



JUN 1978  
 U. S. DEPARTMENT OF COMMERCE  
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

# HORIZONTAL CONTROL DATA

by the  
 National Ocean Survey  
 OLD HAWAIIAN DATUM

Q 191551 STATION 1153  
 HAWAII  
 LATITUDE 19° 30' TO 20° 00'  
 LONGITUDE 155° 00' TO 155° 30'  
 DIAGRAM NE 5-1,5 HAWAII

## ADJUSTED HORIZONTAL CONTROL DATA

NO TEXT

NAME OF STATION: STEEPLE CATHOLIC CHURCH  
 STATE: HAWAII YEAR: 1900 THIRD ORDER

SOURCE: G-SP156  
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	19 48 12.93	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 05 44.45		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	$\theta$ OR $\Delta$ OR ANGLE*
HI 1	5101	638,984.57	352,509.64	+ 0 08 13

\* PLANE AZIMUTH HAS BEEN COMPUTED BY THE  $\theta$  OR  $\Delta$  OR  $\theta$  FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From 1900)	PLANE AZIMUTH* (From 1900)	CODE

QD 344





# HORIZONTAL CONTROL DATA

by the  
 National Ocean Survey  
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1156  
 HAWAII  
 LATITUDE 19 030' TO 20 000'  
 LONGITUDE 155 000' TO 155 030'  
 DIAGRAM NE 5-1,5 HAWAII

## DESCRIPTION

TRIANGULATION STATION

NAME OF STATION: TELECOM  
 ESTABLISHED BY: L.A. Critchlow YEAR: 1977 STATE: Hawaii COUNTY: Hawaii BENCH MARK ALSO   
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: 28 miles northwest of Hilo.  
 HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	

Station is located near the summit of Mauna Kea Mountain, near the southwest corner of the University of Hawaii Observatory and in a concrete sidewalk that runs along the west side of the observatory.

To reach the station from the post office in Hilo, go westerly on State Highway 20 for 27.3 miles to a paved road right. Turn right and go northerly on the paved road (which turns into gravel at about the 9000 foot level) to the summit, University of Hawaii Observatory and the station as described.

The station is a chiseled cross in a concrete sidewalk that runs along the west side of the observatory. It is 10.3 feet south of the top of a concrete step, 5.7 feet northwest of the southwest corner of the observatory, 0.9 foot west of the east edge of the sidewalk and 0.04 foot north of a gap in the concrete that marks a section of the walk. (Note desc.)

Note: This station was marked and used by the U.S. Department of Commerce, Office of Telecommunications, Institute for Telecommunications Sciences, Boulder, Colorado.

## ADJUSTED HORIZONTAL CONTROL DATA

ADJUSTMENT BY NGS

NAME OF STATION: TELECOM OBS BY NGS  
 STATE: HAWAII YEAR: 1978 SECOND ORDER

SOURCE: U-16241

GEODETTIC LATITUDE:	19 49 35.09101	ELEVATION:	4201.9
GEODETTIC LONGITUDE:	155 28 20.17969		13786 METERS FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ ± ANGLE °
HI 1	5101	509,530.05	360,430.83	+ 0°00'34"

\* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ OR Δ ± FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETTIC AZIMUTH (From south)	PLANE AZIMUTH* (From south)	CODE

THESE DATA OBTAINED FROM ADJUSTMENT OF JAN 1979

3M 151

\* Name of chief of party should be inserted here. The person who actually visited the station should sign his name at the end of the recovery note.

NOAA FORM 76-74 (11-72) SUPERSEDES CGS FORM 826A WHICH MAY BE USED.

U.S. DEPARTMENT OF COMMERCE  
 NOAA

U.S. GPO: 1976-665-661/1220 Reprint 6

# HORIZONTAL CONTROL DATA

by the  
 National Ocean Survey  
 OLD HAWAIIAN DATUM

Q 191551 STATION 1157  
 HAWAII  
 LATITUDE 19° 30' TO 20° 00'  
 LONGITUDE 155° 00' TO 155° 30'  
 DIAGRAM NE 5-1.5 HAWAII

DEPARTMENT OF COMMERCE  
 U. S. COAST AND GEODETIC SURVEY  
 FORM 535  
 Rev. Aug. 1963

## DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: TOLEDO STATE: Hawaii County: Hawaii

CHIEF OF PARTY: G.T. Husemeyer YEAR: 1949 Described by: G.B.G.

NOTE: HEIGHT OF TELESCOPE ABOVE STATION MARK 6.96 METERS. HEIGHT OF LIGHT ABOVE STATION MARK 6.36 METERS.

1 (a)	OBJECT	BEARING	DISTANCE		DIRECTION
			feet	meters	
11(a)	ALALA H.G.S.				0 00 00
11(a)	R.M.No.2	WSW	38.468	11.724	133 02 39.5
11(a)	Pepeekeo Pt. Light House 2663				347 18 00.8
11(a)	R.M. No.1	ENE	42.130	12.841	321 01 54.7

Located in eastern Hawaii, North Hilo District, about 15 miles, airline, north of Hilo and about 2.5 miles inland from the coast on a prominent wooded ridge above the cane land, on the north side of Waikamalo stream, on land owned by Richard Toledo.

Station is a standard disk welded to the top of an iron pipe and set in the center of a square topped concrete post, projecting 8 inches above the ground. Stamped TOLEDO 1949.

Reference mark No.1 is east northeast of the station. A standard disk welded to the top of an iron pipe and set in the center of a square topped concrete post, projecting 8 inches above the ground. Stamped TOLEDO NO.1 1949.

Reference mark No.2 is west southwest of the station. A standard disk welded to the top of an iron pipe set in the center of a square topped concrete post, projecting 8 inches above the ground. Stamped TOLEDO NO 2 1949.

To reach from the post office at Hilo: go north on the coast highway for 20.1 miles to Ninole post Office, continue ahead for 0.4 miles, turn left off highway and go up hill on cane road for 1.5 miles, turn left and go 0.5 miles to a covered bridge and end of truck travel. From here pack southwest along north bank of stream to first wooded ridge and station.

## ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: TOLEDO

STATE: HAWAII

YEAR: 1949

SECOND

SOURCE: G- 9279

GEODETIC LATITUDE: 19° 55' 02.644	ELEVATION: 445.4 METERS
GEODETIC LONGITUDE: 155° 11' 23.881	1461 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	S OR Δ S' ANGLE
HI 1	5101	606,497.42	393,773.37	+ 0° 06' 20"

\* PLANE AZIMUTH HAS BEEN COMPUTED BY THE S OR Δ S' FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
HAIKU	216 56 22.1	216 50 02	5101

QE 122

Refer to notes in manuals of triangulation and state publications of triangulation. Direction-angle measured clockwise, referred to initial station.  
 To nearest meter only, when no trigonometric leveling is being done. 10-52502-1 U. S. GOVERNMENT PRINTING OFFICE

(continued on next page)

# HORIZONTAL CONTROL DATA

by the  
 NATIONAL GEODETIC SURVEY  
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1157

LATITUDE ° ' TO ° '  
 LONGITUDE ° ' TO ° '  
 DIAGRAM

TOLEDO (continued)

FORM 526a  
 (2-18-68)

U.S. DEPARTMENT OF COMMERCE  
 COAST AND GEODETIC SURVEY  
**RECOVERY NOTE, TRIANGULATION STATION**

R

NAME OF STATION: **TOLEDO**  
 ESTABLISHED BY: **C.T. Husemeyer** YEAR: **1949** STATE: **Hawaii**  
 RECOVERED BY: **D.M. Whipp** YEAR: **1966** COUNTY: **Hawaii**  
 Island: **Hawaii**

HEIGHT OF TELESCOPE ABOVE STATION MARK **1.5** METERS, HEIGHT OF LIGHT ABOVE STATION MARK METERS.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
HAIKU (HGS) 1877				00 00 00.0
RM No. 3	E	14.760	4.500	51 50 32
COOK (HGS) 1949 (*1949 distance)	ESE	*333.178		67 14 16.1
RM No. 4	W	14.833	4.522	231 50 49

Station mark was recovered in good condition. The reference marks were searched for by distance and angle but could not be found and are believed destroyed. Two new reference marks were established. A complete description follows:

Station is located about 4 miles west-northwest of Hakalau and 2 miles west-southwest of Honohina village, on brush-covered ridge along north side of Waikaumalo Stream, in hilly pasture land, at about 1461 feet elevation. It is 333.2 feet west-northwest of station COOK (HGS), 75 yards northeast of dim stock trail and about 1/3-mile west-northwest of a radio mast.

To reach station from the post office at Ninole, go northwest on State

Highway 19 for 0.05 mile; turn left, into deep cut, and follow cane road uphill for 0.5 mile to paved crossroad; continue ahead for 0.2 mile to fork just after passing station HAIKU on the left. Take right fork and go 0.25 mile to crossroad. Turn right and go 0.8 mile to crossroad. Keep ahead, upgrade, for 0.6 mile to end of truck travel where road turns left and a dim cane road continues ahead. Walk southwest on cane road about 130 yards to metal gate at edge of cane field. From here follow old trail along an old road route across pasture land for about 700 yards (on a heading about 20° right of the radio mast) to where trail crosses ridge. Turn left along ridge line about 75 yards to station. NOTE: Station may also be reached by following description to COOK (HGS), then clearing a trail through brush and crossing Waikaumalo Gulch.

Station mark is a standard disk stamped "TOLEDO 1949", set in the top of an 8-inch-square, concrete monument that projects 6 inches. There is a cribbing of several large iron bars 3 inches square and 30 inches long, built up around the mark.

Reference mark number three is a standard disk stamped "TOLEDO 1949 NO 3 1966", brazed to the top of a 2-inch, iron pipe that is set in cement and projects 4 inches. It is about 8 inches lower than station.

Reference mark number four is a standard disk stamped "TOLEDO 1949 NO 4 1966", brazed to the top of a 1-1/2-inch, iron pipe that is set in cement and projects 8 inches. It is 6 inches higher than station mark.

\*Name of chief of party should be inserted here. The officer who actually visited the station should sign his name at the end of the recovery note.

NOTE - One of these forms must be used for every station recovered.

USCGM-DC 27173-P88



# HORIZONTAL CONTROL DATA

by the  
 National Ocean Survey  
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1159  
 HAWAII  
 LATITUDE 19 030' TO 20 000'  
 LONGITUDE 155 000' TO 155 030'  
 DIAGRAM NE 5-1.5 HAWAII

## DESCRIPTION TRIANGULATION STATION

NAME OF STATION: **VR 1-6 H1DT**  
 ESTABLISHED BY: **L.A. Critchlow** YEAR: **1977** STATE: **Hawaii** BENCH MARK ALSO   
 COUNTY: **Hawaii**  
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **at the west edge of Keaau**  
 HEIGHT OF TELESCOPE ABOVE STATION MARK **4** FEET. HEIGHT OF LIGHT ABOVE STATION MARK **4** FEET.

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KEAAU 1949				00 00 00
RM 1	NW	29.43	8.970	111 04 29
RM 2	ENE	25.94	7.910	232 16 42
RM 1 to RM 2		48.27	14.713	

The station is located about 8 miles south-southeast of Hilo on the west edge of Keaau at the junction of State Highways 11 and 13.

To reach the station from the junction of State Highways 11 and 19 in Hilo, go south on Highway 11 for 7.5 miles to the junction of State Highway 13 and Highway 11. Turn left and go about 100 feet to the station site on the left near the center of a traffic island.

The station marks are State of Hawaii survey disks stamped VR 1-6 1977. The surface disk is set in a round concrete post 0.4 foot below the ground. The underground disk is set in an irregular mass of concrete about 4 feet below the ground. They are 23.2 feet south of a road, 16.8 feet north of a road, 14 feet south of a curb and 14.2 feet northwest of a lightpole.

Reference mark 1, stamped 1, is a railroad spike with a punch hole marking the center, cemented in a drill hole in a curb, 33.5 feet east of the west end of the curb and 9 feet south of the road. Reference mark 2, stamped 2, is a railroad spike with a punch hole marking the center, cemented in a drill hole in a curb, 14.4 feet northeast of a lightpole and 7 feet south of the road.

\* Name of chief of party should be inserted here. The person who actually visited the station should sign his name at the end of the recovery note.

NOAA FORM 76-96 SUPERSEDES CGS FORM 525A WHICH MAY BE USED.  
 (1-72)

U. S. DEPARTMENT OF COMMERCE  
 NOAA  
 U. S. GPO: 1976-665-641/1220 Reprint 5

## ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: **VR 1-6 H1DT** OBS BY **NGS**  
 STATE: **HAWAII** YEAR: **1977** SECOND ORDER  
 SOURCE: **G-16241**

GEODETIC LATITUDE: <b>19 37 34.75144</b>	ELEVATION: <b>104.7</b> METERS
GEODETIC LONGITUDE: <b>155 02 30.34471</b>	<b>343</b> FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ HOR Δ #1 ANGLE
H1 1	5101	657,214.54	288,175.98	+ 0° 09' 12"

\* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ HOR Δ #1 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
KEAAU	<b>34 47 54.0</b>	<b>34 38 42</b>	<b>5101</b>

THESE DATA OBTAINED FROM ADJUSTMENT OF JAN 1979

# HORIZONTAL CONTROL DATA

by the  
 National Ocean Survey  
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1160  
 HAWAII  
 LATITUDE 19 °30' TO 20 °00'  
 LONGITUDE 155 °00' TO 155 °30'  
 DIAGRAM NE 5-1,5 HAWAII

DESCRIPTION  
~~RECOVERY NOTE:~~ TRIANGULATION STATION

NAME OF STATION: VR 1-BA HILT  
 ESTABLISHED BY: L.A. Critchlow YEAR: 1978 STATE: Hawaii COUNTY: Hawaii BENCH MARK ALSO   
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: In Mountain View  
 HEIGHT OF TELESCOPE ABOVE STATION MARK 4 FEET. HEIGHT OF LIGHT ABOVE STATION MARK 4 FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION				
OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KULANI HGS 1891				00 00 00.0
RM 1	NE	20.72	6.313	159 35 30
RM 2	NE	30.71	11.166	163 40 32
VR 1 to RM 2		16.56	5.049	

The station is located in Mountain View and is on state property. To reach the station from the post office in Mountain View, go northerly on State Highway 11 for 0.25 mile to a side road left and the station on the left.

The station marks are State Of Hawaii Survey Disks stamped VR 1-BA 1977. The surface disk is set in the top of a 12-inch round concrete post that is 5 inches below the ground surface. It is 39 feet north-northeast of the center of North Luako Road, 34 feet west-northwest of the center of State Highway 11 and 29 feet south-southeast of a power pole. The underground disk is set in the top of an irregular mass of concrete that is about 48 inches below the ground surface.

Reference mark 1 is a 1/2 inch iron pipe, cemented in a round mass of concrete that is flush with the ground surface. It is 59 feet north-east of the center of North Luako Road, 33 feet east-southeast of the power pole and 28 feet west-northwest of the center of State Highway 11.

Reference mark 2 is a 1/2 inch iron pipe, set in asphalt on the shoulder of the road and flush with the ground. It is 72 feet north-northeast of the center of North Luako Road, 46.5 feet east of the power pole and 18 feet west-northwest of the center of State Highway 11.

\* Name of chief of party should be inserted here. The person who actually visited the station should sign his name at the end of the recovery note.

NOAA FORM 76-96 SUPERSEDES CGOS FORM 528A WHICH MAY BE USED.  
 (11-72)

U. S. DEPARTMENT OF COMMERCE  
 NOAA  
 U. S. GPO: 1976-545-541/1220 Reprint 6

## ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: VR 1-BA HILT OBS BY NGS  
 STATE: HAWAII YEAR: 1978 SECOND -ORDER

SOURCE: G-16241

GEODETIC LATITUDE: 19 33 21.25249	ELEVATION: 443.2 METERS
GEODETIC LONGITUDE: 155 06 29.00615	1454 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	θ OR Δ OR ANGLE
HI 1	5101	654,957.26	262,548.49	+ 0° 07' 52"

\* PLANE AZIMUTH HAS BEEN COMPUTED BY THE θ OR Δ OR FORMULA NEGLECTING THE SECOND TERM

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
KULANI HGS	80 °01' 22.0"	79 °53' 30"	5101

THESE DATA OBTAINED FROM ADJUSTMENT OF JAN 1979



# HORIZONTAL CONTROL DATA

by the  
 NATIONAL GEODETIC SURVEY  
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1161  
 LATITUDE ° ' TO ° '  
 LONGITUDE ° ' TO ° '  
 DIAGRAM

WAIAKEA MAUKA (USGS) (continued)

U.S. DEPARTMENT OF COMMERCE  
 COAST AND GEODETIC SURVEY  
**RECOVERY NOTE, TRIANGULATION STATION**

NAME OF STATION: **WAIAKEA MAUKA (USGS)**  
 ESTABLISHED BY: **C.T. Husemeyer** YEAR: **1949** STATE: **Hawaii**  
 RECOVERED BY: **D.M. Whipp** YEAR: **1966** COUNTY: **Hawaii**  
 Island: **Hawaii**

HEIGHT OF TELESCOPE ABOVE STATION MARK **1.5 METERS**, HEIGHT OF LIGHT ABOVE STATION MARK METERS.  
 DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
KAIWIKI NEW (USGS) RM No. 1	SE	29.790	9.081	00 00 00.0
	W	34.464	10.504	273 52 01
KAIWIKI NEW (USGS) 1949 RM No. 1	SSE	29.752	9.069	00 00 00.0
	W	34.425	10.493	273 52 20

Station was recovered and all marks found in good condition. The land is now pasture, with scattered brush. A complete description follows:  
 Station is located about 5-1/2 miles southwest of Hilo, in the Waia-kea Homestead District, at 1135 feet elevation, on the east end of a low bluff in pastureland, 1100 feet west of Malaai Rd. and 1200 feet west-southwest of the junction of Malaai Rd. and Ainaola Drive.  
 To reach station from the post office in Hilo, go southeast on Kinooole St. for 3.2 miles to crossroad. Turn right and follow Kawailani St. for

0.85 mile; take left fork and follow Ainaola Drive for 2.7 miles; take left fork, continuing on Ainaola Drive, for 1.4 miles to T-junction. Turn left and go south on Malaai Rd. for 0.1 mile to stock pen on right, and end of truck travel. Walk west across pasture for about 1100 feet to station.

Station mark is a U.S. Geological Survey disk, stamped "1183", set in the top of a 4-inch-diameter, concrete-filled, cast-iron pipe set in a large cairn. A triangular, concrete platform, 7 feet on each side, has been built on top of the cairn, and extends 3 feet above ground. A concrete block 2 feet high is secured to center of the platform and supports a red and white metal target 10 feet tall. Station mark is visible through a passage under the block.

Reference mark number one is a standard disk stamped "WAIAKEA MAUKA USGS NO 1", brazed to the top of a 2-inch, iron pipe projecting 14 inches above ground. It is about 3 feet lower than station mark.

Reference mark number two is a standard disk stamped "WAIAKEA MAUKA USGS NO 2", brazed to the top of a 2-inch, iron pipe that projects 8 inches above ground. It is about 3 feet lower than station mark.

**RECOVERY NOTE, TRIANGULATION STATION**

NAME OF STATION: **WAIAKEA MAUKA (USGS)**  
 ESTABLISHED BY: **C. T. Husemeyer** YEAR: **1949** STATE: **Hawaii** BENCH MARK(S) ALSO   
 RECOVERED BY: **R. B. Melby** YEAR: **1975** COUNTY: **Hawaii**  
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **5 1/2 miles SW of Hilo**

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:

The station and reference mark 2 were recovered in good condition. Reference mark 1 was not found and it is believed to be lost as the ground at the described location of the mark has been graded.

**RECOVERY NOTE, TRIANGULATION STATION**

NAME OF STATION: **WAIAKEA MAUKA USGS**  
 ESTABLISHED BY: **C. T. Husemeyer** YEAR: **1949** STATE: **Hawaii** BENCH MARK ALSO   
 RECOVERED BY: **L. A. Critchlow** YEAR: **1977** COUNTY: **Hawaii**  
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **5-1/2 miles southwest of Hilo.**  
 HEIGHT OF TELESCOPE ABOVE STATION MARK **4 FEET.** HEIGHT OF LIGHT ABOVE STATION MARK **4 FEET.**

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
HALAI 2 HGS				00 00 00.0
HILO VOR ITO	NE	About 7 miles		34 32 28.6
RM 3	SE	37.58	11.454	121 19 01
RM 4	S	33.84	10.313	172 49 44
RM 3 to RM 4		31.22	9.517	

The station mark was recovered in good condition. A house is now located at the station site. Reference marks 1 and 2 were searched for but not recovered and were believed destroyed when the house was put in. Reference marks 3 and 4 were set at this time and due to changes a new description follows.

The station is located about 5-1/2 miles southwest of Hilo, 5-1/2 miles northwest of Kurtistown and on property owned by Mr. Howard E. Kent who lives at the station site.

To reach the station from the junction of State Highways 11 and 19 in the east part of Hilo, go south on highway 11 for 2.55 miles to a cross road. Turn right and go west on Kawailani Street for 0.9 mile to a fire station on the left. Continue west on Kawailani Street for 0.15 mile to a fork and cross road. Turn left, then right and go southwest on Ainaola Road for 2.5 miles to a fork. Take the left fork and continue southwest on Ainaola Road for 1.35 miles to a T-road. Turn left and go south on Malaai Road for 0.1 mile to a track road on the right. Turn right going through a gate and go west on the track road for 0.3 mile to the top of the hill at Mr. Howard E. Kent's resident and the station site.

The station mark is a USGS disk stamped 1183 set in the top of a 4-inch concrete-filled cast-iron pipe set in a large cairn. A triangular concrete platform, 7 feet on each side, has been built on top of the cairn and extends 3 feet above the ground. A concrete block 2 feet high is secured to the center of the platform and supports a red and white metal target 10 feet tall. It is 31 feet north of the north face of the house. Note, Desc.

Reference mark 3 is a NGS disk stamped WAIAKEA MAUKA USGS 1949 NO 3 1977. It is cemented in a drill hole in the concrete foundation of the house and projects about 4 inches above the ground surface. It is at the northeast corner of the house. Note, Desc.

Reference mark 4 is a NGS disk stamped WAIAKEA MAUKA USGS 1949 NO 4 1977. It is cemented in a drill hole in the concrete foundation of the house and projects about 4 inches above the ground surface. It is 31.5 feet west of the northeast corner of the house, 7 feet west of a water faucet and 0.3 foot north of the north edge of the house. Note, Desc.

\* Name of chief of party should be inserted here. The person who actually visited the station should sign his name at the end of the recovery note.

# HORIZONTAL CONTROL DATA

by the  
 National Ocean Survey  
 OLD HAWAIIAN DATUM

0 191551 STATION 1162  
 HAWAII  
 LATITUDE 19° 30' TO 20° 00'  
 LONGITUDE 155° 00' TO 155° 30'  
 DIAGRAM NE 5-1, HAWAII

DEPARTMENT OF COMMERCE  
 U. S. COAST AND GEODETIC SURVEY  
 Form 535  
 Rev. Aug. 1965

## DESCRIPTION OF TRIANGULATION STATION

NAME OF STATION: WAIAKEA NEW (USGS) STATE: Hawaii COUNTY: Hawaii

CHIEF OF PARTY: C. T. Husemeyer YEAR: 1949

Described by: C. J. Hoepffel

NOTE*	HEIGHT OF TELESCOPE ABOVE STATION MARK METERS.1	HEIGHT OF LIGHT ABOVE STATION MARK METERS.	DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION			
			OBJECT	BEARING	DISTANCE feet meters	DIRECTION:
	Surface-station mark					
	Underground-station mark					
			HALAI (HGS)	N	4 miles	00 00 00
			Hilo Stack, (Hilo Sugar Co.)	E	14 35 36.2	14 35 36.2
pipe			R. M. No. 1	E	17.533	93 00 30
			Olaa Stack, (Olaa Sugar Co.)	SSE	5.5 miles	158 08 43.5
12c			R. M. No. 2	W	33.472	289 53 16

The station is located on the summit of a low knoll which lies about 5.5 miles northwest of Olaa, about 3 miles south of Hilo, about 1 mile west of the road which runs between Hilo and Olaa, about 150 yards east of a house and 19.8 feet west of power and telephone pole number 8. To reach from the post office at Hilo; go southerly for 3.2 miles; turn right, at a service station, and go westerly for 0.85 mile; continue straight ahead, on a graveled road, for 0.2 mile; turn right and go north for 0.1 mile to a house and the end of truck travel. From this point pack easterly, through the yard for about 150 yards to the high point of the knoll and the station.

The station is a U. S. Geological Survey bronze disk, stamped 393, set in the top of an irregular mass of concrete which projects about 1 foot. Over this disk has been placed a concrete platform which is about 6 feet square and 5 feet high. The station mark has been left open to view.

Reference mark number 1 is a standard disk, stamped WAIAKEA NEW NO USGS, set in the top of a 2 1/2 inch pipe which projects about 6 inches. It is located 2 feet west of a telephone pole and about 2 feet lower than the station.

Reference mark number 2 is a standard disk, stamped WAIAKEA NEW NO USGS, set into a drill hole in a boulder which projects about 1 1/2 feet. It is located on the crest of the ridge about 1 foot higher than the station.

DEPARTMENT OF COMMERCE  
 U. S. COAST AND GEODETIC SURVEY  
 Form 536  
 (Rev. Feb. 1965)

## RECOVERY NOTE, TRIANGULATION STATION

R

NAME OF STATION: WAIAKEA NEW (USGS)

ESTABLISHED BY: C.T.H. YEAR: 1949 STATE: Hawaii  
 RECOVERED BY: H.O.F. YEAR: 1958 COUNTY: Hawaii

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:

The station was recovered as described in 1949, in good condition, and except for the following corrections:

The house is 301 feet west of the station, and the power and telephone pole is gone. To reach from the post office in Hilo, go S. W. along Kindole St., for 3.35 miles; turn right on Kawailani St., go 0.95 mile due west to forks of road; keep to right fork straight ahead for 0.2 mile; turn right on gravel road for 0.1 mile to house on right; station is about 150 yards on right and on high part of knoll.

(continued on next page)

## ADJUSTED HORIZONTAL CONTROL DATA

ADJUSTMENT BY: NGS

NAME OF STATION: WAIAKEA NEW USGS

OBS BY CGS

STATE: HAWAII

YEAR: 1949

SECOND

ORDER

SOURCE: G- 9279

GEODETIC LATITUDE:	19° 41' 16.20500	ELEVATION:	119.81 METERS
GEODETIC LONGITUDE:	155° 05' 11.08000		393.1 FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	ϕ OR Δ OR ANGLE °
HI 1	5101	642,273.51	310,476.05	+ 0° 08' 22"

\* PLANE AZIMUTH HAS BEEN COMPUTED BY THE ϕ OR Δ OR FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
HALAI 2 HGS	158° 59' 16.3	158° 50' 55"	5101

THESE DATA ARE OBTAINED FROM ADJUSTMENT OF 1951  
 LEVELING BY CGS

SM 163

# HORIZONTAL CONTROL DATA

by the  
 NATIONAL GEODETIC SURVEY  
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1162  
 LATITUDE ° ' TO ° '  
 LONGITUDE ° ' TO ° '  
 DIAGRAM

WAIAKEA NEW (USGS) (continued)

FORM 526a  
 (5-16-68)

U.S. DEPARTMENT OF COMMERCE  
 COAST AND GEODETIC SURVEY  
**RECOVERY NOTE, TRIANGULATION STATION**

R

NAME OF STATION: **WAIAKEA NEW (USGS)**  
 ESTABLISHED BY: **C.T. Husemeyer** YEAR: **1949** STATE: **Hawaii**  
 RECOVERED BY: **D.M. Whipp** YEAR: **1966** COUNTY: **Hawaii**  
 Island: **Hawaii**

HEIGHT OF TELESCOPE ABOVE STATION MARK **2.5** METERS. HEIGHT OF LIGHT ABOVE STATION MARK METERS.  
 DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
HALAI (HGS) 1877----1949 Distance and Direction				00 00 00.0
RM No. 1	E	17.533	5.346	93 00 30
RM No. 2	W	33.472	10.203	289 53 16
----- <b>1966 Distance and Direction</b>				
RM No. 1	ENE	17.530	5.344	92 50 45
RM No. 2	WSW	33.477	10.204	289 54 25

Station was recovered and all marks found in good condition. The telephone pole mentioned in original description has fallen down and is lodged tightly against RM 1 and probably shifted it slightly, as indicated by the 10-minute difference between the 1949 and 1966 observations. A complete description follows:

Station is located about 2-3/4 miles south of Hilo, at 393 feet elevation, on a low knoll covered with tall dense grass and scattered guava trees on top and surrounded by sugar cane on the sides. It is about 125 yards east of a house and 150 yards southeast of a slaughter-house.

To reach station from the post office in Hilo, go southeast on Kinole Street for 3.2 miles; turn right and go west on Kawailani Street for 1.05 miles to gravel side road right, by water hydrant K-47. Turn right and go 0.1 mile to top of grade and house on right. From here walk east, making trail through dense grass, about 125 yards to station.

Station mark is a U.S. Geological Survey Triangulation disk stamped "393", set in the top of a mass of concrete projecting 1 foot above ground. A Hawaii Territorial Survey Type A signal is centered over the mark; the concrete platform being 4 feet above ground and a red and white metal target extending 8 feet above the platform.

Reference mark number one is a standard disk stamped "WAIAKEA NEW USGS NO 1", braced to the top of a 2-inch iron pipe that projects 6 inches. It is at west edge of sugar cane growth and about 2 feet lower than station.

Reference mark number two is a standard disk stamped "WAIAKEA NEW USGS NO 2", cemented in a drill hole in an irregular-shaped boulder that projects 1-1/2 feet above ground. It is along crest of knoll, about 2 feet higher than station.

**RECOVERY NOTE, TRIANGULATION STATION**

R

NAME OF STATION: **WAIAKEA NEW (USGS)**  
 ESTABLISHED BY: **C. T. Husemeyer** YEAR: **1949** STATE: **Hawaii** BENCH MARK(S) ALSO   
 RECOVERED BY: **R. B. Melby** YEAR: **1975** COUNTY: **Hawaii**  
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **2 1/2** miles south of Hilo

Detailed statement as to the fitness of the original description; including marks found, stampings, changes made, and other pertinent facts:

The station was recovered in good condition. Considerable brush and grass have grown up around the station site. The reference marks were not searched for.

**RECOVERY NOTE, TRIANGULATION STATION**

R

NAME OF STATION: **WAIAKEA NEW USGS**  
 ESTABLISHED BY: **C.T. Husemeyer** YEAR: **1949** STATE: **Hawaii** BENCH MARK ALSO   
 RECOVERED BY: **L.A. Critchlow** YEAR: **1977** COUNTY: **Hawaii**  
 AIRLINE DISTANCE AND DIRECTION FROM NEAREST TOWN: **2-3/4** miles south of Hilo.  
 HEIGHT OF TELESCOPE ABOVE STATION MARK **4** FEET. HEIGHT OF LIGHT ABOVE STATION MARK **4** FEET.

DISTANCES AND DIRECTIONS TO AZIMUTH MARK, REFERENCE MARKS AND PROMINENT OBJECTS WHICH CAN BE SEEN FROM THE GROUND AT THE STATION

OBJECT	BEARING	DISTANCE		DIRECTION
		FEET	METERS	
HALAI 2 HGS				00 00 00.0
HILO HARBOR COMMISSIONERS WATER TANK 1951				
RM 1	NE	About 3-1/2 miles		53 02 48.9
	NE	17.52	5.340	92 52 27
RM 2	W	33.44	10.194	289 53 23

The station mark and reference marks 1 and 2 were recovered in good condition. The distance and direction to reference marks 1 and 2 compared favorable to the 1966 date, the difference to reference mark 1 being 0.004 meters shorter and 01 minute, 42 seconds larger. The difference to reference mark 2 being 0.010 meters shorter and 01 minute, 02 seconds smaller. The 1966 description is adequate.

\* Name of chief of party should be inserted here. The person who actually visited the station should sign his name at the end of the recovery note.

JUN 1978  
 U. S. DEPARTMENT OF COMMERCE  
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

# HORIZONTAL CONTROL DATA

by the  
 National Ocean Survey  
 OLD HAWAIIAN DATUM

0 191551 STATION 1163  
 HAWAII  
 LATITUDE 19° 30' TO 20° 00'  
 LONGITUDE 155° 00' TO 155° 30'  
 DIAGRAM NE 5-1.5 HAWAII

NO TEXT

## ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WAI'AU CRATER  
 STATE: HAWAII YEAR: 1892 THIRD ORDER

SOURCE: G-SP156

GEODETIC LATITUDE:	19 48 44.23	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 28 49.94		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	$\theta$ OR $\Delta$ OR ANGLE *
HI 1	5101	506,669.34	355,501.39	+ 0 00 24 "

\* PLANE AZIMUTH HAS BEEN COMPUTED BY THE  $\theta$  OR  $\Delta$  OR  $\alpha$  FORMULA NEGLECTING THE SECOND TERM

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE

QQ 365

JUN 1978  
 U. S. DEPARTMENT OF COMMERCE  
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

# HORIZONTAL CONTROL DATA

by the  
 National Ocean Survey  
 OLD HAWAIIAN DATUM

0 151551 STATION 1164  
 HAWAII  
 LATITUDE 19 ° 30' TO 20 ° 00'  
 LONGITUDE 155 ° 00' TO 155 ° 30'  
 DIAGRAM NE 5-1.5 HAWAII

NO TEXT

## ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION WEST OF 2 STACKS  
 STATE HAWAII YEAR 1900 THIRD -ORDER

SOURCE G-SP156  
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	19 50 44.62	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 05 18.67		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	$\theta$ HOR $\Delta$ $\theta$ 1 ANGLE *
HI 1	5101	641,408.9c	367,818.22	+ 0° 08' 23"

\* PLANE AZIMUTH HAS BEEN COMPUTED BY THE  $\theta$  HOR  $\Delta$   $\theta$  1 FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE

QQ 348

JUN 1978  
 U. S. DEPARTMENT OF COMMERCE  
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

# HORIZONTAL CONTROL DATA

by the  
 National Ocean Survey  
 OLD HAWAIIAN DATUM

0 191551 STATION 1165  
 HAWAII  
 LATITUDE 19 ° 30' TO 20 ° 00'  
 LONGITUDE 155 ° 00' TO 155 ° 30'  
 DIAGRAM NE 5-1.5 HAWAII

NO TEXT

## ADJUSTED HORIZONTAL CONTROL DATA

NAME OF STATION: WHARF  
 STATE: HAWAII YEAR: 1900 THIRD ORDER

SOURCE: G-SP156  
 NO OBSERVATION CHECK ON THIS POSITION

GEODETIC LATITUDE:	19 43 51.21	ELEVATION	METERS
GEODETIC LONGITUDE:	155 04 22.18		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	$\theta$ FOR $\Delta$ $\theta$ ANGLE *
HI 1	5101	646,906.89	326,126.49	+ 0 08 39

\* PLANE AZIMUTH HAS BEEN COMPUTED BY THE  $\theta$  FOR  $\Delta$   $\theta$  FORMULA NEGLECTING THE SECOND TERM

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE

QD 326





NOV 1979  
 U. S. DEPARTMENT OF COMMERCE  
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
 NATIONAL OCEAN SURVEY & NATIONAL GEODETIC SURVEY

# HORIZONTAL CONTROL DATA

by the  
 National Ocean Survey  
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1168  
 HAWAII  
 LATITUDE 19° 30' TO 20° 00'  
 LONGITUDE 155° 00' TO 155° 30'  
 DIAGRAM NE 5-1.5 HAWAII

## DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: PEPEEKEO RADIO STATION KIPA MAST

CHIEF OF PARTY: R. B. MELBY YEAR: 1978 STATE: HAWAII COUNTY: HAWAII

Description, including sketch of object:

LOCATED ABOUT 8 MILES NORTH OF THE CITY OF HILO, ON PEPEEKEO POINT, ABOUT 250 FEET NORTHWEST OF PEPEEKEO POINT LIGHT (AN AID TO NAVIGATION) AND IN A SMALL CLEARING ON THE EAST SIDE OF THE HOUSES.

THE STATION IS THE RED LIGHT ATOP A QUAYED, 385 FOOT HIGH, SKELETON STEEL MAST, OF RADIO STATION KIPA.

## ADJUSTED HORIZONTAL CONTROL DATA ADJUSTMENT BY NGS

NAME OF STATION: PEPEEKEO RAD STA KIPA MAST

OBS BY NGS

STATE: HAWAII

YEAR: 1978

THIRD ORDER

SOURCE: G-16108

GEODETIC LATITUDE:	19° 51' 02.81074	ELEVATION:	METERS
GEODETIC LONGITUDE:	155° 05' 09.34818		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	$\theta$ OR $\Delta$ OR ANGLE*
HI 1	5101	642,294.34	369,655.50	+ 0° 08' 26"

\* PLANE AZIMUTH HAS BEEN COMPUTED BY THE  $\theta$  OR  $\Delta$  OR  $\theta$  FORMULA NEGLECTING THE SECOND TERM.

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH (From south)	CODE
THESE DATA OBTAINED FROM ADJUSTMENT OF AUG 1979			

NOAA FORM 76-81  
 (10-71)

Described by U. S. DEPARTMENT OF COMMERCE  
 NOAA  
 \*U.S.G.P.O. 1975-987-041

RL 011

NOV 1979

U. S. DEPARTMENT OF COMMERCE  
 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
 NATIONAL OCEAN SURVEY, NATIONAL GEODETIC SURVEY

## HORIZONTAL CONTROL DATA

by the  
 National Ocean Survey  
 OLD HAWAIIAN DATUM

QUAD 191551 STATION 1169  
 HAWAII  
 LATITUDE 19° 30' TO 20° 00'  
 LONGITUDE 155° 00' TO 155° 30'  
 DIAGRAM NE 5-1.5 HAWAII

## DESCRIPTION OF TRIANGULATION INTERSECTION STATION

NAME OF STATION: WAIAKEA CREEK CHANNEL DAYBEACON 1

CHIEF OF PARTY: R. B. MELBY YEAR: 1978 STATE: HAWAII COUNTY: HAWAII

## Description, including sketch of object:

LOCATED IN HILO BAY, IN THE WAIAKEA DISTRICT OF THE CITY OF HILO, AT THE EAST ENTRANCE OF THE WAILOA RIVER AND IN ABOUT 3 FEET OF WATER.

THE STATION IS THE LONE PILE THAT SUPPORTS A SQUARE, GREEN DAYMARK WITH THE NUMBER 1 DISPLAYED. DESIGNATED UNDER NO. 3681 IN THE PUBLICATION 'LIGHT LIST, VOLUME III, PACIFIC COAST AND PACIFIC ISLANDS, 1977'.

NOAA FORM 76-81  
 (10-71)

Described by \_\_\_\_\_  
 U. S. DEPARTMENT OF COMMERCE  
 NOAA  
 \*U.S.G.P.O. 1975-887-041

ADJUSTED HORIZONTAL CONTROL DATA  
 ADJUSTMENT BY NGS

NAME OF STATION: WAIAKEA CREEK CHAN DAYBEACON 1 OBS BY NGS  
 STATE: HAWAII YEAR: 1978 THIRD ORDER  
 SOURCE: G-16108

GEODETIC LATITUDE:	19° 43' 38.01589	ELEVATION:	METERS
GEODETIC LONGITUDE:	155 04 26.27406		FEET

STATE COORDINATES (Feet)				
STATE & ZONE	CODE	X	Y	# OR Δ # ANGLE *
HI 1	5101	646,519.12	324,794.48	+ 0 08' 38"

\* PLANE AZIMUTH HAS BEEN COMPUTED BY THE # OR Δ # FORMULA NEGLECTING THE SECOND TERM

TO STATION OR OBJECT	GEODETIC AZIMUTH (From south)	PLANE AZIMUTH * (From south)	CODE

THESE DATA OBTAINED FROM ADJUSTMENT OF AUG 1979

RL 012