	7
Koko Head	49	170	7
Koko Head 2	49	------	7
Koko Head 3	46	166	7
Koko Head datum point	50	170	7
Kokole	25	147	6
Kole	132	------	17
Kole (N)	134	------	14, 17
Kolekole	63	179	4, 11
Koloa Church	41	160	6
Koloa latitude station	21	------	6
Konahuanui	49	170	7
Konahuanui 2	51	171	7
Kopala	74	183	9
Kualoa	46	165	7
Kuiaha	90	------	11
Kuiki	89	------	11
Kuilei	106	199	13, 14
Kuili	103	194	13, 15
Kukaiau stack	130	------	14
Kukii Point Light	27	150	6
Kukui	74	------	9
Kukuihaele Light	131	218	14
Kukuihaele stack	132	218	14
Kulani	105	197	13, 16, 17
Kuloli	89	------	11
Kum	47	167	7
Kumimi	69	------	9
Kumukahi	124	214	17
Kumulae	52	172	8
Kupapau	122	212	17
Kupeke	69	------	9
La Ula	117	------	15, 16
Laaukahi	25	148	6
Lad	85	------	11
Lae Loa	114	207	15
Lae o Heku	115	208	15
Lae o Kanoni	114	207	15
Laeapuki	122	213	17
Lahaina Church	81	------	11
Lahaina Courthouse	80	187	11
Lahaina latitude station	21	------	11
Lahaina Protestant Church	81	------	11
Lahaina wireless pole (Pa)	81	------	11
Lahikiola	109	------	14
Lahilahi	47	167	7
Laie (Laie 2)	49	170	7
Laie 1	45	165	7
Laimi	127	215	17
Laina (Kaa) (Molokai)	73	182	9
Laina (Maui)	79	187	11
Lak	45	164	7
Lake	43	------	5
Lamaloa	69	------	9
Lan	33	154	6
Lanakila Church	113	206	15
Landing	130	217	14
Lani	25	147	4, 5, 6
Lanipo	46	166	7
Large chimney	59	------	7
Last	85	------	11
Latitude station, Haiku	21	------	11
Hana	21, 84	189	11
Hanalei	21, 23	144	6
Hilo	21	------	17
Honolulu	21	------	8
Ka lae	21, 104	196	13, 16
Kahuku	21	------	7
Kailua	21, 103	195	13, 15
Kalaieha	21	------	17
Kaupo	21	------	11
Kawaihae	21	------	14
Kohala	21	------	14
Koloa	21	------	6
Lahaina	21	------	11
Mauna Kea (Waiau)	21, 133	219	17
Pakaoao	21	------	11
Waiau (Mauna Kea)	21, 133	219	17
Waikiki C. & G. S	21	------	8
Waimea	21, 25	147	6
Lau	94	------	11
Laumaia B	134	------	14, 17
Launiupoko	79	187	11
Laupahoehoe	129	216	14
Lava (Kauai)	40	159	6
Lava (Maui)	96	------	11
Lava cone	112	205	15
Law	41	159	6
Leahi (Diamond Head)	44	161	4, 7, 8
Leaning stack	87	------	11
Lehua	42	160	4, 5

Station	Position	Description	Sketch
	Page	*Page*	*Figure*
Leinaopaplo	71		9
Leleiwi	124	214	17
Lelemako	70		9
Lepeamoa	133		17
Lew	94		11
Lia	26	149	6
Library, University of Hawaii	52	172	8
Lift	131	218	14
Light:			
Ahukini (1910)	28		6
Ahukini (1927)	28	150	6
Alia (1900) (Pepeekeo Point)	127		17
Alia Point (1912) (Pepeekeo Point)	127		17
Barbers Point	56		7
Green	126		17
Ka lae	118		16
Kaena Point	57		7
Kahala (1910)	31		6
Kahala (1927)	31	152	6
Kahului breakwater	87		11
Kahului Harbor front range	87		11
Kailua (1913)	113	206	15
Kailua (1928)	113		15
Kanahena Point	96		11
Kauhola Point (1910)	108		14
Kauhola Point (1913)	108	202	14
Kaumalapau, red	79	186	10
Kaumalapau, white	79	186	10
Kaunakakai, front range	66		9
Kaunakakai, rear range	66		9
Kawaihae	110	203	14
Keahole Point (1913)	112	205	15
Keahole Point (1928)	112	205	15
Kilauea	33	154	6
Kukii Point	27	150	6
Kukuihaele	131	218	14
Makahuena Point	42	160	6
Nakalele Head	82	188	11
Napoopoo (1913)	115	208	15
Napoopoo (1928)	115	208	15
Ninini Point (Nawiliwili Harbor)	27	150	6
Paukaa Point (1912)	126		17
Pepeekeo Point (Alia Point, 1912)	127		17
Sand Island	54		8
Light mast, Mahukona Harbor	109	203	14
Lighthouse	97		11
Lighthouse, Alia (1900) (Pepeekeo Point)	127		17
Diamond Head	51		8
Honolulu	54		8
Honolulu front range	54		8
Honolulu rear range	55		8
Kawaihae	110		14
Makapuu Point	61		7
Paukaa	125		17
Southwest Point	75		9
Lihau	81		11
Lihue County Building	28	150	6
Lihue mill chimney (1910)	28		6
Lihue mill chimney (1927)	28	150	6
Lihue, mutual wireless pole	27	150	6
Lik	31	152	6
Lilinoe (new)	133		17
Loa (see Hawaiiloa Hill)	61	177	7
Loaloa 1	132		17
Log	33	153	6
Lolo (Kauai)	24	145	6
Lolo (Oahu)	47	168	7
Lolo 2 (Kauai)	35	155	6
Lom	31	153	6
Lone Hale	129		17
Lone tree	38		6
Long gray shed, east gable	27		6
Long gray shed, west gable	27	150	6
Longitude monument, Honolulu	21, 53	173	8
Longitude, Niu	21, 50	171	7
Lookout tower	56		7
Lorrins Hill	89		11
Lost	79	186	10
Low	101	194	12
Lua	24	146	6
Luahine (Kauhikoa)	89	190	11
Lualailua	92	191	11
Lucas	50	171	7
Luke	86	189	11
Lump	100	193	12
Lunalilo Home	52	172	8
Lupehu	69	182	9
Maalaea	94		11
Mac	41	159	6
Mahana	118	210	16
Mahilikua	67	181	9
Mahu	108	202	14
Mahukona Harbor Church	109	203	14
Mahukona Harbor flag "A"	109		14
Mahukona Harbor light mast	109	203	14
Mahukona Harbor north day beacon	109	203	14
Mahukona Harbor schoolhouse flagstaff	109	203	14
Mahukona Harbor south day beacon	109	202	14
Mahukona Harbor wharf derrick	109	203	14
Mahukona Light	109	203	
Maili	45	163	7
Mailiili (1875)	56	174	7
Mailiili (1927)	56	174	7
Maka (1910)	39	158	6
Maka (1927)	35	155	6
Makaha (Kauai)	24	145	6
Makaha (Oahu)	47	167	7
Makaha (U. S. E.)	57		7
Makaha 2 (Kauai)	35	155	6
Makahahaua	93	192	11
Makahuena Point Light	42	160	6
Makakupaia	64		9
Makalawena Church	112	205	15
Makaliihanau	93	192	11
Makana	33		6
Makapuu Point	48	169	7
Makapuu Point Light	61		7
Makaweli mill chimney	37	158	6
Makiki	52		8
Makolehale	114		15
Makolelau	67		9
Makua (U. S. E.)	49	169	
Makua 2	47	168	7
Malo	80	187	11
Mana	24	146	6
Mana 2	35	156	6
Manana Island	61	177	7
Manawahua	47	166	4, 7
Manawai	67		9
Maneoneo	92	191	11
Mango	127	215	17
Manini (Puu Kolii)	80		11
Manowaeopae 3	129	216	14, 17
Manui	78	186	10
Mapulehu	65	180	9
Mast (most westerly radio)	50	170	7
Maui north base	63	179	11
Maui south base	63	178	11
Maulu	28	150	6

Station	Position	Description	Sketch
	Page	*Page*	*Figure*
Mauna Kea	134	219	17
Mauna Kea Latitude Station (Waiau)	21, 133	219	17
Mauna Loa	62	177	4, 9
Mauna Oune	78	------	10
Mauna Una	44	162	7
Maunalua Bay datum point	50	170	7
Mauumea	51	------	7, 8
Mawai	133	------	17
Mawini (Puu)	98	193	11
Mc	33	154	6
McBryde Landing warehouse	40	------	6
McBryde new sugar mill, stack (1928)	41	159	6
McBryde sugar mill, northwest stack (1904)	41	159	6
Mid	96	------	11
Middle base, Hilo	123	------	17
Middle Hill (Kaulapuu)	62	177	9
Middle of roof	82	------	11
Militres	61	177	7
Mill (1910) (Waialua mill chimney, 1927)	57	175	7
Mill (Kihei)	95	------	11
Mill (Maui)	85	------	11
Mill (tallest of 3 stacks) (Hawaii)	125	------	17
Mill chimney	55	------	8
Milo	35	------	6
Milolii	115	208	15, 16
Mo (Windmill)	77	------	10
Moana Hotel (1909)	52	172	8
Moana Hotel (1925)	51	172	8
Moanui	68	------	9
Mok	57	174	7
Mokapu (Molokai)	71	------	9
Mokapu (Oahu)	46	166	4, 7
Mokohola	73	------	9
Mokolea Rock	61	177	7
Mokolii Island	59	175	7
Moku	47	168	7
Moku o Loe Island	60	176	7
Mokuhooniki	68	181	9
Mokuia	92	191	11
Mokuleia	57	174	7
Mokuleia (U. S. E.)	49	------	7
Mokulua Island	61	177	7
Mokuola	123	213	17
Mol	31	152	6
Moloaa	26	149	6
Molokai north base	62	------	9
Molokai south base	62	------	9
Molokini	100	193	11
Mopua	93	192	11
Mormon Church	59	------	7
Mos	35	157	6
Mowae (S.)	116	------	15, 16
Mutual wireless pole, Lihue	27	150	6
N	37	------	6
Na	24	145	6
Na Puu a Pele	104	196	13, 16
Na Puu Kulua 2	76	184	9
Naholoku	92	191	11
Nahuna	95	------	11
Nak	37	158	6
Nakalele Head Light	82	188	11
Namanuikehau	117	------	15, 16
Nan	36	157	6
Nana	79	186	10
Nanualele	91	------	11
Naopu Mauka	92	191	11
Napohakuloloa	115	208	15
Napoopoo Church	115	208	15
Napoopoo Light (1913)	115	208	15
Napoopoo Light (1928)	115	208	15
Napoopoo school flagpole	115	208	15
Napukalua	111	------	15
Napuukulua	73	183	9
Nat	66	180	9
Nawai	111	204	--------
Nawiliwili Harbor (Ninini Point) Light	27	150	6
Niha	34	155	6
Niha 2	33	153	6
Ninini Point Light (Nawiliwili Harbor)	27	150	6
Niu longitude	21, 50	171	7
Niulii	107	201	14
Niulii stack	107	202	14
Nohili	36	157	6
Nohili 2	35	156	6
Nohonaohae	63	179	13, 14, 15
Nomilo	25	148	6
Nonou	22	142	6
Noon (Kahoolawe)	102	------	12
Noon (Molokai)	66	------	9
North base 1	132	------	17
North base '92	133	------	17
North base, Kauai	22	142	6
North base, Maui	63	179	11
North base, Molokai	62	------	9
North base (U. S. E)	55	173	8
North gable, green roof	38	------	6
North meridian (Kailua, lat. sta.)	103	195	13
North Rim	121	212	16
North wireless pole, Kaumalapau	79	186	10
Northmost high mast Wailupe	50	------	7
Northwest gable, north house	36	------	6
Nose	120	212	16
Nuk	42	160	6
Nunulu	107	201	14
Nupawei Kukuio Piikea	97	------	11
Nut	66	------	9
Nye (Pinnacle Peak)	31	------	6
O (Honokahau)	80	187	11
Oahu east base	48	169	7, 8
Oahu Pen	55	173	8
Oahu west base	48	169	7, 8
Oar	103	------	12
Observatory	120	211	16
Ohai	93	192	11
Ohale	120	211	16
Ohepuupuu	104	196	13, 15, 16
Ohialele	117	------	15, 16
Ohianui	65	------	9
Ohikilolo	57	------	7
Ohulehule	46	165	7
Oke	76	------	9
Okohola	83	188	11
Ol	29	151	6
Olaa	122	213	17
Olaa stack	124	214	17
Olai	86	189	11
Old	40	159	6
Old Catholic Church	59	------	7
Old government wharf, southeast corner	40	------	6
Oleleuwe	72	------	9
Olinda	89	------	11
Olokuana	118	------	16
Olokui flag	71	------	9
Olomana	61	------	7
Olopawa	84	188	11
Olowalu mill flagstaff	81	------	11
Olowalu stack	81	------	11
Omaokoili	133	218	17
Onini	64	180	9
Onomea Arch	126	215	17
Onouli	114	------	15
Ookala stack	130	------	14, 17
Oomano	38	158	6
Opae	24	146	6
Opana	45	164	7

Station	Position	Description	Sketch
	Page	*Page*	*Figure*
Opane	90		11
Opikoula	84	188	11
O'Reilly	45	163	7
Pa (Lahaina wireless pole)	81		11
Paa	25	148	6
Paauhau	106	199	13, 14
Paauhau Church	131		14
Paauhau stack	130		14
Paauilo stack	130		14
Pack	110	204	14
Paehala	99		11
Pahala stack	119	211	16
Paheehee	48	169	7
Paheehee New	47	167	7
Paheehee (U. S. E.)	48		
Pahoa stack	124	214	17
Pahoehoe	116		15
Pahu	60	176	7
Pahuolona	99	193	11
Paia stack	88		11
Pakaoao latitude station	21		11
Pakihi (Kaluanui)	83	188	11
Pal	31	152	6
Palaha	83	188	11
Palahemo	105	196	13, 16
Palemano	116	209	15
Pali (Hawaii)	121	212	16
Pali (Kauai)	23	144	6
Palianihi	116	209	15
Palm	38		6
Panau	122	213	17
Paniau	42	160	4, 5
Pap (Kauai)	31	152	6
Pap (Molokai)	76	185	9
Papa	61		7
Papaa (Kauai)	26	149	6
Papaa (Oahu)	60		7
Papaaloa	106	198	13, 14, 17
Papai	25	147	6
Papaikou stack	126		17
Papalekoki	106	199	13, 14, 17
Papau	49	170	7
Patch	95		11
Paukaa Lighthouse	125		17
Paukaa Point Light (1912)	126		17
Paumalu (U. S. E.)	58		7
Pauoa	52		8
Paupau	62	178	4, 11
Pauwalu	90	190	11
Pauwela	90		11
Pauwoaka	73		9
Paw	39	158	6
Peahinala	58	175	7
Peak A (Pollahu)	133	219	17
Peak B	133		17
Pearl Harbor entrance datum point	55	174	7
Pele	24	146	4, 5, 6
Pepeekeo Point Light (Alia, 1900)	127		17
Pepeekeo Point Light (Alia Point, 1912)	127		17
Pepeekeo stack	127		17
Picos	98		11
Pihakapu	26		6
Pihea	23	144	6
Piiholo	63	178	11
Pili	118		16
Pimoe	92	191	11
Pin	43	161	5
Pine	26	150	6
Pineapple tank	55		8
Pinnacle	23	143	6
Pinnacle Peak (Nye)	31		6
Pioneer mill stack	81		11
Pipe (1900)	126		17
Pipe (1912)	128	216	17
Pipe (Kihei stack)	95		11
Pipe (Molokai)	66		9
Plantation flagstaff	97		11
Podmore	60	176	7
Pohakea (Kauai)	25	148	6
Pohakea (Maui)	97		11
Pohakuhaku	130	217	14
Pohakuloa (Maui)	81		11
Pohakuloa (Molokai, east end)	70		9
Pohakuloa (Molokai, west end)	74	183	9
Pohakumauliuli	75		9
Pohakunui	72		9
Pohakupili	23	142	6
Pohoiki	124	214	17
Pohoula	62	178	4, 10
Point (1910)	27		6
Point (1926)	37	157	6
Point (1928)	113	206	15
Point 2	38	158	6
Poliahu (Peak A)	133	219	17
Polipoli	91	190	11
Polo	25	149	6
Pond (Maui)	86	190	11
Pond (Oahu)	60	176	7
Pooku (Hanalei or Crows Nest lat. sta.)	23	144	6
Popoloa	99		11
Port	76	185	9
Post (Kauai)	41	160	6
Post (Oahu)	61	177	7
Post 2	36	157	6
Post office, northwest tower, Honolulu	53	173	8
Post office, southeast tower, Honolulu	53	173	8
Prominent Peak (Prom)	31	152	6
Protestant Church, Haleiwa	58		7
Protestant Church, East Oahu	59		7
Puaena	58	175	7
Puahaunui	70		9
Puako	63	179	4, 13, 14
Pualehua	104		13, 15, 16
Pualu	93	192	11
Puena (1927) (Ena, 1910)	58	175	7
Pukaana Church	116		15
Pukauahi	74	183	9
Pukaulua	84	189	11
Pukoo	68	181	9
Pulama	122	213	17
Pum (windmill)	78		10
Pump	57	174	7
Pump stack	88		11
Pumping station chimney, Honolulu	54		8
Puna	49	170	7
Punakua	75		9
Punaluu Church	119	211	16
Punchbowl (Puowaina)	48	168	7, 8
Punchbowl East	52		8
Punohu	135	219	14
Puolo	25	147	6
Puowaina (Punchbowl)	48	168	7, 8
Pupukea	45	164	7
Puu Ahinui	103	195	13, 15, 16
Puu Alii	71		9
Puu Anoano	72		9
Puu Ehu	23	143	6
Puu Enuhe	118	210	16
Puu Eu	31		6
Puu Hakina	75		9
Puu Hele	93	192	11
Puu Hele 2	94		11
Puu Hinai (Hawaii)	111		14
Puu Hinai (Maui)	91		11
Puu Hoomaha	104	196	13, 15, 16
Puu Hou	117	210	16
Puu Huluhulu	105	197	13, 16, 17
Puu Iki	45	163	7
Puu Iloli	74	183	9
Puu Io (Hawaii)	106	200	13, 14
Puu Io (Maui)	63	179	11
Puu Ka Pele	111		15

Station	Position	Description	Sketch
	Page	*Page*	*Figure*
Puu Kaeo	71	------	9
Puu Kahea	69	------	9
Puu Kamalii	110	------	13, 14
Puu Kamalii 2	110	203	14
Puu Kanaloa	92	191	11
Puu Kanaloa (1904)	96	192	11
Puu Kapele	70	------	9
Puu Kapukapu	119	211	16
Puu Kea	111	------	15
Puu Ki	117	209	16
Puu Koa	89	------	11
Puu Koai	75	------	9
Puu Kolekole	64	------	9
Puu Kolii (Manini)	80	------	11
Puu Kukai	90	190	11
Puu Lehua	70	------	9
Puu Liolio	130	------	14
Puu Loa	63	179	4, 13, 14
Puu Loa 2	112	------	15
Puu Lua	72	------	9
Puu Lua Wailau	72	------	9
Puu Luahine	64	180	9
Puu Mahoe	91	191	11
Puu Mahoe 2	97	------	11
Puu Mano	69	182	9
Puu Manu	62	178	4, 10
Puu Nahaha	116	209	15, 16
Puu Naio	97	------	11
Puu Nene	89	190	11
Puu Nene mill, cupola	87	------	11
Puu Nene mill, north stack	87	------	11
Puu Nene mill, south stack	87	------	11
Puu Nianiau	83	188	11
Puu o Hoku	68	181	9
Puu o Holehua	74	------	9
Puu o Ka Haula	91	------	11
Puu o Kahanui	74	183	9
Puu o Kaiaka	75	184	9
Puu o Kali	91	190	11
Puu o Kamao	72	------	9
Puu o Keokeo	104	196	13, 15, 16
Puu o Koha	89	190	11
Puu o Nale	107	200	13, 14
Puu Ohai	105	198	13, 17
Puu Ohau	103	195	13, 15
Puu Ohia (Tantalus)	44	161	7, 8
Puu Ohohia	117	------	15, 16
Puu Olai	63	178	11
Puu Olelo	73	------	9
Puu Oo	132	218	17
Puu Ouli	97	------	11
Puu Pa	63	179	13, 14
Puu Pane	63	179	11
Puu Pane 2	98	193	11
Puu Papai	62	178	4, 9
Puu Pehe	77	------	10
Puu Pili	106	200	13, 14
Puu Ula (1894)	119	------	16
Puu Ula (1913)	107	201	13, 14
Puu Ulaula (1891)	132	------	16
Puu Ulaula (1914)	119	210	16
Puuiki	93	192	11
Puuki (Hawaii)	110	------	14
Puuki (Oahu)	45	164	7
Pyramid Rock	61	177	7
Q	80	------	11
Quarantine flagstaff, Honolulu (1909)	55	------	8
Quarantine Island flagstaff, Honolulu (1925–1928)	55	173	8
Quick	100	193	12
R	80	187	11
R. C. A. tank at receiving station	50	171	7
Race	29	151	6
Rad (House)	55	173	8
Radio tower	49	170	7
Rail (Hawaii)	109	202	14
Rail (Maui)	85	------	11
Rain	29	151	6
Raw	82	------	11
Rear range lighthouse, Honolulu	55	------	8
Red (1899)	86	------	11
Red (1900)	95	------	11
Red (Kahoolawe)	101	194	12
Red (Kauai)	32	------	6
Red beacon No. 4, Honolulu	54	------	8
Red beacon No. 6, Honolulu	54	------	8
Red beacon No. 8, Honolulu	54	------	8
Red church, spire	59	------	7
Red gas tank	55	173	8
Red Hill	105	198	13, 14, 17
Red spire	86	------	11
Reef (Kahoolawe)	102	------	12
Reef (Kauai)	40	159	6
Reef (Hawaii)	124	------	17
Ren	29	------	6
Rez	27	150	6
Ric	36	157	6
Ridge (1902)	128	------	14, 17
Ridge (1910–1929)	107	200	13, 14
Ridge (Oahu)	49	170	7
Road	95	------	11
Roan	32	153	6
Rob	43	------	5
Rock (Molokai)	65	------	9
Rock (Niihau)	43	161	5
Rocky	39	------	6
Rocky Hill	51	172	7, 8
Rope	36	157	6
Rough	95	------	11
Round Top	51	------	8
Royal Hawaiian Hotel	52	------	8
Ruddy	26	150	6
S	80	------	11
S. Mowae	116	------	15, 16
Sacred Heart Academy, Honolulu	51	172	8
St. Andrews Cathedral	53	172	8
Sand (Kauai)	40	159	6
Sand (Maui)	94	------	11
Sand (Niihau)	43	161	5
Sand Hill (1901)	123	------	17
Sand Hill (1914)	123	214	17
Sand Hill (1920)	120	212	16
Sand Island Light	54	------	8
Sand Island south base	54	------	------
Schofield east base	44	162	7
Schofield laundry, stack	58	------	7
Schofield Post, flag	58	------	7
Schofield west base	44	162	7
School (Hawaii)	127	215	17
School (Maui)	95	------	11
Seawall (U. S. E.)	54	------	8
See	101	194	12
Shack (Kamalo Harbor)	67	181	9
Shack (Kaunakakai Harbor)	67	------	9
Shed	94	------	11
Sheriff	61	177	7
Ship	95	------	11
Shore A	97	------	11
Shore D	92	191	11
Shore N	92	------	11
Shy	102	------	12
Signal	114	207	15
Site	82	------	11
Small white house	41	160	6
Smoke (1900), (Lanai)	77	------	10
Smoke (church spire)	77	------	10
Smoke (Hawaii)	129	217	14, 17
Son	67	------	9
South Azimuth Station	133	------	17
South base 1	132	------	17
South base '92	133	------	17
South base, Kauai	22	141	6

Station	Position	Description	Sketch
	Page	*Page*	*Figure*
South base, Maui	63	178	11
South base, Molokai	62		9
South base, Sand Island	54		
South Crater	101	193	12
South Hill	101	194	12
South Rim	121	212	16
South wireless pole, Kaumalapau	79	186	10
Southeast corner old government wharf	40		6
Southwest gable, south house	36		6
Southwest Point Lighthouse	75		9
Spald	31		6
Spire, buff	88		11
Spire, yellow (Waihee)	88		11
Spire, yellow (Wailuku)	88		11
Spit	121	212	16
Square	113	207	15
Stack	81		11
Stack "A"	84		11
Stack (f)	87		11
Stack, northwest, Hawaiian Electric Co	53	173	8
Stack, southeast, Hawaiian Electric Co	53	173	8
Stack, Heeia Mill	60		7
Stack, Hoea (1913)	108	202	14
Stack, Holualoa	113	206	15
Stack, Honokaa	131	218	14
Stack, Honomu	128		17
Stack, Honuapo	119	210	16
Stack, Kahului electric light	87		11
Stack, Kapaa (1910) (Gray chimney, 1927)	30	152	6
Stack, Kauhola	108	202	14
Stack, Kealia steel (1910) (Black chimney, 1927)	30	152	6
Stack, Kilauea Landing	32	153	6
Stack, Kukaiau	130		14
Stack, Kukuihaele	132	218	14
Stack (leaning)	87		11
Stack, McBryde new sugar mill	41	159	6
Stack, Niulii	107	202	14
Stack, northwest, McBryde sugar mill	41	159	6
Stack, Olaa	124	214	17
Stack, Olowalu	81		11
Stack, Ookala	130		14, 17
Stack, Paauhau	130		14
Stack, Paauilo	130		14
Stack, Pahala	119	211	16
Stack, Pahoa	124	214	17
Stack, Paia	88		11
Stack, Papaikou	126		17
Stack, Pepeekeo	127		17
Stack, Pioneer Mill	81		11
Stack (Pipe), Kihei	95		11
Stack, pump	88		11
Stack, Puu Nene mill, north	87		11
Stack, Puu Nene mill, south	87		11
Stack, Schofield laundry	58		7
Stack, Union	108	202	14
Stack, Waihee Mill	88		11
Stack, Waikapu	87		11
Stack, Wailuku Mill (1912)	88		11
Stack, Wainaku	125		17
Stacks, east of two	127		17
Stacks, tallest of three (Mill)	125		17
Stacks, west of two	127		17
Stacks, western of two	85		11
Staff	34	154	6
Stand	125		17
Station B	127		17
Station G	55	174	7
Station Z	44	162	7
Steeple, Catholic Church	126		17
Stole	40		6
Stone	95		11
Summit	133		17
T	81		11
Tall	84		11
Tall tree	38		6
Tan	32	153	6
Tank, black water	50	171	7
Tank, Hololulu, pineapple	55		8
Tank, Kailua, east oil	113		15
Tank, Kailua, west oil	113		15
Tank post	30		6
Tank (R. C. A.)	50	171	7
Tantalus (Puu Ohia)	44	161	7, 8
Target	114	207	15
Temple	126	214	17
Thorn	35	156	6
Tit	34	155	6
Tobacco	115	209	15
Toe	35	157	6
Tom	67		9
Tower, radio	49	170	7
Tower, square church	125		17
Transit of Venus, Honolulu	53	173	8
Tray	103		12
Tree	82		11
Tug	86	190	11
Turnover	46	165	7
Turtons Mill chimney	81		11
U	81		11
Ulalena	83	188	11
Ult	50		7
Uma	98		11
Umi's Ahu	117	210	16
Union stack	108	202	14
University of Hawaii, Library Building	52	172	8
U. S. E. north base	55	173	8
U. S. E. "Seawall"	54		8
U. S. L. H	131	218	14
Uwekahuna	120	211	16
Vane	30		6
Venice	60	176	7
Vieira	128		17
W. C. 1	75	184	9
W. C. 17	75		9
W. C. 26	77		9
W. C. 27	77		9
Waawaa	111		15
Wahe Pele	115		15
Wahiawa	37	157	6
Wahiawa stables	41		6
Wahie	77		10
Wai	29	151	6
Wai Ale	84	188	11
Waiahilahila	46	165	7
Waiahole	59	176	7
Waialae	49		7
Waialee	45	164	7
Waialeia	71		9
Waialua	68		9
Waialua 2	45	163	7
Waialua (U. S. E.)	58	174	7
Waialua mill chimney (Mill, 1910)	57	175	7
Waialua Sea	69	182	9
Waianae mill chimney	56		7
Waiau Crater	133		17
Waiau (Mauna Kea) latitude station	21, 133	219	17
Waiehu	71		9
Waiehu church buff spire	88		11
Waiele	109	203	14
Waieli (Maui)	99		11

Station	Position	Description	Sketch
	Page	*Page*	*Figure*
Waieli (Molokai)	74	183	9
Waieli (1914) (Molokai)	76	------	9
Waihee	86	189	11
Waihee mill stack (1912) (chimney)	88	------	11
Waihee yellow spire	88	------	11
Waikapu	87	------	11
Waikapu church	85	------	11
Waikapu stack	87	------	11
Waikiki	52	------	8
Waikiki C. & G. S. latitude pier	21	------	8
Waikiki latitude eccentric	52	172	8
Waikukuu	114	------	15
Waikulu	80	187	11
Wailau	72	------	9
Wailea	95	192	11
Wailua Iki	91	190	11
Wailuku	84	189	11
Wailuku chimney	88	------	11
Wailuku mill stack (1912)	88	------	11
Wailuku yellow spire	88	------	11
Wailupe cupola	50	171	7
Wailupe flagstaff	50	171	7
Wailupe, northmost high mast	50	171	7
Waimanalo	46	166	7
Waimanalo wharf derrick	61	177	7
Waimea	59	175	7
Waimea church	39	------	6
Waimea latitude station	21, 25	147	6
Waimea mill chimney (1910)	37	------	6
Waimea mill chimney (1926)	37	157	6
Wainaku stack	125	------	17
Wainiha	23	144	6
Waiopai (Puu)	98	------	11
Waiplo	106	199	13, 14
Waipio Mauka (Waipio Uka)	44	162	7
Waipio Uka (Waipio Mauka)	44	162	7
Waipouli flagstaff	29	------	6
Waipouli windmill	29	------	6
Waipunalei	129	------	14, 17
Wait	33	154	6
Wal	31	152	6
Wall	41	159	6
Waolani	53	------	7
War	39	158	6
Ware	34	154	6
Wash	78	------	10
Water	130	217	14
Water tank	79	------	10
Water tank, black	50	171	7
Water tower, American Cannery	55	------	8
Wes	34	154	6
West	34	154	6
West (of two stacks)	127	------	17
West (Western of two stacks)	85	------	11
West base, Hawaii	64	180	13, 14
West base, Hilo	123	------	17
West base, Oahu	48	169	7, 8
West base, Schofield	44	162	7
West Heiheiahulu	105	197	13, 17
Western of two stacks (west)	85	------	11
Wet	103	------	12
Wharf (Hawaii)	124	------	17
Wharf (Kauai)	37	157	6
Wharf (Molokai)	76	185	9
White (1900)	125	------	17
White (1912)	128	------	17
White (Molokai)	76	185	9
White building, Lanai	77	------	10
White church, spire	59	------	7
White spire and cross, church	126	------	17
Wind (Kauai)	41	159	6
Wind (Lanai)	78	185	10
Wind (Oahu)	57	174	7
Windmill	36	------	6
Windmill (Mo)	77	------	10
Windmill (Pum)	78	------	10
Windmill, Waipouli	29	------	6
Wireless, Kawaihae	110	204	14
Wireless, Lahaina (Pa)	81	------	11
Wireless mast, Kaunakakai Harbor	67	------	9
Wireless pole (Kauai)	27	------	6
Wireless pole (Oahu)	59	------	7
Wireless pole, Honolulu	53	------	8
Worship	130	217	14
Wreck	82	------	11
Wyllie	53	------	8
X	77	------	9
Yellow	130	217	14, 17
Yellow spire, Waihee	88	------	11
Yellow spire, Wailuku	88	------	11
Z, Station	44	162	7