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U.S. DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY

PRINCIPAL FACTS FOR 133 GRAVITY STATIONS, WITH COLOR MAPS OF BOUGUER AND ISOSTATIC RESIDUAL GRAVITY ANOMALIES ON THE WINNEMUCCA 1° BY 2° QUADRANGLE, NEVADA

By

Robert F. Sikora[1]

1991

91-256-A Principal facts documentation
91-256-B Gravity data on diskette

Open-File Report 91-256-A

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Principal facts for 133 gravity stations, with color maps of Bouguer and isostatic residual gravity anomalies on the Winnemucca 1° by 2° quadrangle, Nevada

by

Robert F. Sikora

Part A of this report is a paper copy describing the base stations, datum, principal facts for 133 new gravity stations, reduction techniques, and references. Sixteen 30 minute by 30 minute plots of Bouguer and isostatic anomalies are included at a scale of 1:250,000. Page-size color contour maps of both Bouguer and isostatic anomalies accompany this report. (It does not list older data.) 40 p.

Open-File Report 91-256-B

Principal facts for gravity stations on the Winnemucca 1° by 2° quadrangle, Nevada

by

Robert F. Sikora

Part B is a 3 1/2 inch diskette, double-sided, high-density (1.44 MB), containing files in ASCII format. Requirements for part B: IBM PC™ or compatible, DOS™ v. 2.0 or higher, with a 3 1/2 inch disk drive or a MACINTOSH™ with a Super Drive™ and Apple File Exchange™ software to convert from PC to MAC. The three files contained on the diskette include:

1. readme.win - This file contains an explanation of the diskette format, including accuracy codes and a disclaimer statement.

2. new.iso - This file contains the principal facts for 133 gravity stations obtained in 1985.

3. old.iso - This file contains the principal facts of all the previous gravity stations on the Winnemucca 1° by 2° quadrangle.

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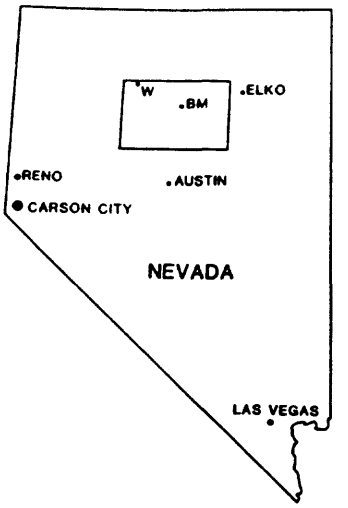
ABSTRACT

In September 1985, 133 new gravity measurements were made in the geographic area covered by the Winnemucca 1° lat. by 2° long. quadrangle, north-central Nevada. This quadrangle extends from 40° to 41° N lat. and from 116° to 118° W long. The purpose was to improve gravity coverage in the Sonoma Ranges, north slope of Battle Mountain, Fish Creek Basin, central Reese River Valley and eastern Boulder Valley. LaCoste and Romberg gravity meter G-161 was used to make the measurements. The data were reduced to complete Bouguer anomaly values assuming a terrain density of 2.67 g/cm^3 and terrain corrected to 166.7 km from the station. Isostatic reduced gravity anomaly values were computed assuming an Airy-Heiskanen isostatic model utilizing a crustal model with a sea-level thickness of 25 km, a crustal density of 2.67 g/cm^3 and a lower crust-mantle density contrast of 0.4 g/cm^3. The principal facts for each gravity station were included in a table and updated isostatic and Bouguer anomaly 30 minute by 30 minute maps at 2 mGal have been included showing locations of both new and previous gravity stations (1:250,000 scale). Page-size color contour maps of Bouguer gravity and isostatic residual gravity were also included.

INTRODUCTION

In September 1985, 133 gravity stations were established on the Winnemucca 1° lat. by 2° long. quadrangle, Nevada, which extends from 40° to 41° lat. and from 116° to 118° long (figure 1). This report is intended to document the principal facts, accuracies, and locations as well as presenting updated complete Bouguer gravity and isostatic gravity maps.



W=Winnemucca BM=Battle Mtn.

FIGURE 1. Index map (Wagini, 1986)

Gravity coverage was added to the following geographic areas (figure 2):

(A.) Sonoma Range, Humboldt County.

Gravity measurements were added in this area to improve control of the isostatic residual gravity step from Grass Valley to the Sonoma Range (see figure 9A). The additional measurements helped to fill a rather extensive gap in coverage around the Sonoma Range and may be useful in better understanding the nature of the isostatic balance (figures 7A, 7B, 9A and 9B).

(B.) North slope of Battle Mountain (North Peak), Humboldt County.

Improved gravity coverage on the north slope of Battle Mountain should help determine the extension of a pediment below the surface, as well as improve the overall density of stations between North Peak and Antler Peak. Gravity measurements were made at a number of locations of previous measurements, which helped to confirm the quality of the previous gravity measurements (figures 7B and 9B).

(C.) Fish Creek Basin, Lauder County.

Additional data in this area has helped control the gravity anomaly over the Fish Creek Basin caldera which may assist geologists in their interpretations of the area (figures 7F and 9F).

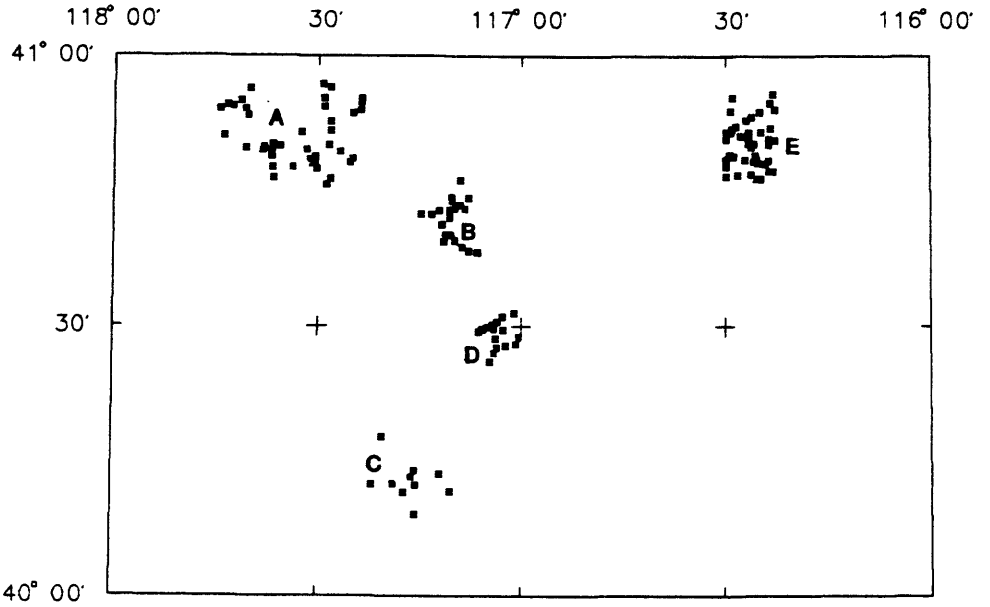
(D.) Central Reese River Valley (south-southwest of the town of Battle Mountain), Lauder County.

New data has helped to fill a rather significant gap in gravity coverage ir this area (figures 7B, 7C, 7G, 7F, 9B, 9C, 9G and 9F).

(E.) Eastern Boulder Valley (southwest of Carlin Mine), Eureka County.

The additional data collected in this region have helped control the negative anomaly and may assist geochemists and geologists in their investigations of the area (figures 7C,7D,9C and 9D).

These data supplement previously released data from the Winnemucca quadrangle (Wagini, 1985; Wagini, 1986).



A = Sonoma Range B = north slope Battle Mtn. C = Fish Creek Basin
D = Central Reese River Valley E = eastern Boulder Valley

FIGURE 2. Geographic areas map.

GRAVITY METER AND CALIBRATION

All 133 gravity stations were obtained using LaCoste and Romberg geodetic gravity meter G-161. The factory calibration of G-161 was adjusted by a factor of 1.000573, based on multiple gravity measurements on calibration loops (Barnes and others, 1969; Ponce and Oliver, 1981).

BASE STATIONS

All new gravity stations were tied to two base stations. Base station ACIC 0474-1 is located at the Winnemucca Municipal Airport (fig. 3a) and base station ACIC 2344-2 is located at Battle Mountain Airport (fig. 3b) Both base stations are on the World Relative Gravity Reference Network described by Jablonski (Jablonski, 1974, p. 730 and p. 1134). Table 1 specifies the base stations used for every gravity measurement.

TABLE 1. Gravity stations and their corresponding bases.

Corresponding Base		Gravity Stations
Battle Mountain	ACIC 2344-2	85WIN101 - 85WIN117
		85WIN125 - 85WIN140
		85WIN152 - 85WIN233
Winnemucca	ACIC 0474-1	85WIN118 - 85WIN124
		85WIN141 - 85WIN151 *

* These stations were tied to two bases instead of one.

GRAVITY DATUM

Theoretical gravity is based on the Geodetic Reference System of 1967 (International Union of Geodesy and Geophysics, 1971), and observed base station and other gravity values are referenced to the International Gravity Standardization Net 1971 (IGSN 71) observed gravity datum described by Morelli (1974, p. 18).

GRAVITY REDUCTION

The observed gravity values were reduced to complete Bouguer anomaly values after applying free-air, Bouguer, latitude, curvature, and terrain corrections. The inner (zones A-D) and outer (zones E-O) terrain corrections were computed by the Hayford-Bowie (1912) system. For zones A and B, 0 to 68 m from the gravity measurement location, the terrain corrections were estimated in the field using half-slope graphs derived from a program by V.W. Adams (Robbins, S.L. and Oliver, H.W., October 1970, written commun.) For zones C and D, 68 to 590 m, elevations of terrain were estimated for the Hayford-Bowie (1912) compartments from 1:62500/1:24000 scale topographic maps using clear glass circular templates based on Hayford's original system of zones (Swick, 1942, p. 66). The resulting terrain corrections for zones C and D were computed by a FORTRAN code called HANDTC (Spielman and Ponce, 1984). For zones E through O (590 to 166.7 km) the terrain correction was computed from a 1/4 minute lat. by 1/4 minute long. digital elevation model using a procedure by Plouff (1977). The terrain density was assumed to be 2.67 g/cm^3. The

GRAVITY BASE STATION #	ACIC 0474-1
NAME WINNEMUCCA	STATE NEVADA
LATITUDE 40° 54.23'	LONGITUDE 117° 48.21'
ELEVATION 1310 meters	
OBSERVED GRAVITY 979,810.48 mGal	S B A

LOCATION DESCRIPTION

The station is at the Winnemucca Municipal Airport, (4 mi W. of town), near south wall of Air Service building on concrete sidewalk, 3 ft E. of phone booth, 3 ft W. of door. Site is monumented with a "USFA Gravity Station" disc.

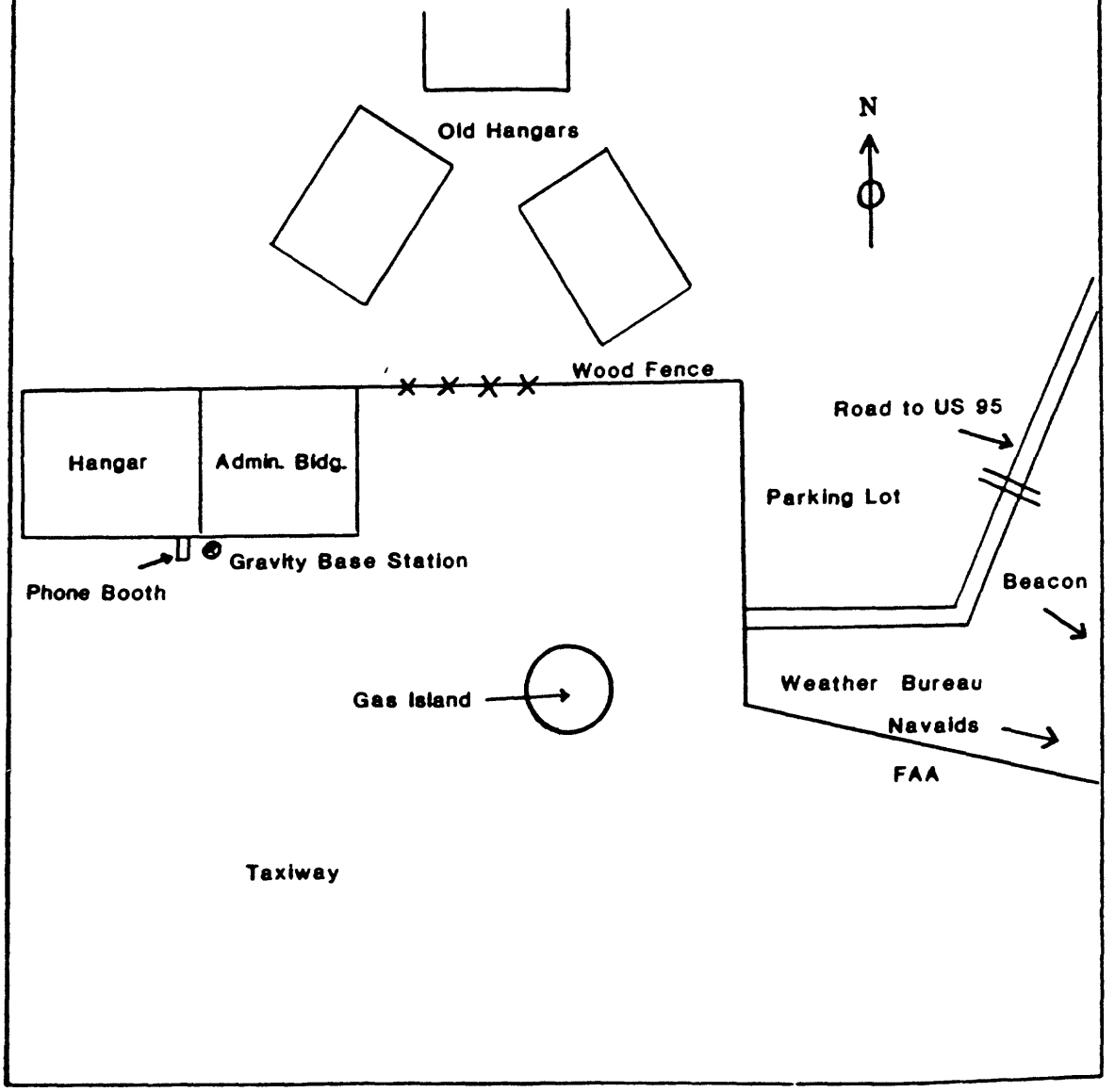


Figure 8A. Gravity base station Winnemucca, Nevada (Wagini, 1985)

GRAVITY BASE STATION #		ACIC 2344-2
NAME	BATTLE MOUNTAIN	STATE NEVADA
LATITUDE	40° 36.44'	LONGITUDE 116° 52.43'
ELEVATION	1379 meters	
OBSERVED GRAVITY	979,754.79 mGal	S B A

LOCATION DESCRIPTION

Station is at the Battle Mountain Airport, E. of town, at the SE. corner of the main hangar-office building, (W. of the fuel storage tanks). Site was monumented with a "USFA Gravity Station" disc (missing).

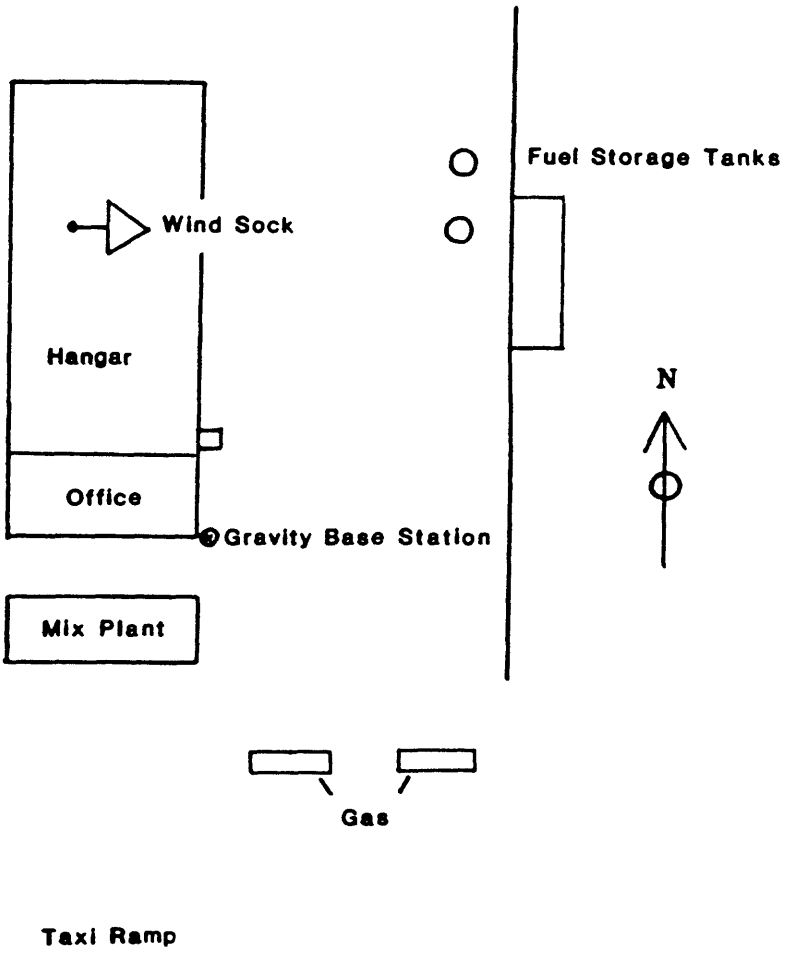


Figure 3B. Gravity base station Battle Mountain, Nevada (Wagini, 1985)

Bouguer gravity values were reduced to the isostatic residual gravity values by applying an isostatic correction based on an Airy-Heiskanen isostatic model (Heiskanen and Vening Meinesz, 1958; Karki and others, 1961)). The isostatic correction was computed by a FORTRAN program, AIRYROOT (Simpson and others, 1984), using the Airy-Heiskanen parameters of 2.67 g/cm^3 for the density of the topographic load, 25 km for the crustal thickness at sea-level, and 0.40 g/cm^3 for the density contrast between the lower-crust and the upper-mantle. Contoured plots were generated from 0.8 km grids.

PRINCIPAL FACTS

The principal facts explained in table 2 include station name, latitude,longitude, elevation, observed gravity, free air anomaly, simple Bouguer anomaly, inner-zone terrain correction, letter designation (D) of the outer-most zone of the inner-zone terrain corrections, total terrain correction, complete Bouguer anomaly, and isostatic residual gravity anomaly (Morin, 1987). A listing of the principal facts is included in table 4. Maps of station locations are indexed in figure 4 and shown in figures 5A-E. Updated complete Bouguer anomaly maps with a screened topographic base are indexed in figure 6 and shown in figures 7A-H. Isostatic residual gravity anomaly plots are indexed in figure 8 and displayed on top of a U.S. Geological Survey topographic base in figures 9A-H. Color contour maps of both complete Bouguer gravity anomaly and isostatic residual gravity anomaly for the Winnemucca 1° by 2° quadrangle are shown in figure 10 and 11, respectively.

ADDITIONAL INFORMATION

An aeromagnetic map of the Winnemucca 1° by 2° quadrangle by Kirchoff-Stein (1988) covers the same geographic area as this gravity report. Also covering the same area is an extensive bibliography by Orris and others (1987) listing 1,530 geologic publications with indexing by county, commodity, mine name and mining districts. These may be helpful in interpreting the data included in this report.

ACKNOWLEDGMENTS

I greatly appreciated the assistance of Robert L. Morin in the collection and planning of the field work. Special thanks to Tracy V. Bare for the many hours she spent doing terrain corrections and map digitization. Howard W. Oliver, supervisor of the project, provided helpful guidance and planning. Thanks to David A. Ponce and Carter W. Roberts for their technical assistance in the preparation of this report. Reviews by Howard W. Oliver and Steven F. Carle were very helpful.

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TABLE 2.- *Explanation of principal facts format*

Item	Explanation
STATION NAME	An alphanumeric combination of up to 8 characters used for identification of the gravity measurement location.
LAT	Latitude in degrees and minutes, to 0.01 minute.
LON	Longitude in degrees and minutes, to 0.01 minute.
ELEV	Elevation, to 0.1 feet.
OG	Observed gravity, to 0.01 mGal.
AC	Four digit code describing the general location, elevation, latitude and observed gravity accuracy.
FAA	Free-air anomaly, to 0.01 mGal.
ITC	Inner-zone terrain correction from 0.0 to 0.59 km for a density of 2.67 g/cm^3, to 0.01 mGal. Single letter code "D" indicates 0.59 km radius.
TC	Total terrain correction from 0.0 to 1.67 km for a density of 2.67 g/cm^3, to 0.01 mGal.
CBA	Complete Bouguer anomaly reduced for a density of 2.67 g/cm^3, to 0.01 mGal.
ISO	Isostatic residual gravity anomaly based on Airy-Heiskanen model for isostatic compensation, assumes sea-level crustal thickness of 25 km, density contrast of topographic load 2.67 g/cm^3, and lower-crust upper-mantle density contrast of 0.40 g/cm^3, to 0.01 mGal.

TABLE 3.–*Explanation of accuracy codes (modified from Morin, 1987)*

[NGS, National Geodetic Survey; NMD, National Mapping Division; USGS, U. S. Geological Survey]

Code	Explanation	Code	Explanation
	General elevation and location code–1st digit		
A	Altimetry, good control	P	On or near surveyed mark
B	On USGS or NGS level-line bench mark	Q	River gradient interpolation
C	Contour line interpolation	R	Lake or reservoir elevation by leveling
D	Destroyed or not found reference mark	S	Sea level elevation
E	Near level-line bench mark other than USGS or NGS	T	Photogrammetry by USGS NMD
F	Map elevation, black or field checked	U	Unknown elevation source
G	Map elevation, brown or not field checked	V	On vertical angle bench mark
H	Near vertical angle bench mark	W	Map elevation, blue
I	Other special source	X	On or near boundary marker
K	Photogrammetry by other than USGS NMD	Y	Altimetry, poor control
N	Near USGS or NGS level-line bench mark	Z	Special source (e.g. mobile elevation recorder)
M	On level-line bench mark other than USGS or NGS		

	Elevation code–2nd digit	Elevation accuracy (ft)	Approximate gravity effect (mGal)
1	On bench mark	0.2	0.01
2	Near bench mark	0.3	0.02
3	Transit or good alidade survey	1.0	0.06
4	Vertical angle bench mark or black map elevation	2.0	0.12
5	Black map elevation on old map or good photogrammetry	4.0	0.24
6	Brown map elevation or good photogrammetry on 20 ft contour interval map	10	0.6
7	Brown map elevation on 80 ft contour interval map or good altimetry	20	1.2
8	Contour interpolation on 80 ft contour interval map	40	2.4
9	Contour interpolation on 200 ft contour interval map or poor altimetry	80	4.8

	Latitude code–3rd digit (based at lat 37°)	Latitude accuracy (min)	Distance accuracy (ft)	Approximate gravity effect (mGal)
1	Triangulation or special survey data	0.007	42	0.01
2	Location known to 0.04 in on 1:24,000 map (special care)	0.014	84	0.02
3	0.10 in on 1:24,000 map or 0.04 in on 1:62,500 map	0.035	210	0.05
4	0.21 in on 1:24,000 map or 0.08 in on 1:62,500 map	0.07	420	0.1
5	0.42 in on 1:24,000 map or 0.16 in on 1:62,500 map	0.14	840	0.2
6	0.40 in on 1:62,500 map or 0.1 in on 1:250,000 map	0.35	2,100	0.5
7	0.80 in on 1:62,500 map or 0.2 in on 1:250,000 map	0.7	4,200	1.0
8	1.60 in on 1:62,500 map or 0.4 in on 1:250,000 map	1.4	8,400	2.0
9	4.00 in on 1:62,500 map or 1.0 in on 1:250,000 map	3.5	21,000	5.0

	Observed gravity code–4th digit	Approximate gravity effect (mGal)
1	Local survey with special gravity meter	0.01
2	Multiple observations with LaCoste and Romberg gravity meter	0.02
3	Average LaCoste and Romberg or multiple observations with Worden gravity meter	0.05
4	LaCoste and Romberg observation with small vibrations or average Worden gravity meter	0.1
5	Data from loop with closure error this large	0.2
6	Data from loop with closure error this large	0.5
7	Data from loop with closure error this large	1
8	Data from loop with closure error this large	2
9	Data from loop with closure error this large	4

TABLE 4.–*Principal Facts for 133 Gravity Stations*

STATION NAME	LAT deg	LAT min	LON deg	LON min	ELEV ft	OG mGal	AC	FAA mGal	SBA mGal	ITC mGal		TC mGal	CBA 2.67	ISO 2.67
85WIN101	40	27.59	117	3.59	4625.0	979742.59	B133	-32.52	-190.26	0.00	D	0.29	-191.33	-15.64
85WIN102	40	27.00	117	4.08	4639.0	979738.96	F433	-33.96	-192.18	0.00	D	0.26	-193.28	-17.56
85WIN103	40	26.13	117	4.67	4651.0	979732.88	F433	-37.61	-196.24	0.00	D	0.23	-197.38	-21.59
85WIN104	40	28.61	117	3.86	4621.0	979748.19	B133	-28.82	-186.43	0.01	D	0.34	-187.45	-12.09
85WIN105	40	29.63	117	5.67	4650.0	979744.58	F433	-31.22	-189.82	0.00	D	0.60	-190.58	-15.87
85WIN106	40	29.38	117	6.26	4705.0	979738.58	F433	-31.67	-192.15	0.08	D	0.59	-192.93	-18.30
85WIN107	40	29.56	117	5.83	4655.0	979743.35	F433	-31.88	-190.65	0.01	D	0.60	-191.41	-16.72
85WIN108	40	29.91	117	4.97	4622.0	979750.26	F433	-28.58	-186.23	0.00	D	0.61	-186.98	-12.18
85WIN109	40	30.18	117	4.27	4609.0	979750.17	F433	-30.30	-187.50	0.00	D	0.58	-188.28	-13.39
85WIN110	40	30.46	117	3.57	4608.0	979746.24	F433	-34.74	-191.90	0.00	D	0.52	-192.74	-17.76
85WIN111	40	31.02	117	2.79	4633.0	979749.86	F433	-29.61	-187.62	0.01	D	0.48	-188.51	-13.49
85WIN112	40	31.46	117	1.07	4597.0	979748.48	F433	-35.02	-191.82	0.00	D	0.36	-192.81	-17.52
85WIN113	40	29.70	117	4.14	4604.0	979749.76	B133	-30.46	-187.49	0.00	D	0.46	-188.39	-13.36
85WIN114	40	27.79	117	2.28	4631.0	979735.22	B133	-39.62	-197.57	0.00	D	0.32	-198.61	-22.65
85WIN115	40	28.00	117	0.86	4646.0	979731.65	B133	-42.09	-200.56	0.00	D	0.40	-201.52	-25.26
85WIN116	40	28.82	117	0.44	4605.0	979733.09	B133	-45.74	-202.80	0.00	D	0.40	-203.76	-27.63
85WIN117	40	29.57	117	2.69	4600.0	979748.80	C633	-31.60	-188.50	0.00	D	0.33	-189.52	-14.13
85WIN118	40	54.05	117	44.36	4551.0	979800.18	F433	-21.33	-176.55	0.00	D	1.28	-176.62	-13.63
85WIN119	40	54.52	117	43.26	4806.0	979784.56	F433	-13.68	-177.60	0.03	D	1.70	-177.29	-14.08
85WIN120	40	54.36	117	42.48	4980.0	979774.67	F433	-6.98	-176.83	0.01	D	2.39	-176.85	-12.41
85WIN121	40	54.00	117	40.61	5495.0	979745.10	C833	12.40	-175.02	2.24	D	8.80	-167.68	-3.70
85WIN122	40	53.35	117	40.28	5823.0	979722.19	C833	21.28	-177.32	3.74	D	11.07	-167.74	-3.56
85WIN123	40	54.93	117	41.32	5427.0	979754.11	F433	13.63	-171.47	0.04	D	3.21	-169.72	-6.08
85WIN124	40	56.29	117	40.01	5351.0	979763.64	F433	13.98	-168.53	0.02	D	2.77	-167.20	-3.46
85WIN125	40	11.59	117	10.45	5006.0	979686.43	F433	-29.07	-199.81	0.12	D	0.95	-200.27	-22.41
85WIN126	40	13.56	117	11.94	5560.0	979655.49	C833	-10.87	-200.50	0.27	D	1.79	-200.18	-23.33
85WIN127	40	9.00	117	15.54	5750.0	979641.78	F433	0.06	-196.06	0.11	D	1.42	-196.12	-19.50
85WIN128	40	12.33	117	15.42	5385.0	979669.98	F433	-11.00	-194.66	0.46	D	1.85	-194.26	-18.32
85WIN129	40	13.24	117	16.14	5499.0	979664.56	F433	-7.05	-194.61	0.02	D	0.93	-195.14	-19.64
85WIN130	40	13.97	117	15.61	5630.0	979655.66	F433	-4.73	-196.75	0.04	D	1.27	-196.95	-21.42
85WIN131	40	11.50	117	17.23	5680.0	979653.75	C833	1.73	-192.00	0.16	D	1.43	-192.04	-16.58
85WIN132	40	12.43	117	18.76	6151.0	979621.65	F433	12.51	-197.28	0.40	D	1.88	-196.90	-22.17
85WIN133	40	12.46	117	22.00	6469.0	979606.97	F433	27.67	-192.97	0.45	D	3.55	-190.93	-17.39
85WIN134	40	17.72	117	20.51	5055.0	979709.92	C733	-10.09	-182.50	0.16	D	1.81	-182.11	-8.79
85WIN135	40	46.07	117	8.97	4676.0	979790.13	C733	-7.72	-167.20	0.01	D	0.33	-168.24	2.54
85WIN136	40	44.17	117	10.26	5002.0	979762.25	F433	-2.13	-172.73	0.05	D	0.80	-173.34	-2.42
85WIN137	40	43.69	117	10.20	5060.0	979757.31	F433	-0.90	-173.48	0.63	D	1.61	-173.29	-2.26
85WIN138	40	43.31	117	8.99	5113.0	979753.53	F433	0.86	-173.53	0.13	D	1.46	-173.49	-2.19
85WIN139	40	44.11	117	7.74	4856.0	979770.34	F433	-7.67	-173.29	0.02	D	0.81	-173.87	-2.52
85WIN140	40	42.84	117	8.29	5564.0	979723.69	F433	14.12	-175.66	1.26	D	3.64	-173.48	-1.96
85WIN141	40	51.12	117	43.83	4738.0	979788.23	F433	-11.32	-172.92	0.28	D	3.24	-171.06	-7.41
85WIN142	40	49.65	117	40.60	5276.0	979755.18	F433	8.38	-171.57	0.96	D	6.68	-166.33	-1.57
85WIN143	40	49.48	117	38.12	8114.0	979574.63	F433	94.77	-181.98	3.00	D	18.00	-165.44	-0.01
85WIN144	40	49.76	117	37.91	7900.0	979594.88	F433	94.49	-174.96	1.15	D	12.04	-164.40	1.02
85WIN145	40	50.14	117	36.67	8629.0	979538.79	F433	106.32	-187.99	3.08	D	20.41	-168.99	-3.35
85WIN146	40	49.37	117	36.78	7359.0	979627.12	F433	76.48	-174.51	1.79	D	8.46	-167.56	-1.83
85WIN147	40	48.77	117	36.82	7579.0	979609.73	F433	80.66	-177.84	3.82	D	12.61	-166.73	-0.89
85WIN148	40	47.55	117	36.67	6788.0	979659.36	F433	57.78	-173.74	2.74	D	7.43	-167.82	-1.75
85WIN149	40	46.36	117	36.55	5495.0	979734.37	C833	13.06	-174.36	1.03	D	7.30	-168.52	-2.22
85WIN150	40	49.92	117	35.57	7283.0	979631.50	C833	72.90	-175.50	0.51	D	7.06	-169.95	-4.04
85WIN151	40	51.45	117	32.38	5577.0	979737.36	C833	16.17	-174.05	0.03	D	2.56	-172.95	-6.72
85WIN152	40	42.81	117	10.57	5331.0	979739.33	F433	7.90	-173.92	0.07	D	1.14	-174.23	-3.08
85WIN153	40	42.92	117	9.85	5327.0	979739.30	F433	7.33	-174.35	0.07	D	1.33	-174.47	-3.23
85WIN154	40	42.32	117	10.57	5495.0	979727.09	F433	11.81	-175.61	0.27	D	1.65	-175.42	-4.17
85WIN155	40	41.89	117	10.60	5775.0	979708.51	F433	20.18	-176.79	1.11	D	3.01	-175.26	-3.92
85WIN156	40	42.72	117	12.12	5348.0	979736.81	F433	7.11	-175.29	0.03	D	0.81	-175.93	-4.99
85WIN157	40	41.12	117	11.71	5693.0	979715.26	F433	20.37	-173.80	0.09	D	1.63	-173.65	-2.32
85WIN158	40	39.98	117	11.10	6016.0	979690.26	F433	27.43	-177.76	0.14	D	3.01	-176.24	-4.59
85WIN159	40	39.31	117	11.39	7210.0	979611.69	C833	62.05	-183.86	3.26	D	12.27	-173.10	-1.34
85WIN160	40	40.02	117	10.40	5955.0	979693.54	F433	24.91	-178.19	1.27	D	4.71	-174.98	-3.23
85WIN161	40	39.39	117	9.78	6160.0	979680.03	C833	31.61	-178.49	2.82	D	7.65	-172.35	-0.37
85WIN162	40	38.63	117	8.67	6520.0	979659.73	C833	46.27	-176.11	1.45	D	5.81	-171.81	0.51
85WIN163	40	38.22	117	7.80	6770.0	979650.77	C833	61.41	-169.49	0.31	D	4.01	-167.00	5.56
85WIN164	40	38.10	117	6.43	7139.0	979622.75	F433	68.24	-175.25	0.47	D	5.74	-171.02	1.81
85WIN165	40	42.32	117	13.17	5163.0	979745.58	F433	-0.91	-177.00	0.03	D	0.84	-177.59	-6.73
85WIN166	40	42.33	117	14.78	5055.0	979752.34	F433	-4.32	-176.73	0.01	D	0.54	-177.60	-6.97
85WIN167	40	55.36	116	28.91	4914.0	979776.26	F433	-13.08	-180.68	0.01	D	0.71	-181.37	1.21
85WIN168	40	53.90	116	29.21	4835.0	979781.74	F433	-12.84	-177.75	0.00	D	0.39	-178.75	3.43
85WIN169	40	51.53	116	29.91	4727.0	979781.30	N233	-19.90	-181.13	0.00	D	0.12	-182.38	-0.84
85WIN170	40	51.52	116	29.19	4728.0	979782.50	F433	-18.60	-179.85	0.00	D	0.09	-181.14	0.65

TABLE 4.–*Principal Facts for 133 Gravity Stations–Continued*

STATION NAME	LAT deg	LAT min	LON deg	LON min	ELEV ft	OG mGal	AC	FAA mGal	SBA mGal	ITC mGal		TC mGal	CBA 2.67	ISO 2.67
85WIN171	40	51.89	116	29.00	4745.0	979782.11	N233	-17.93	-179.77	0.00	D	0.11	-181.04	0.87
85WIN172	40	52.12	116	28.52	4748.0	979782.54	F433	-17.57	-179.51	0.00	D	0.11	-180.78	1.33
85WIN173	40	52.84	116	26.99	4751.0	979785.92	N233	-14.98	-177.03	0.00	D	0.19	-178.22	4.54
85WIN174	40	53.19	116	26.21	4732.0	979786.44	F433	-16.77	-178.17	0.00	D	0.30	-179.24	3.85
85WIN175	40	53.75	116	25.03	4774.0	979785.04	P233	-15.06	-177.89	0.00	D	0.43	-178.84	4.77
85WIN176	40	54.76	116	23.45	4926.0	979780.07	F433	-7.25	-175.26	0.03	D	0.82	-175.85	8.54
85WIN177	40	55.80	116	23.11	5162.0	979769.54	F433	2.85	-173.21	0.08	D	0.89	-173.75	10.98
85WIN178	40	54.07	116	22.78	5001.0	979774.30	F433	-4.94	-175.51	0.03	D	0.92	-176.00	8.48
85WIN179	40	51.98	116	23.37	4719.0	979788.09	F433	-14.54	-175.49	0.00	D	0.69	-176.17	7.71
85WIN180	40	50.66	116	22.86	4707.0	979788.31	F433	-13.48	-174.02	0.00	D	0.65	-174.74	9.09
85WIN181	40	50.80	116	23.69	4698.0	979784.06	F433	-18.78	-179.01	0.00	D	0.41	-179.97	3.59
85WIN182	40	50.12	116	23.68	4712.0	979782.51	N233	-17.99	-178.71	0.00	D	0.35	-179.73	3.75
85WIN183	40	51.54	116	24.84	4699.0	979782.94	F433	-20.91	-181.18	0.00	D	0.28	-182.27	1.02
85WIN184	40	51.53	116	26.60	4709.0	979783.08	F433	-19.82	-180.43	0.00	D	0.12	-181.68	1.00
85WIN185	40	51.09	116	26.58	4699.0	979781.30	F433	-21.88	-182.15	0.00	D	0.11	-183.41	-0.80
85WIN186	40	51.08	116	27.72	4709.0	979781.75	F433	-20.48	-181.09	0.00	D	0.07	-182.39	-0.18
85WIN187	40	50.32	116	26.57	4684.0	979778.43	F433	-25.01	-184.77	0.00	D	0.09	-186.05	-3.54
85WIN188	40	49.84	116	26.25	4674.0	979777.51	F433	-26.15	-185.57	0.00	D	0.10	-186.84	-4.28
85WIN189	40	50.25	116	25.84	4679.0	979778.18	F433	-25.62	-185.21	0.00	D	0.13	-186.45	-3.70
85WIN190	40	48.90	116	25.68	4681.0	979778.11	F433	-23.50	-183.15	0.00	D	0.11	-184.41	-1.77
85WIN191	40	48.49	116	25.48	4689.0	979777.87	F433	-22.37	-182.29	0.00	D	0.11	-183.56	-0.90
85WIN192	40	48.09	116	25.29	4702.0	979777.73	N233	-20.69	-181.06	0.00	D	0.12	-182.31	0.37
85WIN193	40	47.98	116	24.55	4726.0	979778.77	F433	-17.23	-178.42	0.00	D	0.17	-179.63	3.30
85WIN194	40	47.92	116	24.16	4748.0	979779.33	N233	-14.51	-176.45	0.00	D	0.21	-177.62	5.43
85WIN195	40	48.36	116	23.68	4780.0	979779.68	D233	-11.81	-174.84	0.00	D	0.25	-175.97	7.29
85WIN196	40	47.15	116	23.67	4773.0	979781.14	F433	-9.20	-171.99	0.01	D	0.31	-173.07	10.10
85WIN197	40	47.14	116	23.10	4830.0	979779.24	F433	-5.74	-170.47	0.01	D	0.39	-171.47	11.89
85WIN198	40	46.26	116	24.82	4712.0	979781.17	F433	-13.58	-174.30	0.00	D	0.21	-175.46	7.26
85WIN199	40	46.26	116	25.39	4697.0	979779.98	F433	-16.18	-176.38	0.00	D	0.15	-177.61	4.92
85WIN200	40	46.81	116	26.24	4679.0	979780.88	F433	-17.80	-177.38	0.00	D	0.07	-178.68	3.60
85WIN201	40	48.18	116	25.84	4681.0	979778.02	F433	-22.51	-182.16	0.00	D	0.09	-183.44	-0.94
85WIN202	40	48.46	116	27.15	4659.0	979780.16	F433	-22.86	-181.76	0.00	D	0.04	-183.09	-1.00
85WIN203	40	48.82	116	28.80	4663.0	979781.40	F433	-21.77	-180.81	0.00	D	0.01	-182.17	-0.59
85WIN204	40	48.95	116	29.34	4662.0	979782.06	F433	-21.40	-180.41	0.00	D	0.01	-181.77	-0.35
85WIN205	40	51.13	116	29.92	4714.0	979780.94	F433	-20.88	-181.67	0.00	D	0.09	-182.95	-1.47
85WIN206	40	50.74	116	29.93	4699.0	979780.80	F433	-21.85	-182.12	0.00	D	0.07	-183.43	-2.01
85WIN207	40	48.40	116	29.94	4652.0	979784.31	F433	-19.27	-177.94	0.00	D	0.00	-179.30	1.86
85WIN208	40	47.66	116	29.94	4644.0	979786.16	F433	-17.07	-175.47	0.00	D	0.00	-176.83	4.28
85WIN209	40	46.58	116	29.95	4651.0	979786.31	F433	-14.66	-173.29	0.00	D	-0.02	-174.67	6.38
85WIN210	40	46.72	116	28.20	4650.0	979784.93	C633	-16.33	-174.93	0.00	D	0.01	-176.28	5.34
85WIN211	40	55.28	117	23.62	5159.0	979785.19	B233	18.99	-156.96	0.02	D	0.55	-157.84	9.23
85WIN212	40	54.83	117	23.74	5204.0	979780.27	F433	18.98	-158.52	0.05	D	0.66	-159.29	7.82
85WIN213	40	53.58	117	24.89	6112.0	979718.04	F433	43.95	-164.52	1.55	D	6.43	-159.59	7.54
85WIN214	40	53.97	117	23.74	5476.0	979761.78	F433	27.33	-159.44	0.20	D	1.34	-159.56	7.67
85WIN215	40	56.48	117	28.25	4464.0	979815.96	N233	-17.35	-169.60	0.01	D	0.51	-170.43	-4.33
85WIN216	40	56.84	117	29.32	4441.0	979823.87	B133	-12.14	-163.61	0.01	D	0.61	-164.33	1.53
85WIN217	40	55.25	117	29.12	4659.0	979805.58	B134	-7.56	-166.47	0.02	D	0.80	-167.04	-0.90
85WIN218	40	54.30	117	29.12	4688.0	979800.80	G633	-8.20	-168.10	0.03	D	1.11	-168.36	-2.07
85WIN219	40	52.67	117	28.24	4848.0	979789.62	G633	-1.91	-167.26	0.04	D	1.04	-167.61	-0.89
85WIN220	40	51.66	117	28.22	5013.0	979776.69	G633	2.17	-168.81	0.03	D	0.75	-169.47	-2.57
85WIN221	40	50.00	117	28.49	5078.0	979770.35	F433	4.42	-168.78	0.02	D	0.88	-169.32	-2.15
85WIN222	40	46.21	117	28.25	4645.0	979777.91	F433	-23.06	-181.49	0.01	D	1.50	-181.35	-13.43
85WIN223	40	45.63	117	28.79	4657.0	979775.57	G633	-23.41	-182.25	0.02	D	1.88	-181.73	-13.79
85WIN224	40	48.09	117	25.37	4571.0	979787.75	G633	-22.98	-178.89	0.01	D	1.04	-179.20	-11.20
85WIN225	40	48.54	117	25.00	4593.0	979789.24	G633	-20.10	-176.75	0.02	D	0.98	-177.13	-9.16
85WIN226	40	49.30	117	26.88	4923.0	979779.26	C733	-0.19	-168.10	0.14	D	1.19	-168.31	-0.77
85WIN227	40	47.41	117	30.26	5410.0	979738.13	F433	7.27	-177.25	0.05	D	2.34	-176.36	-9.01
85WIN228	40	48.03	117	30.50	5377.0	979748.75	F433	13.87	-169.53	0.01	D	2.27	-168.71	-1.51
85WIN229	40	47.98	117	30.92	5502.0	979740.23	F433	17.16	-170.49	0.06	D	2.94	-169.02	-1.88
85WIN230	40	48.43	117	31.20	5646.0	979733.16	F433	22.95	-169.61	0.03	D	2.65	-168.44	-1.43
85WIN231	40	48.71	117	30.45	5367.0	979751.53	F433	14.69	-168.36	0.05	D	1.93	-167.88	-0.80
85WIN232	40	47.59	117	33.69	6736.0	979659.61	F433	53.09	-176.65	0.08	D	3.95	-174.22	-7.53
85WIN233	40	49.48	117	31.64	5909.0	979720.78	F433	33.73	-167.81	0.04	D	2.22	-167.08	-0.34

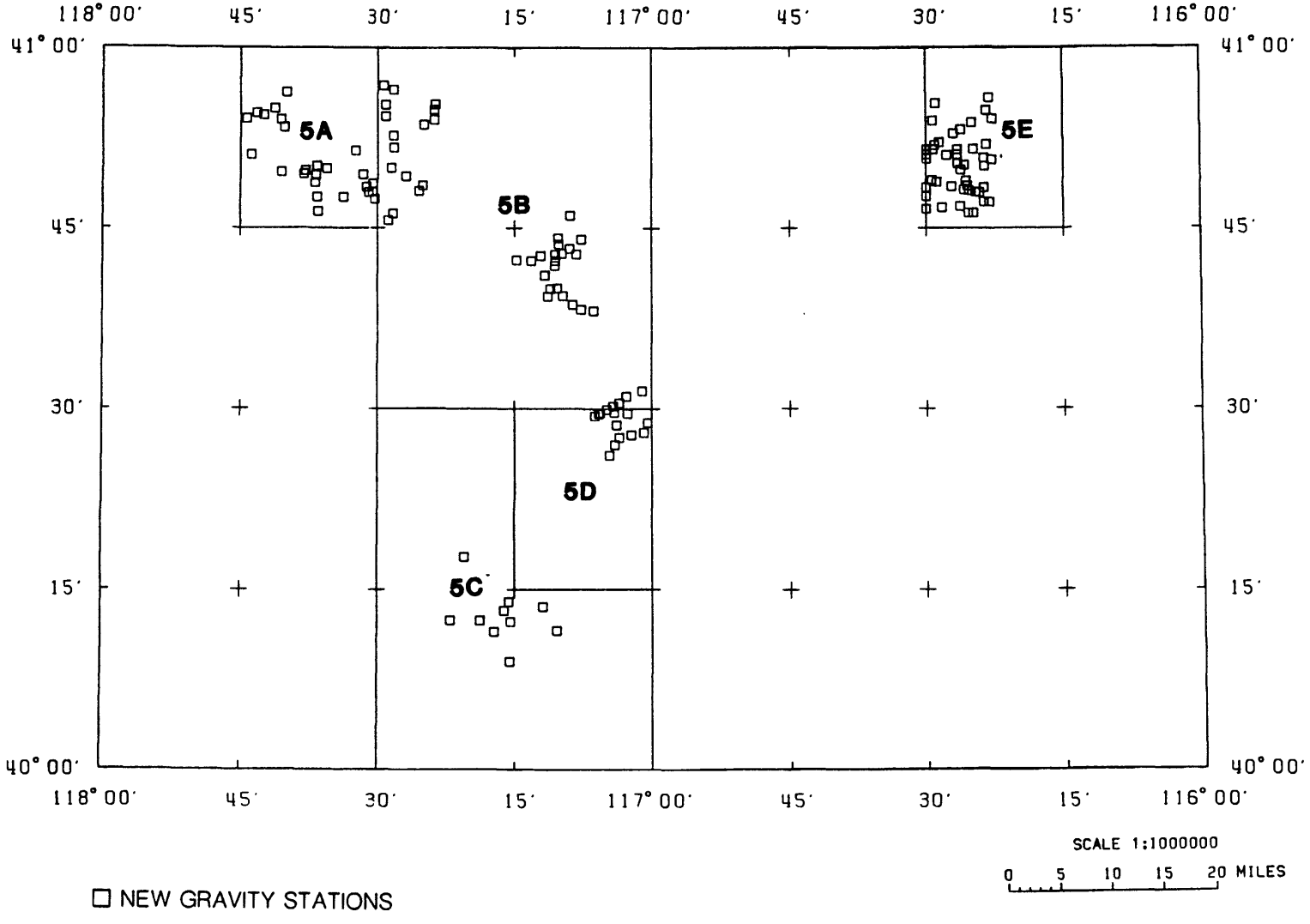


FIGURE 4. Index of gravity station location maps.

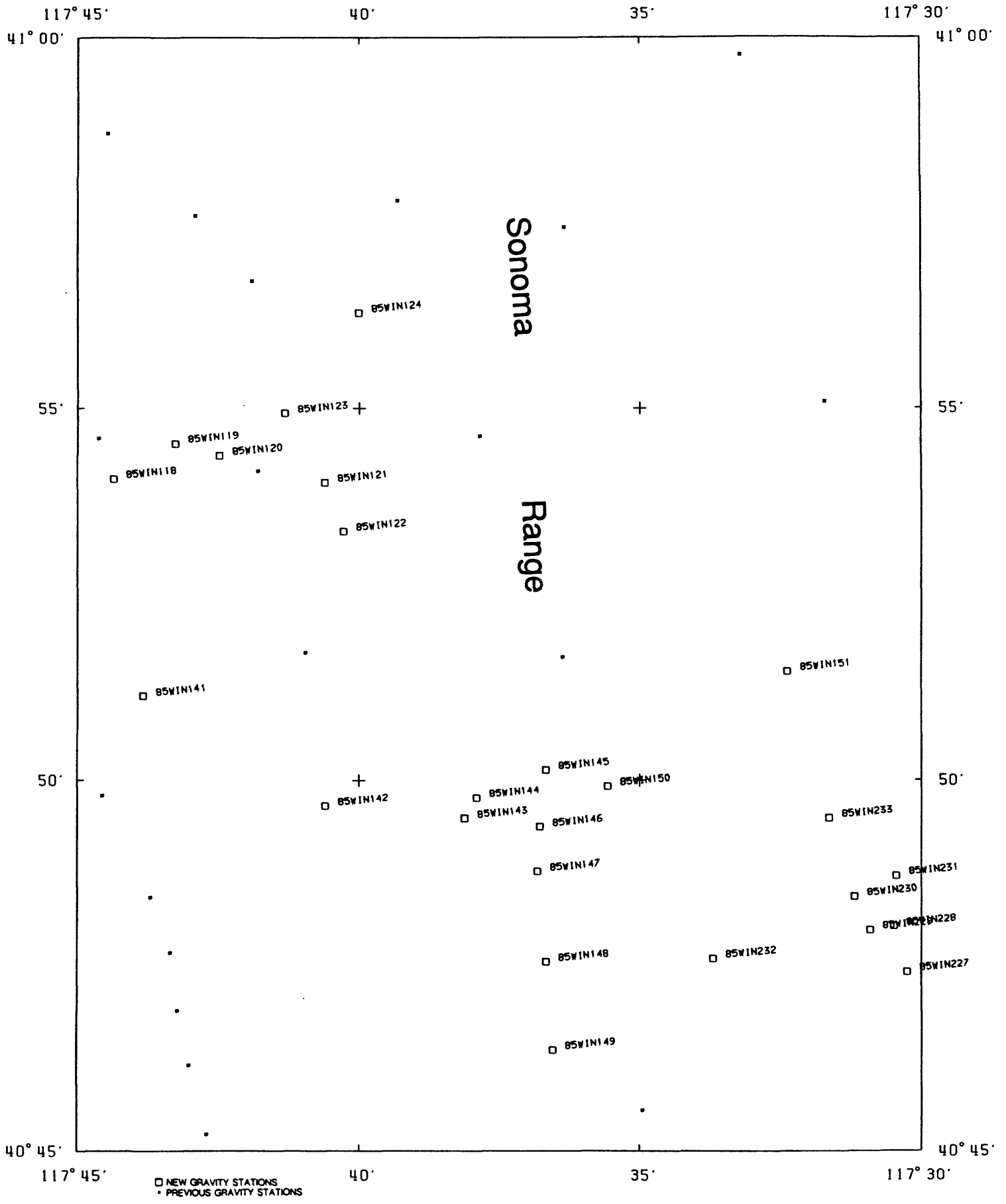


FIGURE 5A. Map of gravity station locations in the Sonoma Range.

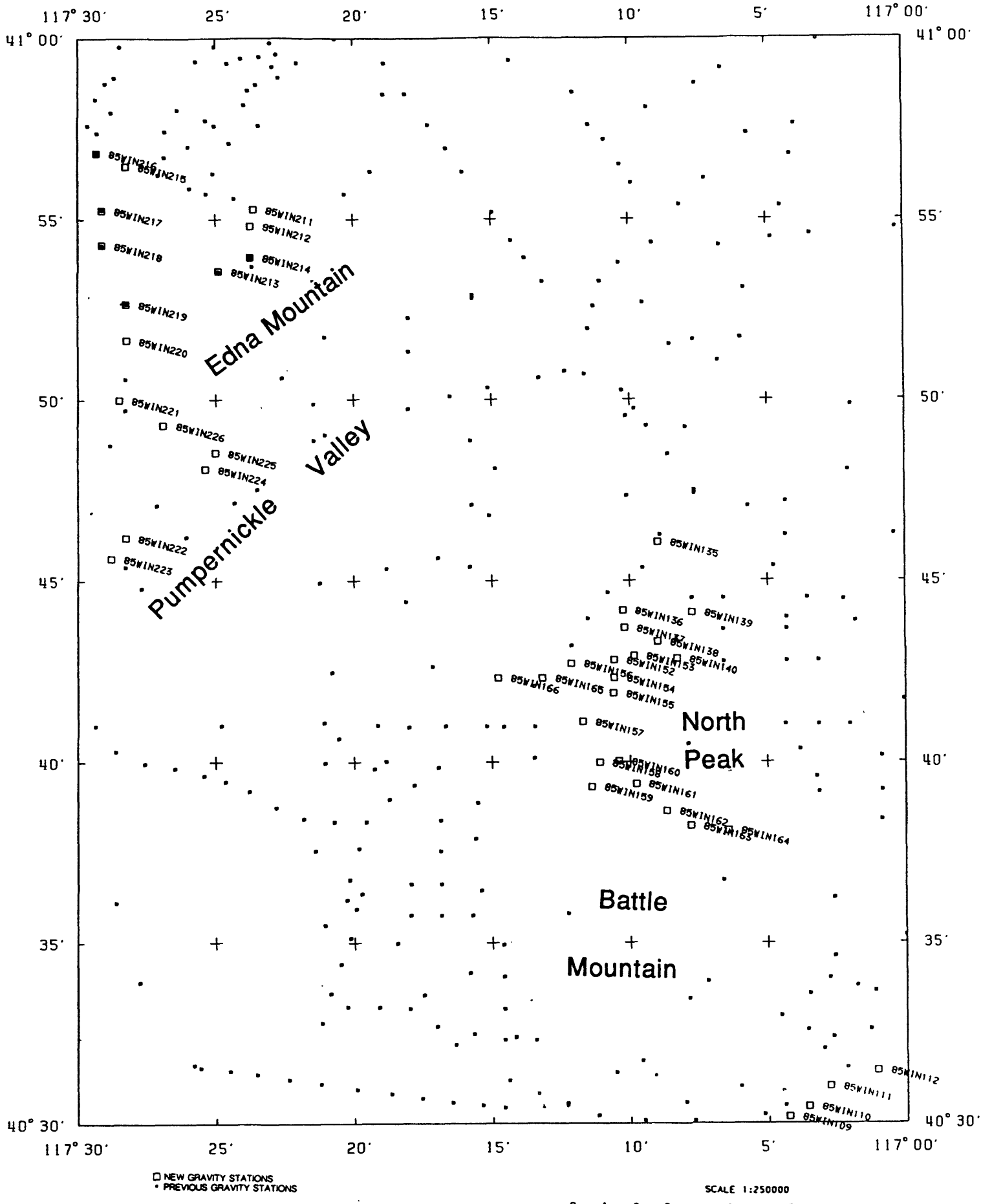


FIGURE 5B. Map of gravity station locations in the Edna Mountain, Pumper-nickle Valley, North Peak areas near Battle Mountain.

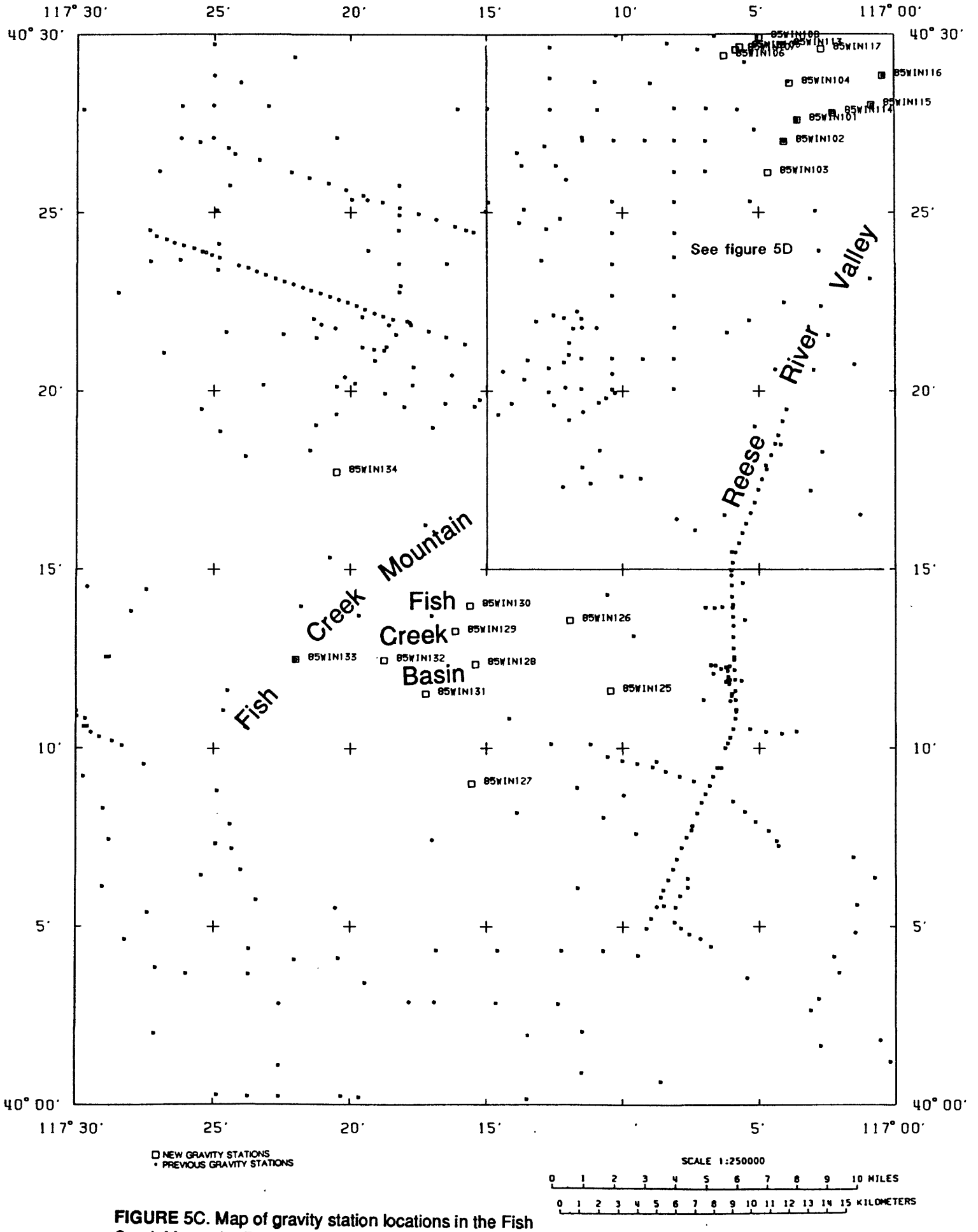


FIGURE 5C. Map of gravity station locations in the Fish Creek Mountain, Fish Creek Basin, and Reese River Valley areas.

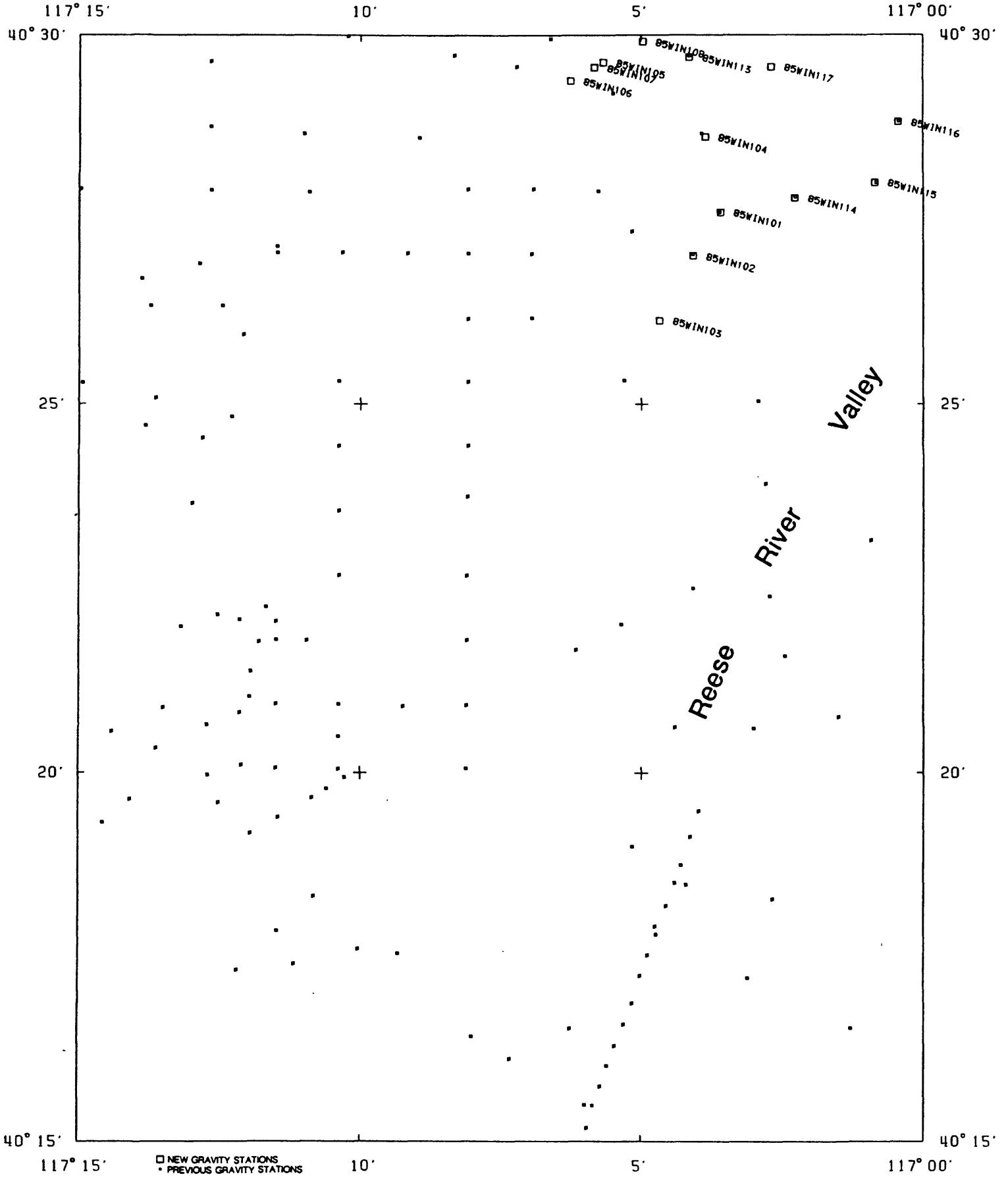


FIGURE 5D. Map of the gravity station locations in the Reese River Valley area.

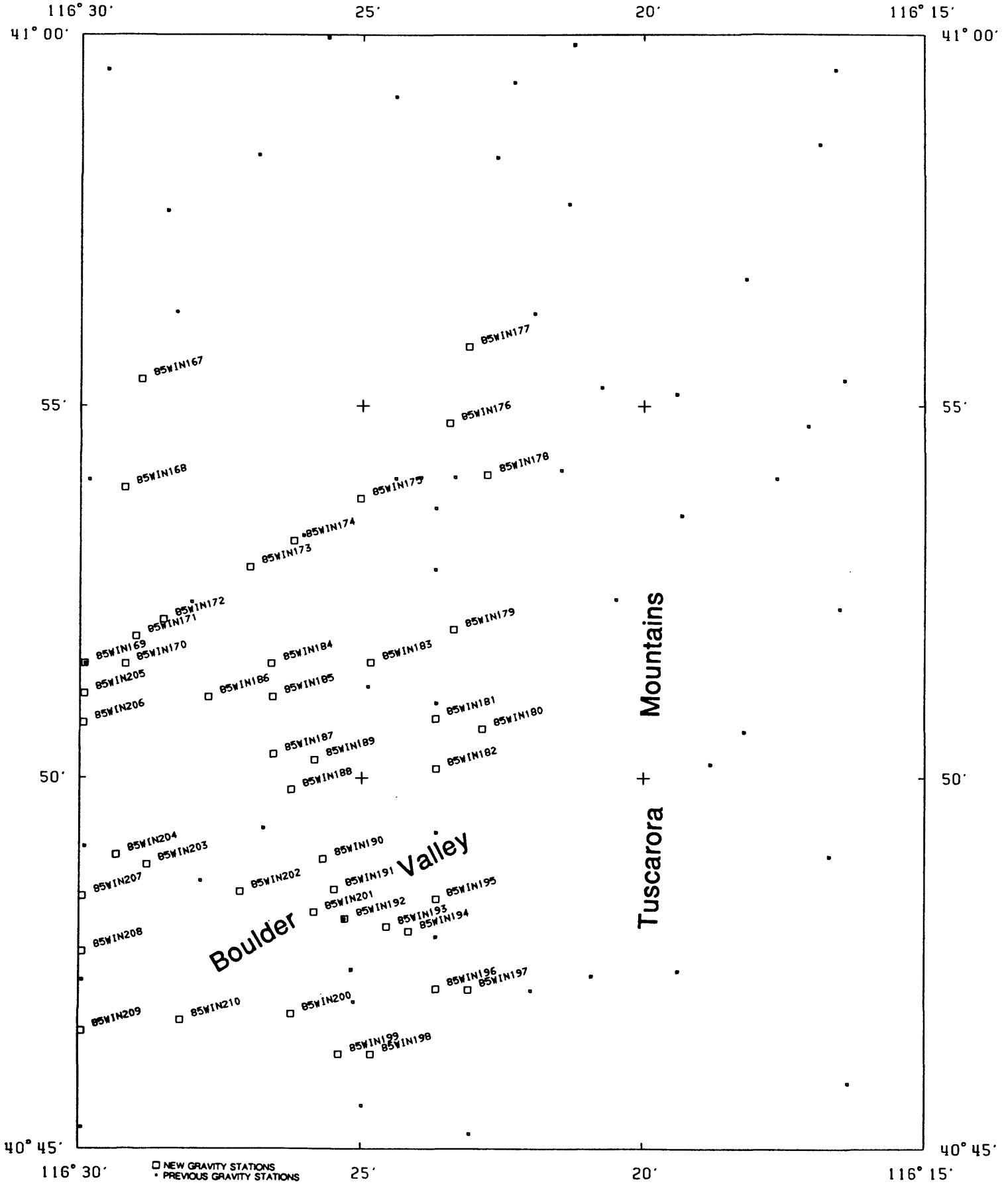


FIGURE 5E. Map of the gravity station locations in the Boulder Valley and Tuscarora Mountain areas

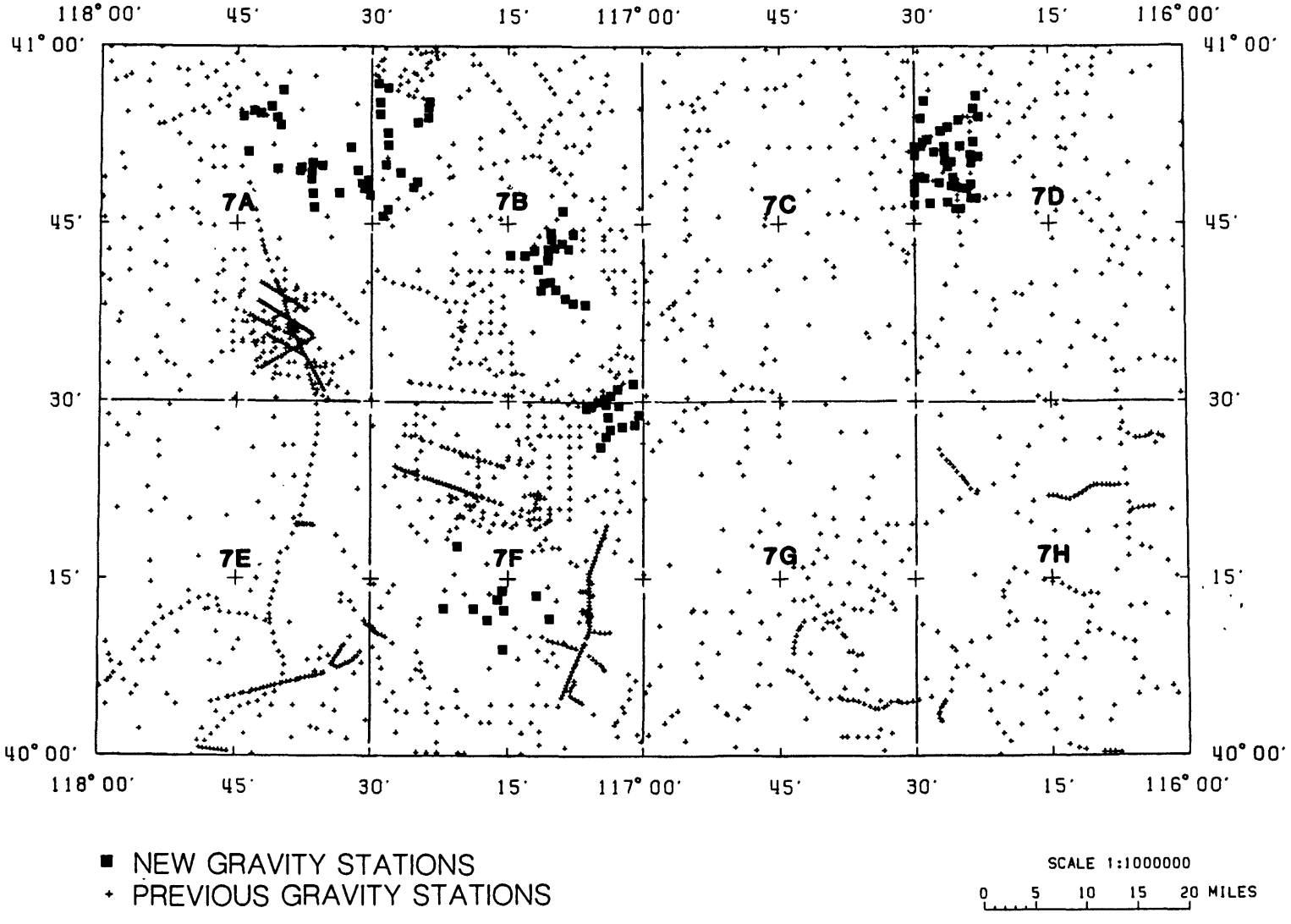


FIGURE 6. Index of Bouguer gravity anomaly maps.

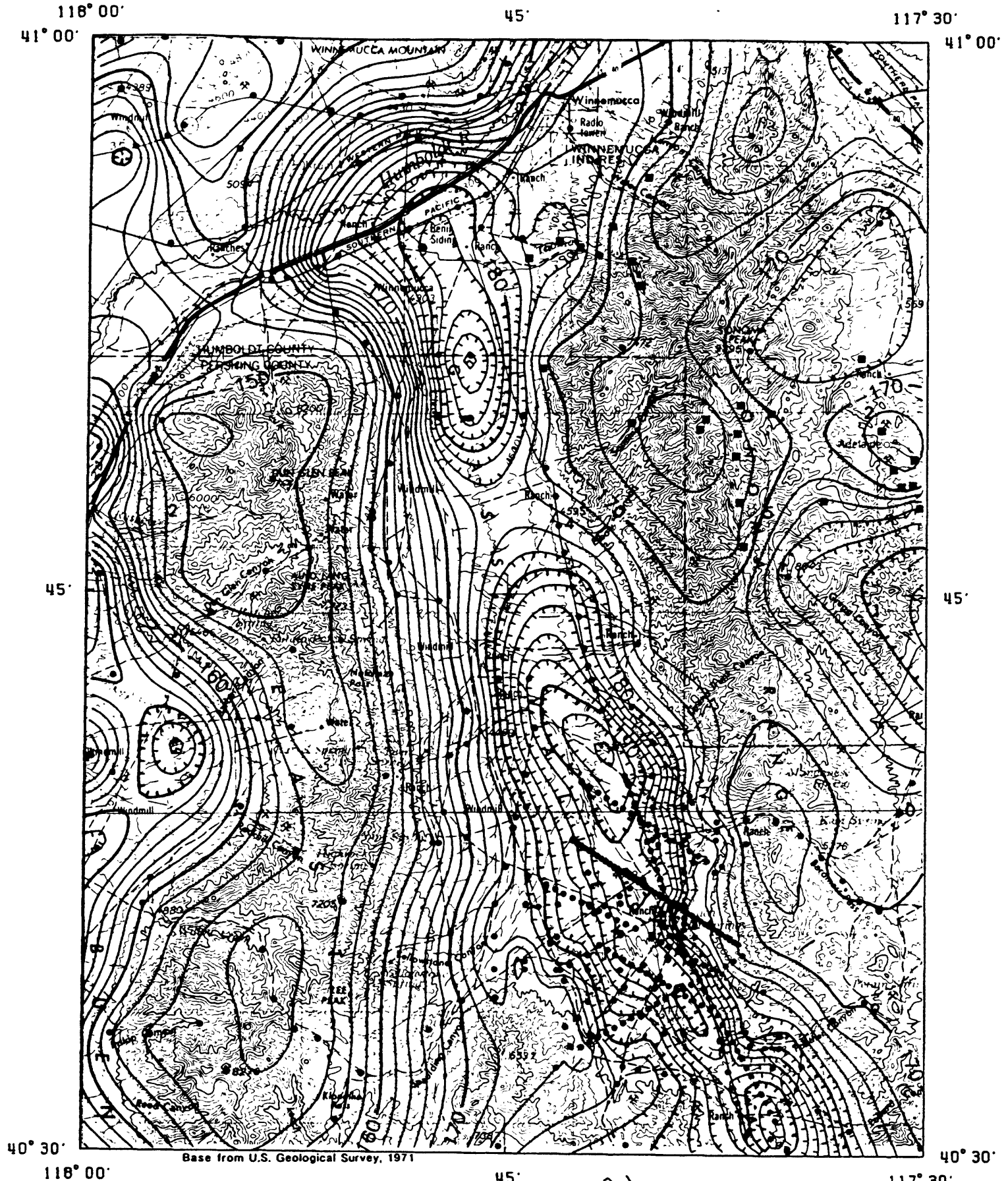


FIGURE 7A. Bouguer gravity anomaly map A.

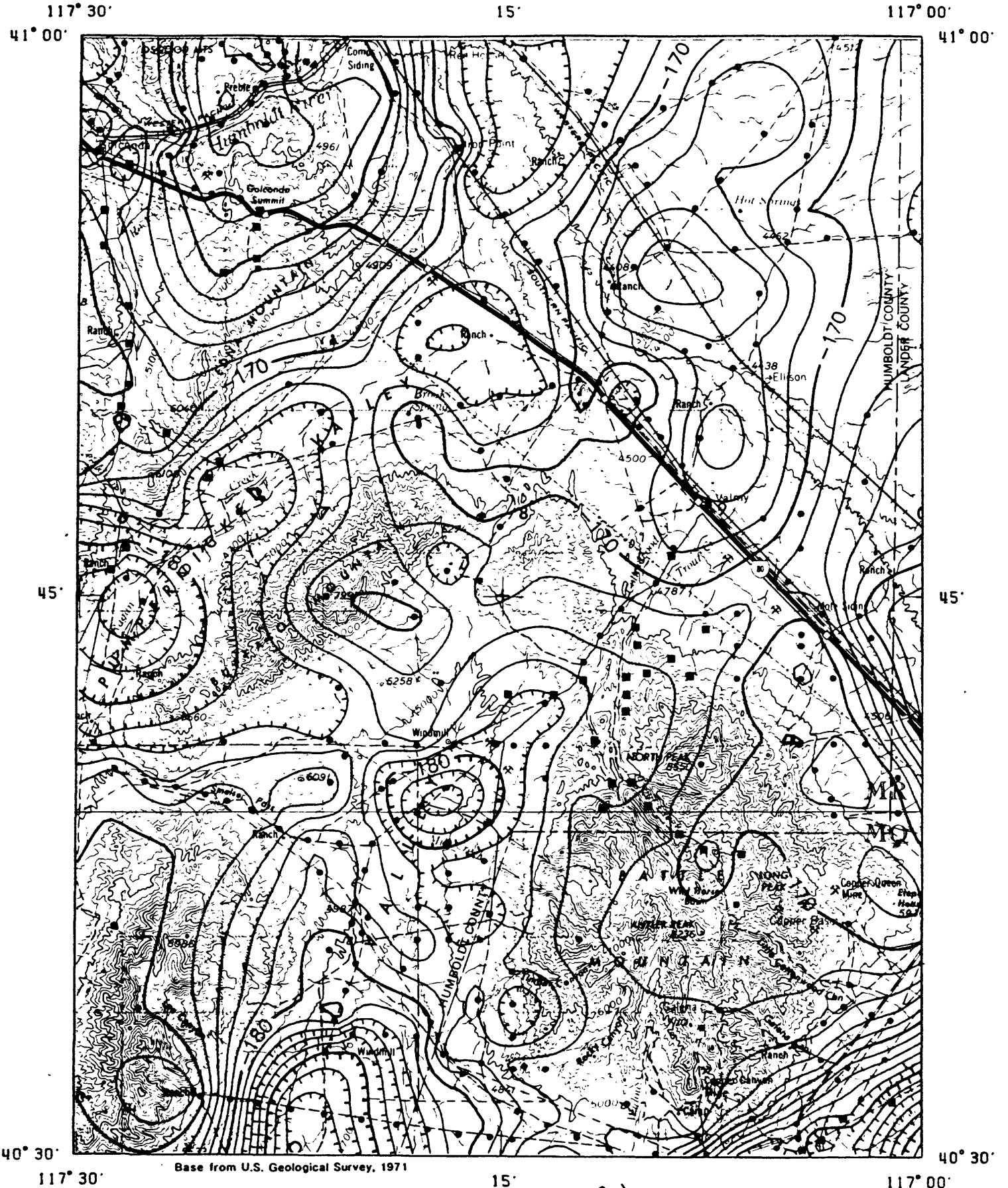


FIGURE 7B. Bouguer gravity anomaly map B.

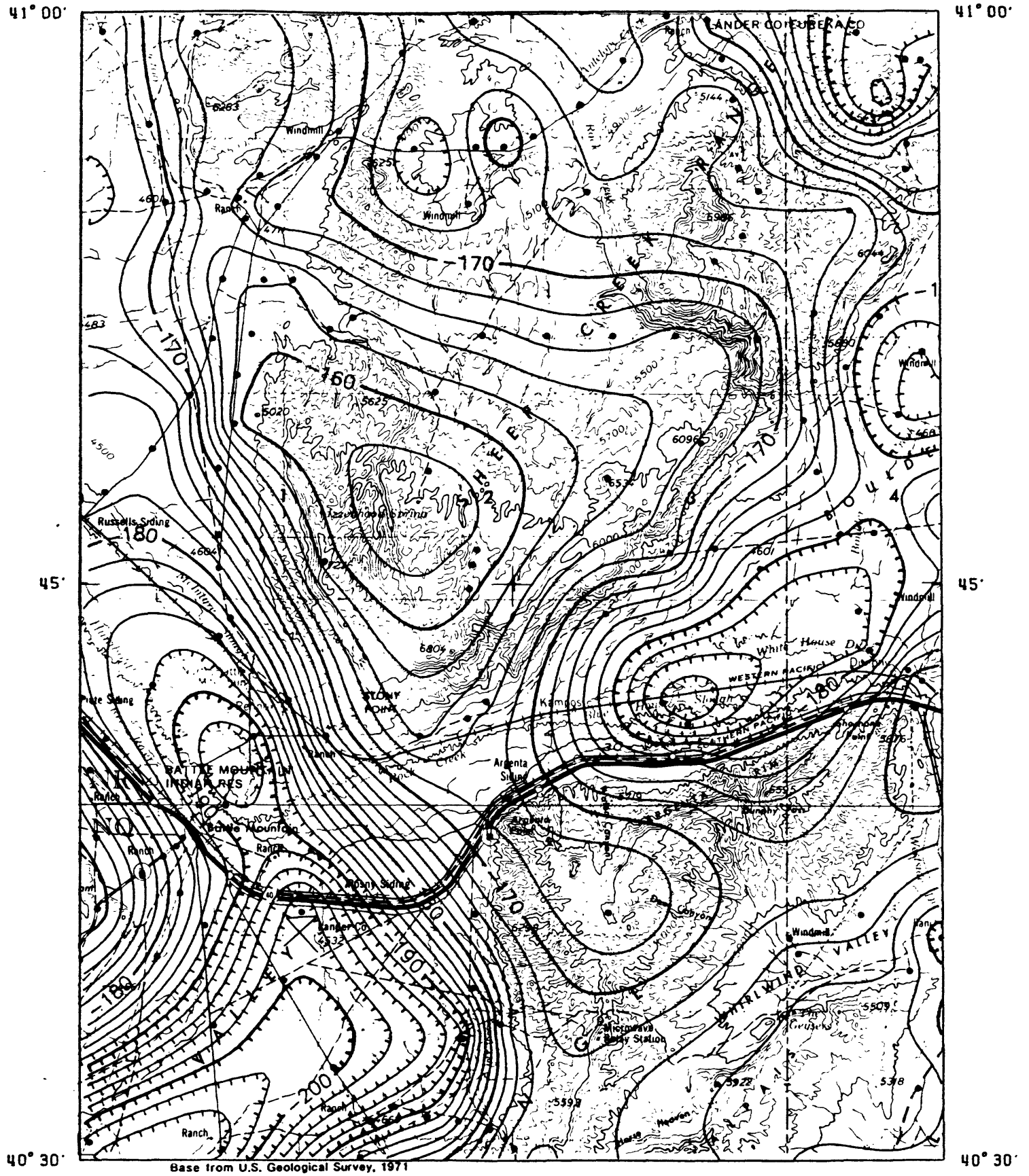


FIGURE 7C. Bouguer gravity anomaly map C.

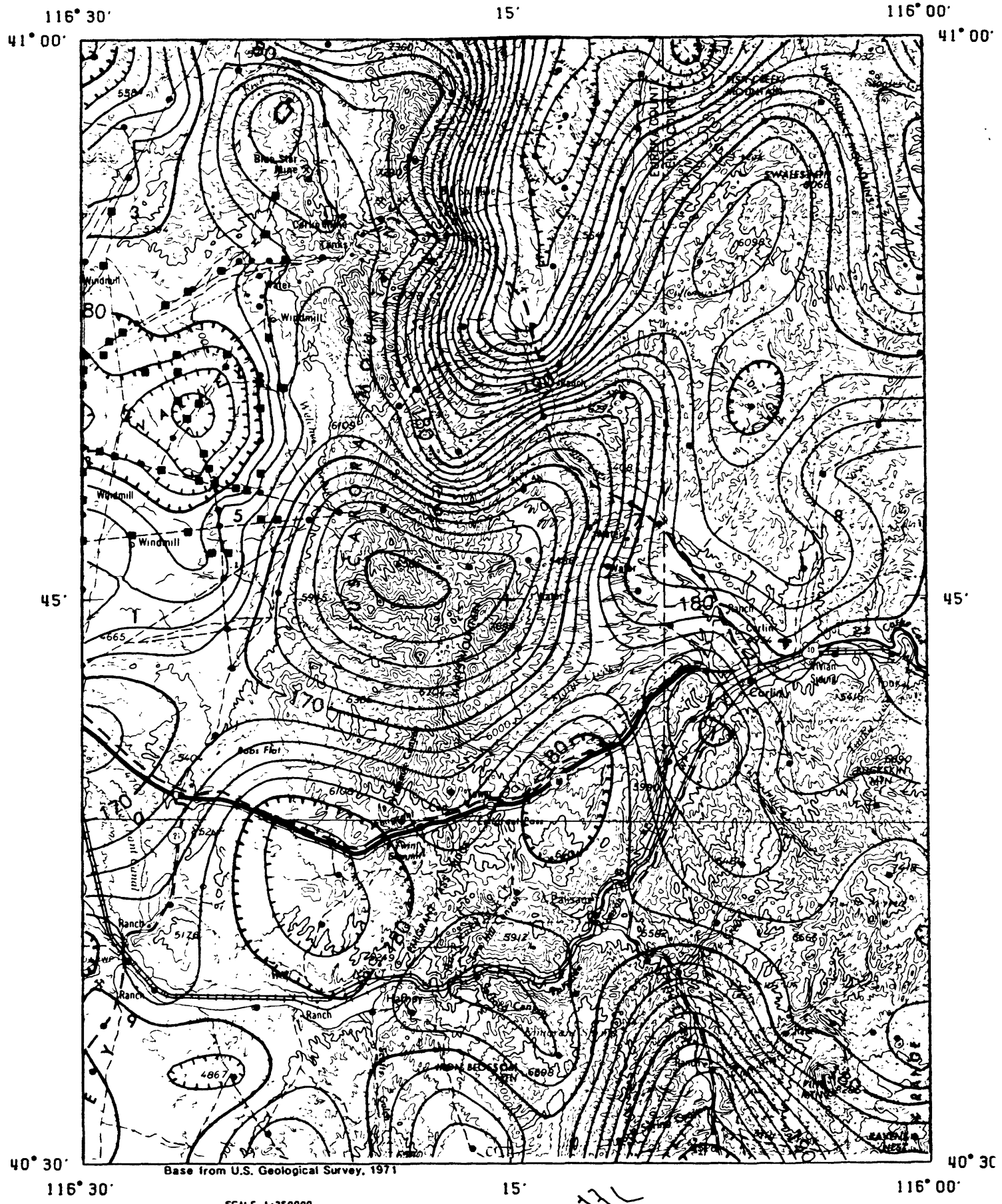


FIGURE 7D. Bouguer gravity anomaly map D.

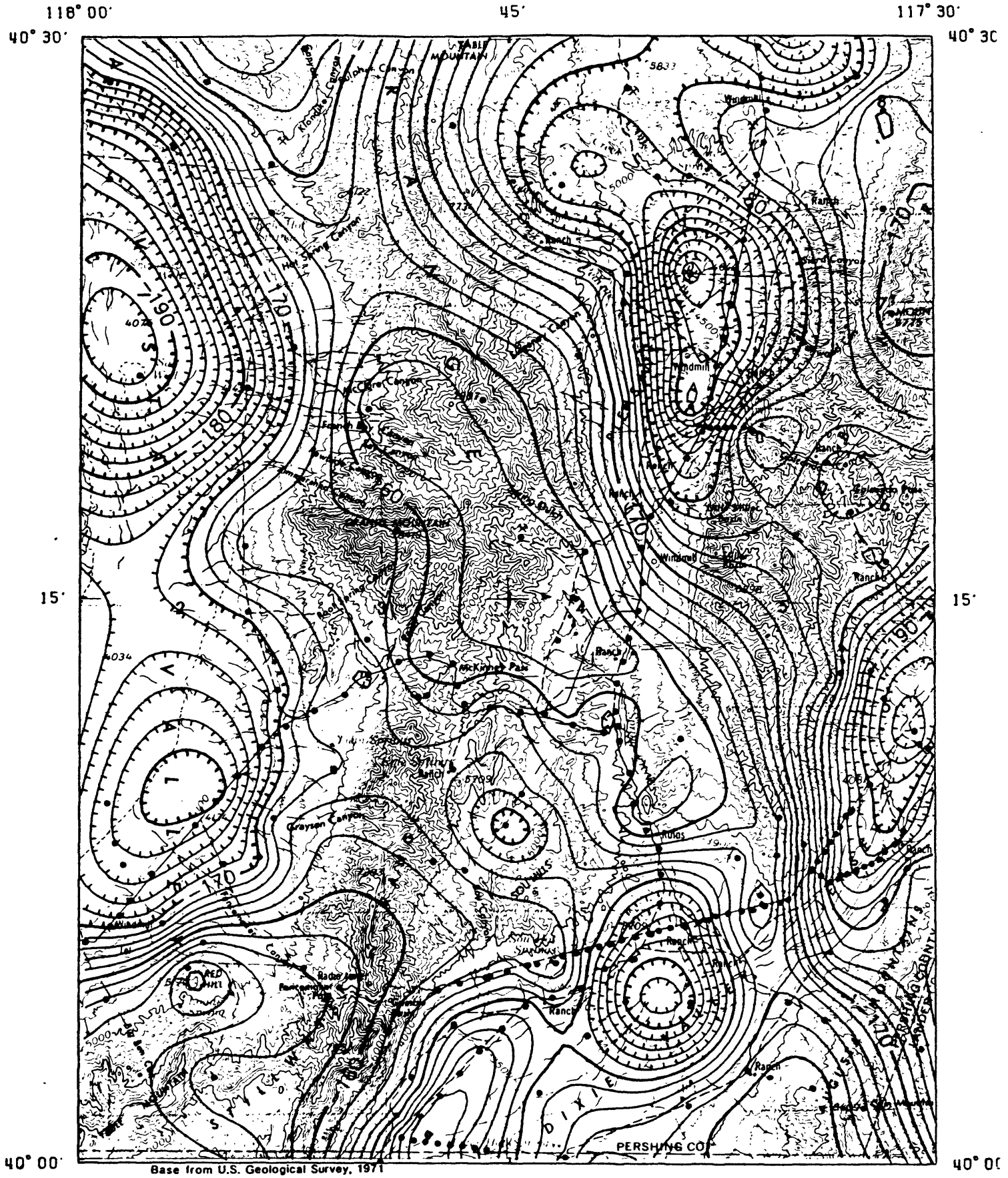


FIGURE 7E. Bouguer gravity anomaly map E.

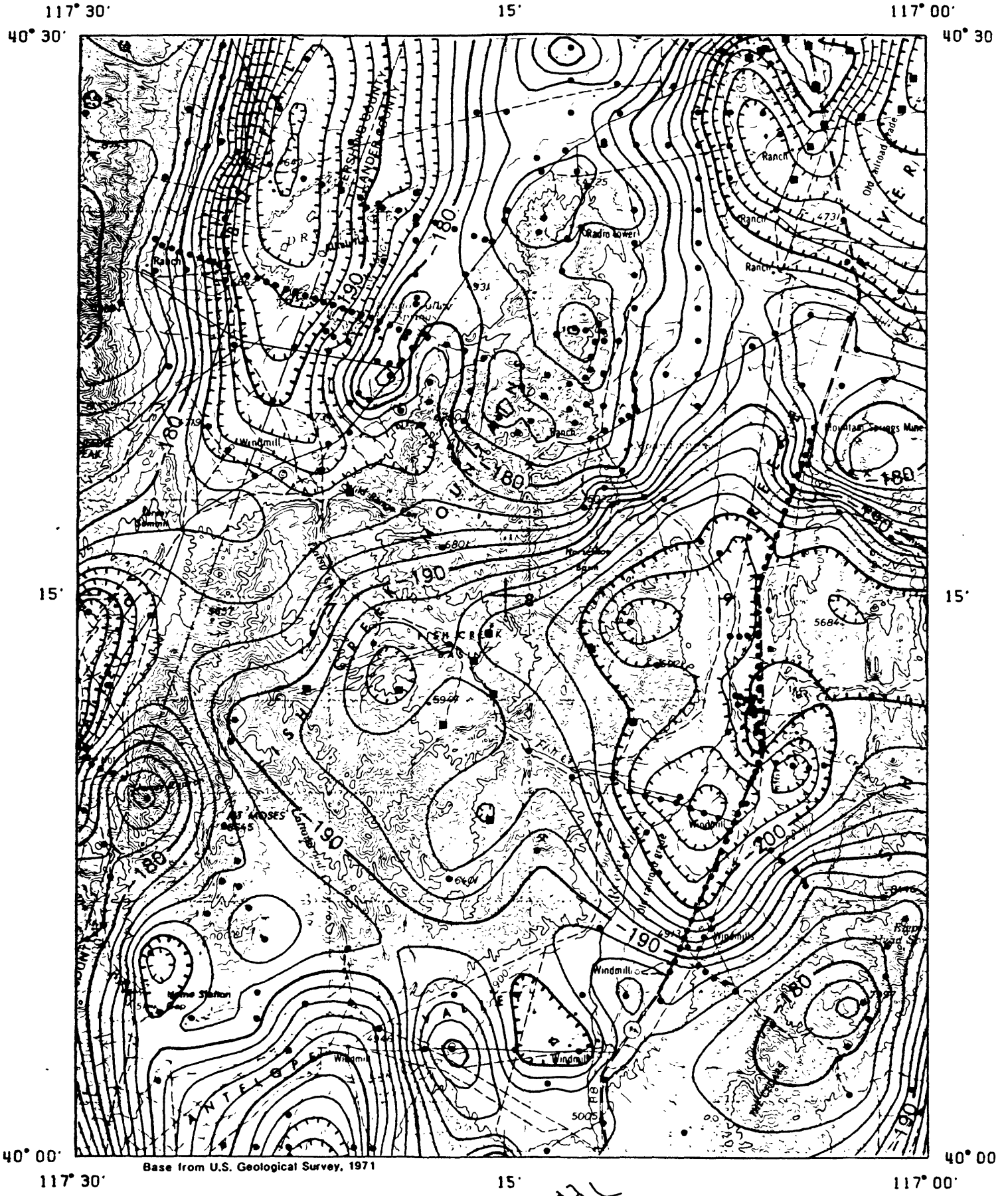


FIGURE 7F. Bouguer gravity anomaly map F.

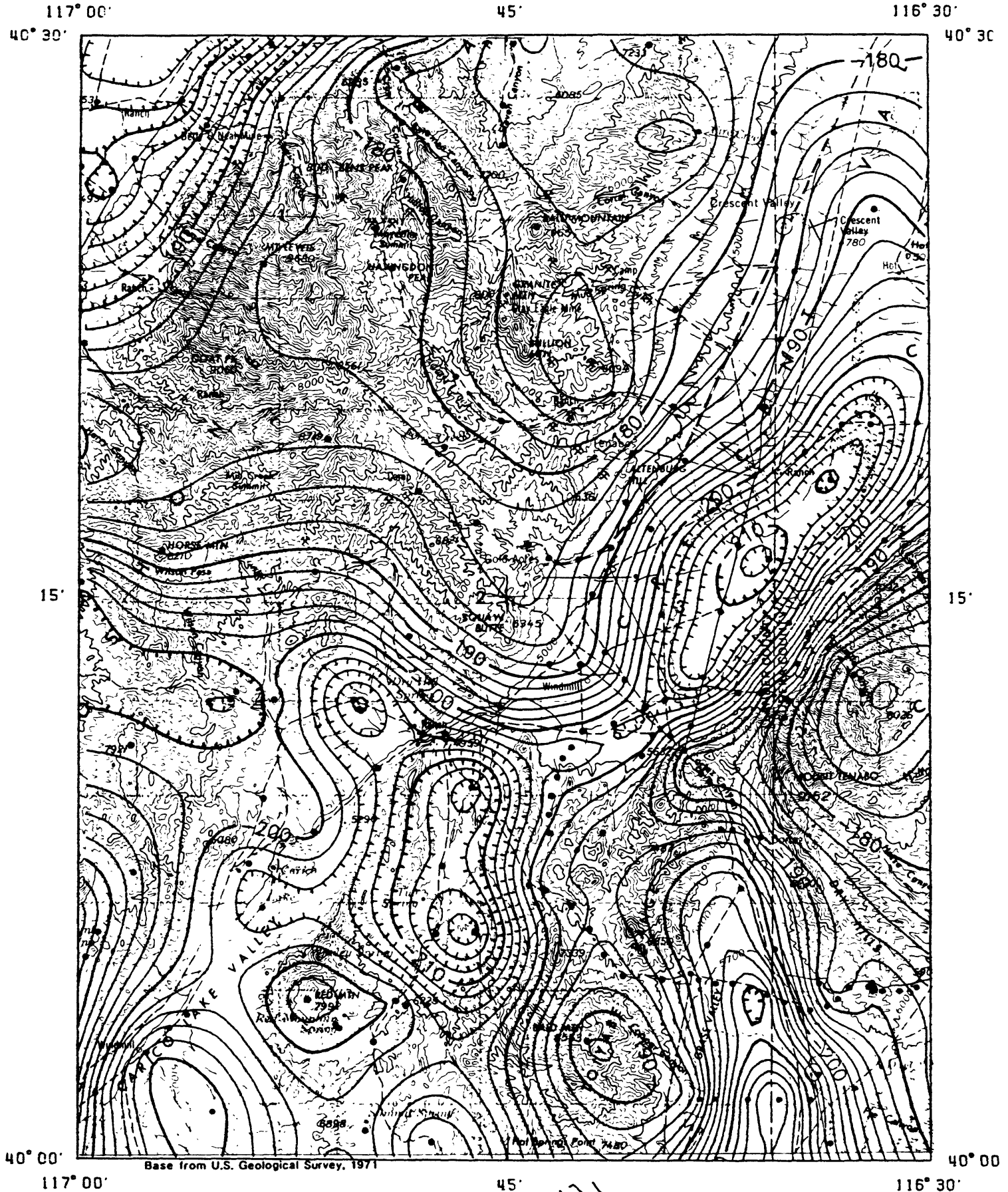


FIGURE 7G. Bouguer gravity anomaly map G.

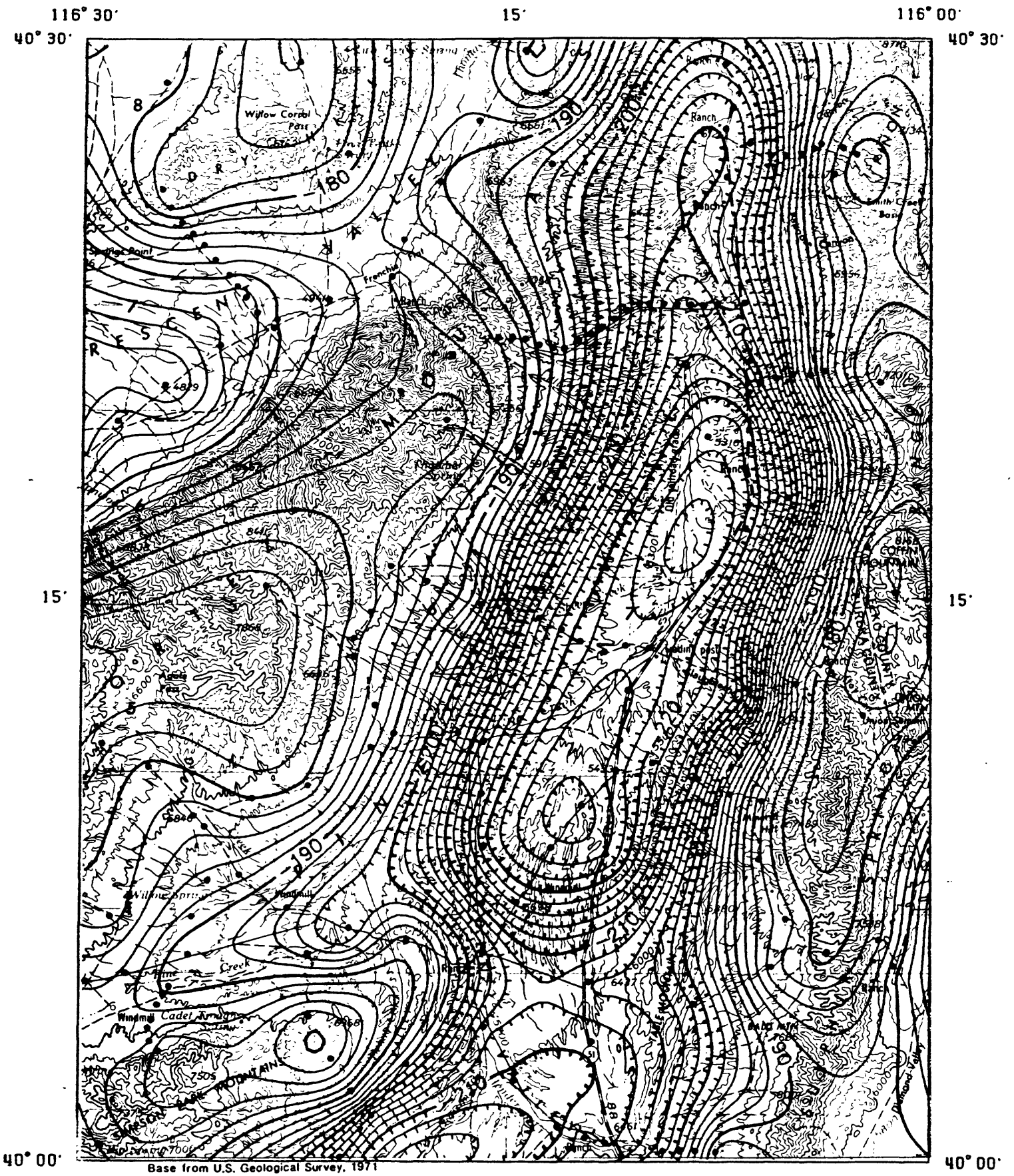


FIGURE 7H. Bouguer gravity anomaly map H.

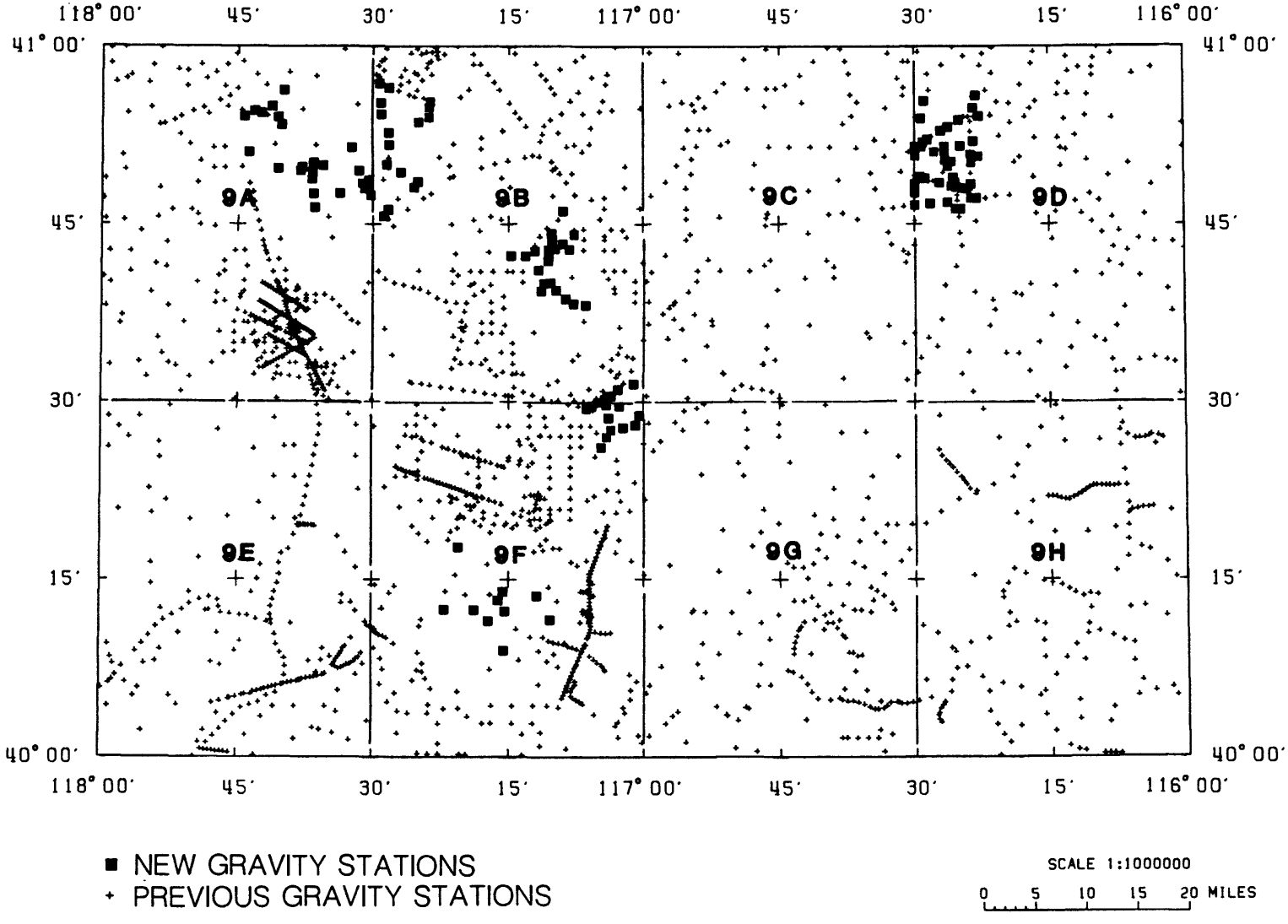


FIGURE 8. Index of isostatic residual gravity anomaly maps.

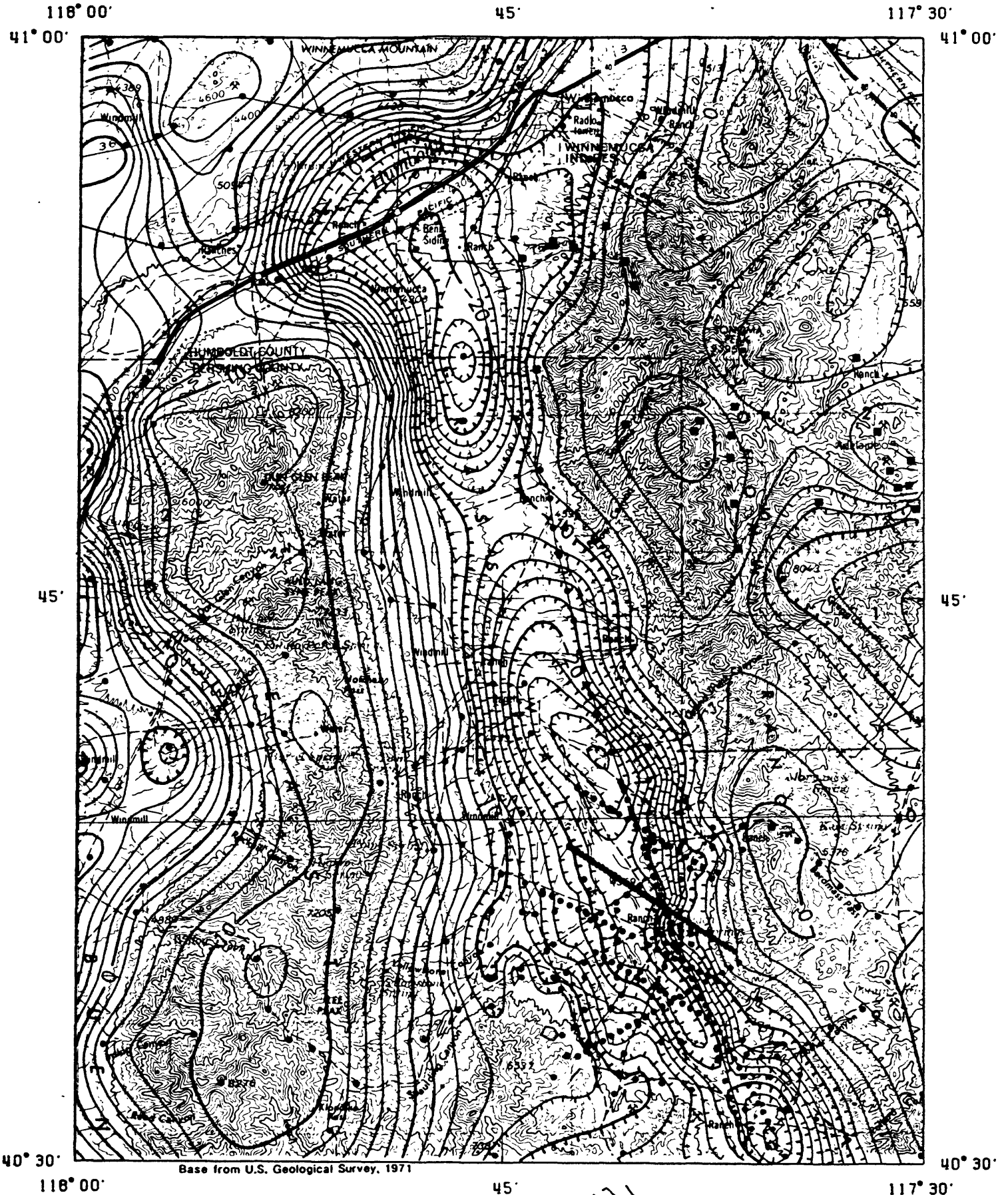


FIGURE 9A. Isostatic residual gravity map A.

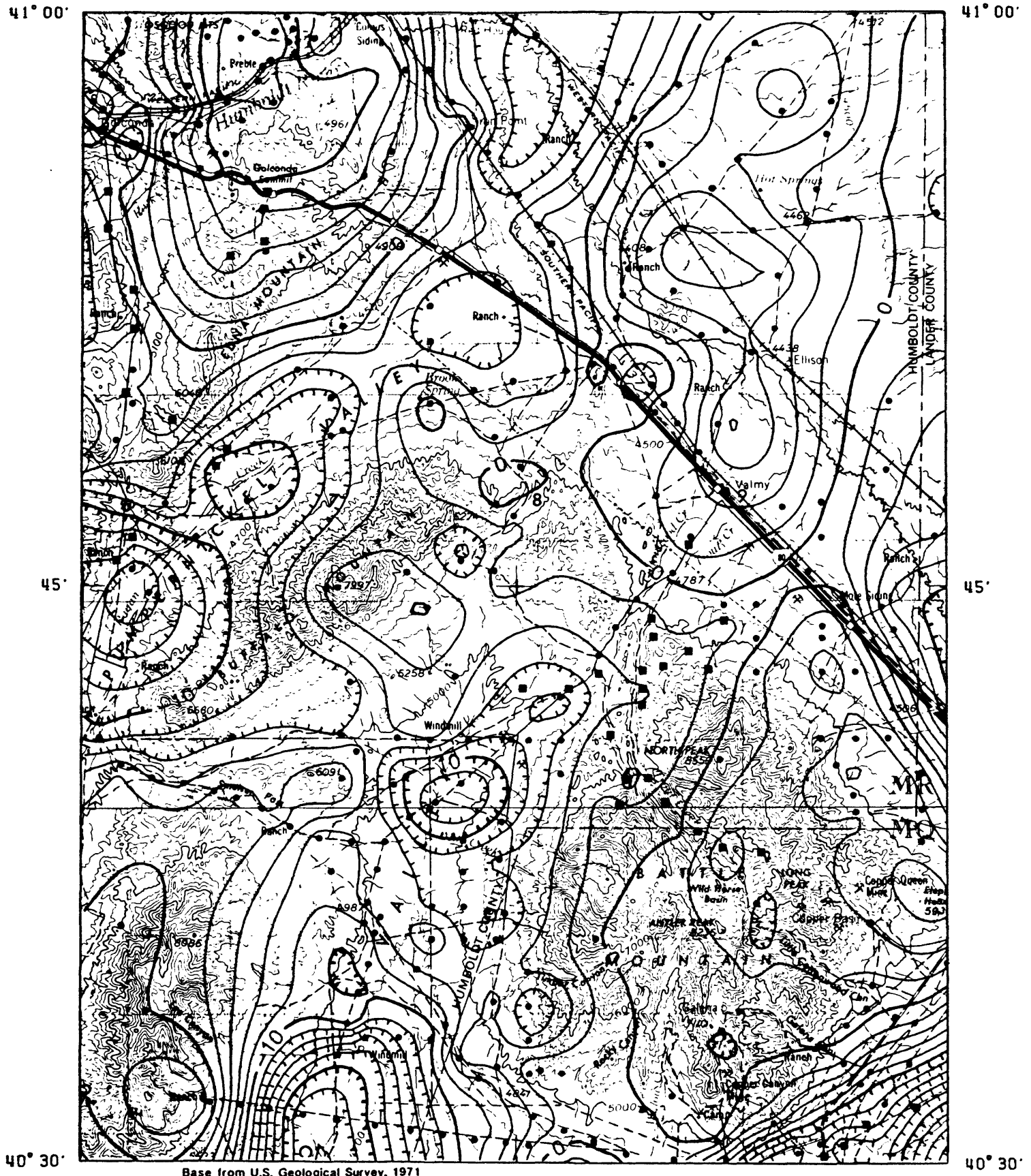
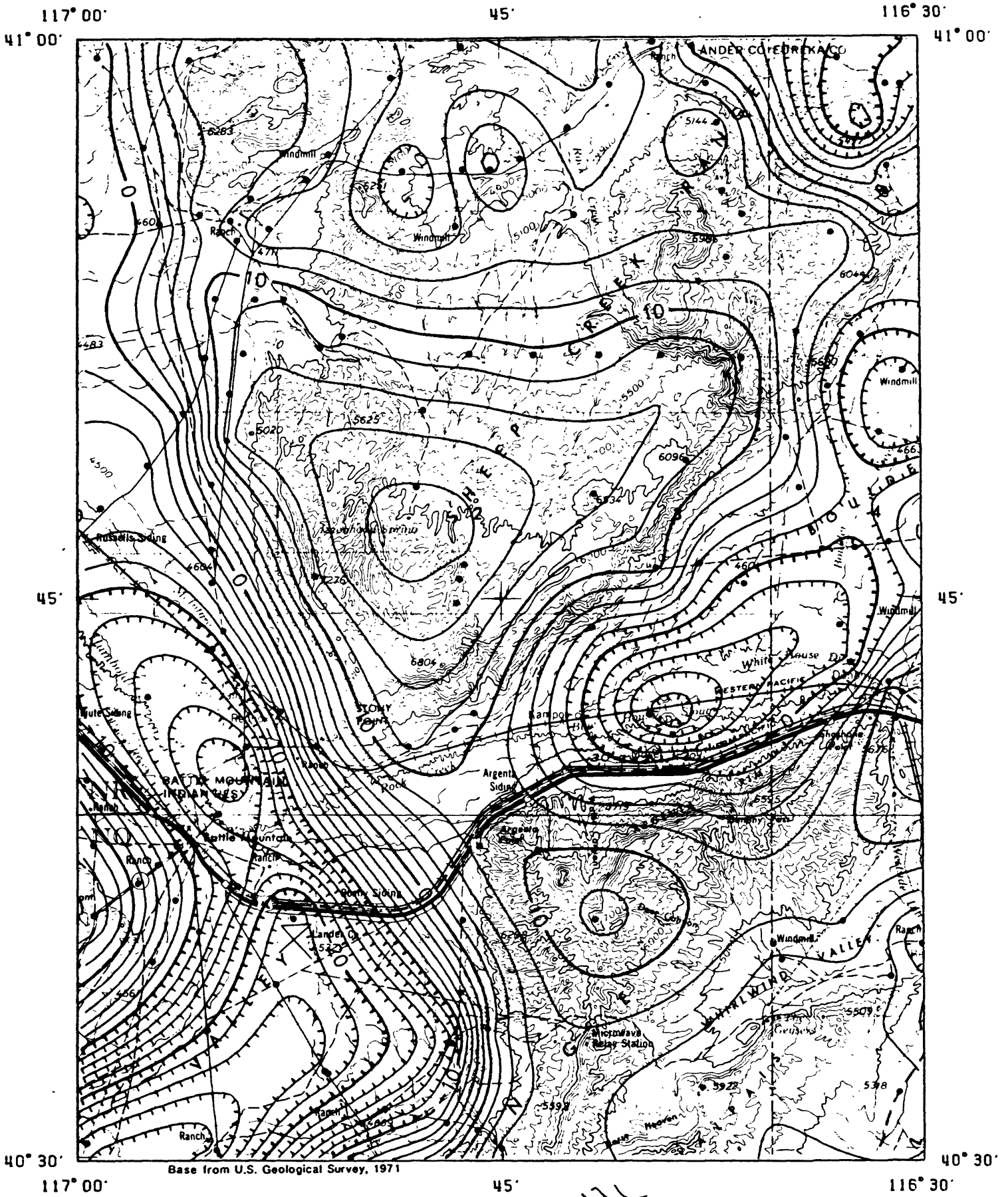


FIGURE 9B. Isostatic residual gravity map B.



SCALE 1:250000

0 1 2 3 4 5 6 7 8 9 10 MILES

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 KILOMETERS

■ NEW GRAVITY STATIONS
• PREVIOUS GRAVITY STATIONS

Gravity Contours - contour interval 2 mGal. Hachured contours indicate areas of low gravity closure.

FIGURE 9C. Isostatic residual gravity map C.

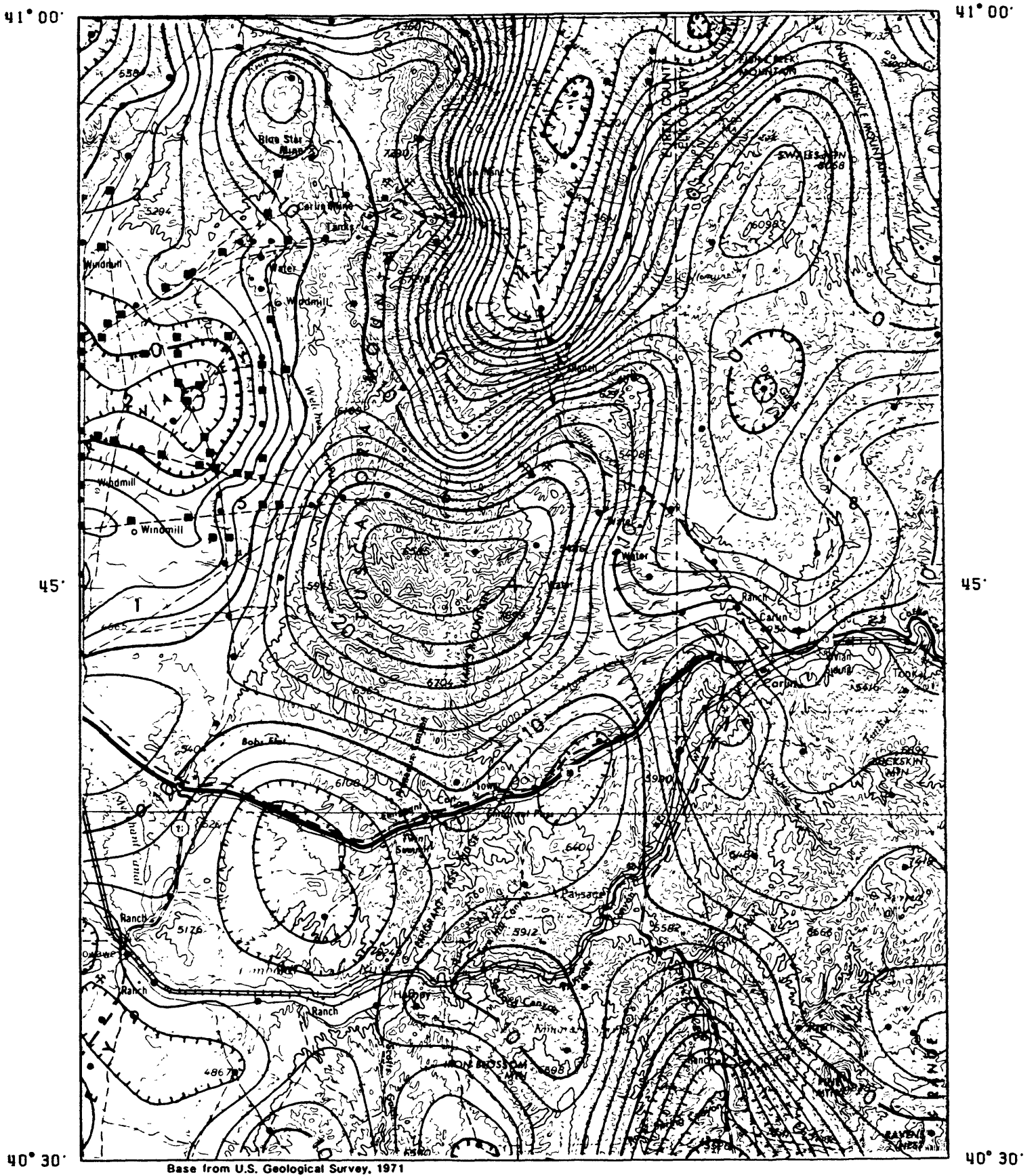


FIGURE 9D. Isostatic residual gravity map D.

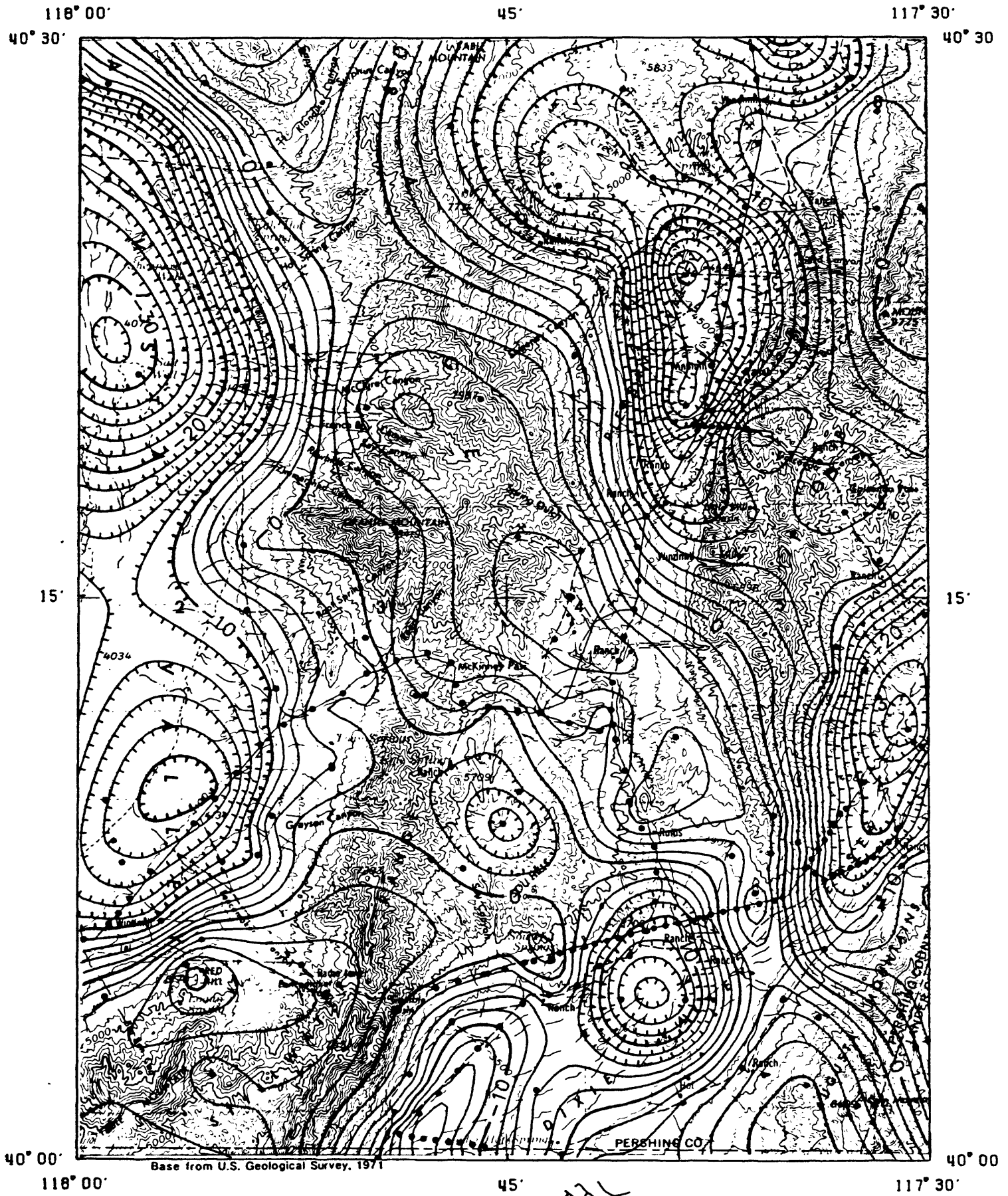


FIGURE 9E. Isostatic residual gravity map E.

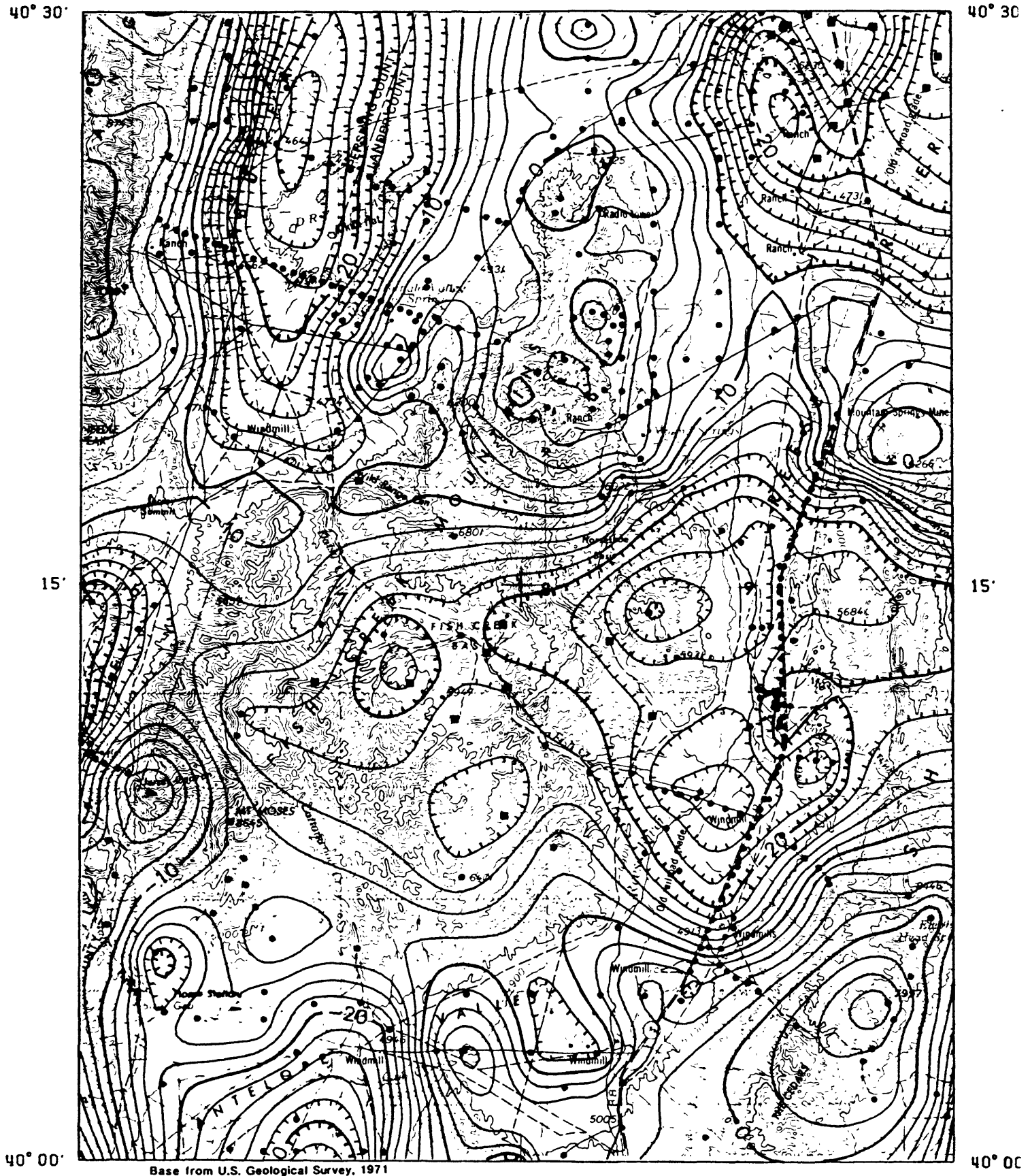


FIGURE 9F. Isostatic residual gravity map F.

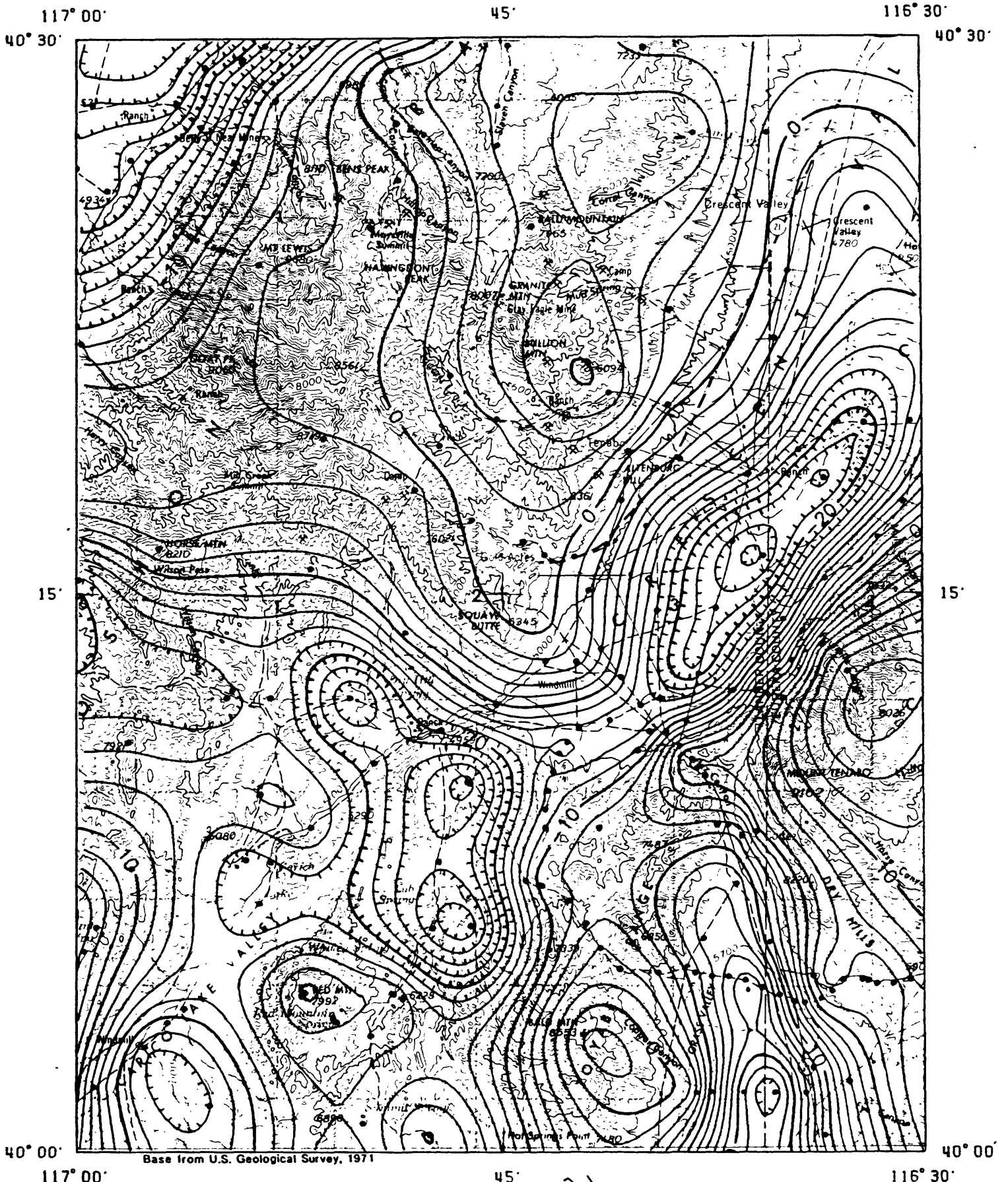


FIGURE 9G. Isostatic residual gravity map G.

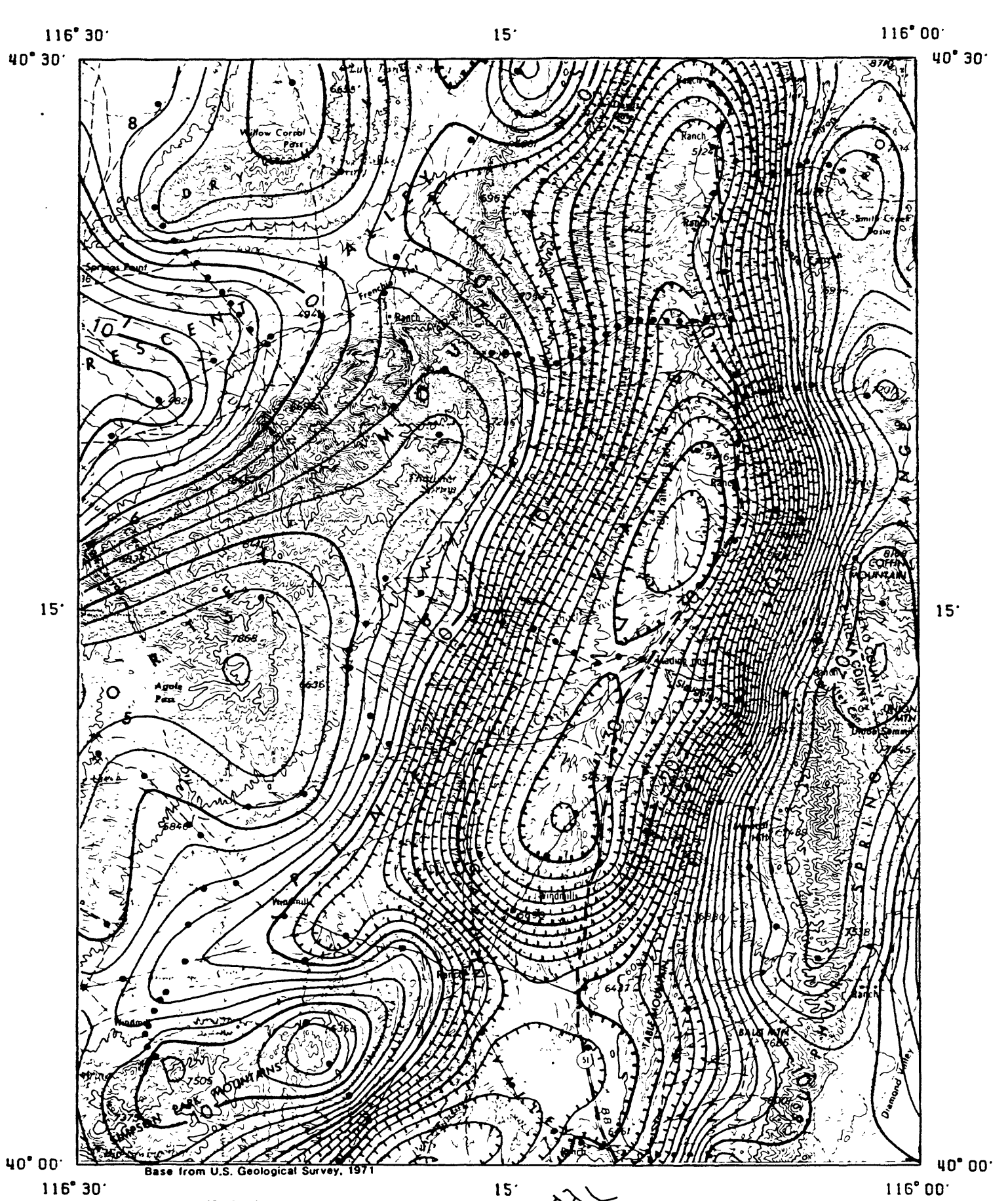


FIGURE 9H. Isostatic residual gravity map H.

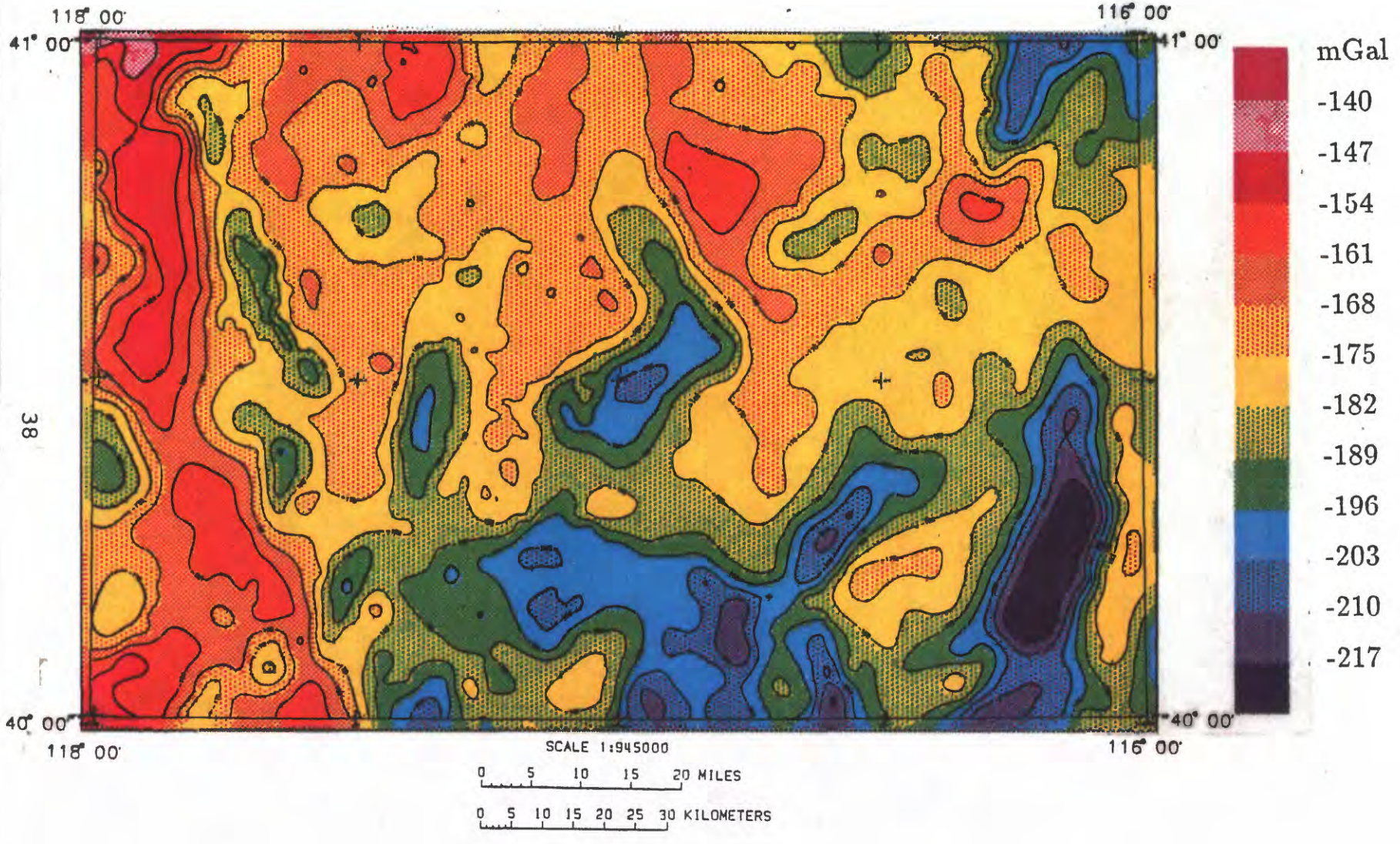


FIGURE 10 .Complete Bouguer gravity anomaly map of Winnemucca 1° by 2° quadrangle.

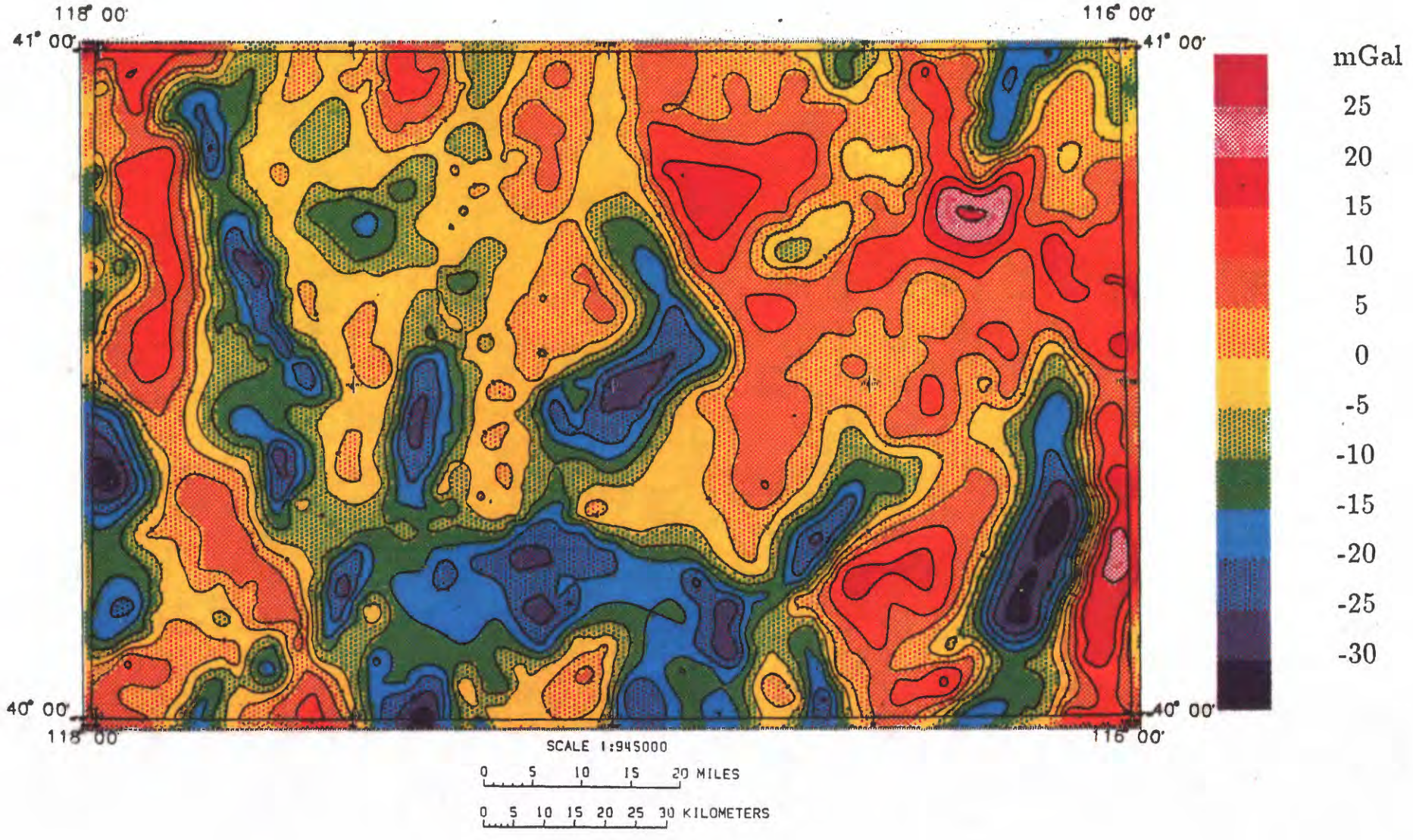


FIGURE 11. Isostatic residual gravity anomaly map of Winnemucca 1° by 2° quadrangle.

APPENDIX

Information about available diskette

PRINCIPAL FACTS FOR GRAVITY STATIONS ON THE WINNEMUCCA 1° BY 2° QUADRANGLE, NEVADA

BY

ROBERT F. SIKORA

Open-File Report 91-256-B

Part B of this report is a 3 1/2 inch disskette, double-sided, high-density (1.44 MB), containing the data files in ASCII format.

Requirements for part B: *IBM PC* or compatible, *DOS v. 2.0* or higher, with a 3 1/2 inch disk drive or a *Macintosh* with a *Super Drive* and *Apple File Exchange* software to convert from *PC* to *MAC*.

Files contained on diskette:

readme.win -- Description of diskette, principal facts format table, and explanation of accuracy codes.

new.iso-- File containing the principal facts for 133 gravity stations obtained in 1985. The data are in Plouff format*.

old.iso-- File containing the principal facts of all the previous gravity stations on the 1° by 2° quadrangle. Data are on the IGSN 71 datum and reduced using the GRS67 ellipsoid formula.

*(a8,f3.0,f4.2,f5.1,f7.2,a4,f6.2,f6.2,f5.2,f5.2,a1,f6.2,f6.2)