BOULDER MAGNETIC OBSERVATORY

I. OBSERVATORY LOCATION & DESCRIPTION The Boulder Magnetic Observatory is located on Table Mountain, 8 miles north and 2½ miles east of Boulder, Colorado. The field site is on government land acquired by purchase in 1961. The geographic coordinates of the observatory are 40° 08' 15''N, 105° 14' 08''W.

Table Mountain is an elevated, flat-top butte approximately 2½ miles in a N-S direction by 1½ miles E-W, and has an area of approximately 1800 acres, with a uniform 2% slope. The mesa is the remnant of an ancient plain about 1000 feet higher than the present 5500 feet. It is capped with stream-deposited boulders and pebbles. All the streams were at one time of the level of the highest mesas and they meandered around on great flood plains. Finally they were rejuvenated (probably due to to uplifts in the mountains) and proceeded to cut valleys below the high mesa level. This process was repeated not less than five times in this region.

The climate is semi-arid with an average annual temperature of 51.6°F. The average annual precipitation is 18.6 inches, occuring in the form of summer thunderstorms and snowfall. Average annual snowfall in Boulder is 81.0 inches.

II. HISTORY OF OBSERVATORY - TO PRESENT Originally called the Boulder Magnetic Station, construction of a non-magnetic building began on September 15, 1960 at the Campus Site, south of the Radio Building of NBS. Mr. William S. Hough, Sun-Earth Relationships Section, NBS Boulder Laboratories was in charge

assisted by Richard G. Green and J. R. DeLine.

The first recording of the D and H traces was on December 23, 1960, with the Z trace added on December 30, 1960.

On April 15, 1963 a memoradum of understanding between NBS and C&GS was signed for the operation of a cooperative magnetic observatory located at the present site. Impetus for the program was provided by Dr. J. Herbert Holloman, assistant Secretary of Commerce for Science and Technology, Dr. A. V. Astin, director of NBS, Rear Adm. H. Arnold Karo, director of USC&GS, and Joel Cambell, operations officer of C&GS. Project leader at the field site for C&GS was Alfred J. Bilik. Affiliated NBS scientists were Dr. Wallace H. Campbell, Harry G. Sellery and William S. Hough.

Installation at the Table Mt. site began on June 22, 1964 and the first complete record was on July 16, 1964. The observatory lies at the center of a "magnetically clean" area encompassed by a circle of 1000 feet radius.

III. FACILITIES The facilities at the Table Mt. site include a variations building with normal and rapid run rooms, an absolute building, fluxgate building and two utility buildings, one for storage and one housing the time marking system and batteries for the operation of the variometers. The Earth Sciences Laboratory also has two buildings presently used for research.

IV.A. EQUIPMENT Instruments used to measure the magnitude of the magnetic field components D, H, and Z are a Ruska field magnetometer, quartz horizontal magnetometer, and the Elsec proton magnetometer respectively.

A standard normal and rapid run magnetograph, composed of Ruska D, H, and Z variometers, continuously record variation of the magnetic field.

Additional instruments in operation belonging to other agencies are a CARL 3 component fluxgate, a rubidium (85) vapor magnetometer, telluric and micropulsation recording equipment.

V. ANALYSES Continuous recordings of D, H, and Z weekly absolute observations and base-line values, hourly scalings, K-indices, selected magnetic effects and principal magnetic storm data are provided by the observatory.

VI.A. COOPERATIVE WORK The Geomagnetism Laboratory of ESSA, under the direction of Dr. Wallace H. Campbell, operates an ULF detection system collecting micropulsation data in the frequency range of 0.00s c/s to 5.0 c/s. The micropulsation data is obtained using two induction loop antennas, 2 meters in diameter, 16,000 turns. The output voltage is recorded visually and on magnetic tape as a frequency modulated signal. This station is one of about twelve, located in unique geophyscial regions throughout the world, participating in a special ULF program studying natural geomagnetic field phenomena. The collected data are used in experimental programs designed to determine the nature of special phenomena, their interrelationship with known geophyscial processes and the possible generative processes.

A pair of lead, earth-current probes spaced at 300 meters are attached to a specially designed operational amplifier and balancing circuit to feed NS and EW telluric measurements to a FM tape recording system.

The Boulder Magnetic Observatory facilities are also being used by the Geomagnetism Laboratory for research developement of a stabe rubidium vapor magnetometer and work in the field of paleomagnetism.

Copies of the Boulder Magnetograms are furnished to the Space Disturbance Laboratory, HANDS group and Infrasonics group of ESSA and the Engineering Dept. of the University of Colorado.

The Forecast Center, of the Space Disturbance Laboratory, receives real-time K-indice data from the CARL fluxgate magnetometer via telephone line from Table Mt.

IV.B. The High Altitude Observatory of the University of Colo- operates a continuous recording rubidium vapor magnetometer, providing data for research work under the supervision of Dr. Sadami Matsushita.