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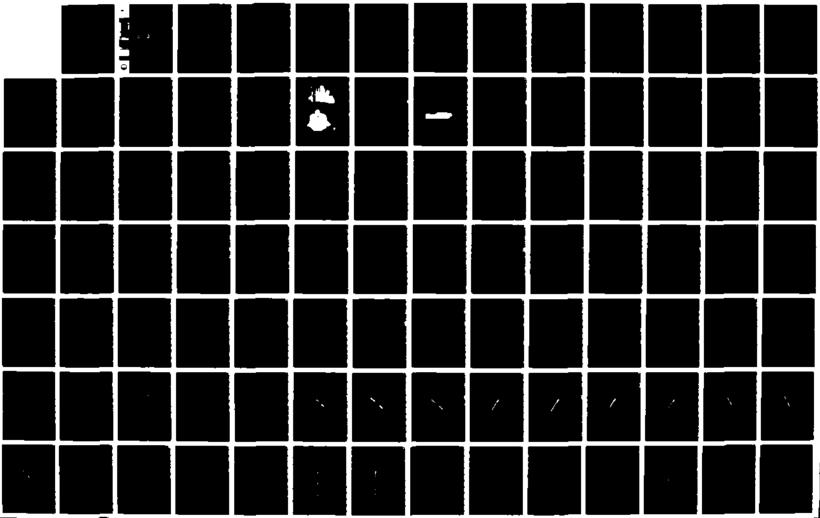

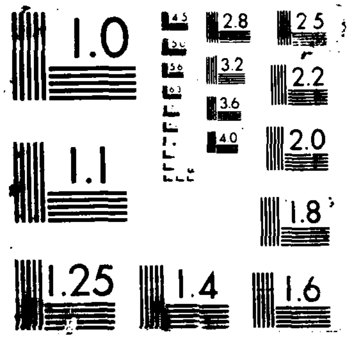
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TIDAL ELEVATIONS AND CURRENTS AT PONCE DE LEON INLET, FLORIDA

by

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Coastal Engineering Research Center

DEPARTMENT OF THE ARMY
Waterways Experiment Station, Corps of Engineers
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19 ABSTRACT (Continue on reverse if necessary and identify by block number)

Tidal elevation and current data were measured and analyzed at Ponce de Leon Inlet for use in calibrating model studies that will evaluate alternative improvements to the weir jetty system.

Data were successfully obtained from four of six Sea Data TDR-2 pressure sensors and 14 Endeco 174 current meters during the period September to November 1983. Quality of the data was excellent with very few spikes or missing points. Hardware-related problems occurred on the TDR for Gage T7 due to flooding. Two of the Endeco gages at sta 2B lost their impellors due to high sediment and current flows and/or fishing activity in the inlet throat.

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19. ABSTRACT (Continued).

Tidal harmonic analysis of 56 days of National Ocean Survey (NOS) tide data, using Coastal Engineering Research Center's software, verified the accuracy of the program and provided a reference for tidal elevation and current harmonic analysis results. The root mean square (rms) error was 0.11 ft. Constituent amplitudes and local epochs for 10 constituents agreed quite well with NOS's data for the full calendar year of 1974 from Daytona Beach Pier using 37 constituents.

Pressure and surface elevation time series and harmonic analysis plots are presented for tidal elevation data collected in Ranges 3 through 6. Mean water depths ranged from 5.46 to 23.00 ft. The maximum tidal range was 3.5 ft at Range 4. The harmonic analysis results were very good for Ranges 3 and 4 with rms errors of 0.07 and 0.08 ft, respectively. For Ranges 5 and 6, the rms errors were higher at 0.35 and 0.28, respectively, but still very good.

For the tidal current data, current roses, vector (stick) plots, current velocity magnitude time-series, current direction time-series, and harmonic analysis plots are presented. The maximum velocity recorded was 3.0 ft/sec at Range 3 for flood flow and 4.6 ft/sec at Range 2 for ebb flow. In general, these values are consistent with those reported earlier.

Temperature data were remarkably consistent between TDR and Endeco gages, showing the same general trends. The range of temperatures was approximately 22.5° to 28.5°C.

Conductivity data were recorded by the Endeco current meters and ranged from approximately 30 to 55 mmho/cm.

PREFACE

Authority for the US Army Engineer Waterways Experiment Station (WES) to conduct this study from September through November 1983 was contained in Intra-Army Order for Reimbursable Services CW-83-0148 from the US Army Engineer District, Jacksonville, Jacksonville, Fla.

The study was conducted by personnel of the Coastal Engineering Research Center (CERC), WES, under the general direction of Dr. James R. Houston, Chief, and Mr. Charles C. Calhoun Jr, Assistant Chief, CERC; Dr. Frederick E. Camfield, Acting Chief, and Dr. William L. Wood and Mr. Thomas R. Richardson, successive Chiefs, Engineering Development Division; and Dr. Dennis R. Smith, Chief, Prototype Measurement and Analysis Branch. The field data collection effort was planned by Mr. J. Michael Hemsley, Research Hydraulic Engineer, Mr. Thomas H. Flor, Physical Scientist, Mr. Terry L. Miloser, Equipment Specialist, and Messrs. Michael D. Dickey and Ralph E. Ankeny, Civil Engineering Technicians. Data analysis was planned and conducted by Mr. Michael J. Briggs, Hydraulic Engineer. Some of the software development was provided by Dr. Michael E. Andrew, Statistician, and Mr. James Rosati, Hydraulic Engineer. Mr. Toby Wilson, Civil Engineer Technician, performed some of the data reduction. This report was prepared by Messrs. Hemsley and Briggs. The Jacksonville District Technical Monitor for this effort was Mr. Earl Howard.

Commander and Director of WES during the conduct of this study and the preparation and publication of this report was COL Dwayne G. Lee, CE. Technical Director was Dr. Robert W. Whalin.

CONTENTS

CONVERSION FACTORS, NON-SI TO SI (METRIC) UNITS OF MEASUREMENT

Non-SI units of measurement used in this report can be converted to SI (metric) units as follows:

Multiply	By	To Obtain
Fahrenheit (degrees)	5/9*	Celsius degrees or Kelvins
feet	0.3048	metres
inches	2.54	centimetres
miles (US statute)	1.609347	kilometres
pounds per square inch gage	6.894757	kilopascals
tons (2,000 pounds, mass)	907.1847	kilograms

* To obtain Celsius (C) temperature readings from Fahrenheit (F) readings, use the following formula: $C = (5/9)(F - 32)$. To obtain Kelvin (K) readings, use: $K = (5/9)(F - 32) + 273.15$.

TIDAL ELEVATIONS AND CURRENTS AT PONCE DE LEON INLET, FLORIDA

PART I: INTRODUCTION

Background

1. Ponce de Leon Inlet is in Volusia County on the east coast of Florida about 65 miles* south of St. Augustine Harbor and 57 miles north of Canaveral Harbor (Figure 1). The inlet is a natural waterway stabilized by jetties which connect the Atlantic Ocean with the Halifax and Indian rivers, both of which join the Intracoastal Waterway. The current configuration of the stabilized inlet includes a rubble-mound north jetty with a weir section, an impoundment basin adjacent to the weir section, and a short rubble-mound south jetty (US Army Engineer District (USAED), Jacksonville, 1983).

2. The weir section of the north jetty was constructed during the period 1968 through 1972 when no criteria existed for the design of weir jetties. Design of the project, therefore, included monitoring the behavior of the inlet following construction. To facilitate future adjustments, the weir was constructed with king piles and concrete panels (USAED, Jacksonville, 1983).

3. Monitoring efforts at the inlet, performed after construction of the jetties, revealed a general pattern of erosion to the north of the inlet and accretion to the south (Purpura et al. 1974, Purpura 1977). Eventually, sand filled the area south of the south jetty and then began bypassing this area. A large accumulation of sand has formed north of the south jetty, forcing the channel northward through the impoundment basin. Figure 2 shows the development of the south shoreline. Migration of the channel and the lack of sand passing over the weir have rendered the impoundment basin ineffective.

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* A table of factors for converting non-SI units of measurement to SI (metric) units is presented on page 3.

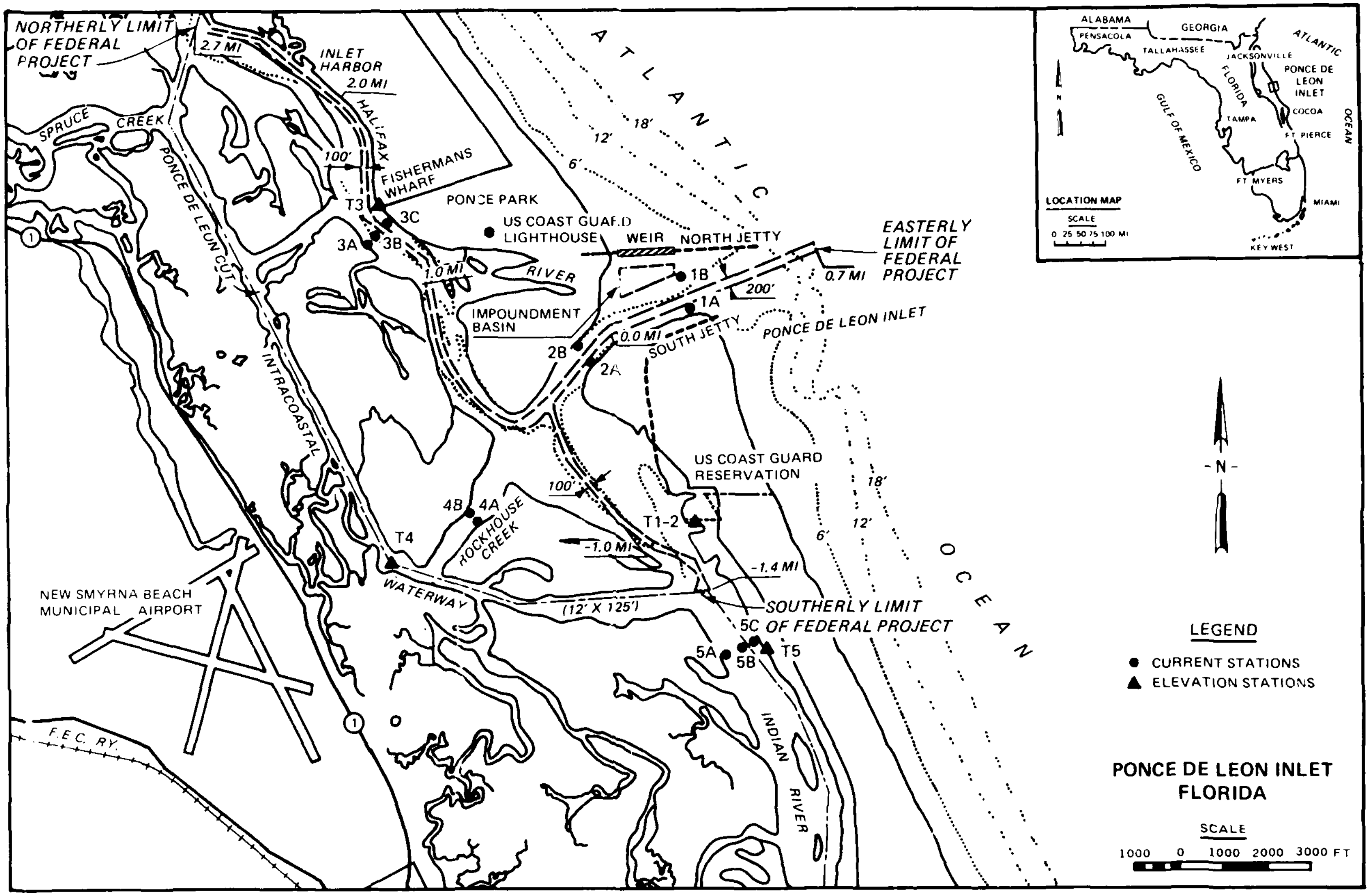

Figure 1. Ponce de Leon Inlet, Florida

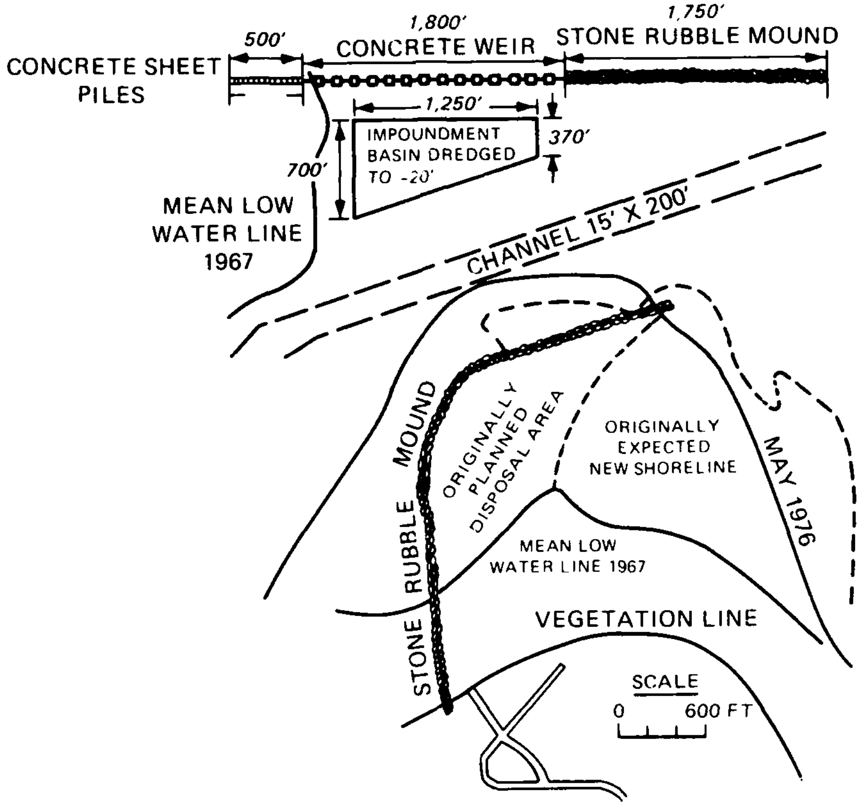

Figure 2. Growth of the south beach
(from USAED, Jacksonville, 1967)

Purpose

4. Jacksonville District, as a result of the failure of the weir-jetty system to perform as designed, initiated an investigation "to examine the performance of the Ponce de Leon Inlet Navigation Project and, based on the results of this examination, develop the most effective plan for future maintenance of the Navigation Project" (USAED, Jacksonville, 1983). The intent was to adjust the weir in a manner that would reduce waves and currents in the channel caused by overtopping of the weir and cause the channel to move away from the north jetty. The weir would be closed by inserting concrete panels between the existing king piles and then covering these panels with armor stone (Figure 3). Removal of the buildup north of the south jetty and renourishment of the north beach would follow the weir closure.

5. During the stabilization of the beach-inlet system, a model study is planned at the US Army Engineer Waterways Experiment Station (WES) to evaluate

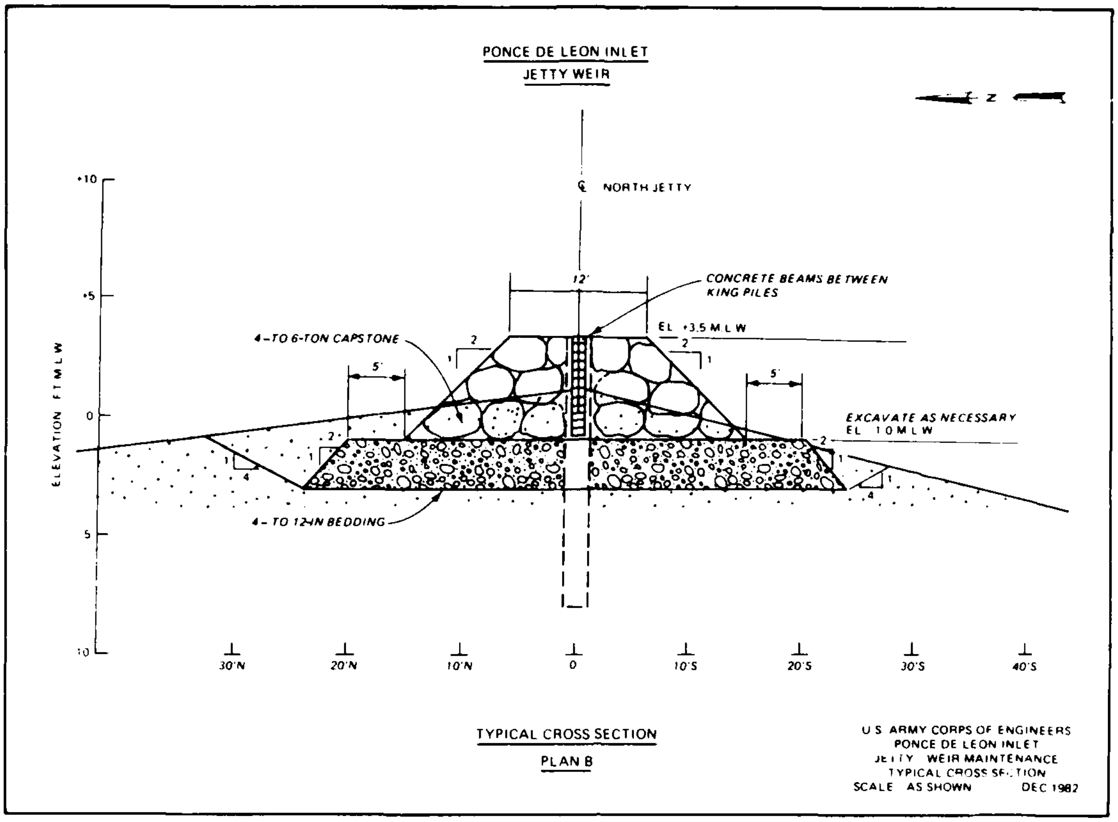

Figure 3. Closure of Weir

alternative improvements to the weir-jetty system. Figure 4 identifies the proposed model layout for this study. To provide baseline data for the model study, tidal elevations and currents were measured at the inlet and are reported herein.

Previous Studies

6. There have been a number of studies performed at Ponce de Leon Inlet since completion of jetty construction during 1972. The original design was developed prior to the publication of the Shore Protection Manual and other guidelines for weir-jetty design. Consequently, Jacksonville District supported investigations by the University of Florida to monitor the performance of the jetty system. These studies have been reported by Purpura et al. (1974) and Purpura (1977), and summarized by Jones and Mehta (1978). Each of these studies has produced the same general conclusion: close the weir, stabilize the inlet, and make improvements as needed to the jetty system.

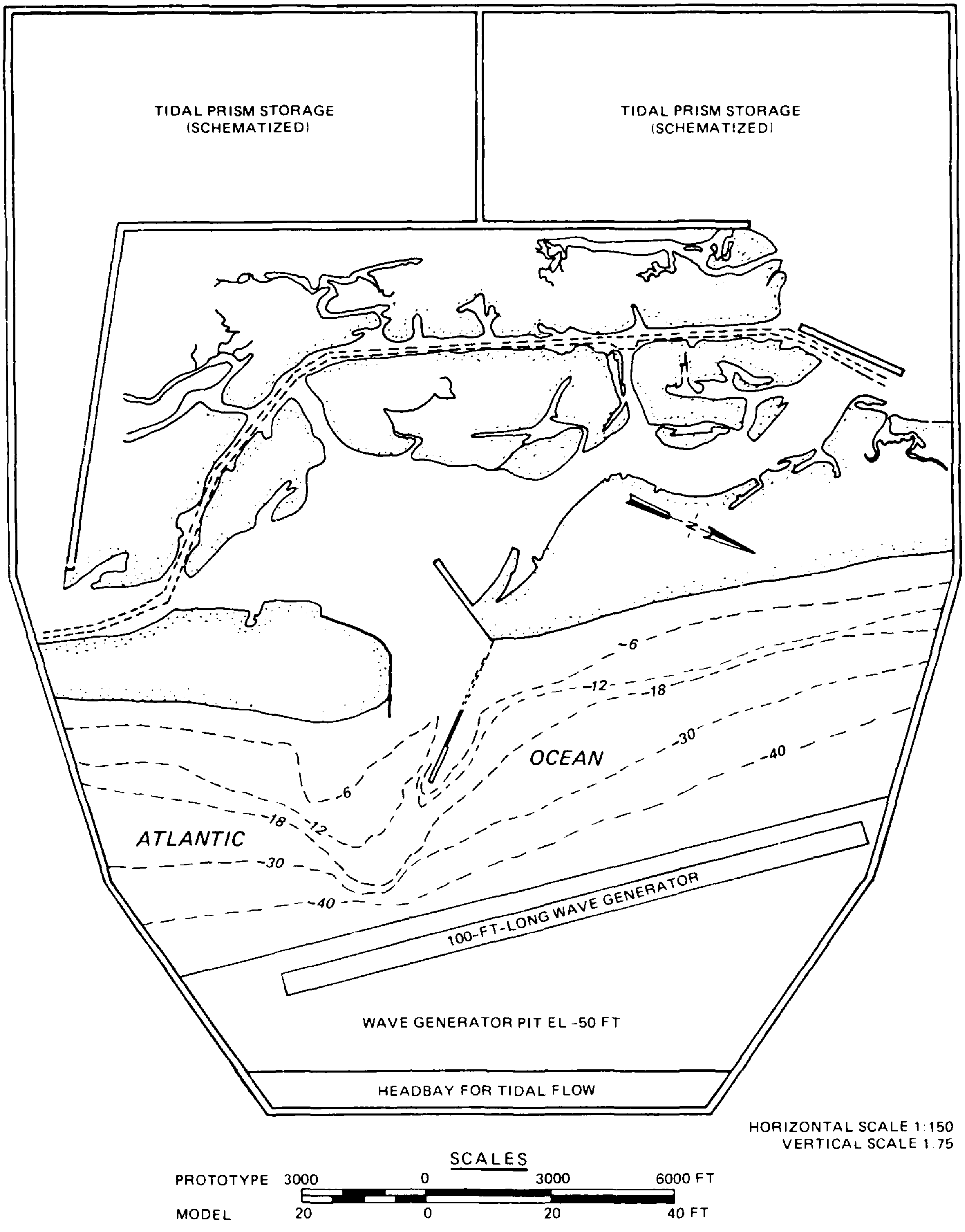

Figure 4. Proposed model layout for Ponce de Leon Inlet

Considerable data were collected and reported through these studies. A brief summary of these data, which includes the position of the navigation channel, tidal elevations and currents, and other hydraulic parameters, is contained in this report.

7. While the jetties have provided a deep navigation channel, Figure 5

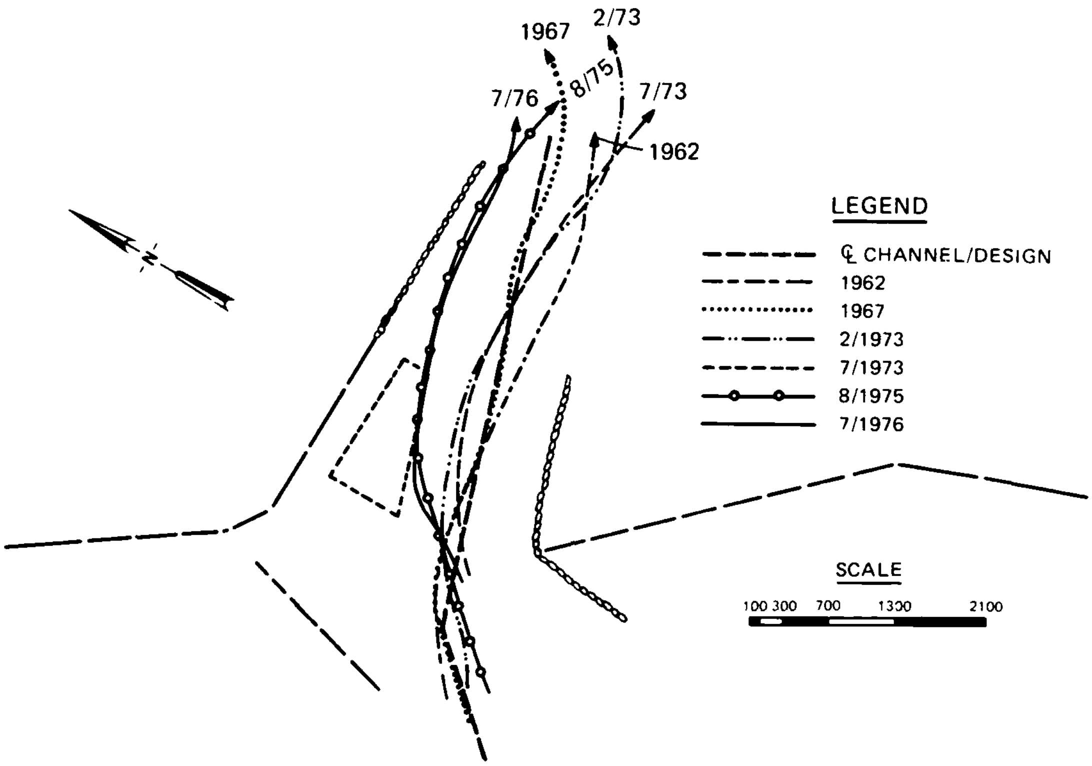

Figure 5. Historical movement center line of channel, Ponce de Leon Inlet (after Jones and Mehta 1978)

shows how the channel has migrated northward alongside the north jetty. Consequently, stability of the jetty toe could be endangered by scour from tidal currents. In addition, boaters are faced with dangerous navigation conditions when strong winds blow from the south.

8. Tidal elevation data for the Ponce de Leon Inlet area are available from several sources: the National Ocean Survey (NOS) which operated tide gages on the pier at Daytona Beach, and the US Coast Guard (USCG) Station which is located inside the inlet. Table 1 lists tidal ranges from the NOS tide tables. Figure 6 shows the location of the two NOS gages as well as four other tide recorders used in the Corps sponsored studies during 1974

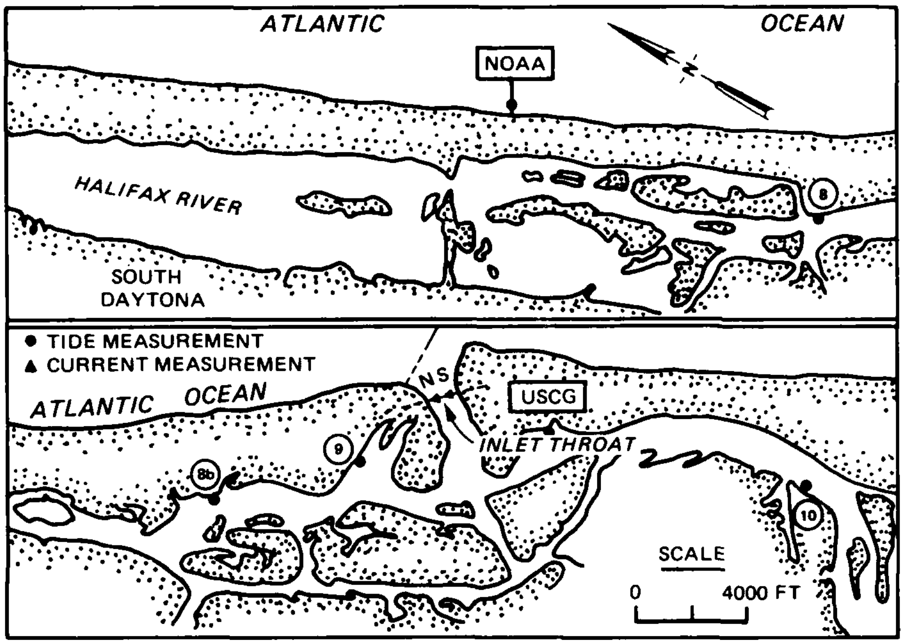

Figure 6. Tide and current measurement locations, previous studies (NOAA = National Oceanic and Atmospheric Administration) (after Jones and Mehta 1978)

(locations 8, 9, and 10) and 1976 (all six locations). Tidal elevations measured and reported by Purpura (1977) are shown on Figure 7.

9. During the field work conducted in 1976, tidal current measurements were taken at stations in the inlet throat shown on Figure 6. Figure 7 also contains these current data. Purpura (1977) said, "The highest measured point velocity for ebb flow was 4.5 ft/sec at 1.65 ft below the surface." This study indicated that flood flows were stronger than ebb flows.

10. The pattern of tidal currents has also been studied at the inlet by using dye and drogue studies (Purpura et al. 1974). Dye patterns indicated a strong flood current against the north edge of the channel and that flow over the weir during flood flow followed the northern boundary of the channel. During ebb flow, stronger velocities were found along the south bank. A strong southerly current along the beach north of and across the weir was also revealed. This current appears to be independent of wave direction.

11. In 1976, both drogues and dye were used to trace current patterns in the inlet throat. As shown in Figure 8, neither the flood nor the ebb flow follows the design channel. Both flows are strong through the deposition

basin, hugging the north jetty, with considerable flow passing across and/or through the weir.

12. Studies performed at Ponce de Leon Inlet include also a one-dimensional numerical model (Purpura 1977), a wave refraction analysis (Purpura et al. 1974, Purpura 1977), tidal prism analysis (Jones and Mehta 1978), and considerable topographic and bathymetric data review. The reader is referred to the references for additional information.

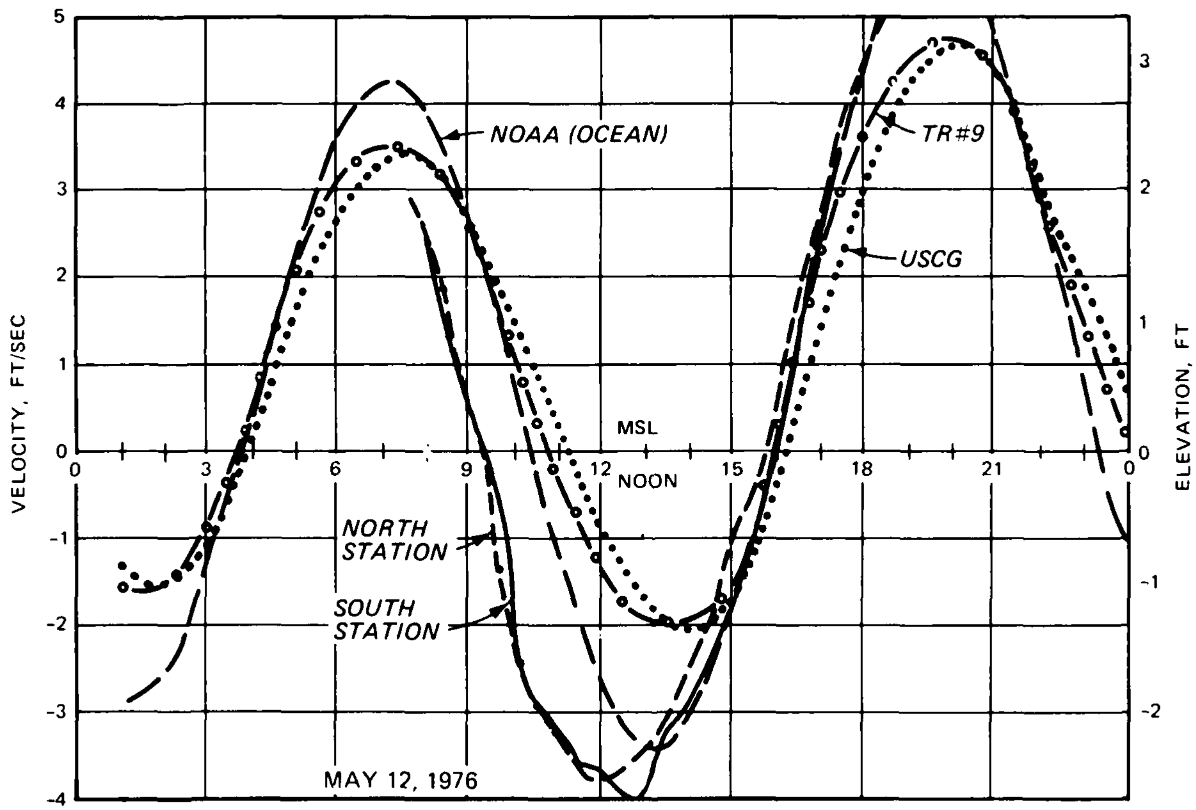

Figure 7. Tidal elevations and currents (msl = mean sea level) (NOAA = National Oceanic and Atmospheric Administration) (after Purpura 1977)

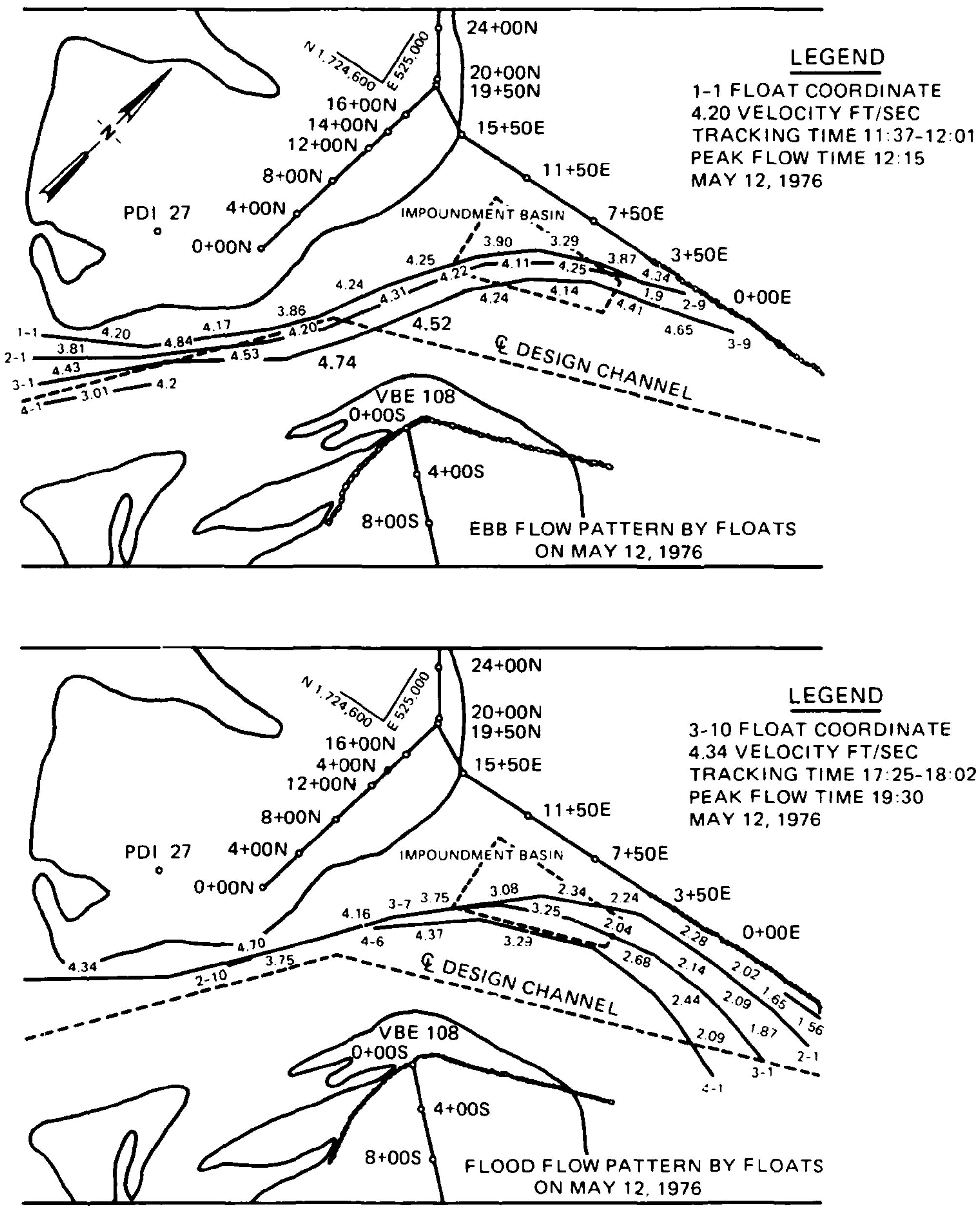

Figure 8. Current patterns (after Purpura 1977)

PART II: FIELD DATA COLLECTION

Planning

13. The decision to acquire baseline tidal elevation and current data was made late in FY 1983. This allowed limited time to plan and obtain 1 month's data before winter storms set in. The plan involved the deployment of six Sea Data TDR-2 pressure sensors (Figure 9) and eighteen Endeco 174 current meters (Figure 10), as well as acquiring tide data from the existing NOS gage at Daytona Beach. The data will be used in the physical model study (Figure 4), so instruments were deployed primarily within the model boundaries except for two tide gages located some distance to the north and south to calibrate the tidal prism storage.

14. After meetings at WES and a site visit, the final instrument stations were determined. Initially, a tide gage was planned for the inlet mouth, but the lack of any fixed structure on which to mount the instrumentation precluded installation. Instead, a gage was installed at the USCG dock inside the inlet. Figure 11 shows the measurement stations within the model boundaries. Two additional stations were included: one approximately 6.4 miles north of the inlet, just north of the Bascule Bridge into Daytona Beach, and the other 4.4 miles south of the inlet at the Smyrna Yacht Club.

15. Installation was scheduled for the week of 25 September 1983. It was estimated that 1 week would be necessary to assemble and install all the instrumentation. The instruments would remain in the water through at least one lunar cycle.

16. During the reconnaissance trip, pile dimensions were recorded, arrangements were made with the Coast Guard to use their facility as a staging area, and property owners were contacted concerning the installation of tide gages on their property. Mounts which could be installed by divers for the TDR-2's were fabricated. Meanwhile, discussions were conducted with Endeco, Inc., to determine the best mooring system for current meters in an inlet with swift tidal currents. Figure 12 illustrates the mooring system developed. Two current meters would be installed on each mooring at measurement sta 1A and 1B, 2A and 2B, and 4A and 4B. Only one instrument would be placed at the remaining stations that were located in shallower water. Table 2 summarizes the instrument locations.

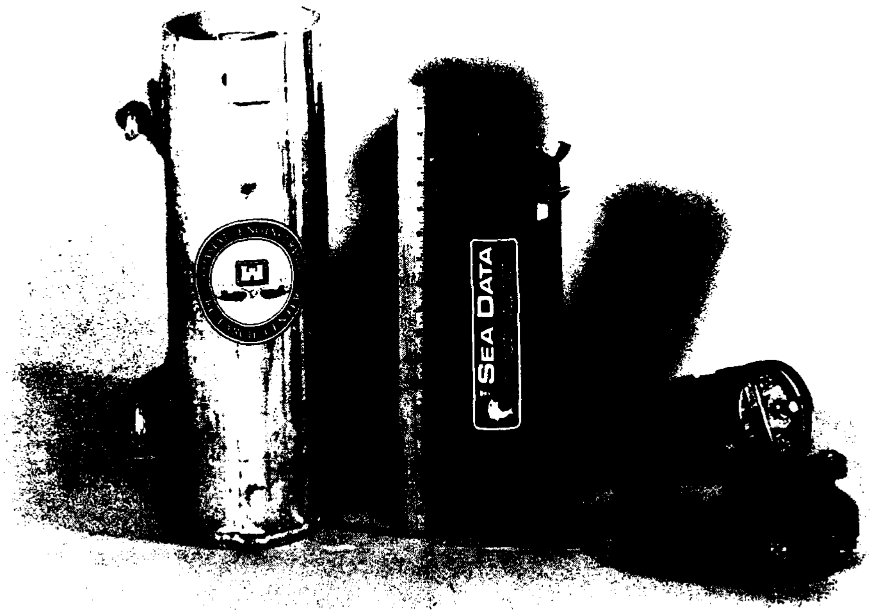

Figure 9. TDR-2 pressure sensor

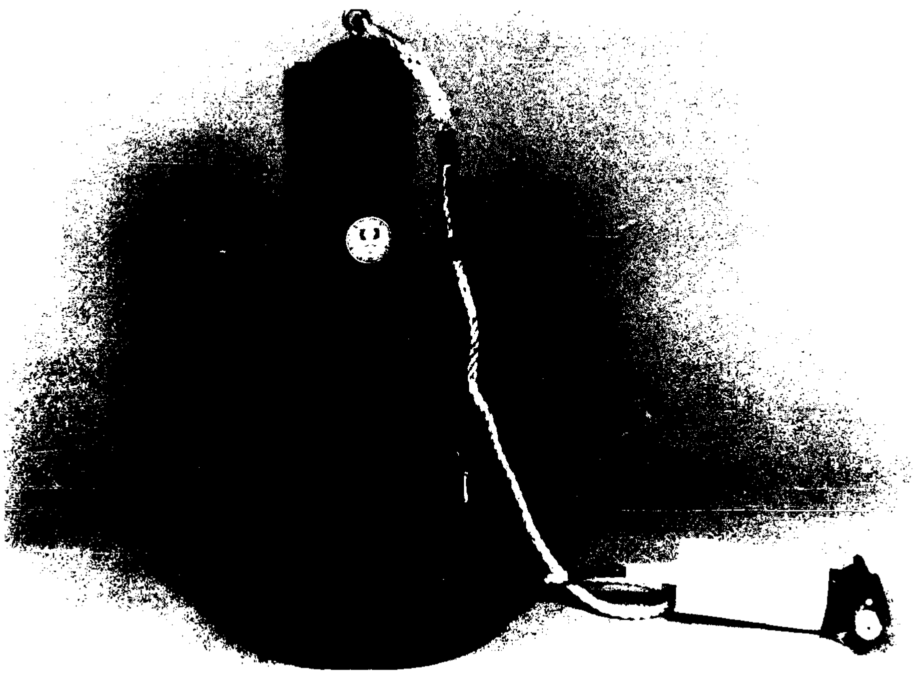

Figure 10. Endeco 174 current meter

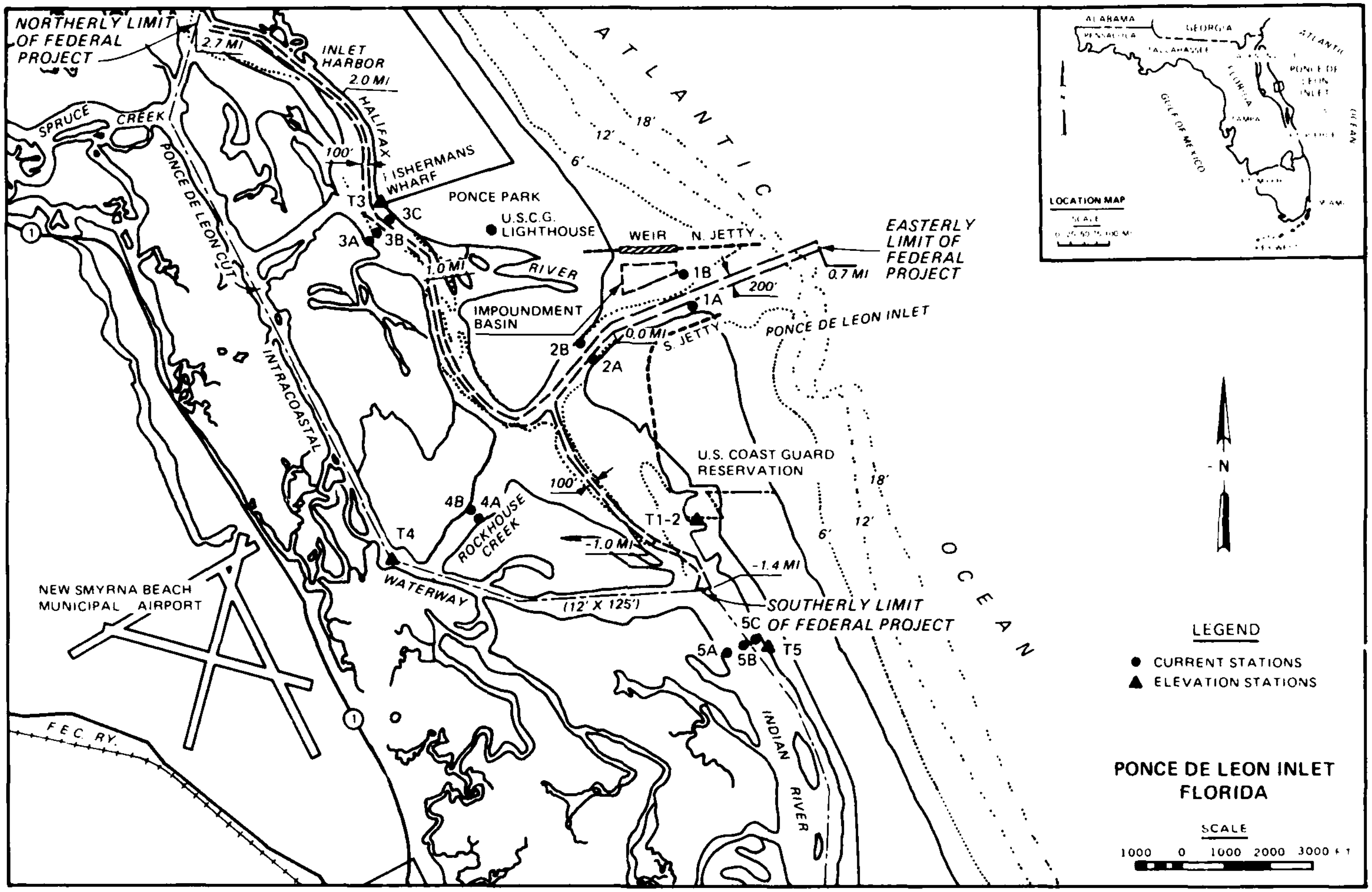

Figure 11. Measurement stations

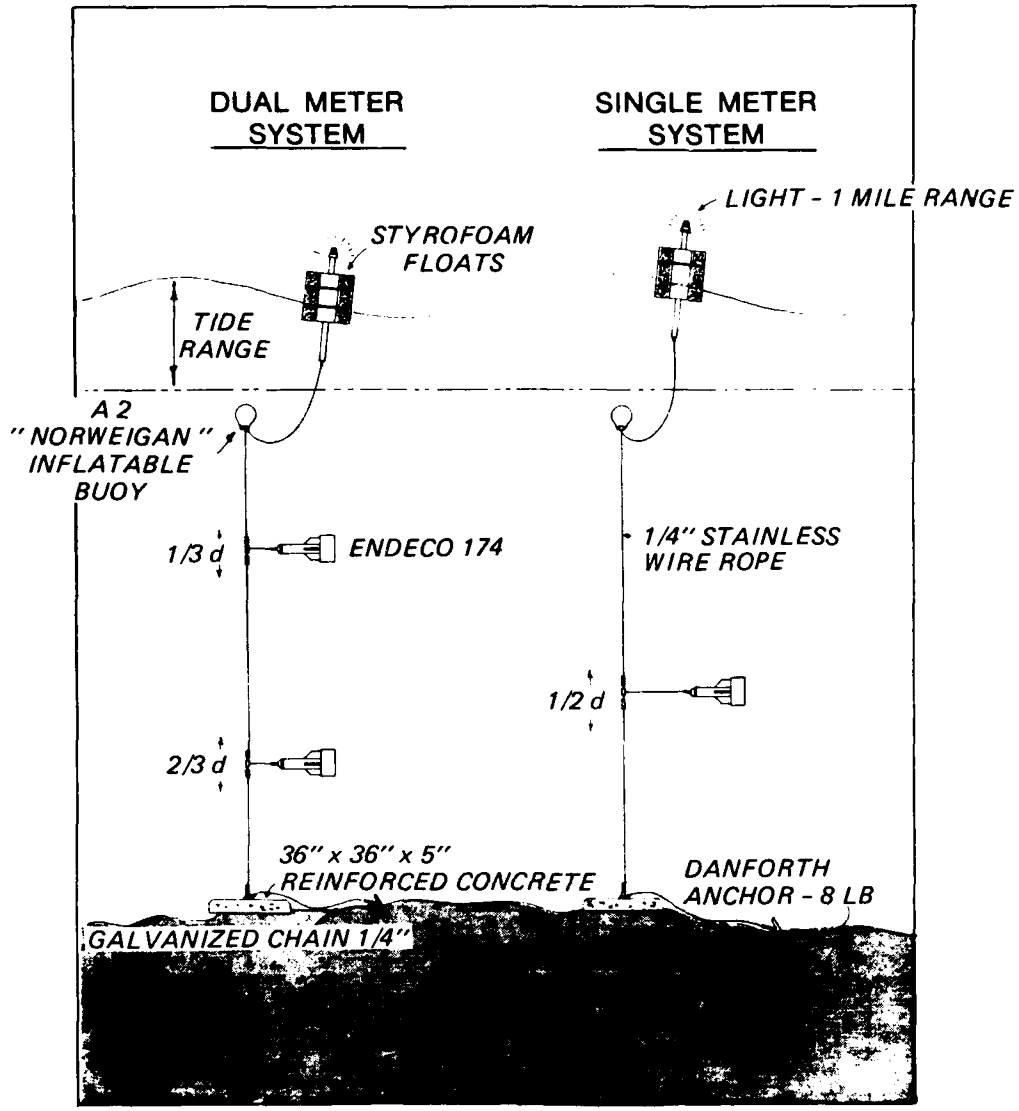

Figure 12. Current meter mooring system

Data Collection

17. The instrumentation was installed between 25 September and 1 October 1983. The operation was conducted with only one persistent problem: continuous rough conditions in the mouth of the inlet as a result of the overtopping of the north jetty precluded installation of the meters on Range 1 (sta 1A and 1B). Thus, an Endeco 110 current meter was brought to the site from WES and deployed from a small boat. Two personnel remained onsite to maintain the surface floats and to monitor the condition of the moorings.

18. All instrumentation remained in place until the week of 7 November 1983. The instruments, the mounts, and the bulk of the mooring systems were then removed. Since current measurements had been made with the Endeco 110's for limited periods on 2 days, additional current data were required for the inlet mouth.

19. By monitoring weather charts and the real-time wave data collected by the University of Florida for WES's Hurricane Surge Prototype Data Collection Program, it was determined that wave conditions inside the inlet would be acceptable for a few days around 26 January 1984. Thus, on 27 January 1984 the additional current data were collected. Readings were taken once each hour at each station on Ranges 1 and 2 (Figure 12) at two depths, approximately one-third and two-thirds the water depth. Table 3 shows the data collected. Eleven of the desired thirteen hours of measurements were taken. Conditions in the inlet mouth necessitated the use of a sizeable vessel with twin engines in order to hold position during the measurements. The vessel used was limited by USCG regulations to a total of 12 working hours per day, as were all other suitable and available commercial vessels.

Data Recovery

20. Table 4 shows the data recovered during the collection period. Data recovery was very good. Four tide gages collected complete data sets, and at sta 1-2, a portion of the data was collected while the tide gage at sta 7 suffered a seal failure soon after installation, and no data were collected.

21. The percent recovery for the Endeco 174 current meters was excellent. All meters collected complete data on current direction, temperature, and conductivity. Twelve of the meters collected data on current velocity as well, while the remaining two meters at sta 2B collected nearly 2 weeks of velocity data. Suspended sediment and swift water velocities in the inlet throat combined to cause the failure of impeller bearings on the meters at sta 2B. (These failures might have been exacerbated by fishermen tangling their lines in the impellers, but that is mostly conjecture.)

22. These data losses, while unfortunate, will not seriously impact the operation of the model since sufficient data were collected to allow proper calibration.

PART III: DATA ANALYSIS

Data Presentation Formats

23. Tabular listings and plots are the two forms of data presentation used to document the data collection effort. Tabular listings were generated for model verification. Figure 13 is an example of a TDR listing for Gage T4 (PI152). This listing gives the date, time, pressure, and depth data at 5-min intervals. Figure 14 is the corresponding TDR listing for temperature data in both degrees Celsius and Fahrenheit. Figure 15 is an example of an hourly listing for the Endeco 174 gages of date, time, current speed and direction, temperature, and conductivity for Gage 2AB. Interval listings of 10 and 2 min were also prepared for the current meters for use in model verification. Due to the voluminous nature of these listings, none have been included in this report, but they are available from the authors upon request.

24. The following three types of plots were generated to display the data: time series plots, current vector "rose" diagrams, and harmonic analysis plots. Time-series plots are x-y plots that show the variation of a parameter such as surface elevation versus time in days. A current rose is a graphical method of illustrating current magnitude and direction for a set of data points. The rose consists of seven concentric rings, spaced every 0.5 ft/sec, with the origin at zero speed. Points are plotted radially about the origin, the magnitude given by the distance from the origin and the direction measured from true north at the top of the diagram. The current flows in a direction emanating from the origin toward the plotted point. Finally, harmonic analysis plots consist of two curves overlain on one graph; the first curve shows the measured data, and the second curve illustrates the calculated values. A second graph shows the corresponding tidal harmonic analysis residuals or differences between the first two curves.

25. To facilitate comparison among the different gages and locations, an effort was made to standardize x- and y-axis scales with the greatest resolution. Table 5 is a summary of plot formats listings the x- and y-axis ranges and units of measure for each parameter plotted. The instrument used (i.e. source) to measure these data is also given. For time-series plots, the beginning x-axis value is dated 27 September 1983 with 7-day increments between annotations. The one exception is the NOAA tidal height data. Due to

PONCE DE LEON INLET PROJECT
STATION PI152, SEPT TO NOV '83

DATE	TIME EST	PRESS PSIG	DEPTH FT	TIME EST	PRESS PSIG	DEPTH FT	TIME EST	PRESS PSIG	DEPTH FT	TIME EST	PRESS PSIG	DEPTH FT	TIME EST	PRESS PSIG	DEPTH FT	TIME EST	PRESS PSIG	DEPTH FT
9-27-83	1915	4.29	22.59	1920	4.27	22.59	1925	4.29	22.56	1930	4.29	22.59	1935	4.32	22.65	1940	4.31	22.63
9-27-83	1945	4.33	22.67	1950	4.33	22.68	1955	4.30	22.74	2000	4.37	22.76	2005	4.36	22.74	2010	4.38	22.80
9-27-83	2015	4.35	22.81	2020	4.42	22.89	2025	4.46	22.96	2030	4.48	23.01	2035	4.49	23.04	2040	4.49	23.04
9-27-83	2045	4.5[illegible]	23.11	2050	4.55	23.16	2055	4.58	23.24	2100	4.61	23.31	2105	4.62	23.33	2110	4.64	23.36
9-27-83	2115	4.65	23.40	2120	4.67	23.40	2125	4.68	23.45	2130	4.70	23.51	2135	4.72	23.54	2140	4.74	23.60
9-27-83	2145	4.76	23.65	2150	4.76	23.65	2155	4.80	23.72	2200	4.81	23.76	2205	4.81	23.76	2210	4.84	23.81
9-27-83	2215	4.8[illegible]	23.85	2220	4.87	23.90	2225	4.88	23.92	2230	4.88	23.92	2235	4.91	23.97	2240	4.90	23.96
9-27-83	2245	4.91	23.97	2250	4.91	23.97	2255	4.92	24.01	2300	4.94	24.05	2305	4.94	24.05	2310	4.95	24.07
9-27-83	2315	4.96	24.08	2320	4.96	24.19	2325	4.96	24.13	2330	4.96	24.08	2335	4.97	24.12	2340	4.97	24.12
9-27-83	2345	4.97	24.10	2350	4.97	24.12	2355	4.96	24.10	0	4.96	24.08	5	4.95	24.07	10	4.95	24.07
9-28-83	15	4.9[illegible]	24.07	20	4.96	24.07	25	4.94	24.05	30	4.94	24.05	35	4.92	24.01	40	4.92	23.99
9-28-83	45	4.91	23.97	50	4.92	23.9[illegible]	55	4.90	23.96	100	4.89	23.94	105	4.88	23.92	110	4.87	23.90
9-28-83	115	4.85	23.85	120	4.85	23.85	125	4.83	23.80	130	4.81	23.76	135	4.80	23.74	140	4.78	23.69
9-28-83	145	4.76	23.65	150	4.76	23.63	155	4.75	23.62	200	4.72	23.54	205	4.72	23.54	210	4.71	23.52
9-28-83	21[illegible]	4.68	23.47	220	4.65	23.40	225	4.64	23.38	230	4.62	23.33	235	4.62	23.33	240	4.60	23.28
9-28-83	245	4.57	23.22	250	4.56	23.19	255	4.53	23.13	300	4.52	23.10	305	4.49	23.04	310	4.50	23.07
9-28-83	315	4.4[illegible]	23.04	320	4.4[illegible]	22.96	325	4.45	22.95	330	4.42	22.89	335	4.42	22.89	340	4.39	22.81
9-28-83	345	4.37	22.77	350	4.35	22.74	355	4.36	22.74	400	4.36	22.74	405	4.33	22.67	410	4.29	22.59
9-28-83	415	4.2[illegible]	22.59	420	4.27	22.54	425	4.25	22.50	430	4.24	22.47	435	4.23	22.45	440	4.21	22.41
9-28-83	445	4.19	22.36	450	4.19	22.36	455	4.14	22.24	500	4.16	22.29	505	4.13	22.23	510	4.12	22.21
9-28-83	515	4.13	22.15	520	4.11	22.17	525	4.10	22.15	530	4.10	22.15	535	4.10	22.15	540	4.08	22.12
9-28-83	545	4.07	22.10	550	4.09	22.14	555	4.07	22.10	600	4.09	22.14	605	4.09	22.14	610	4.09	22.14
9-28-83	615	4.10	22.15	620	4.10	22.15	625	4.09	22.14	630	4.10	22.15	635	4.09	22.14	640	4.10	22.15
9-28-83	645	4.10	22.15	650	4.13	22.23	655	4.12	22.21	700	4.16	22.29	705	4.16	22.29	710	4.16	22.30
9-28-83	715	4.15	22.36	720	4.26	22.38	725	4.22	22.44	730	4.23	22.45	735	4.25	22.50	740	4.26	22.53
9-28-83	745	4.29	22.59	750	4.32	22.65	755	4.35	22.72	800	4.36	22.74	805	4.36	22.74	810	4.38	22.80
9-28-83	815	4.42	22.87	820	4.42	22.89	825	4.46	22.96	830	4.48	23.01	835	4.50	23.05	840	4.52	23.11
9-28-83	845	4.55	23.16	850	4.56	23.19	855	4.59	23.25	900	4.61	23.31	905	4.64	23.36	910	4.64	23.38
9-28-83	915	4.6[illegible]	23.45	920	4.6[illegible]	23.47	925	4.72	23.54	930	4.75	23.62	935	4.76	23.65	940	4.76	23.65
9-28-83	945	4.78	23.69	950	4.80	23.74	955	4.83	23.80	1000	4.85	23.85	1005	4.87	23.90	1010	4.88	23.92
9-28-83	1015	4.91	23.97	1020	4.91	23.97	1025	4.92	23.99	1030	4.95	24.07	1035	4.97	24.12	1040	5.00	24.17
9-28-83	1045	5.01	24.21	1050	5.04	24.26	1055	5.04	24.26	1100	5.05	24.29	1105	5.07	24.34	1110	5.08	24.36
9-28-83	1115	5.10	24.41	1120	5.11	24.43	1125	5.13	24.47	1130	5.13	24.48	1135	5.16	24.54	1140	5.17	24.56
9-28-83	1145	5.17	24.56	1150	5.17	24.56	1155	5.17	24.57	1200	5.17	24.57	1205	5.19	24.60	1210	5.20	24.63
9-28-83	1215	5.24	24.67	1220	5.21	24.65	1225	5.21	24.65	1230	5.21	24.65	1235	5.21	24.65	1240	5.21	24.65
9-28-83	1245	5.21	24.65	1250	5.21	24.65	1255	5.21	24.65	1300	5.21	24.65	1305	5.20	24.63	1310	5.20	24.63
9-28-83	1315	5.17	24.57	1320	5.17	24.57	1325	5.17	24.57	1330	5.17	24.57	1335	5.17	24.57	1340	5.17	24.56
9-28-83	1345	5.16	24.54	1350	5.14	24.50	1355	5.14	24.50	1400	5.11	24.43	1405	5.09	24.39	1410	5.08	24.36
9-28-83	1415	5.07	24.34	1420	5.05	24.29	1425	5.04	24.26	1430	5.05	24.29	1435	5.01	24.21	1440	5.01	24.21
9-28-83	1445	4.9[illegible]	24.14	1450	4.95	24.07	1455	4.92	23.99	1500	4.91	23.97	1505	4.90	23.96	1510	4.88	23.92
9-28-83	1515	4.8[illegible]	23.85	1520	4.81	23.76	1525	4.79	23.71	1530	4.77	23.67	1535	4.76	23.63	1540	4.75	23.62
9-28-83	1545	4.72	23.54	1550	4.72	23.54	1555	4.68	23.47	1600	4.68	23.47	1605	4.68	23.45	1610	4.65	23.40
9-28-83	1615	4.63	23.34	1620	4.64	23.33	1625	4.62	23.33	1630	4.59	23.25	1635	4.59	23.25	1640	4.56	23.19
9-28-83	1645	4.54	23.14	1650	4.52	23.11	1655	4.52	23.11	1700	4.49	23.04	1705	4.49	23.04	1710	4.49	23.04
9-28-83	1715	4.46	22.96	1720	4.46	22.96	1725	4.42	22.89	1730	4.42	22.89	1735	4.42	22.87	1740	4.39	22.81
9-28-83	1745	4.39	22.81	1750	4.39	22.81	1755	4.39	22.81	1800	4.39	22.81	1805	4.39	22.81	1810	4.38	22.80
9-28-83	1815	4.3[illegible]	22.80	1820	4.38	22.80	1825	4.36	22.74	1830	4.36	22.74	1835	4.35	22.72	1840	4.33	22.67

Figure 13. Example TDR pressure (in pounds per square inch gage (PSIG)) and depth listing for Gage T4 (PI152)

PONCE DE LEON INLET PROJECT
ST [illegible] SEPT TO NOV 83

PAGE 1

DATE	TIME EST	TEMP DEG C	TEMP DEG F	TIME EST	TEMP DEG C	TEMP DEG F	TIME EST	TEMP DEG C	TEMP DEG F	TIME EST	TEMP DEG C	TEMP DEG F	TIME EST	TEMP DEG C	TEMP DEG F	TIME EST	TEMP DEG C	TEMP DEG F
9-27-83	1915	25.43	77.78	1920	25.42	77.76	1925	25.39	77.71	1930	25.38	77.69	1935	25.35	77.63	1940	25.34	77.61
9-27-83	1945	25.3[illegible]	77.55	1950	25.31	77.56	1955	25.28	77.50	2000	25.28	77.50	2005	25.25	77.45	2010	25.24	77.43
9-27-83	2015	25.21	77.38	2020	25.19	77.35	2025	25.17	77.31	2030	25.16	77.28	2035	25.15	77.26	2040	25.15	77.26
9-27-83	2045	25.1[illegible]	77.26	2050	25.13	77.23	2055	25.16	77.29	2100	25.30	77.54	2105	25.31	77.56	2110	25.30	77.54
9-27-83	2115	25.3[illegible]	77.54	2120	25.3[illegible]	77.54	2125	25.28	77.50	2130	25.26	77.50	2135	25.26	77.47	2140	25.28	77.50
9-27-83	2145	25.1[illegible]	77.[illegible]7	2150	25.11	77.19	2155	25.05	77.09	2200	25.13	77.22	2205	25.17	77.31	2210	25.12	77.21
9-27-83	2215	25.0[illegible]	77.14	2220	25.0[illegible]	77.04	2225	25.00	77.00	2230	25.00	77.00	2235	25.00	77.00	2240	24.98	76.97
9-27-83	2245	24.[illegible]7	76.9[illegible]	2250	24.9[illegible]	76.92	2255	24.95	76.90	2300	24.95	76.90	2305	24.97	76.95	2310	24.96	76.92
9-27-83	2315	24.91	76.83	2320	24.93	76.87	2325	25.00	77.00	2330	25.01	77.02	2335	25.00	77.00	2340	24.98	76.97
9-27-83	2345	25.0[illegible]	77.04	2350	25.0[illegible]	77.04	2355	25.01	77.02	0	24.97	76.95	5	24.98	76.97	10	24.98	76.97
9-28-83	15	24.9[illegible]	76.87	20	24.91	76.83	25	24.93	76.87	30	24.93	76.87	35	24.95	76.90	40	24.92	76.85
9-28-83	45	24.[illegible]	76.81	50	24.[illegible]	76.74	55	24.88	76.78	100	24.85	76.74	105	24.88	76.78	110	24.88	76.78
9-28-83	115	24.8[illegible]	76.78	120	24.8[illegible]	76.[illegible]1	125	24.87	76.76	130	24.87	76.76	135	24.87	76.76	140	24.85	76.74
9-28-83	145	24.81	76.66	150	24.80	76.64	155	24.80	76.64	200	24.81	76.66	205	24.81	76.66	210	24.83	76.69
9-28-83	215	24.84	76.72	220	24.84	76.72	225	24.85	76.74	230	24.85	76.74	235	24.85	76.74	240	24.87	76.76
9-28-83	245	24.8[illegible]	76.74	250	24.81	76.[illegible]6	255	24.81	76.66	300	24.81	76.66	305	24.81	76.66	310	24.81	76.66
9-28-83	315	24.8[illegible]	76.64	320	24.79	76.55	325	24.75	76.55	330	24.79	76.62	335	24.77	76.59	340	24.74	76.53
9-28-83	345	24.7[illegible]	76.45	350	24.72	76.50	355	24.65	76.36	400	24.66	76.38	405	24.62	76.32	410	24.55	76.19
9-28-83	415	24.34	75.8[illegible]	420	24.39	75.85	425	24.31	75.76	430	24.34	75.82	435	24.32	75.78	440	24.33	75.80
9-28-83	445	24.37	75.80	450	24.32	75.78	455	24.32	75.78	500	24.31	75.76	505	24.28	75.70	510	24.26	75.67
9-28-83	515	24.2[illegible]	75.67	520	24.2[illegible]	75.57	525	24.23	75.62	530	24.21	75.57	535	24.21	75.57	540	24.19	75.54
9-28-83	545	24.1[illegible]	75.54	550	24.18	75.[illegible]	555	24.15	75.46	600	24.13	75.43	605	24.13	75.43	610	24.12	75.41
9-28-83	615	24.1[illegible]	75.41	620	24.0[illegible]	75.36	625	24.11	75.3[illegible]	630	24.05	75.30	635	24.08	75.35	640	24.08	75.35
9-28-83	645	24.07	75.32	650	24.0[illegible]	75.35	655	24.07	75.32	700	24.04	75.28	705	24.02	75.24	710	24.05	75.30
9-28-83	715	24.04	75.26	720	24.01	75.22	725	23.99	75.16	730	23.96	75.13	735	23.98	75.16	740	23.96	75.13
9-28-83	745	23.9[illegible]	75.11	750	23.95	75.11	755	23.95	75.11	800	23.95	75.11	805	23.96	75.13	810	23.98	75.16
9-28-83	815	23.99	75.16	820	23.9[illegible]	75.16	825	24.00	75.20	830	24.02	75.24	835	24.04	75.28	840	24.05	75.30
9-28-83	845	24.05	75.30	850	24.05	75.30	855	24.05	75.30	900	24.07	75.32	905	24.09	75.36	910	24.13	75.43
9-28-83	915	24.1[illegible]	75.43	920	24.14	75.4[illegible]	925	24.17	75.51	930	24.17	75.51	935	24.22	75.59	940	24.30	75.73
9-28-83	945	24.3[illegible]	75.8[illegible]	950	24.34	75.[illegible]	955	24.34	75.82	1000	24.39	75.89	1005	24.42	75.96	1010	24.44	75.99
9-28-83	1015	24.47	76.04	1020	24.5[illegible]	76.10	1025	24.51	76.1[illegible]	1030	24.59	76.27	1035	24.62	76.32	1040	24.65	76.36
9-28-83	1045	24.67	76.41	1050	24.72	76.50	1055	24.87	76.76	1100	24.97	76.95	1105	25.00	77.00	1110	25.02	77.04
9-28-83	1115	25.0[illegible]	77.04	1120	25.05	77.09	1125	25.01	77.02	1130	24.96	76.92	1135	24.98	76.97	1140	25.04	77.07
9-28-83	1145	25.07	77.13	1150	25.07	77.13	1155	25.12	77.21	1200	25.06	77.12	1205	25.04	77.07	1210	25.09	77.15
9-28-83	1215	25.1[illegible]	77.2[illegible]	1220	25.1[illegible]	77.[illegible]	1225	25.18	77.3[illegible]	1230	25.07	77.13	1235	25.11	77.19	1240	25.11	77.19
9-28-83	1245	25.0[illegible]	77.0[illegible]	1250	25.0[illegible]	77.12	1255	25.07	77.1[illegible]	1300	25.04	77.07	1305	25.02	77.04	1310	25.07	77.13
9-28-83	1315	25.11	77.1[illegible]	1320	25.0[illegible]	77.15	1325	25.12	77.21	1330	25.15	77.26	1335	25.11	77.19	1340	25.15	77.26
9-28-83	1345	25.12	77.21	1350	25.13	77.23	1355	25.13	77.23	1400	25.13	77.23	1405	25.15	77.26	1410	25.15	77.26
9-28-83	1415	25.1[illegible]	77.26	1420	25.15	77.26	1425	25.12	77.21	1430	25.13	77.23	1435	25.12	77.21	1440	25.13	77.23
9-28-83	1445	25.1[illegible]	77.2[illegible]	1450	25.13	77.23	1455	25.15	77.2[illegible]	1500	25.15	77.26	1505	25.12	77.21	1510	25.13	77.23
9-28-83	1515	25.1[illegible]	77.2[illegible]	1520	25.1[illegible]	77.31	1525	25.17	77.31	1530	25.22	77.40	1535	25.24	77.43	1540	25.28	77.50
9-28-83	1545	25.[illegible]	77.5[illegible]	1550	25.[illegible]	77.[illegible]1	1555	25.39	77.71	1600	25.39	77.71	1605	25.39	77.71	1610	25.41	77.73
9-28-83	1615	25.41	77.73	1620	25.4[illegible]	77.[illegible]	1625	25.50	77.9[illegible]	1630	25.49	77.88	1635	25.49	77.88	1640	25.49	77.88
9-28-83	1645	25.47	77.85	1650	25.4[illegible]	77.81	1655	25.42	77.76	1700	25.45	77.81	1705	25.45	77.81	1710	25.47	77.85
9-28-83	1715	25.4[illegible]	77.81	1720	25.43	77.[illegible]1	1725	25.43	77.78	1730	25.42	77.75	1735	25.41	77.73	1740	25.41	77.73
9-28-83	1745	25.3[illegible]	77.67	1750	25.37	77.66	1755	25.37	77.66	1800	25.35	77.63	1805	25.37	77.66	1810	25.35	77.63
9-28-83	1815	25.3[illegible]	77.[illegible]	1820	25.34	77.[illegible]1	1825	25.33	77.5[illegible]	1830	25.31	77.56	1835	25.29	77.51	1840	25.25	77.45

Figure 14. Example TDR temperature listing for Gage T4 (PI152)

PONCE DE LEON INLET PROJECT
ENDECO 174 CURRENT METER DATA LISTING
STATION PI2AB, SEPT TO NOV '83, HOURLY

DATE	TIME EST	SPEED FPS	DIR DEG TN	TEMP DEG C	COND MMHO/CM	DATE	TIME EST	SPEED FPS	DIR DEG TN	TEMP DEG C	COND MMHO/CM
10- 8-83	2318	2.57	219.25	26.84	38.89	10- 9-83	18	2.40	213.65	26.84	38.98
10- 9-83	318	1.63	208.05	26.74	38.98	10- 9-83	218	0.23	205.25	26.74	38.98
10- 9-83	518	1.71	42.65	26.64	38.79	10- 9-83	418	2.79	41.45	26.64	38.79
10- 9-83	[illegible]	2.79	41.45	[illegible]	[illegible]	10- 9-83	618	2.48	44.25	26.64	38.01
10- 9-83	718	[illegible]	[illegible]	[illegible]	[illegible]	10- 9-83	818	1.43	24.65	26.74	37.23
10- 9-83	918	0.37	[illegible]	[illegible]	[illegible]	10- 9-83	1018	1.57	215.05	26.64	37.91
10- 9-83	1118	[illegible]	208.05	26.64	38.40	10- 9-83	1218	2.85	212.25	26.64	38.50
10- 9-83	1318	[illegible]	212.25	26.74	38.59	10- 9-83	1418	1.63	208.05	26.74	38.59
10- 9-83	1518	0.00	24.65	26.84	38.59	10- 9-83	1618	2.06	47.05	27.42	39.28
10- 9-83	1718	[illegible]	[illegible]	27.42	[illegible]	10- 9-83	1818	2.77	44.25	27.62	35.08
10- 9-83	[illegible]	[illegible]	41.45	[illegible]	[illegible]	10- 9-83	2018	1.97	45.65	27.62	37.91
10- 9-83	2118	1.40	10.65	27.71	35.91	10- 9-83	2218	0.20	196.85	27.71	37.32
10- 9-83	2318	[illegible]	[illegible]	27.42	[illegible]	10-10-83	18	2.74	215.05	27.03	38.59
10-10-83	118	[illegible]	203.05	26.93	[illegible]	10-10-83	218	1.65	215.05	26.93	38.50
10-10-83	318	0.50	[illegible]	26.84	[illegible]	10-10-83	418	2.02	44.25	26.74	38.30
10-10-83	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10-10-83	618	2.77	51.25	26.64	37.51
10-10-83	718	[illegible]	41.45	[illegible]	37.42	10-10-83	818	2.11	24.65	27.13	36.74
10-10-83	[illegible]	[illegible]	[illegible]	27.13	[illegible]	10-10-83	1018	0.80	219.25	26.93	35.27
10-10-83	1118	2.51	216.85	26.84	37.91	10-10-83	1218	2.99	209.45	26.74	37.81
10-10-83	1318	[illegible]	220.65	26.74	37.81	10-10-83	1418	2.68	219.25	26.64	37.81
10-10-83	1518	1.74	216.45	26.64	37.91	10-10-83	1618	0.17	48.45	26.74	38.01
[illegible]	1718	[illegible]	[illegible]	[illegible]	[illegible]	10-10-83	1818	3.05	45.65	27.32	38.40
10-10-83	[illegible]	[illegible]	41.45	[illegible]	[illegible]	10-10-83	2018	2.48	47.05	27.42	38.11
10-10-83	[illegible]	[illegible]	46.05	[illegible]	[illegible]	10-10-83	2218	1.17	19.05	27.52	37.13
10-10-83	[illegible]	0.86	[illegible]	27.32	37.13	10-11-83	18	2.37	220.65	27.23	37.81
10-11-83	[illegible]	[illegible]	[illegible]	26.84	38.01	10-11-83	218	1.85	210.85	26.84	38.01
10-11-83	[illegible]	[illegible]	[illegible]	[illegible]	38.01	10-11-83	418	0.03	306.05	26.84	38.01
10-11-83	[illegible]	[illegible]	[illegible]	26.74	37.81	10-11-83	618	2.40	37.25	26.64	37.71
10-11-83	718	[illegible]	[illegible]	[illegible]	[illegible]	10-11-83	818	2.28	42.85	26.64	37.03
10-11-83	[illegible]	1.79	[illegible]	[illegible]	[illegible]	10-11-83	1018	0.63	35.85	26.84	35.57
10-11-83	1118	[illegible]	219.25	[illegible]	36.74	10-11-83	1218	2.17	213.65	26.84	37.81
10-11-83	[illegible]	[illegible]	[illegible]	[illegible]	37.81	10-11-83	1418	2.05	212.25	26.84	37.81
10-11-83	1518	[illegible]	222.25	26.84	37.71	10-11-83	1618	0.91	213.65	26.74	37.62
10-11-83	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10-11-83	1818	1.60	37.25	26.84	37.52
10-11-83	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10-11-83	2018	2.14	45.65	27.03	37.32
10-11-83	[illegible]	1.54	[illegible]	[illegible]	[illegible]	10-11-83	2218	1.48	51.25	27.03	36.15
10-11-83	[illegible]	1.60	[illegible]	27.03	[illegible]	10-12-83	18	0.06	220.65	27.03	35.37
10-12-83	[illegible]	1.74	[illegible]	[illegible]	[illegible]	10-12-83	218	1.37	216.45	26.74	36.74
10-12-83	318	1.11	[illegible]	26.74	[illegible]	10-12-83	418	0.37	222.05	26.64	36.54
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10-12-83	618	1.77	42.65	26.64	36.35
[illegible]	718	[illegible]	[illegible]	[illegible]	[illegible]	10-12-83	818	1.51	42.85	26.64	35.08
[illegible]	[illegible]	[illegible]	[illegible]	26.74	[illegible]	10-12-83	1018	1.06	19.05	26.74	35.37
[illegible]	1118	0.77	[illegible]	26.64	[illegible]	10-12-83	1218	0.17	210.85	26.74	33.22
[illegible]	[illegible]	1.27	[illegible]	26.54	[illegible]	10-12-83	1418	1.77	210.85	26.74	36.05
10-12-83	[illegible]	[illegible]	[illegible]	26.84	[illegible]	10-12-83	1618	1.20	217.85	26.84	36.35
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10-12-83	1818	0.54	45.65	26.84	36.25
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10-12-83	2018	1.57	41.45	27.03	35.27
[illegible]	[illegible]	[illegible]	[illegible]	27.13	[illegible]	10-12-83	2218	1.48	41.45	27.13	34.45
[illegible]	[illegible]	[illegible]	33.05	27.13	34.20	10-13-83	18	1.11	35.85	27.13	33.03
[illegible]	[illegible]	[illegible]	[illegible]	27.13	32.93	10-13-83	218	0.88	209.45	26.93	33.71

Figure 15. Example Endeco hourly listing for Gage 2AB (sta PI2AB)

the length of these data (56 days), an increment of 10 days was used. The y-axis values are also listed in Table 5 for each parameter. Finally, for the harmonic analysis plots, the x-axis range is either 0 to 864 hr or 0 to 144 hr per annotation. Again, because of the length of the NOAA data, the x-axis range is either 0 to 1,440 hr or 240 hr per annotation. Because of its greater variance, the y-axis range for these data is twice that of the TDR and Endeco gage harmonic analysis plots.

Data Editing

26. In general, the measured data were not edited as this would mask actual observed conditions. Thus, the tabular listings, which will be used for model verification, were not edited. For the plots, however, the TDR-2 pressure, surface elevation, and temperature data were edited, but this was of a minor nature. The TDR's occasionally produced bad records of 4 hr length (i.e., 48 data points at 5-min intervals). These bad records are filled with a value of "999.00" at each bad data point during initial processing to distinguish them from good data. The editing consisted of replacing these 999's with the value of the first previous good data point in the data array. On the plots, these edited values show up as a horizontal line of length equivalent to the number of consecutive bad hours or records replaced. Editing performed for the tidal harmonic analysis is described in paragraph 29.

Tidal Harmonic Analysis

27. Tidal harmonic analysis was performed on the NOAA tide data, TDR surface elevation data, and Endeco tidal current data. This analysis consisted of averaging, editing, filtering, and least square harmonic analysis to obtain tidal constituent amplitudes and local epochs.

Data averaging

28. The data were averaged to obtain hourly values before further analysis. The number of points averaged for the NOAA, TDR, and Endeco data were 10, 12, and 30, respectively.

Data editing

29. Spikes and missing data were replaced with the value of the previous good data point in a record. These error points were determined by

checking the data to see if they exceeded a user-specified tolerance level. For the tidal elevations, a value of 60 ft was used. Similarly, a tolerance level of 5 ft/sec was used for the current speed data. Finally, the mean was calculated and removed from the data before further processing.

Digital filtering

30. A digital band-pass filter was applied to attenuate low and high frequencies in the data. A period range of 3 to 26 hr was used in the harmonic analysis. Rapid changes in the wind field can cause short-term trends of less than 3 hr duration. Persistent winds of long duration, river outflows, and other solar- and lunar-induced sea level changes can produce long-term effects with periods greater than 26 hr.

31. An eight-pole Butterworth filter (Outlaw 1982) was applied to the data. This filter is characterized by a smooth power gain with maximum flatness in the passband and stopband and a reasonably sharp cutoff. The beginning and ending 50 points (i.e., hours) in each data set are affected by this filter and thus deleted.

Least squares harmonic analysis

32. According to Outlaw (1982), tidal elevation (or current speed) of the prototype tide (or current) at a station can be represented (Schureman 1958) by

$$h(t) = H_o + \sum_{i=1}^{J} f_i H_i \cos \left[\bar{a}_i t + \left(V_o + u\right)_i - K_i\right] \tag{1}$$

where

h = tidal elevation (current speed) at time t

t = time reckoned from some initial epoch

H_o = mean height (speed) above reference datum

J = total number of constituents

f_i = node factor to reduce mean amplitude to year of prediction

H_i = mean amplitude of i^{th} constituent

$\bar{a}_i$ = angular speed of i^{th} constituent

$V_o + u_i$ = equilibrium argument of the i^{th} constituent for $t = 0$

K_i = local epoch of i^{th} constituent

The coefficients f_i, $\bar{a}_i$, and the equilibrium $(V_o + u)_i$ can be obtained from tables in Schureman (1958). Equation 1 may be rewritten as

$$h(t) = H_o + \sum_{i=1}^{J} A_i \cos(\omega_i t + \theta_i) \qquad (2)$$

where

$A_i = f_i H_i$ = amplitude of the i^{th} constituent

ω_i = angular frequency of the i^{th} constituent

θ_i = phase of the i^{th} constituent

33. Observed prototype surface elevation (current speed) data h_p can be represented as

$$h_p(t) = \bar{h}_p(t) + \varepsilon(t) = a_o + \sum_{i=1}^{J} a_i \cos(\omega_i t) + b_i \sin(\omega_i t) + \varepsilon(t) \qquad (3)$$

where

$\bar{h}_p$ = calculated tidal elevation (current speed) represented by a harmonic series of known frequencies

$\varepsilon(t)$ = noise in observed data

a_o, a_i, and b_i = coefficients

The noise level is not known, and the unknown coefficients (amplitudes and phases) are determined by minimizing the variance of the sum of the squared difference between the observed prototype tidal elevation (current speed) data and the form represented by Equation 2 using a least squares procedure.

34. The least square procedure minimizes the variance E such that

$$E = \sum_{i=1}^{N} \varepsilon^2(n\Delta t) = \sum_{i=1}^{N} \left[\bar{h}_p(n\Delta t) - h_p(n\Delta t)\right]^2 \rightarrow \text{minimal} \qquad (4)$$

where

N = total number of data samples

Δt = time interval (i.e. 1 hr) between consecutive samples

To minimize the variance, set

$$\frac{\partial E}{\partial a_i} = 0 , \qquad i = 1 , \ldots , J \qquad (5)$$

and

$$\frac{\partial E}{\partial b_i} = 0 , \qquad i = 1 , \ldots , J \qquad (6)$$

Algebraically, Equations 5 and 6 result in a set of simultaneous equations that may be solved for the a_i and b_i coefficients.

35. For each tidal constituent, the amplitude A_i and the phase θ_i can be determined from

$$A_i = \left(a_i^2 + b_i^2\right)^{1/2} \tag{7}$$

and

$$\theta_i = \arctan\left(\frac{b_i}{a_i}\right) \tag{8}$$

This calculated amplitude, A_i, is then corrected by dividing by a node factor, f_i, to obtain the value which is reported. The node factor is selected from the tables in Schureman (1958) for the middle of the year of measurement. The calculated phase angle θ_i is also corrected by a procedure described in Schureman (1958) to obtain the local epoch.

36. The first step is to calculate the equilibrium argument for the meridian of Greenwich for each constituent corresponding to the year, month, day, and hour of the beginning of the filtered data:

$$(V_o + u)_{Gr} = (V_o + u)_{Yr} + (V_o + u)_{Mon} + (V_o + u)_{Day} + (V_o + u)_{H_r} \tag{9}$$

where

$(V_o + u)_{Gr}$ = Greenwich equilibrium argument

$(V_o + u)_{Yr}$ = equilibrium argument for the meridian of Greenwich at the beginning of a calendar year

$(V_o + u)_{Mon}$ = correction to equilibrium argument for the meridian of Greenwich at the beginning of a month

$(V_o + u)_{Day}$ = correction to equilibrium argument for the meridian of Greenwich at the beginning of a day

$(V_o + u)_{Hr}$ = correction to equilibrium argument for the meridian of Greenwich at the beginning of an hour

The last correction term for the beginning hour should be interpolated to the nearest minute to compensate for the beginning of the data after the averaging process and the first 50 hr are deleted due to filtering. The next step is to calculate the local equilibrium argument:

$$(V_o + u)_{Lo} = (V_o + u)_{Gr} - pL + \frac{as}{15} \tag{10}$$

where

$(V_o + u)_{Lo}$ = local equilibrium argument value

p = coefficient of period for a particular constituent, number of periods in a constituent day

L = longitude, positive west of Greenwich, deg

a = angular speed of constituent, deg/solar hour

s = longitude of time meridian, deg

Finally, the local epoch κ is given by

$$\kappa = (V_o + u)_{Lo} + \theta_i \tag{11}$$

Tidal constituents

37. Ten tidal constituents were used in the harmonic analysis of the tidal elevation and current data. Table 6 lists the periods for these constituents in descending order. Included are diurnal, semidiurnal, and shallow-water overtide components used by NOAA in their standard 29-day tidal harmonic analysis.*

* Personal Communication, J. French, 1984, Predictions Branch, NOAA, Rockville, Md.

PART IV: ANALYSIS RESULTS

NOAA Tide Data

Surface elevation time series plot

38. Tidal heights from NOS's Daytona Beach, Florida, station (#8721120) were analyzed using CERC's tidal harmonic analysis program. The purpose was twofold: (a) to provide a reference for the tidal elevation and current harmonic analysis results, and (b) to verify the accuracy of the CERC computer program. Table 7 lists the sampling parameters for these data. Plate 1 is a time-series plot of the tidal elevations referenced to the original zero of the tide-staff datum. A "setting value" supplied by NOAA was added to the measured tidal heights in order to reference the heights to this station's datum. This is the datum used by NOS for harmonic analysis. Every 10 points were averaged to obtain hourly averages. The data are unedited, although they were checked for missing values.

Harmonic analysis plots

39. Plate 2 illustrates the results from the harmonic analysis of the NOAA data for the filtered prototype (measured) and constituent analysis (calculated) curves overlain on one graph. Plate 3 shows the corresponding tidal analysis residuals. The fit was very good with a root mean square (rms) error of 0.11.

40. Comparisons of the calculated constituent amplitudes and local epochs from these data were made with results from the NOS data for the full calendar year of 1974 from Daytona Beach pier using the full 37 constituents. Table 8 summarizes the values. The fit was generally very good when considering the disparity in the record lengths, the number of constituents which could be used in each analysis, and the seasonal and yearly changes. Also, hourly averages were used in the CERC analysis whereas NOS used only hourly points.

Tidal Elevation Data

41. Presented in this report within Plates 4 through 19 are tidal elevation data which consist of pressure time-series plots, surface elevation time-series plots, and harmonic analysis plots for Gages T3 through T6. All

were measured with TDR-2 instruments. Table 7 lists the sampling parameters for the TDR's. Every 12 points were averaged to obtain hourly averages.

Pressure time-series plots

42. Plates 4 through 7 contain the gage pressure (i.e. pounds per square inch gage) plots for the four gages T3 through T6, respectively. The pressure range is from 2 to 8 psig, reflective of the different water depths.

Surface elevation time-series plots

43. The four surface elevation (depth) time-series plots (see Plates 8 through 11) range from approximately 5 to 24 ft. The height of the gage above bottom (see Table 2) was added to the converted pressure to obtain these values. Table 9 lists the maximum tidal elevation ranges and current speeds for each range. Range 4 had the largest tidal elevation range with a value of 3.5 ft.

Harmonic analysis plots

44. Plots from the harmonic analysis of the tidal elevation data are contained in Plates 12 through 19 for Gages T3 through T6. The first plot in each series of two for each gage is the overlain graph of filtered prototype (measured) and constituent analysis (computed) curves. The second plot is the tidal analysis residuals. Table 10 lists the constituent amplitudes, and Table 11 gives the local epochs (phases) for each tide gage. In general, the fit was very good for Gages T3 and T4 with rms error values of 0.07 and 0.08 ft, respectively. The fit was not as good for Gages T5 and T6, although still not bad with rms errors of 0.35 and 0.28 ft, respectively. Short-term, high-frequency fluctuations due to changes in the wind field or other local disturbances might have caused some of the disparity.

Tidal Current Data

45. Tidal current data consist of the following:

a. Current vector roses.

b. Current vector "stick" plots.

c. Current velocity magnitude time-series plots.

d. Current direction time-series plots.

e. Harmonic analysis plots.

These plots are grouped by type in Appendix C in ascending order for the 14 data sets 2AB to 5C, respectively. Table 7 lists the sampling parameters for the Endeco current meters. Every 30 points were averaged to obtain hourly averages except for the current vector roses and vector stick diagrams.

Current vector roses

46. Plates 20 to 33 contain the current vector roses. In general, they illustrate the tidal influence on currents flowing in the inlet. For Range 2, the general trend is northeast to north-northeast ebb by southwest to south-southwest flood. For Range 3, the flow aligns itself quite strongly with a southeast ebb by northwest flood. Range 4 is characterized by a northeast ebb and a south-southwest flood. Finally, the general trend of Range 5 is a north-northwest ebb by a south-southeast flood. Gage 5C, however, aligns itself more with a northwest ebb and a southeast flood.

Current vector stick plots

47. These plots are similar to the current roses, except that they show the individual vectors as a time-series. They are contained in Plates 34 through 47. Directions are referenced in degrees from true north (top of page). The vectors are spaced 2 hr apart. Since the data are not edited or averaged, erroneous points show up as vectors with unreasonably large magnitudes or errant directions. In general, the ebb and flood directions match those indicated by the rose plots. For sta 2B, the date on which the impellers failed can be clearly seen. Table 9 summarizes the maximum current speed and corresponding tidal stage for each of the ranges measured. The largest ebb flow was 4.6 ft/sec for Range 2 (see Plates 34 and 37). The largest flood was recorded for Range 3 with a value of 3.0 ft/sec (see Plates 38 through 40).

Current velocity magnitude plots

48. Current velocity magnitude time-series plots are shown in Plates 48 through 61. The range is from 0 to 4 ft/sec. Averaged data at 1-hr intervals are plotted. Since it is unedited (i.e., raw) data, occasional spikes show up. The plotting program automatically clips any erroneous points greater than 4 ft/sec and resets them to this maximum value. Data sets 2BT, 3A, 4AB, 4BB, and 5B have some points which have been reset.

Current direction plots

49. Current direction time-series plots are shown in Plates 62 through 75. Plotted points represent hourly averages of unedited data. The influence of tides can be clearly seen by the cyclical reversal in direction. The data

are surprisingly good, with few spikes being apparent (see data sets 2BB, 3A, 4AB, and 5B).

Harmonic analysis plots

50. Because the records were too short because of damaged impellers, no harmonic analysis was performed on data sets 2BB and 2BT. Plates 76 through 99 contain the results from the harmonic analysis of the tidal current data for the remaining twelve data sets 2AB through 5C. The first plot in each series of two plots for each data set is the graph of overlain filtered prototype (measured) and constituent analysis (computed) curves. The second plot is the tidal analysis residuals. Table 12 shows the constituent amplitudes for each current gage. Table 13 lists the corresponding local epochs (phases) for each current gage. In general, the fits were good for current data with rms errors ranging from 0.18 to 0.40 ft/sec. The mean velocity values ranged from 0.68 to 1.81 ft/sec.

Temperature and Conductivity Data

51. Temperature data were collected by four TDR-2 stations and fourteen Endeco 174 stations. Conductivity was measured at the Endeco stations only. Plots of these data are contained in Plates 100-133.

TDR temperature plots

52. The temperature data (see Plates 100 through 103) were remarkably consistent for the four TDR gages on Ranges 3 through 6. The range in values was from approximately 24° to 28.5° C. The following general trend in temperature cycling is reflected in each of the four stations:

a. Declines for 2 days from 25.5° to 24° C.

b. Builds up to a maximum of 28.5° C over a 10-day period.

c. Declines to 25° C for 7 days.

d. Finally begins rising back to 27° C over a 3-day period.

Endeco temperature plots

53. Fourteen plots of temperature from the Endeco 174 current meters, Gages 2AB to 5C, respectively, are contained in Plates 104 through 117. The range in temperature values is 22.5° to 27.5° C. The same general trend is illustrated for all stations and is consistent with the results obtained by the TDR gages. The temperature does the following:

a. Slowly rises over a 10-day period from 24° to 27.5° C.

b. Declines for 7 days to 25.5° C.

c. Rises momentarily over 3 days to 27° C.

d. Falls off over 7 days to a low of 22.5° C.

e. Finally begins another cycle of 4 days to 24° C before declining again.

Conductivity plots

54. Conductivity plots for the fourteen Endeco 174 stations are contained in Plates 118 through 131. In general, values range from 30 to 55 mmho/cm, with one cycle lasting for 16 days and another cycle for 3 weeks with a transition period of 3 to 7 days in between. The same consistency does not exist among all data sets, or even at the same location, as it did for the temperature data.

PART V: SUMMARY

55. Tidal elevation and current data were measured and analyzed at Ponce de Leon Inlet for use in calibrating model studies that will evaluate alternative improvements to the weir-jetty system.

56. Data were successfully obtained from four of six Sea Data TDR-2 pressure sensors and 14 Endeco 174 current meters during the period September to November 1983. Quality of the data was excellent with very few spikes or missing points. Hardware-related problems occurred on the TDR for Gage T7 due to flooding. Two of the Endeco gages at sta 2B lost their impellers due to high sediment and current flows and/or fishing activity in the inlet throat.

57. Tidal harmonic analysis of 56 days of NOS tide data, using CERC's software, verified the accuracy of the program and provided a reference for tidal elevation and current harmonic analysis results. The rms error was 0.11 ft. Constituent amplitudes and local epochs for 10 constituents agreed quite well with NOS's data for the full calendar year of 1974 from Daytona Beach pier using 37 constituents.

58. Pressure and surface elevation time series and harmonic analysis plots are presented for tidal elevation data collected in Ranges 3 through 6. Mean water depths ranged from 5.46 to 23.00 ft. The maximum tidal range was 3.5 ft at Range 4. The harmonic analysis results were very good for Ranges 3 and 4 with rms errors of 0.07 and 0.08 ft, respectively. For Ranges 5 and 6, the rms errors were higher at 0.35 and 0.28, respectively, but still very good.

59. For the tidal current data, current roses, vector stick plots, current velocity magnitude time-series, current direction time-series, and harmonic analysis plots are presented. The maximum velocity recorded was 3.0 ft/sec at Range 3.0 for flood flow and 4.6 ft/sec at Range 2 for ebb flow. In general, these values are consistent with those reported earlier.

60. Temperature data were remarkably consistent between TDR and Endeco gages, showing the same general trends. The range of temperatures was approximately 22.5° to 28.5° C.

61. Conductivity data were recorded by the Endeco current meters and ranged from approximately 30 to 55 mmho/cm.

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Table 1

Tidal Ranges from National Ocean Survey Tide Tables

Station	Mean Range ft	Spring Range ft
Daytona Beach	4.1	4.9
Ponce de Leon Inlet	2.3	2.7

Table 2

Summary of Instrument Locations

Station Number	ID Number	Description	Height Above Bottom, ft	Mean Depth ft	Mean Elevation Reference msl ft
		Tide Gages			
T1-2	153	United States Coast Guard dock	1.69	--	--
T3	159	Down the Hatch Restaurant	0.60	5.89	0.53
T4	152	Day Marker 10 in ICCW	12.95	23.00	0.45
T5	154	Christian's Pier, 1720 N. Indian River	1.65	5.46	0.29
T6	158	Smyrna Yacht Club	1.45	4.58	0.60
T7	157	1st pier north of Bascule Bridge	3.15	--	--

Gage Number	ID Number	Description
		Current Meters
2AT*	174A080	Inlet throat, south of channel, 1/3 water depth
2AB	174A079	Inlet throat, south of channel, 2/3 water depth
2BT	174A090	Inlet throat, north of channel, 1/3 water depth
2BB	174A088	Inlet throat, north of channel, 2/3 water depth
3A	174A085	Halifax River, west gage, 1/2 water depth
3B	174A082	Halifax River, center gage, 1/2 water depth
3C	174A075	Halifax River, east gage, 1/2 water depth
4AT	174A077	Rockhouse Creek, south of channel, 1/3 water depth
4AB	174A092	Rockhouse Creek, south of channel, 2/3 water depth
4BT	174A084	Rockhouse Creek, north of channel, 1/3 water depth
4BB	174A076	Rockhouse Creek, north of channel, 2/3 water depth
5A	174A087	Indian River, west gage, 1/2 water depth
5B	174A078	Indian River, center gage, 1/2 water depth
5C	174A091	Indian River, east gage, 1/2 water depth

*Legend:
- 2 = Range 2.
- 2A = Station 2A.
- T = Top Gage.
- B = Bottom Gage.

Table 3

Current Measurements, 27 January 1984

Station 1A				Station 1B			
Time EST	Depth ft	Velocity ft/sec	Direction deg	Time EST	Depth ft	Velocity ft/sec	Direction deg
0745	5	2.9	80	0730	8	3.2	75
0746	11	2.7	80	0732	17	2.5	105
0837	6	3.4	80	0830	8	3.5	90
0838	11	3.0	80	0831	17	3.7	90
0920	6	2.7	60	0916	8	3.9	72
0921	11	2.5	75	0918	17	3.0	90
1015	5	2.4	75	1011	7	3.5	80
1016	11	2.4	80	1012	14	3.7	90
1124	5	1.6	100	1118	8.5	2.2	75
1125	11	1.9	110	1119	18	2.0	90
1215	5	1.5	60	1211	8	1.2	90
1216	10	1.0	135	1212	17	1.7	90
1315	5	0.8	90	1311	7.5	0.8	65
				1312	16	0.8	5
1422	5	0.8	340	1418	8	0.8	335
1423	11	1.5	270	1419	16	1.4	285
1516	6	1.4	345	1513	9	1.5	255
				1514	18	1.4	285
1616	5.5	1.4	270	1610	9	1.4	280
1617	11	1.3	230	1611	18	1.2	290
1713	6	1.2	210	1709	8	1.0	255
1714	11	1.0	205	1710	18	0.7	275
1804	6	0.8	135	1800	9	0.8	175
1805	12	1.0	120	1801	18	1.0	150
0715	3	1.9	45	0700	6	2.5	105
0716	7	2.9	30	0701	12	2.2	105
0807	5	3.0	15	0755	6	4.2	35
0808	11	3.2	35	0756	12	2.8	44
0906	5.5	3.5	28	0900	6	3.4	30
0907	11	3.5	28	0902	13	3.8	40

(Continued)

Table 3 (Concluded)

Station 1A				Station 1B			
Time EST	Depth ft	Velocity ft/sec	Direction deg	Time EST	Depth ft	Velocity ft/sec	Direction deg
1005	4	3.7	30	1001	6	2.9	32
1006	9	3.9	32	1002	13	3.2	55
1113	4	2.9	30	1100	6	2.7	30
1115	8	2.5	28	1101	12	2.2	45
1202	4	2.1	20	1159	6	1.6	15
1203	8	2.1	20	1200	12	2.8	45
1304	4	0.8	45	1300	6	1.0	345
1405	4	2.9	210	1401	5	2.5	210
1406	9	1.7	202	1402	10	2.9	260
1506	5	2.0	210	1500	6	2.2	215
1507	11	2.2	210	1501	13	2.7	220
1602	6	2.2	210	1558	6	2.0	210
1603	11	2.0	195	1559	11	1.9	225
1701	4	1.9	210	1656	5	1.0	195
1703	10	1.7	210	1658	11	1.5	225
1751	5	0.7	270	1748	5	0.8	210
1752	11	0.8	200	1749	11	0.9	205

Table 4

Summary of Data Collection from

September through November, 1987

Station	Start Date	End Date	Duration Days	Number of Records Total	Number of Records Bad	Percent Recovery
			Tide Data			
T1-2	9/27	10/8	11	66	49	25.8
T3	9/27	10/20	23	135	2	98.5
T4	9/27	10/24	27	160	5	96.9
T5	9/27	10/24	27	162	29	82.1
T6	9/27	10/23	26	155	7	95.5
T7	9/28		Water damaged			0.0
			Current Data			
2AB*	9/30	11/7	38	916	3	99.7
2AT**	9/30	11/7	38	916	3	99.7
2BB	9/30	11/8	39	939	2	99.8
2BT	9/30	11/8	39	941	2	99.8
3A	9/28	11/7	41	982	99	89.9
3B	9/28	11/7	40	965	2	99.8
3C	9/28	11/7	40	966	3	99.7
4AB	9/29	11/8	40	968	3	99.7
4AT	9/29	11/8	40	969	4	99.6
4BB	9/29	11/8	40	968	3	99.7
4BT	9/29	11/8	27	639	39	93.9
5A	9/29	11/7	39	938	3	99.7
5B	9/29	11/7	37	890	2	99.8
5C	9/29	11/7	39	938	4	99.6

*2AB = Station 2A, bottom current meter.
**2AT = Station 2A, top current meter.

Table 5

Summary of Plot Formats

Parameter	Source	x-Axis Range	x-Axis Units	y-Axis Range	y-Axis Units
Reference mllw* datum height	NOAA**	9/27 to 12/7	Calendar date	0 to 40	ft
Surface elevation	TDR	9/27 to 11/16	Calendar date	0 to 40	ft
Pressure	TDR	9/27 to 11/16	Calendar date	0 to 10	psig
Current vector rose	Endeco	NA	NA	0 to 3.5	ft/sec
Current vector	Endeco	9/27 to 11/16	Calendar date	-5.0 to 5.0	ft/sec
Current velocity magnitude	Endeco	9/27 to 11/16	Calendar date	-1.0 to 4.0	ft/sec
Current direction	Endeco	9/27 to 11/16	Calendar date	0 to 450	deg true north
Tidal elevation constituents	NOAA	0 to 1440	Hours	-4.0 to 4.0	ft
Tidal elevation residuals	NOAA	0 to 1440	Hours	-4.0 to 4.0	ft
Tidal elevation constituents	TDR	0 to 864	Hours	-2.0 to 2.0	ft
Tidal elevation residuals	TDR	0 to 864	Hours	-2.0 to 2.0	ft
Tidal current constituents	Endeco	0 to 864	Hours	-2.0 to 2.0	ft/sec
Tidal current residuals	Endeco	0 to 864	Hours	-2.0 to 2.0	ft/sec
Temperature	TDR	9/27 to 11/16	Calendar date	20 to 30	°C
Temperature	Endeco	9/27 to 11/16	Calendar date	20 to 30	°C
Conductivity	Endeco	9/27 to 11/16	Calendar date	20 to 70	mmho/cm

* Mean low lower water.

** National Oceanic Atmospheric Administration.

Table 6

Tidal Harmonic Constituents

Constituent No.	Harmonic Constituent	Symbol	Period, hr
1	Principal lunar diurnal	O1	25.819
2	Lunisolar diurnal	K1	23.934
3	Larger lunar elliptic	N2	12.658
4	Principal lunar	M2	12.421
5	Principal solar	S2	12.000
6	Lunar overtide	M4	6.210
7	Solar quarterdiurnal	S4	6.000
8	Lunar overtide	M6	4.140
9	Solar overtide	S6	4.000
10	Lunar overtide	M8	3.105

Table 7

Standard Sampling Parameters

NOAA, Daytona Beach	
Period measured	6 Oct to 30 Nov 1983
Duration, days	56
Sampling interval, min	6
TDR-2	
Period measured	30 Sep to 7-8 Nov 1983
Sampling interval, min	5
Endeco 174	
Period measured	29-30 Sep to 7-8 Nov 1983
Sampling interval, min	2
Angle, deg Magnetic North to True North	3.25

Table 8

Comparison of National Oceanic Atmospheric Administration Tide Data Daytona Beach Pier versus Coastal Engineering Research Center Analysis

Constituent No.	Constituent	Amplitude, ft NOAA	Amplitude, ft CERC	Local Epoch, deg NOAA	Local Epoch, deg CERC
1	O1	0.24	0.19	120.9	136.0
2	K1	0.32	0.27	116.8	121.1
3	N2	0.47	0.38	187.5	213.1
4	M2	1.87	1.83	209.8	239.7
5	S2	0.32	0.34	231.6	246.6
6	M4	--	0.03	--	156.0
7	S4	--	0.02	--	291.4
8	M6	--	0.02	--	304.0
9	S6	--	0.01	--	222.6
10	M8	--	0.00	--	58.9

Notes: CERC analysis parameters:
Record length, 56 days
Record length, 1,333 hr
Residual rms, 0.11 ft
Mean elevation, 4.88 ft

The symbol (--) means amplitude values are insignificant for this component. Start time of data: 6 Oct 1983, 1254 hr EST and end time of data: 1 Dec 1983, 0912 hr EST. Filtered average start time of data: 8 Oct 1983, 1621 hr EST and filtered average end time of data: 29 Nov 1983, 0842 hr EST.

Table 9

Summary of Maximum Tidal Ranges and Currents

Range	Maximum Tidal Range ft	Maximum Current Speed ft/sec	Tidal Stage for Maximum Speed
1	--	3.9*	Ebb
2	--	4.6	Ebb
3	3.3	3.0	Flood
4	3.5	2.8	Flood
5	3.4	2.5	Flood
6	2.8	--	--
7	Failed	--	--

* Measured by an Endeco 110 current meter.

Table 10

Constituent Amplitudes for Tidal Elevations

Tide Gage	Record Length Days	Record Length Hours	Constituent Amplitudes, ft O1	K1	N2	M2	S2	M4	S4	M6	S6	M8	Residual rms ft	Mean Depth ft
T1-2			Not Enough Data											
T3	22	521	0.13	0.15	0.26	1.06	0.20	0.03	0.02	0.03	0.00	0.01	0.07	5.89
T4	26	613	0.13	0.17	0.24	1.14	0.22	0.04	0.02	0.03	0.00	0.01	0.08	23.00
T5	25	591	0.12	0.11	0.73	0.58	0.36	0.04	0.02	0.00	0.02	0.00	0.35	5.46
T6	25	583	0.10	0.09	0.53	0.73	0.24	0.04	0.02	0.04	0.01	0.00	0.28	4.58
T7			Water Damaged											

Table 11

Local Epochs for Tidal Elevations

Tide Gage	Local Epoch, deg									
	O1	K1	N2	M2	S2	M4	S4	M6	S6	M8
T1-2	Not Enough Data									
T3	266.1	258.3	95.1	131.8	165.6	212.5	139.9	143.8	141.9	259.4
T4	208.6	205.7	338.3	13.3	37.1	330.1	262.0	140.2	142.1	153.5
T5	78.2	117.7	43.9	89.6	144.7	113.3	168.1	76.3	359.6	299.2
T6	161.8	138.2	208.8	196.8	319.1	13.8	17.6	45.7	166.0	302.4
T7	Water Damaged									

Table 12

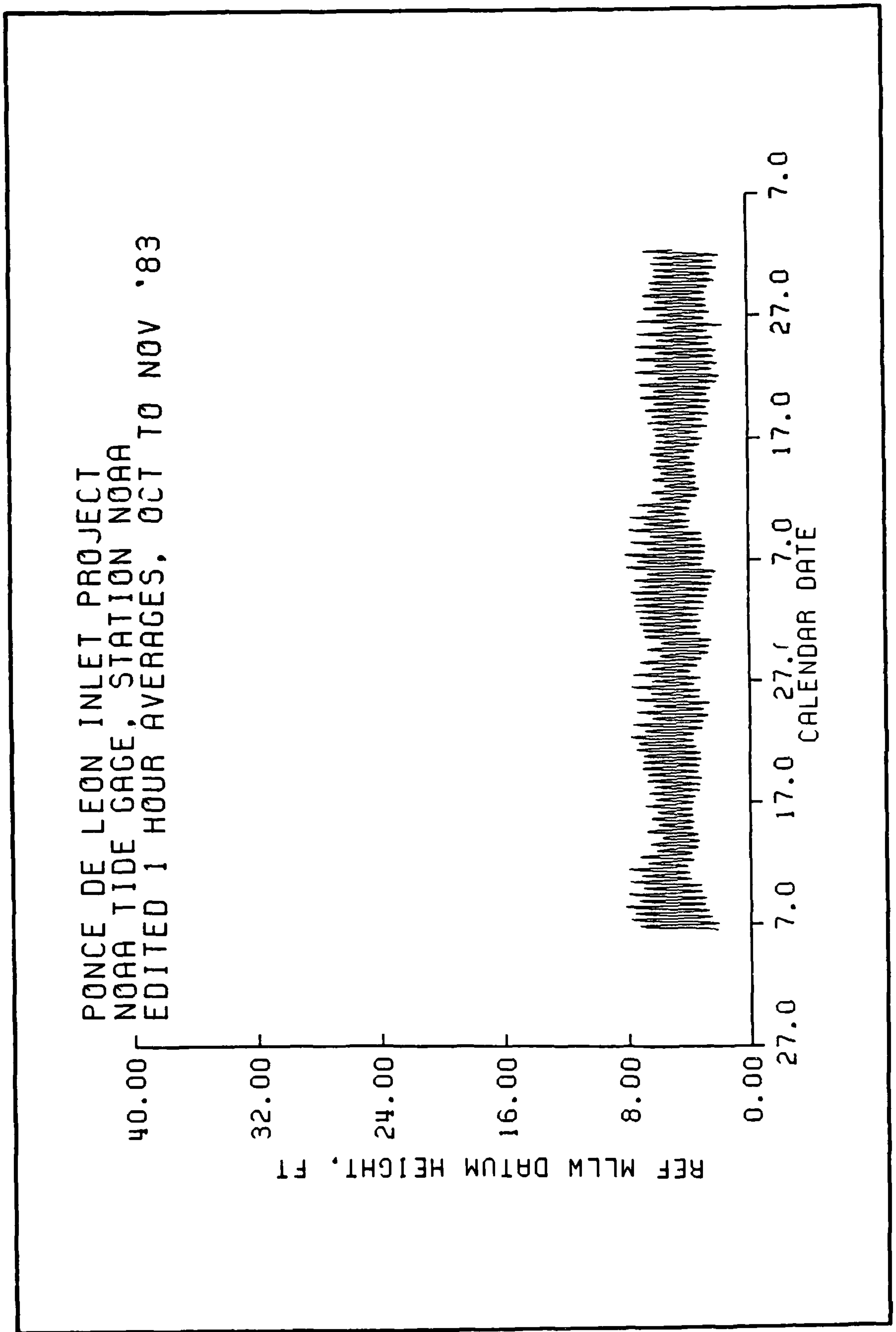
Constituent Amplitudes for Tidal Currents

Current Gage	Record Length Days	Record Length Hours	Constituent Amplitude, ft/sec O1	K1	N2	M2	S2	M4	S4	M6	S6	M8	Residual rms ft	Mean Elevation ft
2AB	37	875	0.08	0.12	0.03	0.31	0.05	0.70	0.04	0.19	0.05	0.08	0.38	1.57
2AT	35	819	0.09	0.12	0.04	0.37	0.07	0.84	0.05	0.18	0.06	0.09	0.40	1.81
2BB							Damaged							
2BT							Damaged							
3A	38	911	0.05	0.04	0.03	0.16	0.02	0.16	0.04	0.08	0.00	0.02	0.31	0.84
3B	40	945	0.09	0.10	0.02	0.12	0.02	0.58	0.01	0.10	0.02	0.05	0.29	1.33
3C	37	885	0.09	0.11	0.05	0.17	0.04	0.58	0.04	0.09	0.03	0.06	0.28	1.15
4AB	40	949	0.08	0.14	0.05	0.43	0.06	0.52	0.00	0.06	0.02	0.05	0.27	0.90
4AT	40	943	0.10	0.15	0.07	0.37	0.08	0.61	0.00	0.07	0.03	0.07	0.28	1.13
4BB	40	947	0.07	0.09	0.02	0.23	0.05	0.41	0.02	0.06	0.02	0.04	0.25	0.74
4BT	22	519	0.08	0.10	0.04	0.10	0.02	0.50	0.01	0.11	0.03	0.06	0.21	0.92
5A	38	907	0.04	0.05	0.04	0.13	0.03	0.31	0.03	0.02	0.02	0.05	0.18	0.68
5B	37	869	0.05	0.04	0.05	0.11	0.00	0.41	0.03	0.03	0.02	0.05	0.23	0.82
5C	38	913	0.06	0.11	0.03	0.08	0.03	0.47	0.02	0.06	0.02	0.05	0.28	0.98

Table 13

Local Epochs for Tidal Currents

Current Gage	Local Epoch, deg									
	O1	K1	N2	M2	S2	M4	S4	M6	S6	M8
2AB	128.8	164.4	354.1	158.0	135.1	310.6	209.9	299.5	183.4	102.1
2AT	151.5	171.3	47.6	130.2	110.7	264.7	162.6	227.6	97.1	283.6
2BB					Damaged					
2BT					Damaged					
3A	8.9	4.2	99.2	187.3	193.4	358.2	35.0	47.9	333.4	216.0
3B	10.2	23.6	145.9	156.1	121.1	342.9	9.3	334.9	190.0	142.7
3C	28.9	53.1	9.6	100.5	125.2	86.4	357.6	138.1	357.7	12.6
4AB	300.1	294.5	194.4	236.7	245.0	83.4	172.2	329.9	143.3	11.9
4AT	305.8	302.1	206.1	255.6	293.8	121.9	195.5	24.3	236.1	83.1
4BB	238.9	230.7	203.2	90.9	119.0	154.8	193.1	219.5	103.1	131.3
4BT	356.7	9.8	151.7	7.2	69.5	343.5	105.5	320.7	161.8	112.4
5A	1.9	3.2	100.7	155.1	113.4	333.8	278.5	351.2	182.5	131.5
5B	351.6	8.8	94.6	164.2	153.3	325.0	267.3	296.9	188.4	128.8
5C	345.3	8.7	223.1	106.0	45.2	330.3	236.2	349.0	184.4	120.8



PONCE DE LEON INLET PROJECT
NOAA TIDE GAGE, STATION NOAA
EDITED 1 HOUR AVERAGES, OCT TO NOV '83
REF MLLW DATUM HEIGHT, FT
40.00
32.00
24.00
16.00
8.00
0.00
27.0
7.0
17.0
27.0
7.0
17.0
27.0
7.0
CALENDAR DATE

PLATE 1

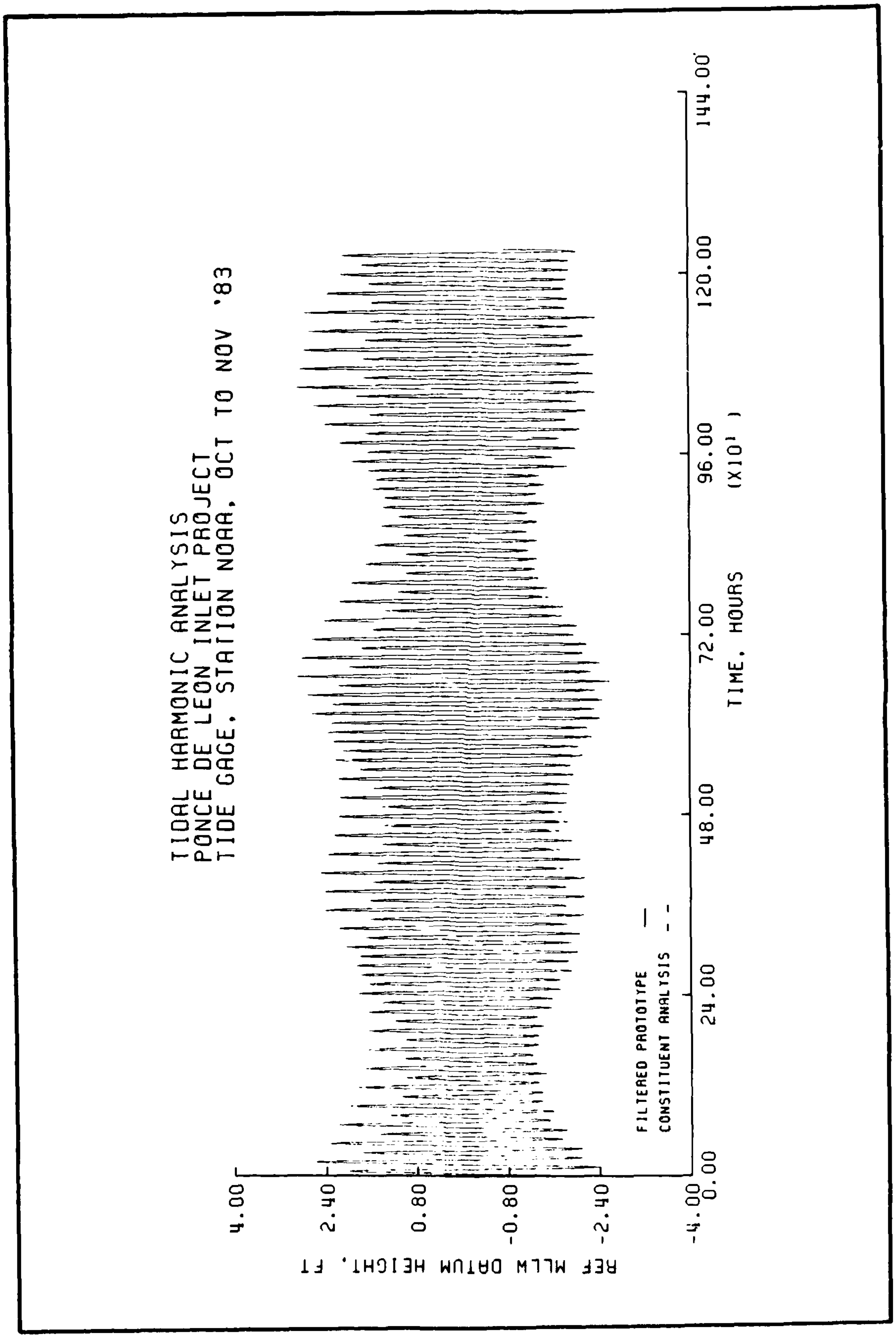

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
TIDE GAGE, STATION NOAA, OCT TO NOV '83
REF MLLW DATUM HEIGHT, FT
4.00
2.40
0.80
-0.80
-2.40
-4.00
0.00
24.00
48.00
72.00
96.00
120.00
144.00
TIME, HOURS
(X10¹)
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS

PLATE 2

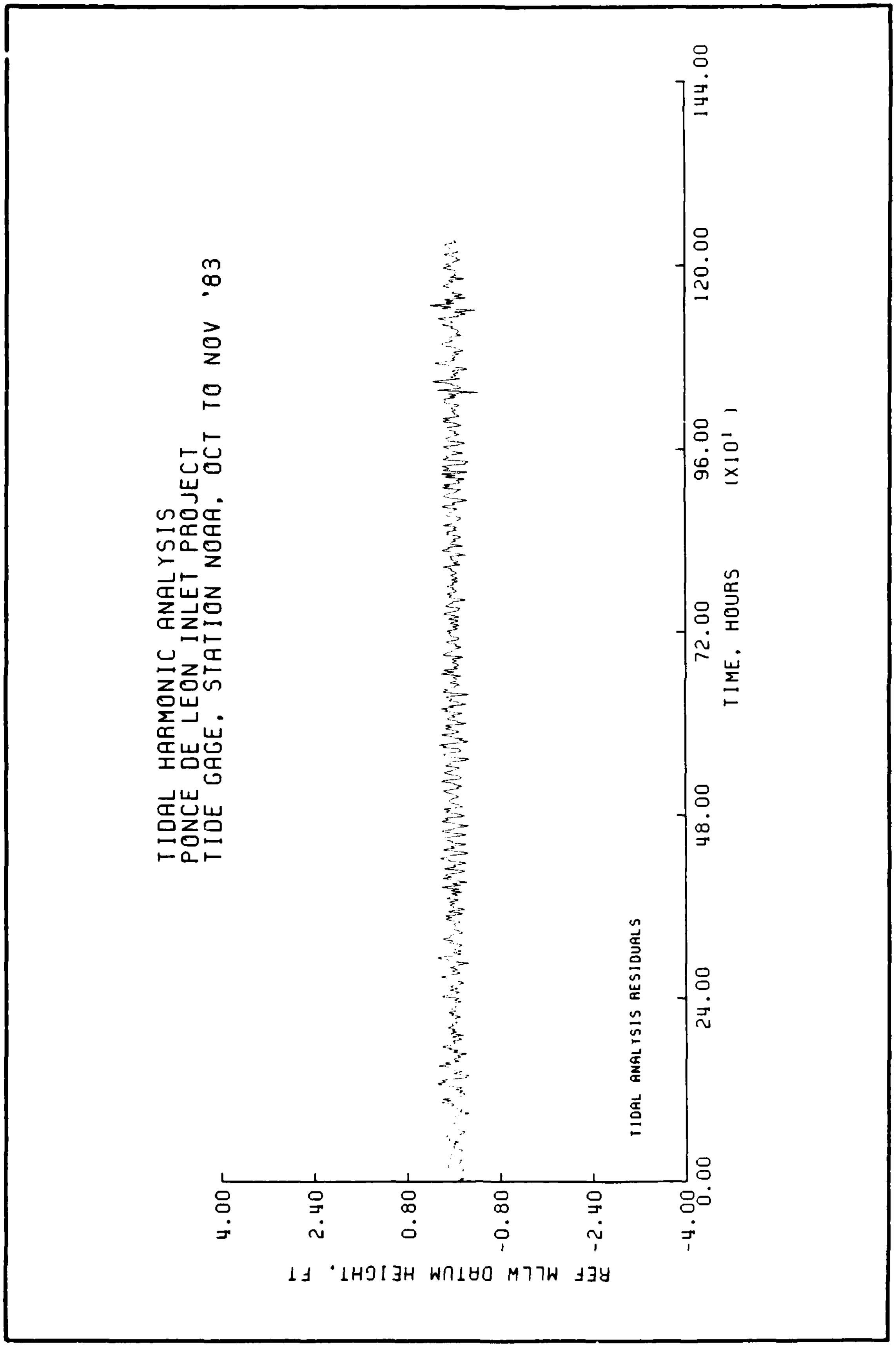

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
TIDE GAGE, STATION NOAA, OCT TO NOV '83
TIDAL ANALYSIS RESIDUALS
REF MLLW DATUM HEIGHT, FT
4.00
2.40
0.80
-0.80
-2.40
-4.00
0.00
24.00
48.00
72.00
96.00
120.00
144.00
TIME, HOURS
(X10¹)

PLATE 3

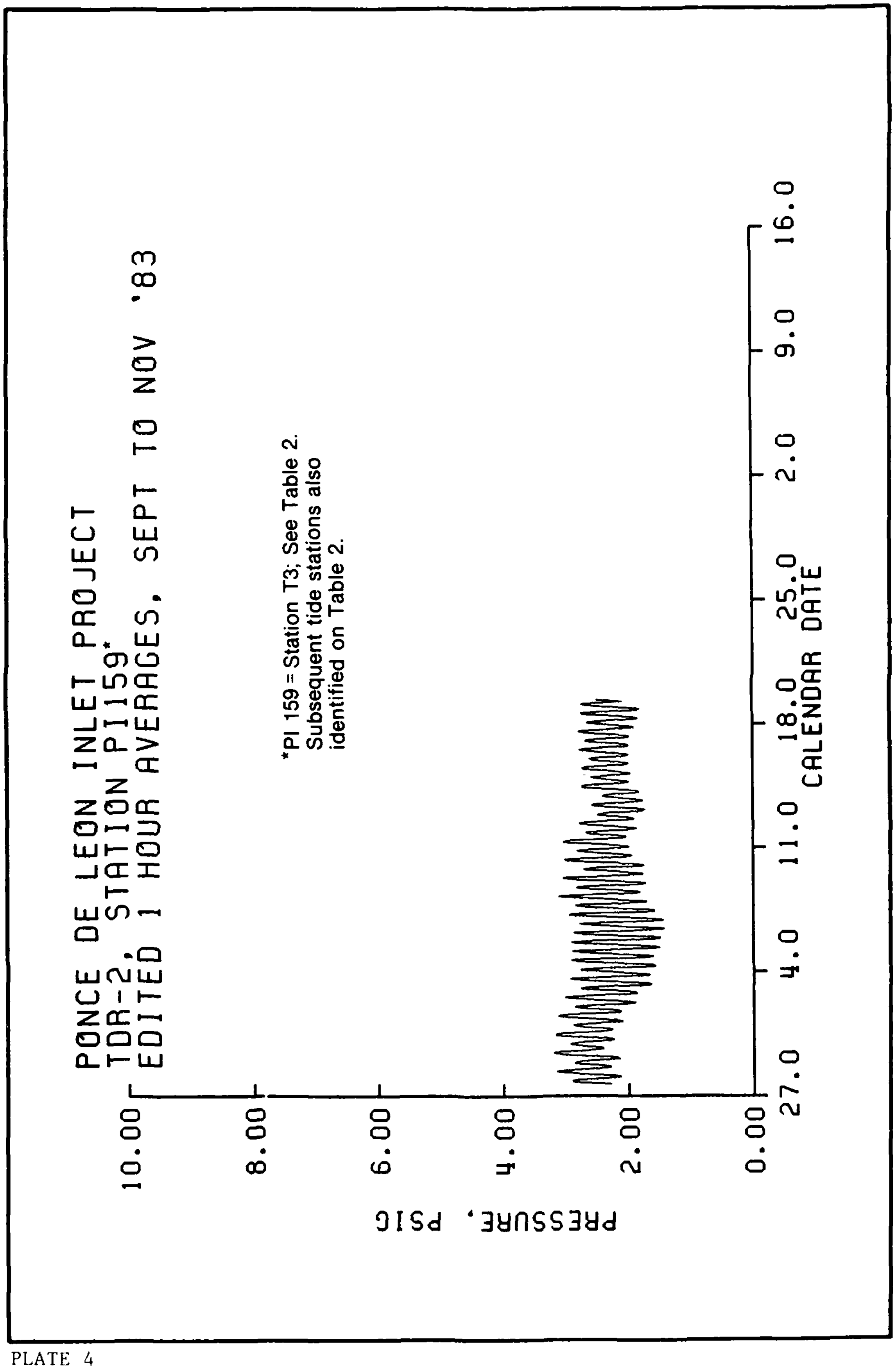

PONCE DE LEON INLET PROJECT
TDR-2, STATION PI159*
EDITED 1 HOUR AVERAGES, SEPT TO NOV '83
*PI 159 = Station T3; See Table 2. Subsequent tide stations also identified on Table 2.
PRESSURE, PSIG
10.00
8.00
6.00
4.00
2.00
0.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 4

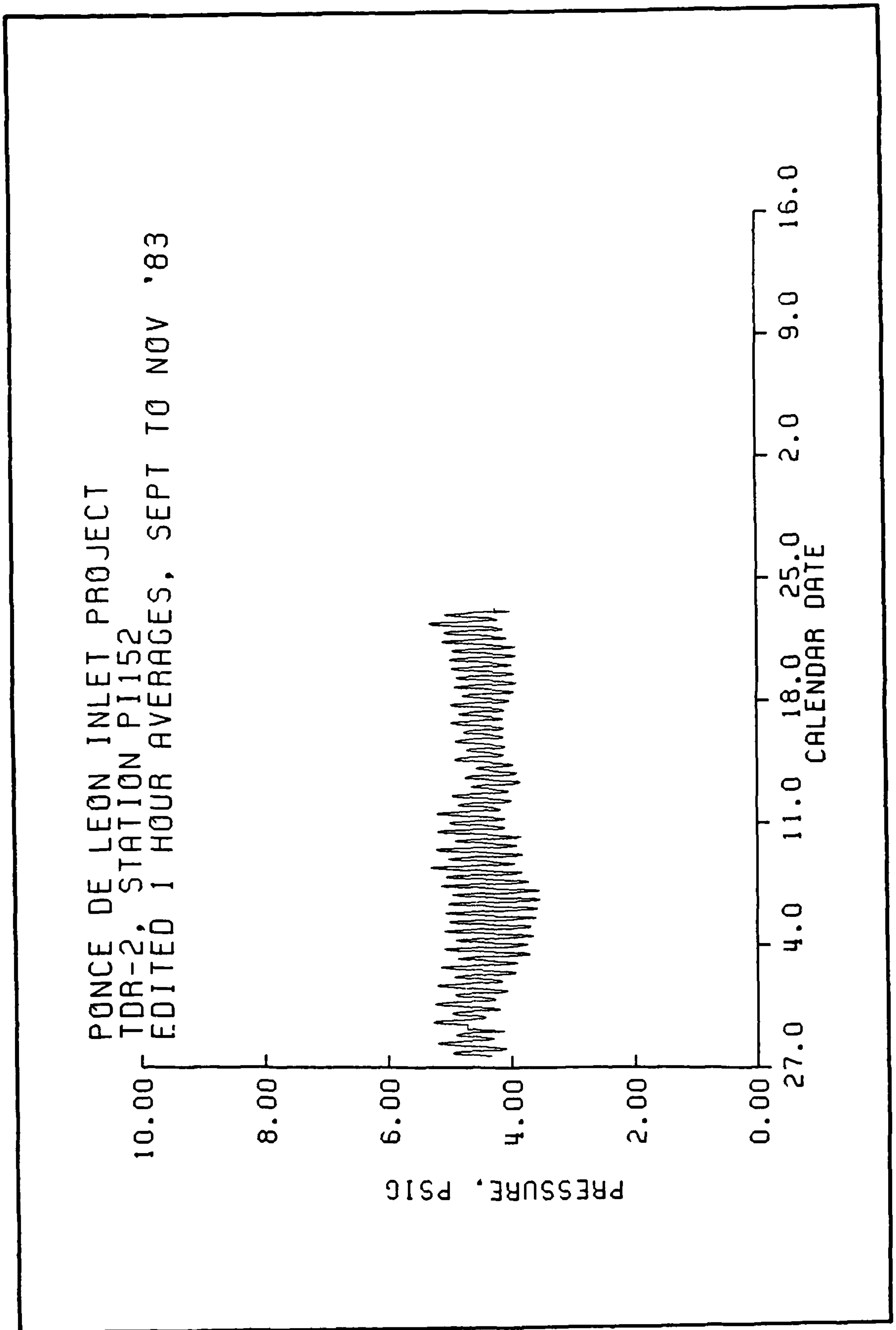

PONCE DE LEON INLET PROJECT
TDR-2, STATION PI152
EDITED 1 HOUR AVERAGES, SEPT TO NOV '83
PRESSURE, PSIG
10.00
8.00
6.00
4.00
2.00
0.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 5

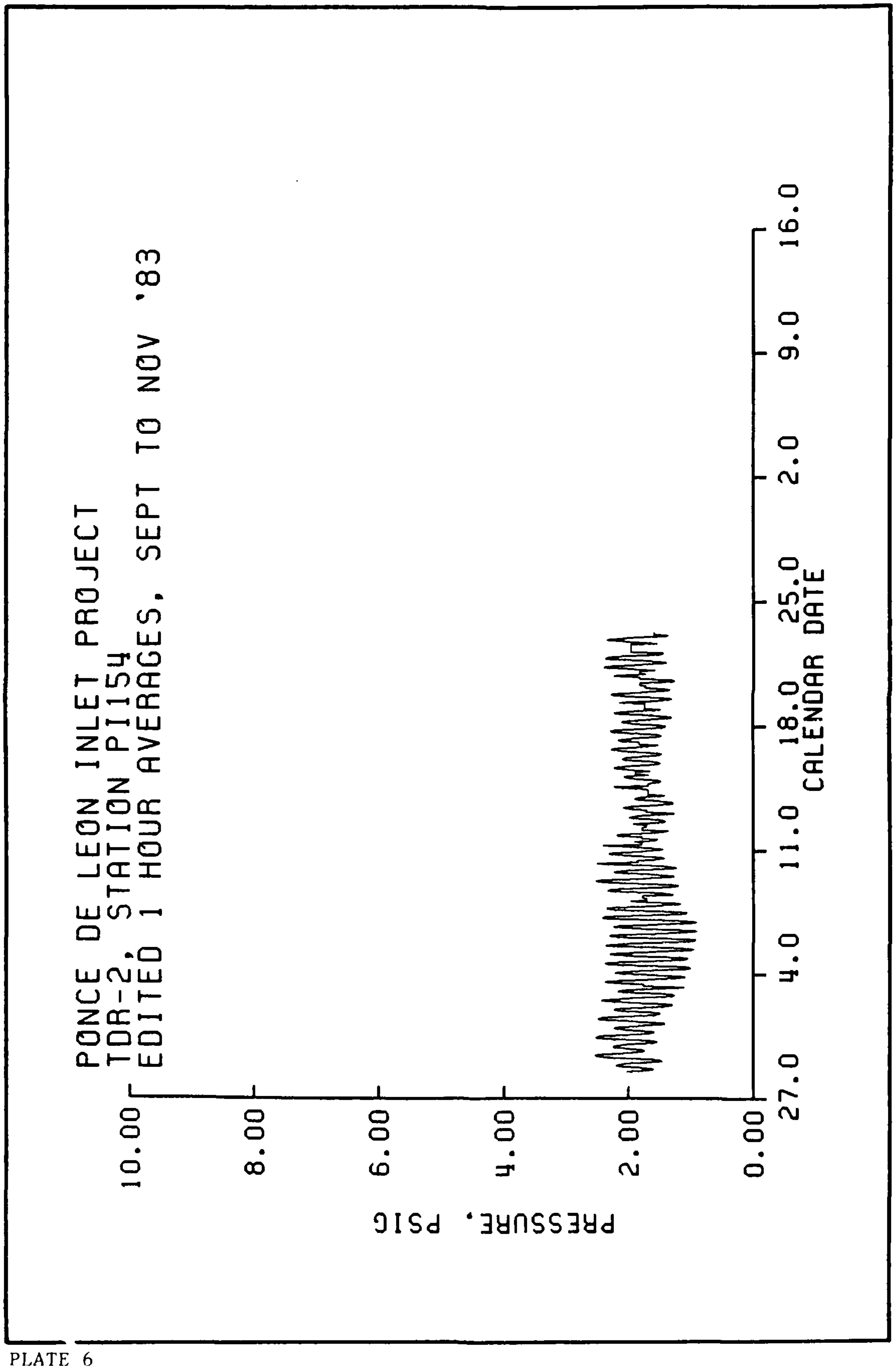
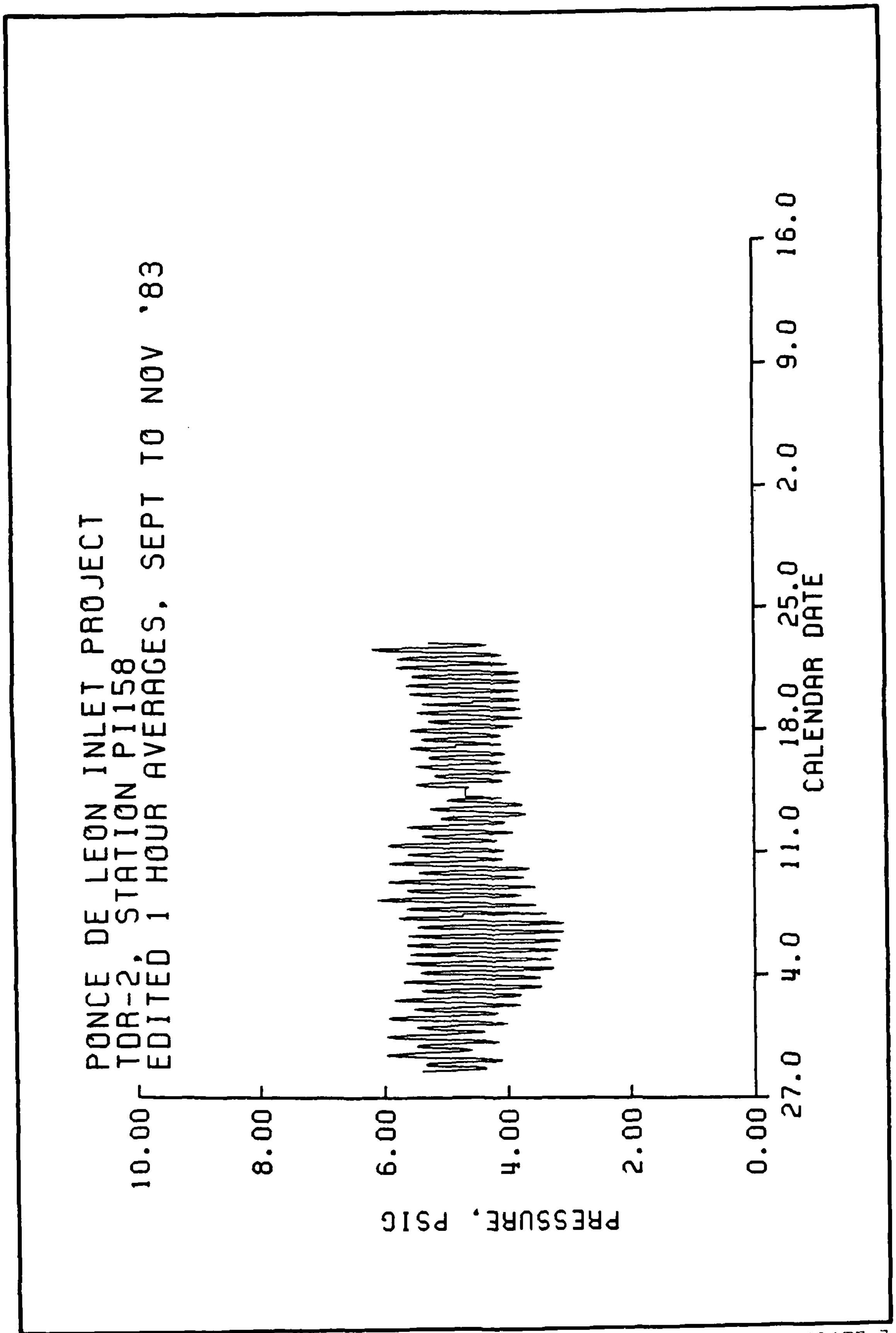

PONCE DE LEON INLET PROJECT
TDR-2, STATION PI154
EDITED 1 HOUR AVERAGES, SEPT TO NOV '83
PRESSURE, PSIG
10.00
8.00
6.00
4.00
2.00
0.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 6



PONCE DE LEON INLET PROJECT
TDR-2, STATION PI158
EDITED 1 HOUR AVERAGES, SEPT TO NOV '83
PRESSURE, PSIG
10.00
8.00
6.00
4.00
2.00
0.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 7

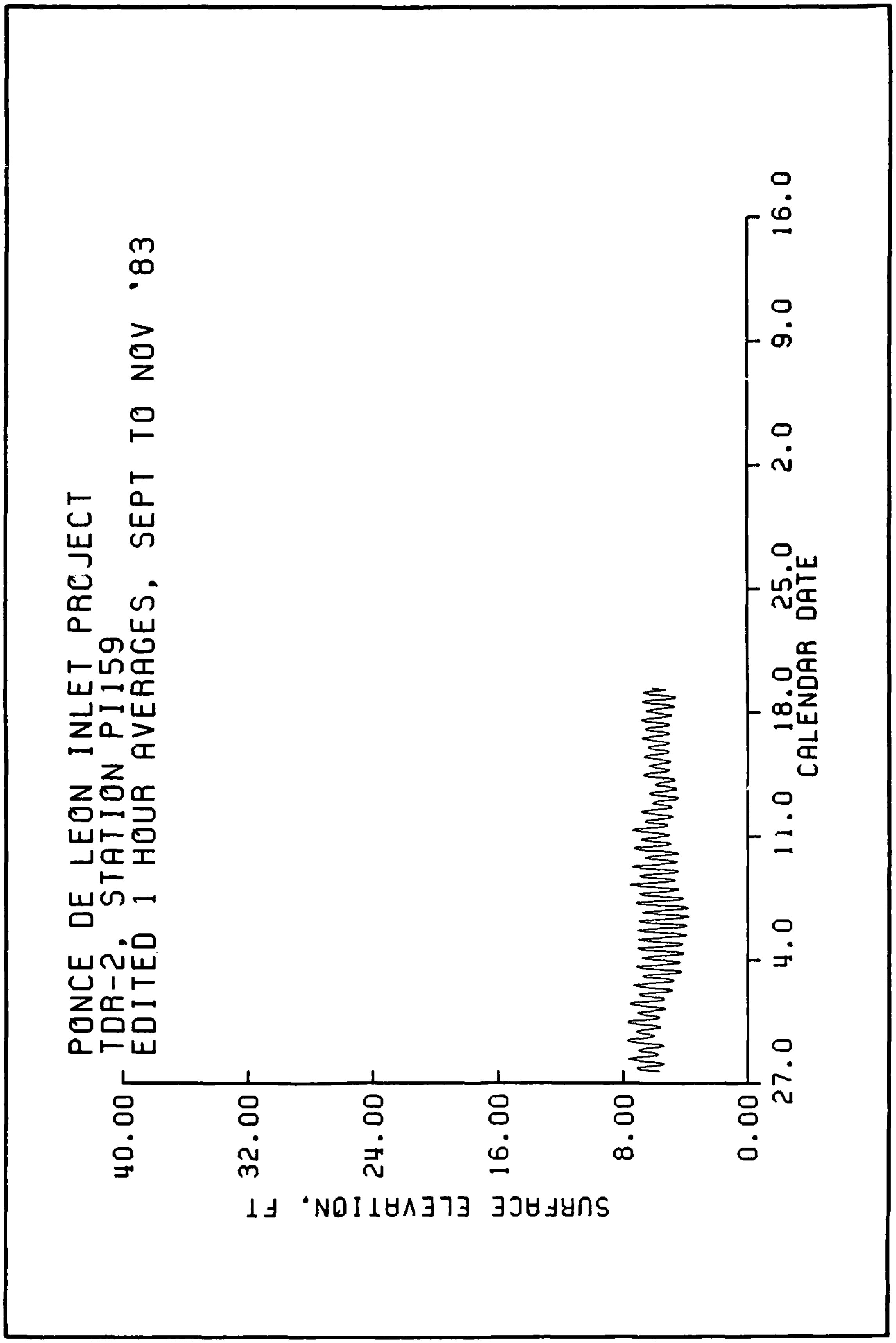
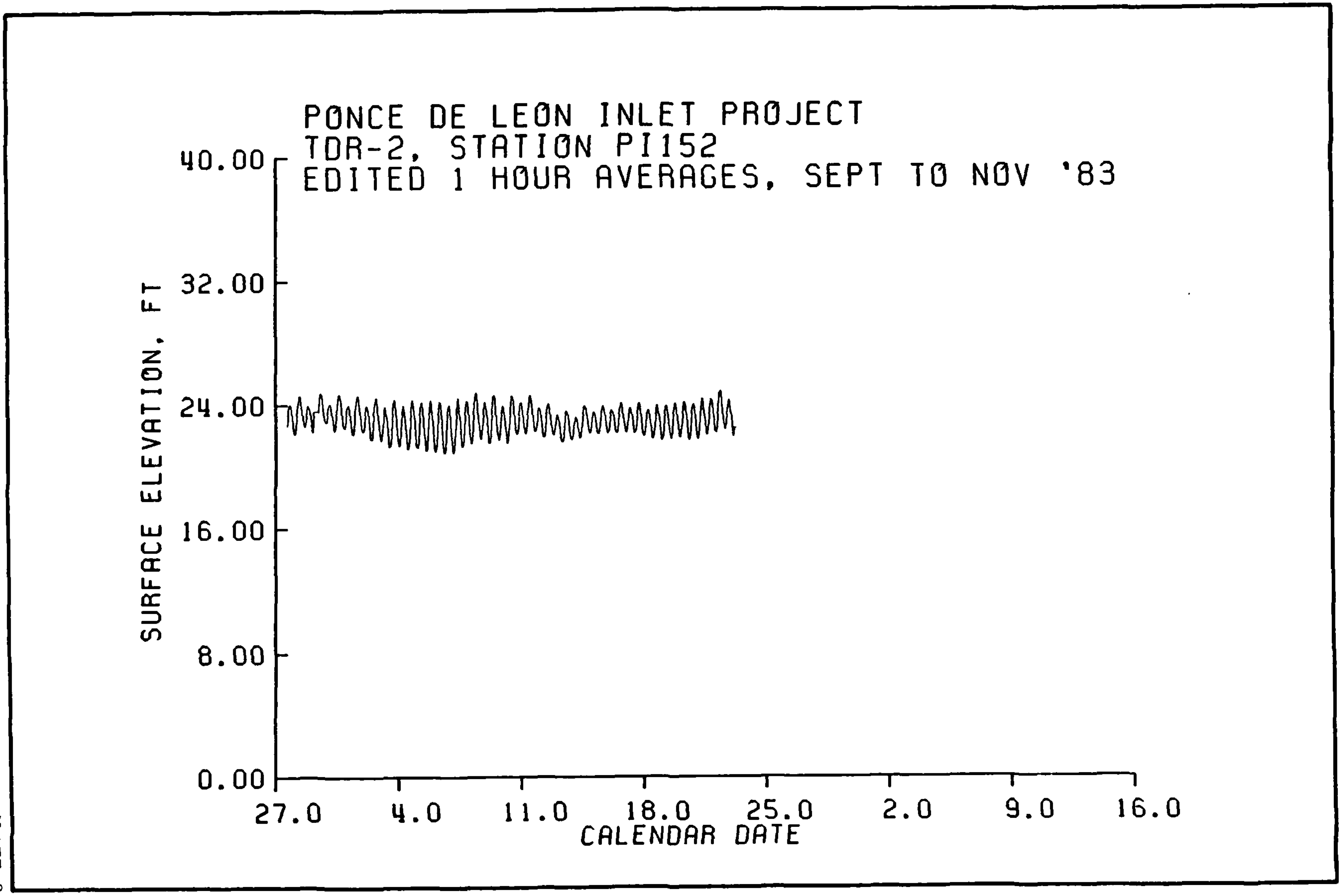

PONCE DE LEON INLET PROJECT
TDR-2, STATION PI159
EDITED 1 HOUR AVERAGES, SEPT TO NOV '83
SURFACE ELEVATION, FT
0.00
8.00
16.00
24.00
32.00
40.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 8



PONCE DE LEON INLET PROJECT
TDR-2, STATION PI152
EDITED 1 HOUR AVERAGES, SEPT TO NOV '83
SURFACE ELEVATION, FT
40.00
32.00
24.00
16.00
8.00
0.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 9

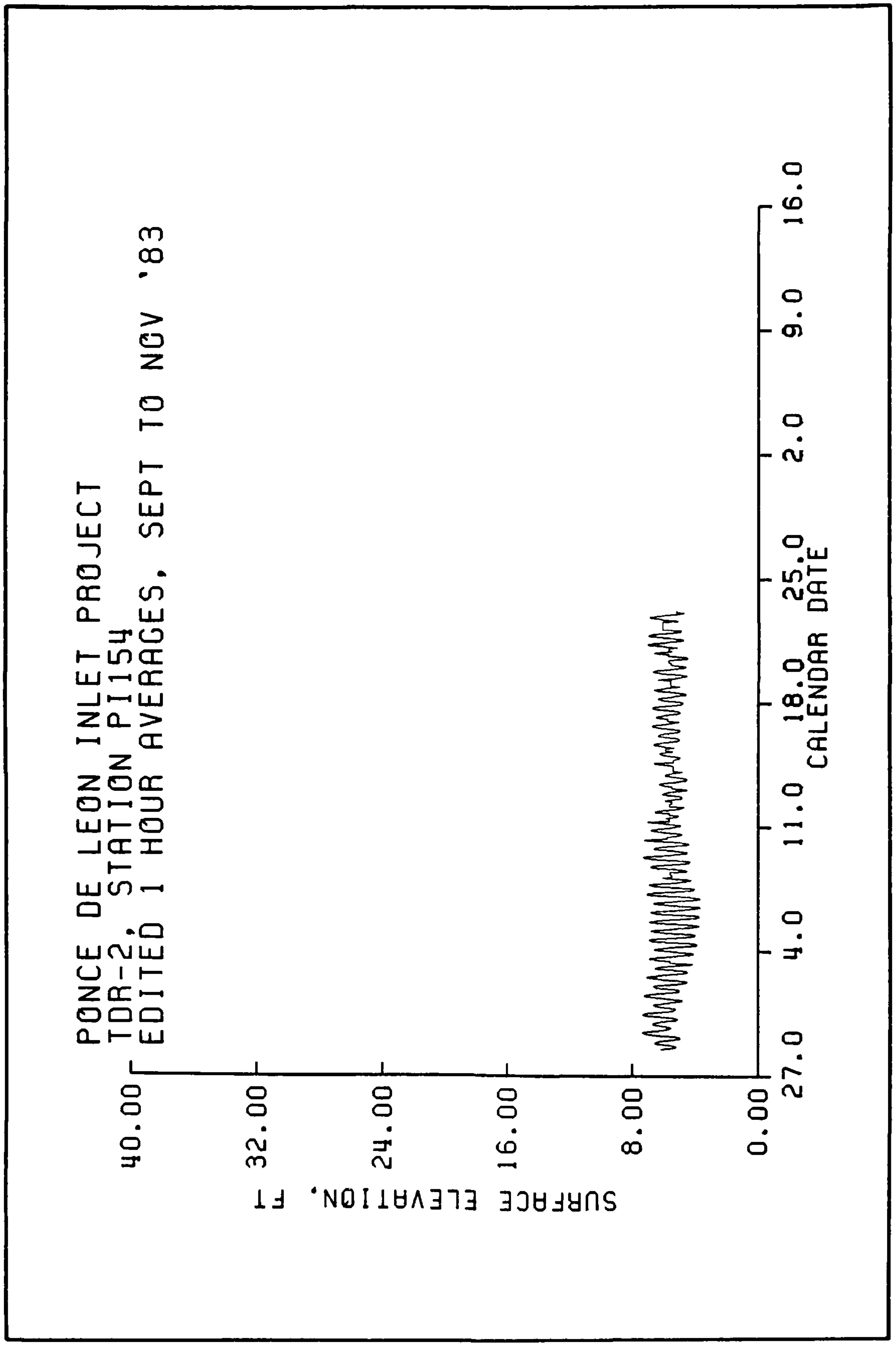

PONCE DE LEON INLET PROJECT
TDR-2, STATION PI154
EDITED 1 HOUR AVERAGES, SEPT TO NOV '83
SURFACE ELEVATION, FT
0.00
8.00
16.00
24.00
32.00
40.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 10

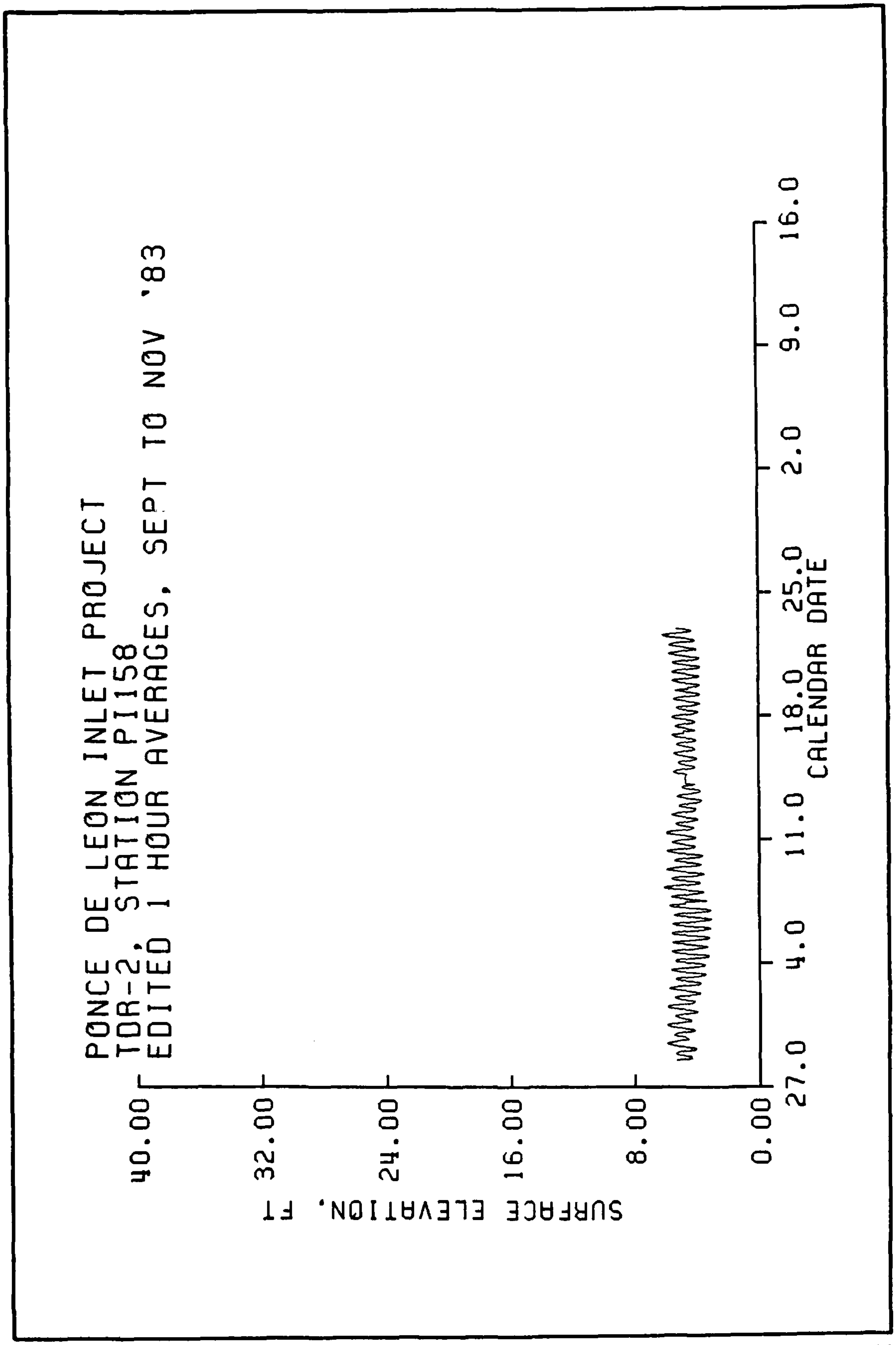

PONCE DE LEON INLET PROJECT
TDR-2, STATION PI158
EDITED 1 HOUR AVERAGES, SEPT TO NOV '83
SURFACE ELEVATION, FT
40.00
32.00
24.00
16.00
8.00
0.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 11

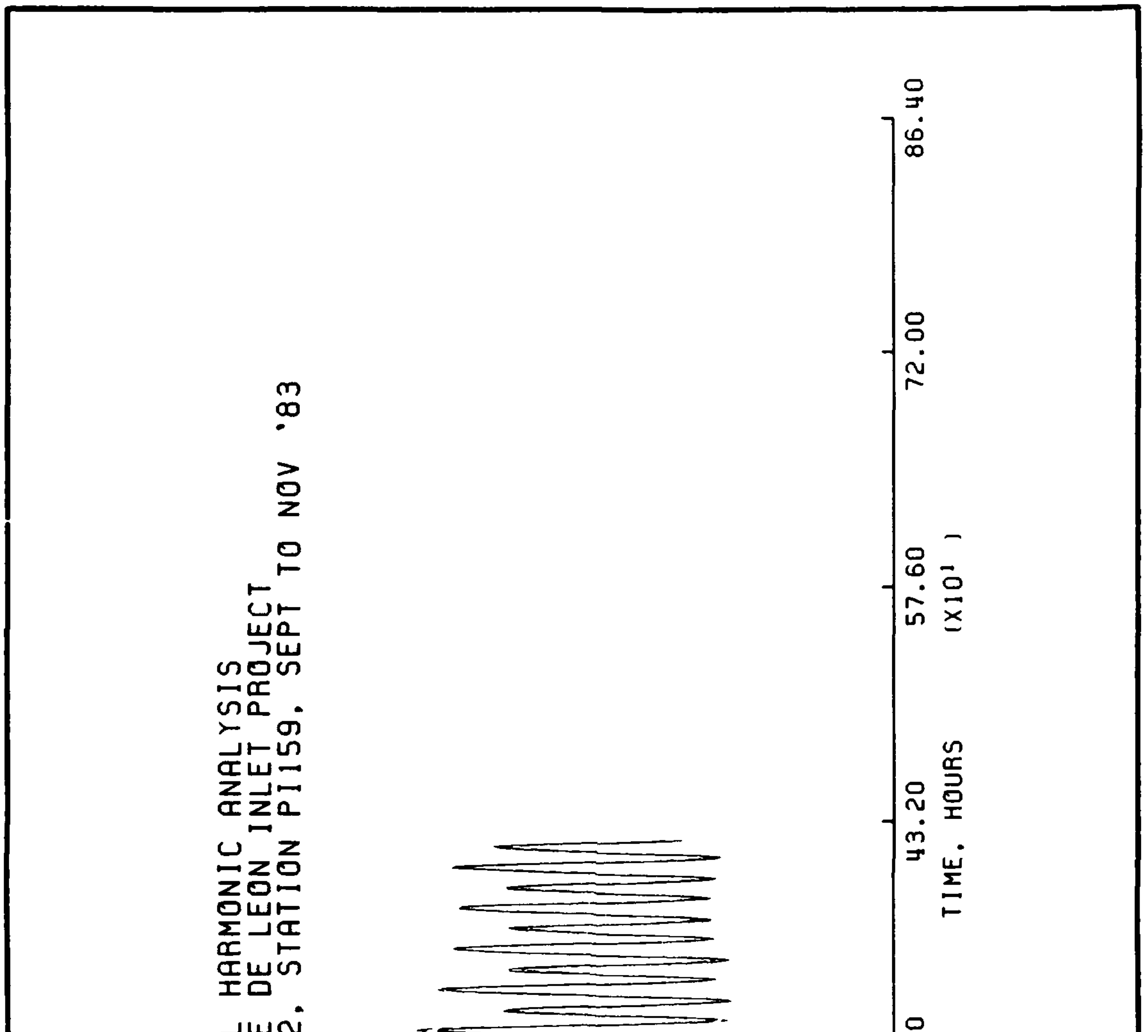

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
TDR-2, STATION PI159, SEPT TO NOV '83
SURFACE ELEVATION, FT
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS

PLATE 12

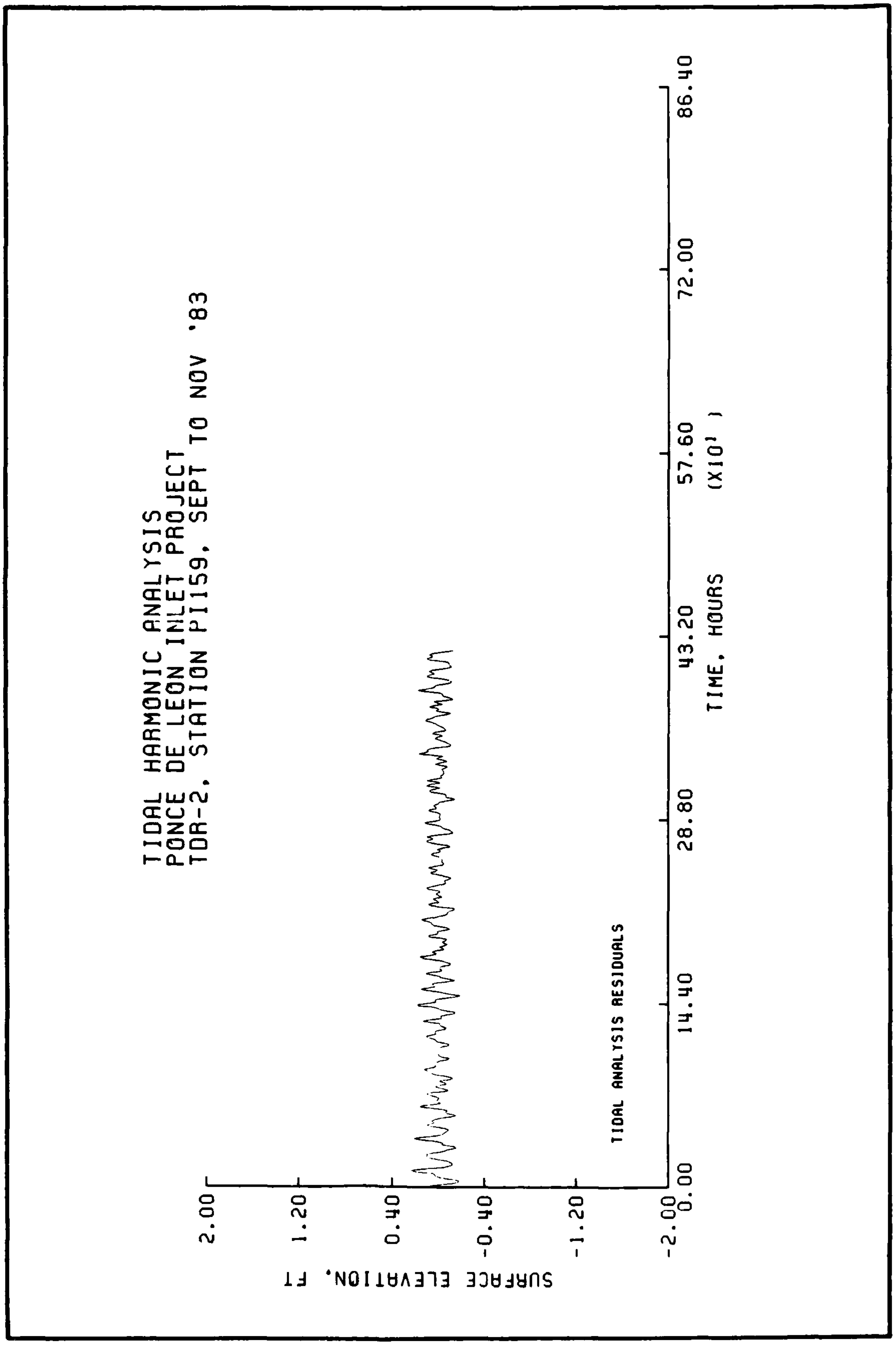
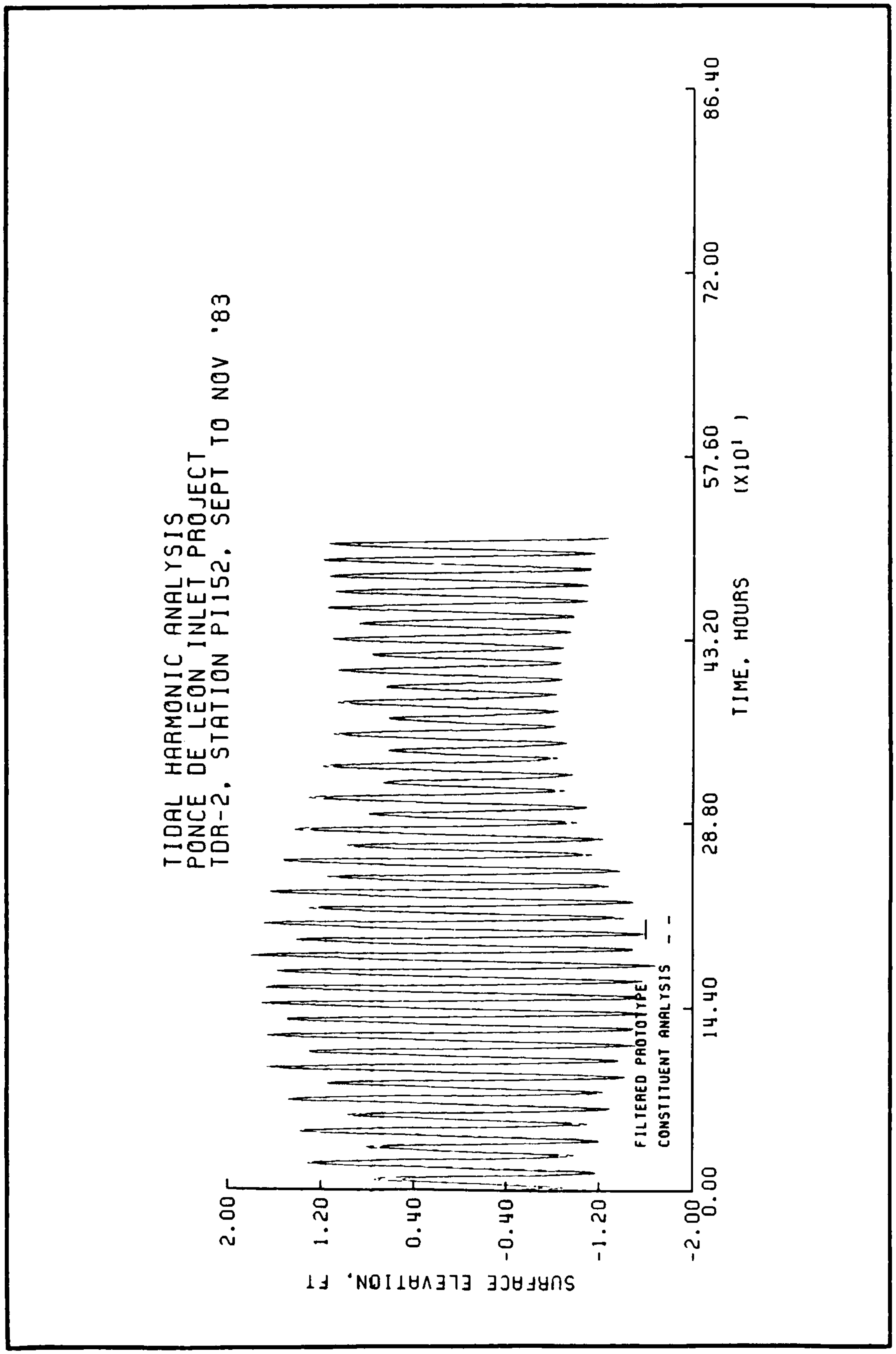

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
TDR-2, STATION PI159, SEPT TO NOV '83
TIDAL ANALYSIS RESIDUALS
SURFACE ELEVATION, FT
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS (X10')

PLATE 13


TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
TDR-2, STATION PI152, SEPT TO NOV '83
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS
SURFACE ELEVATION, FT
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)

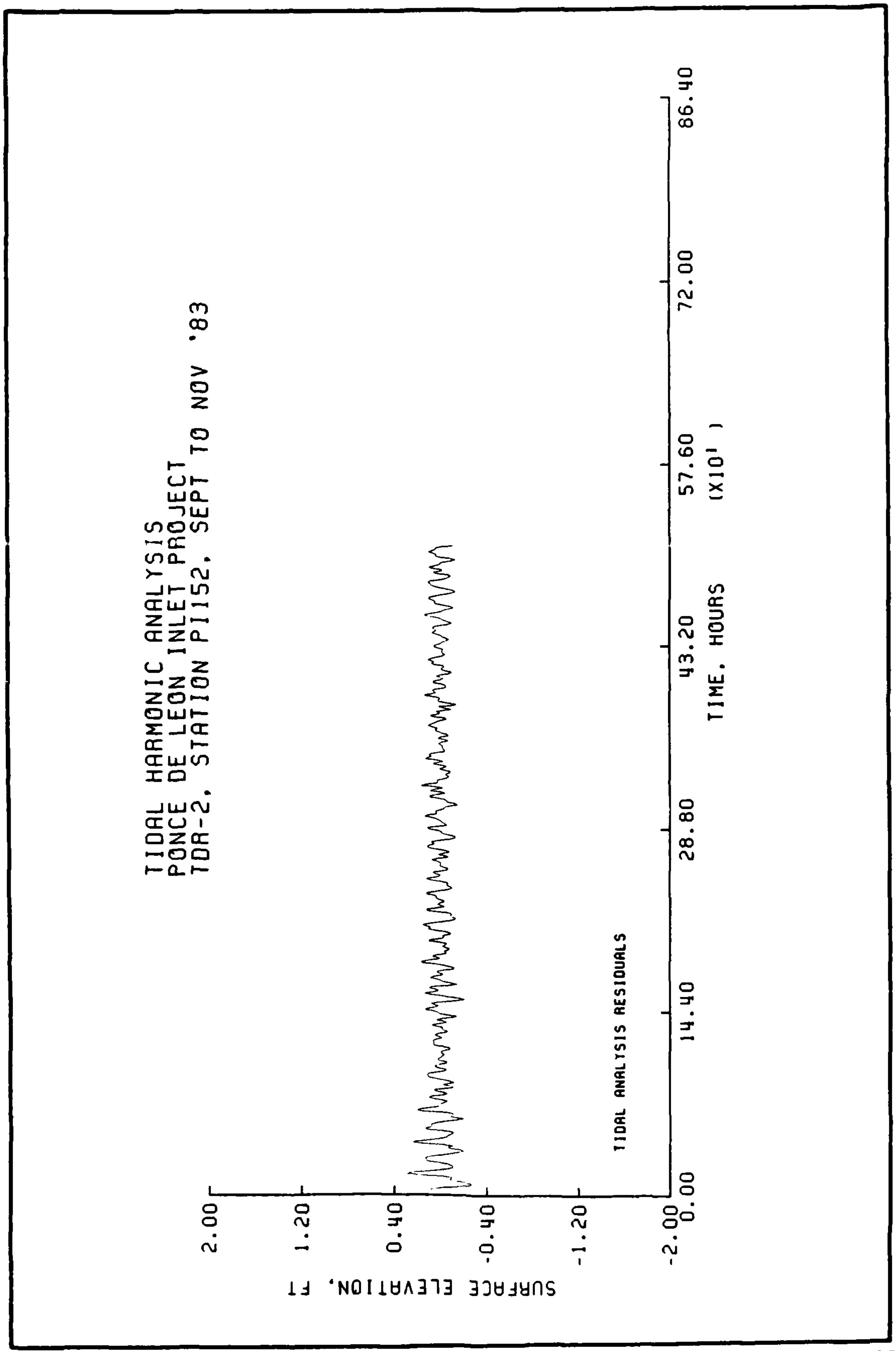
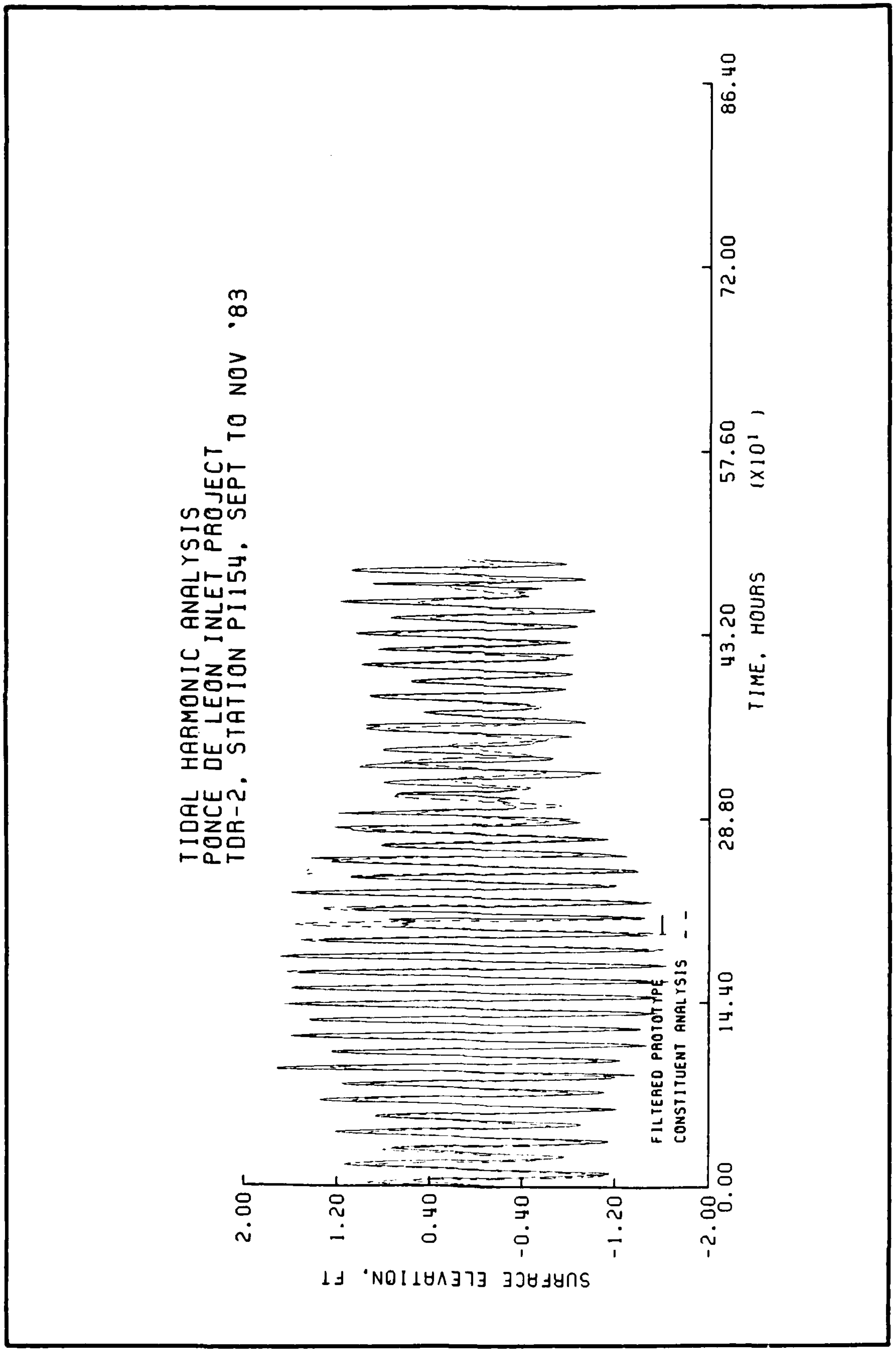

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
TDR-2, STATION PI152, SEPT TO NOV '83
TIDAL ANALYSIS RESIDUALS
SURFACE ELEVATION, FT
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS (X10¹)

PLATE 15



TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
TDR-2, STATION PI154, SEPT TO NOV '83
SURFACE ELEVATION, FT
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS

PLATE 16

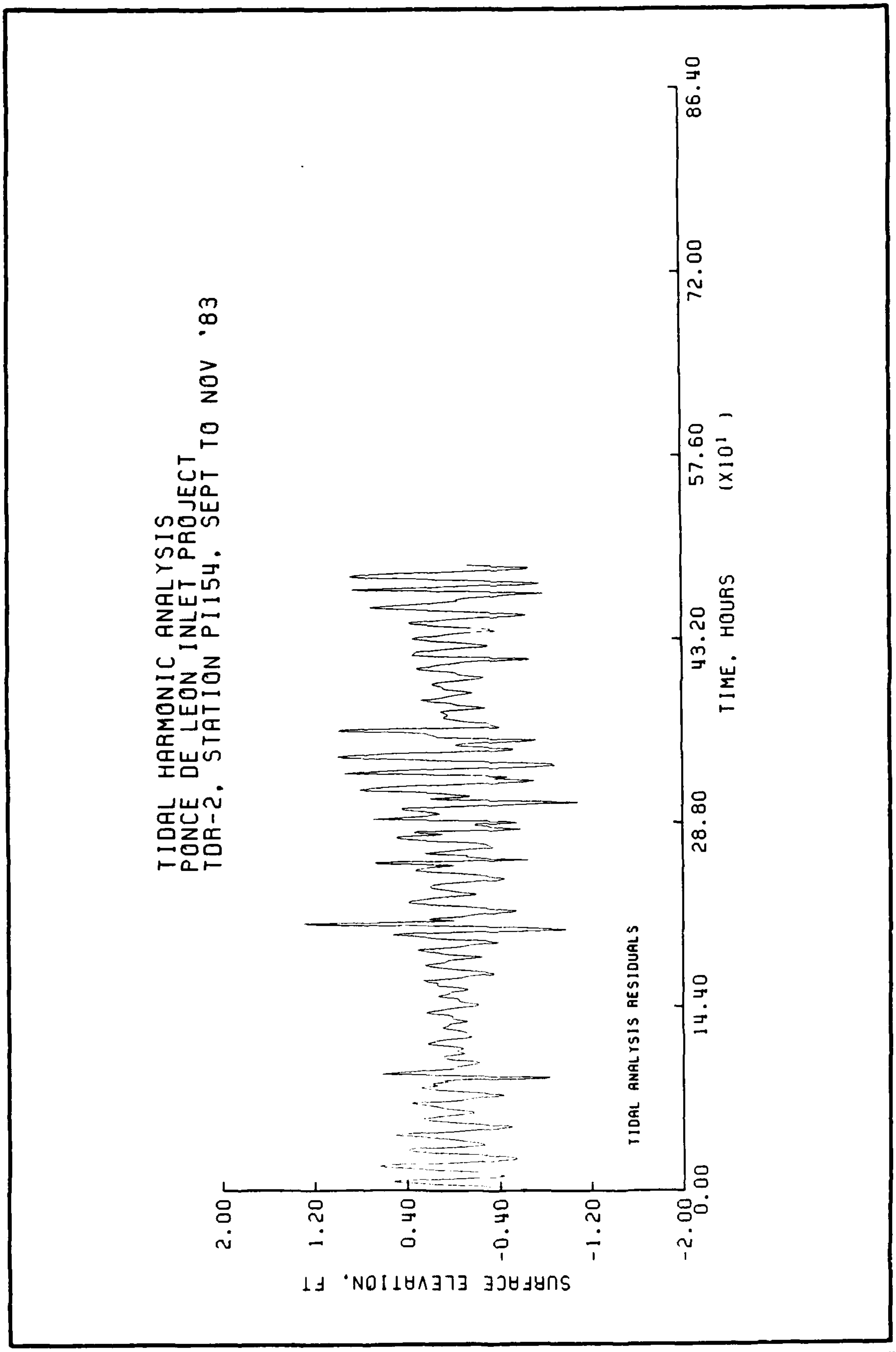
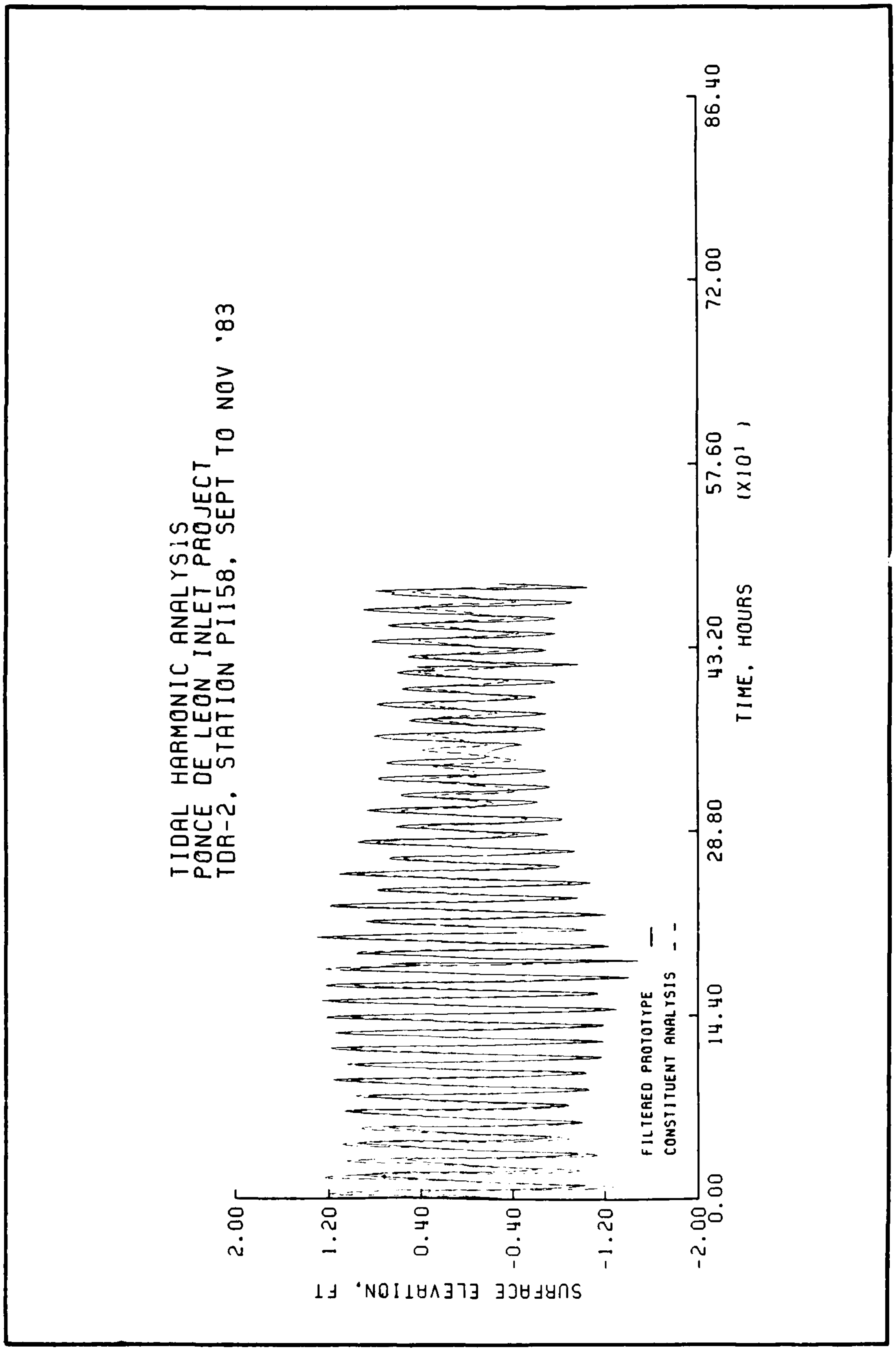
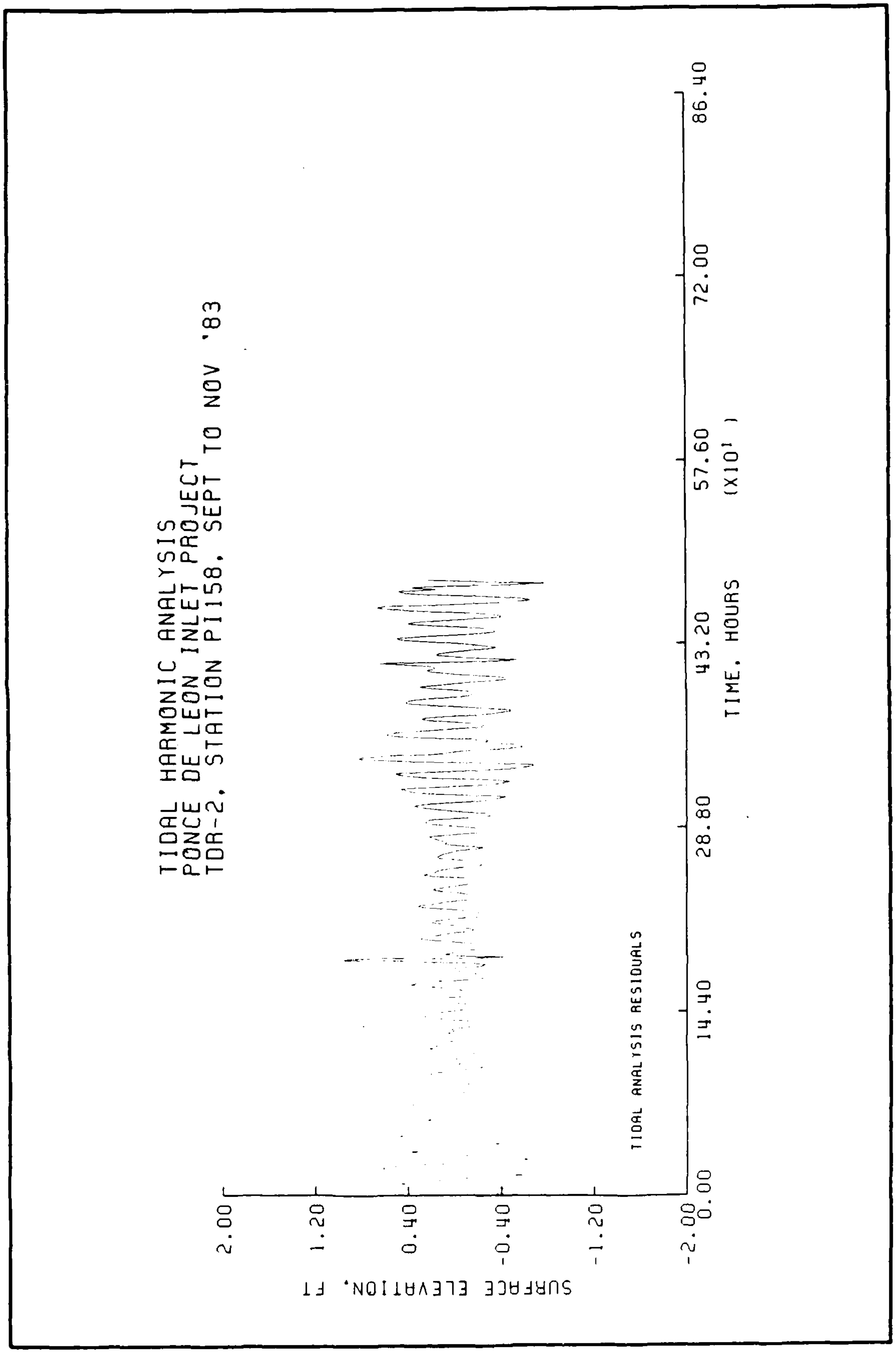

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
TDR-2, STATION PI154, SEPT TO NOV '83
TIDAL ANALYSIS RESIDUALS
SURFACE ELEVATION, FT
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10^1)

PLATE 17



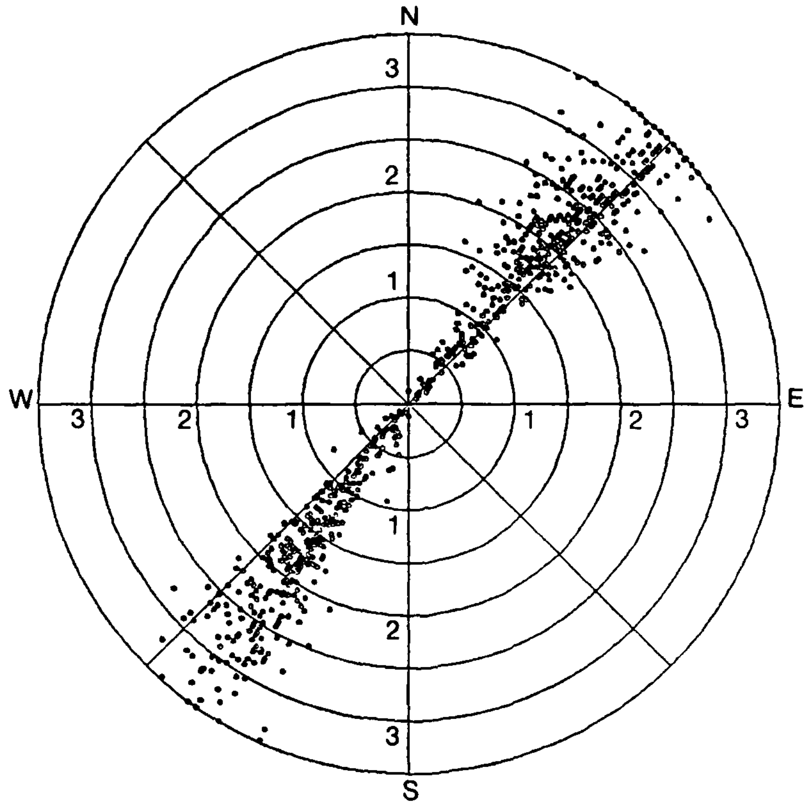
TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
TDR-2, STATION PI158, SEPT TO NOV '83
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS
SURFACE ELEVATION, FT
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)

PLATE 18

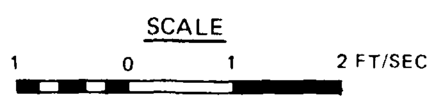


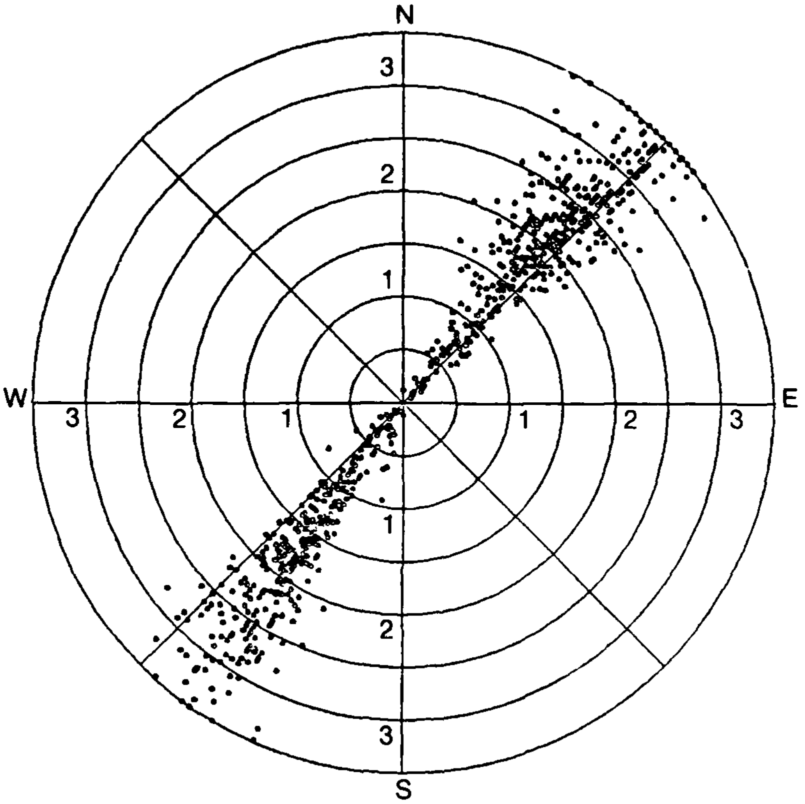
TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
TDR-2, STATION PI158, SEPT TO NOV '83
TIDAL ANALYSIS RESIDUALS
SURFACE ELEVATION, FT
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)

PLATE 19



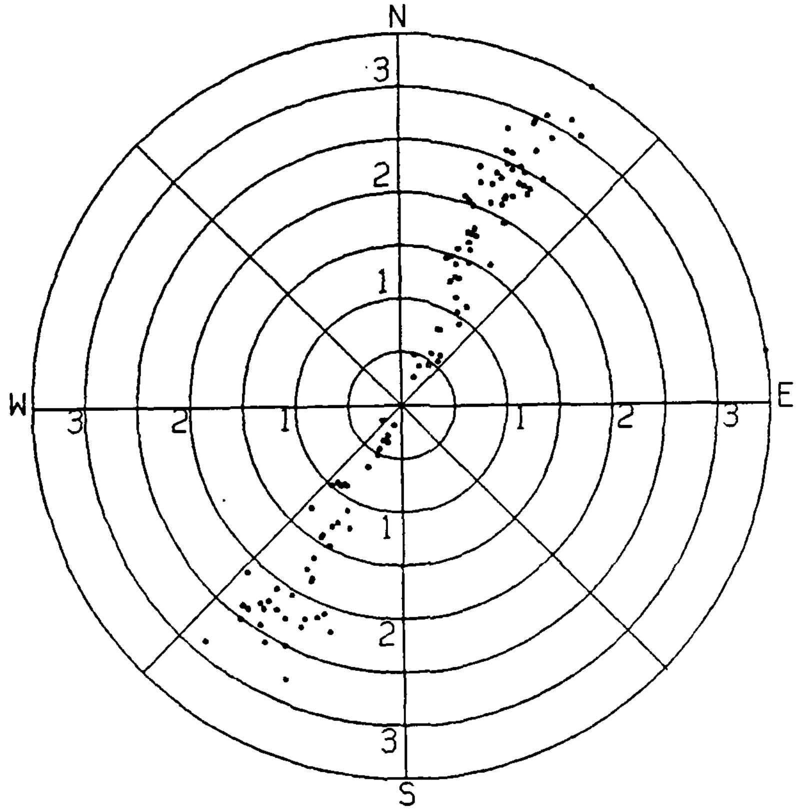
CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI2AT, SEPT TO NOV '83





CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI2AT, SEPT TO NOV '83

SCALE
1 0 1 2 FT/SEC



CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI2BB, SEPT TO NOV '83

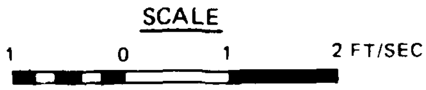
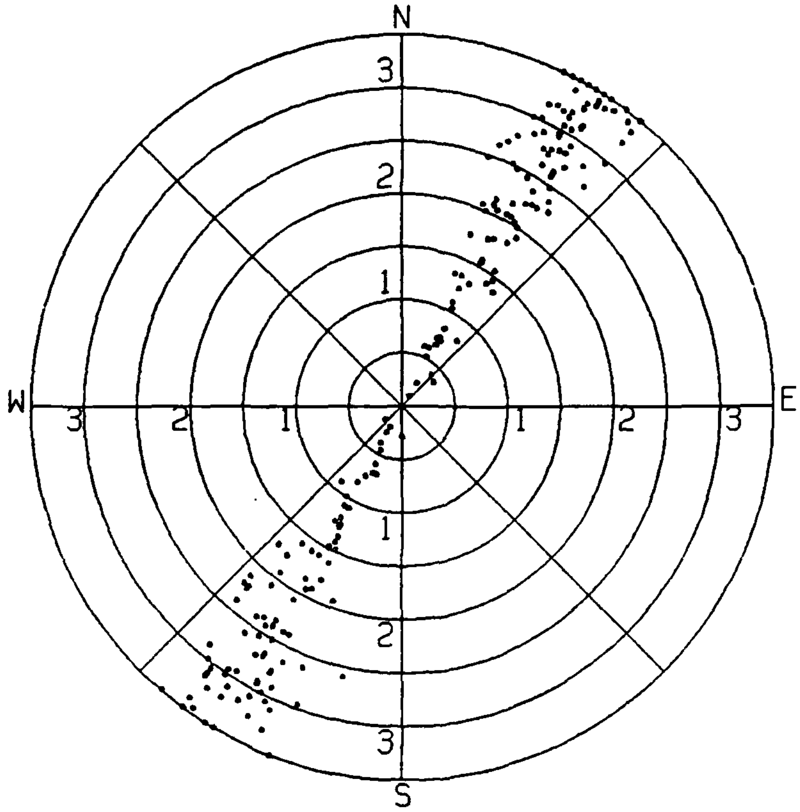


PLATE 22



CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI2BT, SEPT TO NOV '83

SCALE

1 0 1 2 FT/SEC

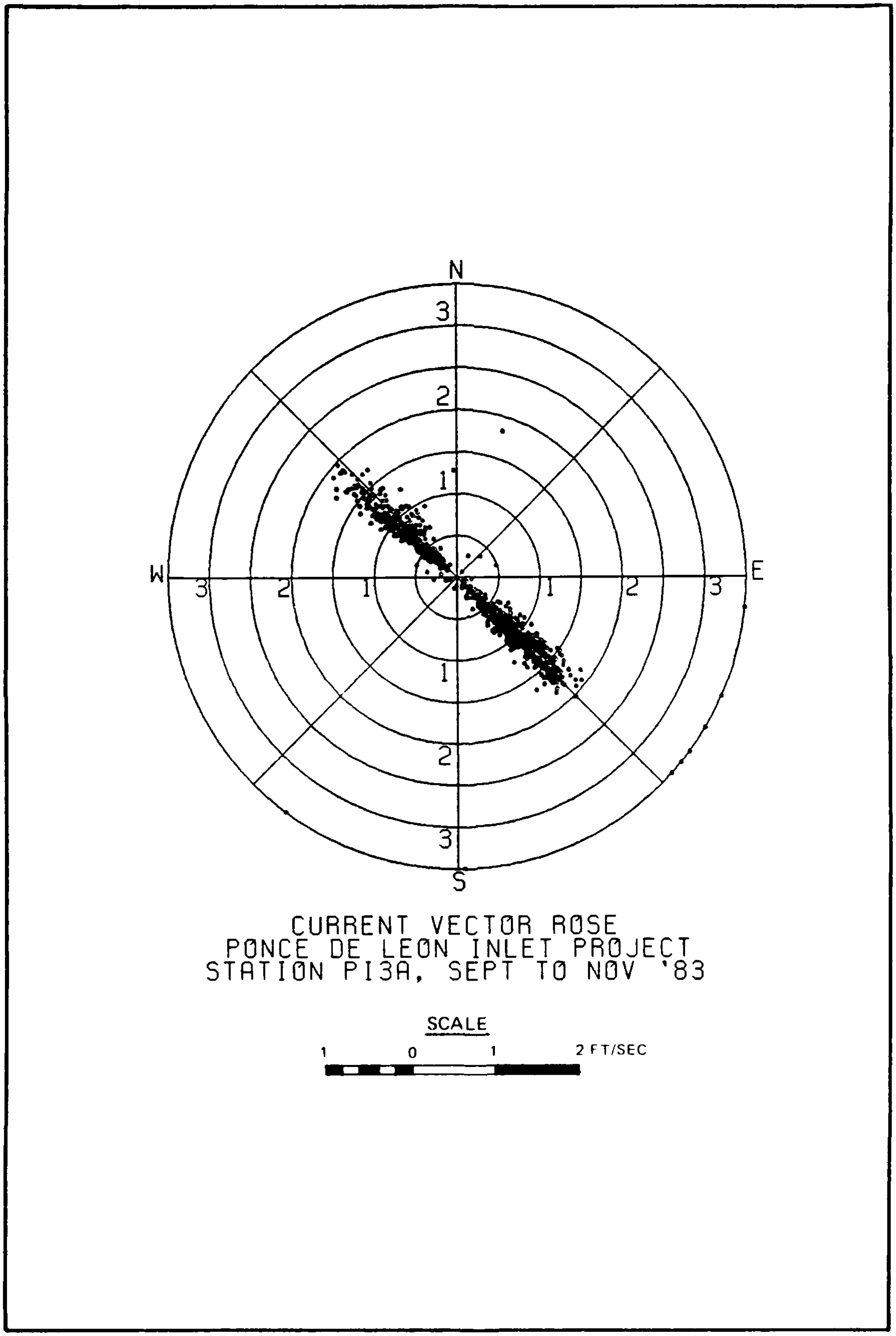
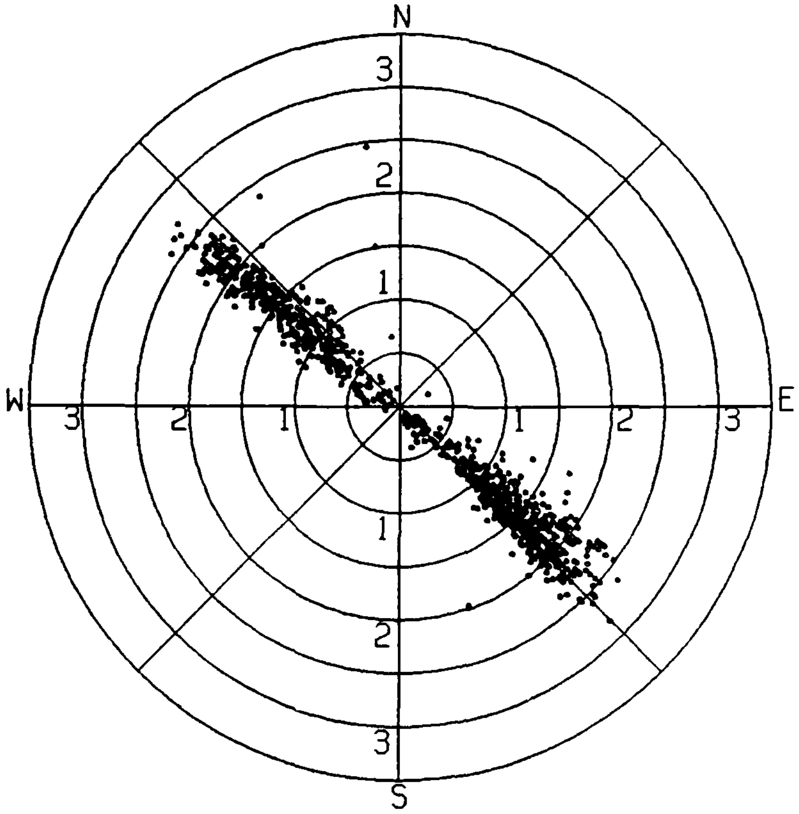

N
E
S
W
3
2
1
CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI3A, SEPT TO NOV '83
SCALE
1
0
1
2 FT/SEC

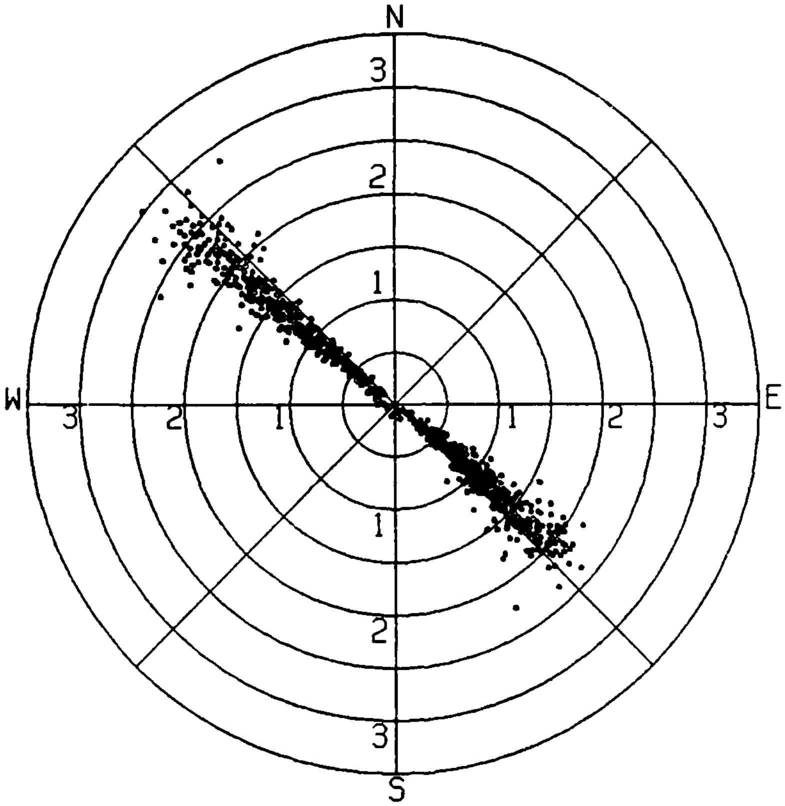
PLATE 24



CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI3B, SEPT TO NOV '83

SCALE

1 0 1 2 FT/SEC

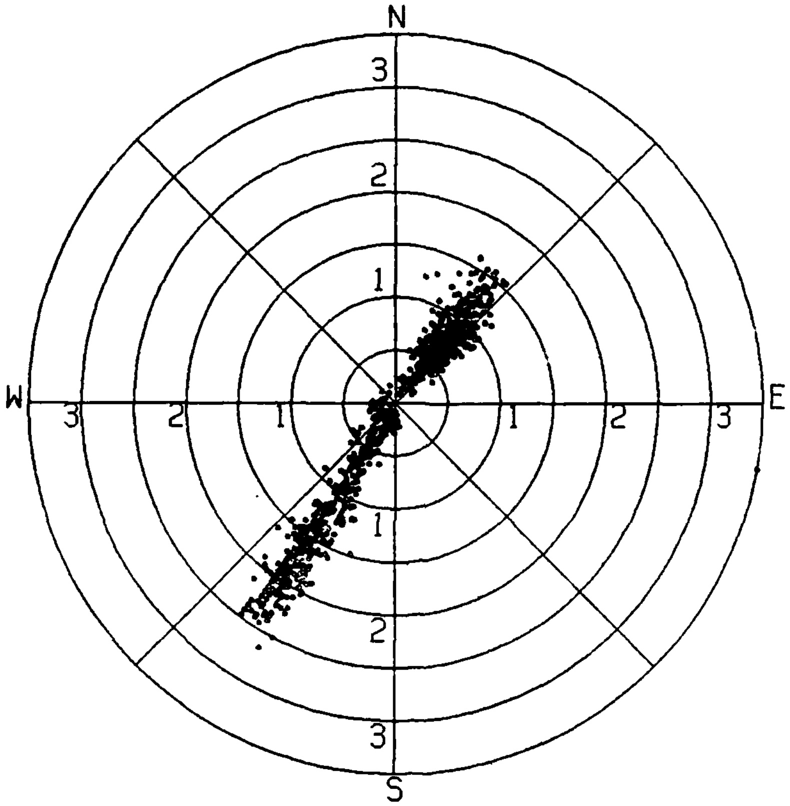


CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI3C, SEPT TO NOV '83

SCALE

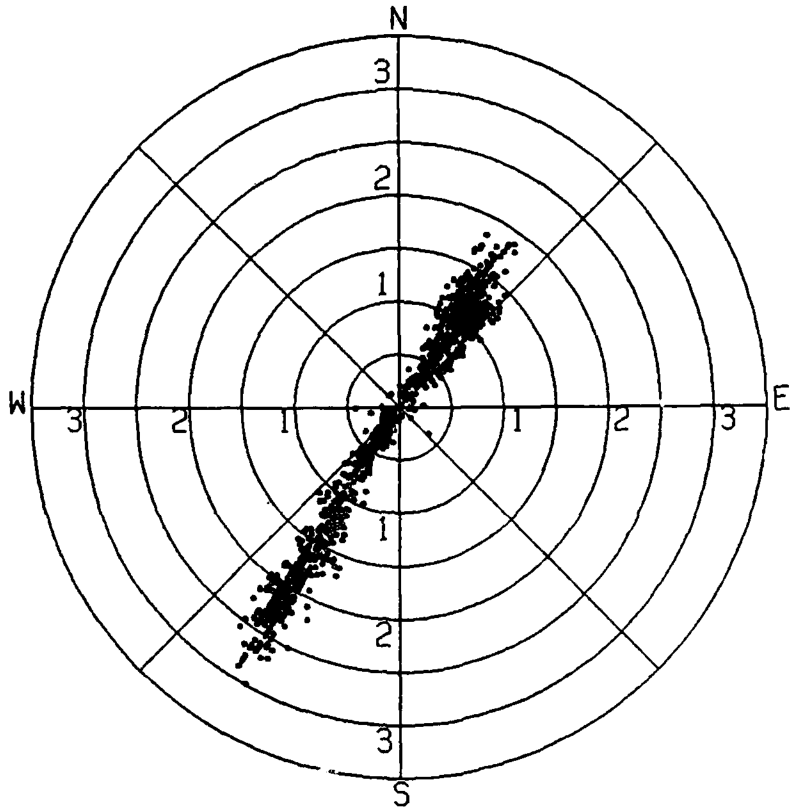
1 0 1 2 FT/SEC

PLATE 26



CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI4AB, SEPT TO NOV '83

SCALE
1 0 1 2 FT/SEC



CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI4AT, SEPT TO NOV '83

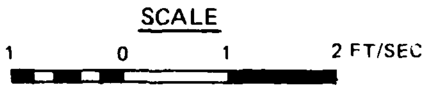
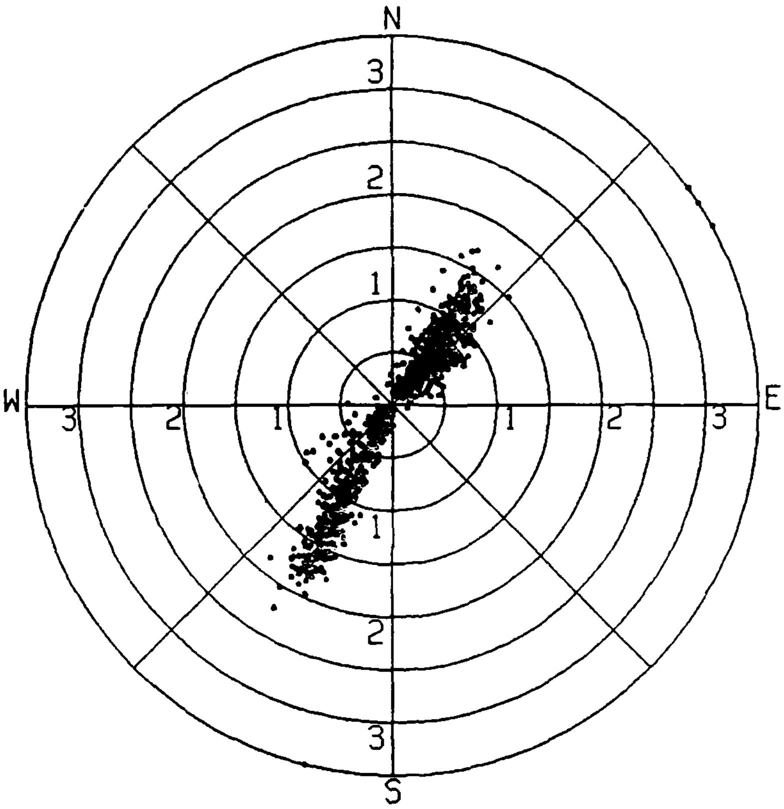


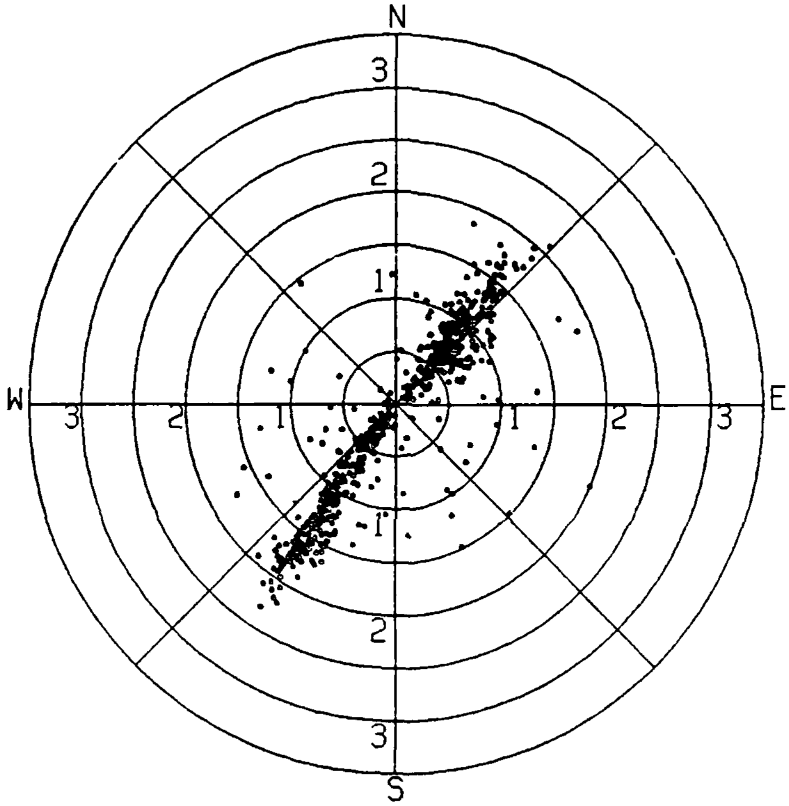
PLATE 28



CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI4BB, SEPT TO NOV '83

SCALE

1 0 1 2 FT/SEC

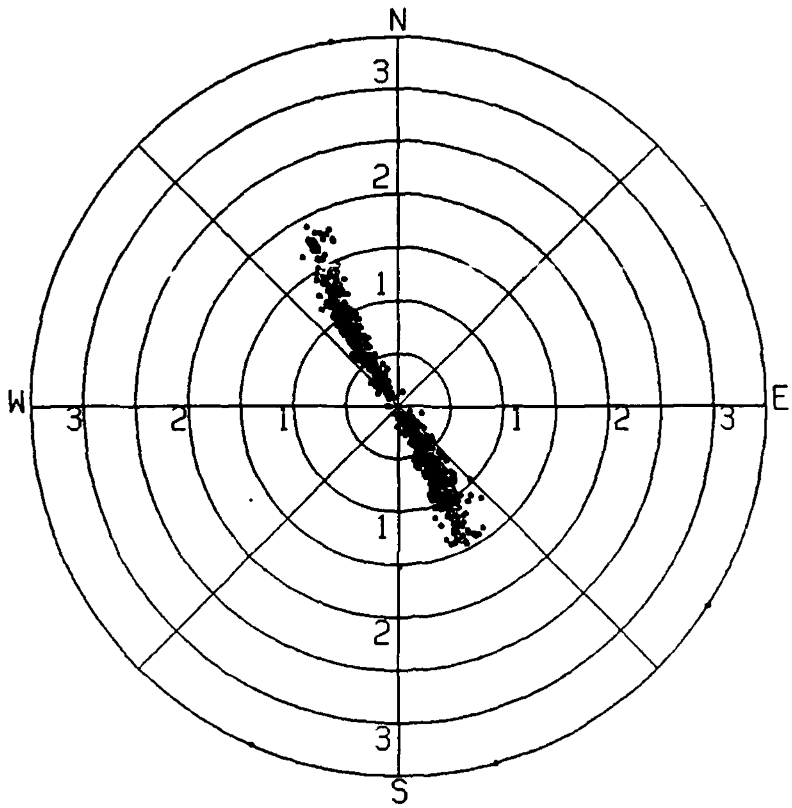


CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI4BT, SEPT TO NOV '83

SCALE

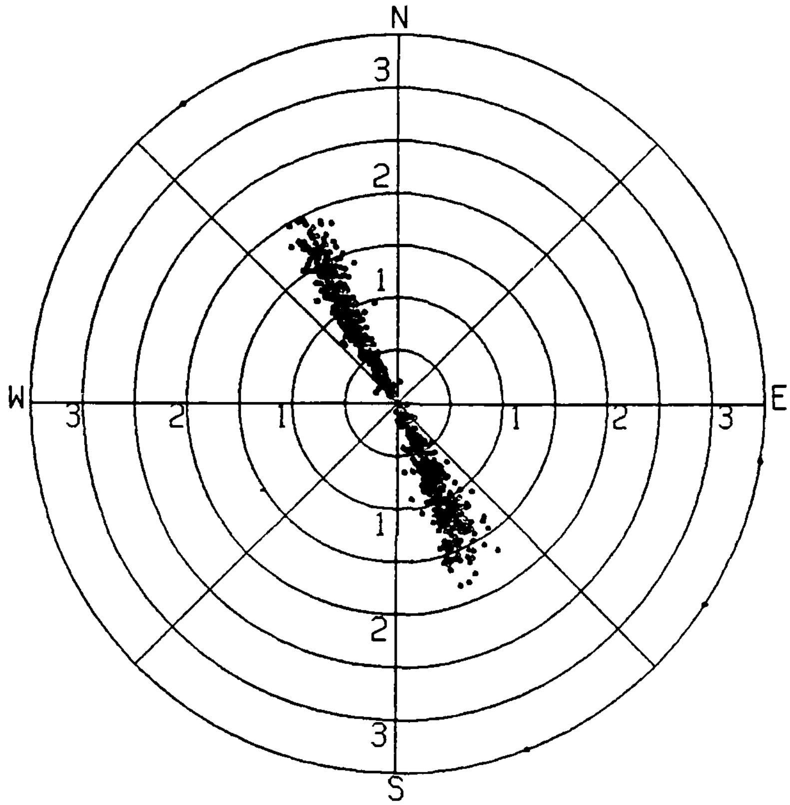
1 0 1 2 FT/SEC

PLATE 30

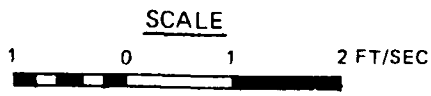


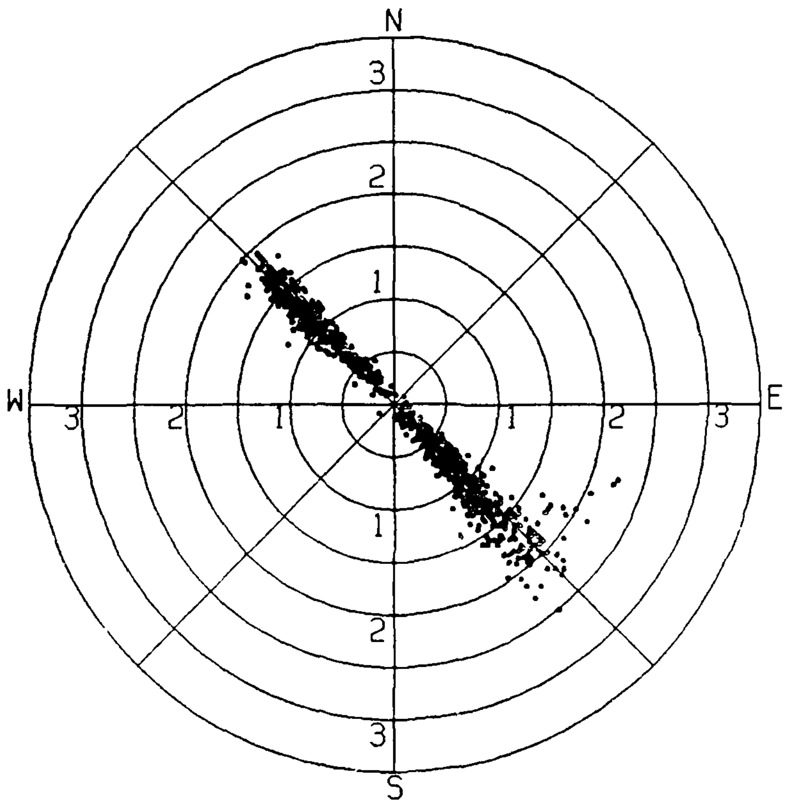
CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI5A, SEPT TO NOV '83

SCALE
1 0 1 2 FT/SEC



CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI5B, SEPT TO NOV '83





CURRENT VECTOR ROSE
PONCE DE LEON INLET PROJECT
STATION PI5C, SEPT TO NOV '83

SCALE

1 0 1 2 FT/SEC

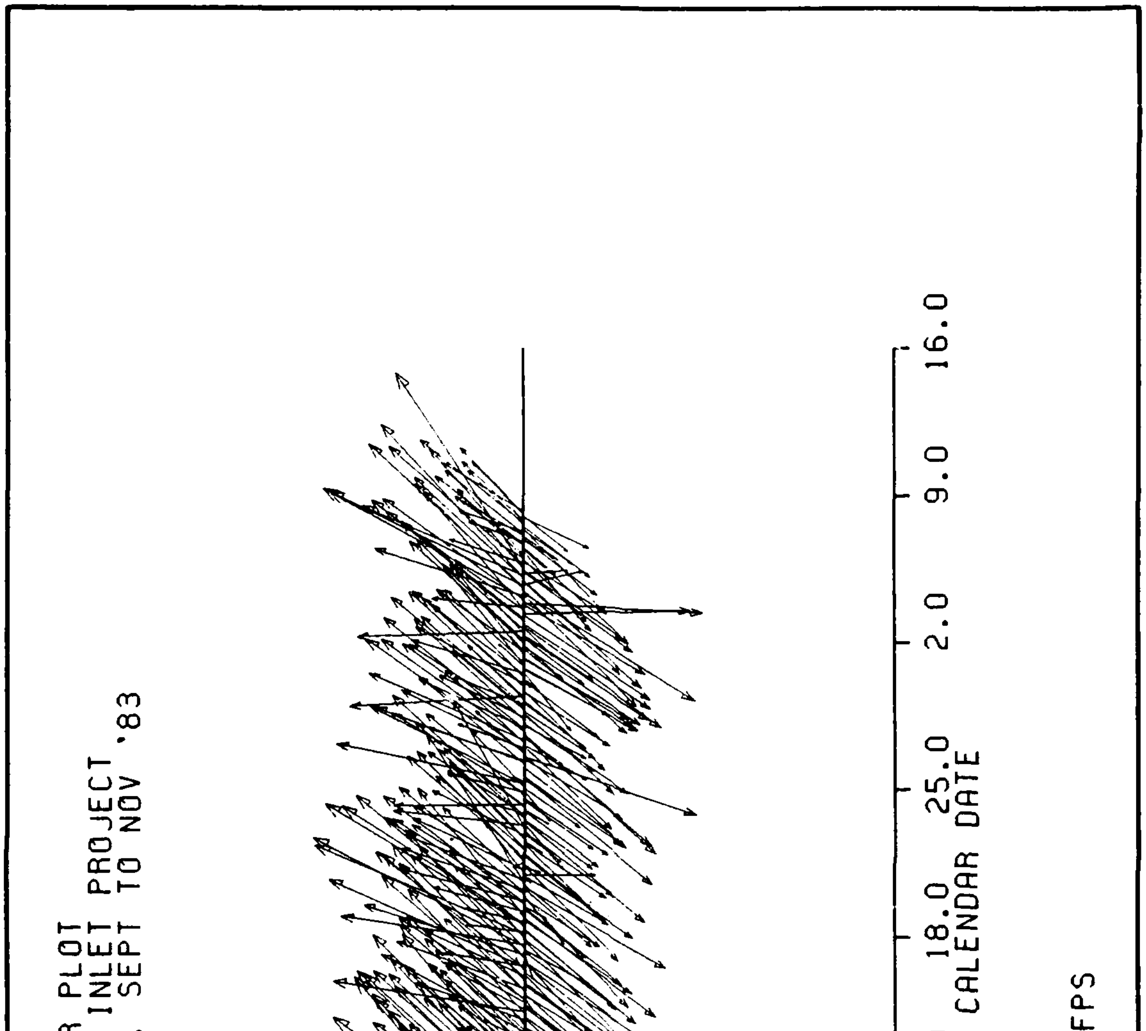
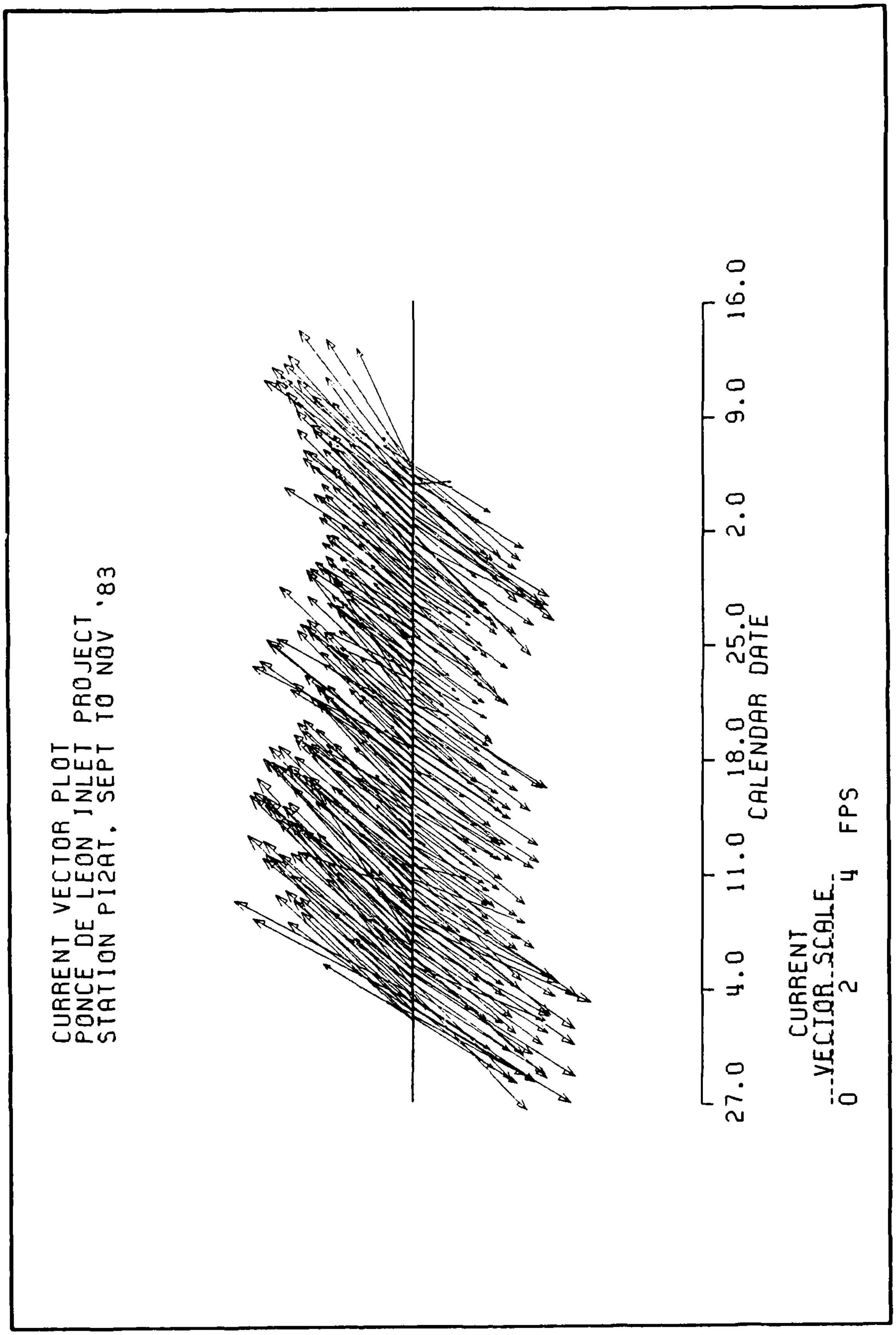

CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI2AB, SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS

PLATE 34



CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI2AT, SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS

PLATE 35

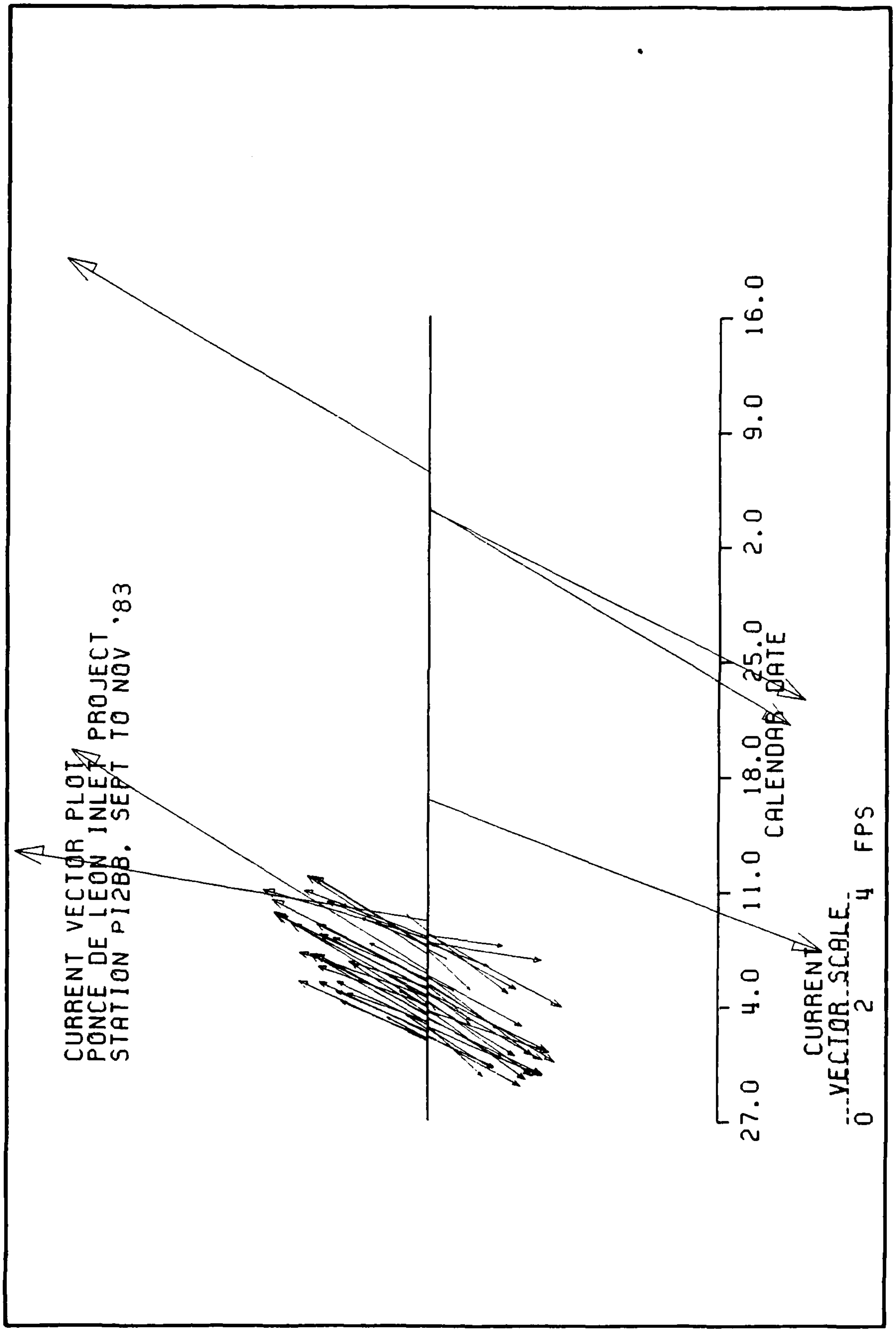
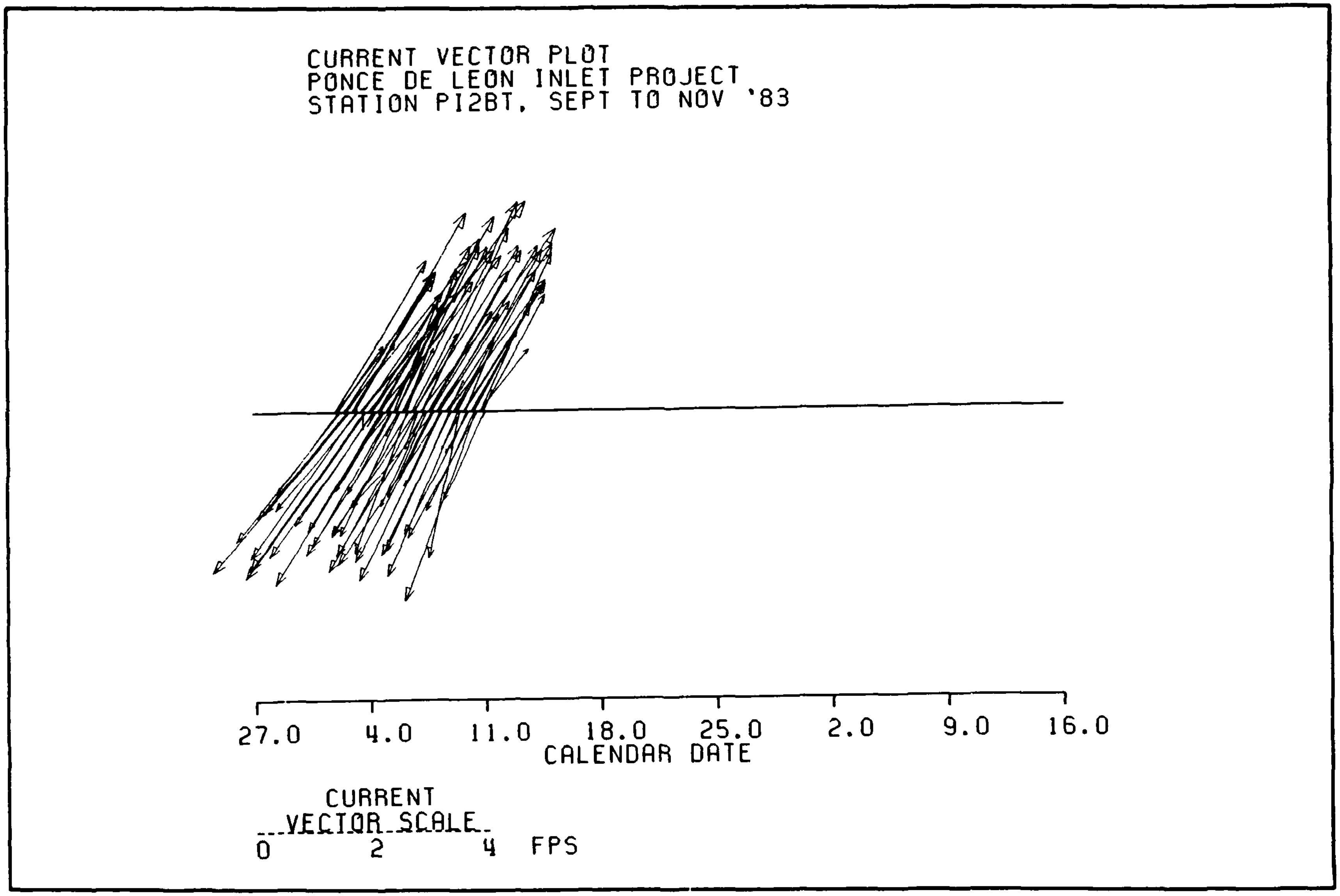

CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI2BB. SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS

PLATE 36



CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI2BT, SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS

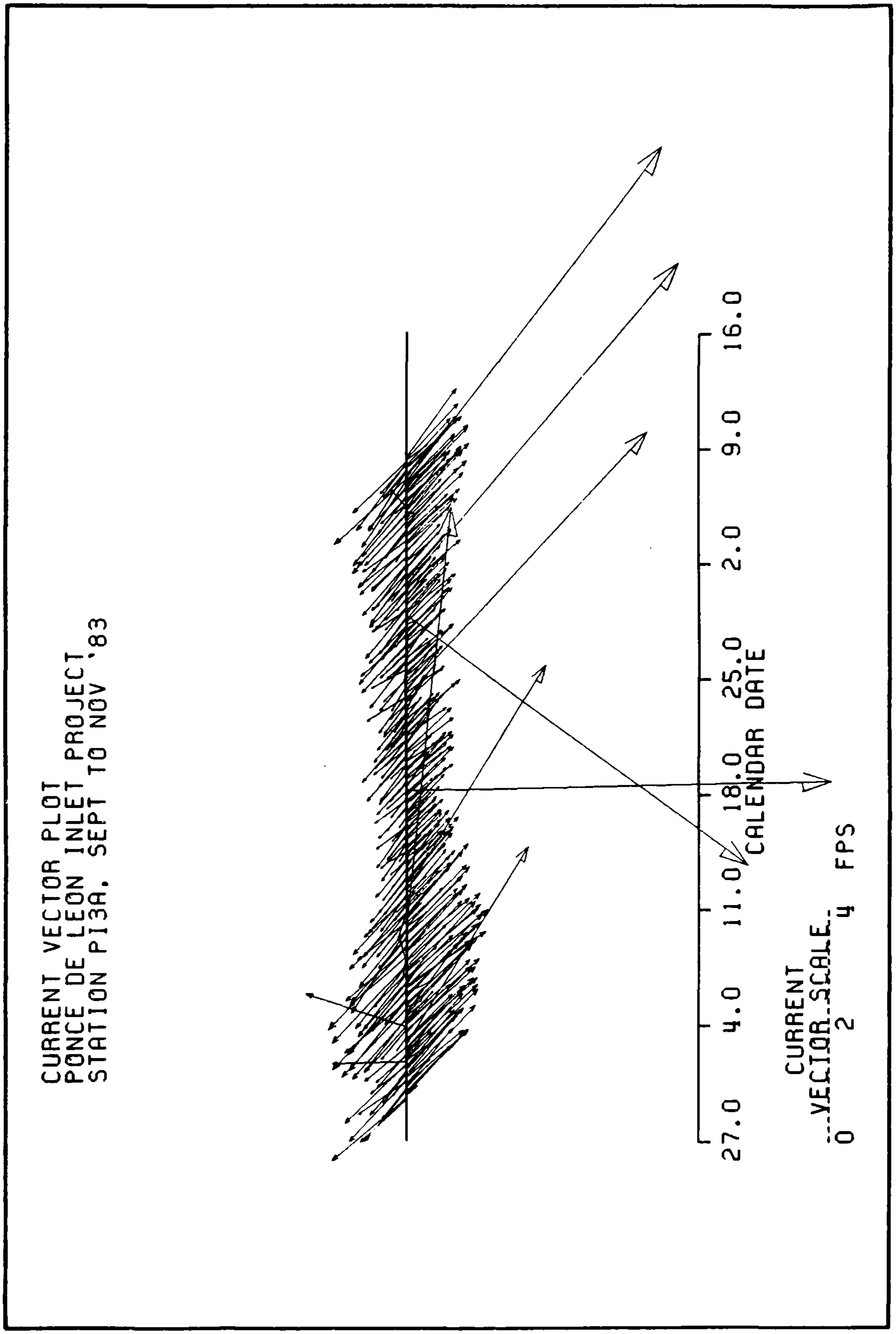

CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI3A, SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS

PLATE 38

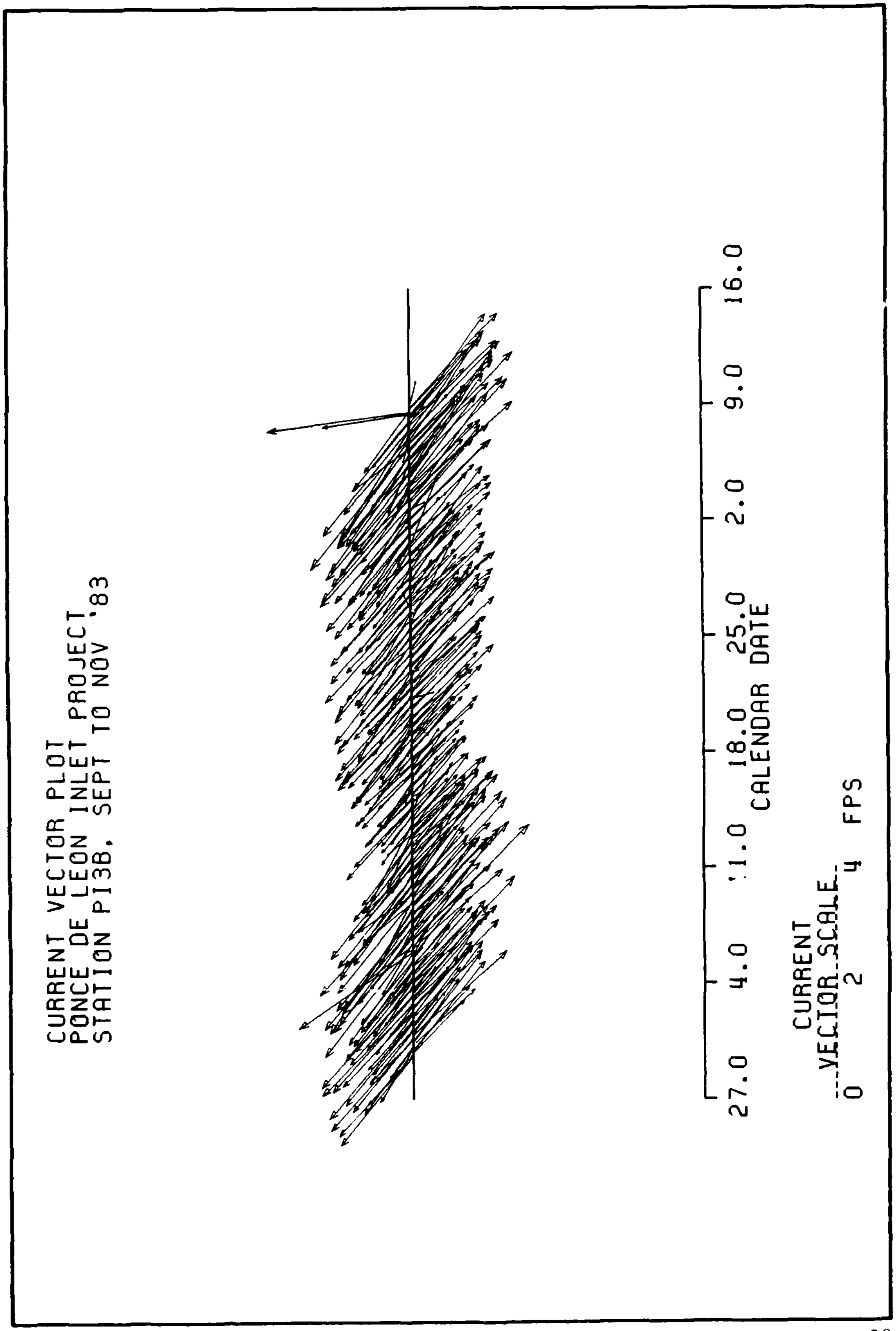

CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI3B, SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS

PLATE 39

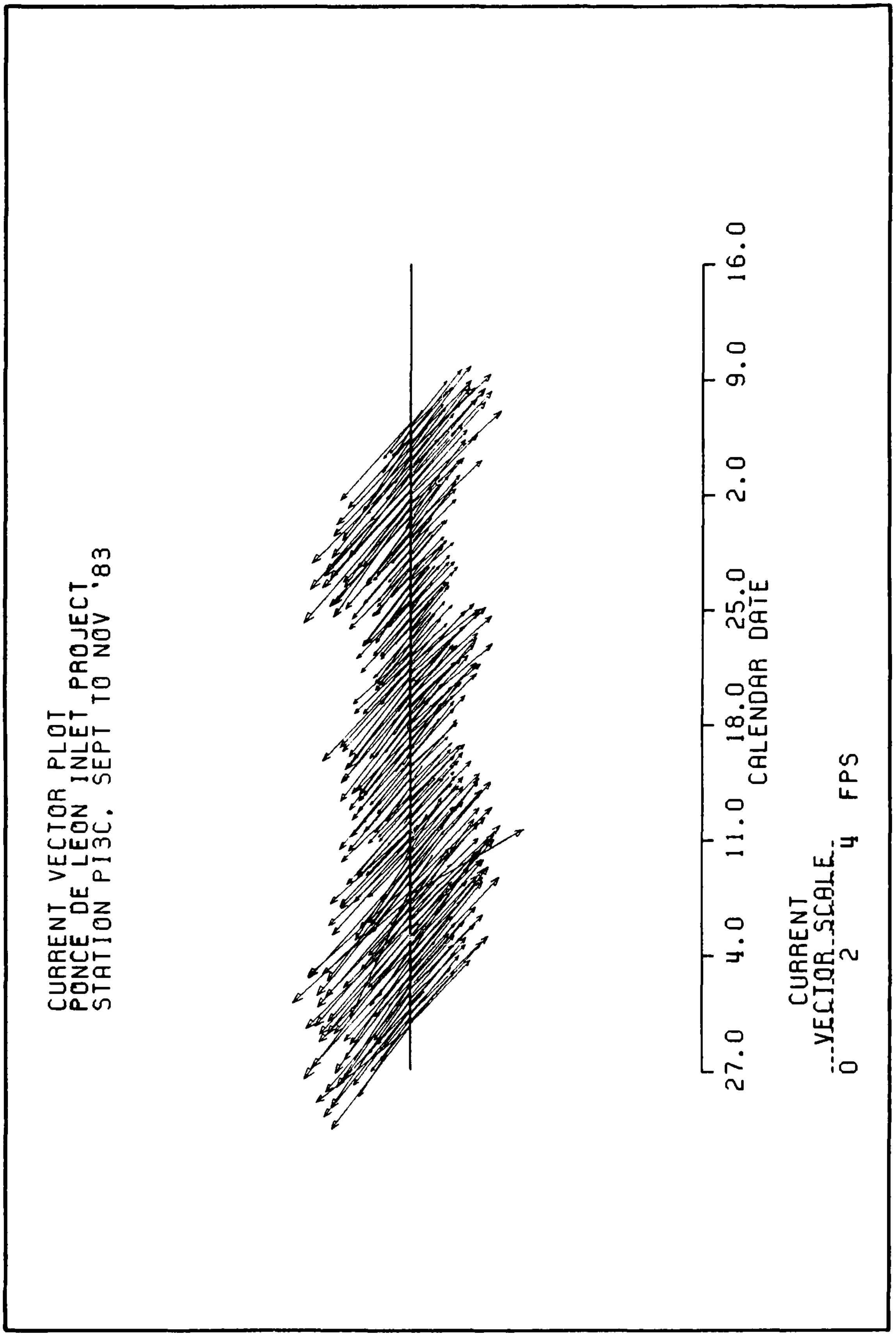
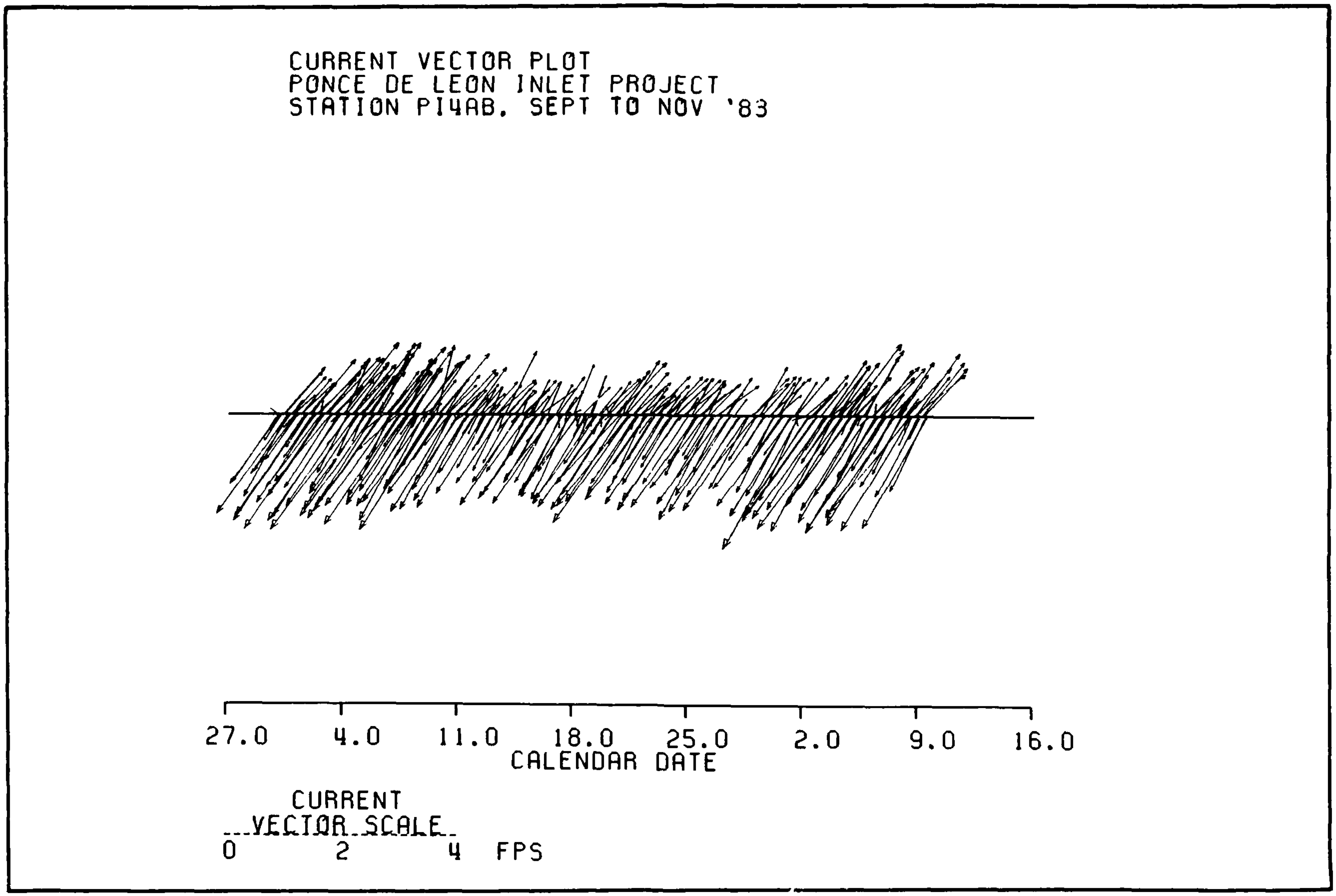
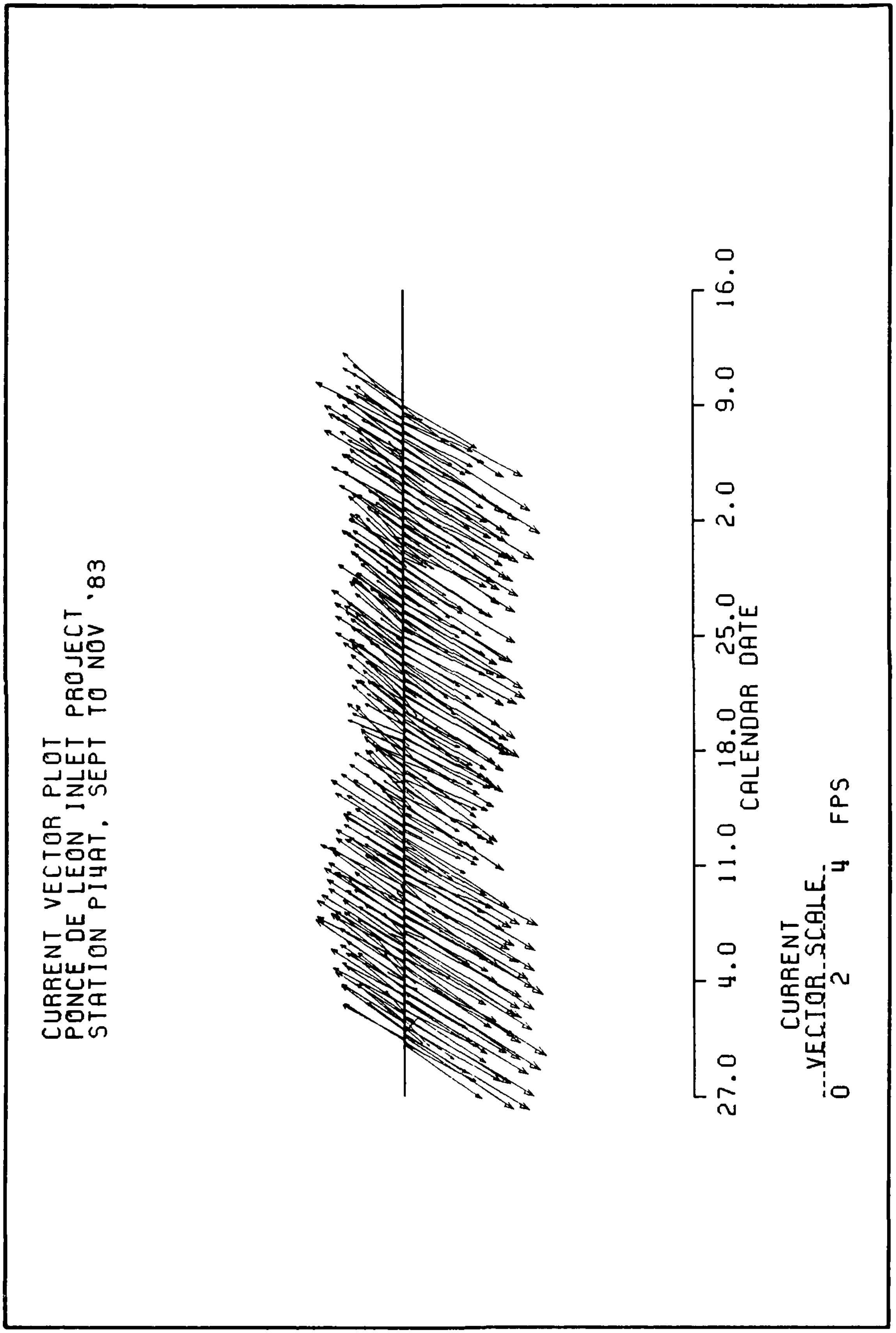

CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI3C, SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS

PLATE 40


CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI4AB. SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS



CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI4AT, SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4 FPS

PLATE 42

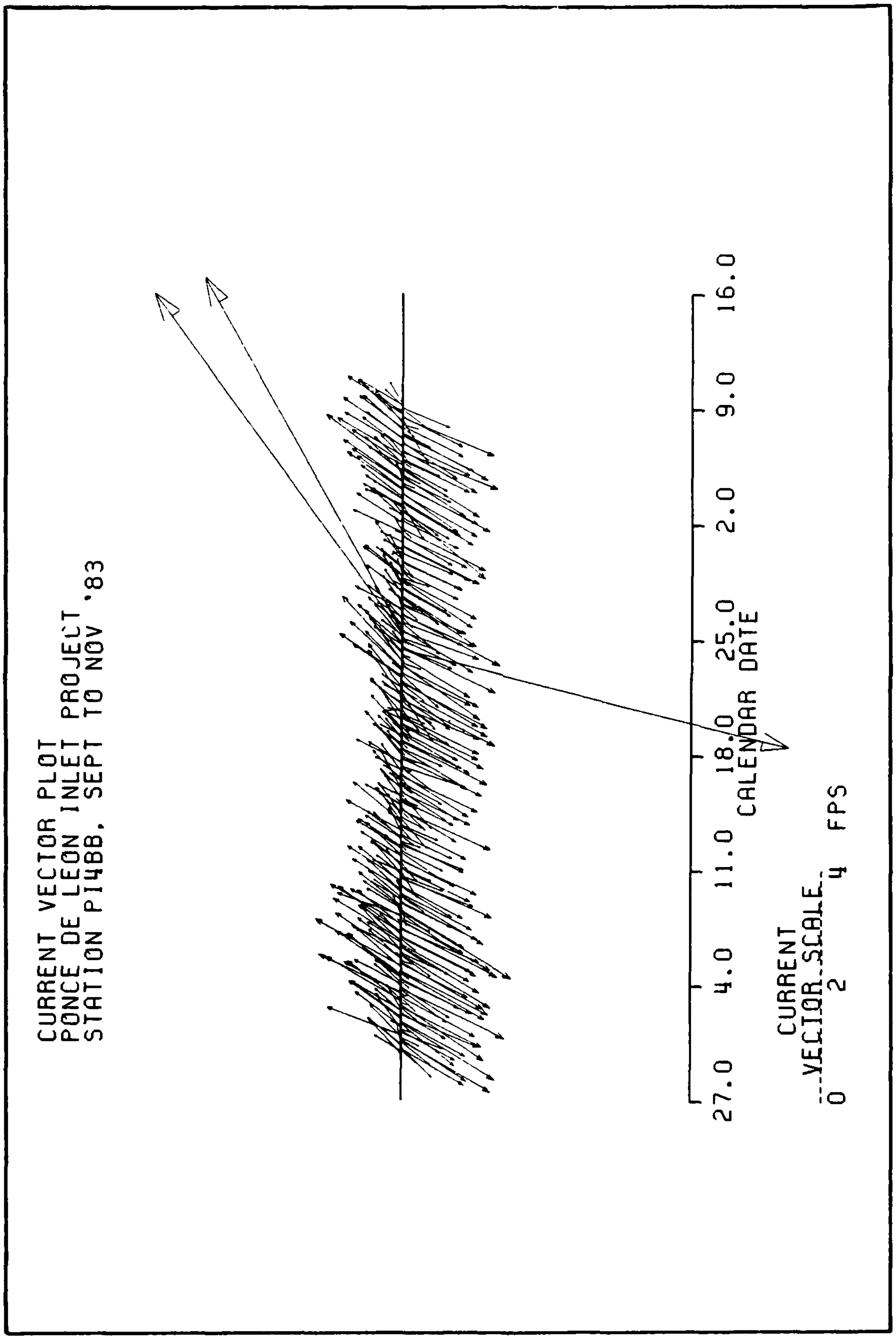

CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI4BB, SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS

PLATE 43

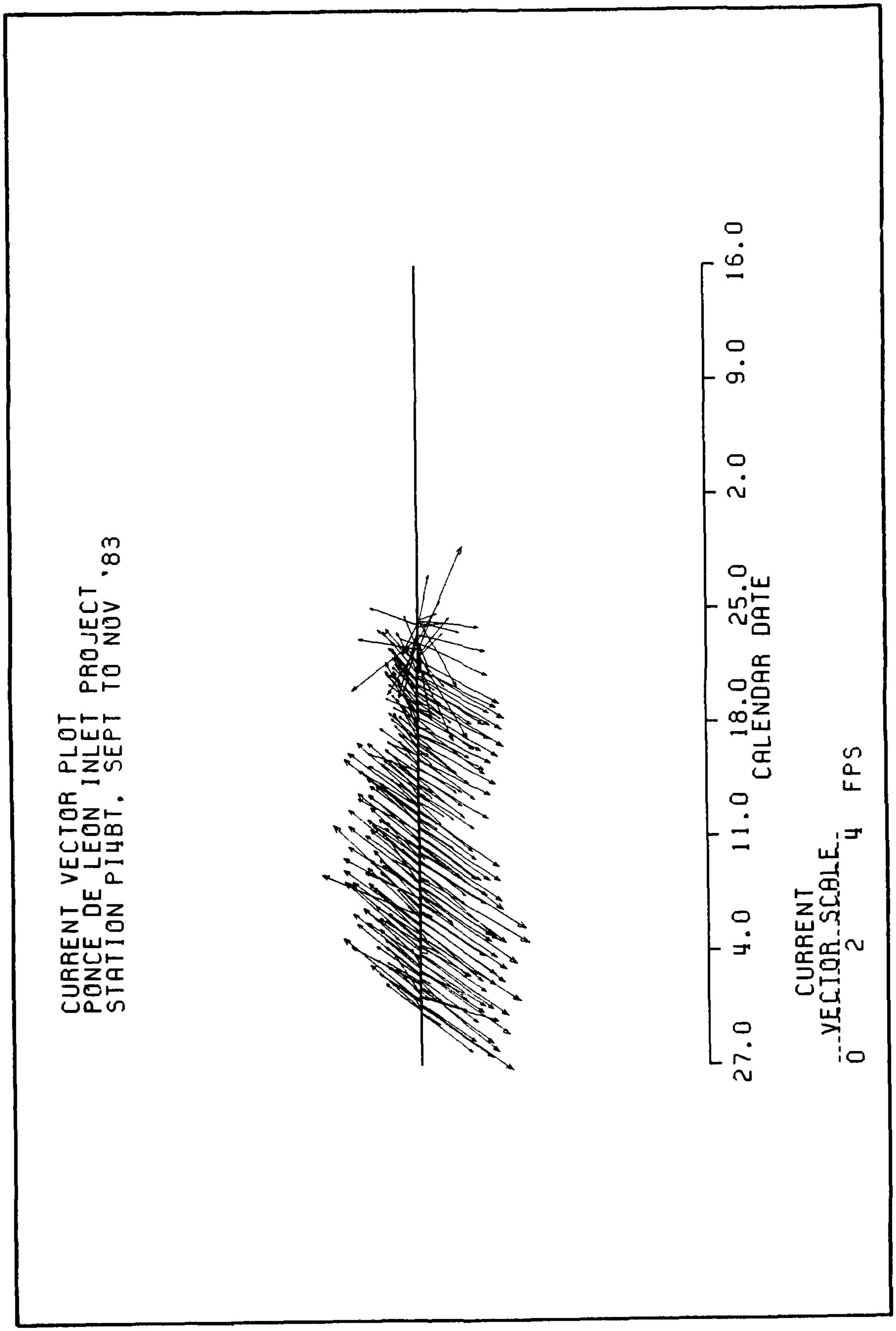
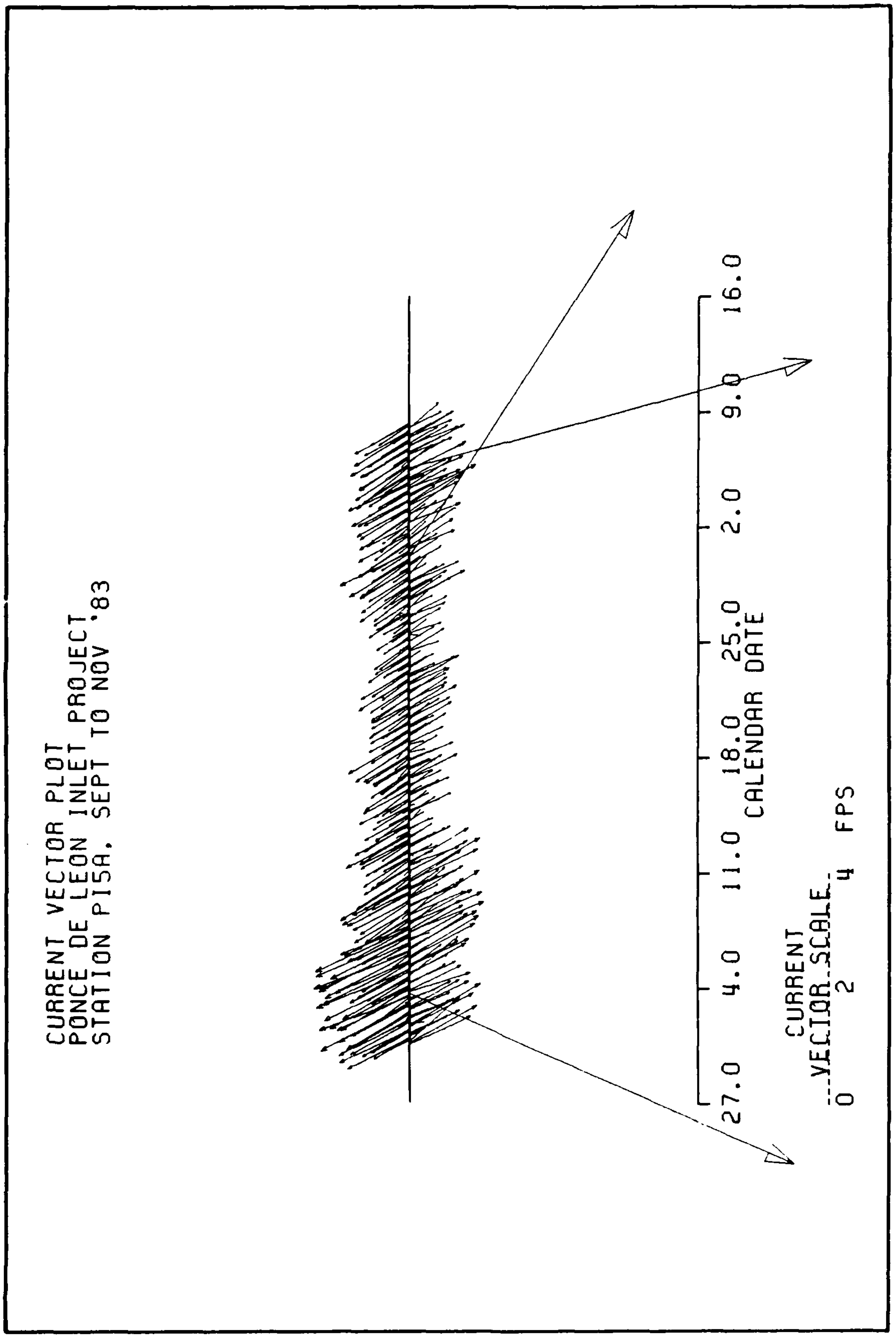

CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI4BT. SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS

PLATE 44



CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI5A, SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS

PLATE 45

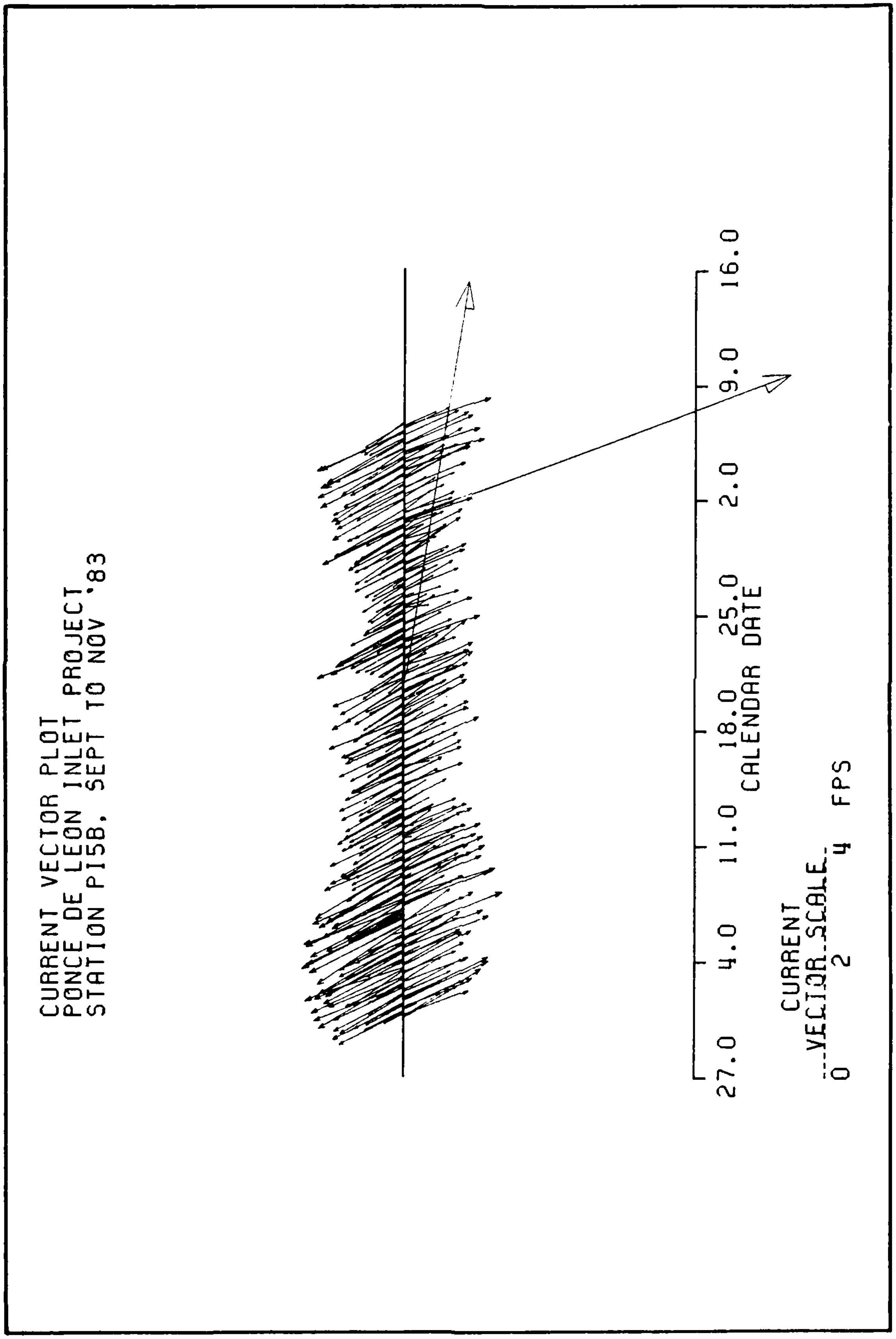
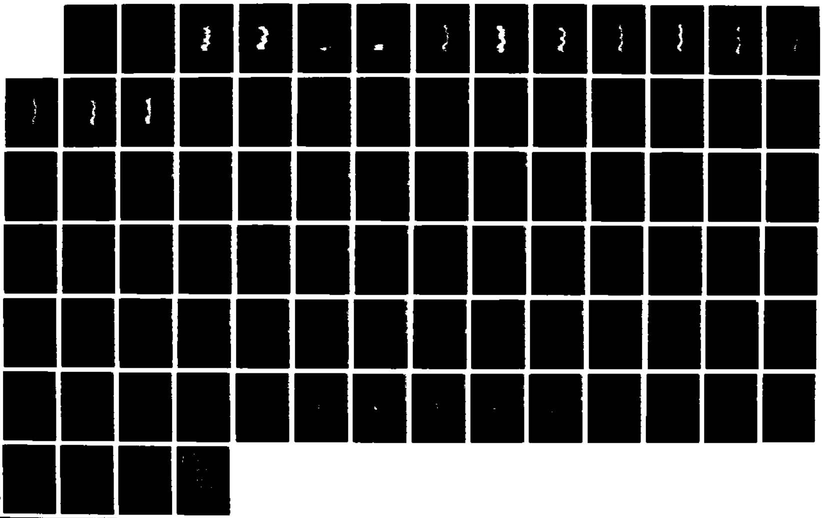
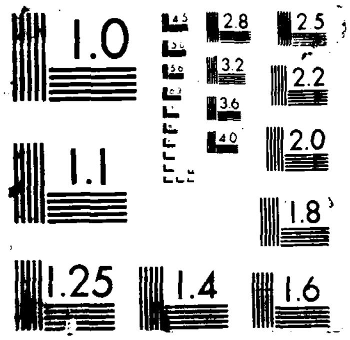

CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI5B, SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS

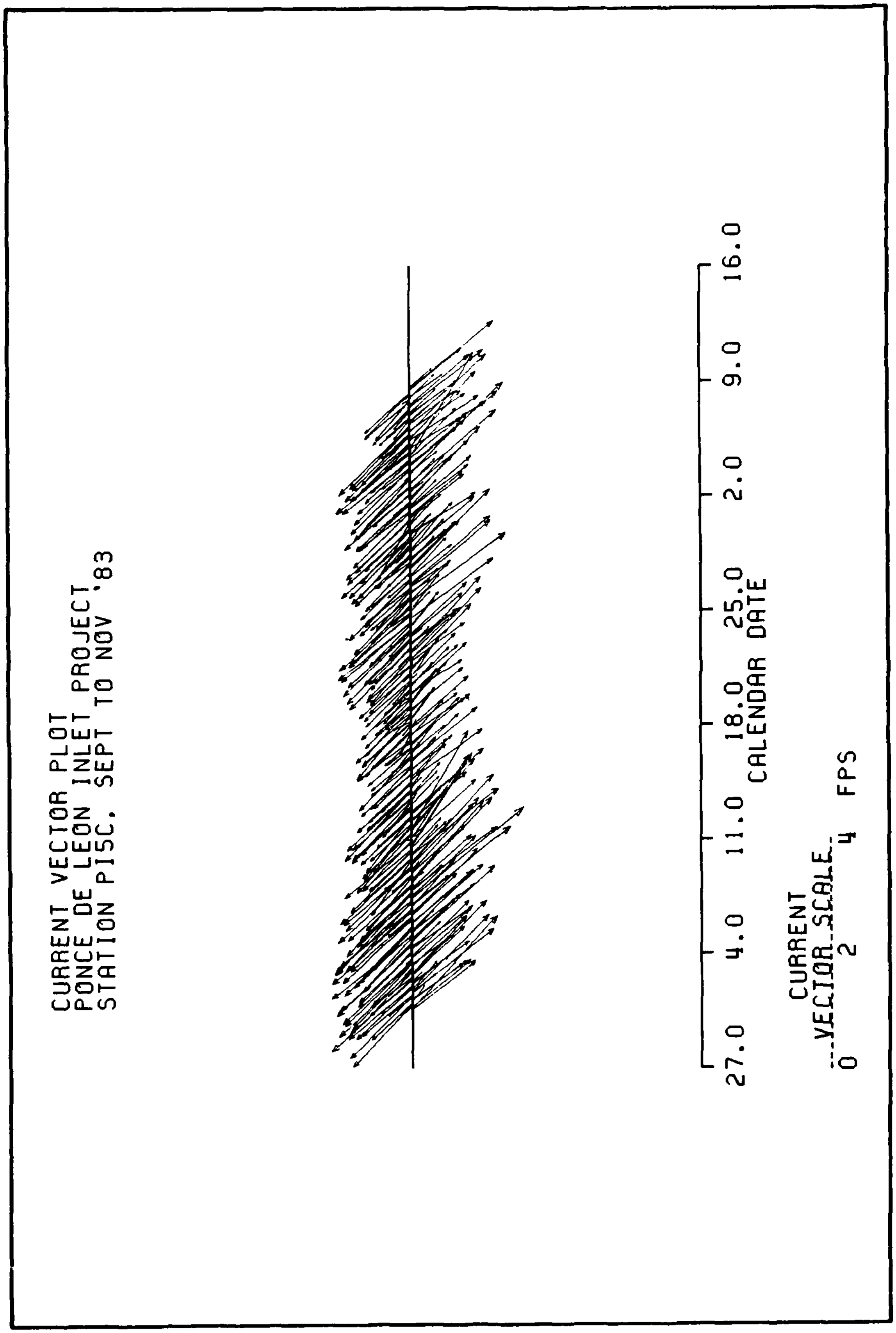
PLATE 46

AD-A195 072 TIDAL ELEVATIONS AND CURRENTS AT PONCE DE LEON INLET 2/2
FLORIDA(U) COASTAL ENGINEERING RESEARCH CENTER
VICKSBURG MS J M HEMSLEY ET AL. MAY 88 CERC-MP-88-8

UNCLASSIFIED F/G 8/3 NL




1.0
2.8
2.5
3.2
2.2
3.6
4.0
2.0
1.1
1.8
1.25
1.4
1.6


CURRENT VECTOR PLOT
PONCE DE LEON INLET PROJECT
STATION PI5C. SEPT TO NOV '83
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE
CURRENT
VECTOR SCALE
0
2
4
FPS

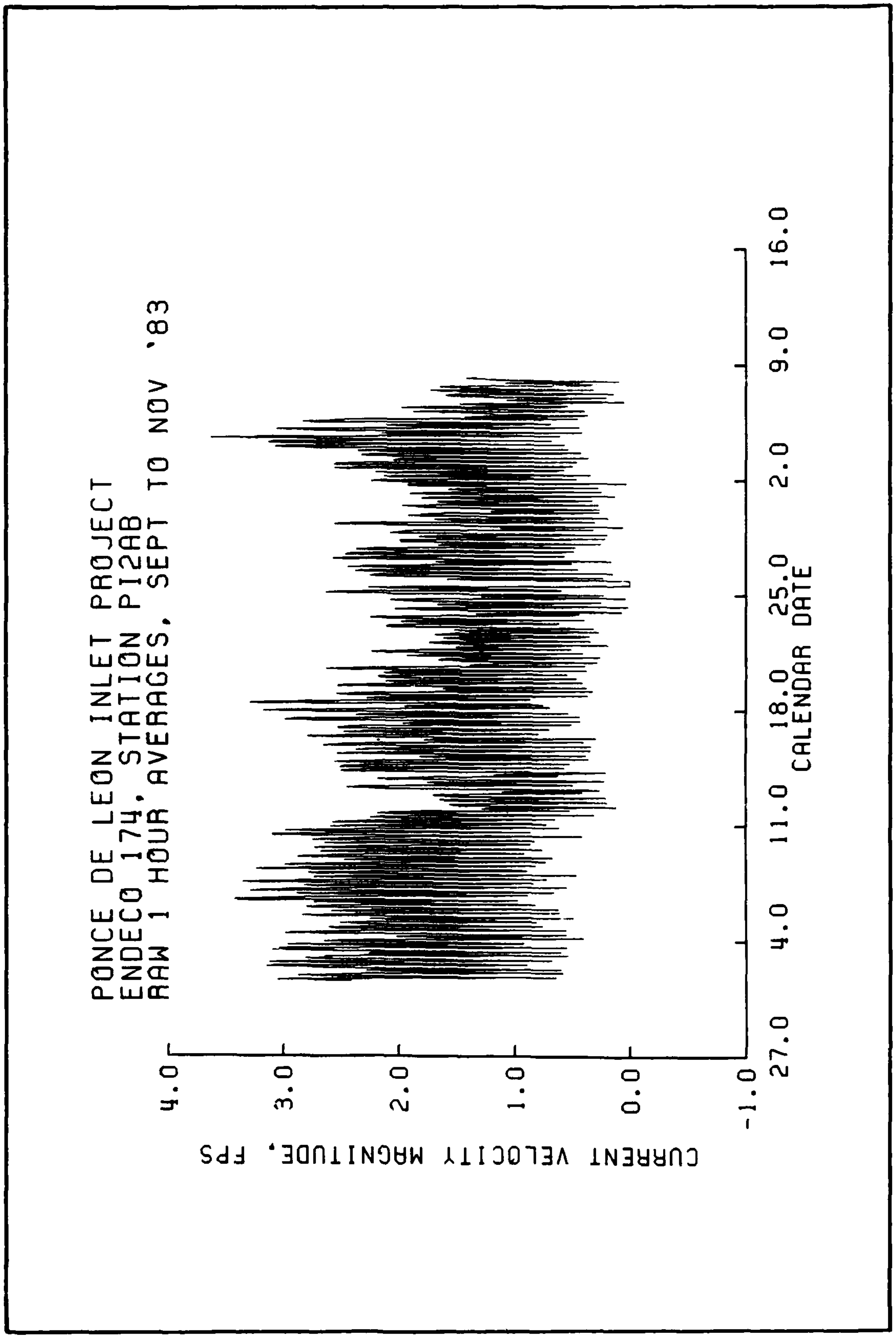

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2AB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
-1.0
0.0
1.0
2.0
3.0
4.0
CALENDAR DATE
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0

PLATE 48

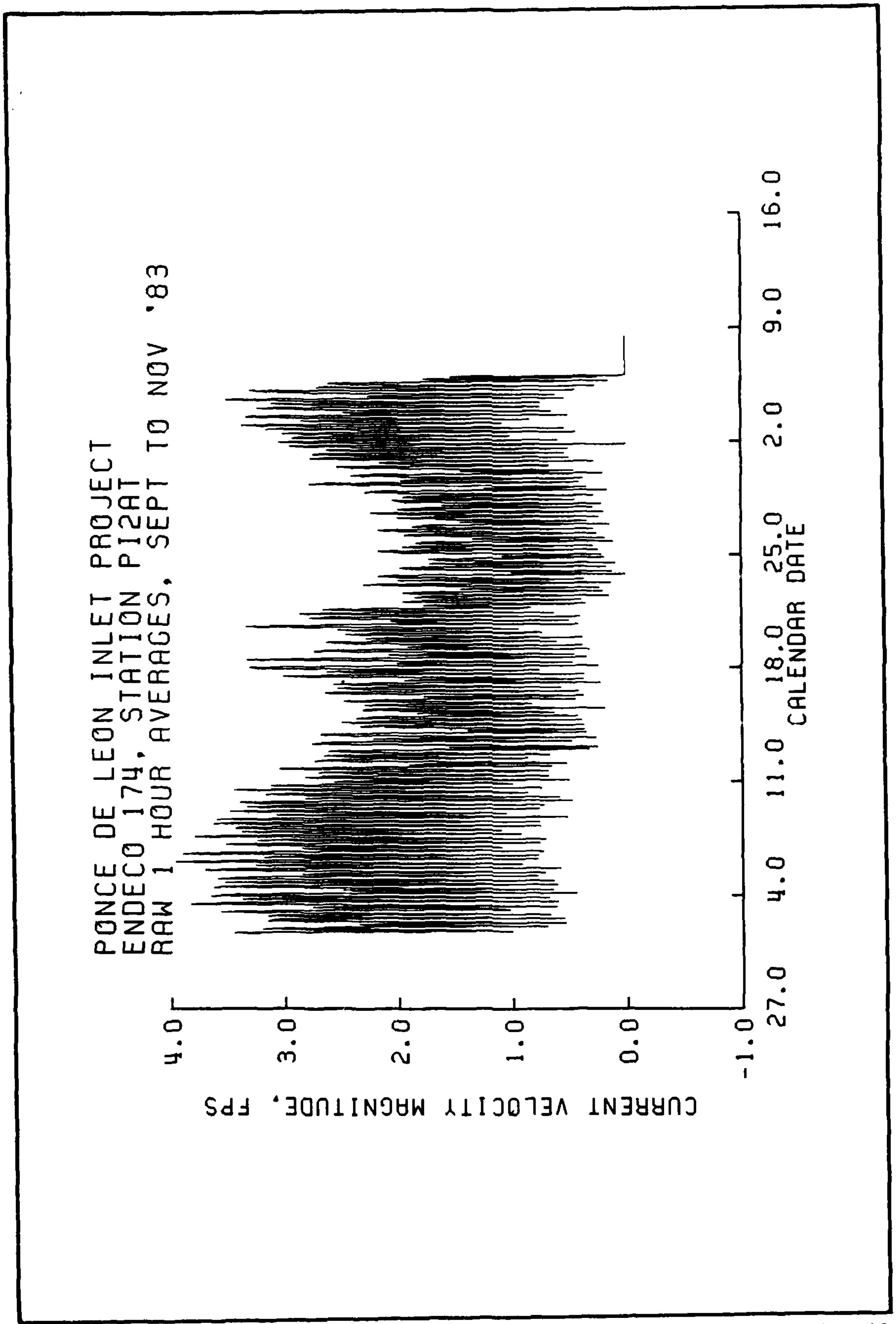

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2AT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 49

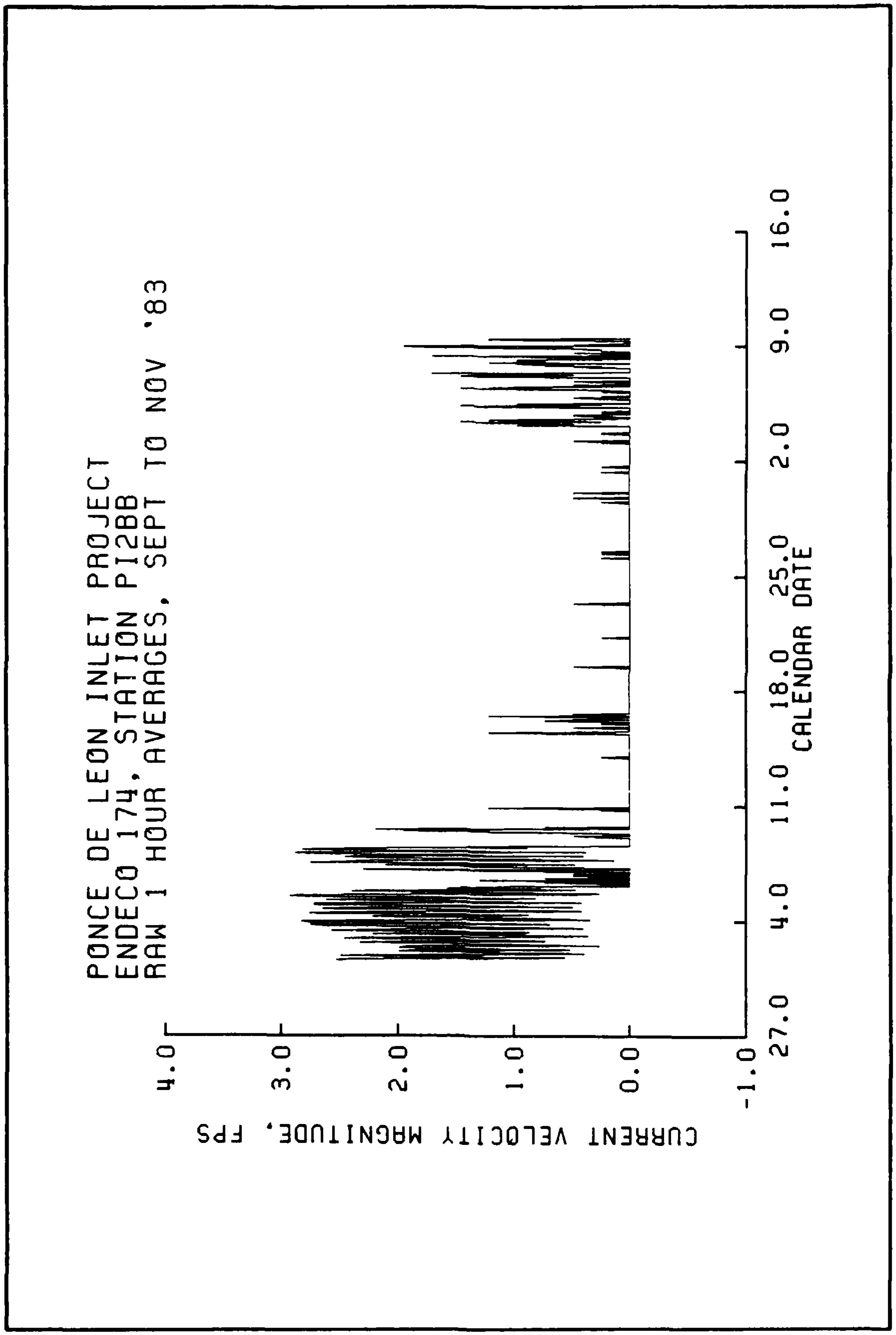
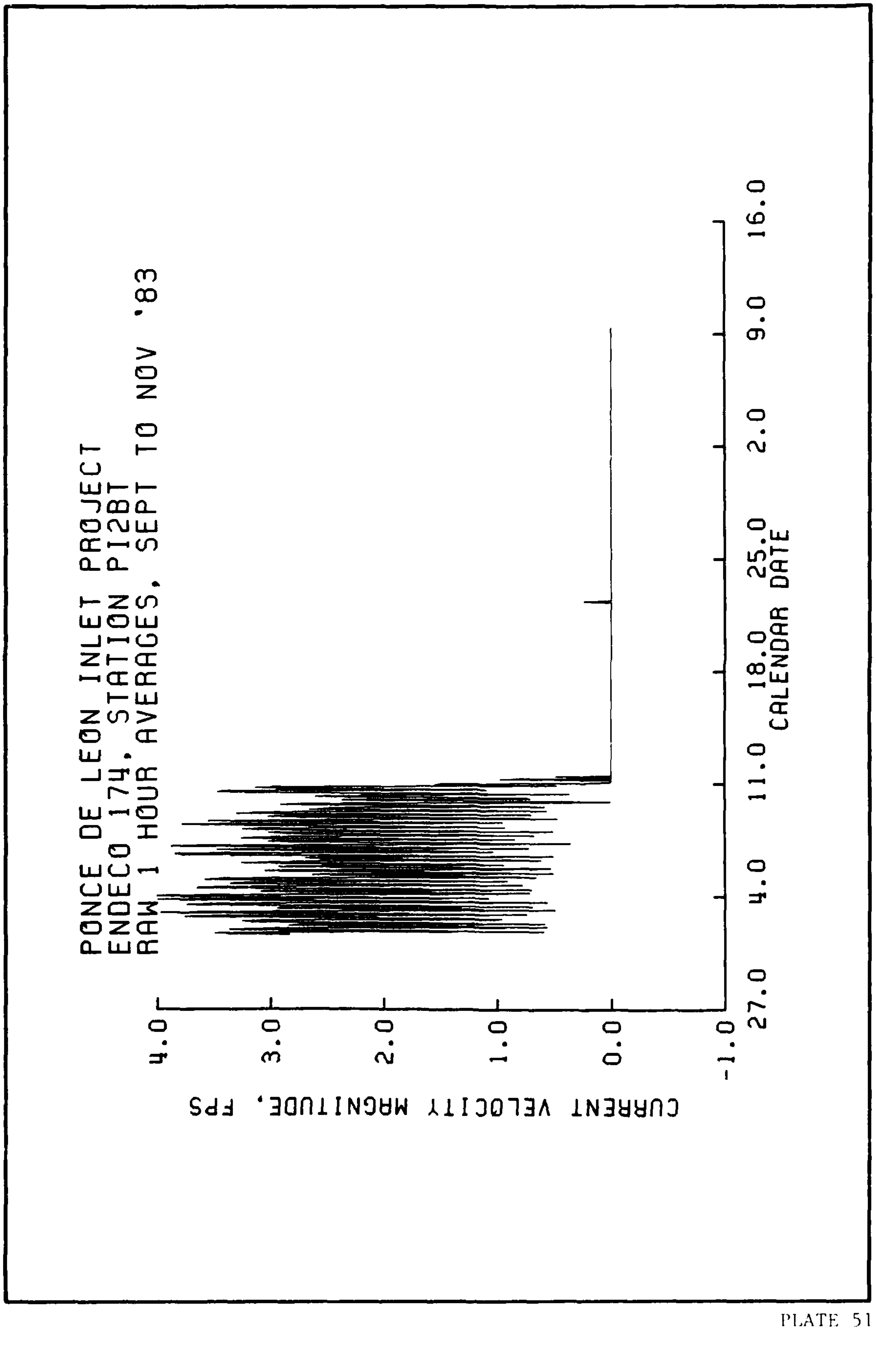
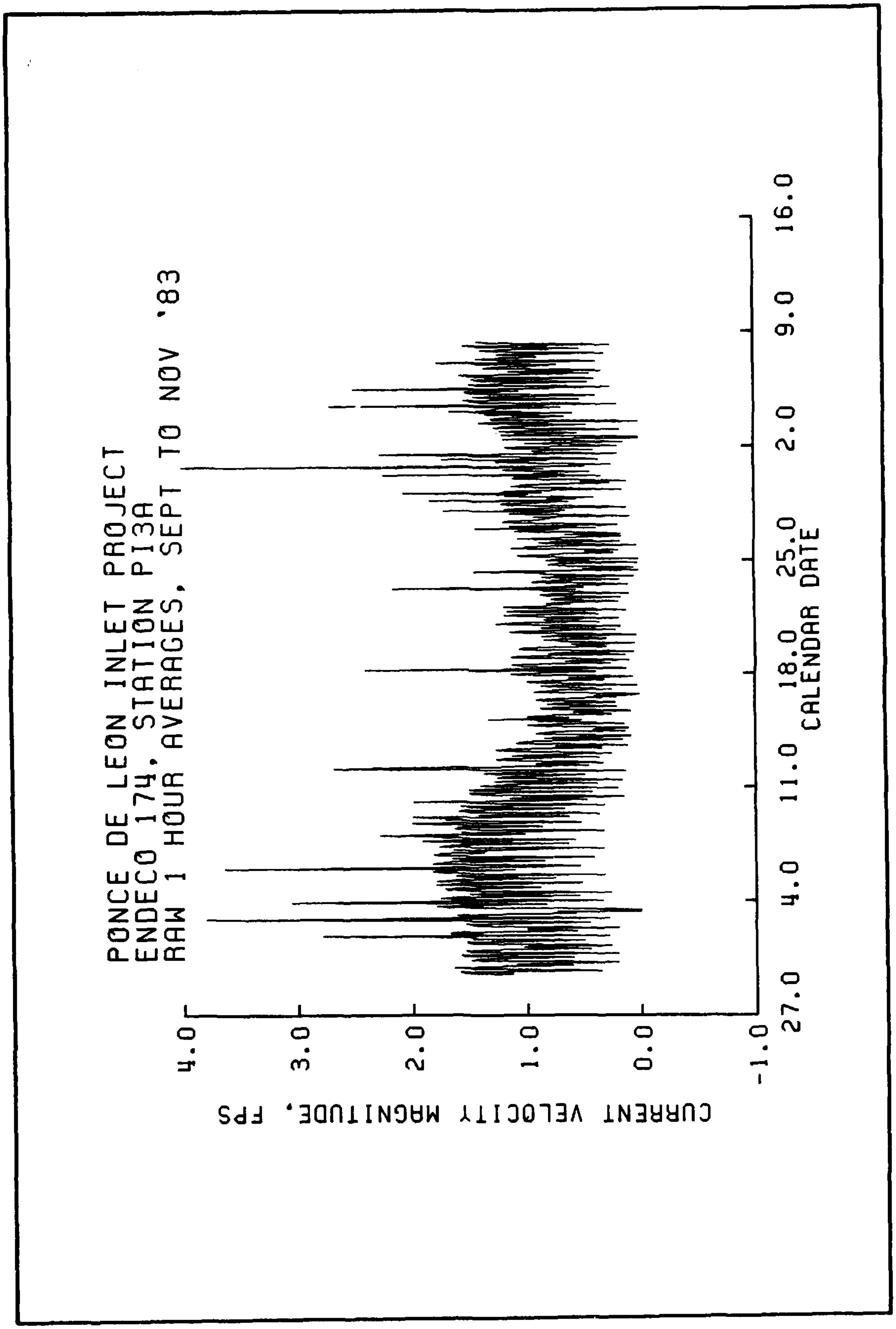

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2BB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

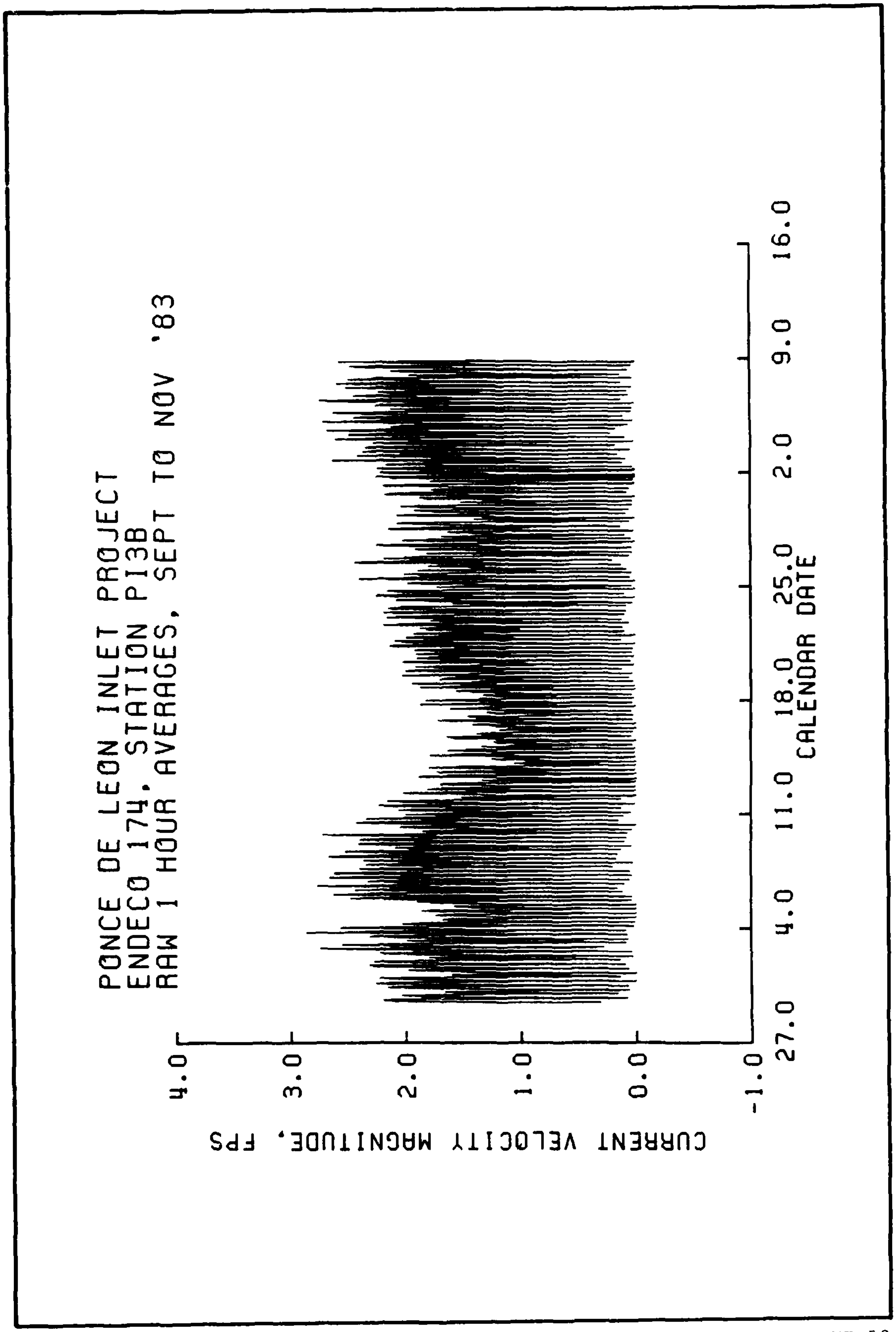
PLATE 50


PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2BT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE



PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3A
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 52


PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3B
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

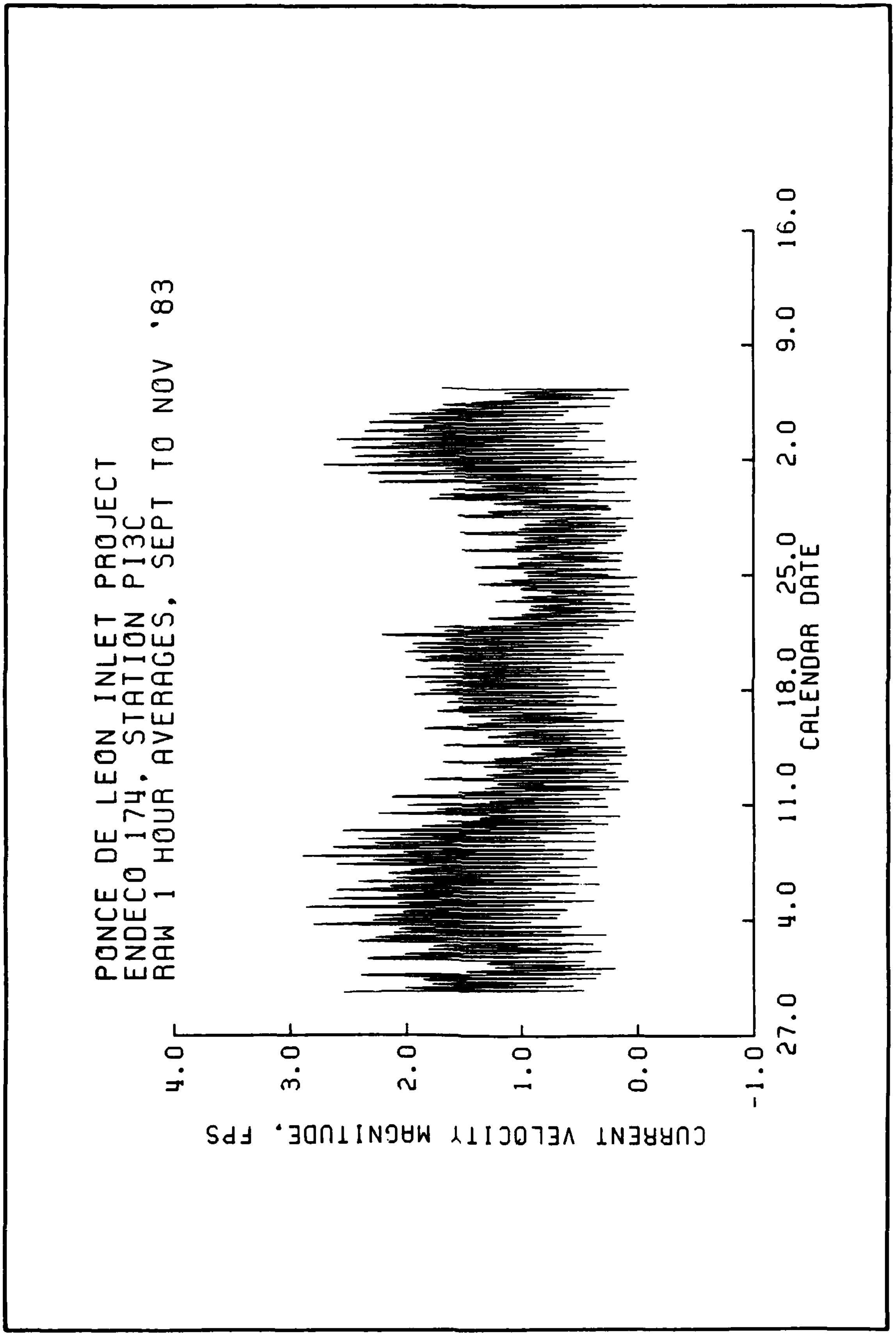
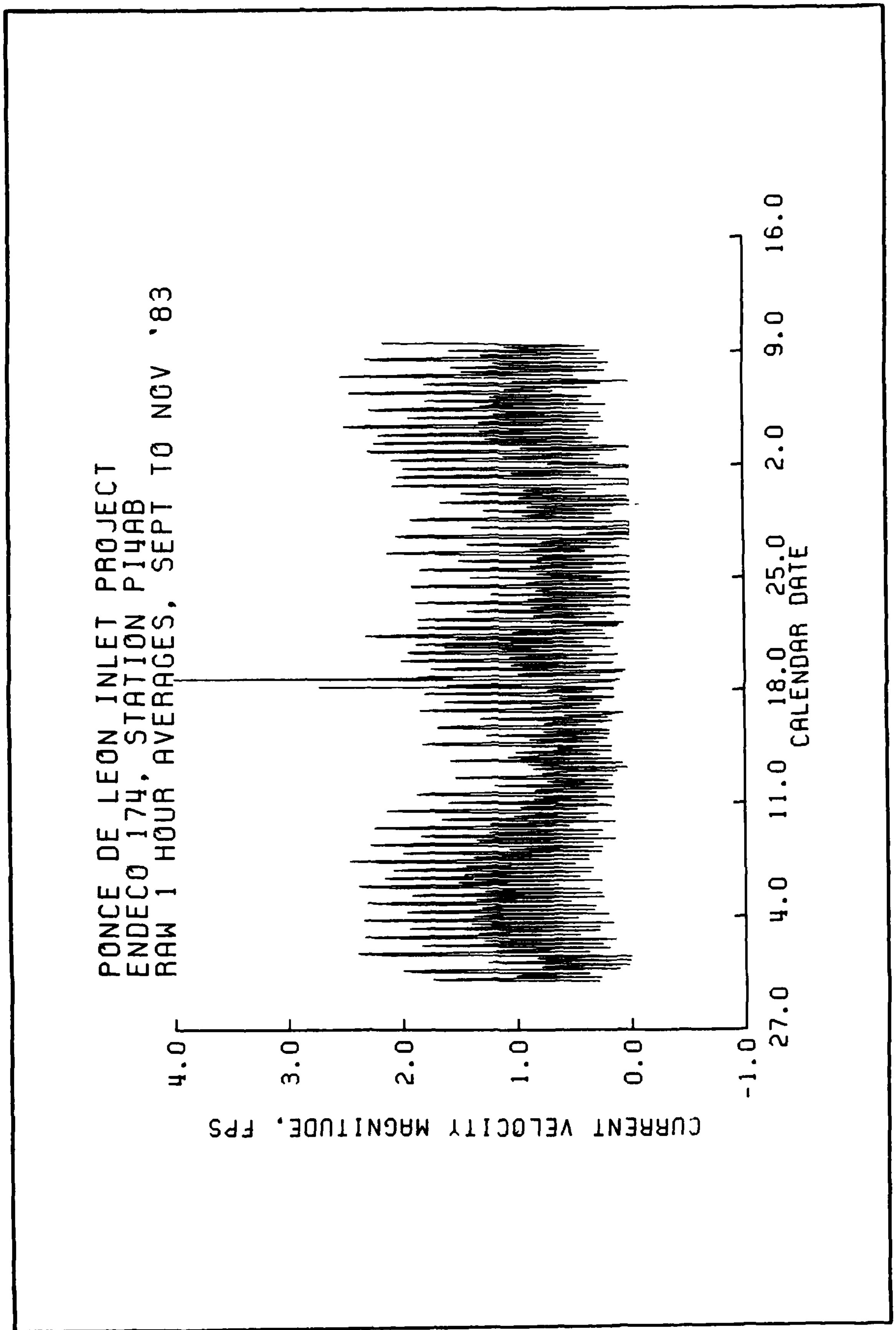
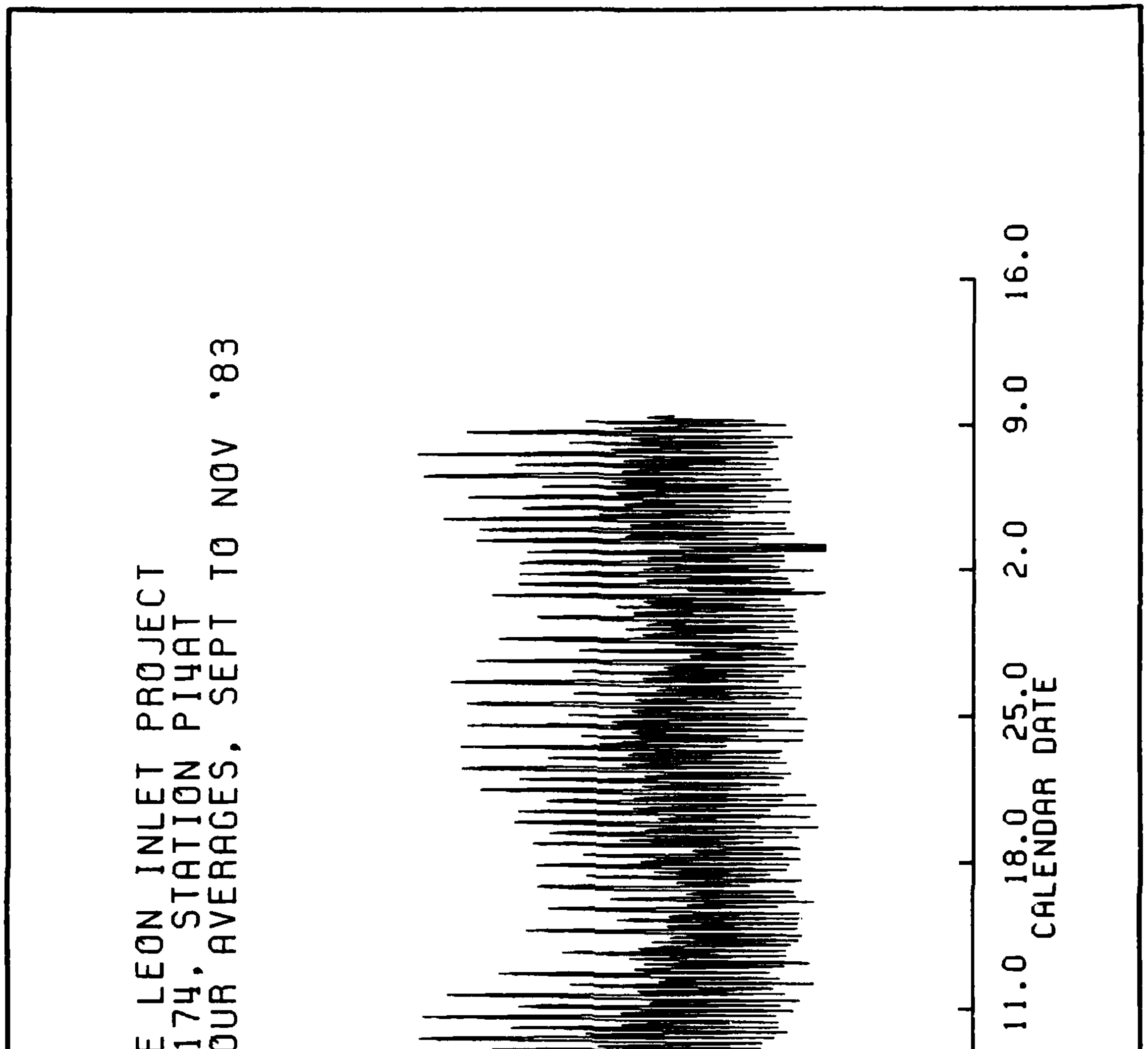

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3C
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 54



PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4AB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE



PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4AT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 56

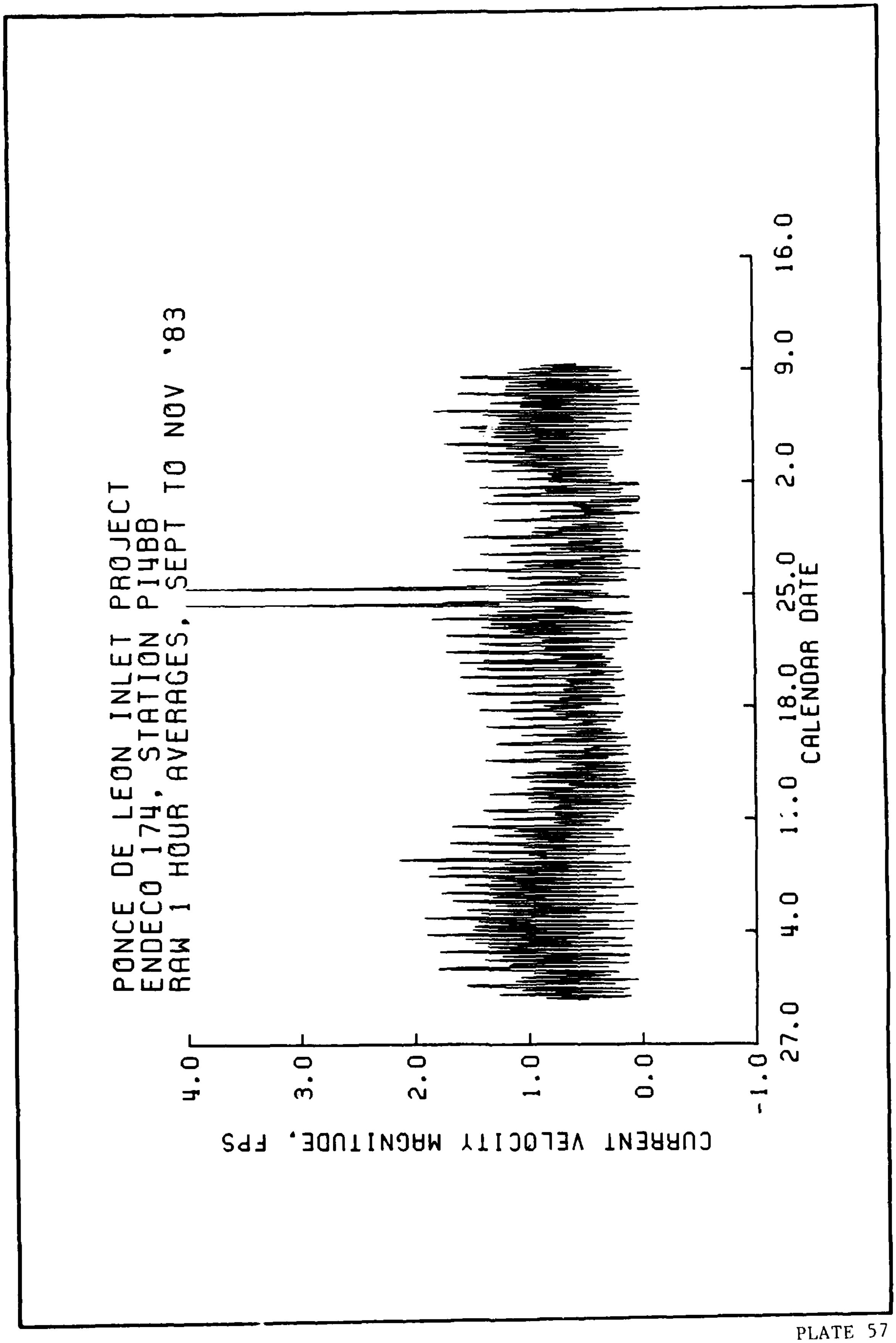

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4BB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 57

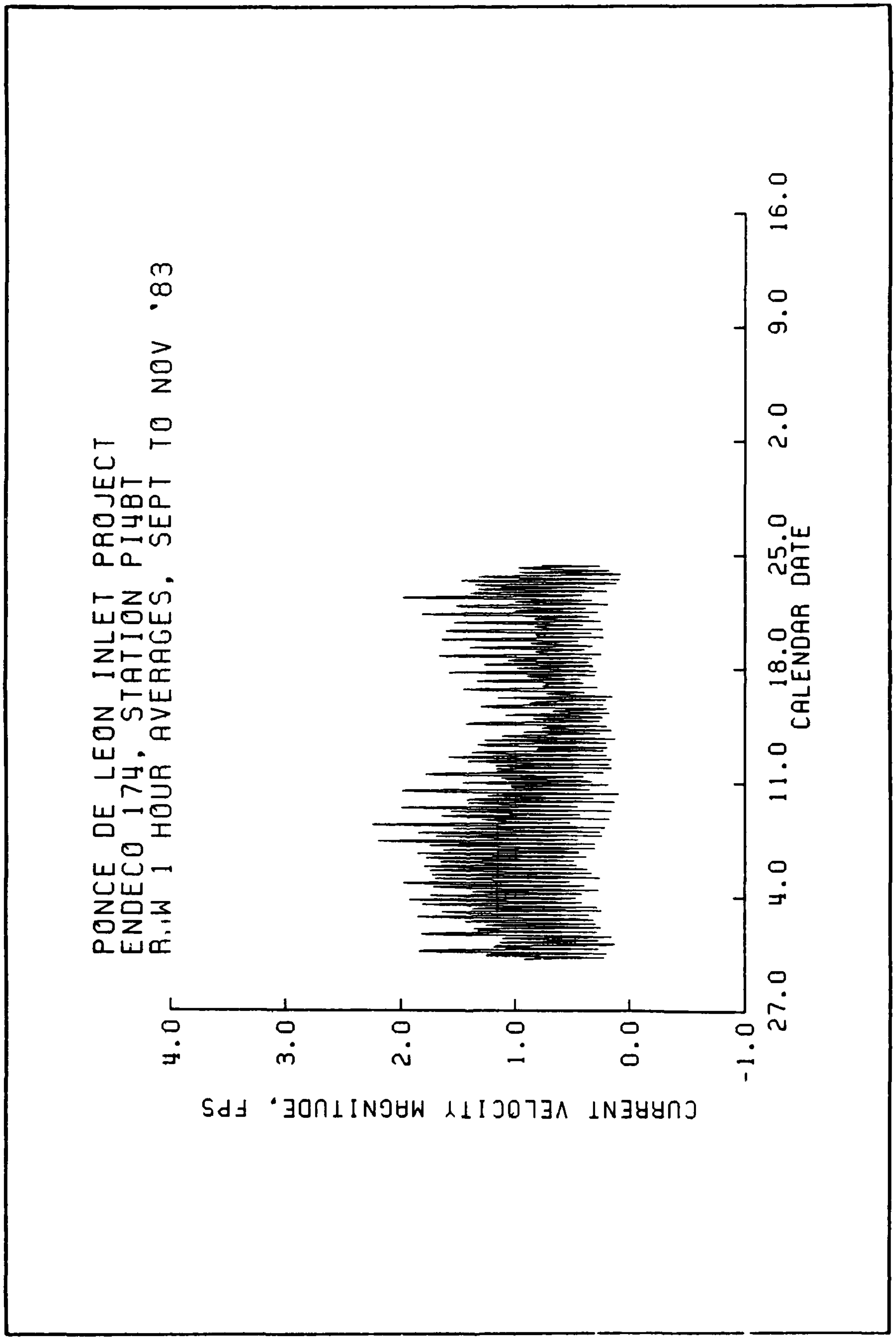

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4BT
R.W 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 58

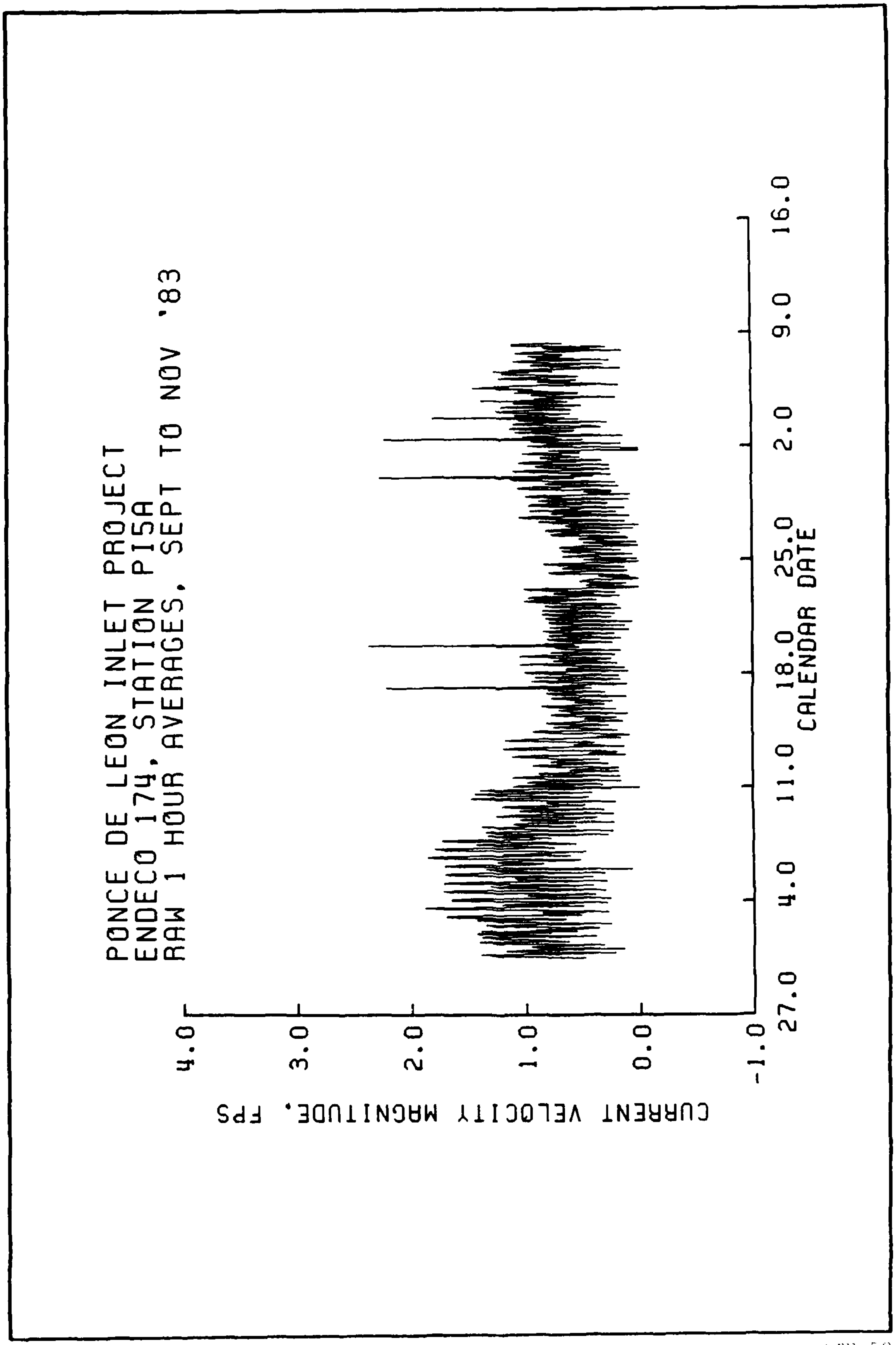

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5A
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 59

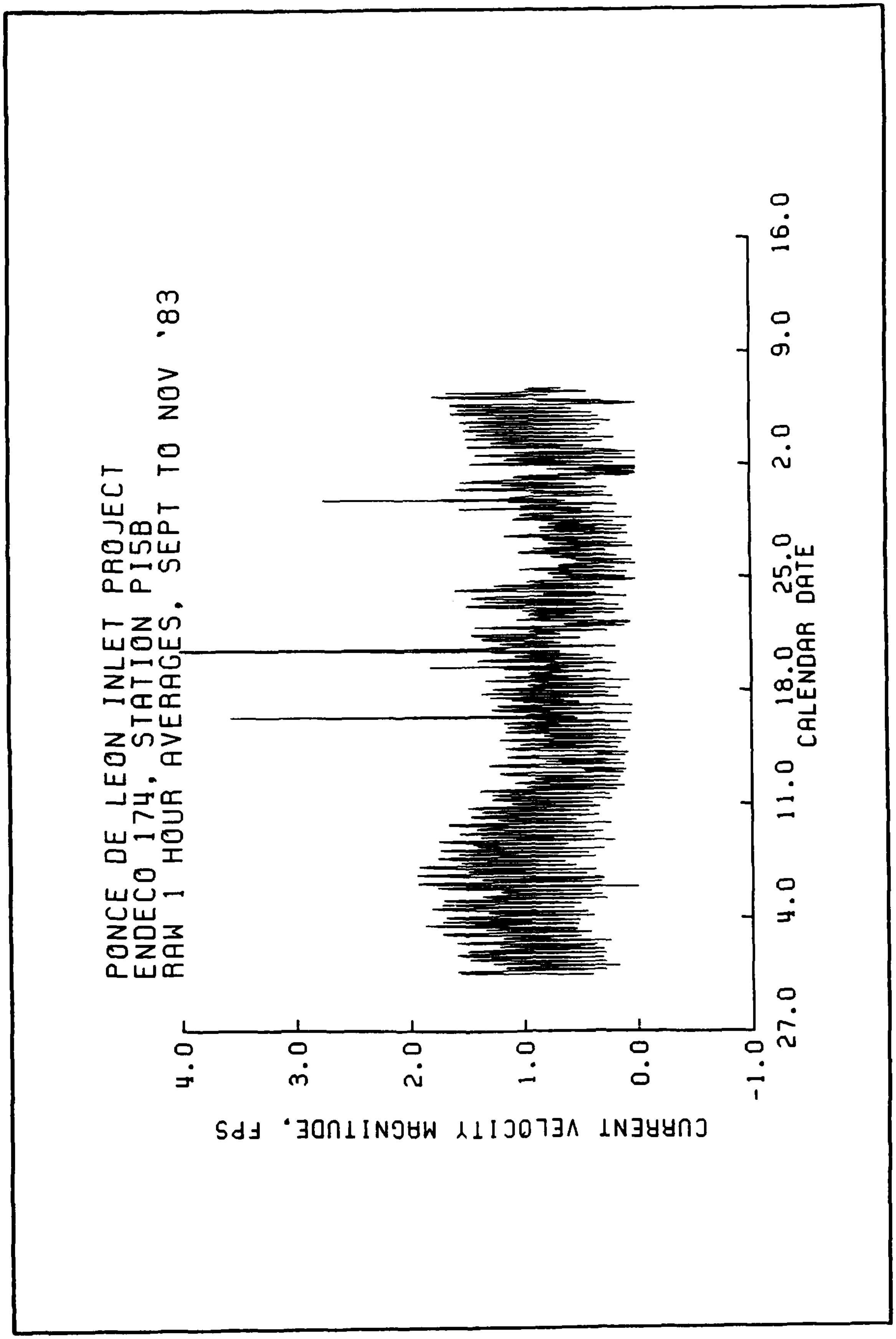

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION P15B
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 60

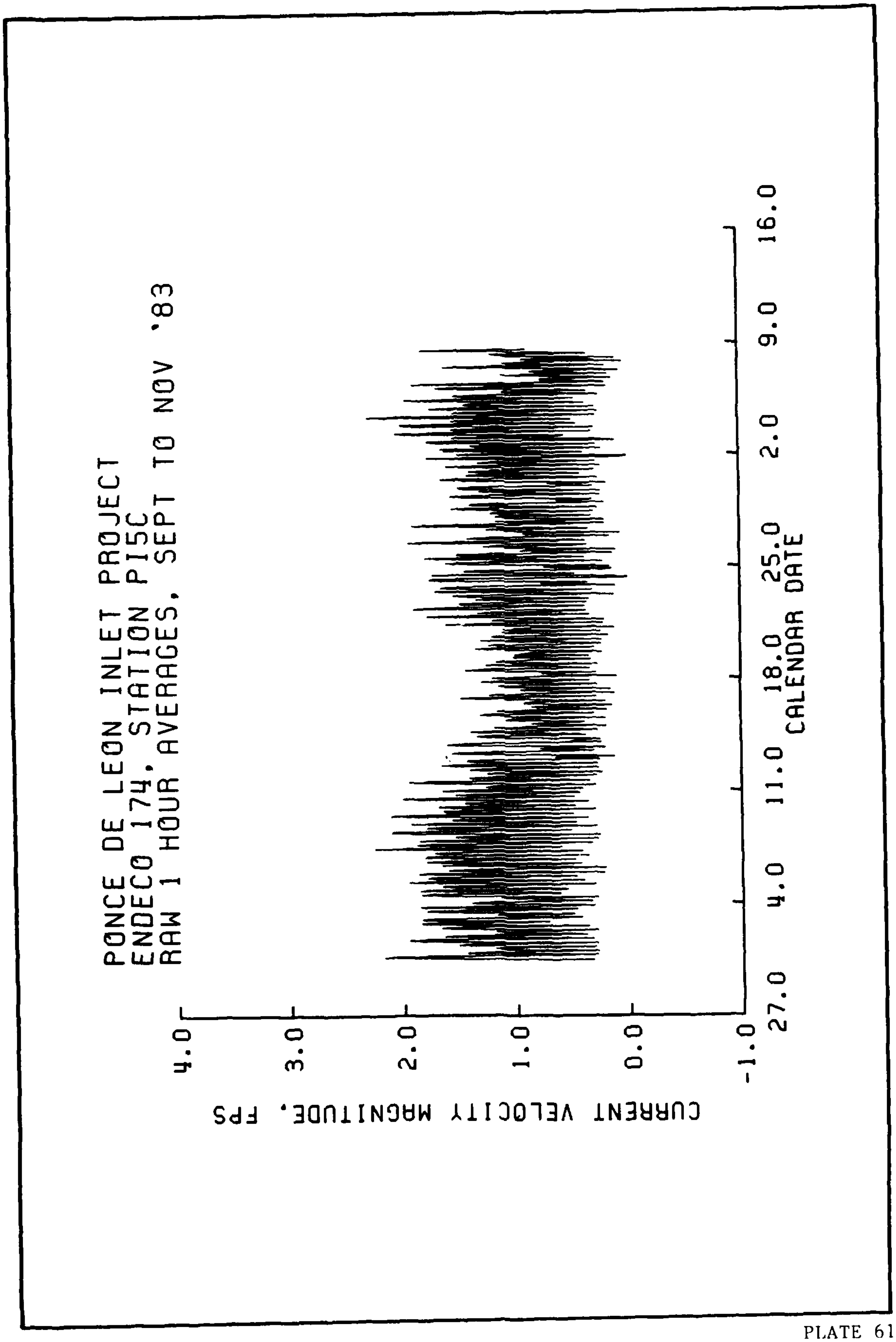
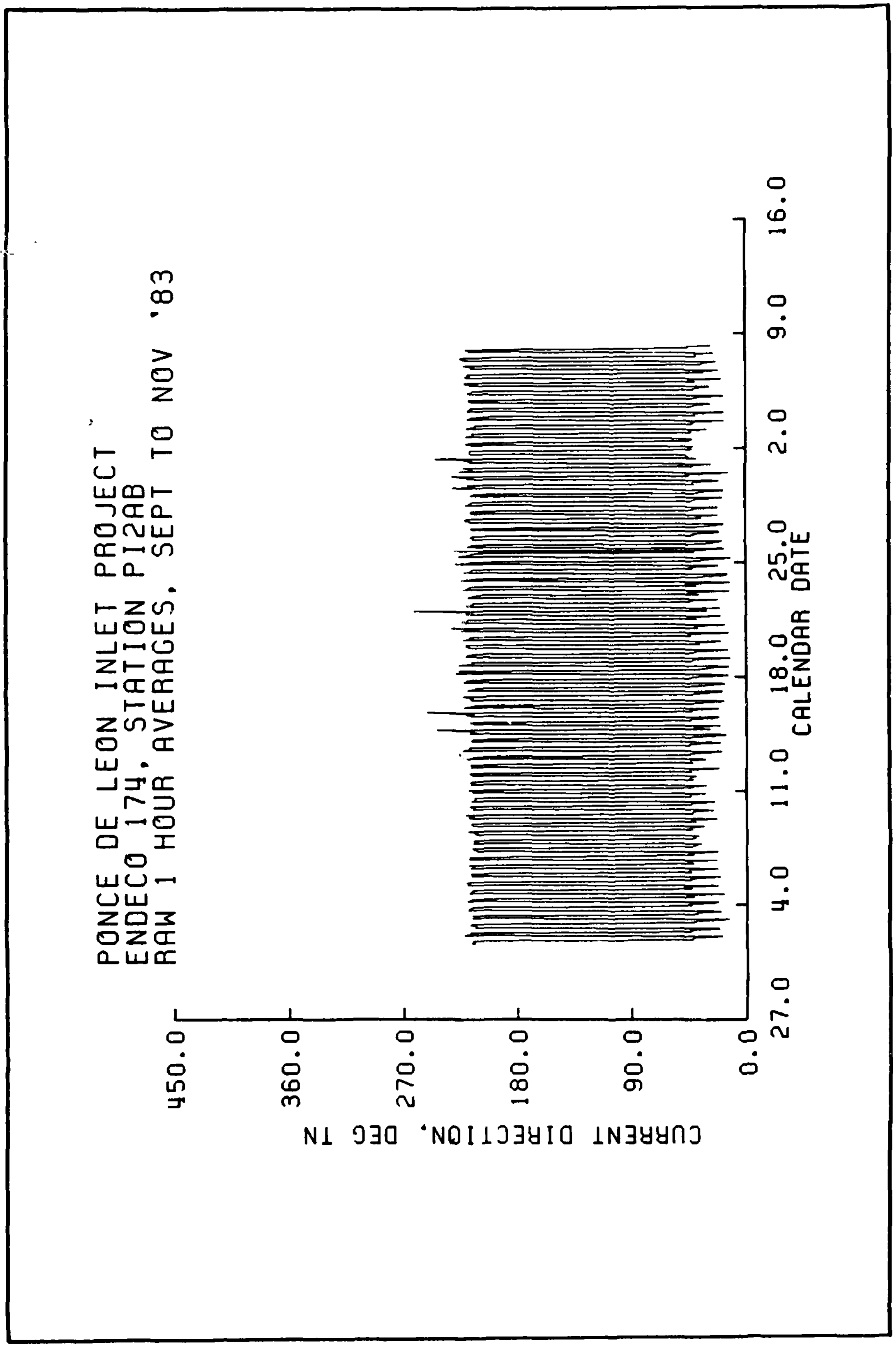
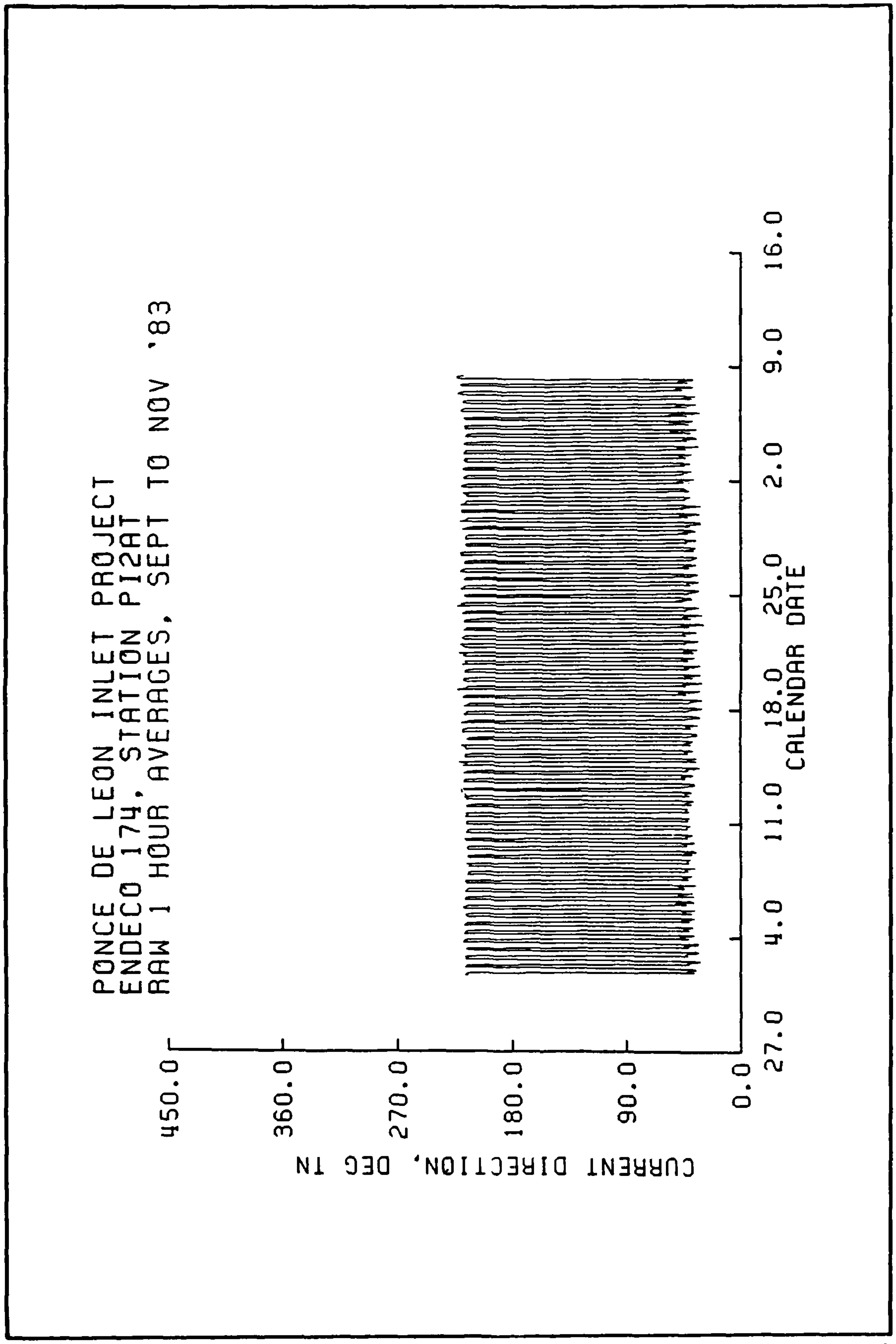

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5C
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT VELOCITY MAGNITUDE, FPS
4.0
3.0
2.0
1.0
0.0
-1.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 61



PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2AB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT DIRECTION, DEG TN
450.0
360.0
270.0
180.0
90.0
0.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 62



PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2AT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT DIRECTION, DEG TN
450.0
360.0
270.0
180.0
90.0
0.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 63

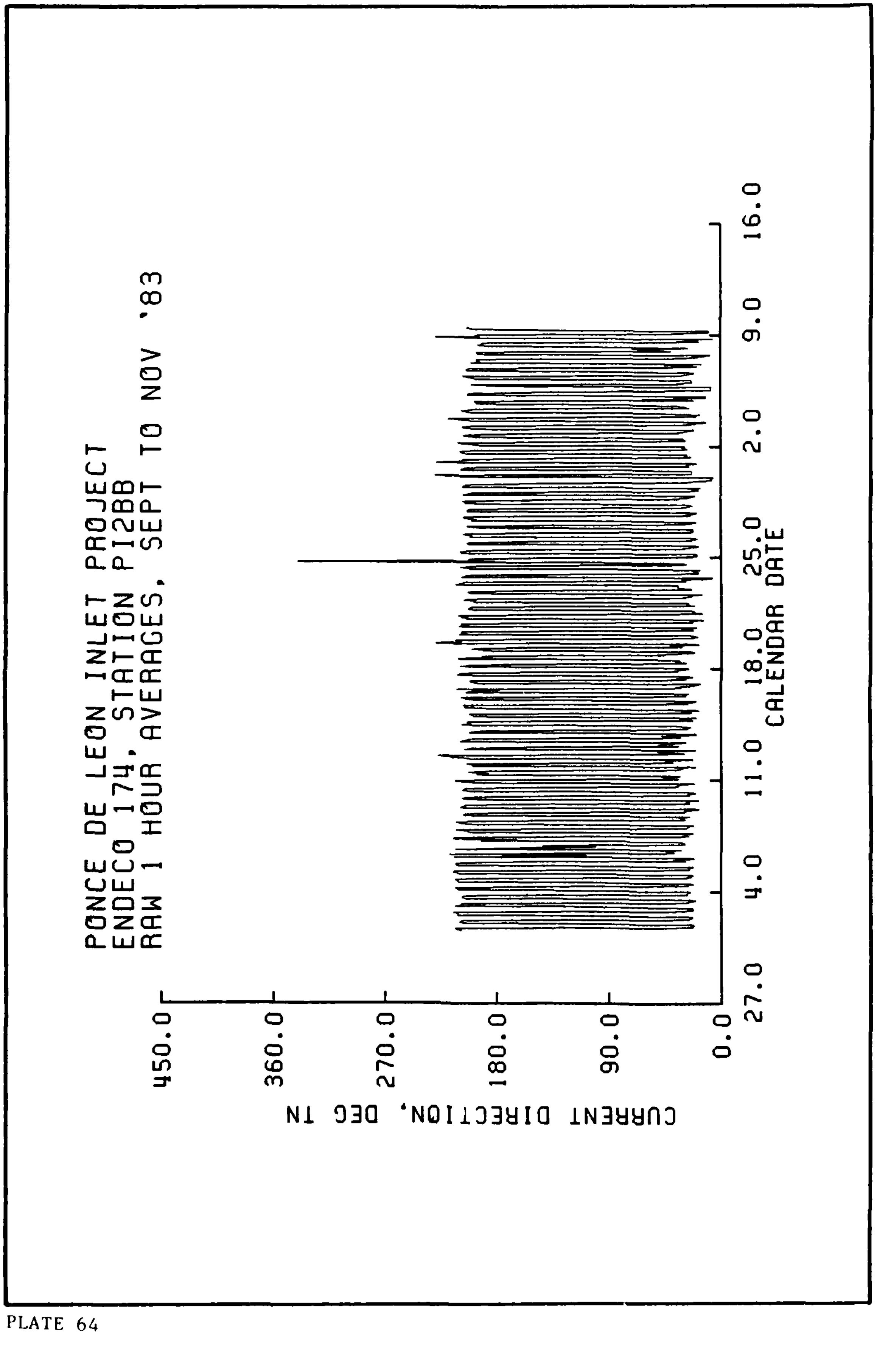

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2BB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT DIRECTION, DEG TN
450.0
360.0
270.0
180.0
90.0
0.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 64

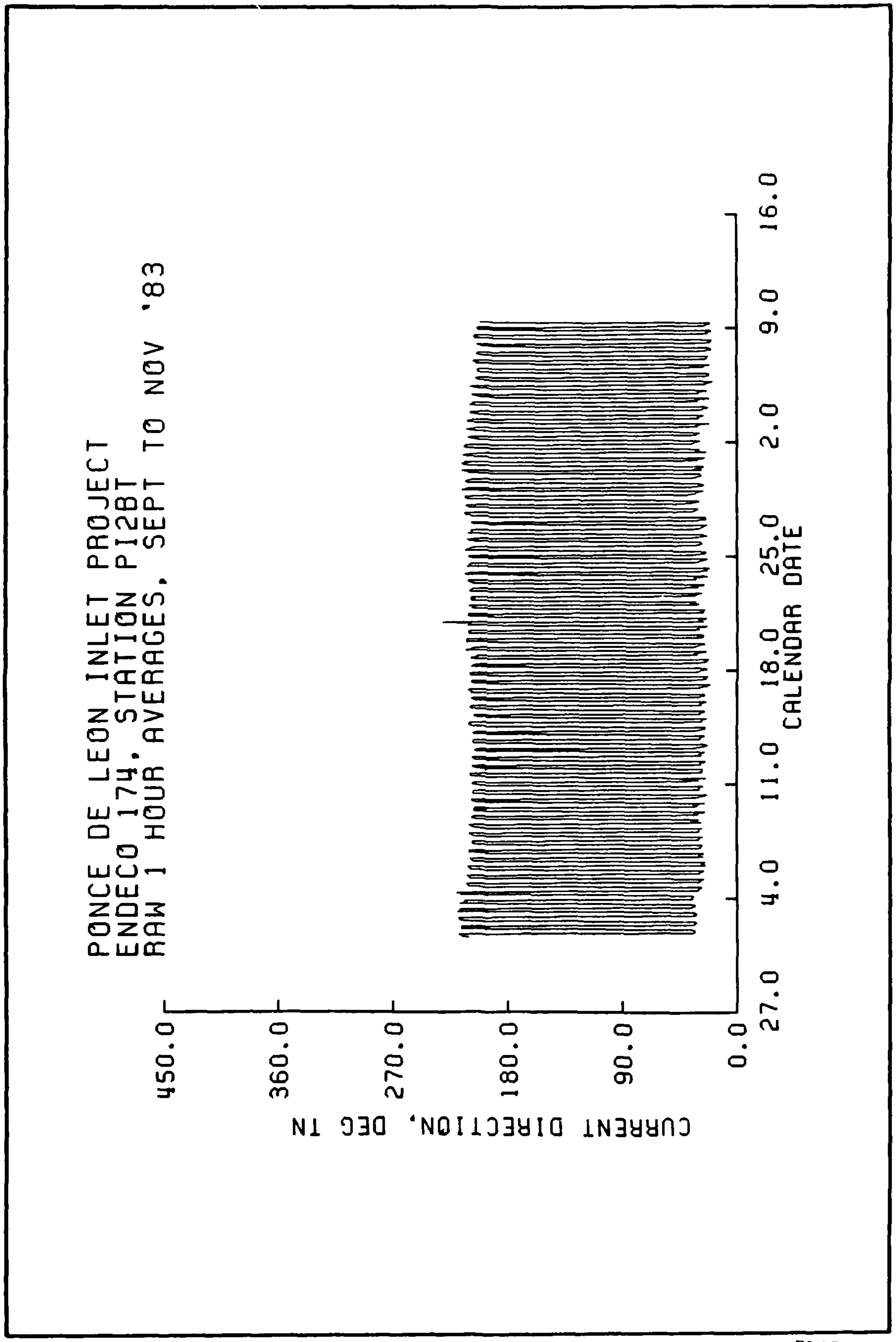

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2BT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT DIRECTION, DEG TN
450.0
360.0
270.0
180.0
90.0
0.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 65

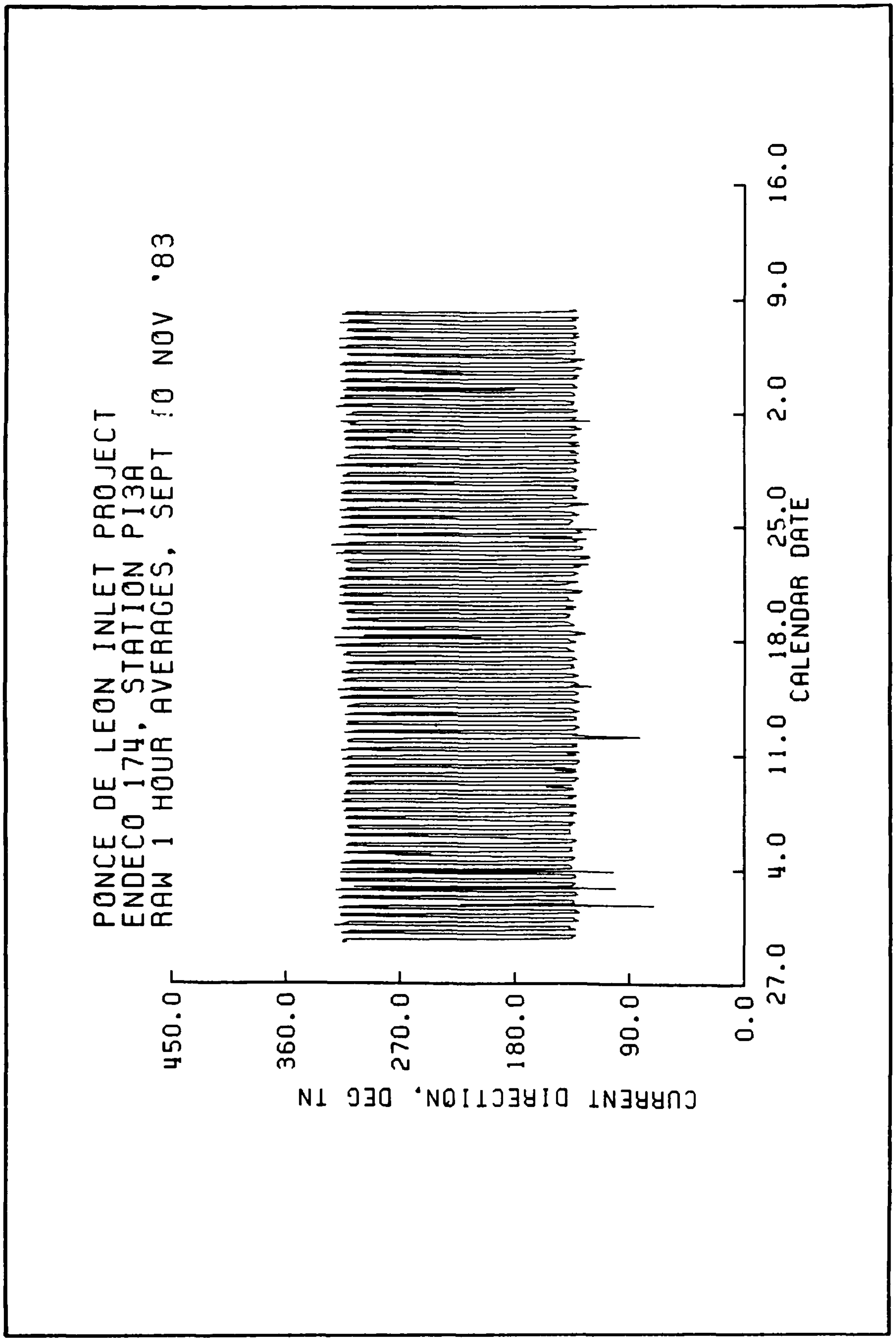
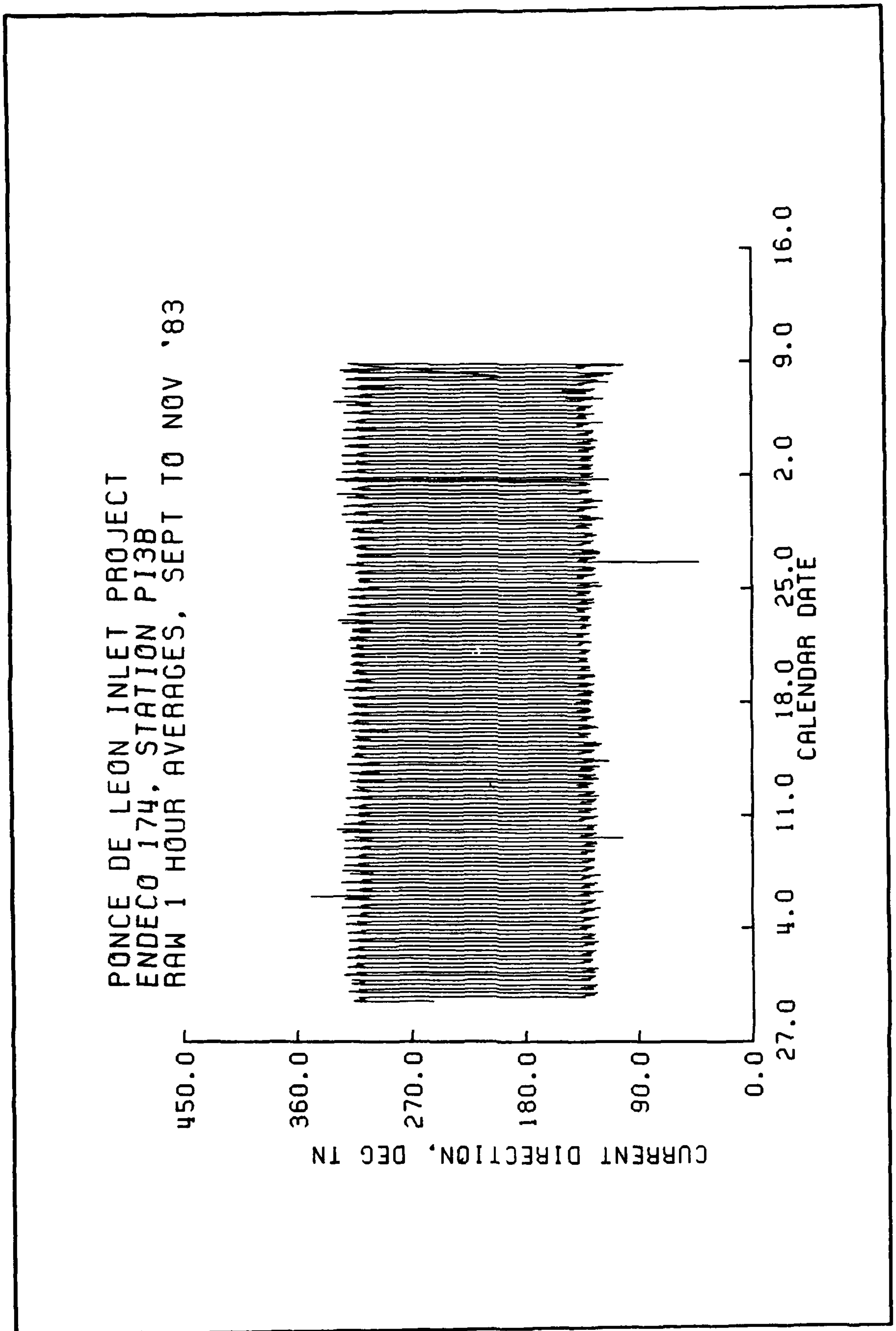

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3A
RAW 1 HOUR AVERAGES, SEPT 10 NOV '83
CURRENT DIRECTION, DEG TN
450.0
360.0
270.0
180.0
90.0
0.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 66


PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3B
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT DIRECTION, DEG TN
450.0
360.0
270.0
180.0
90.0
0.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

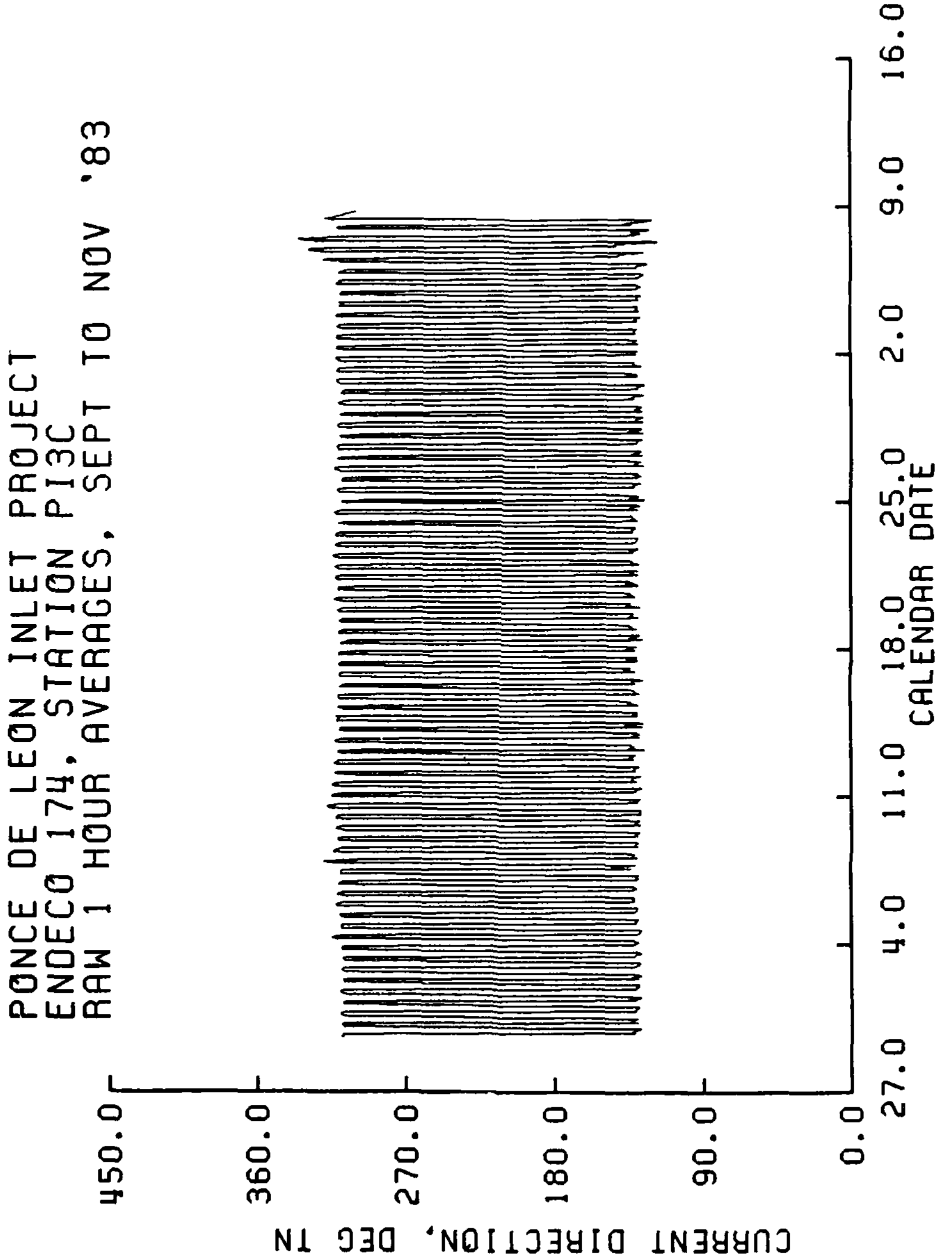
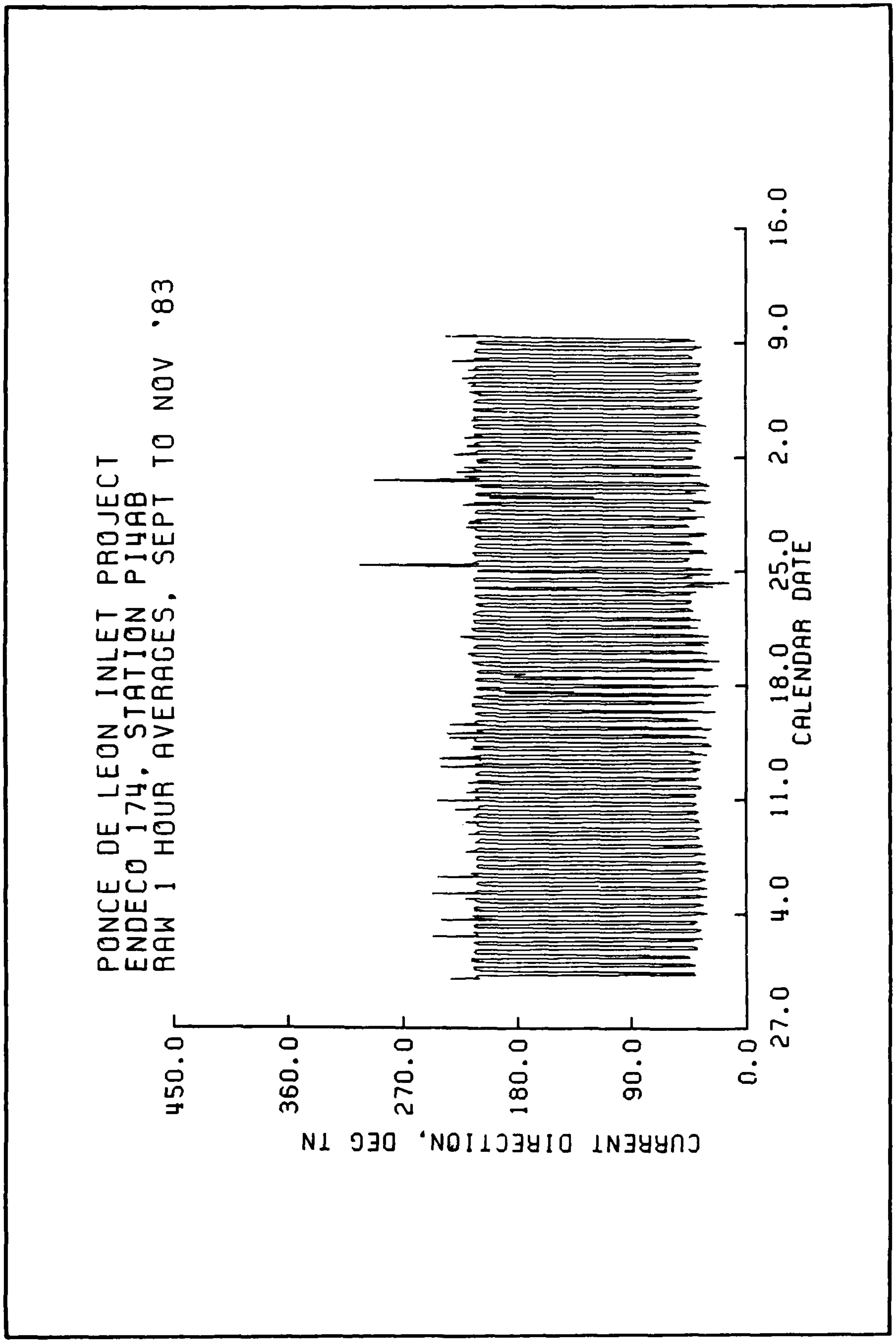

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3C
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT DIRECTION, DEG TN
450.0
360.0
270.0
180.0
90.0
0.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 68


PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4AB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT DIRECTION, DEG TN
450.0
360.0
270.0
180.0
90.0
0.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

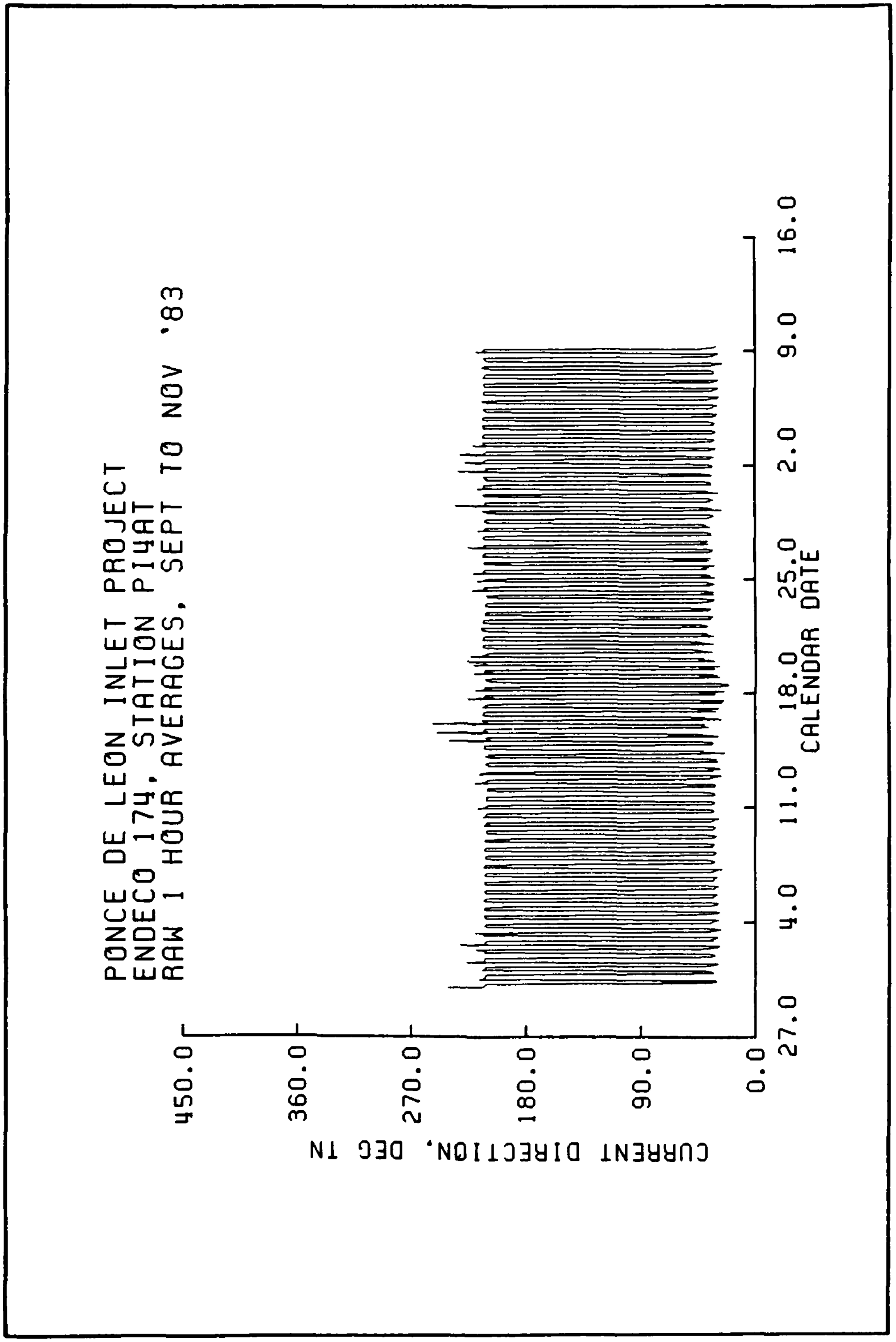
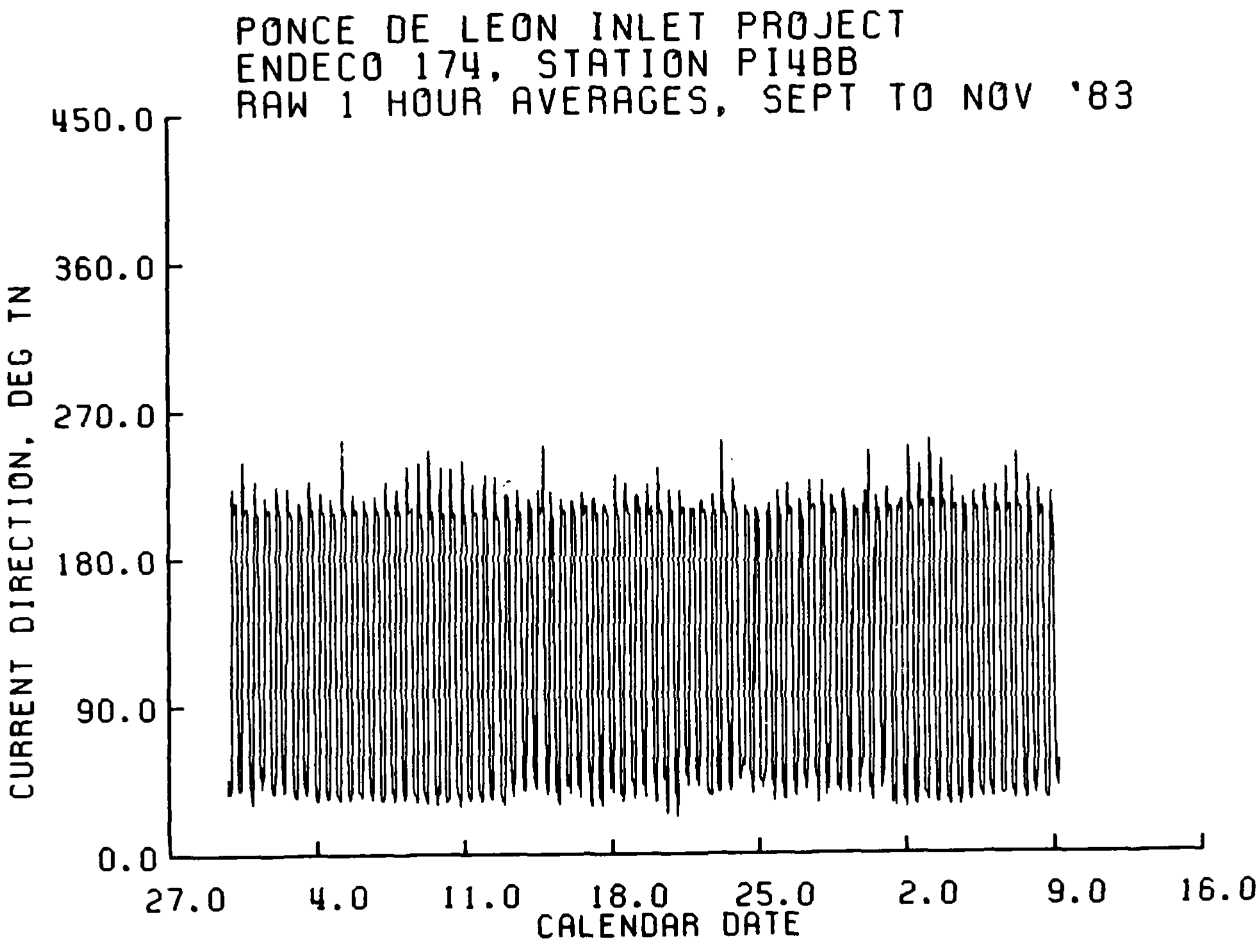

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4AT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
450.0
360.0
270.0
180.0
90.0
0.0
CURRENT DIRECTION, DEG TN
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 70


PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4BB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
450.0
360.0
270.0
180.0
90.0
0.0
CURRENT DIRECTION, DEG TN
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

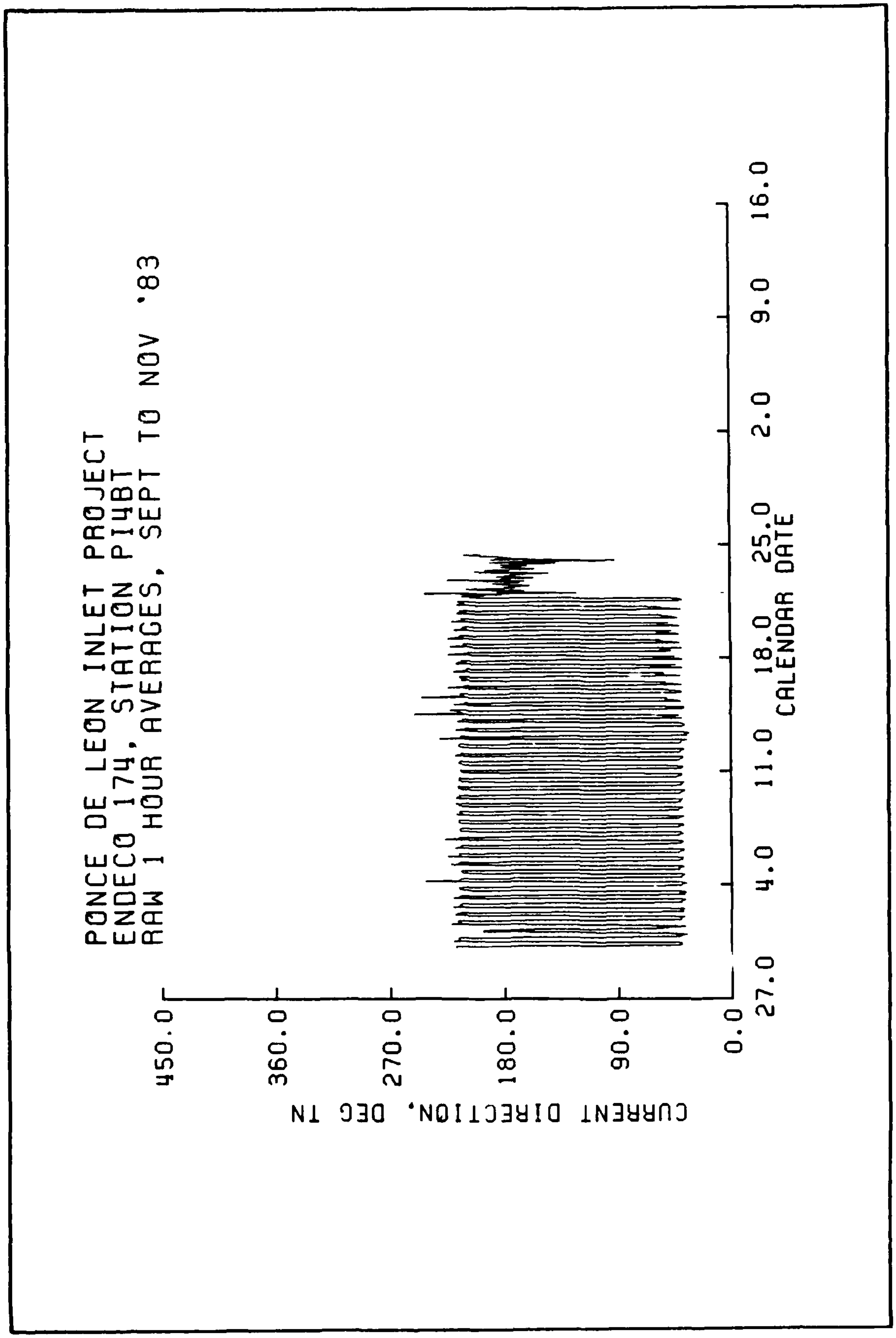
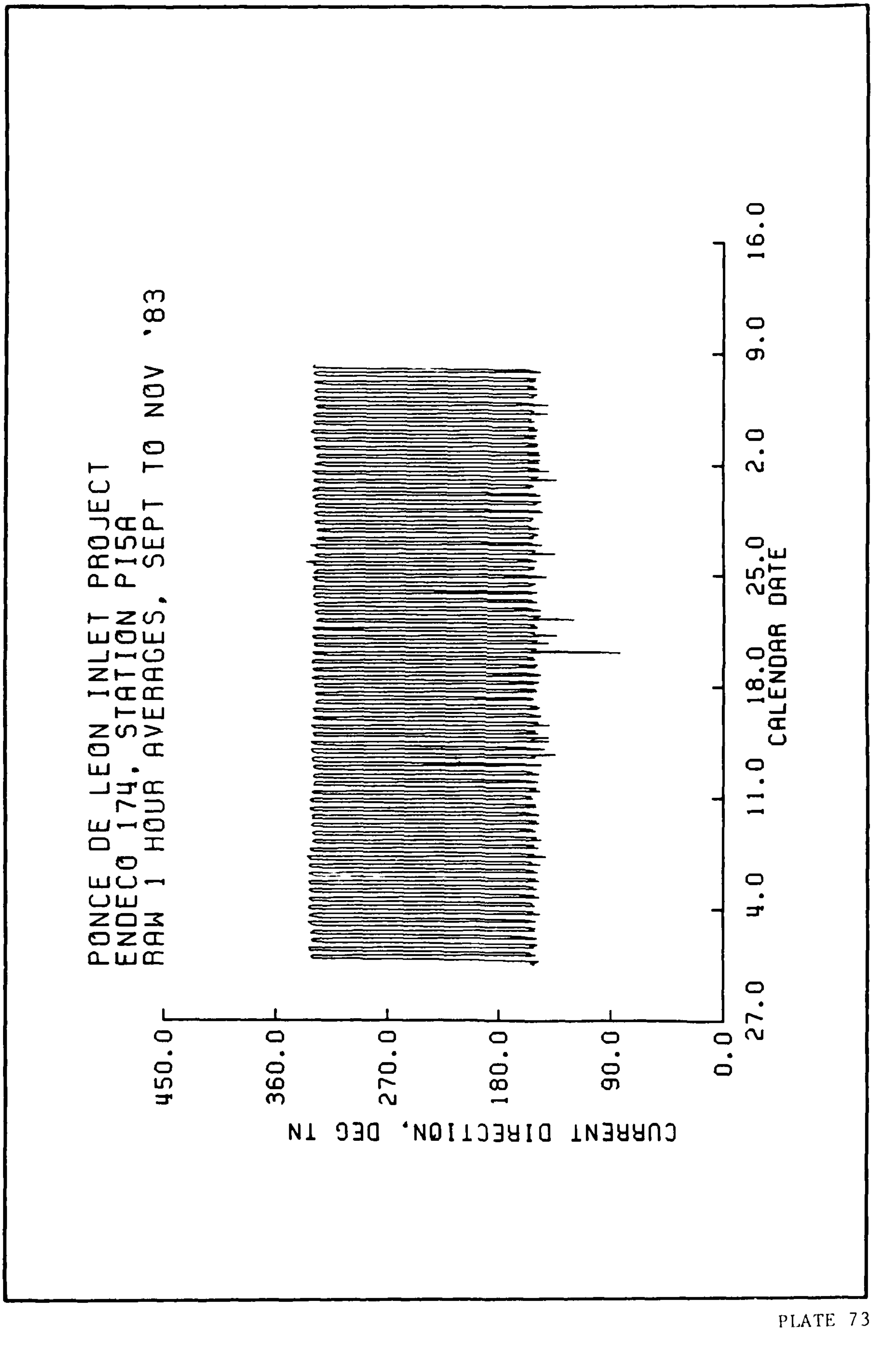

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4BT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT DIRECTION, DEG TN
450.0
360.0
270.0
180.0
90.0
0.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 72


PONCE DE LEON INLET PROJECT
ENDECO 174, STATION P15A
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT DIRECTION, DEG TN
450.0
360.0
270.0
180.0
90.0
0.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

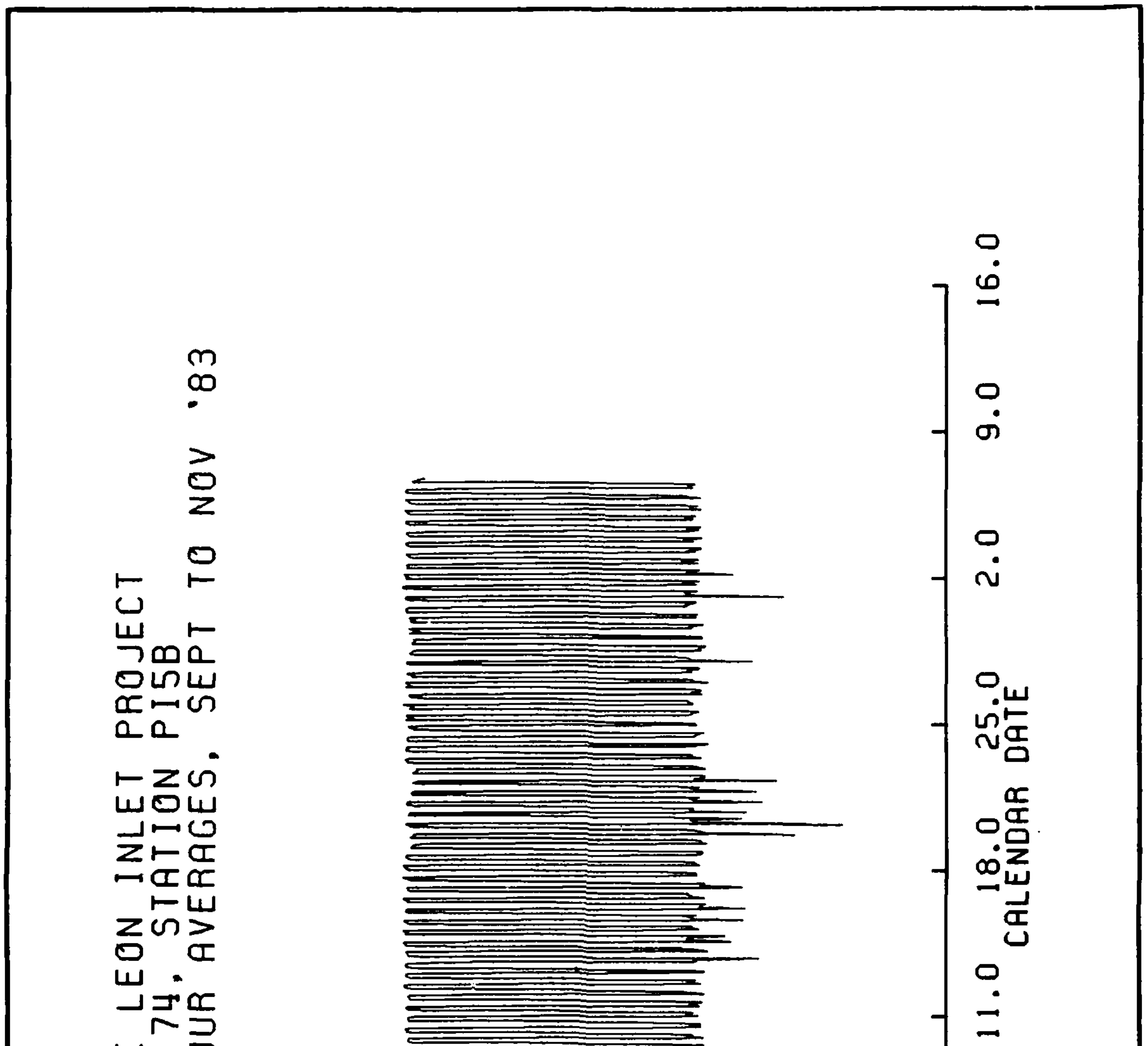

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5B
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT DIRECTION, DEG TN
450.0
360.0
270.0
180.0
90.0
0.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 74

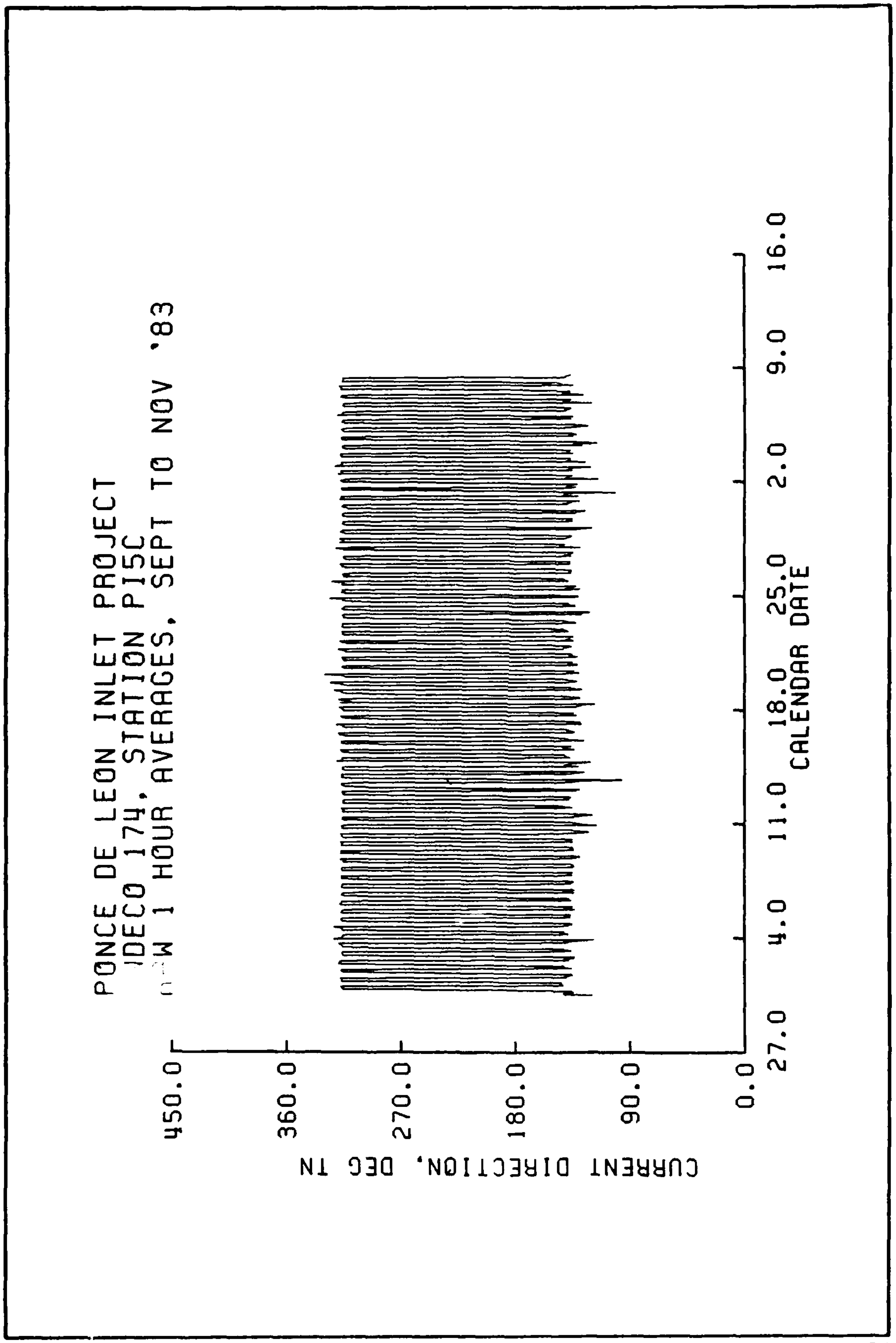

PONCE DE LEON INLET PROJECT
IDECO 174, STATION PI5C
W 1 HOUR AVERAGES, SEPT TO NOV '83
CURRENT DIRECTION, DEG TN
450.0
360.0
270.0
180.0
90.0
0.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 75

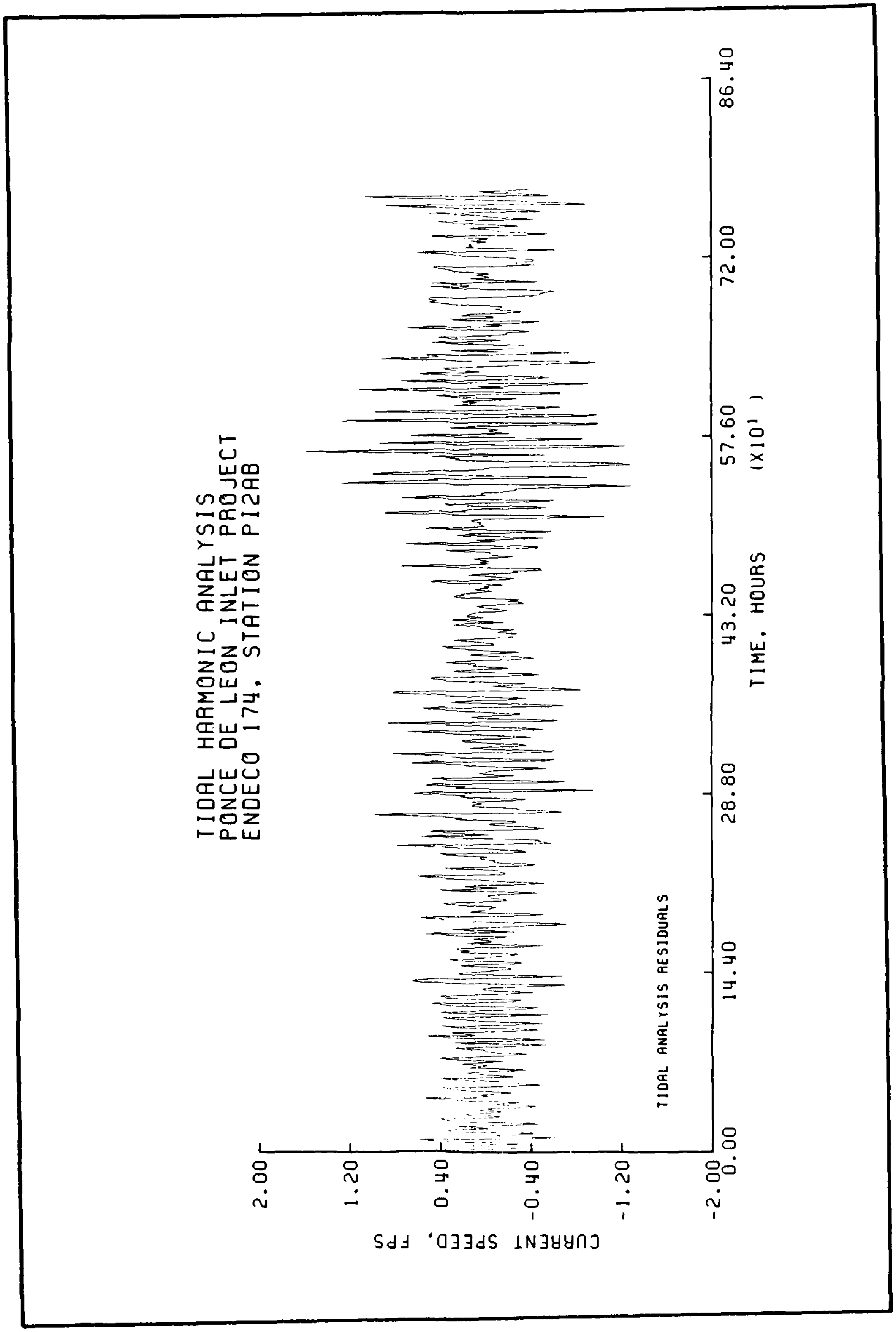
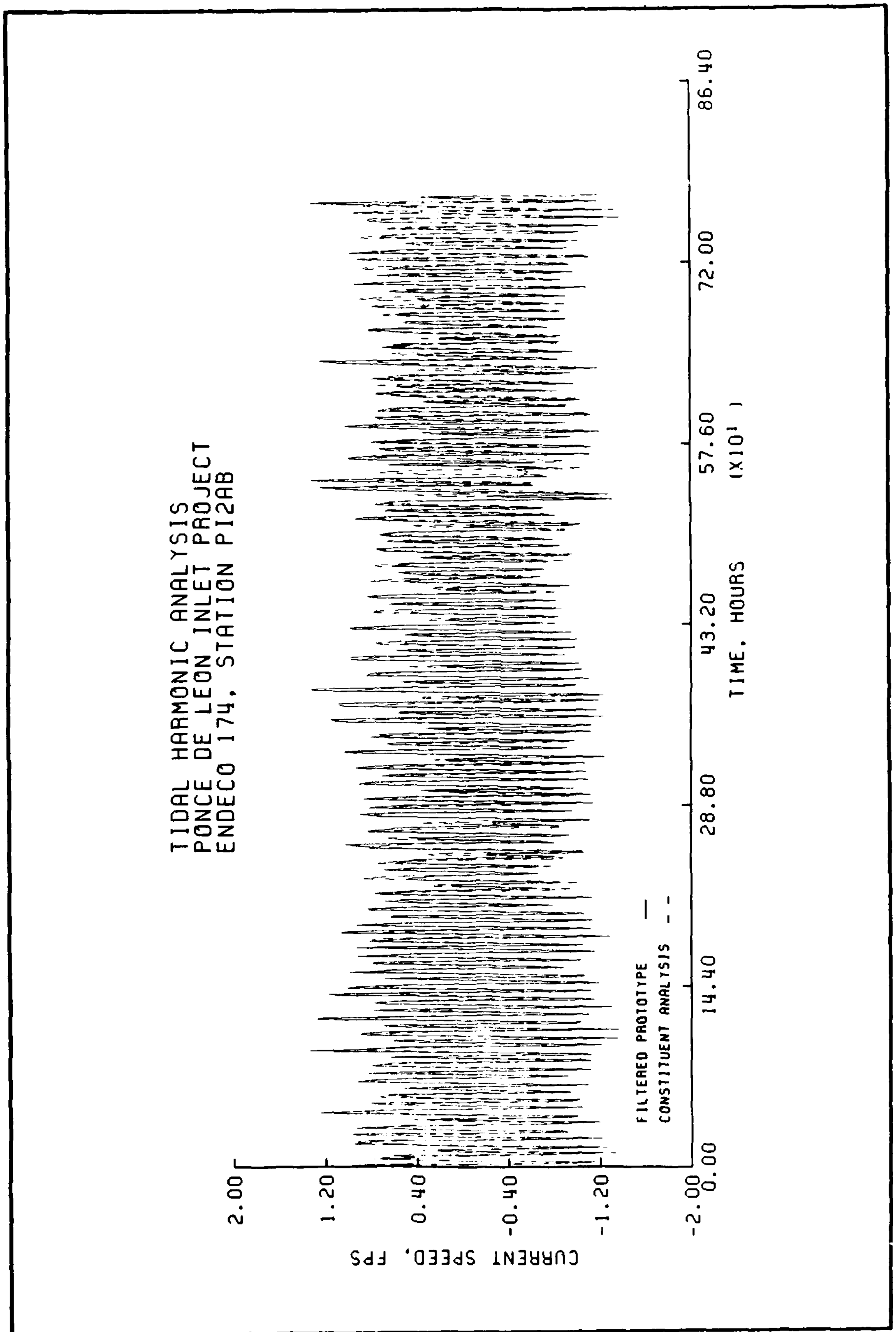

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2AB
TIDAL ANALYSIS RESIDUALS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS (X10¹)

PLATE 76



TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2AB
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS (X10¹)

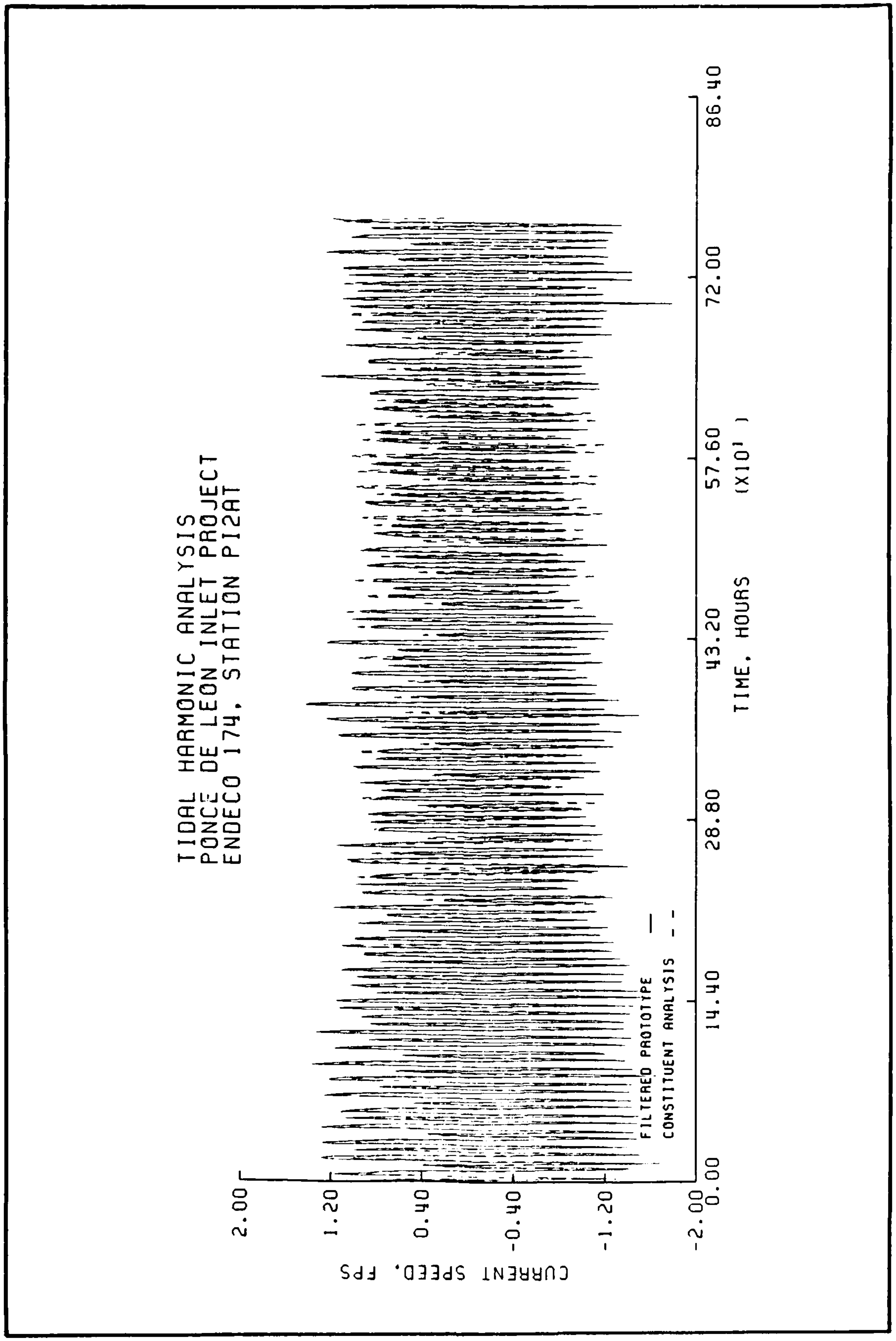
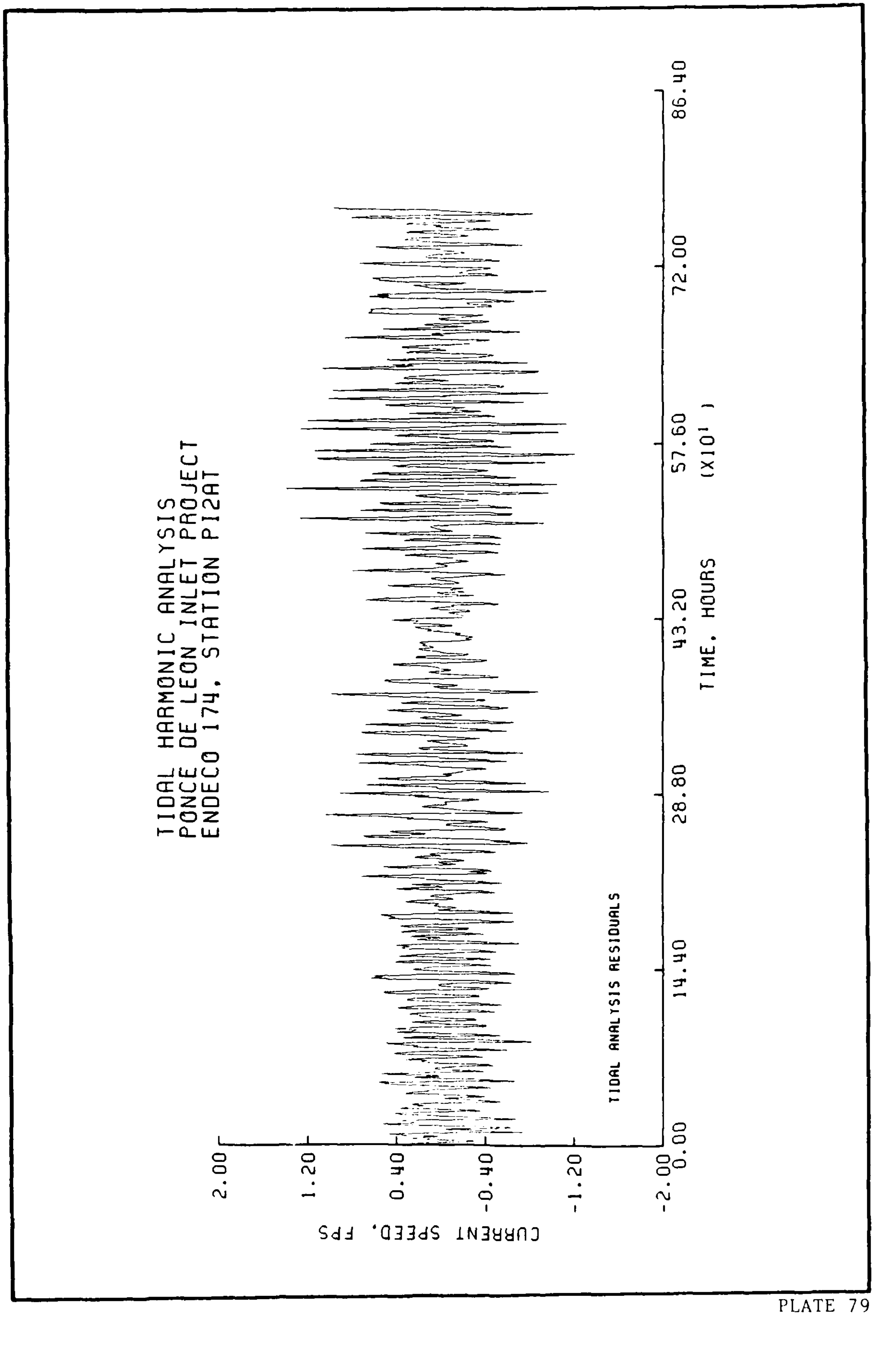
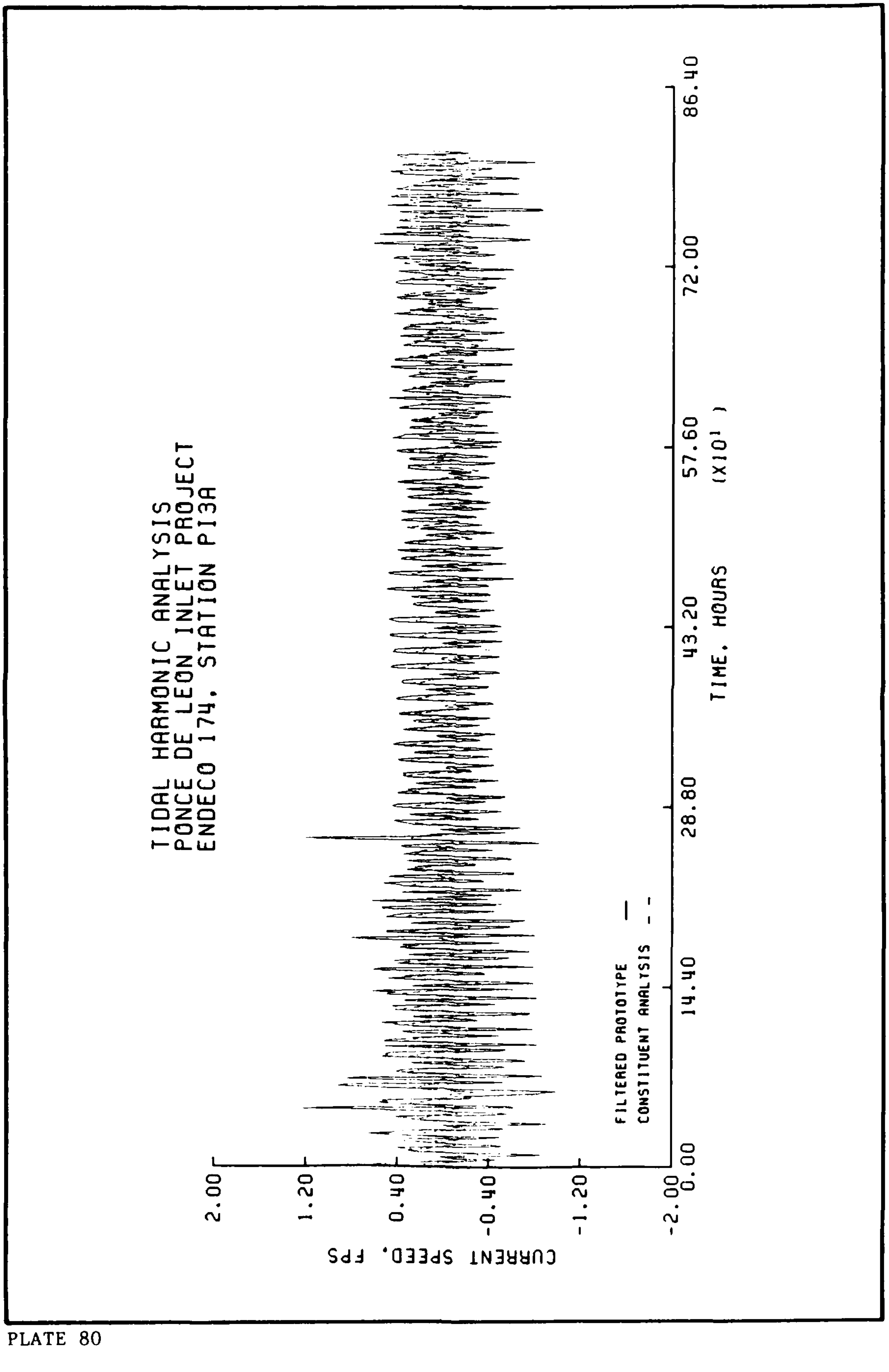

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2AT
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS

PLATE 78

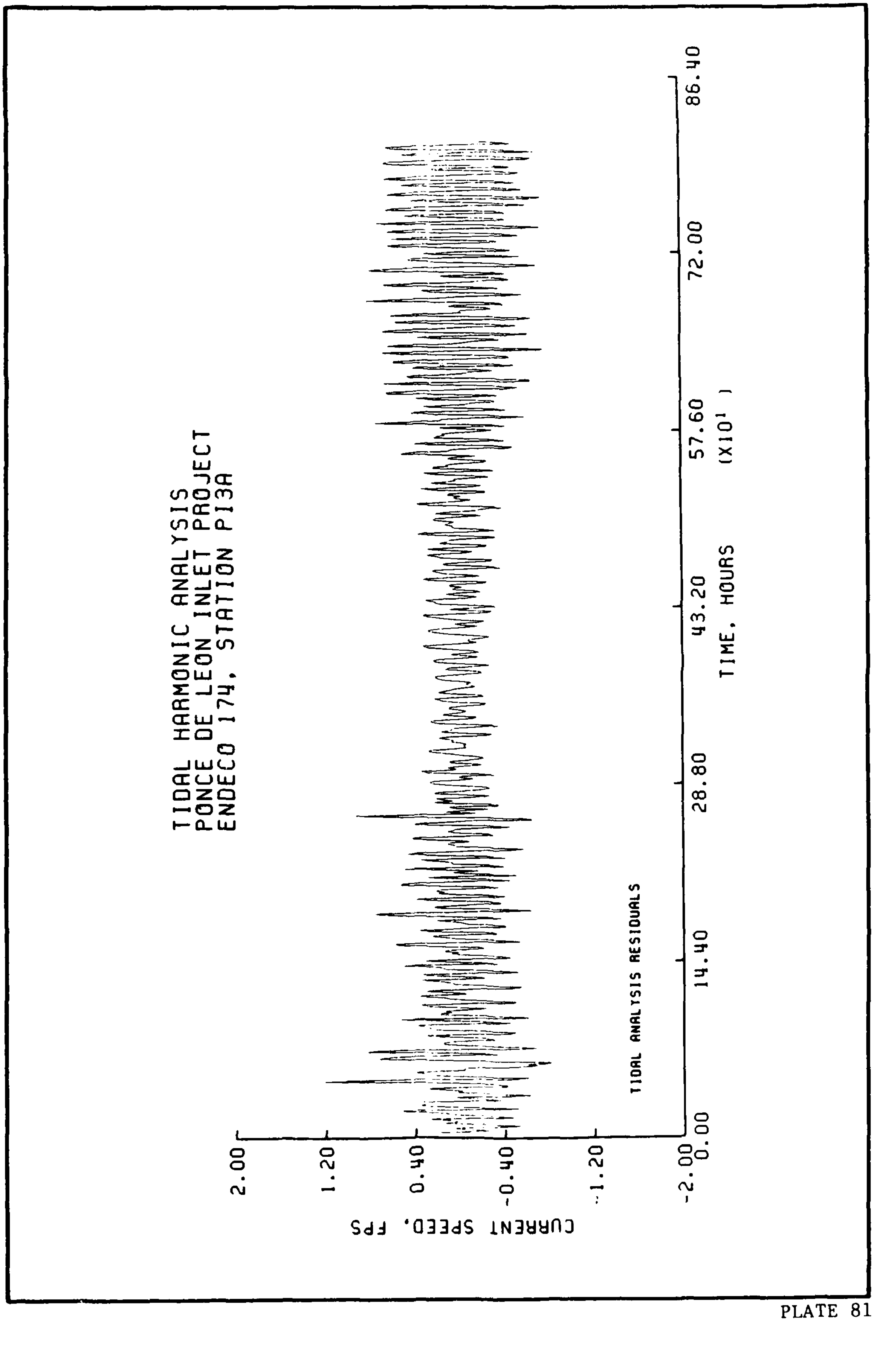


TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2AT
TIDAL ANALYSIS RESIDUALS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS (X10¹)



TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3A
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS (X10¹)

PLATE 80


TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION P13A
TIDAL ANALYSIS RESIDUALS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10^{1})

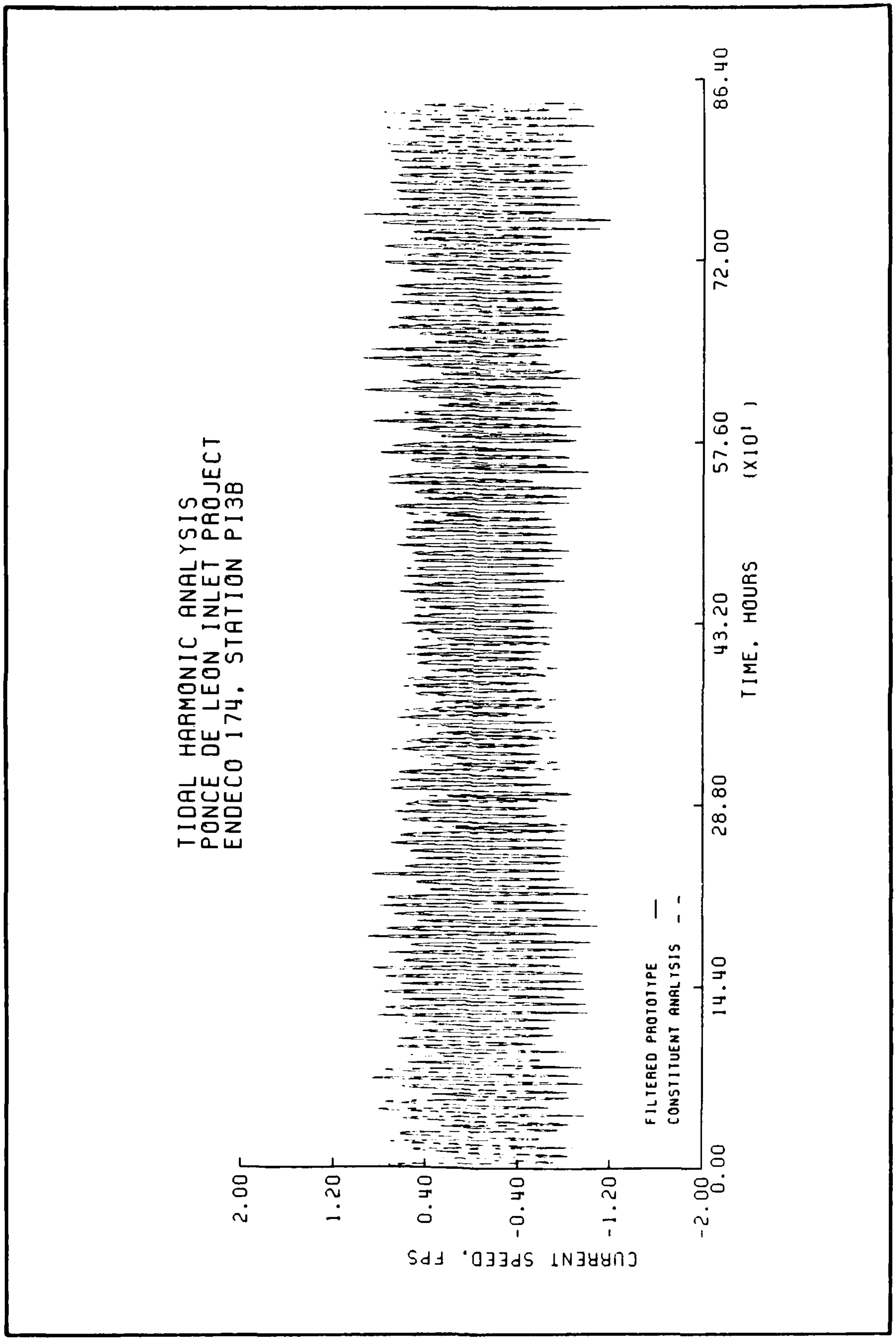
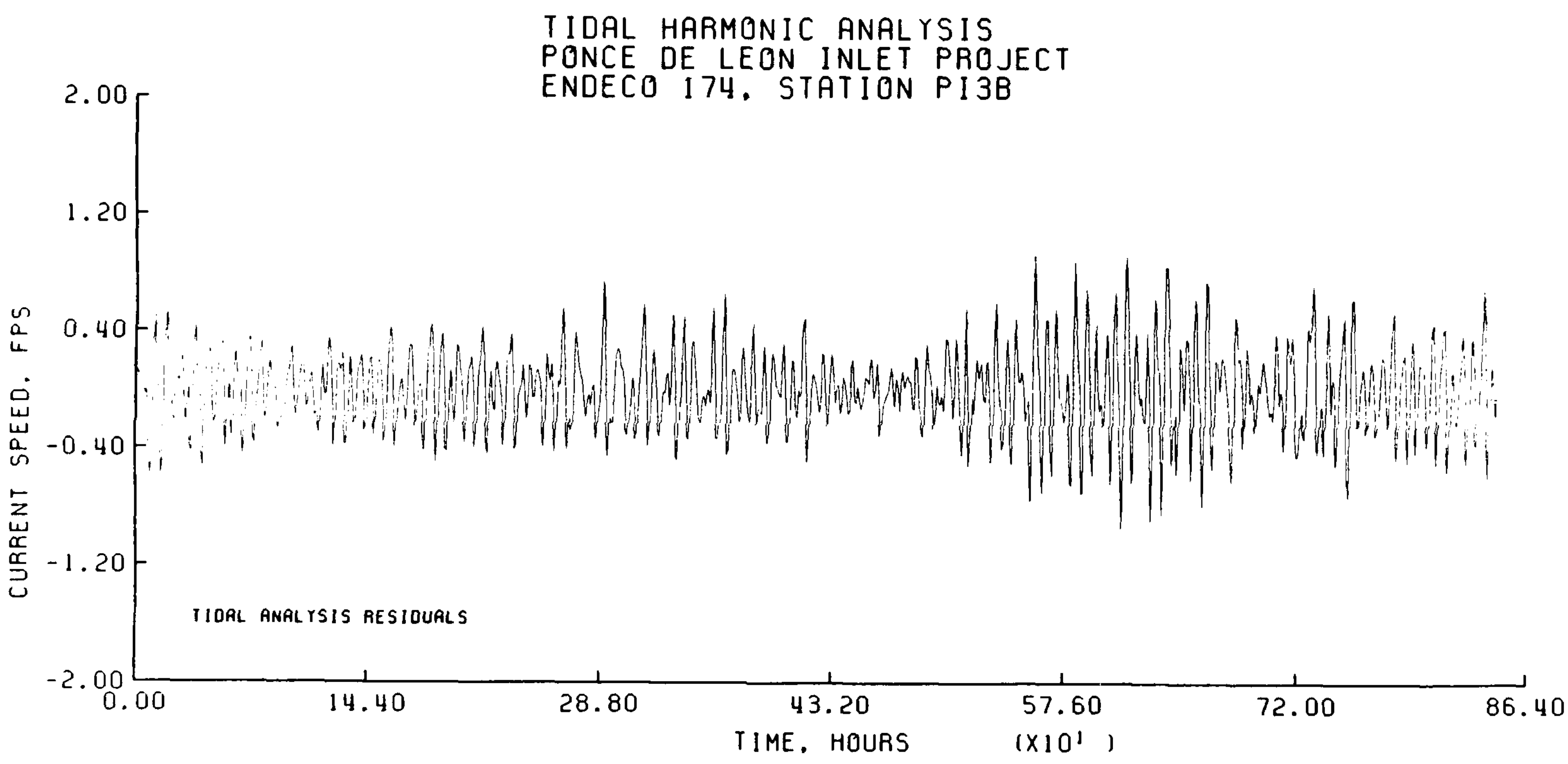

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3B
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)

PLATE 82


TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3B
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
TIDAL ANALYSIS RESIDUALS
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)

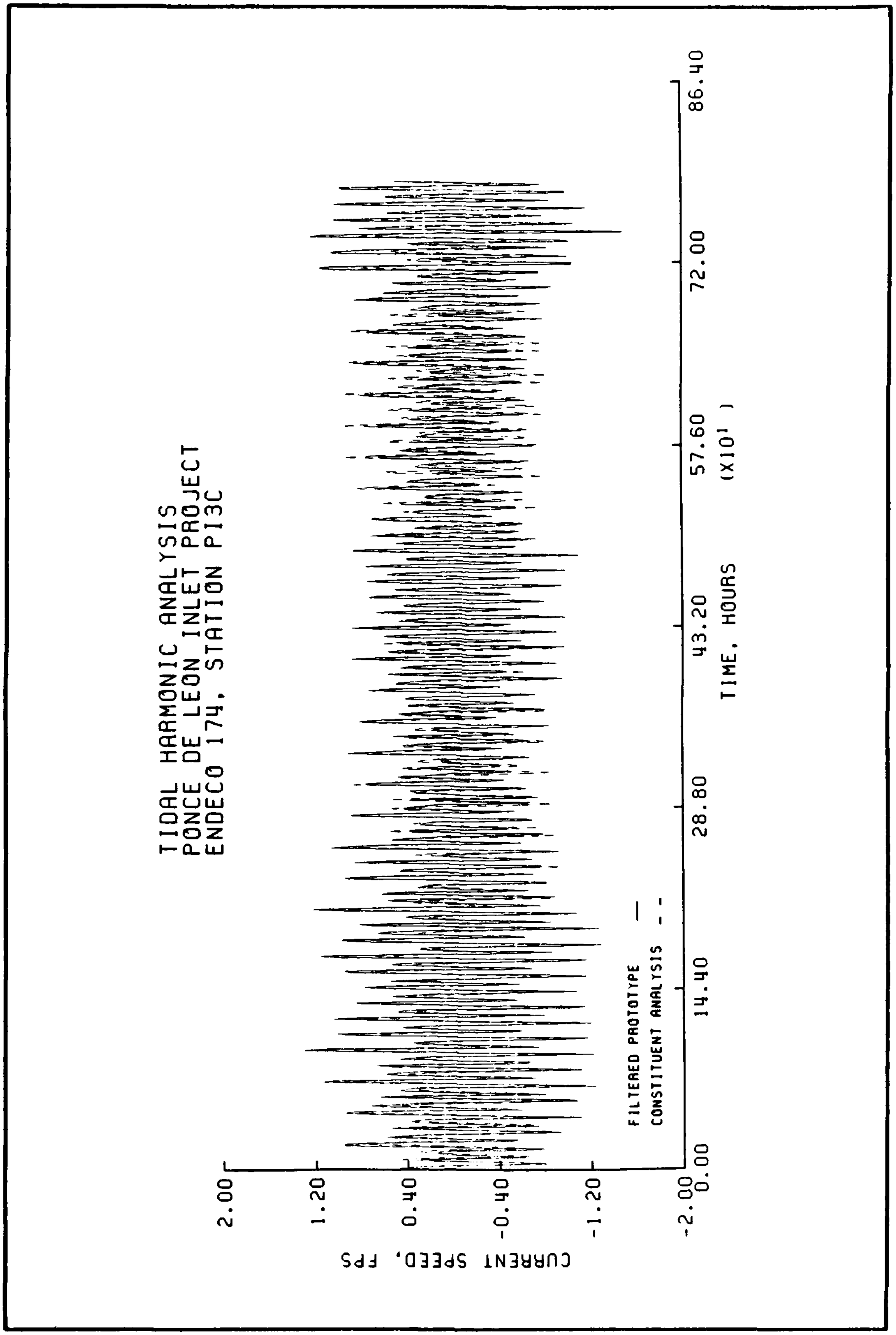

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3C
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS

PLATE 84

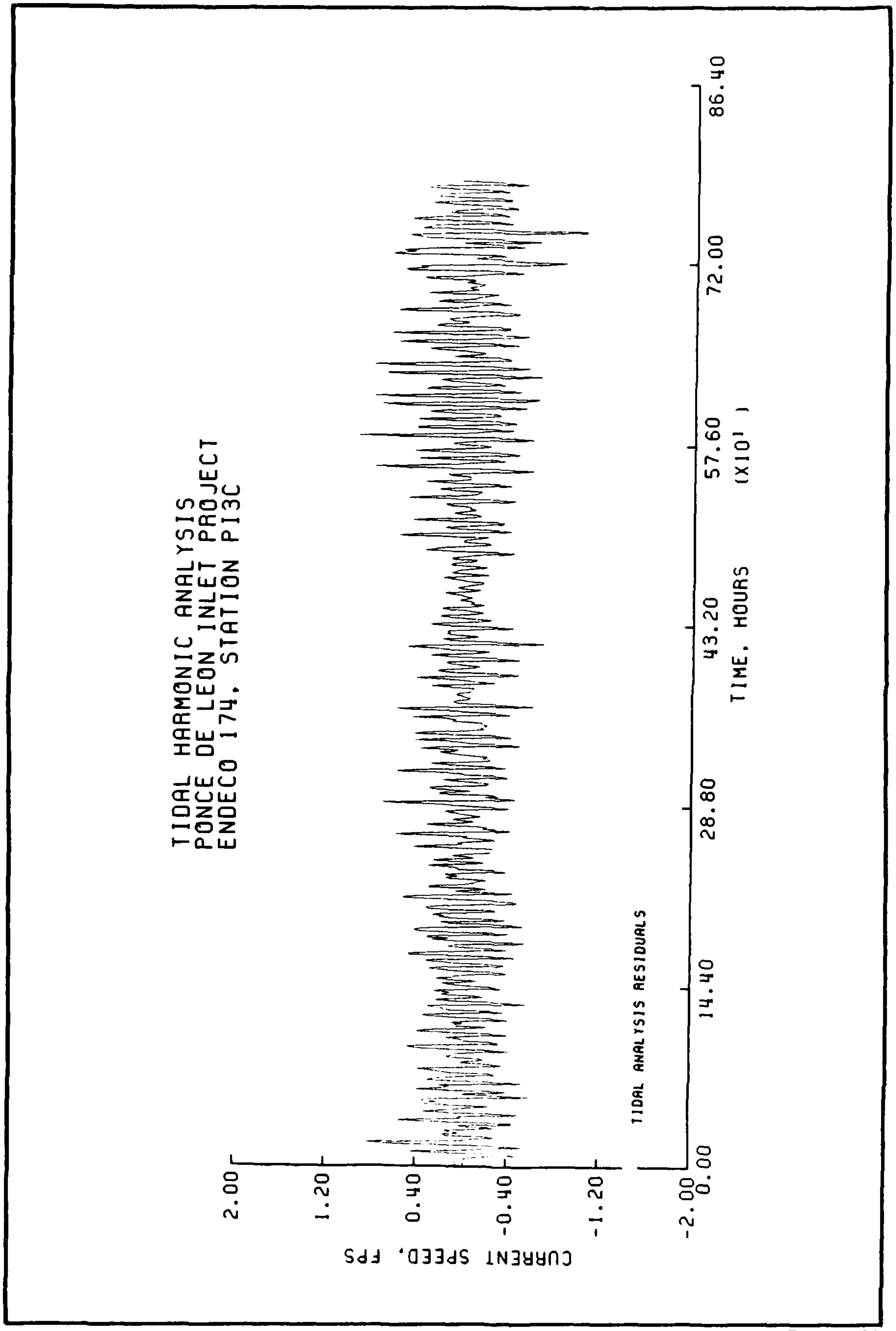

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3C
TIDAL ANALYSIS RESIDUALS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS (X10¹)

PLATE 85

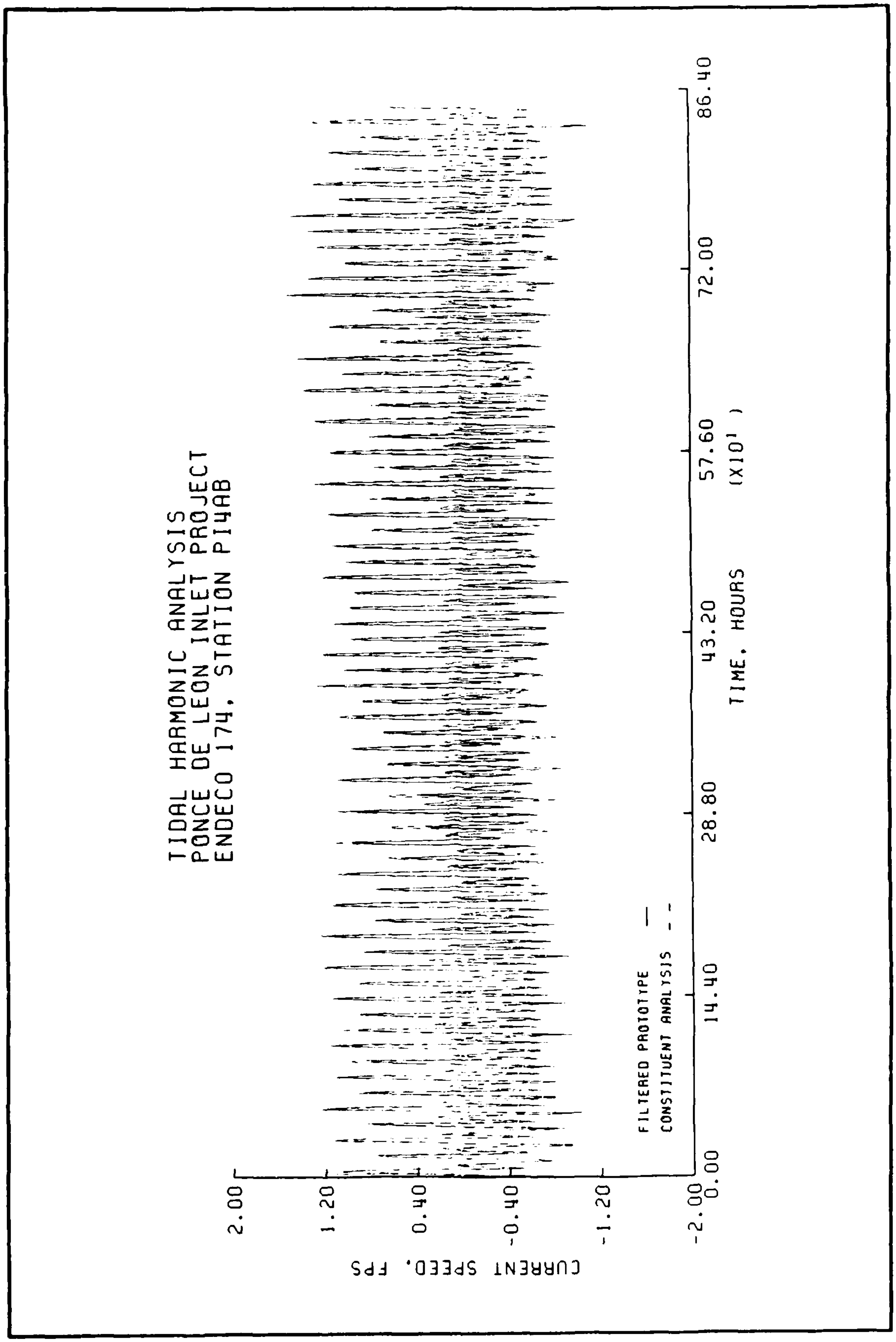
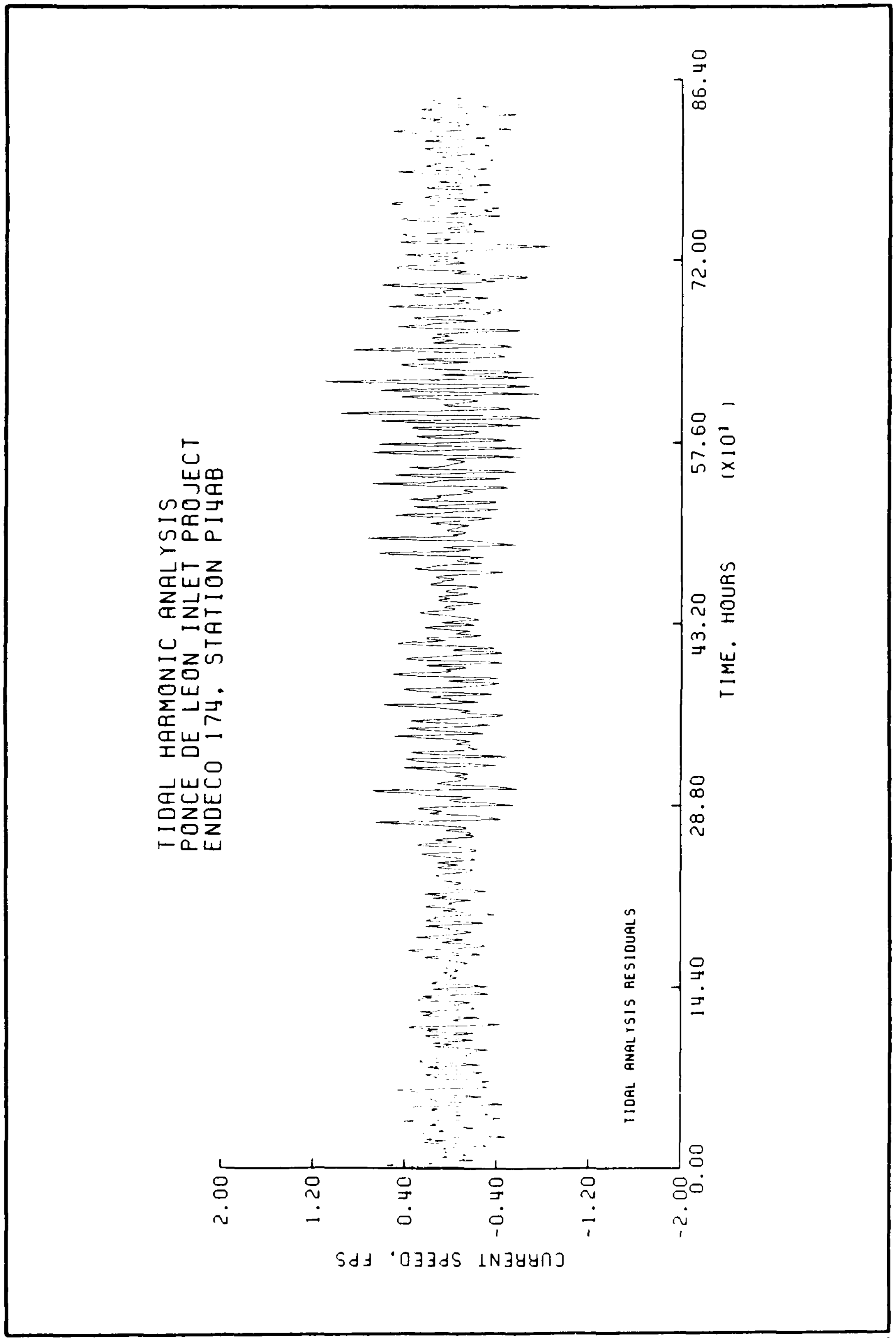

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION P14AB
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS (X10¹)

PLATE 86


TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4AB
TIDAL ANALYSIS RESIDUALS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)

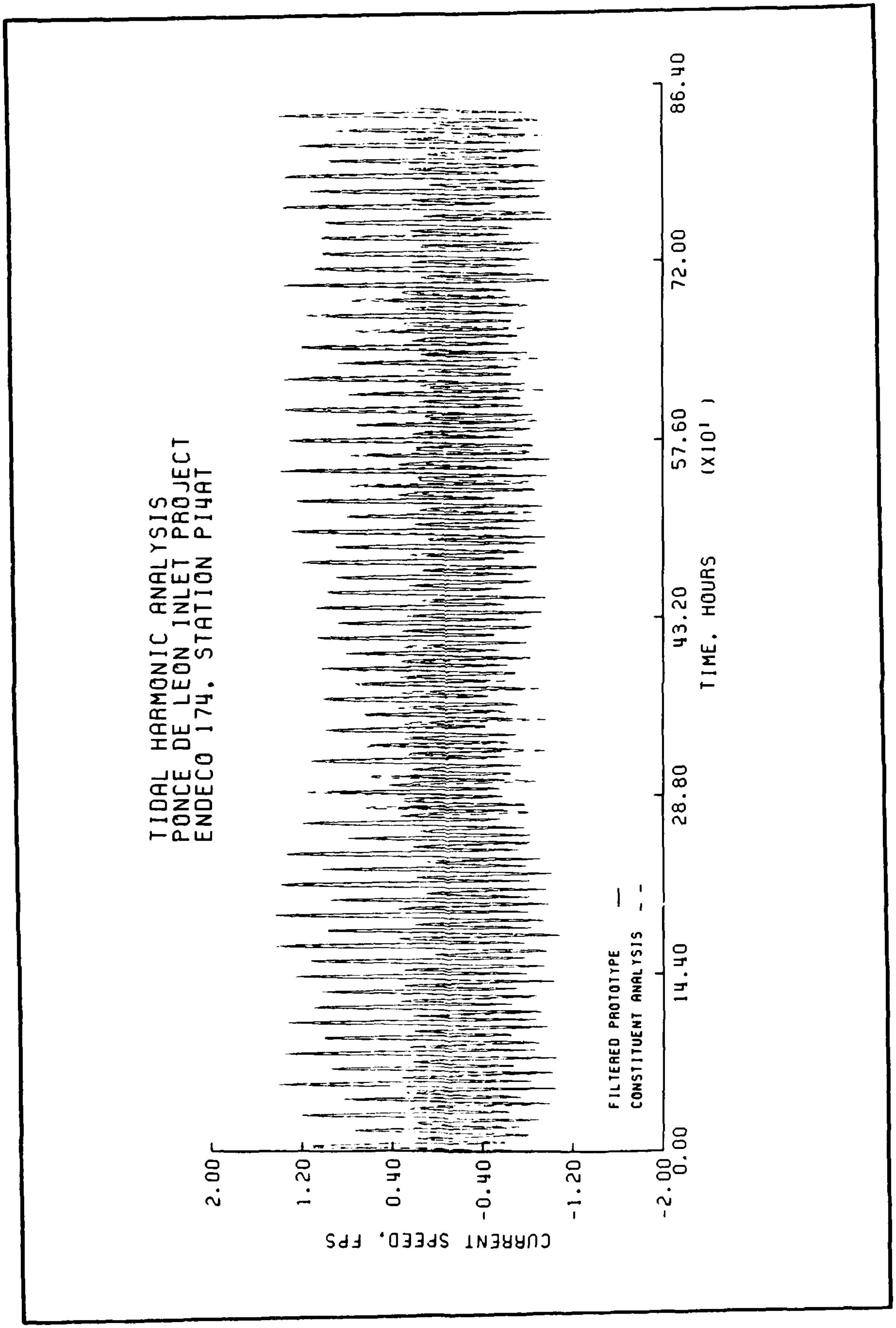
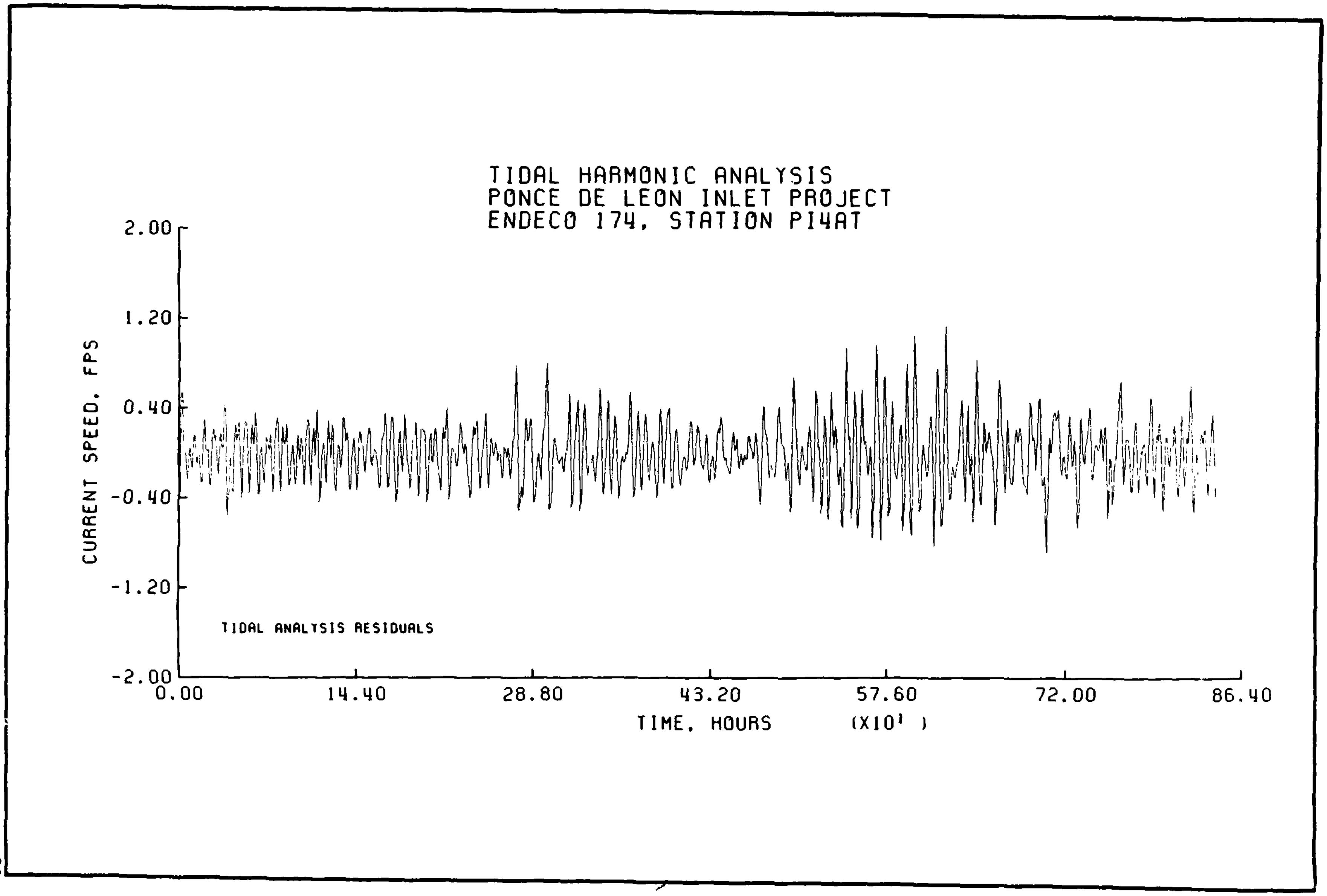

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4AT
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS (X10¹)

PLATE 88


TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4AT
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)
TIDAL ANALYSIS RESIDUALS

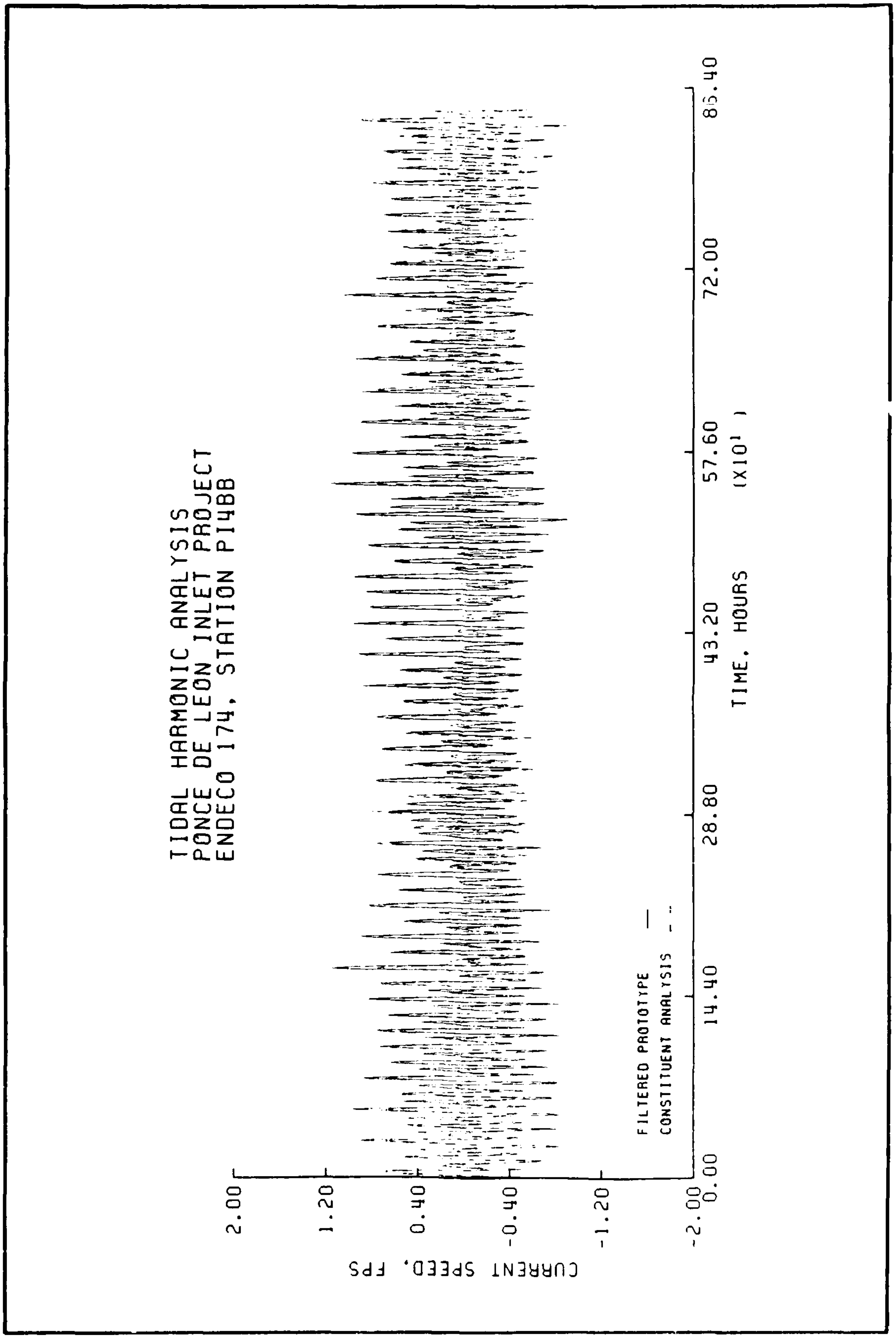
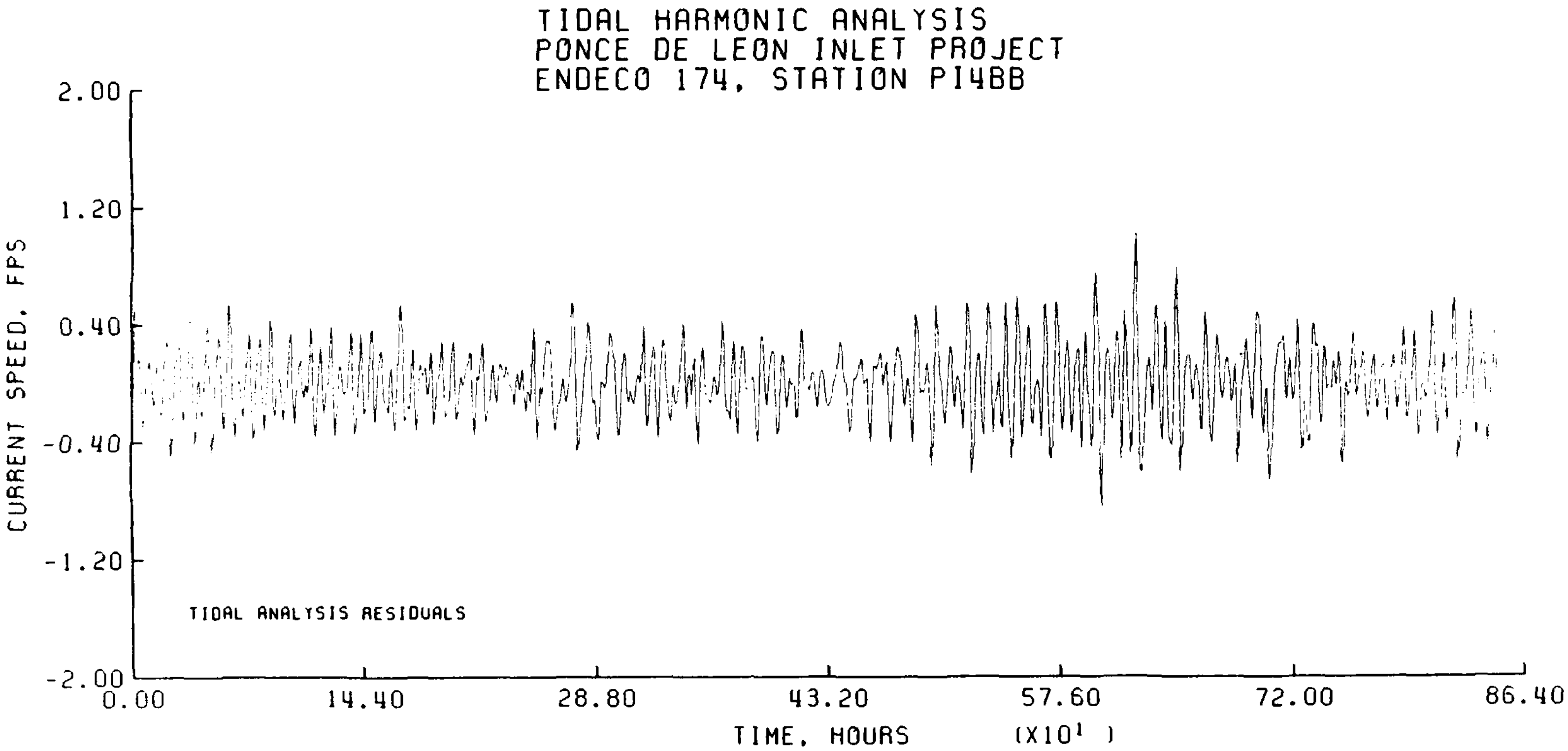
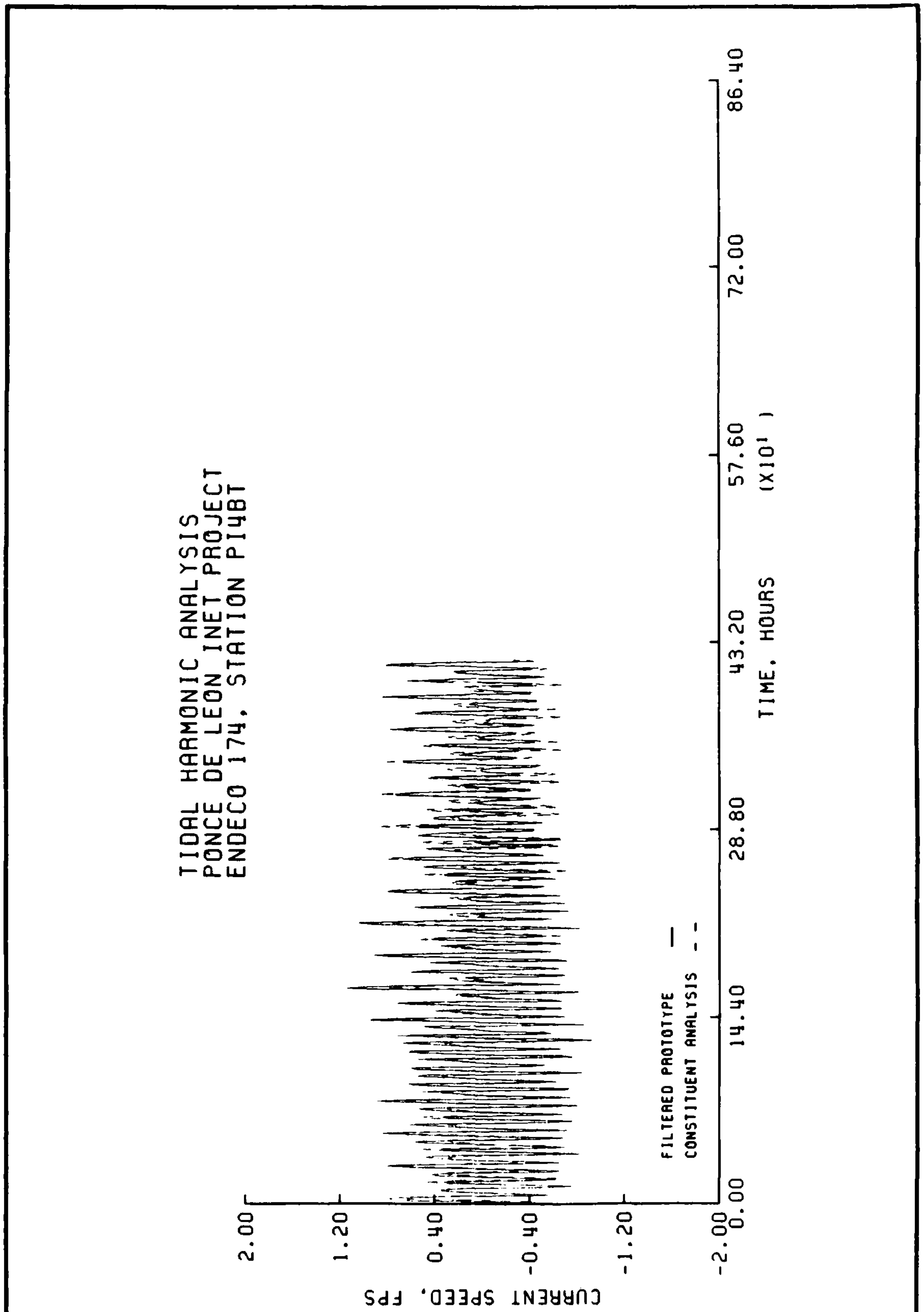

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4BB
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS (X10^1)

PLATE 90

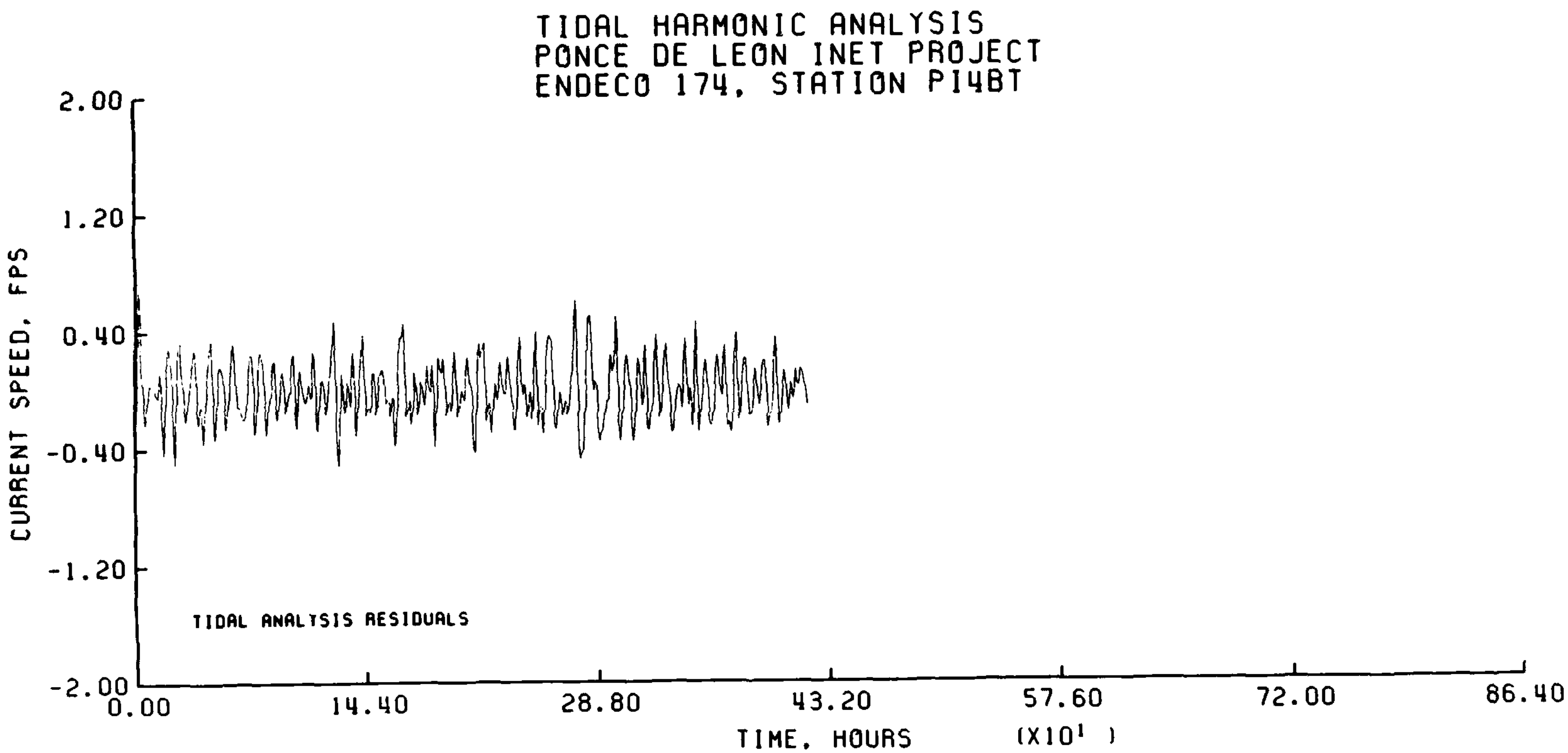


TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4BB
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
TIDAL ANALYSIS RESIDUALS
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)



TIDAL HARMONIC ANALYSIS
PONCE DE LEON INET PROJECT
ENDECO 174, STATION PI4BT
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS
CURRENT SPEED, FPS
TIME, HOURS
(X10¹)
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40

PLATE 92


TIDAL HARMONIC ANALYSIS
PONCE DE LEON INET PROJECT
ENDECO 174, STATION PI4BT
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
TIDAL ANALYSIS RESIDUALS
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)

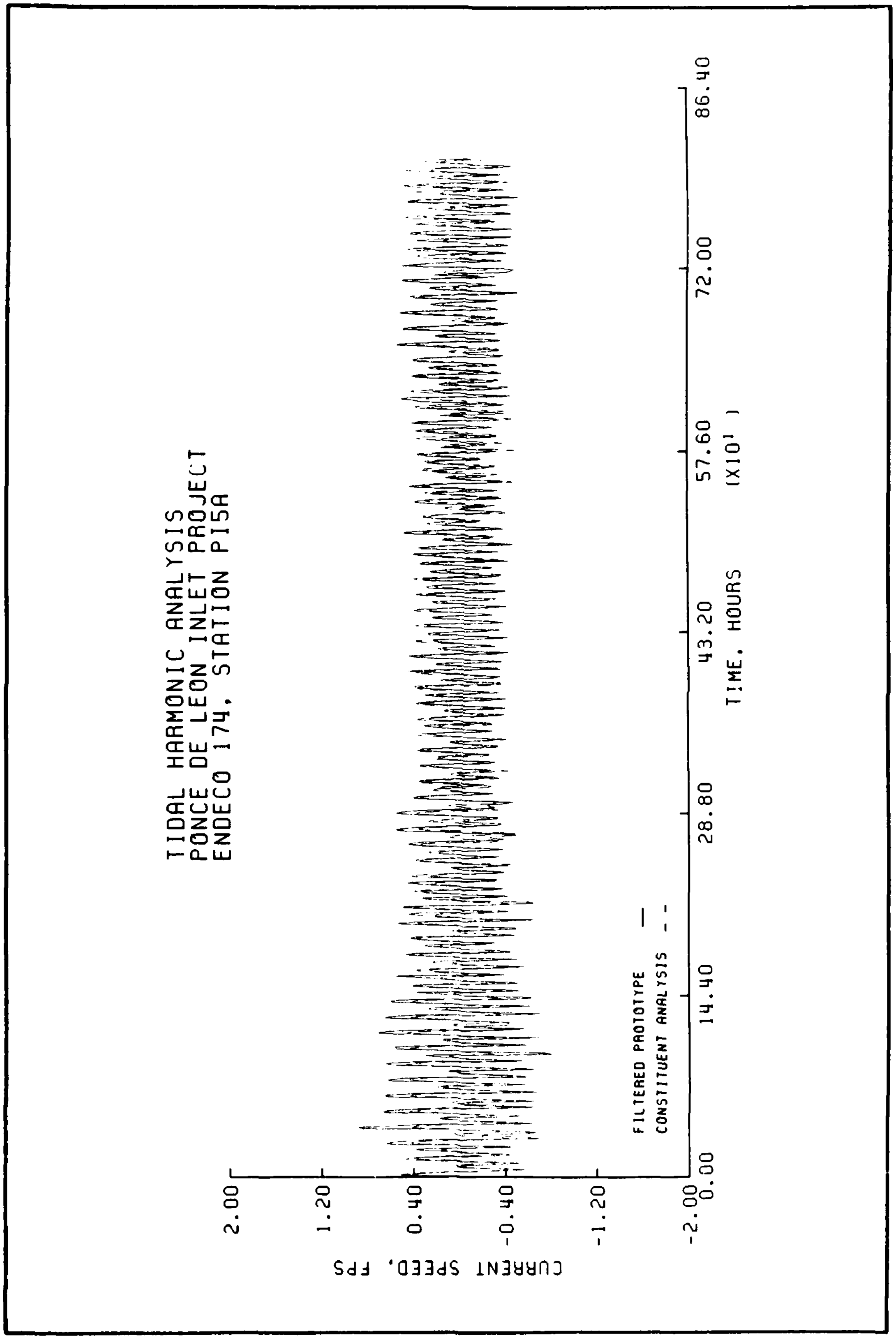
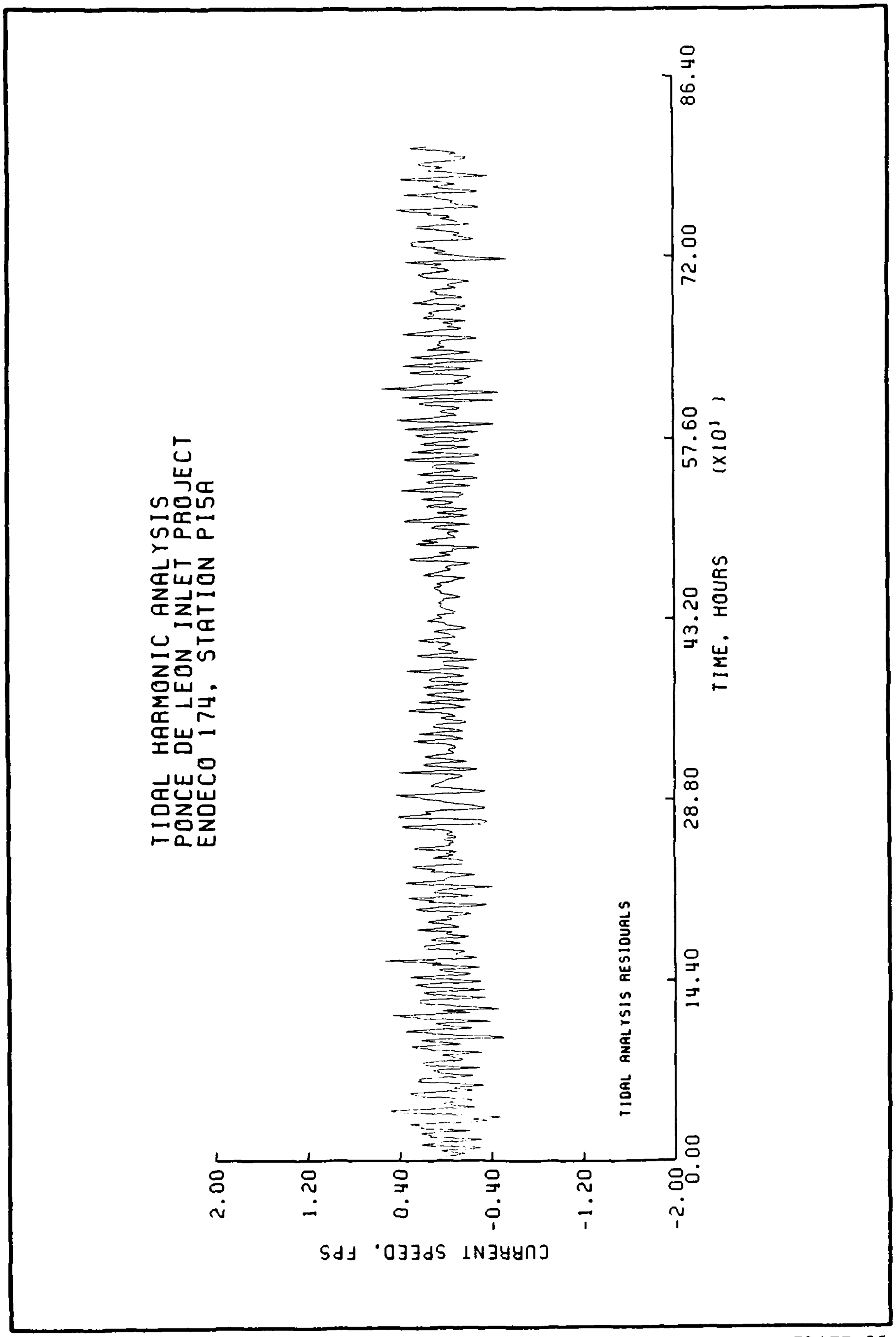
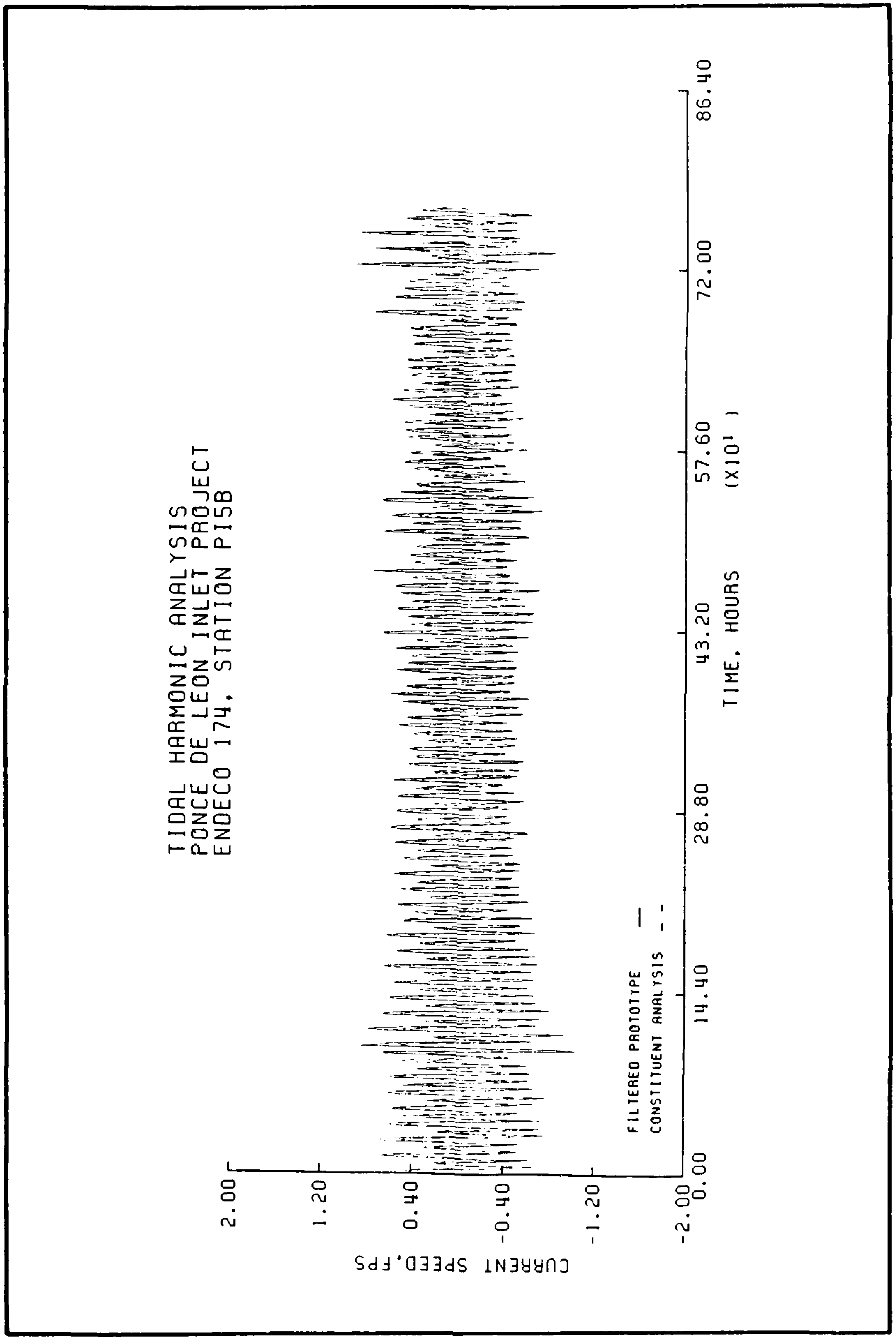

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5A
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10^{1})

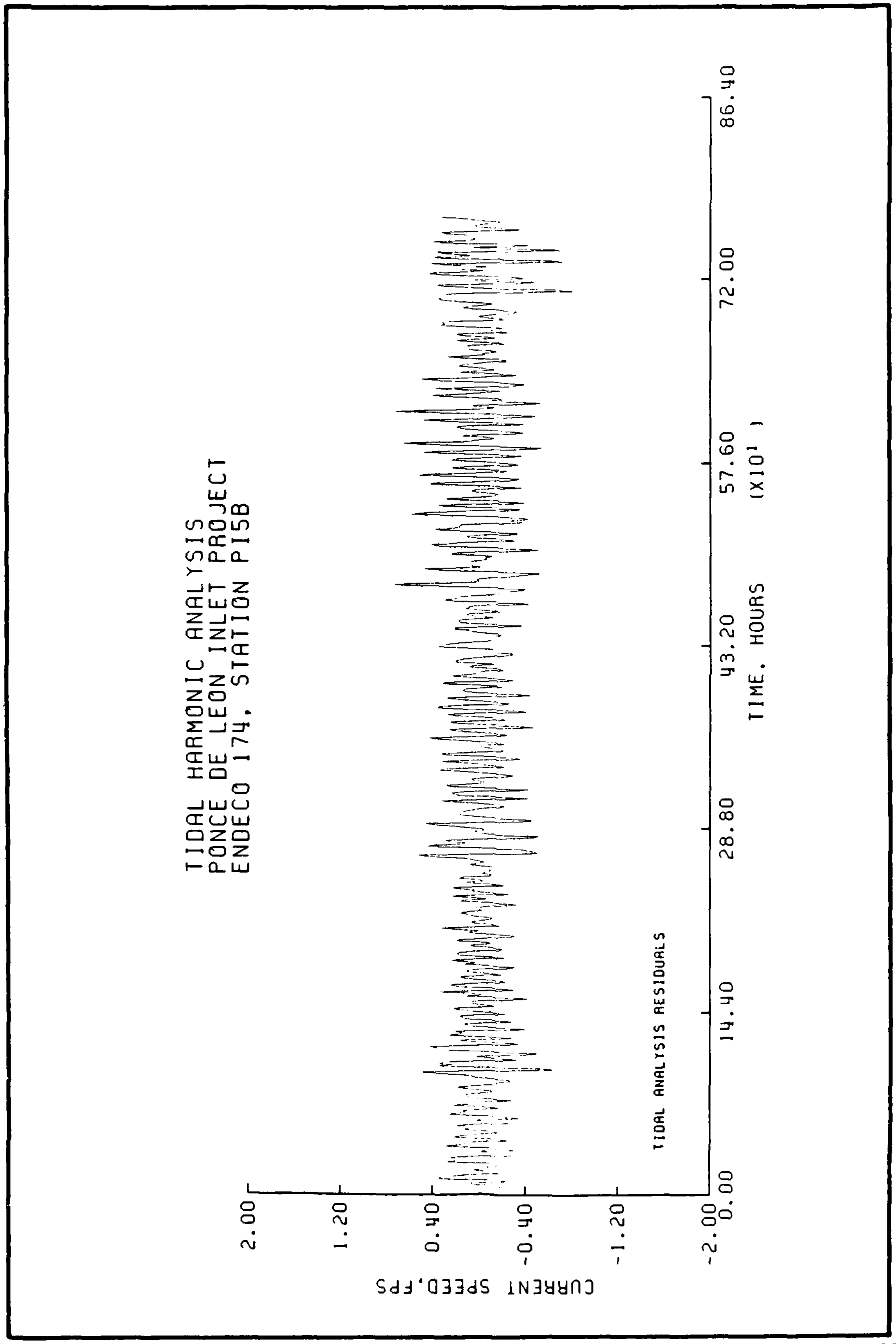
PLATE 94


TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5A
TIDAL ANALYSIS RESIDUALS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)



TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5B
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS (X10^{1})

PLATE 96


TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5B
TIDAL ANALYSIS RESIDUALS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-1.20
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)

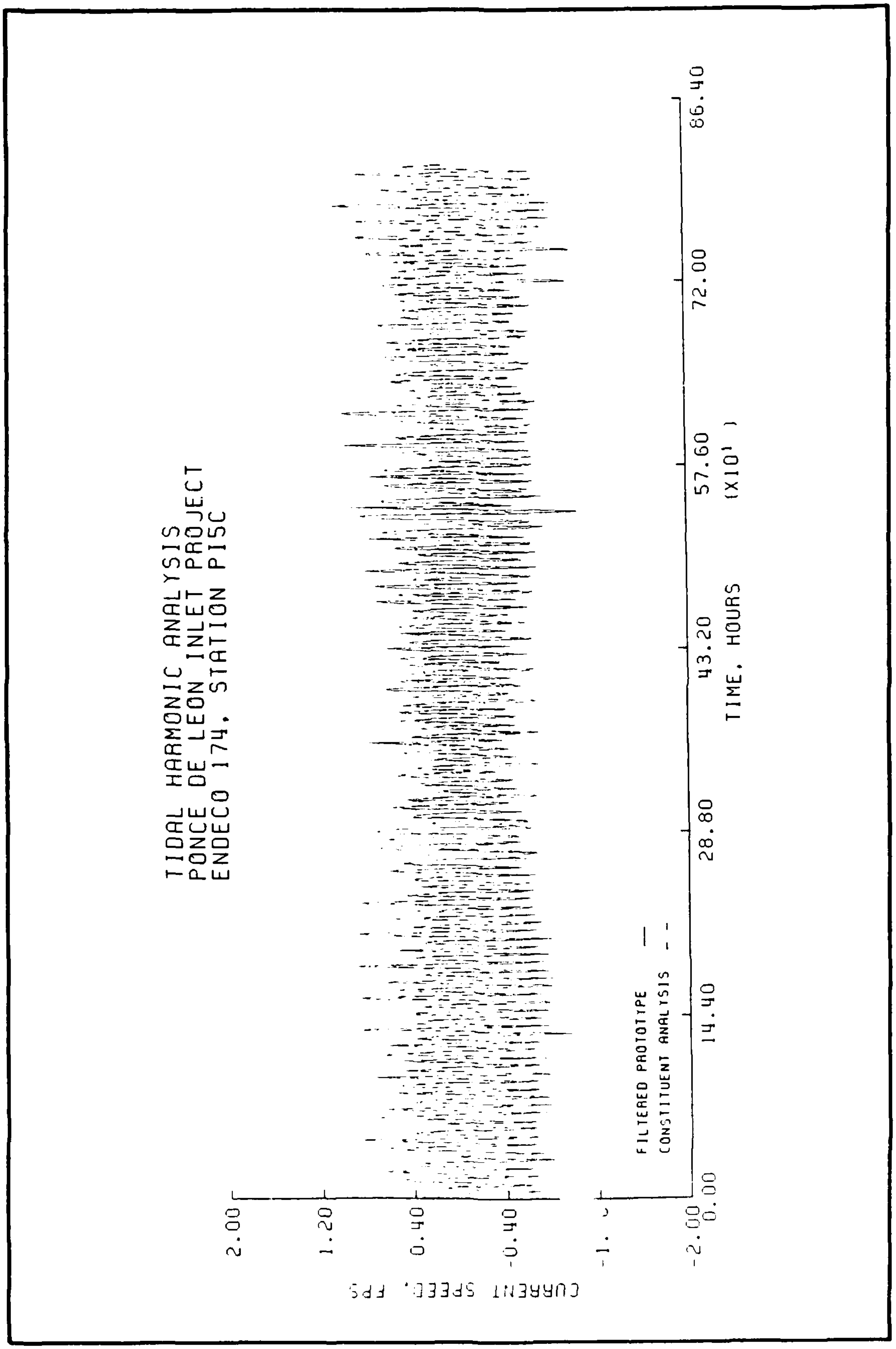
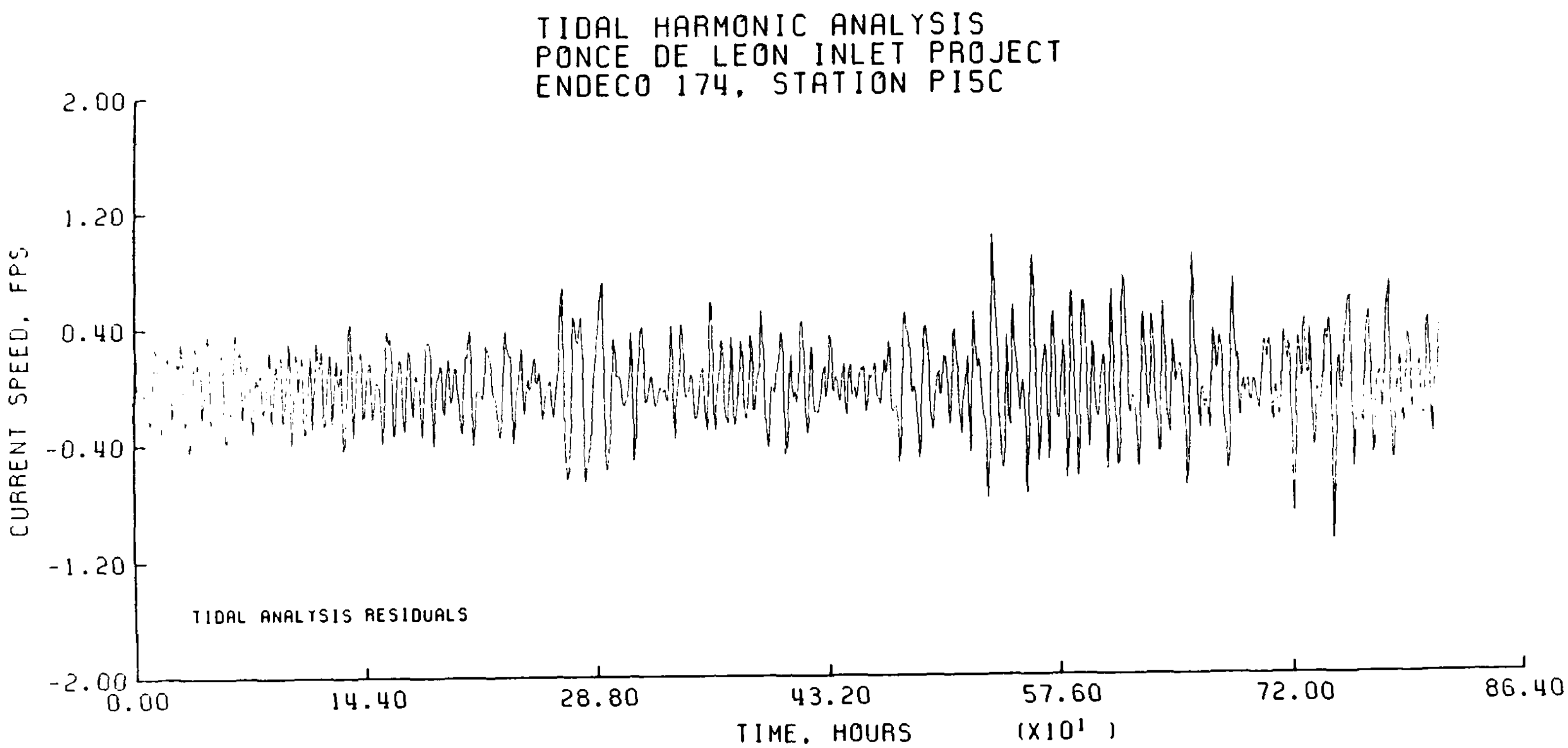

TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5C
FILTERED PROTOTYPE
CONSTITUENT ANALYSIS
CURRENT SPEED, FPS
2.00
1.20
0.40
-0.40
-2.00
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)

PLATE 98


TIDAL HARMONIC ANALYSIS
PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5C
2.00
1.20
0.40
-0.40
-1.20
-2.00
CURRENT SPEED, FPS
TIDAL ANALYSIS RESIDUALS
0.00
14.40
28.80
43.20
57.60
72.00
86.40
TIME, HOURS
(X10¹)

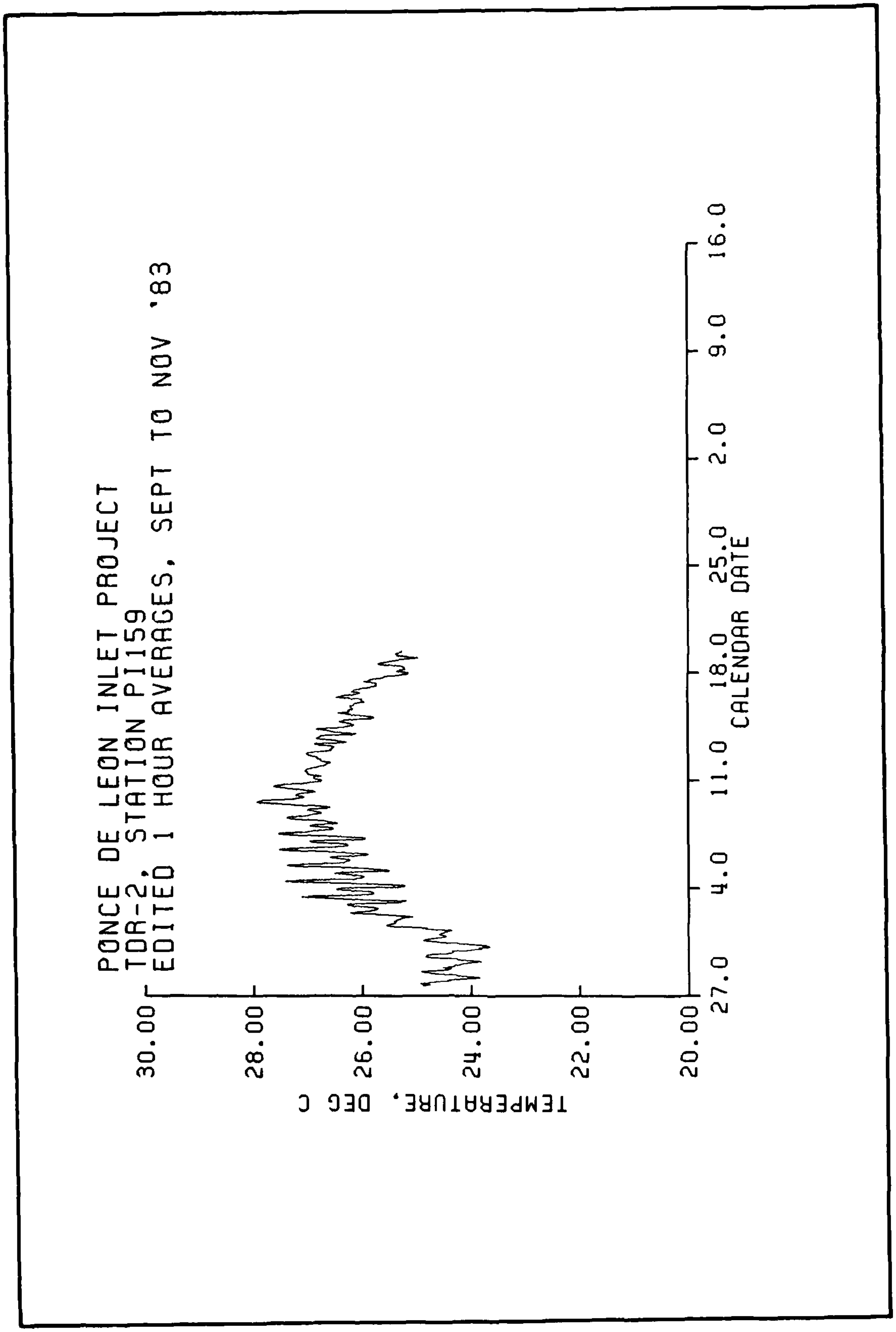

PONCE DE LEON INLET PROJECT
TDR-2, STATION PI159
EDITED 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 100

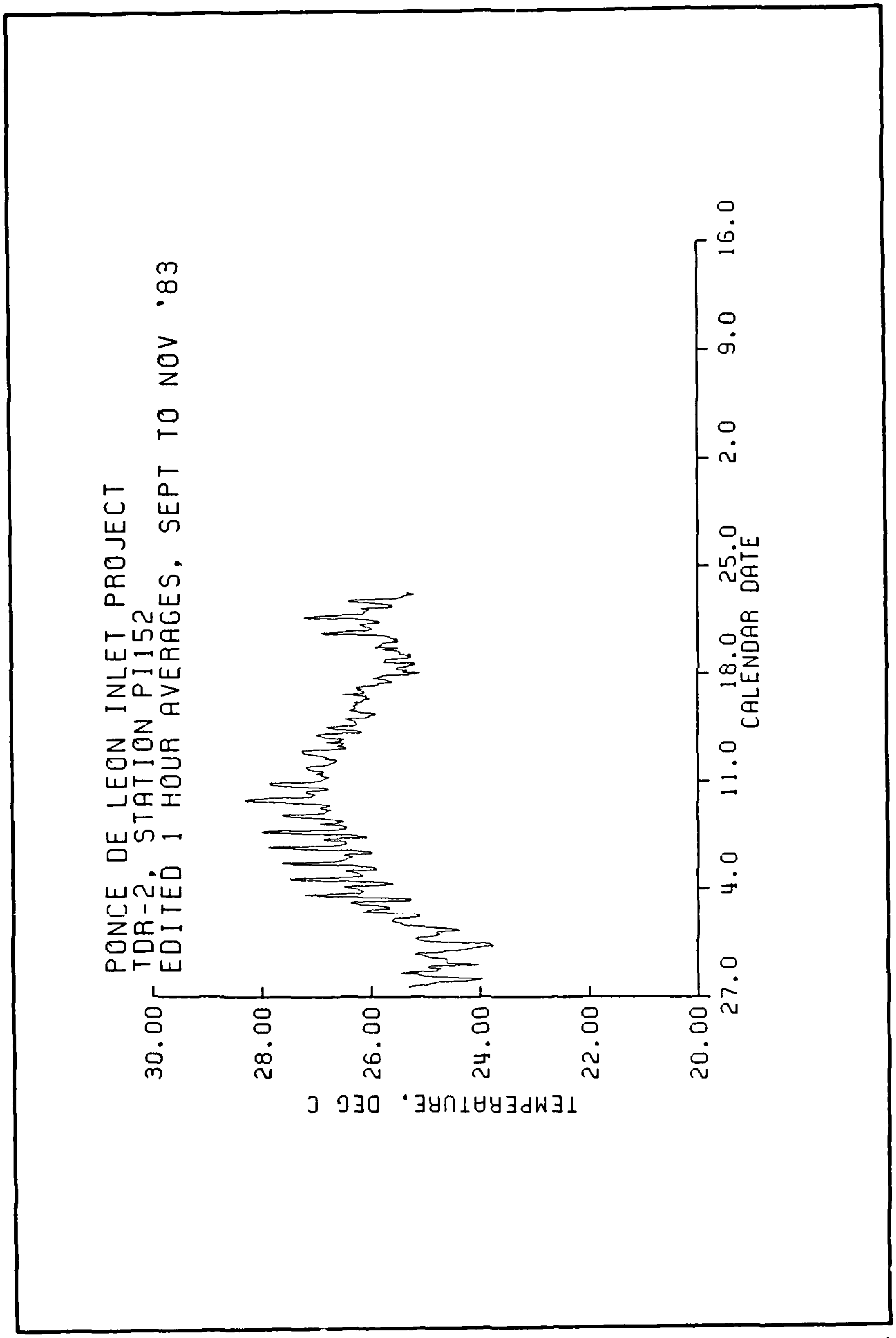

PONCE DE LEON INLET PROJECT
TDR-2, STATION PI152
EDITED 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 101

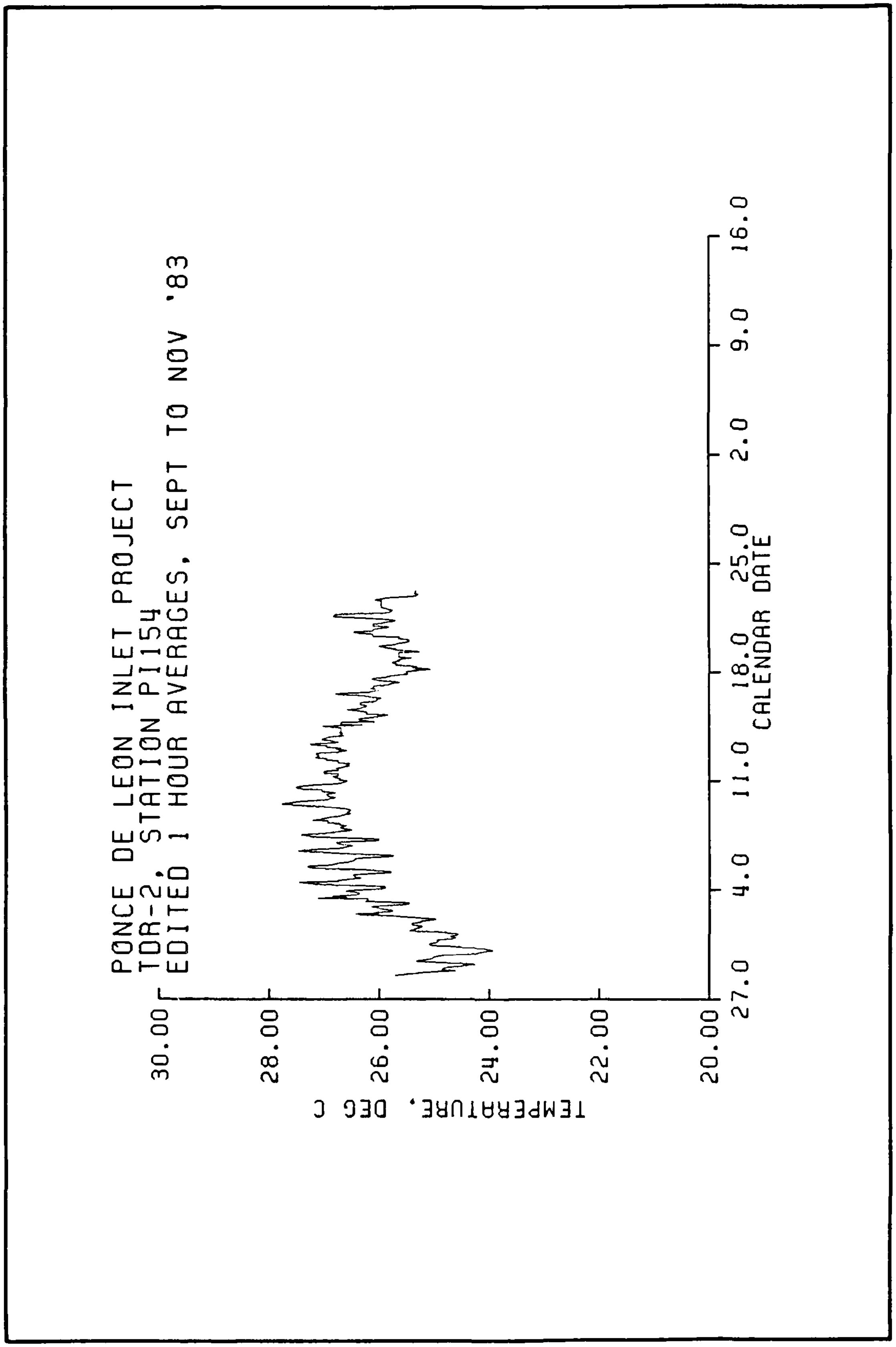
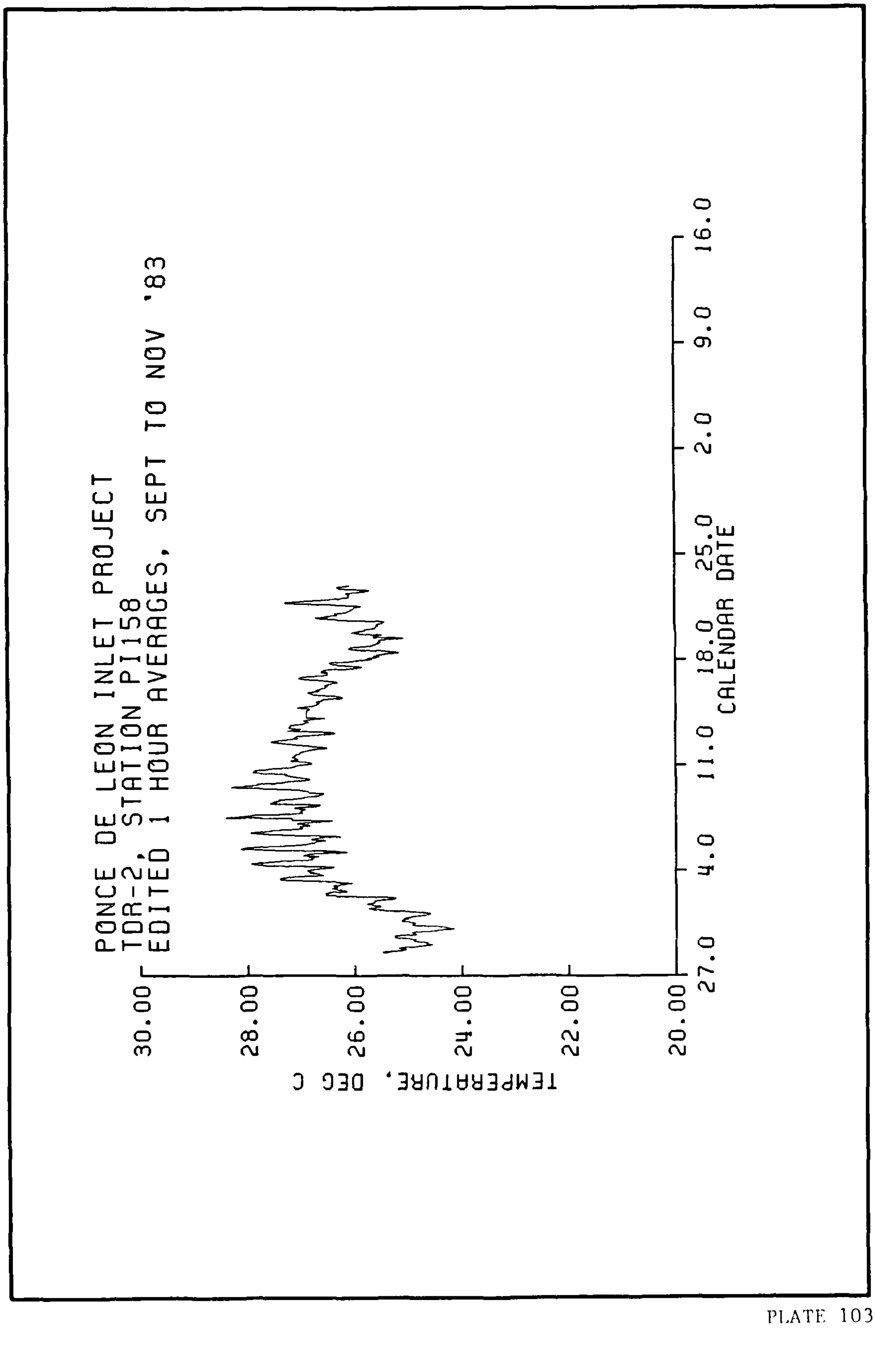

PONCE DE LEON INLET PROJECT
TDR-2, STATION PI154
EDITED 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 102


PONCE DE LEON INLET PROJECT
TDR-2, STATION PI158
EDITED 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

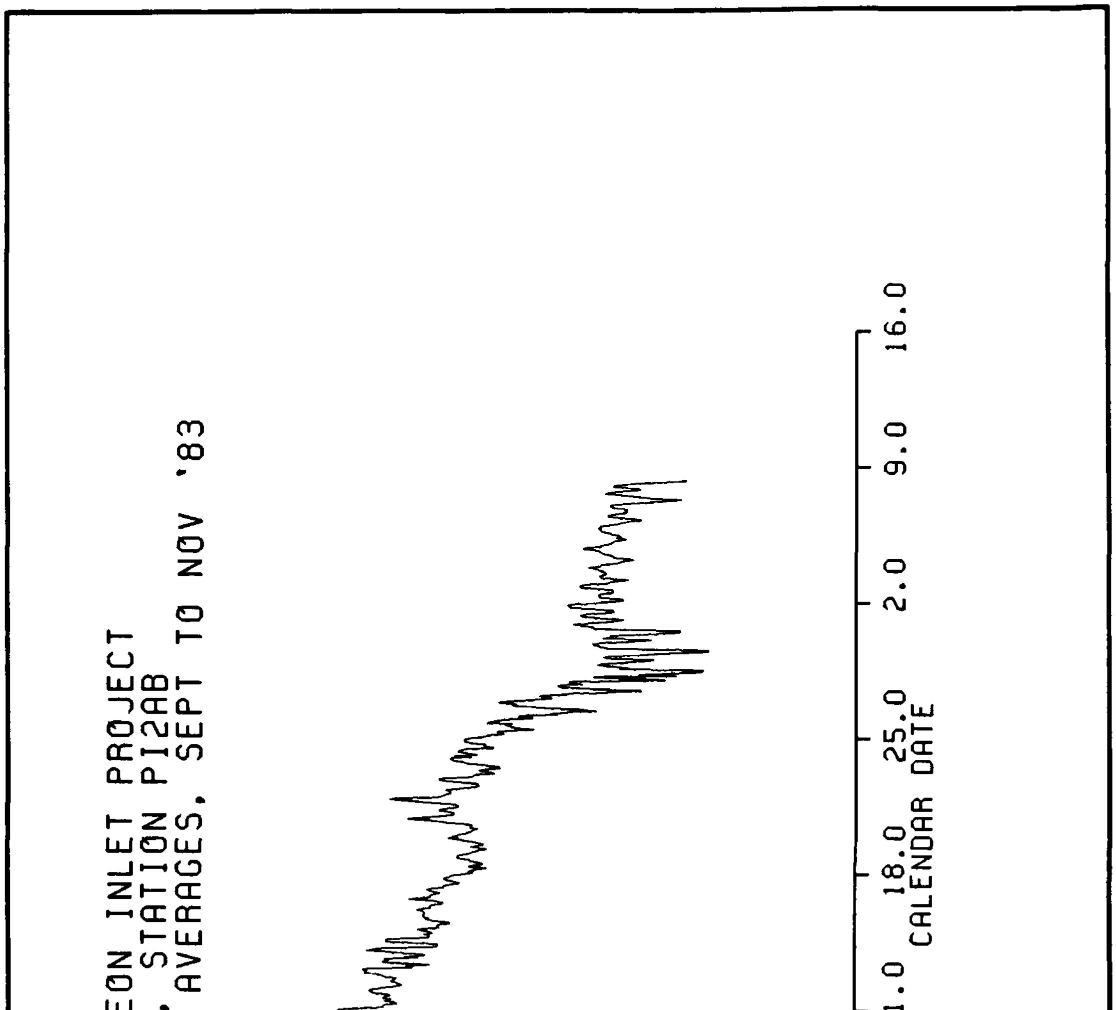

PONCE DE LEON INLET PROJECT
ENDECO 170, STATION PI2AB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 104

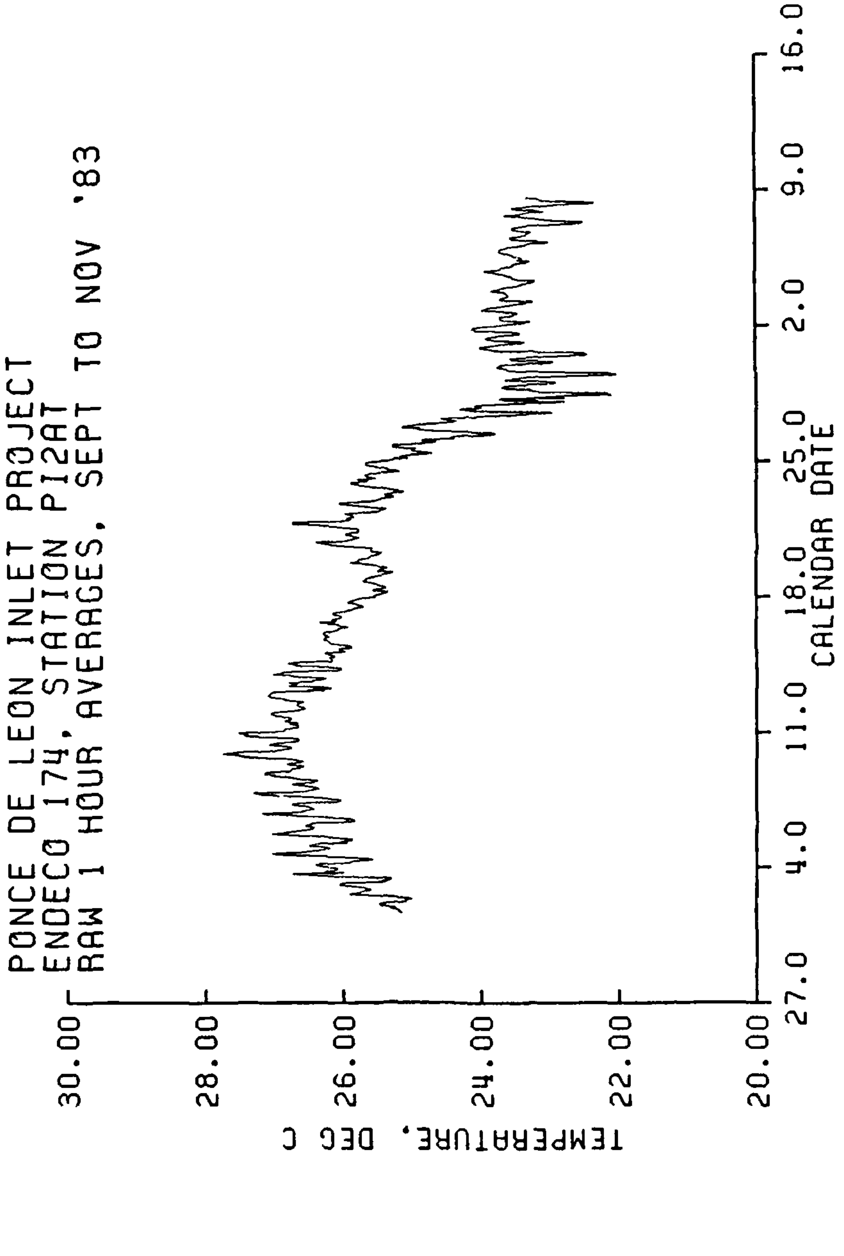
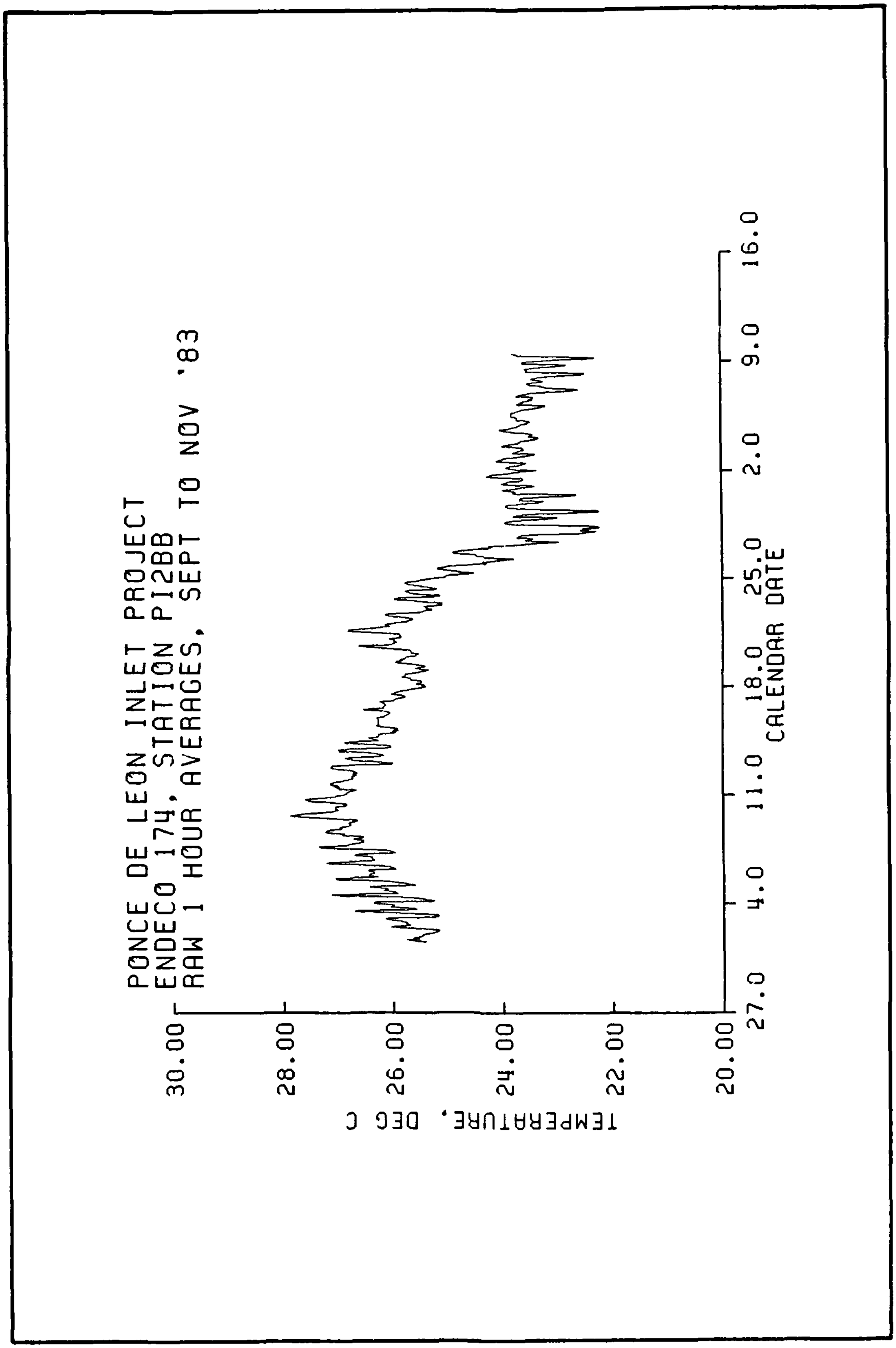
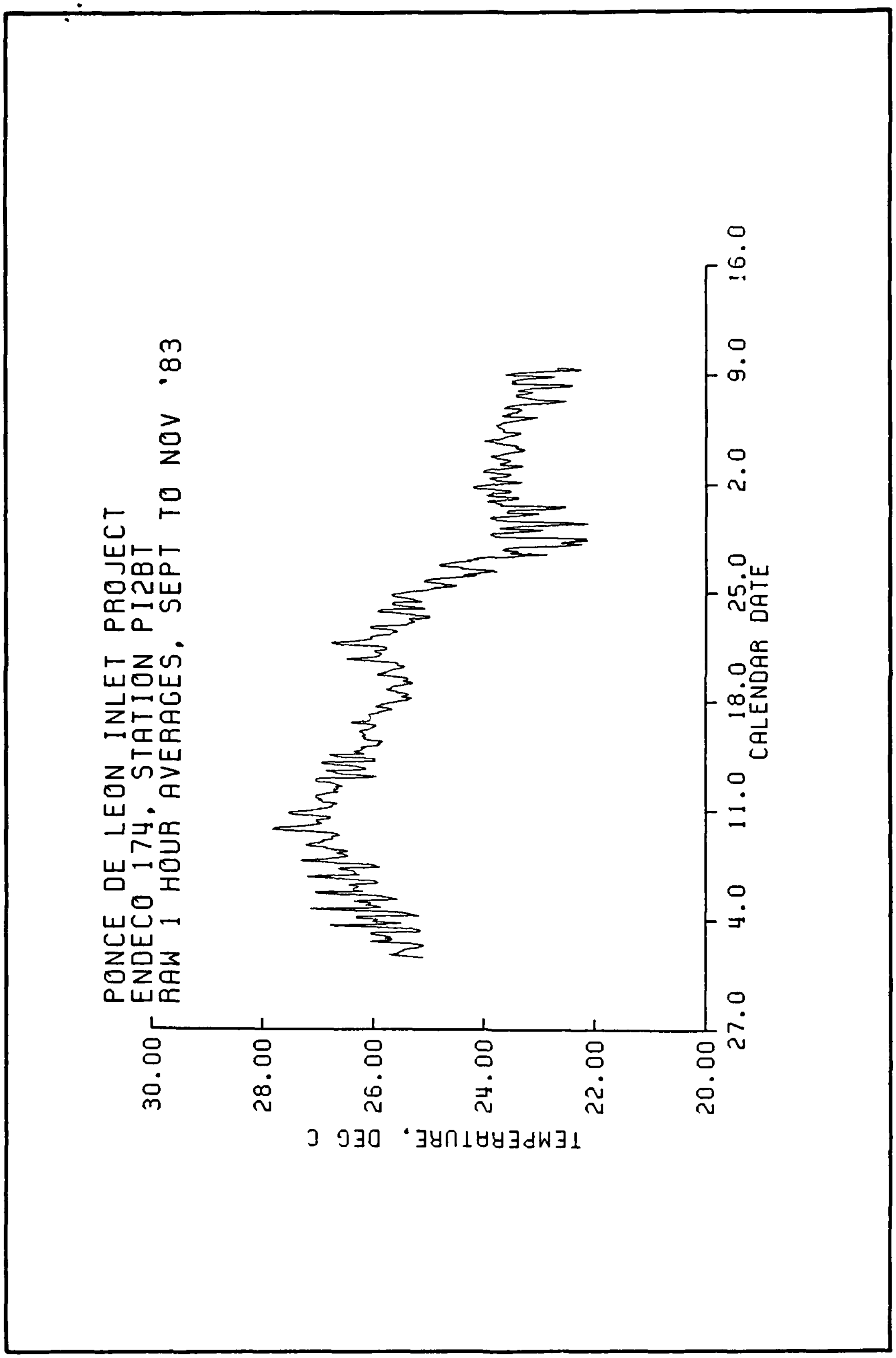

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2AT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 105



PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2BB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 106



PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2BT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 107

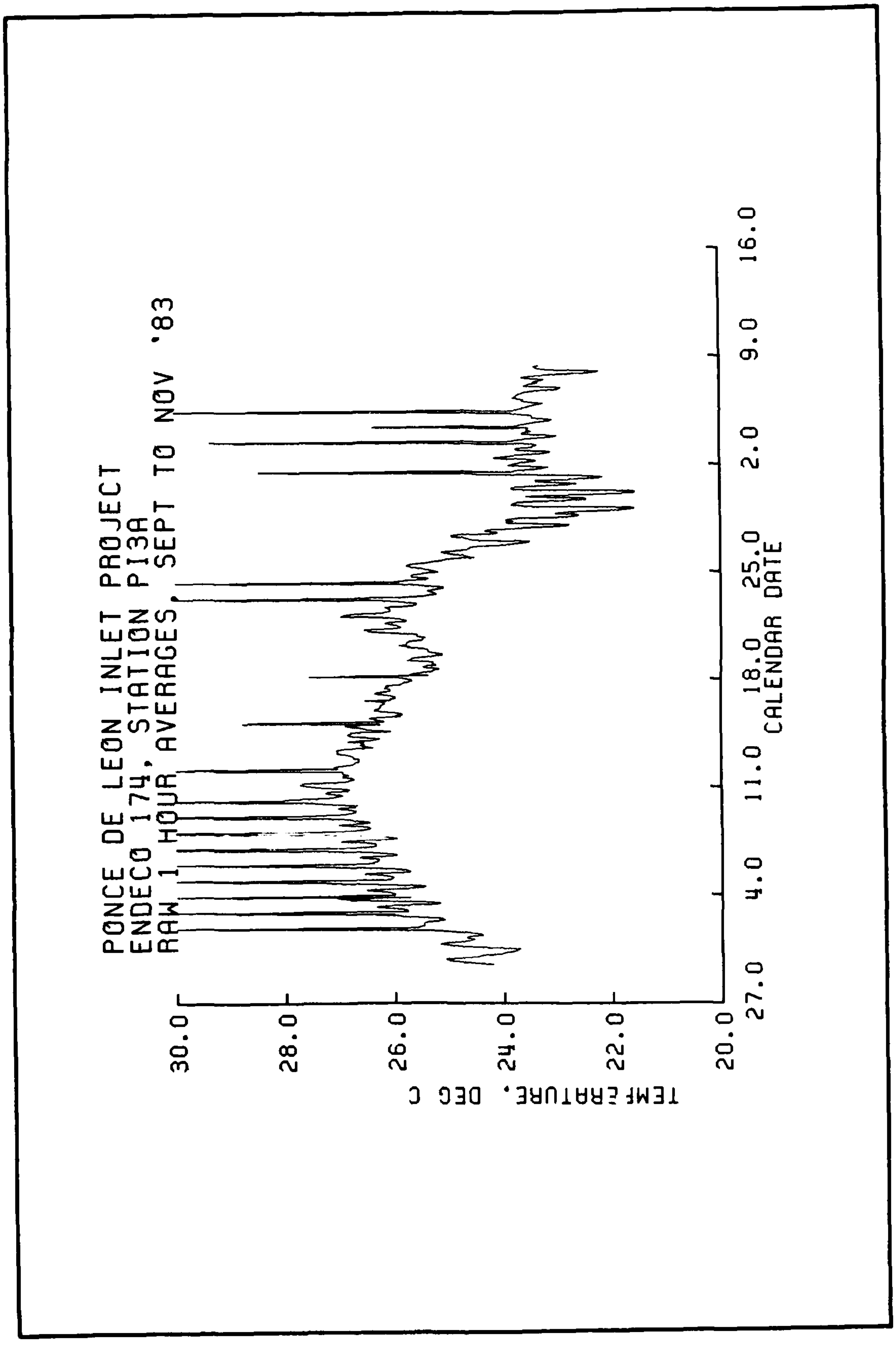

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3A
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.0
28.0
26.0
24.0
22.0
20.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 108

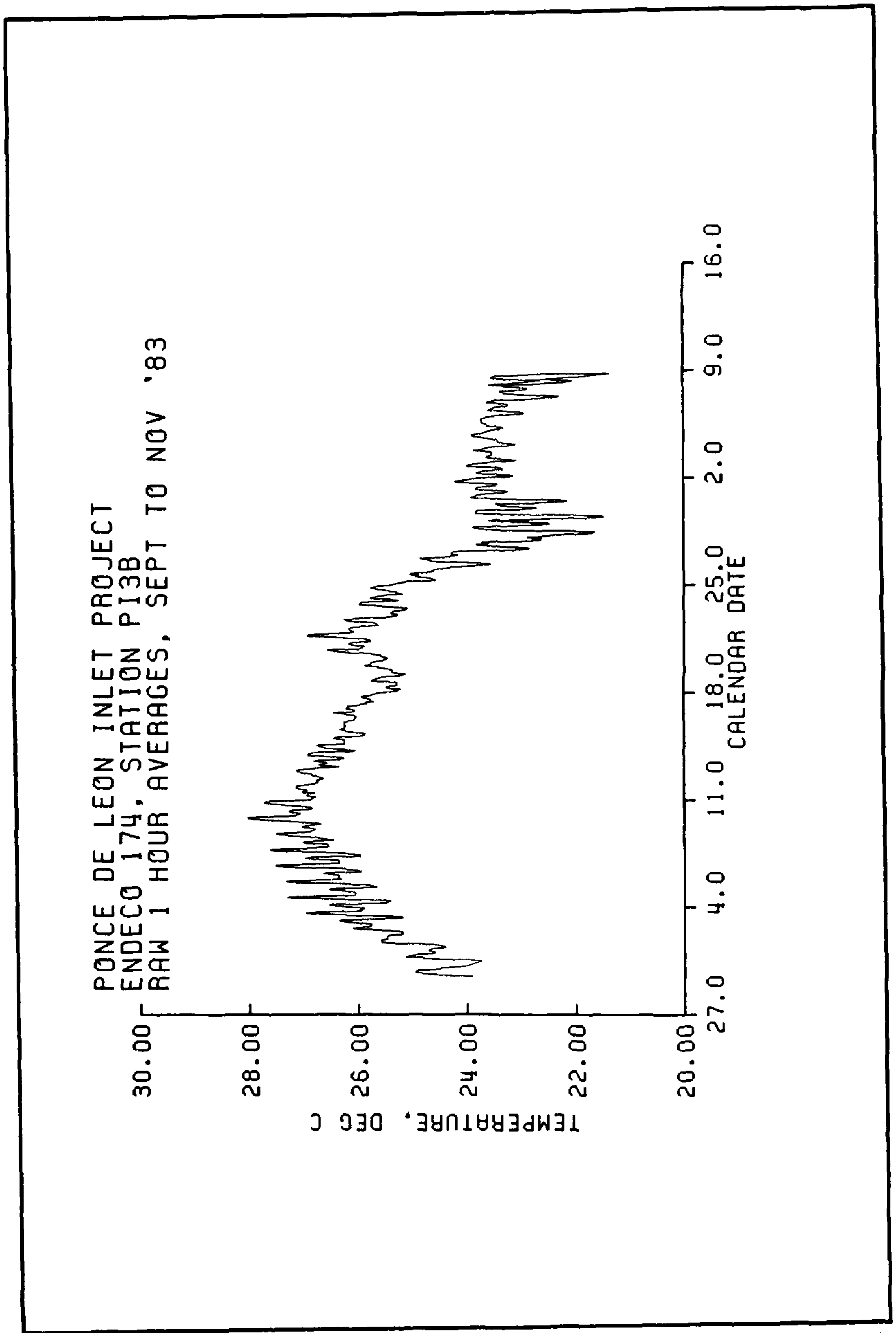

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3B
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 109

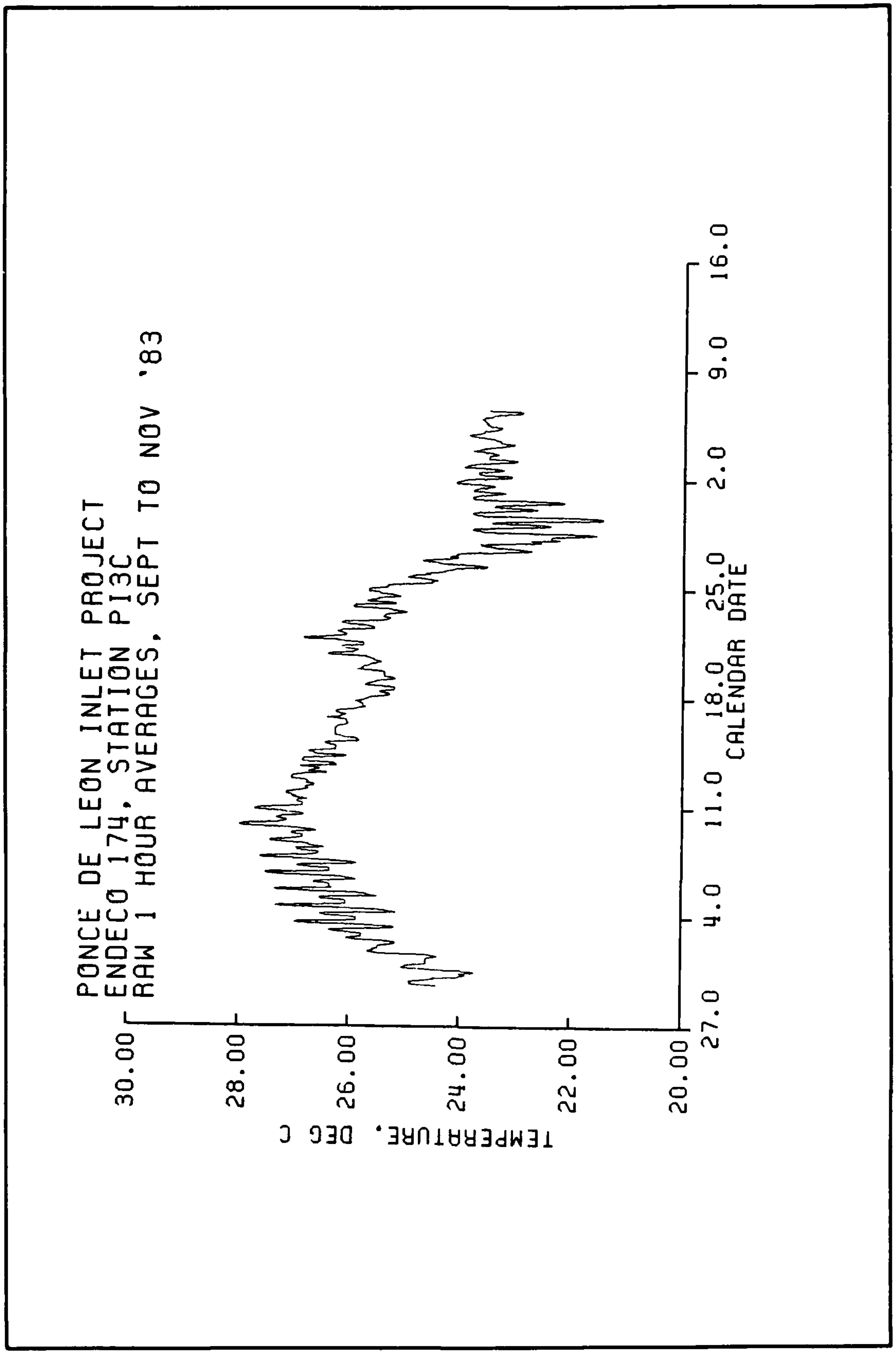
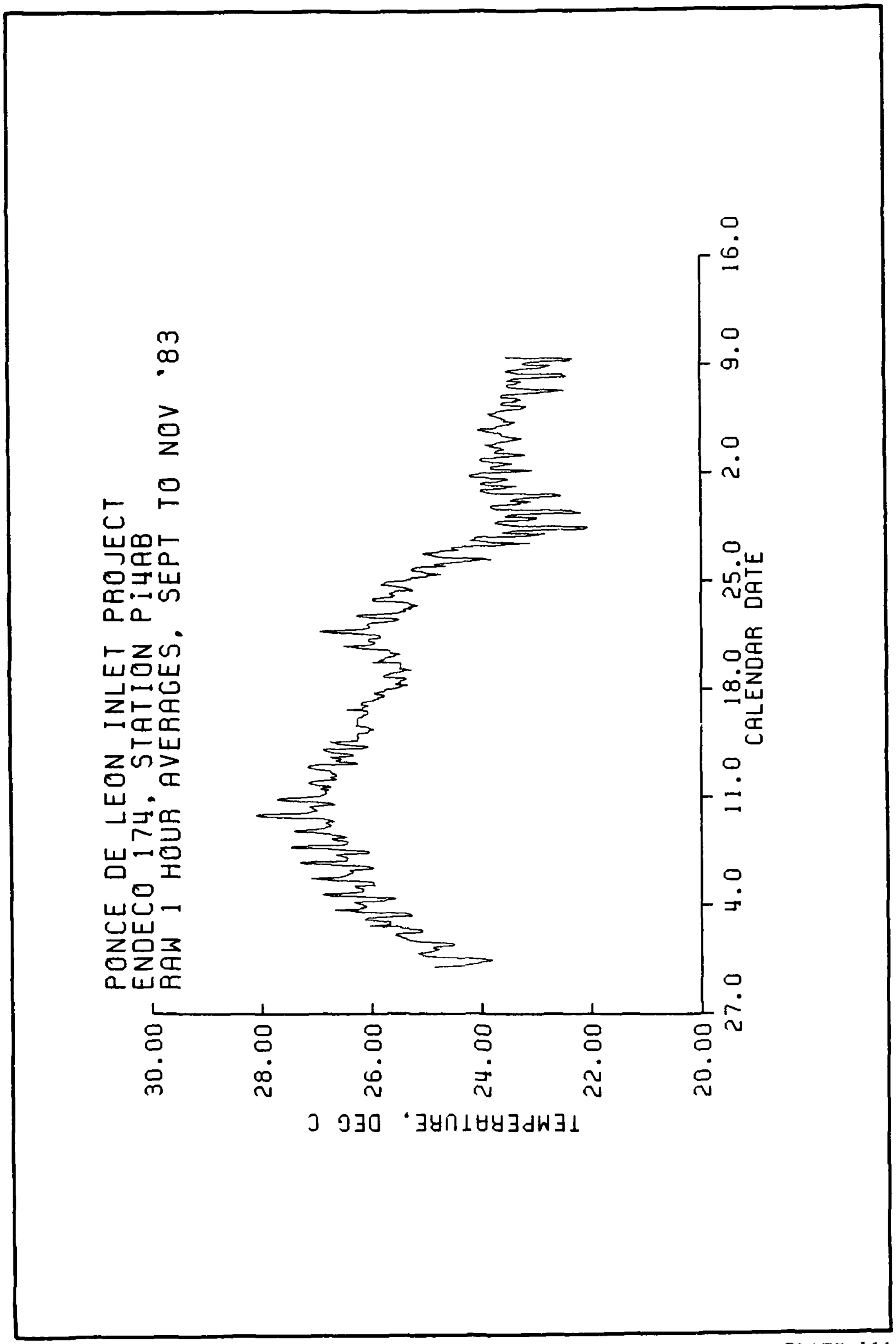
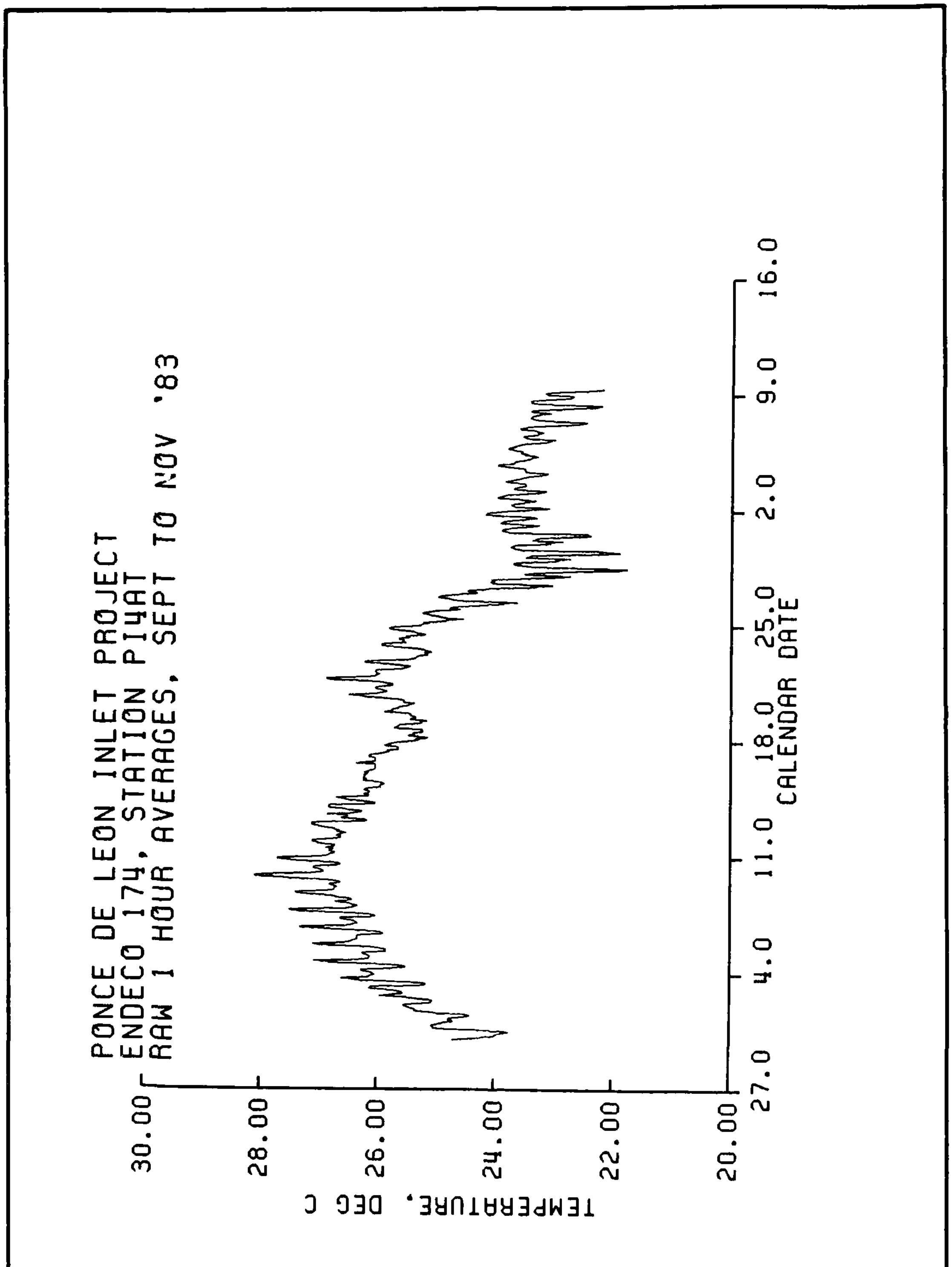

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3C
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 110



PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4AB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 111



PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4AT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 112

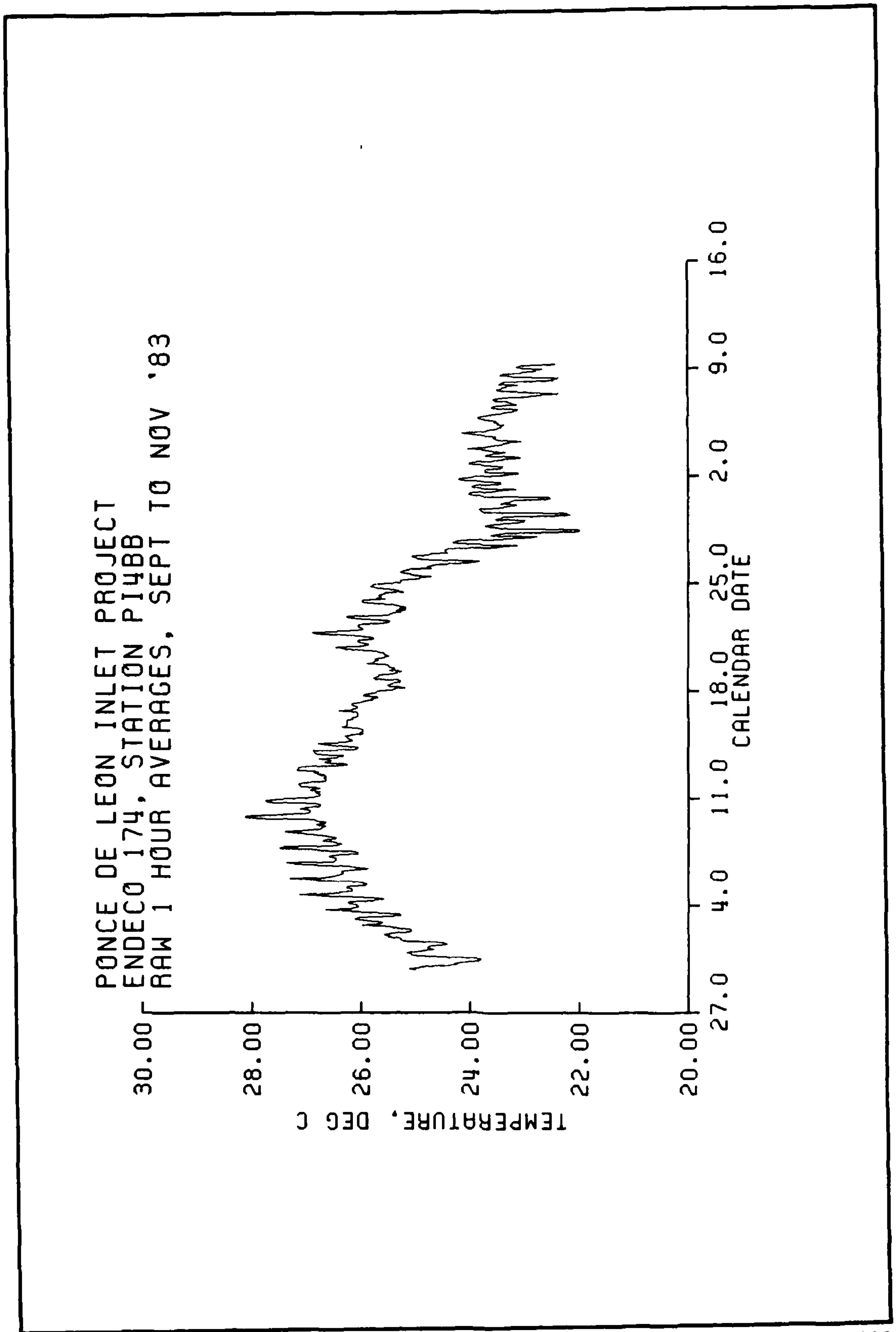

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION P14BB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
30.00
28.00
26.00
24.00
22.00
20.00
TEMPERATURE, DEG C
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 113

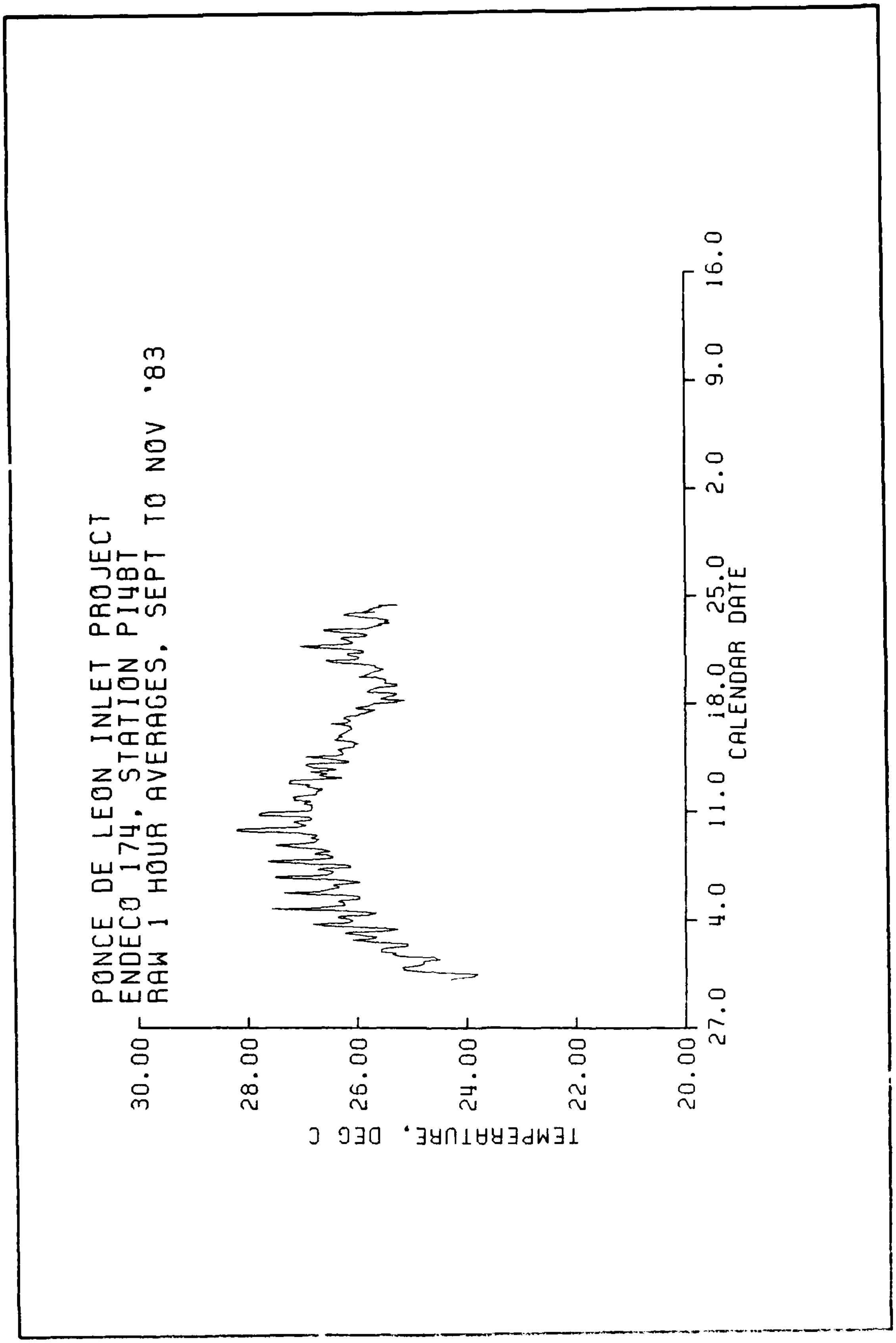
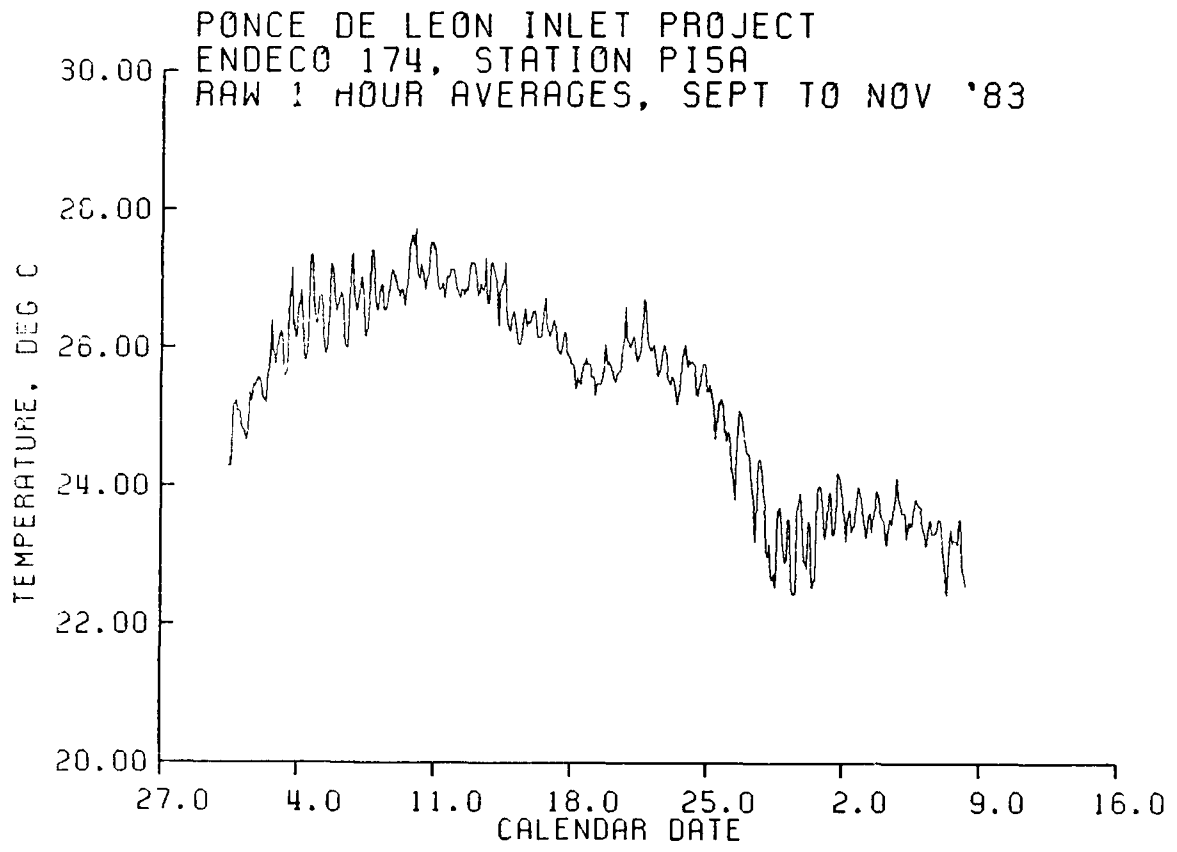

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4BT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 114



PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5A
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
30.00
28.00
26.00
24.00
22.00
20.00
TEMPERATURE, DEG C
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

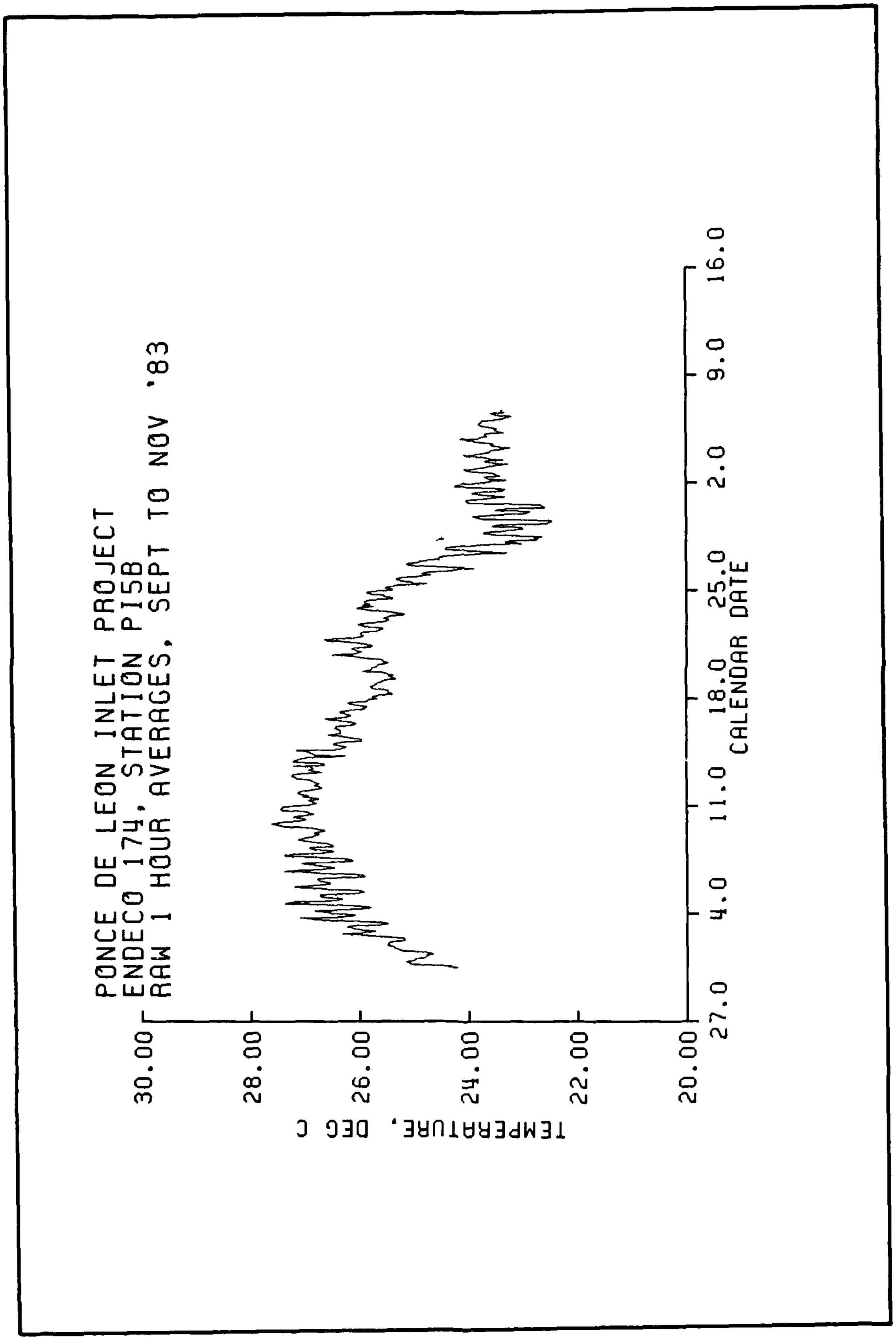

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5B
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 116

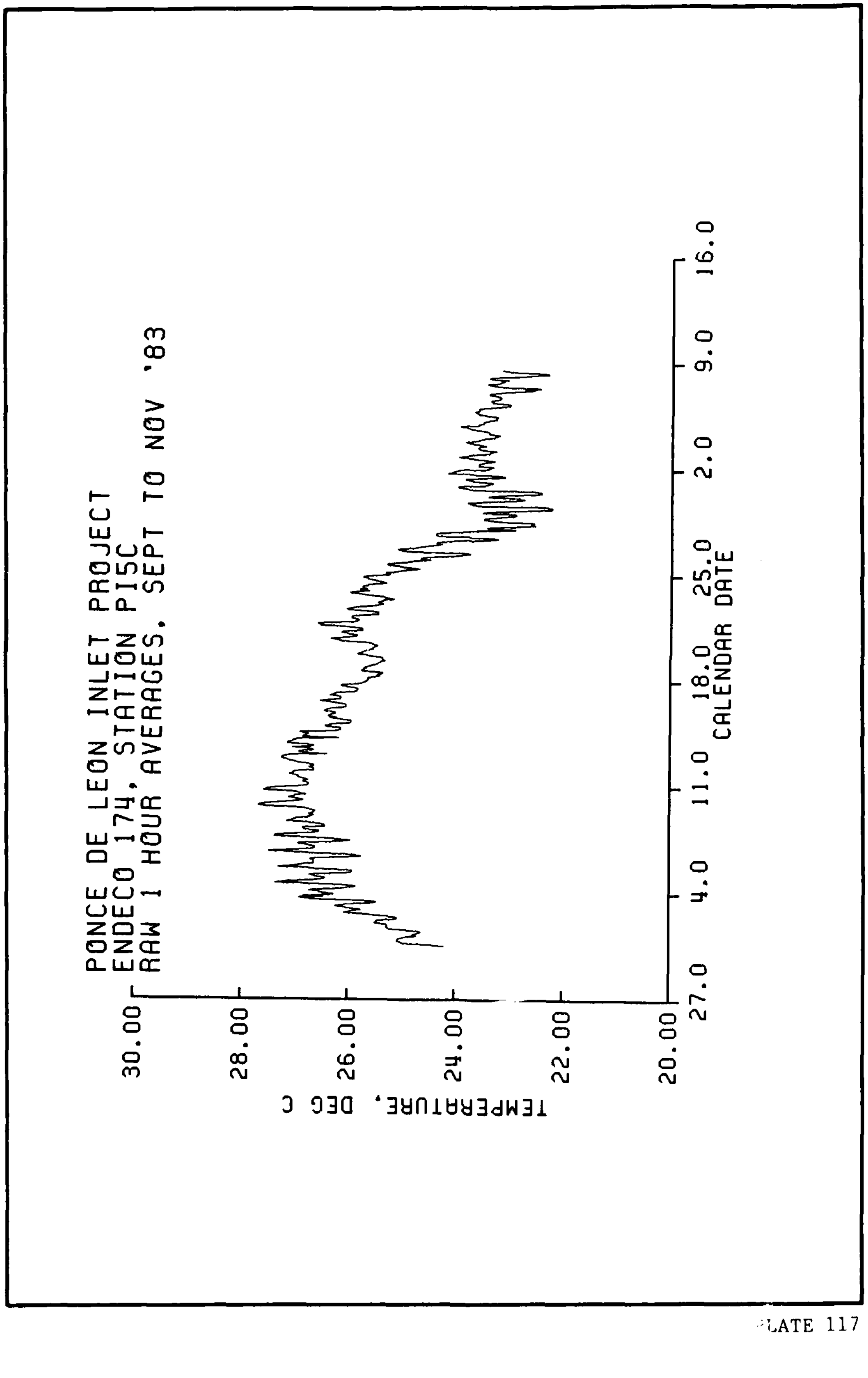

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5C
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
TEMPERATURE, DEG C
30.00
28.00
26.00
24.00
22.00
20.00
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 117

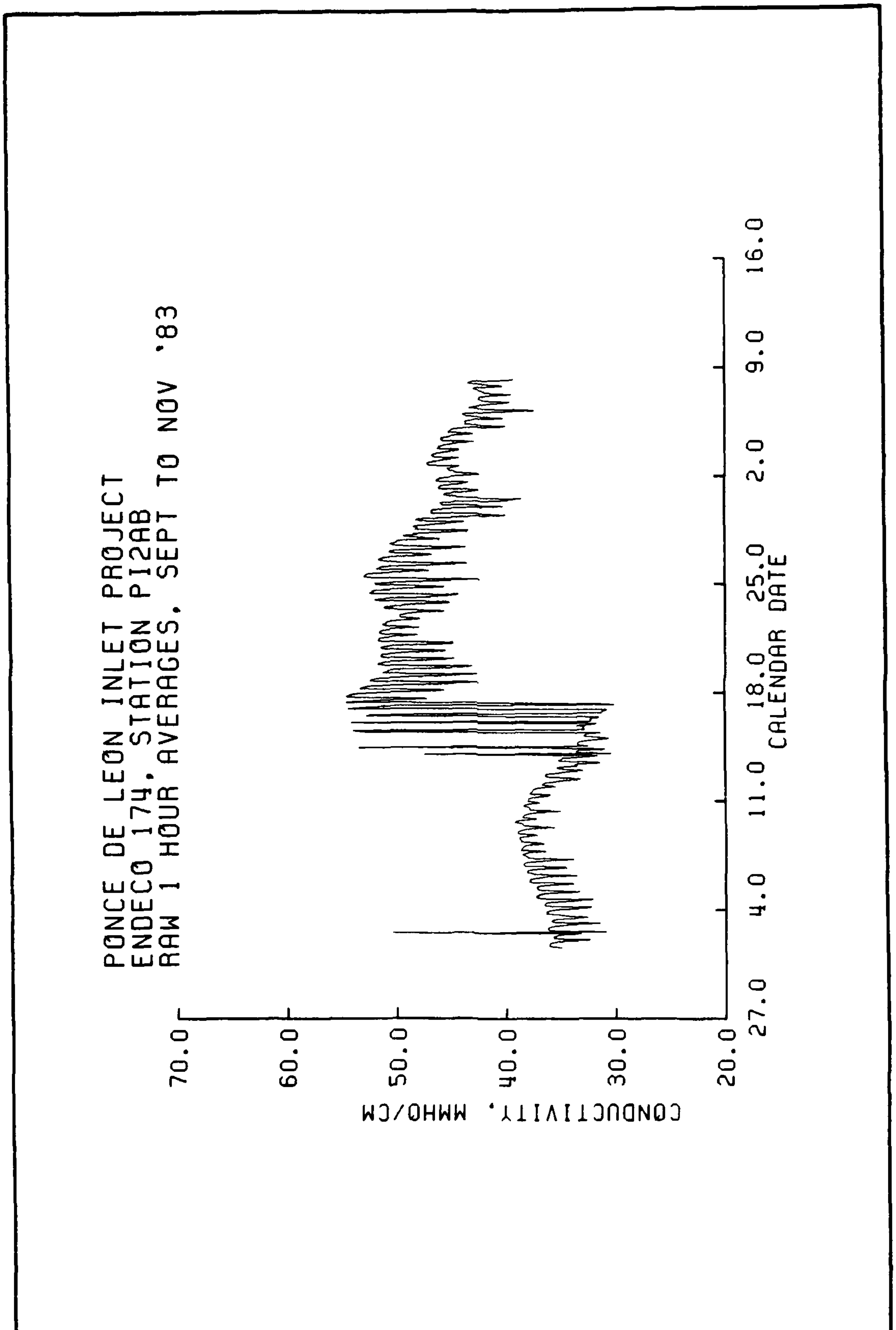

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2AB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CONDUCTIVITY, MMHO/CM
70.0
60.0
50.0
40.0
30.0
20.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 118

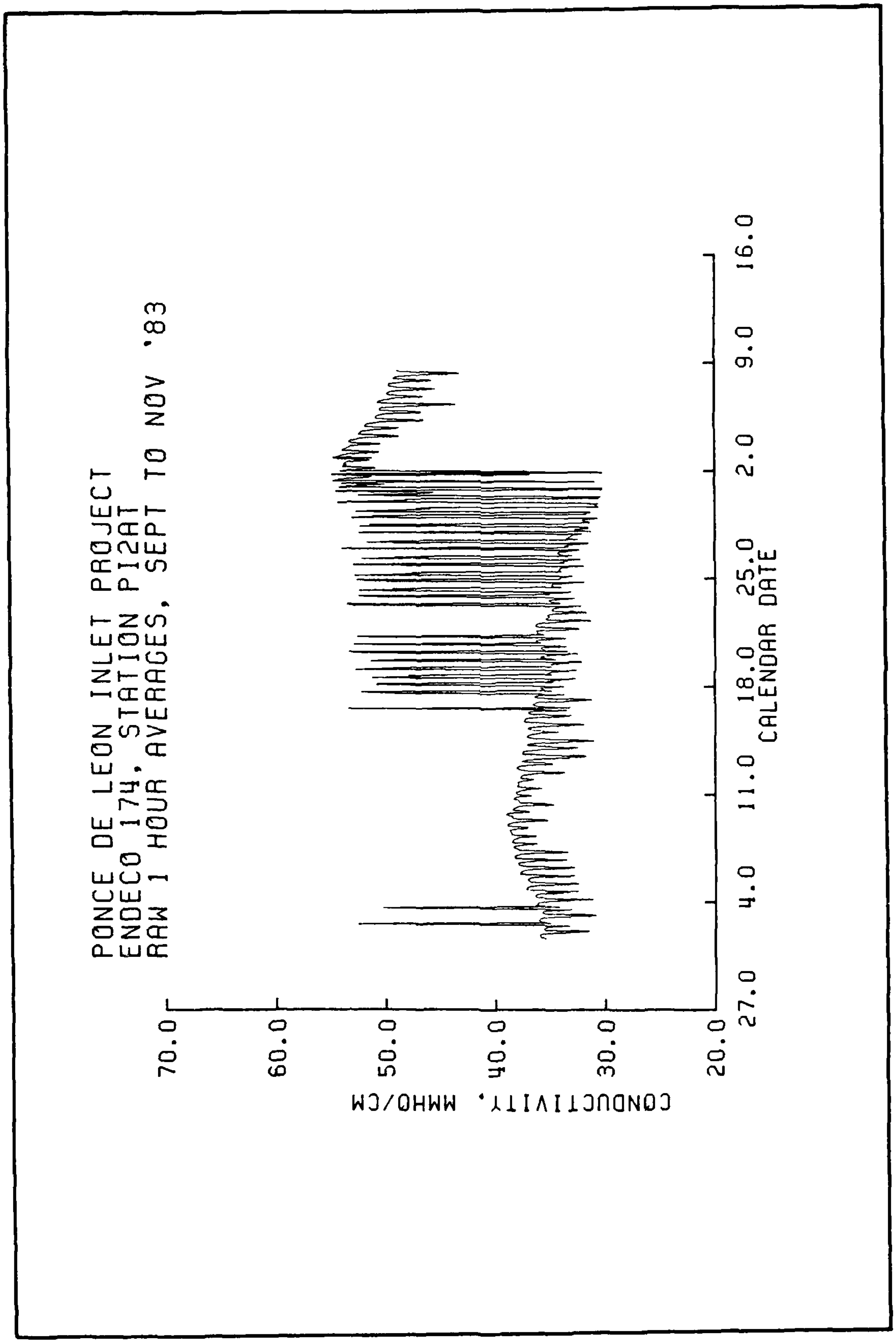

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2AT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CONDUCTIVITY, MMHO/CM
70.0
60.0
50.0
40.0
30.0
20.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 119

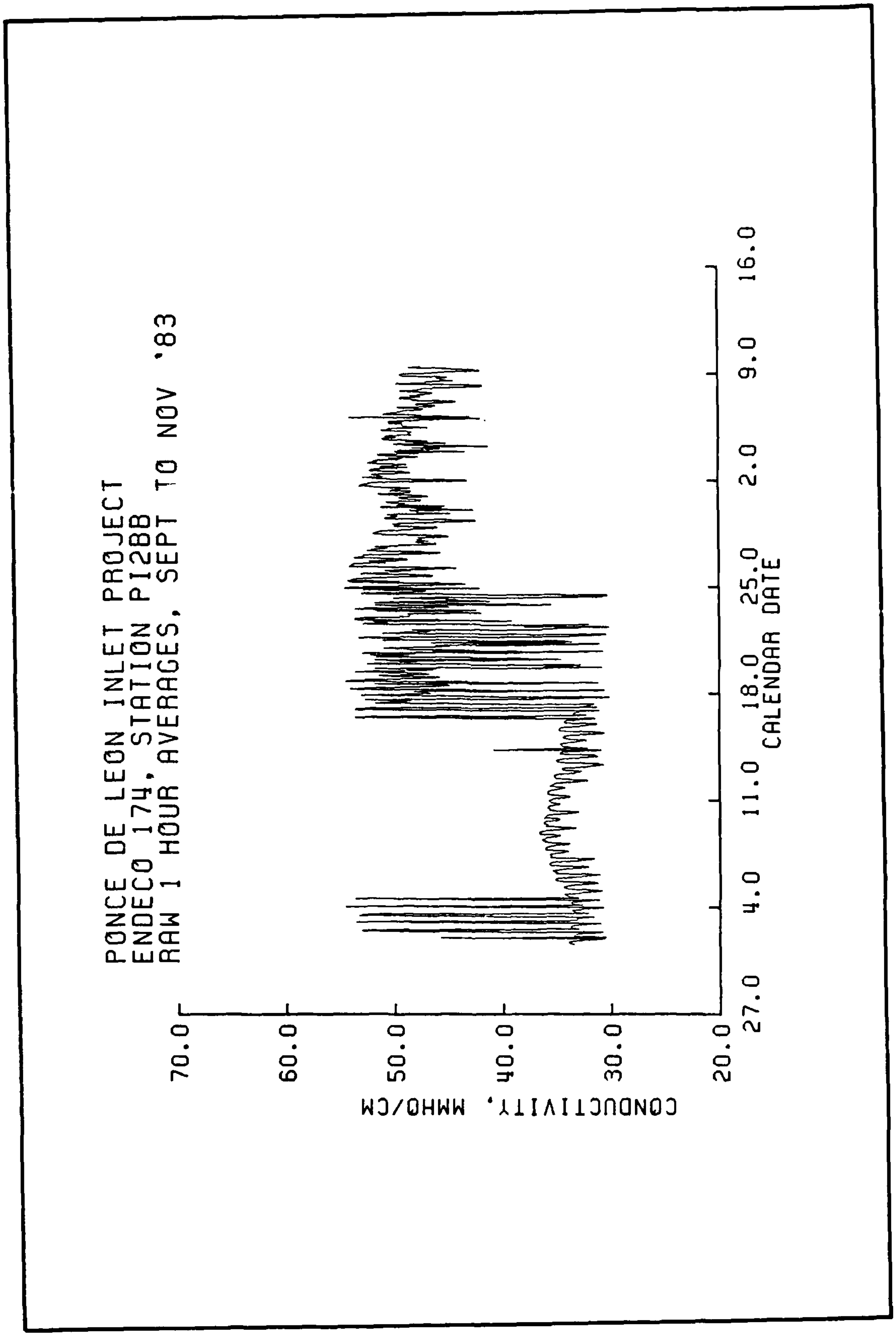

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2BB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CONDUCTIVITY, MMHO/CM
70.0
60.0
50.0
40.0
30.0
20.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 120

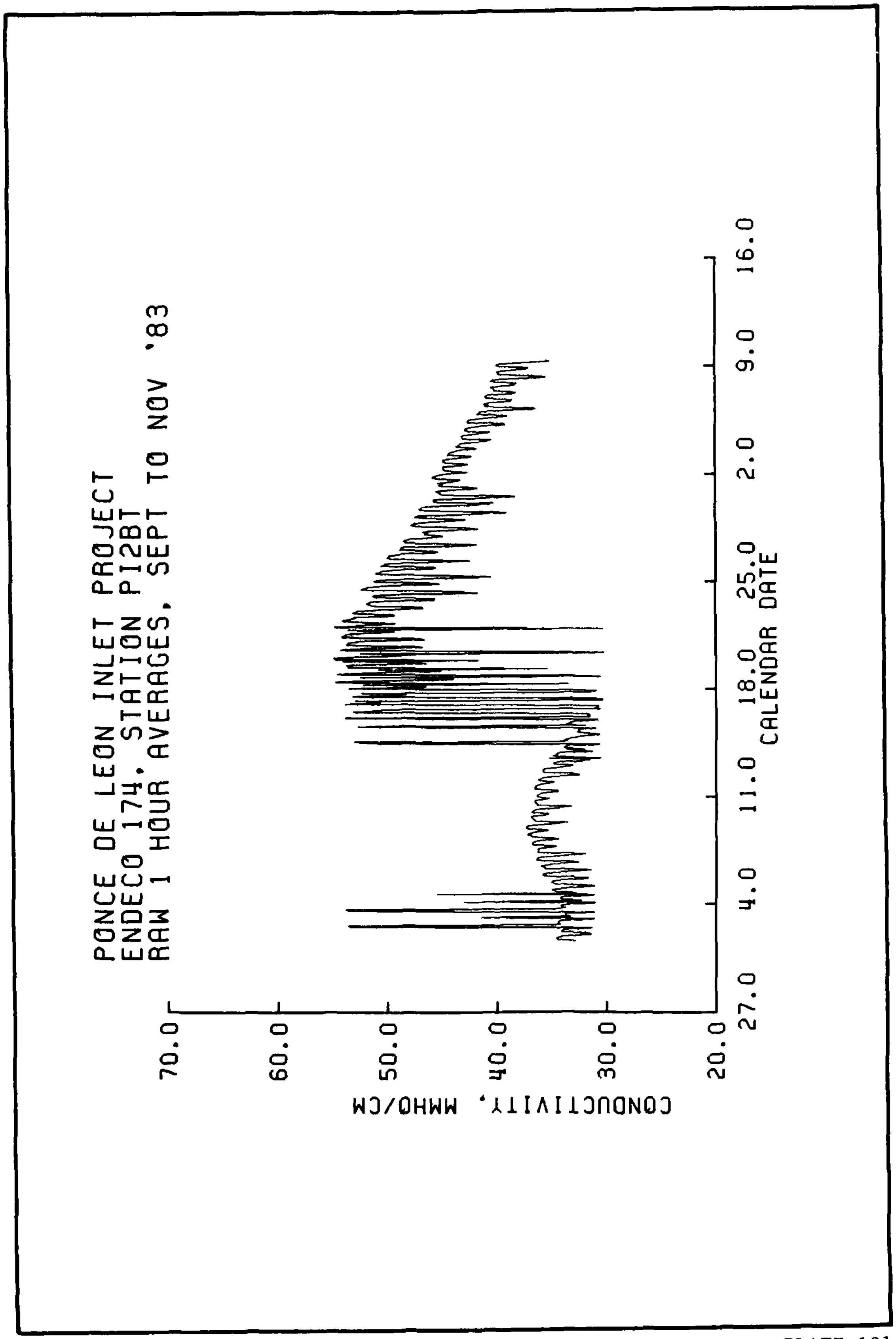

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI2BT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CONDUCTIVITY, MMHO/CM
70.0
60.0
50.0
40.0
30.0
20.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 121

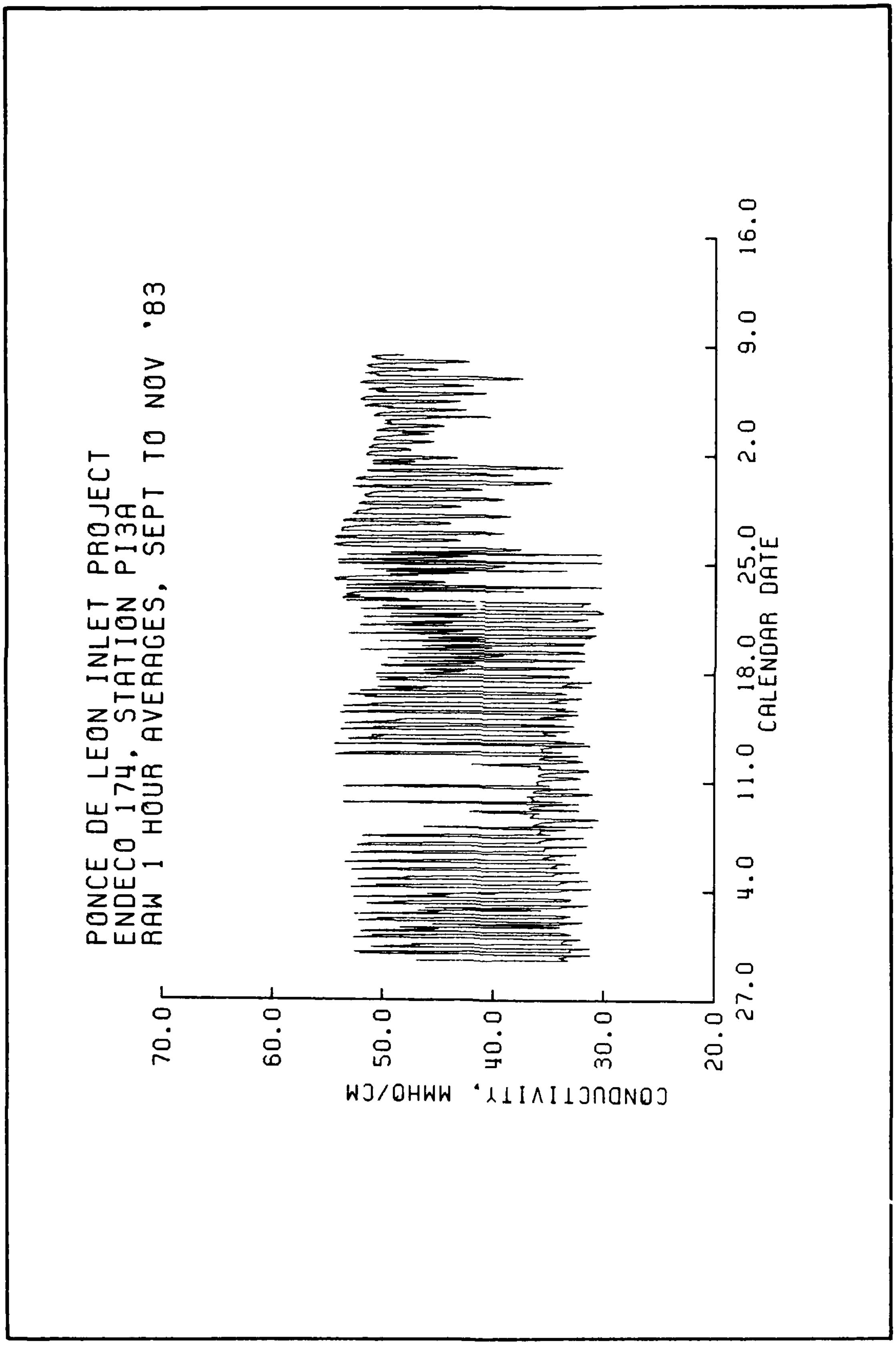

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3A
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CONDUCTIVITY, MMHO/CM
70.0
60.0
50.0
40.0
30.0
20.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 122

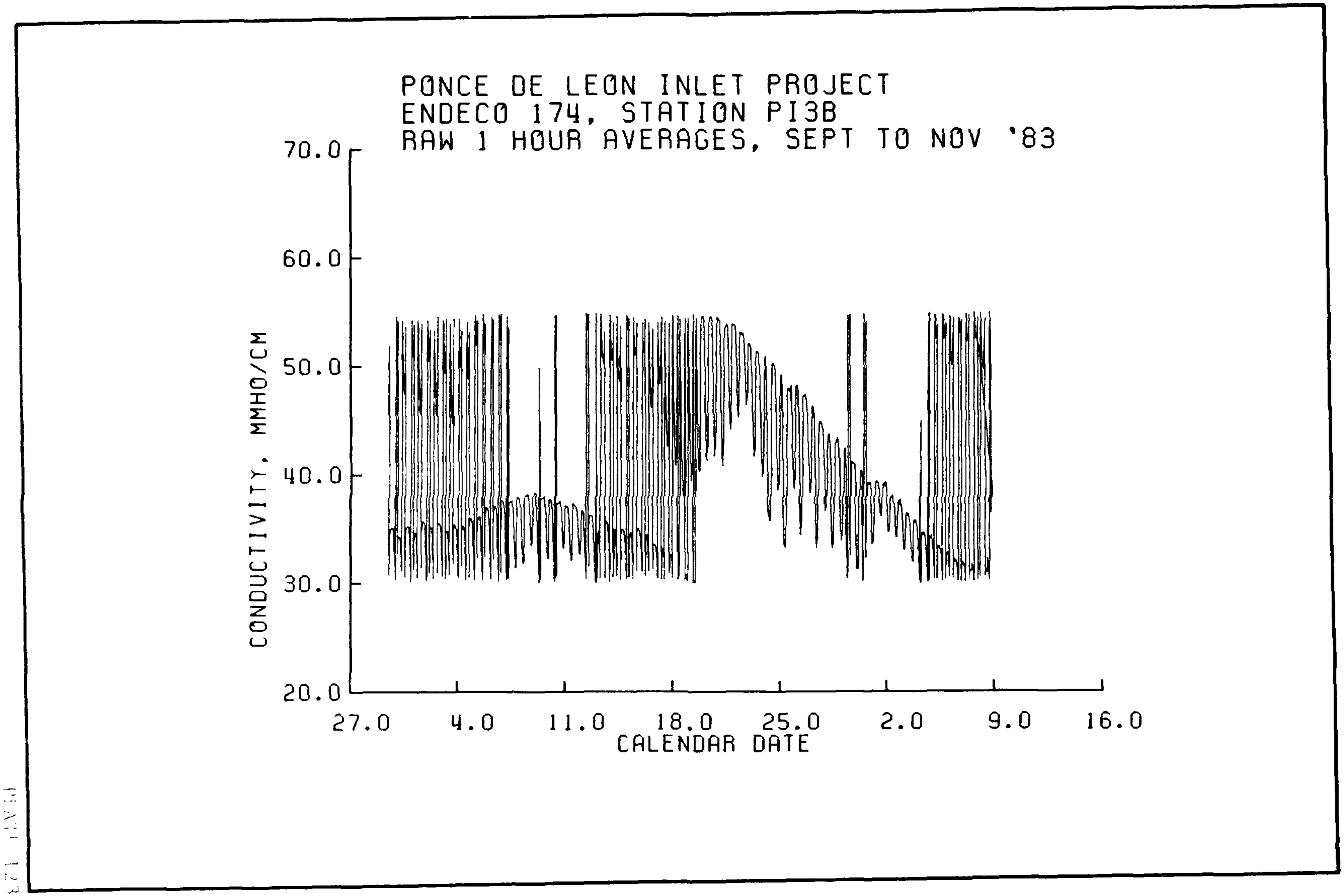

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3B
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
70.0
60.0
50.0
40.0
30.0
20.0
CONDUCTIVITY, MMHO/CM
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 123

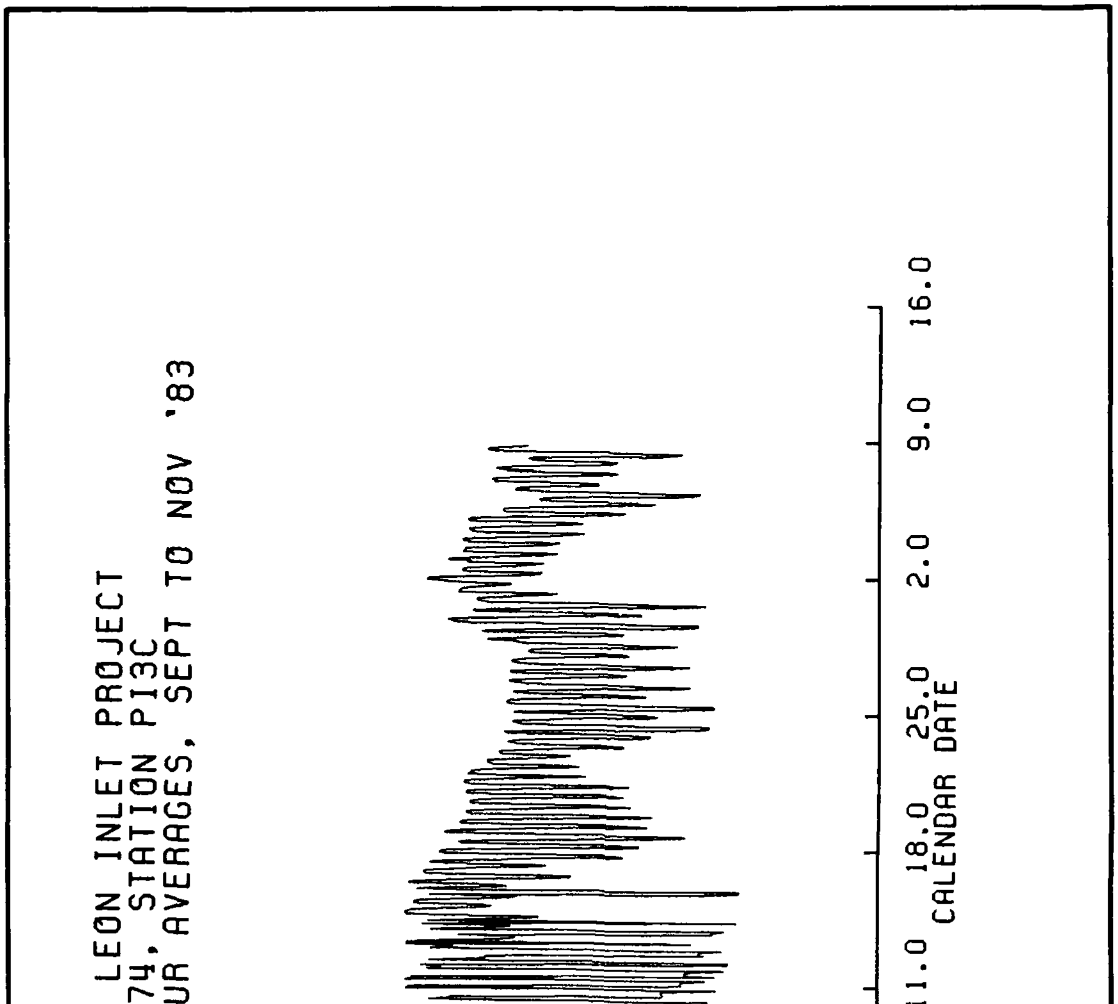
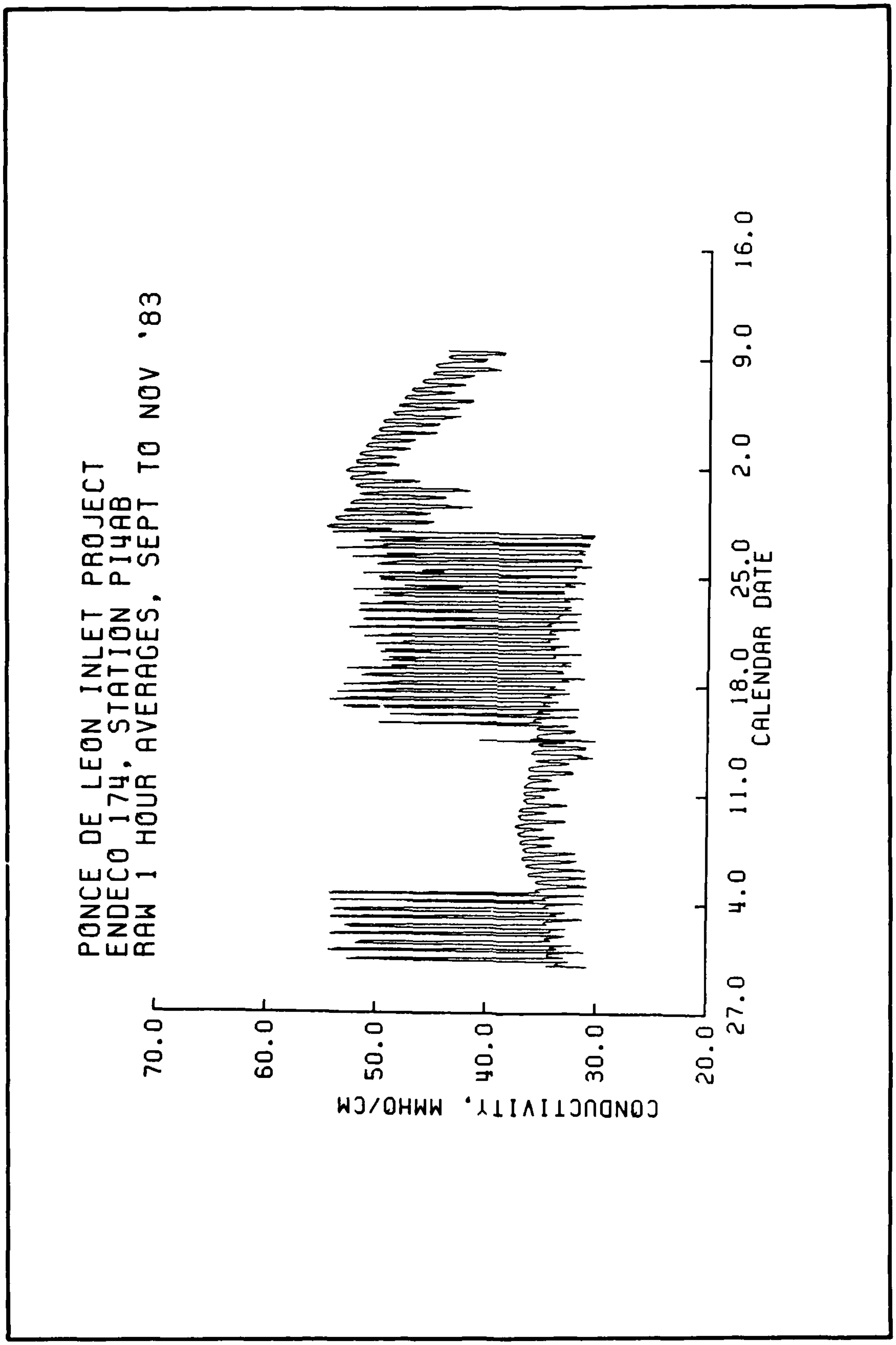

PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI3C
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CONDUCTIVITY, MMHO/CM
70.0
60.0
50.0
40.0
30.0
20.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 124



PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4AB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CONDUCTIVITY, MMHO/CM
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60.0
50.0
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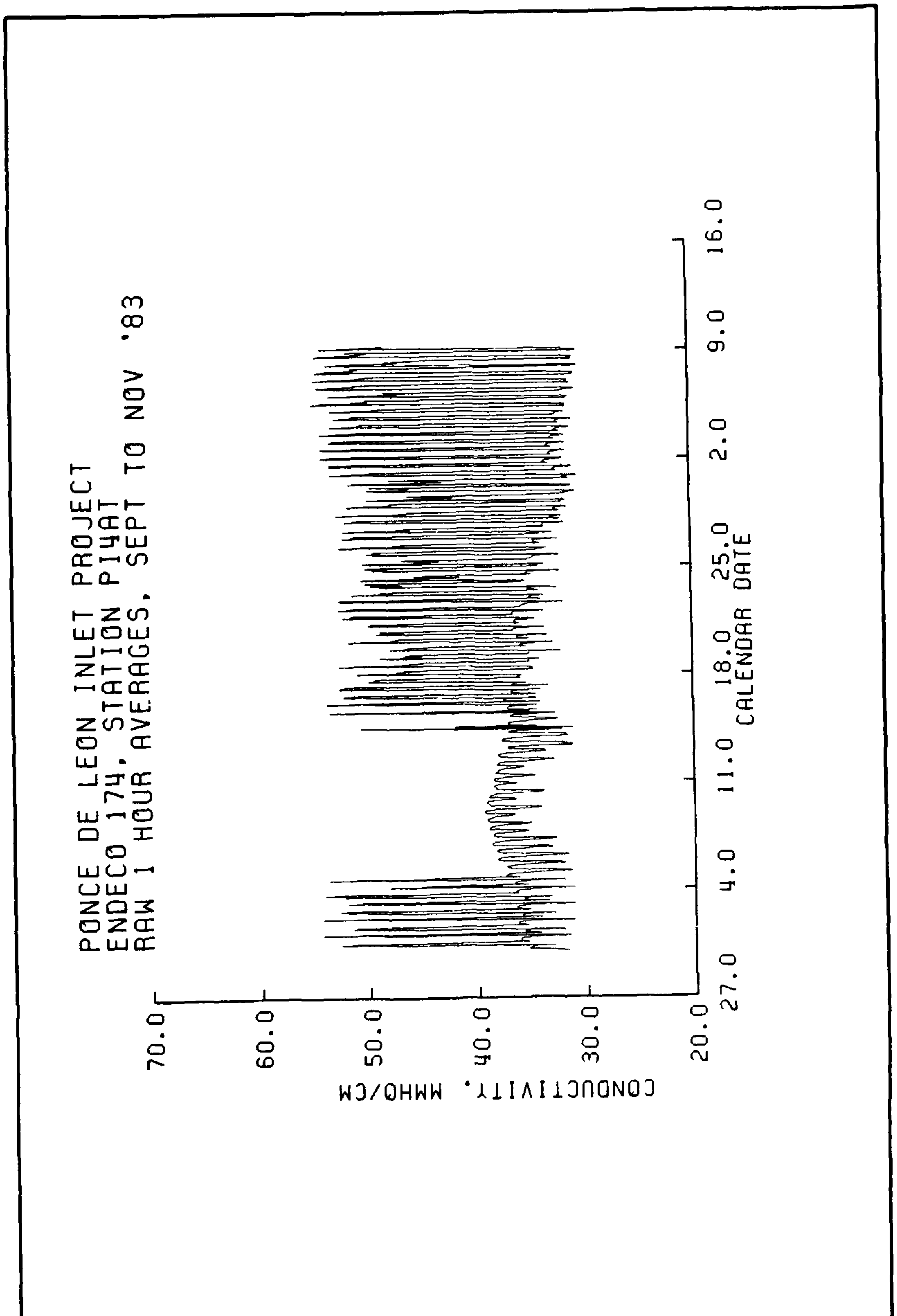
20.0
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE


PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4AT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CONDUCTIVITY, MMHO/CM
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50.0
40.0
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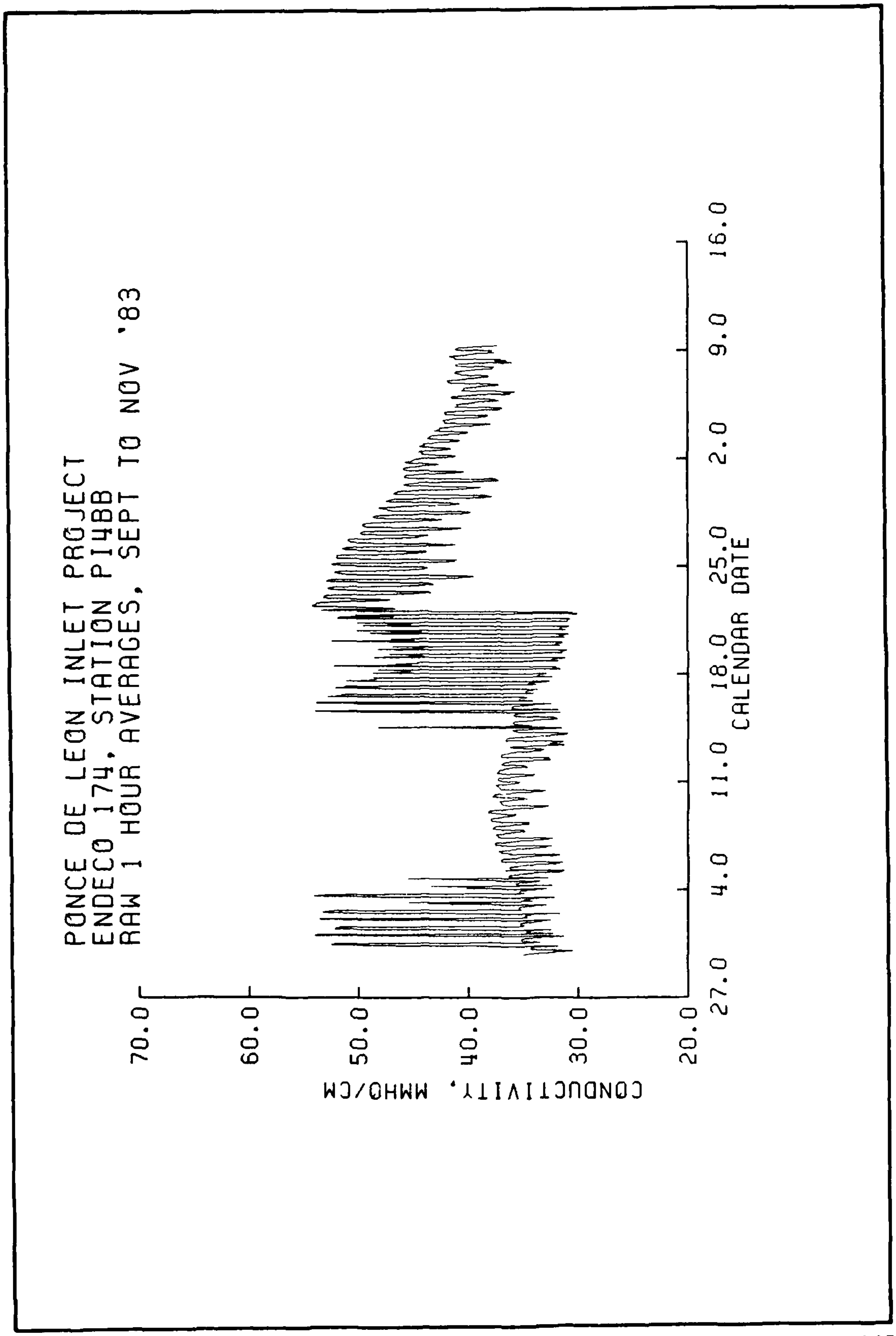
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 126


PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4BB
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CONDUCTIVITY, MMHO/CM
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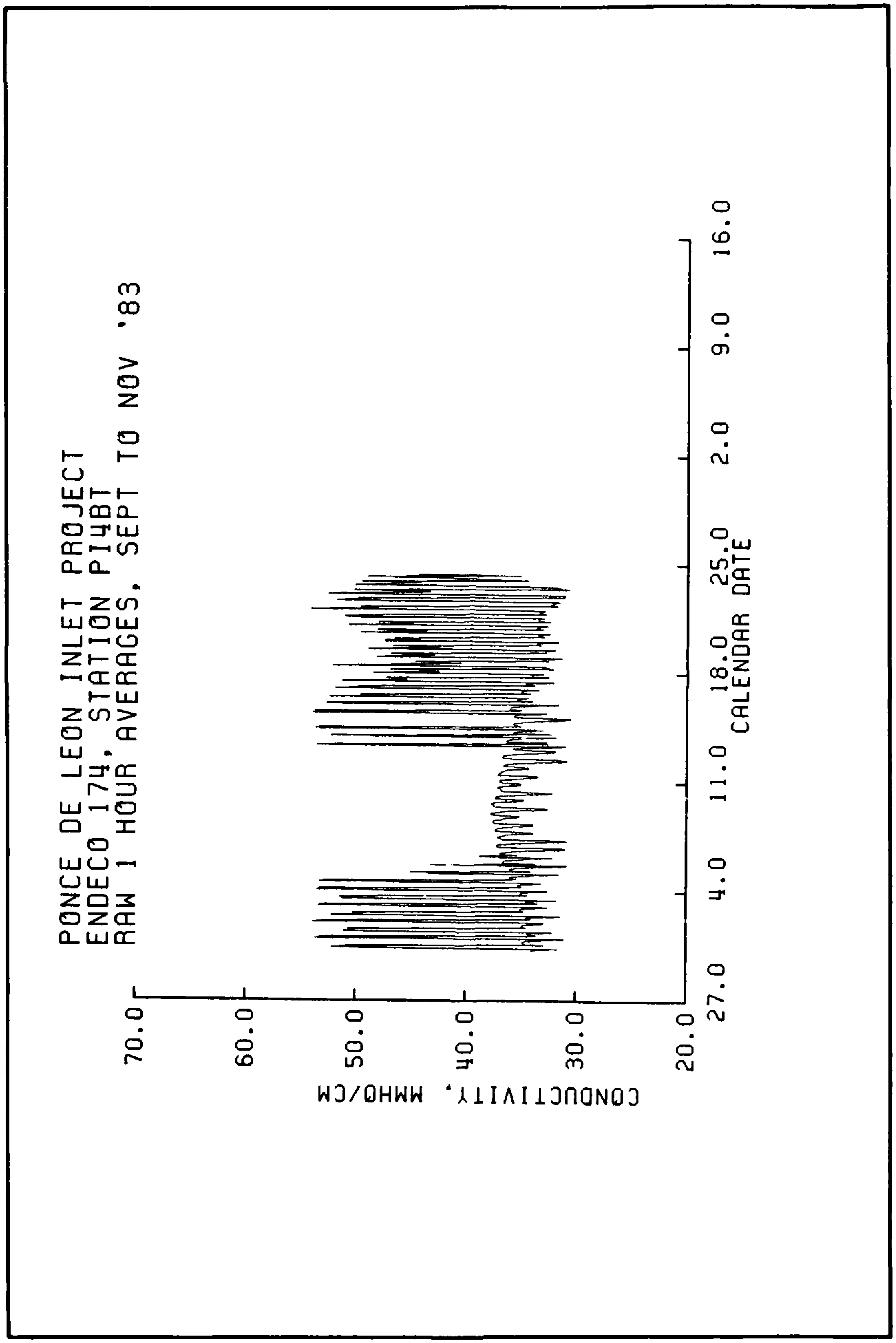
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE


PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI4BT
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CONDUCTIVITY, MMHO/CM
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40.0
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20.0
CALENDAR DATE
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4.0
11.0
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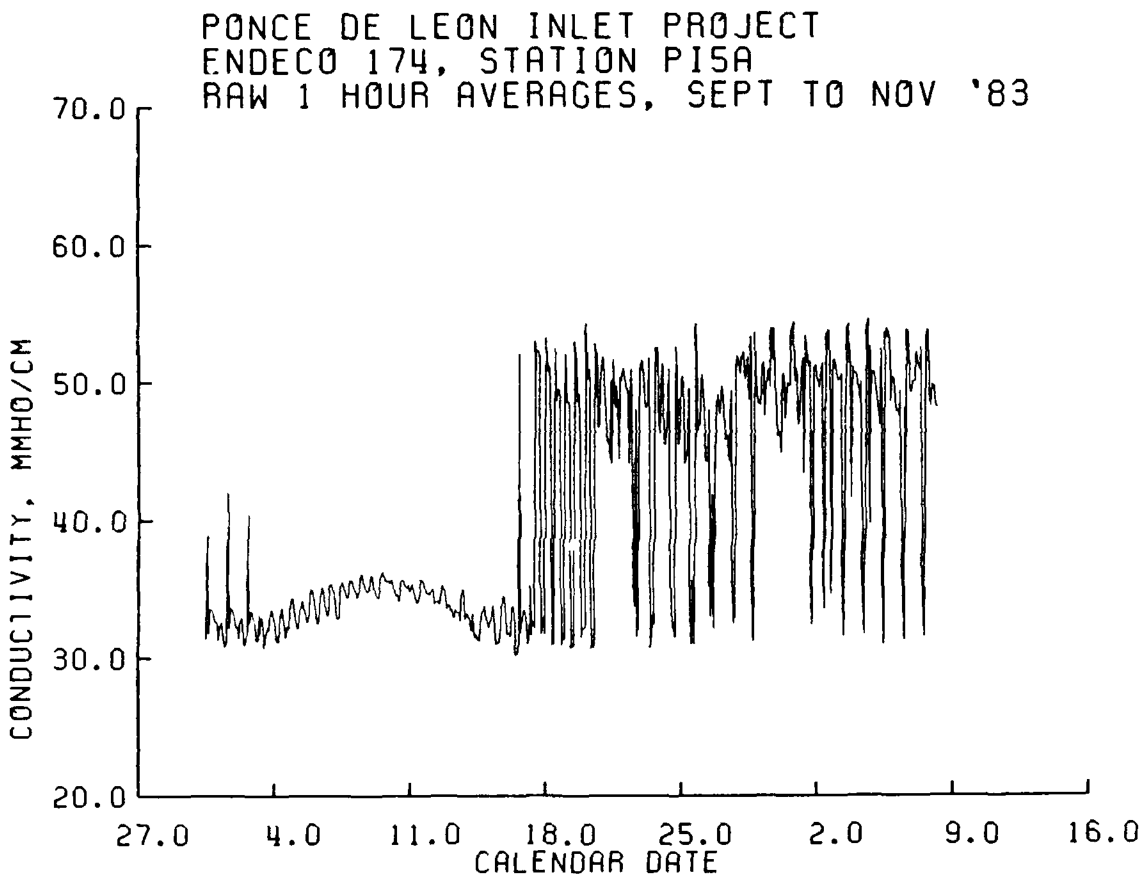
25.0
2.0
9.0
16.0

PLATE 128


PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5A
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
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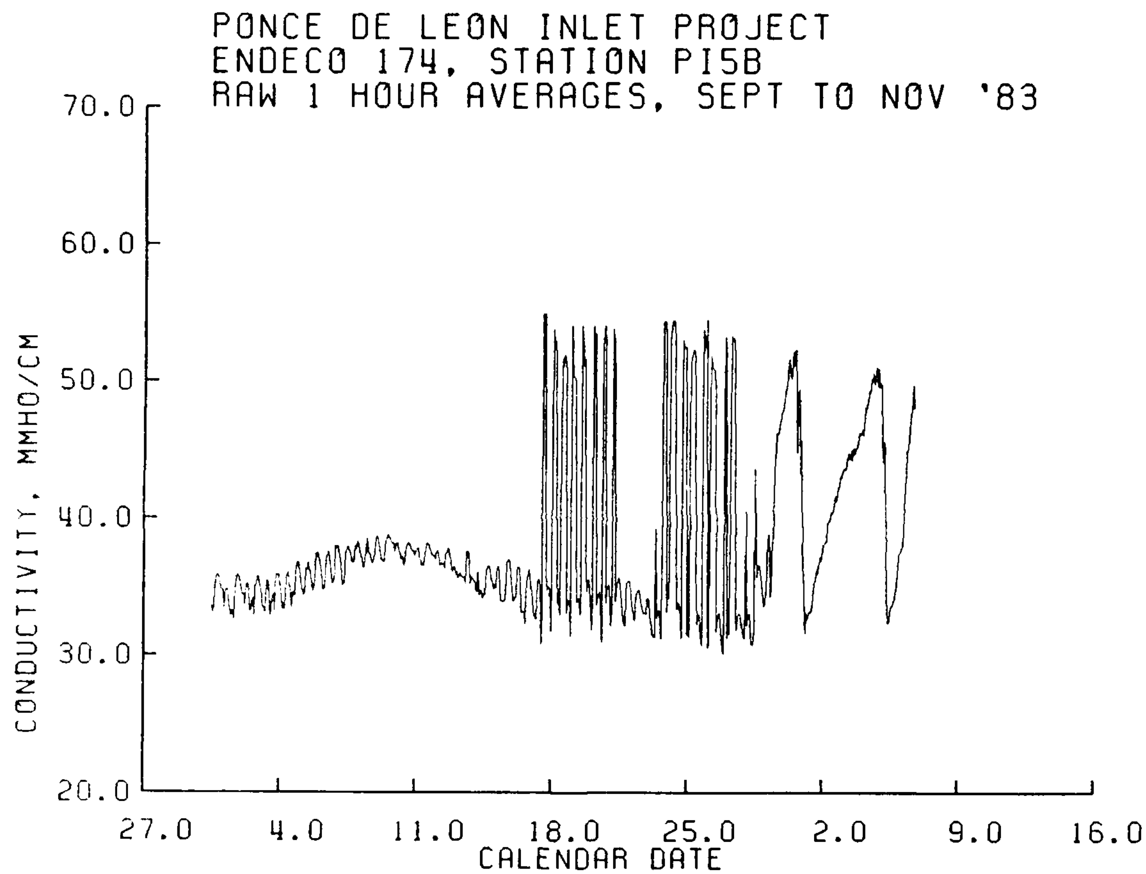
30.0
20.0
CONDUCTIVITY, MMHO/CM
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

PLATE 129


PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5B
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
CONDUCTIVITY, MMHO/CM
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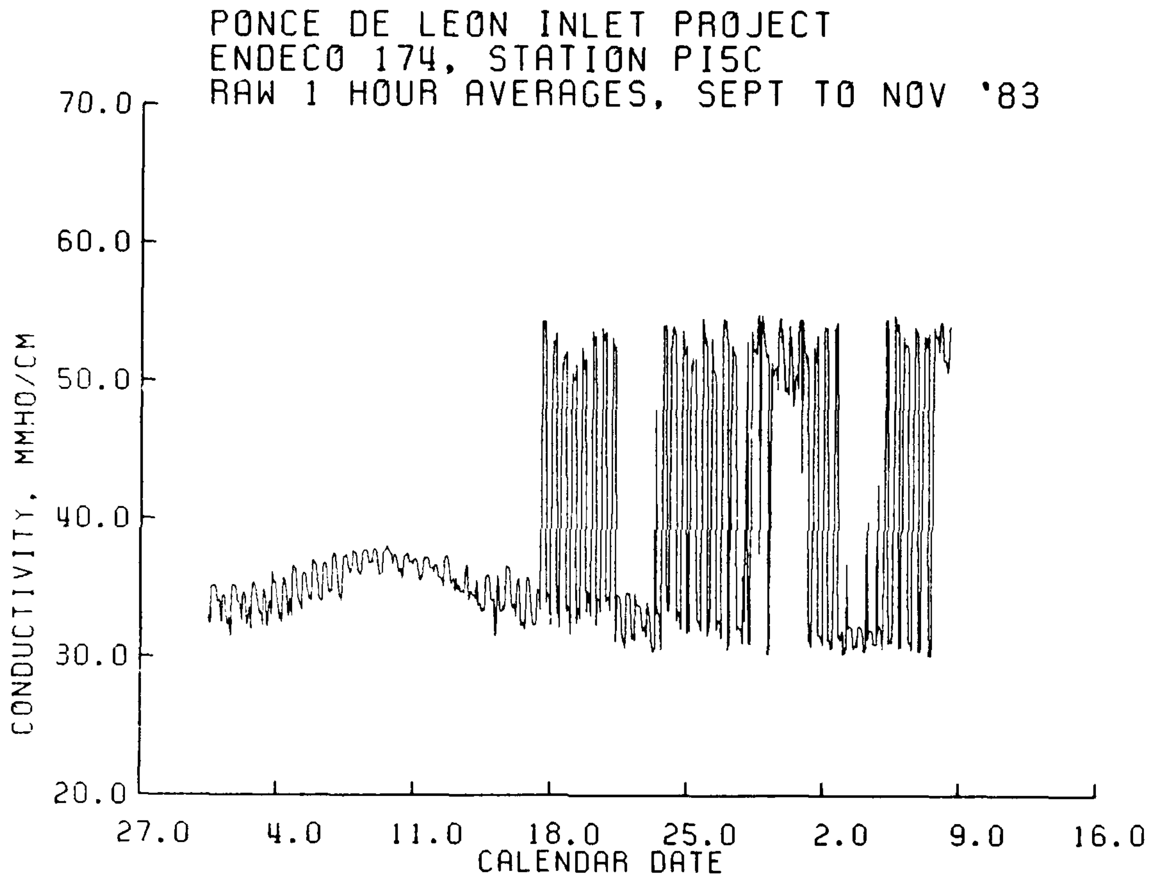
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE


PONCE DE LEON INLET PROJECT
ENDECO 174, STATION PI5C
RAW 1 HOUR AVERAGES, SEPT TO NOV '83
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30.0
20.0
CONDUCTIVITY, MMHO/CM
27.0
4.0
11.0
18.0
25.0
2.0
9.0
16.0
CALENDAR DATE

END

DATE

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