

U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

*Bench Mark Descriptions and Photographs for Global Positioning System (GPS)  
Stations in the Vicinity of Mt. Shasta and Medicine Lake, California*

BY

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Open-File Report 95-811

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## INTRODUCTION

During July 1990, members of the U.S. Geological Survey (USGS), David A. Johnston Cascades Volcano Observatory (CVO) in Vancouver, Washington, established a 23 station Global Positioning System (GPS) network near Mt. Shasta and Medicine Lake, California (figure A), using TI 4100 receivers.

All of the stations were occupied for two consecutive days with each day's occupation consisting of 8 hours of observation. Stations Hat Creek and Quincy (not shown on the map), both "Very Long Baseline Interferometer" (VLBI) stations, were used to fix station P501 which was occupied each day of the campaign and was used as a fiducial site.

## PROJECT DESCRIPTION

The GPS project was funded by the USGS Volcano Hazards and Geothermal Studies Program and contributes to a continuing effort to detect ground deformation related to magmatic or tectonic processes with the ultimate objective of assessing the potential for future eruptions in the Cascade Range.

Crustal deformation can be a long term process; many decades may pass before any detectable changes can be measured. Therefore this report contains photographs and descriptions of the bench marks to provide a field guide for future researchers who may have a need to re-occupy the sites.

## BLACK FOX

From the intersection of Squaw Valley road and Highway 89 at the town of McCloud, Calif., proceed east along Highway 89 for 5.3 km (3.3 mi) to a "T" intersection and a sign "PILGRIM CREEK ROAD". Turn left onto Pilgrim road (this road is later "signed" FS road 13), and proceed northeast along FS road 13 for 11.1 km (6.9 mi) to a "T" intersection with FS road 40N16 on the right. Continue northeast along FS road 13 an additional 9.0 km (5.65 mi) to the intersection with Edison Access road. Continue along FS road 13 an additional 2.2 km (1.35 mi), (total of 22.3 km, 13.8 mi.) to the intersection with FS road 41N05. Turn right and follow FS road 41N05 east for 1.9 km (1.2 mi) to an intersection. Continue through the intersection, still following FS road 41N05 for 0.9 km (0.55 mi) to a "Y" intersection with FS road 41N37. Take the right fork along FS road 41N37 and continue for 1.2 km (0.75 mi) to a "Y" intersection. Take the right fork and continue for 1.4 km (0.85 mi) to another "Y" intersection with a sign, "L O". Take the left fork and continue for 1.0 km (0.6 mi) to another "Y" intersection. Continue uphill along the left fork for 0.7 km (0.45 mi) to another "Y" intersection. Continue along the left fork for 1.5 km (0.95 mi) to the end of the road and the lookout tower.

The bench mark is cemented in the top of a boulder, about 29 m (95 ft) southwest of the lookout tower (see figure 1 and 1a).

The bench mark is a U.S. Coast and Geodetic Survey brass tablet stamped "BLACK FOX".

*Driving time from Mt. Shasta City is about 45 minutes.*

Figure 1



Black Fox

View looking northwest

Figure 1a



Black Fox

View looking north



## CVO90-60 (MT. BOLIVAR)

From the town of Weed, Calif., proceed north along interstate I-5 for 5.7 km (3.5 mi) and take the Gazelle exit. At the end of the exit ramp and at the stop sign, turn left and continue 0.2 km (0.1 mi) to another stop sign. Turn right and proceed north for 11.3 km (7.0 mi) to the town of Gazelle. Turn left at the Union 76 service station and a sign, "Scott Valley", "Callahan". Continue west along the Scott Valley road for 40 km (25 mi) to a junction on the left with Highway 3. Continue north along Highway 3 for 2.9 km (1.8 mi) to the southern part of the town of Callahan, Calif. Leave Highway 3 at a store, and a road leading left, and follow the paved road west for 1.1 km (0.70 mi) to a "Y" intersection with FS road 40N16 and a sign, "BOLIVAR L.O.". Continue along the left fork, following FS road 40N16 for 0.6 km (0.35 mi) to a "Y" intersection. Continue along the left fork for 4.4 km (2.70 mi) to an intersection on the right, and a sign, "BOLIVAR L.O.". Turn right and continue another 4.8 km (3.0 mi) to the lookout. The bench mark is cemented in a large outcropping of bedrock, 8.8 m (28.9 ft) east of the stairs of the lookout tower, 1.5 m (5 ft) west, and 1.2 m (4 ft) lower than the highest point on the hill, and about 6.1 m (20 ft) east of the center of the road (no photographs were taken of this station). The bench mark is U.S. Geological Survey brass tablet stamped "CVO90-60".

*Note: The road to this station is extremely steep and requires a 4 wheel drive vehicle. The person driving to this station should be an experienced driver.*

The town of Callahan is 20.8 km (12.9 mi) southwest of the intersection of Highway 3 and the road to Yreka, in the town of Etna. From the town of Etna, to interstate I-5 is about 42.9 km (26.6 mi).

*Driving time from the town of Callahan to the summit is about a half hour, and about 1 hour 50 minutes from Mt. Shasta City, Calif.*

## CVO90-70

From the town of Weed, Calif., proceed north along interstate I-5 for 5.7 km (3.5 mi) and take the Gazelle exit. At the end of the exit ramp and the stop sign, turn left and continue 0.2 km (0.1 mi) to another stop sign. Turn right and proceed north 0.7 km (0.4 mi) to Steward Springs road on the west. Turn left onto Steward Springs road and continue west about 6.5 km (4.0 mi) to a "Y" intersection and a sign, "Green Spring House". Continue along the right fork for 2.2 km (1.35 mi) to a sharp "hair pin" turn to the left. Immediately after rounding this bend is FS road 42N19. Turn right onto the dirt road and follow FS road 42N19 northwest for 0.7 km (0.45 mi) to a small stream. Cross the stream and continue an additional 1.0 km (0.65 mi) to a "Y" intersection. Take the left fork and continue along FS road 42N19 for 4.9 km (3.05 mi) to a "Y" intersection. Continue along the left fork leading uphill, for 1.4 km (0.85 mi) to a sharp curve to the right.

The bench mark is cemented on an outcrop, 2.1 m (7 ft) south of the center of the dirt road, at the northwest-end of the rock outcrop, about 2.4 m (8 ft) below the highest part of the rock outcrop, and about 1.2 m (4 ft) below the road level (see figure 2 & 2a).

On the inside of the curve, and across the road from the rock outcrop, and the bench mark, is a large rock outcrop that extends 12.2 m (40 ft) above the road level. The bench mark is a U.S. Geological Survey brass tablet stamped "CVO90-70".

*Driving time from Mt. Shasta City, Calif. is about 40 minutes.*

Figure 2



CVO90-70

View looking northwest

Figure 2a



CVO90-70

View looking west

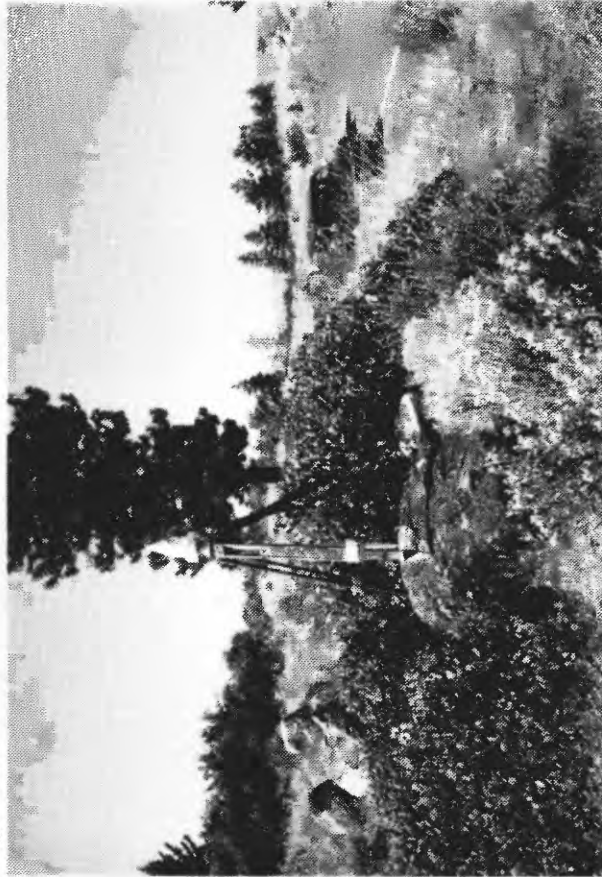
## CVO90-80

From the "flashing" stop light on Highway 97, in the town of Weed, Calif., proceed north on Highway 97 for 8.9 km (5.55 mi) to north-end of a slight down-grade. The bench mark is cemented on the south-end of a round, 1.8 m (6 ft) diameter embedded boulder that projects 0.3 m (1 ft) above ground level, about 2.1 m (7 ft) above the road level, and about 14 m (47 ft) east of the centerline of the highway (See figure 3 & 3a). About 22 m (74 ft) south of bench mark CVO90-80 is a Coast and Geodetic Survey bench mark stamped "Y 494".

Across the highway from the bench mark is a highway sign, "Keep Right Except to Pass". The bench mark is a U.S. Geological Survey brass tablet stamped "CVO90-80".

*Driving time from Mt. Shasta City, Calif. is about 25 minutes.*

Figure 3



CVO90-80

View looking west

Figure 3a



CVO90-80

View looking southwest

## CVO90-90 (Stephen Pass)

From the intersection of Squaw Valley road and Highway 89, at the town of McCloud, Calif., proceed east along Highway 89 for 5.3 km (3.3 mi) to a "T" intersection and a sign "PILGRIM CREEK ROAD". Turn left onto Pilgrim road (this road is later "signed" FS road 13) and proceed northeast along FS road 13 for 29.0 km (18.0 mi) to a "T" intersection with FS road 42N09 on the northwest and a sign, "Lost Springs", "Tennant". Turn left on FS road 42N09 and continue for 1.3 km (0.8 mi) to a "T" intersection with FS road 43N44. Turn right and continue northeast along FS road 43N44 for 7.3 km (4.50 mi) to an intersection and a sign, "Lost Springs", "Tennant". Continue ahead for 1.0 km (0.60 mi) to an intersection from the left. Continue ahead 0.3 km (0.20 mi), to a track road to the north. Turn right into the track road, and continue uphill for 121 m (400 ft).

The bench mark is in a 15 cm (6 in) PVC pipe, about 8 m (28 ft) west of the center of the track road, about 2.7 m (9 ft) north of a 1 m (3.5 ft) diameter tree stump, and at the northeast-end of a 46 x 46 m (150 X 150 ft) cleared area (see figure 4 & 4a). The bench mark is U.S. Geological Survey brass tablet stamped "CVO90-90".

*NOTE: 1 km (0.65 mi) beyond the turn off is a cattle guard.*

*Driving time from Mt. Shasta City, Calif. is about 45 minutes.*

Figure 4



CVO90-90

View looking north

Figure 4a



CVO90-90

View looking east



## GAZELLE

A key to a locked gate is required to reach this station. The key and permission, can be obtained by calling Mr. Newton, the ranch owner at (916) 842-2663, or by calling Mr. Axton, the ranch foreman at (916) 467-5105.

From the town of Weed, Calif., proceed north along interstate I-5 for 5.7 km (3.5 mi) and take the Gazelle exit. At the end of the exit ramp and at the stop sign, turn left, and continue 0.2 km (0.1 mi) to another stop sign. Turn right and continue north for 11.3 km (7.0 mi) to the intersection of Main Street, and Scott Valley Road, at the Union 76 Service station in the town of Gazelle. Turn left and continue west along Scott Valley road towards the town of Callahan for 31.4 km (19.45 mi) to a blue pipe gate on the north side of the road. This is the road to station Gazelle. Continue southwest on Scott Valley road an additional 4.0 km (2.5 mi) to several houses, just past a curve in the road. The key to the gate passed 4.0 km (2.5 mi) previous, can be obtained from Mr. Axton, the ranch foreman who resides here.

From the blue gate mentioned earlier; continue north through the locked gate for 0.5 km (0.3 mi) to a "Y" intersection. Continue along the left fork for 0.2 km (0.1 mi) to a very sharp left turn uphill. Continue uphill along the left fork for 1.8 km (1.1 mi) to the top of the hill and an old abandoned Weather Station.

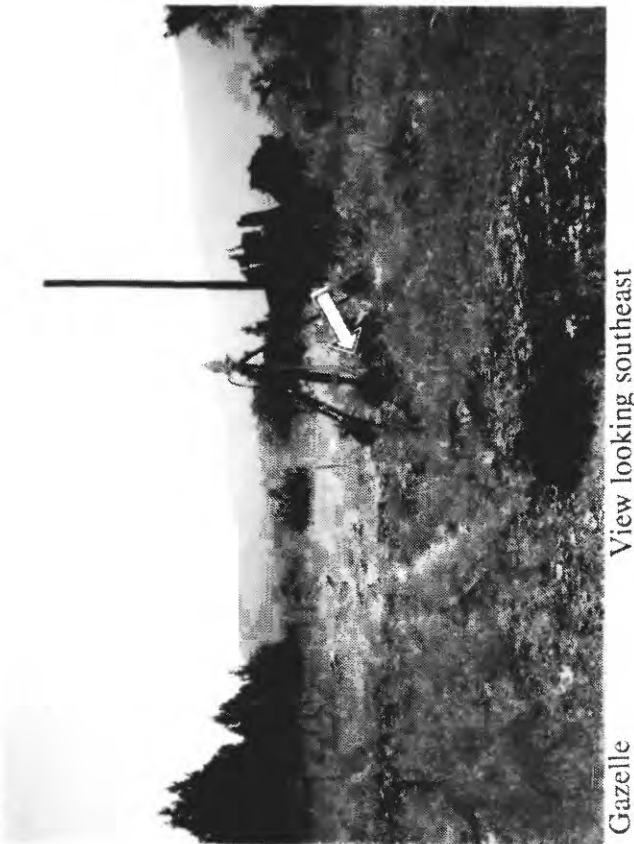
The bench mark is cemented in the top of a small exposure of bedrock, about 13 m (44 ft) west of the fence enclosing the weather station (see figure 5 & 5a). The bench mark is a U.S. Coast and Geodetic Survey brass tablet stamped "GAZELLE 1952".

*Driving time from Mt. Shasta City, Calif. is about 50 minutes.*

Figure 5



Figure 5a



## GRENADA SOUTH BASE NO. 1

From the town of Weed, Calif., proceed north on interstate I-5 for 5.7 km (3.5 mi) and take the Gazelle exit. At the end of the exit ramp and the stop sign, turn left and continue 0.2 km (0.1 mi) to another stop sign. Turn right and continue north for 12.2 km (7.55 mi) to the post office in the town of Gazelle. Proceed through the town of Gazelle and continue another 3.7 km (2.3 mi) to a large hay storage shed, and a farm house on the left side. The main mark has been destroyed. Use reference mark (RM) no.1. RM no. 1 is 15.1 m (49.5 ft) east of the centerline of the highway, 11.2 m (36.8 ft) southeast of telephone pole no. 131, which has a triangular blaze on the east side, 8.4 m (27.6 ft) west of the west rail of the railroad track, 12.5 m (41 ft) southeast of a wooden witness post at RM no. 2, and 13.0 m (42.5 ft) southeast of RM no. 2 (see figure 6 & 6a). The bench mark is a U.S. Coast and Geodetic Survey brass tablet stamped "Grenada South Base No 1 1952".

*Driving time from Mt. Shasta City is about 20 minutes.*

Figure 6



Grenada South Base No. 1

View looking southeast

Figure 6a



Grenada South Base No. 1

View looking northwest

## HERD

From the "flashing" stop light on Highway 97 in the town of Weed, Calif., proceed north on U.S. Highway 97 for 30.9 km (19.15 mi) to the "VISTA OVERLOOK" parking lot on the west side of the highway. Continue past the Overlook parking lot an additional 0.7 km (0.45 mi) to a cattle guard, and a dirt road leading to the west (left) (this road is later "signed", 45N22). Turn left and continue along FS road 45N22 for 0.8 km (0.5 mi) to a "Y" intersection. Continue along the left fork for 0.3 km (0.2 mi) to a "Y" intersection and a sign, "HERD PEAK". Take the right fork, staying on FS road 45N22, and continue ahead for 0.3 km (0.2 mi) to another "Y" intersection. Continue along the left fork for 3.4 km (2.15 mi) to a "Y" intersection and a sign, "HERD PK LO 4". Take the left fork and continue for 4.5 km (2.80 mi) to the lookout tower. Park, and follow the stairs to the lookout tower.

The bench mark is about 15 m (50 ft) higher than the road level, cemented in a boulder southwest of the lookout tower, next to a 0.6 m (2 ft) high 10 x 10 cm (4 x 4 in) post with a wooden box attached on the top (See figure 7 & 7a). The bench mark has a nail hammered in the center.

The bench mark is U.S. Coast and Geodetic Survey brass tablet stamped "HERD 1952".

*Driving time from Mt. Shasta City is about 45 minutes.*

Figure 7



Herd

View looking south

Figure 7 a



Herd

View looking southwest

## HOLLENBECK

From the intersection of U.S. Highway 299 and 139, 0.8 km (0.5 mi) southeast of the town of Canby, Calif., proceed north on U.S. Highway 139 for 27.4 km (17.0 mi) to a "T" intersection with County Road 91 on the left and a sign, "LOOKOUT", "BIERBER". Turn south and proceed on County road 91 for 7.2 km (4.45 mi) to a sign, "NATIONAL FOREST ACCESS". Continue another 0.4 km (0.25 mi) to an intersection with FS road 56 on the right and a sign, "LONGBELL", "MUD SPRINGS RD". Turn right and proceed northwest along FS road 56 for 4.8 km (2.95 mi) to a "Y" intersection. Continue along the right fork for 3.0 km (1.90 mi) to a "T" intersection on the right and a building made of tile blocks, and a sign, "MUD WELLS SPRINGS". Continue ahead another 0.9 km (0.55 mi) to a "T" intersection on the left and a sign, "LONGBELL 10" "HOLLENBECK BUTTE". Turn left and proceed southwest along the Hollenbeck Butte road for 2.5 km (1.55 mi) to a small clear-cut hill about 152 m (500 ft) east of the road.

A short hike is required to reach the bench mark, which is cemented on a 0.6 x 0.9 m (2 x 3 ft) boulder, 10 - 15 cm (4 - 6 in) above ground level, at the northeast part of the hill (see figure 8 & 8a).

The bench mark is a U.S. Coast and Geodetic Survey brass tablet stamped "HOLLENBECK 1948".

*If approaching this station from the north then:*

From the "flashing" light on Highway 139 at the town of Tule Lake, Calif., proceed south on Highway 139 for 39.5 km (24.5 mi) to a "T" intersection on the southwest and a sign, "LAVA BEDS NM", "MEDICINE LAKE". Continue past the intersection another 17.3 km (10.7 mi) to a "T" intersection with County Road 91 on the south, and a sign "LOOKOUT", "BIERBER".

\*Follow description as described previously.

**NOTE:** *If you reach a large clearing, and the Railroad tracks on the right, you have gone about 1.6 km (1 mi) past the turn off to Hollenbeck Butte.*

*Driving time from Tule Lake is about 1 hour 15 minutes.*

**Figure 8**



Hollenbeck

View looking east

**Figure 8a**



Hollenbeck

View looking northwest



## JOT DEAN

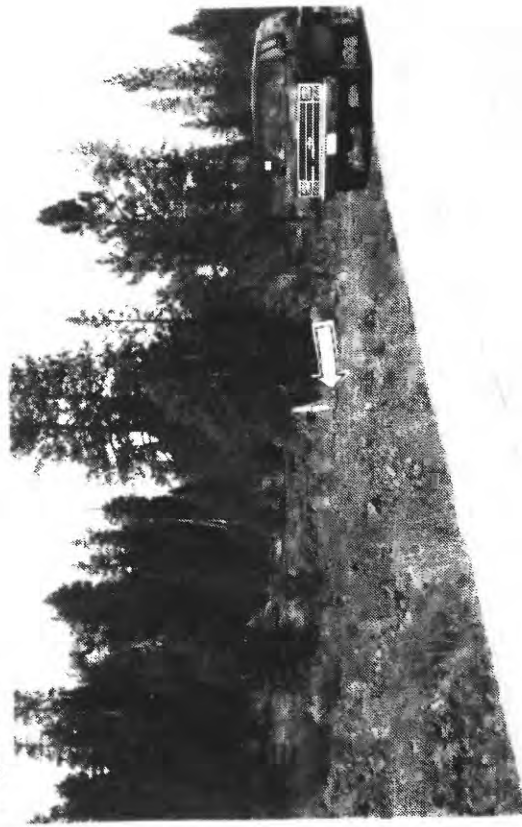
From the intersection of Squaw Valley road and Highway 89, at the town of McCloud, Calif., proceed east on Highway 89 for 26.9 km (16.7 mi), passing the town of Bartle, until an intersection with FS road 15 on the left, and a sign, "Harris Springs Road", "Medicine Lake". Turn left and continue in a northerly direction along FS road 15 for 7.3 km (4.55 mi) to an intersection with FS road 49. Turn right and continue northeast along FS road 49 for about 28.9 km (17.95 mi) to 0.2 km (0.1 mi) south of "Jot Dean Ice Caves".

The bench mark is cemented in a lava flow about 10.7 m (35 ft) west of the road center.

The bench mark is a U.S. Geological Survey brass tablet stamped "JOT DEAN" (see figure 9).

*Driving time from Mt. Shasta City, Calif. is about 1 hour.*

Figure 9



Jot Dean

View looking northwest

## LAKE

From the "flashing" light on Highway 139, at the town of Tule Lake, Calif., proceed south on Highway 139 for 38.5 m (24 mi) to a "T" intersection with FS road 97 and a sign, "LAVA BEDS NM", "MEDICINE LAKE". Turn right and follow FS road 97 for 39.5 km (24.5 mi) to a "T" intersection with FS road 49 (also called FS road 44N75). Turn right and follow FS road 49 for 2.6 km (1.60 mi) to an unmarked "T" intersection. Turn left and continue west towards Medicine Lake for 0.6 km (0.35 mi) to an unmarked "T" intersection. Turn right at the intersection and continue along the road for 0.6 km (0.40 mi) to an intersection on the left and a sign, "A. H. Hogue Campground". Turn left into the campground and follow the campground road for 0.4 km (0.25 mi) to campsite no. 50 on the south side.

The bench mark is cemented on the west-end of a basalt rock outcrop, about 51.8 m (170 ft) west of the center of the road, and about 4 m (13 ft) northwest of the water edge (see figure 10 & 10a).

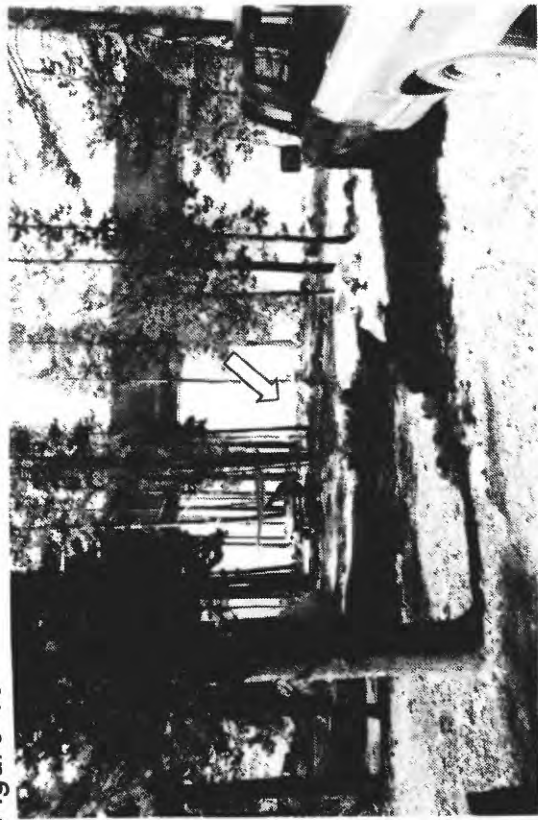
The bench mark is a U.S. Geological Survey brass tablet stamped "LAKE".

*If approaching this station from the south then:*

From the intersection of U.S. Highway 299 and 139, 0.8 km (0.5 mi) southwest of the town of Canby, Calif., proceed north on U.S. Highway 139 for 44.7 km (27.7 mi) to a "T" intersection with FS road 97 on the left and a sign, "LAVA BEDS NM", "MEDICINE LAKE". Follow description as described previously

*Driving time from Tule Lake, Calif. is about 1 hour.*

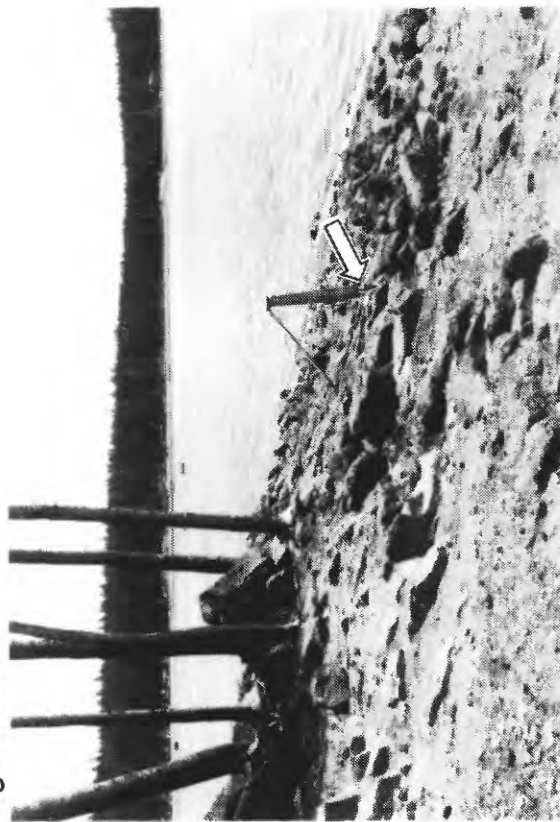
Figure 10



Lake

View looking south

Figure 10a



Lake

View looking southeast

## LOOKOUT

From the "flashing" light on Highway 139 at the town of Tule Lake, Calif. proceed south on Highway 139 for 39.5 km (24.5 mi) to a "T" intersection to the right, and a sign, "LAVA BEDS NM", "MEDICINE LAKE". Continue past the intersection an additional 17.3 km (10.7 mi) to a "T" intersection with County Road 91 on the right and a sign, "LOOKOUT", "BIERBER". Turn south and proceed along county road 91 for 40.6 km (25.2 mi) to a "T" intersection on the right and a sign, "LOOKOUT". Turn right and follow the road uphill for 0.08 km (0.05 mi) to a driveway on the right with a green metal gate. Park at gate and pack towards the northwest, past a large concrete building with a green roof (see figure 11 & 11a).

The bench mark is set on a concrete post 0.3 m (1.0 ft) above ground level.

The bench mark is a U.S. Coast and Geodetic survey brass tablet stamped "LOOKOUT 1984".

*The property is owned by a Mr. Palmer who is in Alaska. Mr. Palmers father lives in the town of Lookout. To reach Mr. Palmers home, continue past the driveway for another 0.2 km (0.1 mi) to a "T" intersection and a service garage. Turn right and follow the road for 0.4 km (0.25 mi). Mr. Palmers house is unpainted and is made of weathered 10 x 10 cm (4 x 4 in) posts rather than the conventional type of construction. Mr. Palmer is willing to open the gate to the property.*

*If approaching this station from the south then:*

From the intersection of U.S. Highway 299 and 139, 0.8 km (0.5 mi) southwest of the town of Canby, Calif., proceed north on U.S. Highway 139 for 27.4 km (17.0 mi) to a intersection on the left and a sign, "LOOKOUT", BIERBER".

\*Follow description as described previously.

*Driving time from Tule Lake, Calif. is about 1 hour 15 minutes.*

Figure 11



Lookout

View looking northeast

Figure 11a



Lookout

View looking east

## M504 (Lava Beds NM)

From the "flashing" light on Highway 139 at the town of Tule Lake, Calif., proceed southeast on U.S. Highway 139 for 7.0 km (4.4 mi) to a Railroad Crossing, and County road 111 (also called FS road 10). Turn right and follow Co. road 111 south for 9.2 km (5.7 mi) to a "T" intersection on the right with Co Rd 120, and a sign, "LAVA BEDS NATIONAL MONUMENT". Turn right and follow Co. Rd 120 into the Monument for 27.3 km (16.9 mi), passing Schonchin Butte, until an intersection on the south (right), and a sign, "Medicine Lake", "Mammoth Crater".

\*The bench mark is cemented on the north-end of a small outcrop of lava that protrudes 0.5 m (1.5 ft) above the ground level, about 30.5 m (100 ft) south-southeast of the apex of the triangle formed by the two roads, about 15 m (50 ft) south of the centerline of the paved road, about 15 m (50 ft) southwest of the center of the dirt road, about 2.4 m (8 ft) above the paved road, 1.8 m (6 ft) above the dirt road, and 20 cm (8 in) above the ground level (see figure 12 & 12a). The bench mark is a U.S. Coast and Geodetic Survey Brass tablet stamped "M504".

*If approaching this station from the south then:*

From the intersection of U.S. Highway 299 and 139, 0.8 km (0.5 mi) southwest of the town of Canby, Calif., proceed north on U.S. Highway 139 for 44.7 km (27.7 mi) to a "T" intersection on the left with FS road 97, and a sign "LAVA BEDS NM", "MEDICINE LAKE".

Turn left and continue southwest on FS road 97 for 4.2 km (2.6 mi) to an unmarked "T" intersection on the right, and a sign, "LAVA BEDS NM". Turn right and follow the National Monument road for 14.5 km (9.0 mi) to the Monument Headquarters. Continue past the Monument Headquarters an additional 1.8 km (1.15 mi) to a sign, "Medicine Lake", "Mammoth Crater", and a dirt road leading to the south.

\*Follow description as described previously.

*Driving time from Tule Lake, Calif. is about 45 minutes.*

Figure 12



M 504

View looking east

Figure 12a



M 504

View looking north



## BRADLEY

From the town of Mt. Shasta City, Calif., proceed south on Interstate I-5 for 16.9 km (10.5 mi) to the south-side of the town of Dunsmuir. Take the "Craig View Dr.", "Railroad Park Dr." exit and continue 0.3 km (0.2 mi) after leaving the freeway to a "T" intersection. Turn right onto Railroad Park Dr. and continue for 0.8 km (0.5 mi) to the north-side of Railroad Park to a "Y" intersection with FS road 39N17. Take the right fork along FS road 39N17 and continue for 1.0 km (0.6 mi) to a "Y" intersection. Continue along the right fork for 1.4 km (0.85 mi) to another "Y" intersection. Take a sharp turn to the left, and continue for 1.85 km (1.15 mi) to a "Y" intersection. Continue along the right fork, staying on FS road 39N17 for 0.9 km (0.55 mi) to an intersection. Continue through the intersection for another 1.7 km (1.05 mi) to a "Y" intersection. Take the right fork and continue for 2.9 km (1.80 mi) to a "Y" intersection. Take the left fork (remains of a sign, "Mt. Bradley L.O.") and continue for 2.2 km (1.35 mi) to the lookout tower.

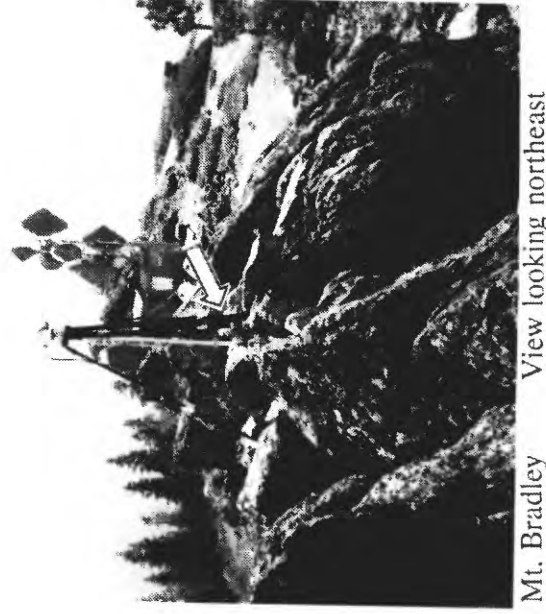
The bench mark is cemented on a large rock outcrop, about 91 m (300 ft) west of the lookout tower, and about 12.2 m (40 ft) above the road level (see figure 13 & 13a). The bench mark is a U.S. Geological Survey brass tablet stamped "Bradley USGS 1952".

*Driving time from the intersection with I-5 is about 35 minutes and about 45 minutes from Mt. Shasta City. A 4 wheel drive is recommended but not required.*

Figure 13



Figure 13a

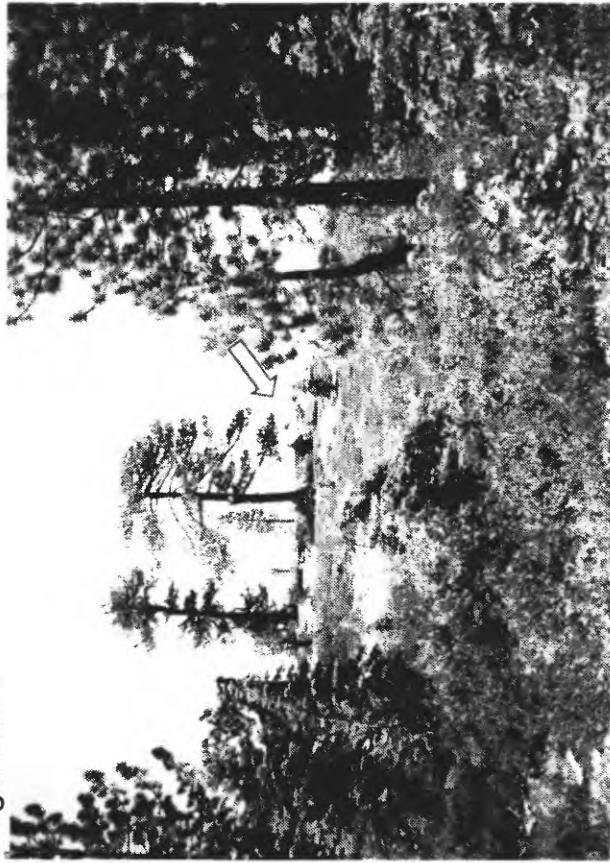


## MUMBO

From the Forest Service Ranger Station in Mt. Shasta City, Calif., proceed southwest on Elma street for 0.08 km (0.05 mi) to the intersection with Pine Street. Turn left on Pine street and continue southeast for 0.2 km (0.15 mi) to the intersection with West Lake street. Turn right on West Lake street and continue for 1.1 km (0.7 mi), crossing over Interstate I-5 (at which point West Lake street becomes Hatchery Lane) to the intersection with South Old Stage road. Turn left on South Old Stage road and proceed south for 0.4 km (0.25 mi) to a "Y" intersection. Take the right fork, still following South Old Stage road. South Old Stage road becomes W A Bar road as you approach the south end of the lake. Continue southwest along the right fork for 8.6 km (5.35 mi). A sign indicating you are on FS road 26 will be on the right side of the road. Continue southwesterly on FS road 26 another 15.1 km (9.40 mi) to a "Y" intersection. Take the left fork, staying on FS road 26 and continue for 1.7 km (1.05 mi) to "GUMBOOT" parking on the west side of the road. To a "Y" intersection with FS road 40N45. Take the left fork, staying on FS road 26 and continue for 1.7 km (1.05 mi) to a major 4-way intersection at Mumbo Creek. Continue through the intersection for another 1.4 km (0.85 mi) to a curve in the road, and an intersection with FS road 38N55. Turn right and proceed southwest along FS road 38N55 for 0.9 km (0.55 mi) to a steep road on the right. Turn northwest onto the unmarked road (2 wheel drive OK but high clearance required), and drive uphill for about 107 m (350 ft) to a flat spot on the road, where it makes its closest approach to rocky ridge crest on the right. Park here (i.e., before the road starts to descend). The bench mark is cemented in bedrock on a skyline outcrop about 137 m (450 ft) on a bearing of 310°, about 30.5 m (100 ft) above the road and 3 m (10 ft) south of a rock cairn (see figure 14 & 14a). The bench mark is a U.S. Geological Survey brass tablet stamped "MUMBO 1990".

*Driving time from Mt. Shasta City is about 1 hour 15 minutes.*

Figure 14



Mumbo

View looking northwest

Figure 14a



Mumbo

View looking northwest

## OVERPASS

From the "flashing" light on Highway 139, at the town of Tule Lake, Calif., drive south on U.S. Highway 139 for 34.9 km (21.75 mi) to where the highway crosses over the Railroad tracks. Continue 0.2 km (0.1 mi) beyond the apex of the overpass to a track road to the right. Turn into the dirt road and backtrack on a faint track road that parallels the main road and a fence line, for 0.2 km (0.1 mi).

\*The bench mark is cemented on a small exposure of bedrock, about 18 m (60 ft) west of the centerline of Highway 139, and about 2.4 m (8 ft) of the fence line (no photographs were taken of this station).

The overpass is 4.4 km (2.75 mi) north of the junction to Medicine Lake, and the Lava Beds National Monument exit.

The bench mark is a U.S. Coast and Geodetic Survey brass tablet stamped "OVERPASS 1948".

*If approaching this station from the south then:*

From the intersection of U.S. Highway 299 and 139, 0.8 km (0.5 mi) southwest of the town of Canby, Calif., proceed north on U.S. Highway 139 for 44.4 km (27.7 mi) to a "T" intersection on the left, and a sign, "LAVA BEDS NM", MEDICINE LAKE". Continue for an additional 4.4 km (2.75 mi) north beyond this intersection.

\*Follow description as previously described.

*Driving time from Tule Lake, Calif. is about 25 minutes.*

## P501

From the "flashing", light on Highway 97 at the town of Weed, Calif., proceed northeast on Highway 97 for 32.2 km (19.95 mi) to the Grass Lake Ranger Station. Continue north another 12.5 km (7.75 mi) beyond the Grass Lake station, to a paved road (Tennant road) on the right. Turn right onto Tennant road and proceed south for 2.1 km (1.30 mi) to a Railroad crossing. Proceed through the crossing and continue southeast another 5.9 km (3.7 mi) to an unmarked "T" intersection (this road is later "signed", Old Stage Highway) on the left and a sign, "BRAY". Turn left onto Old Stage Road and follow this road for 3.7 km (2.3 mi) into the town of Bray. Continue through the town another 3.9 km (2.40 mi) to a "T" intersection with N. Tennant Rd. Turn right and follow N. Tennant Rd. for 2.4 km (1.50 mi) into the "flats", and a small knoll on the east side of the road.

\*The bench mark is cemented on the west side of a lava knoll, about 16.8 m (55 ft) east of the center of the road, about 3.7 m (12 ft) above road level, on a 1.2 x 1.5 m (4 x 5 ft) rock shelf mid-way up the knoll, and slightly left of center of the knoll.

\*The bench mark is a U.S. Coast and Geodetic Survey brass tablet stamped "P501 1954" (see figure 15 & 15a).

*If approaching this station from the northeast then:*

From the intersection of Highway 139 and 161, north of Tule Lake Calif., and south of Merrill, Or., on the Oregon/California border, proceed west on Highway 161 for 31.6 km (19.6 mi), to the junction with Highway 97. Turn left and follow Highway 97 southwest for 6.6 km (4.1 mi), pass the state of California agriculture station and continue an additional 16.0 km (9.9 mi) to the town of Macdoel. Turn left onto Juniper Knoll street (across from the Post Office). Go one block and turn right on "Old State Highway". Follow Old State Highway for 19.8 km (12.3 mi), to the intersection with N. Tennant Rd. Turn left and drive east on N. Tennant Rd. for 2.4 km (1.50 mi), into the "flats", and a small knoll on the east side of the road. Follow description as described previously.

*Driving time from Mt. Shasta City, Calif. is about 1 hour 15 minutes.*

Figure 15



View looking east-northeast

P 501

Figure 15a



View looking east

P 501



## PILGRIM

From the intersection of Squaw Valley road and U.S. Highway 89, at the town of McCloud, Calif., proceed east along U.S. Highway 89 for 13.4 km (8.3 mi), to a large paved pullout on the south side of the highway. The bench mark is cemented on bedrock about 10.7 m (35 ft) north of the centerline of the highway, and 0.9 m (3 ft) above the road level (see figure 16 & 16a).

The bench mark is U.S. Coast and Geodetic Survey brass tablet stamped "Pilgrim".

*Driving time from Mt. Shasta City, Calif. is about 20 minutes.*

Figure 16



Pilgrim

View looking northwest

Figure 16a



Pilgrim

View looking north

## R500

From the intersection of Squaw Valley road and Highway 89, at the town McCloud, Calif., proceed east on Highway 89 for 26.9 km (16.7 mi), passing the town of Bartle, to an intersection with FS road 15 on the left and a sign, "Harris Springs Road", "Medicine Lake". Turn left and proceed northeast along FS road 15 for 7.1 km (4.4 mi) to a "T" intersection with FS road 49. Turn right and proceed northeast along FS road 49 for 3.3 km (2.05 mi) to a "T" intersection with FS road 3. Turn right on FS road 3 (this road is later "signed", 41N03) towards Hambone. Continue east along FS road 41N03 for 5.1 km (3.2 mi) to a "T" intersection on the right to Pondosa. Continue ahead on FS road 41N03 for 12.2 km (7.55 mi) to the bench mark on the north side of the road (see figure 17). The bench mark is cemented in a lava flow, about 11 m (36 ft) north of the road center. The bench mark is a U.S. Coast and Geodetic Survey Brass tablet stamped "R 500 1954".

*Driving time from Mt. Shasta City is about 1 hour.*

Figure 17



## ROUND MTN.

From the "flashing" light on Highway 139 in the town of Tule Lake, Calif., continue south along Highway 139 for 39.4 km (24.4 mi) to an intersection on the right and a sign "Medicine Lake", "Lava Beds NM". Turn right and continue west on FS road 97 to a sign, "Burnt Lava Flow 4", "Black Mtn 2", at a sharp bend, and a gravel road to the left. Turn left and continue uphill along the gravel road to a red cinder road to the left and a sign, "Burnt Lava Flow 2", "Paynes springs 4". Turn left and follow the red cinder road towards Burnt Lava Flow. Continue south for 2.9 km (1.8 mi) to an intersection with FS road 56 on the right. Continue ahead for 5.3 km (3.3 mi) to an unmarked side road on the right.

Leave the well-graded red cinder road and turn right onto the side road. Continue along the side road for 0.4 km (0.25 mi) to a "Y" intersection. Take the left fork and continue for 1.9 km (1.2 mi) to a 4-way intersection. Go through the intersection and continue for 1.3 km (0.8 mi) to a strange "off-set" intersection at a major graded road. Go through the intersection and continue in a south direction for 1.1 km (0.70 mi), passing under high tension power lines. Continue south an additional 0.7 (0.45 mi) to a "Y" intersection. Take the right fork at a sign, "Round Mtn. L.O. 2", and continue for 0.2 km (0.1 mi) to a 4-way intersection. Continuing ahead through the intersection for 2.7 km (1.7 mi) to the Lookout.

The bench mark is cemented in the top of a 25 cm (10 in) diameter concrete post, 6 m (20 ft) south of the Lookout tower, and about 10 m (35 ft) north of the fence surrounding the weather station (see figure 18 & 18a).

The bench mark is a U.S. Coast and Geodetic Survey brass tablet stamped "Round 1948".

*Driving time from Tule Lake, Calif. is about 1 hour and 15 minutes.*

Figure 18



Round Mtn.

View looking north

Figure 18a



Round Mtn.

View looking south

## SCOTT VALLEY AIRPORT

From the town of Greenview, Calif., go north on Highway 3 for 4.3 km (2.7 mi) to the intersection with Serpe Ln. Turn right on Serpe Ln and continue east for 2.1 km (1.3 mi) to the intersection with Island road. Turn right on Island road and continue south for 1.4 km (0.9 mi) to the airport parking lot on the right. Turn into the airport parking lot.

The bench mark is just north of the entrance into the parking lot. There are three bench marks within 9.1 m (30 ft) of each other. One is stamped P864, and the second is stamped Scott Valley Airport, and the third is a reference mark for the Scott Valley mark. Be sure to use the Scott Valley Airport mark, which is closer to the airport entrance (see figure 19 & 19a).

The bench mark is a U.S. Coast and Geodetic Survey brass tablet stamped "Scott Valley Airport 1952".

*Driving time from Mt. Shasta City, Calif. is about 1 hour.*

Figure 19



Scott Valley Airport

View looking southwest

Figure 19a



Scott Valley Airport

View looking south

## SHASTA

From the intersection of N. Mt. Shasta Street and E. Elma Street, in Mt. Shasta City, Calif., proceed northeast on E. Elma Street for 0.6 km (0.4 mi) to a road junction from the left. Continue to the right for 0.3 km (0.2 mi) to a stop sign at the local High School. Turn left and follow county road SIS A10 road north for 21.8 km (13.55 mi) to the parking lot at the end of the road.

The bench mark is cemented on the east-end of a 1.8 x 2.4 m (6 x 8 ft) boulder, 1.5 m (5 ft) above the road level, 0.3 m (1 ft) above the ground level, and at the north-end of the first bend in the road after the parking lot, about 19.2 m (63 ft) north of the centerline of the old road, and about 98 m (320 ft) north of the two metal gate post, northwest of the lower parking level (see figure 20).

The bench mark is a U.S. Geological Survey brass tablet stamped "SHASTA".

*Driving time from Mt. Shasta City, Calif. is about 20 minutes.*

Figure 20



Shasta

View looking northwest



## VAN BREMMER

From the "flashing" light on Highway 139 at the town of Tule Lake, Calif., proceed southeast on U.S. Highway 139 for 7.1 km (4.4 mi) to a Railroad Crossing, and County road 111 (also called FS road 10). Turn right and follow Co. road 111 south for 9.2 km (5.7 mi) to a "T" intersection on the right with Co. Rd 120, and a sign, "LAVA BEDS NATIONAL MONUMENT". Turn right and follow Co. Rd 120 into the Monument for 27.3 km (16.9 mi), passing Schonchin Butte, until an intersection on the south, and a sign, "Medicine Lake", "Mammoth Crater".

Leave the main paved road and take the dirt road to the right (the dirt road is later "signed", FS road 49), and follow the dirt road towards Medicine Lake for 10.2 km (6.30 mi) to a 4-way intersection. Turn right and follow FS road 41N01 west for 18.5 km (11.45 mi) to a major intersection at a paved road and a large parking area with a rest room. \*Continue through the intersection and follow FS road 77 for 3.6 km (2.25 mi), passing a cinder quarry on the left until a "T" intersection on the right (this road is later "signed", FS road 41N03). Turn right and follow FS road 41N03 to the north for 0.6 km (0.35 mi) to a "Y" intersection with FS road 44N06. Take the right fork and follow FS road 44N06 north about 70 m (230 ft) to another "Y" intersection. Take the left fork, following FS road 44N06, for 1.2 km (0.75 mi) to a major intersection with FS road 44N09. Take a sharp left turn, and follow FS road 44N09 southwest, then northwest for 1.0 km (0.65 mi) to a "Y" intersection. Take the left fork and continue for 0.2 km (0.10 mi) to another "Y" intersection. Continue uphill along the right fork for 1.7 km (1.05 mi) to the top of the hill.

The bench mark is cemented on a small rock outcropping, about 22.9 m (75 ft) north of the remains of the forest service lookout tower (see figure 21 & 21a). The bench mark is a U. S. Coast and Geodetic Survey brass tablet stamped "VAN BREMMER 1948".

*If approaching this station from the south:*

From the intersection of Squaw Valley road and Highway 89, at the town McCloud, Calif., proceed east on Highway 89 for 5.1 km (3.2 mi) until an intersection with FS road 13 on the north, and a sign, "PILGRIM CREEK ROAD". Turn left and follow FS road 13 northeasterly for 34.5 km (21.4 mi) to a "Y" intersection and a sign, "Medicine Lake Rd. 2", Harris Springs Rd. 2". Take the left fork and continue northeast for 1.8 km (1.1 mi) to intersection with FS road 15. Turn left on FS road 15 and continue northwest for 27.7 km (17.2 mi) to intersection with FS road 77, and a paved parking lot with a rest room.

\*Follow description as described previously.

*Driving time from Mt. Shasta City, Calif. is about 1 hour 30 minutes.*

Figure 21



Van Bremmer

View looking north

Figure 21a



Van Bremmer

View looking southeast

CLEAR LAKE NATIONAL  
WILDLIFE REFUGE  
Bird Island 7/14 4650

