"Joy of Geodetics"

Part III

Functional Classification of Disk Markers, Primary Installing Agencies, and Representative Examples

Stf/C Greg Shay, JN-ACN

United States Power Squadrons / America's Boating Club

Sponsor: USPS Cooperative Charting Committee

Revision 5 - 2020

Part III - Topics Outline

A. About Disk Marks
B. Disk Casting vs. Stamping
C. Primary Installing U.S. Agencies
D. First Disks
E. Classification by Disk Function

Disk Marks are the "most common" physical type of Mark!

- The disks (sometimes called caps) are typically round (one is hexagonal) and usually 3 inches in diameter.
- They are made from various types of non-corrosive metals (usually bronze, but also brass, aluminum, or stainless steel)
- They display a wide variety of colors (primarily due to surface oxidation or staining over time)
- Some disk surfaces are flat, some convex, and others may have different surface contours
- The disks have a casting of text and usually a center symbol
- The disks have a stampings of the designation (name) and installation date.
- The disks are most often set in concrete, masonry, stone, or on top of a rod driven into the ground.

"Most Every Disk is Unique"

Difference Between the Disk Casting and the Disk Stamping

Disk Casting – This is the wording (Agency and Disk Type) and Symbol (if any) that was imprinted into the disk when the disk was formed (when the disk was cast)

Disk Stamping – this is what is stamped after casting near the center of the disk (usually above and/or below the cast center symbol if any) by the surveyor or an agency just before installing the disk in the field. Normally the Stamping is the Designation (name) plus the Date year of Installation – each NGS datasheet tells what the STAMPING is on the disk

Ref. 10

Disk Casting and the Disk Stamping

Stamping

(Designation & Date)
Imprinted later!

Casting

(Everything else)
Text & Center Symbol
When the disk was cast!

Most Castings include text “Logo" of the Installing Agency and the Disk Type

Installing Agency

Disk Type (Function)

Several agencies of the U.S. Government performed extensive surveying, mapping, and placement of survey disks.

The two most prominent agencies for historic placement of survey disks are:

The National Geodetic Survey (NGS)

within the U.S. Department of Commerce (DOC)

The U.S. Geological Survey (USGS)

within the U.S. Department of Interior (DOI)

Note: these agencies also installed other physical types of marks such as rods, pillars, and the like (see Physical Types of Marks in JOG Part I).

National Geodetic Survey (NGS)

within the DOC

The National Geodetic Survey, our Nation's first civilian scientific agency, was established by President Thomas Jefferson in 1807 as the Survey of the Coast (1807-1836). The name was changed to U.S. Coast Survey (1836–1878), then to U.S. Coast and Geodetic Survey (1878–1970), and finally in 1970 to the National Geodetic Survey where it is a unit within the National Ocean Service (NOS), within NOAA, within the U.S. Department of Commerce (DOC). NGS defines and manages a national coordinate system, providing the foundation for transportation and communication; mapping and charting; and a large number of applications of science and engineering. *NGS is the only agency that maintains a database of survey marks from all of the various agencies*.

Common Disk Logos

U.S. COAST & GEODETIC SURVEY or U.S.C.&G.S.

or NATIONAL GEODETIC SURVEY

Ref. 22

United States Geological Survey (USGS) within the DOI

The United States Geological Survey, established in 1879, is a scientific agency within the U.S. Department of the Interior (DOI). The scientists of USGS study the landscape of the United States, its natural resources, and the natural hazards that threaten it. The organization's work spans the disciplines of biology, geography, geology, and hydrology. The USGS is a fact-finding research organization with no regulatory responsibility. The U.S. DOI is responsible for the management and conservation of most federal lands and natural resources, and the administration of programs relating to Native Americans, Alaska Natives, Native Hawaiians, territorial affairs, and insular areas of the U.S.

Common Disk Logos

U.S. DEPARTMENT OF INTERIOR + GEOLOGICAL SURVEY

or just U.S. GEOLOGICAL SURVEY

Ref. 23 & 25

First Disks: "Old Style / Old Type" and More Conventional Early Disks

The first USC&GS survey "disks" were set in c1900 in Kansas, Oklahoma, and Texas along the 98th Meridian Arc of Triangulation, and perhaps in other locations. These early disks were 'cup' shaped with a flat center and a raised edge with just the raised lettering U.S.C. & G.S on them. In NGS Data Sheets, these discs are referred to as "Old Style" or "Old Type" in the Station Description. Some of these disks may have been set as late as 1944. The newer style flat disks were introduced shortly after that in c1903 with cast lettering: "U.S. COAST & GEODETIC SURVEY, B.M. ; $250 FINE OR IMPRISONMENT FOR DISTURBING THIS MARK". Later some convex disks and disk caps were also introduced.

Ref. 3

USC&GS "Old Type / Old Style" Station Disks

Relatively Rare

QE2273 (RIDGE) – Monumented 1905,

NW of Junction, OR (NGS)

QE2396 (BALD) – Monumented 1908, near Bald Mountain, OR (NGS)

HX3058 (CHARLESTON MAGNETIC) – Monumented 1944, Charleston, WV (NGS)

Outline by "Disk Installing Agency"

In JOG Part III - Principal U.S. Government Agencies

- Mainly NGS, prior NGS (e.g. USC&GS), and USGS

In JOG Part IV – Other Installing Agencies

- Other U.S. Government Agencies
- States
- Counties, Districts, & Cities
- Non-Governmental Agencies
- Commemorative Disks (various agencies)

Ref. 3 & GDS

Principal U.S. Disk Installing Agencies

Prior NGS (USC&GS)

NGS and parent USDOC

USGS and parent USDOI

Note: Classification in this section will be by Disk Function with the primary installing Agencies randomly represented.

DISK MARK "FUNCTIONAL" CLASSIFICATION

A. Primarily "Horizontal" Disk Marks

- Triangulation Station
- Horizontal Control
- Reference Mark
- Azimuth Mark
- Traverse Station
- Calibration Base Line

B. Primarily "Vertical" Disk Marks

- Bench Mark
- Vertical Control
- Tidal Bench Mark
- Gaging Station
- Hydrographic Station
- Topographic Station

- Geodetic Control Mark (New)
- Magnetic Station
- Gravity Station

GDS Classification

A. Primarily
HORIZONTAL DISK MARKS

- Horizontal Control
- Triangulation Stations
- Reference Marks
- Azimuth Marks
- Traverse Stations
- Calibration Base Line Stations

“HORIZONTAL CONTROL” DISKS

The Horizontal Control disk was a “replacement” for USC&GS Triangulation and Traverse Station disks. The Horizontal Control disk is a mark of known lat/lon set using horizontal surveying methods such as traverse, triangulation, or trilateration for qualifying accuracy. The marks are stamped with “HORIZONTAL CONTROL MARK” and the symbol is a small triangle at the center of the disk.

Ref. 3

"HORIZONTAL CONTROL"
Disk Examples - 1

DE1773 (TREAT) – Sumpter, SC (DAF)

DI0633 (S40 B) – Proser Airport, OR (JVH)

DE7969 (LIBRARY 3) – Myrtle Beach, SC (DLT)

"HORIZONTAL CONTROL"
Disk Examples - 2

DE1702 (BROGDON) – Brogdon, SC (DAF)

DE3154 (MIDDLETON) – Cane Savannah, SC (DAF)

DG9029 (BIG RIDGE) – Blue Ridge Parkway, NC (GDS)

“TRIANGULATION STATION” DISKS

OR

A Triangulation Station is a horizontal position survey point established during a survey utilizing the triangulation surveying method. The triangulation method produces accurate horizontal positions for the survey mark but only approximate elevations. A given mark may have a more accurate elevation determined by a differential leveling. There may be six or more survey disks in the vicinity of each Triangulation Station. The disk is stamped with TRIANGULATION STATION, and the symbol is a small triangle similar to that on a Horizontal Control disk.

Ref. 3

"TRIANGULATION STATION"
USC&GS Disk Examples - 1

EZ0695 (STATE COLLEGE) - Raleigh, NC (GDS)

FT0559 (ATOLIA) – Atolia, CA (RJS)

DG1675 (CHEEHAHAW 2) – Cheaha Mountain, AL (INT)

"TRIANGULATION STATION"
USC&GS Disk Examples - 2

CK2355 (KRELL) – Hunting Island State Park, SC (TJH)

GZ3004 (SHAKERTOWN) – Shakertown, KY (GDS)

LX5826 (HOLMN) – South Lyme, CT (DAF)

"TRIANGULATION STATION"
USDOI-USGS Disk Examples

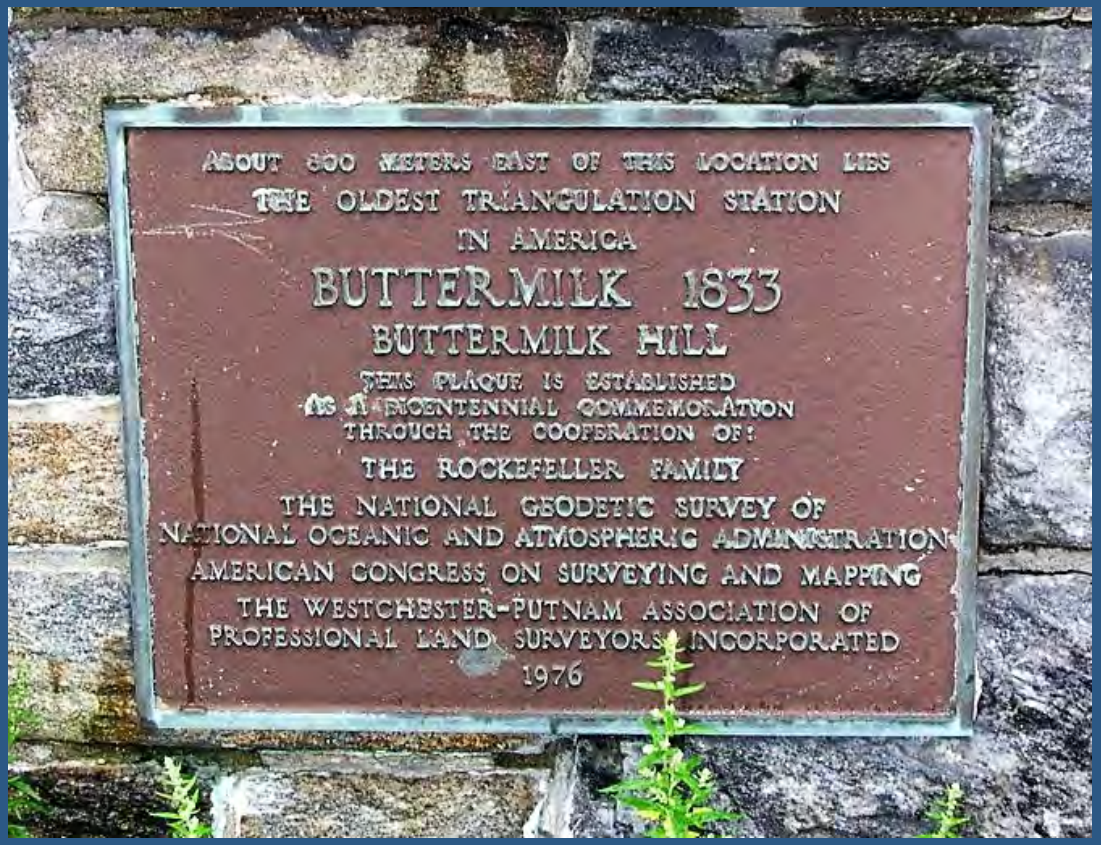
DE1311 (HARBRO) - Manning, SC (DAF)

gw2499 (3 MLS) – James River Visitor Center, Blue Ridge Pkwy, VA (GDS)

AA5699 (FRY PAN AZ MK) – Blue Ridge Pkwy, Transylvania County, NC (GDS)

BUTTERMILK – Oldest Surviving Triangulation Station Mark

This bronze plaque commemorates BUTTERMILK, the oldest surviving first-order (high accuracy) triangulation station survey point (mark) in the United States. It was dedicated in 1776 as part of the U.S. Bicentennial Celebration. Located just north of NY City.



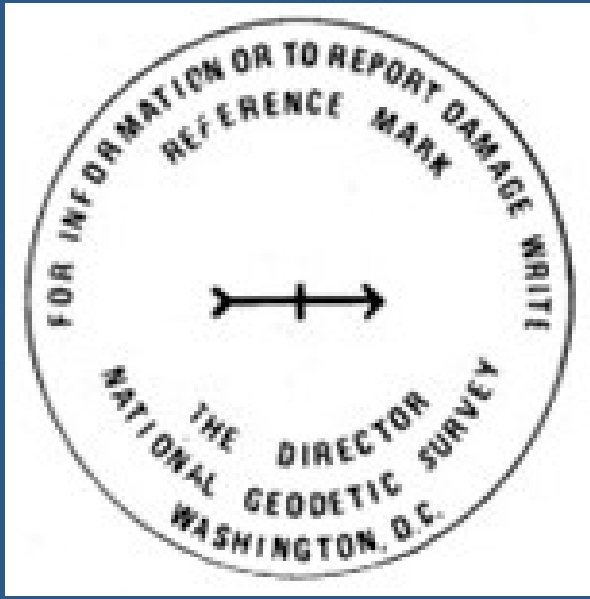
Ref. 1

Original Triangulation Station Mark set in 1833 by Ferdinand Hassler - a drill hole 2.5” in diameter and 10” deep

Bronze Triangulation Station Disk later set by National Geodetic Survey in 1932

Ref. 1

“REFERENCE MARK” DISKS



 USC&GS / NGS

OR

 USGS

Reference Marks (RM) were set to assist in locating the Triangulation Station (TS) as well as to help determine if the TS was undisturbed and in its original position.
RMs could also be used to reset a station mark if required. Reference Marks were factory stamped with “REFERENCE MARK” and symbol that is an arrow with a small vertical slash. When setting a reference disk, the surveyor rotated the disk until it pointed directly toward the TS disk. There were typically 2-3 reference disk per TS disk.

Ref. 3

"REFERENCE MARK"
USC&GS Disk Examples - 1

CY0349 (SIMON RM 1) – San Simon, AZ (RJS)

FA4256 (MARTHA RM 2) – Salem Church, NC (CAC)

FT0561 (ATOLIA RM 1) – Atolia, CA (RJS)

"REFERENCE MARK"
USC&GS Disk Examples - 2

EZ5562 (ELLERBE RM 1) – Ellerbe, NC (GDS)

EZ0694 (STATE COLLEGE RM 4)- NCSU, Raleigh, NC (GDS)

KY3201 (WHEELING 2) - Wheeling Island, WV (TJH)

"REFERENCE MARK"
USC&GS Disk Examples - 3

FY4247 (BULLOCK RM 4) – Bullock, NC (GDS)

FY0209 (VAUGHN RM=J 4) – Vaughn, NC (GDS)

FA1759 (FORREST) – Uwharrie National Forest, NC (CAC)

"REFERENCE MARK"
DOI-USGS Disk Examples

EC2351 (SCAPE ET RM 1) - Oswego, SC (CEF)

EC2350 (SCAPE ET AZ MK) – Oswego, SC (CEF)

EC2388 (TILLER ET AZ MK) – Elliott, SC (CEF)

"AZIMUTH MARK" DISKS

USC&GS / NGS

An Azimuth Mark (another reference mark), was set about ¼ -2 mile distant from the Triangulation Station for use in providing a starting azimuth (direction) for local surveys. It was also used for determining magnetic declination (the difference between true north and magnetic north). Azimuth Marks were factory stamped with "AZIMUTH MARK" and an arrow with a small cross slash (same as on Reference Marks). When setting, the surveyor rotated the Azimuth Mark disk until the arrow pointed directly toward the Triangulation Station disk.

Ref. 3

"AZIMUTH MARK"
Disk Examples - 1

FX4919 (LYNCH AZ MK) – Essex, NC (GDS)

DE1782 (WEDGEFIELD AZ MK 2) – Wedgefield, SC (CEF)

EZ6433 (STATE COLLEGE AZ MK) – NCSU, Raleigh, NC (GDS)

"AZIMUTH MARK"
Disk Examples - 2

KY1341 (BENTON AZ MK) – Benton, OH (TJH)

EB1936 (CORNER AZ MK) – Sardis, SC (CEF)

EU1018 (MOLE AZ MK) – Vidal Junction, CA (RJS)

"AZIMUTH MARK"
Disk Examples - 3

DE2025 (MANCHESTER AZ MK) – Pinewood, SC (DAF)

MC0935 (HURON AZ MK) – Huron, OH (TJH)

MB2041 (CX3 271 BLOOMFIELD AZ MK) – North Bloomfield, OH (TJH)

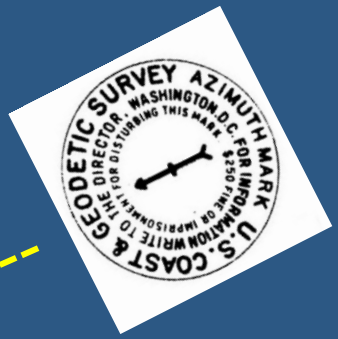
Typical arrangement of Triangulation Station and associated Reference & Azimuth Disks

RM 1

close

Triangulation Station or Horizontal Control

½ - 2 miles



Azimuth

close

RM 2

"TRAVERSE STATION" DISKS

Traverser Station disks were set during traverse surveys, a type of survey that determines positions by means of a series of angles and distances between adjacent points along a route. This disk is stamped with "TRAVERSE STATION" and a large triangle in the center - larger triangle than on Horizontal Control or Triangulation Station disks.

Ref. 3

“TRAVERSE STATION”
Disk Examples

FY1510 (SHILOAH) – West Fork, VA (CSB)

HV1668 (BOUNDARY MARK 14 DC VA) – Alexandria, VA (RJS)

“CALIBRATION BASELINE STATION” DISKS

+ or •

CALIBRATION BASELINE DISKS with “+” in center, or a small punch mark in center provided accurate distances for calibration of electronic distance measuring instruments (EDMI) and measuring tapes. The “+” disks are used to mark distances: 0, 150, 430, and 1400 meters. The blank disks are used to precisely mark 100 feet from the “0” disk, for checking 100-foot measuring tapes.

Ref. 3

CALIBRATION BASELINE STATION DISK
Example

This "+" disk was used to mark distances: 0, 150, 430, and 1400 meters.

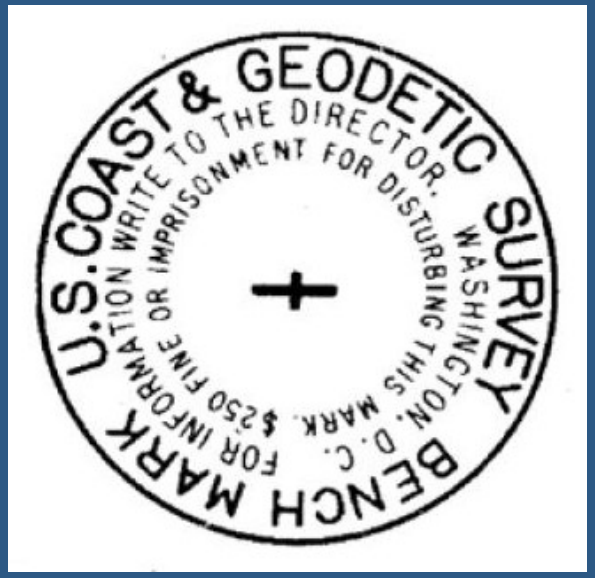
AJ8222 (BASELINE) – Beaumont, TX (NGS)

B. Primarily
VERTICAL DISK MARKS

- Bench Marks
- Vertical Control Marks
- Tidal Bench Marks
- Gaging Stations
- Hydrographic Stations
- Topographic Stations

“BENCH MARK” DISKS

AGENCY STAMPINGS
U.S. COAST & GEODETIC SURVEY (USC&GS)
U.S. GEOLOGICAL SURVEY (USGS)



A Bench Mark is a vertical mark whose elevation above or below an adopted geodetic vertical datum is known with a certain amount of accuracy. When USC&GS became NGS, the Bench Mark name was changed to Vertical Control Disk. A Bench Mark may also have an accurate horizontal position, but most older marks do not and may only have positions scaled from a map. The disk is stamped with “BENCH MARK” and symbol that is a horizontal slash and shorter vertical cross slash.

Ref. 3

"BENCH MARK"
USC&GS Disk Examples - 1

CS1740 (Y 268) – Fort Worth, TX (RBP)

FB0323 (V 56) – Henderson, NC (CSB)

GZ0093 (A163) – Berea, KY (GDS)

"BENCH MARK"
USC&GS Disk Examples - 2

HZ1474 (S 348) –
Louisville, KY (TJH)

HY1089 (B 208) –
Portsmouth, OH
(TJH)

HZ1705 (N 321) –
Swanville, IN (TJH)

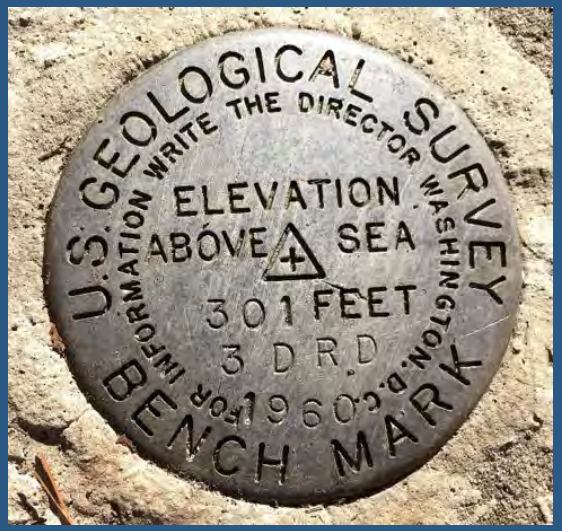
"BENCH MARK"
USGS Disk Examples - 1

EU0677 (39 JRH) –
Sheephole Valley
Wilderness, CA (RJS)

KZ1224 (Y 250) –
Mansfield, OH (TJH)

KY3328 (25 DWP) –
Alliance, OH (TJH)

"BENCH MARK"
USGS Disk Examples - 2



EZ1115 (3 DRD) – Corinth, NC (GDS)

FC1039 (864) – Pikeville, TN (DLG)

EZ1679 (192 WSM) – Worthville, NC (CAC)

"VERTICAL CONTROL" DISKS

When NGS was formed, the Bench Mark name was changed to Vertical Control Mark (Ref 7). Vertical Controls are of known accurate elevation set using surveying methods that produced the requisite accuracy of a bench mark. The marks are stamped with "VERTICAL CONTROL MARK" and with the same symbol that appears on the earlier Bench Mark disks - a horizontal slash and shorter vertical cross slash.

Ref. 3

"VERTICAL CONTROL"
Disk Examples - 1

FW0734 (P 261) – Currituck Light House, Corolla, NC (GDS)

DG6927 (LOUISBURG RESET 1993) - Louisburg, NC (GDS)

KY1860 (974) – Fredericksburg, OH (TJH)

"VERTICAL CONTROL"
Disk Examples - 2

KY2918 (T 337) – Massillon, OH (TJH)

OT0649 (E 430) – Hot Springs, SD (MLG)

DG6927 (J 220) - Louisburg, NC (GDS)

"VERTICAL CONTROL"
Disk Examples - 3

EY1529 (D 252) – New Bern, NC (GDS)

ET0765 (V480) – Alamo Lake State Park, AZ (WAJ)

ED1166 (A 201) – Madison, SC (BEH)

Can marks other than Bench Mark disks and Vertical Control disks be bench marks?

Yes! Bench Mark disks and Vertical Control disks were set to meet the requirements of a bench mark i.e. they had a known elevation of qualifying bench mark accuracy. However, any survey point that has been leveled (typically by differential or trigonometric methods) either during installation or at a later date can be considered a "bench mark" including chiseled squares, rods, disks, spikes and almost any other stable type of mark. If a mark has been leveled, it is a bench mark!

Ref. 10

"TIDAL BENCH MARK" DISKS

A Tidal Bench Mark is a stable mark of known elevation with respect to a datum set near a tide gauge to which the tide staff and local tidal datums are referred via precise leveling. They are used to monitor the stability of a nearby water level station. The marks are stamped with "BENCH MARK" and with symbol that is a large circle with horizontal slash.

Ref. 3

“TIDAL BENCH MARK”
Disk Examples - 1

BC0049 (867 9964 TIDAL ST MARYS 1) – St Marys, GA (TJH)

DD0839 (866 1070 F TIDAL) – Myrtle Beach, SC (TJH)

DD0305 (866 2926 TIDAL 1) – Georgetown, SC (CRI)

"TIDAL BENCH MARK"
Disk Examples - 2

FW0685 (865 1370 TIDAL) – Duck, NC (GDS)

AH9279 (865 2232 TIDAL) – Manteo, NC (GDS)

SC1043 (943 9023 TIDAL 4) – Astoria, OR (DMJ)

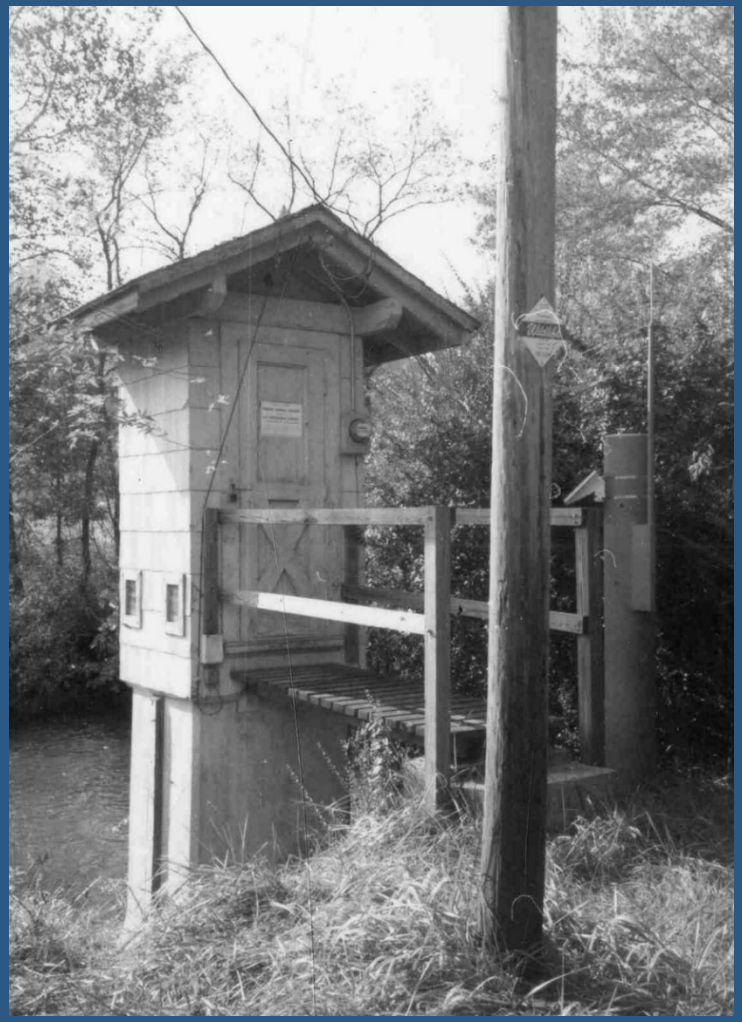
“GAGING STATION” DISKS

○ Small Circle in Middle

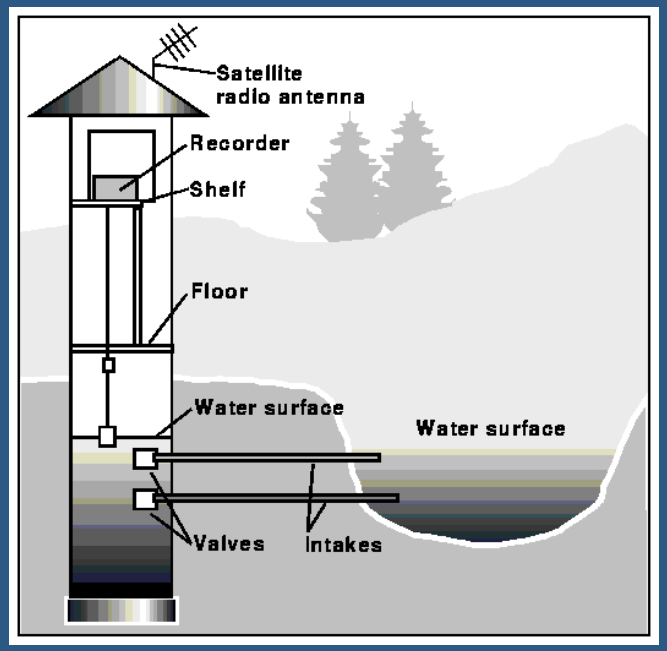
Gaging station marks are factory stamped “GAGING STATION” with a small circle in the middle of the disk. This mark is placed near a stream, river, or lake gaging (gauging) station used by hydrologists or environmental scientists to monitor and test terrestrial bodies of water. Hydrometric measurements of water level surface elevation (stage or gage) and/or volumetric discharge (flow) are taken, and observations of biota and water quality may also be made. Some gauging stations are highly automated and may include telemetry capability transmitted to a central data logging facility.

Ref. 3

Gaging Station Facility



A gaging station a site on a stream, lake, reservoir or other body of water where observations and hydrologic data such as water height (gage height) and stream discharge are obtained.



Ref. Wiki

"GAGING STATION"
Disk Examples

DF7998 (GAGING STATION 3215.7 – on Boone Creek, Boone, NC (GDS)

KY1659 (GAGING STATION) – on Tuscarawas River, Crystal Springs, OH (TJH)

CZ2397 (WR 53) – Tucson, AZ (DAF)

“TOPOGRAPHIC STATION” DISKS

Topographic Station disks were set in preparation for, or during, topographic surveys, i.e. coastal mapping, and also on airports during airport surveys. The disks were specified to be set at one mile intervals along a coastline, except in swampy or other inhospitable areas where the spacing could be increased to two miles. Reference marks were not required. These disks were factory stamped “TOPOGRAPHIC STATION” with a circle in the center.

Ref. 3

“HYDROGRAPHIC STATION” DISKS

This type of disk was set during hydrographic operations; surveys performed to measure the water’s depth. Reference marks were not required. These disks were factory stamped “HYDROGRAPHIC STATION” with a circle in the center.

Ref. 3

New!

"GEODETIC CONTROL MARK" Disks

As of c2015, nearly all new marks being placed by NGS will be Geodetic Control Marks with castings "NATIONAL GEODETIC SURVEY" and "GEODETIC CONTROL MARK" on the disks. These marks have both accurate horizontal and vertical positioning and are being placed primarily by GNSS (satellite positioning) techniques. Among the survey methods used are absolute gravity, relative gravity, GPS Static, GPS RTK, GPS RTN, Leveling, and Deflection of the Vertical.

Ref. 24

"GEODETIC CONTROL MARK"

Disk Examples

DQ5975 (GSVS 036) –
Piedra, CO (NGS)

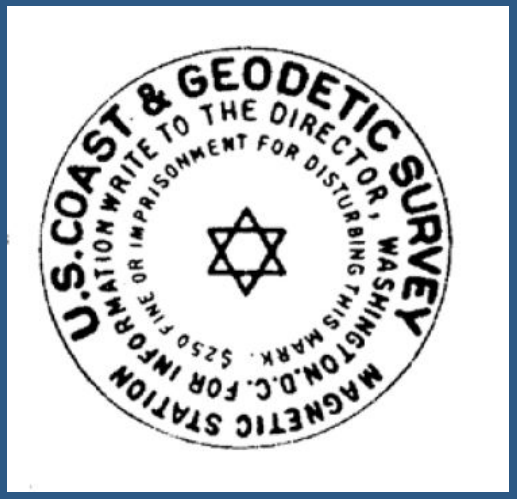
DQ5994 (GSVS 055) –
Pagosa Springs, CO (NGS)

C. SPECIALTY DISK MARKS

MAGNETIC STATION DISKS

GRAVITY STATION DISKS

“MAGNETIC STATION” DISKS



These disks were factory stamped “MAGNETIC STATION” and with a six-pointed star in the center. The original purpose was to supply magnetic measurement information for the nautical charts, but later observations were extended into the interior to aid local surveyors.

Ref. 3

"MAGNETIC STATION"
Disk Examples (Relatively Rare)

FZ0876 - (NEWLAND_N=MAGNETIC_STA) - Newland, NC (NGS)

EZ0710 (K_192_MAGNETIC) - NCSU Campus, Raleigh, NC (GDS)

QE0491 (DALLAS MAGNETIC) – Dallas, OR (NGS)

Conducting MAGNETIC Measurements

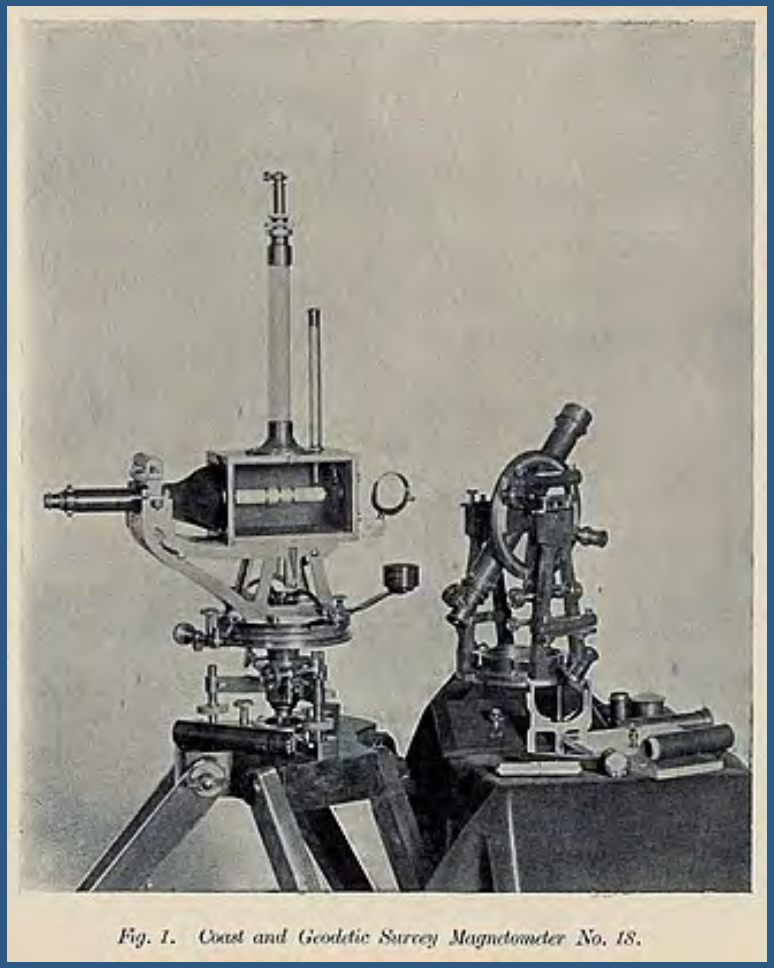


Fig. 1. Coast and Geodetic Survey Magnetometer No. 18.

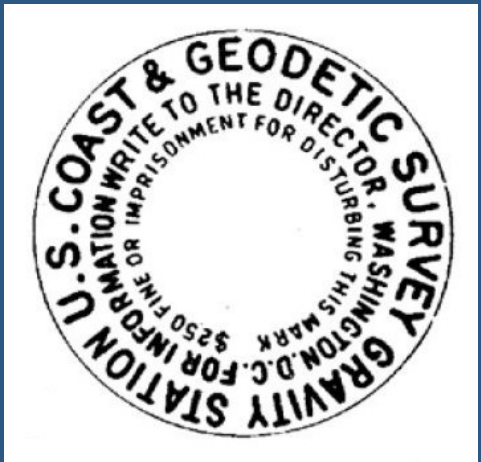
Coast and Geodetic Survey
Magnetometry No. 18

The Survey began Magnetic observations in 1843. Magnetic surveys record spatial variation in the Earth's magnetic field. A magnetometer is a device that measures magnetism - the direction, strength, or relative change of a magnetic field at a particular location. The first magnetometer capable of measuring the absolute magnetic intensity was invented by Carl Friedrich Gauss in 1833. Magnetometers are widely used for measuring the Earth's magnetic field, and in geophysical surveys, to detect magnetic anomalies of various types.

Ref. 11, 12

"GRAVITY STATION" DISKS

Older Style – "Unique" Hexagonal Disk



Newer Style – Conventional Round Disk

The Coast Survey began gravity observations in 1871. Gravity Station disks were placed where an accurate gravity observation were made. The Gravity Station disk was factory stamped "GRAVITY STATION" with no symbol in the center.

Ref. 3

"GRAVITY STATION"
Disk Examples

Older Style - Hexagonal

GS0206 (DAYTON HARRIS GRAVITY STA) – Death Valley Nat Park near Badwater, CA (NGS)

Newer Style - Round

DK4637 (PICACHO PEAK CA) – Picacho Peak State Park, CA (RJS)

GRAVITY Measurements

Field gravimeter being operated

The earth's vertical gravity (gravitational acceleration) varies from place to place over the surface of the earth by about ±0.5% due to differences of density between subsurface rocks (more dense rocks, higher gravity). A field gravimeter is a sensitive instrument used to measure gravity. The measurements are not absolute, but instead measure differences in gravity between one measurement location and another. Corrections are made for differences in elevation (to 1 cm for small scale surveys) as well corrections for latitude and terrain.

Ref. 13, 14, 15

"GRAVITY STATION REFERENCE" DISKS

Gravity Station RM disks were set to indicate the direction to the location of a gravity observation, rather than the direction to a Gravity Station disk. Gravity measurements were sometimes made near the gravity reference marks. Gravity measurements with field gravimeters are not absolute. They measure differences in gravity between one measurement location and another[R8]. This disk was factory stamped "GRAVITY STATION" with an arrow (with no tail) in the center.

Ref. 3

“GRAVITY STATION REFERENCE”
Disk Example

BE0315 (MARIANA GRAVITY_STA 399) - Mariana, FL (NGS)

D. U.S. COOPERATIVE SURVEYS WITH THE STATES

USC&GS AND STATE SURVEY

USGS COOPERATION WITH THE STATE OF

“USC&GS AND STATE SURVEY” DISKS

This type of disk was used when cooperative surveys were conducted with state agencies, and by federal government work programs during the 1930s and up to the 1970s. The factory stamping was “U.S COAST & GEODETIC SURVEY AND STATE SURVEY” with a slash and dot in the center.

Ref. 3

"USC&GS/USGS AND STATES"
Disk Example

AJ4721 (AEO) – St. Augustine, FL (DAF)

“USGS COOPERATION WITH THE STATE” DISKS

PF0058 (420) -
Farmington, ME (CAC)

This type of disk was used when cooperative surveys were conducted with state agencies after 1960’s. The factory stamping was “U.S. GEODETICAL SURVEY and COOPERATION WITH THE STATE OF” with a triangle in the center with small + within it.

GDS

"USGS COOPERATION WITH THE STATE"
Disk Examples - 1

FA1038 (1182.265) – Lenoir, NC (GDS)

HW1290 (R 18) – New Market, VA (GDS)

GD0237 (K 26) – Hollow Rock, TN (DLG)

"USGS COOPERATION WITH THE STATE"

Disk Examples - 2

HW1296 (TT 4 T) – New Market, VA (GDS)

ES0478 (R 18) – Cornville, AZ (WAJ)

MB2951 (20 CWL) – Grafton, OH (TJH)