DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
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PREPARED IN COOPERATION WITH THE
OHIO GEOLOGICAL SURVEY
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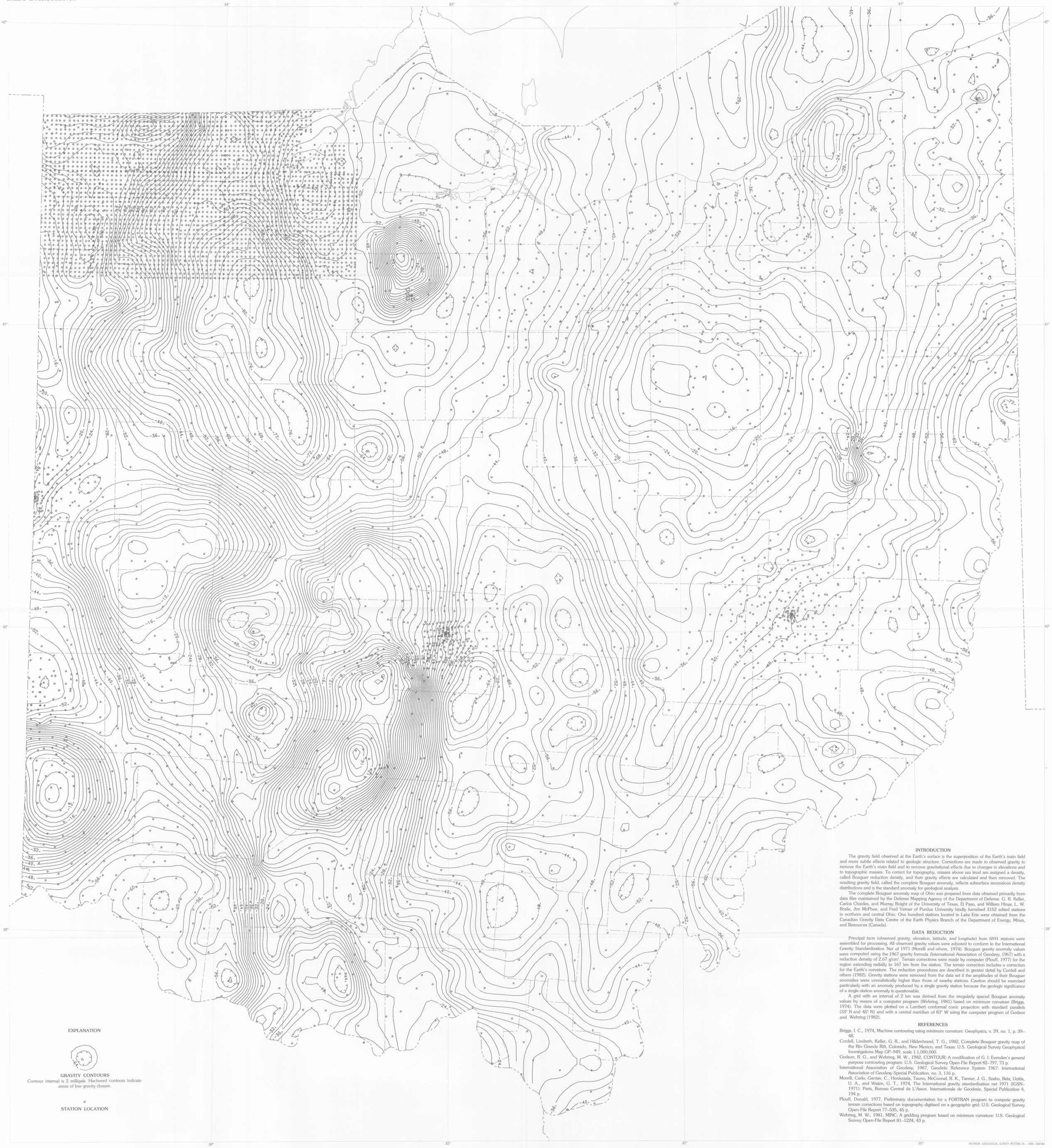
GEOPHYSICAL INVESTIGATIONS MAP
GP–962



EXPLANATION

GRAVITY CONTOURS
Contour interval is 2 milligals. Hachured contours indicate areas of low gravity closure.

STATION LOCATION

Base from U.S. Geological Survey, 1984

SCALE 1:500 000
10 0 10 20 30 40 50 MILES
10 0 10 20 30 40 50 60 70 KILOMETERS

INTRODUCTION

The gravity field observed at the Earth's surface is the superposition of the Earth's main field and more subtle effects related to geologic structure. Corrections are made to observed gravity to remove the Earth's main field and to remove gravitational effects due to changes in elevations and to topographic masses. To correct for topography, masses above sea level are assigned a density, called Bouguer reduction density, and their gravity effects are calculated and then removed. The resulting gravity field, called the complete Bouguer anomaly, reflects subsurface anomalous density distributions and is the standard anomaly for geological analysis.

The complete Bouguer anomaly map of Ohio was prepared from data obtained primarily from data files maintained by the Defense Mapping Agency of the Department of Defense. G. R. Keller, Carlos Chaides, and Murray Boight of the University of Texas, El Paso, and William Hinze, L. W. Braile, Jim McPhee, and Fred Verner of Purdue University kindly furnished 3152 edited stations in northern and central Ohio. One hundred stations located in Lake Erie were obtained from the Canadian Gravity Data Centre of the Earth Physics Branch of the Department of Energy, Mines, and Resources (Canada).

DATA REDUCTION

Principal facts (observed gravity, elevation, latitude, and longitude) from 6591 stations were assembled for processing. All observed gravity values were adjusted to conform to the International Gravity Standardization Net of 1971 (Morelli and others, 1974). Bouguer gravity anomaly values were computed using the 1967 gravity formula (International Association of Geodesy, 1967) with a reduction density of 2.67 g/cm³. Terrain corrections were made by computer (Plouff, 1977) for the region extending radially to 167 km from the station. The terrain correction includes a correction for the Earth's curvature. The reduction procedures are described in greater detail by Cordell and others (1982). Gravity stations were removed from the data set if the amplitudes of their Bouguer anomalies were unrealistically higher than those of nearby stations. Caution should be exercised particularly with an anomaly produced by a single gravity station because the geologic significance of a single-station anomaly is questionable.

A grid with an interval of 2 km was derived from the irregularly spaced Bouguer anomaly values by means of a computer program (Webring, 1981) based on minimum curvature (Briggs, 1974). The data were plotted on a Lambert conformal conic projection with standard parallels (33° N and 45° N) and with a central meridian of 83° W using the computer program of Godson and Webring (1982).

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Plouff, Donald, 1977, Preliminary documentation for a FORTRAN program to compute gravity terrain corrections based on topography digitized on a geographic grid: U.S. Geological Survey Open-File Report 77–535, 45 p.

Webring, M. W., 1981, MINC; A gridding program based on minimum curvature: U.S. Geological Survey Open-File Report 81–1224, 43 p.

Data were gridded at a spacing of 2 km on Lambert conformal conic projection 83° W as central meridian. Contours computer drawn

COMPLETE BOUGUER GRAVITY ANOMALY MAP OF OHIO

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