

CSIRO
Division of Fisheries and Oceanography

REPORT 101

**Satellite-tracked buoy
data report III.
Indian Ocean 1977
Tasman Sea July-December 1977**

G. R. Cresswell
and
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1979

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION
DIVISION of FISHERIES and OCEANOGRAPHY
P.O. BOX 21, CRONULLA NSW 2230

National Library of Australia Cataloguing-in-Publication Entry

Cresswell, G.R.

Satellite-tracked buoy data report 3.

(Division of Fisheries and Oceanography report;
101)

ISBN 0 643 02202 3

1. Ocean currents - Indian Ocean - Measurement.
2. Oceanographic buoys. 3. Ocean currents - Tasman Sea - Measurement. I. Golding, T.J., joint author. II. Commonwealth Scientific and Industrial Research Organization. Marine Laboratory.
- III. Title. (Series: Commonwealth Scientific and Industrial Research Organization. Division of Fisheries and Oceanography. Report; 101).

551.47'7

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Printed by CSIRO, Melbourne

SATELLITE-TRACKED BUOY DATA REPORT I-III.
 INDIAN OCEAN 1977.
 TASMAN SEA JULY-DECEMBER 1977

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CSIRO Aust. Div. Fish. Oceanogr. Rep. 101 (1979)

Abstract

Track, speed, and sea surface temperature data from three buoys in the Indian Ocean in 1977 and ten buoys in the Tasman Sea during July-December 1977 tracked by the NASA* weather satellite NIMBUS-6 are presented. An eddy which formed in March 1977 was still in existence in December 1977 and held individual buoys for up to five months.

INTRODUCTION

This third data report on CSIRO free-drifting buoys tracked by the NASA weather satellite NIMBUS-6 covers buoy data for both the Indian Ocean for 1977 and the Tasman Sea for July to December 1977. In so doing it completed the Indian Ocean data because the sole surviving buoy (1104) ran aground in Tanzania in December 1977 and ceased functioning after being taken ashore. The Tasman Sea work is continuing.

THE BUOYS

Two different types of buoys were used. One is a vertical PVC/fibre-glass 'spar' of length 5 m (Cresswell 1976), while the other is a horizontal 'torpedo' of length 2 m (Cresswell, Richardson, Wood and Watts, unpublished data). The 'torpedo' buoys are indicated in the following by a T added to the buoy identification code, e.g. 1132T.

*National Aeronautics and Space Administration, U.S.A.

(a) The Indian Ocean

Only 3 buoys functioned during 1977:

0725 apparently ran aground on a reef SW of Timor and ceased working.

1062 was released from HMAS "Diamantina" near 110°S, 105°E in mid 1976 and was not reported through the NIMBUS-6 system until day 56 1977. It only ran for two months, but this was sufficient to show it to be travelling in the South Equatorial Current.

1104 operated through to the end of 1977 and, in the process, was carried across the Indian Ocean in the South Equatorial Current to Africa. It ran aground, was taken from the water (judging from its temperature record) and promptly ceased working.

Earlier information on these and other Indian Ocean buoys can be found in Data Report I (Cresswell and Vaudrey 1977). A composite chart of the Indian Ocean buoy data *in toto* is given in Fig. 1. The data have been used for a paper on eddies (Cresswell 1977) and a paper on the subtropical convergence (Cresswell *et al.* 1978).

(b) Tasman Sea

Buoy data for the period November 1976-July 1977 were presented in Data Report II (Cresswell and Wood 1977). In that time ten buoys were released and in the next six months, to December 1977, three more (1202T, 1710T and 1726) were released. The primary objective during the latter period was to monitor eddy B (see Report II) with buoys and XBTs for as long as possible and this was achieved by F.V. "Courageous" under the direction of Garrey Maxwell and Malcolm Castle. At the time of writing (July 1978) the status of the individual buoys is as follows:

1054 has no temperature channel, but is otherwise functioning well. Its lifetime since initial Indian Ocean deployment exceeds $2\frac{1}{2}$ years.

1132T continues to function. Lifetime $1\frac{1}{2}$ years.

1202T is functioning sporadically at this time. Its temperature circuit failed on day 243 1977. This buoy showed that eddy B moved in an anti-clockwise arc in the second half of 1977.

1234T failed on day 150 of 1977 as mentioned in Report II. The buoy washed ashore in the Great Barrier Reef in early 1978 and was electronically sound. Its lack of transmission was due to failure of the shackle coupling it to the ballast and drogue. The failure allowed it to float on its side, thereby preventing effective solar charging or radio transmission. Its lifetime was six months.

1352 continues to function. Lifetime exceeds one year.

1364 had a faulty battery when released and has not yielded any useful data. It is still occasionally heard by the NIMBUS-6 system.

1546 failed after one year of operation.

1570T was released in March 1977 with a drogue at 200 m rather than the usual 20 m. Its lifetime exceeds one year, but the temperature channel has failed and transmissions suitable for position fixing do not occur every day.

1631 continues to function and its lifetime exceeds one year.

1640 ran aground in the Middle Bellona Reef in September 1977. It functioned until December, remained silent for several months and has been heard occasionally during mid-1978.

1676 failed in early 1978 after nine months operation.

1710T released into eddy B on day 285 1977. It continues to operate and has a lifetime of nine months.

1726 released near 35°S on day 337 1977. It is operating, but is being fixed at irregular intervals.

A composite track chart for July-December 1977 is presented in Fig. 2.

DATA HANDLING

The data were received from NASA on magnetic tapes. Data gaps were filled from the NASA computer listings. Considerable editing was done to remove bad fixes.

DATA PRESENTATION

As with the two earlier reports the buoy track charts are 9° of latitude by 15° of longitude with the distance for 1° of latitude being a constant 1.25 times that for 1° of longitude. The temperature graphs have been improved by plotting temperatures at

the actual time of the day measured, rather than plotting all of a particular day at the start of that day.

For the period days 190-206 NASA advised that longitude errors of 0.25° - 0.50° to the east could occur until further notice. As a result buoy 1546 has some spikes which will be corrected later by comparison with buoy transmitters under test at Cronulla at that time.

Acknowledgements

We thank the cruise leaders mentioned earlier in the report, as well as David Crooks, Julie Crawford, Garry Richardson, Alpo Metso, and John Wood. Naturally the program would not be possible without the NIMBUS-6 satellite and the excellent service provided by NASA's data processors.

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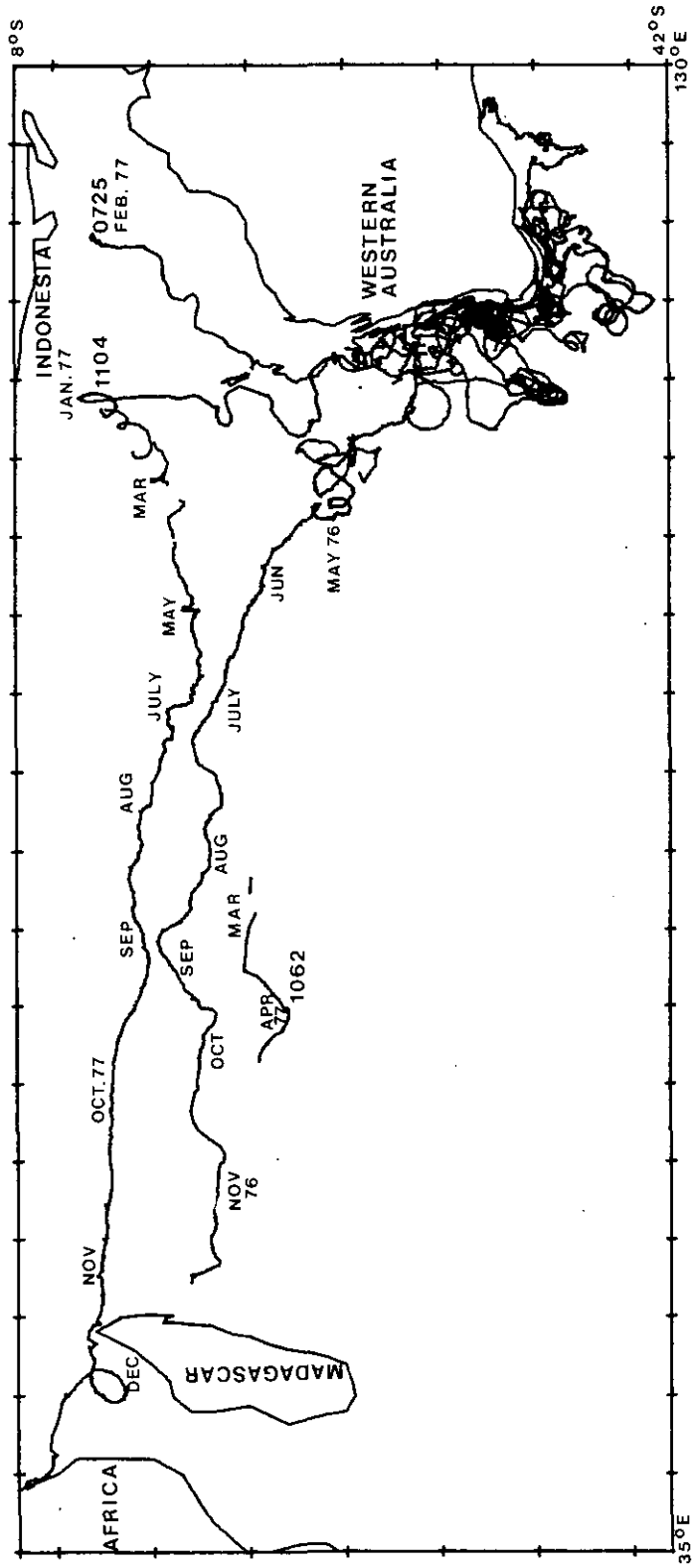


Fig. 1. A buoy track composite for all Indian Ocean CSIRO buoys.

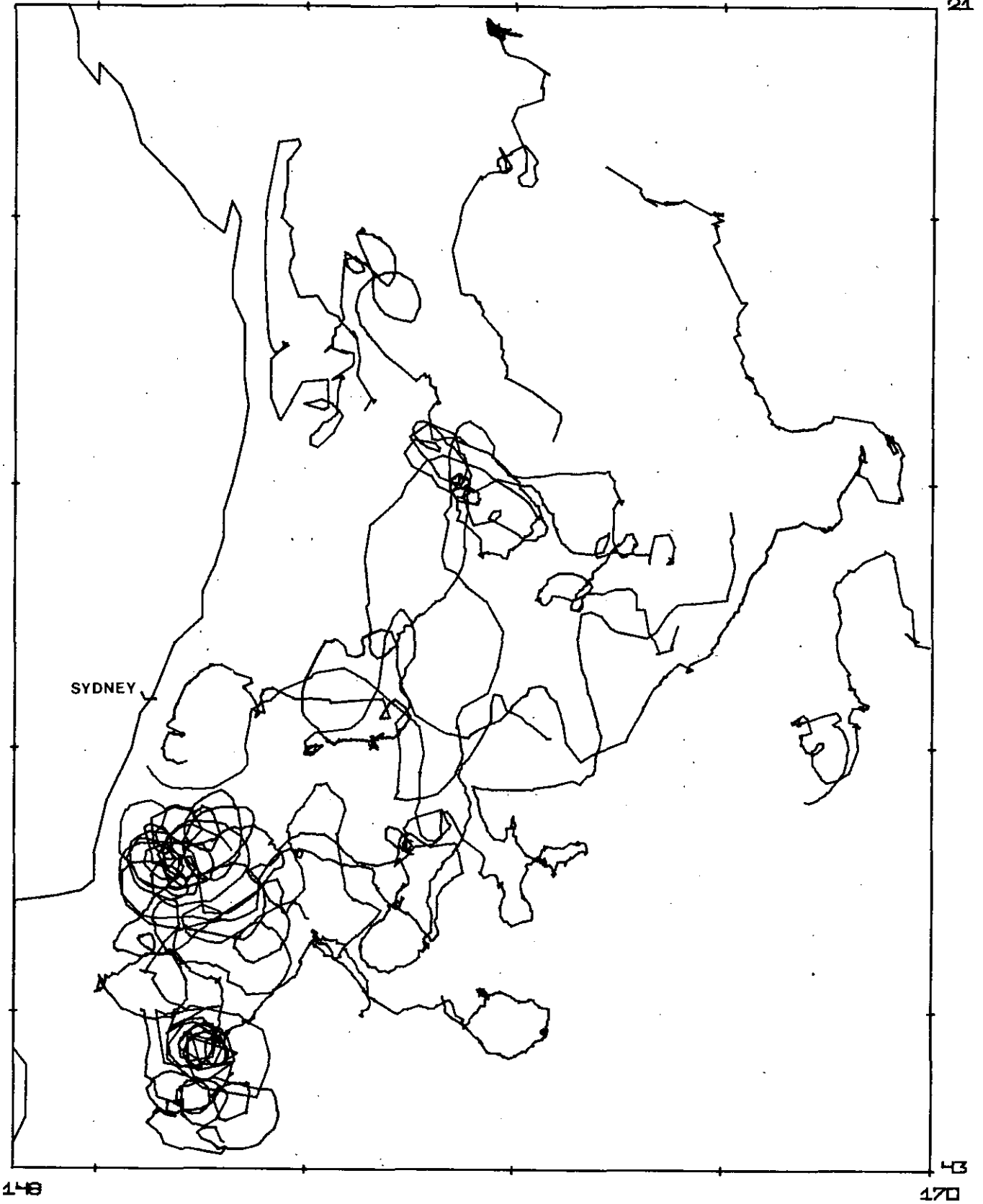
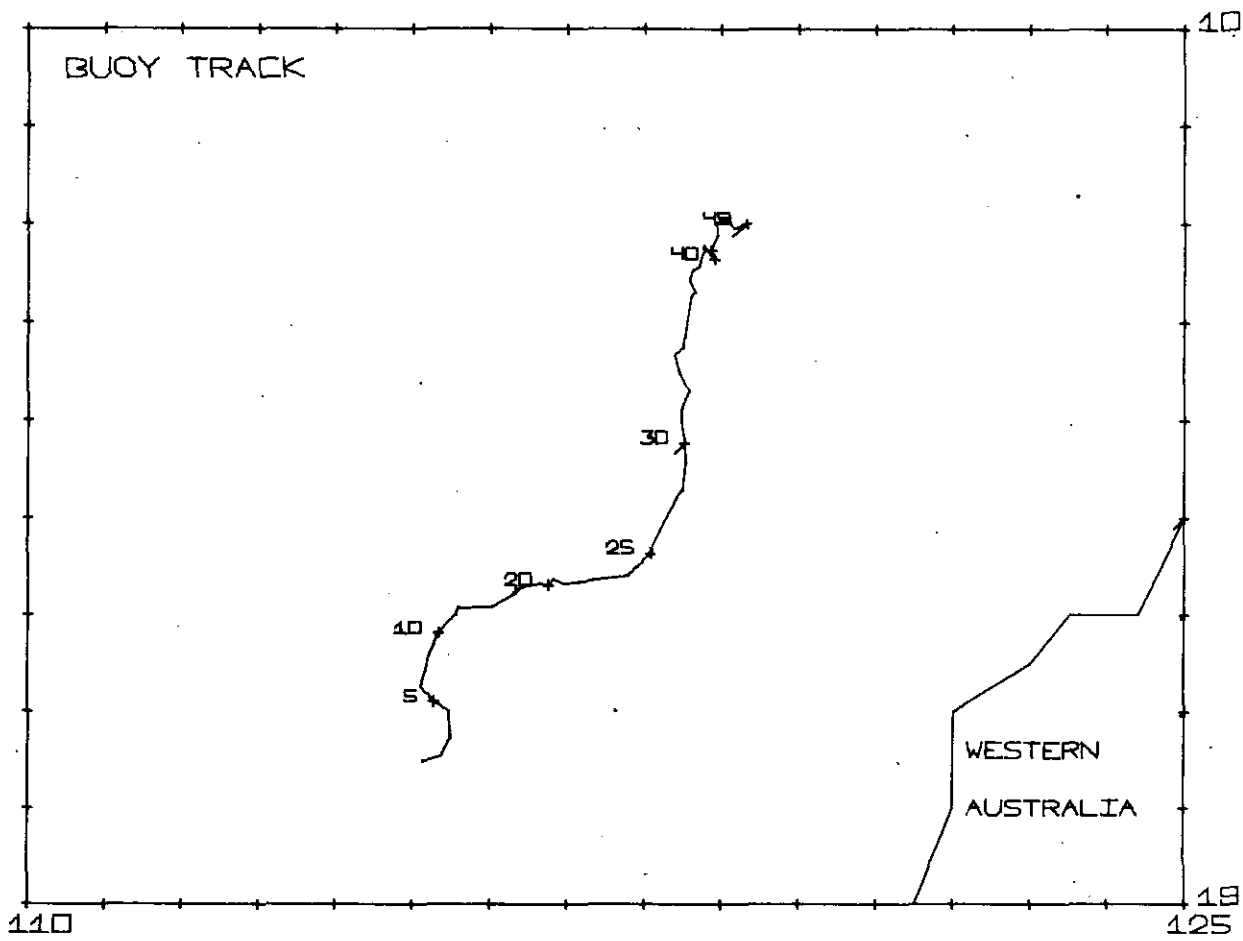
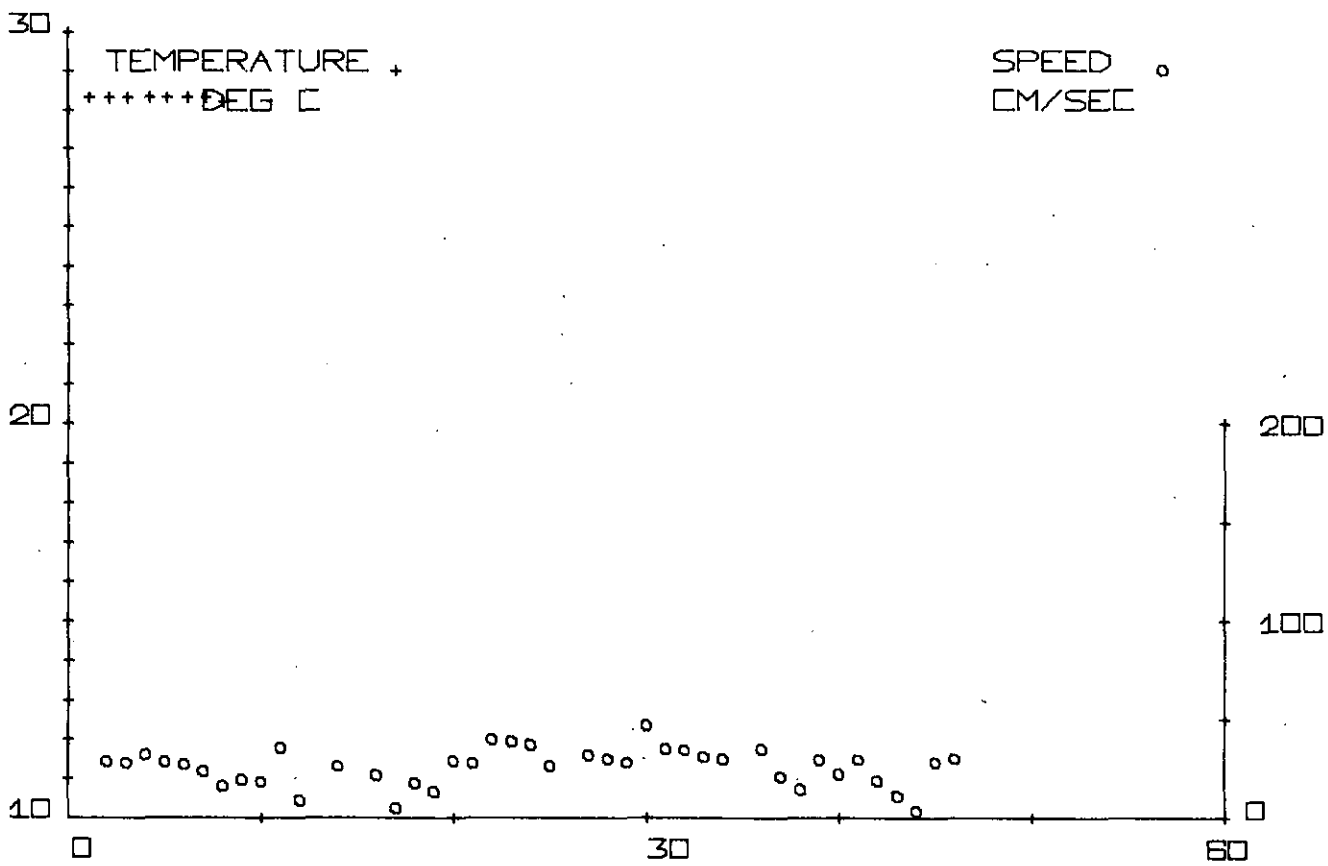


Fig. 2. A buoy track composite for July to December 1977 for the Tasman Sea.

The buoy data plots:

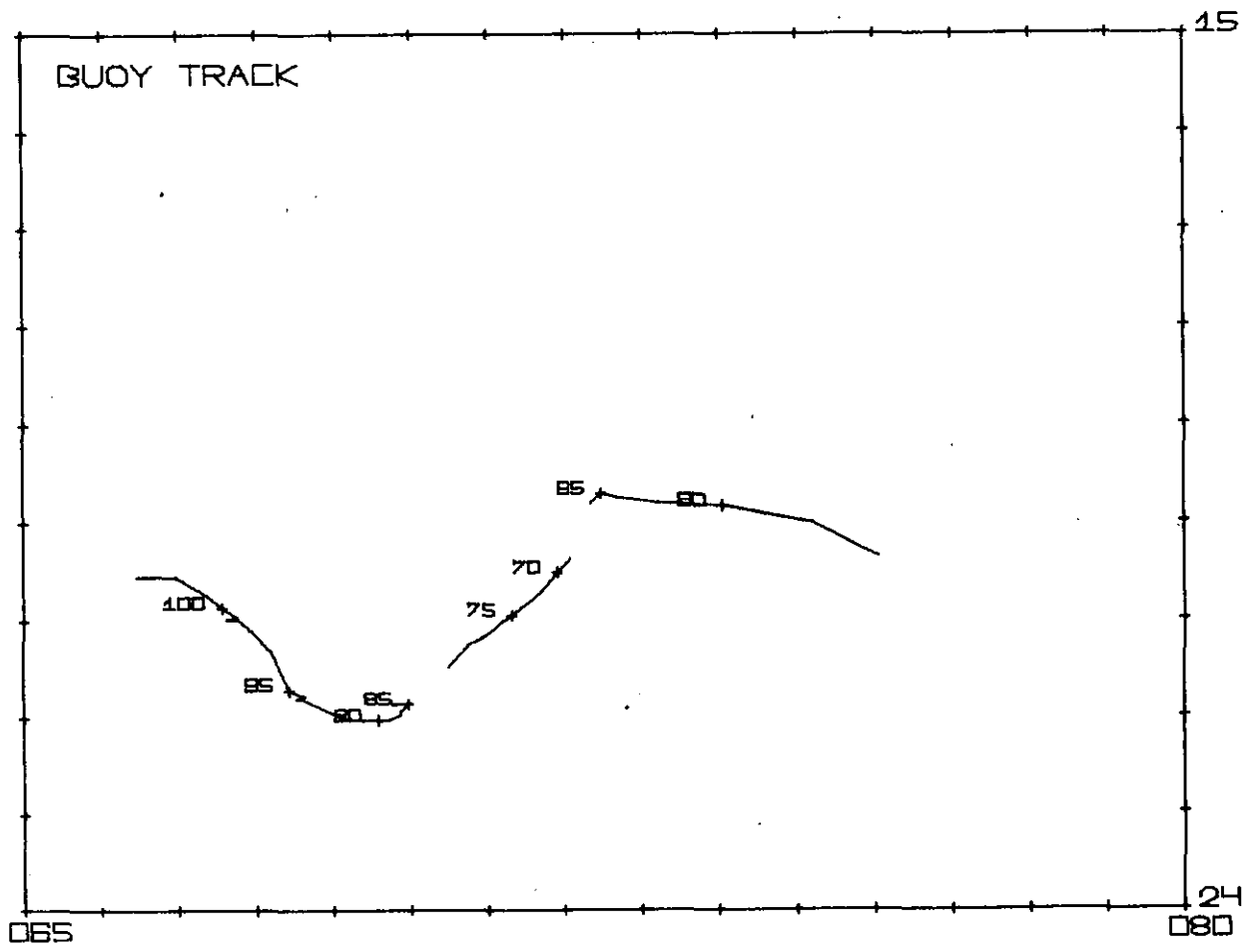
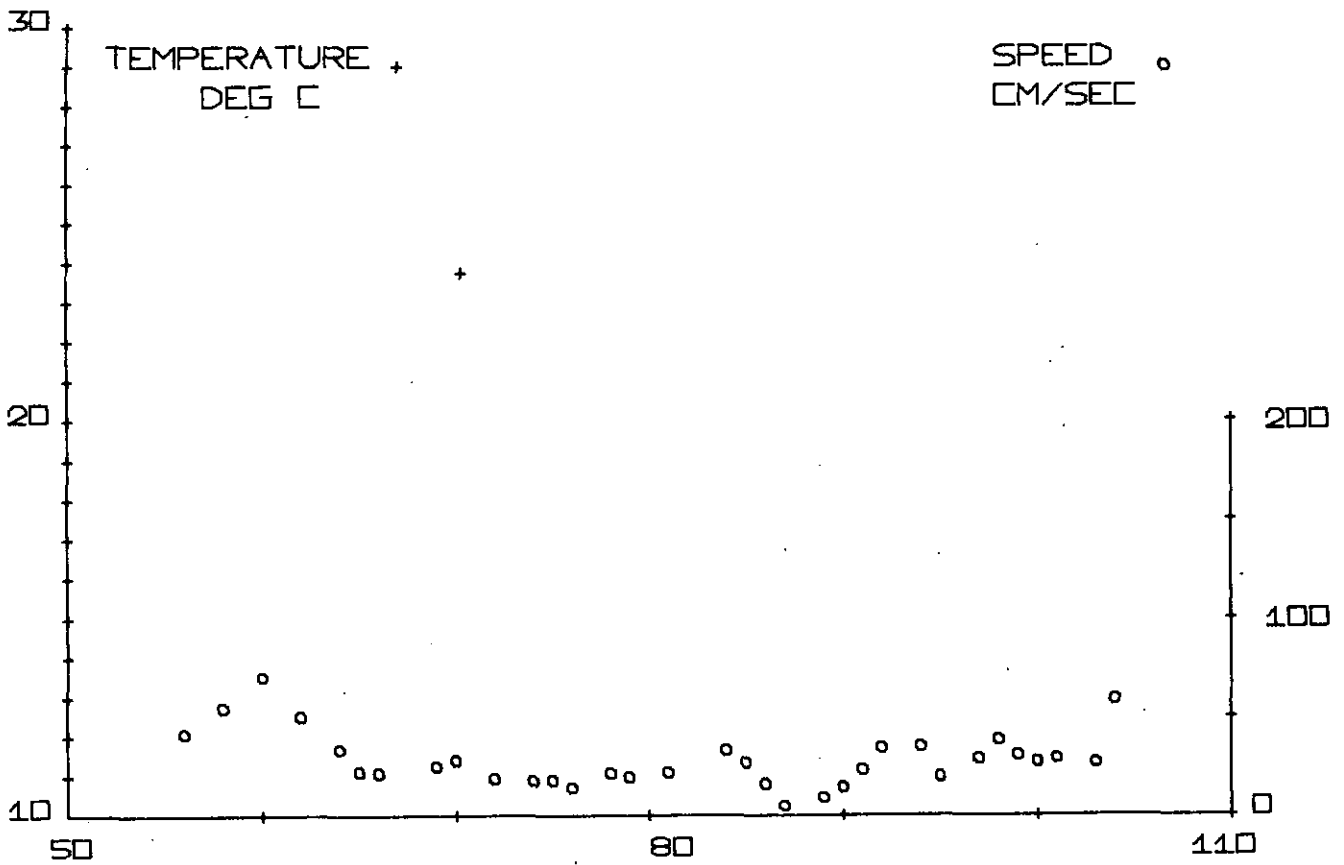
The Indian Ocean buoys 0725, 1062, and 1104 are presented first. They are followed by the Tasman Sea buoys starting with 1054.

BUOY 725 DAYS 0-60 1977



BUOY 1062

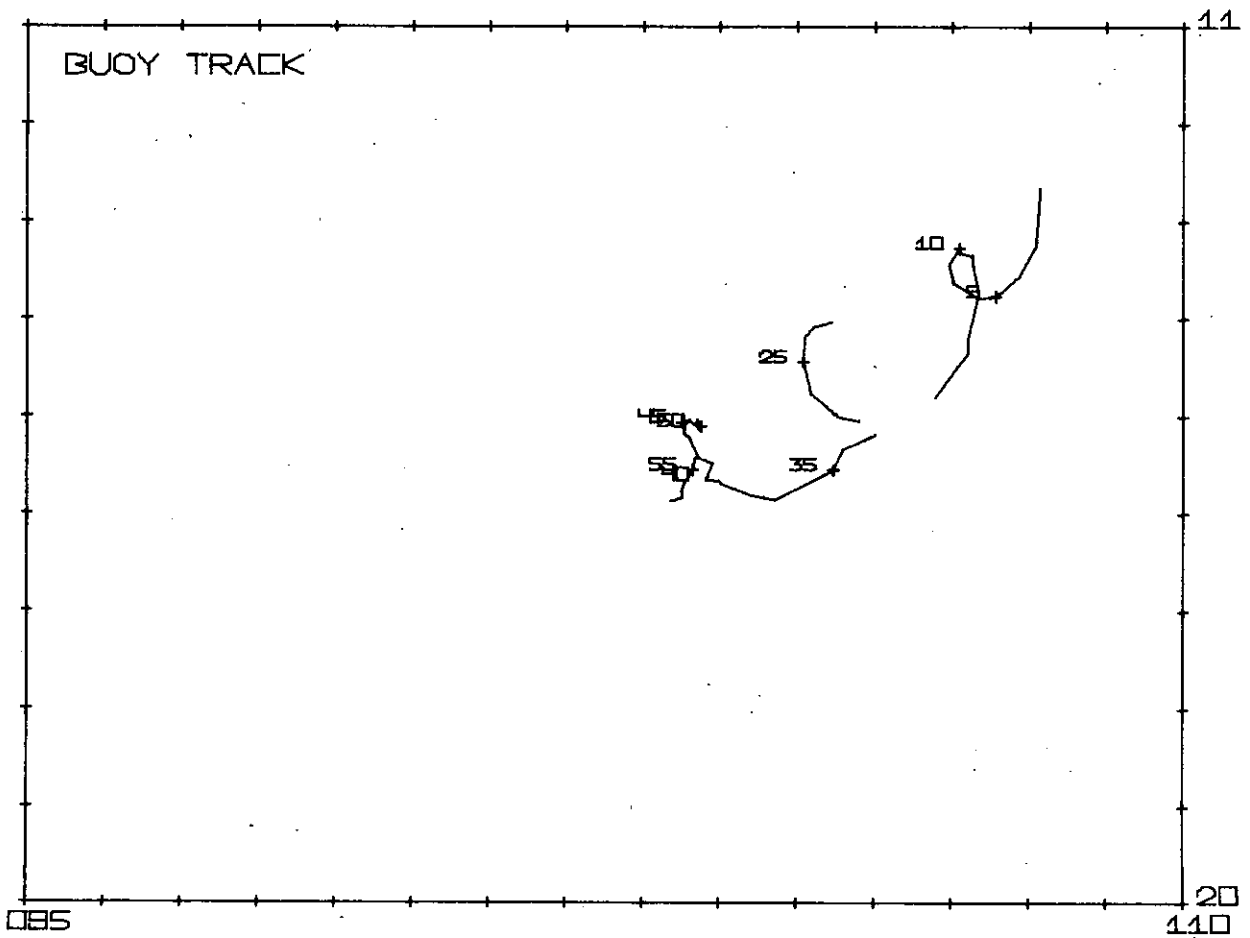
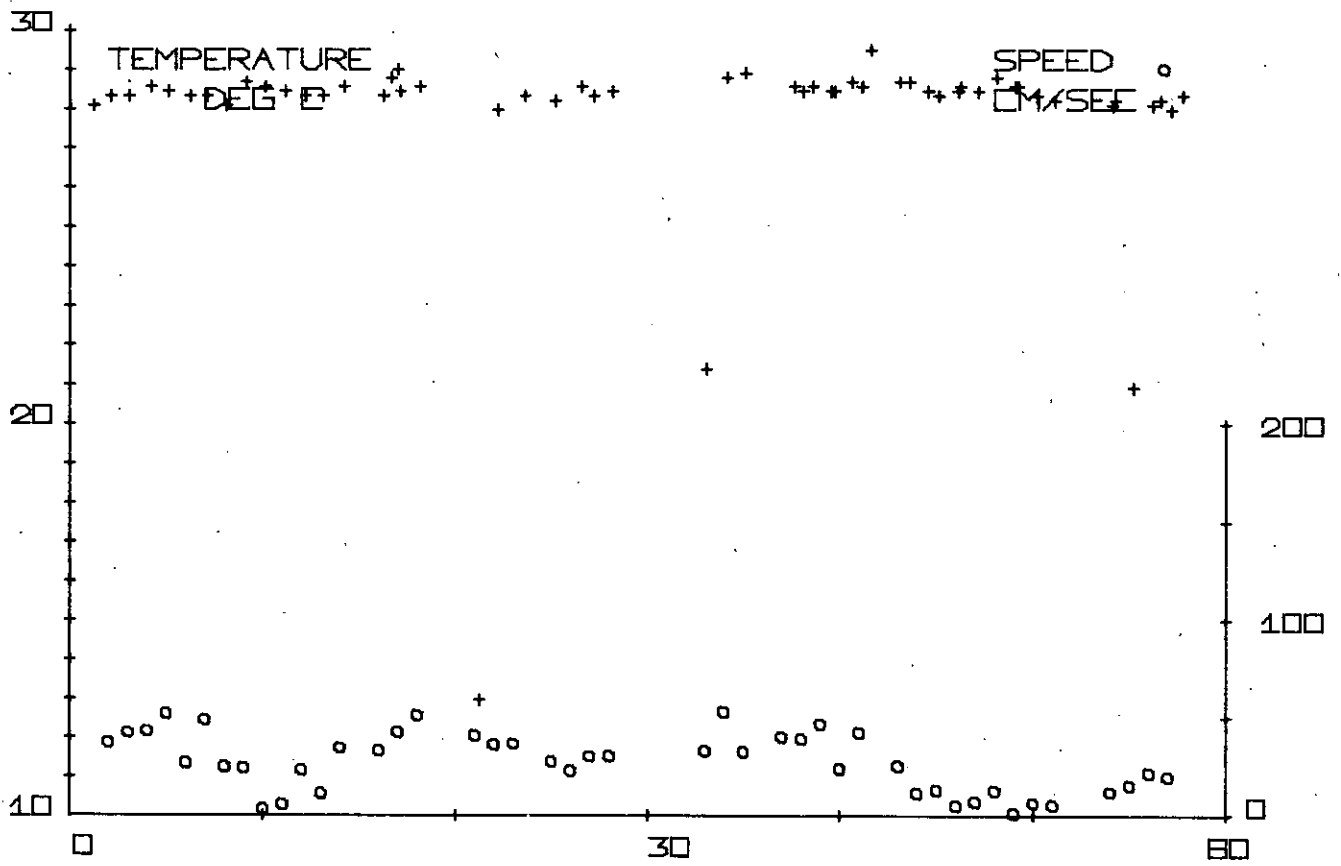
DAYS 50-110 1977



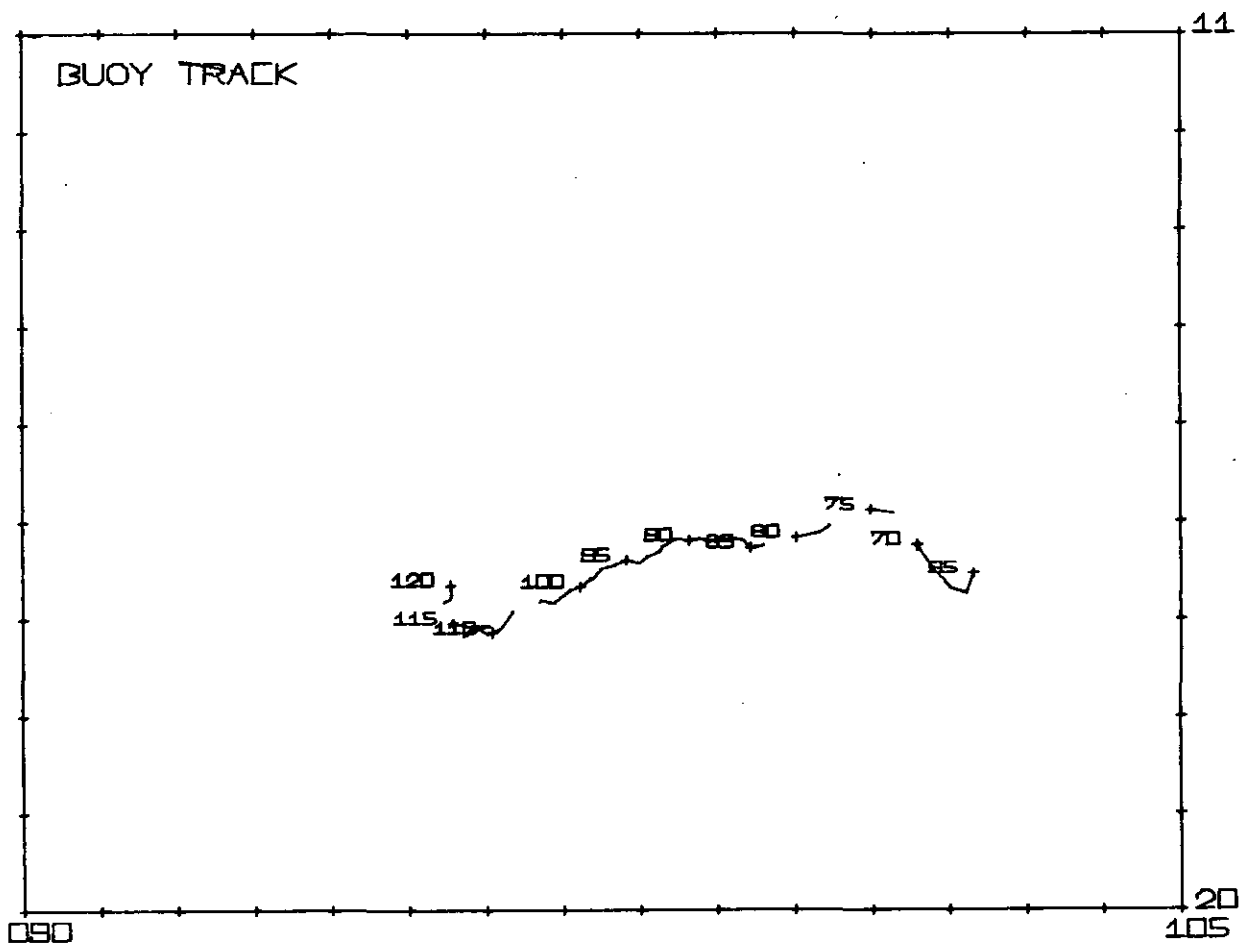
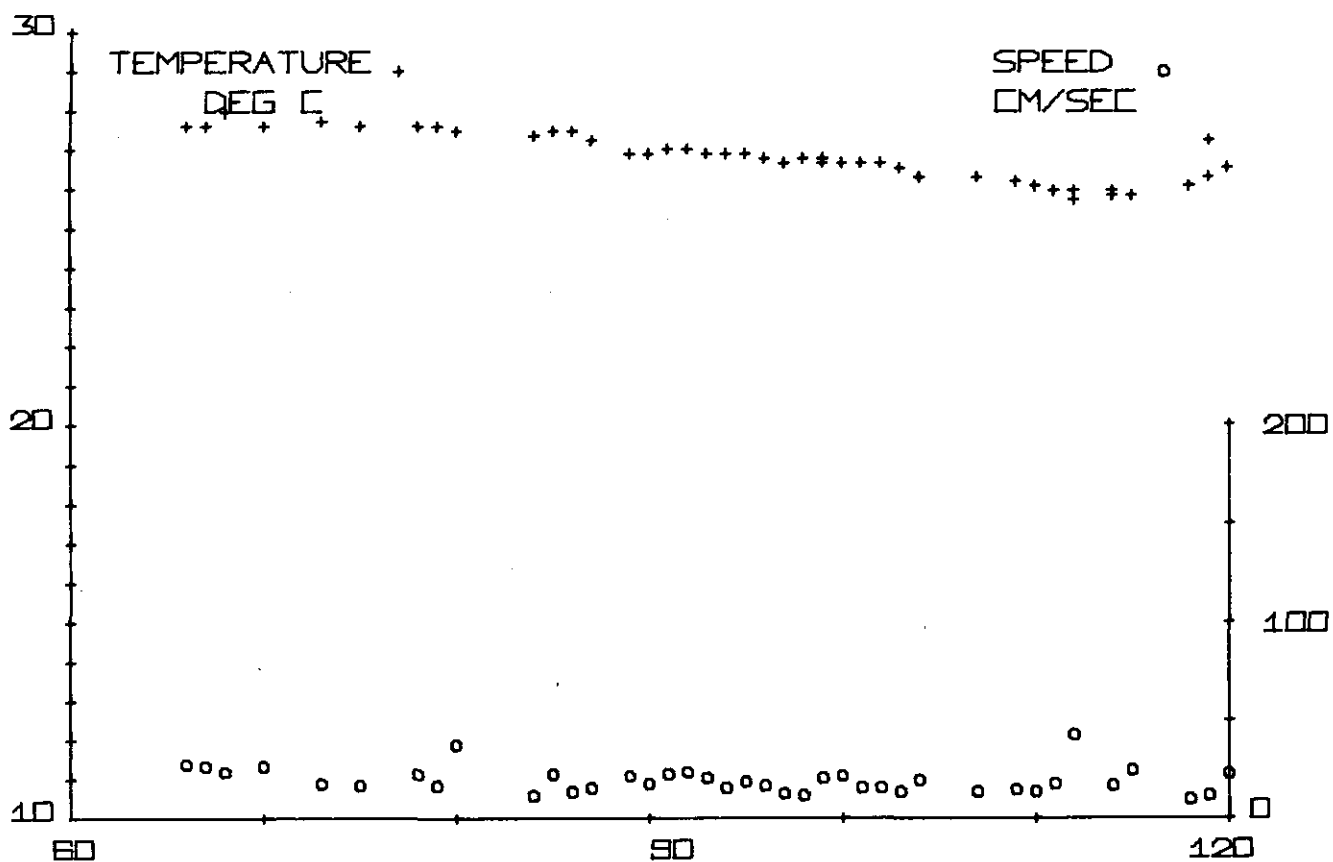
BUOY 1104

DAYS

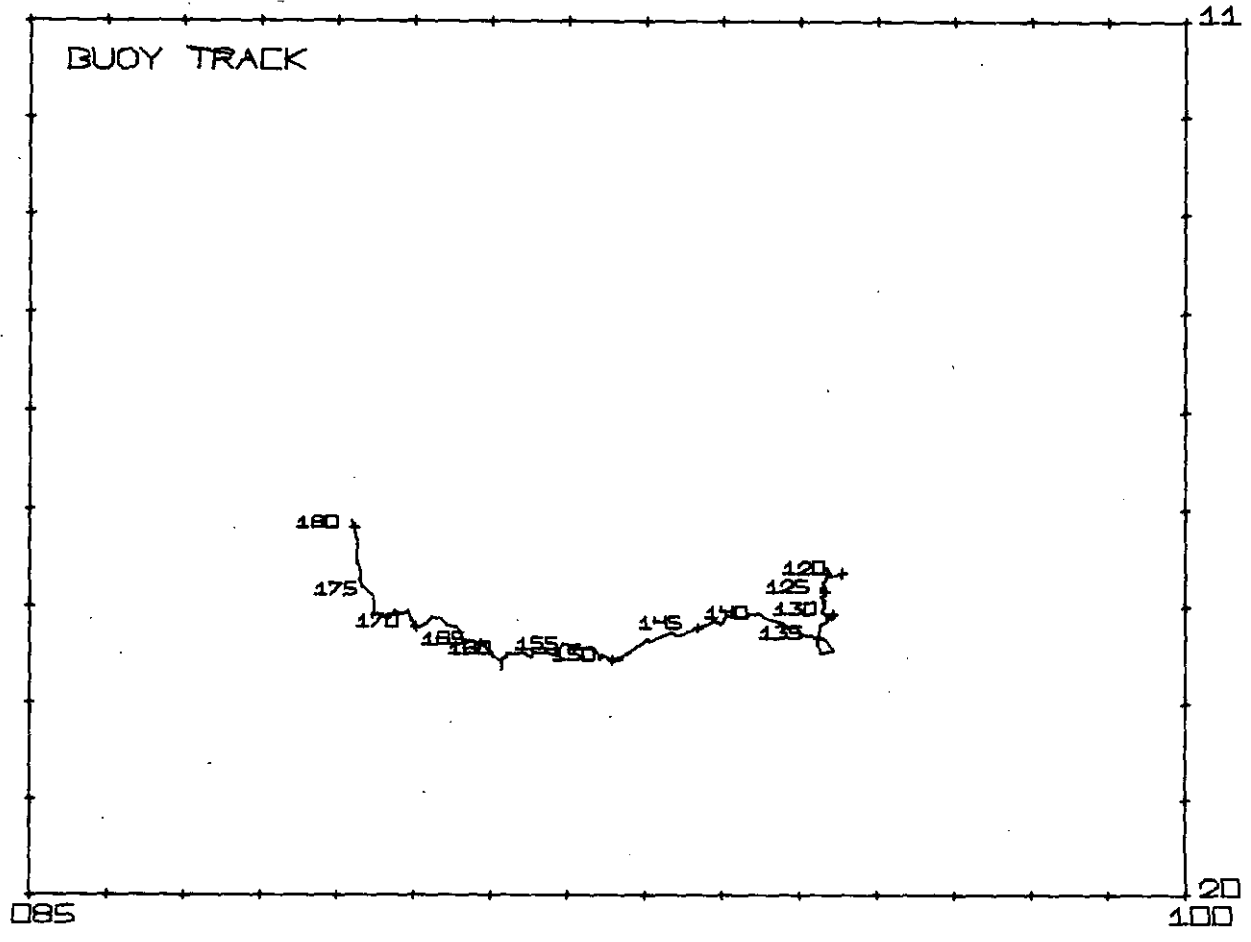
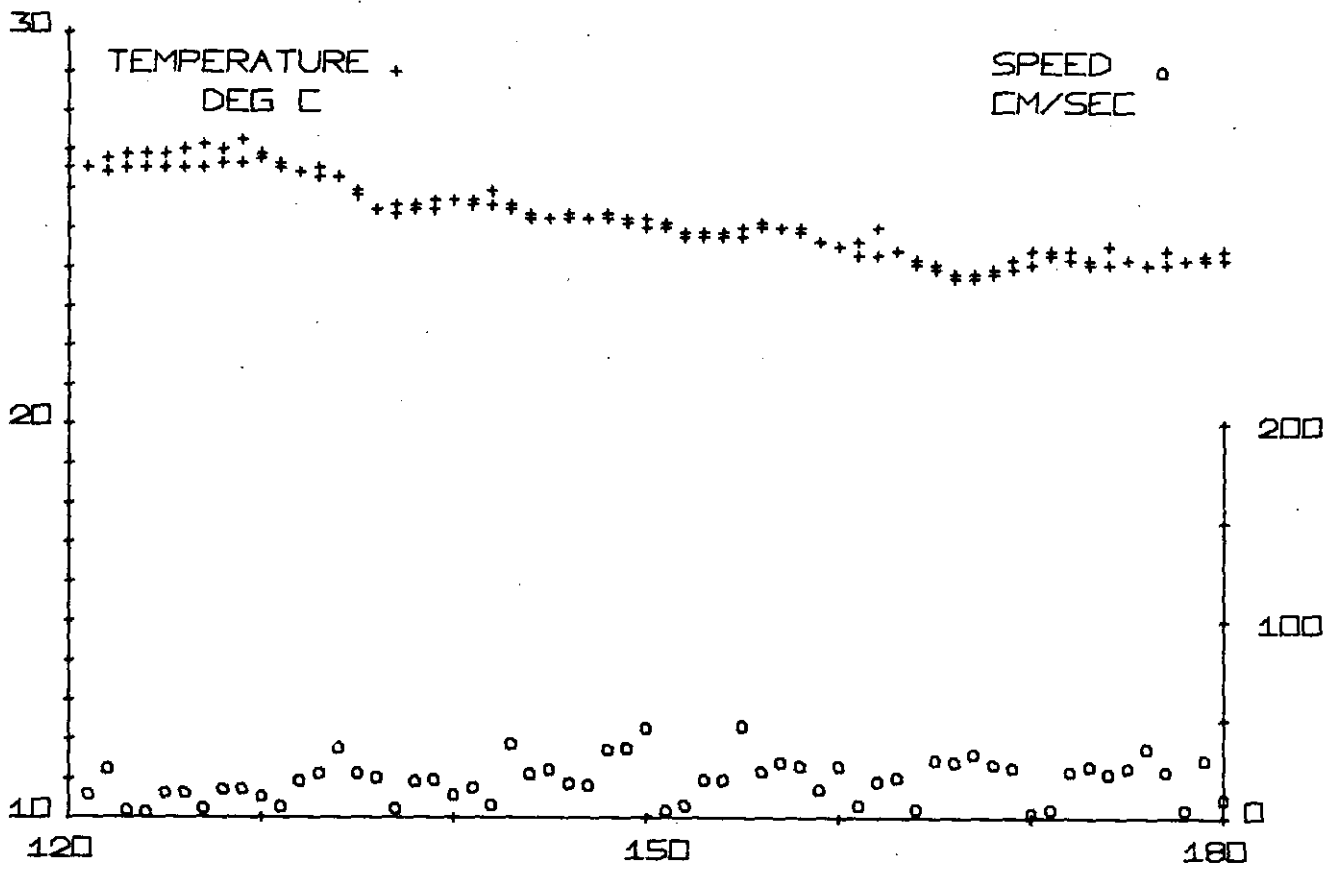
0 - 60 1977



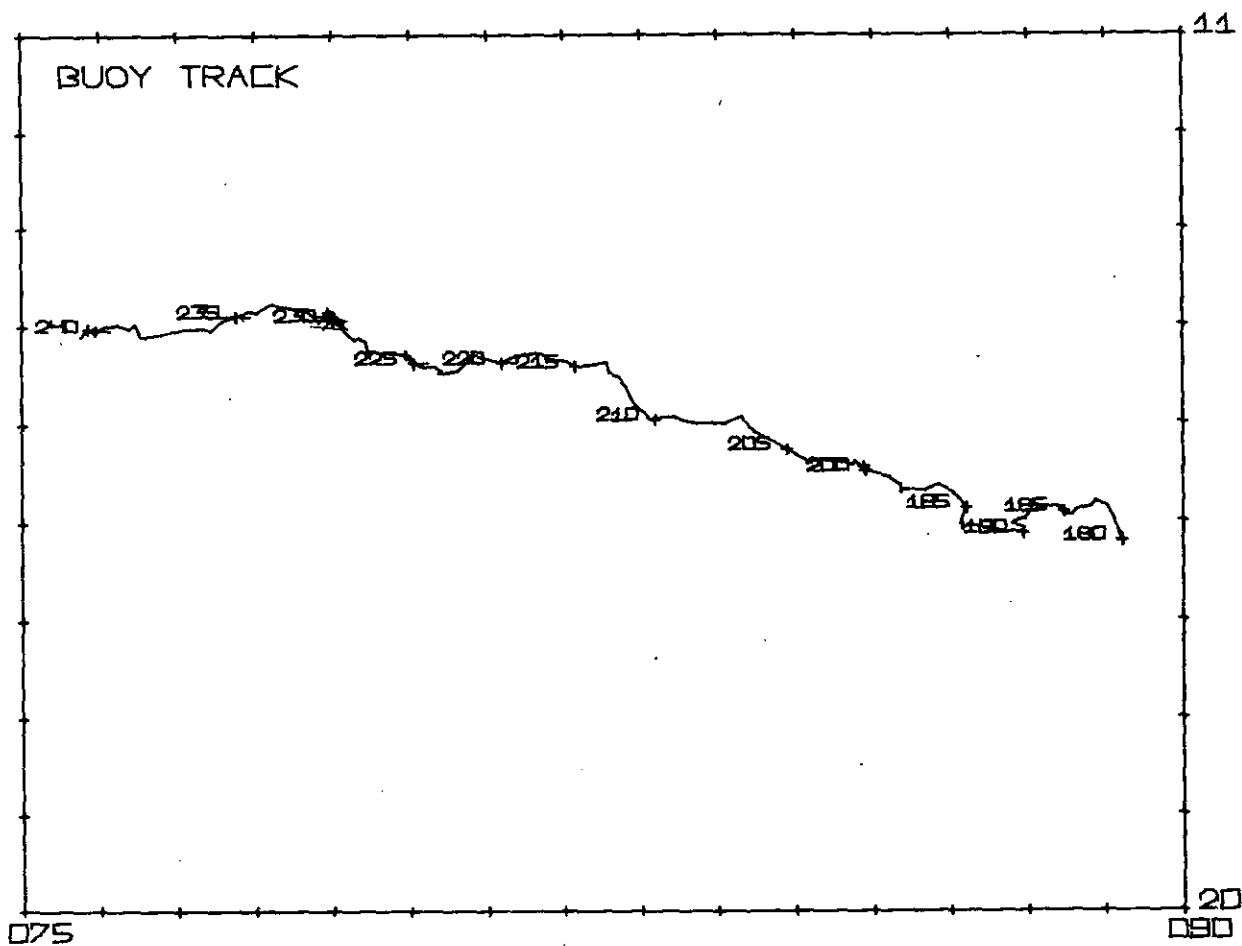
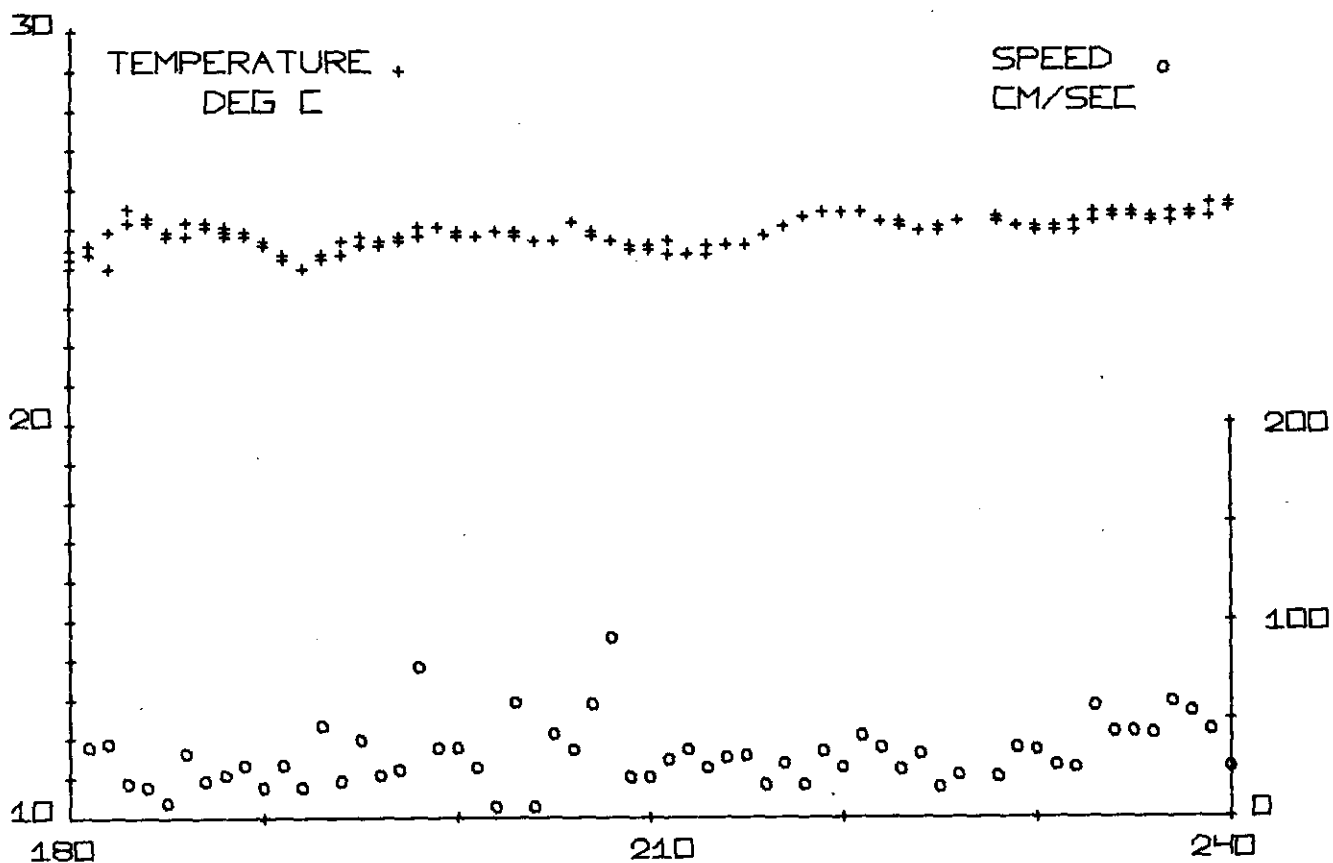
BUOY 1104 DAYS 60-120 1977



BUOY 1104 DAYS 120-180 1977

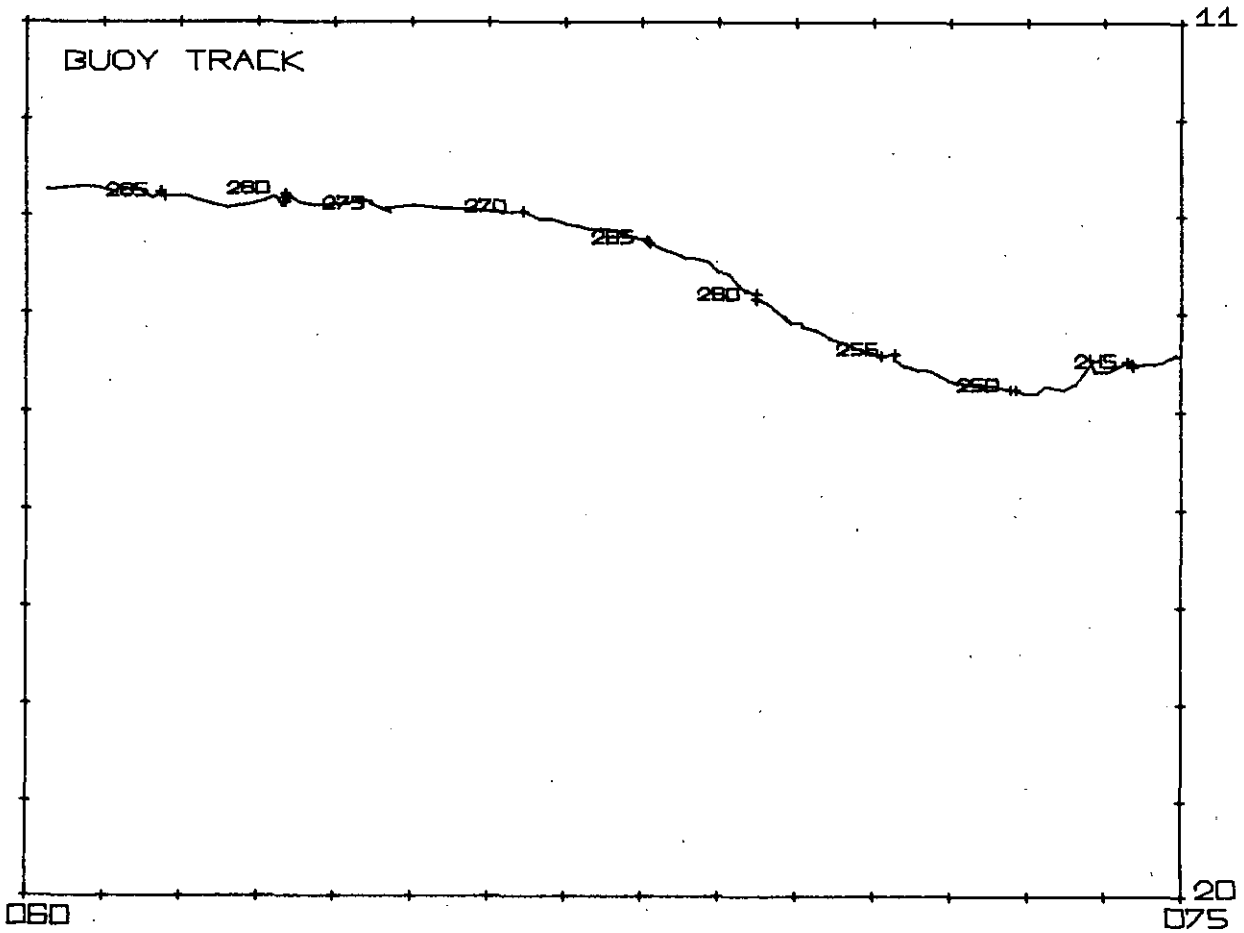
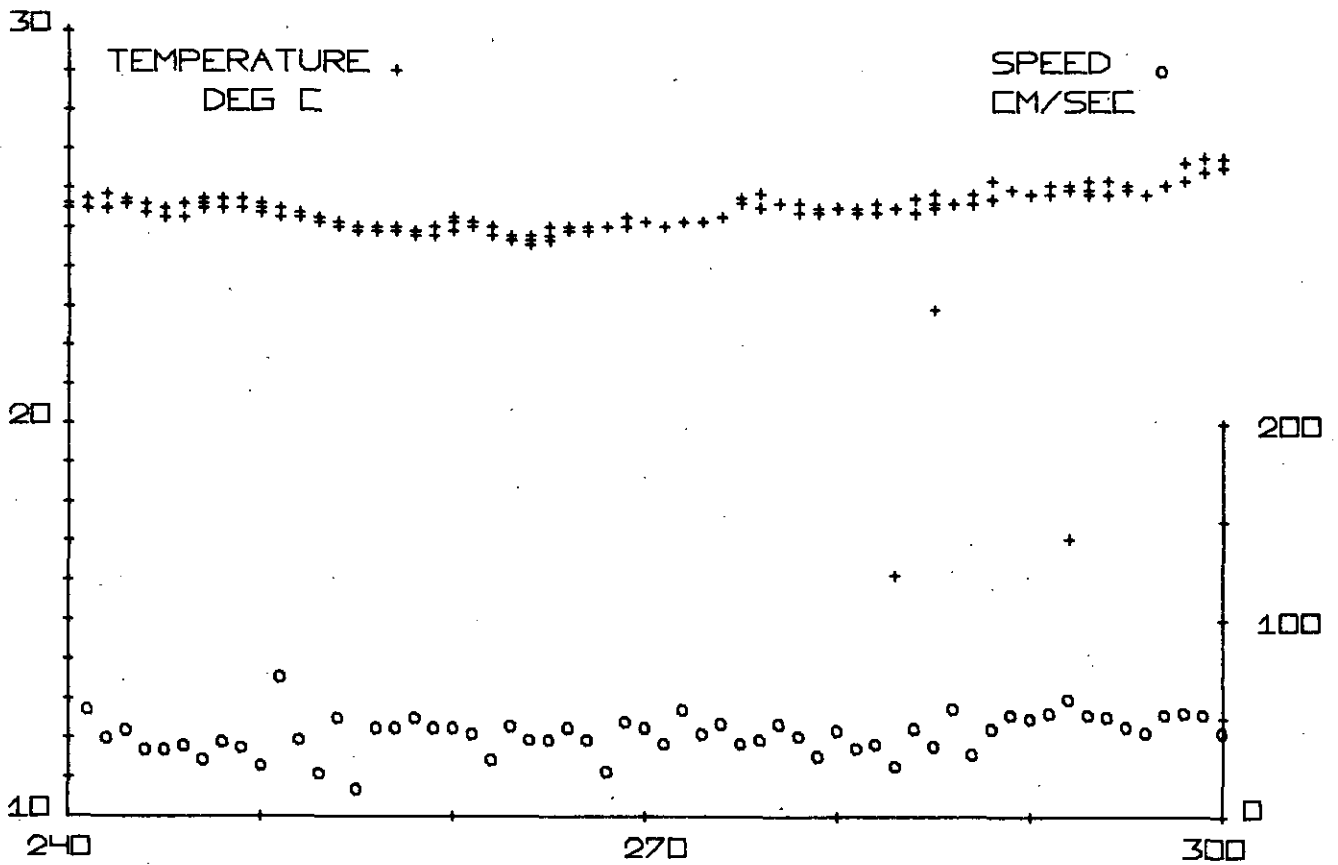


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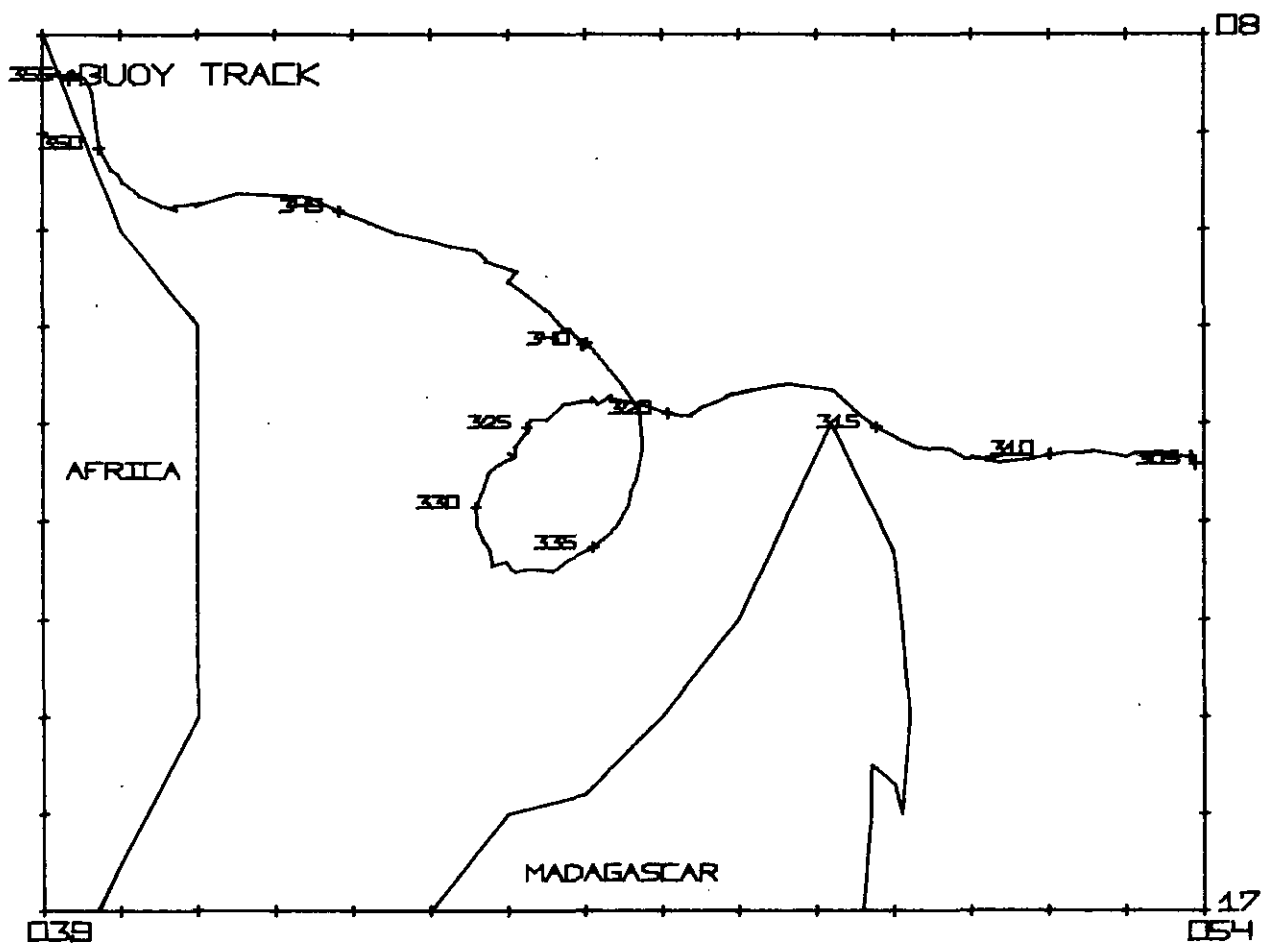
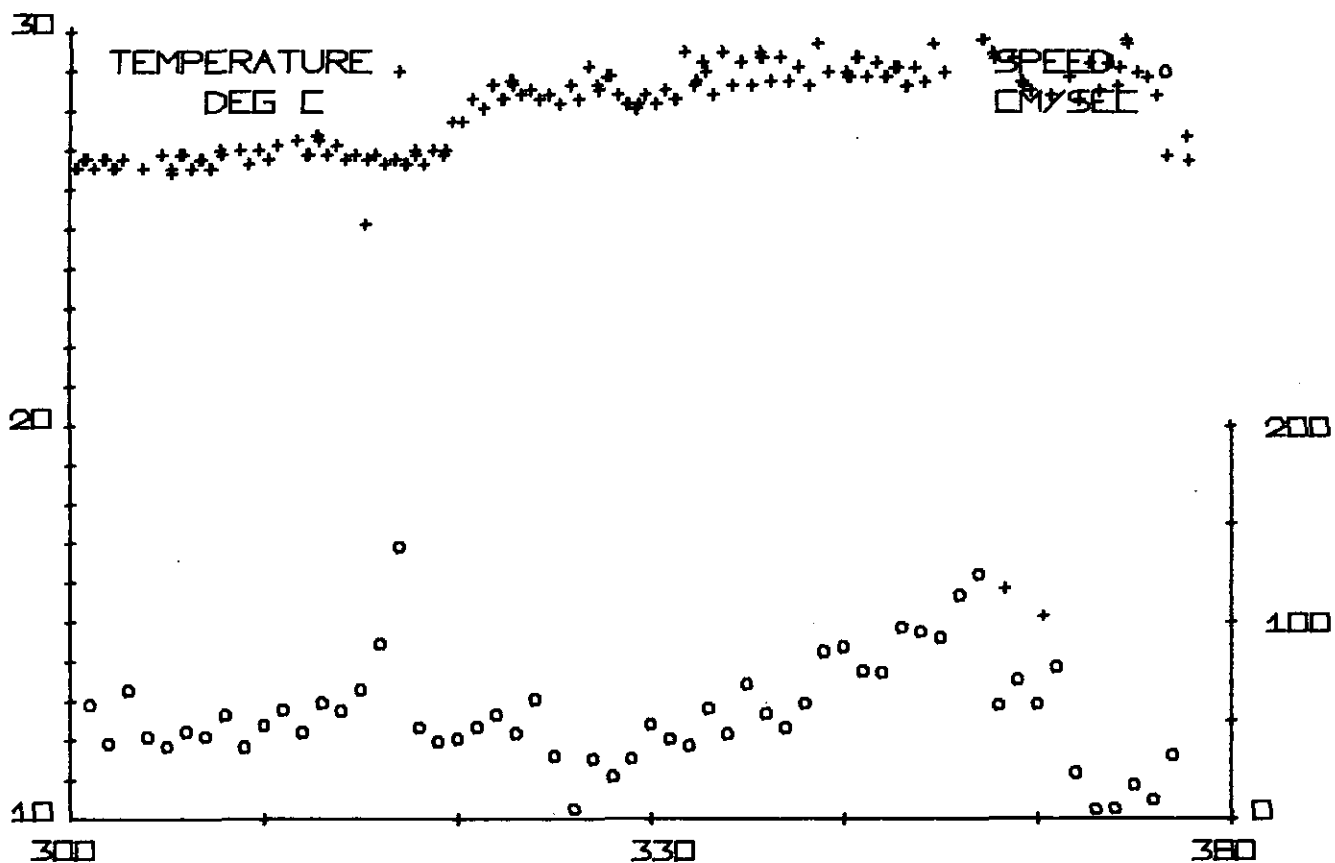


BUOY 1104

DAYS 240-300 1977

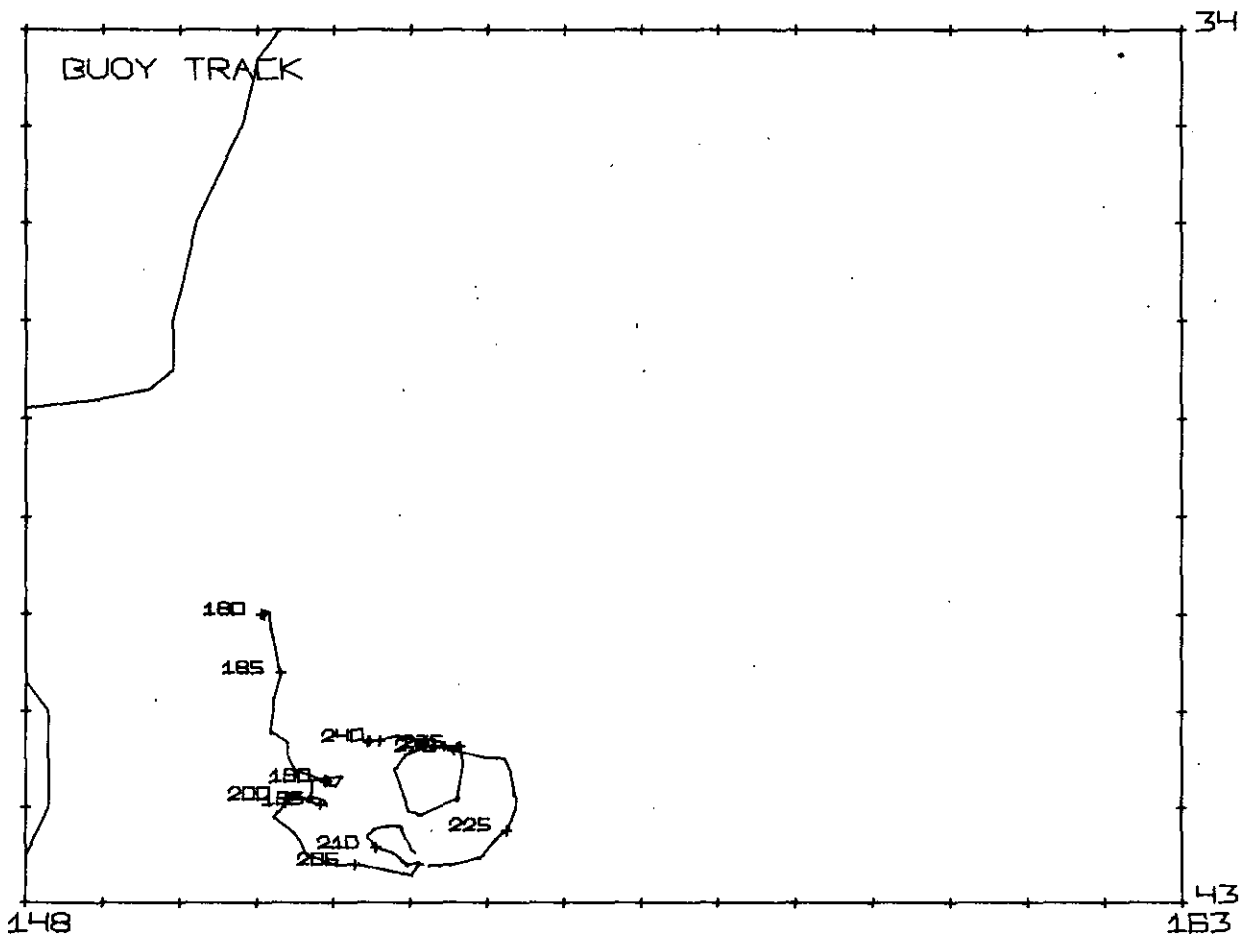
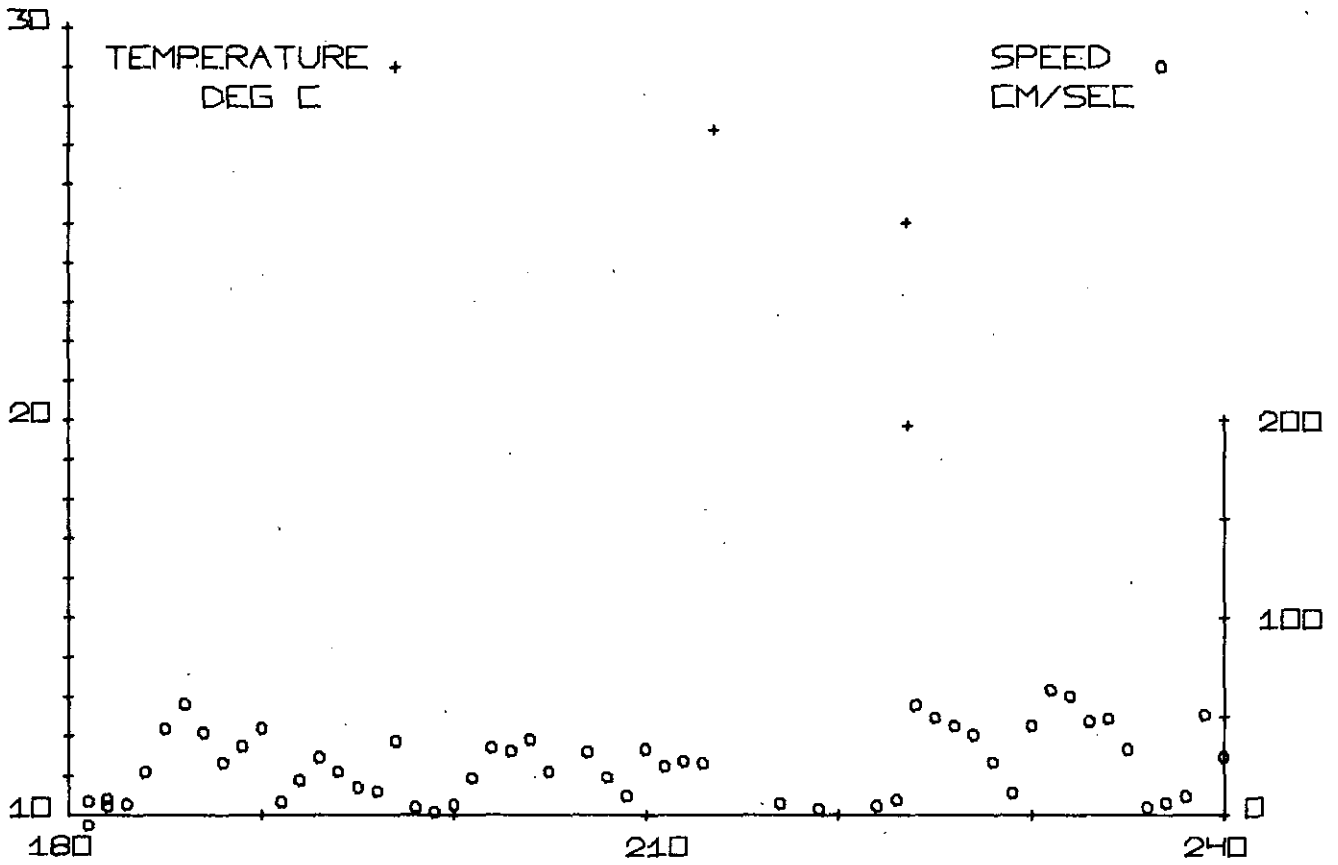


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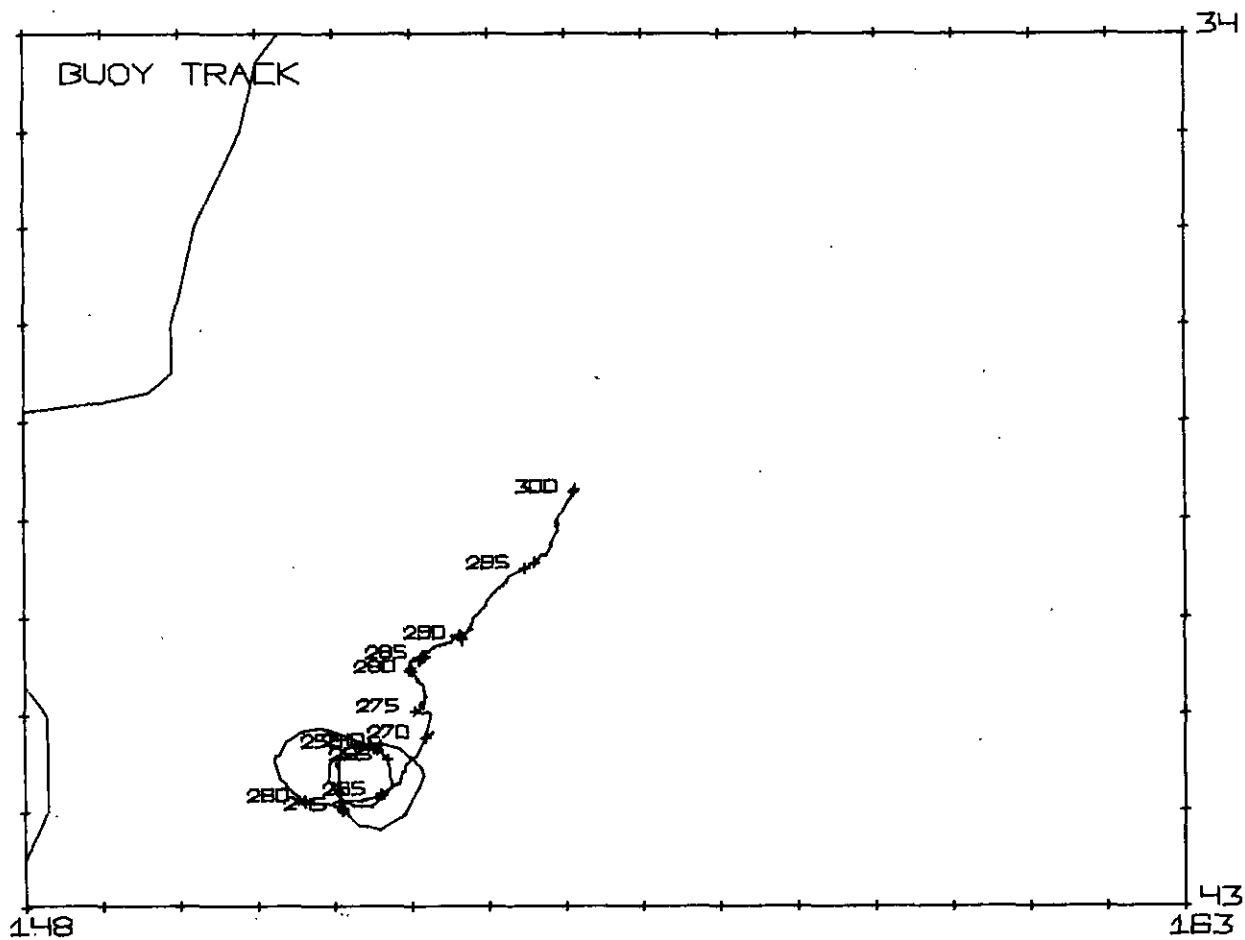
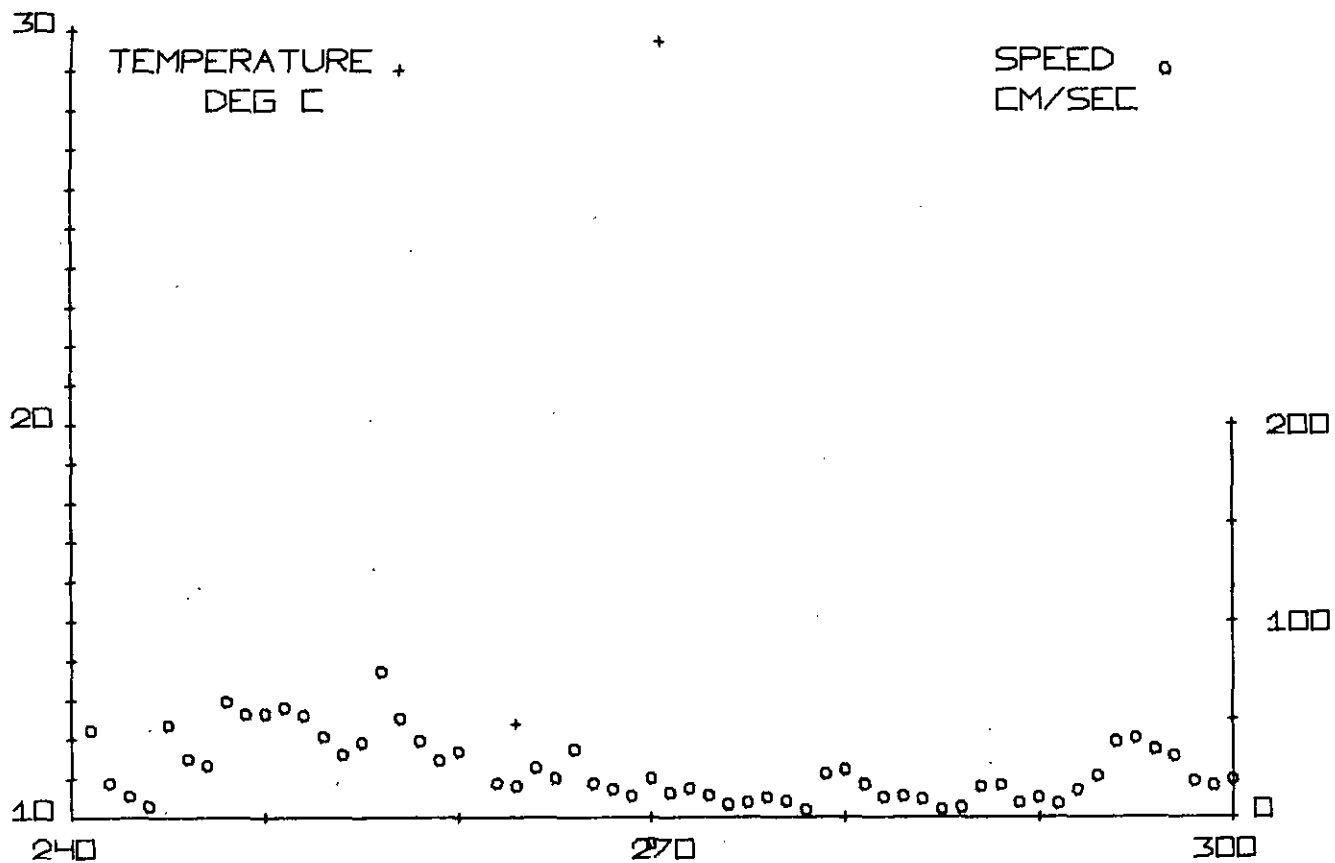


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DAYS 180-240 1977

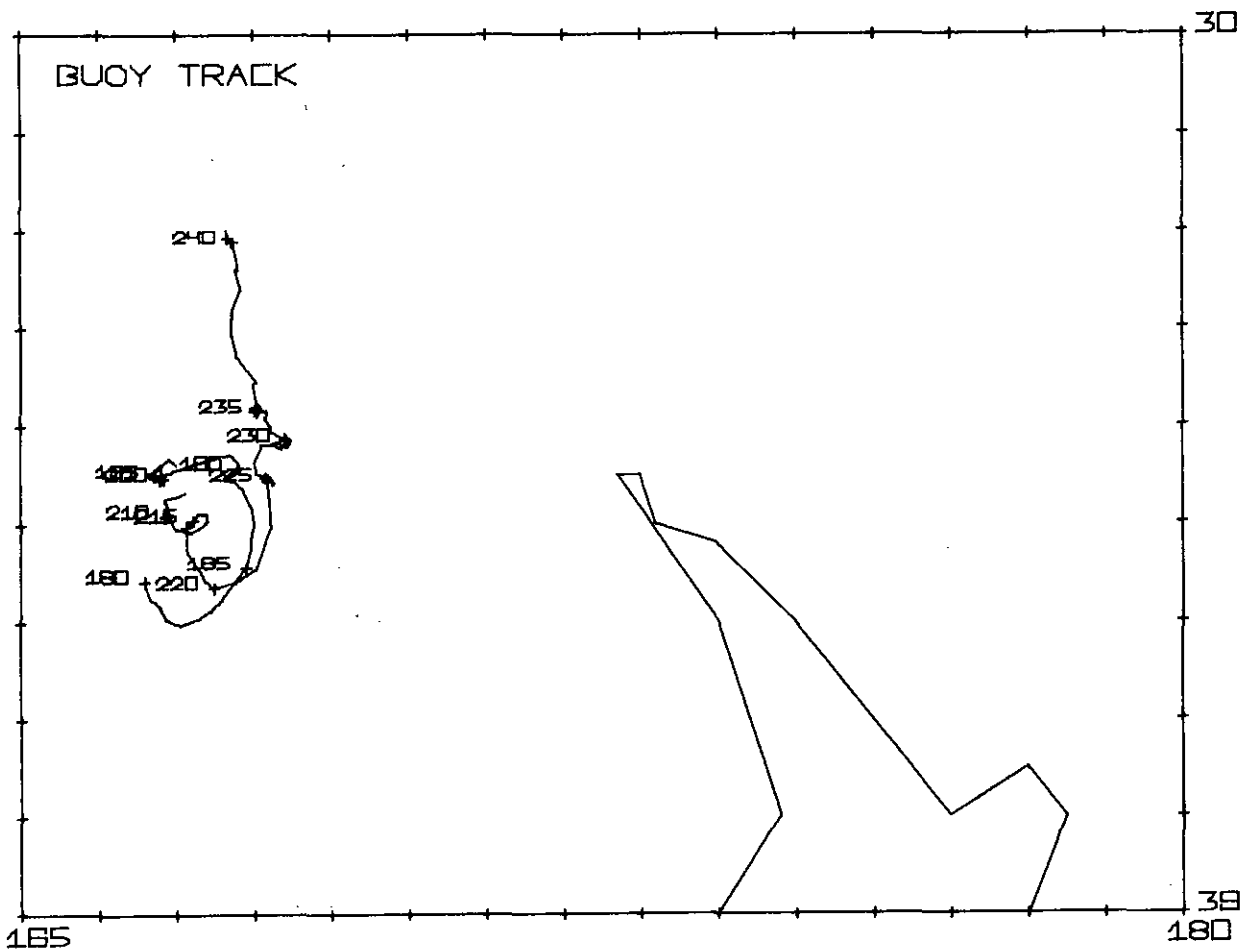
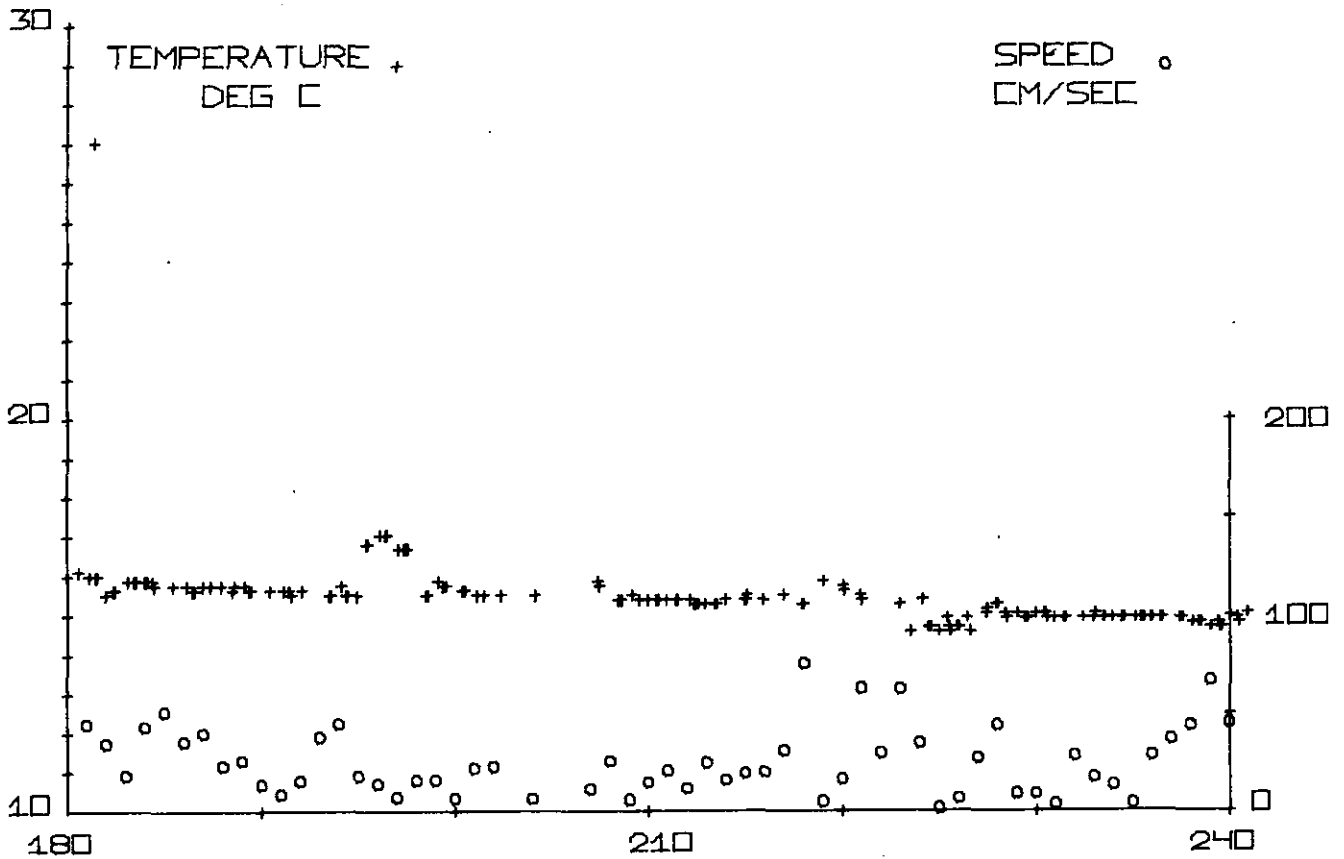


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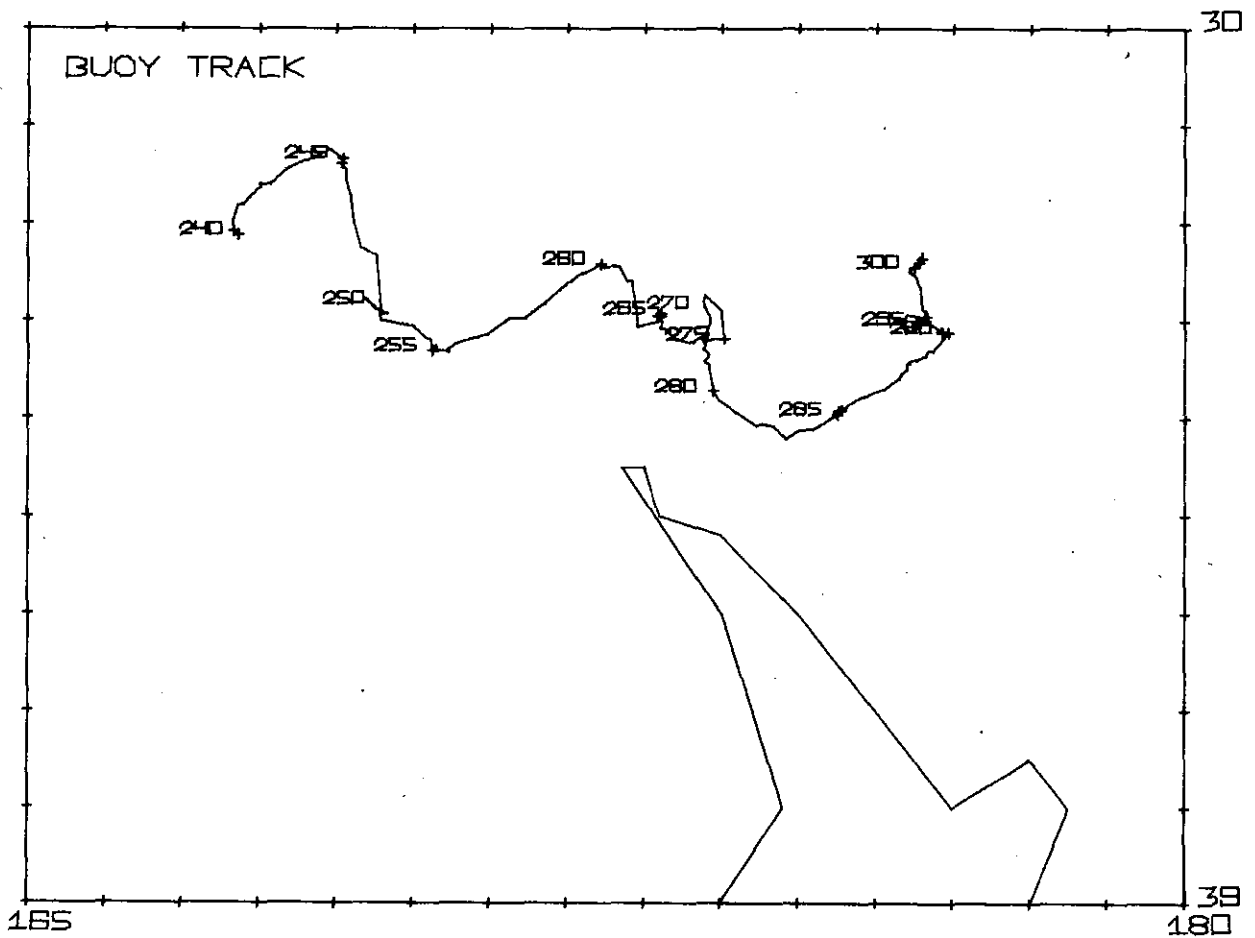
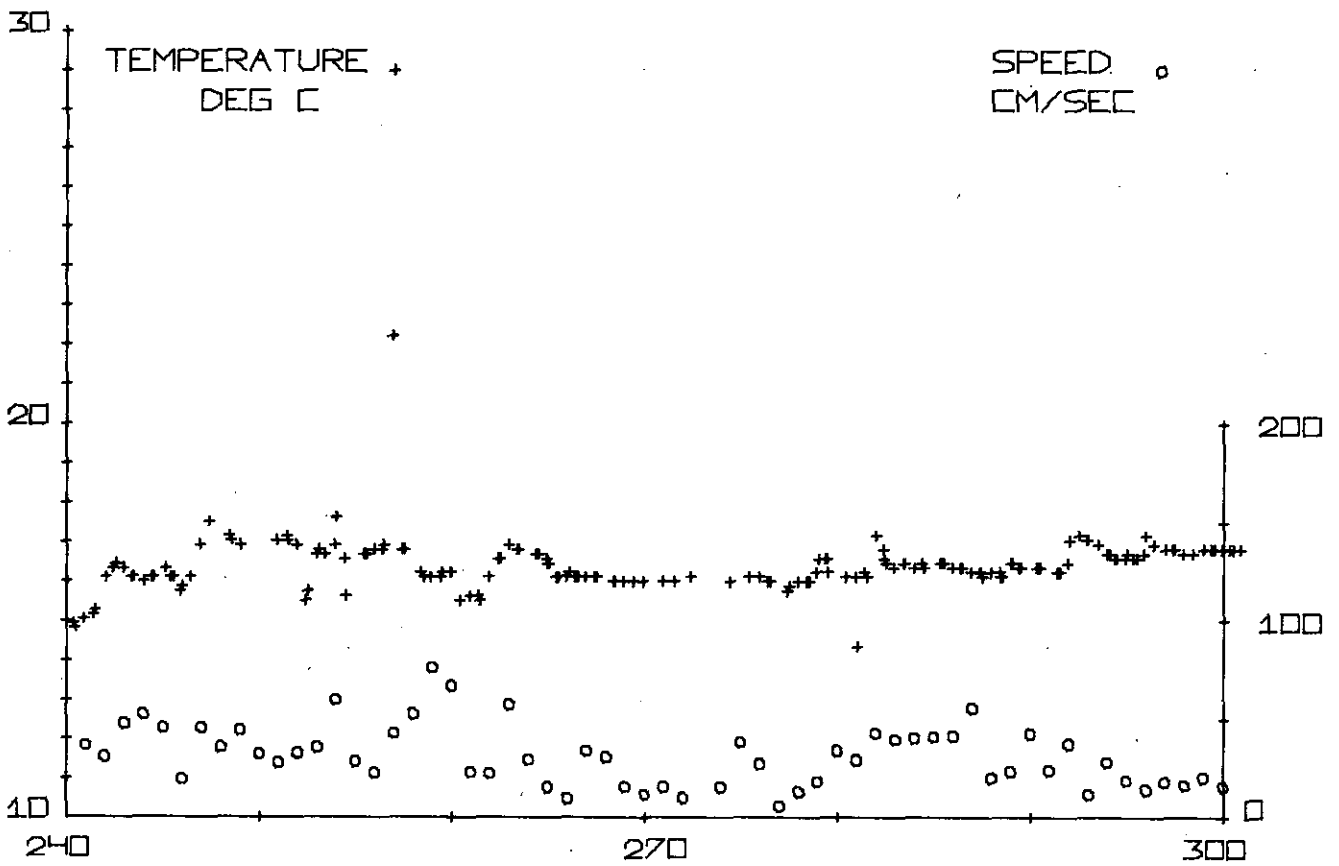
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DAYS 180-240 1977



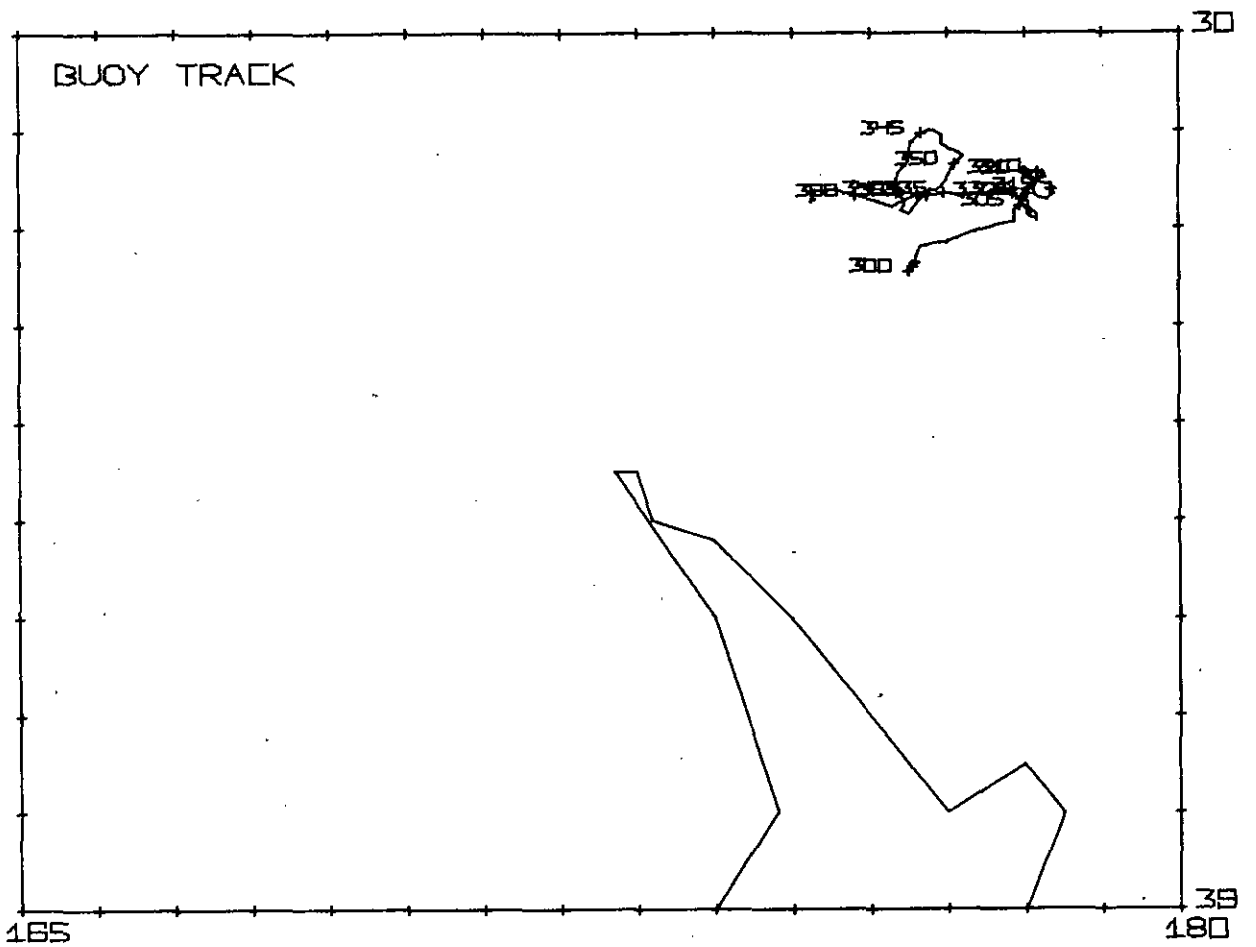
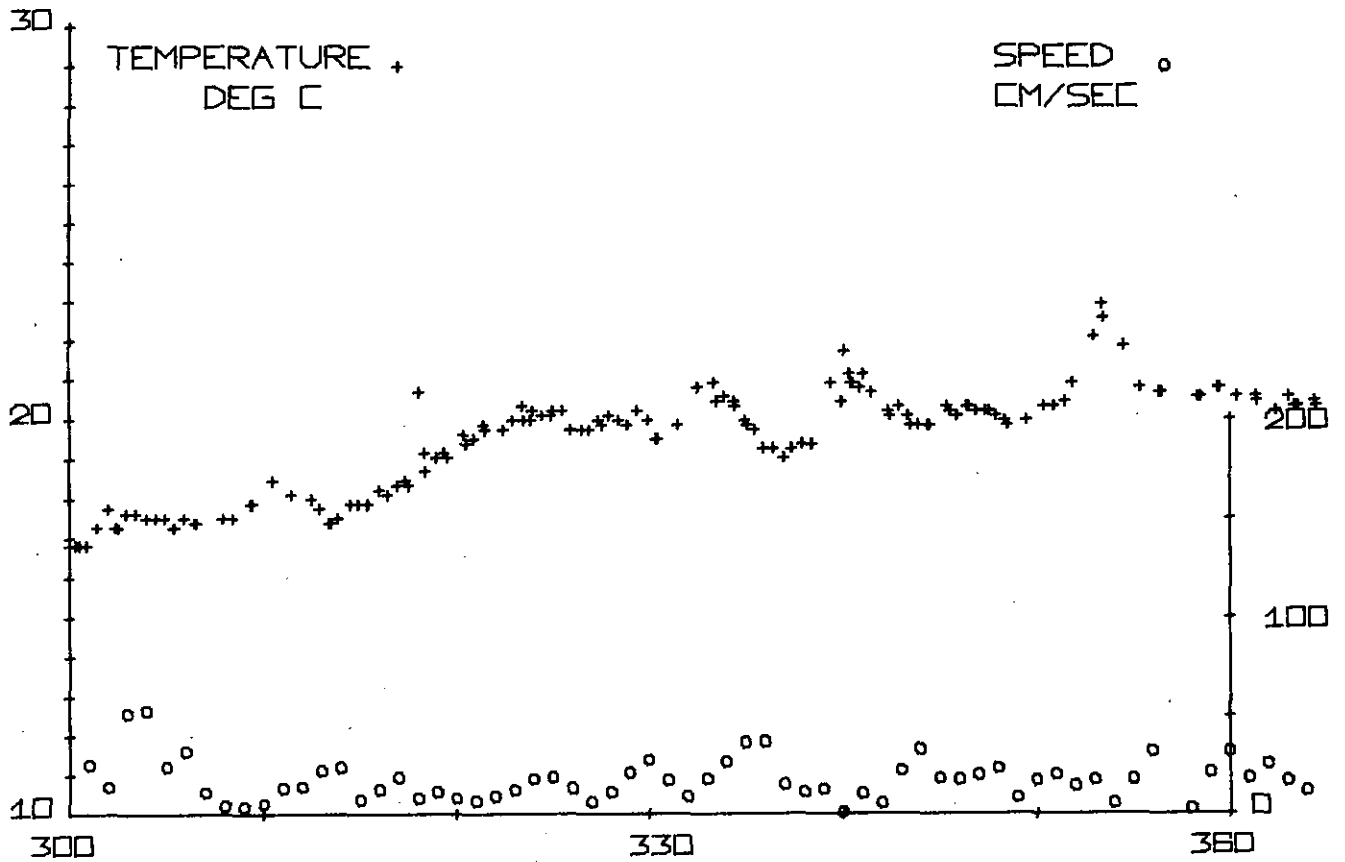
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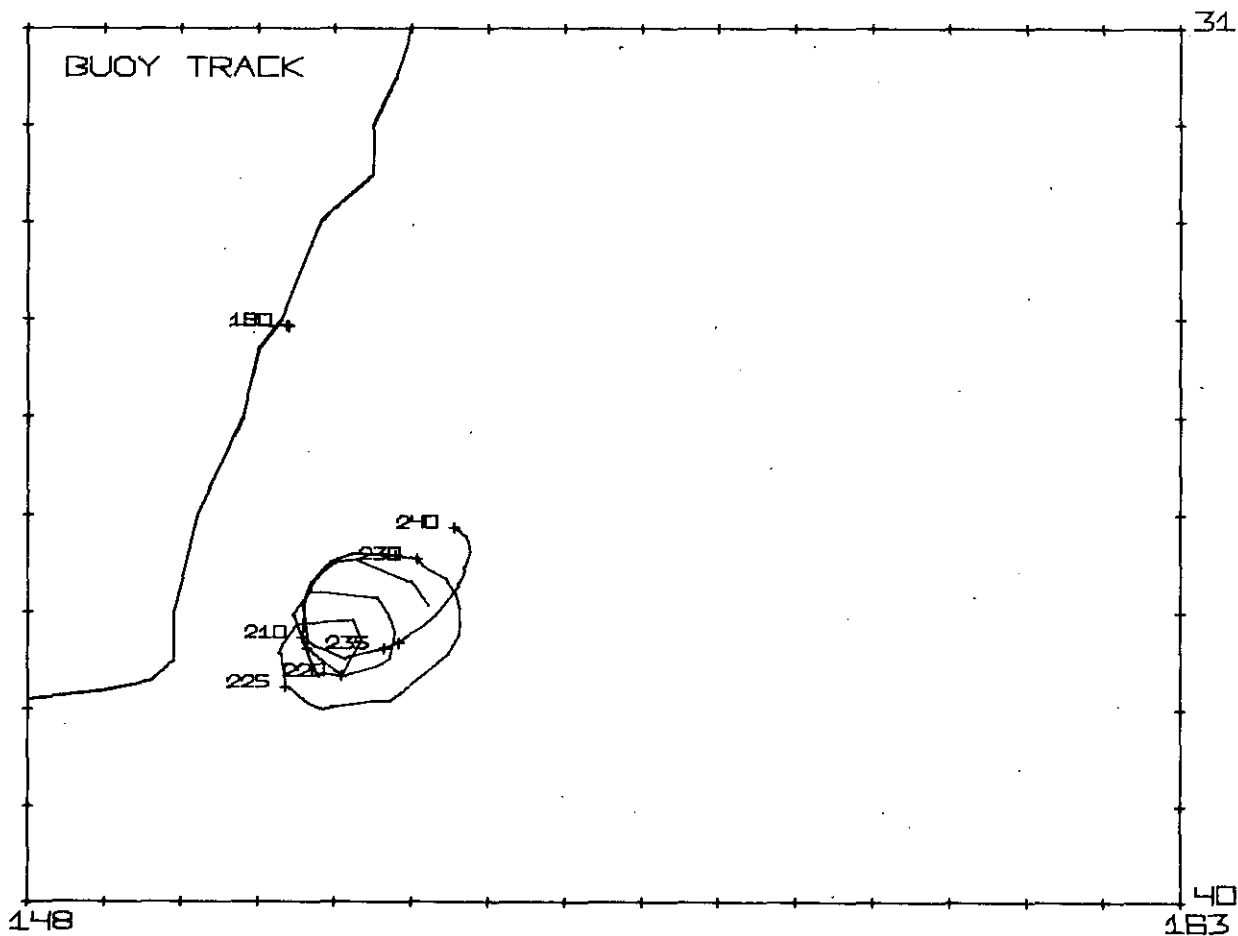
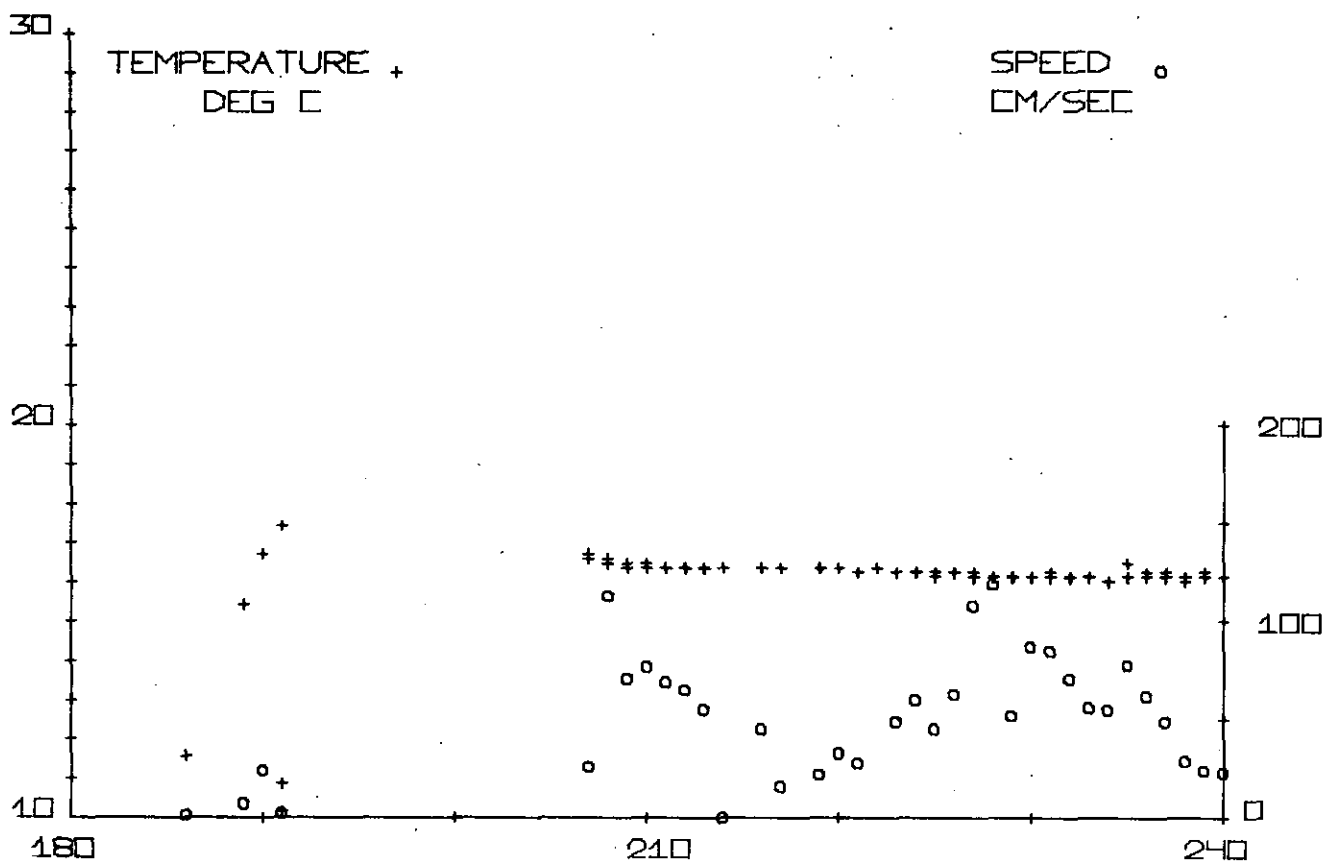
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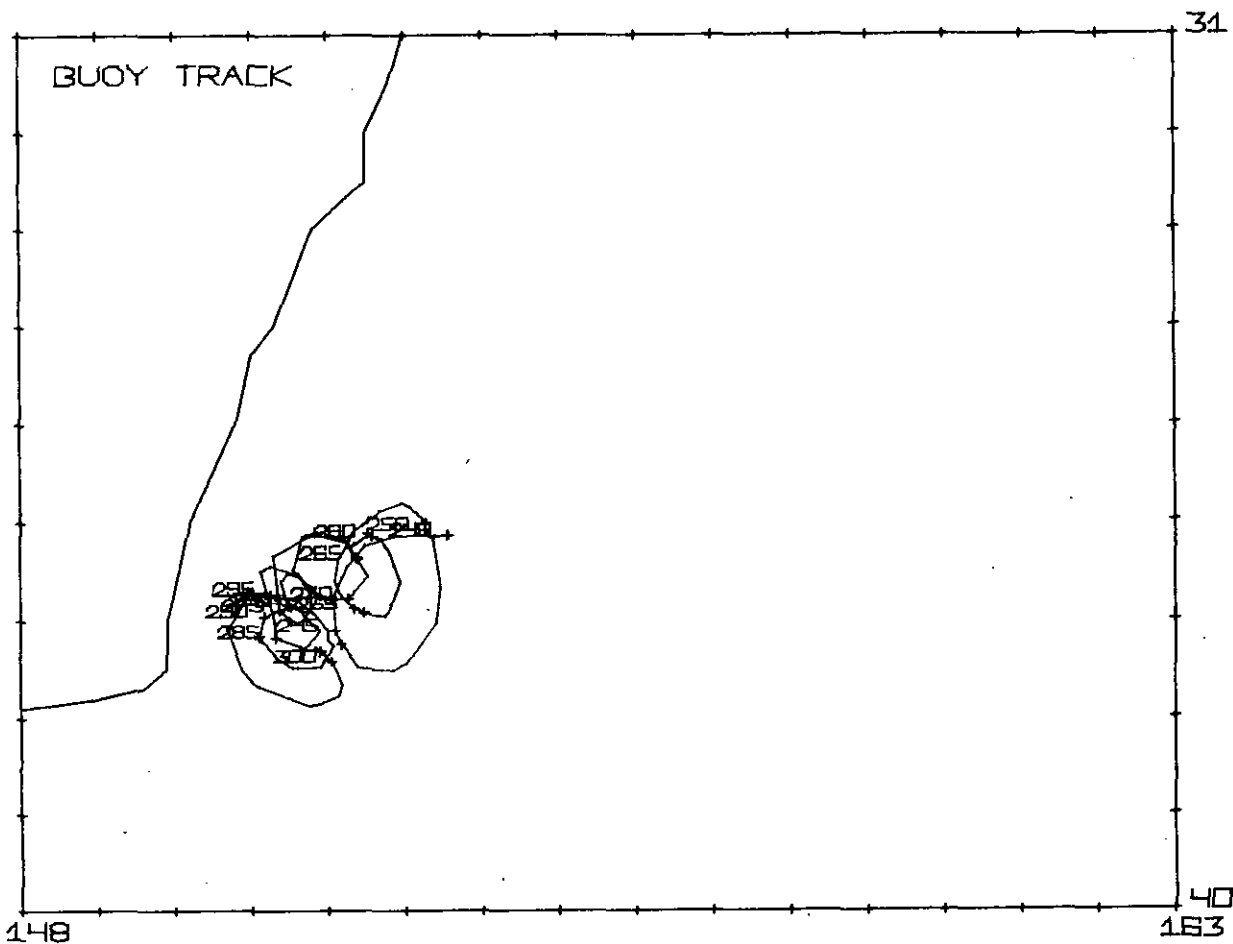
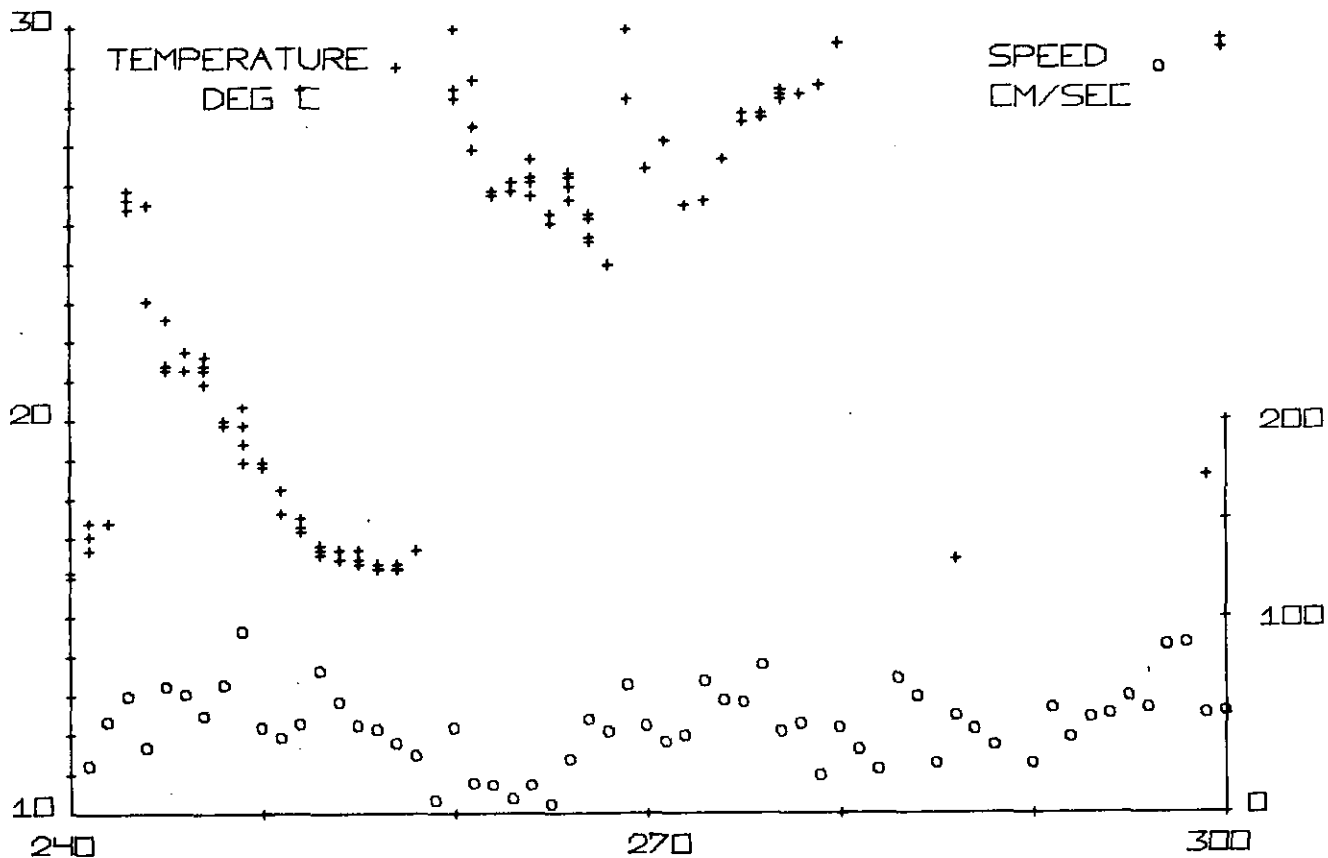


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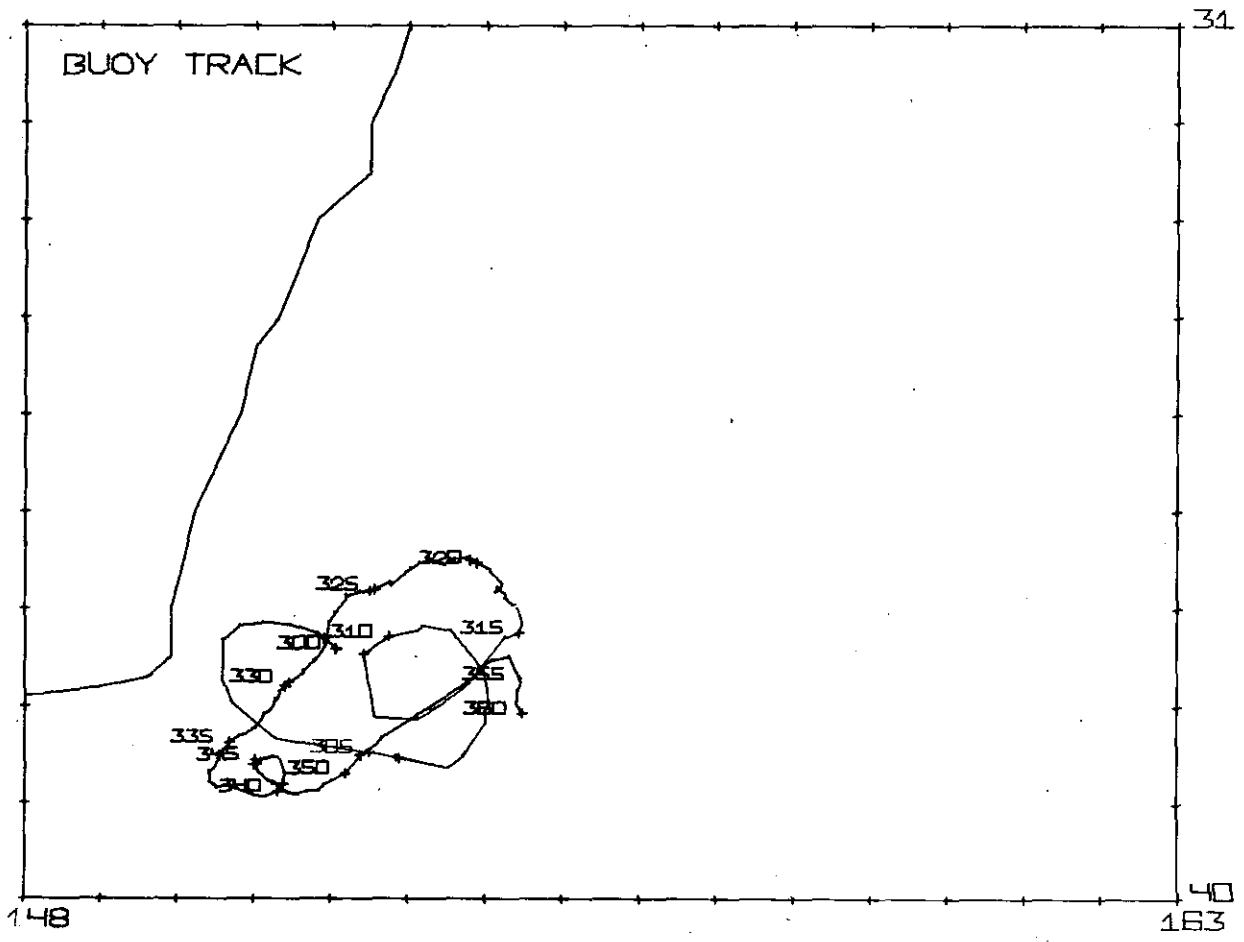
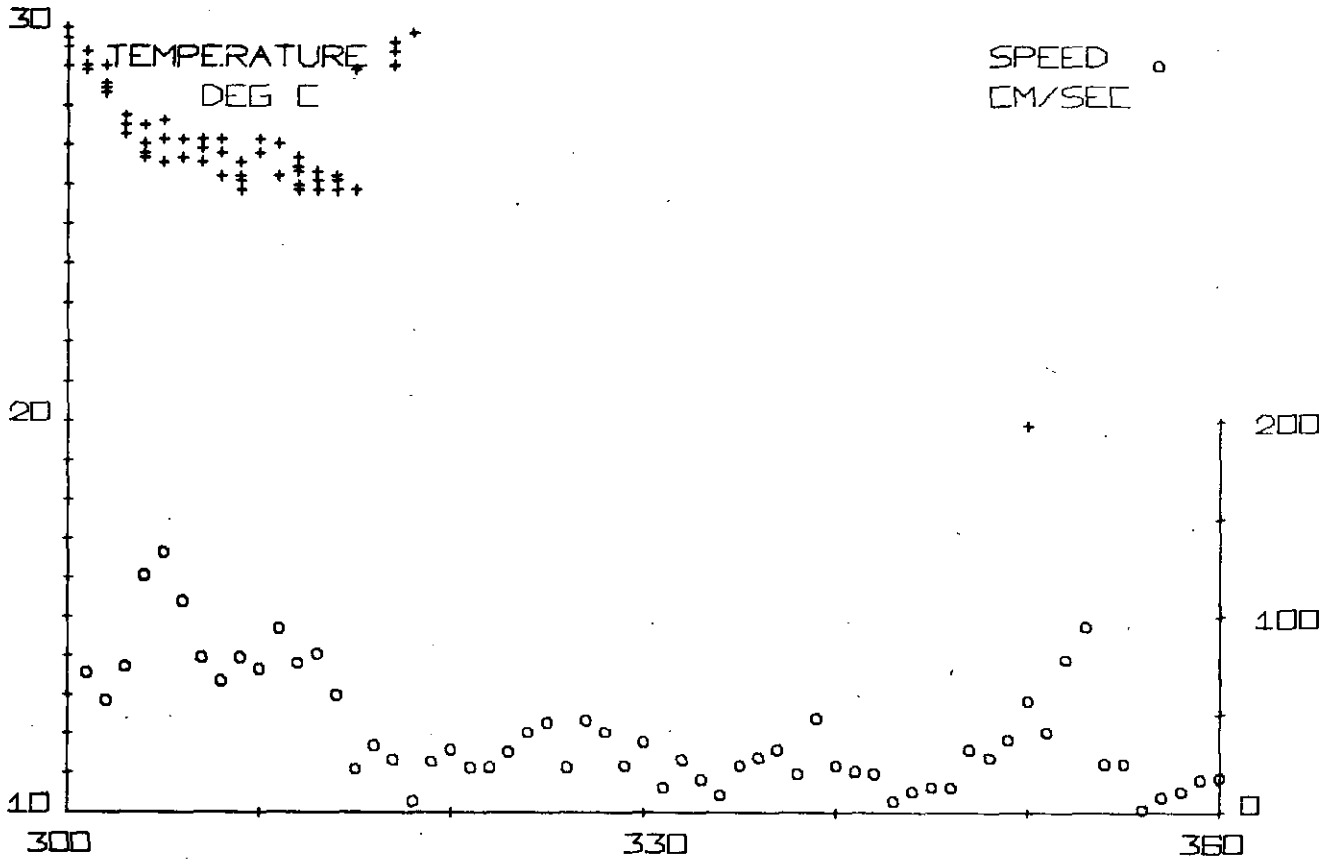


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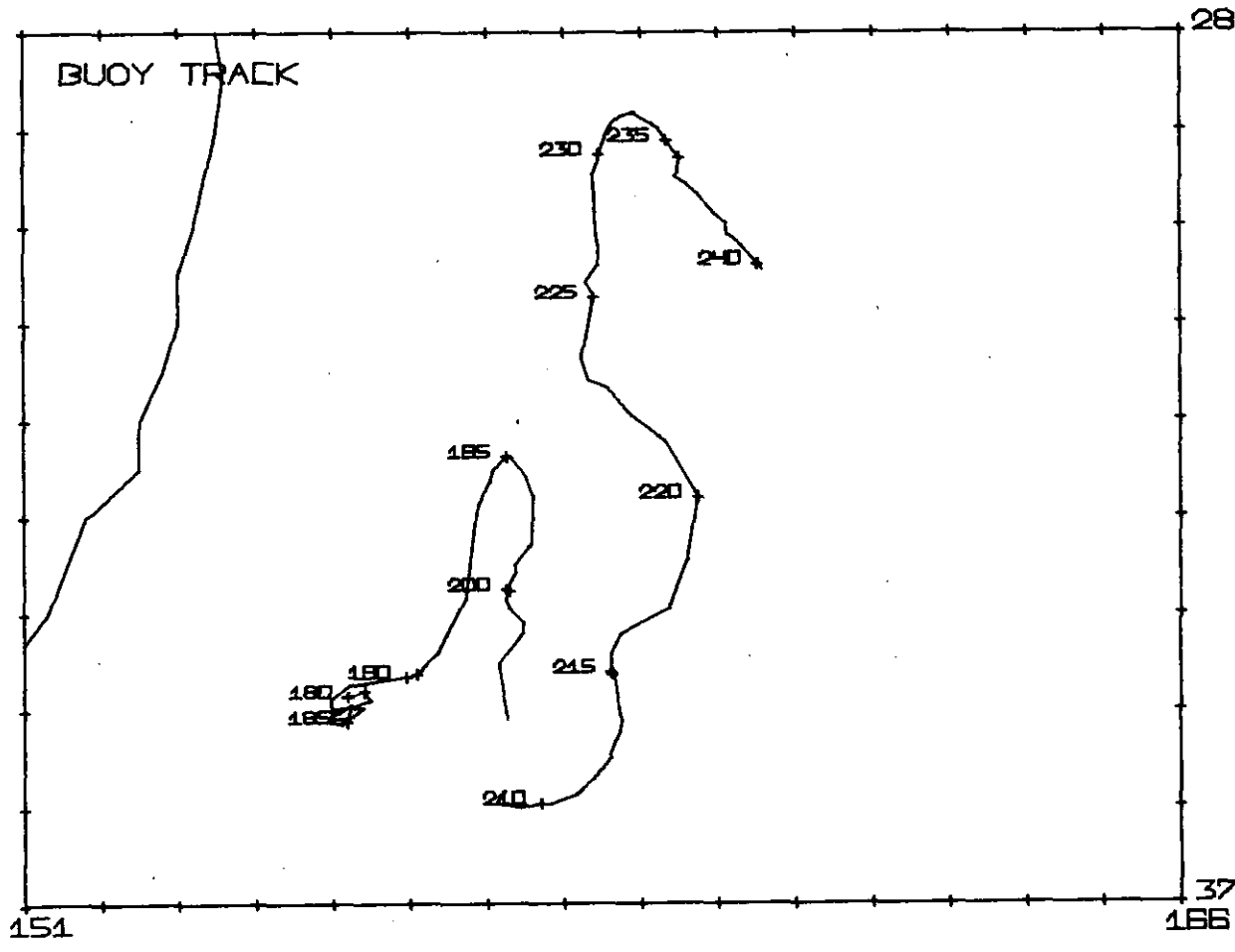
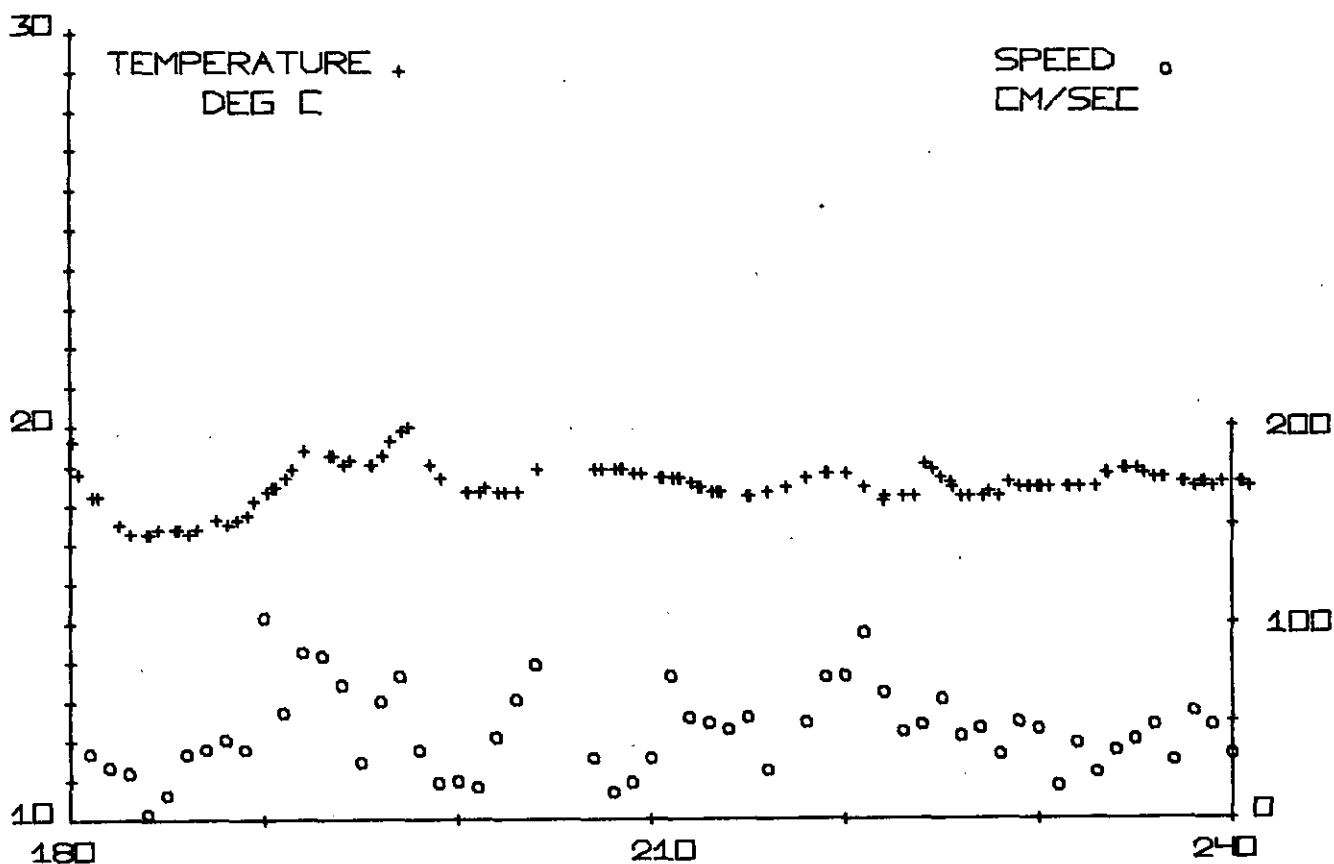
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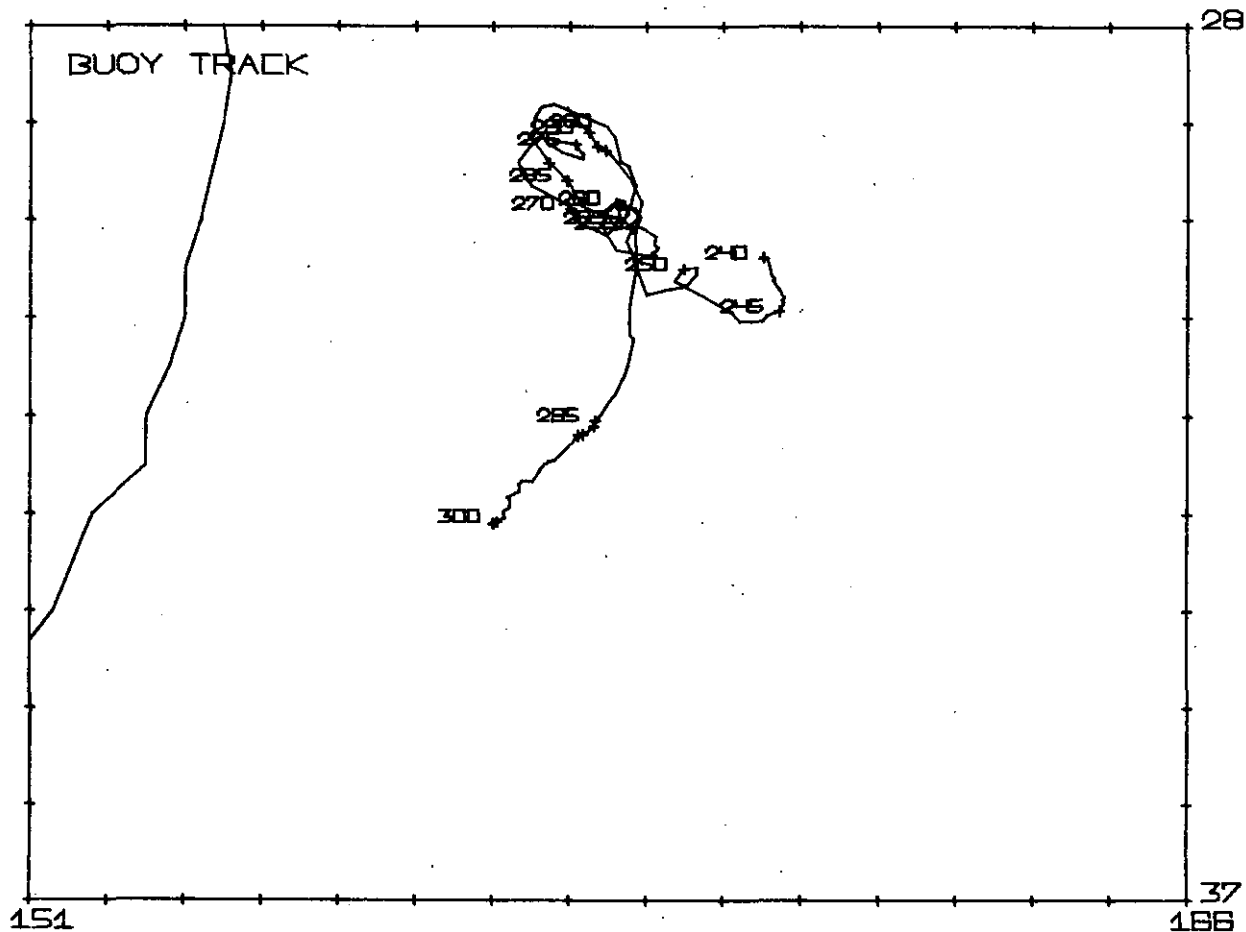
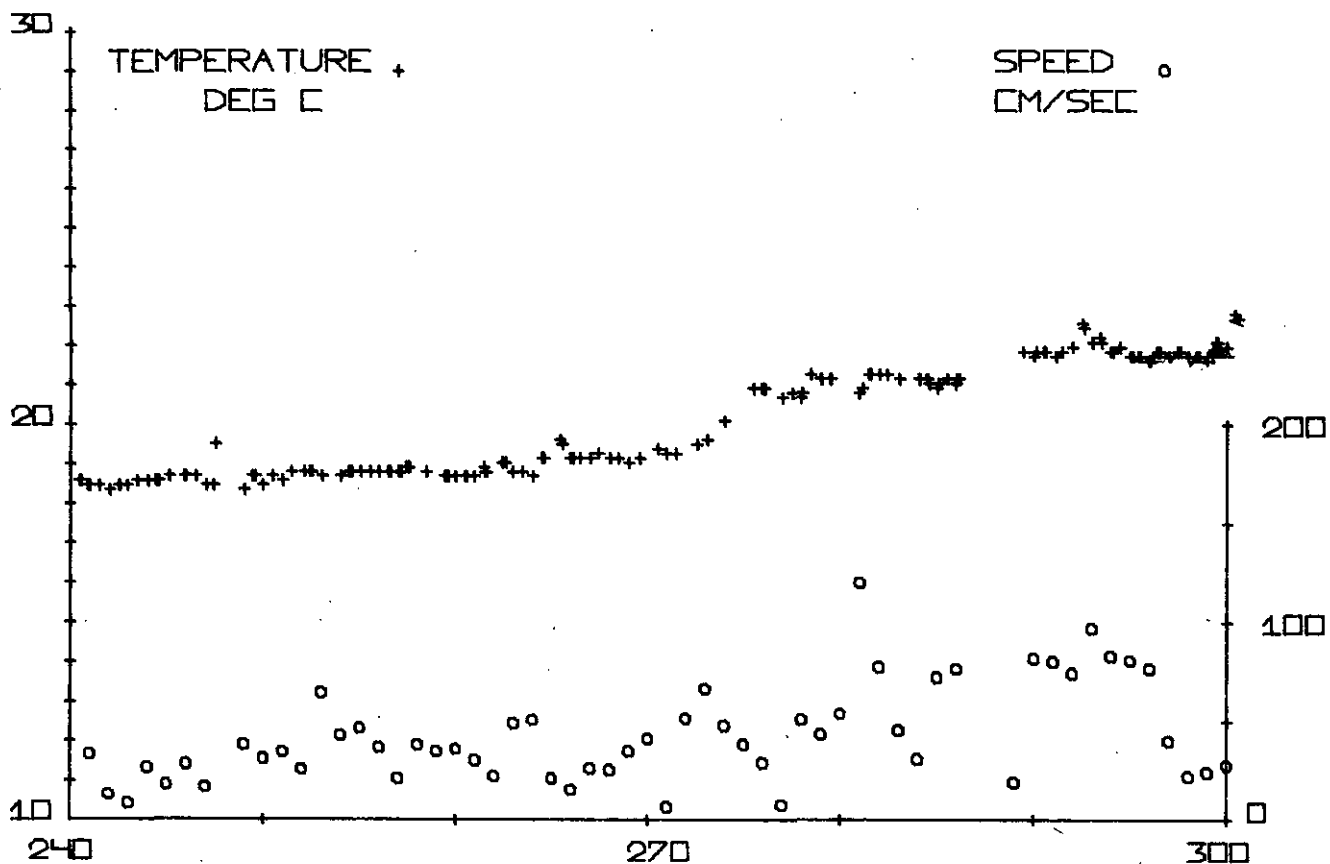
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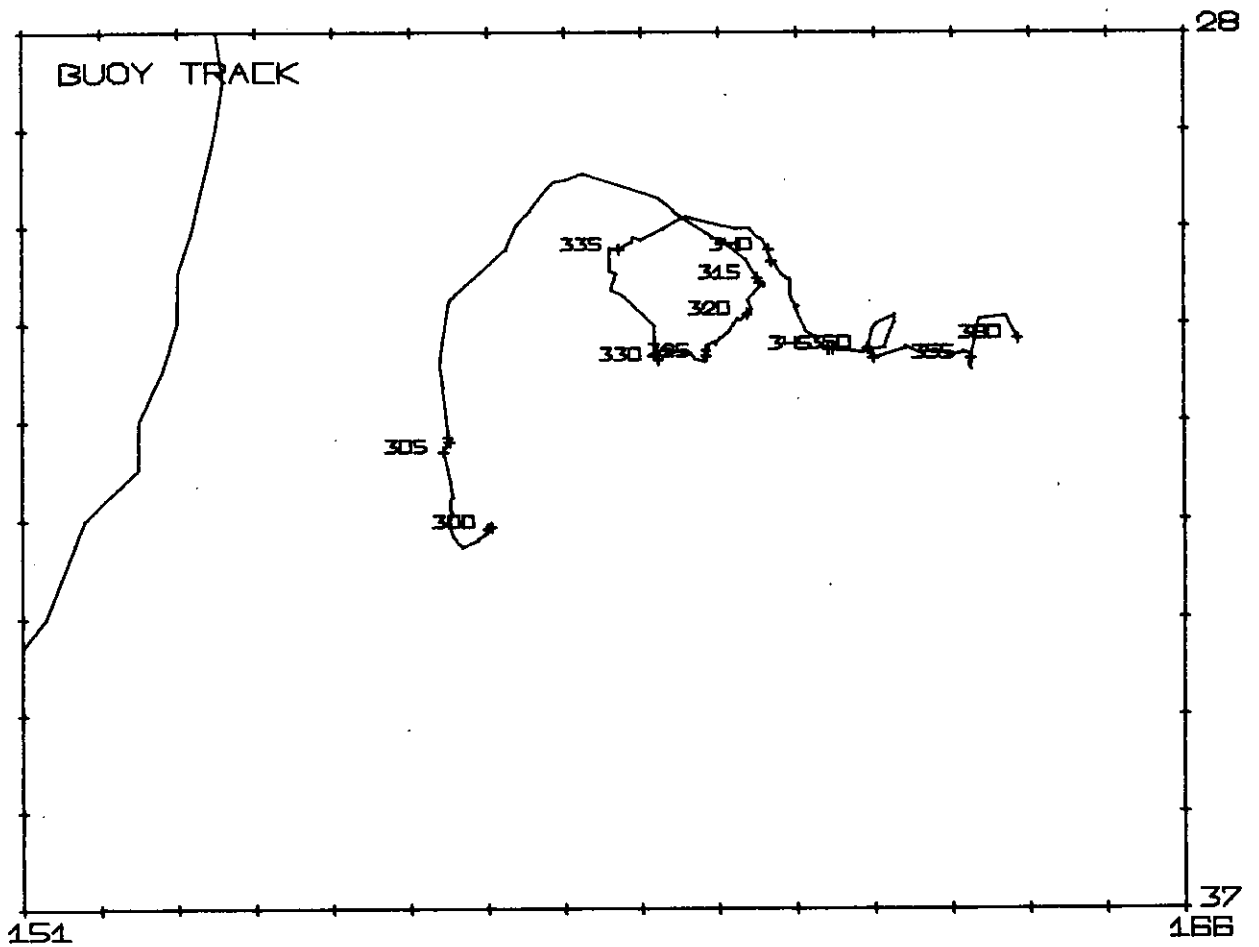
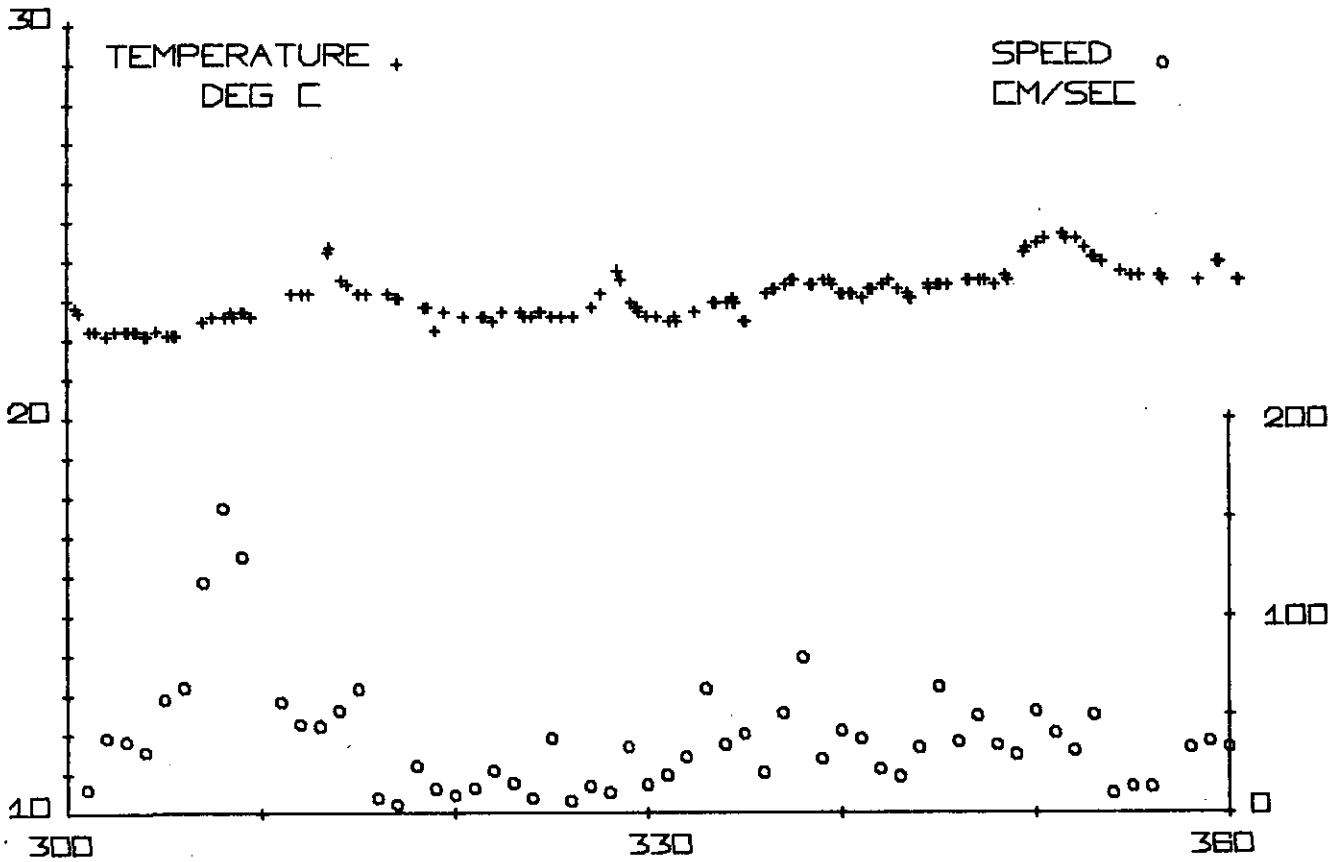


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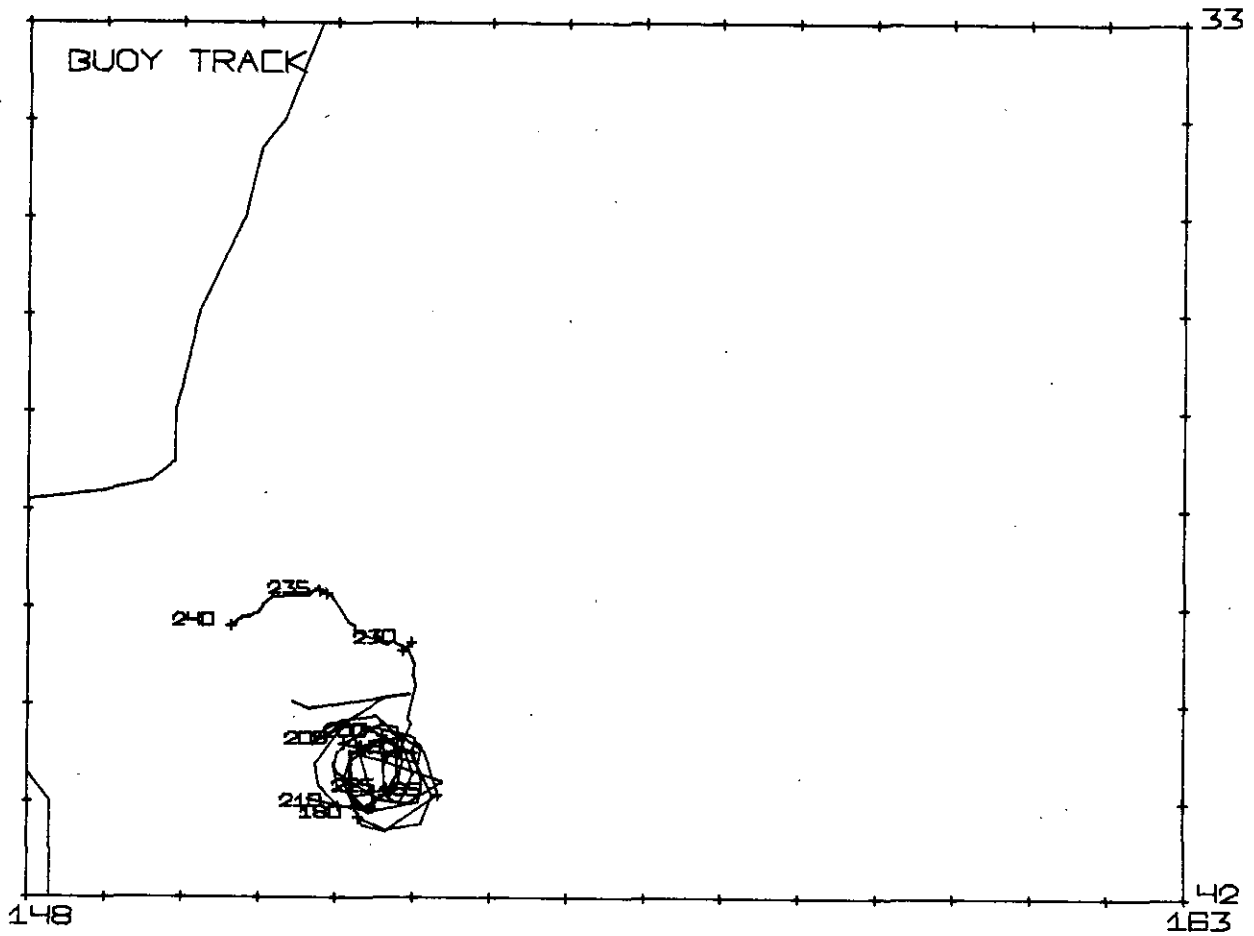
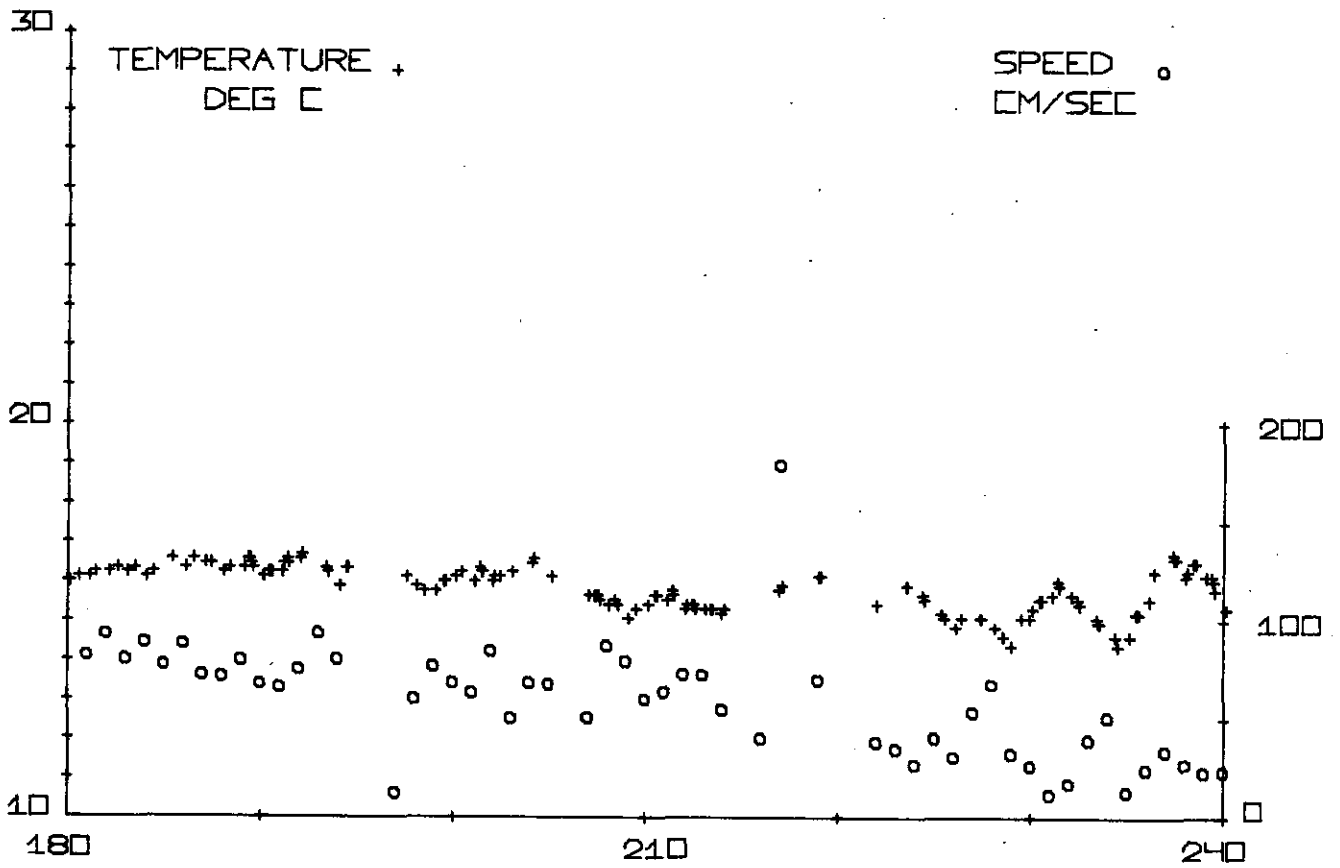


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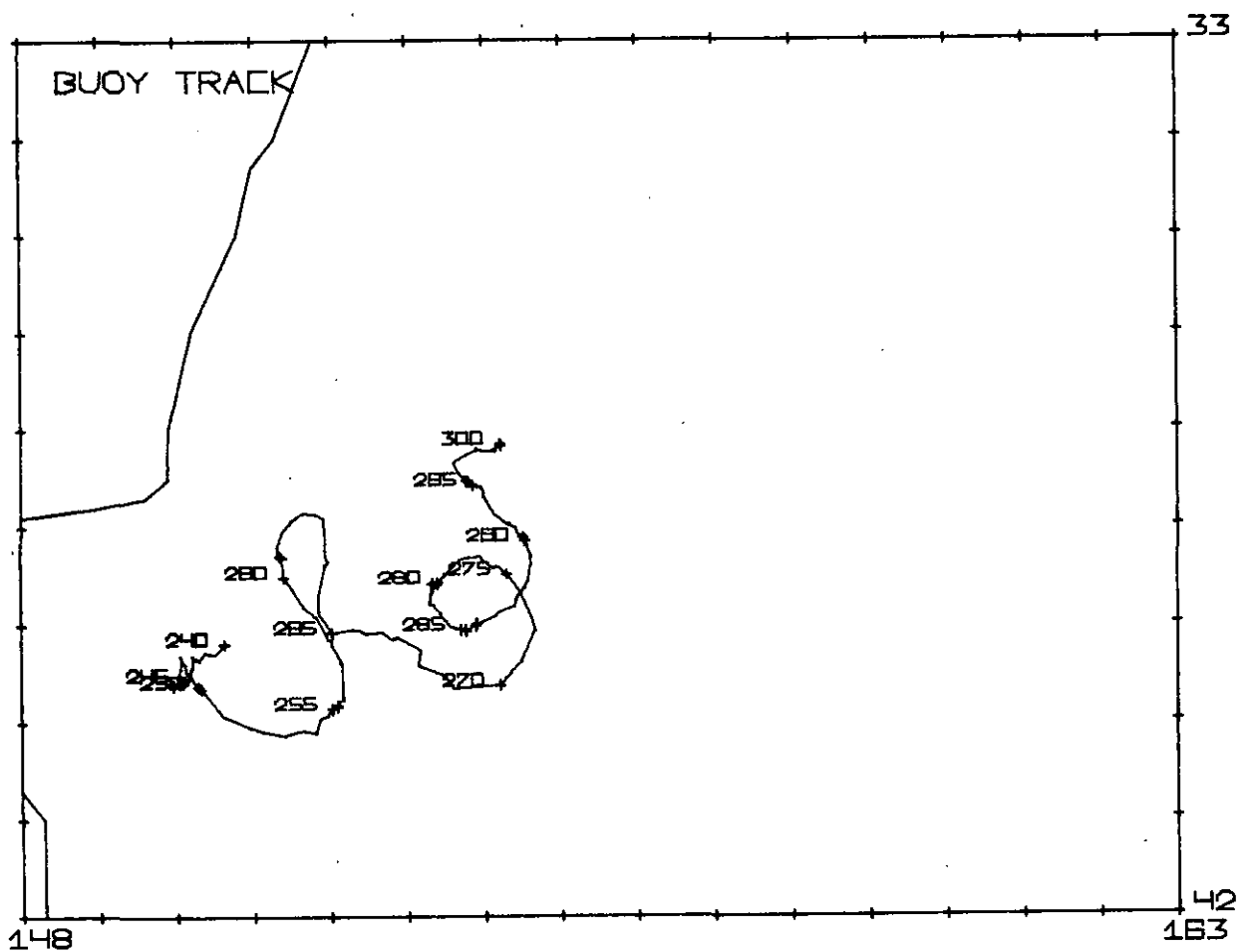
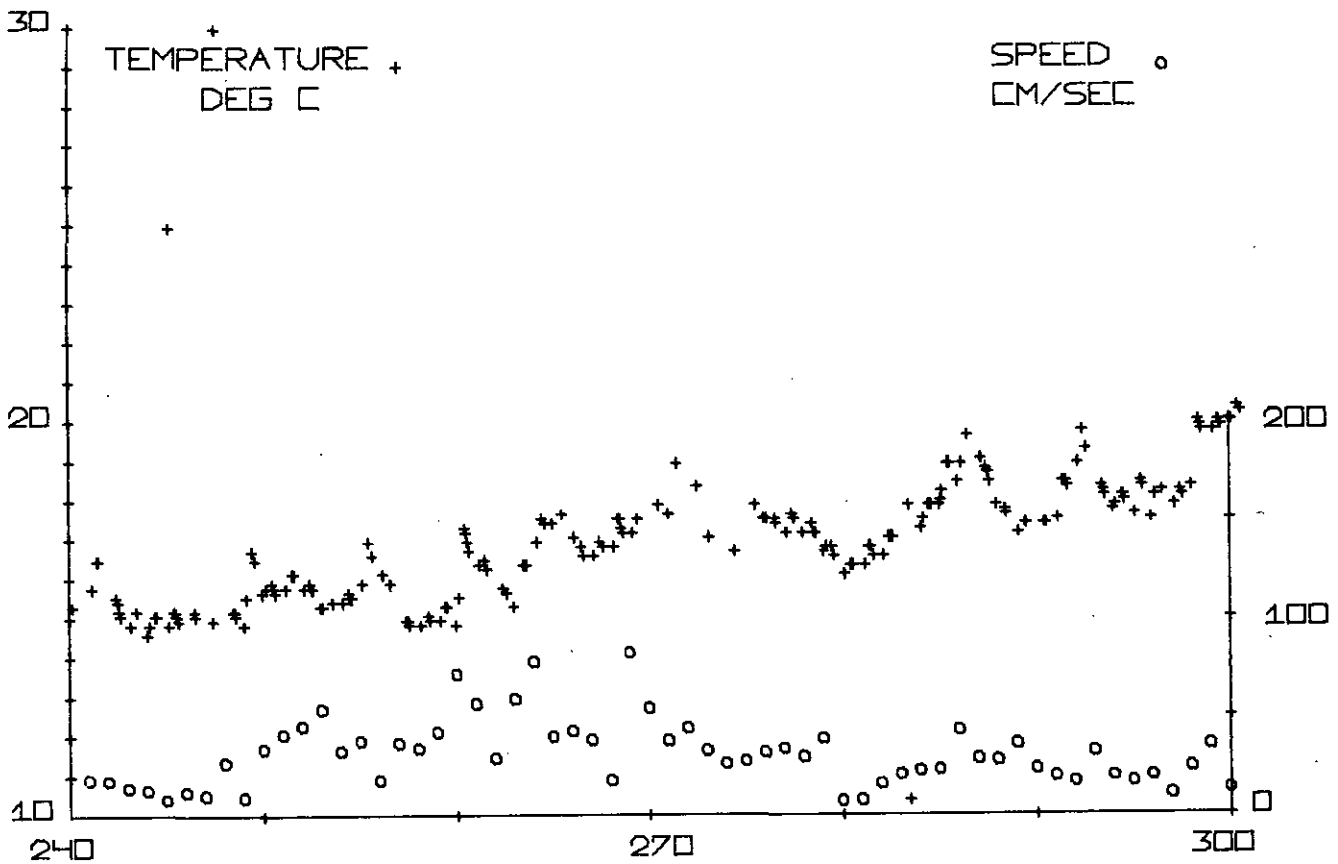


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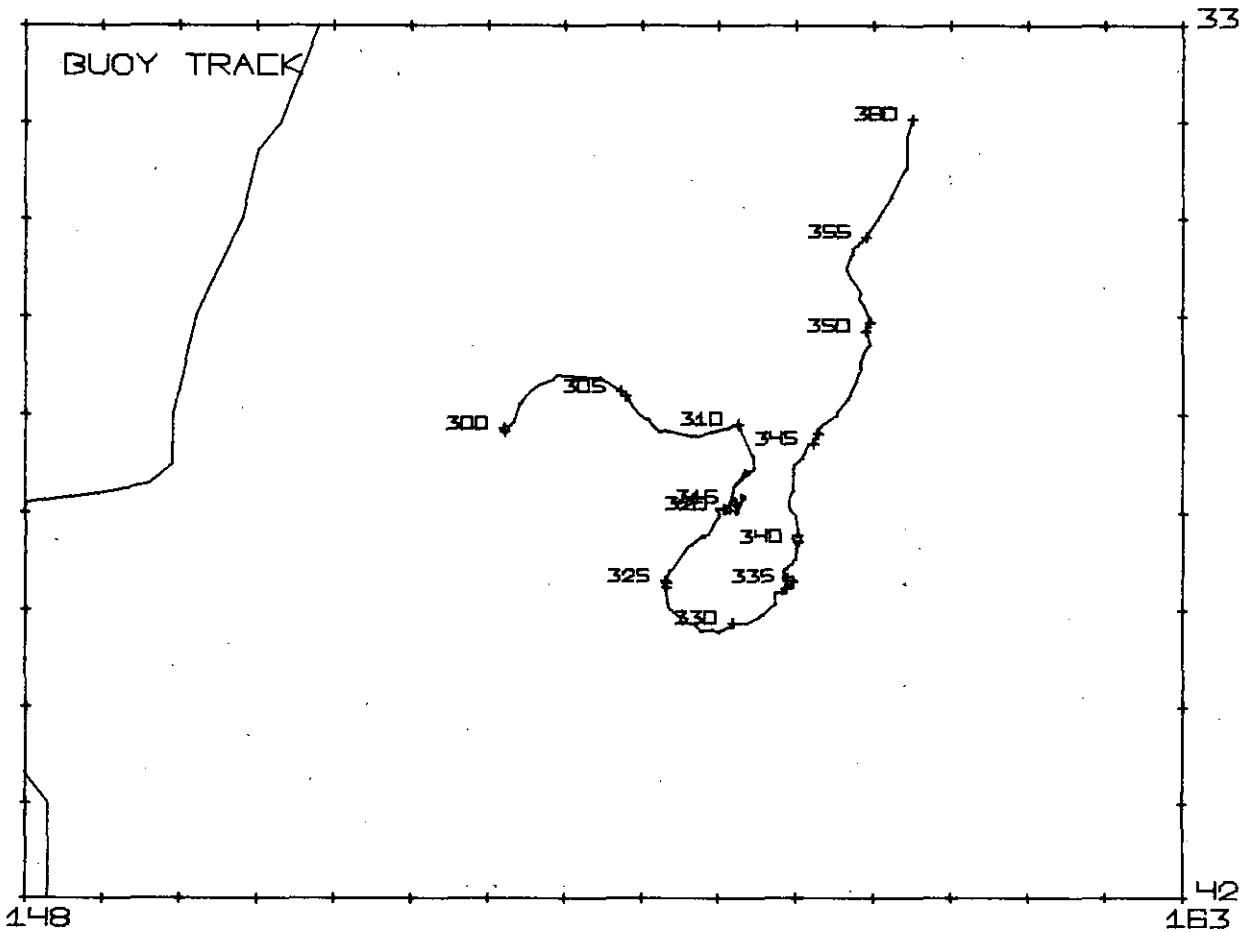
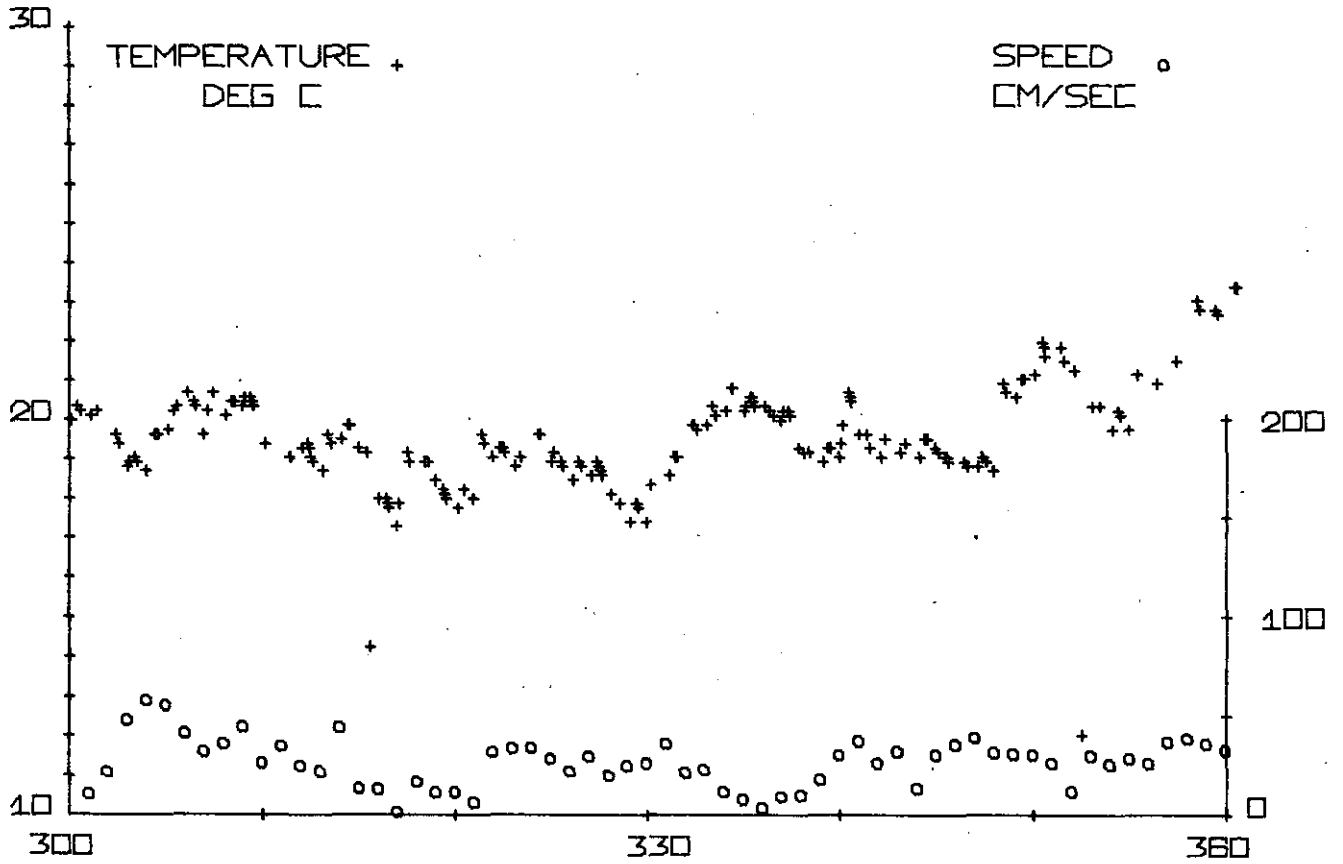


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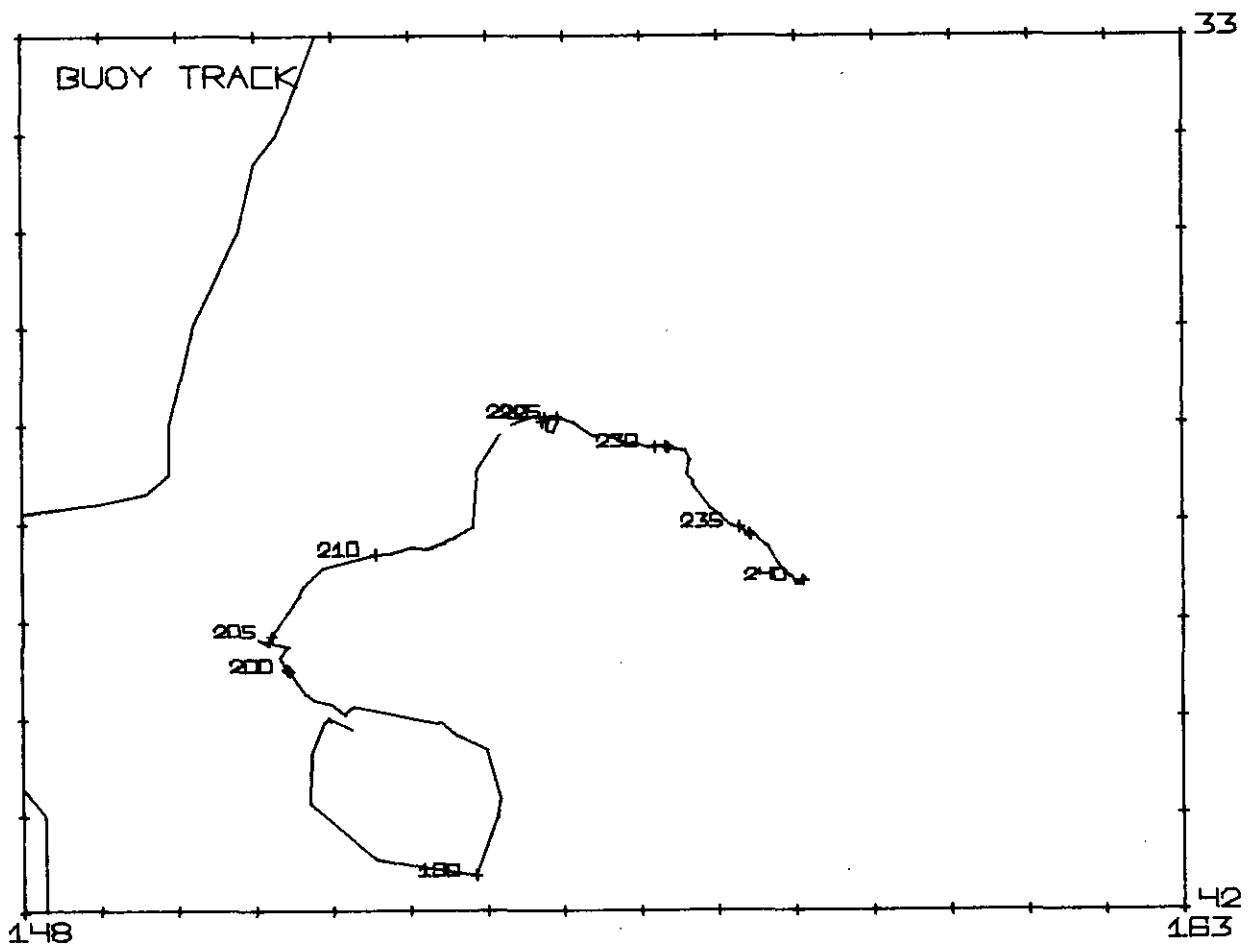
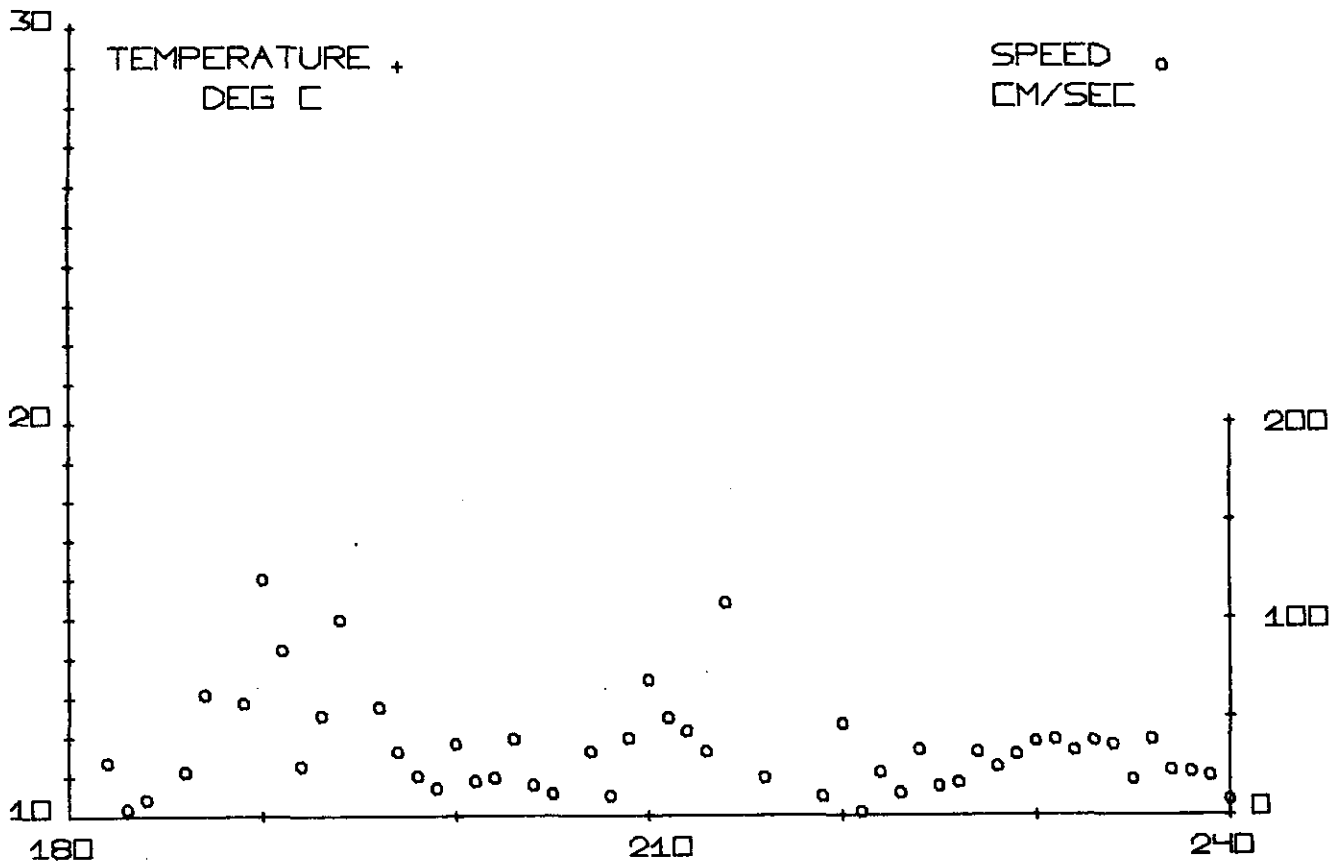


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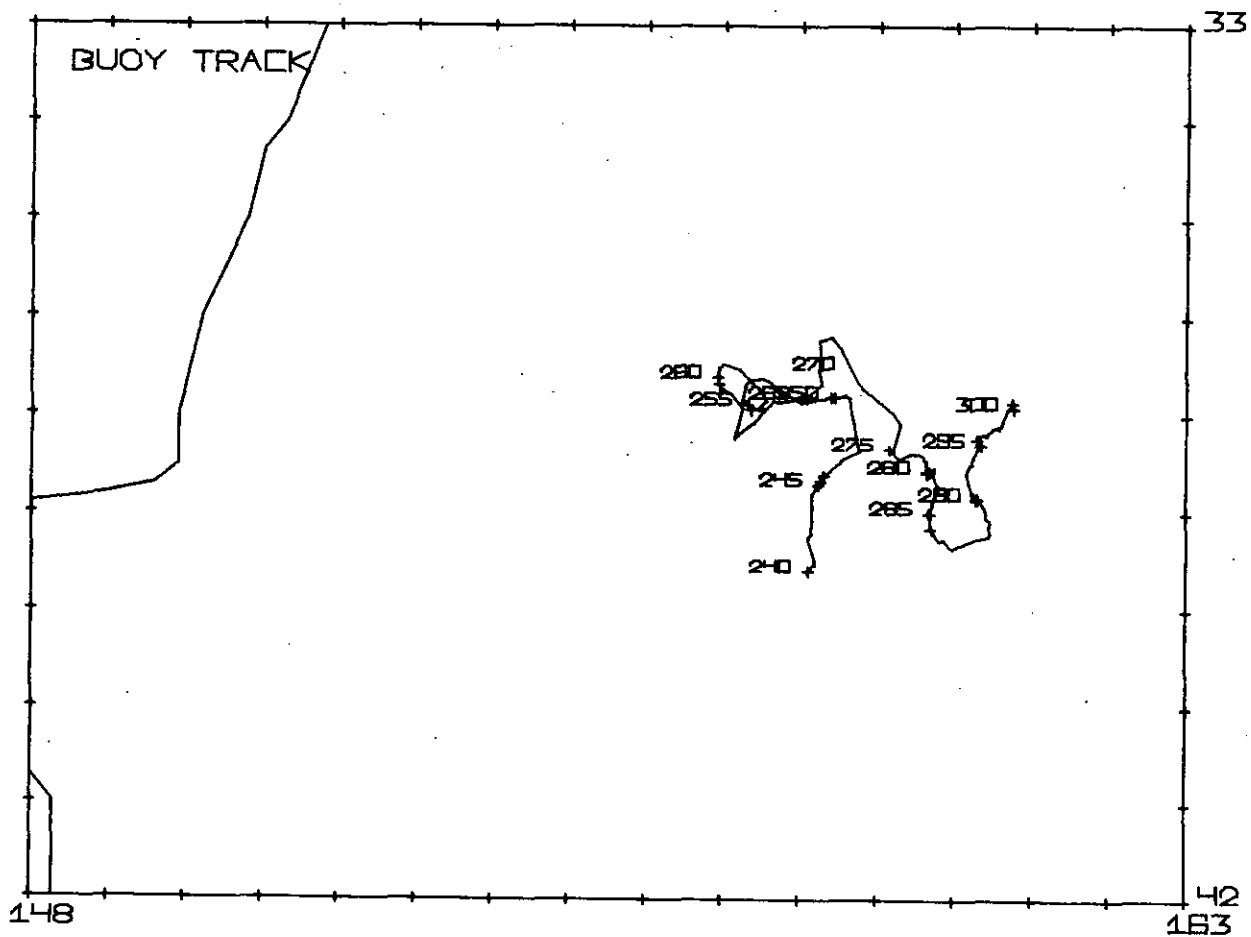
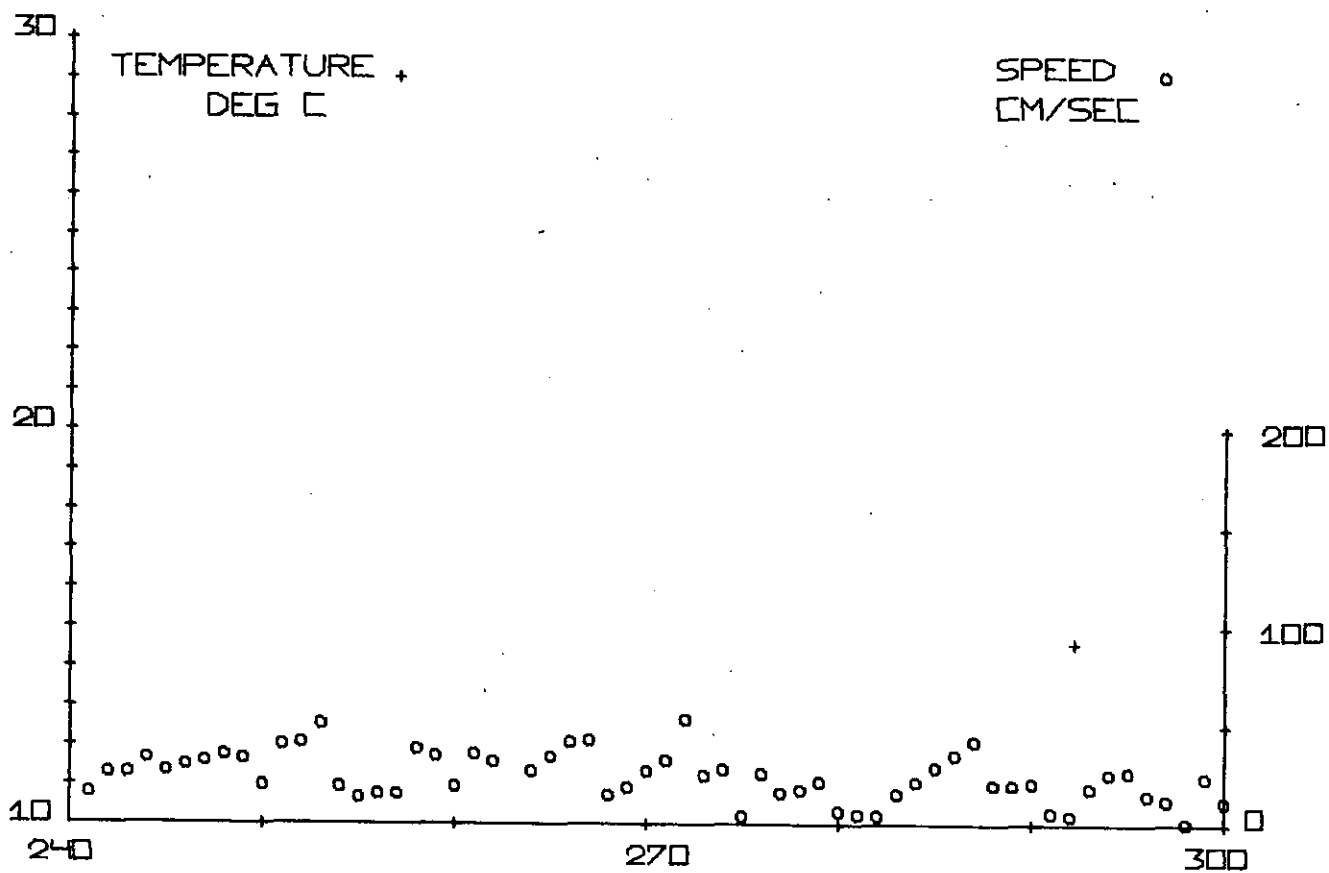
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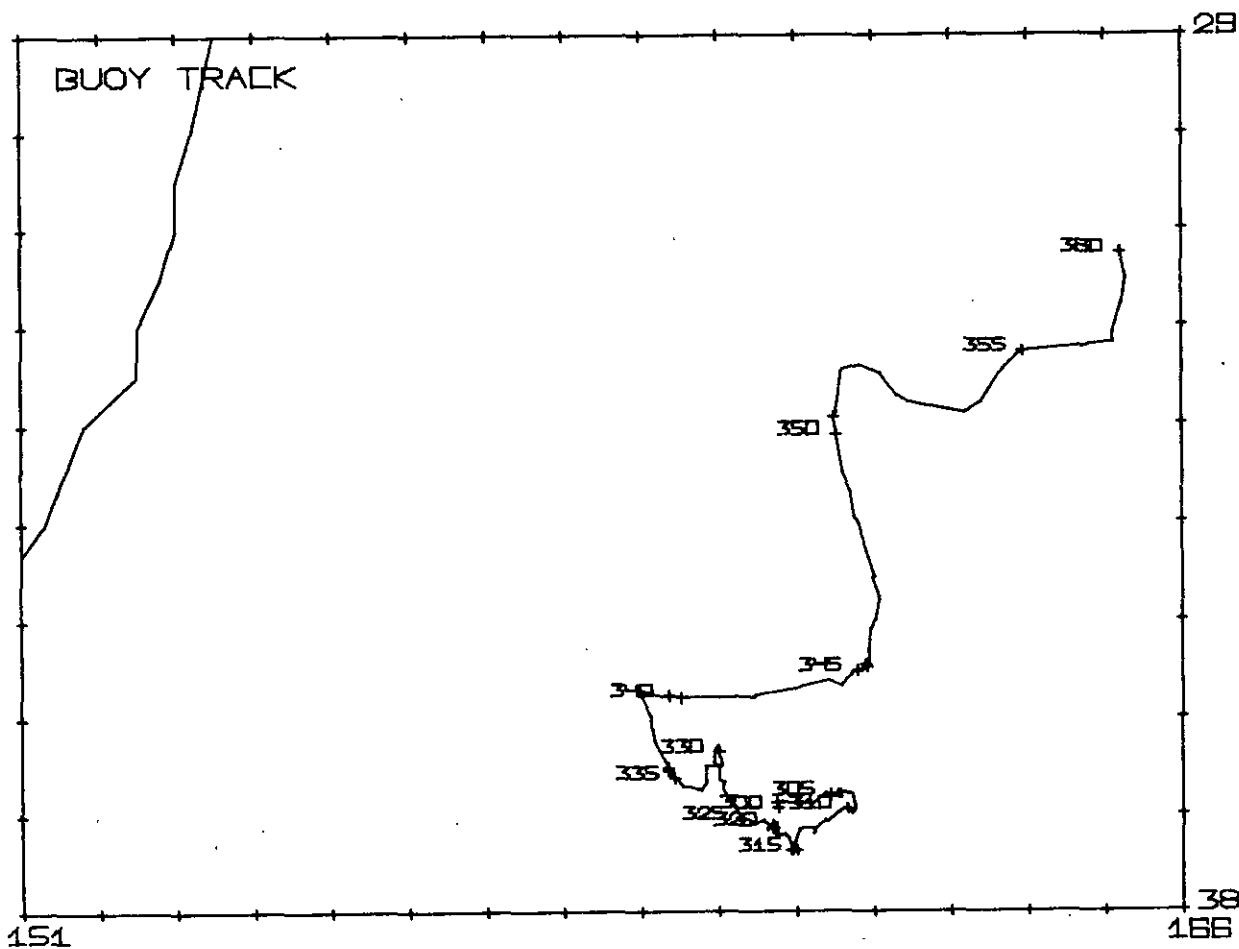
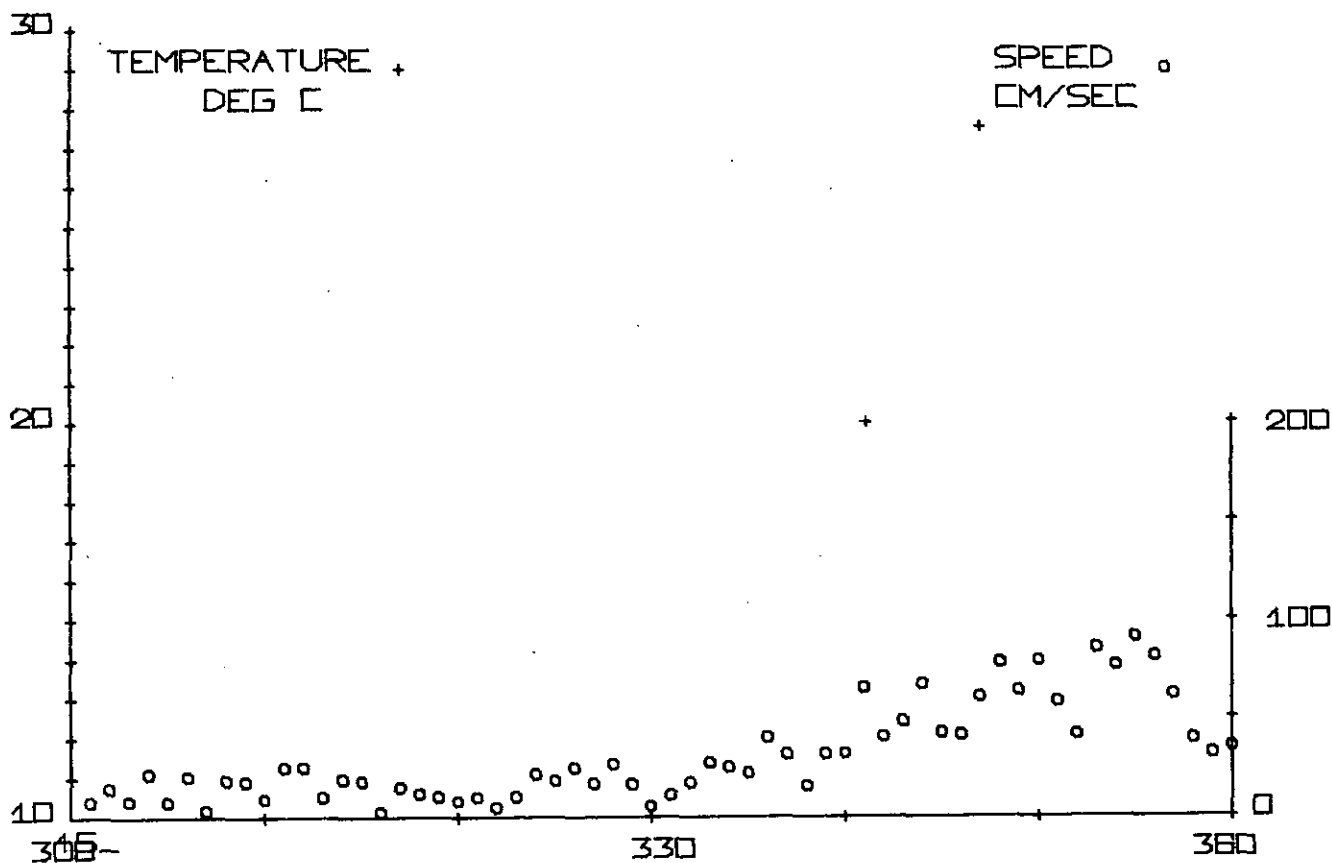
BUOY 1570 DAYS 180-240 1977



BUOY 1570 DAYS 240-300 1977

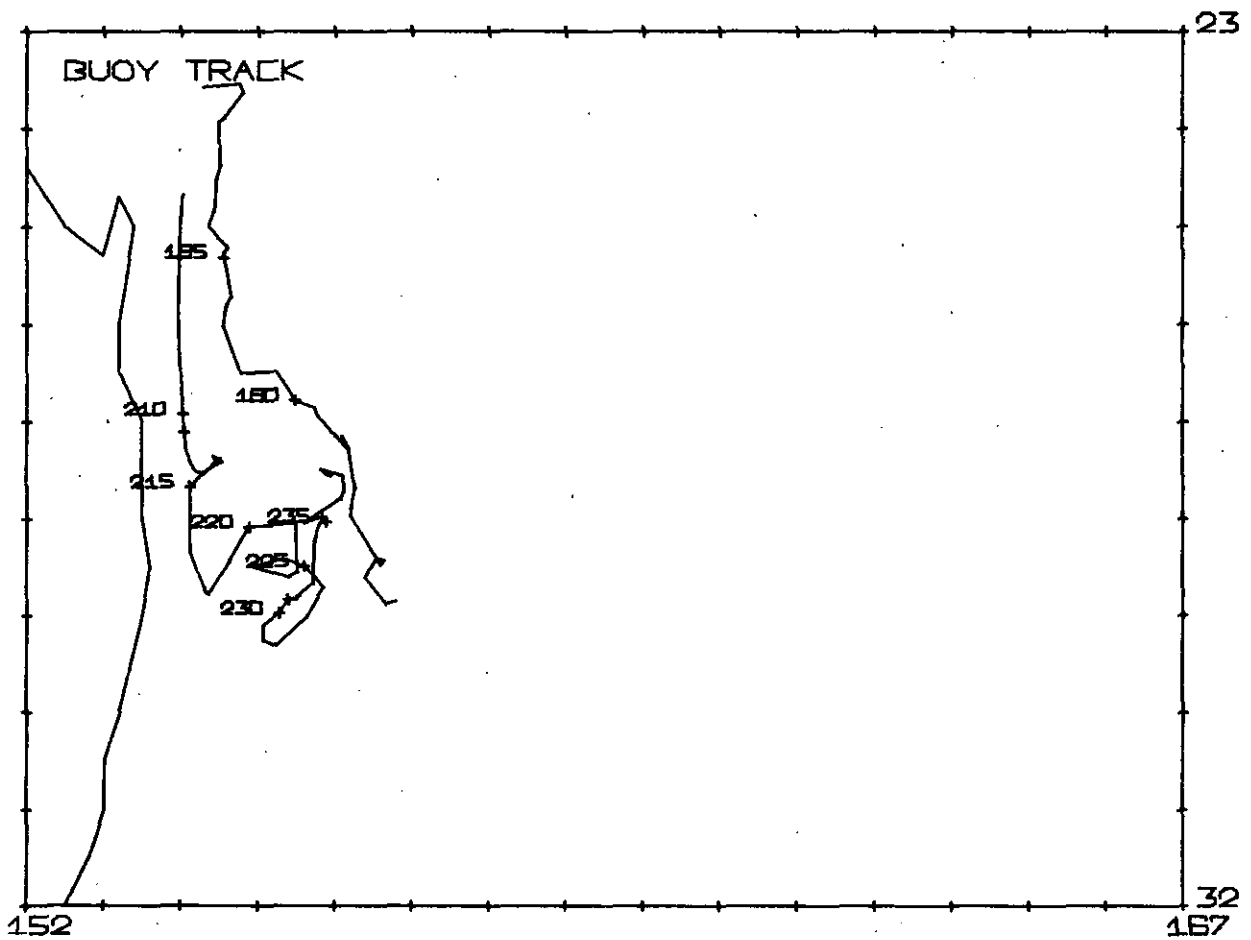
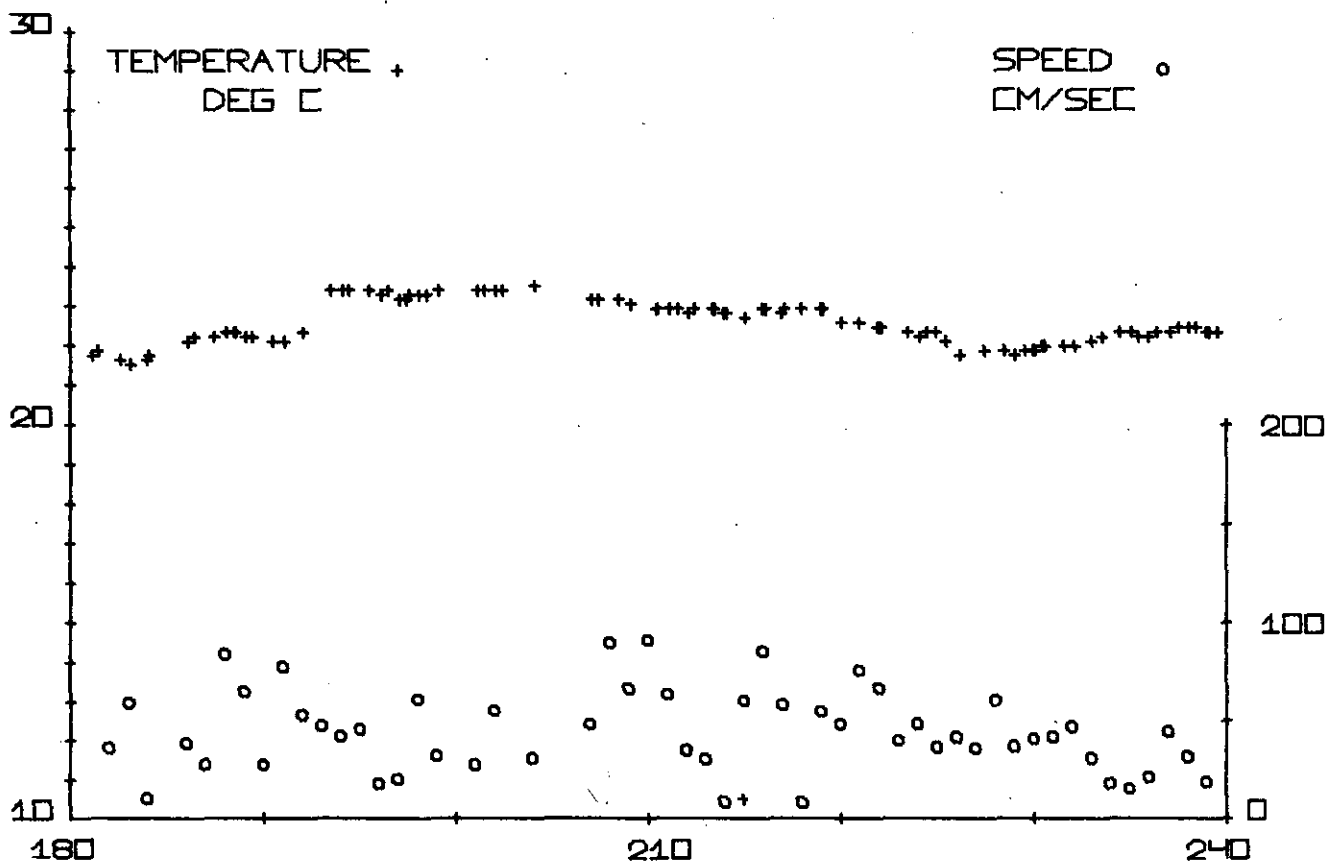


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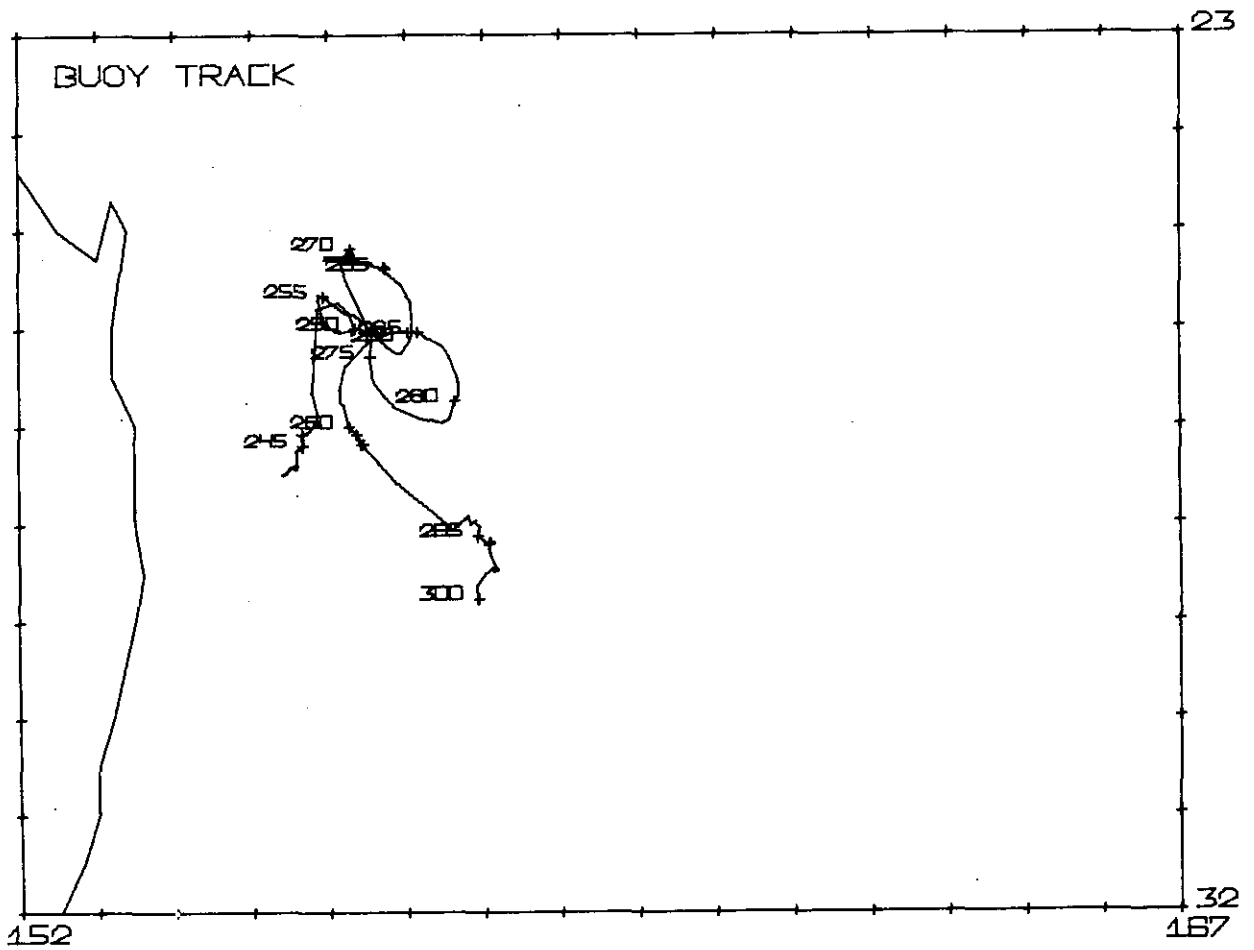
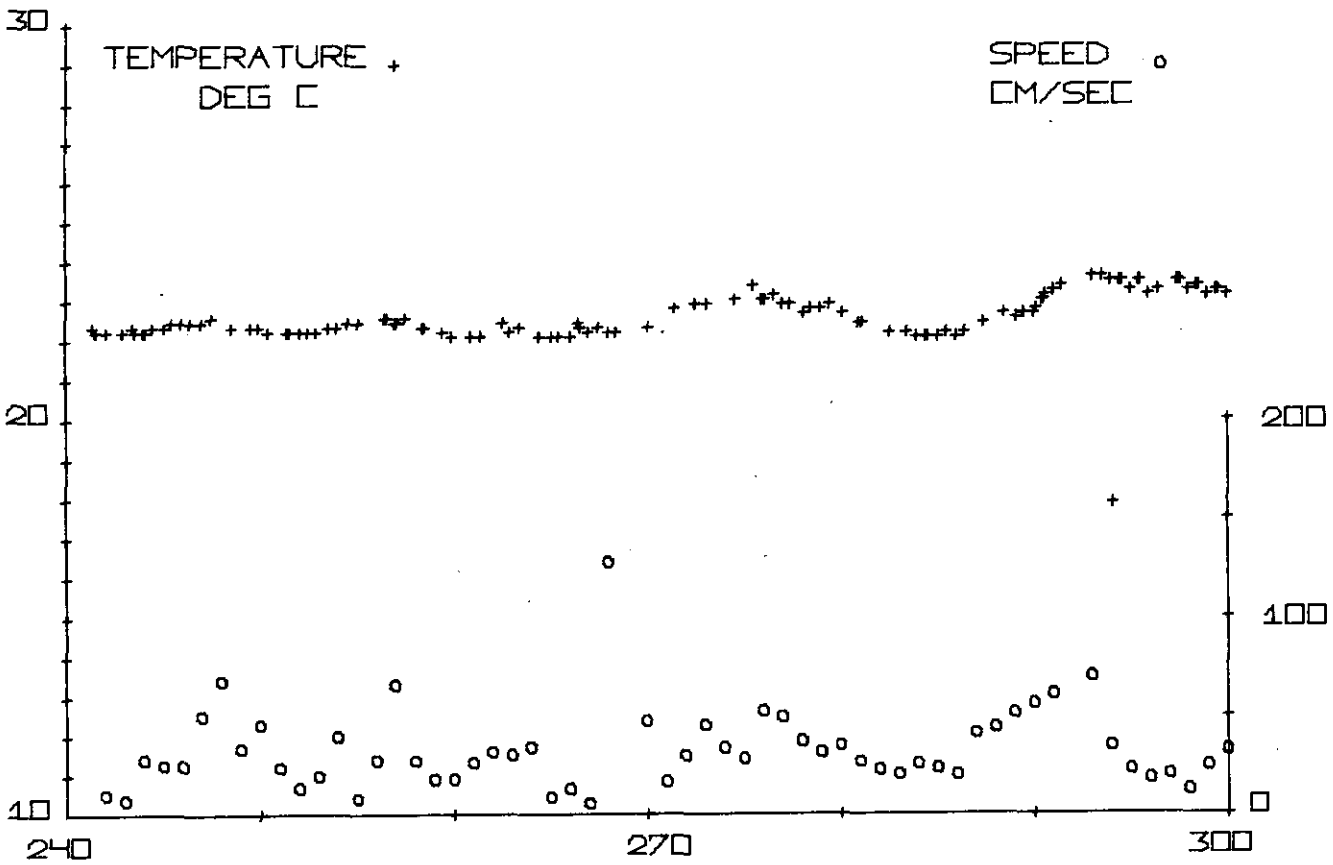
BUOY 1631

DAYS 180-240 1977



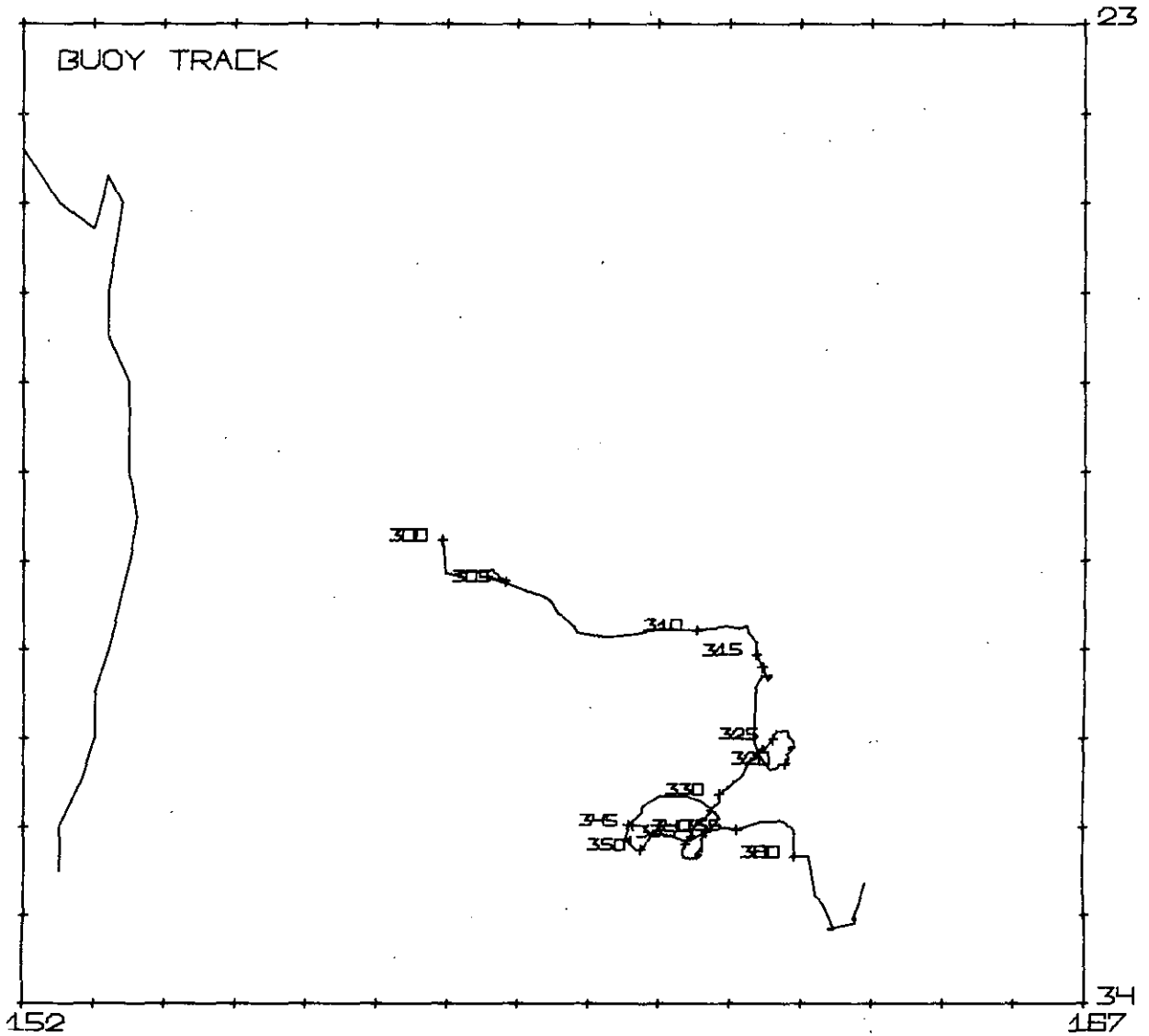
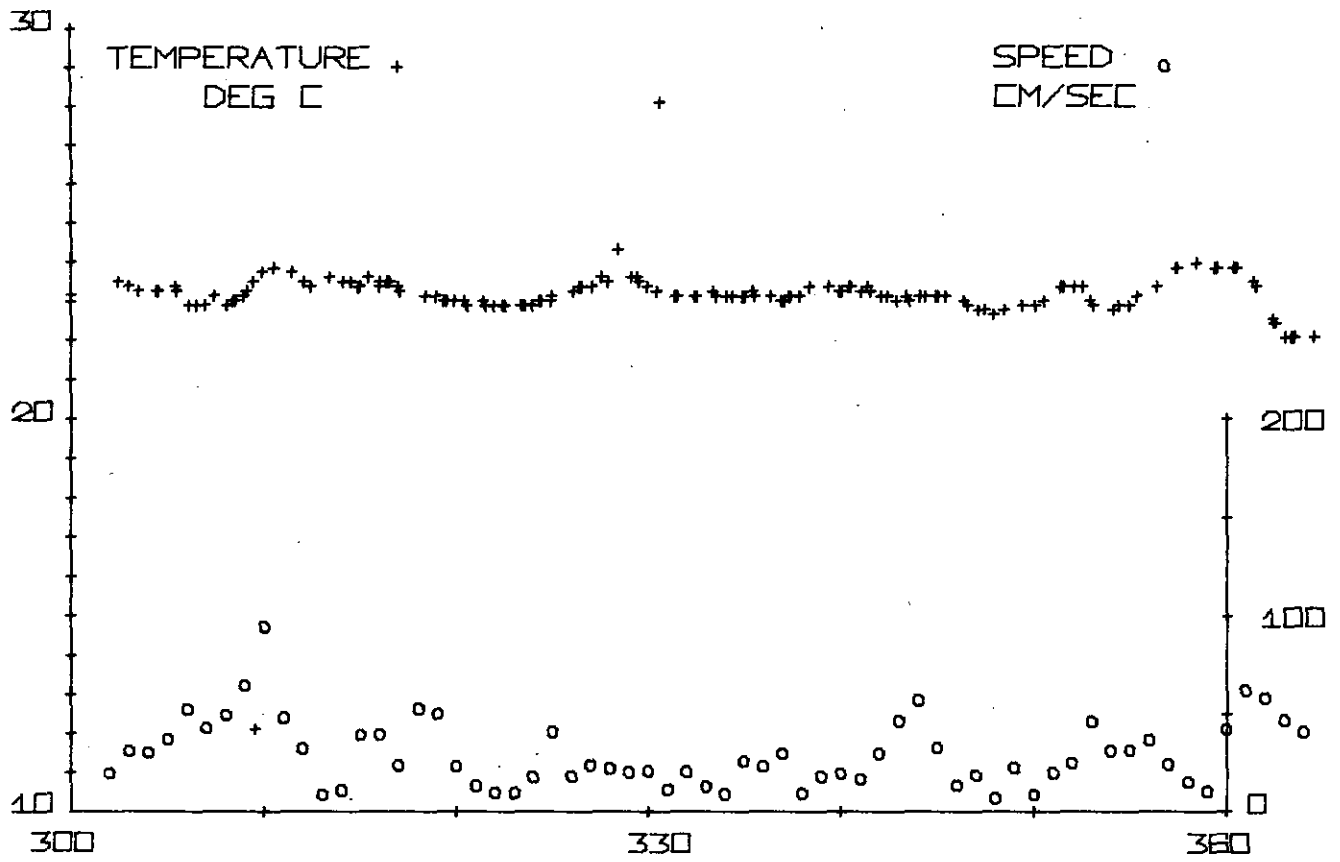
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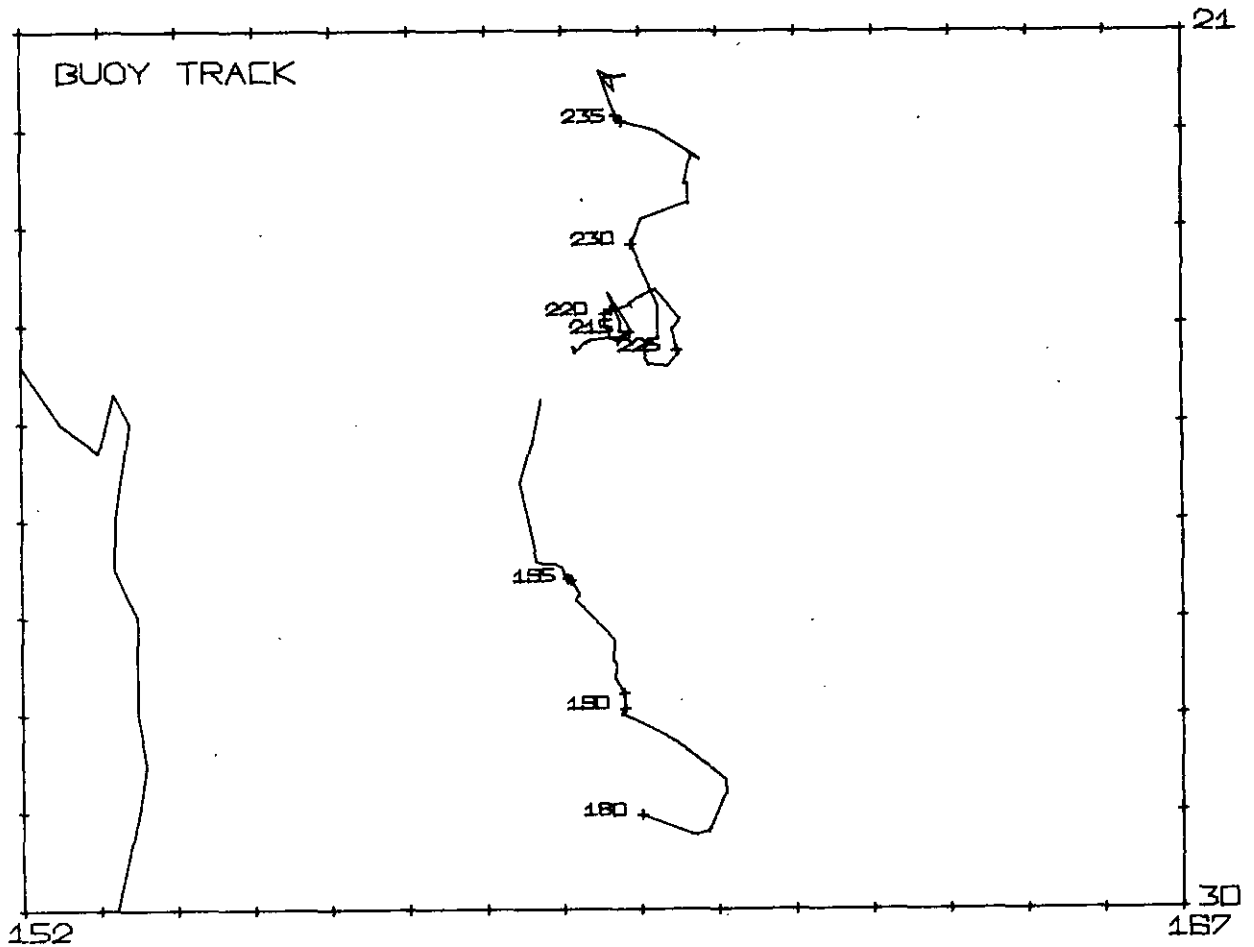
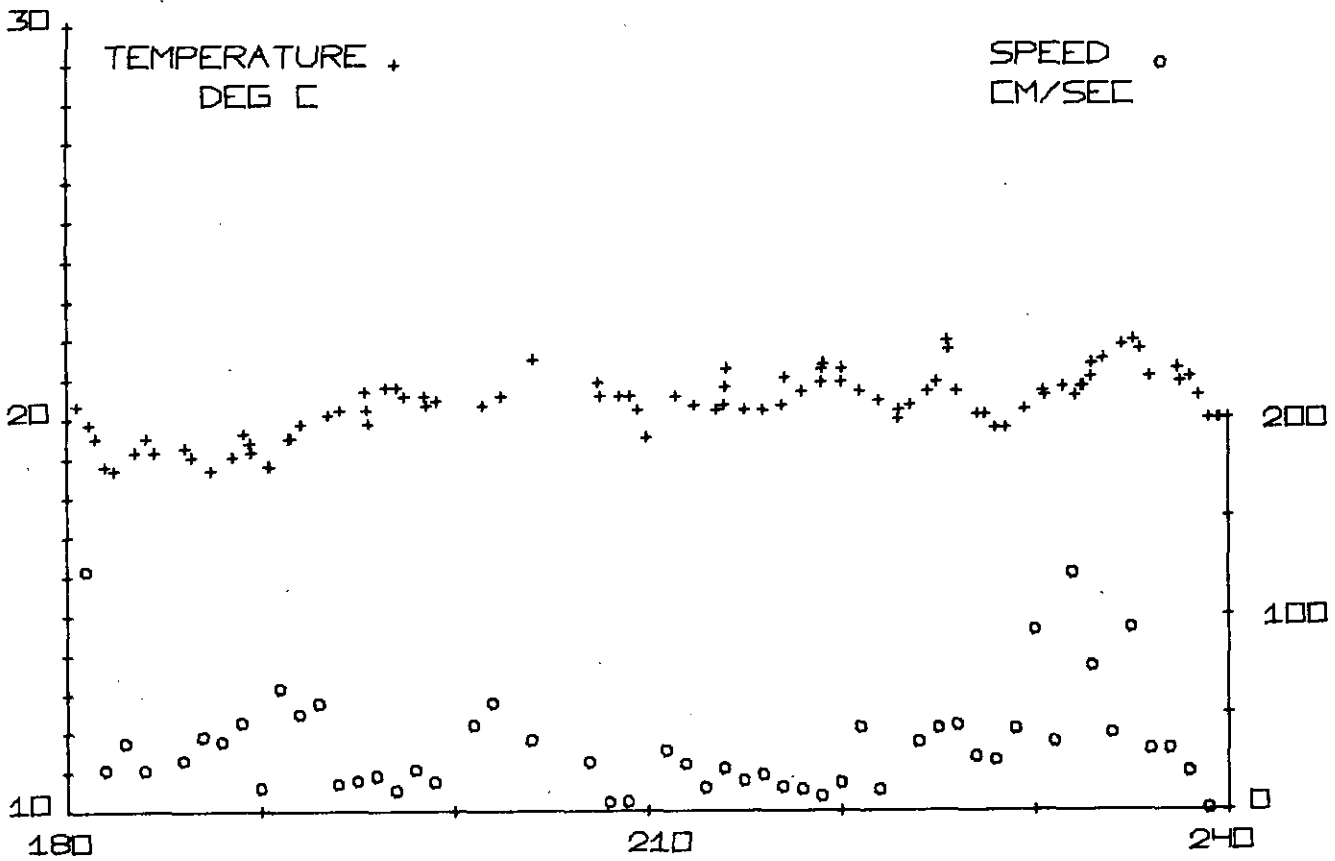


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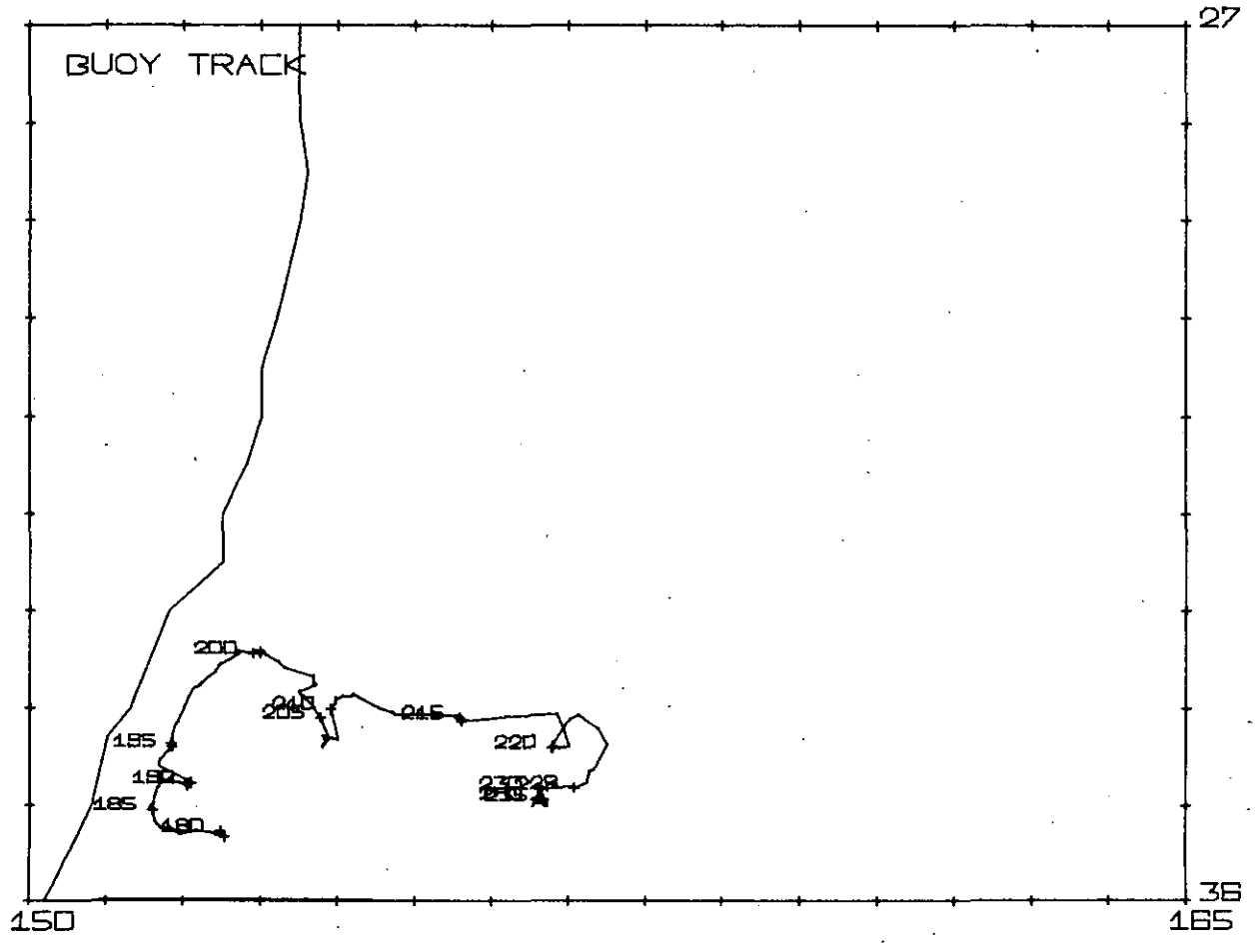
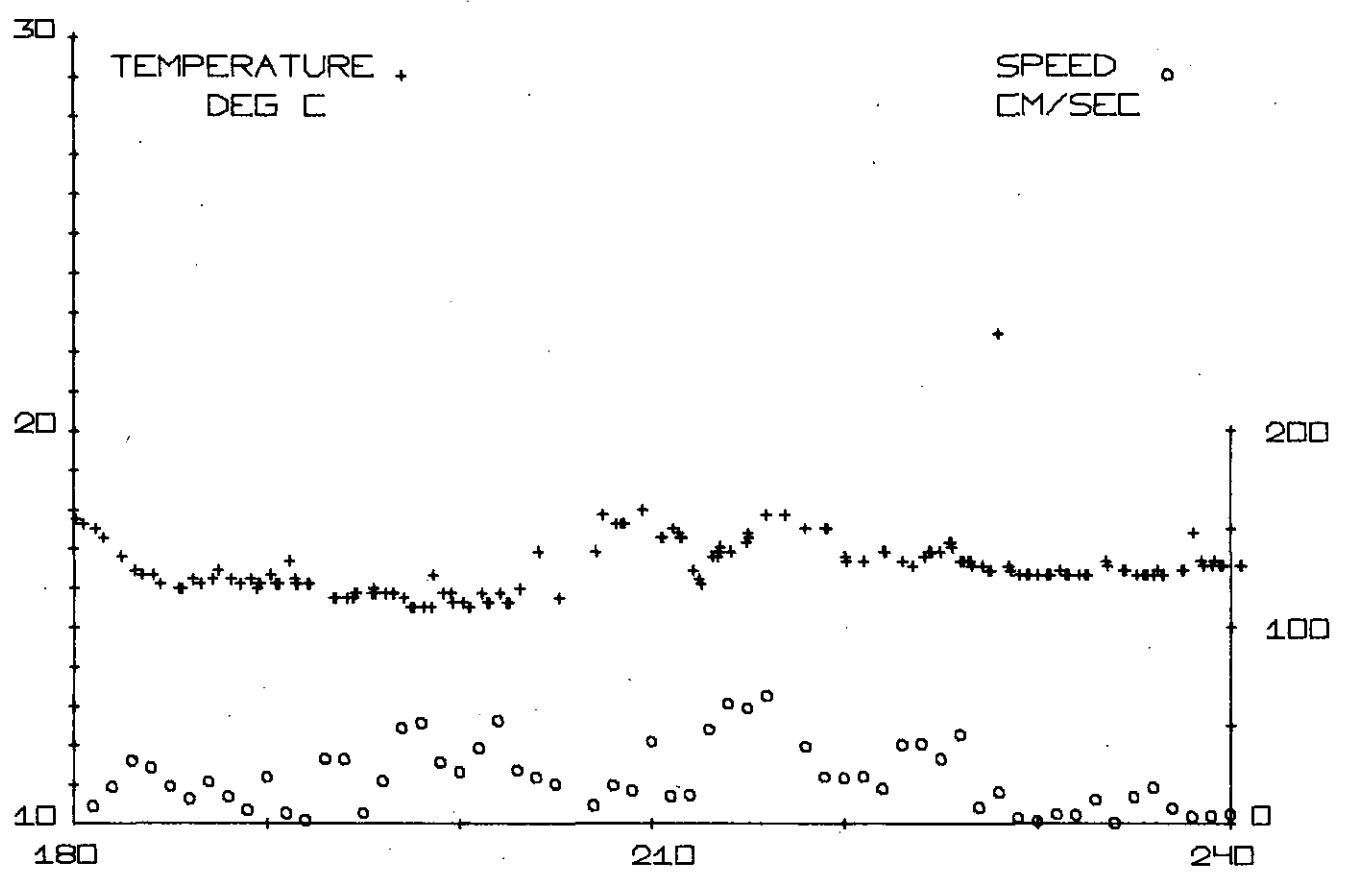


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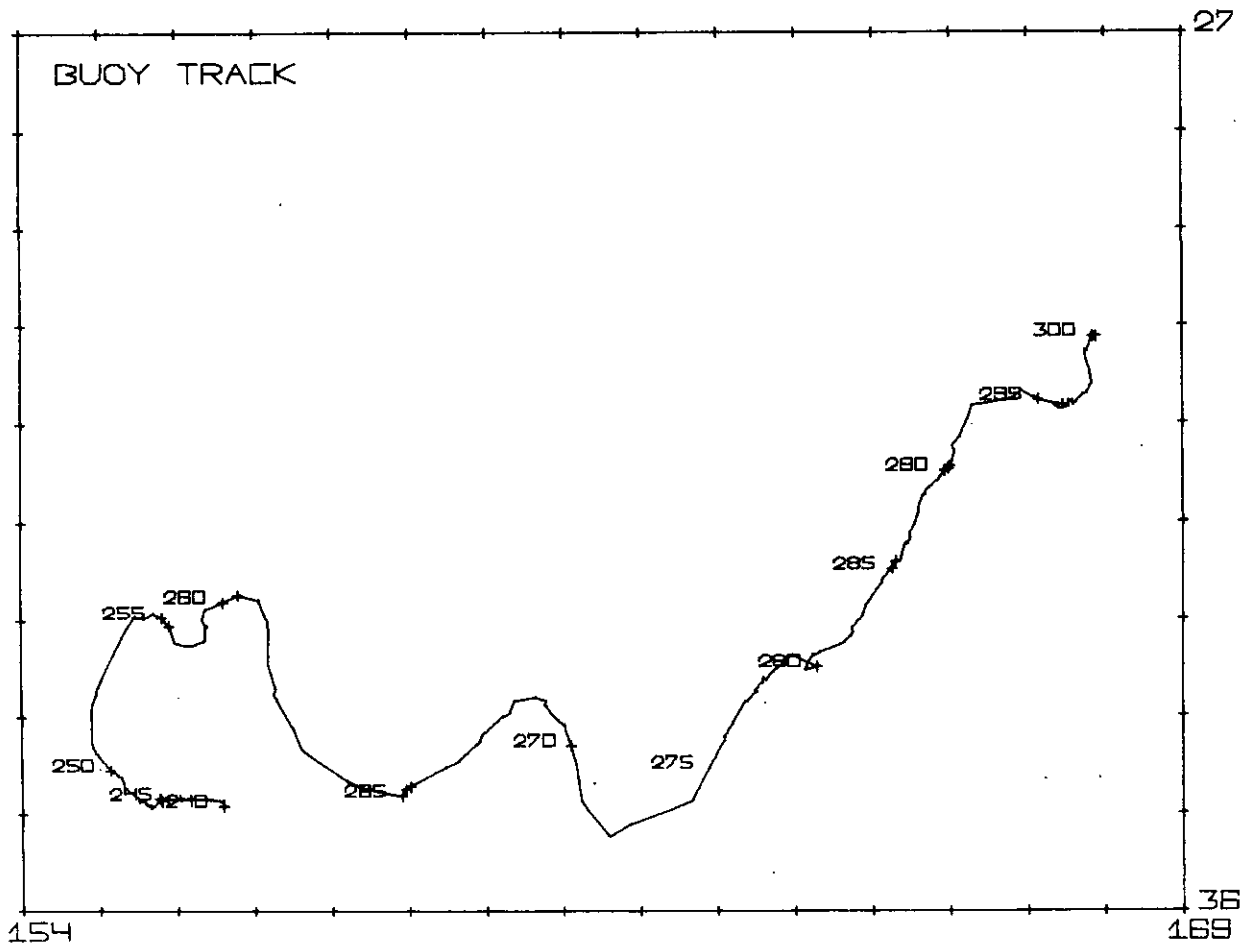
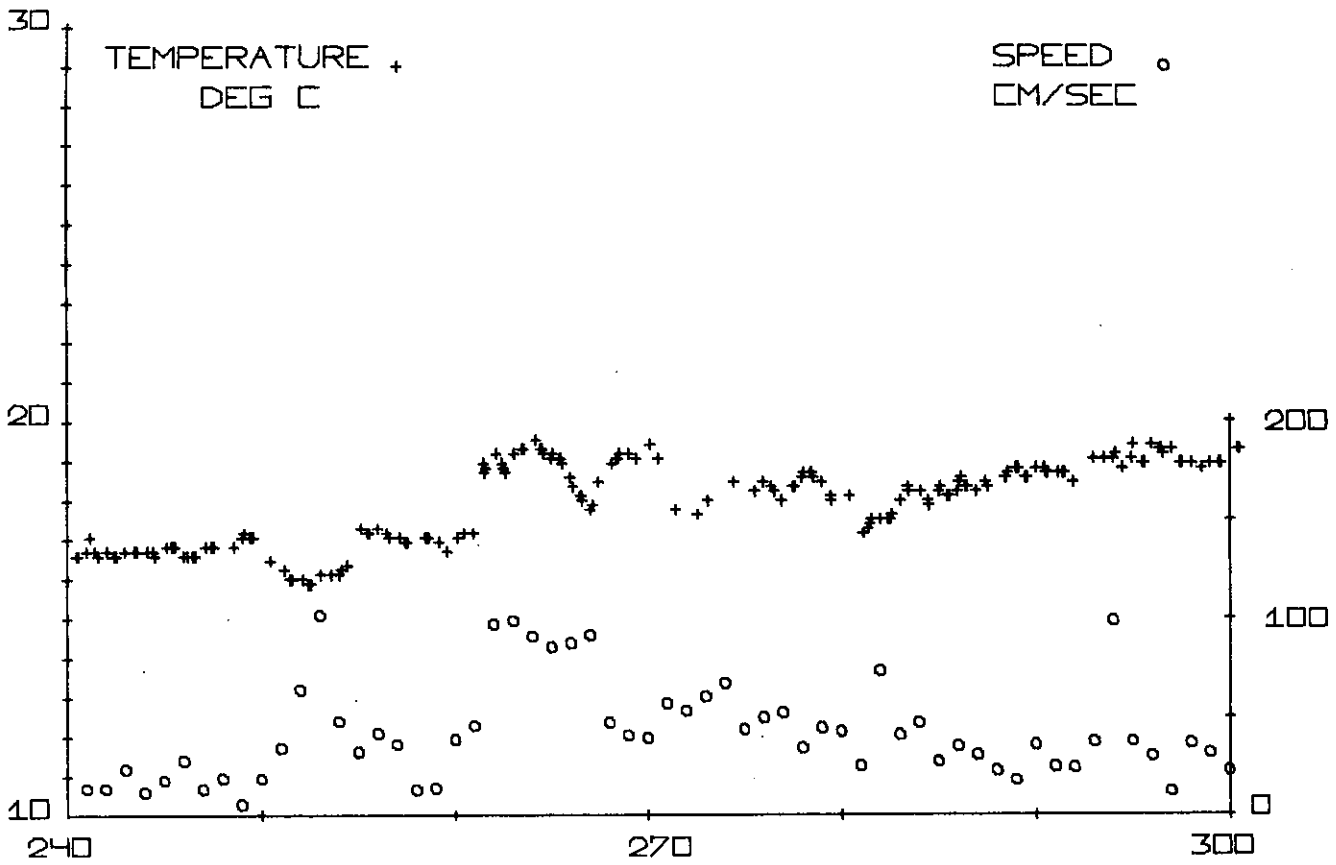


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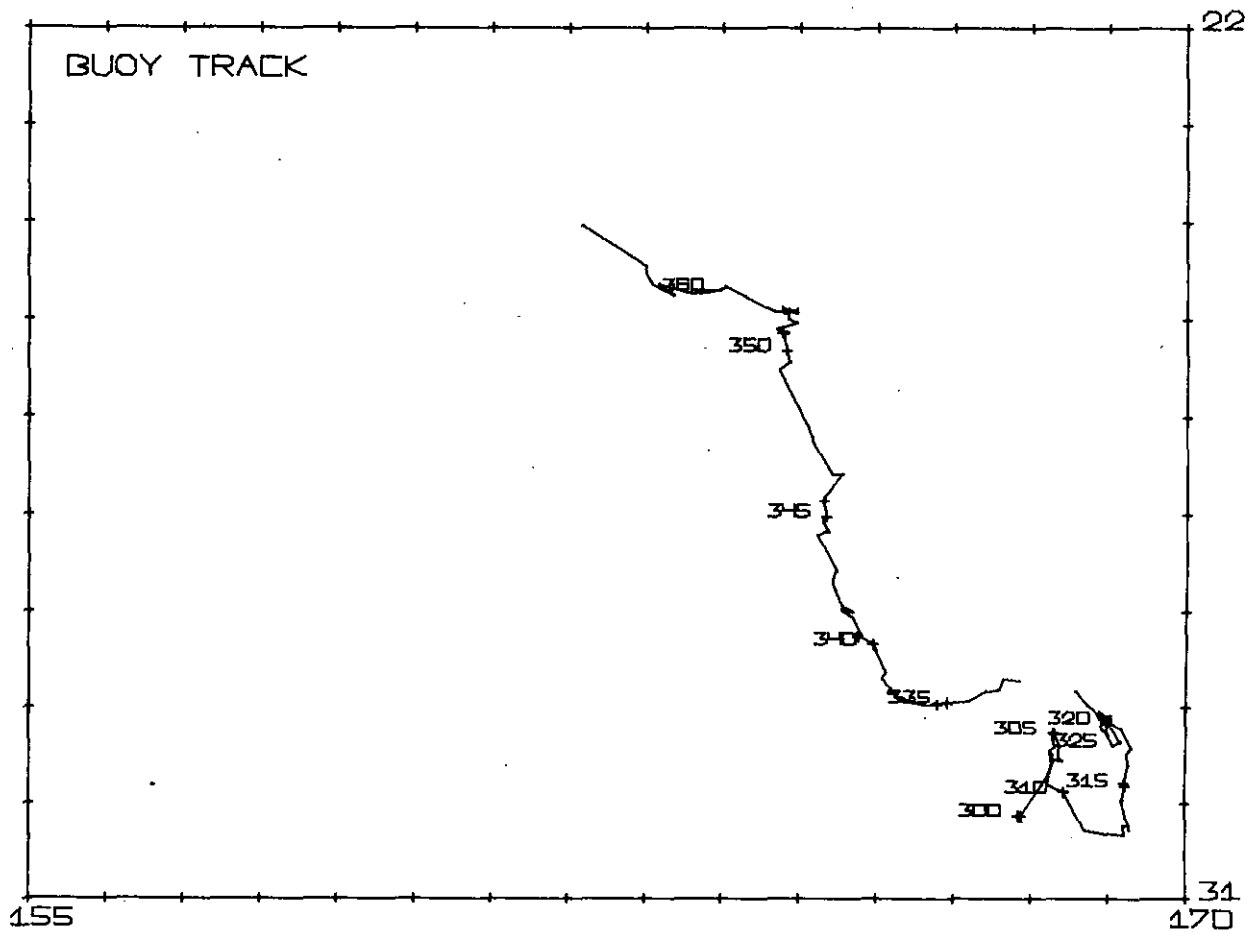
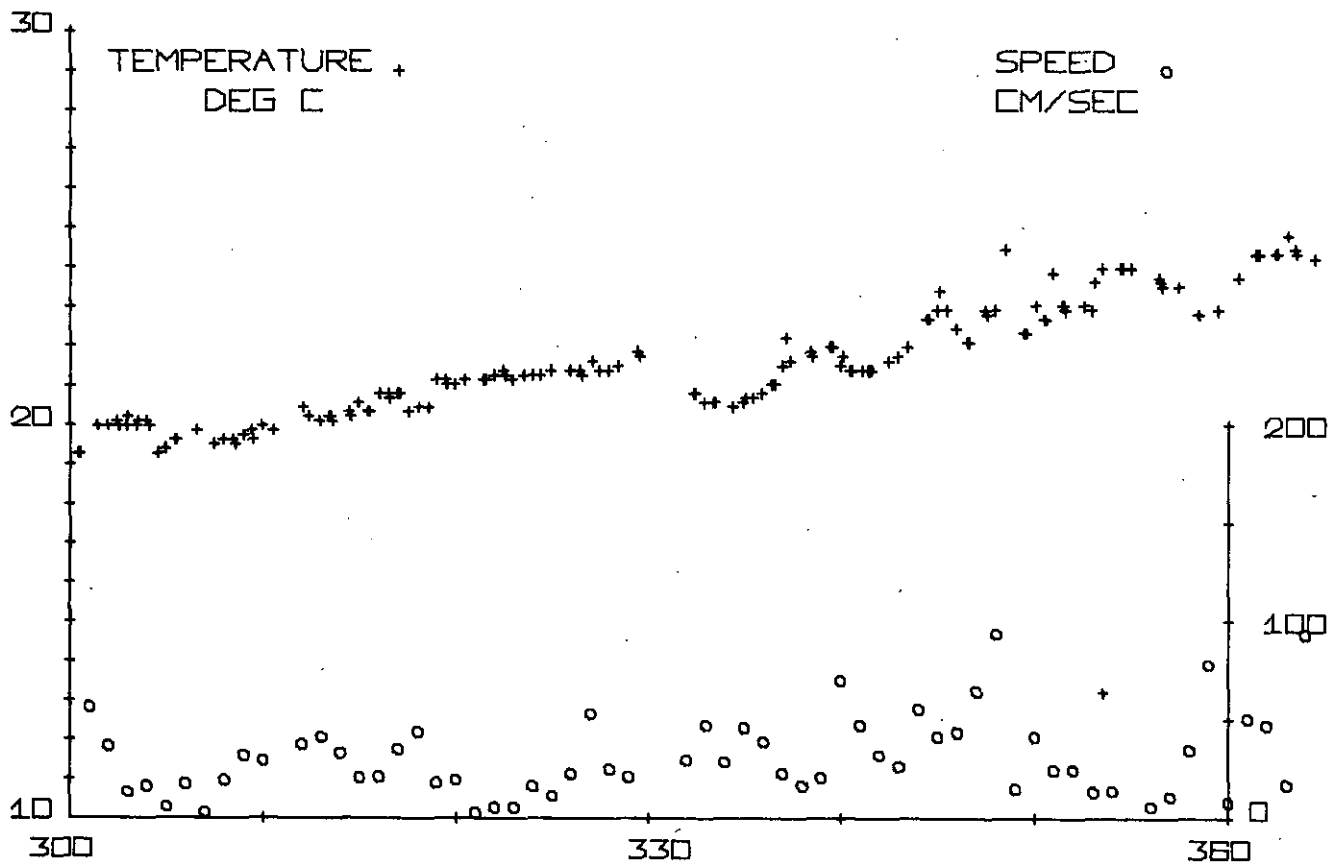


BUOY 1676 DAYS 240-300 1977



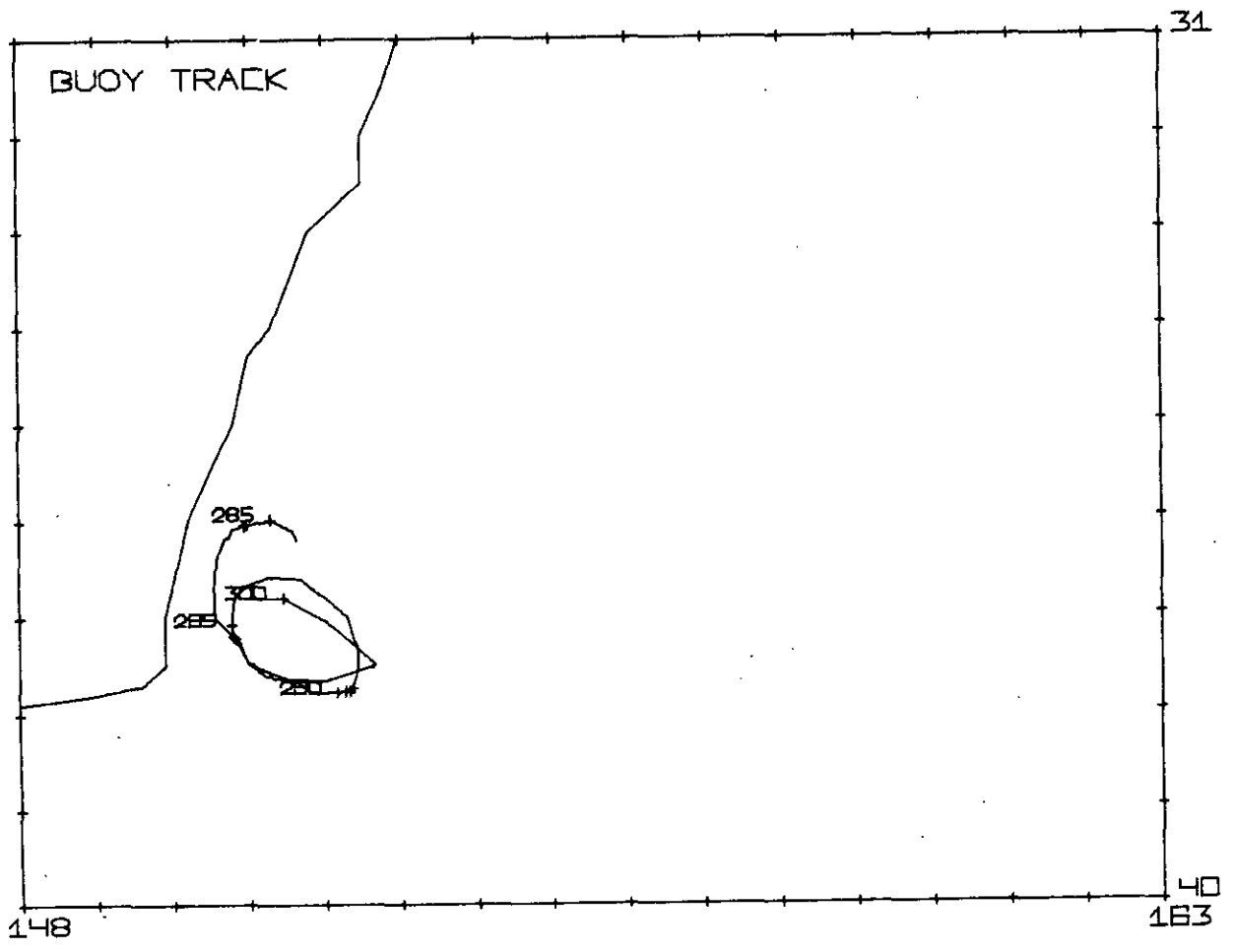
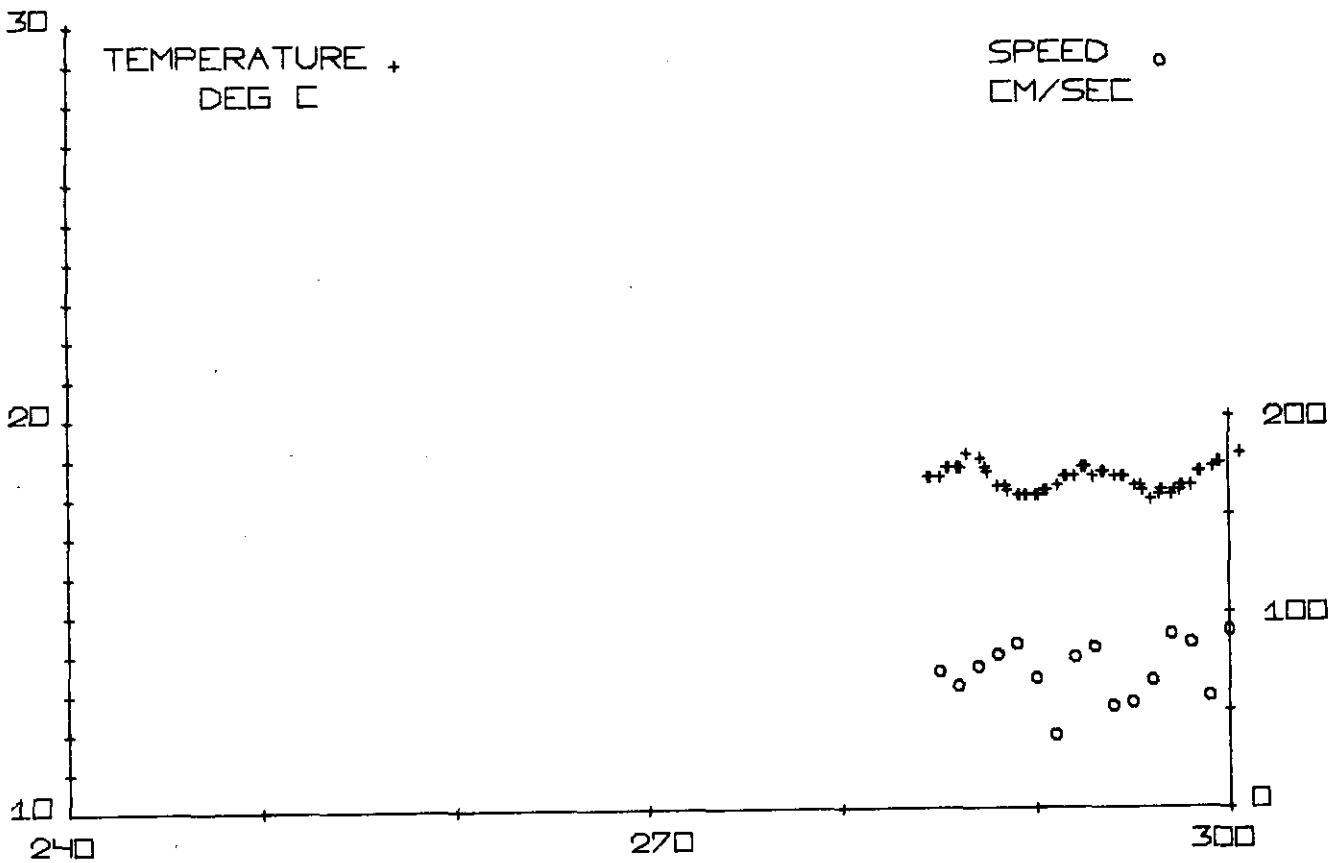
BUOY 1676

DAYS 300-360 1977



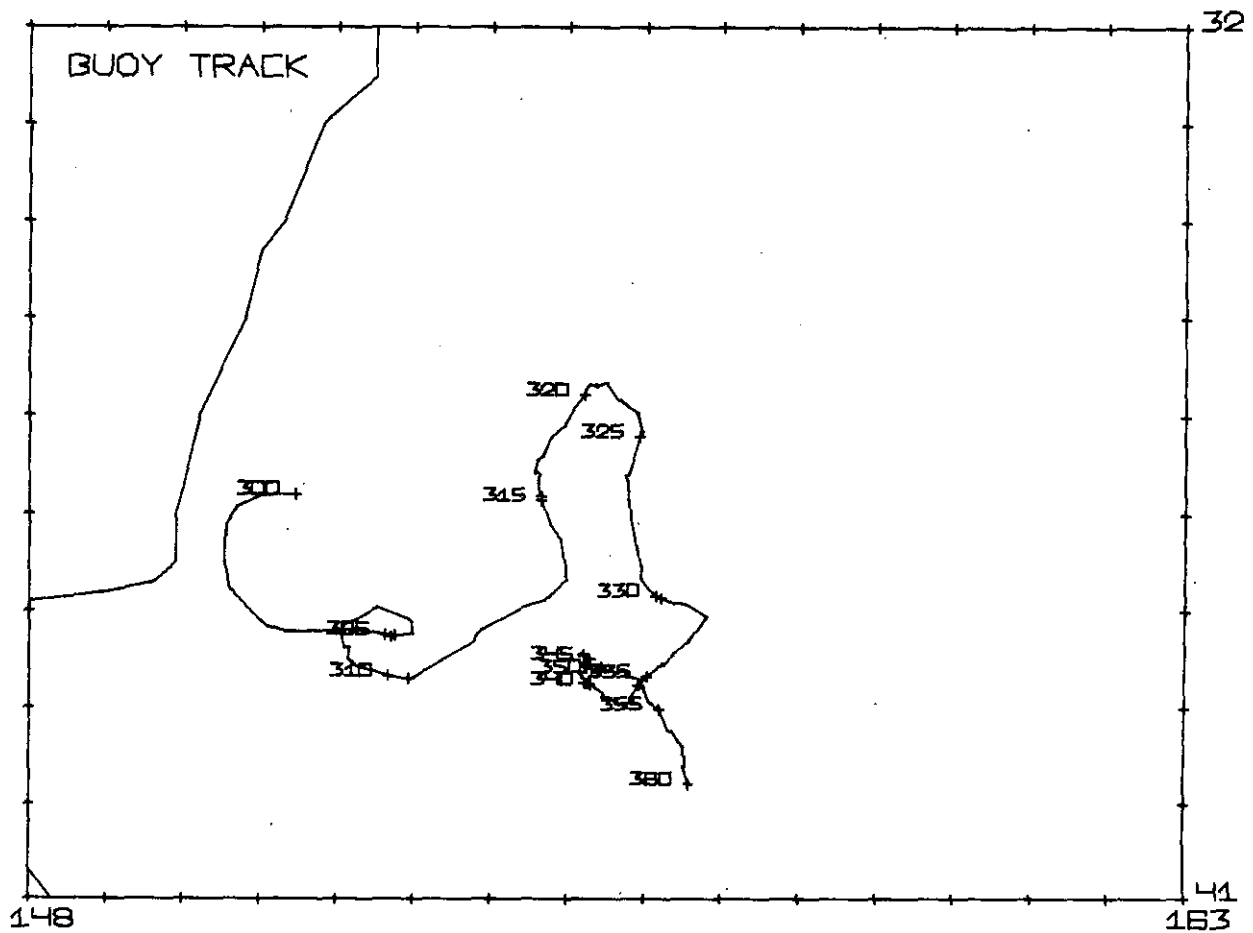
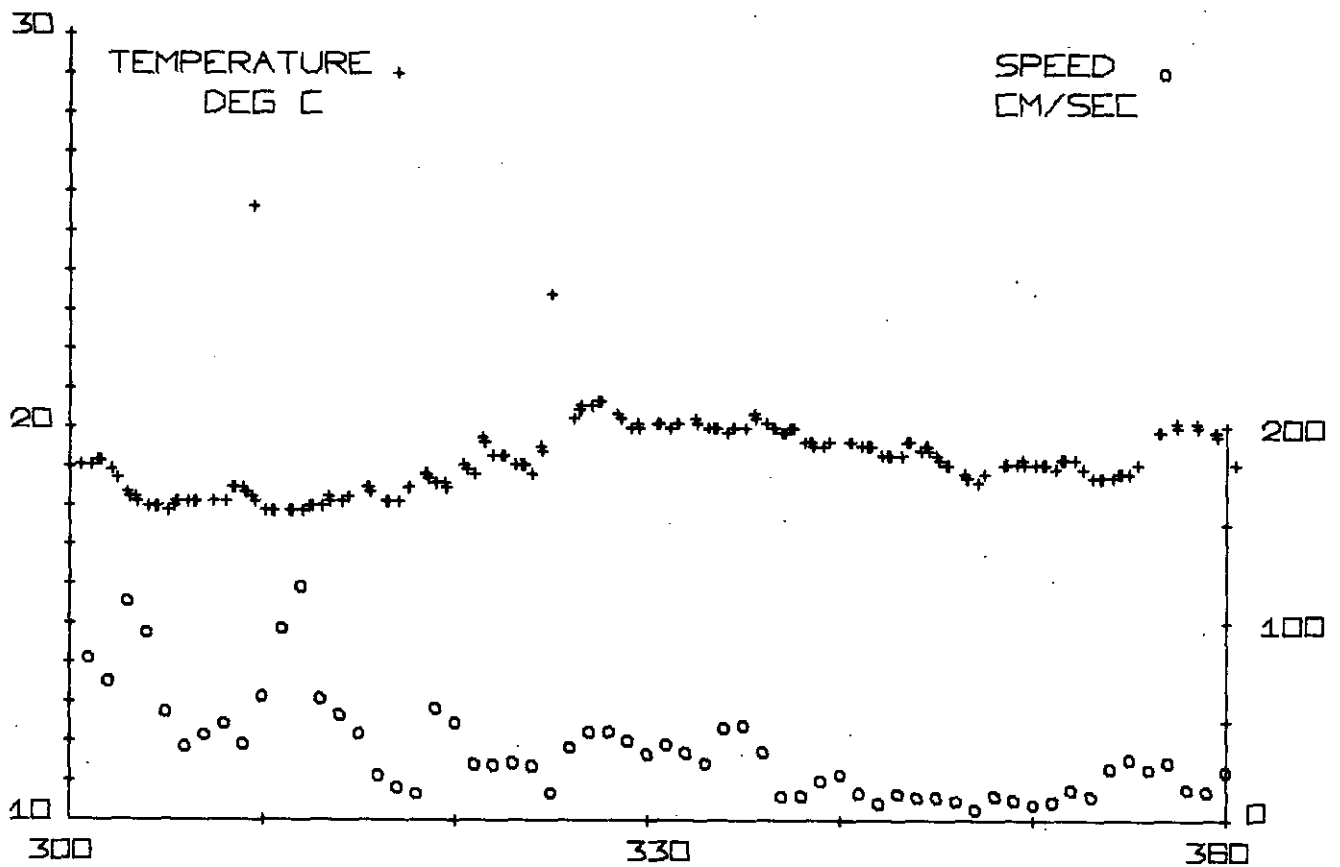
BUOY 1710

DAYS 240-300 1977



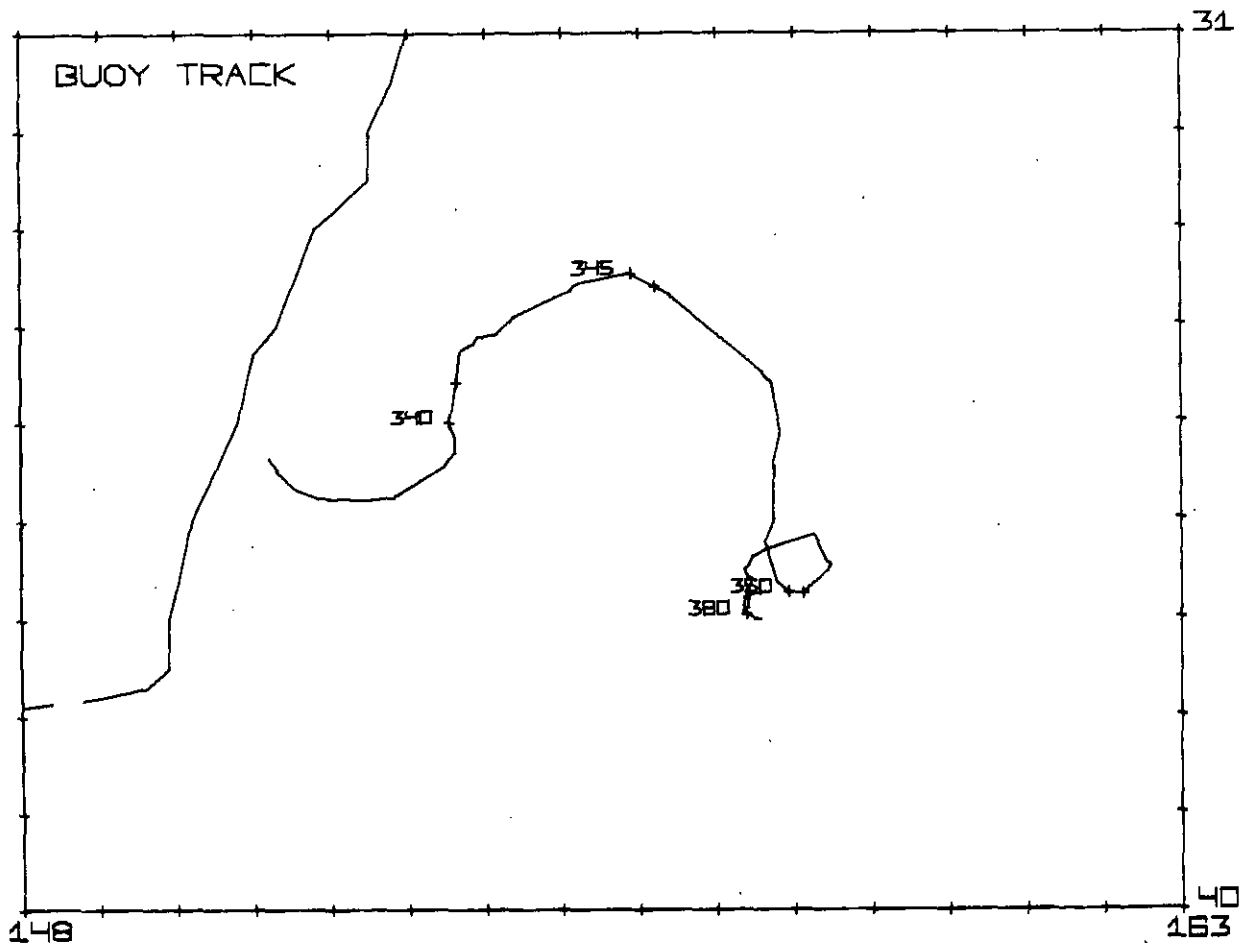
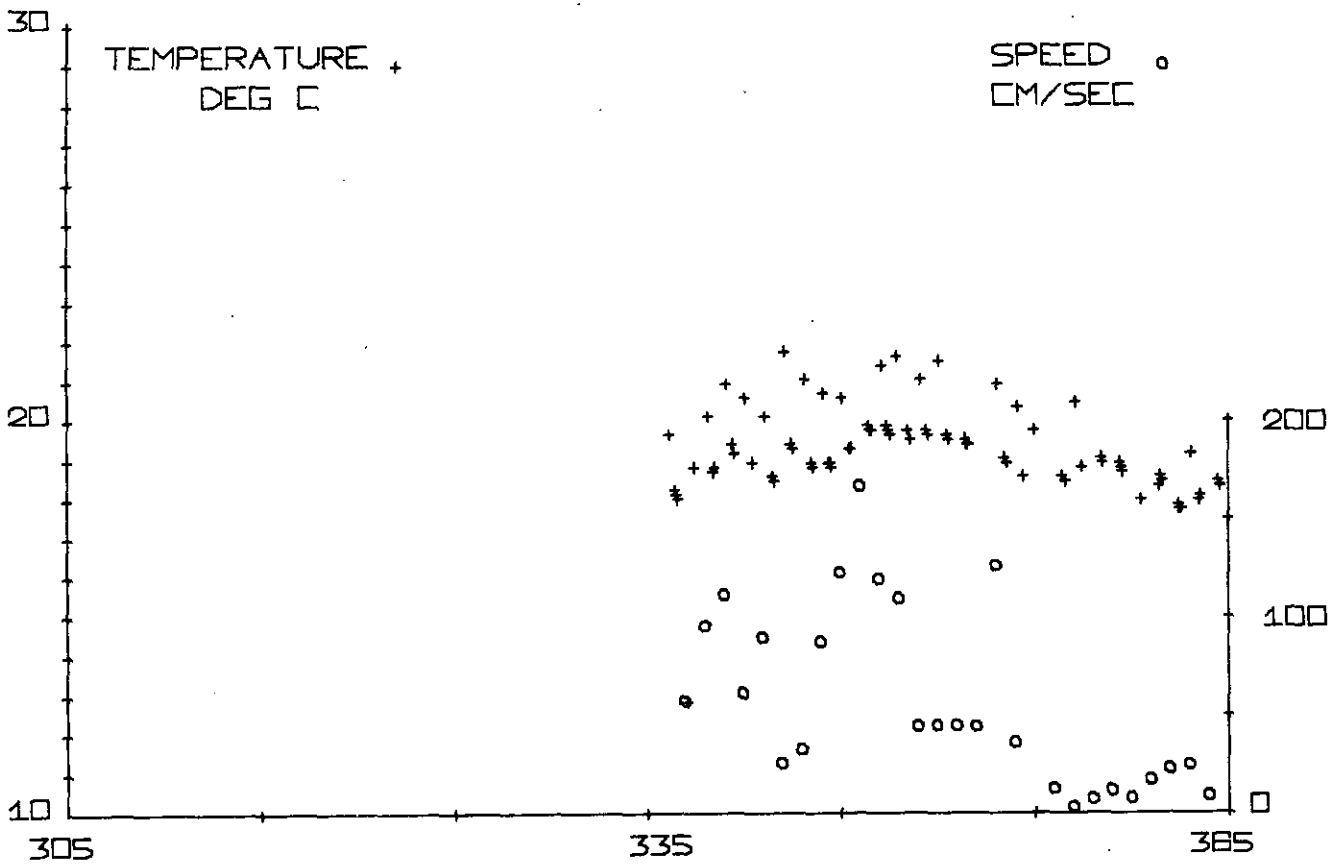
BUOY 1710

DAYS 300-380 1977



BUOY 1726

DAYS 305-365 1977



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