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HYDROLOGY OF THE SOUTH-EAST TASMAN SEA

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D. M. GARNER

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FOREWORD

One of the least-known areas around New Zealand from the standpoint of hydrology has been the region off the south-western extremity of the South Island.

This study presents the results of an examination of the summer hydrological situation in the south-eastern Tasman Sea and provides, for the first time, a satisfactory general survey of the complex hydrology of this area.

The memoir was prepared for publication by Miss B. J. Davison.

J. W. BRODIE, Director,
New Zealand Oceanographic Institute,
Wellington.

HYDROLOGY OF THE SOUTH-EAST TASMAN SEA

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HYDROLOGY OF THE SOUTH-EAST TASMAN SEA

by

D. M. Garner

New Zealand Oceanographic Institute

ABSTRACT

The results are presented of a survey of the distribution of temperature and salinity in the upper 2.5 km of the south-east Tasman Sea, south-west of New Zealand. This is the second of a series of studies of the summer hydrological situation in the ocean waters surrounding New Zealand. A discussion of the survey data is offered in terms of the general oceanic circulation system in the area and, in particular, the Subtropical Convergence. Calculations of the velocity of sound through the survey area are made and related to the hydrological structure, and velocity corrections for echo soundings in the area are derived.

INTRODUCTION

SURVEY DETAILS

A survey of the distribution of temperature and salinity in the upper 2½ km of the south-east Tasman Sea was made by the New Zealand Oceanographic Institute from m.v. *Taranui* during February 1964. The results of this survey are presented here together with a discussion of their relation to ocean circulation and sound propagation in this region.

The survey area was bounded by south latitudes 41° and 48°, east longitude 159°, and the 2 km isobath off the west coast of South Island. Station positions and the general bathymetry of the area are shown in fig. 1. The area includes the eastern part of the Tasman Basin where depths are generally greater than 4½ km and the bottom is relatively featureless. Around the eastern margin of this basin, the sea floor rises to form the southern flank of the Lord Howe Rise in the north-east, the South Island slope in the east, and the Puysegur Bank—Macquarie Ridge system in the south-east.

Field work occupied the period 10–25 February 1964, under very calm conditions except for two periods of strong winds encountered at Sta. A 939 and A 942. Station circumstances are set out in table 1.

Inset 2*

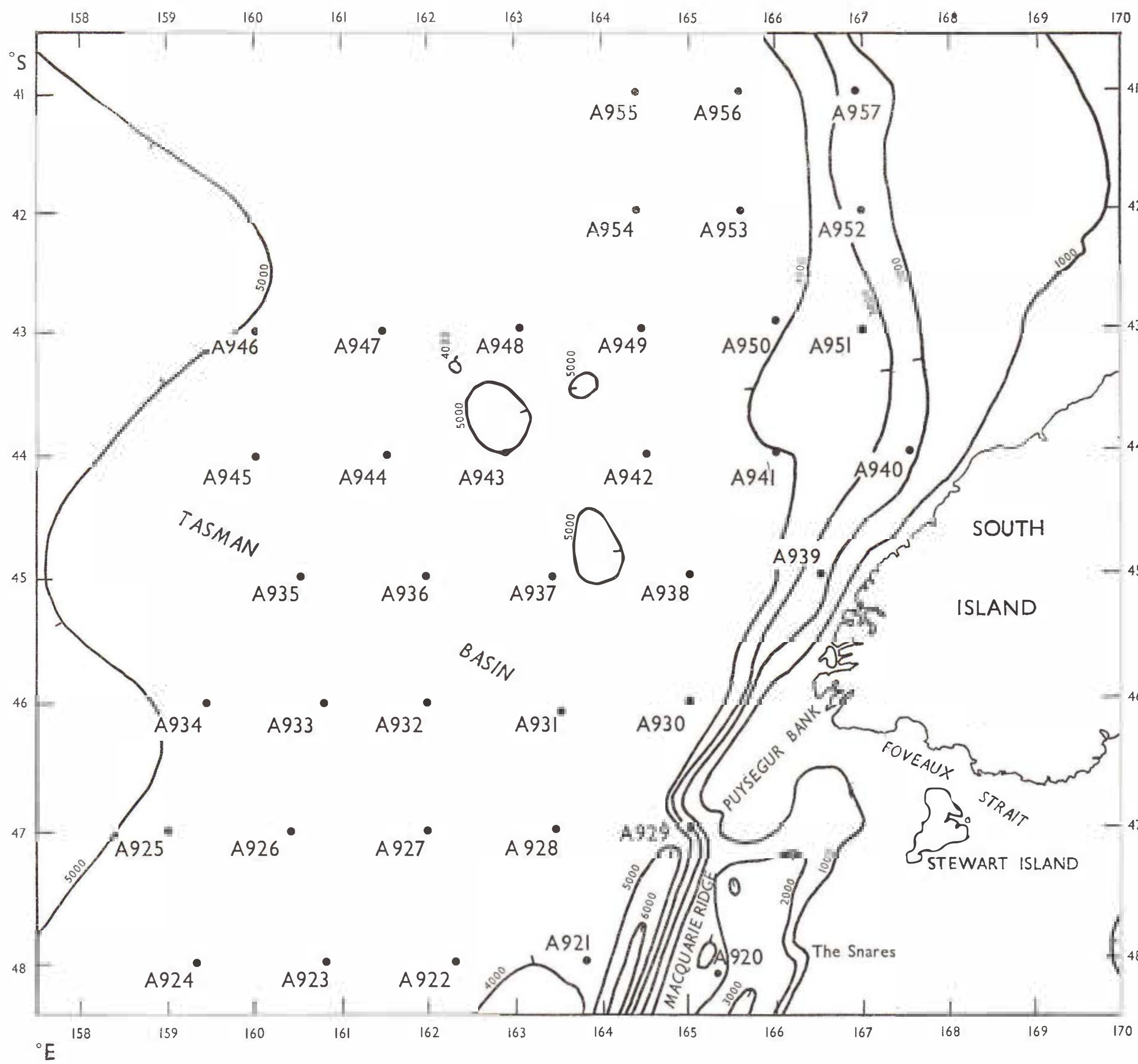

Fig. 1. The survey area showing station positions in relation to main bathymetric features. Isobaths are in metres sketched at intervals of 1 km.

DATA COLLECTION

Water samples were collected at each station with a series of 21 Knudsen reversing bottles attached at intervals to a sounding wire. The greatest sampling depth achieved at each station was determined by the length of wire available ($2\frac{1}{2}$ km) and departure of the wire from the vertical due to relative motions of ship and water. Water temperature and pressure were determined at each sampling point by means of Negretti and Zambra protected and unprotected reversing thermometers mounted on the reversing bottles. A Wallace and Tiernan bathythermograph provided detailed definition of the temperature-depth relationship through the upper 270 m of water depth. Water samples were stored in glass bottles and their salinities determined on an inductive salinometer the day following collection to ensure temperature equilibrium with ambient conditions. Similar temperature equilibrium for the reversing thermometers was achieved by the storage of thermometer frames in water-filled tanks, through the transparent sides of which the thermometers were read three to four hours after recovery from the sounding wire. Corrected temperatures and depths were derived from the thermometric data as described by Eger (1962).

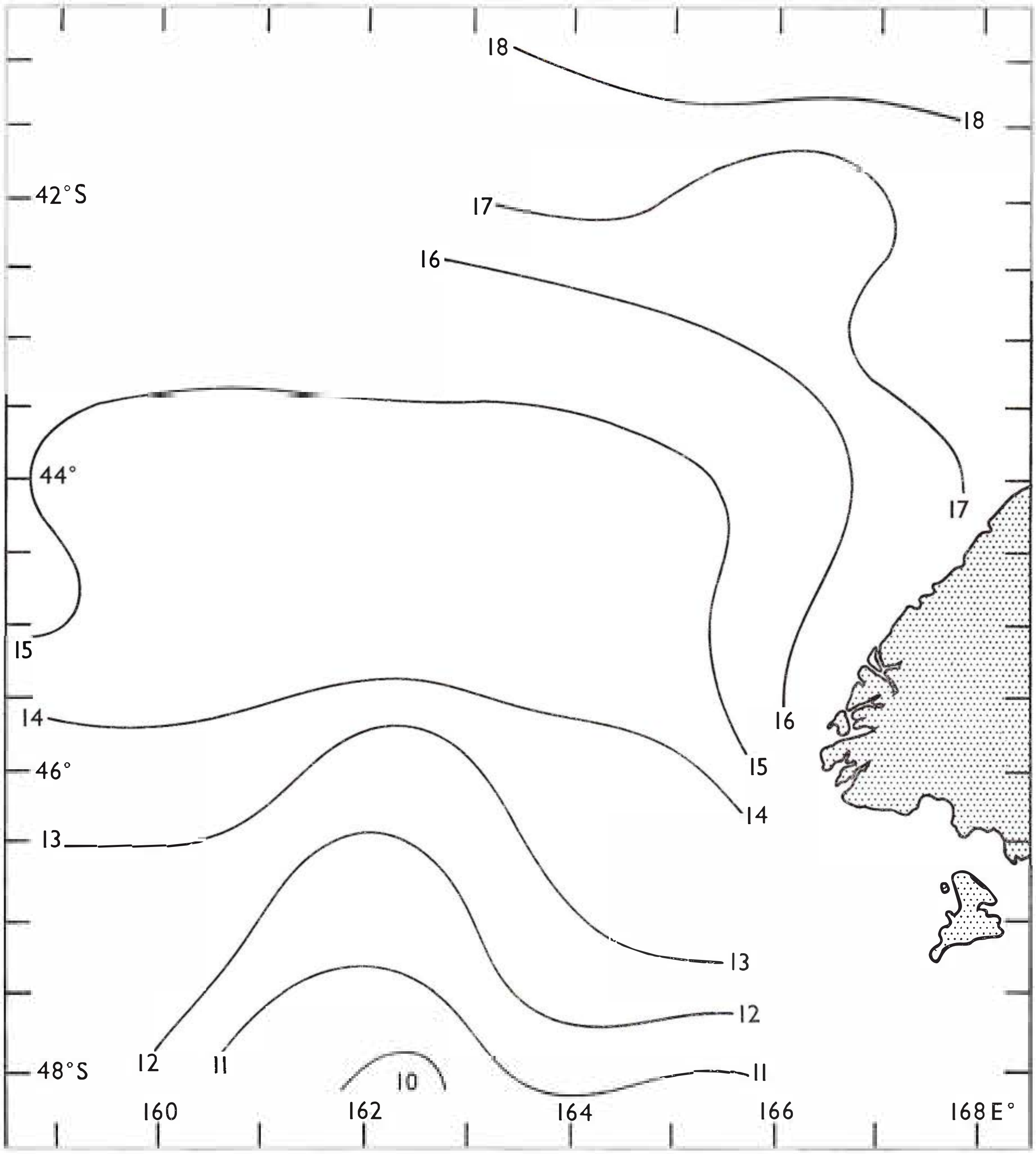

Fig. 2. Isotherms at the sea surface (°c).

PRESENTATION OF DATA

The numerical survey data derived from reversing bottle sampling of the water column at each station are tabulated in the Appendix. With these measured values of depth, temperature and salinity are given computed values of density and geopotential anomalies, and of sound velocity. Formulas given by LaFond (1951) and by Wilson (1960) were used to derive these quantities. Bathythermograph traces are reproduced in fig. 6.

PREVIOUS WORK

A general summary of hydrological stations previously worked in the survey area was given by Garner and Ridgway (1965). More recent work in the south-east Tasman Sea has been described by Wyrtki (1962b). Surface and near-surface waters are derived from a general east-going movement across the south Tasman Sea. Off the South Island coast this forms two branches, one of which flows northwards to the west of the South Island, while the other is deflected southwards to flow south of New Zealand. A difference of opinion exists as to whether this splitting of the south Tasman Current takes place to the north or to the south of the Subtropical Convergence as is shown by comparison of Wyrtki (1962a, fig. 5) and Garner (1962, fig. 4). Perhaps this apparent conflict arises through differences in the definition of terms. This question is examined further here in a later section. The properties of water at intermediate depths are governed by the low salinity core of the Antarctic Intermediate Water, found at a depth of about 1 km in the south-east Tasman Sea (Garner 1962, fig. 6; Wyrtki 1962a, fig. 12). Below this core is found the relatively high salinity Pacific Deep Water into the upper part of which the sampling of this survey extended.

DISCUSSION

SURFACE TEMPERATURE AND SALINITY

At the surface of the survey area, the variation of these properties (figs. 2 and 3) ranged from a low of about 10°C; 34.2‰ in the south (Sta. A 922 –923) to a high of some 18.6°C; 35.4‰ in the north-east (Sta. A 956). Regions of relatively steep horizontal gradient of surface property in both southern and northern parts of the survey area were separated by a central region where such gradients were weak. A tongue of cold, low salinity water in the southern part of the survey area, its axis defined by Sta. A 922, 927, and 932, was associated with the relatively steep surface gradient in this region. A band of warm, highly saline water, derived from the north-eastern part of the survey area, lay between the Fiordland coast and this cold intrusion.

Over this south-east Tasman survey block, surface temperature (T°C) and salinity (S‰) correlated approximately according to the linear relation

$$S = 0.125T + 32.97$$

The surface pattern of isohalines was thus generally similar in form to that of the isotherms. Correlation between surface temperature and salinity was complicated somewhat by low salinity tongues in the central eastern and western parts of the survey area (Sta. A 945 and 940) which had no corresponding feature in the surface temperature pattern. The lower salinity at Sta. A 940 is very likely due to fresh water run-off from the Fiordland coast, a region of very high rainfall, the effects of which were noticeable as surface water discoloration for many miles off the coast. The observed range of surface salinity showed that the survey area encompassed waters of both subtropical and subantarctic origins. Deacon (1937) found that the Subtropical Convergence, or boundary zone between these water masses, was generally marked in summer by the 14°C isotherm and the 34.9‰ isohaline. These isohalines (figs. 2, 3) lie on the northern edge of the relatively steep horizontal gradient of surface properties which bounds the southern tongue of cold, low salinity water. This steep gradient may thus tentatively be identified with the Subtropical Convergence in this region. The higher salinity water in the northern part of the area and its southwards extension along the Fiordland coast is thus probably derived from a branch of the East Australian Current system. The change of surface salinity for a given temperature change over this south-east Tasman area was not as great as that previously defined in the vicinity of the Subtropical Convergence east of New Zealand (Garner, 1966).

SUB-SURFACE PROPERTIES

Sub-surface water properties are illustrated by meridionally oriented vertical cross-sections of temperature and salinity through the survey area (figs. 4, 5).

Temperature

At the northernmost station of the section, A 956, an isothermal mixed layer overlay a well-developed summer thermocline layer. Detailed bathythermograph records (fig. 6) show a near-discontinuity in vertical temperature gradient at a depth of about 35 m at this station, marking the bottom of the upper mixed layer and the top of the summer thermocline. A secondary weakening of the vertical temperature gradient between 150 and 200 m probably marked the lower portion of the upper mixed layer during its period of maximum vertical development in winter. Below this layer temperature decreased with depth through the permanent thermocline to reach some 2°c at a depth of about 2,500 m, the limit of the soundings. The temperature structure of water deeper than 500 m was fairly uniform throughout the section. Isotherms above this depth had an upward trend from north to south, so that the intermediate layer of relatively weak vertical temperature gradient became deeper and thicker towards the south. To the south of Sta. A 931, in the vicinity of which the horizontal surface temperature gradient was greatest, the summer thermocline was relatively weak. Temperature inversions were recorded on bathythermograph traces for two groups of stations; a southern group, Sta. A 920 – 925, 931, and 932, and a northern group, Sta. A 941, 943, 945, and 947. A similar grouping of inversions with respect to the Subtropical Convergence was previously found east of New Zealand (Garner, 1966).

Salinity

Comparison of a meridionally oriented vertical cross-section of salinity (fig. 5) through this south-east Tasman survey area, with its counterpart through the Subtropical Convergence region to the east of New Zealand (Garner, 1966, fig. 13), shows similarities in general structure.

A dominant feature of this section is the minimum salinity layer of the Antarctic Intermediate Water enclosed by the 34.5‰ isohaline. The core of this layer lay at a depth of about 1,000 m and followed closely the 5°c isotherm having a density of about 27.2 g/l (σ_t). Core salinity varied by only a few parts per hundred thousand from a value of 34.40‰. Highest core salinity (~ 34.5‰) was found over the South Island slope and lowest values (~ 34.3‰) were found under the subantarctic surface water around Sta. A 922 (fig. 3). Probably regional salinity variations in these superimposed water masses are correlated to some extent through vertical mixing processes. These appear to account for relatively high salinity in the Antarctic Intermediate Water over topographic highs; compare fig. 5 here with Garner (1962) fig. 6, and again with Garner and Ridgway (1965), fig. 39.

Beneath the salinity minimum of the Intermediate layer, salinity increased slowly with depth. Observations did not extend to a sufficiently great depth to define the core of the Pacific Deep Water, which has been defined by earlier *Discovery* work in this area as a salinity maximum layer of about 34.74‰ at a depth of some 3,000 m (see Garner 1962, fig. 7). In this south-east Tasman survey, the core of the Deep Water appeared to slope upwards towards the north as judged by the trend of the 34.7‰ isohaline (lower part of fig. 5).

A layer of high salinity water was generally identified between the Intermediate minimum and the sea surface. Referring to the south Tasman Sea, Deacon (1937) noted that a salinity maximum was commonly present at depths less than 150 m north of the Subtropical Convergence, and that this maximum was found to be deeper and weaker to the south of that Convergence. It was inferred that subantarctic surface water moved northwards to the Subtropical Convergence where it sank, mixing with subtropical water, returning southwards beneath the subantarctic surface water in the salinity maximum layer. Burling (1961, p. 32) noted that the summer thermocline in subantarctic water is usually shallower than the salinity maximum, whereas it lies at or near the subtropical salinity maximum north of the Convergence. Wyrtki (1962a, p. 26) called the subtropical salinity maximum the core of the "Subtropical Lower Water", and considered that the 35.0‰ isohaline provided a convenient representation of the upper and lower boundaries of this water mass.

The Subtropical Convergence

In terms of these criteria the salinity distribution in the upper part of the section (fig. 5) suggests the following interpretation:

(1) The high salinity layer enclosed by the sea surface and the 34.9‰ isohaline represents subtropical water, probably derived from a branch of the East Australian Current system. The salinity maximum marking the core of this water lies at a depth of about 100 m in, or just below, the thermocline layer (fig. 4).

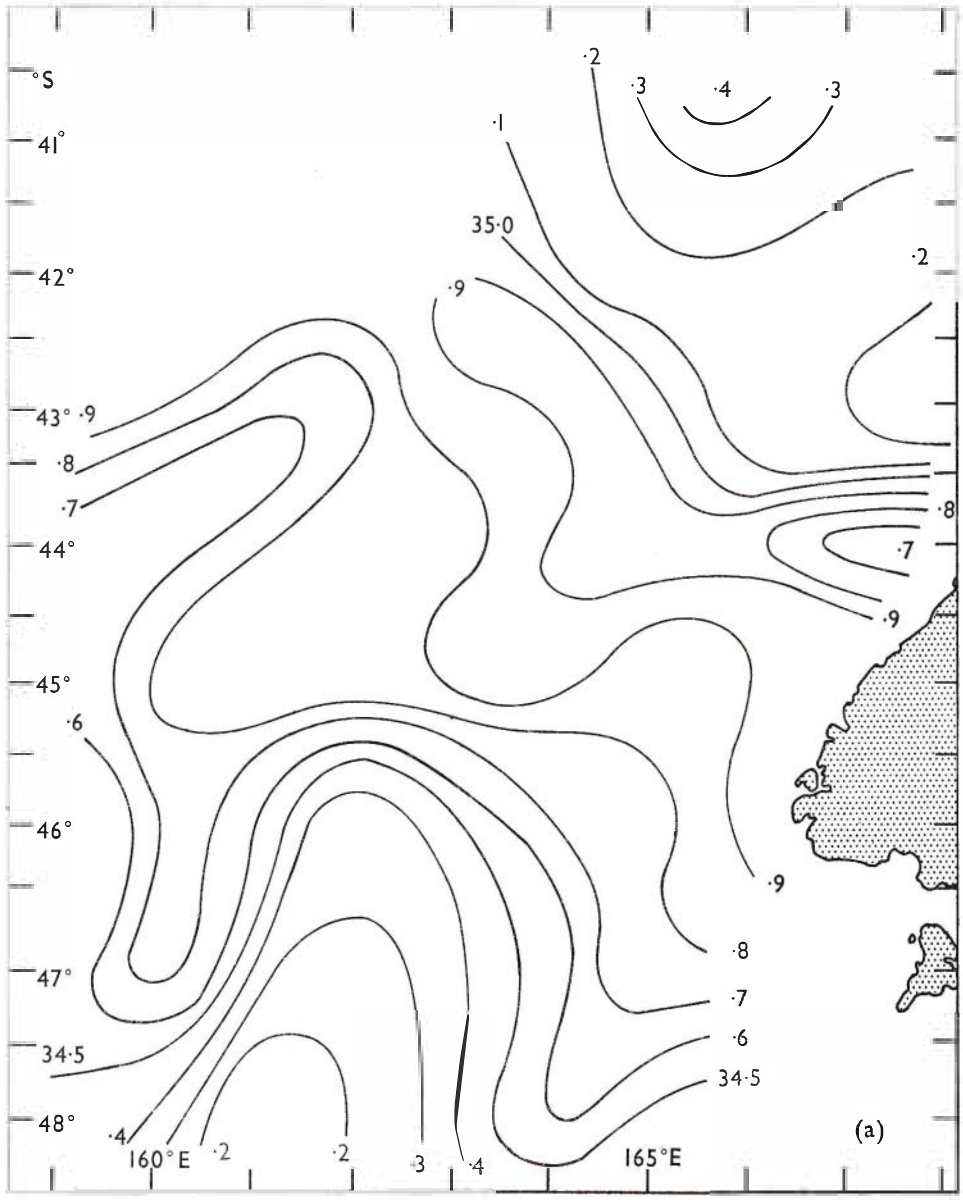

Fig. 3 (a). Isohalines (°/₀₀) at the sea surface.

(2) The steep horizontal gradient of surface salinity between Sta. A 937 and 931 has already been associated with the Subtropical Convergence during discussion of surface properties. Beneath the position of the Convergence at the surface, the tongue of maximum salinity trends deeper and its salinity level weakens, so that it exists at a depth of ~ 250 m at the southern end of the section (fig. 5), well below the thermocline layer.

(3) Water of salinity less than 34.5°/₀₀ lying above the salinity maximum and to the south of the Subtropical Convergence region (salinities between 34.9°/₀₀ and 34.6°/₀₀) is associated with the Circumpolar Subantarctic water mass.

Recent Australian work (Hamon 1965) has shown that the main stream of the East Australian Current probably turns away from the Australian coast around the latitude of Sydney and flows

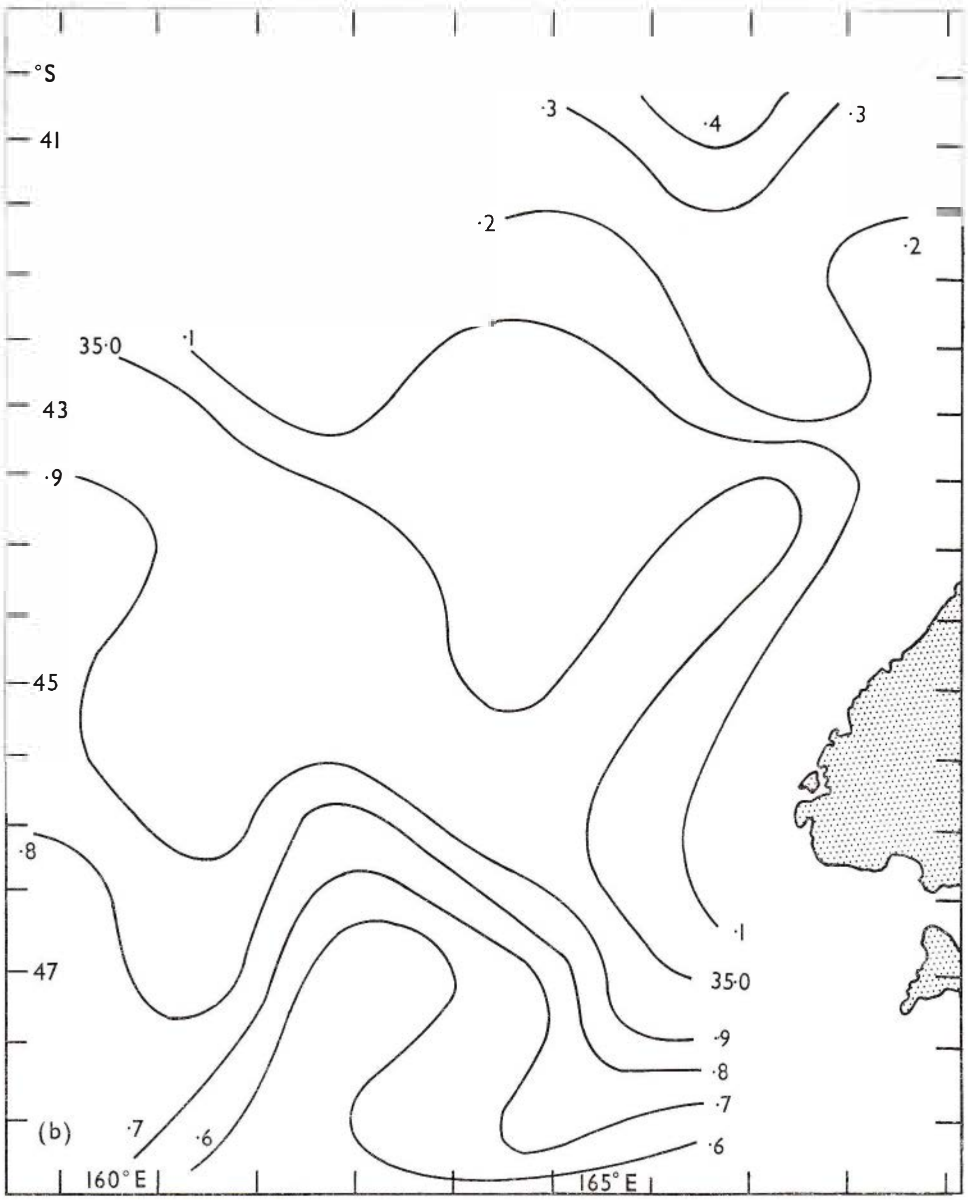

Fig. 3 (b). Isohalines on the surface of maximum salinity.

eastwards across the north Tasman Sea towards the region north of New Zealand. A series of large, long, persistent eddies appears to be shed from the main stream where it turns abruptly from the Australian coast, and the movement of these across the South Tasman Sea would provide the source of warm, high salinity water found off the south-west of South Island. Meeting and mixing of derivatives of these two essentially subtropical branches of the East Australian Current system to the west of New Zealand could possibly give rise to "convergence" structure in the eastern Tasman Sea to the north of the Subtropical Convergence. The salinity structure between Sta. A 937 and A 931 (fig. 5), which has been used to locate the Subtropical Convergence, may also be recognised in weaker form in the vicinity of Sta. A 953. Thus the salinity maximum deepens from 50 m at

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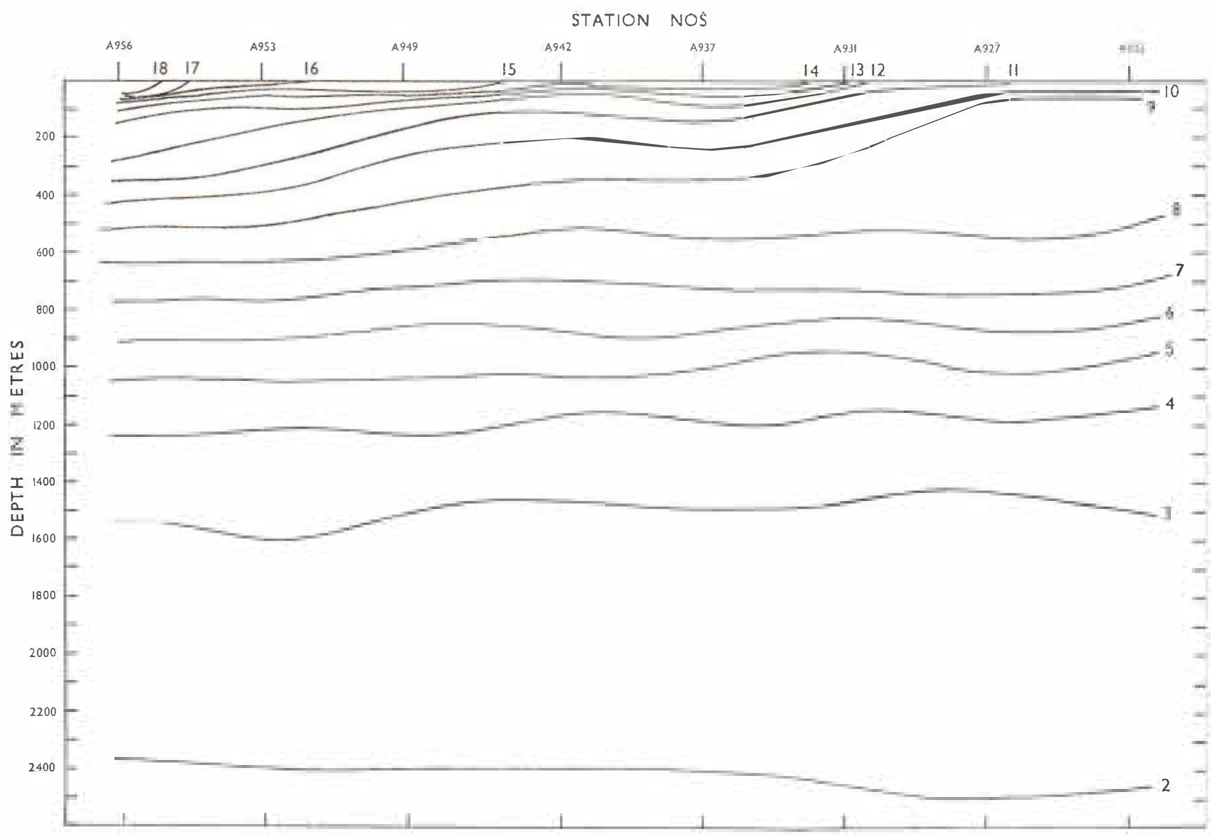

Fig. 4. Isotherms (°c) in vertical cross-section along a meridionally oriented profile through the survey area. North lies on the left.

Sta. A 956 to 150 m south of Sta. A 953, and both surface and core salinity fall through a relatively steep gradient (35.3 to 35.0‰).

This general interpretation of the salinity structure (fig. 5) is not completely in accord with the work of Wyrtki. Having defined the Subtropical Lower Water, as described above, Wyrtki noted that the salinity maximum, which lies at a depth of about 100 m to the north of New Zealand, and is derived from the highly saline subtropical surface water formed in the north-eastern part of the South Pacific Ocean (e.g., Wyrtki, 1962a, fig. 1; Garner, 1959, fig. 2), reaches the sea surface south of the Tropical Convergence at about 30°S latitude. Between 30°S and 40°S, Wyrtki (1962a) reported that the salinity maximum lies at the surface and that the boundary between subtropical and subantarctic surface waters cannot easily be fixed in the South Tasman Sea because of the weak surface gradients of temperature and salinity which characterise this region. From observations made in the Southern Tasman during January 1961, Wyrtki (1962a) recognised a "thin layer of heated subantarctic water found at stations to the south of a line from Tasmania to Cook Strait". The presence of a weak salinity maximum at the bottom of this layer was thought to represent the surface water of the previous winter. If this layer is driven north-eastwards by the prevailing westerly winds, Wyrtki (1960) noted that a convergence must be situated at the northern limit of this westerly belt. This he defined as the "subtropical convergence" which, in his opinion, was identical with the water mass boundary between subtropical and subantarctic surface waters.

There is thus clearly some divergence in interpretation between Wyrtki's studies and the writer's approach to the data of the present survey and reconciliation of these is desirable, at least in the terminology employed. Where interpretations based on the qualitative examination of hydrological data are not in agreement, definitive argument is difficult and final appeal will have to be made to a more quantitative analysis of the dynamics of the whole Tasman Sea circulation. As will be seen in the next section, however, the dynamical interpretation of the present survey data is not straightforward.

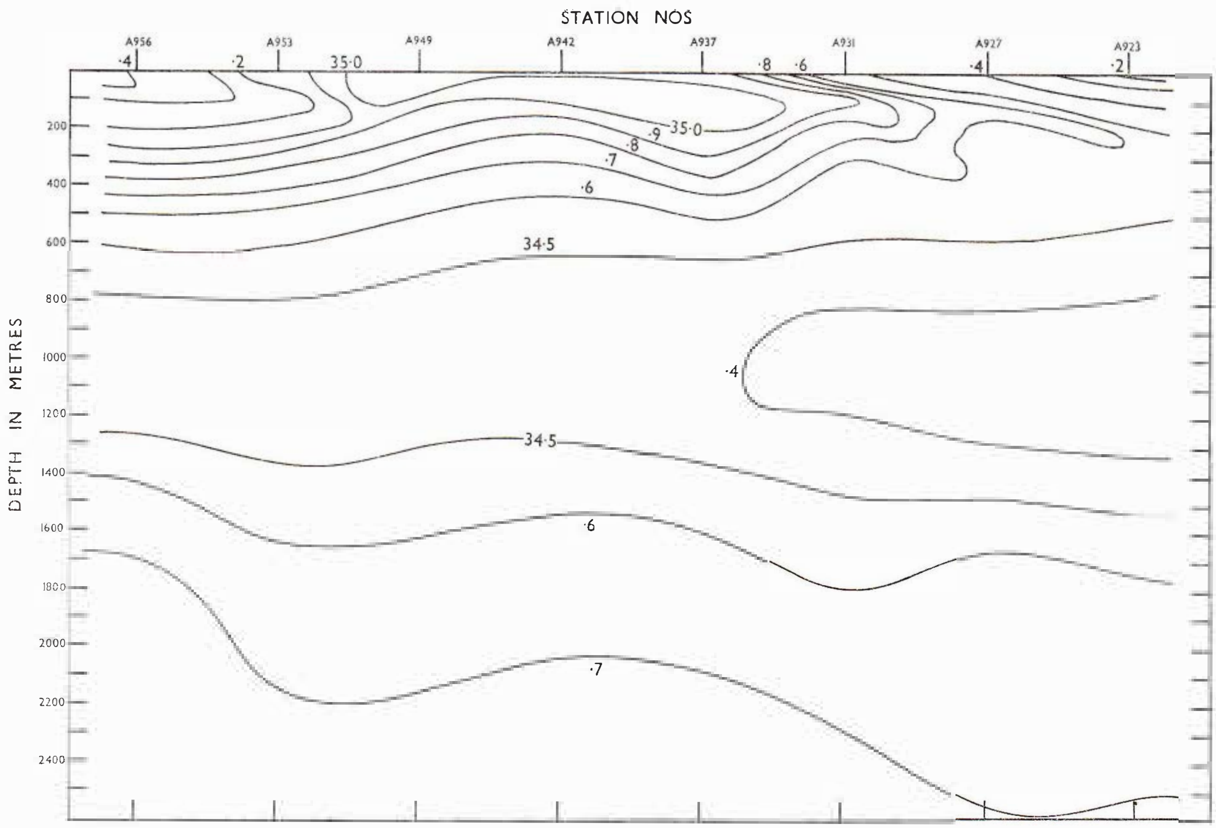

Fig. 5. Isohalines (‰) in vertical cross-section along the meridionally oriented profile described for fig. 4.

DYNAMICS

The geopotential topography of the sea surface relative to 500, 1,000, and 1,750 decibars is shown in fig. 7. In analysis of data taken east of New Zealand (Garner, 1966) sea surface topographic configurations, derived for all reference isobaric surfaces, were essentially similar in shape. This simplified the customary identification of dynamic height contours with stream-lines of geostrophic flow at the surface, and suggested that current direction changed little with depth in the area surveyed. For this south-east Tasman Survey, however, the differences between the patterns (fig. 7) do not lead to such a simple interpretation. Each pattern shows a relative inflow into the survey area from the west. Off the Fiordland coast, however, the south-going flow indicated with respect to the 500 decibar surface becomes indeterminate with reference to 1,000 decibars, and is reversed to a north-going flow relative to 1,750 decibars. This may indicate that vertical variations of current direction are fairly large in this area, and that the method of choice of a reference surface for dynamic computations becomes critical.

An attempt to derive a zero surface from the survey data using Defant's (1961, p. 494) hypothesis, which involves the vertical variation of the difference in relative dynamic height of isobaric surfaces at neighbouring stations, revealed a complex situation which will require further analysis. In particular, the question of a zero surface in the south-west Pacific region should be given further study.

SOUND VELOCITY

The sound velocity pattern in meridional vertical cross-section through the survey area is shown in fig. 8.

North of the Subtropical Convergence a weak velocity maximum was developed in the nearly isothermal upper mixed layer, where increase in velocity with depth due to increasing pressure, is balanced by decrease in velocity with depth due to the fall of temperature in the top of the thermocline.

South of the Convergence, in general, an isothermal upper mixed layer was not developed, and velocity decreased with depth through the summer

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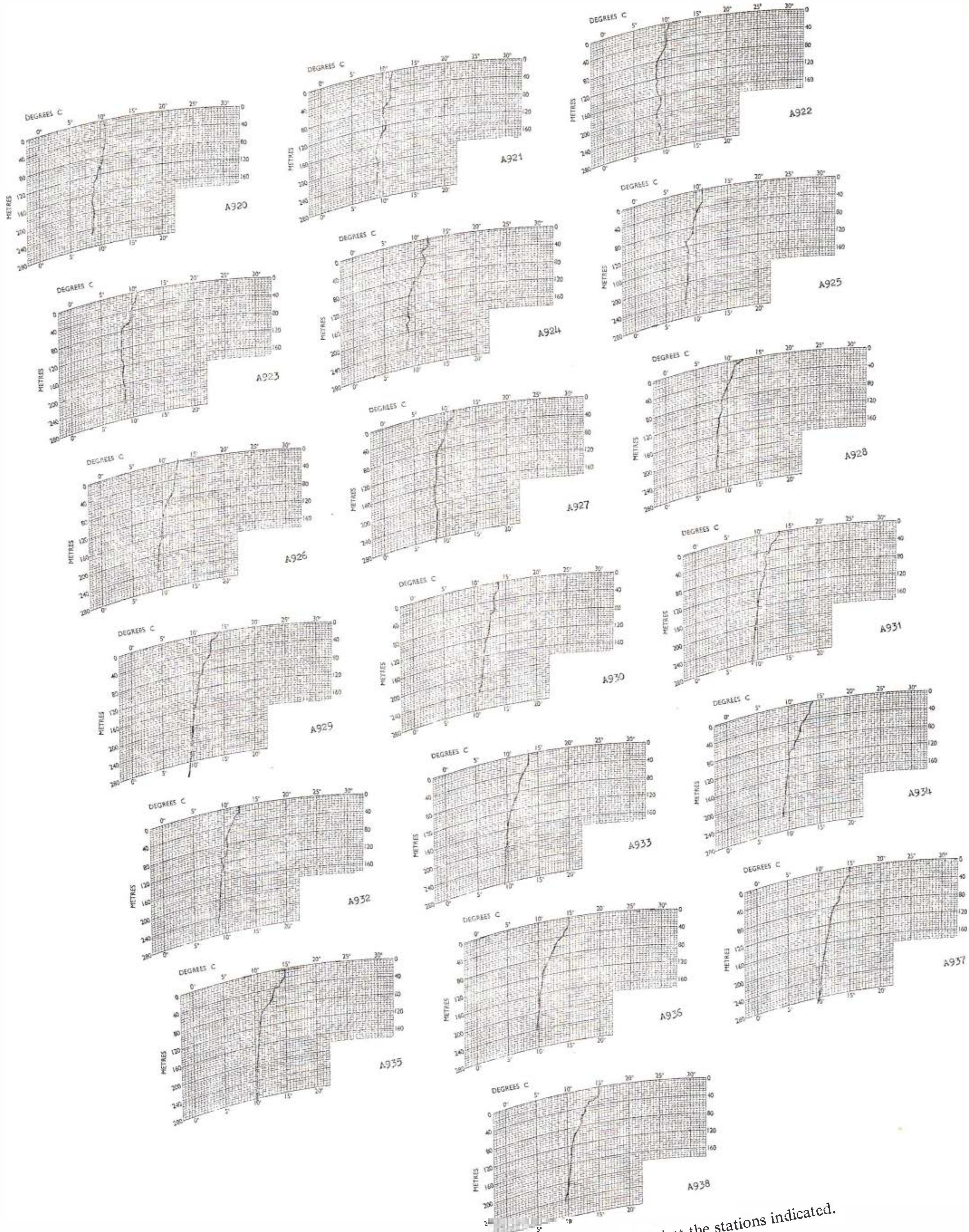

Fig. 6. Bathythermograph traces obtained at the stations indicated.

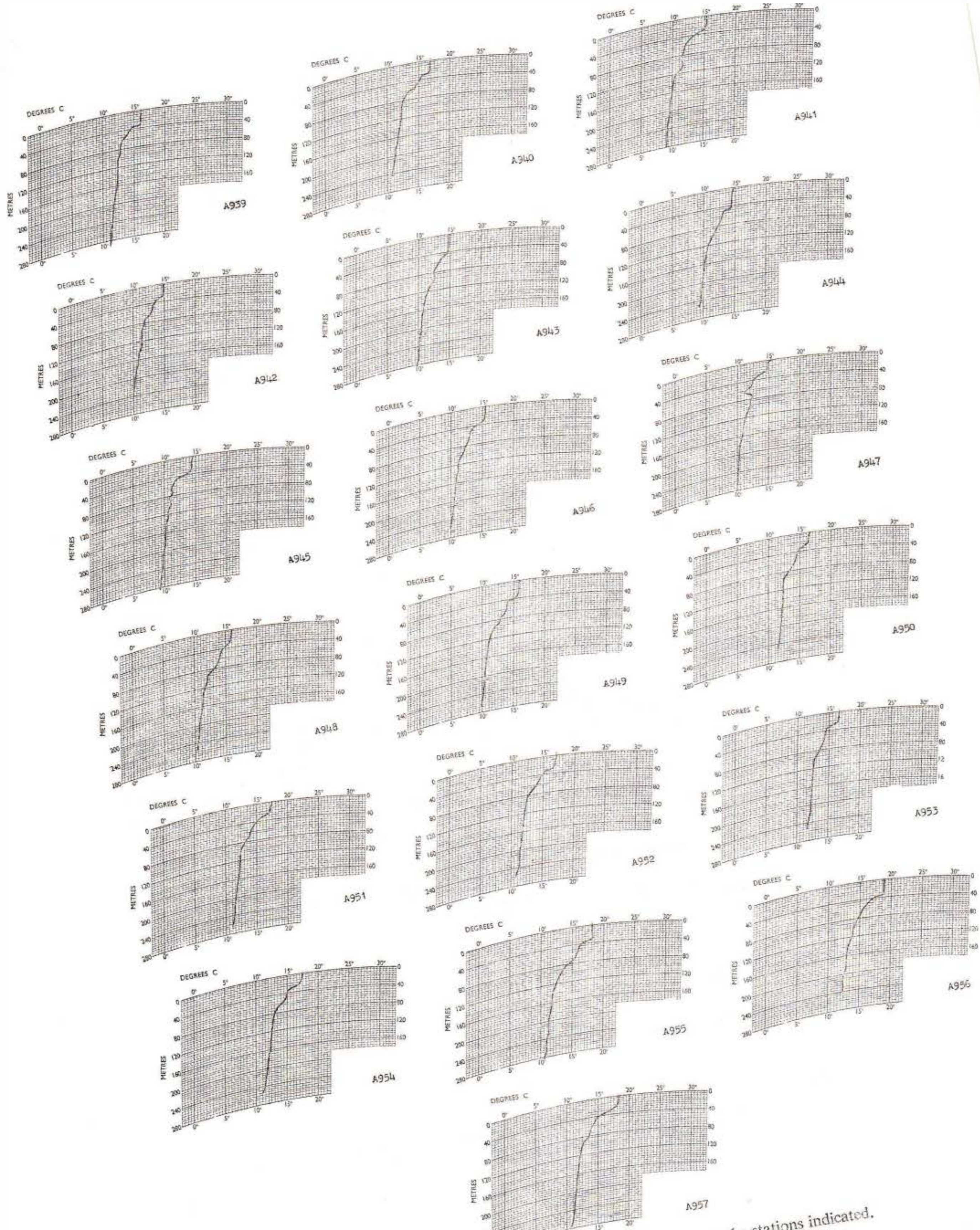

Fig. 6—*continued.* Bathythermograph traces obtained at the stations indicated.

thermocline to reach a minimum, e.g., in about 90 m at Sta. A 923. Here the increase in velocity with decreasing temperature is balanced by the pressure effect at the top of the layer, with a weak vertical temperature gradient lying between the shallow summer thermocline and the deeper permanent thermocline layers (100–500 m). The axis of this shallow duct trended deeper, and its

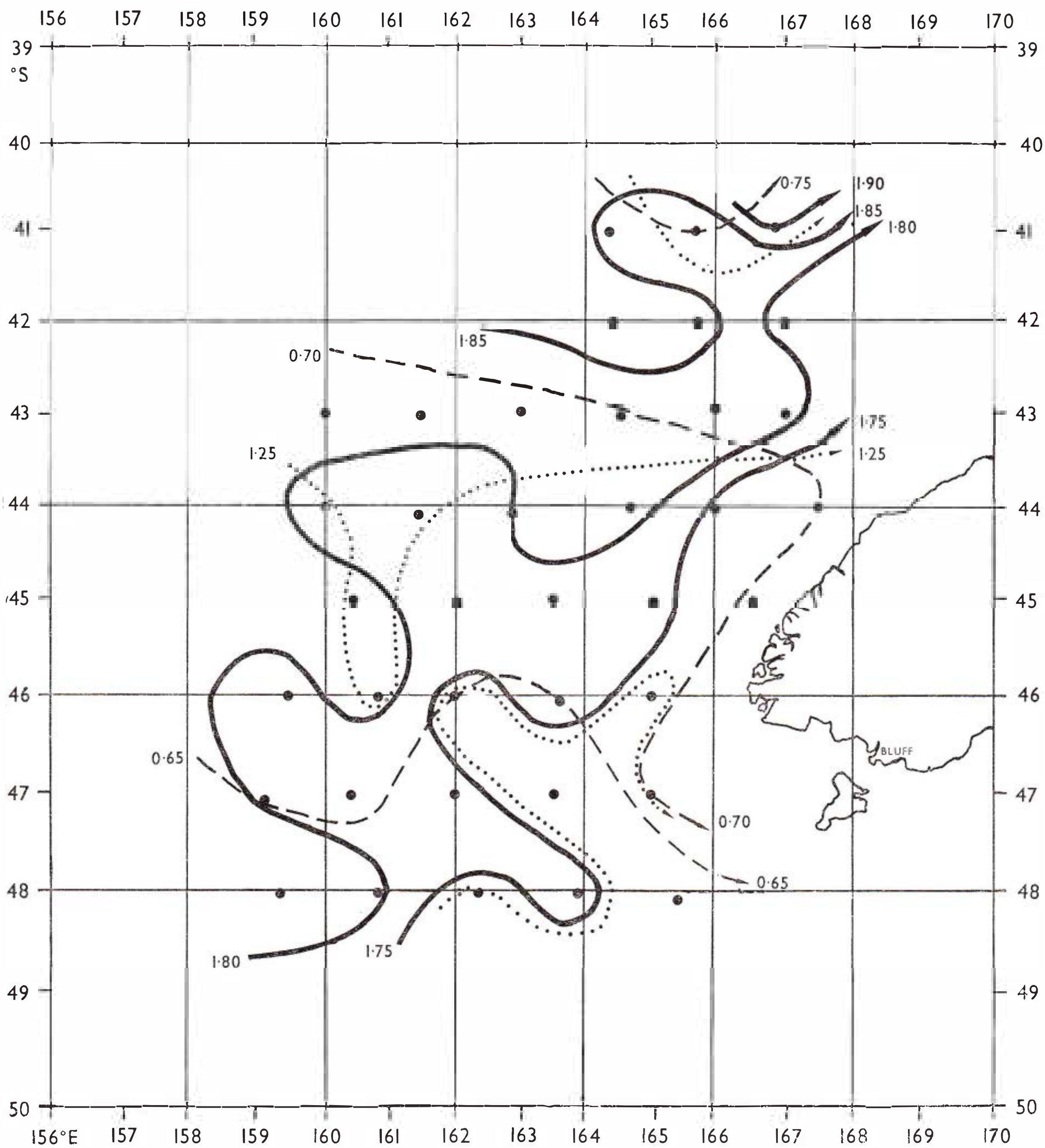

Fig. 7. Contours (dynamic metres) of the geopotential topography of the sea surface relative to:
(a) 500 decibar surface (dashed lines);
(b) 1,000 decibar surface (dotted lines);
(c) 1,750 decibar surface (full lines).
Contours also represent streamlines of the surface geostrophic circulation, relative to these reference surfaces, in the sense shown by the arrows.

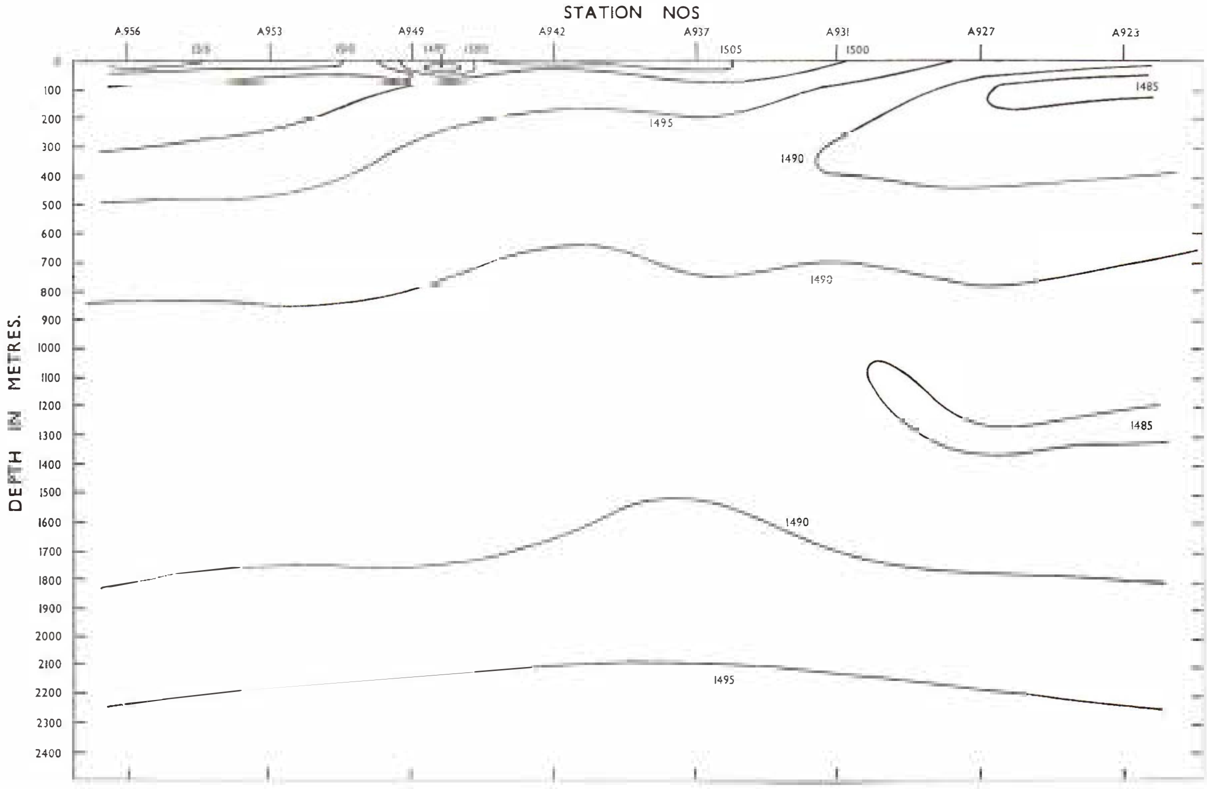

Fig. 8. The velocity of sound (m/sec) in vertical cross-section meridionally through the survey area. North lies on the left.

associated velocity minimum weakened, as the Subtropical Convergence zone was crossed from the south. Its last trace on the section (fig. 8) was found in a depth of about 450 m at Sta. A 937. This structure is probably typical of subantarctic waters in the vicinity of the Subtropical Convergence. At the top of the permanent thermocline, temperature and pressure effects again balance to give a maximum sound velocity in about 600 m at the southern Sta. A 923. This maximum separates the shallow subantarctic duct from the SOFAR duct which was a prominent feature of the velocity pattern of the survey area, its velocity minimum lying in a depth of 1,200 m – 1,300 m through the section (fig. 8). Some features of sound propagation through this area have been given by Kibblewhite and others (1965). The properties of the SOFAR layer in the New Zealand region will be studied as further data from this series of surveys becomes available.

The sound velocity computations for this south-east Tasman survey provide further material for a re-evaluation of existing tables for the velocity correction of echo soundings (Matthews, 1939). Table 2 shows a comparison between the corrections to be applied to soundings from a machine calibrated for a velocity of 1,500 m/sec at northern (Sta. A 956), central (Sta. A 946), and southern (Sta. A 923) stations of the survey area. These stations lie within areas 42, 31, and 22, respectively, of Matthew's Tables and the appropriate corrections from this source are also listed in table 2. Corrections derived from the survey data are a little smaller than Matthew's estimates for the region, the difference reaching some 6 m at a depth of 2,600 m for the southern Sta. A 923.

ACKNOWLEDGMENTS

In the field the writer was assisted by C. J. A. Barber, J. G. Gibb, D. G. McKnight, and A. Langford of the N.Z. Oceanographic Institute, with the crew of *Taranui*, under Capt. R. D. Matheson. Mr K. J. Morris, of the Applied Mathematics Division, D.S.I.R., assisted with data processing.

TABLE 1 - STATION CIRCUMSTANCES

Air (screen) temperature and wind properties were estimated at bridge level.

Station No.	N.Z. Date/Time February 1964 Start	Finish	Air Temp. (°C)	Wind Dirn. (°T)	Wind Speed (kts)	Latitude (south)	Longitude (east)
A 920	10/1300	10/1714	13.2	000	07	48°06'	165°22'
A 921	10/2347	11/0344	12.5	050	09	48°00'	163°52'
A 922	11/0930	11/1224	12.9	020	09	48°00'	162°22.5'
A 923	11/1800	11/2118	12.0	060	03	48°00'	160°53'
A 924	12/0254	12/0535	12.5	060	07	48°00'	159°23.5'
A 925	12/1218	12/1456	13.2	040	10	47°00'	159°00'
A 926	12/2100	12/2400	13.1	040	05	47°00'	160°28'
A 927	13/0550	13/0812	13.0	020	08	47°00'	162°00'
A 928	13/1423	13/1613	12.6	045	14	47°00'	163°30'
A 929	13/2218	14/0320	14.6	060	13	47°00'	165°00'
A 930	14/1045	14/1318	15.0	350	20	46°00'	165°00'
A 931	14/1930	14/2212	14.0	280	10	46°05'	163°33'
A 932	15/0455	15/0700	12.5	260	07	46°00'	162°00'
A 933	15/1201	15/1352	13.8	260	13	46°00'	160°51'
A 934	15/2000	15/2138	14.5	030	07	46°00'	159°24'
A 935	16/0535	16/0848	15.5	050	09	45°00'	160°30'
A 936	16/1418	16/1805	15.3	030	15	45°00'	162°00'
A 937	17/0033	17/0417	15.4	030	18	45°00'	163°30'
A 938	17/1055	17/1248	16.7	035	23	45°00'	165°00'
A 939	17/0000	17/0256	15.8	050	23	45°00'	166°30'
A 940	19/1718	19/2124	15.4	250	17	44°00'	167°30'
A 941	20/0447	20/0656	13.5	260	13	44°00'	166°00'
A 942	20/1800	20/1958	15.2	270	23	44°00'	164°30'
A 943	21/0510	20/0723	12.5	220	12	44°03'	162°52'
A 944	21/1303	20/1456	13.0	150	05	44°03'	161°30'
A 945	21/2100	21/2252	13.2	050	05	44°00'	160°00'
A 946	22/0407	22/0620	15.5	000	03	43°00'	160°00'
A 947	22/1208	22/1408	14.2	030	05	43°00'	161°30'
A 948	22/2033	22/2227	13.8	Calm		42°59.5'	163°02'
A 949	23/0435	23/0650	13.6	020	03	43°00'	164°30'
A 950	23/1221	23/1417	16.8	010	03	42°56'	166°00'
A 951	23/1842	23/2322	17.5	330	03	43°00'	167°00'
A 952	24/0213	24/0408	16.3	030	05	42°00'	167°00'
A 953	24/0935	24/1122	17.6	030	09	42°00'	165°40'
A 954	24/1656	24/1908	18.0	040	13	42°00'	164°20'
A 955	25/0230	25/0431	18.0	040	15	41°00'	164°20'
A 956	25/1136	25/1332	18.5	030	20	41°00'	165°40'
A 957	25/1930	25/2118	18.2	030	14	41°00'	166°55'

TABLE 2

Corrections (m) to be applied to echo soundings from machines calibrated for a velocity of 1500m/sec derived from the data of Appendix I for three stations of the survey area together with the appropriate area corrections extracted from Matthews' Tables.

Corrections (m)

Depth (m)	A 923	Area 22	A 946	Area 31	A 953	Area 42
200	- 2	0	0	+ 1	+ 1	+ 1
400	- 3	- 2	- 1	+ 1	0	0
600	- 5	- 5	- 2	- 1	- 2	- 2
800	- 6	- 8	- 3	- 4	- 2	- 4
1000	- 8	- 11	- 4	- 7	- 4	- 5
1200	- 10	- 14	- 6	- 10	- 6	- 7
1400	- 11	- 18	- 8	- 12	- 8	- 9
1600	- 13	- 20	- 10	- 14	- 10	- 11
1800	- 15	- 22	- 11	- 16	- 11	- 12
2000	- 16	- 23	- 12	- 17	- 12	- 14
2200	- 16	- 23	- 13	- 18	- 13	- 15
2400	- 17	- 22	- 13	- 18	- 13	- 16
2600	- 17	- 23	- 14	- 17	- 14	- 16

APPENDIX

Under station numbers below are listed measured depths, temperatures, and salinities. These are followed by derived values of density, dynamic height anomaly, and sound velocity. The meaning of the table headings is as follows:

D	is the sampling depth in metres.
T	is the sample temperature in °C $\times$ 100.
S	is the sample salinity in ‰ $\times$ 100.
σ_t	is the density reduced to surface pressure isothermally.
σ_{stp}	is the *in situ* density.
	[The "σ" value is derived from the specific gravity, ρ, from the relation $\sigma = (\rho - 1) \times 10^5$.]
$\Sigma\Delta D$	is the anomaly of the geopotential distance from the sea surface to the sample depth in dynamic metres $\times$ 100.
C	is the *in situ* sound velocity in m sec^{-1} $\times$ 10.
C_m	is the integral mean sound velocity between the sea surface and the sample depth in m sec^{-1} $\times$ 10.

K is the correction (metres $\times$ 10) to be applied to an echo sounding reading of D on a machine calibrated for a velocity of 1,500 m sec^{-1}. For further information see the text under "Presentation of Data". For station circumstances see table 1.

A 920

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
0	1086	3444	2638	2638	0	14928	14928	0
18	1042	3444	2646	2654	3	14915	14921	1-
37	1024	3445	2650	2667	6	14912	14917	2-
59	1036	3444	2647	2674	9	14920	14917	3-
80	1005	3449	2657	2693	13	14913	14917	4-
121	924	3461	2679	2735	18	14891	14912	7-
165	857	3455	2685	2761	24	14873	14904	11-
205	871	3461	2688	2781	29	14885	14899	14-
291	834	3458	2691	2824	39	14885	14895	20-
418	800	3453	2693	2883	54	14892	14893	30-
546	770	3449	2694	2943	70	14901	14894	39-
754	629	3442	2708	3054	94	14880	14893	54-
848	573	3441	2714	3104	104	14873	14891	62-
943	505	3441	2722	3157	114	14861	14889	70-
1037	459	3439	2726	3204	122	14857	14886	79-
1132	404	3440	2733	3256	131	14850	14883	88-
1226	380	3442	2737	3303	139	14856	14881	97-
1321	349	3448	2745	3355	146	14860	14879	106-
1414	320	3452	2751	3405	153	14864	14878	115-
1886	233	3466	2769	3641	181	14908	14880	151-
2361	205	3466	2772	3859	204	14976	14893	169-

A 921

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
0	1147	3459	2639	2639	0	14951	14951	0
16	1113	3460	2646	2653	3	14942	14947	1-
32	1102	3461	2649	2663	5	14941	14944	1-
50	1111	3472	2656	2678	8	14948	14944	2-
70	1007	3464	2668	2700	11	14914	14941	3-
104	1015	3476	2676	2723	15	14924	14933	5-
145	897	3462	2685	2751	21	14885	14925	7-
182	911	3467	2686	2769	25	14897	14918	10-
258	878	3464	2689	2807	34	14897	14912	15-
371	818	3454	2691	2860	48	14892	14907	23-
483	806	3452	2691	2911	62	14905	14905	31-
598	770	3448	2693	2966	76	14910	14905	38-
672	754	3450	2697	3004	85	14916	14906	42-
746	702	3448	2703	3044	94	14908	14907	46-
822	656	3449	2710	3086	103	14903	14907	51-
897	594	3442	2712	3124	111	14889	14906	56-
972	530	3440	2719	3166	118	14876	14904	62-
1000	510	3440	2721	3181	121	14872	14903	65-
1046	487	3440	2724	3205	126	14871	14902	69-
1313	316	3446	2746	3354	148	14844	14893	94-
1640	258	3457	2760	3519	169	14876	14886	124-

A 922

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
0	1051	3424	2629	2629	0	14913	14913	0
23	996	3432	2645	2655	4	14898	14905	1-
47	983	3432	2647	2668	8	14897	14901	3-
71	899	3437	2665	2697	11	14871	14895	5-
94	835	3439	2676	2719	14	14851	14887	7-
142	852	3451	2683	2748	21	14867	14877	12-
189	890	3463	2686	2773	26	14890	14878	15-
236	883	3464	2688	2796	32	14895	14881	19-
309	847	3459	2690	2831	41	14893	14884	24-
448	773	3448	2693	2897	58	14886	14886	34-
582	740	3445	2695	2961	74	14895	14887	44-

D	T	S	σ_t	σ_{stp}	$\Sigma \Delta D$	C	C_m	K
A922 cont.								
717	649	3438	2702	3031	90	14881	14887	54-
807	576	3437	2711	3082	100	14867	14886	62-
896	494	3433	2717	3131	109	14848	14883	70-
985	430	3432	2724	3179	118	14836	14879	79-
1075	380	3432	2729	3227	126	14830	14875	89-
1165	341	3434	2734	3274	134	14829	14872	100-
1254	318	3437	2739	3320	141	14834	14869	110-
1344	309	3443	2744	3367	148	14846	14867	119-
1793	249	3463	2766	3595	176	14899	14868	158-
2241	222	3464	2769	3801	200	14963	14881	178-
A 923								
0	1061	3418	2623	2623	0	14915	14915	0
24	1020	3421	2632	2643	4	14905	14910	1-
48	957	3431	2651	2672	8	14887	14903	3-
73	841	3434	2671	2705	12	14849	14891	5-
97	826	3438	2677	2721	15	14848	14881	8-
146	829	3445	2682	2749	21	14858	14871	13-
195	822	3450	2687	2776	27	14864	14869	17-
244	868	3460	2688	2799	33	14890	14870	21-
342	832	3454	2688	2845	45	14892	14876	28-
488	798	3451	2691	2914	63	14903	14883	38-
634	748	3446	2695	2984	81	14907	14888	47-
781	650	3441	2704	3062	99	14892	14890	57-
879	575	3437	2711	3115	110	14878	14890	65-
977	496	3435	2719	3169	120	14862	14888	73-
1074	438	3433	2724	3219	129	14854	14885	82-
1172	392	3434	2729	3271	138	14851	14882	92-
1269	346	3438	2737	3324	146	14849	14880	102-
1367	314	3441	2742	3375	154	14852	14878	112-
1465	301	3446	2748	3426	161	14863	14876	121-
1953	245	3465	2768	3669	191	14924	14881	155-
2442	204	3466	2772	3895	216	14989	14896	170-
A 924								
0	1218	3444	2614	2614	0	14974	14974	0
20	1213	3453	2622	2631	4	14976	14975	0
40	1140	3466	2646	2664	7	14956	14971	1-
55	1108	3473	2657	2682	9	14948	14966	1-
70	1032	3473	2671	2702	12	14924	14959	2-
105	916	3462	2681	2729	16	14886	14941	4-
145	883	3460	2685	2751	21	14880	14925	7-
180	900	3466	2687	2769	25	14893	14918	10-
255	867	3462	2689	2806	35	14892	14910	15-
370	835	3457	2690	2859	49	14898	14906	23-
480	807	3452	2691	2910	62	14905	14905	31-
590	793	3451	2692	2961	76	14918	14906	37-
665	747	3446	2695	2998	85	14912	14907	41-
740	701	3444	2700	3038	94	14906	14907	46-
815	655	3441	2704	3077	103	14900	14907	51-
885	605	3440	2709	3115	111	14892	14906	56-
955	560	3440	2715	3154	118	14885	14905	61-
1020	517	3441	2721	3190	125	14879	14903	66-
1085	485	3440	2724	3223	131	14876	14902	71-
1405	352	3447	2744	3392	158	14875	14896	98-
1725	264	3455	2758	3556	180	14892	14893	122-

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
A 925								
0	1224	3458	2624	2624	0	14978	14978	0
23	1182	3460	2633	2644	4	14967	14972	0
47	1086	3465	2655	2676	8	14938	14962	1-
71	1004	3467	2671	2703	11	14913	14950	2-
95	992	3470	2675	2718	15	14913	14941	4-
142	969	3475	2683	2747	21	14913	14932	6-
188	945	3475	2687	2772	26	14912	14927	9-
234	914	3469	2687	2794	32	14907	14923	12-
327	891	3462	2686	2834	44	14913	14920	18-
469	823	3455	2691	2904	61	14910	14917	26-
608	787	3451	2693	2970	79	14918	14916	34-
749	708	3444	2699	3041	96	14910	14916	42-
843	634	3442	2707	3093	107	14896	14915	48-
937	569	3440	2714	3144	117	14886	14912	55-
1030	480	3437	2722	3197	126	14865	14909	63-
1121	427	3437	2728	3245	135	14858	14905	71-
1210	370	3437	2734	3293	142	14849	14901	80-
1300	333	3441	2741	3342	150	14849	14898	89-
1390	314	3445	2746	3389	156	14856	14895	98-
1837	250	3462	2765	3614	185	14906	14891	133-
2285	214	3467	2772	3824	208	14967	14900	152-
A 926								
0	1276	3469	2622	2622	0	14997	14997	0
17	1253	3470	2627	2635	3	14992	14994	0
32	1215	3473	2637	2651	6	14982	14991	0
48	1174	3477	2648	2670	8	14971	14986	0
68	1115	3478	2660	2690	11	14954	14979	1-
104	1024	3484	2681	2728	16	14928	14966	2-
142	983	3480	2684	2749	21	14919	14954	4-
182	946	3474	2686	2769	26	14911	14946	7-
254	902	3467	2688	2803	35	14906	14935	11-
367	872	3464	2690	2857	49	14913	14927	18-
473	838	3456	2689	2905	62	14916	14924	24-
583	790	3452	2693	2959	76	14916	14923	30-
655	740	3449	2698	2997	84	14908	14922	34-
725	694	3447	2703	3035	92	14901	14920	39-
788	647	3444	2707	3068	100	14893	14918	43-
854	597	3442	2712	3104	107	14884	14916	48-
916	551	3441	2717	3138	113	14875	14913	53-
980	502	3439	2721	3172	120	14866	14910	58-
1044	470	3438	2724	3205	126	14863	14908	64-
A 927								
0	1144	3429	2616	2616	0	14946	14946	0
24	1032	3431	2638	2649	4	14911	14928	1-
47	995	3433	2646	2667	8	14901	14917	3-
70	883	3443	2672	2704	11	14865	14906	4-
94	855	3448	2680	2723	14	14859	14895	7-
142	834	3451	2686	2751	20	14860	14883	11-
189	831	3453	2688	2774	26	14867	14878	15-
236	832	3454	2688	2796	32	14875	14877	19-
331	811	3452	2690	2841	44	14882	14877	27-
473	804	3453	2692	2908	61	14903	14882	37-
614	785	3450	2692	2972	78	14919	14888	46-
757	689	3442	2700	3046	96	14904	14893	54-
852	624	3440	2707	3097	107	14894	14893	61-

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
A927 cont.								
946	542	3438	2716	3151	117	14876	14893	68-
1040	484	3436	2721	3200	126	14868	14891	76-
1135	424	3438	2729	3253	135	14859	14888	84-
1229	376	3438	2734	3302	143	14855	14886	93-
1324	323	3441	2742	3355	151	14848	14884	103-
1418	305	3446	2747	3404	158	14857	14881	112-
1895	245	3464	2767	3642	187	14914	14883	148-
2360	200	3469	2775	3861	210	14974	14895	166-
A 928								
0	1249	3445	2609	2609	0	14984	14984	0
15	1133	3447	2632	2639	3	14947	14966	0
30	1094	3447	2639	2653	5	14936	14954	1-
45	1026	3451	2654	2675	8	14915	14944	2-
58	986	3454	2664	2690	10	14903	14936	2-
89	931	3458	2676	2716	14	14888	14922	5-
125	878	3462	2688	2745	18	14875	14910	7-
162	865	3459	2687	2761	23	14876	14902	11-
222	867	3461	2689	2790	30	14887	14897	15-
325	834	3457	2691	2839	43	14891	14894	23-
420	820	3455	2691	2883	54	14901	14894	30-
523	798	3452	2692	2931	67	14909	14896	36-
589	765	3449	2695	2964	75	14907	14898	40-
656	727	3446	2698	2998	83	14903	14898	44-
720	682	3443	2702	3031	91	14895	14898	49-
783	629	3441	2707	3066	98	14884	14898	53-
852	580	3440	2713	3104	105	14876	14896	59-
920	514	3439	2720	3143	112	14861	14894	65-
982	474	3436	2722	3175	118	14854	14892	71-
1320	303	3441	2743	3355	147	14839	14880	105-
1650	254	3455	2759	3523	169	14876	14876	137-
A 929								
0	1380	3474	2605	2605	0	15032	15032	0
15	1376	3470	2602	2609	3	15033	15032	0
30	1366	3465	2601	2614	6	15031	15032	1
45	1361	3464	2601	2621	9	15032	15032	1
50	1252	3464	2623	2645	10	14996	15030	1
75	1210	3464	2631	2665	14	14986	15017	1
105	1187	3479	2647	2694	19	14985	15008	1
125	1123	3495	2671	2728	22	14968	15003	0
180	1012	3494	2690	2772	29	14937	14988	1-
223	964	3480	2688	2789	35	14925	14977	3-
337	923	3472	2688	2841	49	14928	14960	9-
464	850	3459	2690	2901	65	14920	14950	16-
520	813	3456	2693	2930	72	14915	14946	19-
573	782	3454	2696	2957	78	14911	14943	22-
625	765	3452	2697	2982	84	14913	14941	25-
675	731	3450	2700	3009	90	14908	14938	28-
A 930								
0	1382	3478	2607	2607	0	15033	15033	0
20	1310	3478	2622	2631	4	15013	15023	0
40	1306	3488	2631	2649	7	15016	15018	0
60	1258	3493	2644	2671	11	15003	15016	1
79	1220	3498	2655	2691	14	14994	15012	1
120	1171	3503	2669	2723	20	14985	15004	0
164	1142	3506	2676	2750	26	14982	14999	0

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
A930 cont.								
204	1106	3502	2680	2772	31	14976	14995	1-
281	1029	3488	2683	2810	41	14959	14987	2-
404	797	3456	2695	2880	56	14889	14968	9-
525	737	3451	2700	2940	70	14886	14950	18-
648	656	3446	2707	3005	84	14874	14936	28-
730	616	3443	2710	3046	93	14871	14929	35-
809	568	3442	2716	3088	101	14864	14923	42-
892	512	3442	2722	3133	109	14856	14917	49-
975	467	3442	2727	3177	117	14851	14912	57-
1054	424	3443	2733	3220	124	14846	14907	65-
1138	376	3444	2739	3265	131	14840	14902	74-
1222	348	3447	2744	3310	137	14843	14898	83-
1649	269	3461	2762	3525	165	14883	14889	122-
2058	240	3467	2770	3719	187	14940	14893	146-
A 931								
0	1344	3456	2598	2598	0	15018	15018	0
17	1199	3457	2628	2635	3	14972	14995	0
34	1153	3459	2638	2653	6	14959	14980	0
51	1103	3470	2656	2679	9	14946	14971	1-
70	1101	3487	2669	2701	12	14950	14965	2-
107	1050	3491	2681	2730	16	14939	14958	3-
138	1001	3484	2684	2747	20	14925	14952	4-
173	973	3480	2686	2765	25	14920	14946	6-
237	920	3471	2688	2796	33	14910	14938	10-
330	835	3458	2691	2842	44	14892	14927	16-
425	820	3454	2690	2884	56	14901	14920	23-
526	797	3452	2692	2932	68	14909	14918	29-
593	774	3450	2694	2965	76	14911	14917	33-
663	723	3446	2698	3001	85	14902	14916	37-
725	692	3445	2702	3033	92	14900	14914	41-
790	639	3442	2707	3069	99	14890	14913	46-
860	574	3438	2712	3107	107	14875	14910	51-
921	511	3436	2718	3142	113	14859	14907	57-
989	464	3434	2721	3178	120	14851	14904	63-
1285	352	3445	2742	3336	145	14855	14892	92-
1568	279	3454	2756	3482	165	14872	14887	118-
A 932								
0	1224	3431	2603	2603	0	14974	14974	0
21	1099	3439	2632	2642	4	14935	14955	1-
42	1030	3451	2654	2673	7	14916	14940	2-
63	989	3461	2669	2697	10	14906	14930	3-
85	980	3473	2679	2718	13	14908	14924	4-
128	918	3474	2691	2749	19	14892	14916	7-
171	890	3466	2689	2767	24	14888	14909	10-
215	876	3463	2689	2787	29	14889	14905	14-
301	825	3455	2690	2828	39	14883	14900	20-
431	797	3452	2692	2889	55	14893	14896	30-
562	778	3451	2694	2951	71	14907	14897	39-
693	702	3445	2700	3017	87	14899	14898	47-
781	624	3440	2707	3065	97	14882	14897	53-
869	541	3436	2714	3114	106	14863	14895	61-
955	488	3437	2721	3161	115	14855	14892	69-
1041	429	3437	2728	3209	123	14845	14888	78-
1129	383	3438	2733	3256	130	14841	14885	87-
1215	357	3444	2741	3303	137	14845	14882	96-
1303	341	3448	2745	3348	144	14854	14880	105-
1727	252	3461	2764	3563	171	14888	14877	141-
2162	214	3465	2770	3767	194	14946	14885	165-

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
A 933								
0	1346	3466	2606	2606	0	15020	15020	0
20	1336	3467	2608	2617	4	15020	15020	0
35	1269	3476	2629	2644	7	15001	15016	0
60	1192	3487	2652	2679	11	14980	15005	0
80	1169	3491	2660	2696	14	14976	14998	0
115	1071	3491	2678	2730	19	14947	14987	1-
160	1008	3485	2684	2757	24	14931	14974	3-
200	984	3482	2686	2777	29	14929	14965	5-
280	949	3475	2686	2813	39	14928	14955	8-
397	878	3465	2690	2871	54	14920	14946	14-
518	839	3459	2691	2927	69	14924	14940	21-
630	813	3455	2692	2979	83	14932	14938	26-
708	761	3451	2697	3020	93	14925	14937	30-
788	719	3449	2701	3061	102	14922	14936	34-
868	641	3446	2709	3107	111	14904	14934	38-
945	594	3442	2712	3146	120	14897	14931	44-
1017	537	3442	2719	3187	127	14886	14928	49-
1090	489	3441	2724	3226	134	14879	14925	54-
1168	442	3440	2729	3267	141	14872	14922	61-
1532	292	3452	2753	3462	170	14872	14910	92-
1900	248	3462	2765	3642	192	14916	14907	118-
A 934								
0	1384	3455	2589	2589	0	15031	15031	0
22	1303	3459	2609	2619	4	15008	15019	0
44	1201	3467	2635	2655	8	14978	15006	0
66	1142	3473	2651	2681	12	14962	14994	0
86	1075	3477	2666	2705	15	14942	14984	1-
128	992	3481	2684	2742	21	14920	14967	3-
173	929	3472	2687	2766	26	14903	14953	5-
217	902	3467	2688	2787	32	14900	14942	8-
301	853	3460	2690	2827	42	14894	14930	14-
432	819	3455	2691	2888	58	14902	14920	23-
562	777	3449	2693	2949	74	14907	14916	31-
692	703	3447	2702	3018	89	14899	14914	40-
781	654	3445	2707	3065	99	14895	14912	46-
870	594	3443	2713	3112	109	14885	14910	52-
959	529	3440	2719	3160	118	14873	14907	60-
1047	483	3440	2724	3206	127	14869	14904	67-
1137	417	3440	2731	3256	135	14857	14901	75-
1225	371	3443	2738	3305	142	14853	14897	84-
1316	344	3446	2743	3352	149	14857	14894	93-
1762	254	3462	2764	3579	178	14895	14890	130-
2214	217	3467	2772	3792	202	14956	14897	152-
A 935								
0	1487	3483	2589	2589	0	15068	15068	0
19	1480	3483	2590	2599	4	15068	15068	0
39	1293	3492	2636	2654	8	15012	15054	1
58	1253	3492	2644	2670	11	15001	15038	1
78	1138	3495	2669	2704	14	14965	15024	1
115	1076	3493	2678	2730	19	14949	15003	0
157	1044	3491	2682	2754	24	14945	14988	1-
195	1024	3488	2684	2772	29	14943	14979	3-
276	999	3484	2685	2810	39	14947	14969	6-
395	921	3472	2688	2868	54	14937	14961	10-
512	856	3460	2689	2922	69	14930	14955	15-
632	792	3453	2694	2982	84	14925	14949	21-

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
A935 cont.								
712	742	3450	2699	3024	94	14918	14946	25-
791	688	3448	2705	3066	103	14910	14943	30-
871	621	3445	2711	3110	112	14896	14939	35-
1069	482	3441	2725	3217	132	14872	14929	50-
1156	411	3442	2734	3267	140	14858	14924	58-
1246	359	3443	2740	3316	147	14851	14919	67-
1337	338	3447	2745	3363	154	14858	14915	76-
1784	266	3464	2765	3589	183	14905	14906	111-
2246	217	3468	2772	3807	207	14962	14912	132-
A 936								
0	1467	3485	2595	2595	0	15061	15061	0
13	1452	3486	2599	2604	3	15059	15060	1
26	1388	3486	2612	2624	5	15040	15055	1
39	1290	3491	2636	2654	8	15011	15045	1
50	1240	3489	2645	2667	9	14995	15036	1
77	1126	3496	2672	2706	13	14961	15016	1
105	1060	3491	2680	2727	17	14942	14999	0
130	1024	3487	2683	2742	20	14933	14987	1-
195	987	3482	2685	2774	28	14929	14968	4-
287	914	3471	2689	2819	40	14916	14954	9-
375	860	3460	2689	2860	51	14909	14944	14-
475	830	3457	2691	2908	63	14914	14937	20-
665	733	3450	2700	3004	86	14907	14929	31-
725	713	3449	2702	3033	93	14909	14928	35-
1010	480	3452	2734	3199	122	14863	14916	57-
1300	333	3463	2758	3360	143	14852	14903	84-
A 937								
0	1488	3494	2597	2597	0	15069	15069	0
16	1489	3494	2597	2604	3	15072	15071	1
32	1394	3496	2619	2633	6	15044	15065	1
48	1331	3502	2636	2658	9	15027	15055	2
64	1293	3505	2646	2675	12	15017	15047	2
105	1169	3508	2673	2720	18	14982	15028	2
140	1126	3505	2679	2742	23	14973	15016	1
175	1077	3503	2686	2765	27	14961	15006	1
244	1002	3496	2694	2804	35	14945	14991	1-
345	905	3484	2700	2857	47	14924	14974	6-
440	852	3469	2697	2898	58	14918	14963	11-
545	815	3456	2693	2941	71	14919	14954	17-
611	760	3452	2698	2977	79	14909	14950	20-
680	723	3449	2701	3011	87	14905	14946	25-
748	685	3446	2704	3046	95	14901	14942	29-
819	643	3445	2708	3084	103	14896	14938	34-
888	592	3444	2714	3122	110	14887	14934	39-
947	551	3442	2718	3153	116	14880	14931	43-
973	468	3442	2727	3176	119	14851	14930	46-
1608	361	3457	2751	3491	170	14914	14911	95-
A 938								
0	1494	3483	2587	2587	0	15070	15070	0
15	1488	3481	2587	2594	3	15070	15070	1
30	1300	3483	2628	2641	6	15011	15055	1
45	1227	3489	2647	2667	9	14990	15037	1
60	1183	3494	2659	2686	11	14978	15024	1
100	1111	3499	2677	2722	16	14960	15002	0
140	1079	3495	2679	2743	22	14955	14989	1-
160	1041	3490	2682	2755	24	14944	14984	2-
229	973	3479	2685	2789	33	14929	14970	5-

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
A938 cont.								
335	889	3466	2689	2841	46	14914	14955	10-
435	841	3459	2691	2889	59	14912	14945	16-
537	806	3455	2693	2938	71	14915	14939	22-
606	773	3451	2695	2972	79	14913	14936	26-
680	722	3448	2700	3011	88	14905	14933	30-
751	671	3446	2705	3049	96	14896	14930	35-
826	622	3445	2711	3090	105	14889	14927	40-
902	561	3443	2717	3132	113	14877	14923	46-
974	509	3442	2723	3171	120	14868	14919	52-
1050	466	3442	2728	3212	127	14863	14915	59-
1426	307	3454	2753	3413	156	14861	14901	94-
1800	245	3465	2768	3600	178	14898	14897	124-
A 939								
0	1593	3492	2572	2572	0	15102	15102	0
15	1585	3492	2574	2581	3	15102	15102	0
25	1495	3502	2602	2613	6	15077	15097	2
35	1411	3503	2621	2636	7	15051	15087	2
50	1337	3506	2638	2661	10	15030	15073	2
95	1240	3517	2666	2709	17	15006	15047	3
123	1215	3517	2671	2726	21	15002	15037	3
154	1196	3515	2673	2742	25	15000	15030	3
232	1127	3504	2678	2782	36	14988	15018	3
285	1077	3497	2681	2810	43	14978	15012	2
480	902	3468	2688	2906	68	14943	14991	3-
520	869	3463	2690	2926	73	14937	14987	5-
557	842	3459	2691	2944	78	14932	14983	6-
585	823	3457	2692	2959	81	14929	14981	7-
630	796	3454	2694	2981	87	14926	14977	10-
805	694	3451	2706	3074	107	14915	14965	19-
A 940								
0	1668	3469	2537	2537	0	15122	15122	0
13	1653	3473	2544	2549	3	15120	15121	1
26	1494	3496	2597	2609	6	15076	15110	2
39	1432	3518	2628	2645	9	15061	15096	2
55	1321	3509	2644	2668	12	15026	15080	3
83	1228	3516	2668	2705	16	15000	15058	3
115	1202	3515	2672	2724	20	14996	15041	3
138	1180	3512	2674	2736	23	14992	15033	3
206	1120	3503	2678	2771	32	14981	15018	2
290	1017	3485	2682	2814	43	14956	15004	1
380	916	3470	2688	2860	55	14932	14989	3-
475	864	3463	2691	2907	67	14927	14977	7-
535	827	3460	2694	2938	74	14923	14972	10-
594	793	3456	2696	2967	81	14919	14967	13-
653	748	3453	2700	2998	88	14911	14962	17-
715	702	3450	2704	3031	95	14903	14957	20-
773	652	3449	2710	3064	102	14893	14953	24-
806	628	3450	2714	3084	105	14889	14950	27-
996	473	3451	2734	3193	123	14858	14936	43-
A 941								
0	1522	3483	2581	2581	0	15079	15079	0
16	1514	3484	2584	2591	3	15079	15079	0
32	1337	3482	2620	2634	7	15024	15065	1
50	1230	3478	2638	2660	10	14990	15044	1
76	1151	3481	2655	2690	14	14968	15022	1
110	1109	3487	2668	2717	19	14960	15004	0

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
A941 cont.								
142	1021	3482	2679	2744	23	14933	14991	1-
207	981	3480	2685	2779	32	14929	14972	4-
305	903	3469	2689	2828	44	14915	14956	9-
400	845	3461	2692	2874	55	14908	14945	15-
495	793	3454	2694	2920	67	14903	14938	21-
559	765	3452	2697	2952	74	14902	14934	25-
629	727	3449	2700	2988	83	14899	14930	29-
695	687	3448	2705	3023	90	14894	14927	34-
760	642	3446	2709	3058	97	14886	14924	39-
825	590	3444	2714	3093	104	14876	14920	44-
887	541	3442	2719	3127	111	14866	14917	49-
950	502	3442	2724	3161	117	14861	14913	55-
1270	344	3449	2746	3334	144	14850	14899	86-
1596	275	3461	2762	3500	165	14876	14891	116-

A 942

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
0	1484	3486	2592	2592	0	15067	15067	0
5	1475	3486	2594	2596	1	15065	15066	0
15	1342	3500	2633	2639	3	15025	15052	1
20	1335	3504	2637	2646	4	15024	15045	1
50	1194	3505	2666	2688	8	14982	15020	1
74	1155	3505	2673	2707	12	14972	15006	0
95	1143	3504	2675	2718	14	14971	14998	0
142	1084	3492	2676	2740	21	14957	14987	1-
207	995	3482	2684	2778	29	14934	14974	4-
485	815	3456	2693	2914	64	14910	14944	18-
530	797	3454	2694	2936	69	14910	14941	21-
605	741	3451	2700	2976	78	14900	14937	26-
663	715	3450	2703	3006	85	14900	14933	29-
895	590	3445	2715	3126	110	14888	14923	46-
1112	437	3446	2734	3247	131	14862	14914	64-

A 943

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
0	1450	3487	2600	2600	0	15056	15056	0
19	1445	3487	2601	2609	4	15058	15057	1
38	1400	3494	2616	2633	8	15047	15055	1
57	1279	3491	2638	2664	11	15010	15046	2
76	1224	3501	2657	2691	14	14996	15035	2
119	1135	3500	2673	2727	20	14972	15017	1
157	1067	3496	2682	2753	25	14954	15004	0
194	1038	3491	2684	2771	30	14949	14994	1-
272	975	3478	2684	2808	40	14937	14979	4-
394	879	3464	2689	2868	55	14920	14963	10-
508	823	3456	2691	2923	69	14916	14953	16-
626	787	3455	2696	2981	84	14922	14947	22-
703	721	3450	2702	3023	93	14909	14943	27-
782	658	3447	2708	3066	102	14897	14939	32-
861	597	3444	2714	3109	110	14885	14935	37-
939	545	3443	2719	3151	118	14877	14930	44-
1018	478	3440	2725	3194	126	14862	14926	51-
1096	430	3441	2731	3237	133	14855	14921	58-
1173	397	3442	2735	3277	139	14855	14916	65-
1583	282	3459	2760	3492	169	14877	14903	102-
1954	235	3463	2767	3669	190	14920	14902	127-

A 944

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
0	1465	3486	2596	2596	0	15061	15061	0
23	1451	3487	2600	2610	5	15060	15061	1
47	1299	3489	2633	2654	9	15015	15049	2

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
***A944* cont.**								
71	1255	3487	2640	2672	13	15004	15035	2
95	1164	3492	2661	2704	17	14977	15024	2
143	1063	3491	2679	2744	24	14949	15004	0
192	1022	3486	2682	2769	30	14942	14989	1-
240	992	3482	2684	2793	36	14938	14979	3-
332	917	3469	2687	2838	48	14924	14966	8-
470	841	3458	2690	2904	65	14917	14953	15-
606	772	3451	2695	2972	82	14912	14944	23-
742	677	3447	2705	3045	97	14807	14937	31-
835	599	3443	2713	3096	108	14881	14932	38-
926	533	3441	2719	3145	117	14870	14926	46-
1017	473	3440	2725	3194	126	14860	14921	54-
1108	421	3441	2732	3243	134	14854	14915	63-
1201	370	3442	2738	3293	142	14848	14910	72-
1292	349	3447	2744	3341	149	14855	14906	81-
1384	327	3449	2748	3388	155	14861	14903	89-
1849	251	3462	2765	3619	185	14909	14898	125-
2324	206	3467	2772	3843	209	14970	14907	144-
A 945								
0	1441	3466	2586	2586	0	15051	15051	0
23	1404	3465	2593	2603	5	15042	15047	1
47	1142	3471	2649	2670	9	14959	15023	1
71	1102	3488	2670	2702	13	14951	15000	0
94	1075	3489	2675	2718	16	14945	14987	1-
142	1013	3483	2682	2746	22	14930	14970	3-
189	981	3480	2685	2771	28	14926	14960	5-
236	932	3472	2687	2794	34	14915	14952	8-
331	881	3463	2688	2839	46	14910	14941	13-
474	824	3456	2691	2907	63	14911	14932	22-
614	775	3451	2695	2975	81	14915	14927	30-
757	695	3446	2702	3048	98	14907	14924	38-
851	602	3442	2711	3102	108	14885	14921	45-
947	542	3441	2718	3153	118	14877	14917	52-
1040	466	3439	2725	3205	127	14861	14913	61-
1135	415	3441	2732	3257	136	14856	14908	70-
1231	368	3443	2739	3308	144	14852	14904	79-
1324	332	3447	2745	3358	151	14853	14900	88-
1420	314	3451	2750	3407	157	14862	14897	97-
1894	246	3457	2761	3636	188	14913	14895	133-
2367	208	3462	2768	3858	214	14978	14905	150-
A 946								
0	1533	3493	2586	2586	0	15083	15083	0
24	1511	3493	2591	2602	5	15080	15082	1
48	1289	3489	2635	2656	10	15011	15064	2
72	1244	3492	2646	2678	14	15001	15045	2
96	1167	3499	2666	2710	17	14979	15031	2
145	1100	3493	2674	2740	24	14963	15011	1
194	1044	3489	2681	2769	30	14951	14997	0
242	993	3481	2684	2793	37	14939	14987	2-
340	907	3468	2688	2842	49	14922	14970	7-
484	836	3457	2690	2911	67	14917	14955	14-
627	807	3453	2691	2977	85	14929	14948	22-
772	726	3449	2700	3053	103	14922	14944	29-
867	639	3443	2707	3104	114	14903	14940	34-
963	547	3440	2717	3159	124	14881	14936	41-
1059	487	3439	2723	3211	133	14873	14930	49-
1155	415	3440	2732	3265	142	14859	14925	58-

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
A946 cont.								
1251	370	3443	2739	3317	150	14856	14920	67-
1346	341	3448	2745	3368	157	14861	14915	76-
1442	333	3452	2749	3416	164	14874	14912	84-
1921	250	3462	2765	3651	194	14920	14908	117-
2401	206	3464	2770	3875	220	14983	14917	133-
A 947								
0	1577	3471	2560	2560	0	15094	15094	0
24	1409	3490	2611	2622	5	15047	15071	1
48	1217	3485	2646	2667	9	14987	15044	1
72	1248	3516	2664	2696	13	15005	15028	1
96	1206	3512	2669	2712	16	14994	15021	1
145	1111	3498	2676	2741	23	14967	15007	1
194	1055	3491	2681	2768	29	14955	14996	1-
243	1036	3488	2682	2792	36	14956	14987	2-
340	943	3473	2686	2840	48	14936	14975	6-
485	858	3460	2689	2910	67	14926	14962	12-
630	785	3452	2694	2981	85	14921	14953	20-
776	691	3447	2703	3058	102	14908	14946	28-
873	607	3443	2711	3112	113	14891	14941	34-
970	522	3440	2720	3166	123	14872	14935	42-
1067	471	3440	2725	3217	132	14867	14929	50-
1164	433	3442	2731	3268	141	14868	14924	59-
1261	371	3445	2740	3323	149	14859	14919	68-
1358	342	3450	2747	3375	156	14863	14915	77-
1455	319	3452	2751	3423	163	14870	14912	85-
1941	245	3465	2768	3664	193	14922	14908	119-
2426	205	3469	2774	3890	217	14987	14917	134-
A 948								
0	1577	3491	2575	2575	0	15097	15097	0
23	1525	3489	2585	2595	5	15084	15090	1
46	1365	3499	2627	2648	10	15038	15076	2
69	1277	3504	2649	2680	13	15013	15059	3
98	1179	3508	2671	2715	18	14985	15041	3
140	1104	3498	2677	2740	23	14964	15021	2
188	1056	3491	2680	2765	30	14954	15005	1
235	1018	3485	2682	2789	36	14947	14994	1-
329	947	3475	2687	2836	48	14936	14979	5-
470	847	3459	2690	2904	65	14920	14964	11-
612	784	3452	2694	2973	83	14918	14953	19-
754	700	3449	2704	3049	100	14909	14946	27-
848	640	3445	2709	3097	110	14900	14941	33-
943	573	3443	2716	3149	120	14889	14936	40-
1036	494	3441	2724	3201	130	14872	14931	47-
1130	426	3442	2732	3254	138	14860	14926	56-
1225	378	3444	2739	3305	146	14856	14921	65-
1319	341	3448	2745	3356	153	14856	14916	74-
1415	324	3454	2752	3406	160	14866	14912	83-
1893	253	3464	2766	3640	189	14917	14907	117-
2376	207	3466	2772	3865	214	14979	14915	134-
A 949								
0	1580	3488	2572	2572	0	15097	15097	0
24	1560	3489	2577	2588	5	15095	15096	2
48	1388	3495	2619	2641	10	15045	15083	3
72	1314	3498	2637	2669	15	15025	15067	3
95	1185	3501	2664	2707	18	14985	15052	3

A949 cont.

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
142	1102	3498	2678	2742	25	14964	15026	3
190	1065	3493	2680	2766	31	14958	15010	1
237	1026	3487	2682	2790	37	14951	14999	0
332	957	3476	2686	2836	49	14940	14984	4-
475	857	3461	2690	2906	67	14924	14968	10-
616	781	3453	2695	2976	84	14918	14957	18-
759	688	3447	2704	3051	101	14905	14949	26-
854	611	3446	2713	3105	112	14890	14943	33-
949	542	3442	2719	3155	121	14877	14937	40-
1044	494	3444	2726	3207	131	14874	14931	48-
1139	438	3444	2732	3258	139	14866	14926	56-
1489	299	3455	2755	3444	166	14868	14912	87-

A 950

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
0	1648	3519	2580	2580	0	15122	15122	0
21	1611	3516	2586	2596	5	15114	15118	2
45	1421	3519	2631	2651	9	15058	15101	3
69	1366	3520	2643	2674	13	15044	15084	4
93	1247	3520	2667	2709	17	15009	15069	4
140	1215	3518	2672	2735	23	15005	15048	4
188	1193	3515	2674	2758	30	15005	15037	5
235	1158	3508	2675	2781	36	15000	15030	5
328	1068	3494	2681	2829	49	14982	15019	4
470	900	3467	2688	2901	67	14940	15001	0
610	818	3458	2694	2971	85	14932	14986	6-
753	700	3450	2705	3049	102	14909	14974	13-
846	638	3447	2711	3098	112	14899	14966	19-
940	558	3445	2719	3151	122	14883	14959	26-
1034	498	3442	2724	3200	131	14873	14951	34-
1128	442	3443	2731	3251	140	14866	14944	42-
1212	382	3446	2740	3300	147	14855	14939	50-
1316	346	3450	2746	3355	155	14858	14932	59-
1410	326	3454	2752	3404	161	14866	14928	68-
1880	252	3465	2767	3635	190	14915	14918	102-
2350	200	3477	2781	3863	212	14974	14923	120-

A 951

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
0	1749	3520	2557	2557	0	15152	15152	0
24	1673	3519	2574	2585	6	15134	15143	2
48	1401	3507	2626	2647	10	15051	15118	4
73	1313	3513	2649	2681	15	15027	15091	4
97	1224	3518	2670	2714	18	15001	15072	5
145	1185	3511	2672	2737	25	14995	15047	5
194	1137	3505	2677	2764	31	14985	15033	4
242	1108	3501	2679	2788	38	14983	15023	4
339	1001	3482	2683	2836	51	14958	15008	2
484	872	3464	2690	2910	69	14932	14989	4-
629	783	3457	2698	2985	87	14921	14975	11-
775	682	3449	2706	3061	104	14905	14963	19-
872	585	3445	2716	3116	114	14882	14955	26-
968	515	3443	2723	3168	124	14869	14947	34-
1065	464	3443	2729	3220	133	14865	14940	43-
1162	415	3445	2736	3272	141	14861	14934	51-
1259	365	3447	2742	3324	149	14856	14928	61-
1356	333	3452	2749	3377	156	14860	14923	70-
1453	314	3455	2754	3426	163	14868	14919	79-
1940	243	3465	2768	3663	191	14921	14913	113-
2430	196	3473	2778	3896	215	14985	14921	128-

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
A 952								
0	1698	3514	2564	2564	0	15137	15137	0
24	1658	3514	2574	2585	6	15128	15132	2
48	1426	3514	2626	2647	10	15060	15113	4
72	1345	3517	2645	2677	14	15037	15092	4
96	1248	3519	2666	2709	18	15009	15075	5
145	1194	3517	2675	2740	25	14999	15051	5
194	1165	3510	2675	2763	31	14996	15037	5
243	1130	3505	2678	2787	38	14991	15028	5
340	1007	3484	2683	2837	51	14960	15013	3
485	858	3462	2691	2911	69	14927	14992	2-
631	766	3456	2700	2988	87	14915	14976	10-
776	658	3449	2710	3065	103	14896	14963	19-
874	581	3445	2716	3118	114	14881	14954	27-
970	511	3445	2725	3171	123	14868	14946	35-
1066	448	3444	2731	3223	132	14858	14939	43-
1163	398	3446	2738	3275	140	14854	14932	53-
1260	353	3450	2746	3329	147	14852	14926	62-
1356	315	3453	2752	3380	154	14852	14921	72-
1453	301	3457	2756	3429	160	14863	14917	81-
1937	236	3467	2770	3665	188	14918	14910	116-
2420	190	3475	2780	3894	210	14981	14918	133-
A 953								
0	1641	3517	2580	2580	0	15120	15120	0
23	1615	3515	2585	2595	5	15115	15117	2
46	1420	3515	2628	2648	10	15058	15102	3
69	1377	3519	2640	2671	13	15048	15085	4
92	1296	3521	2658	2699	17	15025	15073	4
136	1220	3519	2672	2733	23	15006	15055	5
183	1197	3517	2675	2757	30	15006	15042	5
227	1177	3510	2673	2775	36	15005	15035	5
319	1077	3495	2680	2824	48	14983	15023	5
456	938	3472	2686	2893	66	14953	15007	2
593	830	3460	2693	2963	84	14934	14992	3-
730	743	3453	2701	3034	100	14922	14980	10-
821	664	3448	2708	3084	111	14905	14973	15-
912	602	3446	2714	3133	120	14896	14965	21-
1003	531	3444	2722	3183	130	14882	14958	28-
1094	474	3443	2727	3231	138	14874	14952	35-
1186	415	3444	2735	3282	146	14865	14945	43-
1277	372	3446	2741	3331	154	14862	14940	51-
1368	350	3449	2745	3377	161	14868	14935	60-
1822	257	3453	2757	3599	192	14905	14923	94-
2275	215	3471	2775	3823	216	14966	14925	113-
A 954								
0	1733	3513	2555	2555	0	15147	15147	0
22	1662	3512	2571	2581	5	15129	15138	2
44	1472	3520	2621	2640	10	15074	15120	4
66	1363	3523	2646	2676	14	15043	15100	4
88	1274	3523	2664	2704	17	15017	15082	5
130	1244	3519	2667	2725	23	15013	15061	5
175	1191	3515	2674	2753	29	15002	15047	5
219	1159	3508	2675	2773	35	14997	15038	5
307	1066	3492	2679	2818	47	14977	15023	5
442	926	3472	2688	2888	64	14946	15004	1
574	836	3460	2693	2954	81	14933	14989	4-

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
A954 cont.								
709	752	3454	2700	3024	97	14922	14978	11-
797	696	3451	2706	3070	108	14914	14971	15-
885	623	3446	2712	3117	117	14900	14965	21-
974	557	3444	2719	3166	127	14888	14958	27-
1064	496	3443	2725	3215	135	14878	14952	34-
1151	435	3443	2732	3263	143	14867	14946	42-
1241	387	3446	2739	3312	151	14862	14940	50-
1334	357	3449	2745	3361	158	14866	14935	58-
1790	257	3466	2767	3594	187	14902	14922	93-
2269	211	3475	2778	3284	210	14964	14924	115-
A 955								
0	1803	3516	2541	2541	0	15168	15168	0
15	1801	3520	2544	2551	4	15170	15169	2
33	1600	3528	2598	2613	8	15114	15154	3
43	1551	3527	2608	2628	10	15100	15143	4
82	1406	3527	2640	2677	17	15060	15113	6
110	1254	3521	2667	2716	21	15014	15094	7
150	1185	3514	2674	2742	27	14996	15070	7
187	1155	3506	2674	2758	32	14991	15055	7
262	1088	3497	2679	2798	42	14978	15035	6
380	941	3475	2688	2860	57	14942	15012	3
492	852	3462	2692	2916	71	14925	14994	2-
610	784	3456	2697	2975	85	14918	14980	8-
687	707	3450	2704	3018	94	14900	14972	13-
762	650	3447	2709	3058	103	14890	14964	18-
839	605	3445	2713	3098	111	14885	14957	24-
917	559	3444	2718	3140	119	14879	14951	30-
994	504	3443	2724	3182	127	14869	14945	36-
1068	460	3443	2729	3221	133	14864	14940	43-
1145	419	3444	2734	3263	140	14859	14934	50-
1526	303	3457	2756	3462	168	14876	14918	84-
1909	245	3463	2766	3648	191	14916	14913	110-
A 956								
0	1861	3539	2544	2544	0	15187	15187	0
15	1852	3540	2547	2553	4	15187	15187	2
28	1853	3540	2546	2559	7	15190	15188	4
41	1609	3533	2600	2618	10	15118	15177	5
50	1530	3540	2623	2645	12	15096	15165	5
75	1415	3536	2645	2679	16	15063	15136	7
104	1347	3532	2656	2703	21	15045	15113	8
135	1287	3524	2662	2723	25	15029	15096	9
198	1261	3519	2664	2752	34	15030	15075	10
298	1164	3509	2675	2809	49	15012	15057	11
370	1060	3492	2680	2847	58	14985	15046	11
467	950	3476	2687	2898	71	14960	15030	9
520	883	3469	2692	2929	78	14943	15022	8
594	837	3462	2694	2964	87	14937	15012	5
645	792	3457	2697	2991	93	14927	15006	2
700	749	3454	2701	3020	100	14919	14999	0
772	692	3449	2705	3058	108	14909	14991	4-
823	653	3448	2709	3086	114	14901	14986	8-
883	616	3446	2713	3117	120	14896	14980	12-
1179	420	3446	2736	3280	148	14866	14955	35-
1524	295	3465	2763	3468	172	14873	14936	65-

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1,400/12/66—29131 A

D	T	S	σ_t	σ_{stp}	$\Sigma\Delta D$	C	C_m	K
A 957								
0	1813	3522	2543	2543	0	15171	15171	0
17	1812	3524	2544	2552	4	15174	15173	2
34	1670	3518	2574	2589	8	15134	15163	4
51	1488	3517	2615	2637	12	15080	15145	5
70	1432	3515	2625	2657	15	15065	15125	6
100	1313	3519	2653	2698	20	15032	15102	7
130	1249	3520	2667	2725	25	15015	15084	7
150	1209	3516	2671	2739	28	15004	15074	7
202	1177	3512	2674	2765	35	15001	15056	8
290	1120	3504	2679	2810	47	14995	15038	7
375	1039	3489	2682	2851	58	14978	15027	7
445	948	3474	2686	2887	67	14955	15017	5
507	882	3463	2688	2918	75	14939	15009	3
569	839	3459	2691	2950	83	14933	15001	0
620	797	3456	2695	2978	89	14925	14995	2-
668	772	3454	2697	3002	95	14923	14990	5-
727	726	3450	2701	3033	102	14914	14984	8-
778	678	3448	2706	3062	108	14904	14979	11-
828	654	3447	2709	3088	113	14903	14974	14-
1090	466	3444	2729	3231	140	14870	14953	34-

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