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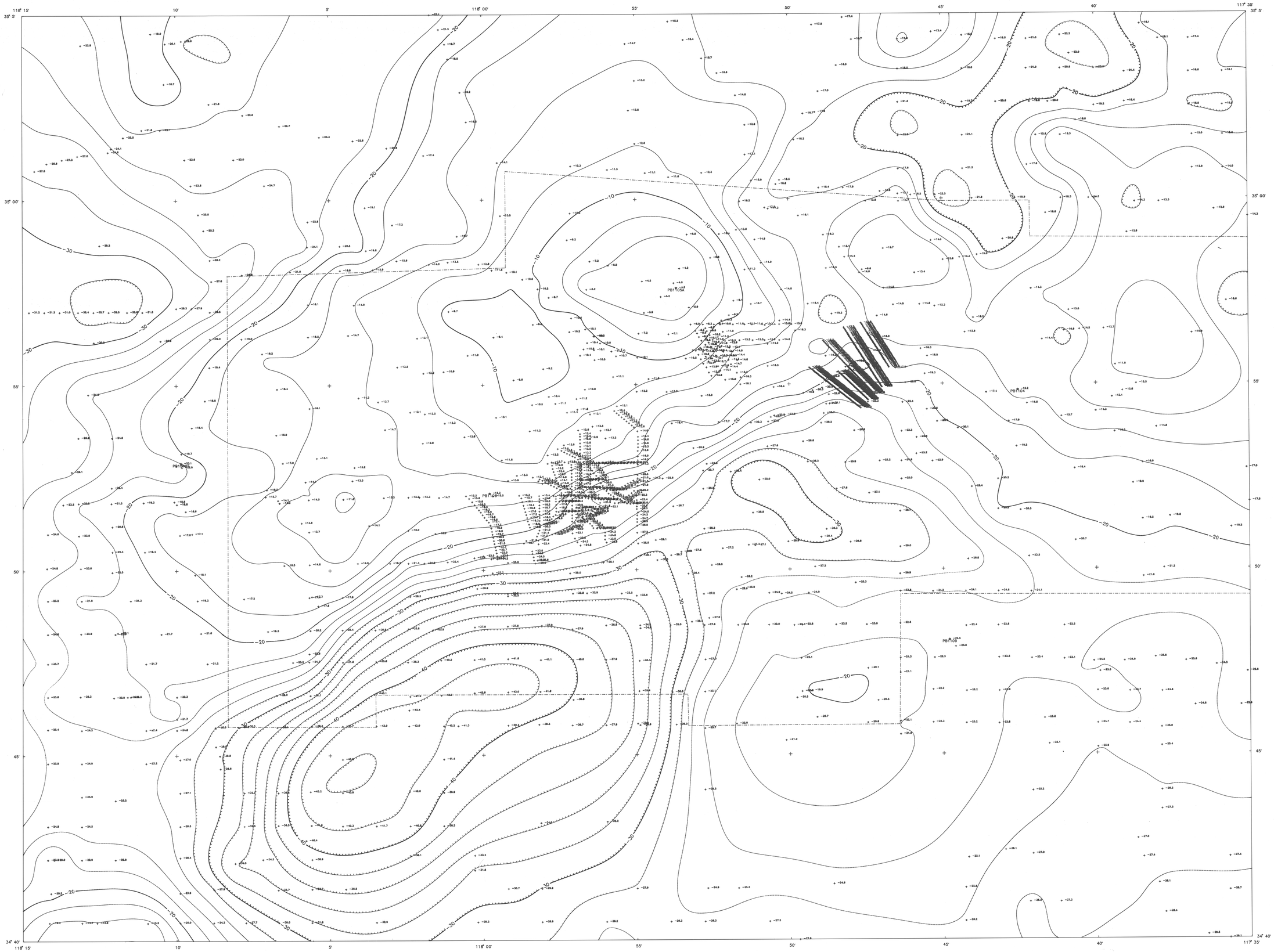

Polyconic projection

SCALE 1:62 500

1 0 1 2 3 4 5 MILES
1 0 1 2 3 4 5 KILOMETERS

GRAVITY ANOMALY CONTOUR INTERVAL 2 MILLIGALS

ISOSTATIC RESIDUAL GRAVITY MAP OF EDWARDS AIR FORCE BASE AND VICINITY, KERN, LOS ANGELES, AND SAN BERNARDINO COUNTIES, CALIFORNIA

BY

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EXPLANATION

GRAVITY ANOMALY CONTOURS

Contour interval 2 mGal. Hachures indicate gravity low. Contours were computer generated based on a 0.5 km grid derived from scattered gravity data. Although the data have been edited, caution should be exercised when interpreting anomalies controlled by only a single gravity station.

-24.1

GRAVITY STATION AND ANOMALY VALUE

PB1109
GRAVITY BASE STATION

BOUNDARY OF EDWARDS AIRFORCE BASE

INTRODUCTION

A gravity survey of Edwards Air Force Base and vicinity, California, was conducted as part of a hydrologic investigation to provide a geophysical basis for estimating the thickness of possible water-bearing Cenozoic deposits and for studying the origin of linear fissures that have appeared on the playa. Gravity was measured at a relatively coarse network of sites to fill gaps in existing data coverage and to construct a regional gravity map with observations roughly every 1-2 km. In addition, detailed gravity surveys were conducted in the vicinity of Graham Ranch (~34° 52' N., 117° 56' W.) to examine an enclosed basin, and near the east edge of Rogers Lake (~34° 55' N., 117° 47' W.) to examine an area containing earth fissures.

GRAVITY DATA

The isostatic residual gravity map of Edwards Air Force Base and vicinity was constructed from three data sets. The starting data set was derived from the gravity data of California (Snyder and others, 1981) and includes 467 observations. To this were added 63 stations collected by Kaman Sciences Corporation under contract to the U. S. Air Force and about 1040 new stations collected as part of this study.

Previous Data

Regional data coverage was obtained from Snyder and others (1981). This data set contains all public data as of the late 1970s. These data were originally based on the gravity datum of Woollard and Rose (1963) and reduced according to the 1930 International Gravity formula (Swick, 1942, p. 61). The present map is based on the more recent 1971 datum (IGSN 71, Morelli, 1974) with data reduced according to the "Geodetic Reference System 1967" (GRS 67) (International Association of Geodesy, 1971). Conversion of the older data to IGSN 71 datum was accomplished following the procedure of Oliver and others (1980, p. 51-52). Terrain corrections were computed for the area from the station to a radial distance of 166.7 kilometers (Plouff, 1977). These data were processed through an isostatic reduction program (Jachens and Roberts, 1981; and Simpson and others, 1983) in order to suppress the effects of deep density distributions that buoyantly support the topography. The isostatic reduction assumes an Airy-Heiskanen model with the following parameters: density of topographic load, 2.67g/cm^3; crustal thickness at sea-level, 25 km; density contrast across the base of the model crust, 0.4g/cm^3.

Sixty-three gravity stations were collected by Kaman Sciences Corporation on Rogers Lake (~34° 56' N., 117° 52' W.) for estimating depth to basement as part of a groundwater flow investigation. La Coste and Romberg gravity meter G141 was used for this survey. Kaman Sciences attempted to tie their gravity survey to gravity base station CH296 near Kramer Junction. This is a base station established by Chapman (1966), but was incorrectly described by Tang and Ponce (1982) as being about 5 km from its correct location. The resulting error in survey datum was corrected by comparing gravity values at a common station as measured during our survey and the Kaman survey, and adjusting the Kaman data accordingly. These data were reduced according to the system described in the preceeding paragraph.

New USGS Data

About 1040 new gravity stations were measured using La Coste and Romberg gravity meter G8-N over about a one year period ending in April 1990. Gravity base control for these surveys is a high-precision set of bases established throughout southern California to monitor vertical crustal motion. The bases used were PB1104, PB1105, PB1106, PB1109, and PB1519 in Roberts and Jachens (1986).

Observed gravity values were based on an assumed linear meter drift between base readings. Elevation control varied depending on the intended use of the data. Elevation control for regional data used to fill in gaps in the area-wide data set was obtained mostly from spot elevations on 1:24,000 scale U.S. Geological Survey topographic maps. Most of the other elevations were from bench marks shown on the same set of maps. A small number of observations were made on bench marks established by other government agencies, with elevations supplied by the Air Force. A few stations required contour interpolation from the topographic maps for elevation control. Elevations for the detailed surveys in the area of Graham Ranch and on Rogers Lake were surveyed using a laser surveying instrument. These surveys were controlled by bench marks in the areas of the surveys. Reduction procedures for the new data were identical to those used for the old data.

CONTOUR MAP

The three data sets were merged and interpolated to a square cartesian grid with a grid spacing of 0.5 km between rows and 0.5 km between columns (polyconic projection) using a procedure based on the principle of minimum curvature (Briggs, 1974). The final map was contoured by computer with a 2 mGal interval at a scale of 1:62,500.

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AREA OF MAP