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GRAYS HARBOR ESTUARY, WASHINGTON

Report 1

VERIFICATION AND BASE TESTS

Hydraulic Model Investigation

by

N. J. Brogdon, Jr.

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April 1972

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GRAYS HARBOR ESTUARY STUDY REPORTS

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1	Verification and Base Tests	April 1972
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13. ABSTRACT

Grays Harbor model, a fixed-bed model with provisions for future conversion to a movable-bed model, was constructed to scales of 1:500 horizontally and 1:100 vertically and reproduced all of Grays Harbor, the Chehalis River to the head of tidal influence (South Montesano), and a portion of the Pacific Ocean adjacent to the harbor entrance. The primary purposes of the overall model study will be to determine the effects of rehabilitation of both the north and south jetties, investigate the stability of Point Chehalis, determine the effects of enlarging and realigning the navigation channel, and locate suitable dredge spoil disposal areas. The flushing rate and dispersion characteristics of waste materials discharged into the system will also be investigated. The model verification tests described herein indicated that the model hydraulic and salinity regimens were in satisfactory agreement with those of the prototype for comparable conditions. It therefore can be assumed that the model will provide quantitative answers concerning the effects of the proposed improvement plans on the hydraulic and salinity regimens of the estuary.

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FOREWORD

The model study reported herein was requested by the U. S. Army Engineer Division, North Pacific, in a letter to the Office, Chief of Engineers, dated 20 April 1966 and was subsequently approved in a letter to the North Pacific Division dated 22 July 1966. Authority to initiate the investigation was granted by the U. S. Army Engineer District, Seattle, in a letter to the Director, U. S. Army Engineer Waterways Experiment Station (WES), dated 24 January 1968.

Design and construction of the model were accomplished during the period February 1968-June 1969; hydraulic and salinity verifications were carried out during the period June 1969-December 1969; and fixed-bed shoaling verification was carried out during the period August 1970-September 1970. Hydraulic, salinity, and dye dispersion base tests were performed during the period January 1970-July 1970. After completion of all fixed-bed model verifications and base tests, the general investigation program was initiated.

This report describes the problems that necessitated the model investigation, the model and its appurtenances, and the fixed-bed model verification and base tests. Subsequent reports will describe the various studies conducted in the model.

The study was conducted in the Hydraulics Division of the WES under the direction of Mr. E. P. Fortson, Jr., Chief of the Hydraulics Division, and Mr. H. B. Simmons, Chief of the Estuaries Branch. The design, construction, verification, and base tests were conducted by Mr. N. J. Brogdon, Jr., Project Engineer, and technicians of the Estuaries Branch, under the supervision of Mr. F. A. Herrmann, Jr., Chief

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of the Harbor Entrance Section. This report was prepared by Mr. Brogdon with the assistance of Mr. Herrmann.

Personnel of the Seattle District who were principally responsible for planning the course of study included: Messrs. Dwain Hogan, John Norman, Bruce McCartney, Bill Peterson, and Harry Disbrow. These personnel and others participated in conferences on the model study and visited the model from time to time.

Directors of WES during the conduct of the study and the preparation and publication of this report were COL Levi A. Brown, CE, and COL Ernest D. Peixotto, CE. Technical Directors were Messrs. J. B. Tiffany and F. R. Brown.

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CONVERSION FACTORS, BRITISH TO METRIC UNITS OF MEASUREMENT

British units of measurement used in this report can be converted to metric units as follows:

Multiply	By	To Obtain
inches	2.54	centimeters
feet	0.3048	meters
miles (U. S. statute)	1.609344	kilometers
square feet	0.092903	square meters
square miles (U. S. statute)	2.58999	square kilometers
cubic yards	0.764555	cubic meters
feet per second	0.3048	meters per second
cubic feet per second	0.02831685	cubic meters per second

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SUMMARY

Grays Harbor model, a fixed-bed model with provisions for future conversion to a movable-bed model, was constructed to scales of 1:500 horizontally and 1:100 vertically and reproduced all of Grays Harbor, the Chehalis River to the head of tidal influence (South Montesano), and a portion of the Pacific Ocean adjacent to the harbor entrance. The primary purposes of the overall model study will be to determine the effects of rehabilitation of both the north and south jetties, investigate the stability of Point Chehalis, determine the effects of enlarging and realigning the navigation channel, and locate suitable dredge spoil disposal areas. The flushing rate and dispersion characteristics of waste materials discharged into the system will also be investigated.

The model verification tests described herein indicated that the model hydraulic and salinity regimens were in satisfactory agreement with those of the prototype for comparable conditions. It therefore can be assumed that the model will provide quantitative answers concerning the effects of the proposed improvement plans on the hydraulic and salinity regimens of the estuary.

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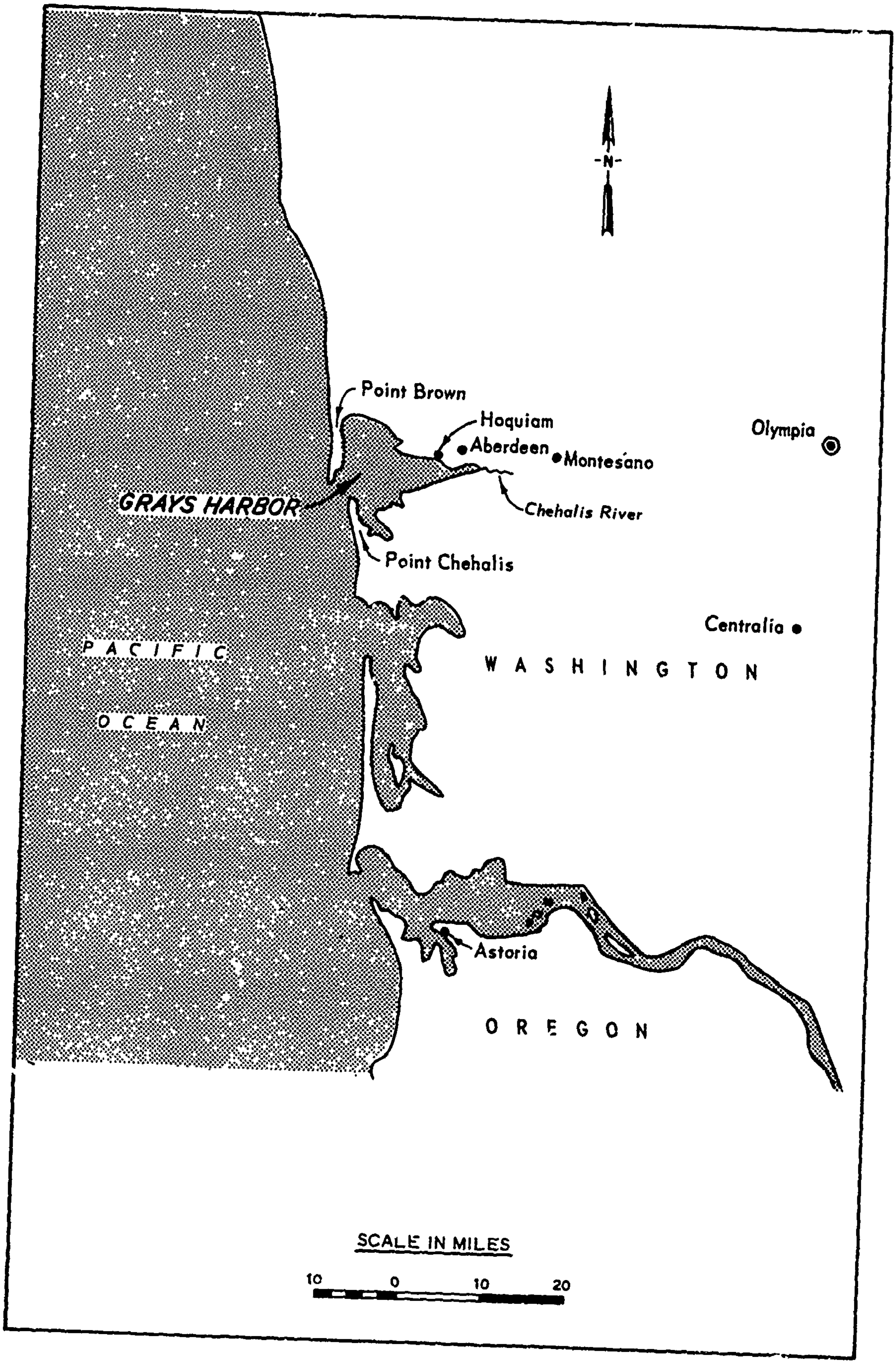

Fig. 1. Vicinity map

GRAYS HARBOR ESTUARY, WASHINGTON

VERIFICATION AND BASE TESTS

Hydraulic Model Investigation

PART I: INTRODUCTION

The Prototype

1. Grays Harbor, Wash. (fig. 1), located about 45 miles* north of the mouth of the Columbia River and 93 miles south of Cape Flattery, is a large bay at the head of which is the Chehalis River. The roughly pear-shaped harbor diverges from the Chehalis River at Aberdeen, Wash., 15 miles east of the entrance, to a maximum width of 13 miles, including North and South Bays (plate 1). The water-surface area of the harbor varies from about 94 square miles at mean higher high water (mhhw) to about 35 square miles at mean lower low water (mllw). The harbor is separated from the Pacific Ocean by two narrow sandy peninsulas. The northerly peninsula is 7 miles long and terminates at Point Brown, just north of the harbor entrance; Point Chehalis comprises the north end of the southerly peninsula, which is 4 miles long.

2. The entrance to Grays Harbor (between Point Brown and Point Chehalis) is about 2.5 miles wide and is protected by two converging rubble-mound jetties that are 6500 ft apart at their outer ends. The existing navigation project for Grays Harbor and Chehalis River was authorized by the Rivers and Harbors Acts of 3 June 1896, 2 March 1907, 25 June 1910, 8 August 1917, 21 January 1927, 3 July 1930, 30 August 1935, 2 March 1945, 30 June 1948, and 3 September 1954. The project provides for a 600-ft-wide by 30-ft-deep entrance channel from the Pacific Ocean across the bar to be secured by dredging, by a south jetty 13,700 ft long, and by a north jetty 16,000 ft long. The top elevation

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* A table of factors for converting British units of measurement to metric units is presented on page vii.

of both jetties, as originally constructed, was +16 ft mllw. The entrance channel is actually self-maintaining for the authorized dimensions and thus requires no maintenance dredging. Maximum depths in the channel are about -70 ft mllw. Based on the recommendations of the U. S. Army Engineer Committee on Tidal Hydraulics and the results of a hydraulic model study conducted at the U. S. Army Engineer Waterways Experiment Station during the period 1950-1952, it was concluded that the outer 6000 ft of the south jetty should be allowed to deteriorate to about elevation 0.0 ft mllw to alleviate the very serious erosion problem at Point Chehalis which resulted from the reconstruction of this jetty during the period 1935-1939. The above-mentioned Rivers and Harbors Acts further provide for maintenance of a channel 30 ft deep and 350 ft wide from the entrance to Cow Point (immediately east of Rennie Island), a distance of 14 miles; thence 30 ft deep and 200 ft wide, for a distance of 4-1/8 miles; a turning basin 30 ft deep, 550 ft wide, and 1000 ft long at the upstream end of the 30-ft channel near Cosmopolis; thence a channel 16 ft deep and 150 ft wide for 10-3/4 miles to Montesano, with a turning basin at Montesano. The interior channel below Cow Point requires annual maintenance dredging of about 1,600,000 cu yd.

3. Tides occuring in Grays Harbor are of the mixed type and vary in mean diurnal range from 9.0 ft at Point Chehalis to 9.9 ft at Aberdeen. At Point Chehalis the elevation of mllw is -4.9 ft mean sea level (msl), while that of mhhw is +4.1 ft msl. The estuary is partially mixed, with a significant difference between surface and bottom salinity concentrations but no distinct saltwater wedge. Saltwater intrusion extends upstream from South Aberdeen (20 miles from the entrance) at normal freshwater flows with the salinity concentration at sta 18 (plate 1) varying from 0.0 ppt (total salt) at lower low water (llw) to about 10.0 to 12.0 ppt at higher high water (hhw). The horizontal density gradient from the entrance to the upstream limits is fairly uniform. Surface salinities in the entrance area average about 1.0 to 2.0 ppt lower than those at the bottom, while near the upstream limits of saltwater intrusion, the surface salinities average about 3.0 to 5.0 ppt lower than those at the bottom.

Purpose of Investigation

4. In general, the primary purposes of the overall model study are to: determine the need for and develop optimum plans for rehabilitation of existing jetties, in conjunction with erosion studies of Point Chehalis and scour adjacent to the south jetty; determine the effects of realignment of the entrance and Sand Island shoal navigation channels; determine the effects of enlarging the navigation channel; determine the location of suitable dredge spoil disposal areas; investigate ways of reducing maintenance dredging requirements in the navigation channel; determine the effects of enlarging existing small-boat basins; and determine the flushing rate and dispersion characteristics of waste materials that are discharged into the estuary.

5. Following the rehabilitation of the north and south jetties in 1942, the entrance channel migrated south to its present location adjacent to the south jetty. Scour adjacent to this jetty has caused fear that the structure may eventually be undermined unless the scour can be controlled or a new entrance can be developed in the northern portion of the entrance. The alignments of the entrance and the bar channels, and their close proximity to the south jetty, present a navigation problem for small and large craft alike when entering and leaving the harbor. This problem could also be resolved if a new entrance channel were developed. The erosion problem at Point Chehalis was also investigated in conjunction with the jetty and entrance channel studies.

6. Model studies will be conducted to develop plans to reduce the existing annual maintenance dredging requirements in the interior channel of the harbor. These studies will be conducted in conjunction with proposed changes in channel alignments and enlarged channel dimensions. Studies will be made for both existing and proposed channel changes to determine best locations of spoil disposal areas and to determine if turning basins along the channel might also serve as sediment traps. This report contains all important data related to the hydraulic, salinity, and fixed-bed shoaling (entrance area) verification of the model.

PART II: THE MODEL

Description

7. The Grays Harbor model reproduced approximately 230 square miles of the prototype area, including the Chehalis River to South Montesano, the Pacific coast from about 7.5 miles north of the north jetty to about 7.5 miles south of the south jetty, and offshore areas well beyond the -60 ft contours; Elk, Johns, Humptulips, Hoquiam, and Wishkah Rivers; North and South Bays; and the system of sloughs and creeks that affects tidal action throughout the model area. The limits of the area reproduced are shown in plate 1. A general view of the model is shown in fig. 2.

8. The model was constructed to linear scale ratios, model to prototype, of 1:500 horizontally and 1:100 vertically. From these basic ratios the following scale relations were computed by the Froudian relations: slope 5:1, velocity 1:10, time 1:50, discharge 1:500,000, and volume 1:25,000,000. The salinity and dye concentration ratios for the study were 1:1. One prototype cycle (diurnal tide) of 24 hr and 50 min was reproduced in the model in 29 min and 48.5 sec. Horizontal grid coordinates are based on Polyconic Projection 1927 North American Datum, and vertical control was based on USC&GS msl 1929 adjustment. The model was approximately 320 ft long and 180 ft wide at its widest point, and covered an area of about 30,000 sq ft. It was completely enclosed to protect it and its appurtenances from the weather and to permit uninterrupted operation.

9. The model was initially constructed as a fixed-bed model; however, provisions were made to convert the entrance area to a movable-bed model at a later date when such studies were deemed necessary. Limits of the movable-bed section are shown in plate 1. The model was molded to conform to the prototype hydrographic conditions that existed in 1967. The navigation channel was molded in removable blocks so that desired alterations could readily be made.

10. The permanent model roughness employed consisted of

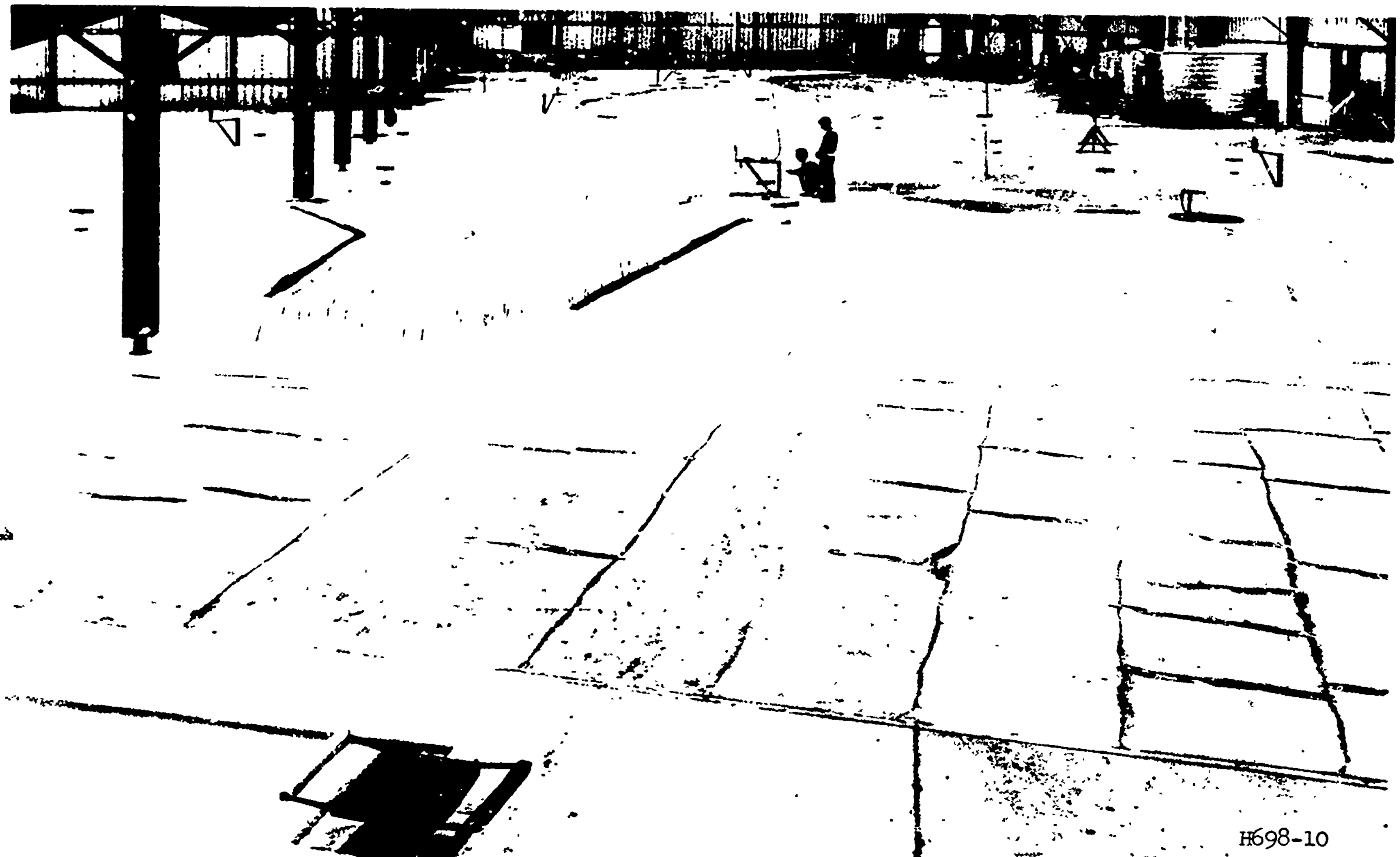


Fig. 2. General view of model, looking upstream

3/4-in.-wide metal strips placed in depths greater than 6 ft below msl and cut off below the low-water elevation. The use of these metal strips as roughness was necessary because proper adjustment of velocity and distribution of currents, both horizontally and vertically, in any given cross section could not be obtained by the use of ordinary boundary roughness alone in the deep areas of the model. The areas above -6 ft msl (shoal areas and tide flats) were roughened by raking the model surface during construction to provide the desired degree of roughness.

Appurtenances

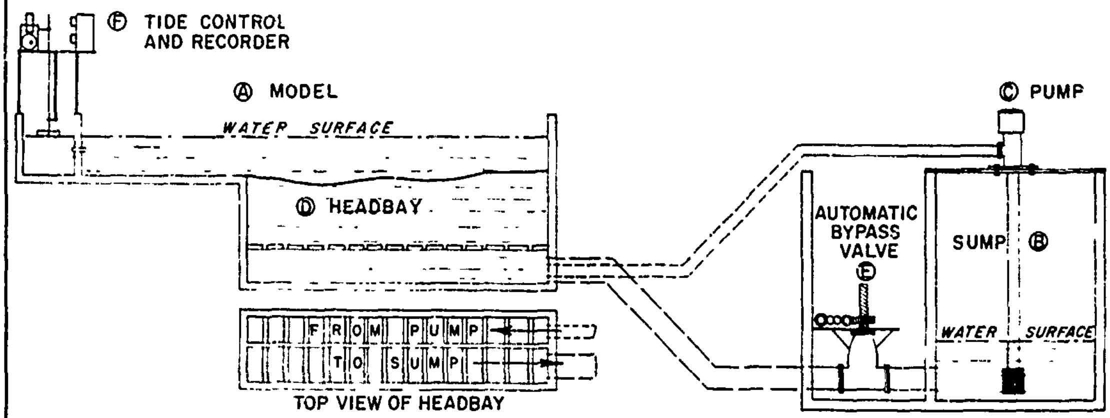
11. The model was equipped with the necessary appurtenances to reproduce and measure all pertinent phenomena such as tidal elevations, saltwater intrusion, current velocities, freshwater inflow, waves, dispersion characteristics, and shoaling distribution. Apparatus used in connection with the reproduction and measurement of these phenomena include a tide generator and recorder, tide gages, salinity meters, salinity samplers, chemical titration equipment, current velocity meters, freshwater measuring weirs, wave generators, dye injection and measuring equipment, and shoaling injection and recovery apparatus. This equipment is described in detail in subsequent paragraphs.

Tide generator and recorder

12. The reproduction of tidal action in the model was accomplished by means of a tide generator (figs. 3 and 4), located in the model ocean, that maintained a differential between a pumped inflow of salt water to the model and a gravity return flow to the supply sump as required to reproduce all characteristics of the prototype tides at the control station (Westport). The tide generator was equipped with a continuous tide recorder so that the accuracy of the model tide reproduction could be checked visually at any time.

Tide gages

13. Permanently mounted point gages were installed in the model at the locations of the seven recording tide gages used for collection of field tide data (plate 1). Portable point gages were used to measure



OPERATION OF TIDE GENERATOR

THE WATER SURFACE IN THE MODEL (A) IS APPRECIABLY HIGHER THAN THE SUMP (B). A PUMP (C) LOCATED IN THE SUMP DISCHARGES A CONSTANT AMOUNT OF WATER INTO ONE SIDE OF A DIVIDED HEADBAY (D). DISCHARGE FROM THE MODEL TO THE SUMP IS CONTROLLED BY AN AUTOMATIC VALVE (E). OPERATION OF THE AUTOMATIC VALVE IS DICTATED BY THE TIDE CONTROL (F) LOCATED IN THE MODEL. WHEN THE TIDE IS RISING IN THE MODEL, THE AUTOMATIC VALVE IS ALMOST CLOSED SO THAT MOST OF THE WATER REMAINS IN THE MODEL. WHEN THE TIDE IS FALLING IN THE MODEL, THE VALVE IS ALMOST OPEN SO THAT ALL THE WATER FROM THE PUMP, PLUS THE DESIRED AMOUNT OF WATER FROM THE MODEL RETURNS TO THE SUMP. THE TIDE CONTROL MAINTAINS THE PROPER VALVE OPENING AT ALL TIMES AS REQUIRED TO REPRODUCE ANY DESIRED TIDE IN THE MODEL.

Fig. 3. Operation of tide generator

Fig. 4. Tide recorder

tidal elevation at other points as required. The model gages were graduated in 0.001 ft (0.1 ft prototype).

Salinity and dye samplers

14. Salinity and dye water samples were drawn into collection vials by negative pressure from a vacuum pump connected to a central manifold, which in turn was connected to tubes running to each sampling location. This device enabled simultaneous sampling at all desired depths at all sampling stations throughout the model. Details of the multidepth sampler are shown in fig. 5.

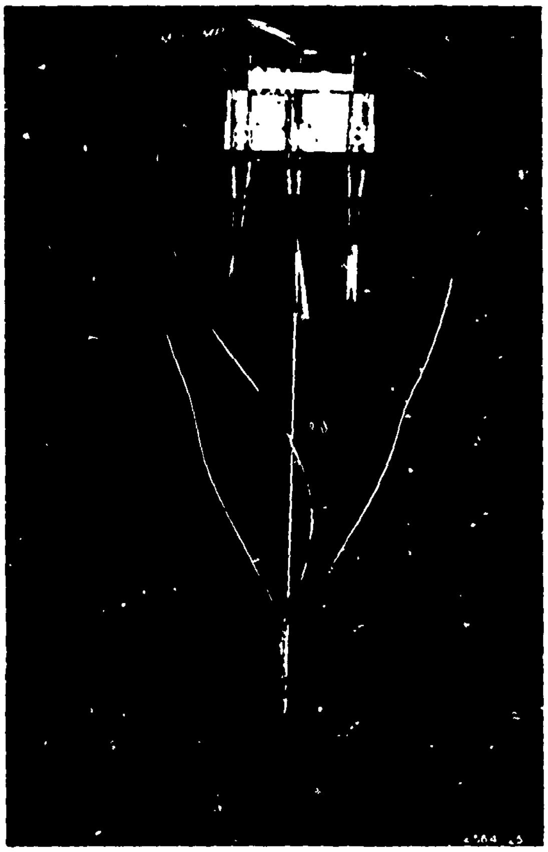


Fig. 5. Multidepth sampler

Chemical titration equipment

15. This method of determining salinity concentration was used primarily to determine the salinity concentration at the saltwater source (sump). The equipment consisted of a graduated burette for measuring the volume of silver nitrate, pipettes for measuring the volume of samples used, sample jars in which to perform the titration, a supply of silver

nitrate, and a quantity of potassium chromate for use as an end-point indicator in the titration process. The method consisted of adding a known concentration of silver nitrate solution to a known volume of the model salinity sample; the amount of silver nitrate required to precipitate the salt contained in the sample was then converted to salinity in parts per thousand of NaCl.

Salinity meters

16. All salinity concentrations for samples taken from the model were determined by use of conductivity cells especially built and calibrated for this purpose. The salinity meter assembly is shown in fig. 6.

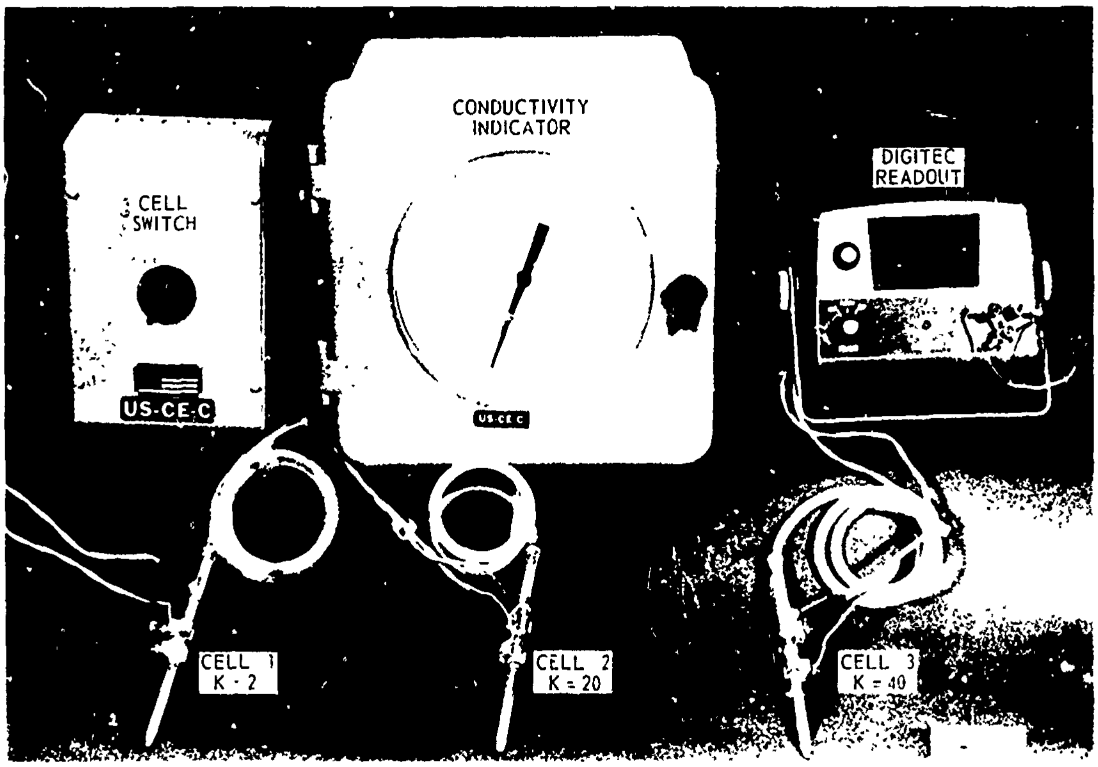


Fig. 6. Salinity meter assembly

Current velocity meters

17. Current velocity measurements were obtained with miniature Price-type current meters (fig. 7). The five meter cups, constructed of a light plastic or metal material, were approximately 0.04 ft (4 ft prototype) in diameter and were mounted on a horizontal wheel 0.09 ft in diameter; the center of the cups was 0.05 ft (5 ft prototype) from the

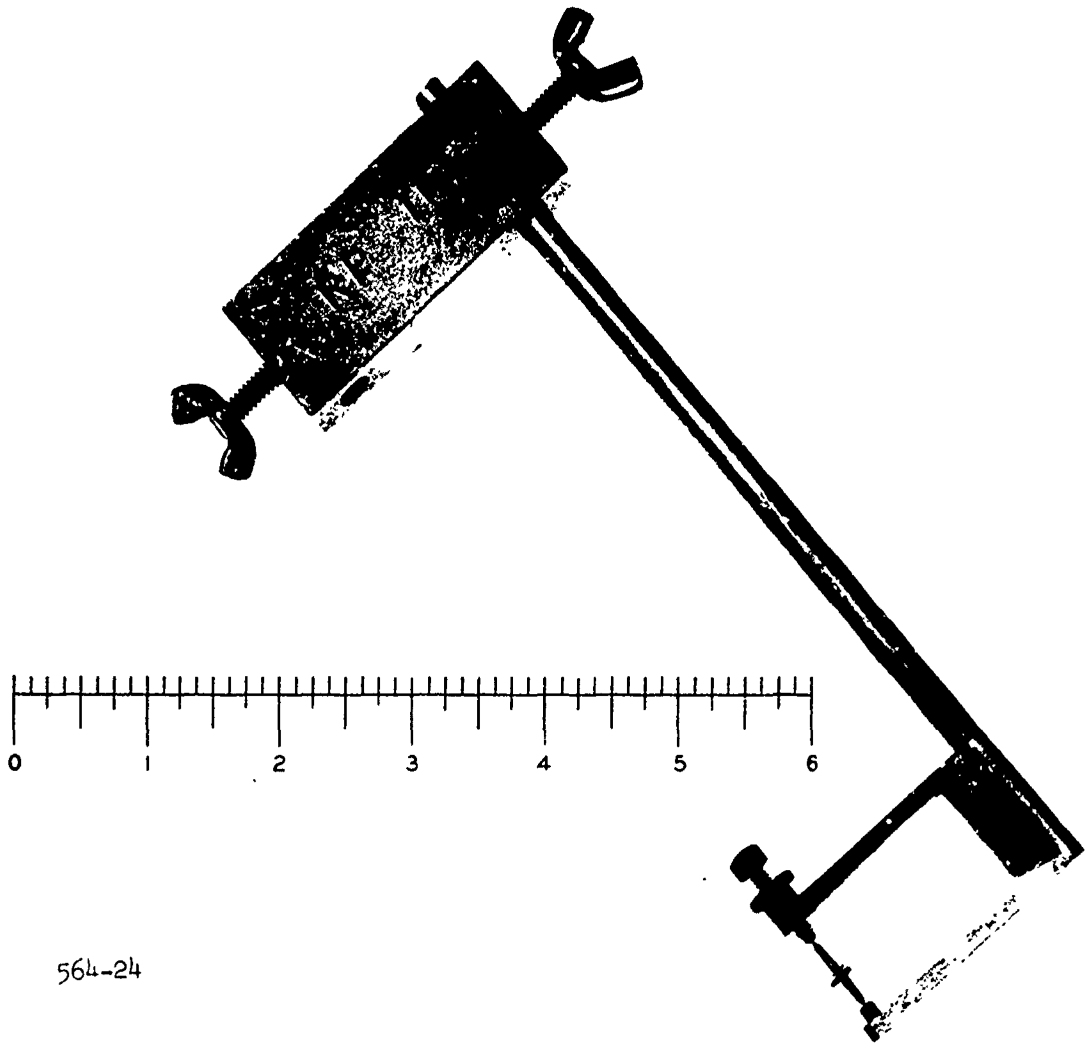


Fig. 7. Miniature Price-type current meter

bottom of the frame. The meters were calibrated frequently to ensure accurate operation and were capable of measuring actual velocities as low as 0.03 fps (0.3 fps prototype).

Freshwater inflow measuring devices

18. All rivers with significant mean freshwater inflows were equipped with a constant head tank and Van Leer weir for precise measurements of their respective flows. The inflows of streams with minor freshwater inflows were combined with those of nearby streams of significant inflow, and the combined inflow was introduced at a central point. Individual inflow points were located on the Chehalis, Hoquiam, and

Wishkah Rivers. Chenois Creek and Grass Creek inflows were combined with that of Humptulips River. Johns River, Newskah Creek, Charley Creek, Stafford Creek, Indian Creek, Campbell Creek, Chapin Creek, O'Leary Creek, and Andrews Creek inflows were combined with that of Elk River.

Skimming weir

19. The mixed salt water and fresh water that accumulated in the model ocean had to be removed in order to maintain a constant volume and a constant source salinity. This was accomplished by means of skimming weirs that removed a quantity of mixed water from the surface layer equal to the freshwater inflow to the estuary. Precise measurement of the combined discharge from the skimming weirs was made by use of a Van Leer weir.

Wave generators

20. The model ocean was equipped with two 20-ft-long wave generators to produce the effects of ocean waves on the transportation and deposition of sediments. The wave generators were of the plunger type and could be adjusted to produce the desired wave height and period.

Dye injection and measuring equipment

21. Model tests were made to determine the flushing rate and dispersion characteristics of the model. A given weight of powdered fluorescent dye was thoroughly mixed with a known volume of water and then stored in a glass-sided tank. The tanks were equipped with a system of valves and tubes to control the desired discharge at the injection locations. Injection was made at two locations simultaneously by utilizing two different types of dyes. Water samples were collected at locations throughout the model with a sampling device identical with the multidepth salinity sampler described in paragraph 14. Concentrations of the samples were measured by means of a Turner Model III fluorometer (fig. 8).

Shoaling injection
and recovery apparatus

22. Shoaling was reproduced in the model by injecting granulated (1/8 in. by 1/8 in.) nylon particles or polystyrene plastics. The specific weight of the model sediment to be used for a particular problem

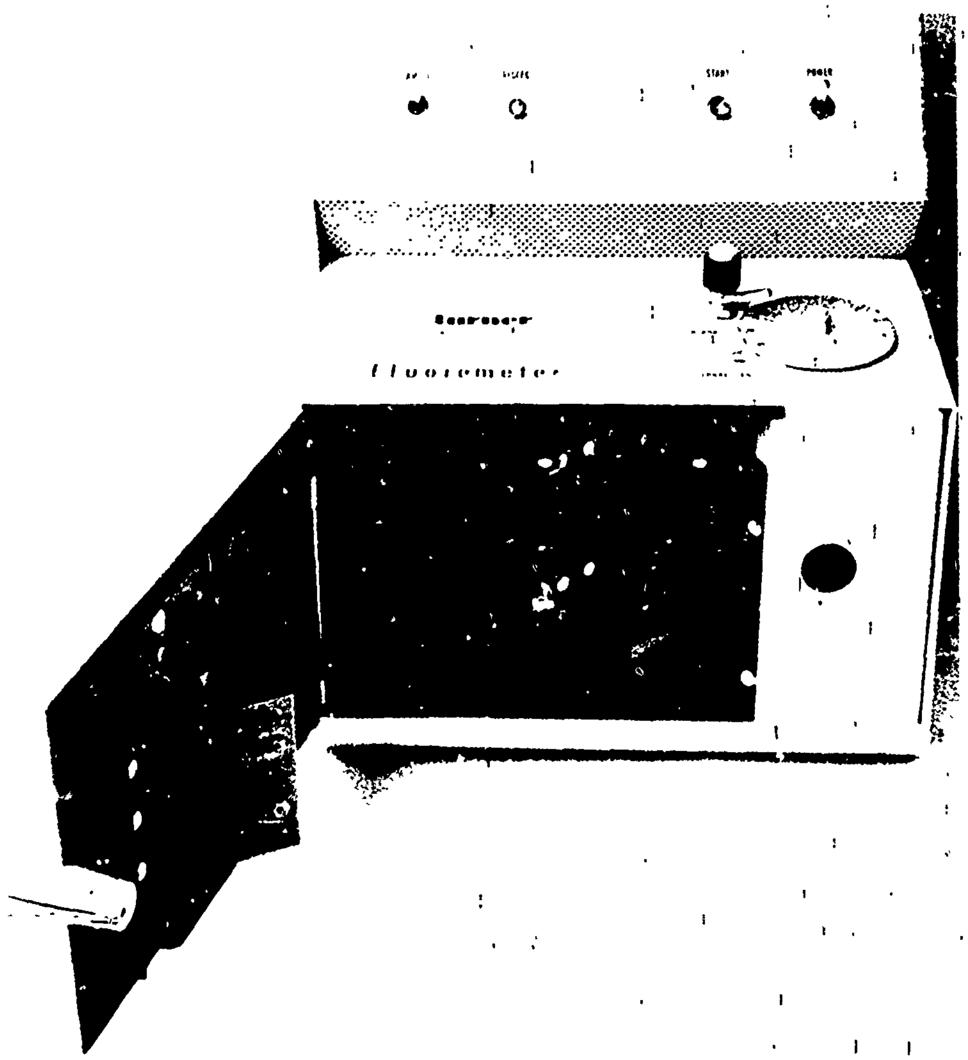


Fig. 8. Turner fluorometer

was determined by trial and error, and varied from about 1.03 to 1.20. The injection procedure for individual problem areas varied; however, the normal methods were to place the material by hand or allow a slurry of the material to flow into the model through a perforated trough. At the end of each model test, the shoaling material deposited within the limits of the navigation channel or prescribed problem area was recovered and measured volumetrically.

PART III: VERIFICATION OF THE MODEL

23. Verification of the Grays Harbor fixed-bed model was accomplished in three phases: (a) hydraulic verification, which ensured that tidal elevations and times, and current velocities and directions were in proper agreement with the prototype; (b) salinity verification, which ensured that salinity phenomena in the model correspond to those of the prototype for similar conditions of tide, ocean salinity, and freshwater inflow; and (c) fixed-bed shoaling verification, which ensured acceptable reproduction of prototype shoaling distribution. Fixed-bed shoaling verification for the interior 30- by 350-ft navigation channel and movable-bed shoaling verification are beyond the scope of this report; however, the fixed-bed shoaling verification for the area between the jetties will be discussed. The need for movable-bed studies had not been determined at the time of preparation and publication of this report; therefore, the movable-bed verification had not been initiated.

24. The accurate reproduction of hydraulic and salinity phenomena in an estuary model is an important phase in the preparation of the model for its ultimate use in evaluating the effects of proposed improvement works. Every effort was made to obtain a comprehensive verification of all pertinent phenomena. Prototype data used for the model hydraulic and salinity verification were collected in the field by U. S. Army Engineer District, Seattle, personnel during the period 4 October to 17 October 1967. These data were furnished to Waterways Experiment Station engineers in the form of curves and tables. The entrance shoaling verification (fixed bed) was based on soundings taken in September 1965 and November 1969.

25. This report contains all important data related to the hydraulic, salinity, and fixed-bed shoaling (entrance area) verification of the model, in order to facilitate reference to these data in other phases of the overall investigation.

Hydraulic Verification

Prototype data

26. In 1967 the Seattle District undertook an extensive prototype metering program of the Grays Harbor estuary in order to obtain data with which to adjust and verify the Grays Harbor estuary model. The metering program was carried out in two consecutive 6-day periods that were selected as being generally representative of normal spring and neap tide conditions on the basis of predicted tides. Eighteen stations on eight ranges (plate 1) were established at which to collect current and salinity data. Because of insufficient personnel and equipment and prohibitive cost, it was impossible to obtain simultaneous observations at all stations.

Tidal adjustment

27. The objective of the model tidal adjustment was to obtain an accurate reproduction of prototype tidal elevations and tidal phases throughout the model. Prototype tidal data from seven recording tide gages (plate 1) were available to verify the accuracy of the model tidal adjustment. These gages recorded essentially continuously throughout the prototype data collection period discussed previously.

28. During each of the 6-day metering periods there were significant variations of tidal ranges and other tidal characteristics. In order to avoid the time-consuming and expensive procedures of adjusting the model to reproduce all of the tides observed during the metering program, it was decided to select one 24.84-hr (diurnal) tide for each of the 6-day periods that approximated the tidal condition for that particular period and to complete the adjustment of tides, currents, and salinities throughout the model for only the two tides thus selected. The two tides chosen were 6-7 October 1967 (spring tide) and 13-14 October 1967 (neap tide).

29. The procedure followed was to adjust the tide generator in such a manner that the tides generated in the model ocean would cause an accurate reproduction of prototype tides at Westport (control) tide gage, then to adjust the model roughness until prototype tidal

elevations and times were reproduced to scale throughout the model.

30. Comparisons of model and prototype tidal data for the two tides reproduced in the model are presented in plates 2-9. Plates 2-4 show tidal elevations for the spring tide condition at the Westport, Bay City, Goose Island, Crossover Channel, Aberdeen Port Dock, South Aberdeen, and Montesano tide gages. Low- and high-water lunar intervals; high-, low-, and mean-water levels; and range of tide profiles are presented in plate 5 for the spring tide condition. The maximum discrepancy in tidal range was in the order of 0.5 ft prototype (0.005 ft model). This maximum discrepancy occurred at the gage located at Montesano. This gage also reflected the greatest discrepancy for high- and low-water lunar intervals and high- and low-water levels. This gage was located very near the upstream model limits (plate 1) and the freshwater discharge point for the Chehalis River. Although tidal effects extend a considerable distance upstream from this gage location in the prototype, there was no supplemental provision for the passage of tidal flow at the upstream model limit. Since the tidal flow in this area is quite small, and since this area is a considerable distance upstream from any potential problem areas that might have been subject to model investigations, it was believed that provision for such tidal flow would have involved an unnecessary expense. The discrepancies between model and prototype tidal data at the Montesano gage are a direct result of the close proximity of this gage to the upstream model limit. Comparisons of model and prototype tidal data for the neap tide condition are presented in plates 6-9. The maximum discrepancy in tidal range was about 1.2 ft and was observed at the Montesano gage location.

Adjustment of currents

31. The objective of the model current adjustment was to obtain an accurate reproduction of prototype current velocities and distributions throughout the model. Prototype current velocity data were available at 18 stations, the locations of which are shown in plate 1. Prototype readings were made at the surface, quarter depth, middepth, three-quarter depth, and 2 ft above the bottom for a period of at least 25 hr at each station. As discussed above, no single simultaneous

survey of the entire estuary was made; and the model adjustment was made for only one tide from each of the 6-day metering periods. The neap and spring tides selected for reproduction in the model corresponded to the days on which current measurements were obtained on range 3 (sta 7, 8, 9, 10, 11, and 12). Since the tidal characteristics varied throughout each 6-day period it is obvious that current velocities observed on any particular day are not necessarily representative of those which would have been observed at the same station on any other day within the 6-day observation period. Thus, it was necessary to adjust at least the maximum prototype velocity observations in order that they would more nearly represent prototype conditions for the tides reproduced in the model. It was found that there was a reasonably good linear relation between tidal range and maximum velocity. The adjusted maximum prototype velocities are shown in the velocity verification plates (10-73) for those stations at which the prototype observations were made on a different tide than that reproduced in the model. Also shown for each current velocity station are the tide which was reproduced in the model and that which actually occurred during prototype data collection corresponding to the prototype current velocity data presented.

32. The procedure followed for adjustment of current velocities was to reproduce each of the two tidal and discharge conditions in turn and adjust the model roughness until the current velocities at each metering station were correctly reproduced in the model. The freshwater discharges used during the current velocity verification were obtained by averaging the inflows that occurred during each of the 6-day metering periods. Comparisons of model and prototype current velocities for all stations are presented in plates 10-73. Measurements obtained at half-hour intervals were plotted for both model and prototype, and smooth curves were drawn through the points. No attempt will be made to discuss each comparison of prototype and model measurements, but the agreement obtained throughout the model is considered to be very satisfactory.

Salinity Verification

33. The objective of the model salinity adjustment was to obtain an accurate reproduction of vertical and lateral distribution of prototype salinities throughout the model. Reproduction of prototype salinity phenomena in the model required the maintenance of the proper salinity in the ocean water-supply system and the establishment of the proper mixing environment. Because prototype salinity data obtained at stations near the mouth of the estuary were obviously in error, it was decided to use a model ocean salinity that was representative of salinities known to occur near the entrance to most west coast estuaries (33.0 ppt). The prototype salinity data at sta 1, 6, and 10 for the neap tide condition and those at sta 1 for the spring tide conditions are omitted from this report because they were obviously erroneous. Prototype observations at these locations were all made with the same meter. Salinity data at other times and stations obtained with the same meter were also obviously in error, but they were not used in the model verification. Salinity observations were made at hourly (prototype) intervals in both the model and prototype. These data were plotted and smooth curves were drawn through the points and are compared with corresponding prototype curves in plates 74-105.

34. The agreement demonstrated between model and prototype is considered excellent. It is pointed out that no additional adjustment of the model was necessary to obtain the agreement shown in plates 74-105. This substantiates the model adjustment of tides and currents and indicates that the upland fresh water was being properly mixed with salt water from the ocean supply.

Entrance Area Fixed-Bed Shoaling Verification

35. The entrance area fixed-bed verification involved the reproduction of the prototype shoaling pattern throughout the entrance area. The basic objective of the model shoaling verification was to identify a synthetic sediment that would move and deposit under the influence of

model forces in the same manner that the natural sediments move and deposit under the influence of natural forces. In the process of identifying a suitable model sediment, a great number of variables were involved and each had to be resolved by trial and error. The most significant variables included: (a) shape, size, gradation, and specific weight of the artificial sediment; (b) method, location, duration, and quantity of artificial sediment injection; (c) height and direction of waves; (d) magnitude of tide range; (e) length of model operation; and (f) readjustment of model roughness. The final adjustment was accomplished using a granulated nylon material with a specific weight of 1.13 to 1.15 and a grain size of about 1/8 in. by 1/8 in. (cylinders). A spring tide was reproduced in the model with a mean freshwater discharge, and waves were generated alternately from the west and southwest. Because of the distortion of the model scales, it was not possible to reproduce waves in the model that represented prototype conditions. At the start of the shoaling test, 100,000 cc of the above material was injected into the model over a period of five cycles beginning at hour 22 of cycle 1. During cycles 1 and 2, 5000 cc was placed in the model at hour 22 along a line represented by the east boundaries of shoaling sections 18, 19, C-7, and 20 (plate 2); 10,000 cc was placed in the model along this same line at hour 9.5; and 5000 cc was placed in the model along a line running north and south through the middle of section 19 at hour 14. During cycles 3, 4, and 5, 5000 cc was placed in the model at hour 22 along a line represented by the east boundaries of shoaling sections 18 and 19; 10,000 cc was placed in the model along this same line at hour 9.5; and 5000 cc was placed in the model at hour 14 along a north-south line represented by the center line of section 19. It was necessary to operate two wave machines in the model ocean to simulate the effects of wave energy on the resuspension and movement of the model sediment. Wave machine 1 was oriented so that waves were generated from the west; wave machine 2 was oriented so that waves were generated from the southwest. The wave heights and periods did not represent any particular prototype waves, but they were adjusted to simulate the degree of agitation required so the model shoal materials could be moved and deposited by the tidal currents. Wave machine 1 was operated between hours 2 and 17; wave machine 2 was operated between hours 20 and 2. This wave machine operating procedure was repeated during each of the five injection cycles. At the end of the test, the material was recovered from individual sections (plate 106) and measured volumetrically.

36. Scour and fill patterns that developed in the prototype during the period 1965-1969 are shown in plate 107. Only the fill patterns indicated in this plate were used as a basis for the entrance shoaling verification since scour cannot be reproduced in a fixed-bed model. The relative shoaling pattern achieved in the model is shown in plate 108. The actual volumes of material retrieved from individual sections are shown in table 1 along with the respective percentages of the total amount injected and recovered.

Limitations of the Accuracy of Model Measurements

37. Measurements of tidal elevations in the model were made with point gages graduated to 0.001 ft, or 0.1 ft prototype. The limitations of the current velocity meters used in the model should be considered in making close comparisons between model and prototype velocity data. The center line of the meter cup was about 0.05 ft above the bottom of the frame; therefore, bottom velocity measurements in the model were actually obtained at a point 5.0 ft (prototype) above the bottom, instead of about 2.0 ft as in the prototype metering program. The model velocities were determined by counting the number of revolutions in a 10-sec interval (which represented a period of about 8 min in the prototype), as compared with about a 1-min observation in the prototype. The horizontal spread of the entire meter cup wheel was about 0.11 ft in the model, representing about 55 ft in the prototype, as compared with less than 1.0 ft for the prototype meter. Thus, the distortion of area (model to prototype) results in comparison of prototype point velocities with model mean velocities for a much larger area. The same is true for the vertical area, since the height of the meter cup was about 0.04 ft

(4.0 ft prototype) as compared with only a few inches for the prototype meter.

38. All model salinity measurements presented in this report were made with a salinity meter (conductivity type) and are considered to be accurate within 0.5 ppt in the higher ranges and 0.2 ppt in the lower ranges. The model samples were collected at the bottom, middepth, and surface elevations. The elevations of the bottom and middepth samplers were fixed in the model and were not allowed to vary with the tide as was the surface sampler. Simultaneous water samples were drawn into vials from the three elevations by means of a vacuum system, whereas the prototype salinities were measured in place at successive depths. Similar to the model velocity data, the model salinity data also represent an average over a much larger prototype area, since the vacuum sampling system used in the model drew the sample from a radius of about 1/2 to 1 in. (80 ft in the prototype). The accuracy with which the model could be expected to duplicate salinities from cycle to cycle for identical conditions appears to be about ± 3 percent.

Discussion of Results of Verification Tests

39. Agreement between model and prototype phenomena, as evidenced by the results of hydraulic and salinity verification data, appears to be excellent. The model was considered to be sufficiently similar to its prototype to be confidently utilized in quantitative studies of the effects of proposed improvement plans on hydraulic phenomena and salinity intrusion.

40. In fixed-bed shoaling tests it is not possible to reproduce bed scour. Should any significant scour areas develop in the prototype as the result of some new construction, they would create a source of new sediments that could cause significantly increased shoaling in other areas that would not be predicted from the model results. The accuracy of the model shoaling tests is considered to be about ± 10 percent, since that is about the limit of accuracy of repeating identical tests.

PART IV: BASE TEST RESULTS

41. In order to evaluate the effects of the proposed improvement plans, it was first necessary to establish hydraulic, salinity, shoaling, surface current pattern, and dye dispersion "base tests" that depicted, respectively, the characteristics of these conditions throughout the model for existing conditions. Thus, a test in which no improvement plan was installed in the model is referred to as a base test, since its results constitute a basis of comparison for determining the effects of improvement plans. The model base tests were conducted with model conditions of a mean tide, a source salinity concentration of 33.0 ppt, and a total freshwater discharge of 11,400 cfs. The discharges at individual inflow points were: Chehalis River, 6300 cfs; Hoquiam River, 970 cfs; Wishkah River, 420 cfs; Humptulips River, 2750 cfs; and Elk River, 960 cfs. Prior to data collection of any type, the model was operated for a sufficient period of time to achieve a condition of dynamic salinity stability. The procedure for starting operation of a tidal model utilizing salt water is developed during the verification phase of the study and thereafter is followed exactly. The initial salinity concentrations are artificial; and the model must be operated for a period of time to allow salinities to reach stable values with respect to time, depth, and location. It was found for the Grays Harbor model that the best procedure was to flood the entire model with ocean water to the elevation of mhhw, then to turn on the freshwater inflow weirs and allow the model to operate until salinity stability was achieved. It was necessary to operate the model for about five tidal cycles (about 2.5 hr) before relatively stable conditions existed, after which data collection could be initiated. To ensure a higher degree of salinity stability when obtaining salinity measurements, salinity samples were not taken until the model had operated for at least 10 cycles (about 4 hr).

42. The locations of all stations monitored during base test conditions are shown in plate 109. Tide gage locations are identical with those in the verification, except that two gages were added in the entrance area (Ocean and Westport "A") to more accurately define tidal

changes in this area resulting from any tests investigated. The verification of current velocities and salinities was based on the results of data obtained at 18 locations throughout the estuary (see plate 1). For obvious reasons, none of these stations could be located along the navigation channel center line. The coverage was not sufficient, particularly in the entrance area, to give a complete composite picture of the effects of future improvement plans to be tested; therefore, the station location and numbering scheme used during the verification phase of the model study was abandoned during the testing phase for a sampling scheme that would better define the effects of proposed plans. These sampling stations were numbered 19-58 in order to avoid confusion with the verification stations (1-18). Several stations were added after the above scheme was adopted and are postfixed with a letter to the number of the nearest station.

Tides

43. Base test tidal height data were obtained at nine locations throughout the model. The data, collected at half-hour intervals, were plotted and smooth curves were drawn through the points. The locations of tide stations are shown in plate 109 and data are presented in plates 110-112.

Current Velocities

44. Base test current velocity data were obtained at 44 locations throughout the model. Data were collected at the surface, middepth, and bottom elevations at half-hour intervals at all locations where the depth of water was sufficient. At the few stations that were located in shallow water, middepth measurements were not made. The half-hour measurements were plotted, and smooth curves were drawn through the points. The locations of current velocity stations are shown in plate 109, and the current velocity data are presented in plates 113-156.

Salinities

45. Base test salinity data were obtained at 41 locations throughout the model. Water samples were collected at the surface, middepth, and bottom elevations at hourly intervals. The salinity concentrations were determined with a salinity meter and were later plotted and smooth curves were drawn through the points. The locations of salinity stations are shown in plate 109, and the salinity data are presented in plates 157-197.

Entrance Shoaling

46. The final results for the verification of shoaling in the entrance area, discussed in paragraphs 35 and 36 of this report, also served as the shoaling base test, since there were no plans installed in the model during the verification tests. The location of the shoal sections, prototype data used as the basis for verification, and final model shoaling verification results are shown in plates 106, 107, and 108, respectively. The volumes of shoaling material retrieved from individual sections are presented in table 1. The shoaling test technique developed for this model provided only qualitative information concerning entrance area shoaling. It was possible to identify areas of heavy shoaling and to compare the merits of various plans on the basis of the relative quantities of shoaling in the entrance area; however, it was not possible to relate quantities of model shoaling to prototype quantities.

Dye Dispersion

47. Model tests were made to determine the flushing rate and dispersion characteristics of the estuary for two very generalized sources (one upstream and one at the entrance) of materials entering the estuary. Test procedures consisted of introducing one type of conservative fluorescent dye (Pontacyl Brilliant Pink) at a point near Cosmopolis and

another type (Uranine) near the outer end of the south jetty. Four liters of Pontacyl Brilliant Pink dye with an initial concentration of 10,000,000 ppb and the density of fresh water of 1.0 was injected into the model near Cosmopolis at the middepth elevation over a complete tidal cycle beginning at hour 0 of cycle 1. Four liters of Uranine dye with an initial concentration of 10,000,000 ppb and the density of sea water was injected into the model near the outer end of the south jetty at the bottom of the channel from hour 20 (llw) of cycle 1 until hour 2 (lhw) of cycle 2. Each dye mixture was contained in a glass standpipe and was introduced at a constant rate throughout the injection period through a 1/4-in. copper tube oriented at the proper elevation. Prior to initiating dye injection, the model was operated for four tidal cycles to establish salinity stability throughout the model.

48. The locations of the two dye release points are shown in plate 109. During the dye dispersion tests, water samples were withdrawn from the model for subsequent analysis for dye concentration. The samples were taken at 41 locations with the multidepth sampler described in paragraph 14. Samples were obtained at surface, middepth, and bottom elevations at the times of hhw slack current (hour 13) and llw slack current (hour 20) over a period of 16 tidal cycles. Concentrations of the samples were measured by means of a Turner Model III fluorometer.

49. Plots of dye concentration as a function of time at typical stations for the Cosmopolis dye release are shown in plates 198-202. Smooth curves have been drawn through the data points. Plots of dye concentration profiles along the navigation channel after 5 and 12 tidal cycles for the Cosmopolis dye release are shown in plates 203 and 204, respectively. Similar plots of concentration histories and profiles for the south jetty dye release are presented in plates 205-211. Table 2 presents the dye concentrations for high- and low-water slacks at surface, middepth, and bottom elevations at all stations for both the Cosmopolis and south jetty dye releases.

Current Pattern Mosaics

50. Surface current pattern mosaics were made of the entrance area for use in evaluating proposed channel realignments, effectiveness of dikes, groins, etc. The mosaic also provides a means for current velocity analysis in areas too shallow for measurements with the velocity meter. The mosaics included in this report cover only the entrance area and a portion of the inner harbor; however, it was anticipated that as the model study progressed this partial mosaic would be expanded to include the entire estuary.

51. The mosaics were prepared from time-exposure photographs of confetti floating on the water surface. A bright light was flashed immediately before the camera lens was closed, resulting in a bright spot at approximately the end of each confetti streak which indicates the direction of flow. Current velocities can be determined from the photographs by measuring the lengths of the confetti streaks and comparing the lengths with the velocity scale presented in each mosaic. Photographs were taken at hourly (prototype) intervals throughout a complete tidal cycle (24.84 hr). Surface current pattern mosaics for base test conditions are presented in photos 1-25.

Table 1

Entrance Shoaling

Base Test Conditions

Section No.	Volume Retrieved cc*	Percent of Total		Section No.	Volume Retrieved cc*	Percent of Total	
		Retrieved	Injected			Retrieved	Injected
1	10	0.01	0.01	31	1,070	1.28	1.07
2	1,125	1.36	1.12	32	15	0.02	0.02
3	220	0.26	0.22	33	0	0.00	0.00
4	1,230	1.47	1.23	34	2,175	2.62	2.18
5	5,680	6.83	5.68	35	0	0.00	0.00
6	10	0.01	0.01	36	0	0.00	0.00
7	20	0.02	0.02	37	1,810	2.18	1.81
8	790	0.95	0.79	38	3,890	4.68	3.89
9	3,750	4.50	3.75	39	5	0.00	0.00
10	1,930	2.32	1.93	40	5	0.00	0.00
11	3,595	4.31	3.59	41	0	0.00	0.00
12	15	0.02	0.02	42	0	0.00	0.00
13	3,960	4.76	3.96	43	6,570	7.90	6.57
14	3,535	4.26	3.54	44	0	0.00	0.00
15	5,985	7.19	5.98	45	0	0.00	0.00
16	3,440	4.13	3.44	46	0	0.00	0.00
17	1,465	1.76	1.46	47	835	1.00	0.84
18	495	0.59	0.49	48	2,710	3.27	2.71
19	2,440	2.94	2.44	49	880	1.06	0.88
20	3,070	3.69	3.07	C-1	15	0.02	0.02
21	25	0.03	0.03	C-2	0	0.00	0.00
22	25	0.03	0.03	C-3	0	0.00	0.00
23	1,210	1.46	1.21	C-4	15	0.02	0.02
24	965	1.16	0.96	C-5	3,795	4.56	3.79
25	340	0.40	0.34	C-6	885	1.05	0.88
26	10	0.01	0.01	C-7	1,110	1.34	1.11
27	2,435	2.94	2.44	C-8	3,035	3.65	3.04
28	2,190	2.64	2.19	C-9	2,245	2.69	2.24
29	1,800	2.16	1.80	C-10	340	0.42	0.34
30	15	0.02	0.02	C-11	15	0.01	0.01
				Total	83,200	100.00	83.20

Note: Total volume injected was 100,000 cc.
* Average of two identical runs.

Table 2

High- and Low-Water Slack Dye Concentrations

Mean Tide, Freshwater Discharge 12,000 cfs, Source Salinity 33.0 ppt

	Uranine*						Pontacyl Brilliant Pink **					
	High-Water Slack Concentration, ppb			Low-Water Slack Concentration, ppb			High-Water Slack Concentration, ppb			Low-Water Slack Concentration, ppb		
Cycle	Surface	Middepth	Bottom	Surface	Middepth	Bottom	Surface	Middepth	Bottom	Surface	Middepth	Bottom
						Station 19						
1	0	0	0	13	12	10	2	0	0	1	1	2
2	190	79	109	485	680	168	9	3	0	201	58	7
3	203	162	92	502	490	149	12	5	1	961	406	207
4	159	76	69	287	289	122	84	32	37	1,612	677	106
5	104	59	60	229	229	99	114	54	30	1,287	717	86
6	80	53	55	177	155	85	118	58	46	934	582	175
7	59	42	47	164	141	69	114	88	74	717	487	207
9	49	39	41	122	109	55	86	67	64	663	365	161
10	41	34	38	98	82	39	85	46	37	514	297	120
12	36	30	31	61	56	36	75	54	45	265	156	85
14	36	26	28	50	46	31	67	49	48	182	146	69
16	31	26	27	38	37	29	56	49	48	123	114	71
						Station 20						
1	0	0	0	1	1	0	0	0	0	0	0	0
2	720	119	1192	1256	1434	357	5	1	2	33	11	8
3	130	69	74	197	159	100	4	2	2	419	93	61
4	80	66	50	115	94	66	46	15	15	853	114	141
5	61	47	41	91	67	79	67	20	18	800	123	150
6	70	61	45	70	60	63	82	26	28	677	123	146
7	76	41	38	71	56	47	79	33	27	636	91	95
9	56	39	36	70	56	44	84	38	43	473	104	90
10	48	33	32	70	60	38	88	38	40	379	85	82
12	47	33	32	66	60	35	79	46	45	270	90	80
14	42	30	29	58	50	33	66	46	46	201	56	59
16	35	30	27	34	41	28	62	48	48	132	58	54
						Station 21						
1	1	0	0	1	0	0	0	0	0	0	0	0
2	130	45	61	929	1042	335	7	12	20	13	12	9
3	178	137	174	446	444	127	10	15	20	109	64	64
4	142	131	141	249	246	112	19	19	21	379	159	127
5	136	112	99	214	195	195	55	40	38	473	155	155
6	256	111	99	200	201	183	54	48	41	501	164	187
7	160	72	73	181	180	157	69	59	58	473	164	155
9	109	79	61	122	116	109	93	62	72	392	164	114
10	89	43	47	105	104	109	106	64	69	338	109	114
12	78	42	40	69	41	40	110	67	64	256	136	100
14	76	60	51	65	65	83	105	69	61	[illegible]	104	100
26	55	42	39	50	47	61	88	66	58	136	104	91
						Station 22						
1	0	1	0	0	0	0	0	0	0	0	0	0
2	30	33	28	1159	1456	1678	0	0	1	270	178	127
3	108	126	158	520	586	550	7	8	6	1,043	961	636
4	82	90	101	368	394	310	59	59	69	1,093	962	555
5	70	77	78	233	231	203	71	71	64	1,530	1,124	637
6	53	57	57	211	197	164	93	98	110	1,205	1,043	545
7	50	49	50	193	165	134	106	111	118	880	718	474
9	38	42	42	151	129	98	110	95	118	474	582	473
10	38	37	36	116	80	69	80	91	91	312	487	392
12	35	38	37	76	70	60	72	72	80	220	338	284
14	32	35	34	59	54	50	66	66	67	155	228	187
16	29	32	31	46	42	42	66	66	64	114	155	136
						Station 23						
1	0	0	1	1	2	2	0	0	0	0	0	0
2	634	144	150	781	999	1409	7	6	5	136	45	20
3	192	122	109	506	567	553	12	6	6	718	406	141
4	112	72	91	374	311	353	43	34	19	962	867	351
5	88	60	65	335	310	272	67	59	40	1,368	880	515
6	73	56	57	217	210	197	100	77	49	1,205	880	555
7	60	48	48	190	195	173	178	109	77	1,043	799	528
9	46	40	44	154	151	128	136	100	82	555	474	[illegible]
10	43	34	36	128	128	114	123	72	74	393	393	365
12	35	33	35	81	78	73	104	82	72	324	365	270
14	33	32	32	62	64	61	91	61	59	311	270	205
16	31	28	30	50	48	46	67	59	56	205	182	146
						Station 24						
1	0	0	1	1	1	0	0	0	0	0	0	0
2	1192	868	510	999	1193	954	9	6	4	23	11	7
3	212	220	198	445	530	469	12	8	5	270	123	65
4	333	470	220	354	354	293	17	12	9	745	446	284
5	248	151	175	254	248	221	30	26	22	907	473	433
6	225	76	92	232	234	230	49	32	45	894	650	488
7	128	64	70	208	208	203	61	56	61	894	677	528
9	90	45	50	150	153	139	80	64	84	[illegible]	--	400

(Continued)

* Four liters of Uranine dye with a concentration of 10,000,000 ppb, density of 33.0 ppt salt was injected at the bottom elevation at sta 19. Injection was started at lower low water (hour 20), cycle 1, and was stopped at lower high water (hour 2), cycle 2.

** Four liters of Pontacyl Brilliant Pink dye with a concentration of 10,000,000 ppb, density of 0.0 ppt salt (fresh water) was injected at the middepth elevation at the upstream end of the navigation channel near Cosmopolis. Injection was started at hour 0, cycle 1, and was stopped at hour 0, cycle 2.

(1 of 7 sheets)

Table 2 (Continued)

Cycle	Uranine: High-Water Slack Concentration, ppb: Surface	Middepth	Bottom	Uranine: Low-Water Slack Concentration, ppb: Surface	Middepth	Bottom	Pontacyl Brilliant Pink: High-Water Slack Concentration, ppb: Surface	Middepth	Bottom	Pontacyl Brilliant Pink: Low-Water Slack Concentration, ppb: Surface	Middepth	Bottom
Station 24 (Continued)												
10	79	40	45	127	127	122	85	85	89	568	447	351
12	57	39	42	87	94	90	90	71	71	[illegible]	338	[illegible]
14	47	34	37	64	68	72	79	64	66	[illegible]	251	214
16	41	29	31	47	49	49	64	56	43	[illegible]	173	155
Station 25												
1	0	0	0	1	0	0	0	0	0	0	0	0
2	378	79	94	998	996	1213	2	1	0	311	205	79
3	208	148	140	565	674	632	45	21	10	1,693	812	419
4	190	137	140	439	462	490	141	71	54	1,937	1,287	826
5	130	94	98	328	348	310	284	111	98	1,855	1,449	880
6	93	75	78	214	215	195	270	114	100	1,530	1,287	894
7	78	55	60	176	171	156	270	146	123	1,124	718	731
9	58	48	48	143	136	117	242	136	136	826	650	501
10	56	44	44	107	108	107	201	114	104	650	609	419
12	45	37	38	79	80	79	141	101	91	406	393	297
14	34	39	--	57	56	54	118	91	80	270	270	237
16	36	36	35	46	42	41	100	74	69	191	169	155
Station 26												
1	1	0	0	3	0	0	0	0	0	0	0	0
2	107	238	529	1029	1523	2050	1	0	0	867	141	123
3	123	193	148	495	609	632	69	33	14	2,343	746	603
4	99	138	125	324	396	291	123	87	64	2,668	1,043	921
5	84	99	104	232	239	206	123	132	98	2,180	1,205	961
6	65	80	67	194	201	169	146	159	179	1,612	1,124	921
7	49	56	46	167	171	147	164	191	123	1,205	880	663
9	43	46	39	127	130	108	141	191	109	812	690	473
10	41	44	37	108	111	90	114	118	91	609	541	392
12	37	39	33	67	70	60	91	109	84	365	365	270
14	35	28	31	53	54	54	84	95	72	270	270	205
16	30	34	29	39	41	39	71	79	62	178	173	146
Station 26A												
1	0	0	0	0	0	0	0	0	0	0	0	0
2	335	355	293	466	509	719	4	4	3	201	95	17
3	164	144	152	413	464	554	15	9	5	1,205	288	155
4	95	83	88	345	373	400	46	45	43	1,530	320	434
5	84	75	73	285	308	312	87	67	56	1,774	1,368	690
6	129	104	97	229	235	224	127	110	92	1,612	1,368	636
7	112	79	80	205	208	211	178	113	110	1,205	962	636
9	65	54	58	145	153	140	146	104	109	839	537	541
10	55	47	47	125	127	122	136	104	100	636	636	446
12	44	40	38	79	82	80	100	100	91	446	433	338
14	41	39	39	60	64	67	75	91	66	297	297	251
16	34	32	32	45	50	51	69	67	66	69	75	--
Station 27												
1	0	0	0	4	0	0	0	0	0	0	0	0
2	1409	1607	1789	122	335	595	3	5	6	16	18	19
3	181	191	196	313	470	615	2	2	2	84	59	38
4	47	53	50	332	423	401	7	8	5	311	297	269
5	62	62	56	311	354	293	22	29	16	623	609	473
6	150	108	110	225	244	218	40	59	32	745	677	773
7	104	102	79	205	221	204	53	69	43	731	704	501
9	66	72	62	153	165	140	62	72	53	609	609	487
10	64	59	54	142	148	125	71	87	69	555	529	419
12	48	49	50	112	114	88	72	69	62	433	406	284
14	47	42	44	82	77	73	75	67	61	324	297	224
16	39	37	39	55	59	56	58	59	53	224	201	146
Station 28												
1	0	0	1	0	0	0	0	0	0	0	0	0
2	1548	1098	998	402	178	740	3	--	--	10	6	6
3	469	313	379	315	295	615	48	30	29	127	187	114
4	221	193	212	232	293	423	105	136	118	839	636	528
5	172	153	156	249	342	332	351	237	233	853	799	690
6	143	124	131	211	235	238	392	269	297	880	880	825
7	114	104	105	172	197	195	419	289	288	799	880	839
9	83	75	79	118	134	136	--	--	--	623	812	663
10	72	67	68	102	111	114	270	205	196	528	636	514
12	49	45	46	60	70	72	205	159	169	338	434	365
14	44	44	46	48	54	56	[illegible]	114	118	270	297	297
16	37	37	33	39	40	42	218	95	95	210	205	178
Station 29												
1	0	0	0	0	0	0	0	0	0	0	0	0
2	1407	1063	613	187	190	929	9	6	3	8	--	--
3	592	355	248	445	220	679	82	40	19	338	242	214
4	331	232	232	398	219	444	311	173	100	948	568	677
5	216	153	172	330	177	330	379	260	214	1,449	623	853
6	160	130	121	233	157	208	487	297	228	1,205	853	948
7	126	104	86	195	123	171	528	379	301	1,043	839	907
9	59	71	75	136	77	117	--	--	--	812	609	690

(Continued)

Table 2 (Continued)

	Uranine						Pontacyl Brilliant Pink					
	High-Water Slack Concentration, ppb			Low-Water Slack Concentration, ppb			High-Water Slack Concentration, ppb			Low-Water Slack Concentration, ppb		
Cycle	Surface	Middepth	Bottom	Surface	Middepth	Bottom	Surface	Middepth	Bottom	Surface	Middepth	Bottom
						Station 29 (Continued)						
10	71	59	63	113	65	98	351	256	215	623	514	514
12	54	50	50	83	55	76	256	178	155	433	351	379
14	44	40	41	54	37	51	187	136	127	284	260	270
16	37	37	35	40	31	41	132	109	100	205	178	178
						Station 30						
1	0	0	1	1	0	0	0	0	0	0	0	0
2	697	233	249	495	531	930	4	1	1	311	--	[illegible]
3	--	--	--	634	738	804	175	15	11	473	260	114
4	290	162	167	--	--	--	228	69	64	2,262	718	528
5	164	111	111	420	420	353	392	136	164	1,855	1,368	704
6	100	89	94	330	324	268	406	159	178	1,530	1,124	677
7	81	67	72	202	205	165	338	173	196	1,237	880	636
9	62	55	56	139	146	121	297	187	164	772	745	487
10	53	50	51	121	123	102	270	156	150	677	595	351
12	45	42	43	73	74	65	187	118	127	460	433	270
14	39	37	38	54	57	51	118	95	100	297	270	196
16	35	32	34	44	44	42	104	91	80	205	191	141
						Station 31						
1	0	2	0	0	0	0	0	0	0	0	0	0
2	494	315	132	445	530	719	3	2	0	311	191	104
3	314	170	174	442	528	594	49	25	18	1,124	718	677
4	234	180	182	396	419	443	274	100	71	1,855	1,536	880
5	173	123	122	306	326	331	297	169	132	1,530	1,368	1,124
6	127	99	102	237	243	213	270	178	146	1,612	1,368	1,043
7	94	77	76	192	197	189	297	228	196	1,205	1,124	999
9	72	62	60	138	149	122	270	171	150	758	753	636
10	58	52	51	109	116	108	242	169	150	609	595	514
12	47	44	40	71	74	66	155	114	114	379	406	351
14	40	42	34	56	57	53	123	100	95	270	270	228
16	34	33	32	41	43	42	62	64	58	85	80	77
						Station 32						
1	0	2	0	0	0	0	0	0	0	0	0	0
2	181	183	186	674	925	758	3	4	4	731	260	210
3	156	157	132	365	563	569	34	18	14	1,693	718	555
4	115	111	114	286	326	330	90	92	82	2,018	1,287	1,205
5	102	87	94	238	236	229	109	85	91	2,018	1,124	1,205
6	85	90	79	194	199	194	114	92	97	1,287	1,124	948
7	65	68	57	176	172	177	155	123	127	962	799	772
9	51	50	46	130	125	127	123	114	114	690	636	528
10	47	47	42	110	108	114	123	109	104	514	501	407
12	39	38	38	70	69	72	109	109	91	406	375	236
14	35	34	35	57	57	60	73	67	53	271	251	191
16	30	29	30	35	34	38	62	59	45	182	155	136
						Station 33						
1	0	0	0	0	0	0	0	0	0	0	0	0
2	699	954	1214	141	207	494	2	3	3	8	10	13
3	446	594	615	235	357	494	4	3	3	141	155	67
4	314	379	402	293	334	270	26	19	17	514	419	324
5	270	234	250	312	333	269	85	48	48	677	677	514
6	243	223	208	246	249	221	127	72	74	756	799	609
7	180	174	164	218	224	200	55	102	103	934	921	704
9	122	111	112	160	167	143	220	137	147	636	650	541
10	108	108	91	147	154	121	182	123	136	568	568	487
12	83	84	74	101	108	87	173	123	123	419	433	351
14	87	80	74	79	84	68	136	114	114	311	[illegible]	270
16	57	60	56	57	60	53	109	91	91	205	228	127
						Station 34						
1	0	0	0	1	0	0	0	0	0	0	0	0
2	113	206	112	60	65	178	4	5	3	1	1	2
3	657	678	468	313	271	555	49	20	11	29	26	13
4	509	332	334	354	378	334	182	159	132	169	155	93
5	333	207	215	332	332	234	419	297	187	351	338	214
6	220	209	185	238	249	209	567	338	269	532	541	279
7	182	180	162	199	192	169	595	392	289	623	603	297
9	148	130	134	175	185	141	473	338	283	663	624	338
10	128	113	111	152	157	115	446	311	260	568	595	270
12	95	82	83	107	110	79	338	251	205	440	433	201
14	73	75	79	82	87	77	247	178	165	338	311	146
16	54	54	57	67	64	66	181	132	124	242	242	104
						Station 35						
1	0	0	0	0	0	0	0	0	0	0	0	0
2	169	128	169	308	396	1061	1	1	1	2,100	967	283
3	137	134	149	500	481	755	24	13	13	3,644	1,775	1,531
4	140	117	132	340	388	419	93	47	58	3,075	2,750	1,938
5	94	94	88	284	324	264	210	136	155	2,668	2,424	1,774
6	86	78	83	241	241	213	228	191	169	1,937	1,855	1,308
7	60	59	64	175	181	163	256	205	191	1,532	1,449	1,043
9	51	47	48	130	135	120	214	173	169	1,043	1,043	745
10	48	44	46	110	117	104	196	141	141	799	734	528
12	39	38	38	67	68	65	123	114	123	460	432	365
14	34	33	34	54	56	50	95	100	95	297	284	[illegible]
16	31	30	30	42	44	40	77	72	79	201	201	105

(Continued)

(3 of 7 sheets)

Table 2 (Continued)

	Uranine						Pontacyl Brilliant Pink					
	High-Water Slack Concentration, ppb			Low-Water Slack Concentration, ppb			High-Water Slack Concentration, ppb			Low-Water Slack Concentration, ppb		
Cycle	Surface	Middepth	Bottom	Surface	Middepth	Bottom	Surface	Middepth	Bottom	Surface	Middepth	Bottom
						Station 36						
1	0	0	0	0	0	0	0	0	0	0	0	0
2	294	313	355	[illegible]72	549	1498	3	2	1	1,287	[illegible]37	311
3	151	154	293	--	--	-	118	114	21	2,118	2,50[illegible]	63[illegible]
4	--	83	201	--	412	354	351	235	306	2,912	2,505	9[illegible]
5	102	79	140	262	285	157	375	30[illegible]	301	2,750	2,615	1,124
6	--	--	--	204	160	150	297	297	238	2,10[illegible]	[illegible]	71[illegible]
7	90	102	102	165	174	150	271	224	237	1,3[illegible]	1,205	54[illegible]
9	68	71	75	119	128	94	210	133	170	785	637	33[illegible]
10	50	50	52	106	109	69	191	150	141	595	623	[illegible]
12	50	51	49	62	57	56	141	152	100	392	379	270
14	38	38	37	48	52	50	204	91	77	270	269	205
16	32	32	33	41	43	40	80	75	59	169	[illegible]	127
						Station 37						
1	1	0	0	2	0	0	0	0	0	0	0	0
2	554	825	1000	250	314	700	1	2	[illegible]	[illegible]	22	14
3	446	293	335	380	554	595	30	9	8	88	115	31
4	--	--	--	378	445	335	10[illegible]	32	22	[illegible]10	2[illegible]0	17[illegible]
5	295	250	220	292	352	270	273	[illegible]	40	[illegible]	[illegible]77	29[illegible]
6	227	205	180	269	291	2[illegible]	[illegible]05	104	51	79[illegible]	[illegible]	320
7	194	161	159	197	216	201	[illegible]	[illegible]	71	[illegible]	704	351
9	134	104	103	156	161	144	419	155	132	555	623	419
10	122	95	95	137	143	118	[illegible]	159	1[illegible]	[illegible]	[illegible]	311
12	79	72	74	10[illegible]	98	88	247	12[illegible]	114	[illegible]	[illegible]	2[illegible]
14	76	76	76	80	72	77	2[illegible]7	115	104	[illegible]	257	150
16	54	51	48	54	54	[illegible]2	1[illegible]	100	83	204	219	114
						Station 38						
1	0	0	0	0	0	0	0	0	0	0	0	0
2	8[illegible]	955	968	294	446	1499	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	249	272	335	314	37[illegible]	554	[illegible]	[illegible]	[illegible]	[illegible]	40	2[illegible]
4	234	235	2[illegible]	332	493	249	[illegible]	14	16	270	270	[illegible]
5	202	203	201	332	354	210	85	34	34	[illegible]	44[illegible]	2[illegible]
6	179	189	162	311	331	217	104	5[illegible]	61	[illegible]09	609	338
7	154	156	144	220	226	179	150	87	9[illegible]	74[illegible]	717	377
9	105	100	94	17[illegible]	168	115	1[illegible]9	105	104	690	[illegible]3	29[illegible]
10	87	91	82	149	14[illegible]	10[illegible]	14[illegible]	105	10[illegible]	[illegible]	[illegible]77	2[illegible]
12	76	77	75	110	113	77	13[illegible]	100	100	44[illegible]	[illegible]	291
14	73	7[illegible]	68	73	85	65	10[illegible]	94	90	311	[illegible]	13[illegible]
16	46	51	51	55	57	4[illegible]	10[illegible]	8[illegible]	62	257	243	114
						Station 39						
1	0	0	0	0	0	0	0	0	0	0	0	0
2	8[illegible]	612	553	177	23[illegible]	690	1[illegible]	5	7	35	46	40
3	469	400	401	312	354	674	51	1[illegible]	30	248	52	79
4	333	312	294	374	441	378	141	91	[illegible]	1,205	[illegible]2	20[illegible]
5	248	217	233	[illegible]1	3[illegible]	269	214	[illegible]	25[illegible]	982	[illegible]	312
6	182	177	--	255	325	247	242	19	131	982	47[illegible]	294
7	170	172	170	224	166	203	274	2[illegible]	201	880	55[illegible]	375
9	102	10[illegible]	108	165	169	137	224	210	214	71[illegible]	715	351
10	[illegible]	[illegible]	90	135	134	114	205	1[illegible]2	1[illegible]	[illegible]	[illegible]	412
12	64	[illegible]7	72	101	10[illegible]	80	141	141	132	[illegible]	429	277
14	64	67	72	71	75	65	123	12[illegible]	114	[illegible]	297	242
16	43	43	44	46	44	41	[illegible]	100	91	225	210	1[illegible]
						Station 40						
1	0	0	0	0	0	0	0	0	0	0	0	0
2	1192	1[illegible]08	[illegible]	77	11[illegible]	52[illegible]	12	[illegible]	[illegible]	2	1	3
3	592	[illegible]33	[illegible]77	508	507	[illegible]	[illegible]	[illegible]	5[illegible]	[illegible]	10[illegible]	115
4	331	332	353	331	375	440	3[illegible]	270	29[illegible]	[illegible]	338	5[illegible]
5	230	231	246	268	30[illegible]	[illegible]	5[illegible]	501	407	[illegible]	717	[illegible]
6	215	231	230	230	2[illegible]	23[illegible]	[illegible]	[illegible]	[illegible]41	793	[illegible]	75[illegible]
7	203	202	203	19[illegible]	2[illegible]	20[illegible]	5[illegible]	[illegible]	[illegible]	512	8[illegible]	7[illegible]
9	135	139	142	142	2[illegible]	2[illegible]0	473	4[illegible]0	4[illegible]3	[illegible]23	7[illegible]7	582
10	11[illegible]	12[illegible]	120	124	132	10[illegible]	420	[illegible]	[illegible]2	[illegible]	[illegible]	[illegible]
12	78	[illegible]	8[illegible]	[illegible]	92	84	297	[illegible]	2[illegible]4	[illegible]	[illegible]2	[illegible]
14	[illegible]7	7[illegible]	73	[illegible]	[illegible]	[illegible]2	[illegible]	220	214	[illegible]	270	27[illegible]
16	47	50	46	[illegible]	47	[illegible]	150	14[illegible]	14[illegible]	[illegible]	214	182
						Station 41						
1	1	0	[illegible]	0	0	[illegible]	[illegible]	[illegible]	[illegible]	0	[illegible]	0
2	[illegible]	[illegible]95	[illegible]2	[illegible]	[illegible]00	5	[illegible]	7	[illegible]	[illegible]	1	[illegible]
3	[illegible]31	612	[illegible]	51	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2[illegible]	[illegible]
4	3[illegible]	377	3[illegible]	[illegible]	37[illegible]	[illegible]	[illegible]	[illegible]24	[illegible]	[illegible]	24[illegible]	[illegible]
5	2[illegible]	231	217	[illegible]	[illegible]	2[illegible]	[illegible]	7[illegible]	[illegible]	[illegible]	[illegible]	4[illegible]
6	24[illegible]	215	217	24[illegible]	210	[illegible]	[illegible]	4[illegible]	7[illegible]	[illegible]	[illegible]	47
7	2[illegible]	192	1[illegible]	21[illegible]	2[illegible]	20[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	473
9	[illegible]44	12[illegible]	[illegible]	1[illegible]	172	240	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4[illegible]
10	11[illegible]	10[illegible]	10[illegible]	127	[illegible]	[illegible]	41[illegible]	[illegible]	[illegible]	5[illegible]1	[illegible]	419
12	[illegible]	92	8[illegible]	102	1[illegible]	[illegible]	2[illegible]	[illegible]	[illegible]	41[illegible]	[illegible]	2[illegible]
14	65	[illegible]7	6[illegible]	77	77	[illegible]	[illegible]	[illegible]0	[illegible]	2[illegible]	2[illegible]	2[illegible]
16	46	45	4[illegible]	40	50	[illegible]	[illegible]	1[illegible]	[illegible]	2[illegible]	22[illegible]	1[illegible]
						Station 42						
1	0	0	[illegible]	0	0	0	0	[illegible]	0	--	--	--
2	[illegible]	857	655	192	22[illegible]	427	[illegible]	[illegible]	10	[illegible]	[illegible]	[illegible]
3	445	332	[illegible]	2[illegible]7	[illegible]	[illegible]	71	71	[illegible]	[illegible]	[illegible]	[illegible]
4	216	210	217	252	2[illegible]	[illegible]	176	200	10[illegible]	[illegible]	[illegible]	[illegible]

(Continued) (4 of [illegible] sheets)

Table 2 (Continued)

Cycle	Uranine, High-Water Slack Concentration, ppb, Surface	Middepth	Bottom	Uranine, Low-Water Slack Concentration, ppb, Surface	Middepth	Bottom	Pontacyl Brilliant Pink, High-Water Slack Concentration, ppb, Surface	Middepth	Bottom	Pontacyl Brilliant Pink, Low-Water Slack Concentration, ppb, Surface	Middepth	Bottom
Station 42 (Continued)												
5	150	135	136	258	260	284	284	257	257	2,993	2,993	2,749
6	139	129	130	208	222	226	350	324	299	2,262	2,180	2,018
7	117	107	108	171	187	191	433	297	351	1,530	1,530	1,530
9	87	78	79	129	133	134	311	219	224	962	962	962
10	64	63	60	104	111	110	210	173	164	759	758	745
12	54	50	52	71	74	74	164	132	136	487	460	460
14	46	46	47	57	58	59	123	104	100	297	297	297
16	39	36	38	43	43	43	104	86	81	201	205	205
Station 43												
1	0	0	0	1	0	0	0	0	0	--	--	--
2	997	997	824	235	299	575	18	16	14	5,268	2,505	--
3	399	422	399	229	296	607	159	68	46	4,130	3,887	2,505
4	195	216	231	259	301	392	311	292	274	3,318	3,318	2,587
5	142	149	152	238	259	285	406	311	297	2,505	2,587	2,181
6	153	160	149	212	210	227	500	406	349	1,855	1,937	1,693
7	137	137	140	187	195	200	365	324	406	1,368	1,368	1,205
9	90	94	98	139	145	146	270	270	284	880	800	800
10	76	79	76	120	115	124	205	205	205	638	638	638
12	51	54	55	66	70	72	164	169	173	446	460	446
14	47	48	46	52	53	55	123	123	127	284	297	284
16	37	37	38	39	41	42	100	95	100	191	196	191
Station 44												
1	0	0	0	2	2	2	0	0	0	315	123	196
2	1522	757	757	141	204	487	49	30	27	5,918	4,374	880
3	693	675	675	148	314	432	677	365	460	5,268	5,268	2,262
4	348	351	351	180	295	414	894	894	718	3,968	4,293	2,343
5	242	244	243	186	262	285	812	826	637	2,749	3,155	2,180
6	193	194	175	176	209	219	731	745	637	2,100	2,344	[illegible]
7	162	141	153	155	184	192	627	719	599	1,449	1,693	1,287
9	119	109	108	112	127	135	555	501	541	962	799	799
10	92	92	88	89	105	113	433	406	406	690	772	636
12	71	71	67	68	71	76	297	270	284	433	446	406
14	49	50	50	47	51	55	196	191	187	270	297	270
16	39	37	39	31	37	39	136	141	141	178	191	182
Station 45												
1	0	0	0	0	1	1	0	0	0	785	201	87
2	1797	2483	2547	126	167	335	86	40	20	7,462	4,213	3,124
3	752	715	674	172	172	402	609	406	351	5,024	4,780	3,155
4	392	329	328	220	279	388	799	853	[illegible]	3,643	3,968	3,237
5	286	229	228	207	260	283	1,124	785	717	2,587	2,912	2,668
6	225	172	174	174	197	213	963	758	650	1,855	2,180	2,099
7	174	148	150	150	168	185	880	690	582	1,530	1,693	1,530
9	128	109	111	99	120	131	704	473	460	948	961	948
10	104	84	87	87	104	109	502	406	379	704	717	717
12	74	59	62	53	63	71	338	270	284	541	509	609
14	52	47	48	42	48	53	251	196	191	260	297	315
16	41	38	38	31	36	40	182	146	141	164	187	201
Station 46												
1	0	0	0	0	0	3	0	0	0	962	637	9
2	553	1212	1379	91	180	67	95	61	31	6,487	--	104
3	773	843	887	170	--	--	1,124	555	419	6,080	4,780	962
4	439	487	505	218	--	314	2,099	1,205	718	4,538	4,213	1,774
5	348	308	310	222	280	327	1,855	1,205	962	3,155	3,074	1,774
6	263	227	245	210	238	266	1,693	1,124	962	2,262	2,343	1,530
7	181	172	171	--	--	--	1,205	1,002	880	1,693	1,612	1,205
9	128	125	121	112	124	130	663	677	663	963	880	799
10	109	106	105	89	102	107	441	528	501	785	785	636
12	76	74	76	64	70	76	351	351	351	446	460	379
14	55	56	58	47	51	56	288	251	246	284	311	284
16	46	42	46	35	38	44	187	173	178	191	205	187
Station 47												
1	0	0	0	0	0	0	1	1	1	1	5	3
2	173	215	248	290	290	311	41	36	25	446	460	324
3	713	733	733	--	282	302	907	961	799	2,424	2,505	2,180
4	521	521	521	279	340	299	2,099	1,774	1,612	3,318	3,237	2,993
5	369	391	369	300	295	300	2,180	1,855	1,774	2,993	2,912	2,749
6	263	263	263	260	282	283	1,937	1,774	1,693	2,587	2,424	2,343
7	225	227	227	--	--	--	1,530	1,287	1,368	2,099	2,018	1,937
9	147	152	150	156	161	161	962	879	879	1,124	1,205	1,043
10	122	122	125	127	130	130	799	772	745	880	880	799
12	88	88	88	91	96	95	501	501	487	663	663	636
14	60	62	62	63	65	65	324	324	311	446	433	419
16	49	41	49	46	48	48	228	224	233	284	284	270
Station 48												
1	0	0	0	0	0	0	0	0	0	3,724	1,937	473
2	232	334	354	8	11	6	406	173	100	7,624	6,812	4,863
3	510	671	671	145	103	211	2,343	1,205	1,205	5,837	5,499	5,755
4	411	437	483	166	183	232	2,912	2,180	2,180	3,805	3,888	4,455
5	295	326	324	177	194	235	2,505	2,099	2,099	2,587	2,830	3,318
6	230	237	242	162	178	223	2,104	1,774	1,693	1,774	2,018	2,505
7	205	206	206	145	152	188	1,530	1,205	1,287	1,363	1,449	1,774
9	148	152	152	102	104	134	960	637	718	637	718	962

(Continued)

(5 of 7 sheets)

Table 2 (Continued)

	Uranine						Pontacyl Brilliant Pink					
	High-Water Slack Concentration, ppb			Low-Water Slack Concentration, ppb			High-Water Slack Concentration, ppb			Low-Water Slack Concentration, ppb		
Cycle	Surface	Middepth	Bottom	Surface	Middepth	Bottom	Surface	Middepth	Bottom	Surface	Middepth	Bottom
						Station 48 (Continued)						
10	123	124	125	82	93	109	717	717	635	555	555	704
12	86	87	88	54	58	79	487	460	440	379	406	473
14	59	62	60	41	43	51	311	297	297	228	243	324
16	47	47	48	30	33	40	233	214	214	155	178	[illegible]
						Station 49						
1	0	0	0	0	0	0	1	7	3	10,650	6,405	4,213
2	18	48	53	0	0	0	704	297	324	10,650	7,649	7,624
3	336	499	541	--	--	--	2,343	1,855	2,180	6,649	6,649	5,593
4	453	454	454	98	72	133	3,318	2,830	3,074	3,399	3,399	3,480
5	319	342	342	94	99	152	2,830	2,749	2,587	2,099	2,018	2,180
6	--	--	--	--	99	142	[illegible]	2,099	[illegible]	1,287	1,205	1,449
7	214	214	215	86	94	130	1,693	1,530	1,530	880	880	962
9	158	162	166	52	56	70	880	799	880	582	568	[illegible]
10	121	124	122	46	49	58	853	812	717	447	419	487
12	78	79	77	37	38	49	514	501	446	255	251	270
14	59	61	61	26	29	33	324	324	284	[illegible]	159	182
16	46	49	48	21	23	27	[illegible]	229	202	114	127	[illegible]
						Station 50						
1	0	0	0	0	0	0	11	7	15	7,137	6,162	2,993
2	21	30	29	0	0	0	433	284	214	7,449	7,380	5,999
3	385	540	556	22	47	116	[illegible]	2,180	1,855	[illegible]	4,455	4,455
4	383	453	479	106	118	176	2,830	2,993	2,830	2,530	2,749	3,562
5	320	342	343	121	143	186	2,749	2,749	2,505	1,855	1,937	2,749
6	237	261	261	117	132	175	2,180	2,180	1,937	1,287	1,368	2,099
7	204	208	211	102	111	152	1,693	1,693	1,530	880	1,111	1,531
9	152	152	157	67	78	101	1,124	1,044	1,044	583	609	[illegible]
10	124	127	127	52	55	71	853	785	785	[illegible]	460	690
12	68	65	66	41	45	57	514	501	487	257	270	406
14	57	58	58	30	30	41	324	324	311	159	178	270
16	43	44	45	23	22	30	228	219	219	104	114	173
						Station 51						
1	0	0	0	0	0	0	1,043	91	324	7,624	7,462	6,730
2	9	0	0	0	0	12	2,424	[illegible]	962	6,250	--	2,505
3	43	117	135	21	--	--	5,431	3,155	2,830	[illegible]	3,887	[illegible]
4	186	361	415	62	178	387	4,374	[illegible]	[illegible]	2,099	2,912	3,074
5	254	299	342	142	192	283	[illegible]	3,074	3,074	[illegible]	2,018	2,424
6	219	259	284	121	169	213	2,424	2,343	2,343	[illegible]	1,368	1,855
7	[illegible]	196	201	106	140	[illegible]	1,774	1,774	1,855	394	880	1,449
9		146	152	75	101	132	880	[illegible]	[illegible]	[illegible]	636	921
10		118	122	54	70	104	705	[illegible]	853	324	338	745
12	72	81	89	31	52	69	578	541	541	[illegible]	210	460
14	55	57	[illegible]	29	43	52	324	[illegible]	338	141	187	270
16	39	[illegible]	44	10	32	38	79	77	[illegible]	82	--	183
						Station 52						
1	0	0	0	0	0	0	No data					
2	0	0	0	0	0	0	No data					
3	23	167	184	0	0	0	No data					
4	87	[illegible]	338	31	51	161	No data					
5	181	277	300	73	94	169	No data					
6	180	222	[illegible]	70	77	181	No data					
7	152	192	200	65	55	133	No data					
9	101	131	137	42	46	79	No data					
10	71	106	109	35	41	65	No data					
12	50	64	68	26	30	49	No data					
14	38	47	52	20	24	39	No data					
16	29	37	42	17	20	29	No data					
						Station 53						
1	0	0	0	0	0	0	40	[illegible]	[illegible]	[illegible]	39,900	39,414
2	0	0	0	0	0	0	7,300	7,055	6,324	7,462	7,543	7,380
3	0	0	0	0	0	0	7,462	7,649	6,974	2,830	2,749	2,830
4	42	53	59	0	1	4	5,004	[illegible]	[illegible]	1,043	880	1,044
5	125	132	137	32	33	34	[illegible]	3,400	3,155	785	663	663
6	118	124	132	35	--	36	2,099	2,180	2,099	419	406	419
7	127	137	139	35	35	36	1,287	1,368	1,205	311	297	311
9	91	94	100	[illegible]	25	26	785	799	772	178	150	[illegible]
10	73	76	79	24	23	25	555	541	568	132	11	[illegible]
12	50	51	53	17	17	18	324	324	324	75	64	[illegible]
14	46	38	28	14	13	11	233	248	233	[illegible]	41	45
16	30	28	28	12	18	8	146	146	146	3	32	[illegible]
						Station 54						
1	0	0	0	0	0	0	54	--	14	31,127	35,028	26,735
2	0	0	0	0	0	0	12,113	[illegible]	[illegible]	10,163	8,700	[illegible]
3	7	42	45	0	0	0	10,000	8,249	7,099	2,587	2,749	3,074
4	62	221	249	29	36	61	4,537	4,618	4,455	1,043	1,124	1,449
5	172	229	257	44	[illegible]	70	3,074	[illegible]	[illegible]	785	853	[illegible]
6	198	217	260	50	54	72	2,099	2,587	2,587	501	514	609
7	151	182	184	43	48	57	1,449	1,774	1,774	[illegible]	379	487
9	111	128	111	30	31	42	921	1,047	1,138	205	253	237
10	103	112	120	26	29	39	717	799	799	132	173	169
12	58	69	70	21	22	[illegible]	419	487	487	84	90	94
14	43	53	56	17	19	23	260	310	310	50	62	[illegible]
16	37	41	41	11	11	12	172	204	213	37	45	48

(Continued)

Table 2 (Concluded)

Cycle	Uranine: High-Water Slack Concentration, ppb: Surface	Midepth	Bottom	Uranine: Low-Water Slack Concentration, ppb: Surface	Midepth	Bottom	Pontacyl Brilliant Pink: High-Water Slack Concentration, ppb: Surface	Middepth	Bottom	Pontacyl Brilliant Pink: Low-Water Slack Concentration, ppb: Surface	Middepth	Bottom
						Station 55						
1	0	0	0	0	0	0	784	31	57	23,000	15,000	7,000
2	0	0	0	0	0	0	19,914	6,030	4,780	5,430	5,593	5,755
3	3	15	31	4	6	12	7,650	6,000	5,106	1,855	1,855	3,887
4	58	188	196	33	33	120	3,500	4,292	4,130	1,165	1,097	2,557
5	124	207	226	43	45	148	2,31[illegible]	3,237	3,074	[illegible]	477	1,430
6	112	198	209	48	53	127	[illegible]	2,424	2,424	433	419	1,097
7	130	173	184	39	40	115	1,043	1,094	1,093	304	311	829
9	85	131	135	20	30	67	636	550	800	182	164	487
10	54	110	116	25	27	55	487	555	555	136	132	305
12	45	64	58	21	20	39	285	370	406	70	70	182
14	32	46	51	15	16	28	190	284	296	40	45	106
16	27	39	41	12	12	25	113	198	205	25	32	84
						Station 56						
1	0	0	0	0	0	0	[illegible]	4,618	1,257	23,810	25,700	24,30
2	0	0	0	0	0	0	[illegible]	6,975	5,183	4,290	3,477	3,152
3	0	0	0	0	0	0	[illegible]	6,64[illegible]	5,427	955	264	1,148
4	21	103	100	[illegible]	4	18	1,934	4,127	4,290	405	362	649
5	57	108	190	12	16	27	877	2,746	3,234	245	267	390
6	--	161	192	15	15	28	701	1,090	2,177	161	170	257
7	48	147	160	10	16	28	454	1,000	1,527	101	130	184
9	31	106	116	7	8	19	249	600	623	51	72	120
10	26	68	107	2	3	18	100	552	674	37	56	83
12	23	51	54	2	4	11	101	302	348	16	29	42
14	20	42	41	1	3	5	60	202	262	10	14	35
16	15	35	36	1	2	5	42	135	161	10	12	20
						Station 57						
1	0	0	0	0	0	0	21,8[illegible]2	36,012	3,449	17,490	42,400	31,612
2	0	0	0	0	0	0	12,580	31,150	22,350	1,852	1,021	3,154
3	0	0	0	0	0	0	3,504	5,207	6,486	218	257	500
4	20	22	40	--	--	--	1,204	1,936	2,624	[illegible]	67	172
5	30	38	75	0	0	4	771	1,050	1,492	42	58	108
6	31	51	75	0	0	6	432	655	1,094	20	25	71
7	26	41	72	0	0	[illegible]	209	418	730	10	13	47
9	24	31	48	0	0	[illegible]	[illegible]	204	320	7	11	26
10	22	24	41	0	0	2	99	145	259	[illegible]	7	23
12	18	22	31	0	0	0	50	76	122	2	2	8
14	10	19	24	0	0	0	30	48	91	1	1	5
16	8	11	21	0	0	0	22	27	66	1	1	[illegible]
						Station 58						
1	0	0	0	0	0	0	26,250	36,100	[illegible]	1,011	16,980	2,400
2	0	0	0	0	0	0	17,[illegible]0	26,740	26,250	250	1,286	1,93[illegible]
3	0	0	0	0	0	0	90[illegible]	2,331	3,393	84	204	241
4	1	1	[illegible]	0	0	0	21[illegible]	45	893	30	27	3[illegible]
5	3	4	18	0	0	0	97	113	29[illegible]	11	10	17
6	2	2	20	0	0	0	44	42	63	4	3	5
7	2	2	12	0	0	0	16	20	21	2	3	2
9	0	0	2	0	0	0	8	10	10	1	1	0
10	0	0	0	0	0	0	4	4	4	1	0	0
12	0	0	0	0	0	0	2	3	3	0	0	0
14	0	0	0	0	0	0	2	2	2	0	0	0
16	0	0	0	0	0	0	2	1	1	0	0	0
						Headbay						
1	0	--	0	0	--	0	--	1	--	--	1	--
2	0	--	0	0	--	0	--	1	--	--	1	--
3	43	--	49	56	--	29	--	1	--	--	1	--
4	47	--	50	172	--	40	--	2	--	--	4	--
5	42	--	33	46	--	34	--	[illegible]	--	--	7	--
6	32	--	31	43	--	29	--	10	--	--	[illegible]	--
7	49	--	26	27	--	25	-	16	--	--	17	--
9	24	--	22	23	--	20	--	[illegible]	--	--	24	--
10	23	--	20	36	--	20	--	26	--	--	19	--
12	20	--	22	26	--	24	--	22	--	--	47	--
14	22	--	23	26	--	26	--	27	--	--	40	--
16	23	--	26	23	--	20	--	42	--	--	42	--
						Jump						
1	0	--	--	0	--	--	--	0	--	--	0	--
2	0	--	--	0	--	--	--	0	--	--	0	--
3	45	--	--	38	--	--	--	0	--	--	1	--
4	33	--	--	35	--	--	--	1	--	--	1	--
5	34	--	--	34	--	--	--	[illegible]	--	--	4	--
6	30	--	--	27	--	--	--	3	--	--	[illegible]	--
7	27	--	--	27	--	--	--	12	--	--	14	--
9	22	--	--	22	--	--	--	20	--	--	22	--
10	23	--	--	22	--	--	--	26	--	--	26	--
12	25	--	--	23	--	--	--	30	--	--	21	--
14	24	--	--	24	--	--	--	32	--	--	41	--
16	22	--	--	22	--	--	--	41	--	--	41	--

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 0

PHOTO 1

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 1

PHOTO 2

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 2

PHOTO 3

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 3

PHOTO 4

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 4

PHOTO 5

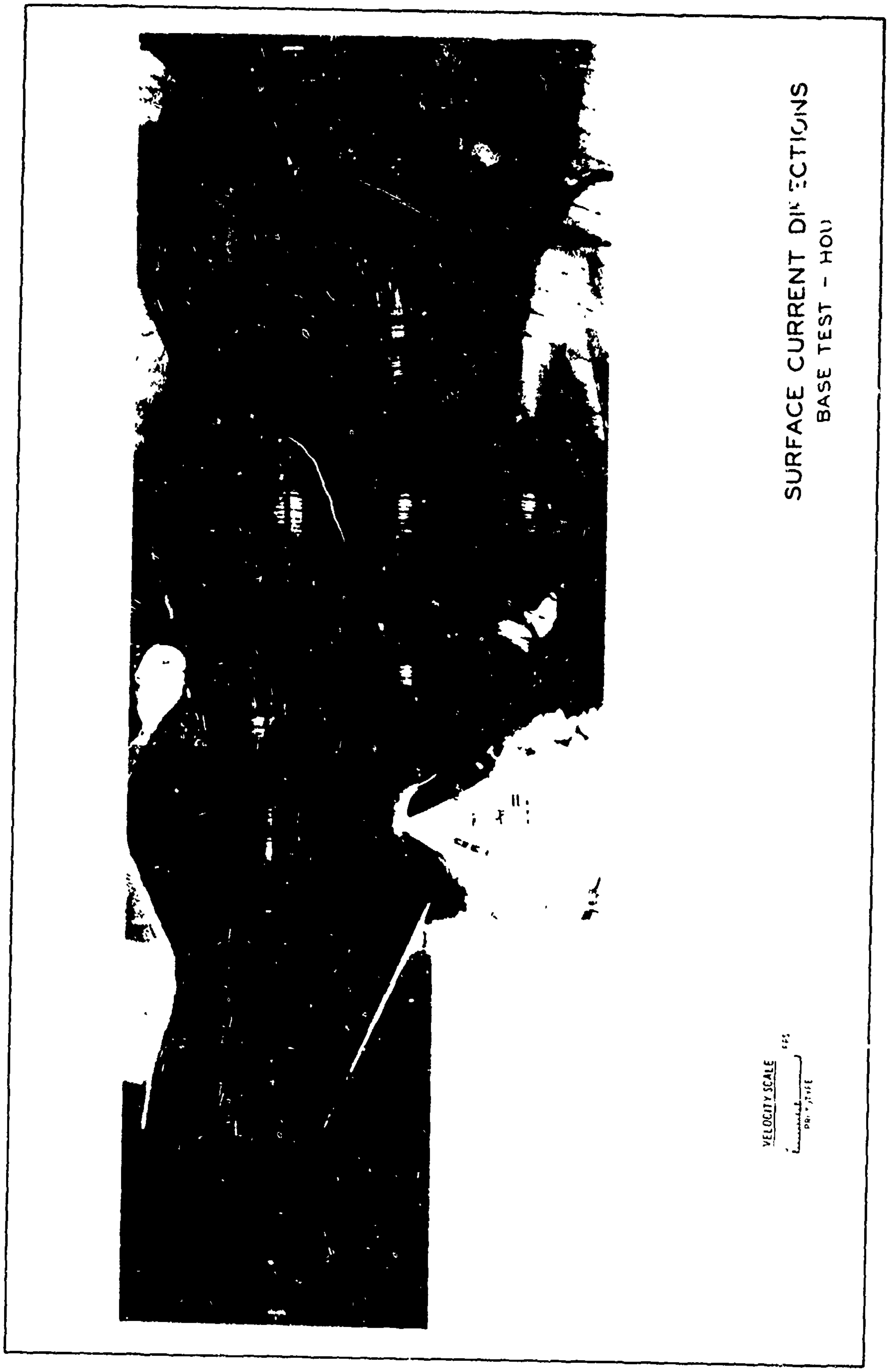


PHOTO 6

SU. (RRENT_DIRECTIONS
... EST - HOUR 6

PHOTO 7

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 7

47

PHOTO 8

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 8

PHOTO 9

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 9

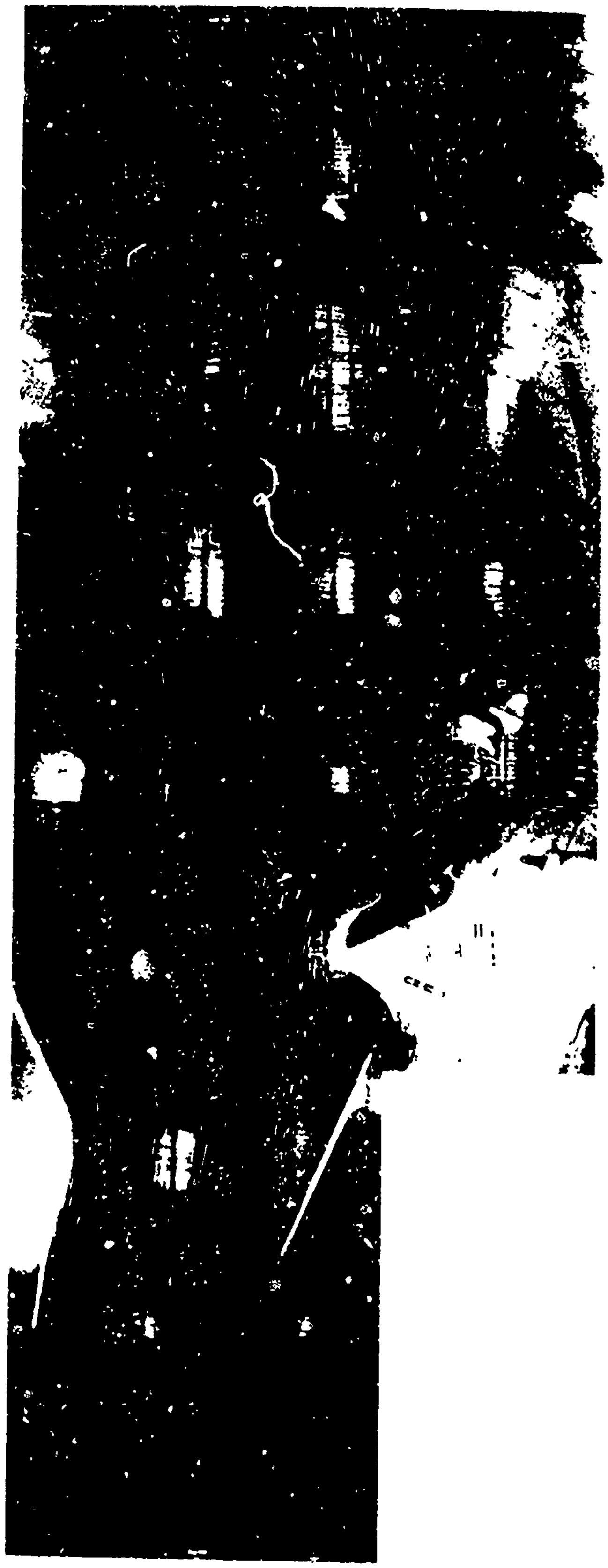
PHOTO 10

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 10

FIGURE 11

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 11

PHOTO 12



SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 12

PHOTO 13

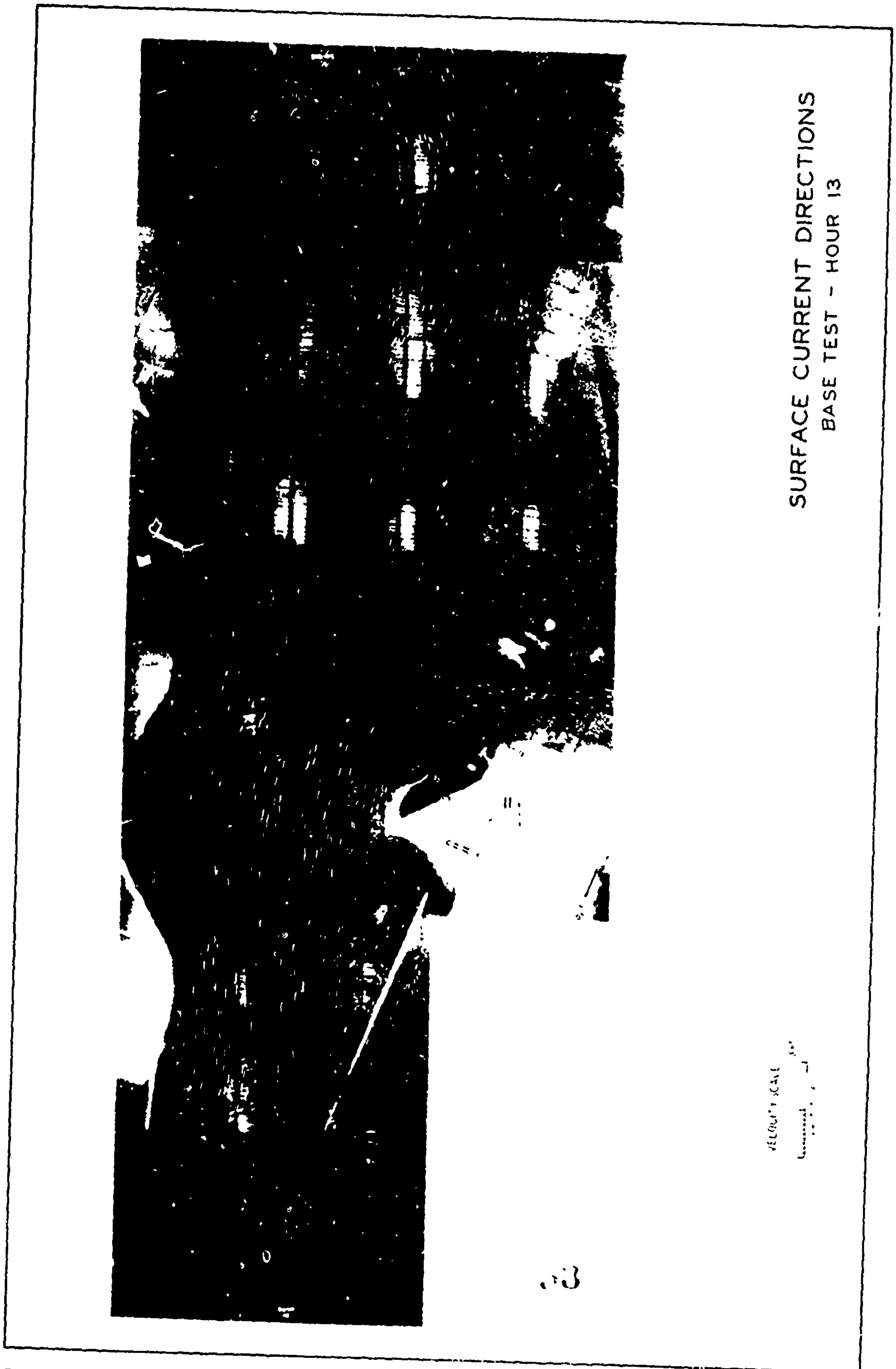


PHOTO 14

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 14

PHOTO 15

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 15

PHOTO 16

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 16

PHOTO 17

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 17

PHOTO 18

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 18

PHOTO 19

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 19

PHOTO 20

SURFACE CURRENT DIRECTIONS
BASE TEST – HOUR 20

PHOTO 21

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 21

PHOTO 22

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 22

PHOTO 23

VELOCITY SCALE

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 23

PHOTO 24

SURFACE CURRENT DIRECTIONS
BASE TEST - HOUR 24

PHOTO 25

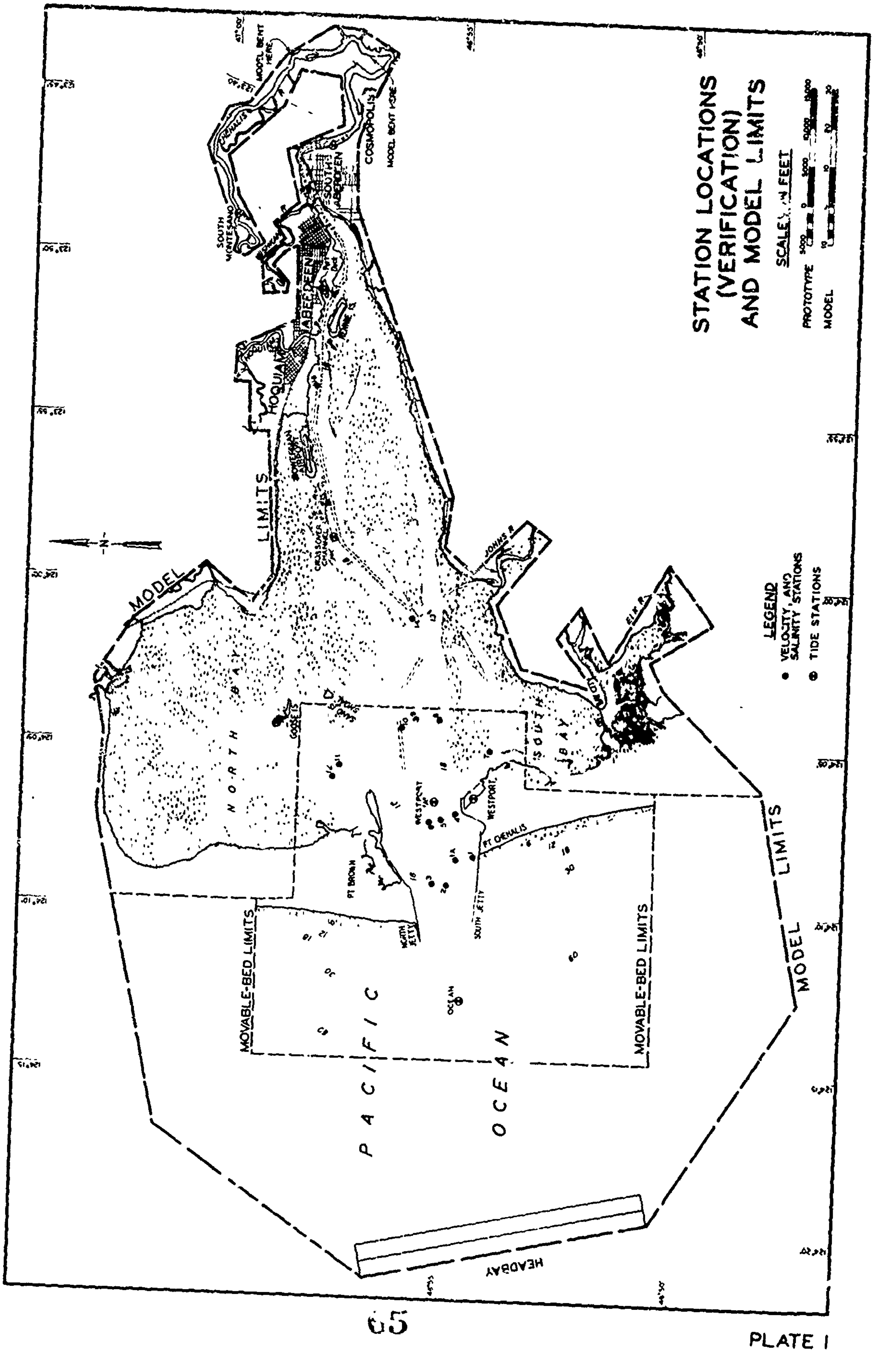
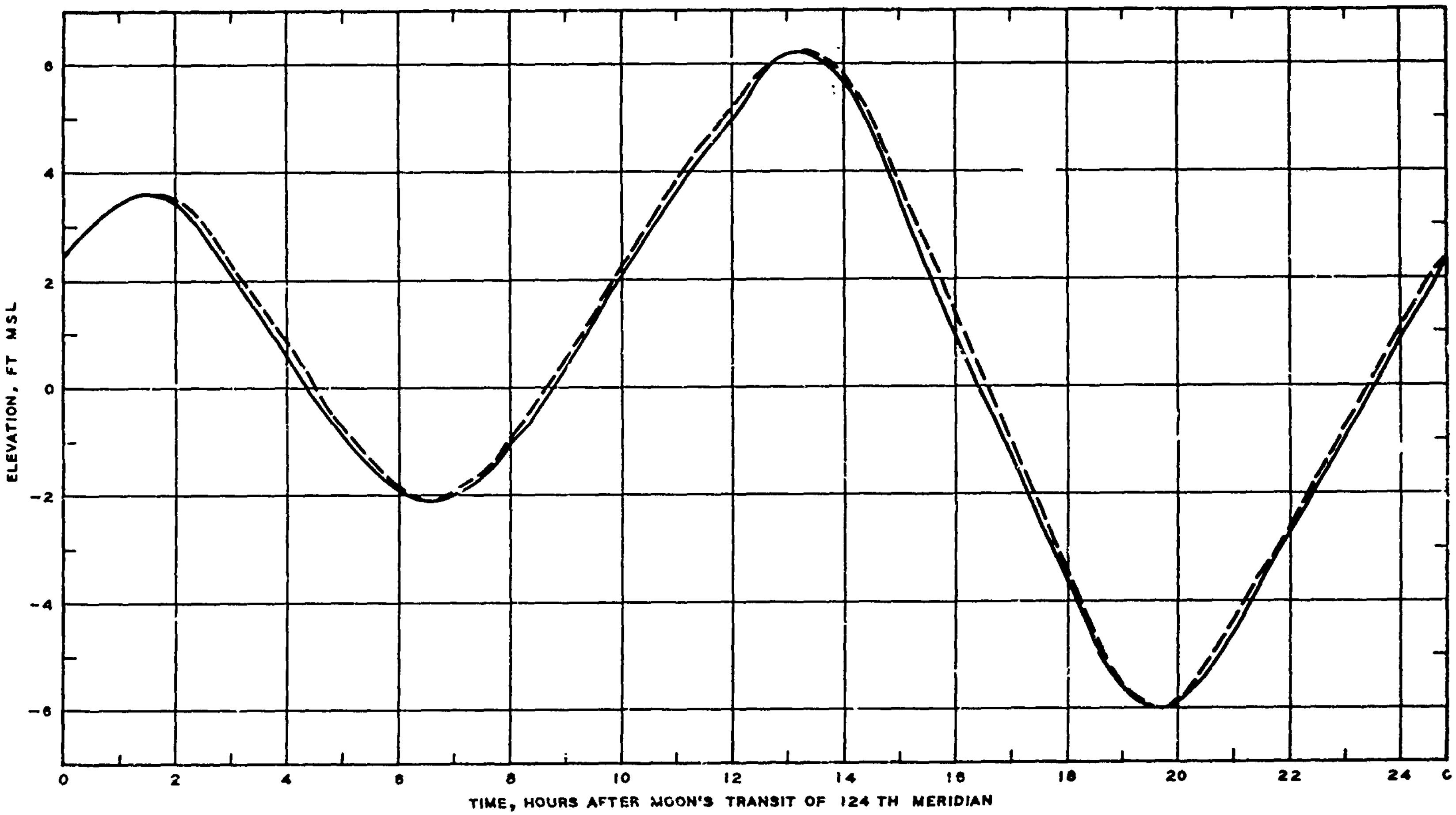

STATION LOCATIONS
(VERIFICATION)
AND MODEL LIMITS
SCALE IN FEET
PROTOTYPE
MODEL
LEGEND
VELOCITY AND SALINITY STATIONS
TIDE STATIONS
MODEL LIMITS
MOVABLE-BED LIMITS
HEADBAY
PACIFIC OCEAN
NORTH BAY
SOUTH BAY
ABERDEEN
HOQUIAM
SOUTH ABERDEEN
COSMOPOLIS
SOUTH MONTESANO
WESTPORT
PT CHEHALIS
PT BROWN
NORTH JETTY
SOUTH JETTY
JOHNS R
ELK R
OCEAN

PLATE I



MODEL TEST DATA

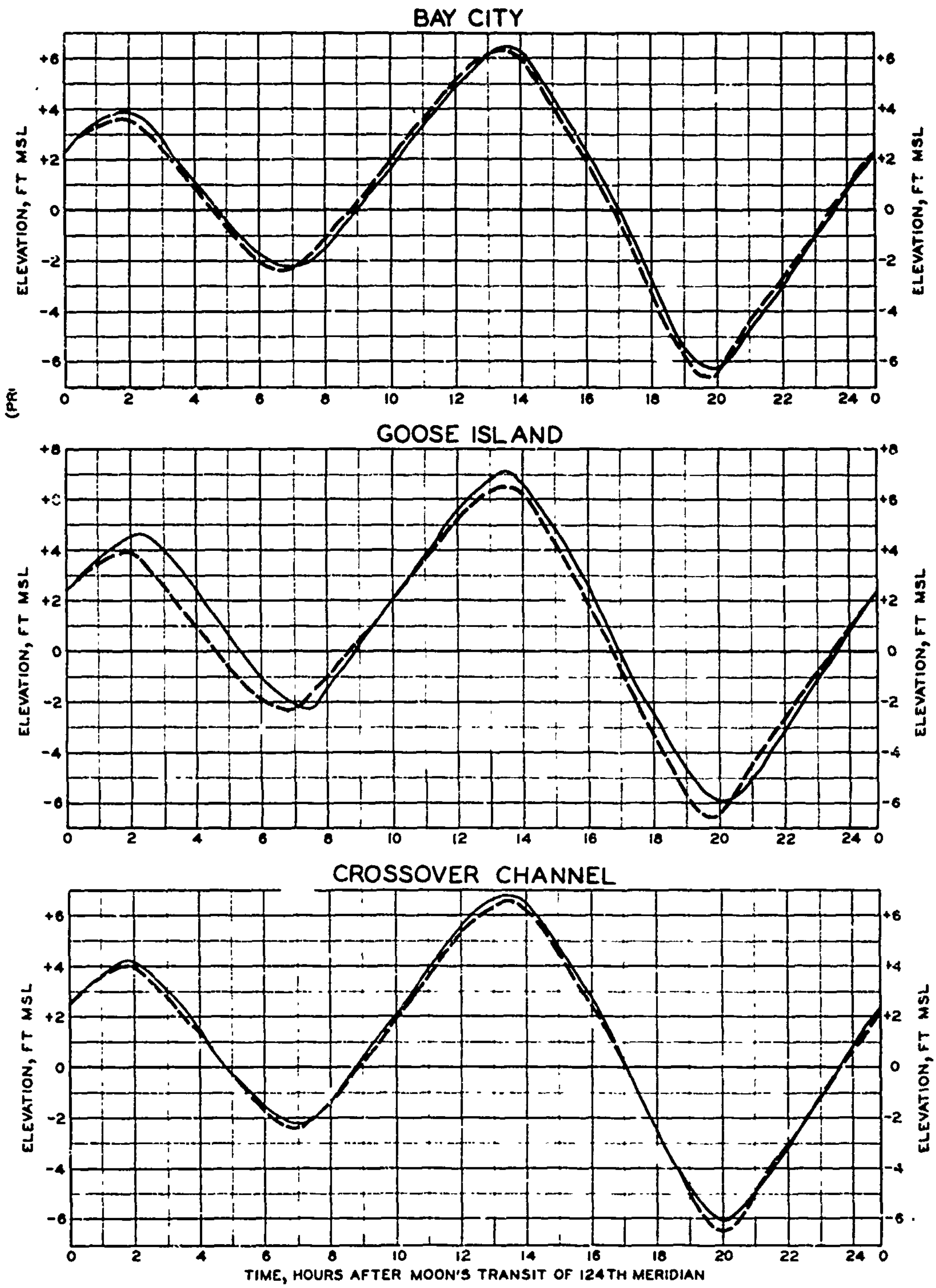
FRESH-WATER DISCHARGE ... 11,400 CFS
SOURCE SALINITY .... 33.0 PPT

LEGEND

——— PROTOTYPE
– – – MODEL

SPRING TIDE
TIDAL HEIGHT VERIFICATION
STATION WESTPORT (CONTROL)

PLATE 2



MODEL TEST DATA

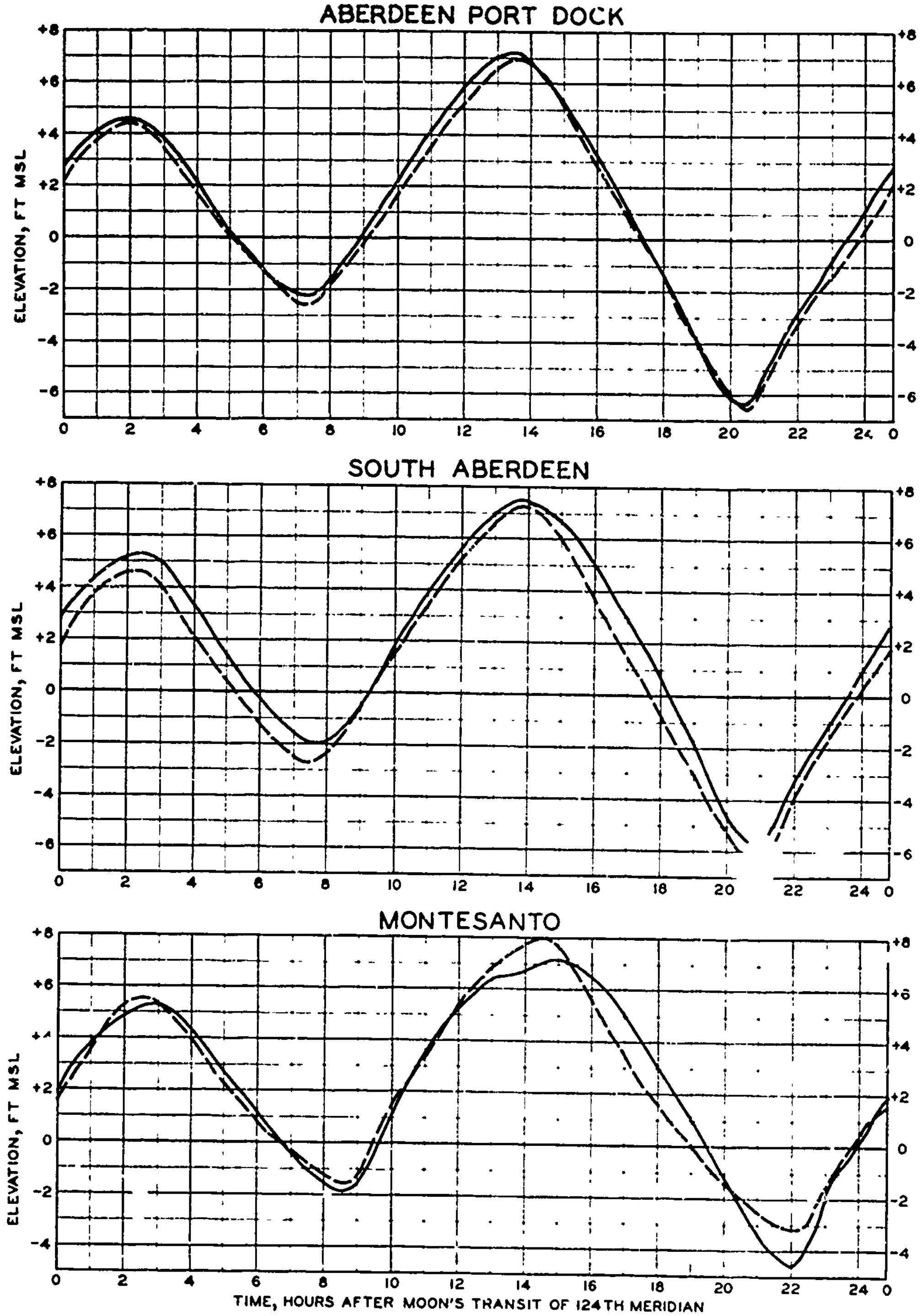
TIDE . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . .11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— PROTOTYPE
— — — MODEL

SPRING TIDE
TIDAL HEIGHTS

STATIONS - BAY CITY, GOOSE ISLAND AND CROSSOVER CHANNEL



MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

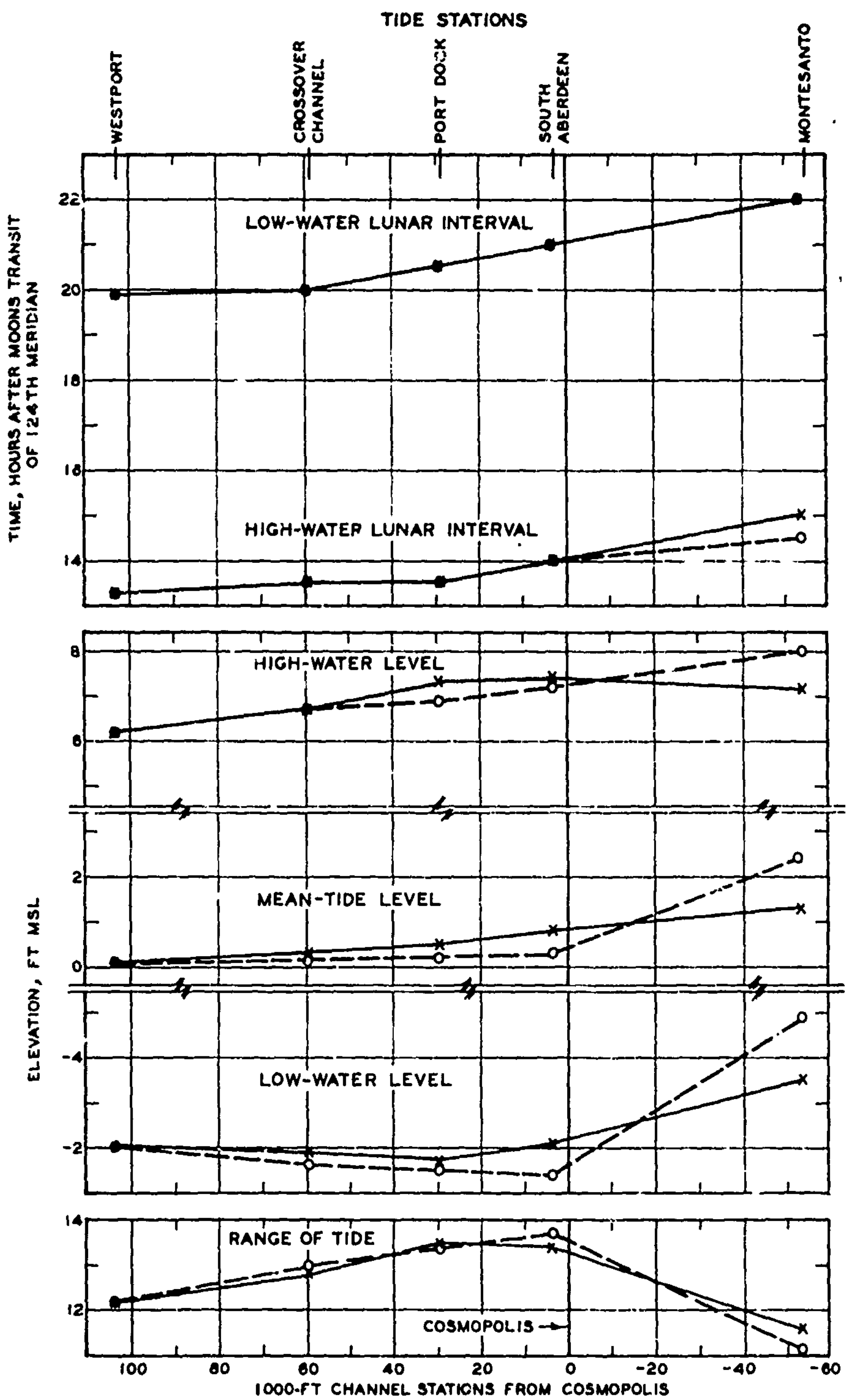
——— PROTOTYPE

— — — MODEL

SPRING TIDE
TIDAL HEIGHTS

STATIONS-ABERDEEN PORT DOCK, SOUTH ABERDEEN AND MONTESANTO

PLATE 4



MODEL TEST DATA

FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— PROTOTYPE
– – – MODEL

TIDAL OBSERVATIONS

SPRING TIDE (6–7 OCT '67)

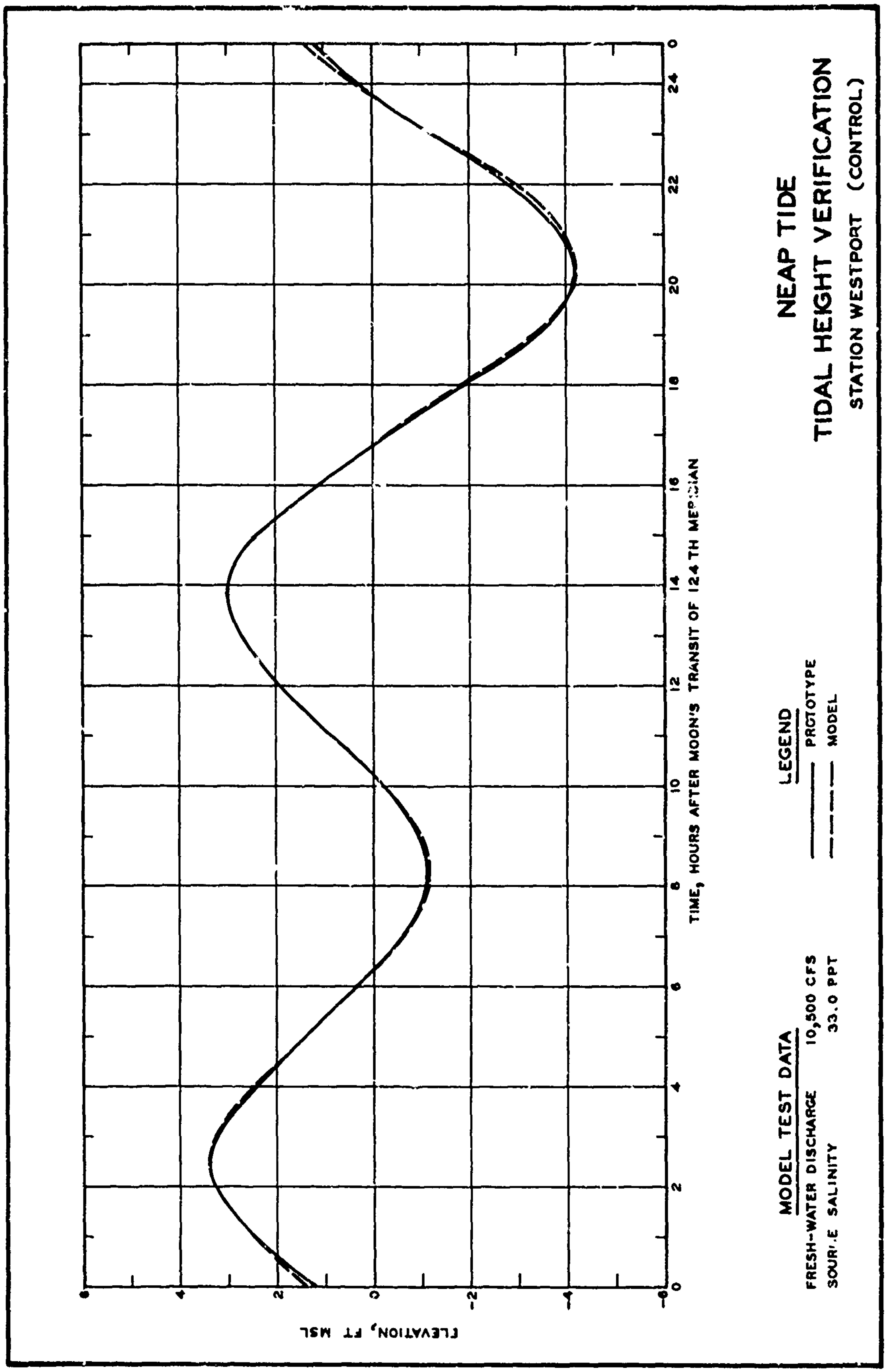
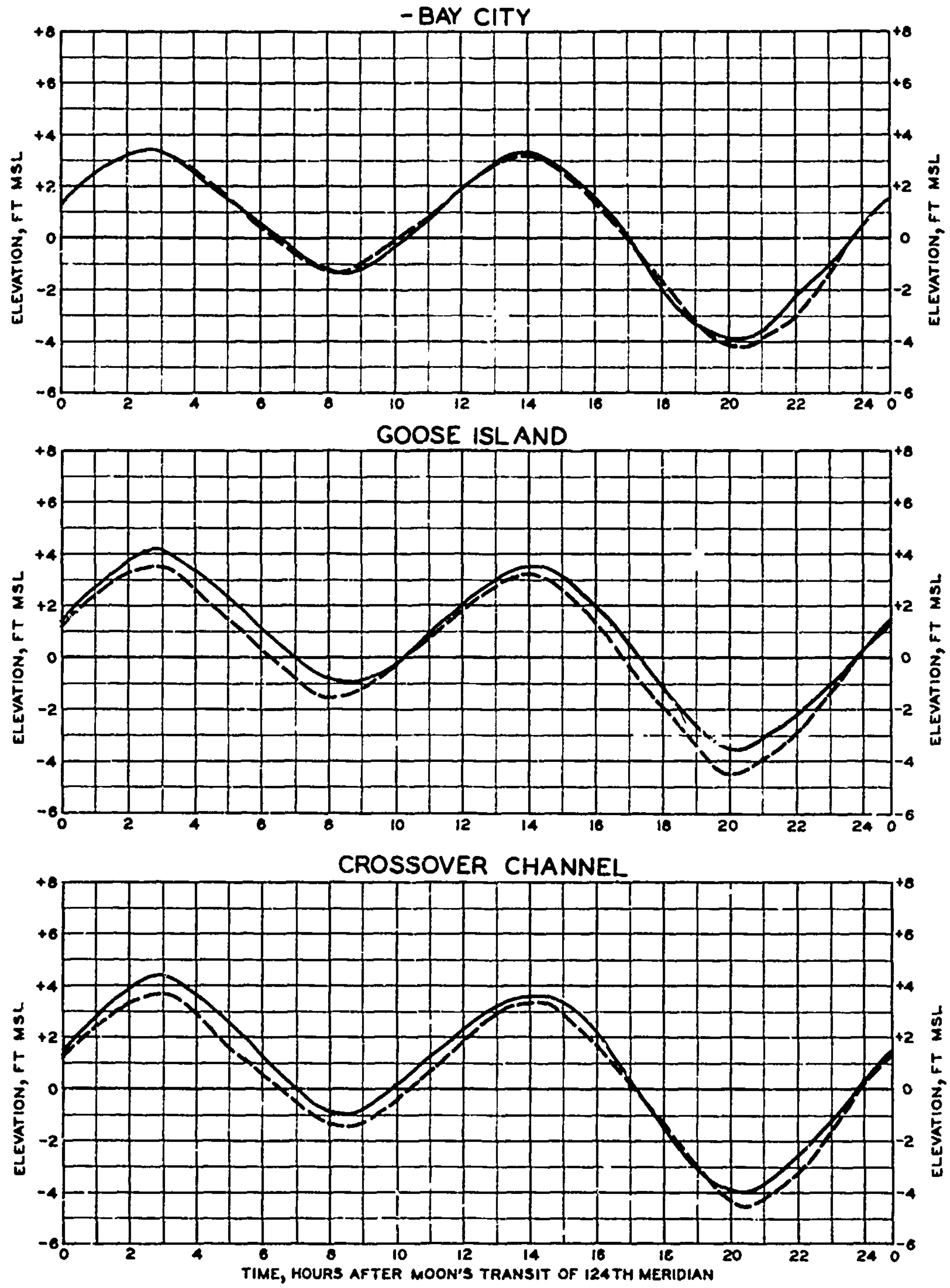

NEAP TIDE
TIDAL HEIGHT VERIFICATION
STATION WESTPORT (CONTROL)
LEGEND
PROTOTYPE
MODEL
MODEL TEST DATA
FRESH-WATER DISCHARGE 10,500 CFS
SOURCE SALINITY 33.0 PPT
TIME, HOURS AFTER MOON'S TRANSIT OF 124TH MERIDIAN
ELEVATION, FT MSL
0
2
4
6
8
10
12
14
16
18
20
22
24
6
4
2
0
-2
-4
-6

PLATE 6



MODEL TEST DATA

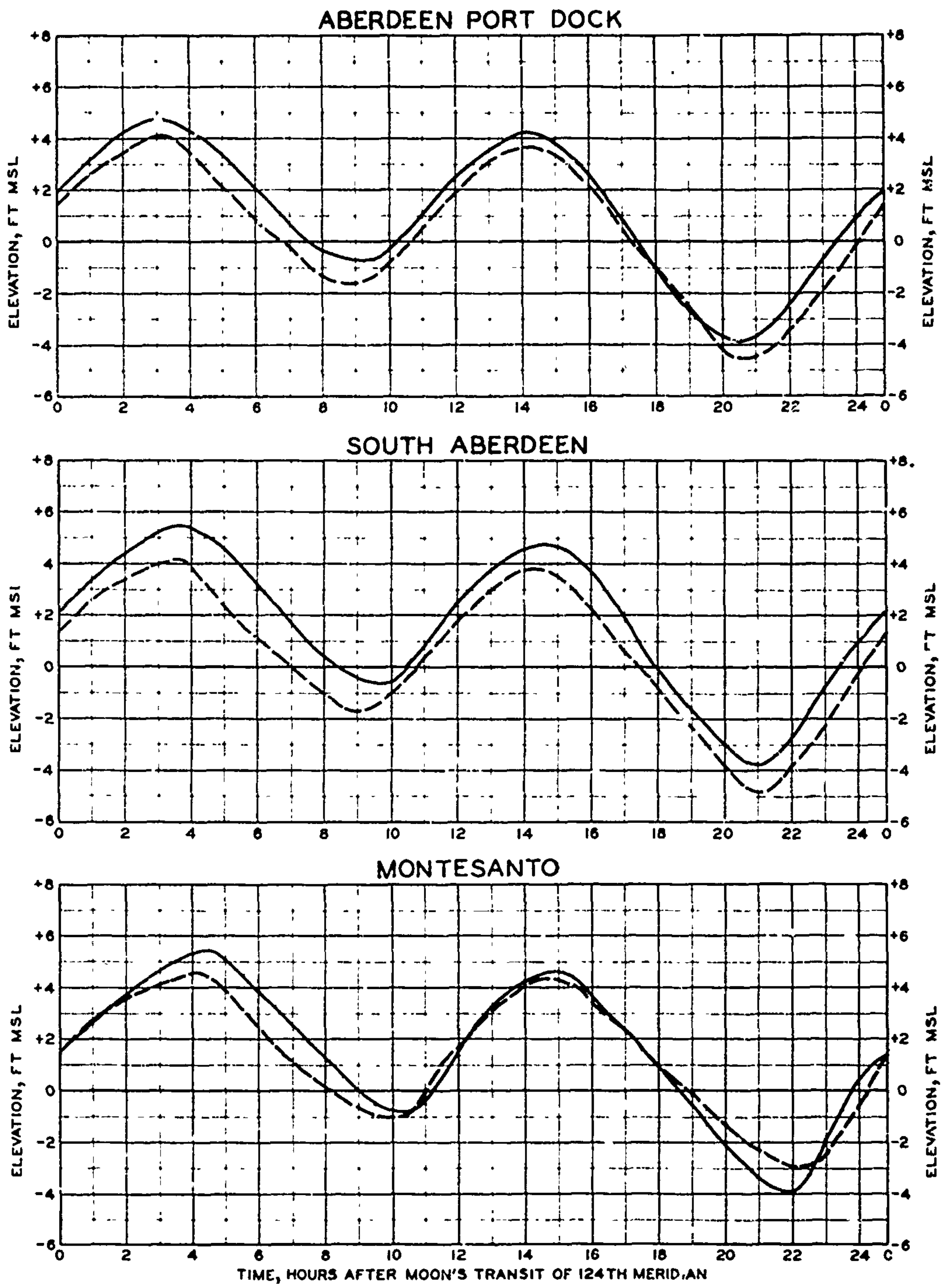
TIDE .. .. NEAP
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY .... 33.0 PPT

LEGEND

——— PROTOTYPE
— — MODEL

NEAP TIDE
TIDAL HEIGHTS

STATIONS-BAY CITY, GOOSE ISLAND
AND CROSSOVER CHANNEL



MODEL TEST DATA

TIDE	NEAP
FRESH-WATER DISCHARGE	10,500 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

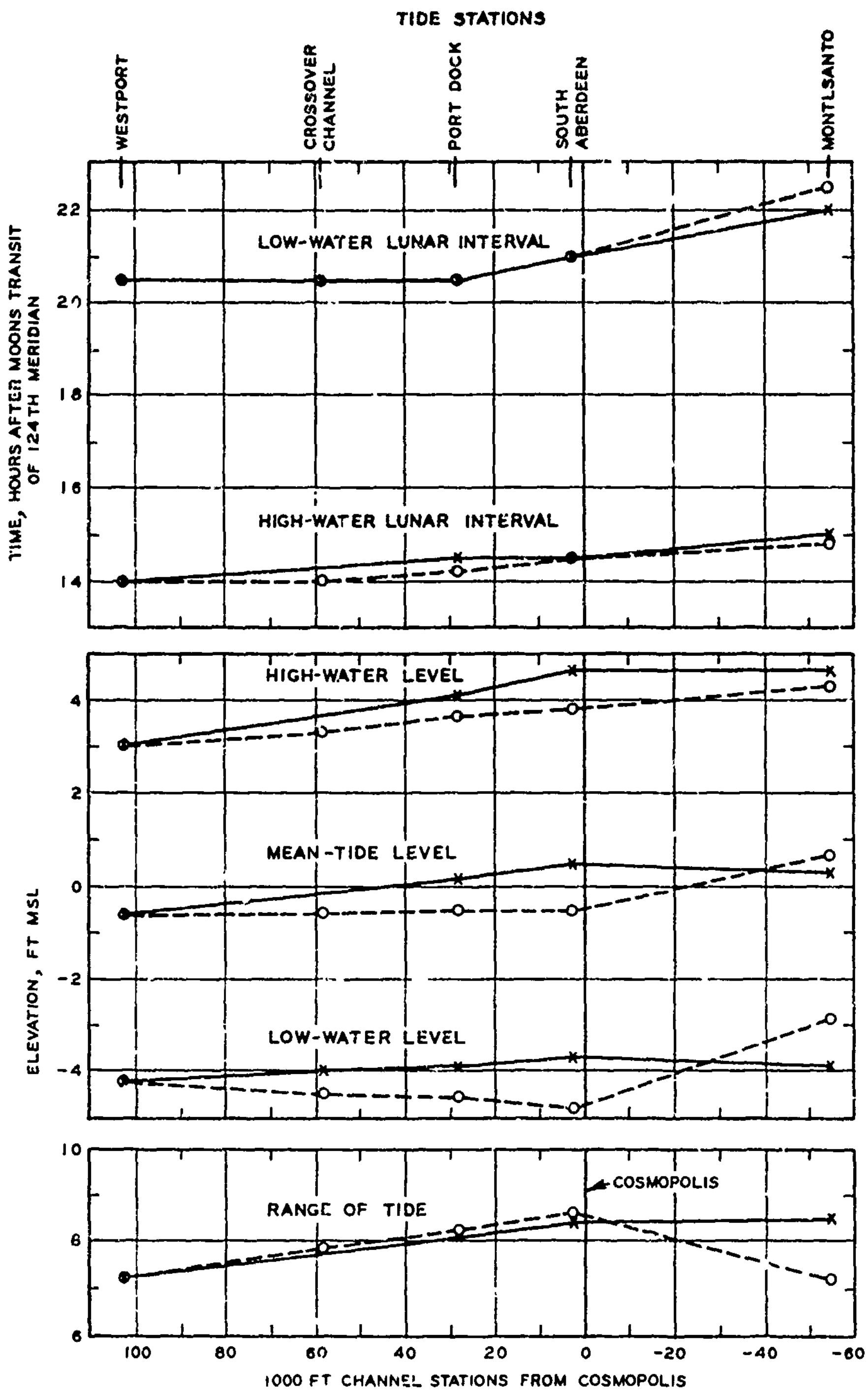
——— PROTOTYPE

— — MODEL

NEAP TIDE
TIDAL HEIGHTS

STATIONS - ABERDEEN PORT DOCK, SOUTH ABERDEEN AND MONTESANTO

PLATE 8



MODEL TEST DATA

FRESH-WATER DISCHARGE 10,500 CFS
SOURCE SALINITY 33 0 P T

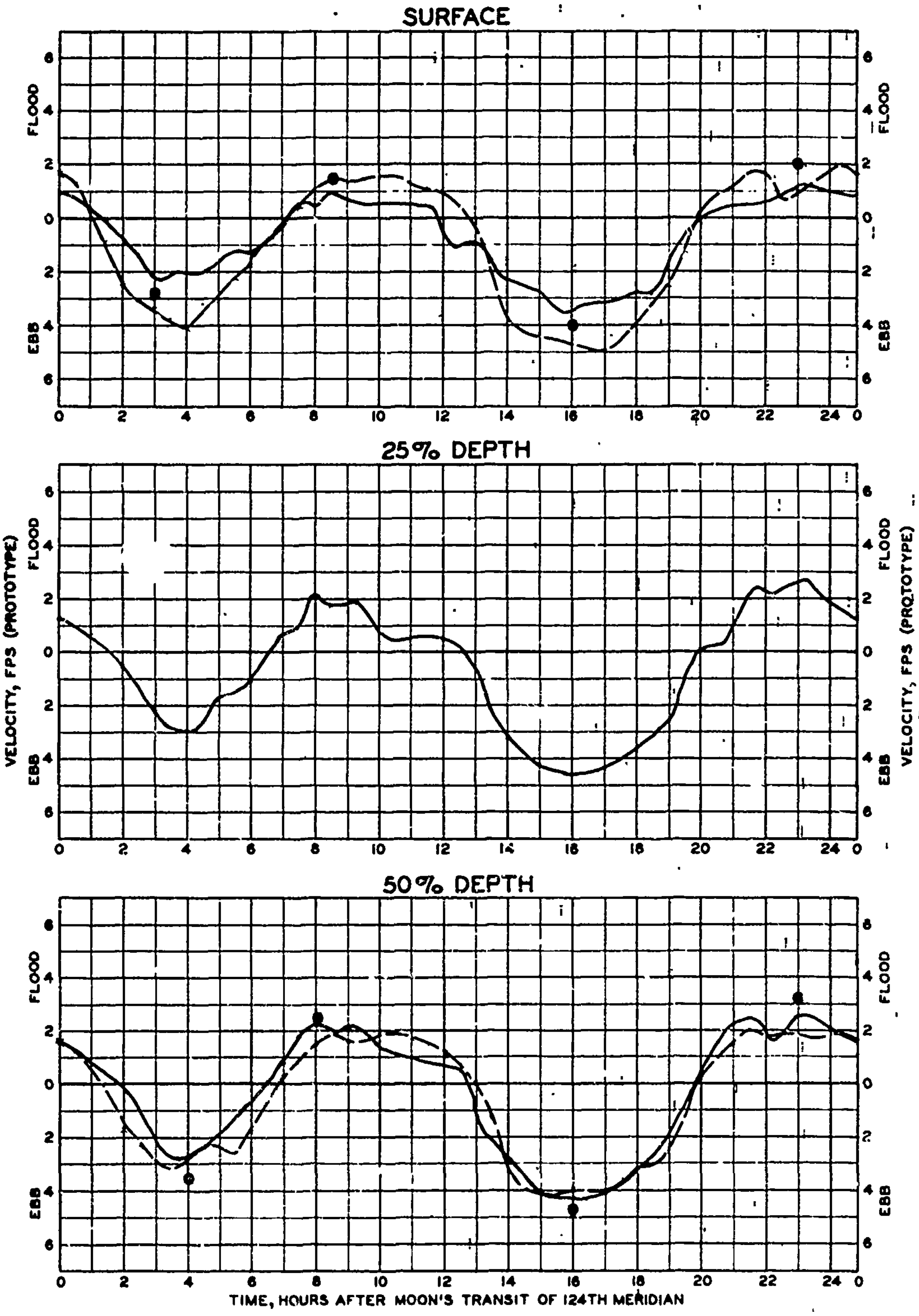
LEGEND

——— PROTOTYPE
– – – MODEL

TIDAL OBSERVATIONS

NEAP TIDE (13-14 OCT '67)

PLATE 9



MODEL TEST DATA

TIDE . . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

——— PROTOTYPE (8-9 OCT 67)
— — — MODEL

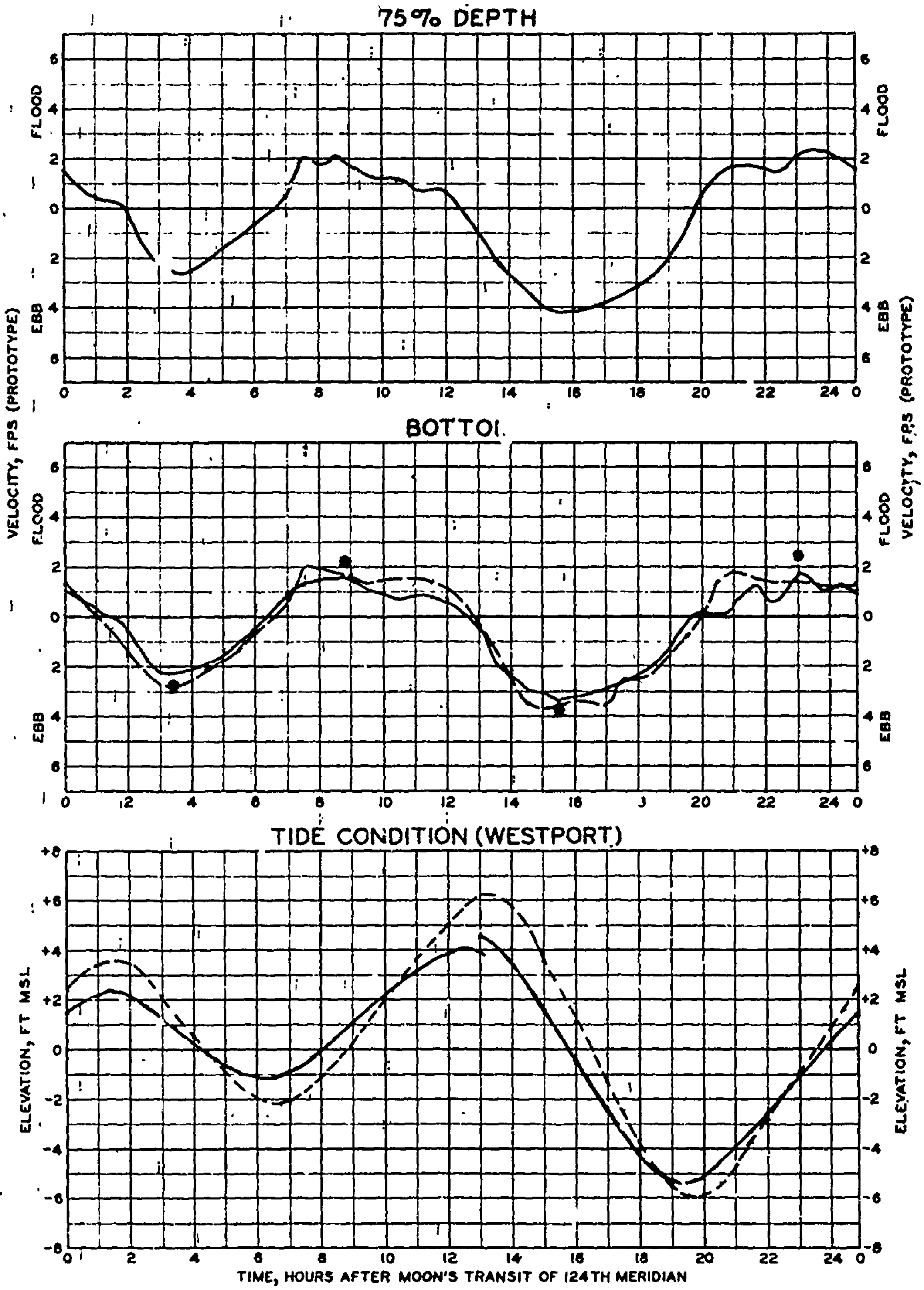
NOTE: ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 1

SURFACE, 25% DEPTH AND 50% DEPTH

74



MODEL TEST DATA

TIDE . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

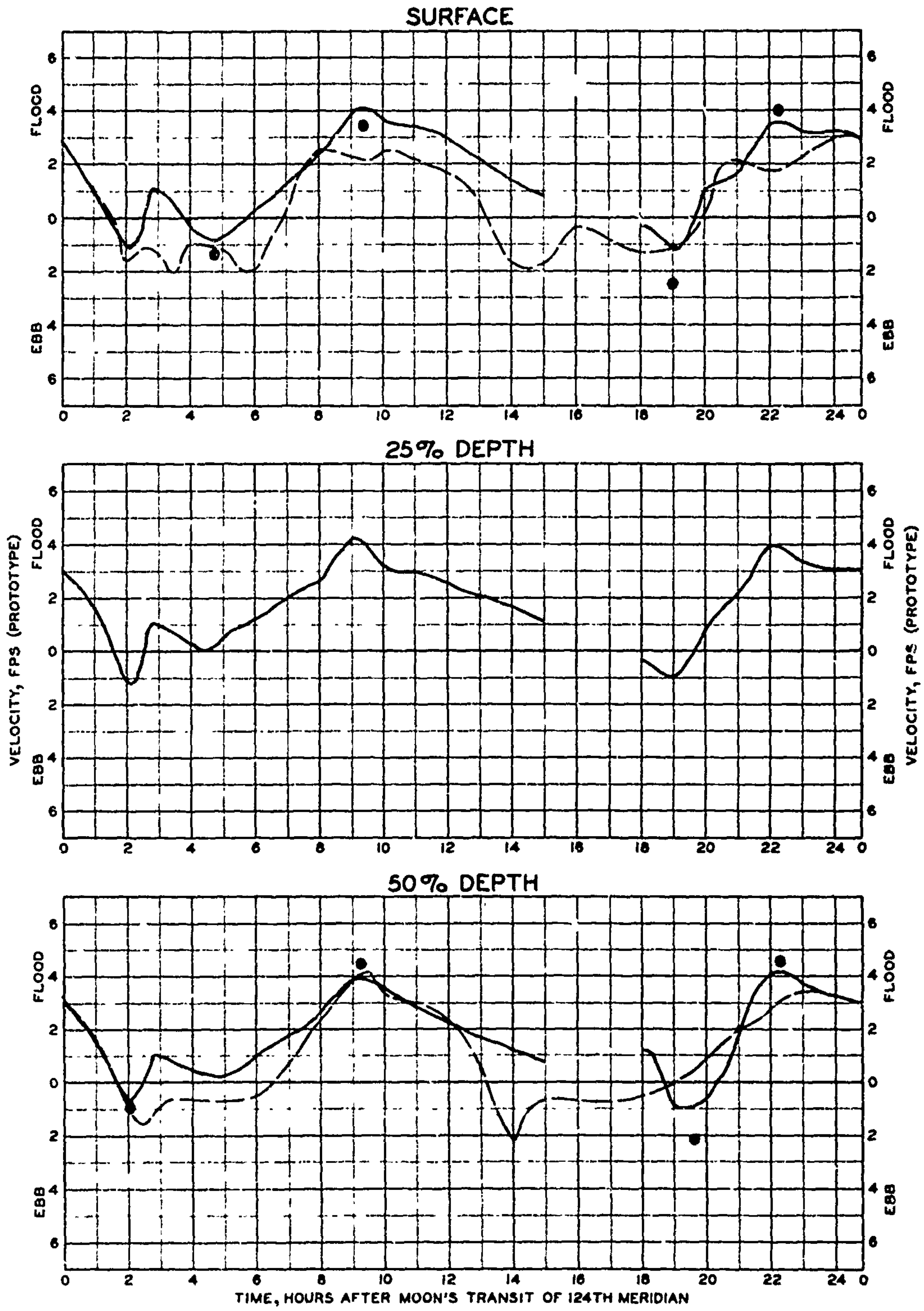
——— PROTOTYPE (8-9 OCT 67)
– – – MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 1

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

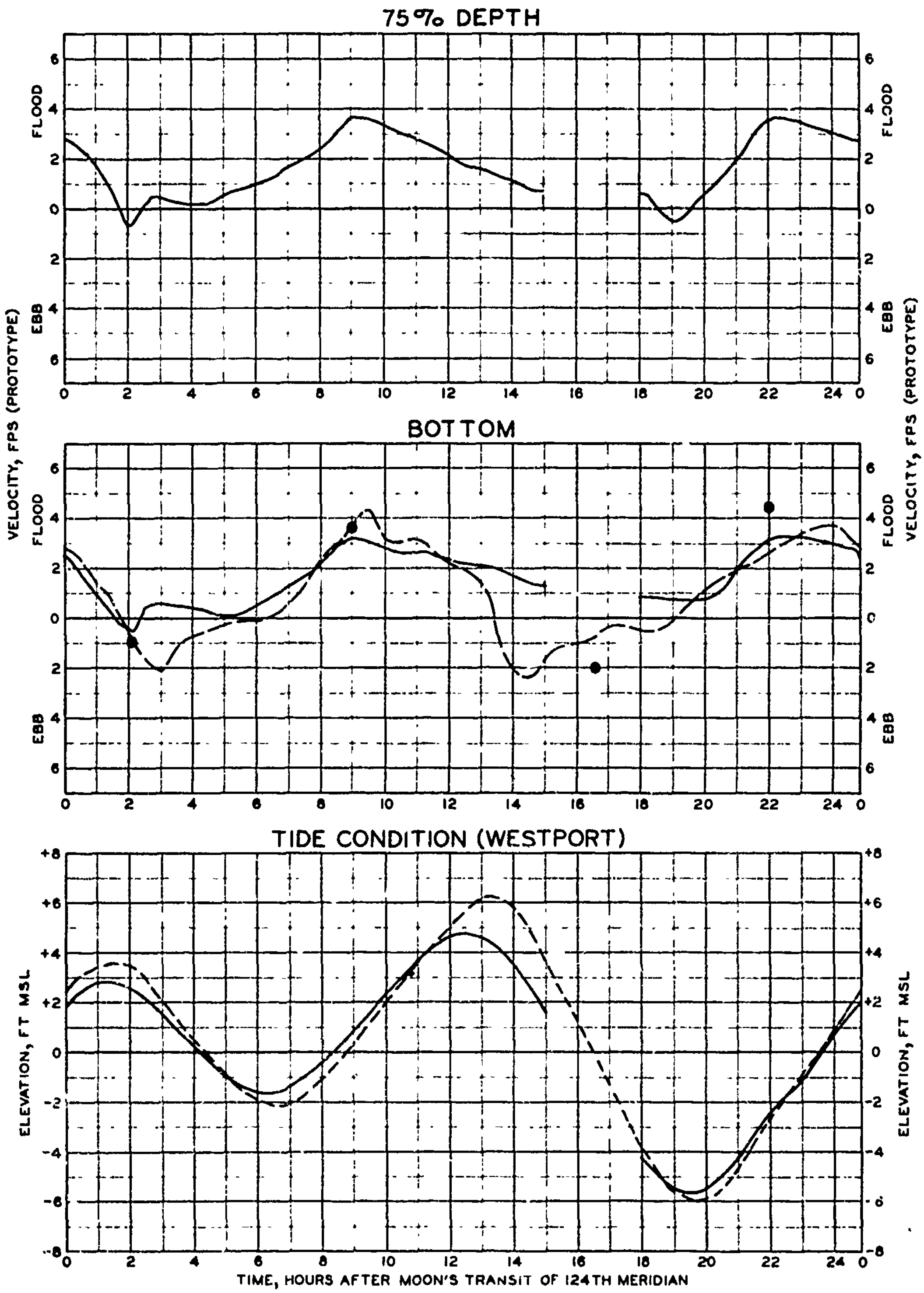
——— PROTOTYPE (7-8 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 4

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

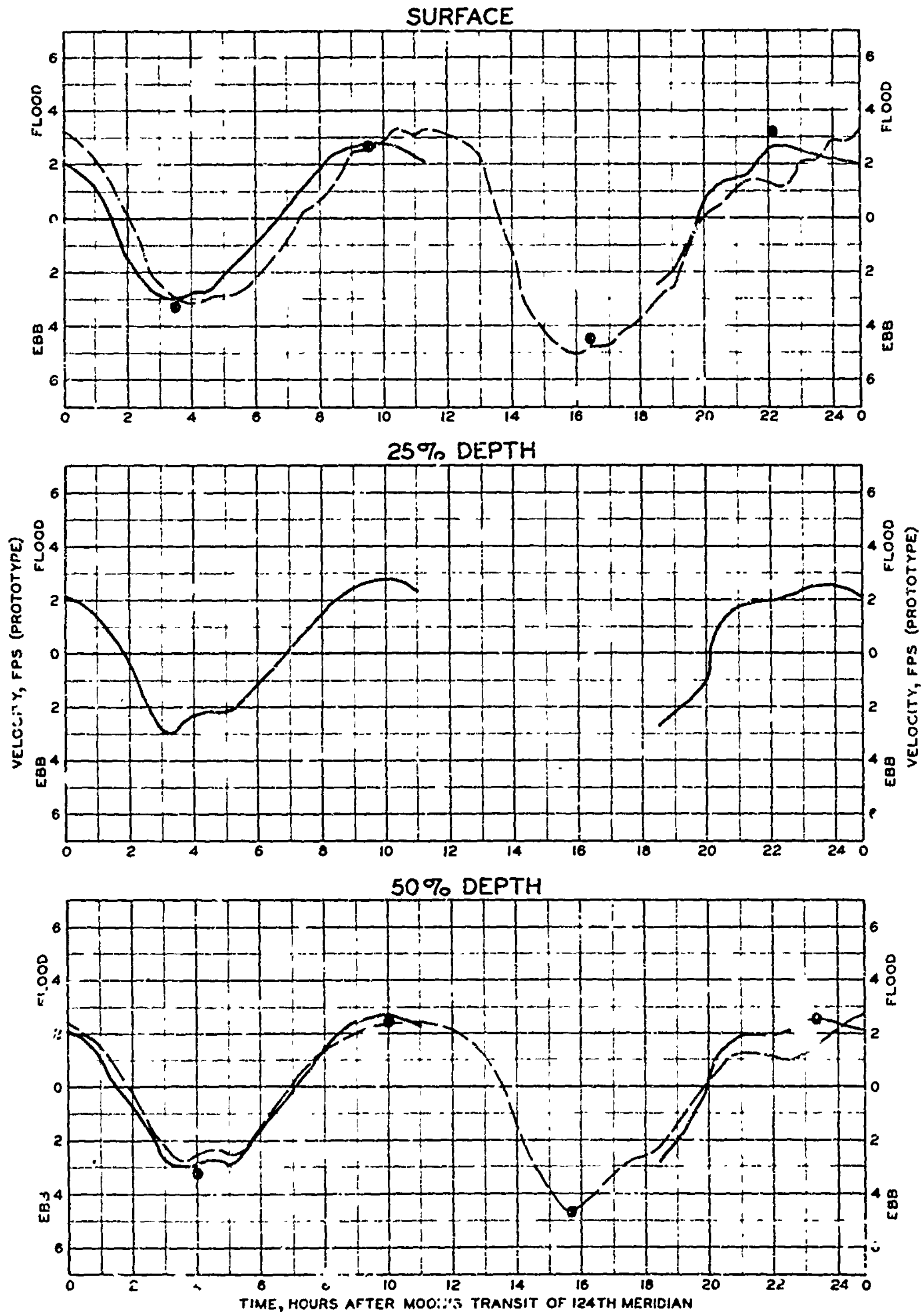
——— PROTOTYPE (7-8 OCT 67)
— — MODEL

NOTE. ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 4

75% DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE 11,000 CFS
SOURCE SA 33.0 PPT

LEGEND

——— PROTOTYPE (7-8 OCT 67)
— — — MODEL

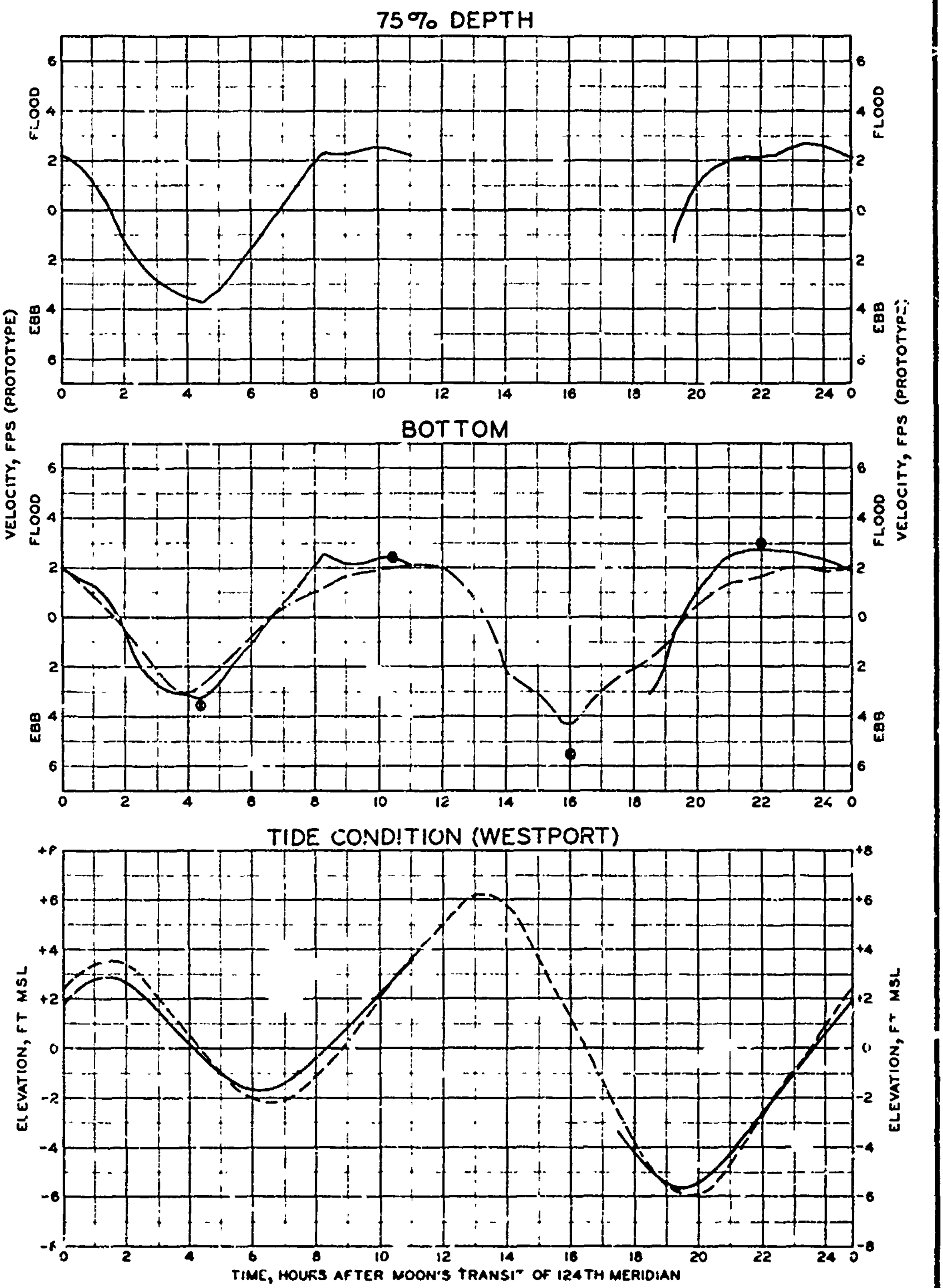
NOTE: ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 5

SURFACE, 25% DEPTH AND 50% DEPTH

PLATE 14



MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE	[illegible] CFS
SOURCE SALINITY	30 PPT

LEGEND

——— PROTOTYPE (7-8 OCT 67)

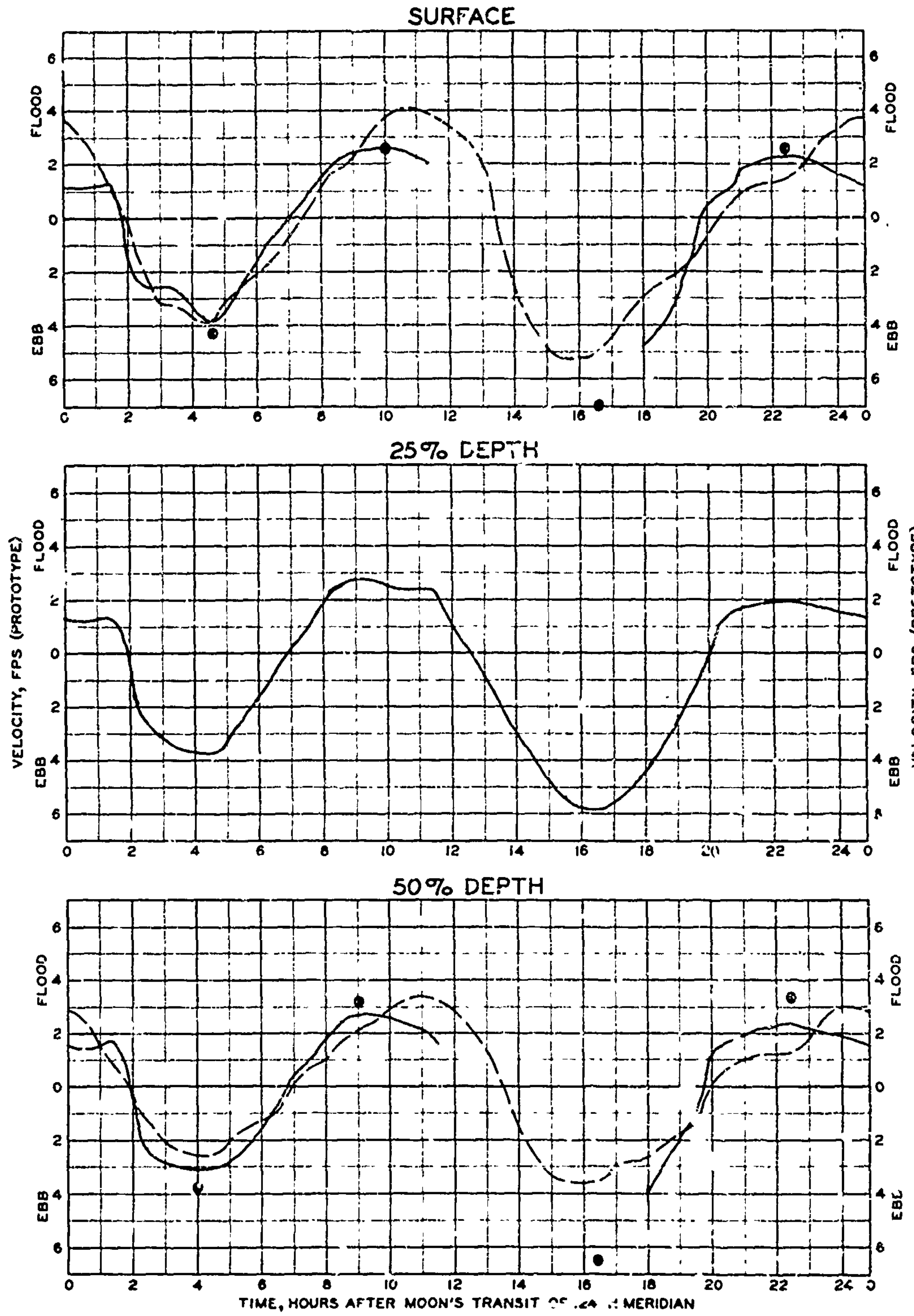
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 5

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE — SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE — 11,400 CFS
SOURCE SALINITY — 33.0 PPT

LEGEND

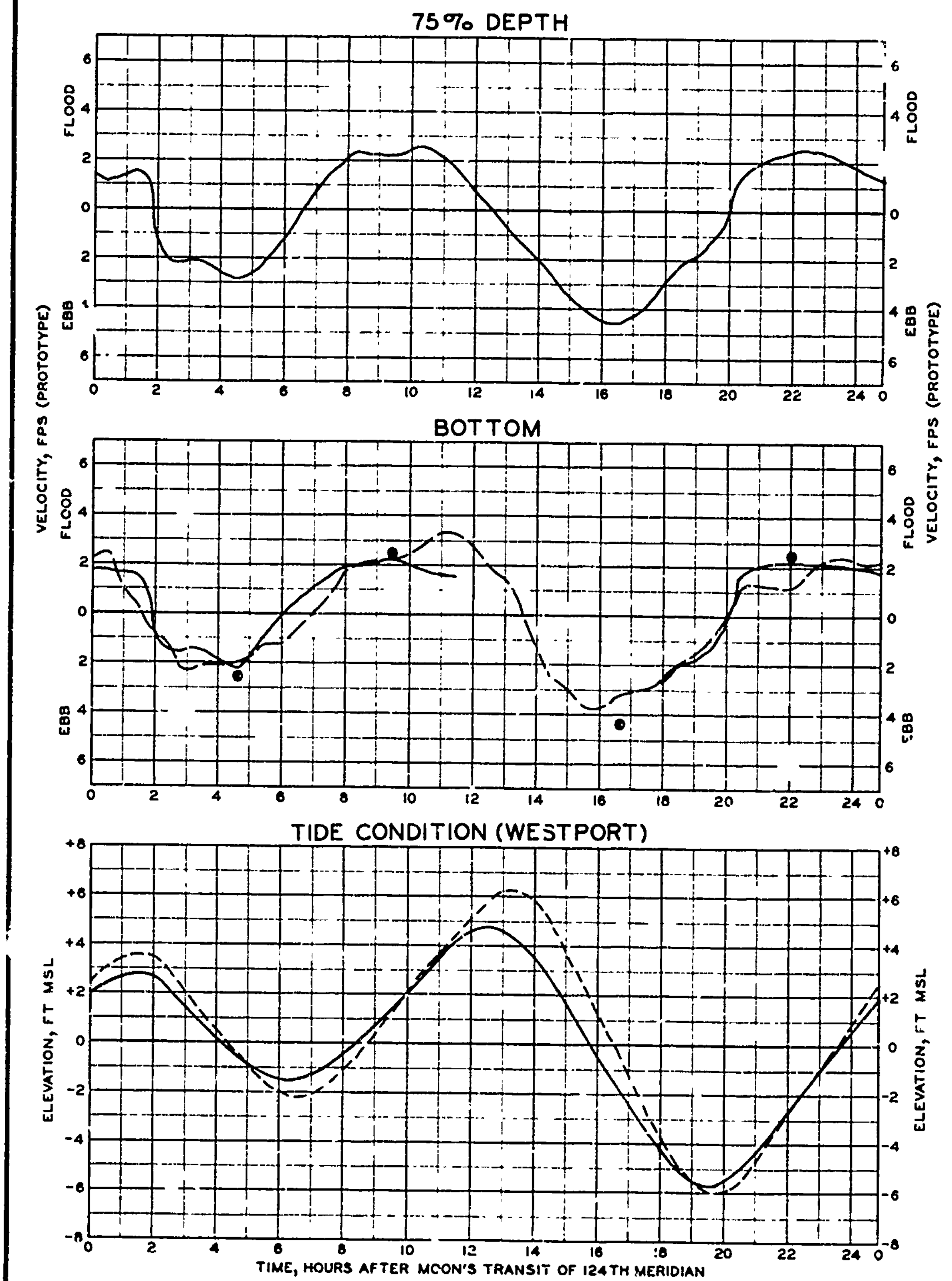
——— PROTOTYPE (7-8 OCT 67)
— — — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 6

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

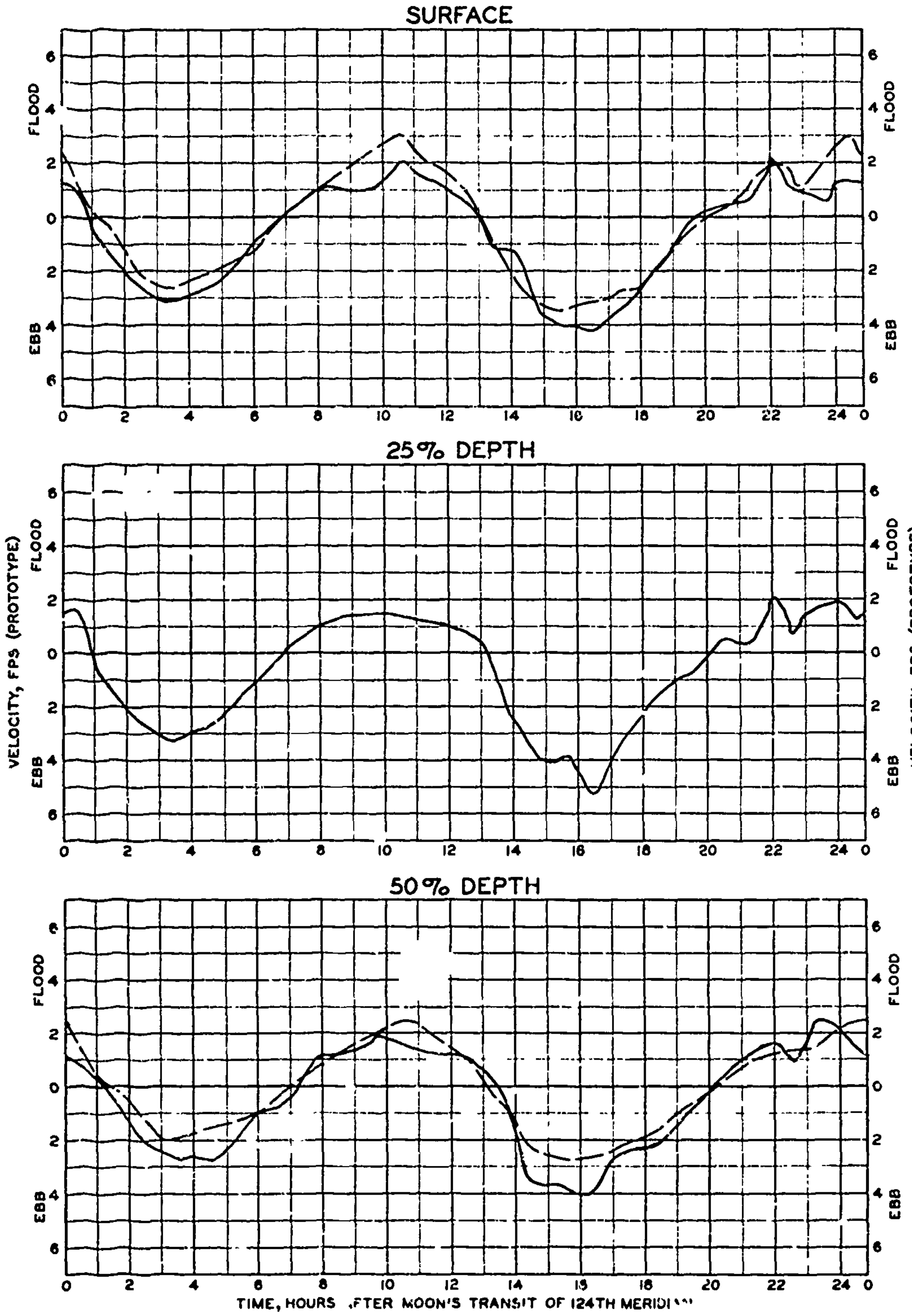
—— PROTOTYPE (7-8 OCT 67)
– – MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 6

75% DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— PROTOTYPE (6-7 OCT 67)

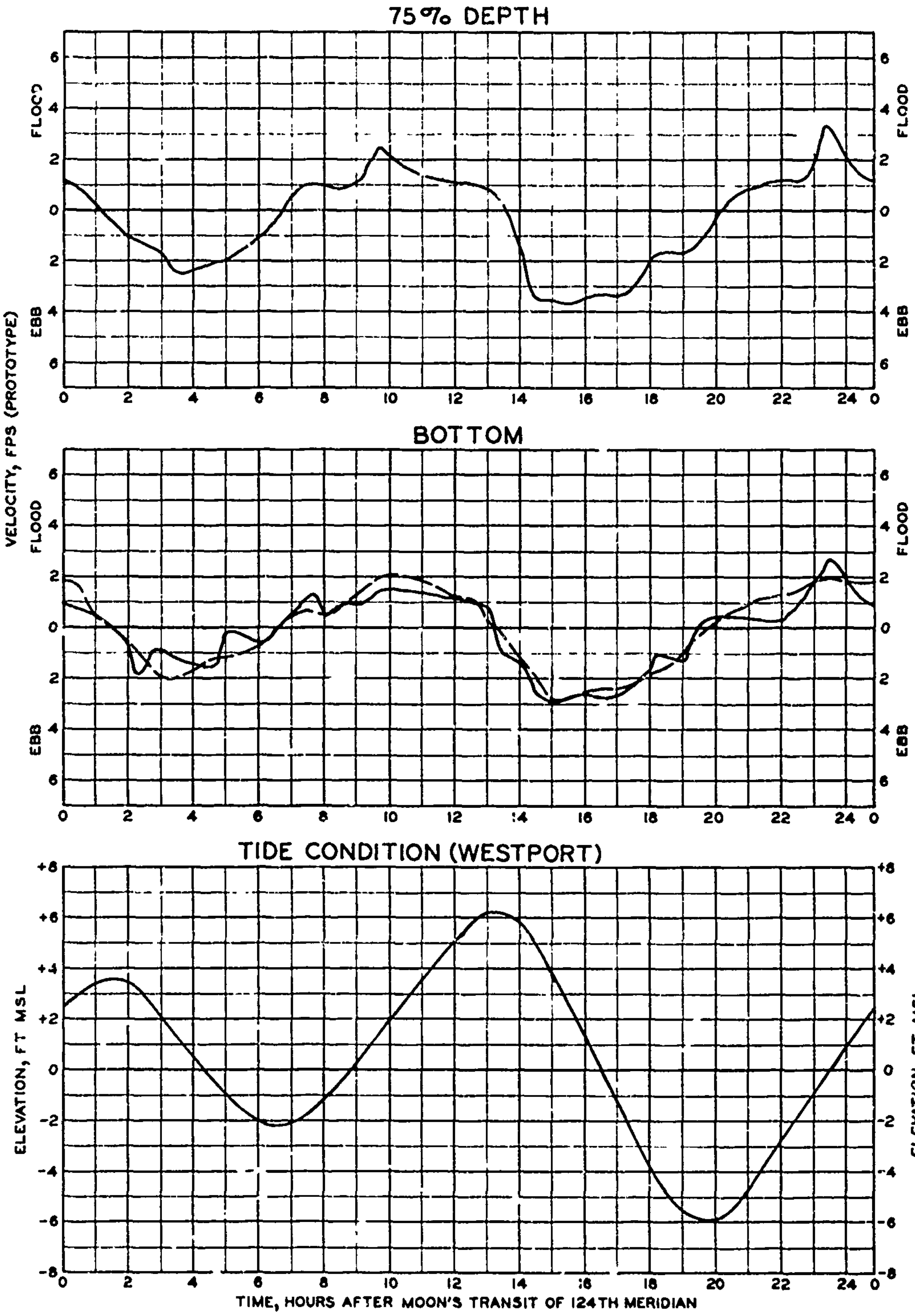
— — — MODEL

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 7

SURFACE, 25% DEPTH AND 50% DEPTH

PLATE 18



MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

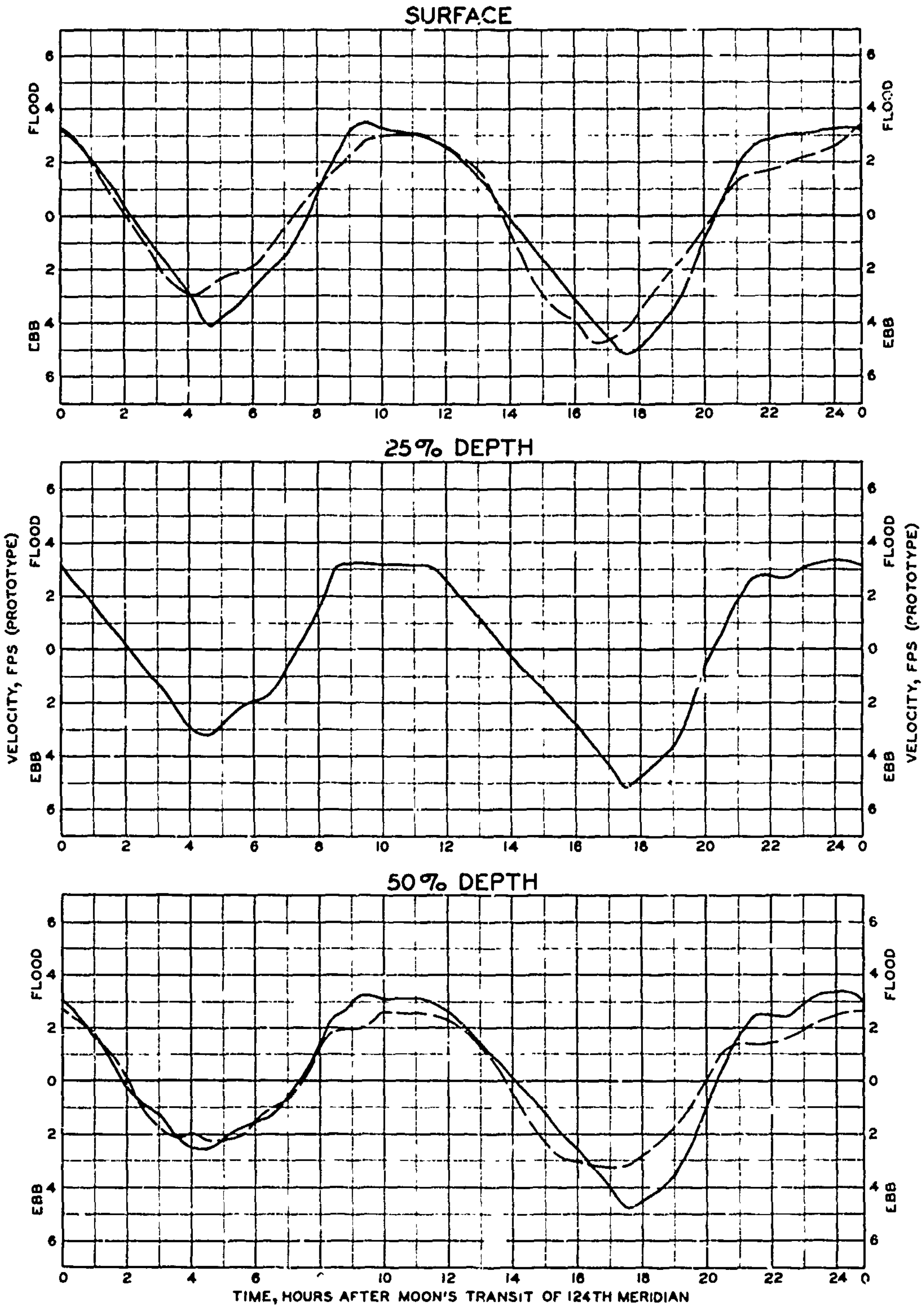
——— PROTOTYPE (6-7 OCT 67)

— — MODEL

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 7

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE	11,^00 CFS
SOURCE SALINITY	33.0 PPT

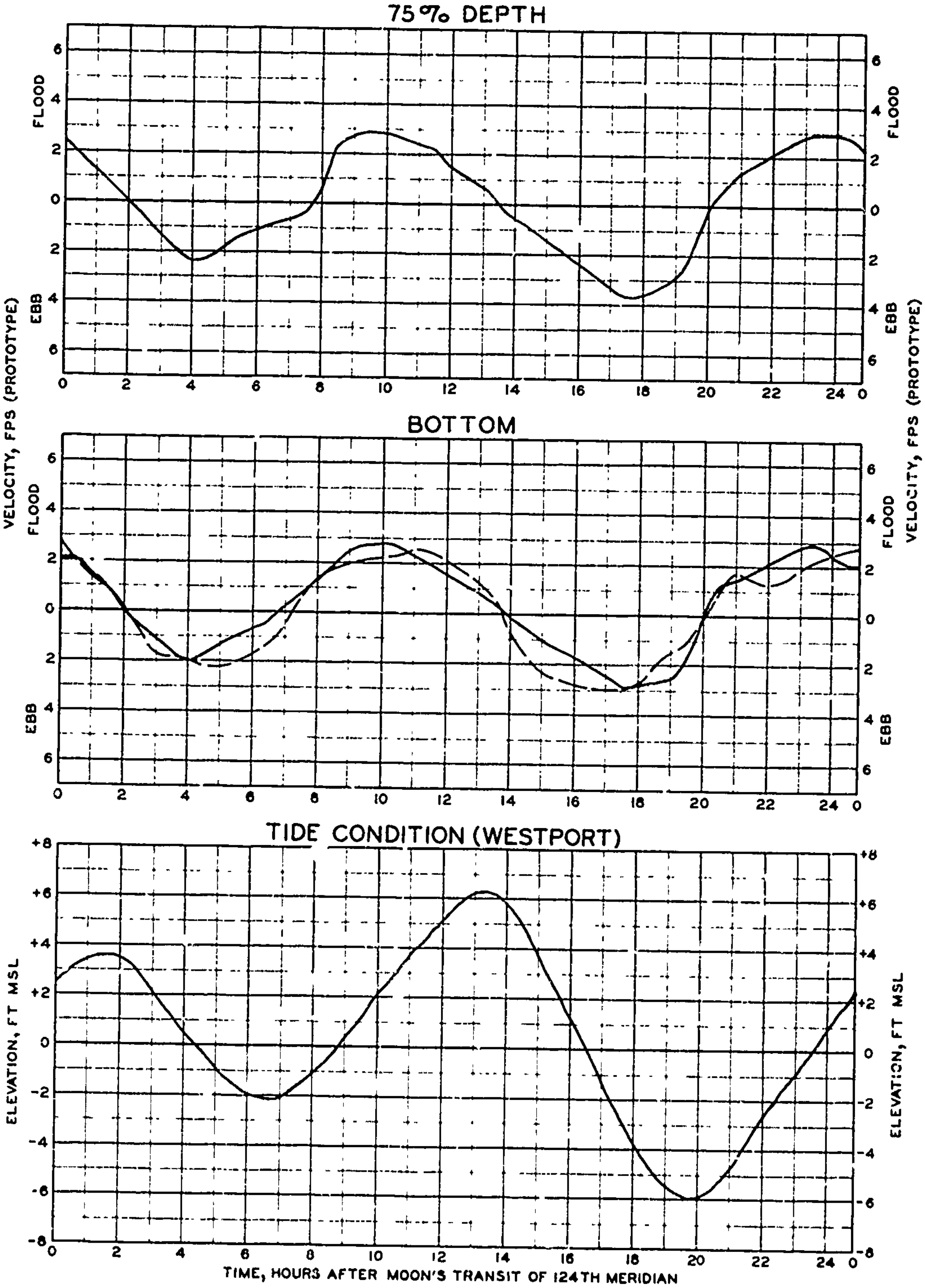
LEGEND

——— PROTOTYPE (6-7 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 8

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	32.0 PPT

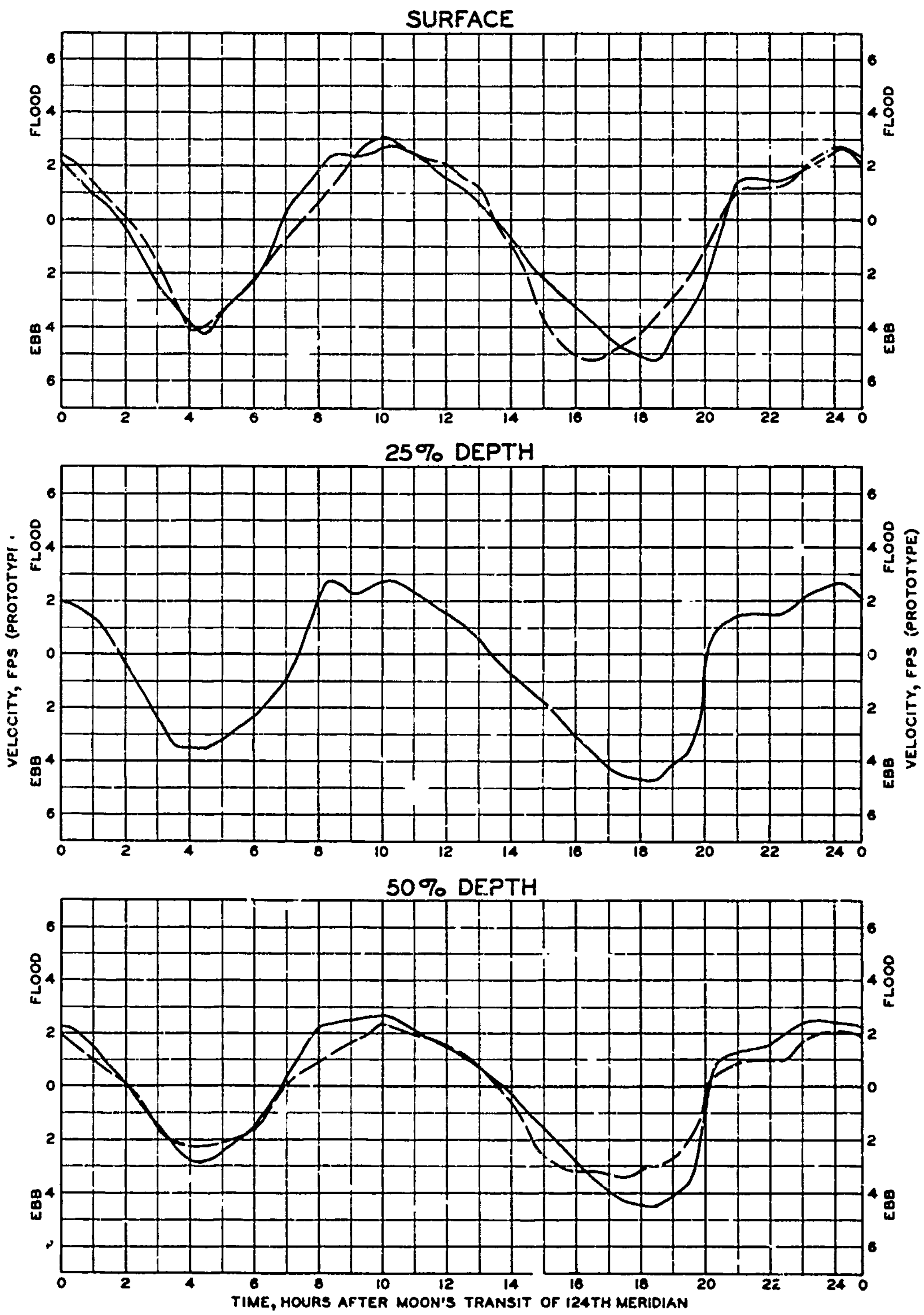
LEGEND

——— PROTOTYPE (6-7 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 8

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

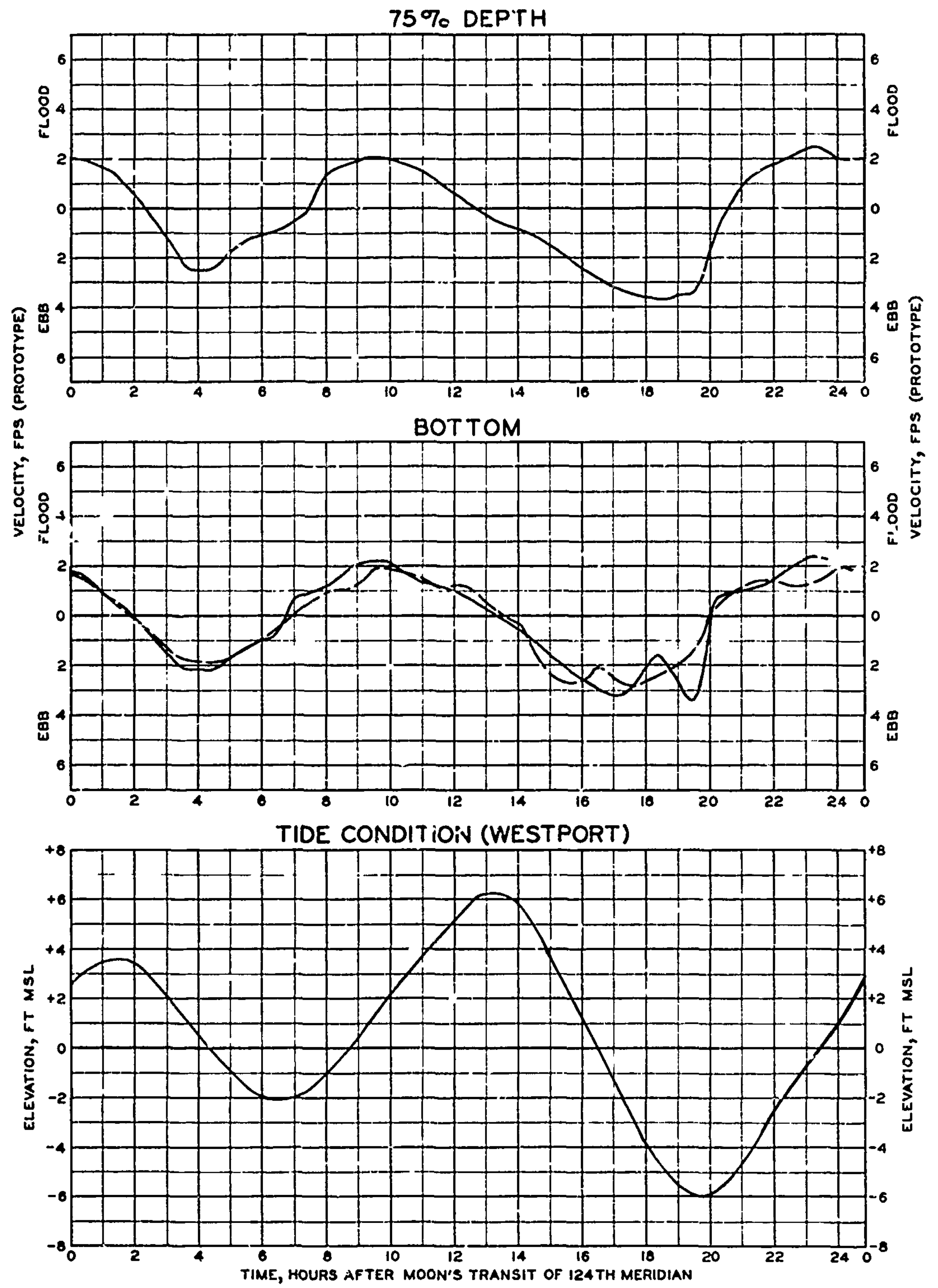
LEGEND

- - - PROTOTYPE (6-7 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 9

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . . 33.0 PPT

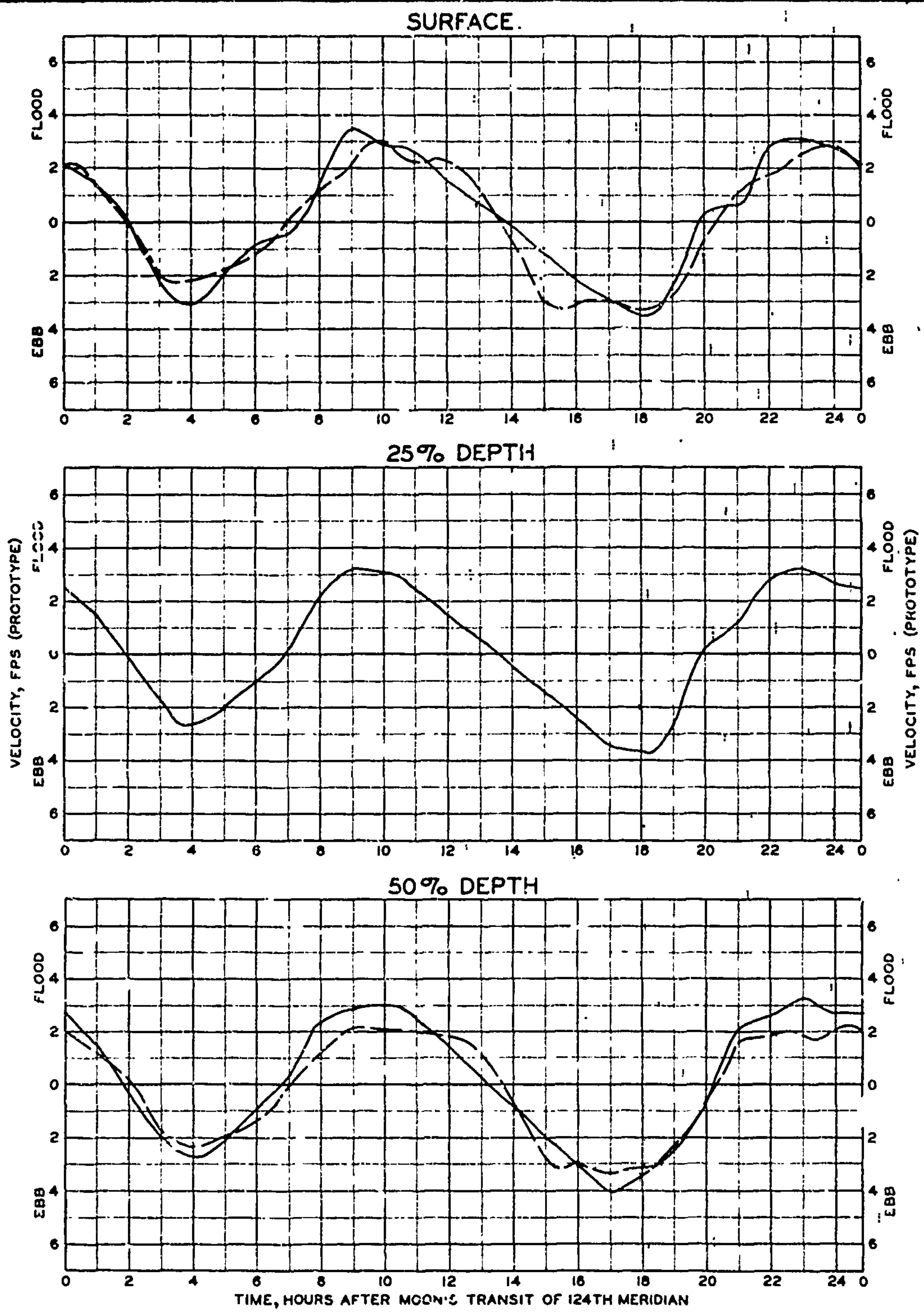
LEGEND

——— PROTOTYPE (6-7 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 9

75% DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TID... SPRING (6-7 OCT 67)
FR... DISCHARGE ...11,400 CFS
... 33.0 PPT

LEGEND

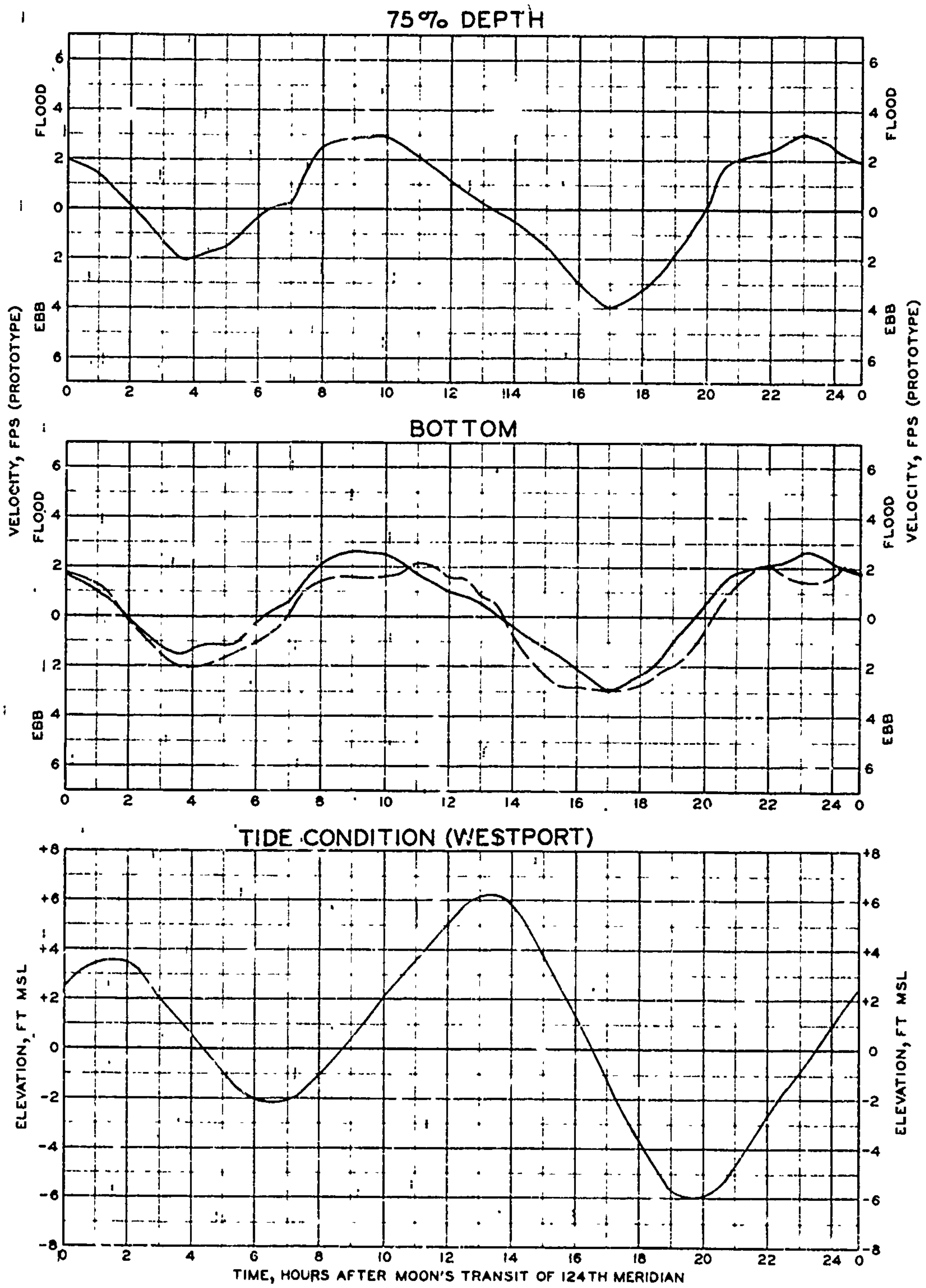
——— PROTOTYPE (6-7 OCT 67)
— — — MODEL

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 10

SURFACE, 25% DEPTH AND 50% DEPTH

PLATE 24



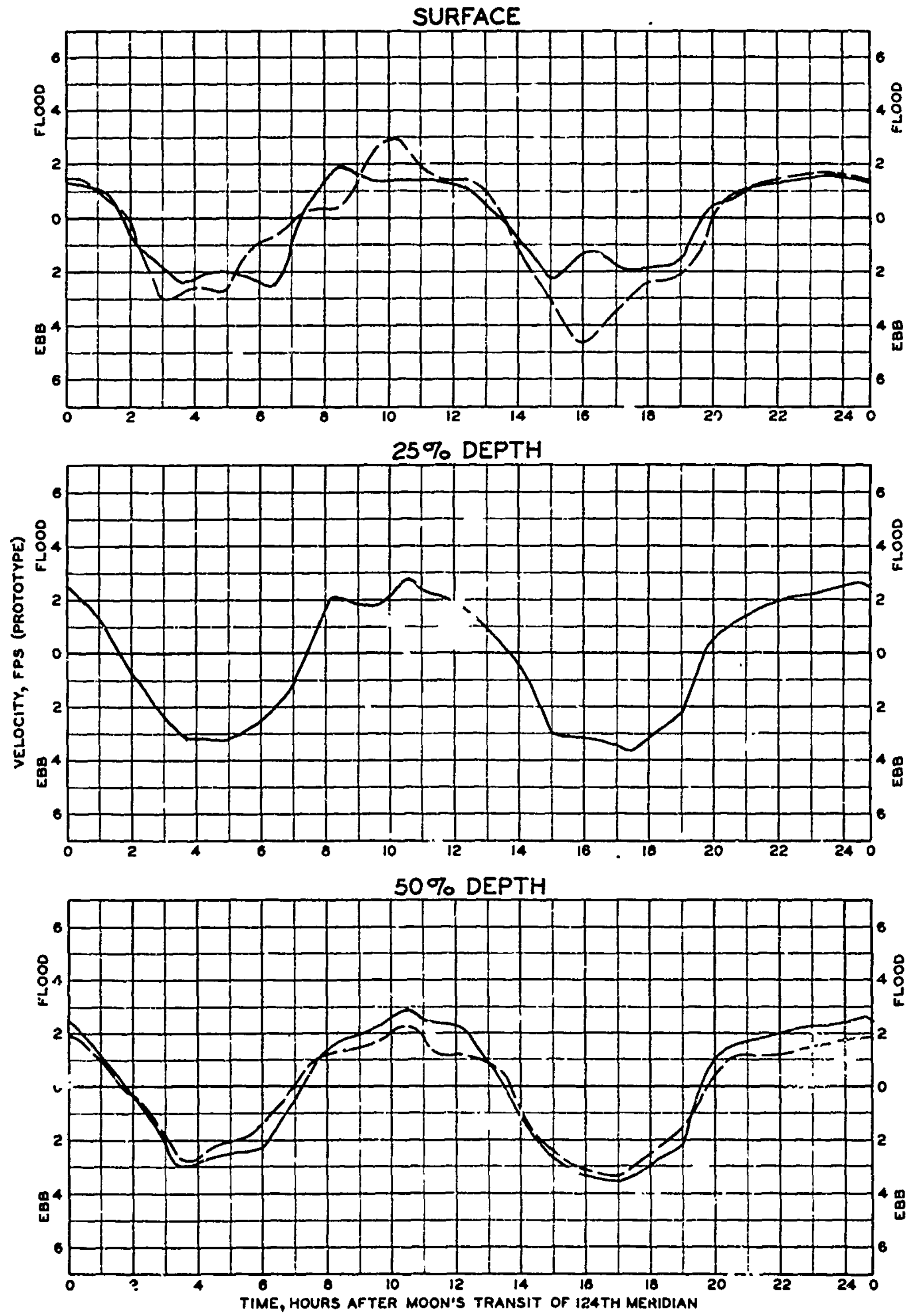
MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

—— PROTOTYPE (6-7 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES
STATION 10
75% DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE . . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . . 33.0 PPT

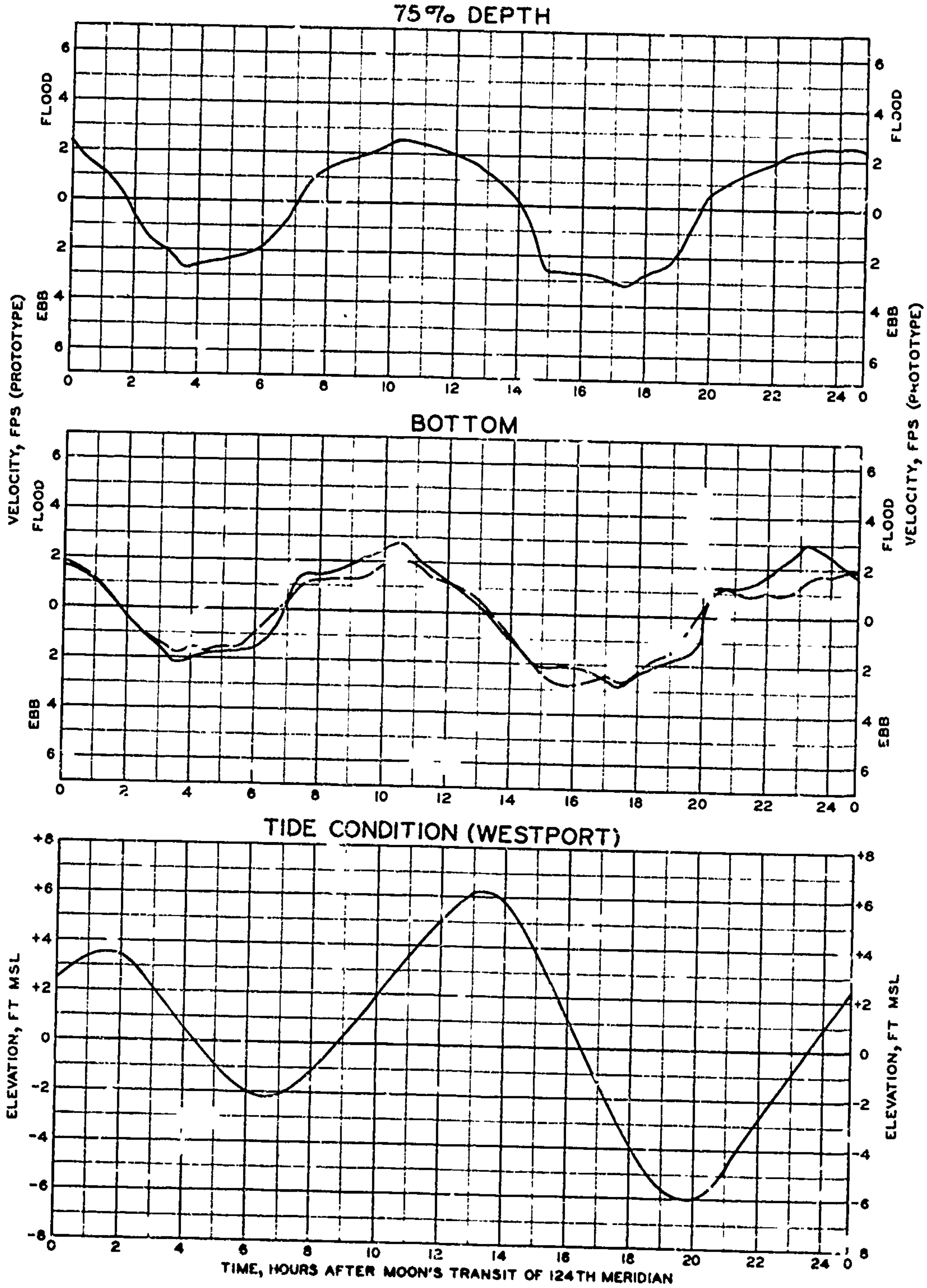
LEGEND

——— PROTOTYPE (6-7 OCT 67)
— — — MODEL

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 11

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY 33.0 PPT

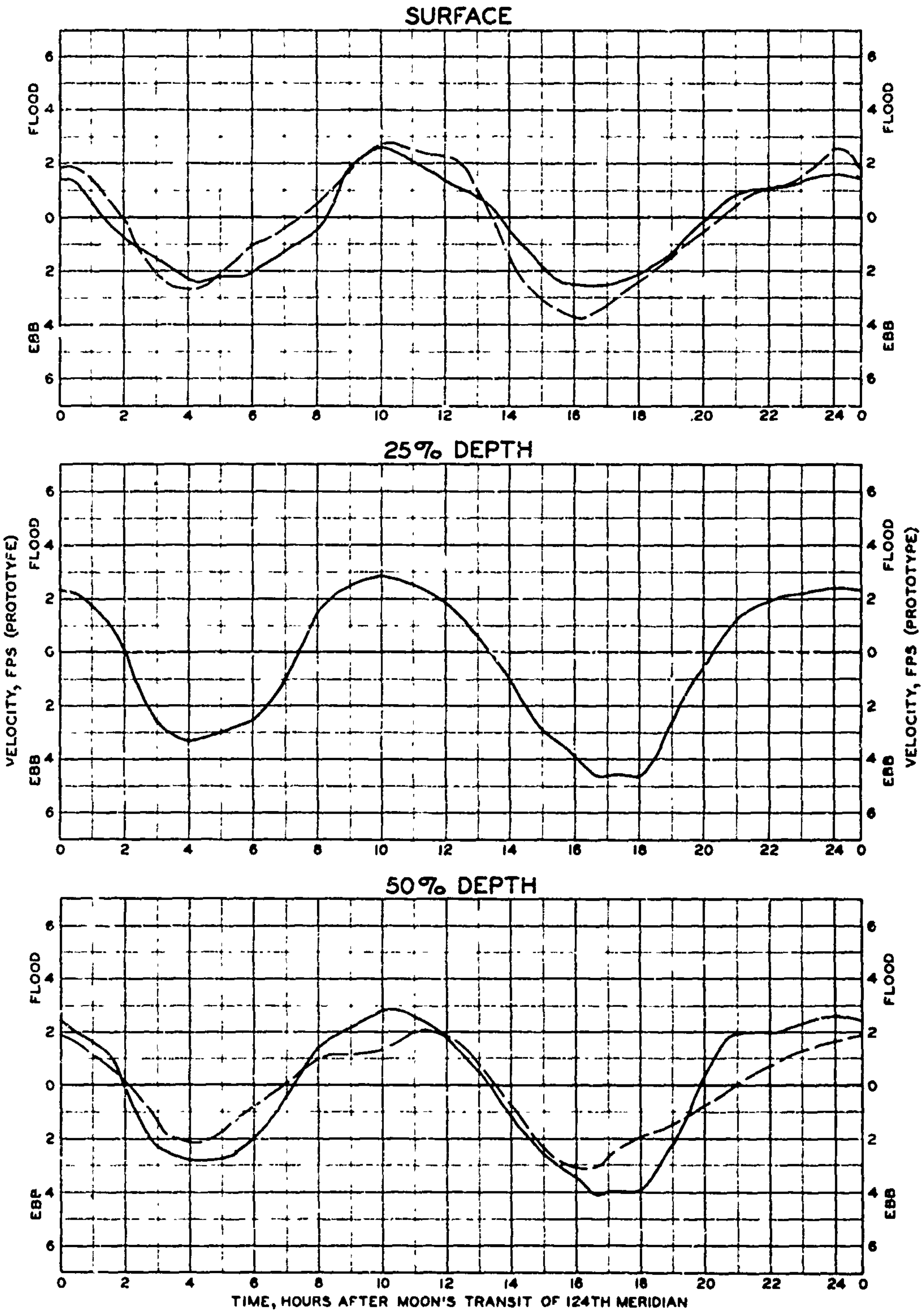
LEGEND

——— PROTOTYPE (6-7 OCT 67)
— — — MODEL

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 11

75% DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— PROTOTYPE (6-7 OCT 67)

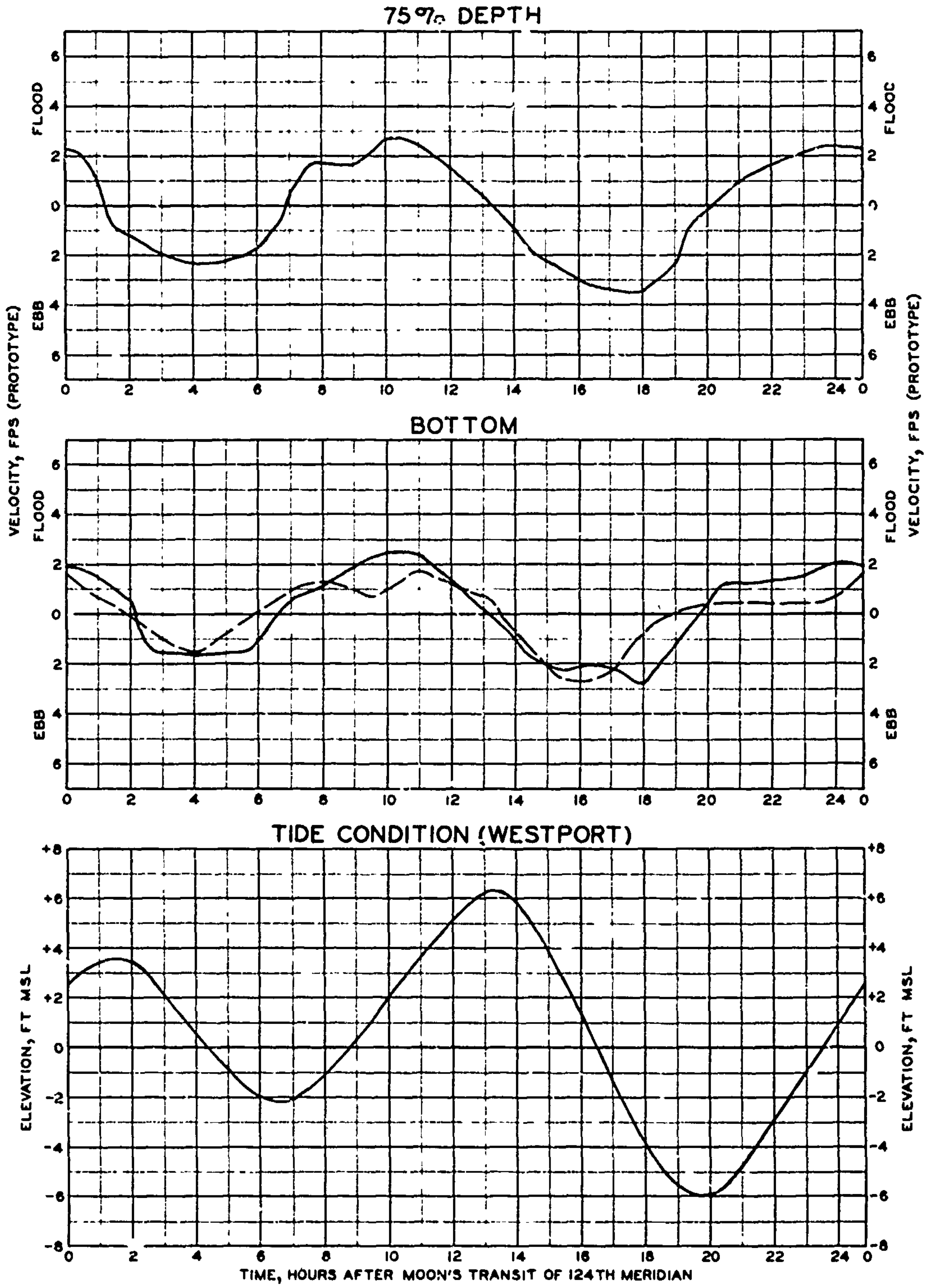
— — MODEL

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 12

SURFACE, 25% DEPTH AND 50% DEPTH

PLATE 28



MODEL TEST DATA

TIDE .. . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY . 33.0 PPT

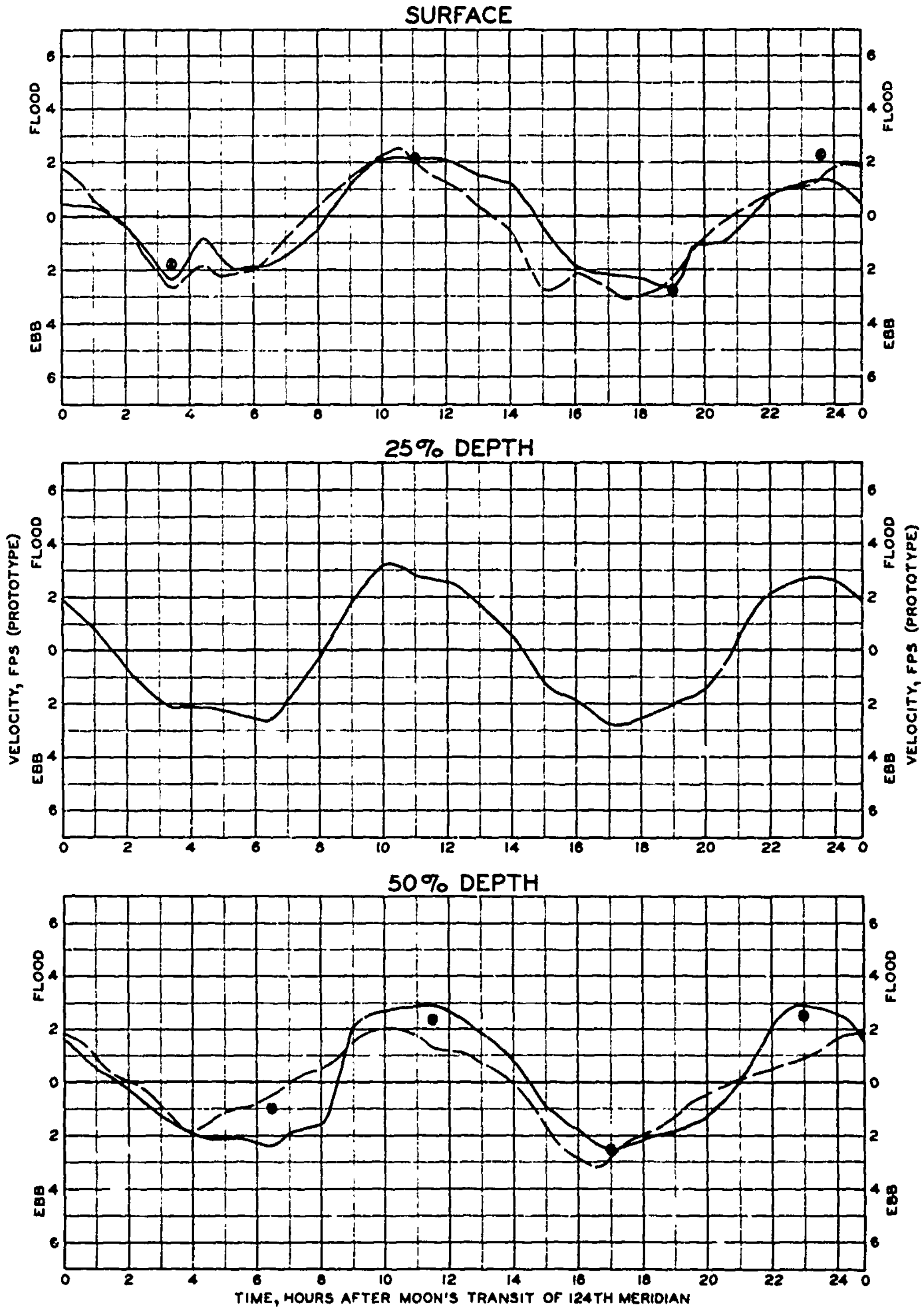
LEGEND

—— PROTOTYPE (6 7 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 12

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

... SPRING (6-7 OCT 67)
... WATER DISCHARGE ... 11,400 CFS
... SALINITY 33.0 PPT

LEGEND

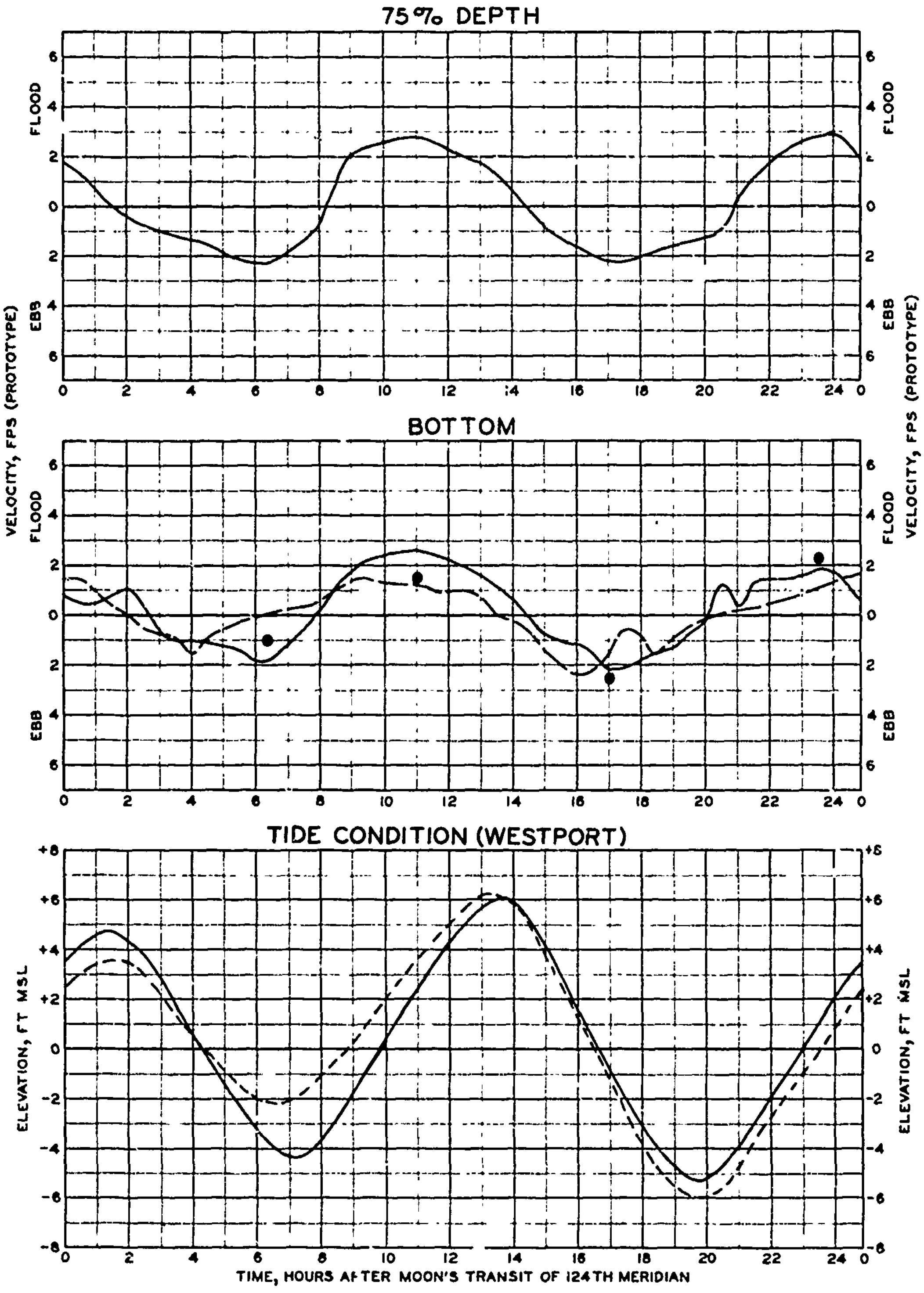
——— PROTOTYPE (4-5 OCT 67)
— — — MODEL

NOTE: ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 13

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— PROTOTYPE (4-5 OCT 67)

— — — MODEL

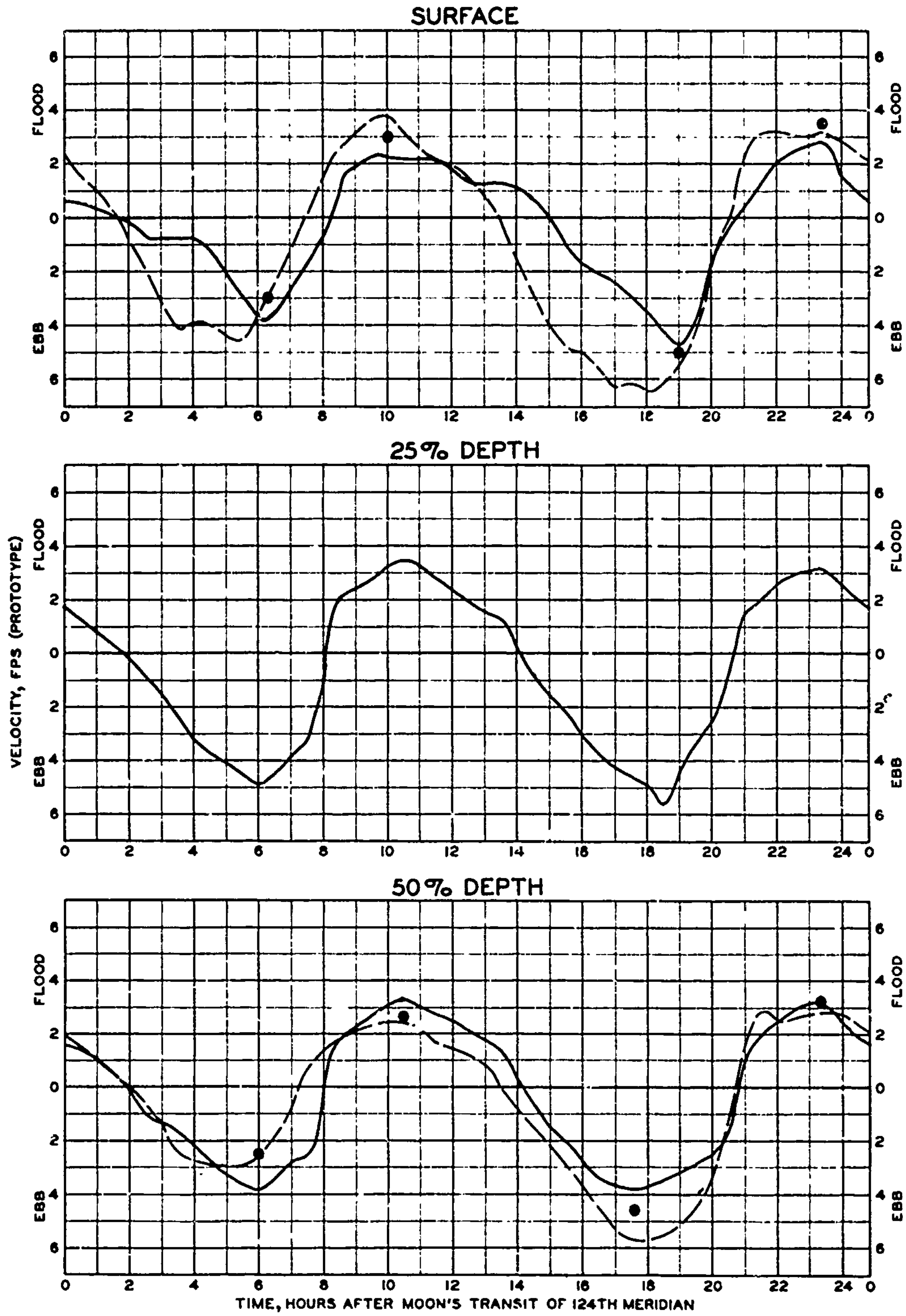
NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 13

75 % DEPTH, BOTTOM & TIDE CONDITION

PLATE 31



MODEL TEST DATA

TIDE . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY. 33.0 PPT

LEGEND

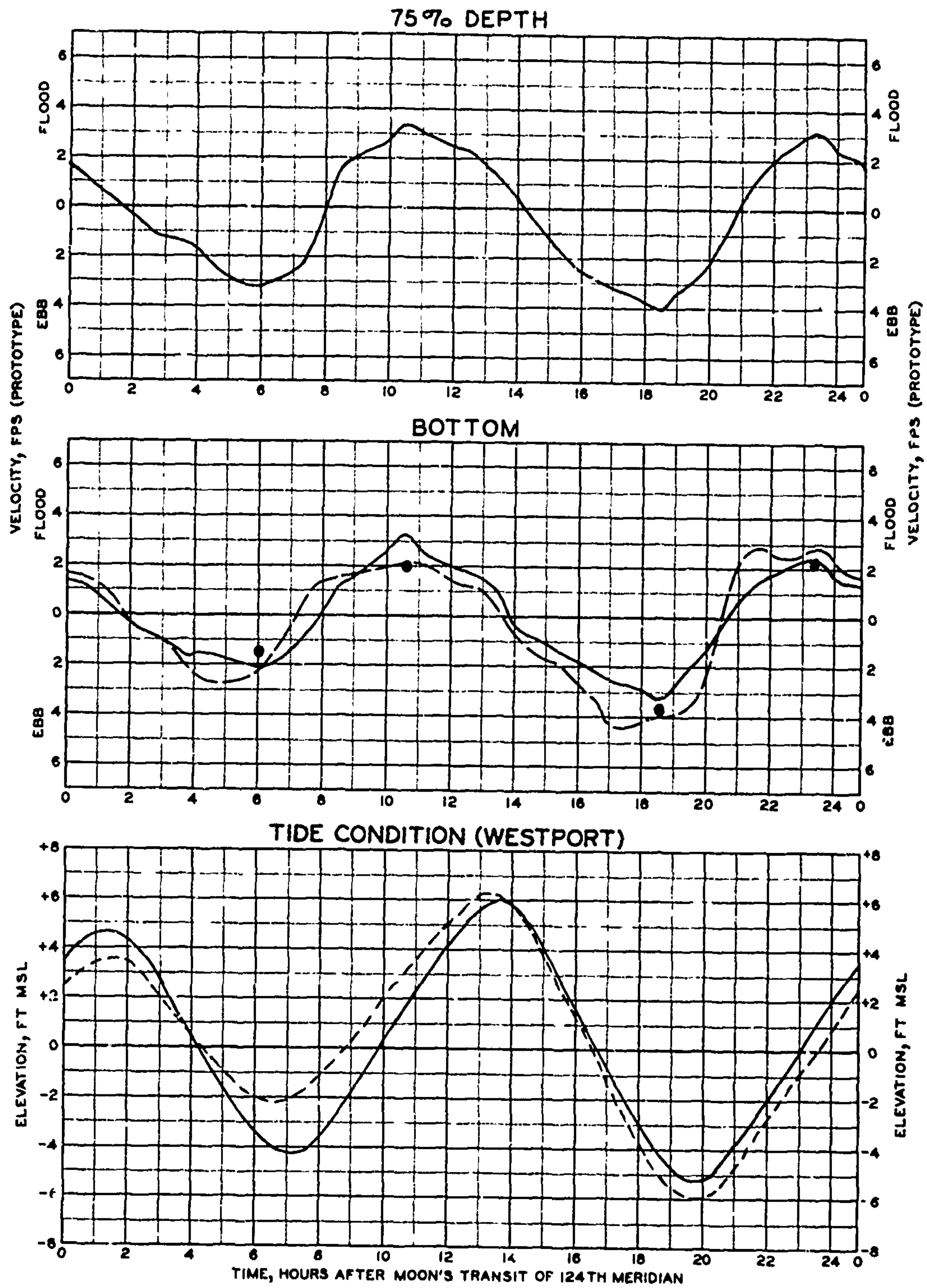
——— PROTOTYPE (4-5 OCT 67)
— — — MODEL

NOTE: ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 14

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE . . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— PROTOTYPE (4-5 OCT 67)
– – – MODEL

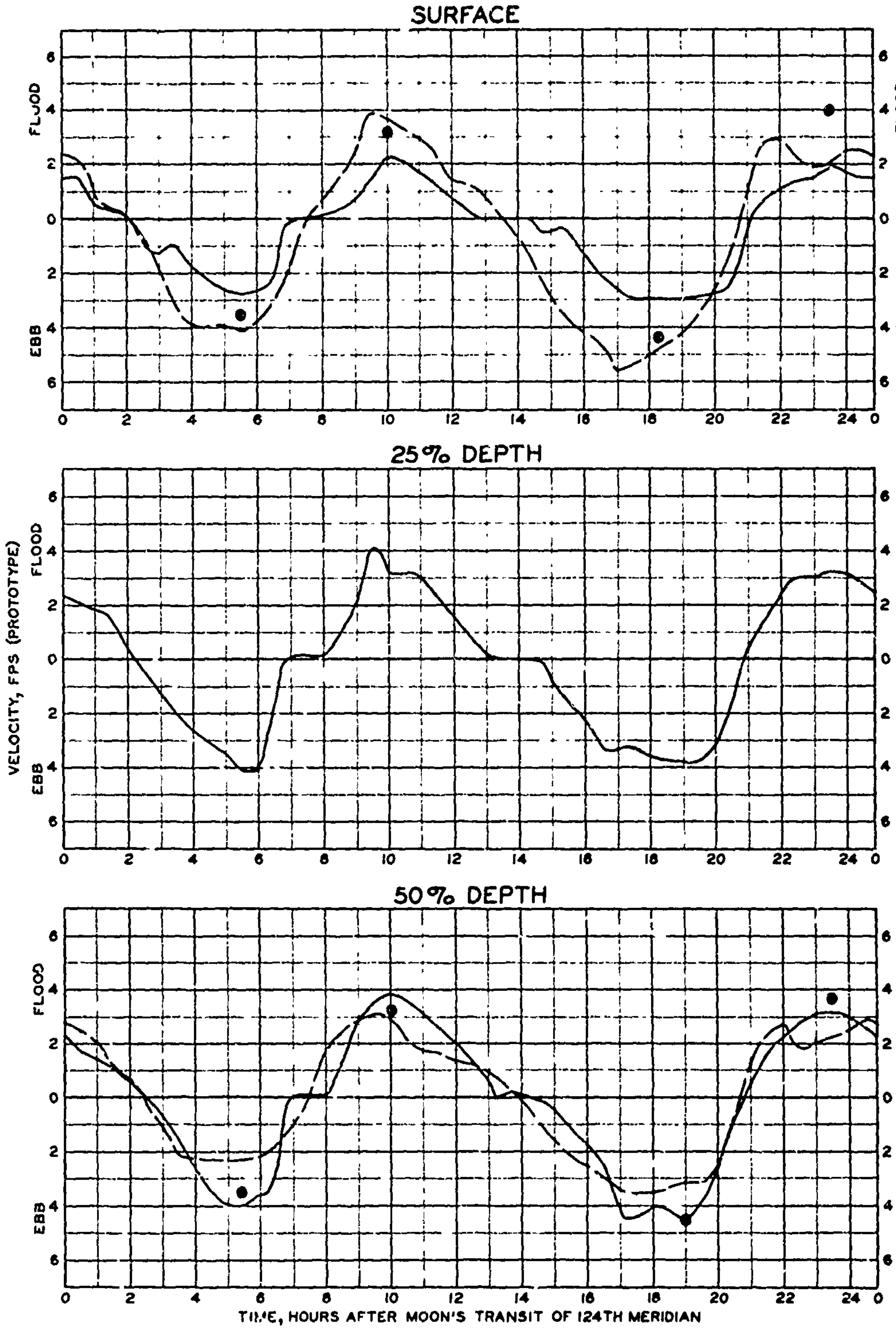
NOTE: ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 14

75% DEPTH, BOTTOM & TIDE CONDITION

PLATE 33



MODEL TEST DATA

TIDE . . . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— PROTOTYPE (5-6 OCT 67)
— — — MODEL

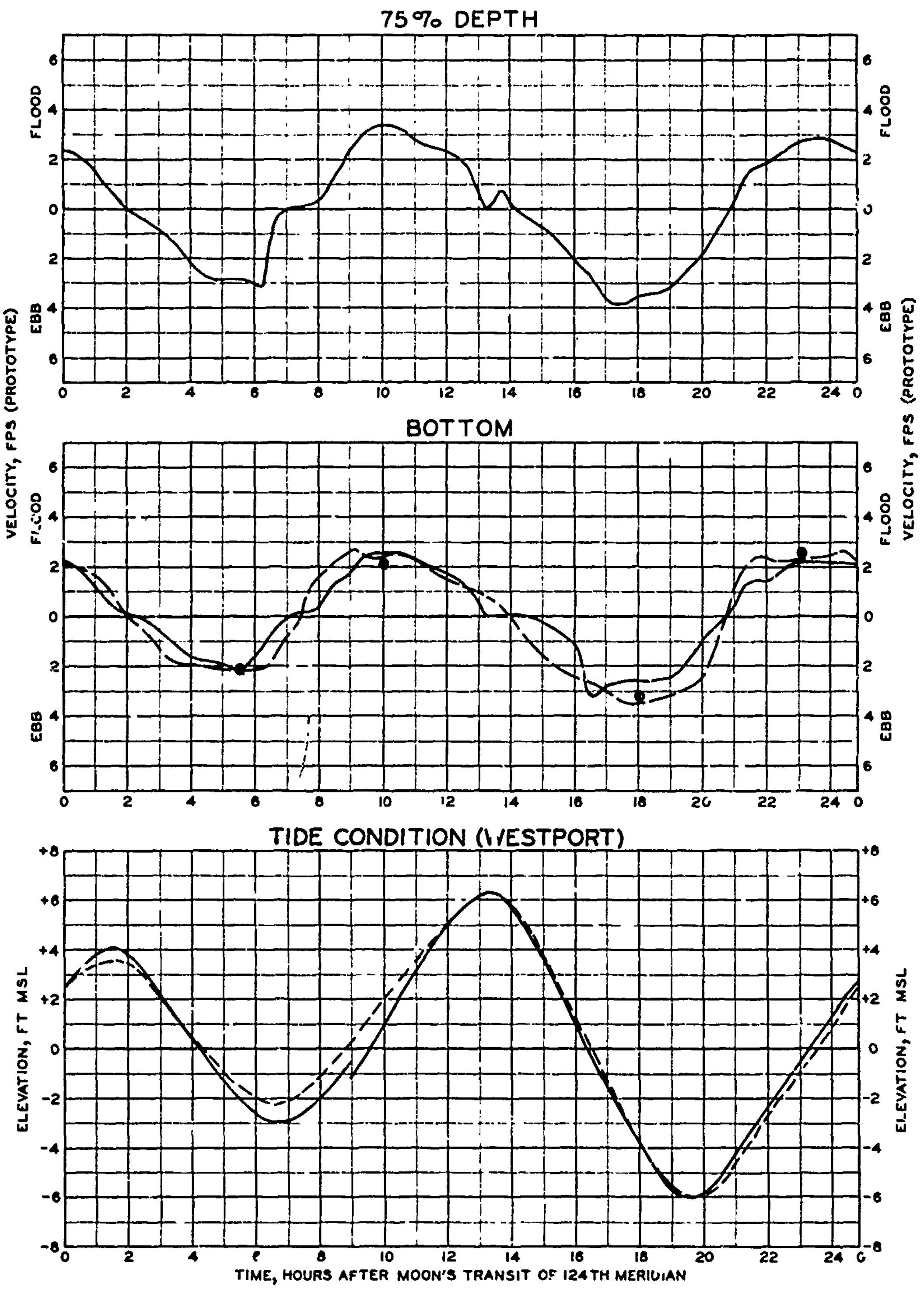
NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 15

SURFACE, 25% DEPTH AND 50% DEPTH

PLATE 34



MODEL TEST DATA

TIDE .... SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE .11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

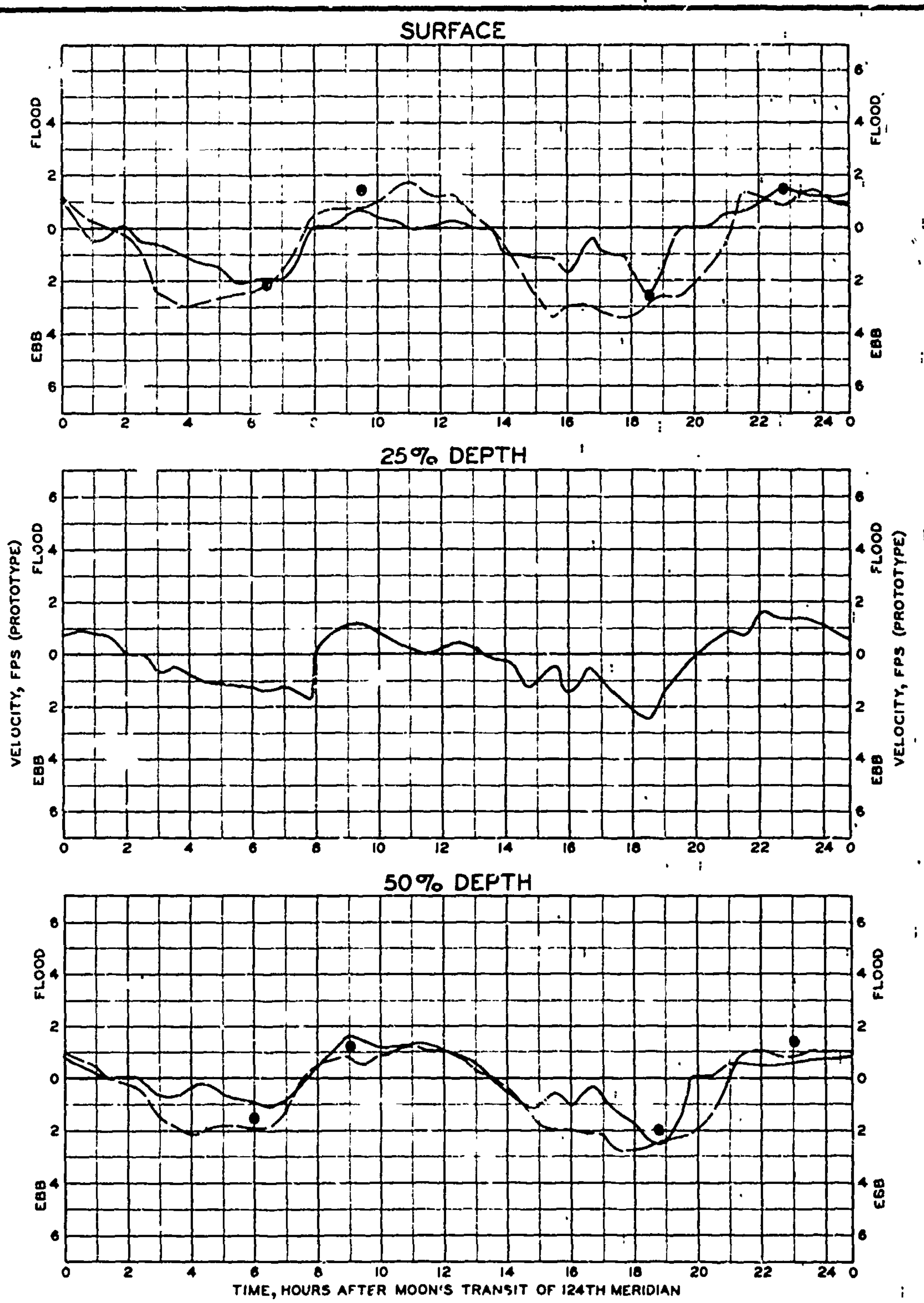
——— PROTOTYPE (5-6 OCT 67)
— — — MODEL

NOTE: ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 15

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE .... SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE .. 11,400 CFS
SOURCE SALINITY .. 33.0 PPT

LEGEND

——— PROTOTYPE (8-9 OCT 67)
— — — MODEL

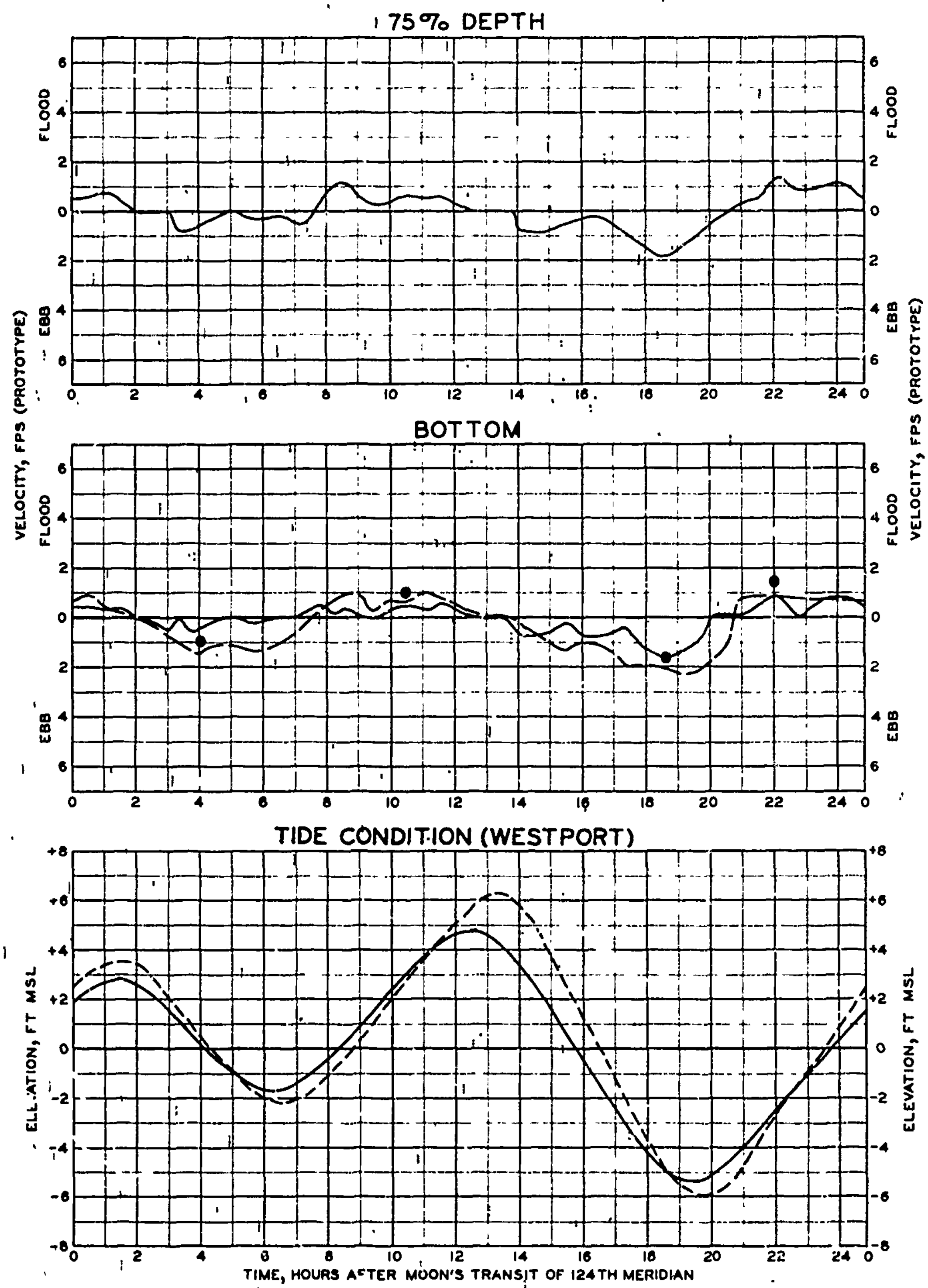
NOTE. ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 16

SURFACE, 25% DEPTH AND 50% DEPTH

PLATE 36



MODEL TEST DATA

TIDE ...... SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

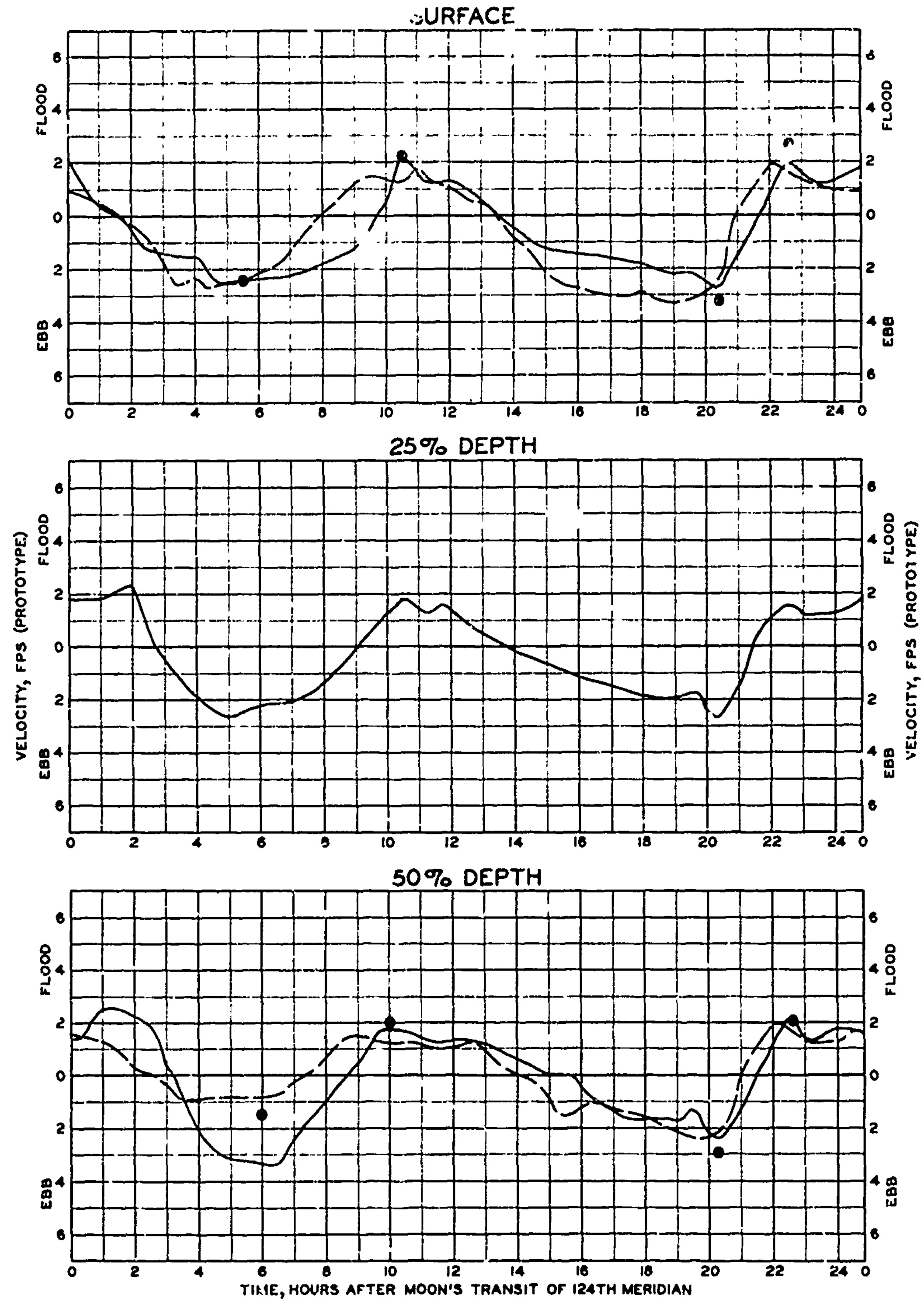
LEGEND

——— PROTOTYPE (8-9 OCT 67)
– – – MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES
STATION 16
75% DEPTH, BOTTOM & TIDE CONDITION

PLATE 37



<u>MODEL TEST DATA</u>

TIDE .... SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE .. 11,400 CFS
SOURCE SALINITY 33.0 PPT

<u>LEGEND</u>

——— PROTOTYPE (4 OCT 67)
— — MODEL

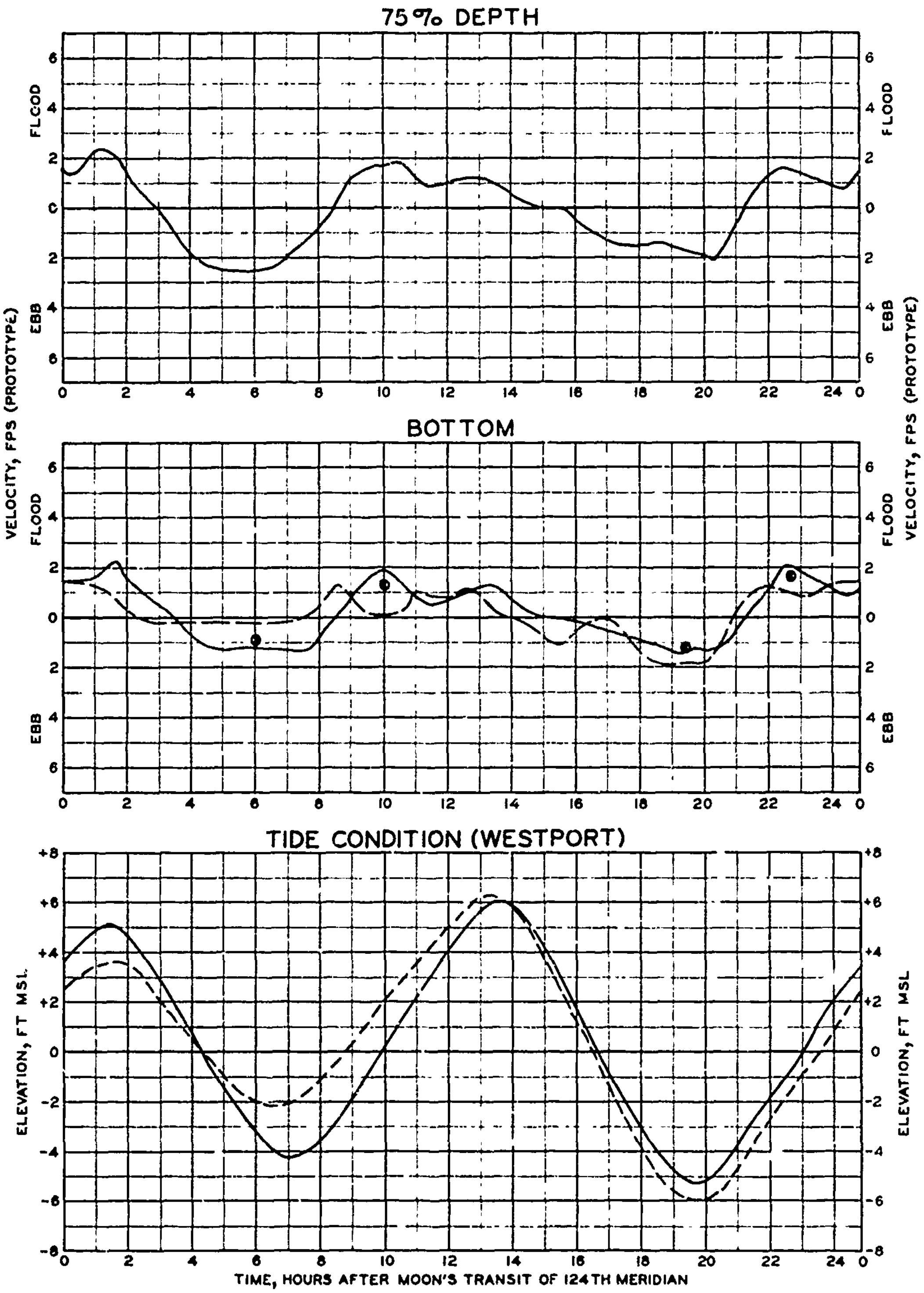
NOTE: ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 17

SURFACE, 25% DEPTH AND 50% DEPTH

PLATE 38



MODEL TEST DATA

TIDE . . . . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

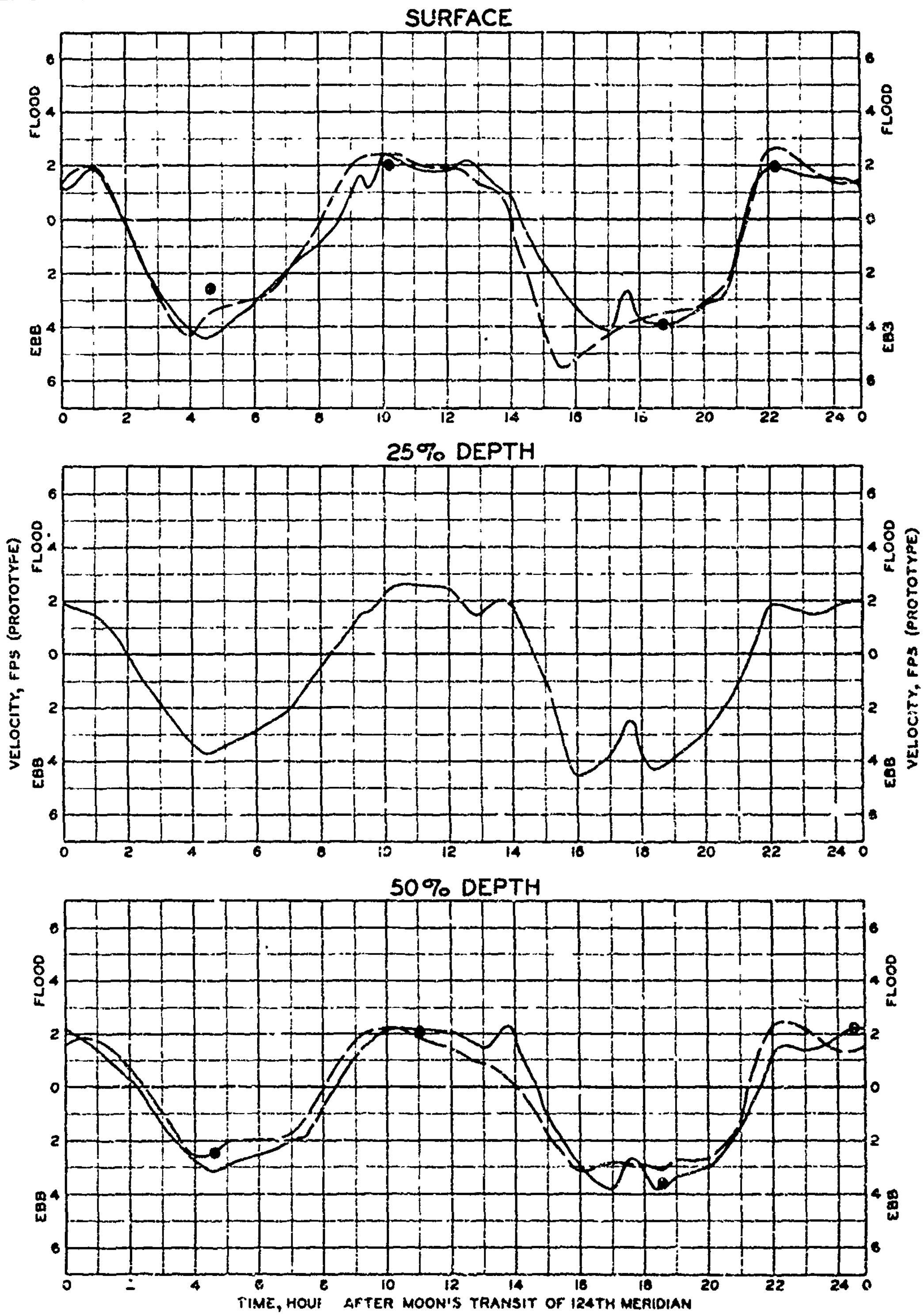
——— PROTOTYPE (4 OCT 67)
— — MODEL

NOTE: ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 17

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

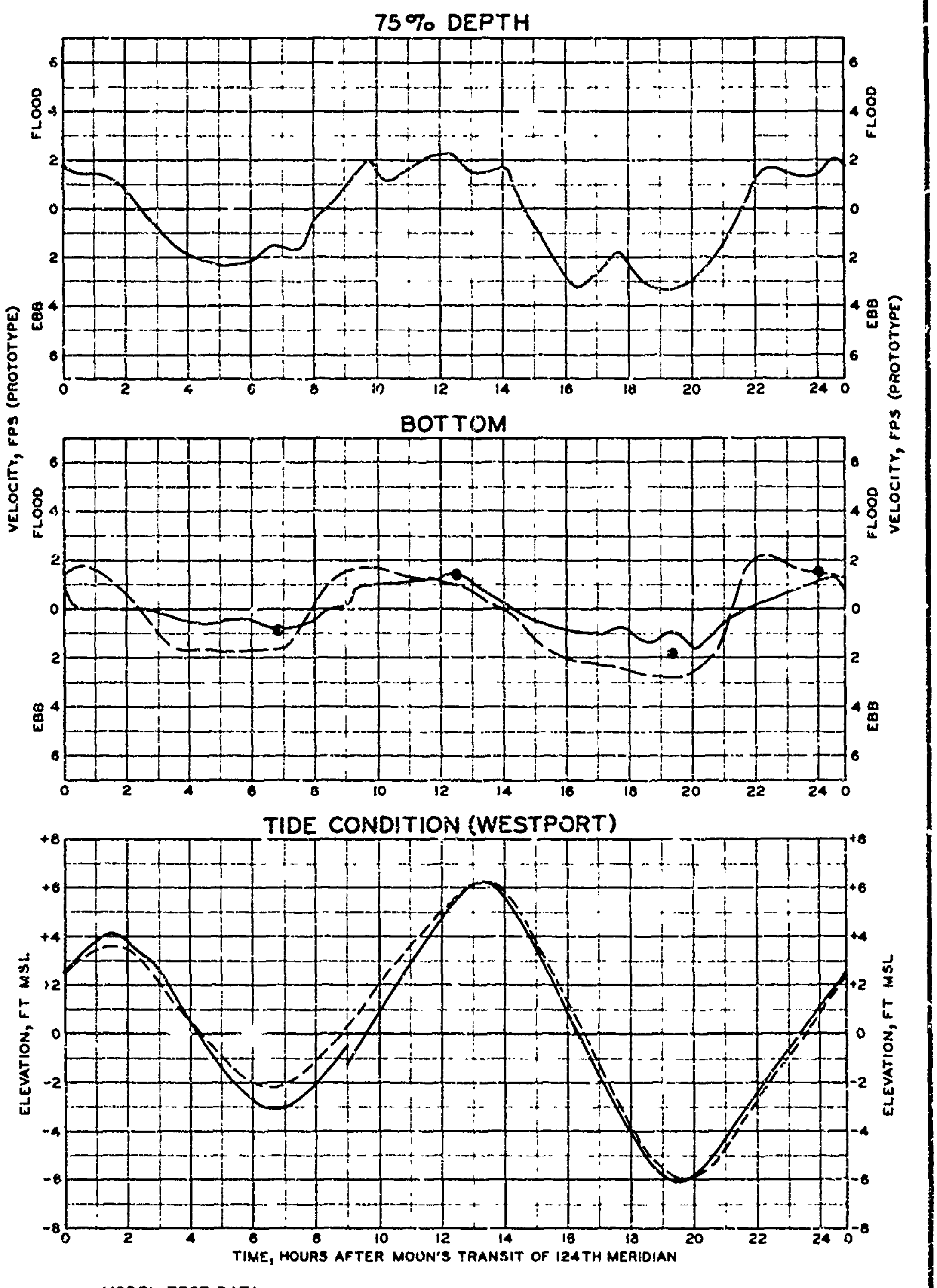
——— PROTOTYPE (5-6 OCT 67)
— — — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 18

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

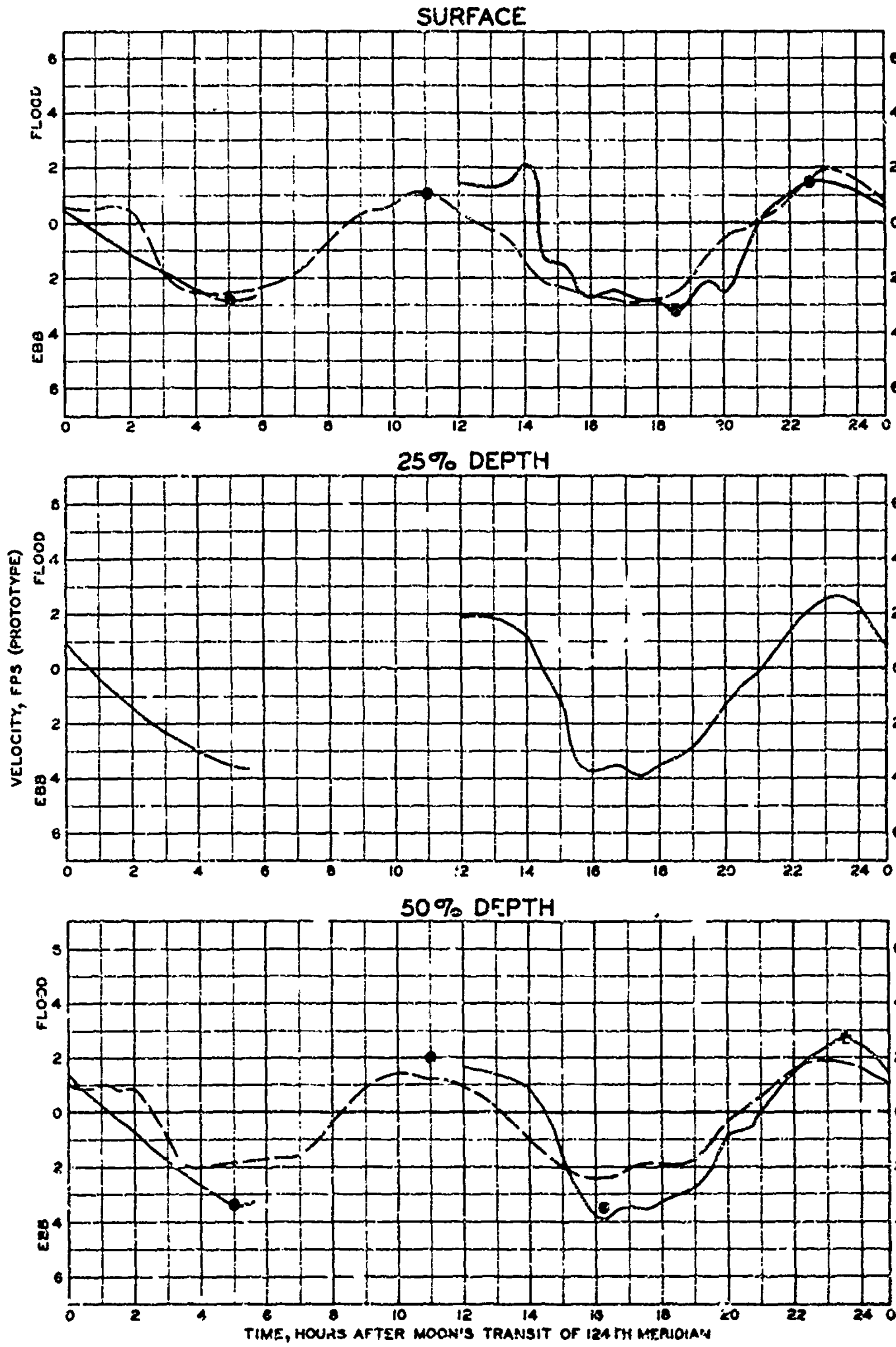
——— PROTOTYPE (5-6 OCT 67)
— — — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF SPRING TIDE CURRENT VELOCITIES

STATION 18

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE	NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE	10,600 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— PROTOTYPE (14-15 OCT 67)

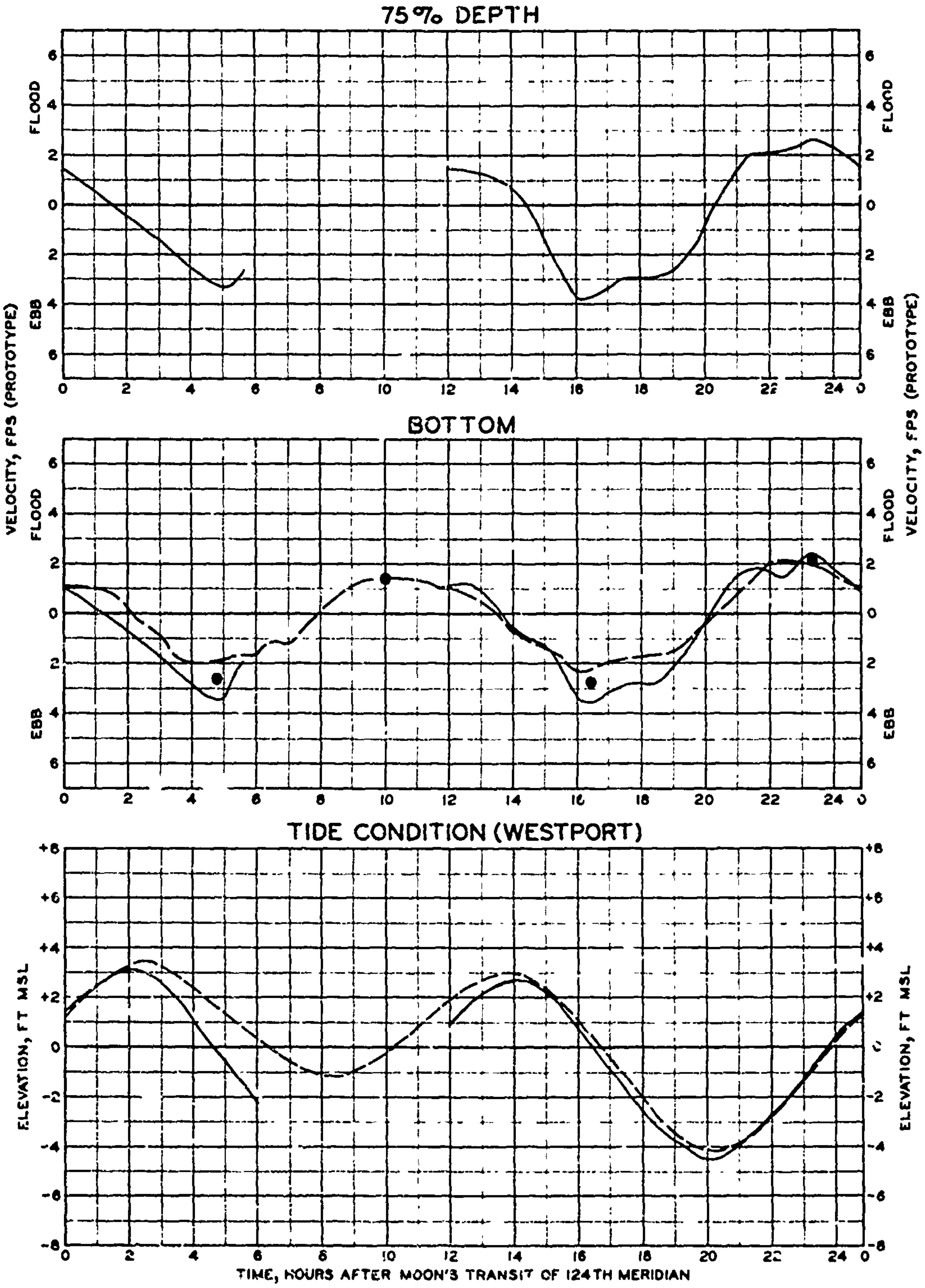
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 1

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE . . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 1,500 CFS
SOURCE SALINITY . . . . 33.0 PPT

LEGEND

——— PROTOTYPE (14-15 OCT 67)
— — — MODEL

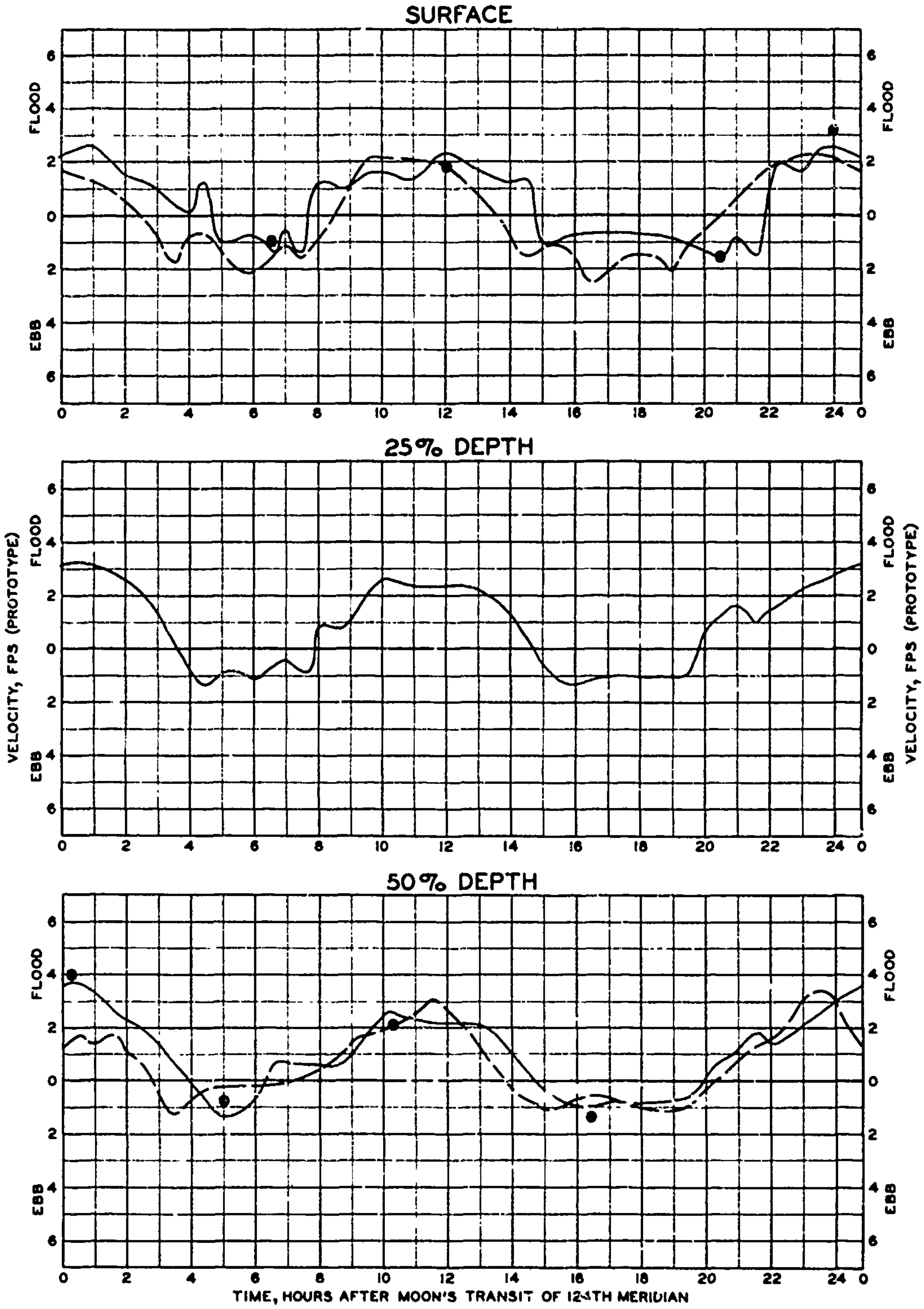
NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 1

75% DEPTH, BOTTOM & TIDE CONDITION

PLATE 43



MODEL TEST DATA

TIDE . . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

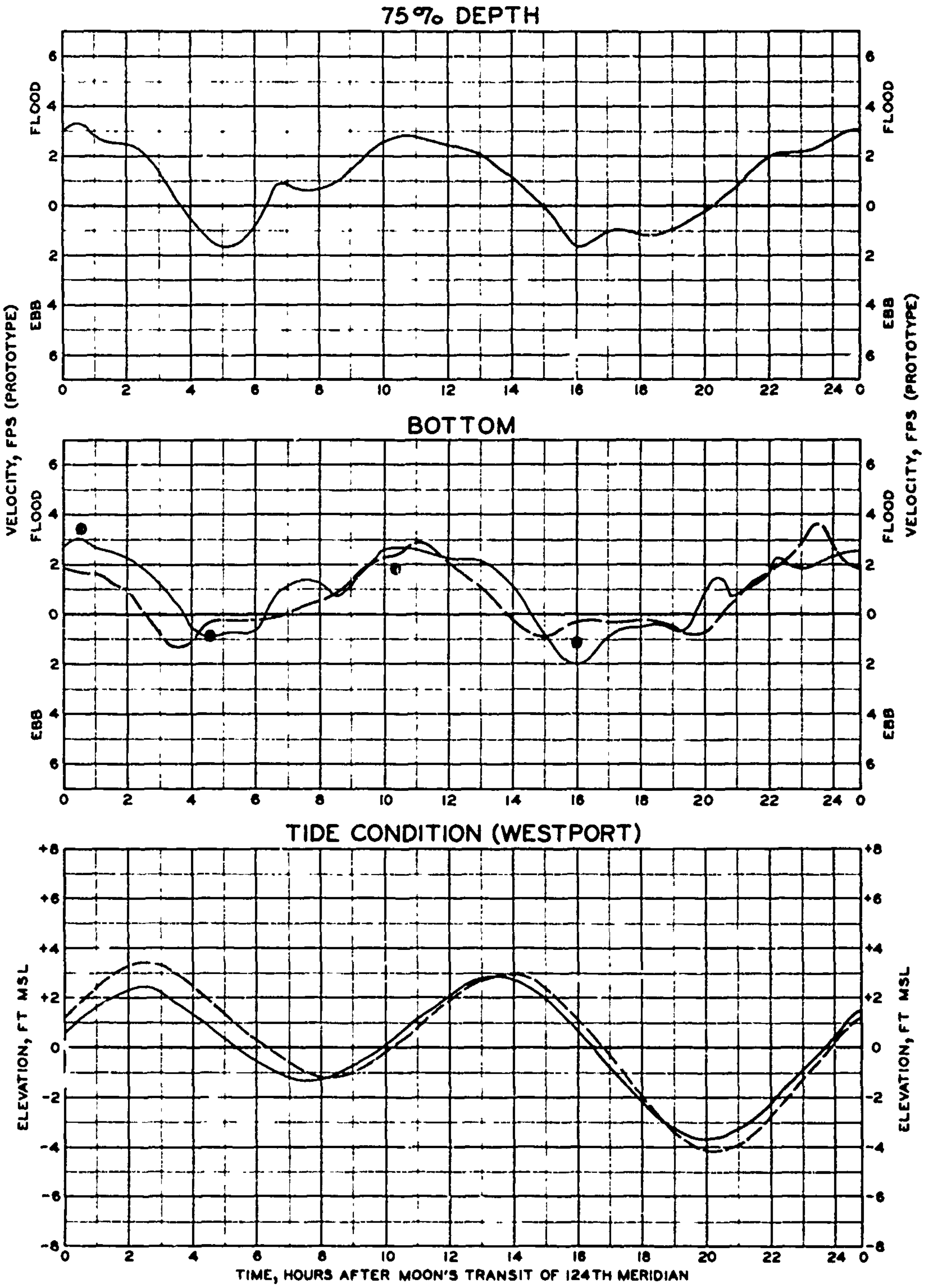
——— PROTOTYPE (12-13 OCT 67)
— — — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 4

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE . . . . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

——— PROTOTYPE (12-13 OCT 67)
— — MODEL

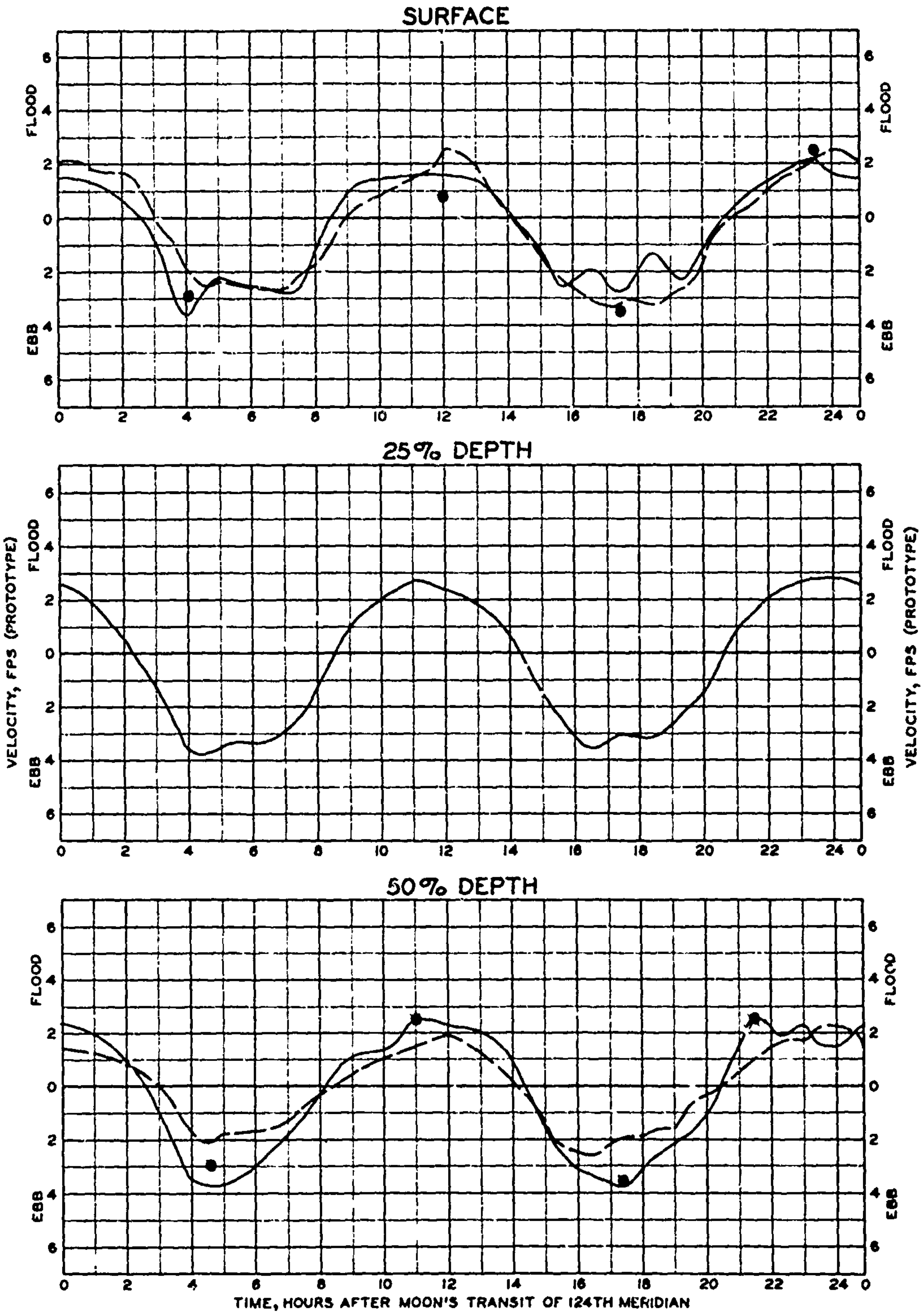
NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 4

75 % DEPTH, BOTTOM & TIDE CONDITION

PLATE 45



MODEL TEST DATA

TIDE . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . ... 33.0 PPT

LEGEND

——— PROTOTYPE (15-16 OCT 67)
— — MODEL

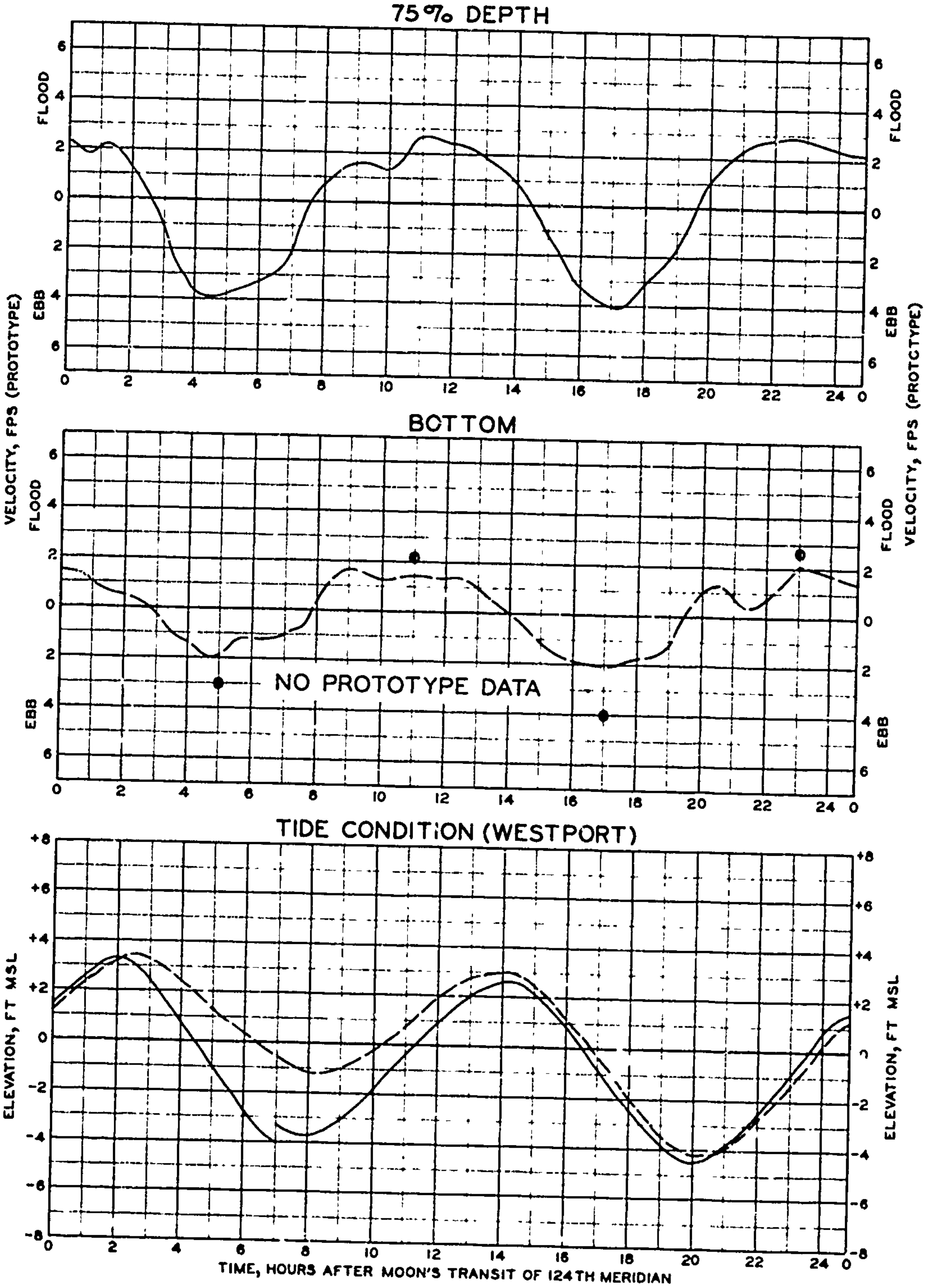
NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 5

SURFACE, 25% DEPTH AND 50% DEPTH

PLATE 46



MODEL TEST DATA

TIDE . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

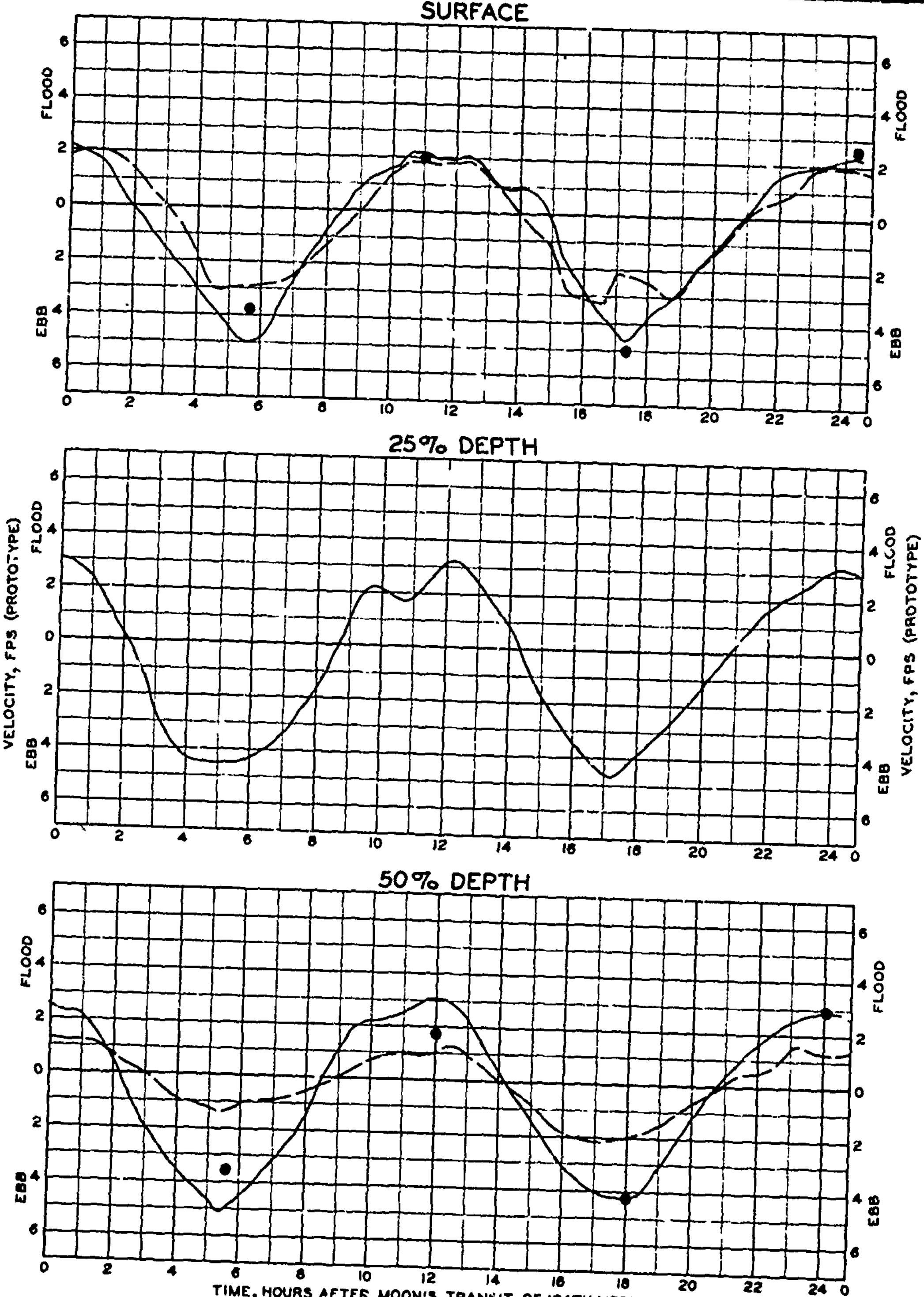
——— PROTOTYPE (15-16 OCT 67)
— — — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP
TIDE CURRENT VELOCITIES

STATION 5

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE . . . . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE 10,500 CFS
SOURCE SALINITY . . . . 33.0 PPT

LEGEND

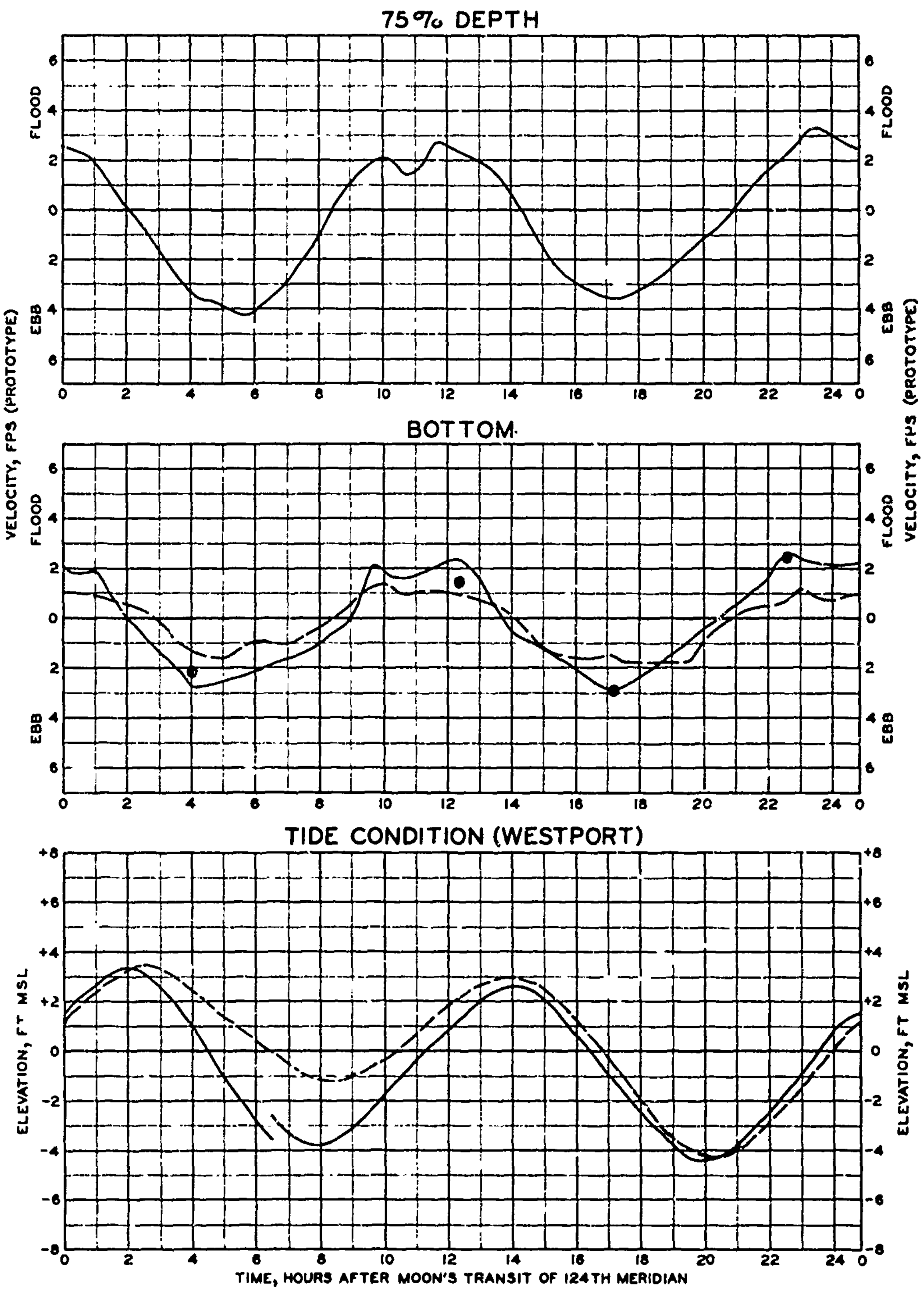
—— PROTOTYPE (15-16 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 6

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE . . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY. . . . 33.0 PPT

LEGEND

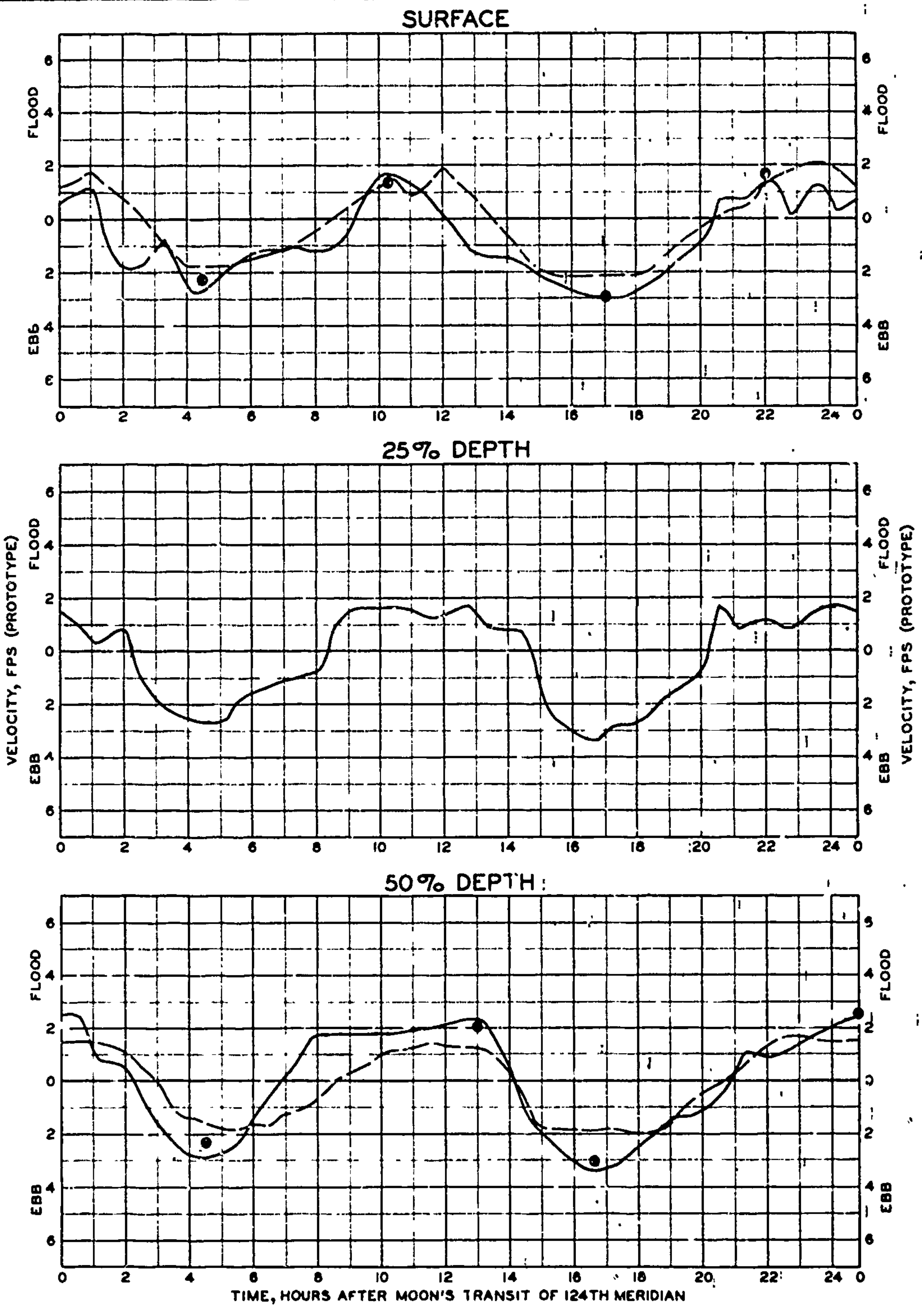
——— PROTOTYPE (15-16 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 6

75% DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE — NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE — 10,500 CFS
SOURCE SALINITY — 33.0 PPT

LEGEND

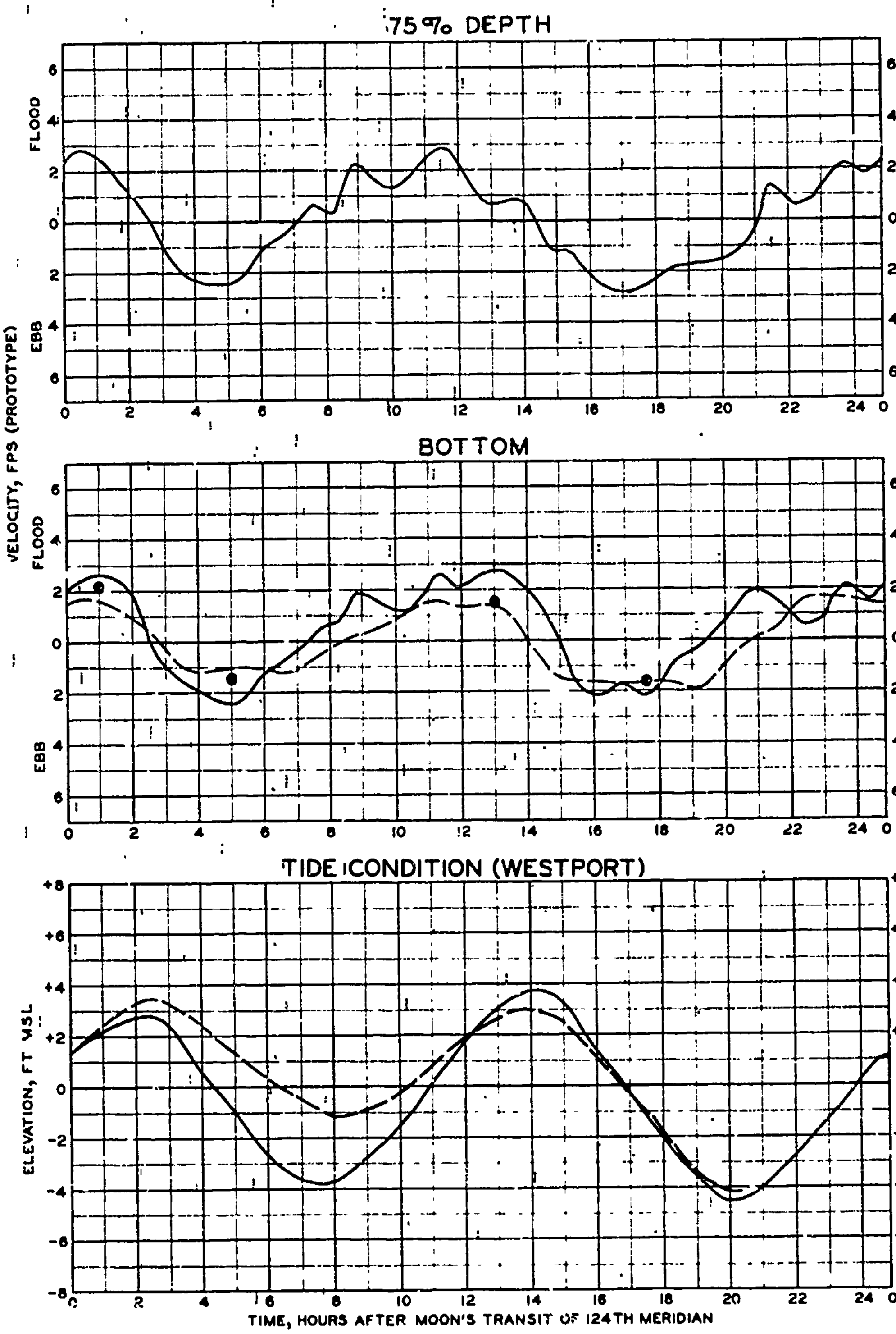
——— PROTOTYPE (16-17 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 7

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE . . . . NEAP (13–14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . . . 33.0 PPT

LEGEND

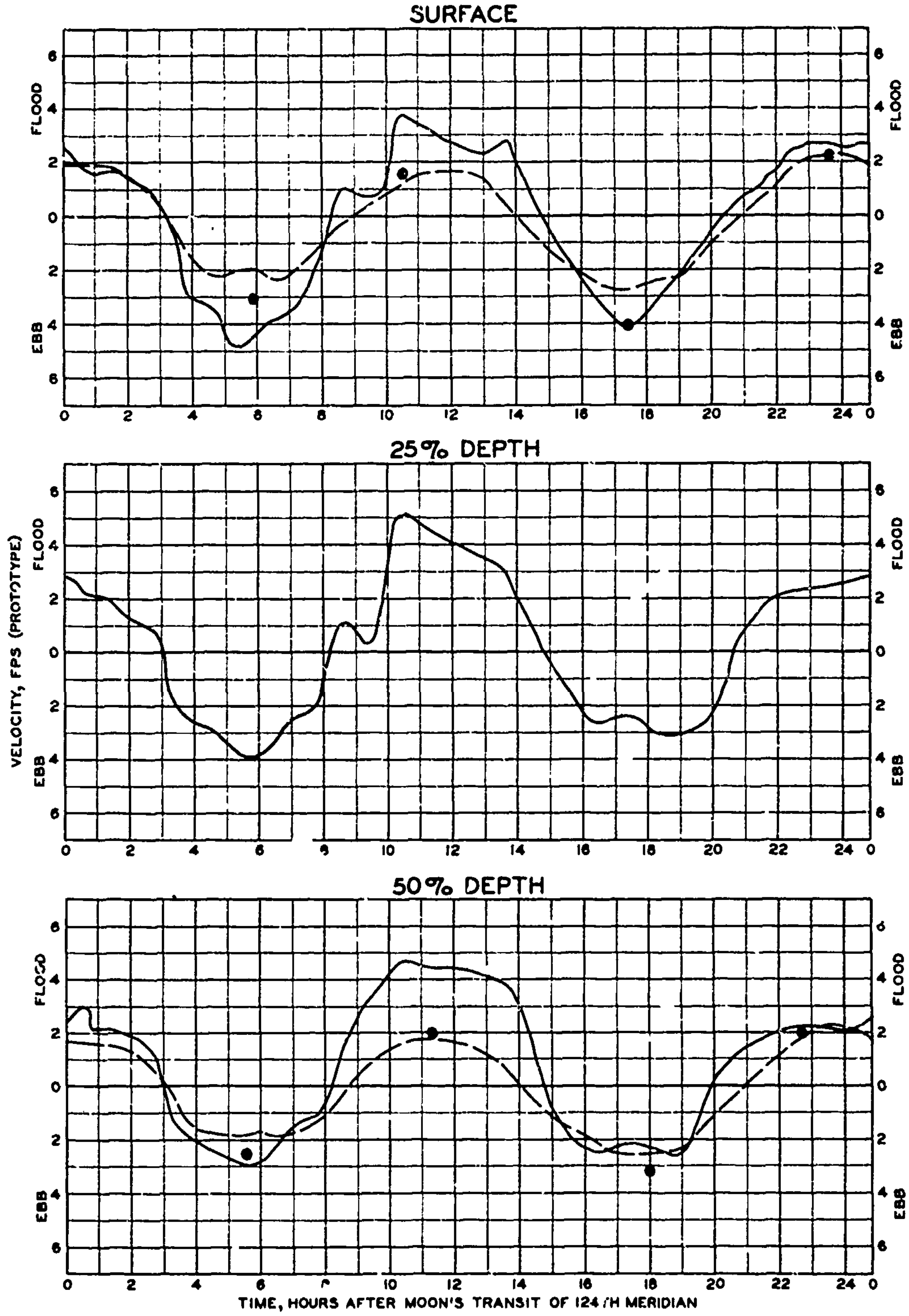
——— PROTOTYPE (16–17 OCT 67)
— — — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 7

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE . . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

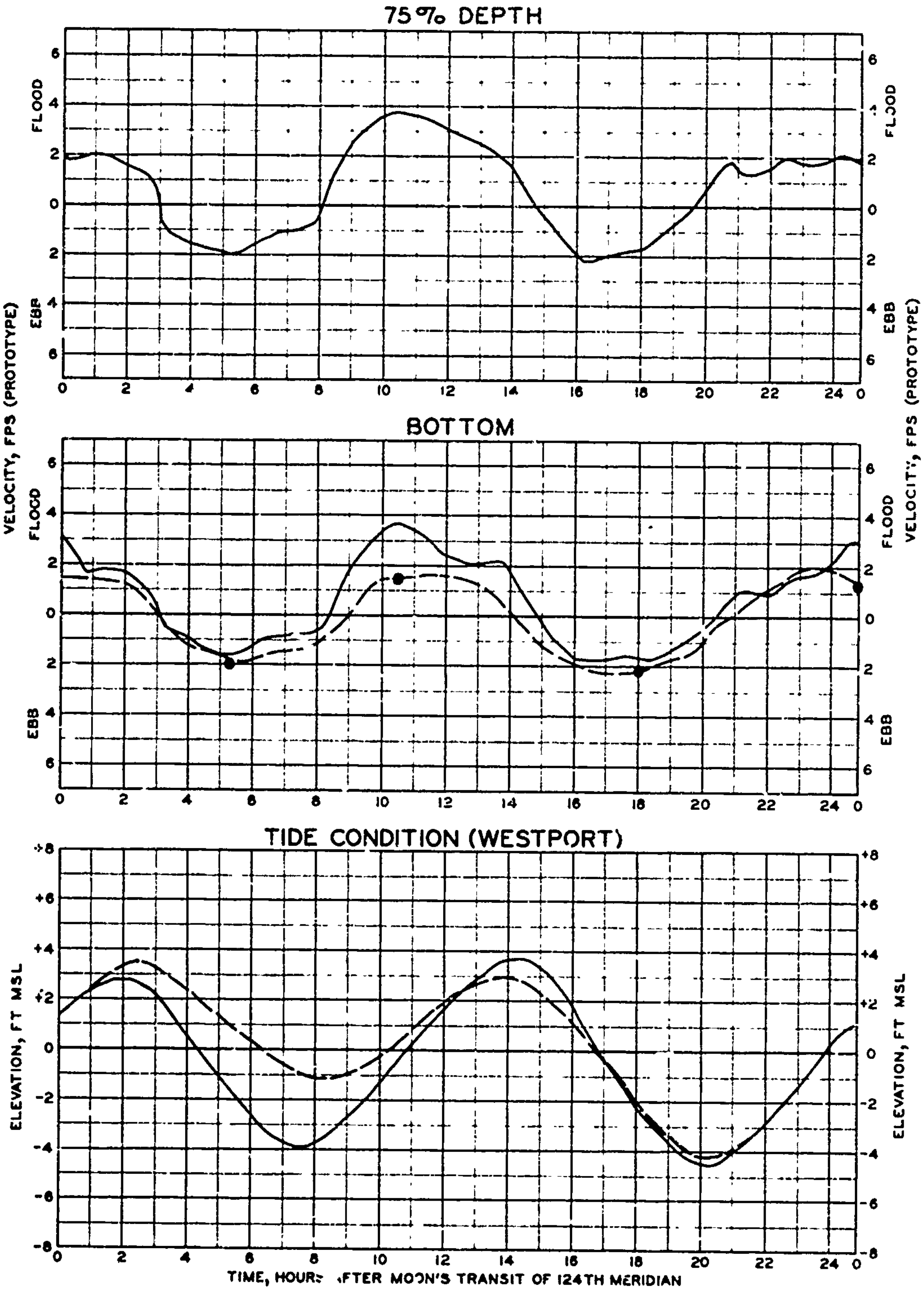
——— PROTOTYPE (16-17 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 8

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE . . . . NEAP (13–14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY. . . . . 33.0 PPT

LEGEND

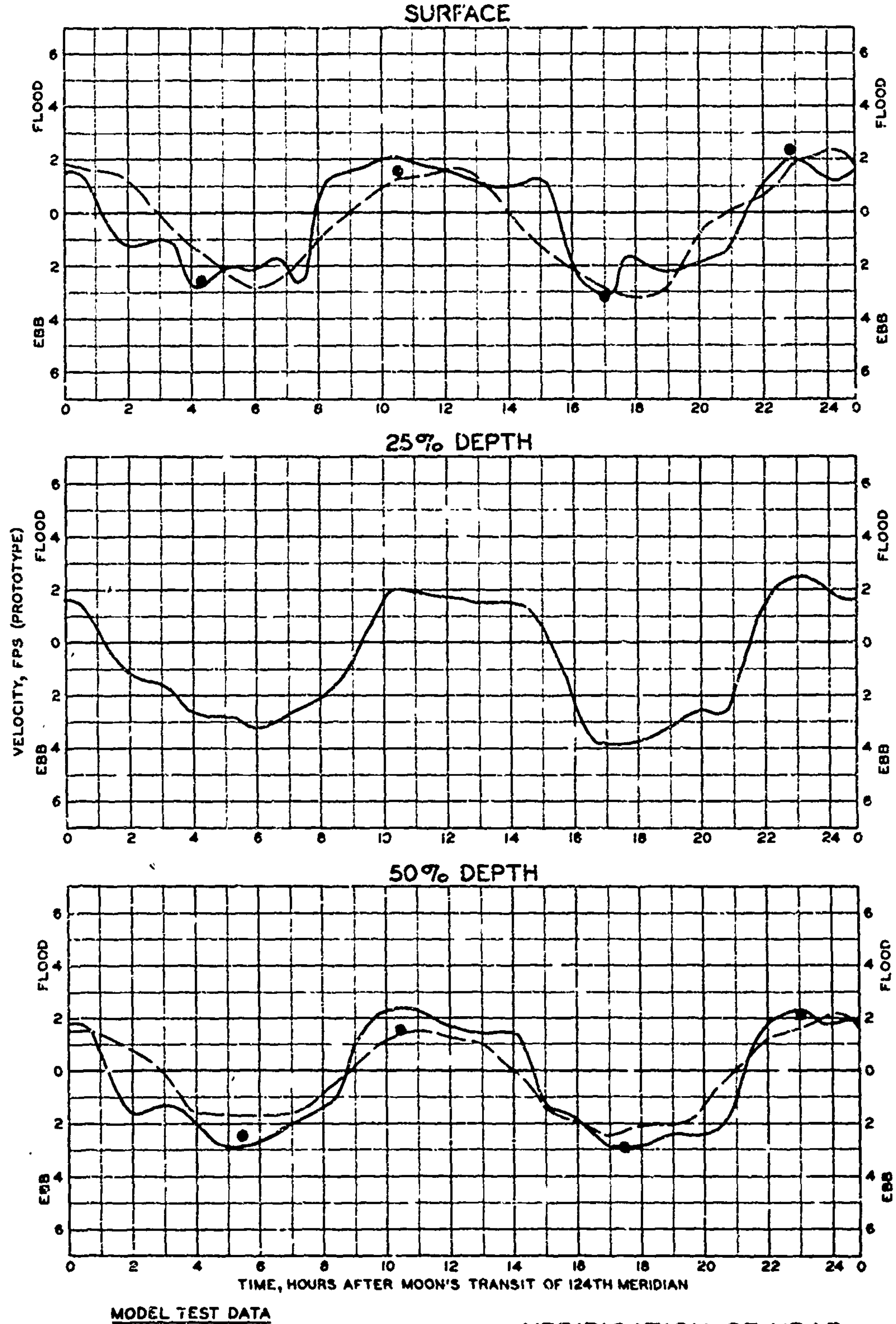
——— PROTOTYPE (16–17 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 8

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE . . . . NEAP (1?-14 OCT 67)
FRESH-WATER DISCHARGE . . 10,500 CFS
SOURCE SALINITY . . . . . 33.0 PPT

LEGEND

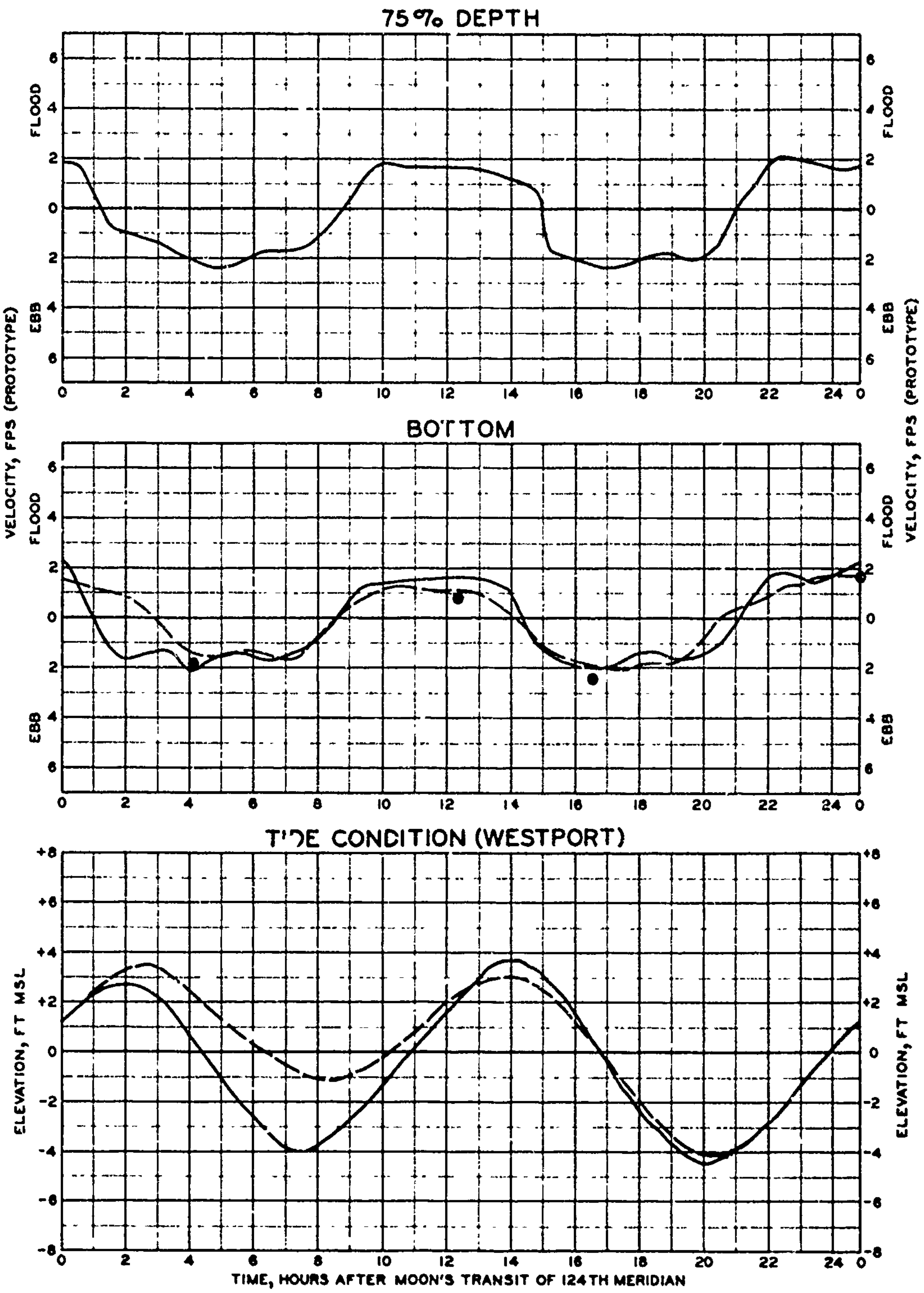
——— PROTOTYPE (16-17 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 9

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE . . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY. . .. 33.0 PPT

LEGEND

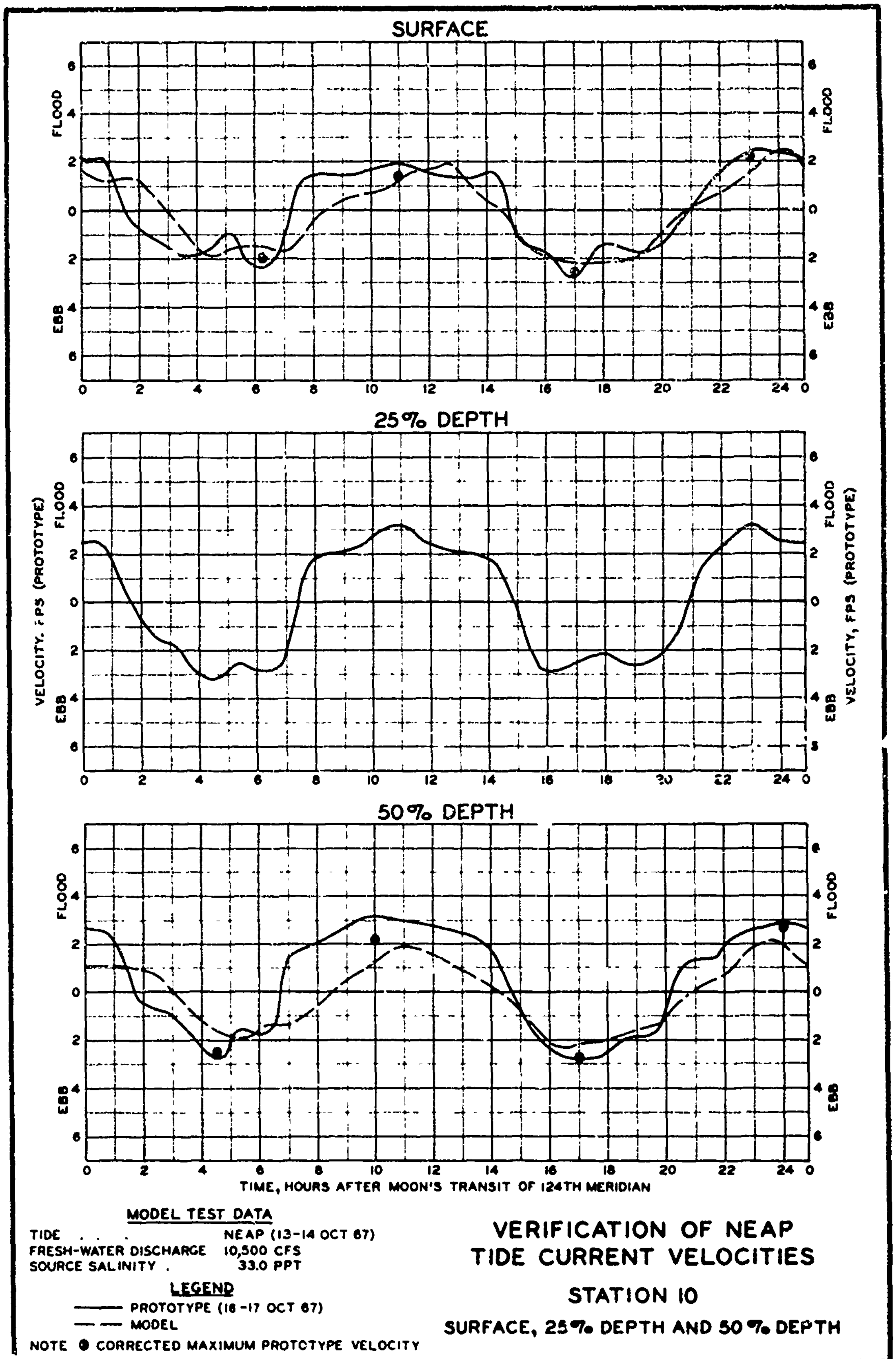
——— PROTOTYPE (16-17 OCT 67)
— — MODEL

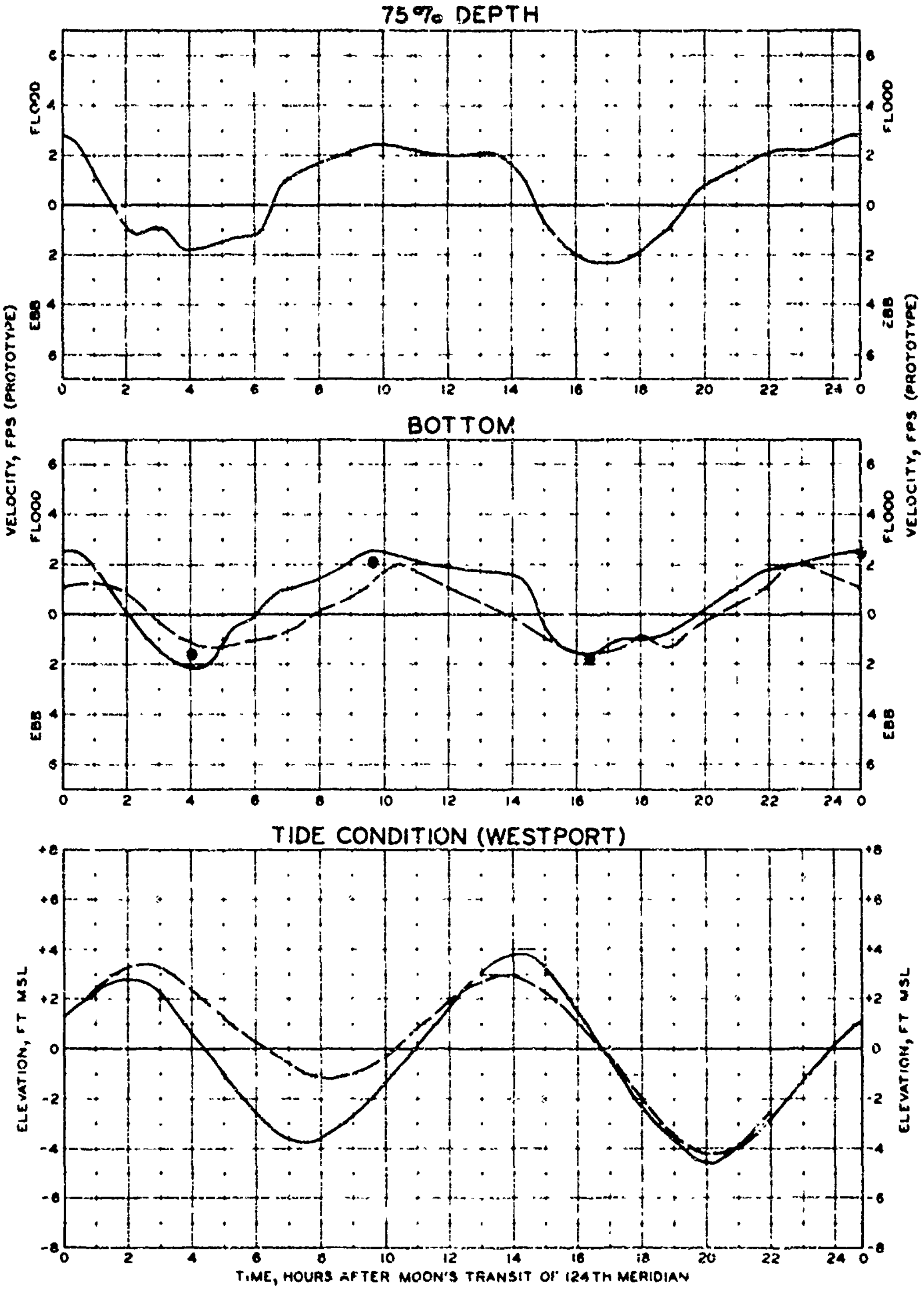
NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 9

75 % DEPTH, BOTTOM & TIDE CONDITION


SURFACE
25% DEPTH
50% DEPTH
FLOOD
EBB
VELOCITY, FPS (PROTOTYPE)
TIME, HOURS AFTER MOON'S TRANSIT OF 124TH MERIDIAN
MODEL TEST DATA
TIDE . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE 10,500 CFS
SOURCE SALINITY . 33.0 PPT
LEGEND
PROTOTYPE (16-17 OCT 67)
MODEL
NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY
VERIFICATION OF NEAP
TIDE CURRENT VELOCITIES
STATION 10
SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE — NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE — 10,500 CFS
SOURCE SALINITY — 33.0 PPT

LEGEND

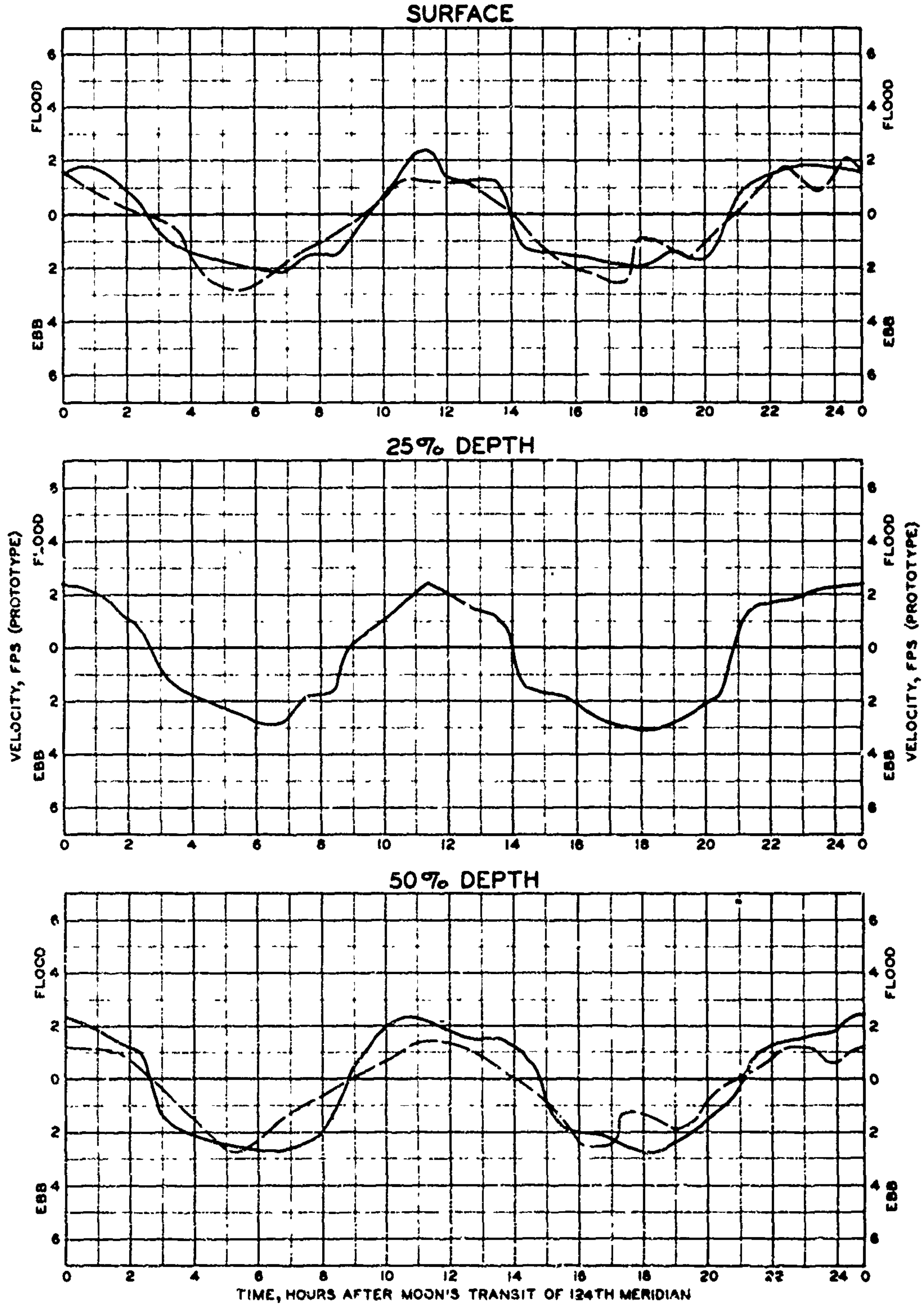
—— PROTOTYPE (16-17 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 10

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE . . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE 10,500 CFS
SOURCE SALINITY . 33.0 PPT

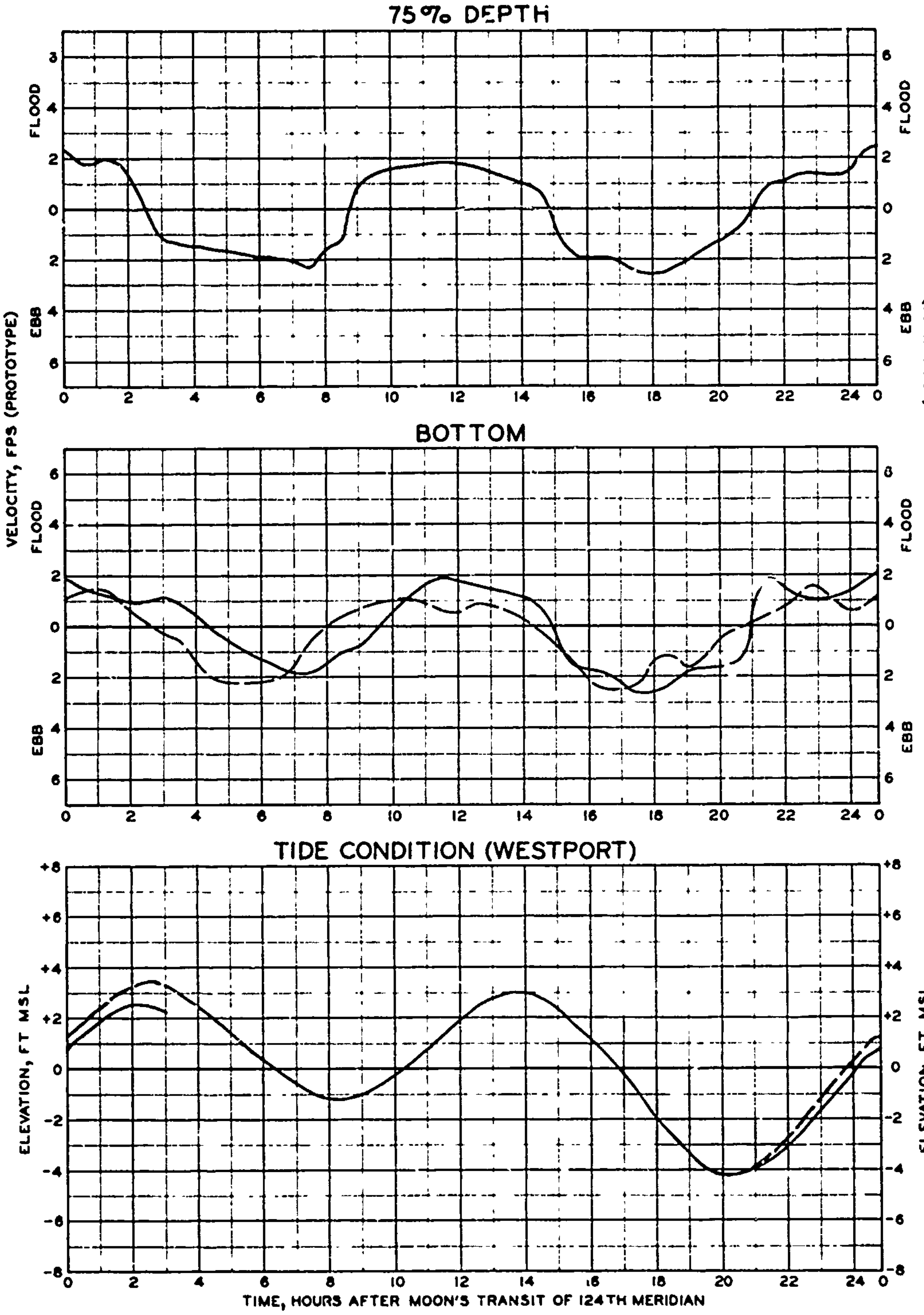
LEGEND

——— PROTOTYPE (13-14 OCT 67)
— — MODEL

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 11

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . 33.0 PPT

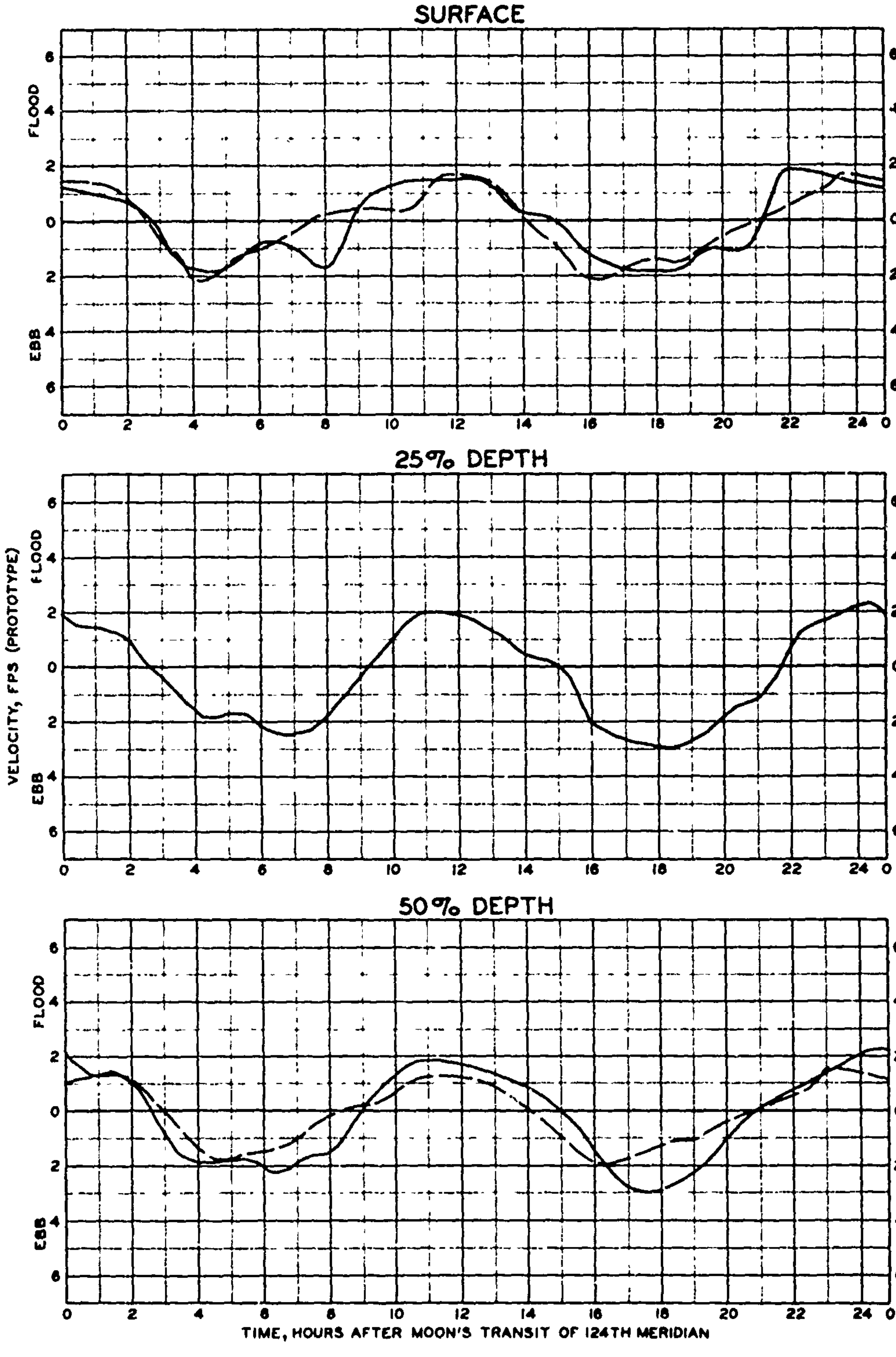
LEGEND

—— PROTOTYPE (13-14 OCT 67)
— — MODEL

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 11

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE — NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE — 10,500 CFS
SOURCE SALINITY — 33.0 PPT

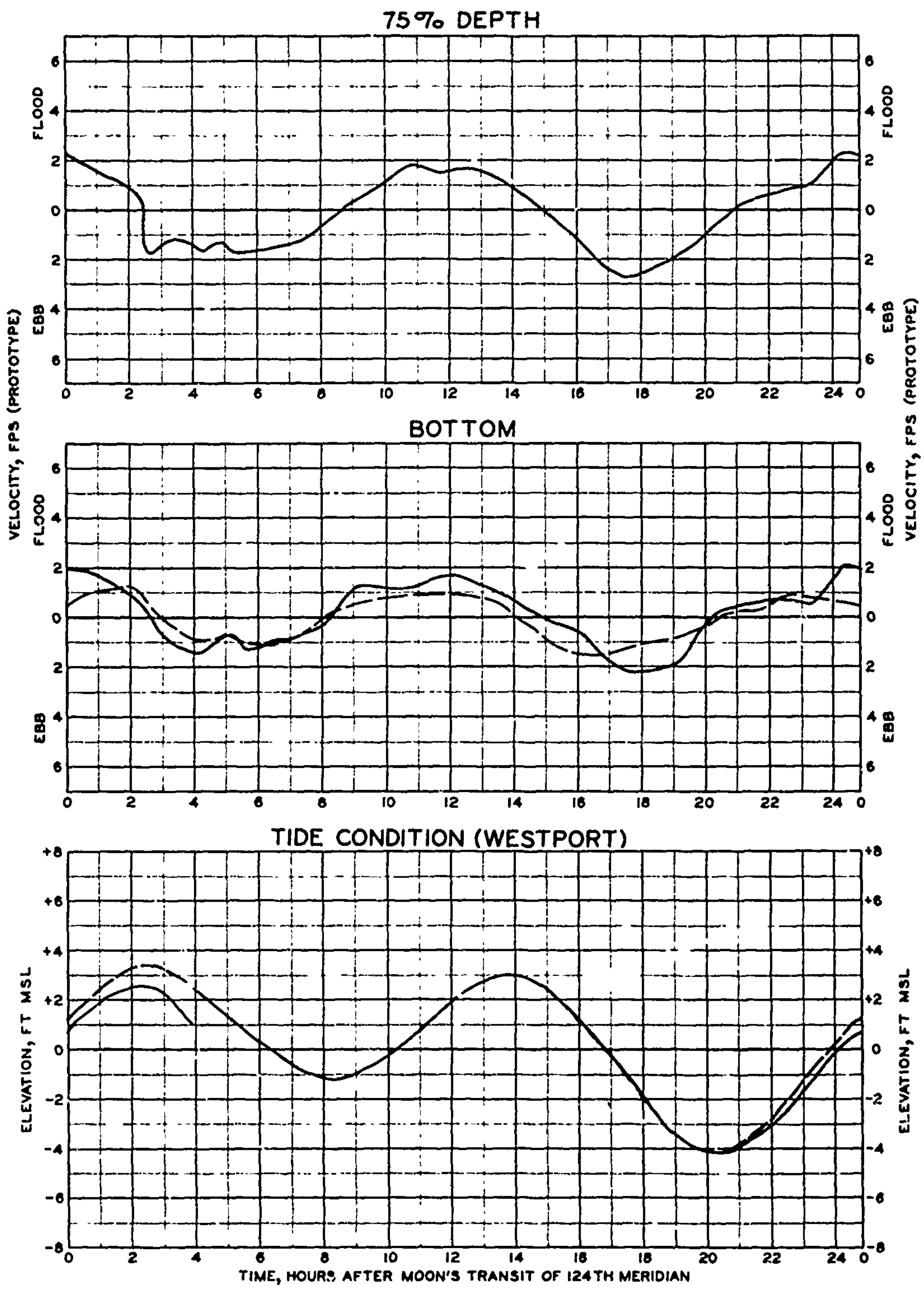
LEGEND

——— PROTOTYPE (13-14 OCT 67)
— — MODEL

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 12

SURFACE, 25% DEPTH AND 30% DEPTH



MODEL TEST DATA

TIDE . . .. NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . 33.0 PPT

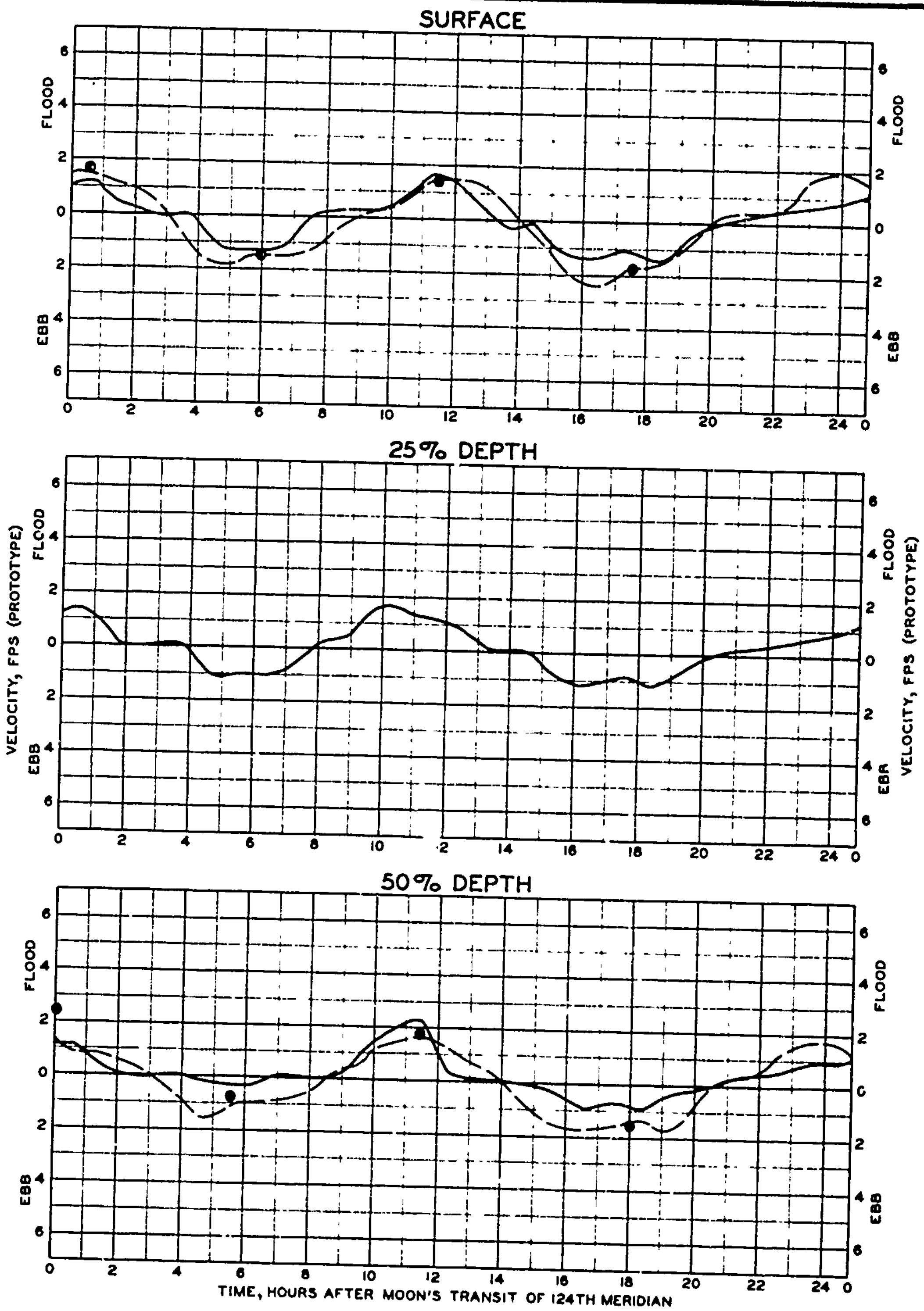
LEGEND

——— PROTOTYPE (13-14 OCT 67)
— — MODEL

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 12

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE . . .. NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE 10,500 CFS
SOURCE SALINITY. . . . 33.0 PPT

LEGEND

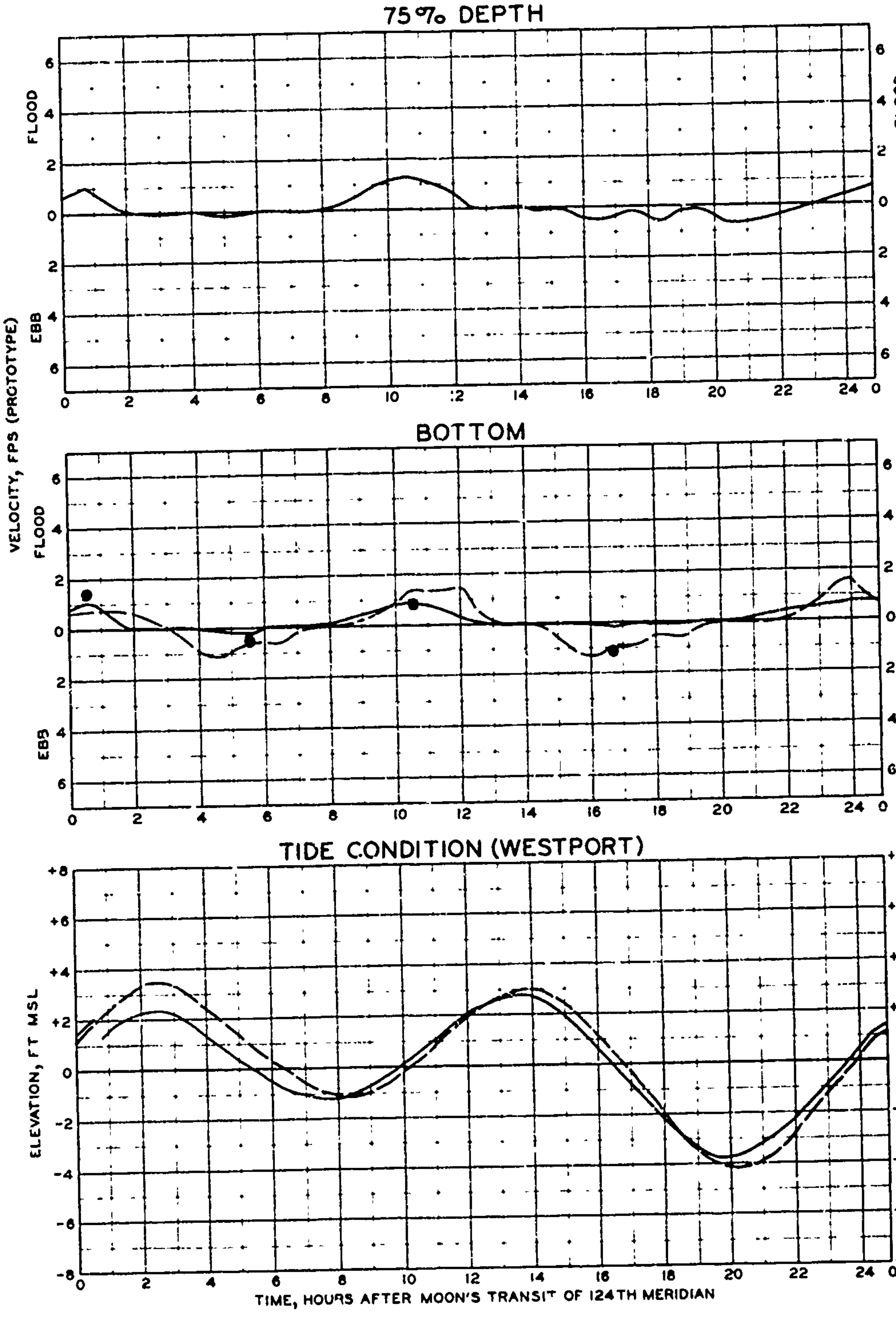
——— PROTOTYPE (12-13 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 13

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE 10,500 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

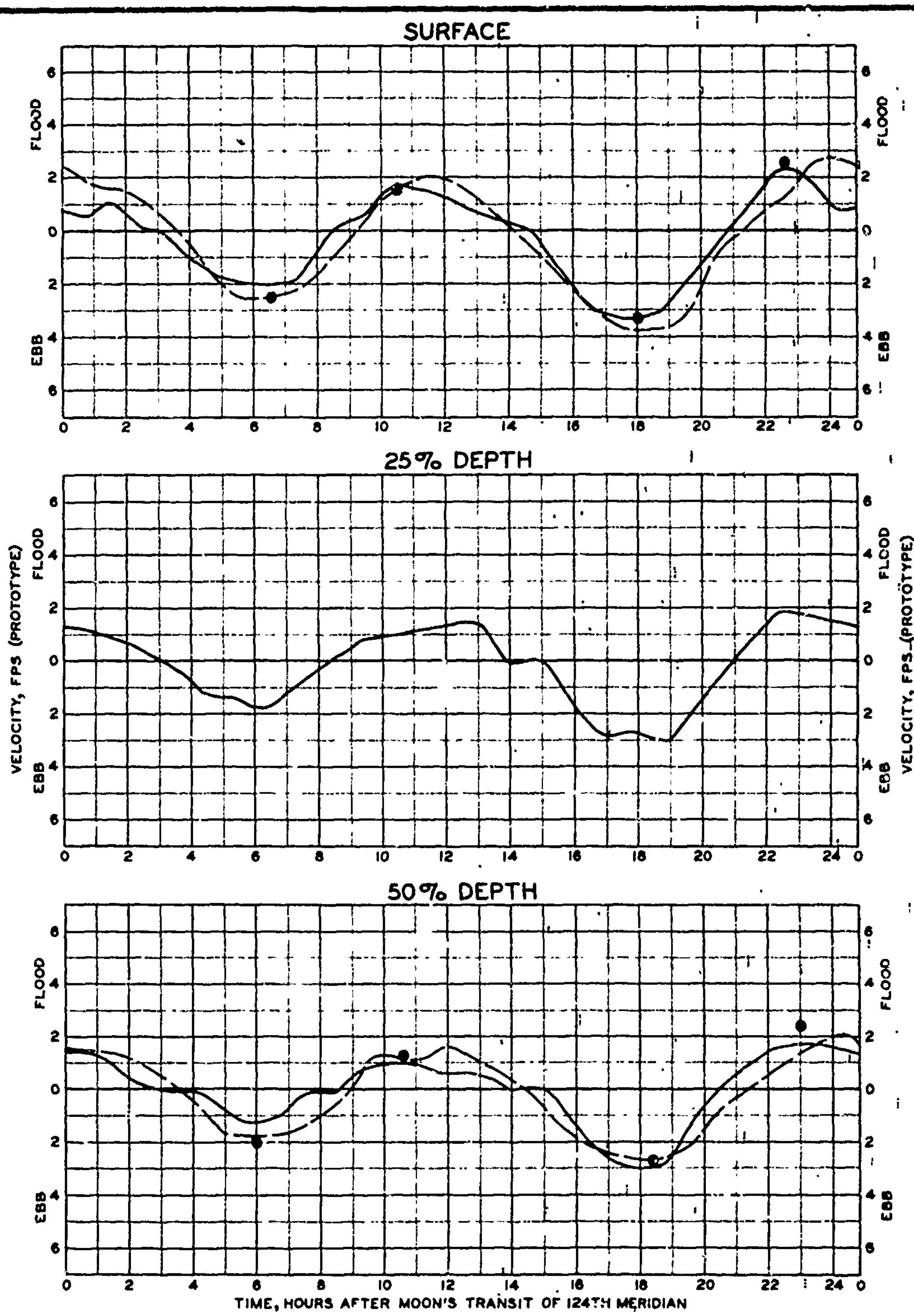
——— PROTOTYPE (12-13 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 13

75% DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE	NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE	10,500 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

—— PROTOTYPE (12-13 OCT 67)

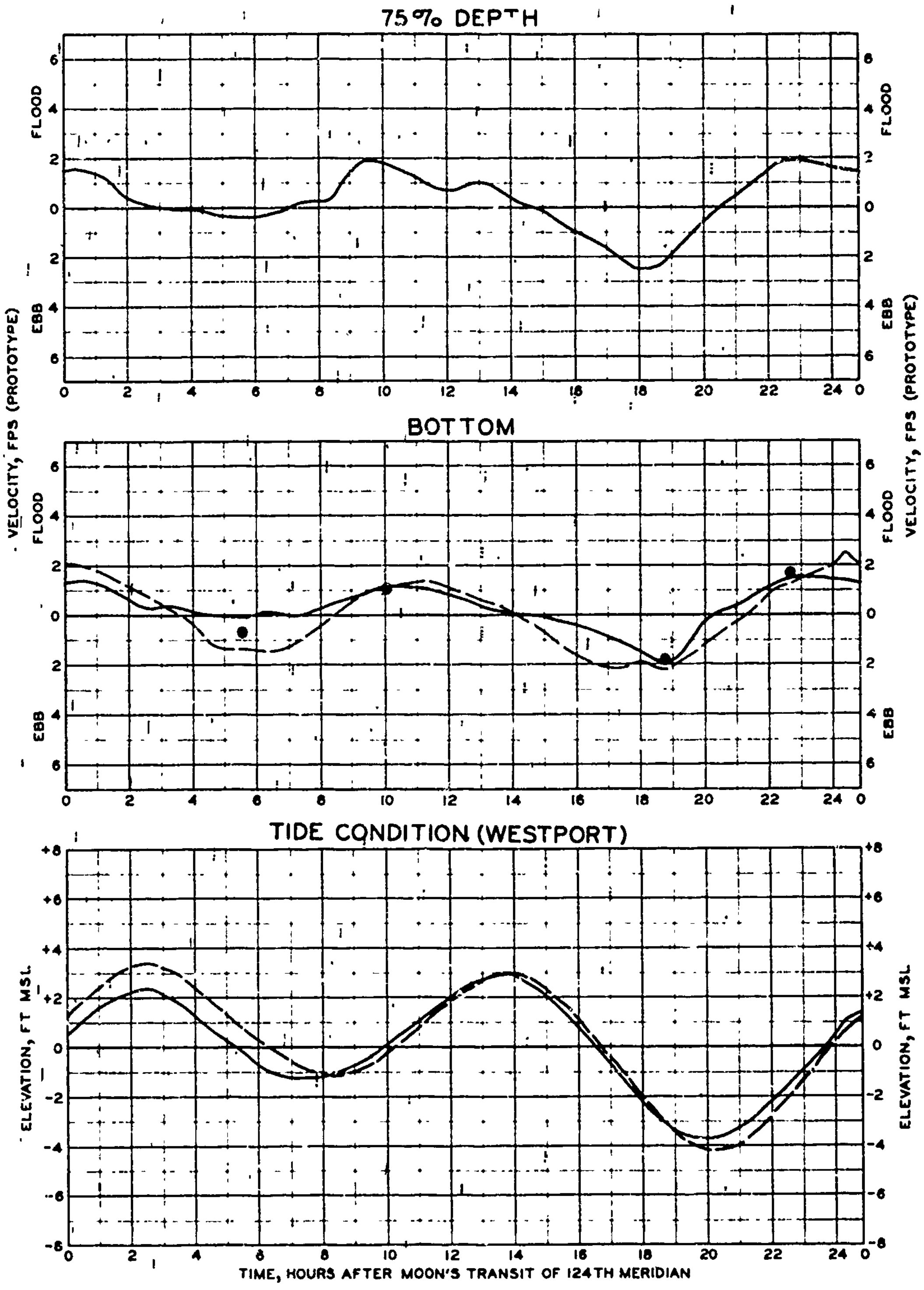
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 14

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

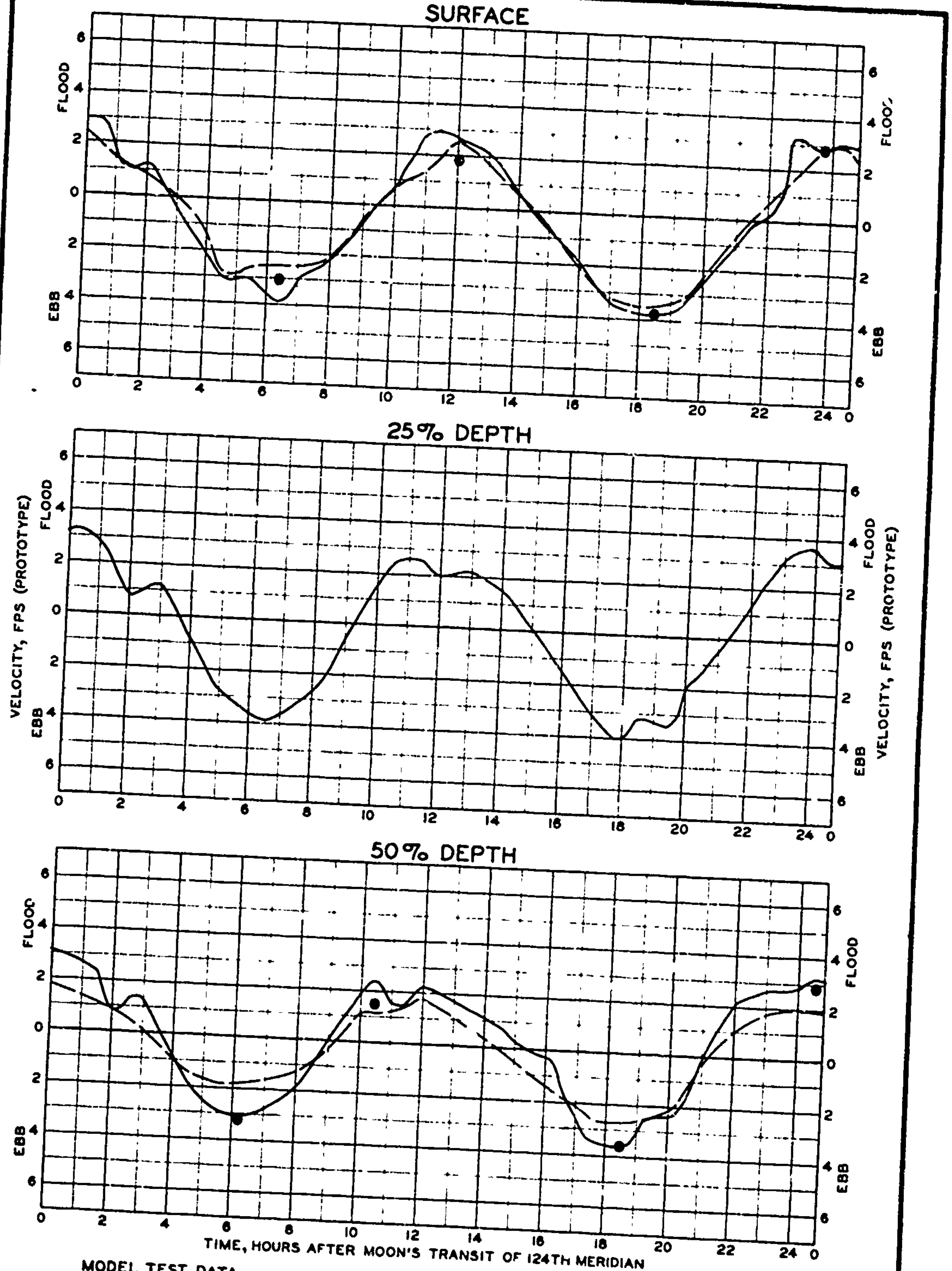
——— PROTOTYPE (12-13 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 14

75% DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE . . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE 10,500 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

——— PROTOTYPE (14-15 OCT 67)
— — MODEL

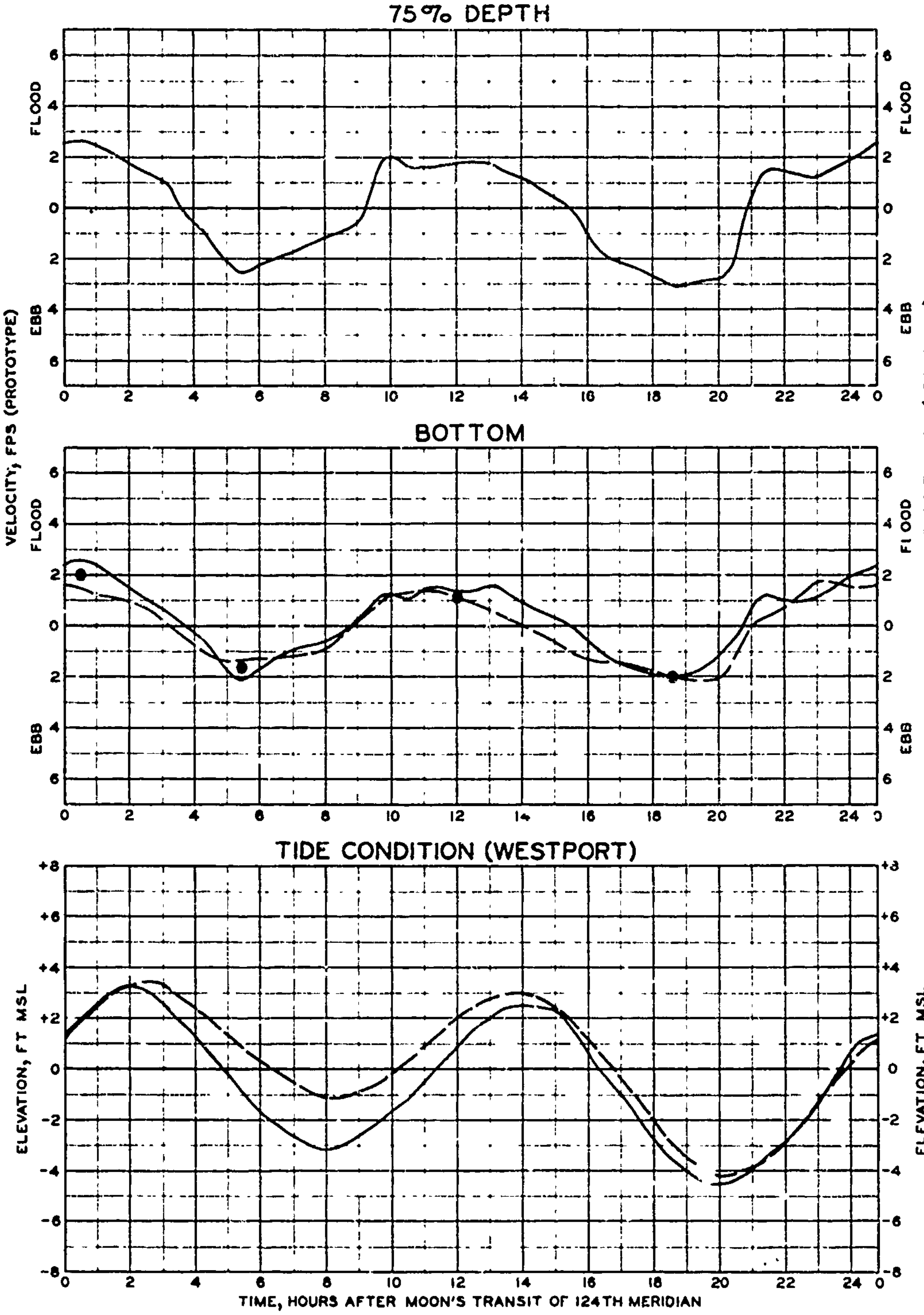
NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 15

SURFACE, 25% DEPTH AND 50% DEPTH

PLATE 66



MODEL TEST DATA

TIDE . . . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . . . .. 33.0 PPT

LEGEND

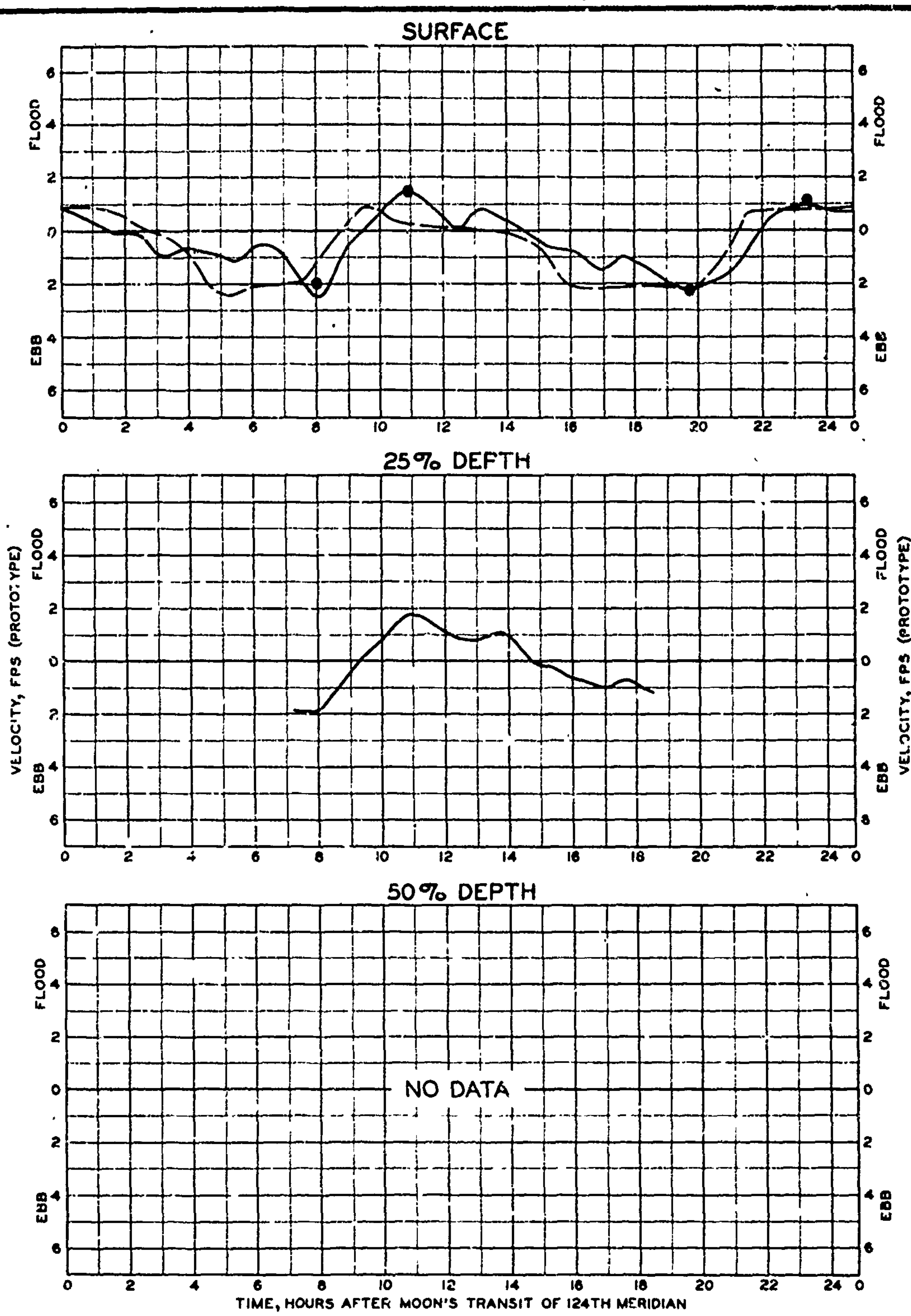
——— PROTOTYPE (14-15 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 15

75 % DEPTH, BOTTOM & TIDE CONDITION



MODEL TEST DATA

TIDE . . . . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE 10,500 CFS
SOURCE SALINITY. . . . 33.0 PPT

LEGEND

——— PROTOTYPE (15-16 OCT 67)
— — MODEL

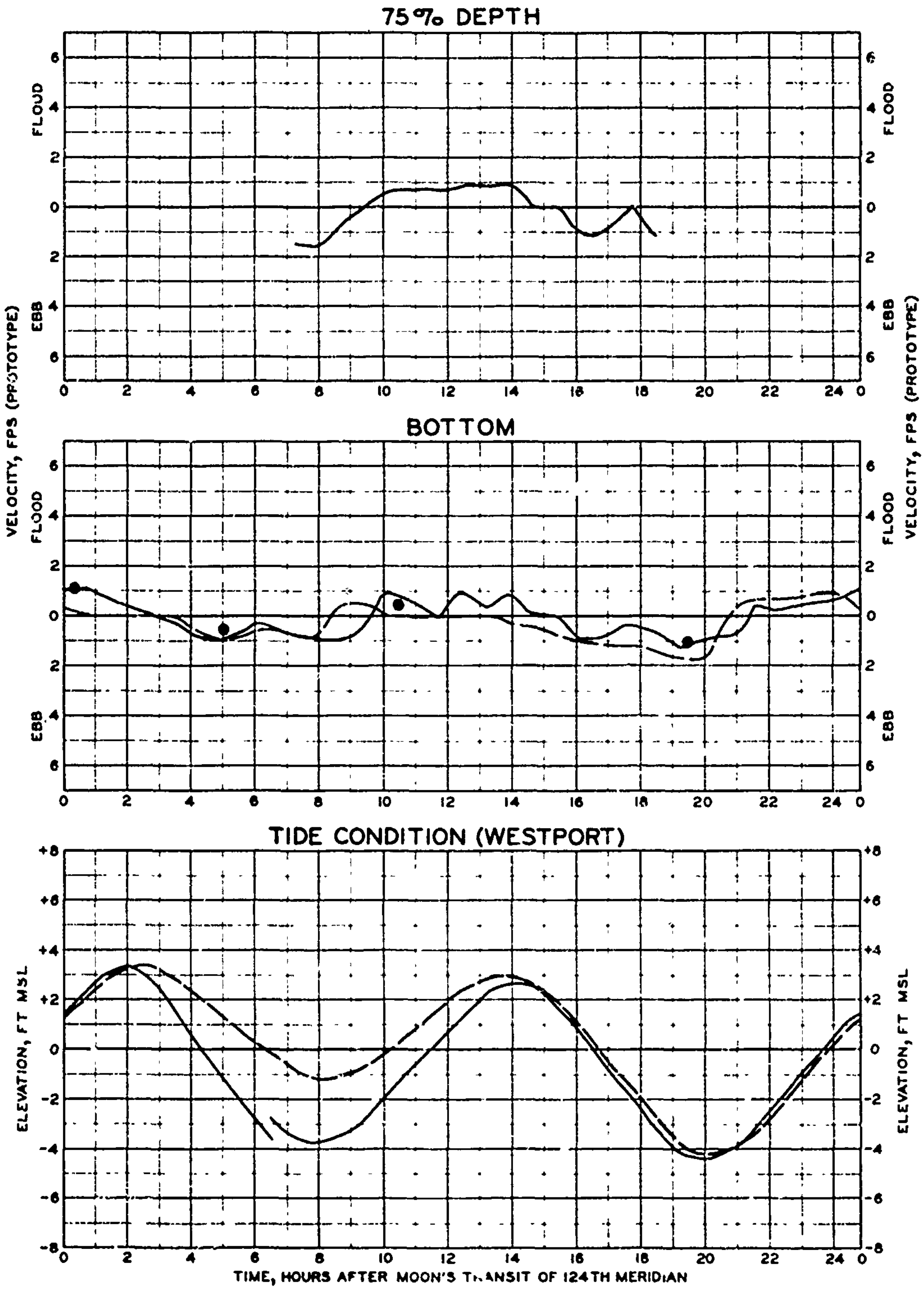
NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 16

SURFACE, 25% DEPTH AND 50% DEPTH

PLATE 68



MODEL TEST DATA

TIDE . . ... . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

——— PROTOTYPE (15-16 OCT 67)
— — MODEL

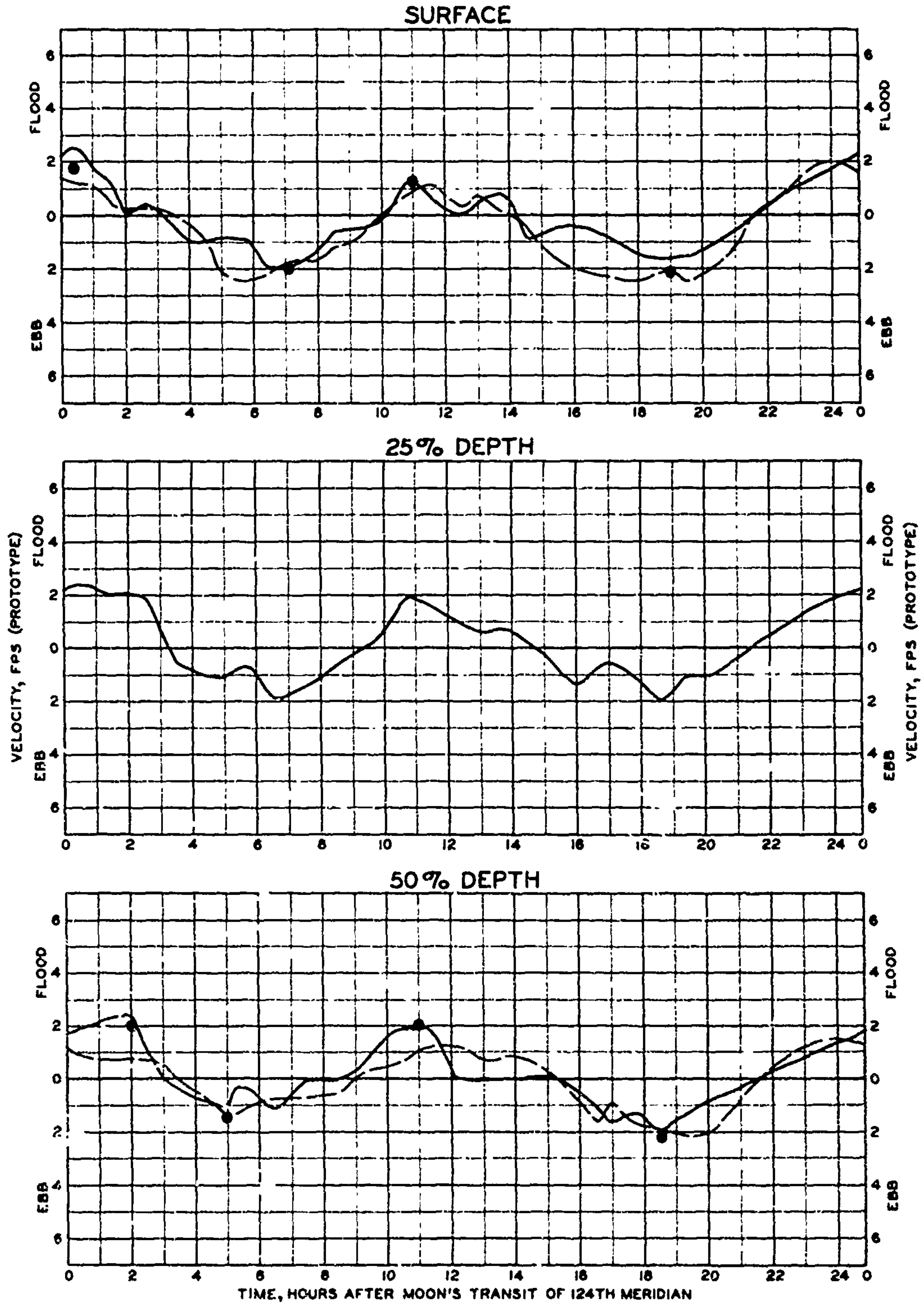
NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 16

75% DEPTH, BOTTOM & TIDE CONDITION

PLATE 69



MODEL TEST DATA

TIDE . ... NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

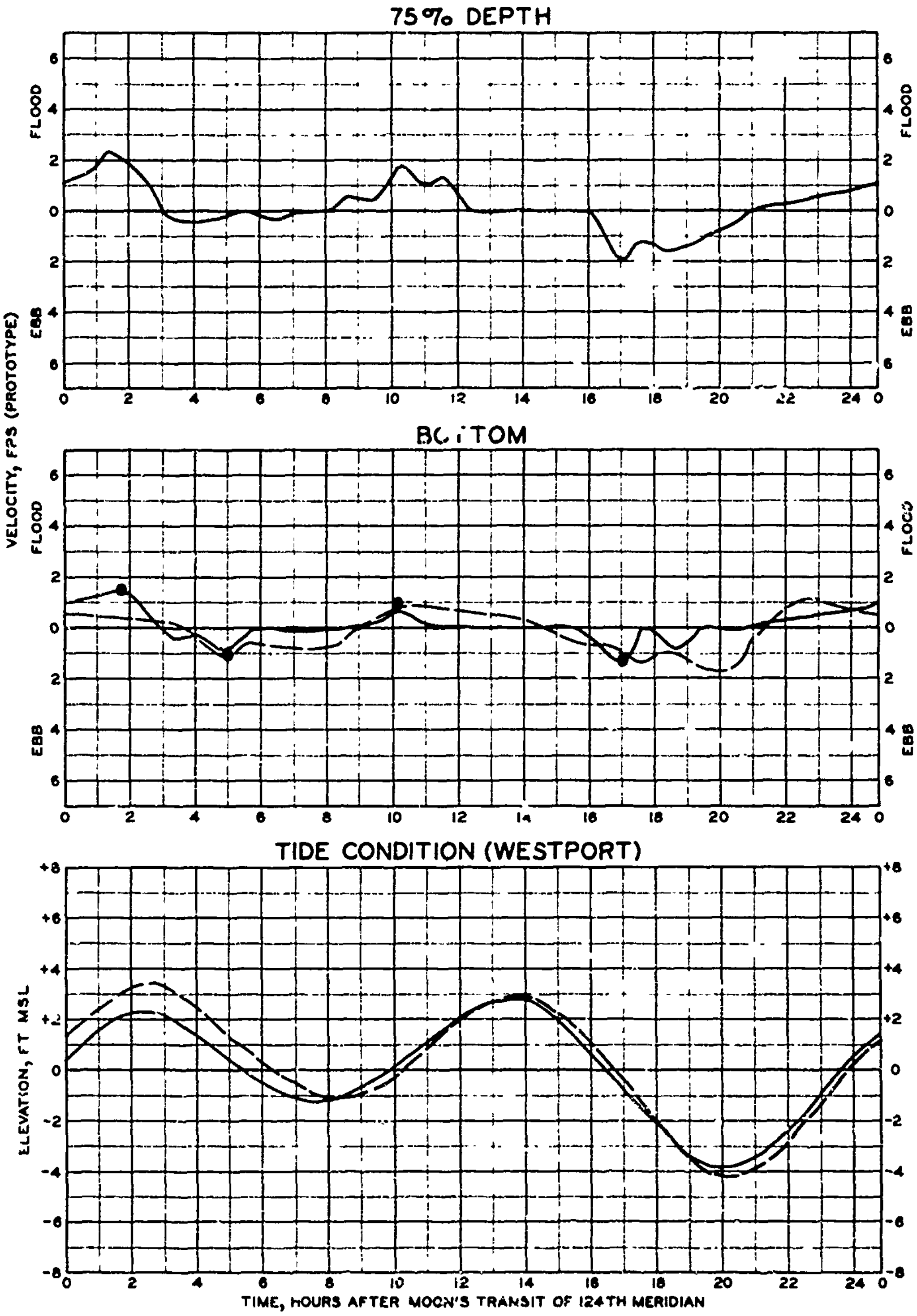
——— PROTOTYPE (12-13 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 17

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE . . . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . . . 33.0 PPT

LEGEND

——— PROTOTYPE (12-13 OCT 67)
— — MODEL

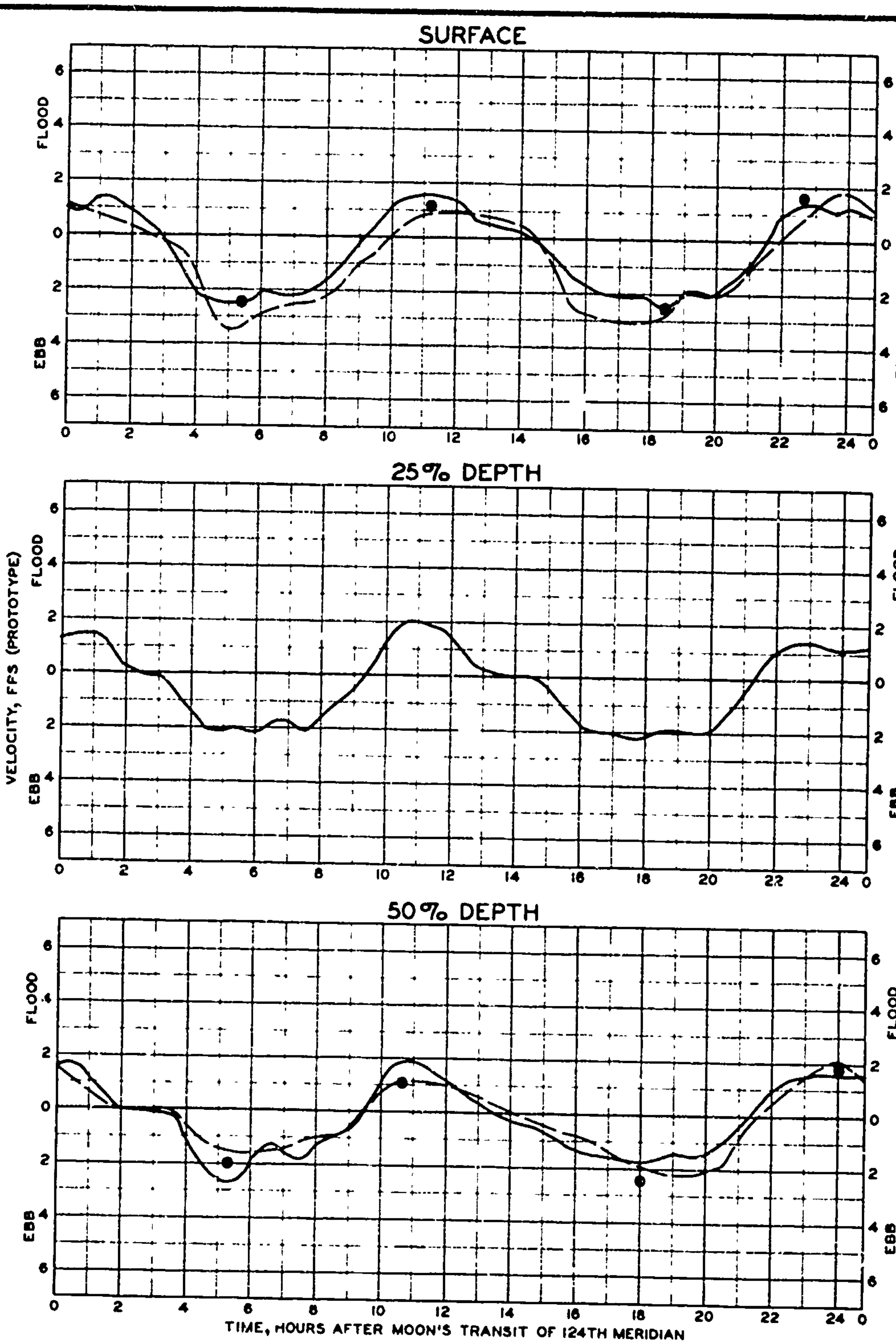
NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 17

75 % DEPTH, BOTTOM & TIDE CONDITION

PLATE 71



MODEL TEST DATA

TIDE . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

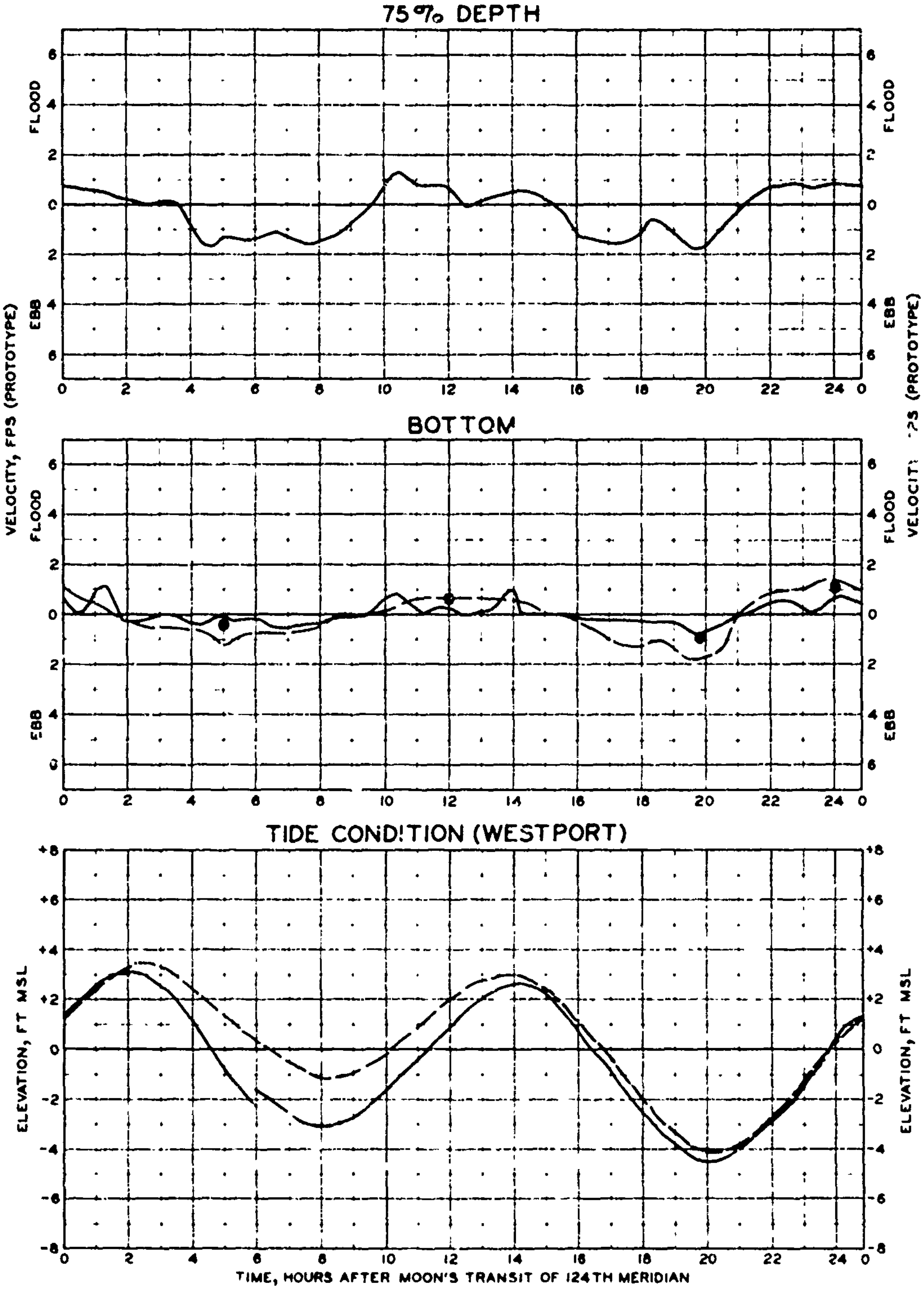
——— PROTOTYPE (14-15 OCT 67)
— — MODEL

NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 18

SURFACE, 25% DEPTH AND 50% DEPTH



MODEL TEST DATA

TIDE	NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE	10,500 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— PROTOTYPE (14-15 OCT 67)

— — — MODEL

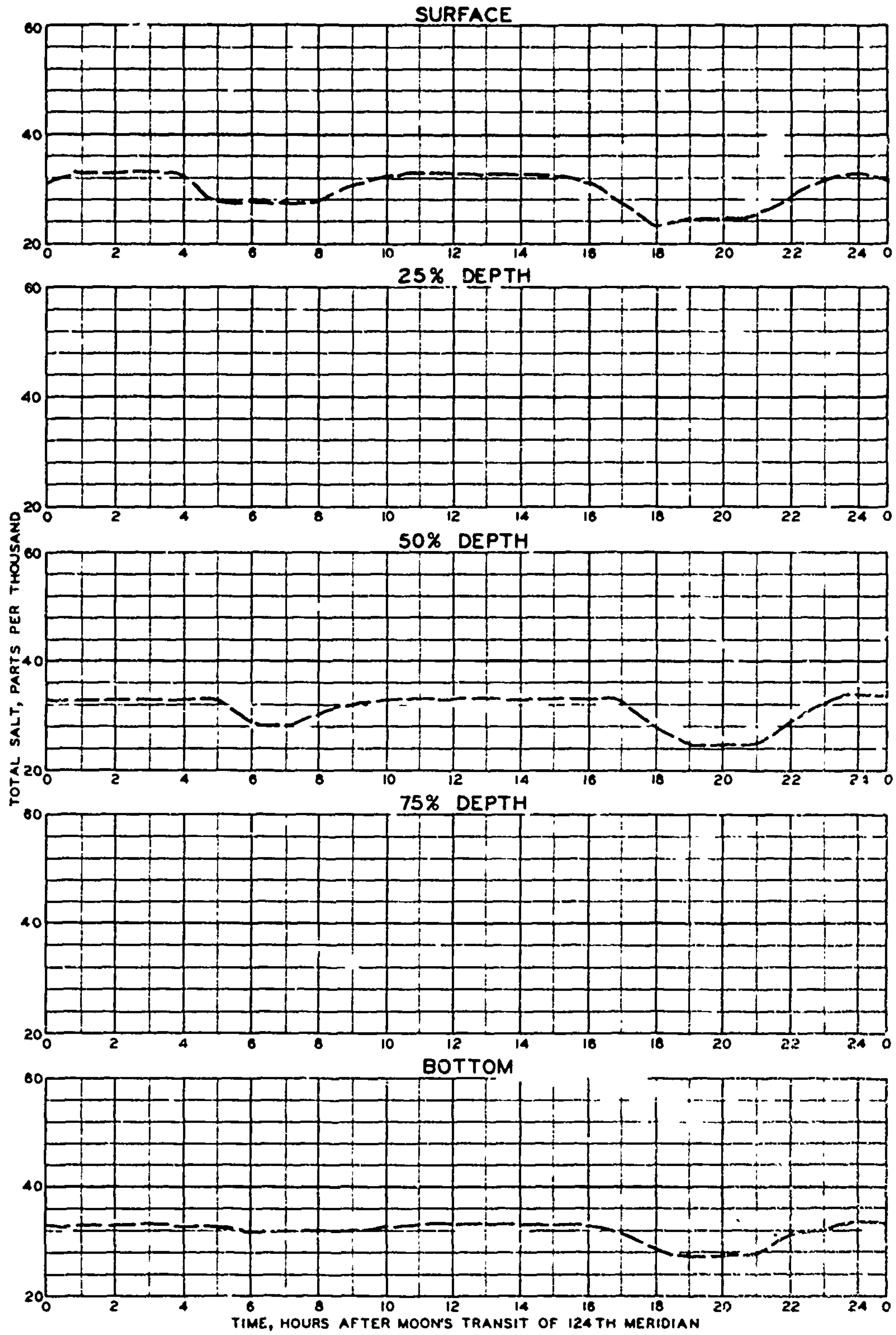
NOTE ● CORRECTED MAXIMUM PROTOTYPE VELOCITY

VERIFICATION OF NEAP TIDE CURRENT VELOCITIES

STATION 18

75 % DEPTH, BOTTOM & TIDE CONDITION

PLATE 73



MODEL TEST DATA

TIDE SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY 33.0 PPT

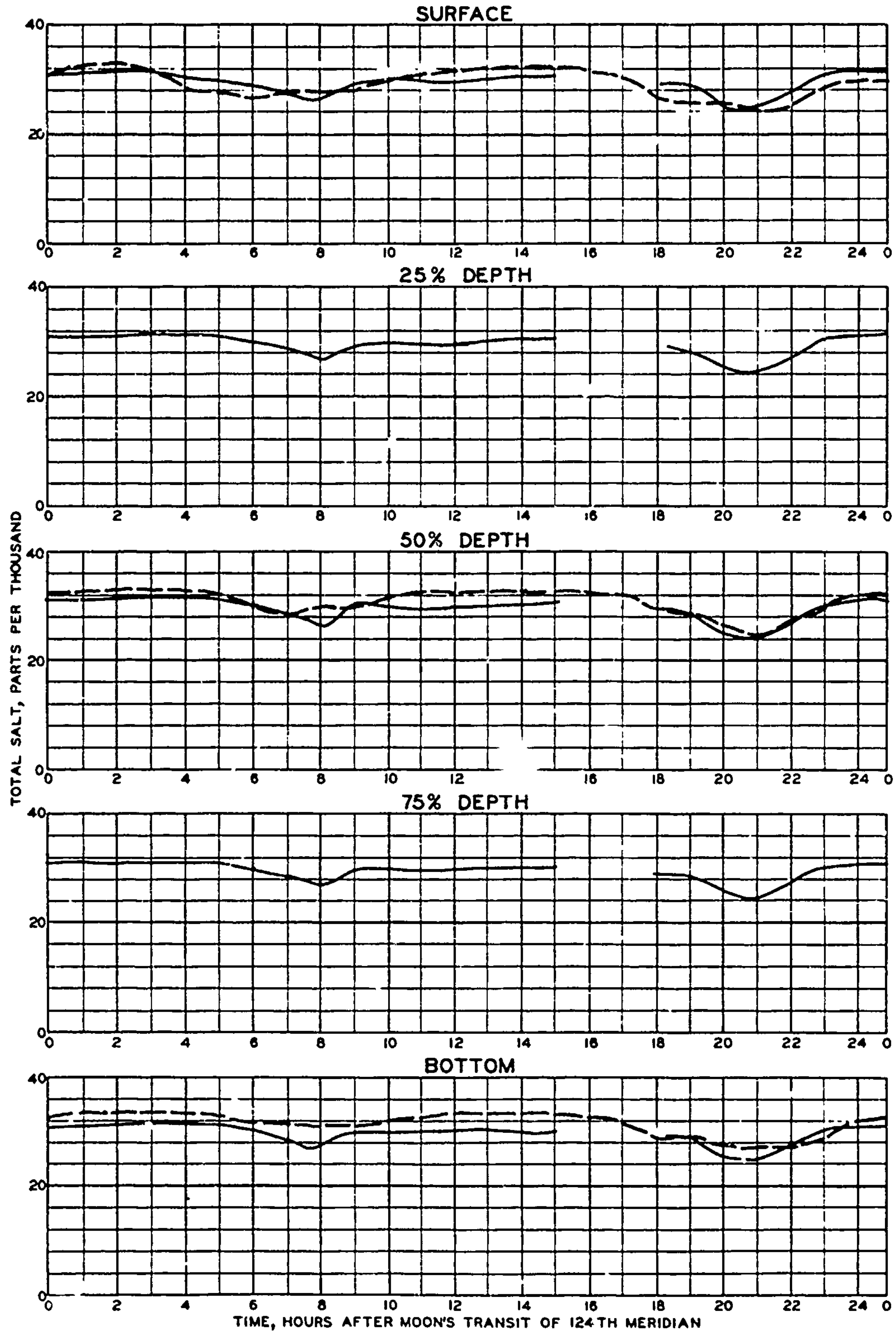
LEGEND

— — MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 1

PLATE 74



MODEL TEST DATA

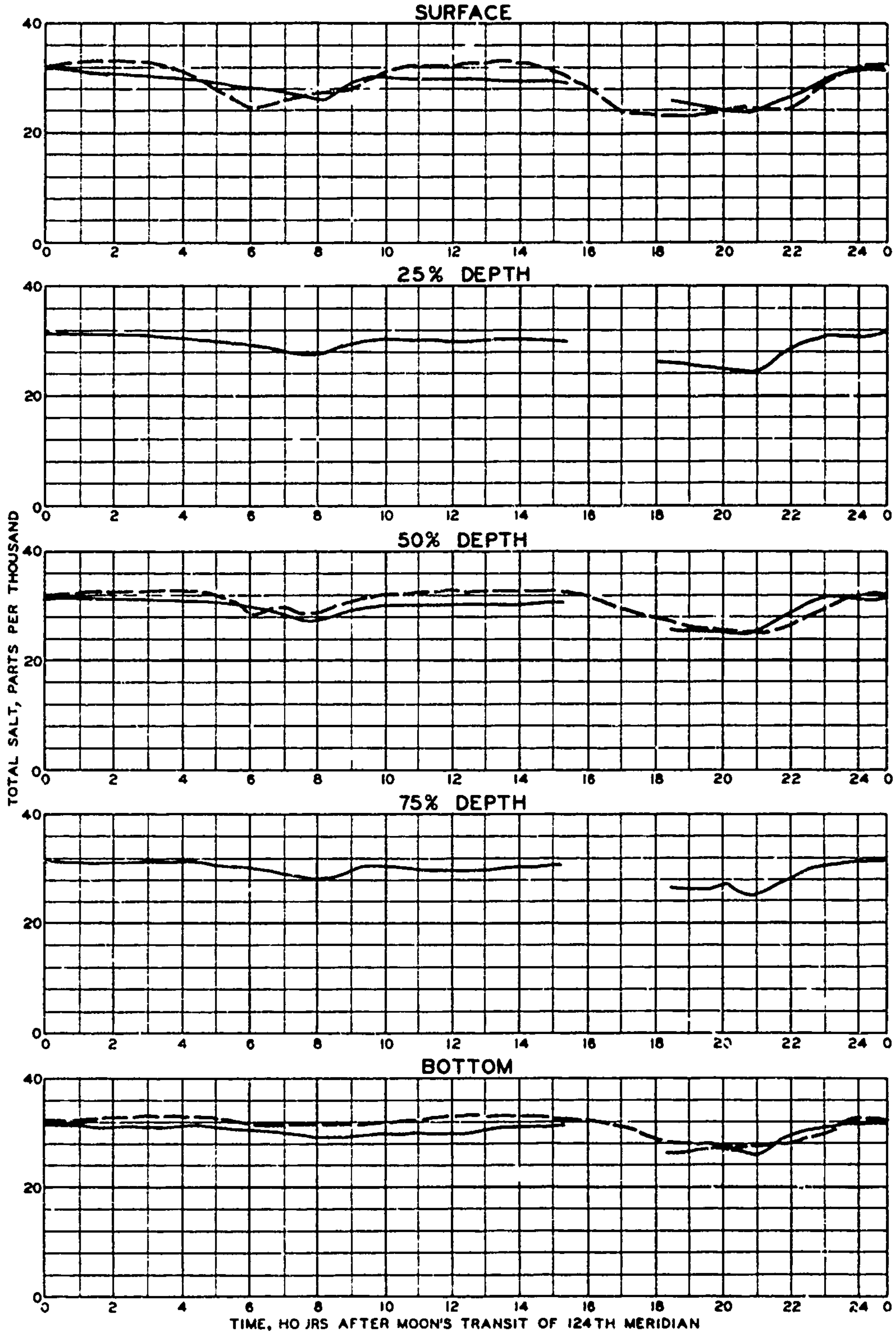
TIDE . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . . 33.0 PPT

LEGEND

——— PROTOTYPE (7-8 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 4



MODEL TEST DATA

TIDE . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY . 33.0 PPT

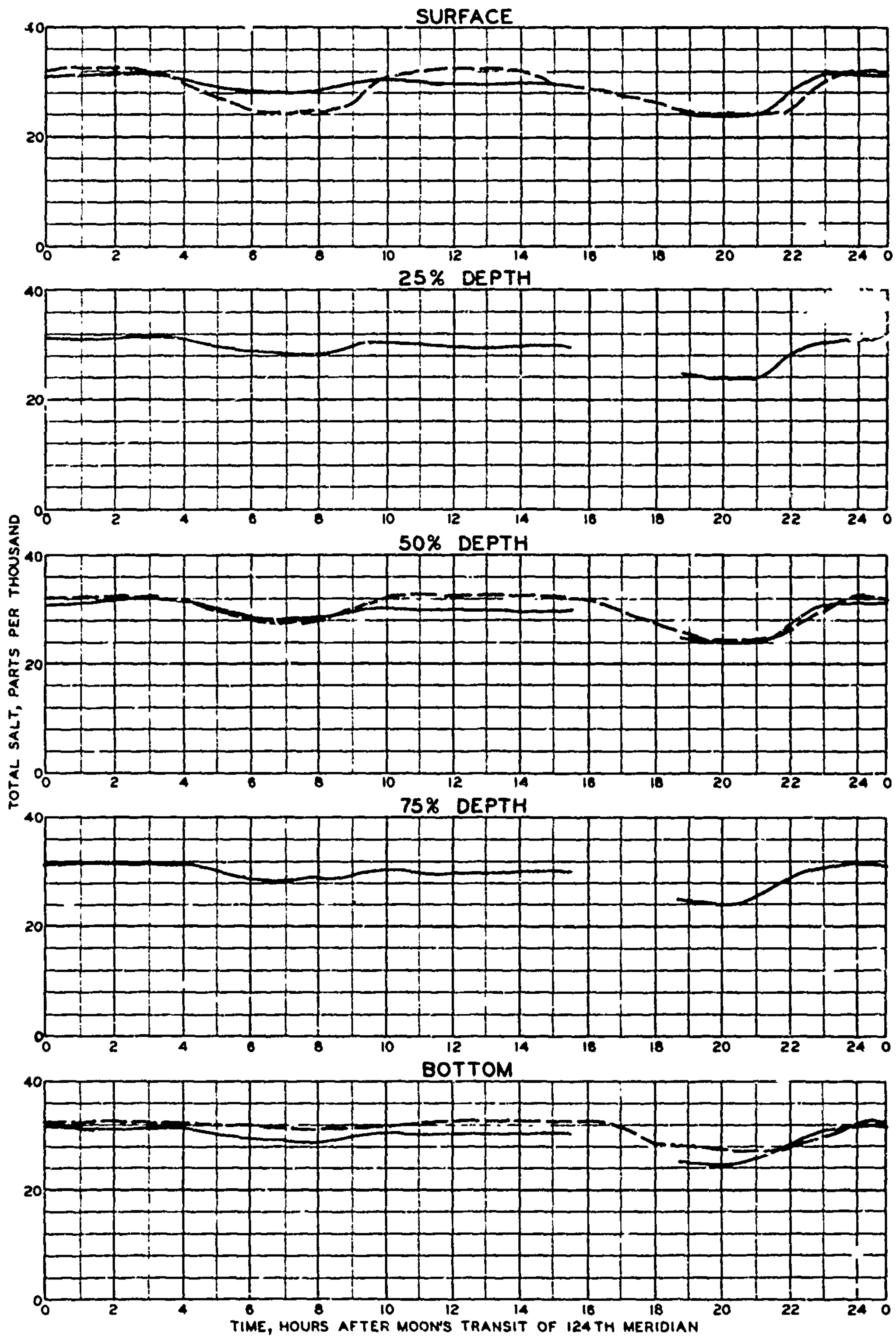
LEGEND

——— PROTOTYPE (7-8 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 5

PLATE 76



MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

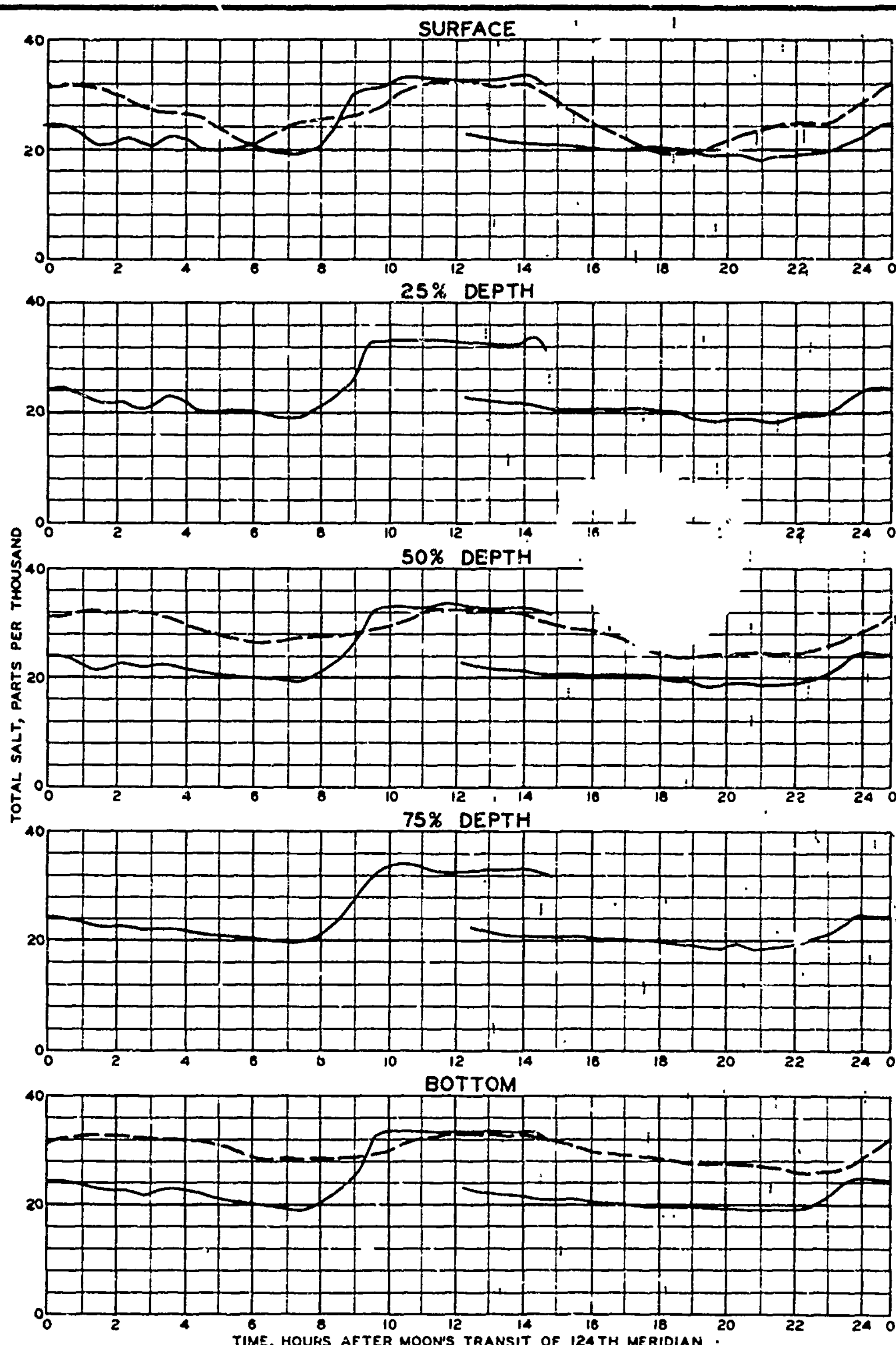
—— PROTOTYPE (7-8 OCT 67)

– – MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 6

PLATE 77



MODEL TEST DATA

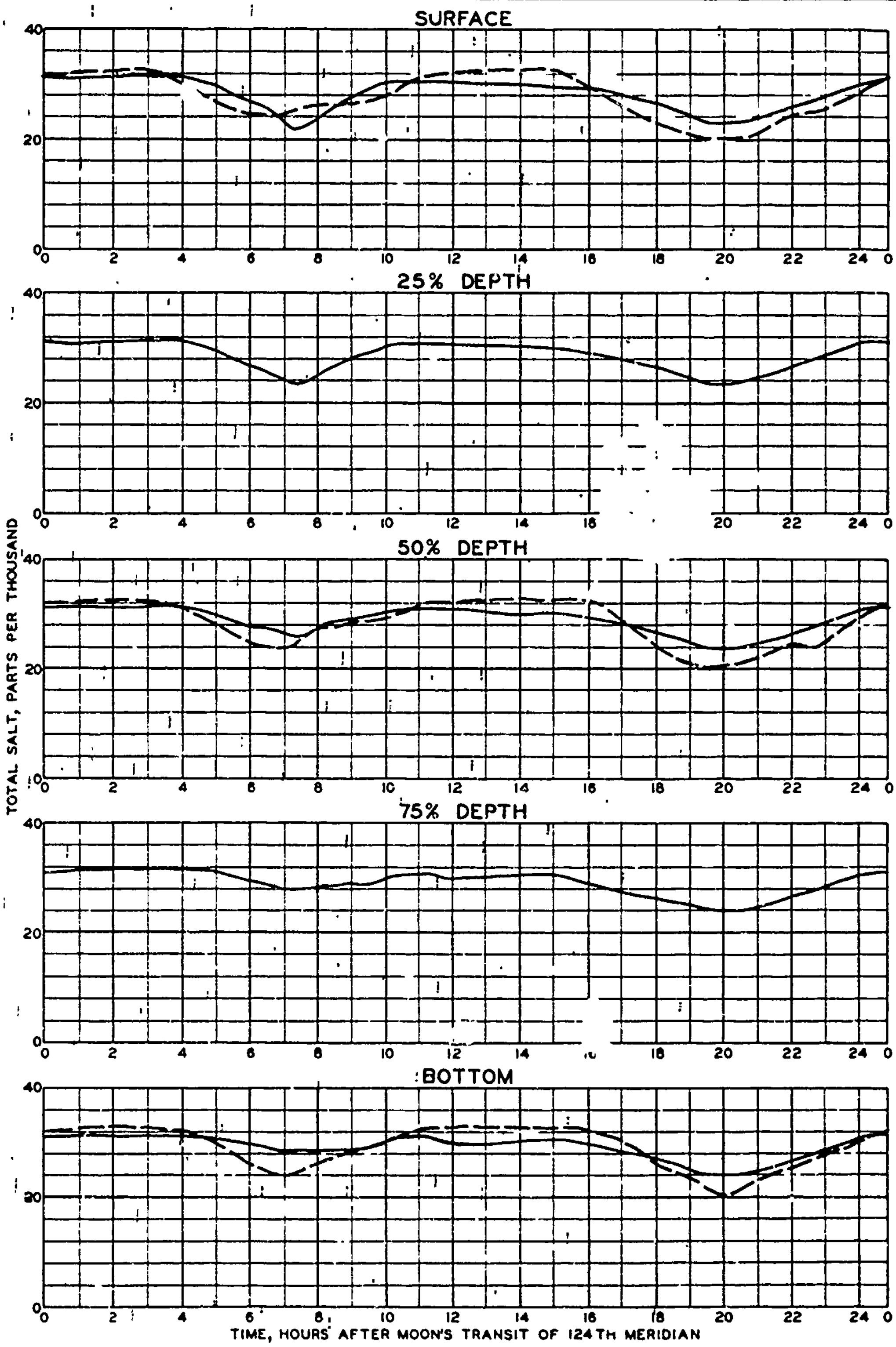
TIDE . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

——— PROTOTYPE (6-7 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 7



MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

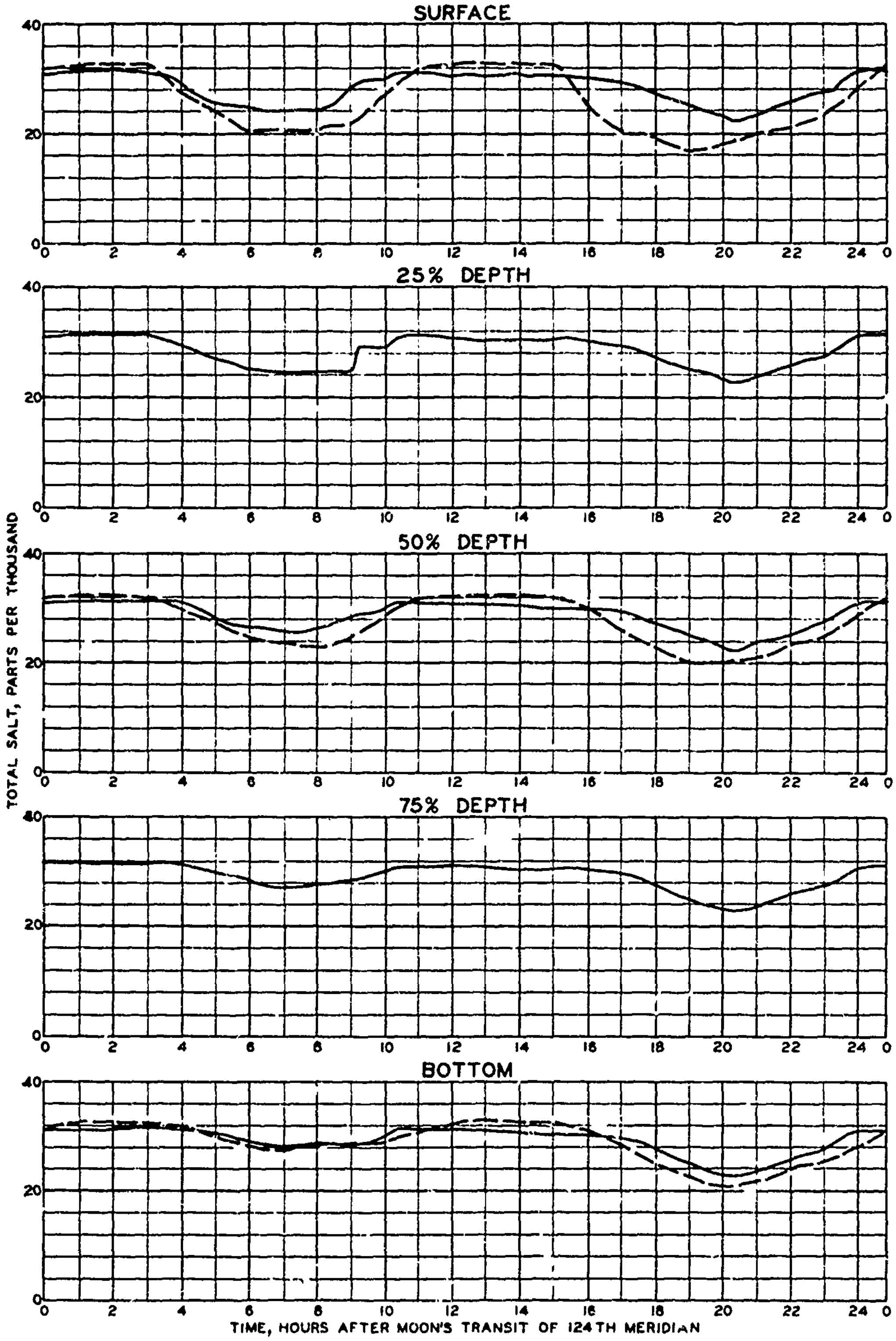
LEGEND

—— PROTOTYPE (6-7 OCT 67)

— — MODEL

VERIFICATION OF
SPRING TIDE SALINITIES

STATION 8



MODEL TEST DATA

TIDE . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . . 33.0 PPT

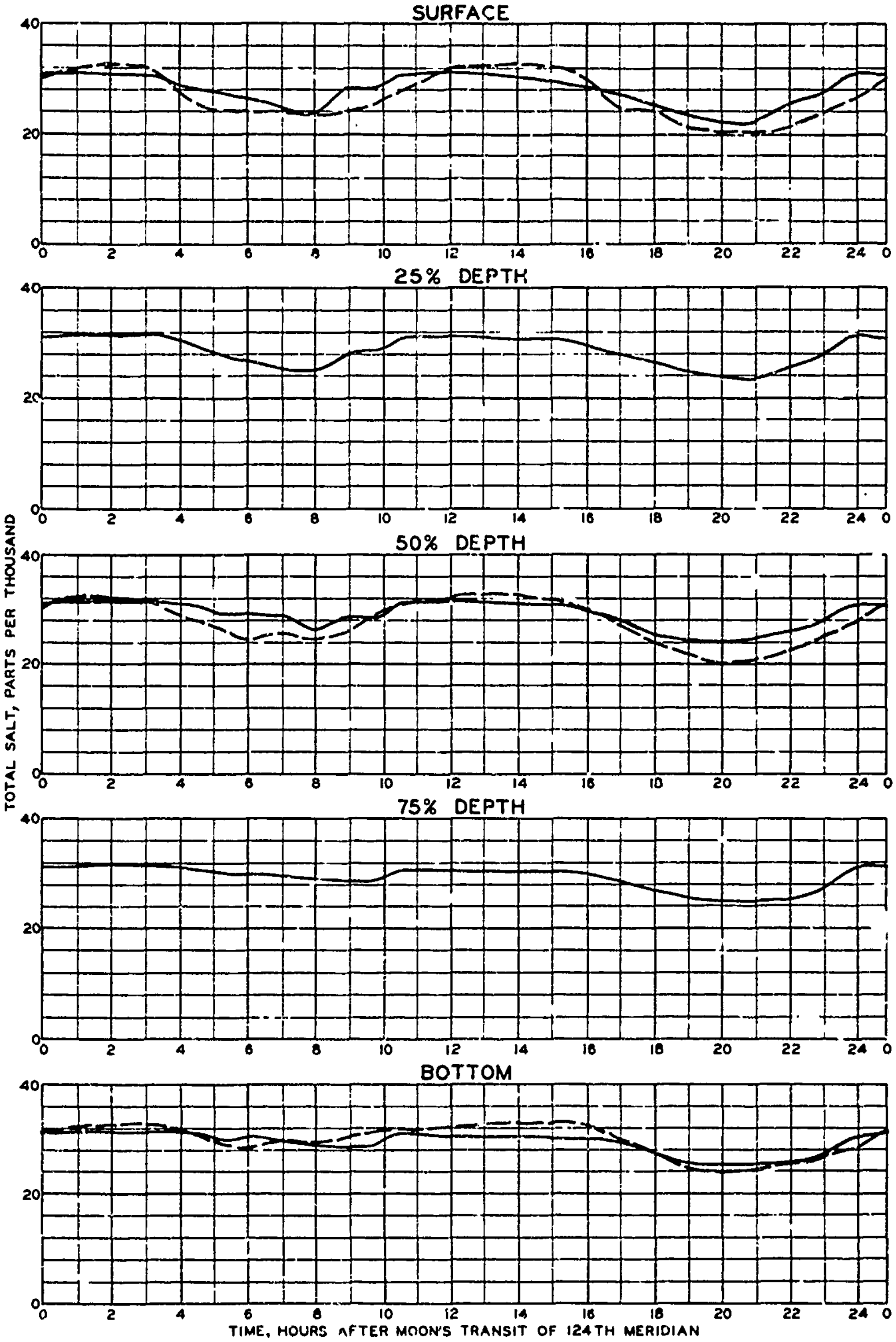
LEGEND

——— PROTOTYPE (6-7 OCT 67)
— — — MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 9

PLATE 80



MODEL TEST DATA

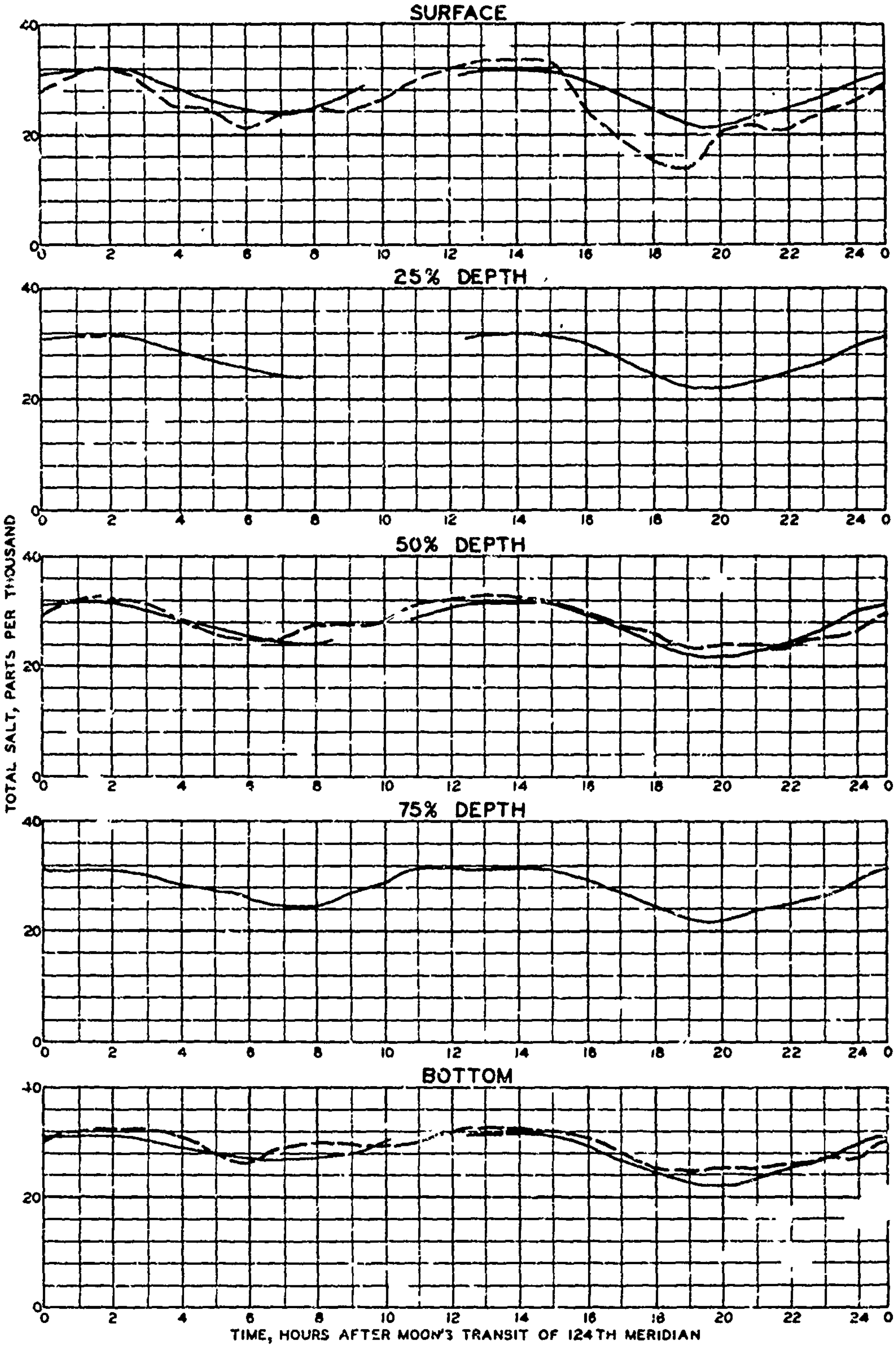
TIDE . . . . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . . 33.0 PPT

LEGEND

——— PROTOTYPE (6-7 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 10



MODEL TEST DATA

TIDE . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY . . 33.0 PPT

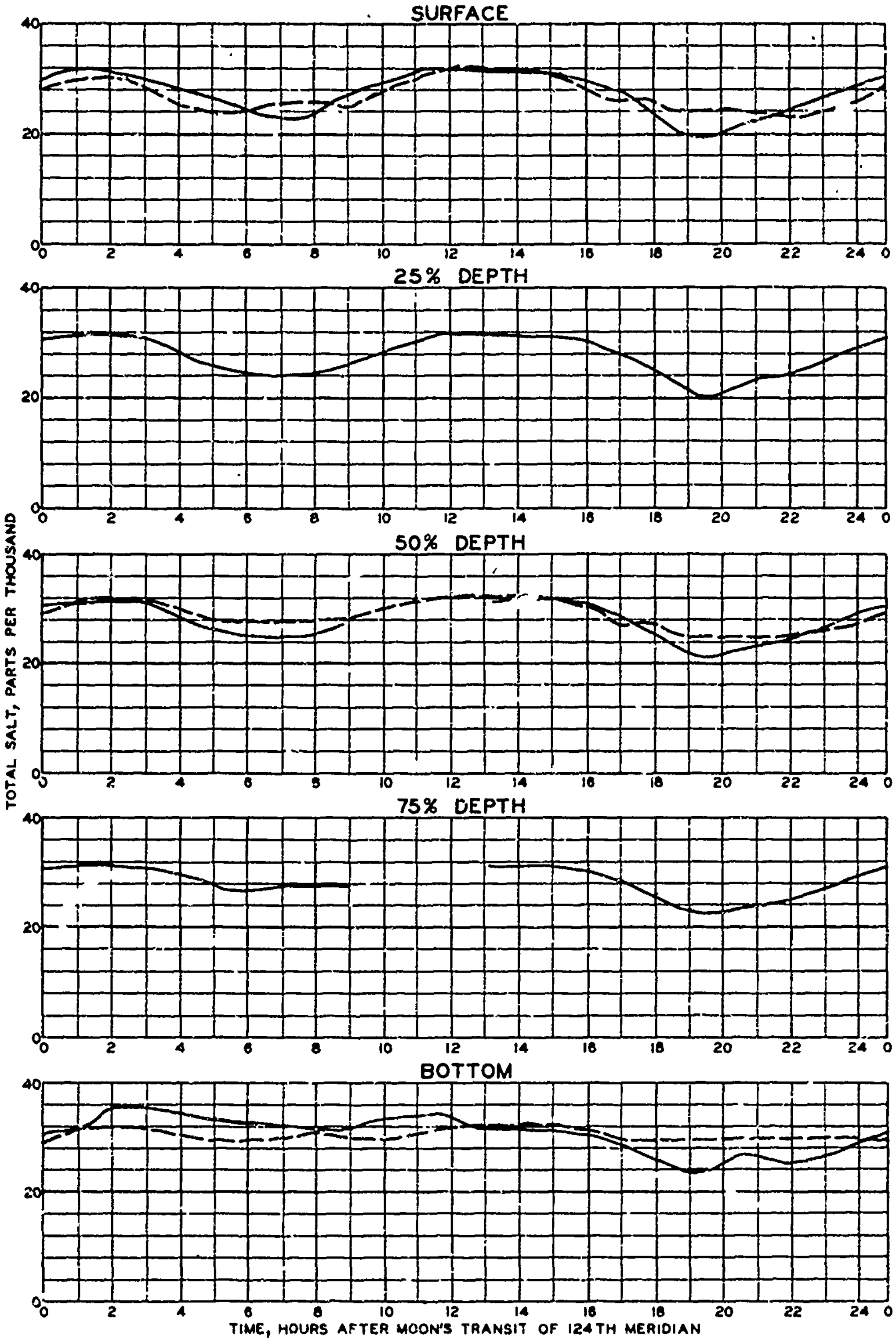
LEGEND

——— PROTOTYPE (6-7 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 11

PLATE 82



MODEL TEST DATA

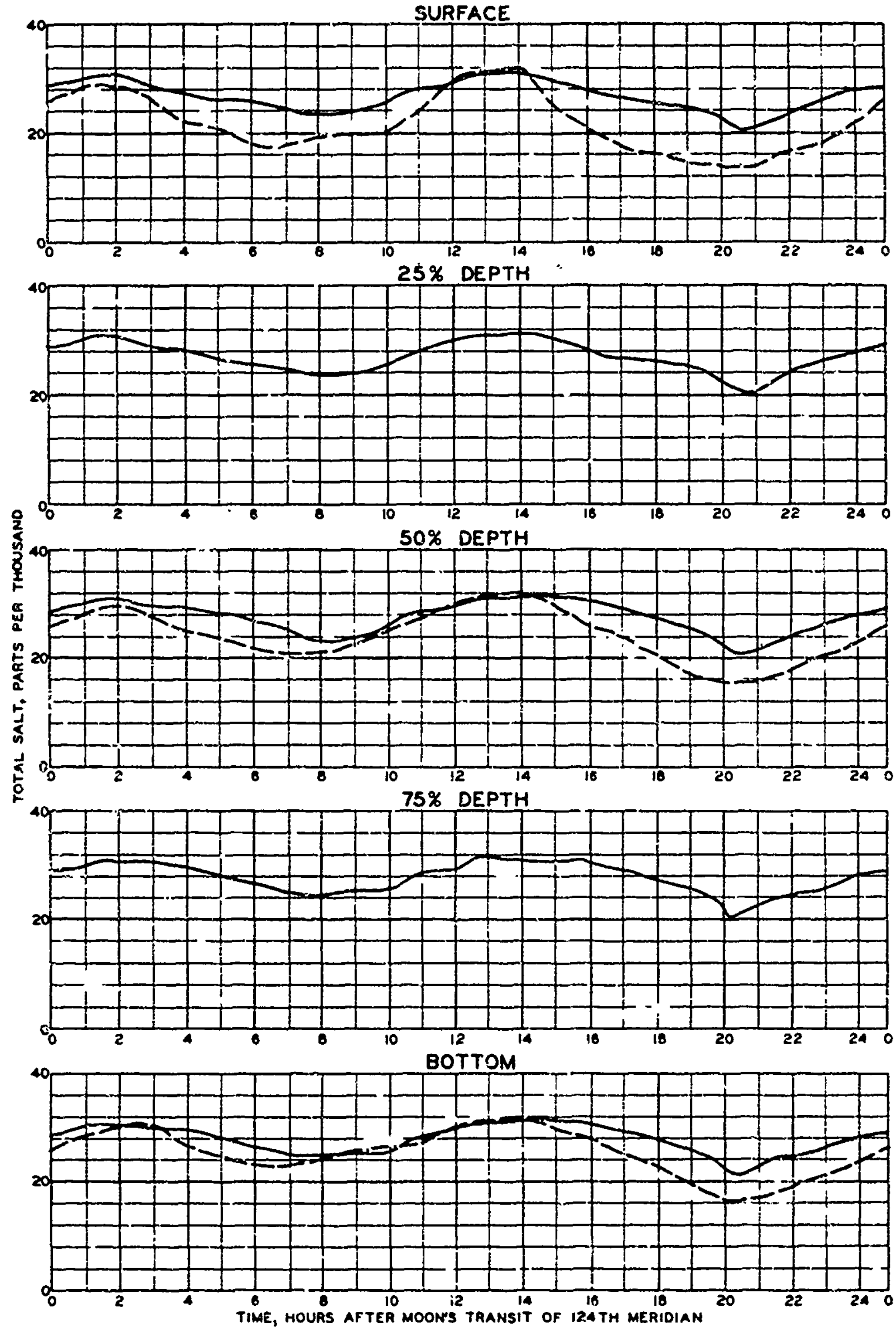
TIDE . . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . . 33.0 PPT

LEGEND

——— PROTOTYPE (6-7 OCT 67)
— — — MODEL

VERIFICATION OF
SPRING TIDE SALINITIES

STATION 12



MODEL TEST DATA

TIDE .... SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE .. 11,400 CFS
SOURCE SALINITY .... 33.0 PPT

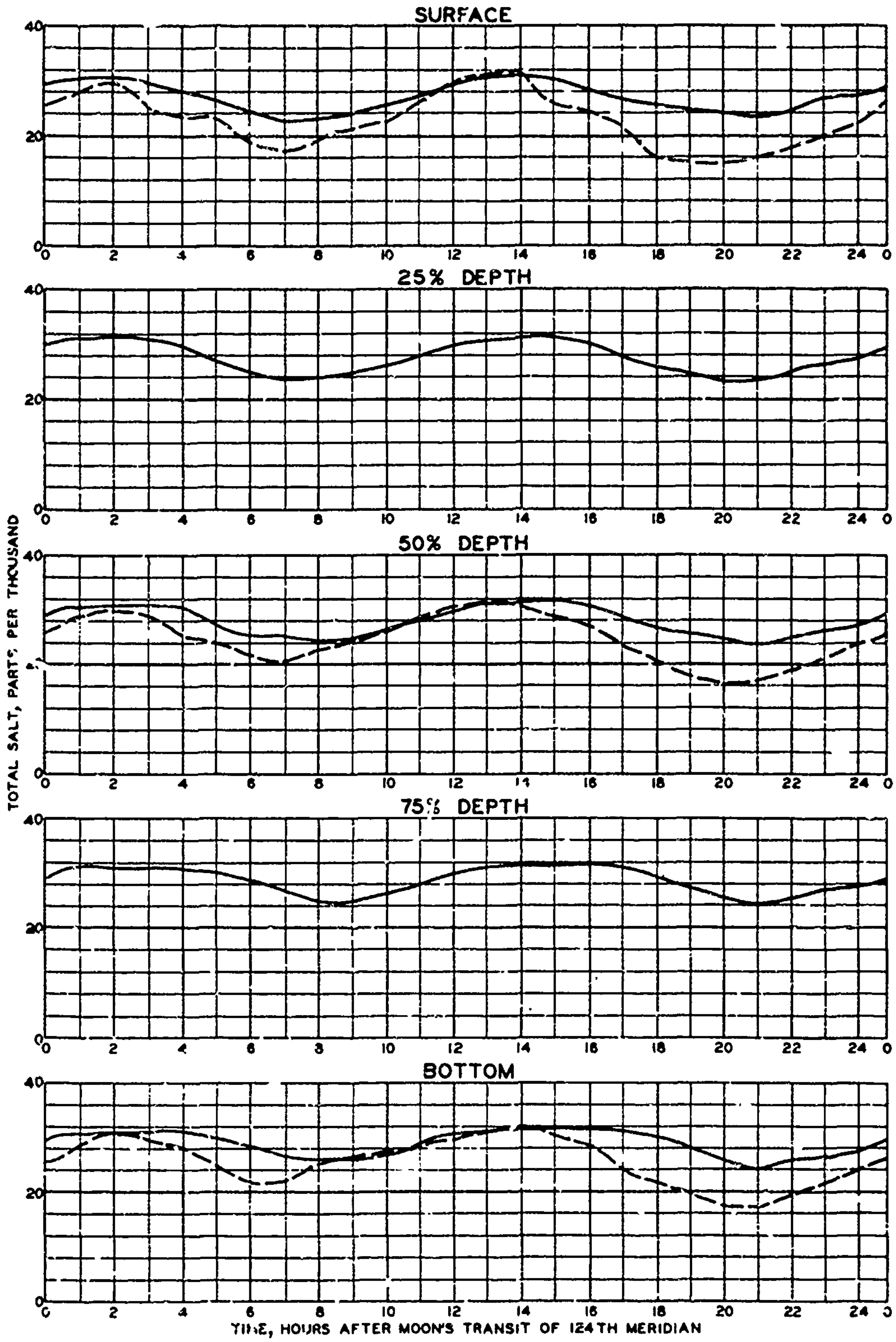
LEGEND

—— PROTOTYPE (4-5 OCT 67)
– – MODEL

VERIFICATION OF
SPRING TIDE SALINITIES

STATION 13

PLATE 84



MODEL TEST DATA

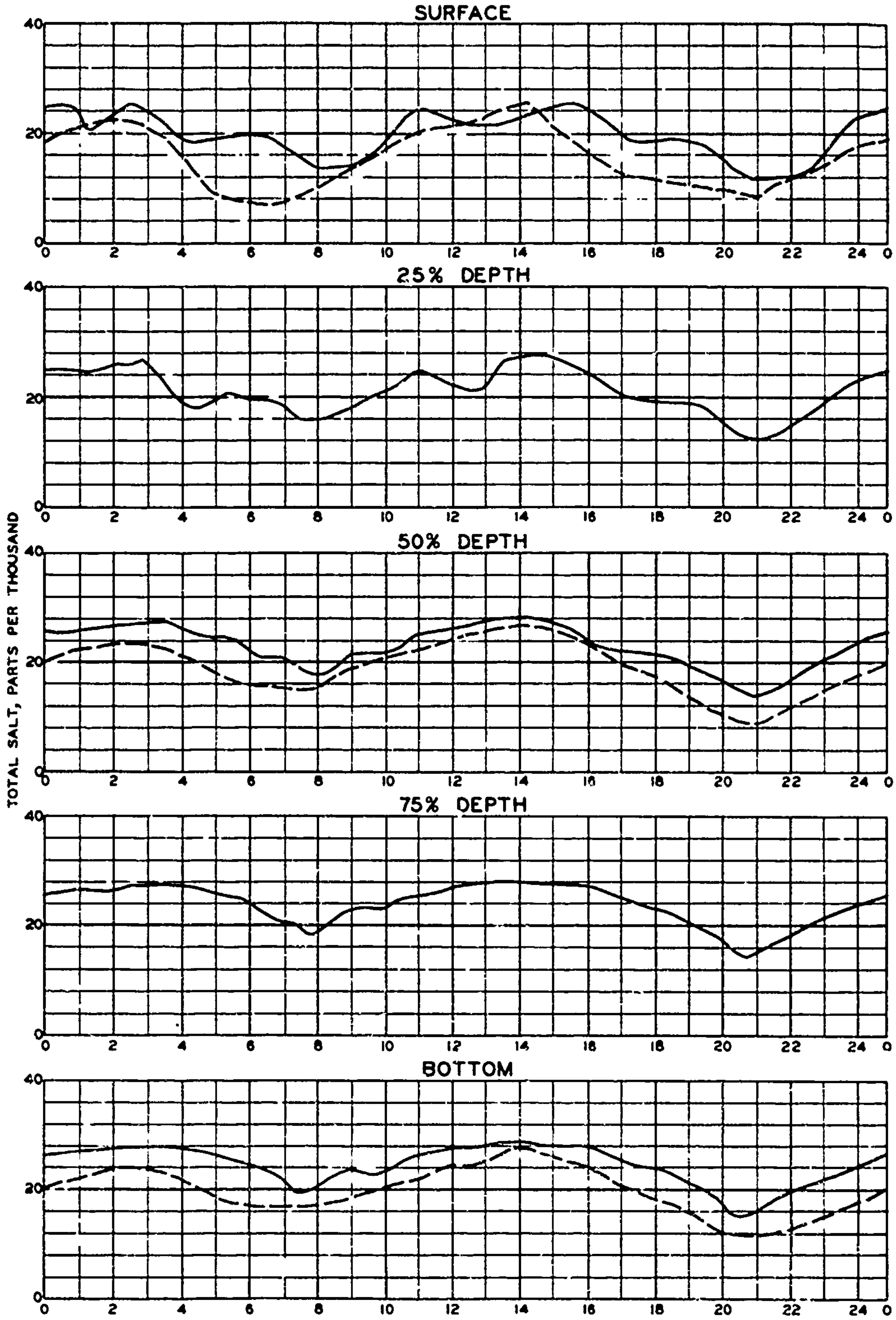
TIDE . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

——— PROTOTYPE (4-5 OCT 67)
– – – MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 14



MODEL TEST DATA

TIDE . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . 33.0 PPT

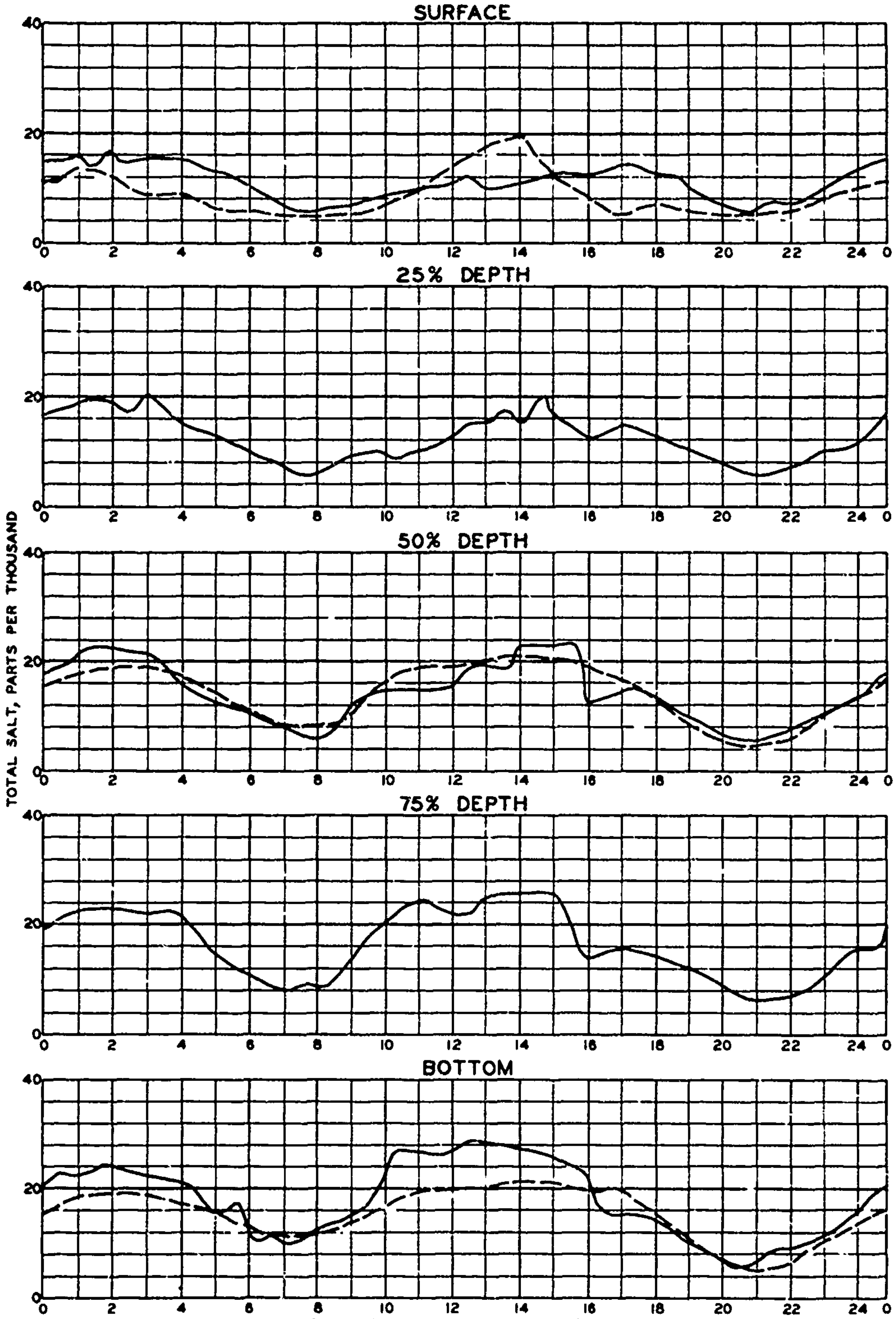
LEGEND

——— PROTOTYPE (5-8 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 15

PLATE 86



MODEL TEST DATA

TIDE . . . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . . 33.0 PPT

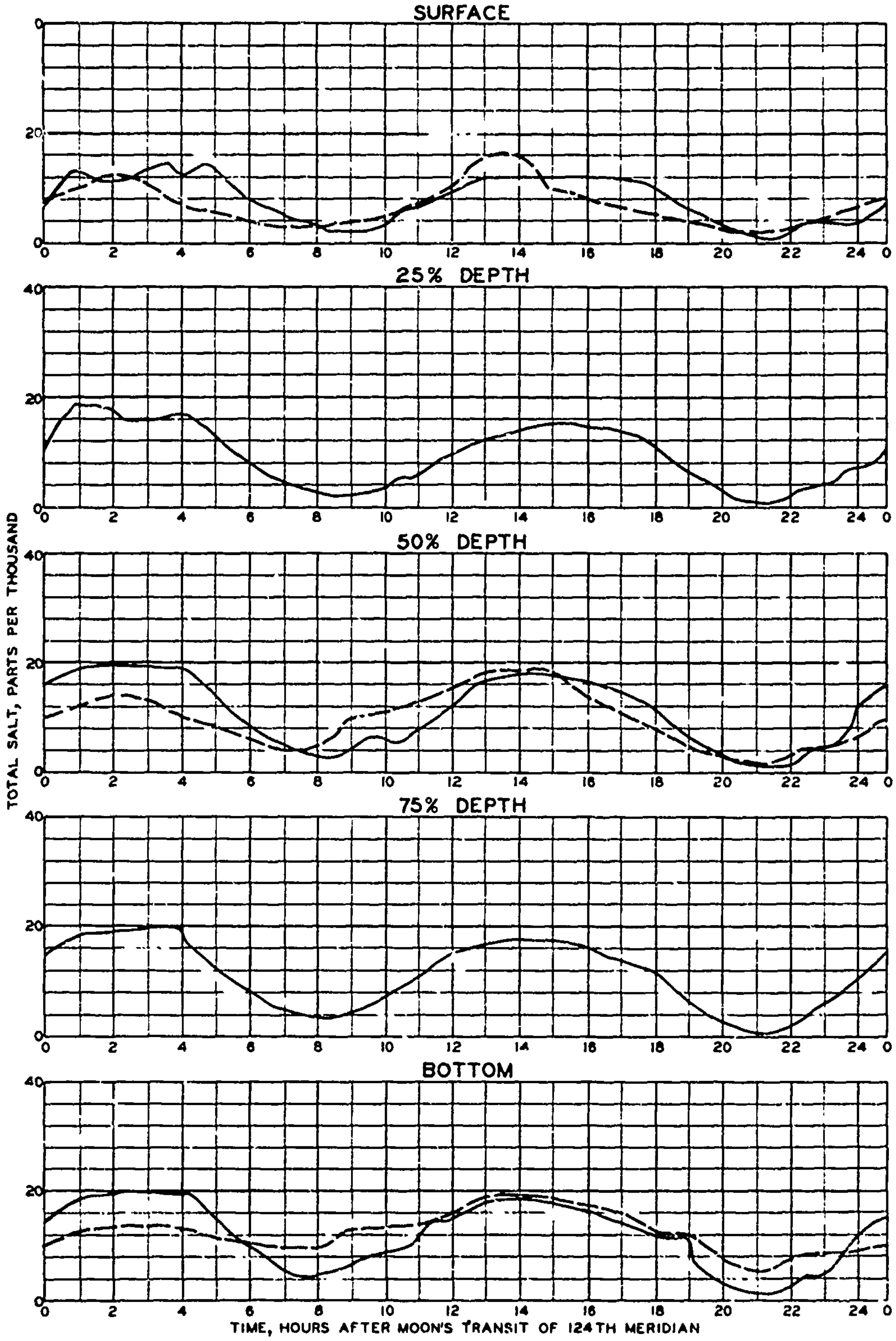
LEGEND

——— PROTOTYPE (8-9 OCT 67)
— — — MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 16

PLATE 87



MODEL TEST DATA

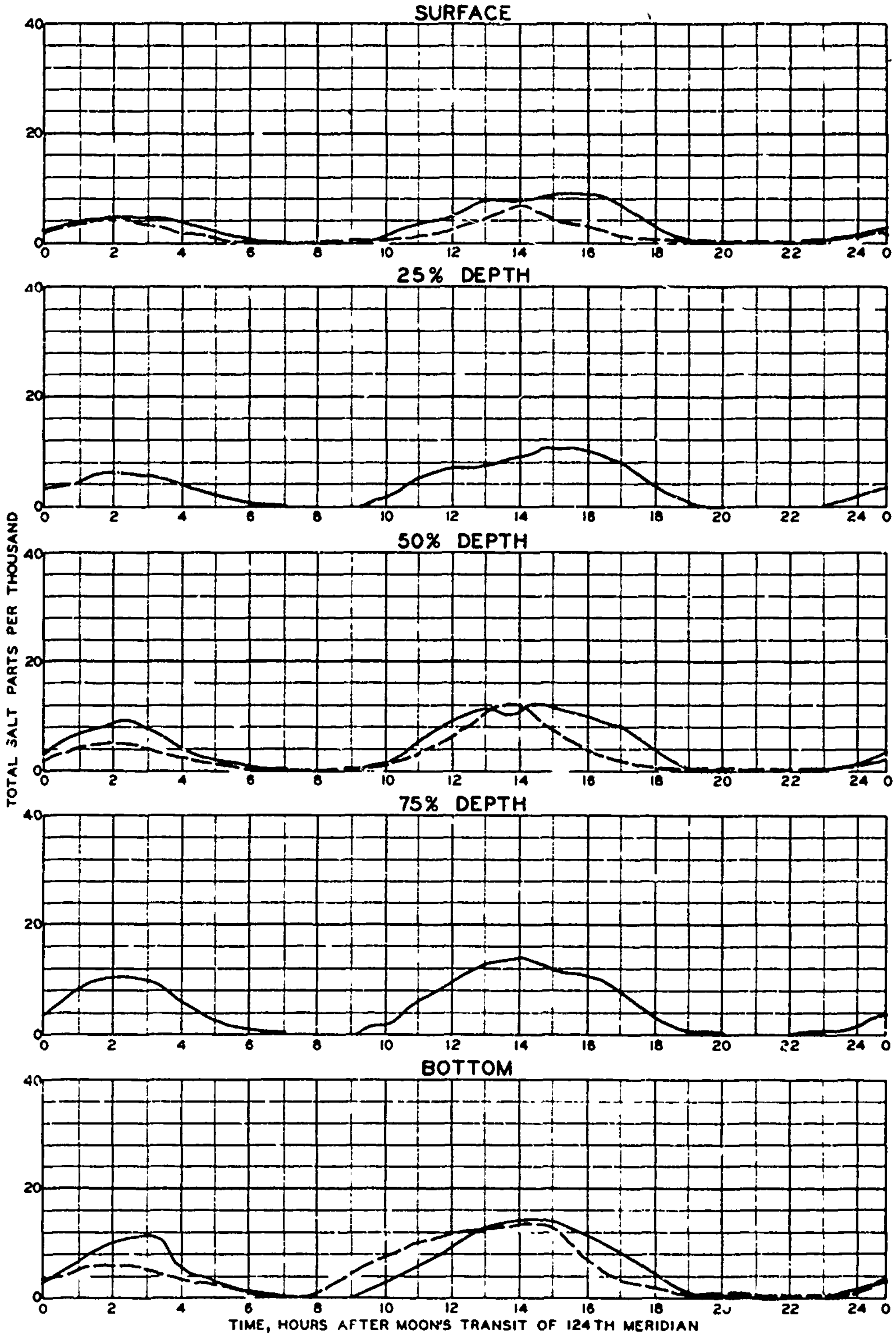
TIDE .. .. . SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE . . 11 400 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

——— PROTOTYPE (4-5 OCT 67)
— — MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 17



MODEL TEST DATA

TIDE	SPRING (6-7 OCT 67)
FRESH-WATER DISCHARGE .	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

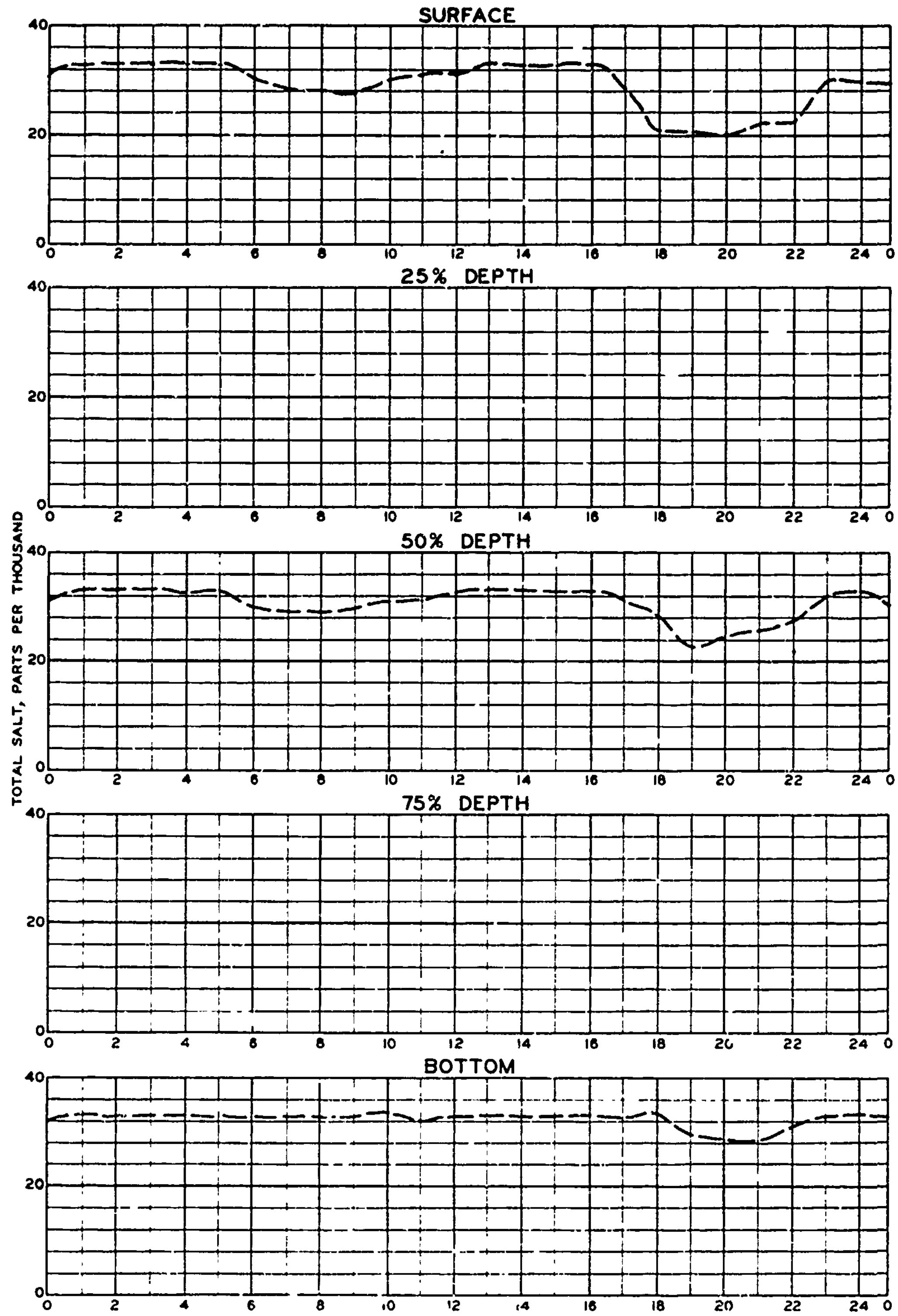
——— PROTOTYPE (5-6 OCT 67)

— — MODEL

VERIFICATION OF SPRING TIDE SALINITIES

STATION 18

PLATE 89



MODEL TEST DATA

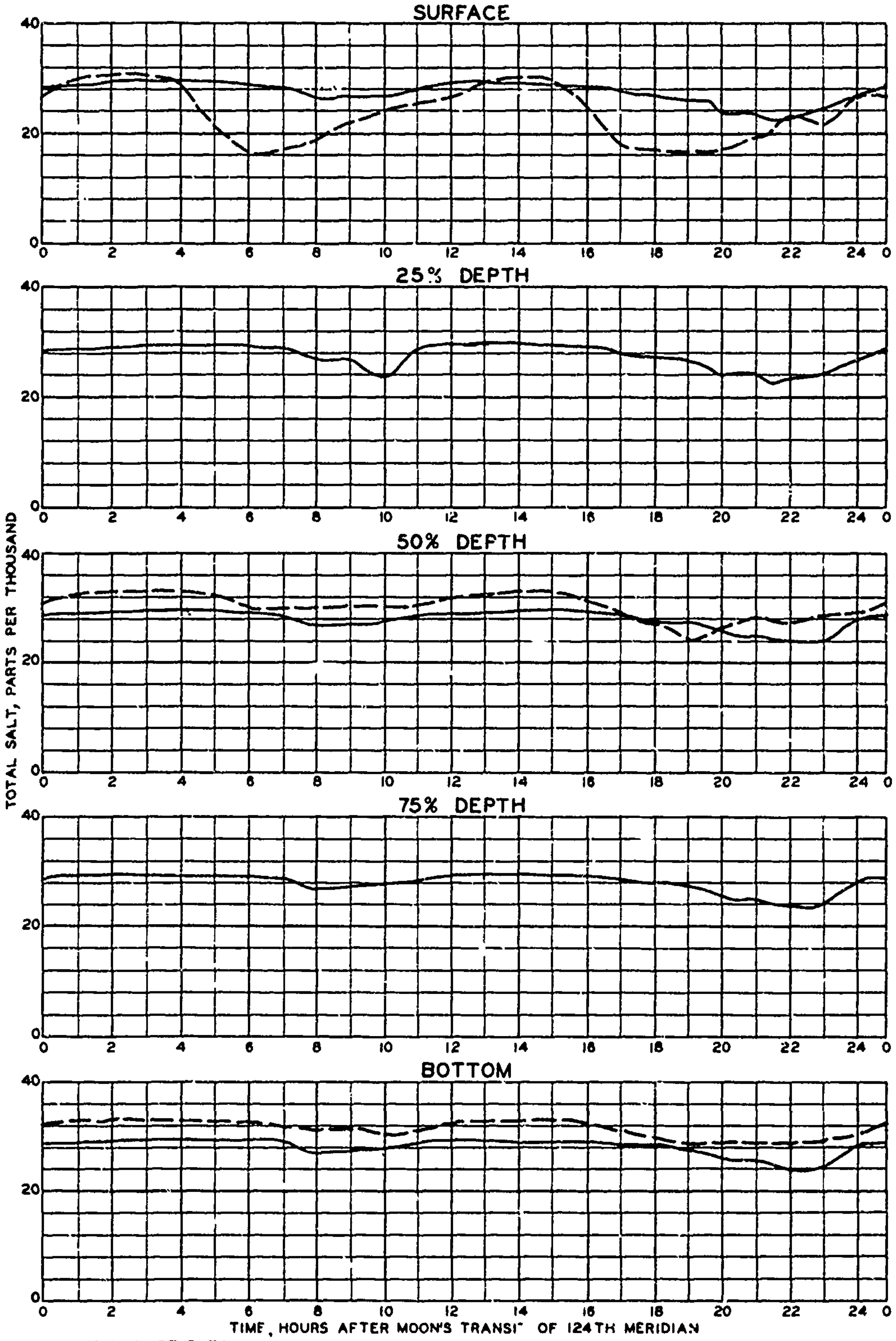
TIDE .... NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE 10,500 CFS
SOURCE SALINITY 330 PPT

LEGEND

— — MODEL

VERIFICATION OF NEAP TIDE SALINITIES
STATION 1

PLATE 90



MODEL TEST DATA

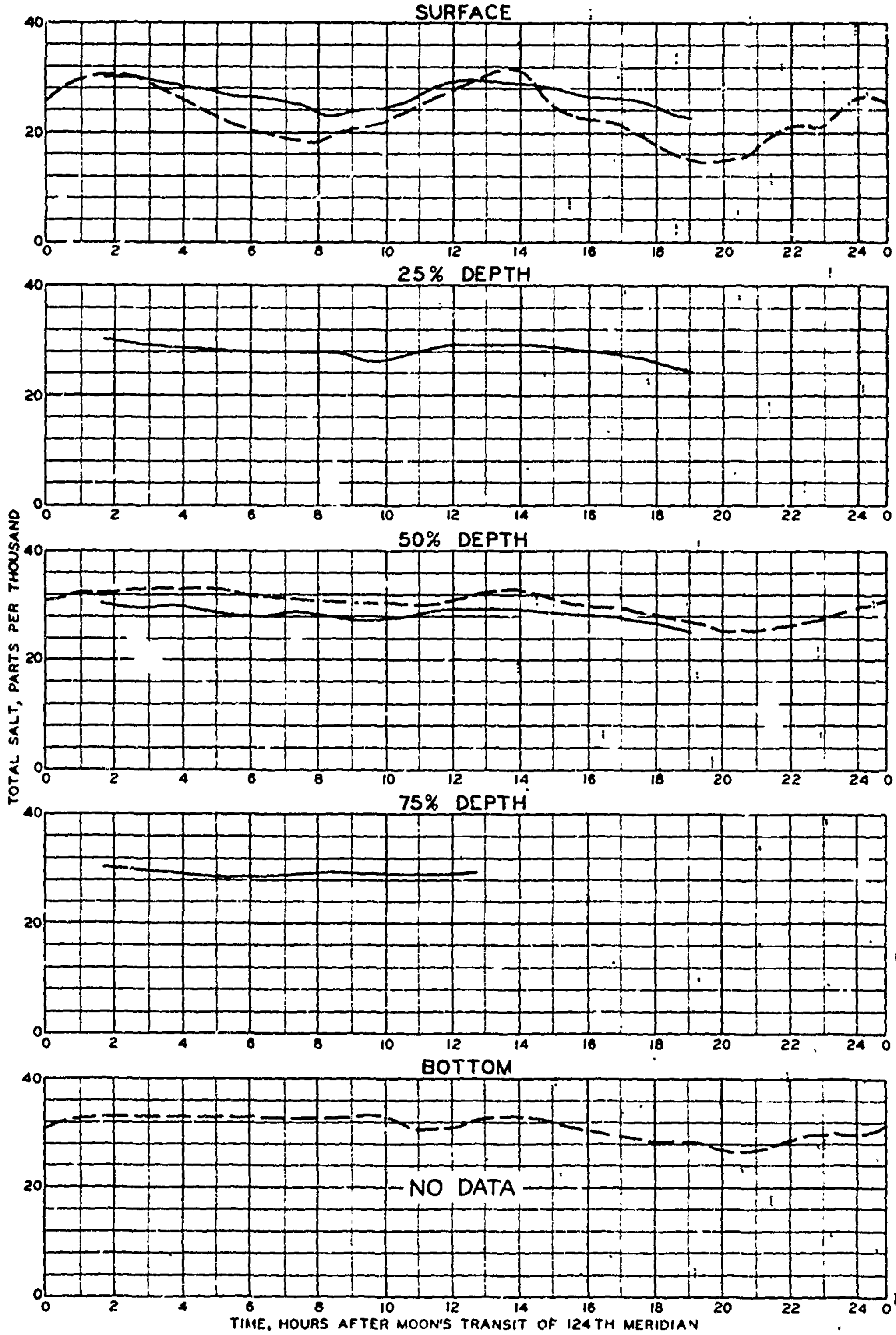
TIDE .... NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE .. 10,500 CFS
SOURCE SALINITY .... 33.0 PPT

LEGEND

—— PROTOTYPE (12-13 OCT 67)
– – MODEL

VERIFICATION OF
NEAP TIDE SALINITIES

STATION 4



MODEL TEST DATA

TIDE	NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE	10,500 CFS
SOURCE SALINITY	33.0 PPT

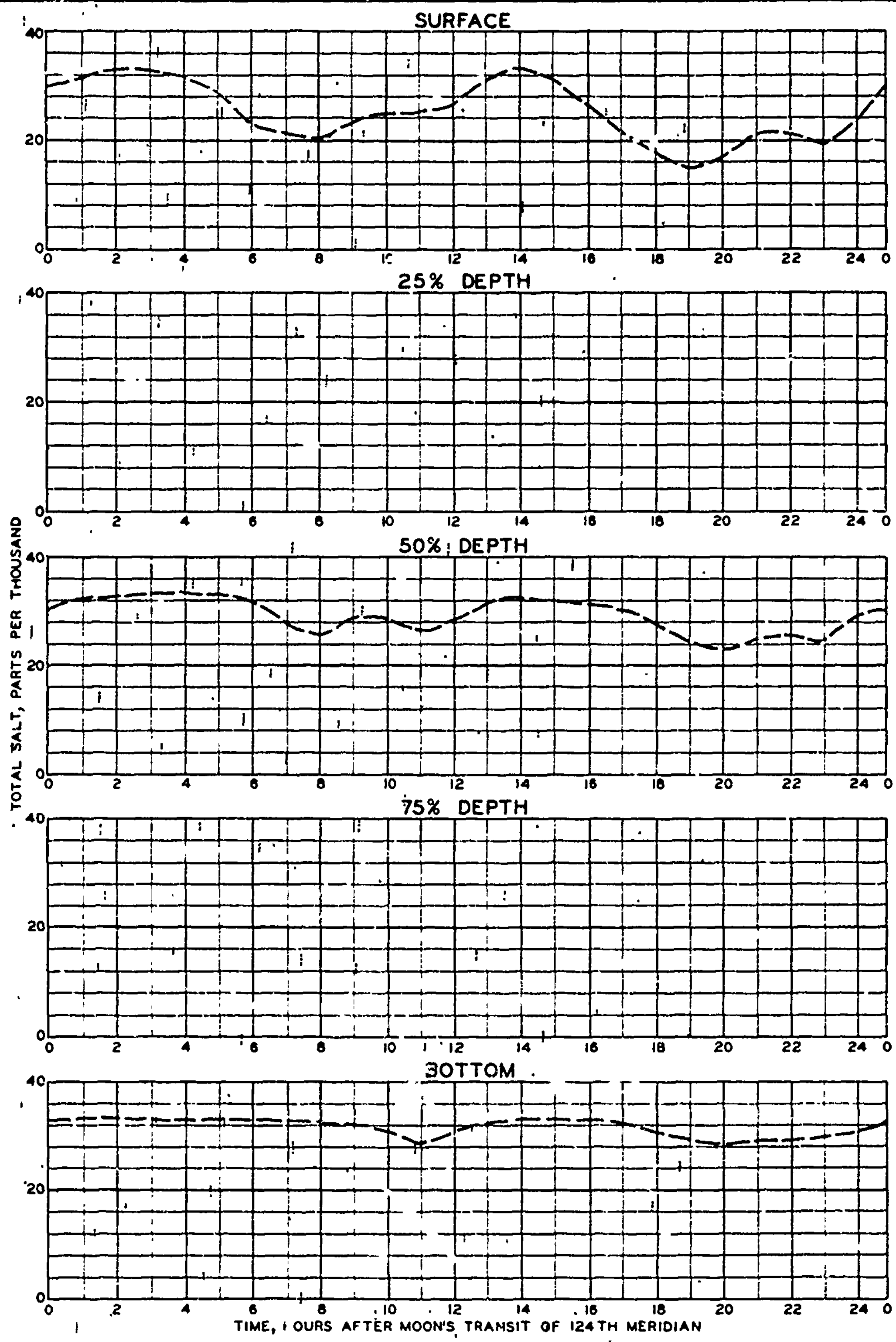
LEGEND

——— PROTOTYPE (12-13 OCT 67)
— — MODEL

VERIFICATION OF NEAP TIDE SALINITIES

STATION 5

PLATE 92



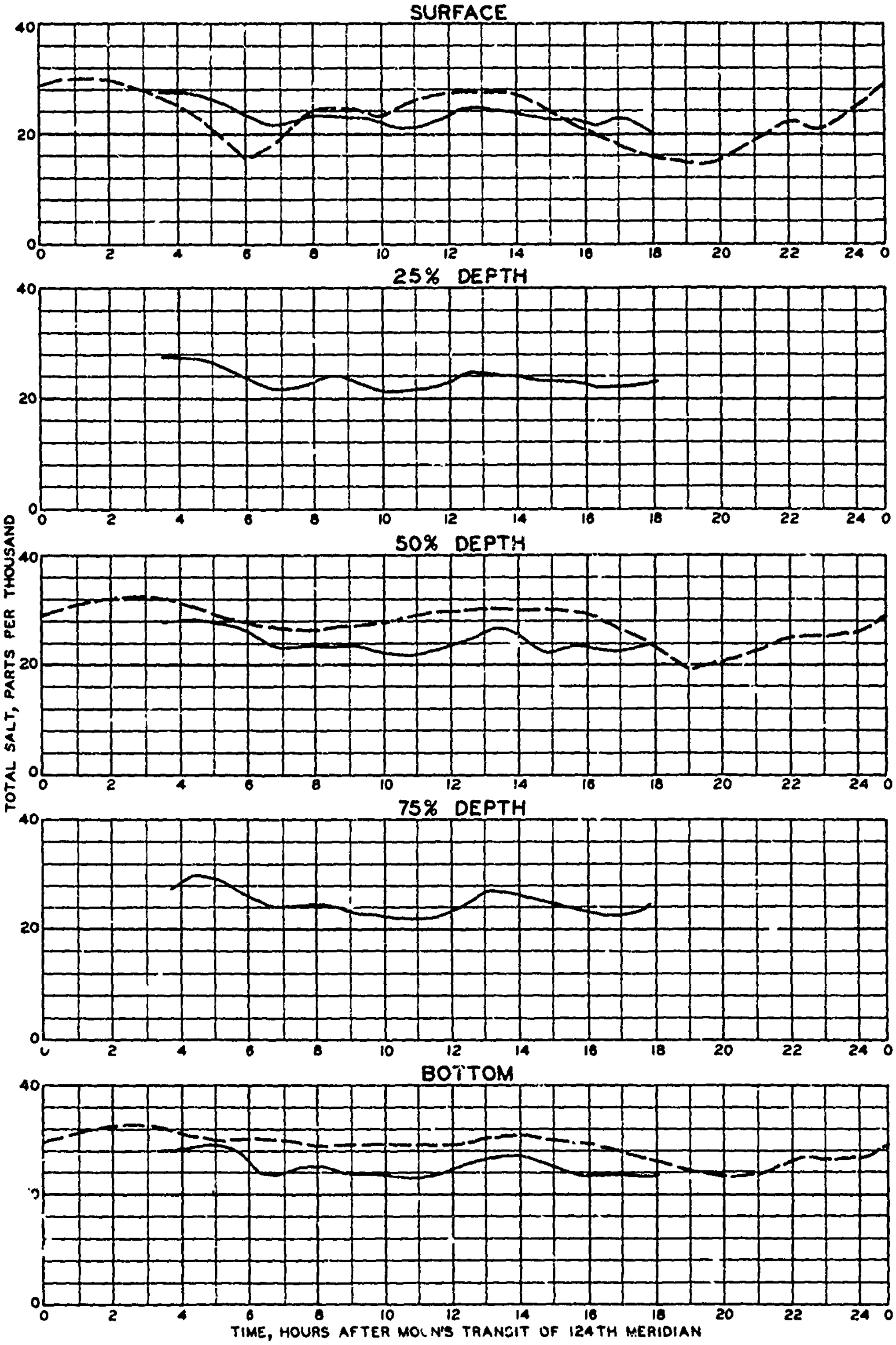
MODEL TEST DATA

TIDE .... NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY .... 33 0 PPT

LEGEND

— — MODEL

VERIFICATION OF
NEAP TIDE SALINITIES
STATION 6



MODEL TEST DATA

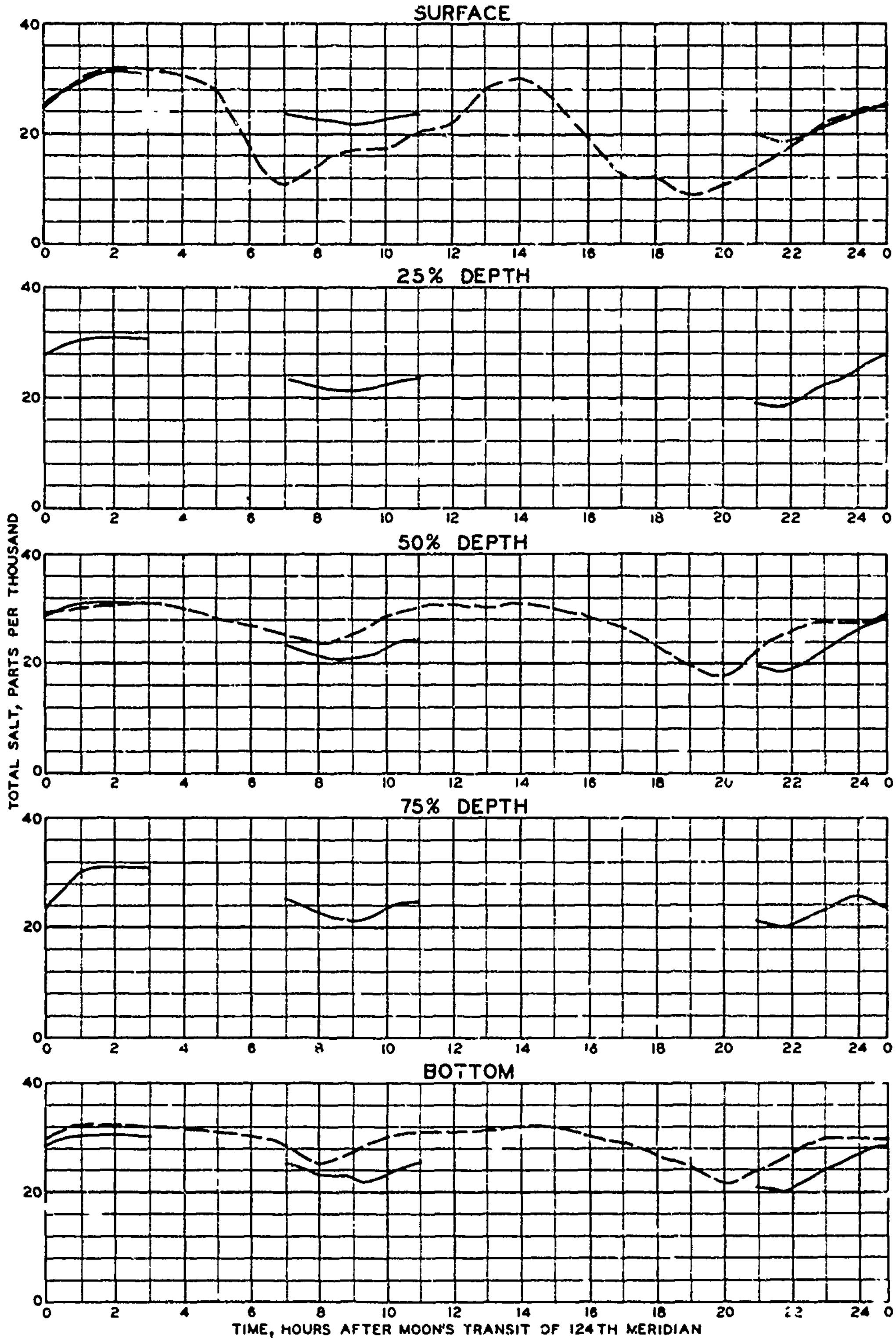
TIDE ....NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY............ 33.0 PPT

LEGEND

—— PROTOTYPE (13-14 OCT 67)
— — MODEL

VERIFICATION OF
NEAP TIDE SALINITIES

STATION 7



MODEL TEST DATA

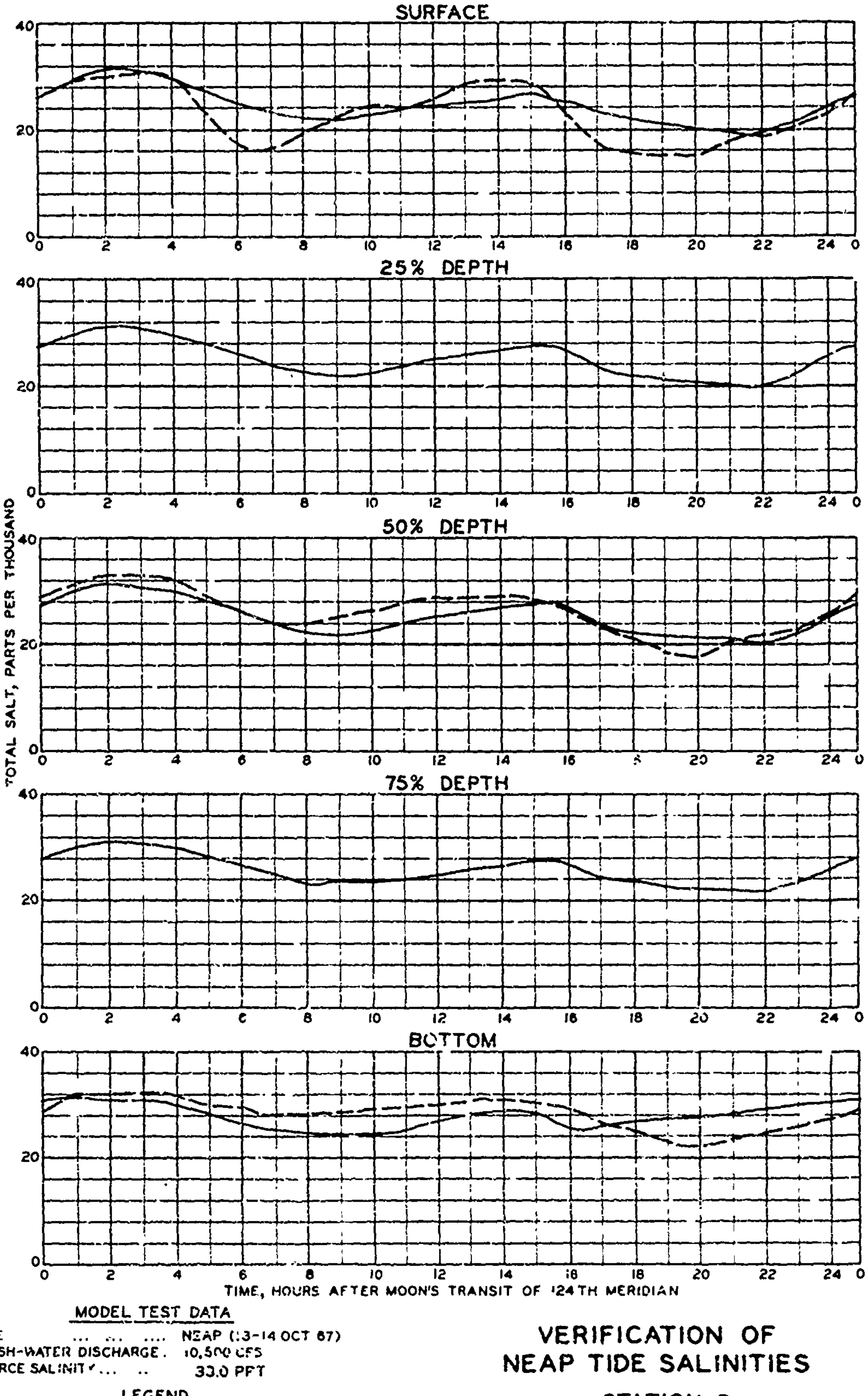
TIDE . . .. NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

——— PROTOTYPE (13-14 OCT 67)
— — MODEL

VERIFICATION OF
NEAP TIDE SALINITIES

STATION 8



MODEL TEST DATA

TIDE ... ... NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY ... .. 33.0 PPT

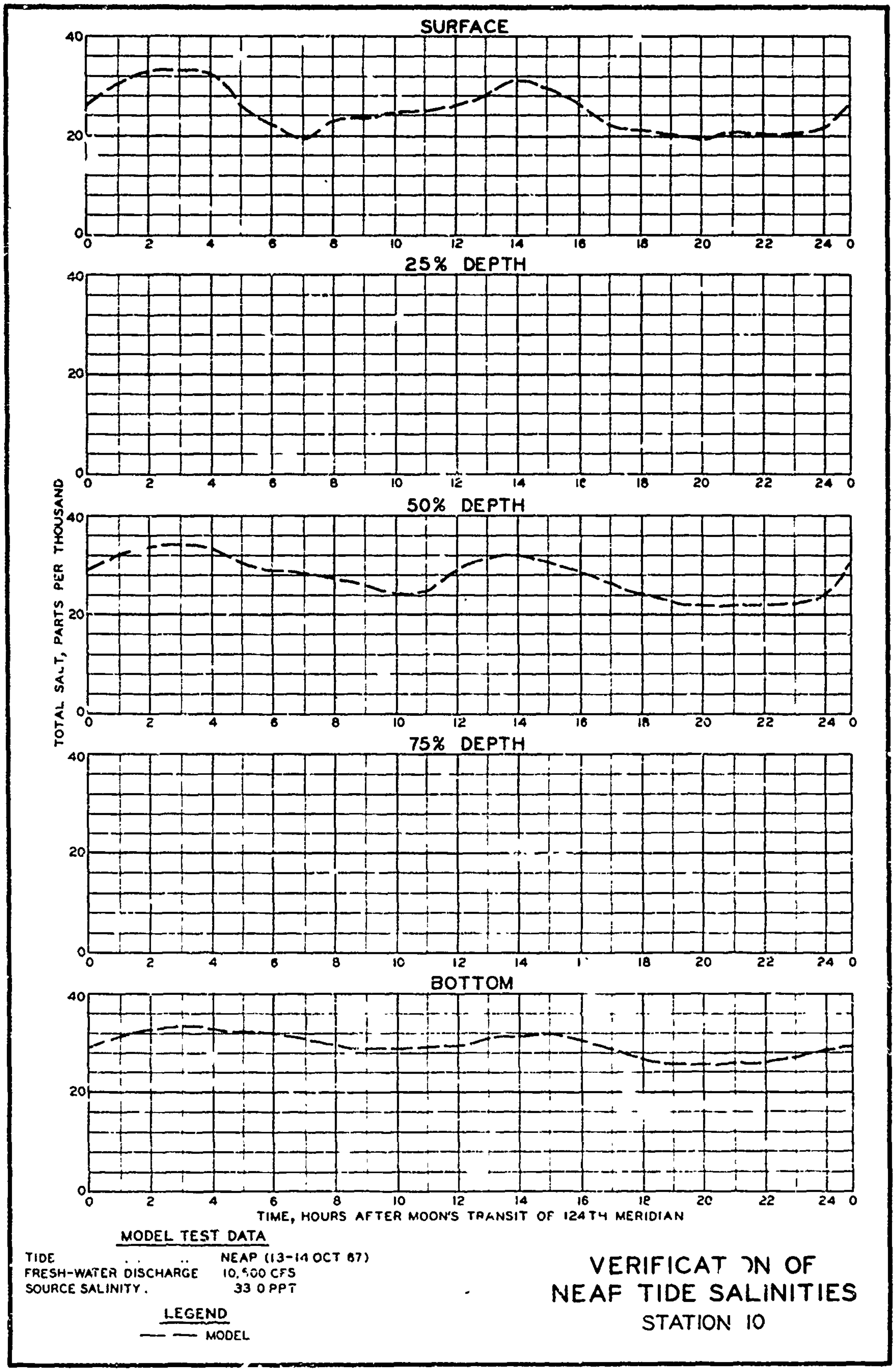
LEGEND

——— PROTOTYPE (13-14 OCT 67)
— — MODEL

VERIFICATION OF
NEAP TIDE SALINITIES

STATION 9

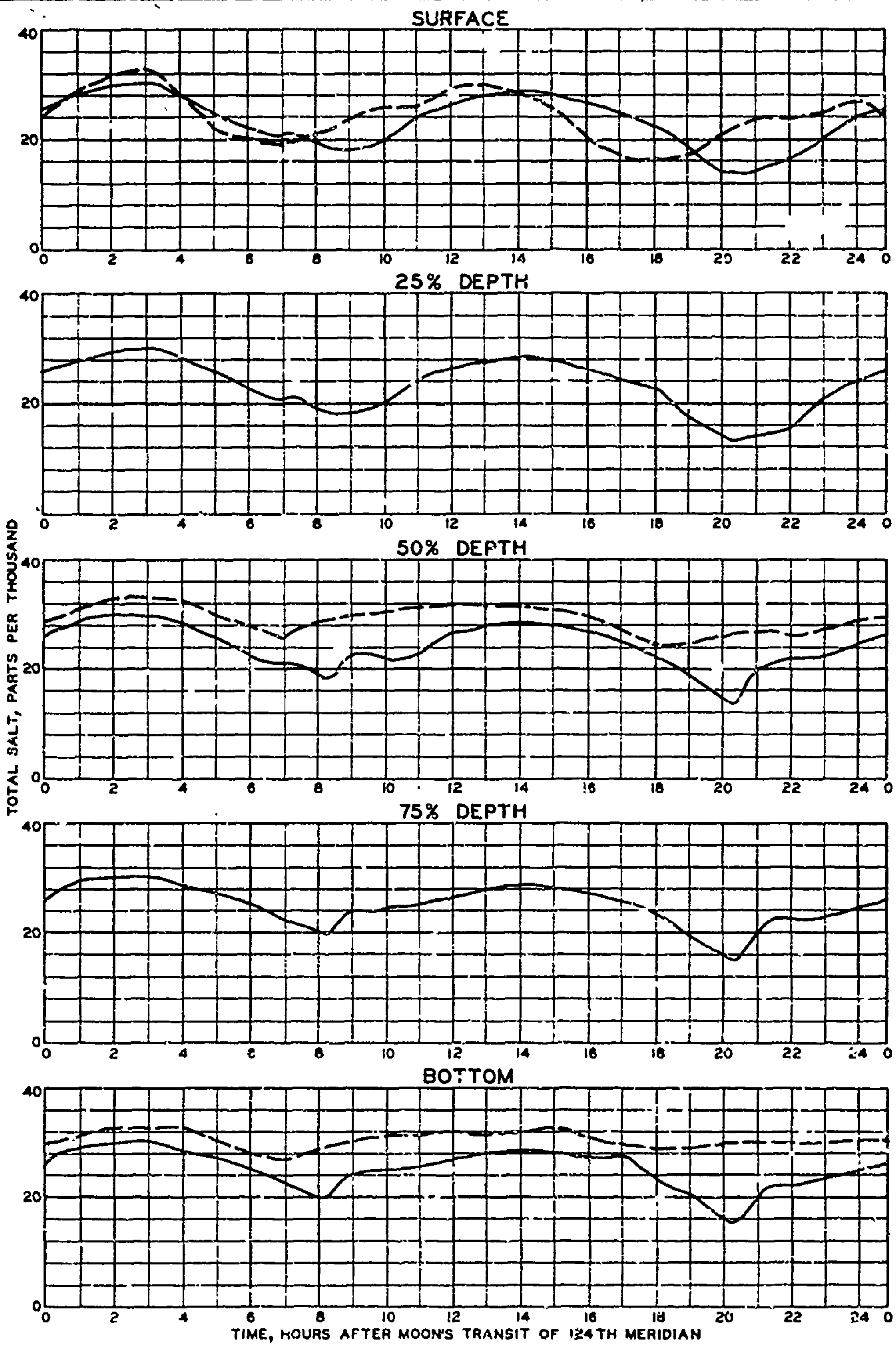
PLATE 96



VERIFICATION OF NEAP TIDE SALINITIES

STATION 10

PLATE 97



MODEL TEST DATA

TIDE .... NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY . . . 33.0 PPT

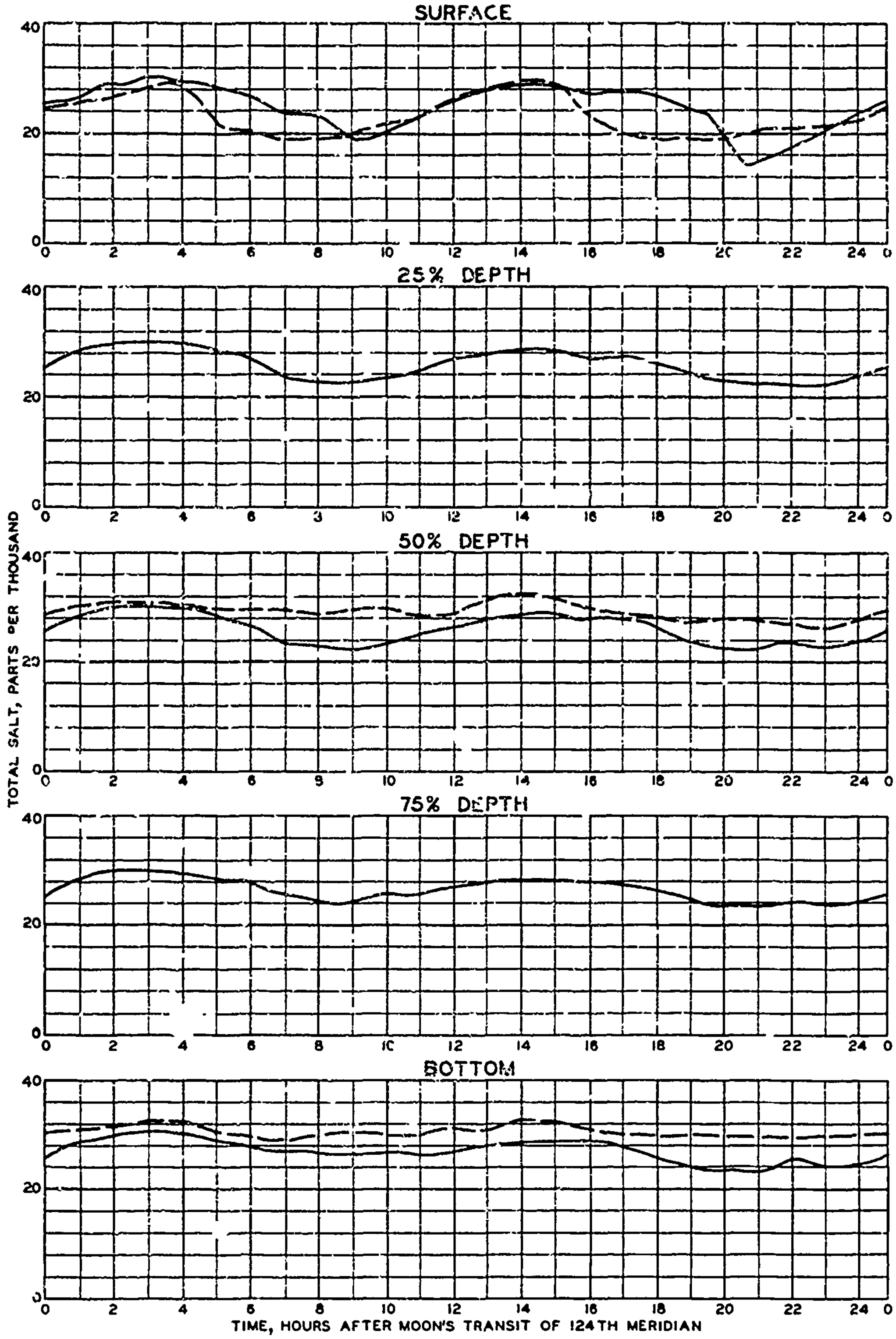
LEGEND

—— PROTOTYPE (13-14 OCT 67)
— — MODEL

VERIFICATION OF
NEAP TIDE SALINITIES

STATION 11

PLATE 98



MODEL TEST DATA

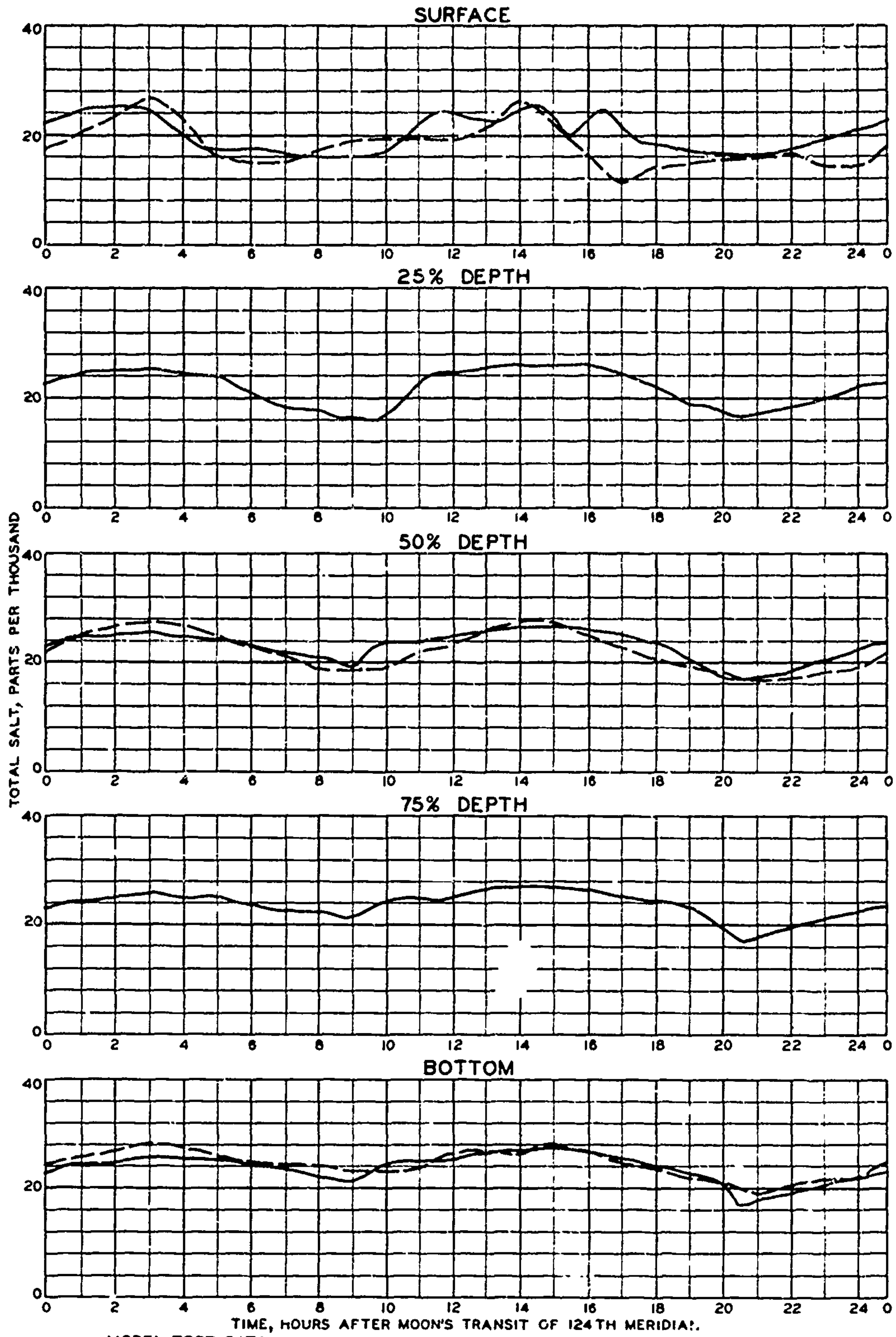
TIDE .... NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE ... 10,500 CFS
SOURCE SALINITY .... 33.0 PPT

LEGEND

——— PROTOTYPE (13-14 OCT 67)
– – – MODEL

VERIFICATION OF NEAP TIDE SALINITIES

STATION 12



MODEL TEST DATA

TIDE .... NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE .. 10,500 CFS
SOURCE SALINITY ... 33.0 PPT

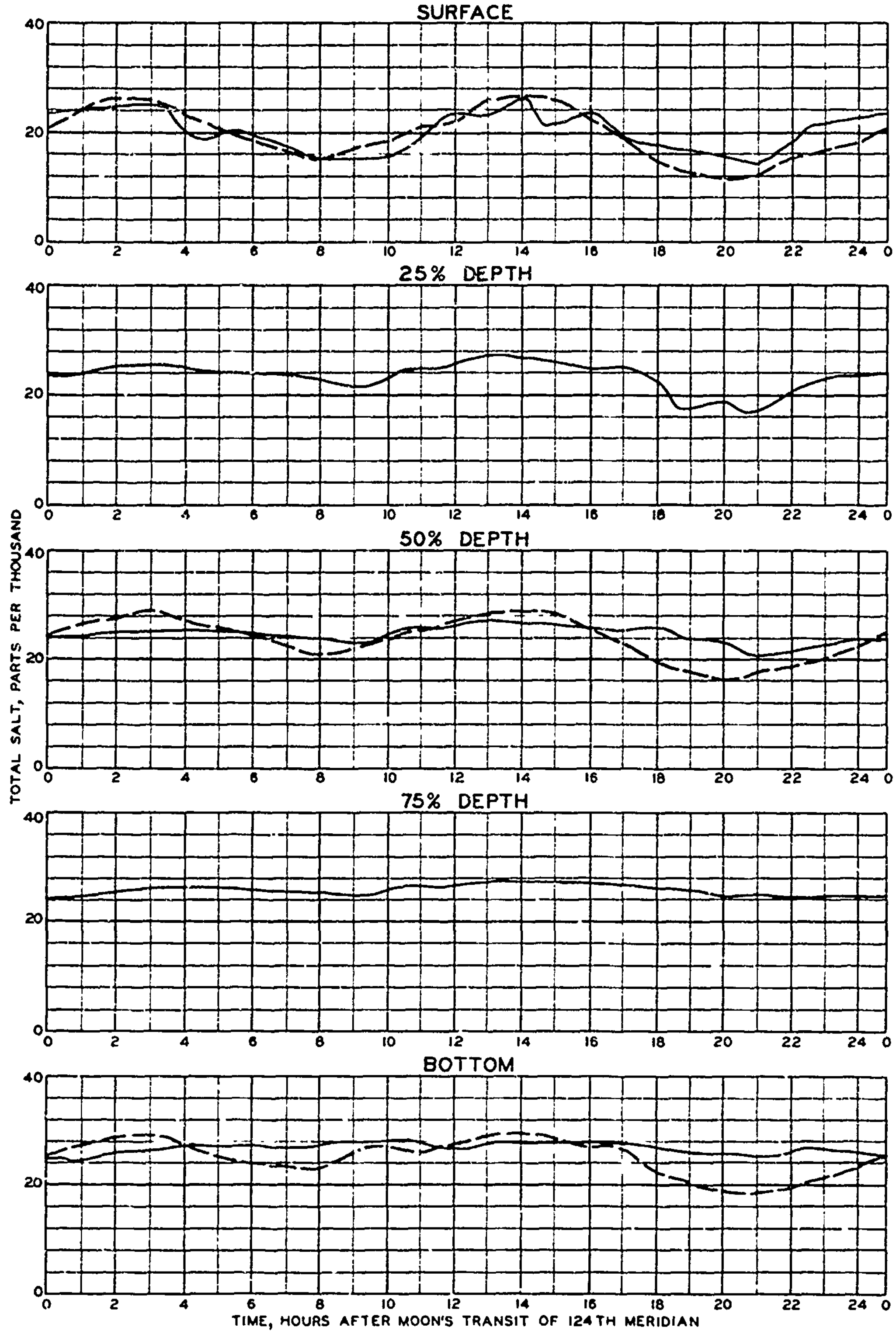
LEGEND

—— PROTOTYPE (12-13 OCT 67)
— — MODEL

VERIFICATION OF
NEAP TIDE SALINITIES

STATION 13

PLATE 100



MODEL TEST DATA

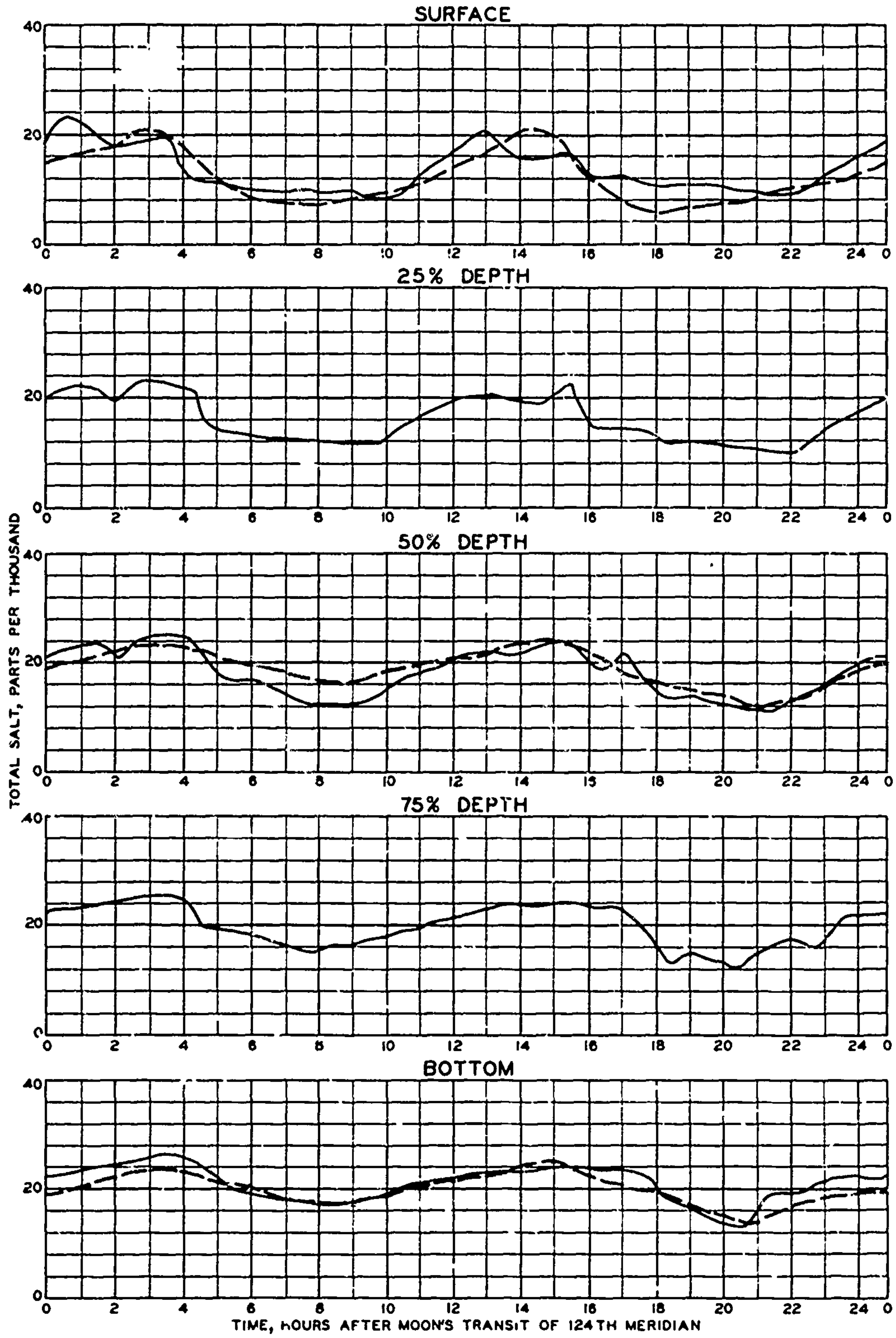
TIDE .. . . NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE 10,500 CFS
SOURCE SALINITY.. .. .. .. 33.0 PPT

LEGEND

——— PROTOTYPE (12-13 OCT 67)
– – – MODEL

VERIFICATION OF NEAP TIDE SALINITIES

STATION 14



MODEL TEST DATA

TIDE .. ..NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE... 10,500 CFS
SOURCE SALINITY........ ... 33.0 PPT

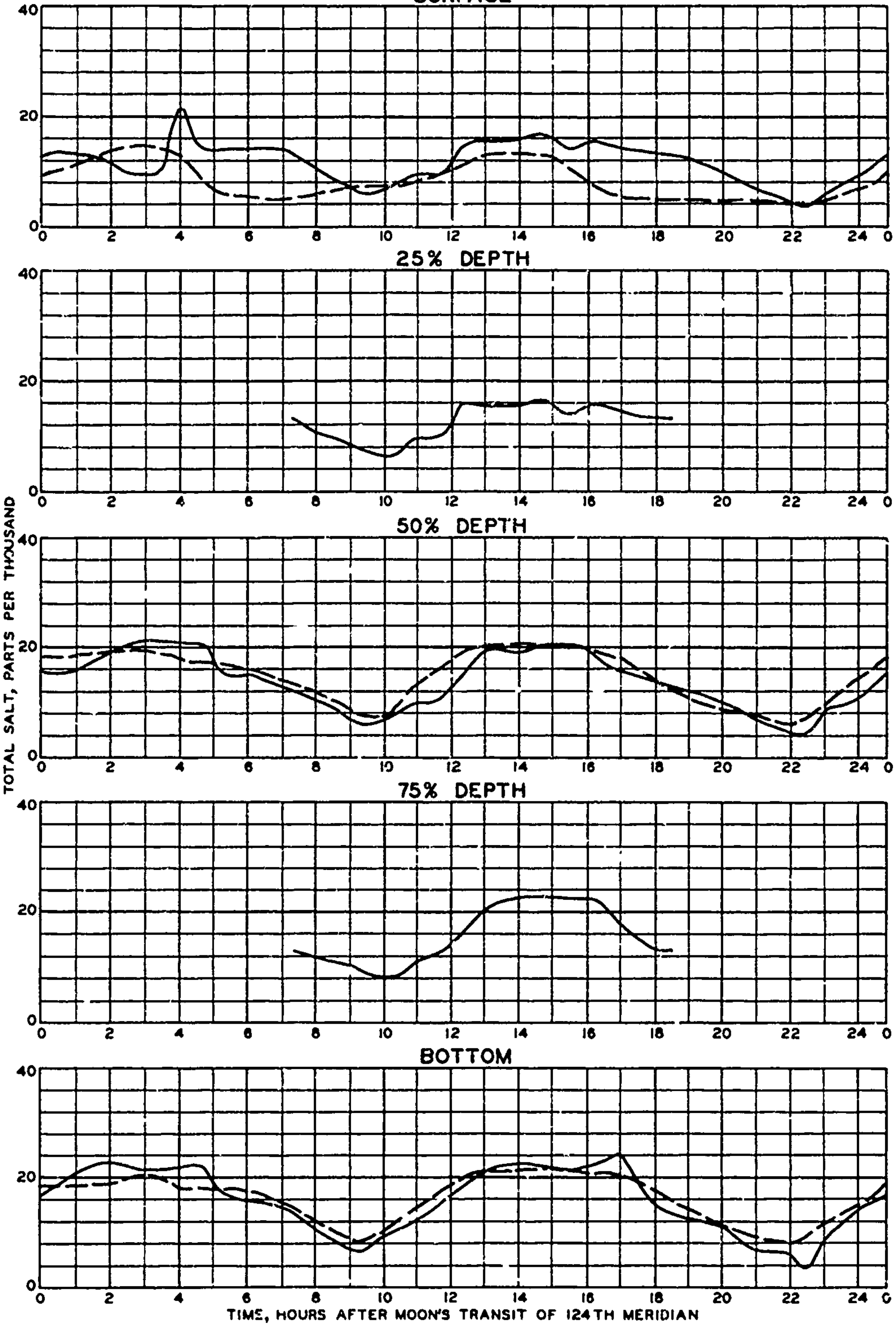
LEGEND

——— PROTOTYPE (14-15 OCT 67)
— — MODEL

VERIFICATION OF NEAP TIDE SALINITIES

STATION 15

PLATE 102



MODEL TEST DATA

TIDE ....NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE . 10,500 CFS
SOURCE SALINITY .... 33.0 PPT

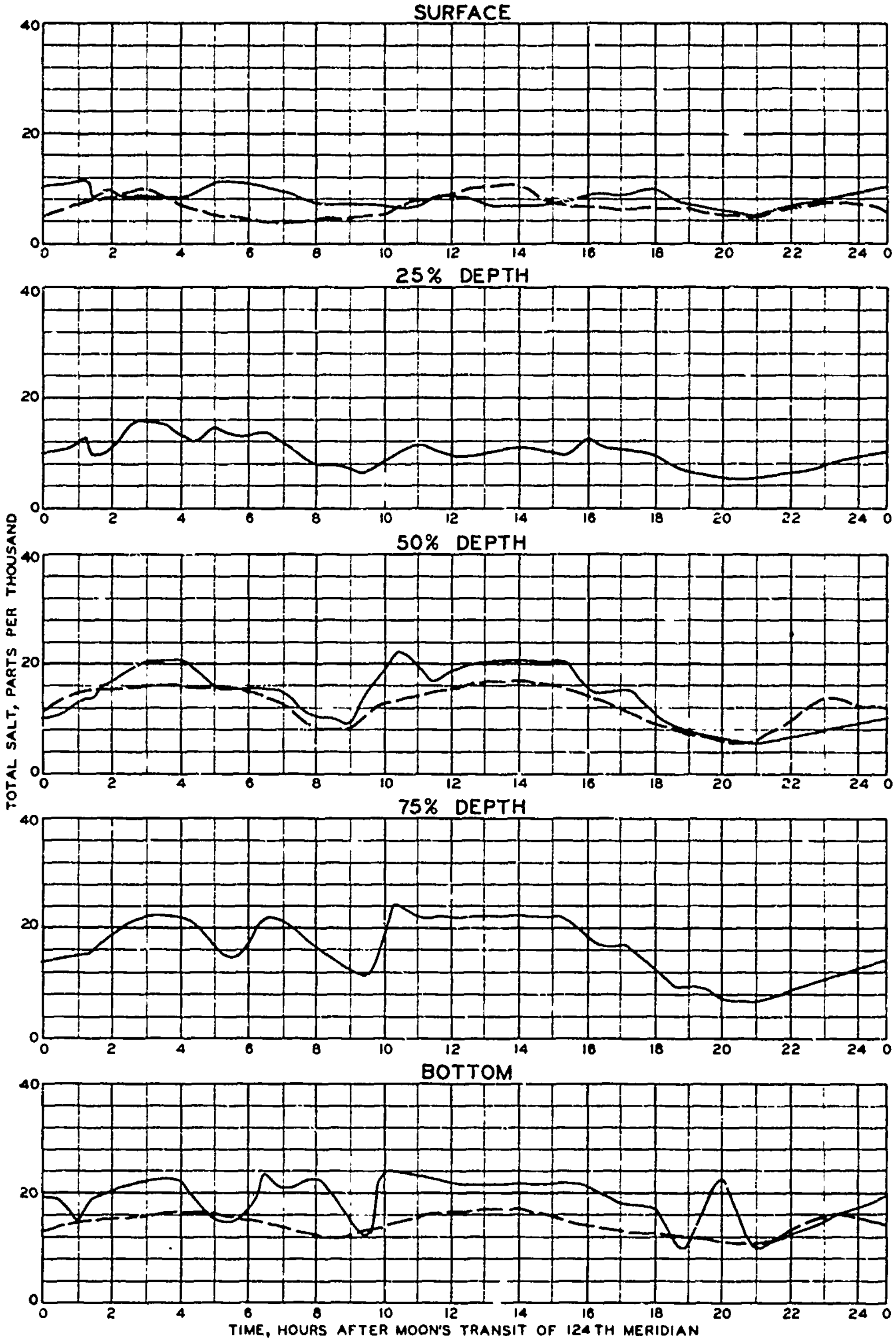
LEGEND

——— PROTOTYPE (15-16 OCT 67)
— — MODEL

VERIFICATION OF
NEAP TIDE SALINITIES

STATION 16

PLATE 103



MODEL TEST DATA

TIDE ....NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE.. 10,500 CFS
SOURCE SALINITY.. . .. 33.0 PPT

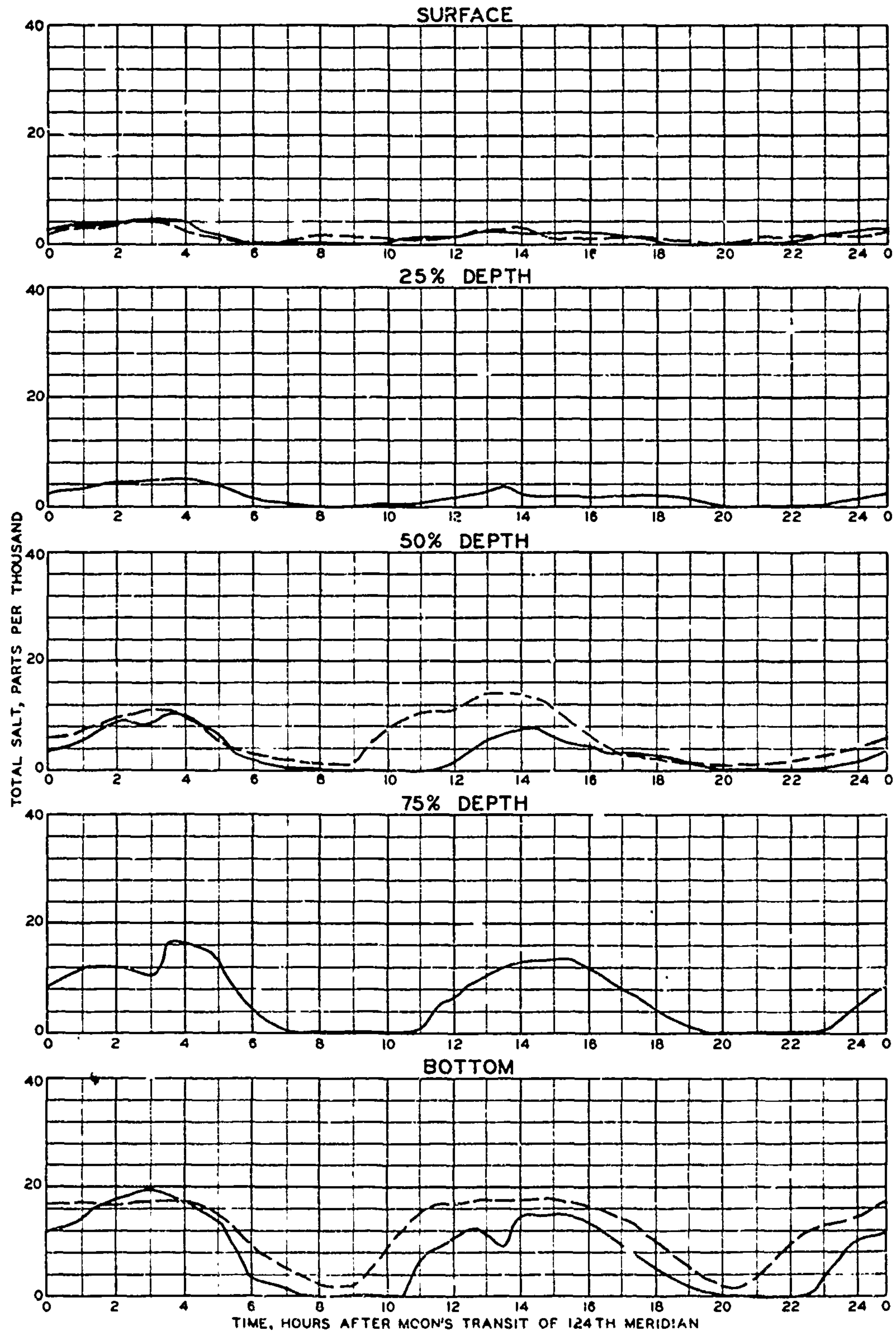
LEGEND

——— PROTOTYPE (12-13 OCT 67)
— — MODEL

VERIFICATION OF NEAP TIDE SALINITIES

STATION 17

PLATE 104



MODEL TEST DATA

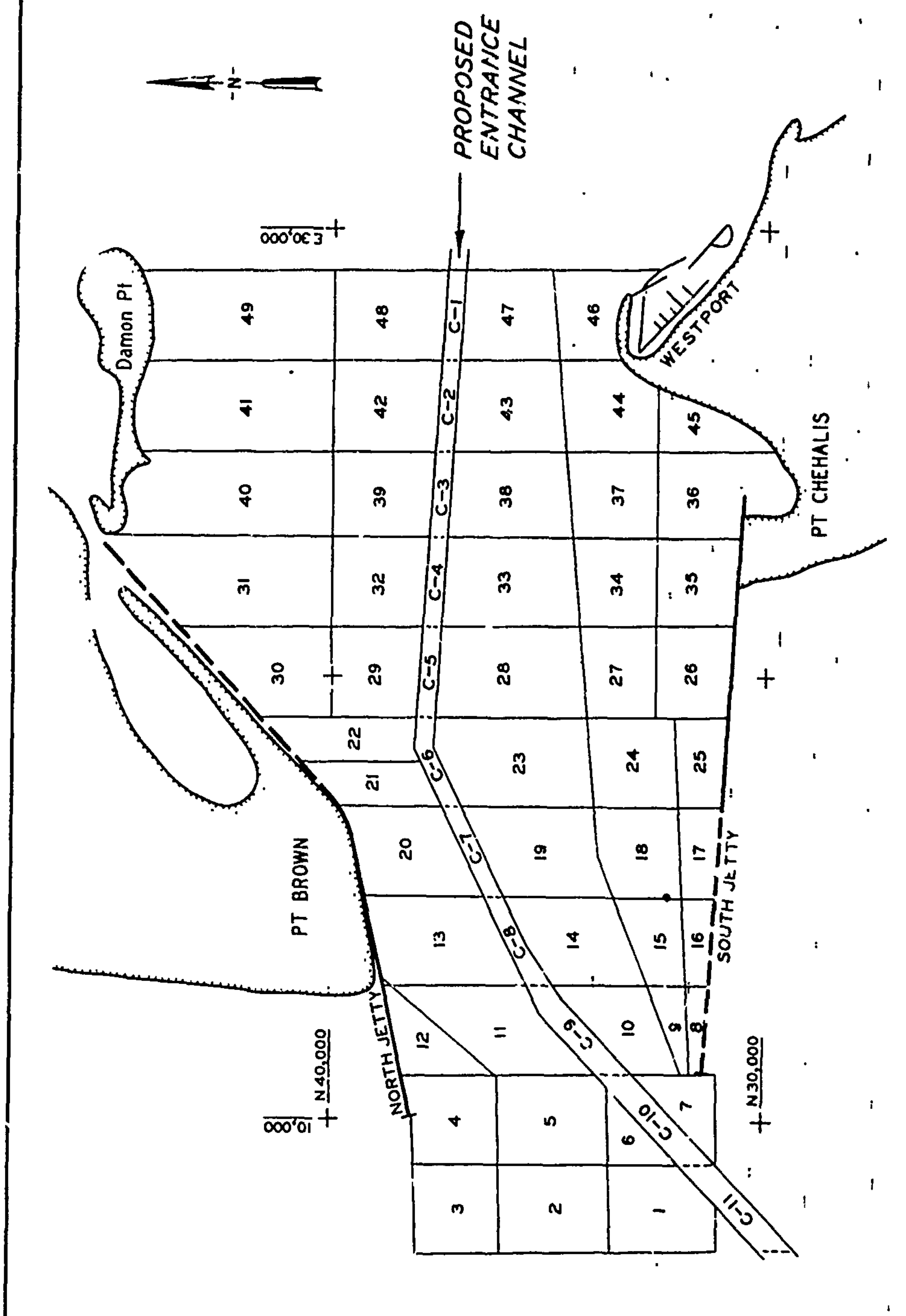
TIDE ... ... NEAP (13-14 OCT 67)
FRESH-WATER DISCHARGE 10,500 CFS
SOURCE SALINITY .. .. . 33.0 PPT

LEGEND

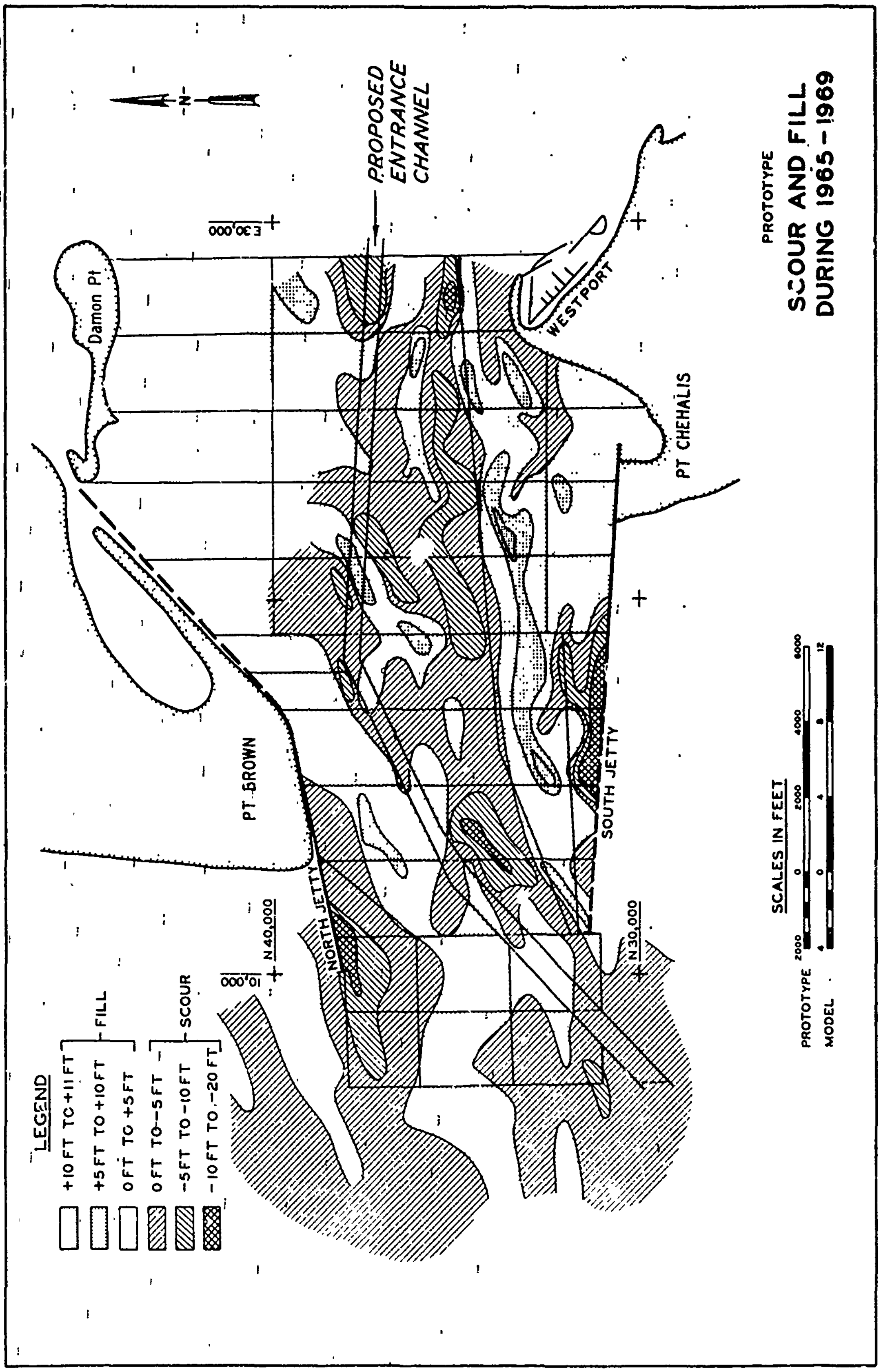
——— PROTOTYPE (14-15 OCT 67)
— — MODEL

VERIFICATION OF NEAP TIDE SALINITIES

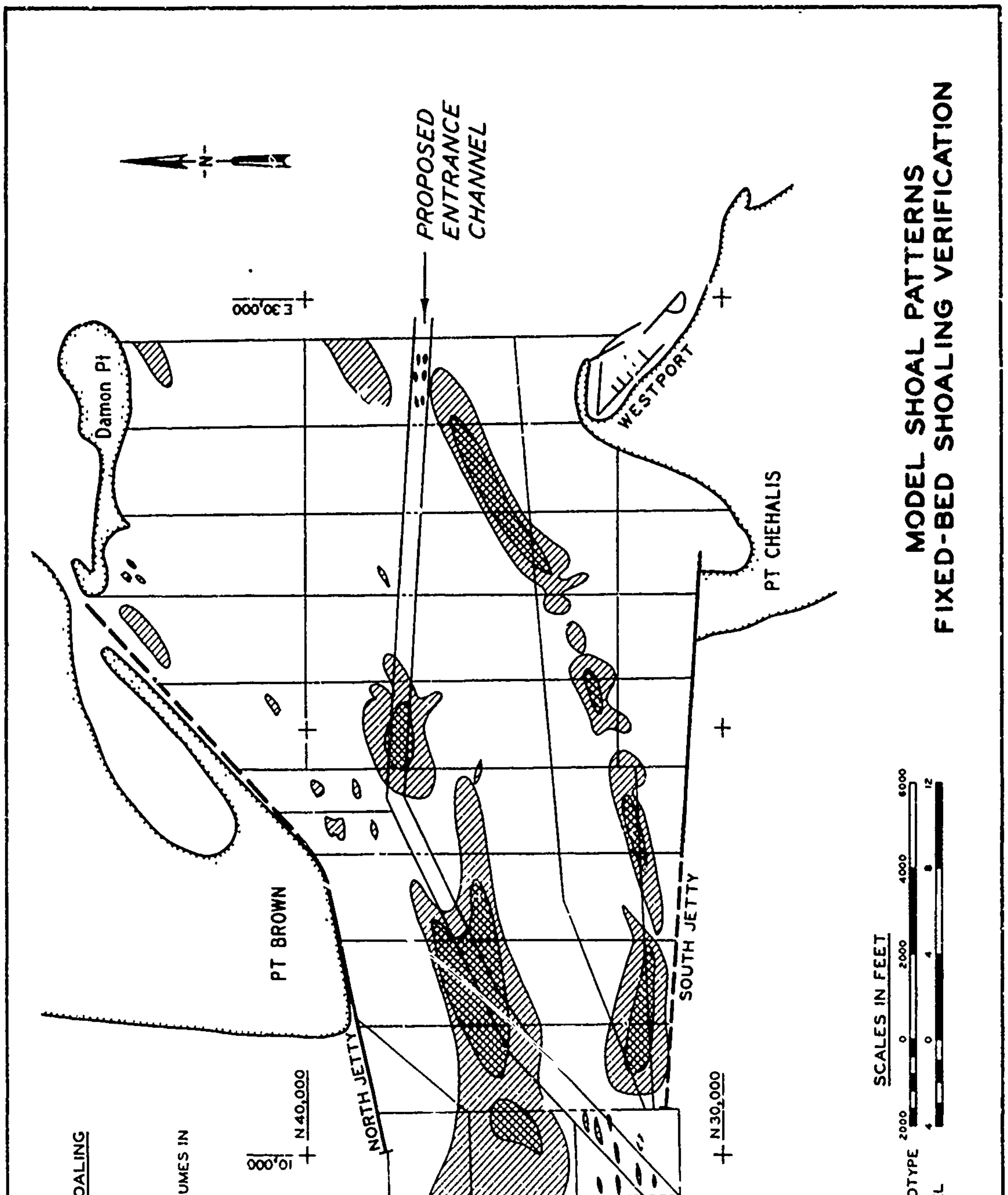
STATION 18



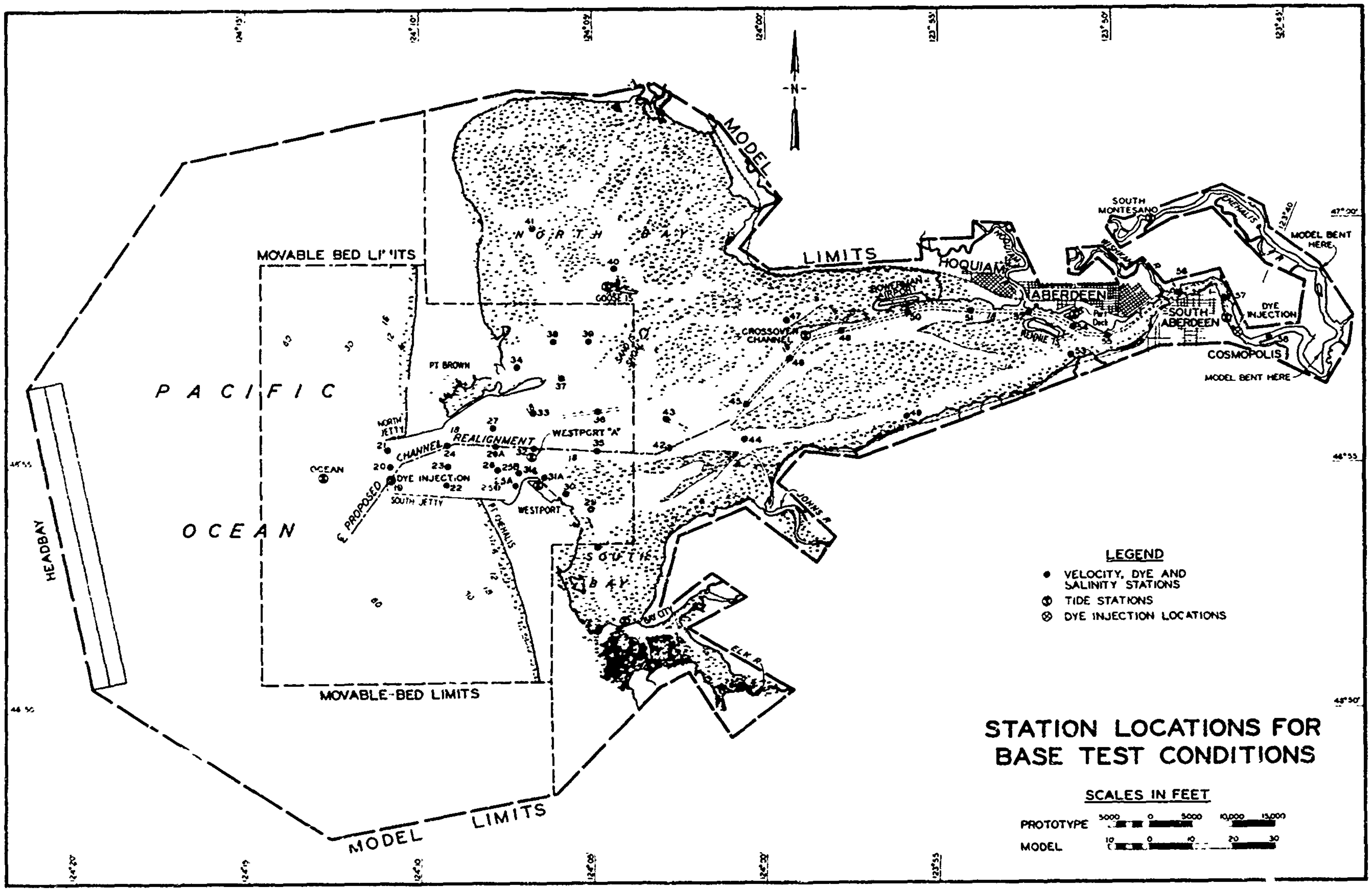
LOCATION OF SHOALING TEST SECTIONS

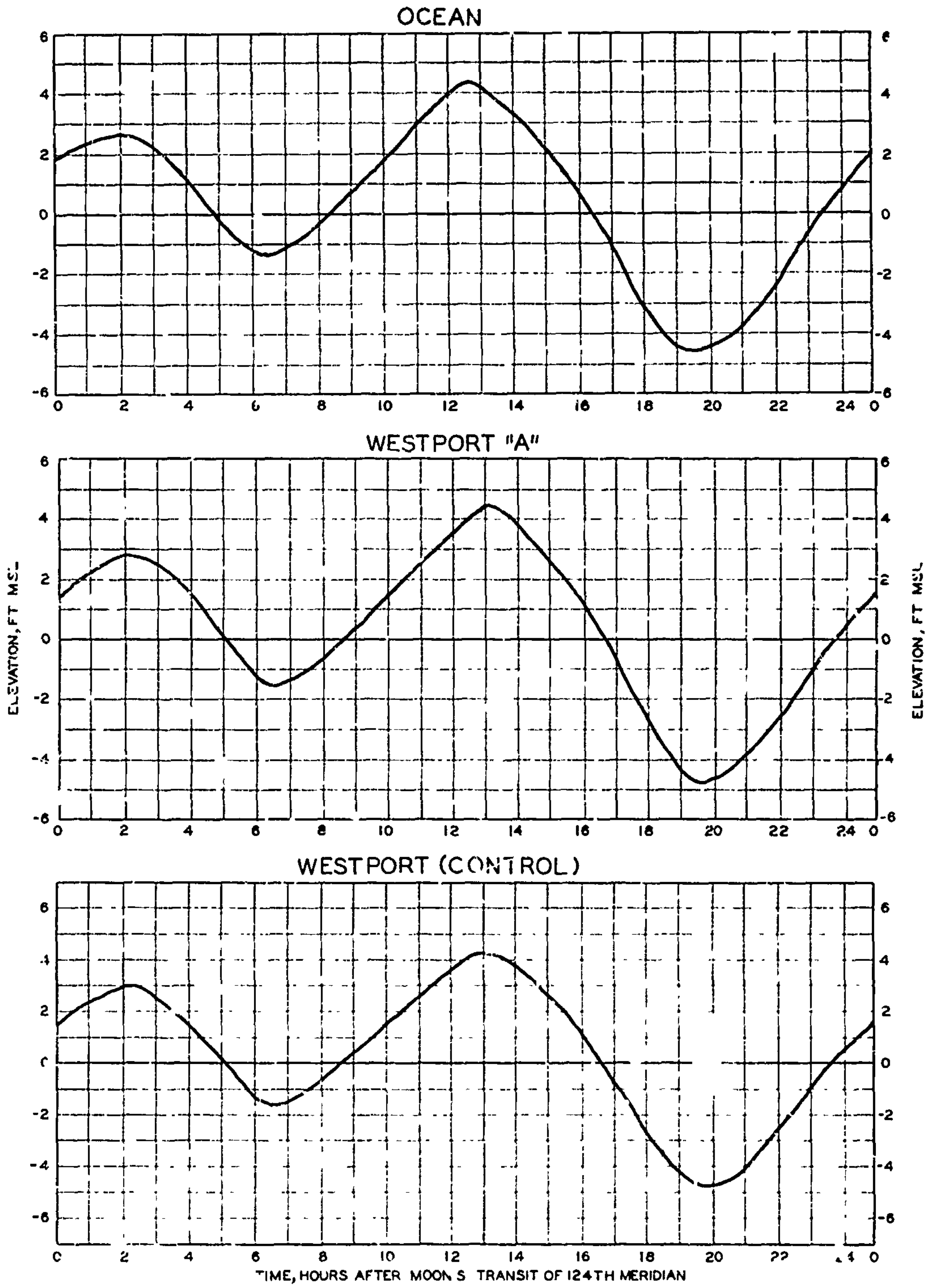


PROTOTYPE
SCOUR AND FILL DURING 1965-1969



MODEL SHOAL PATTERNS
FIXED-BED SHOALING VERIFICATION


STATION LOCATIONS FOR
BASE TEST CONDITIONS
LEGEND
VELOCITY, DYE AND SALINITY STATIONS
TIDE STATIONS
DYE INJECTION LOCATIONS
SCALES IN FEET
PROTOTYPE 5000 0 5000 10,000 15,000
MODEL 10 0 10 20 30
MODEL LIMITS
MOVABLE BED LIMITS
MOVABLE-BED LIMITS
HEADBAY
PACIFIC
OCEAN
NORTH BAY
SOUTH BAY
PT BROWN
NORTH JETTY
SOUTH JETTY
OCEAN
DYE INJECTION
CHANNEL REALIGNMENT
PROPOSED
WESTPORT "A"
WESTPORT
PT CHEHALIS
GOOSE IS
CROSSOVER CHANNEL
HOQUIAM
ABERDEEN
SOUTH ABERDEEN
COSMOPOLIS
SOUTH MONTESANO
MODEL BENT HERE
DYE INJECTION
JOHNS R
ELK R
N



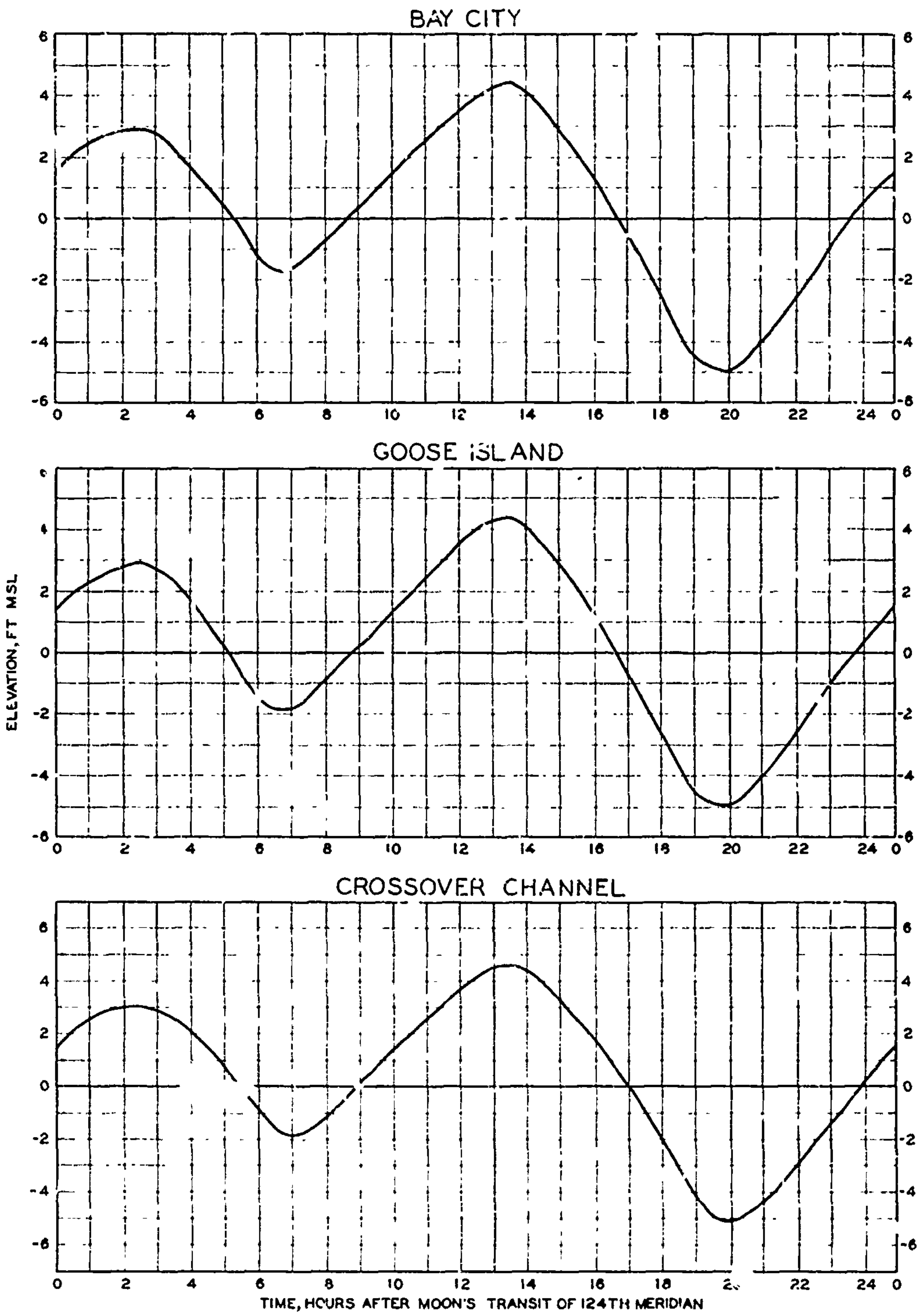
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

TIDE HEIGHTS
BASE TEST CONDITIONS

STATIONS - OCEAN, WESTPORT "A" AND WESTPORT (CONTROL)

PLATE 110

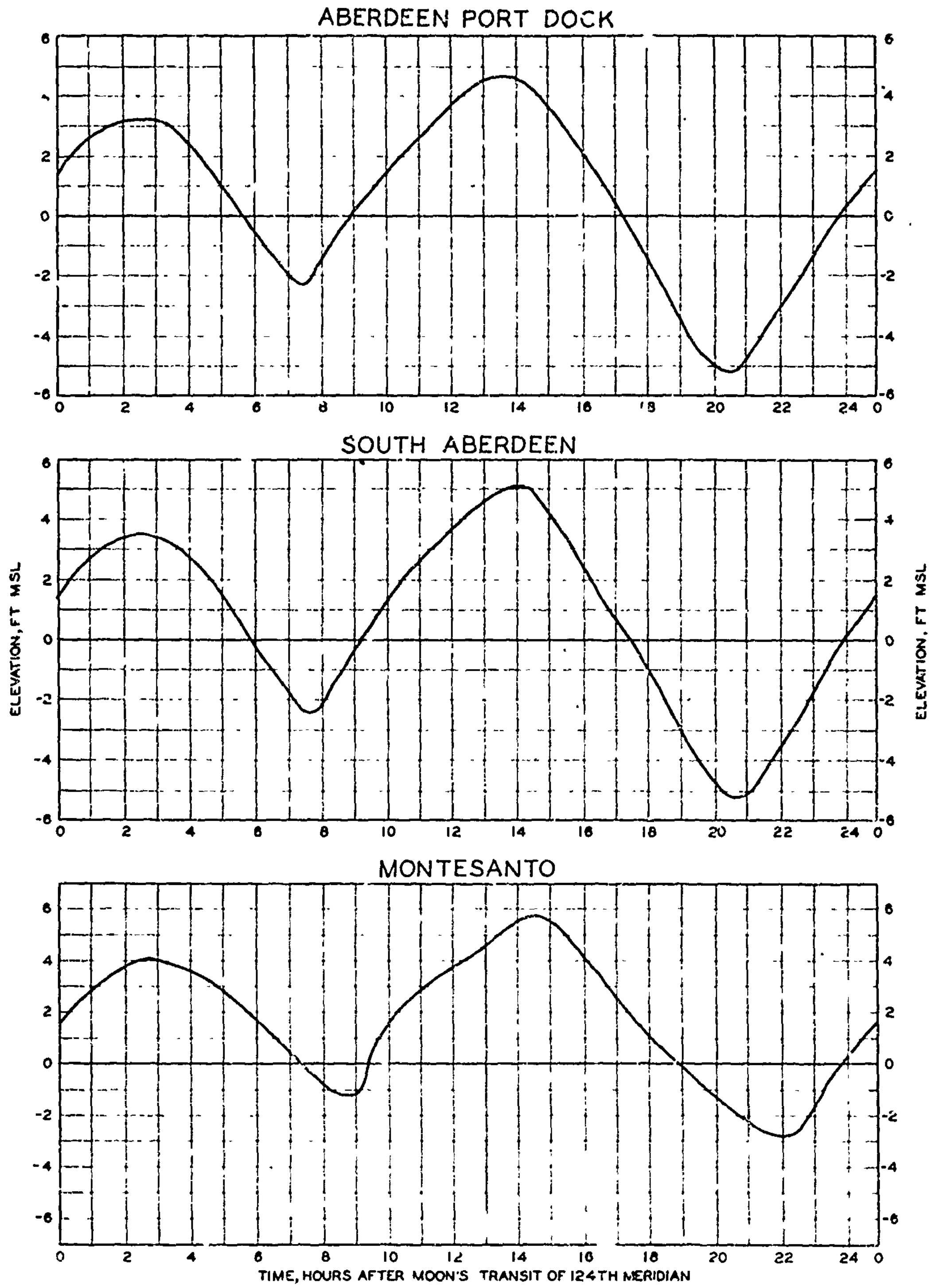


MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

TIDE HEIGHTS
BASE TEST CONDITIONS

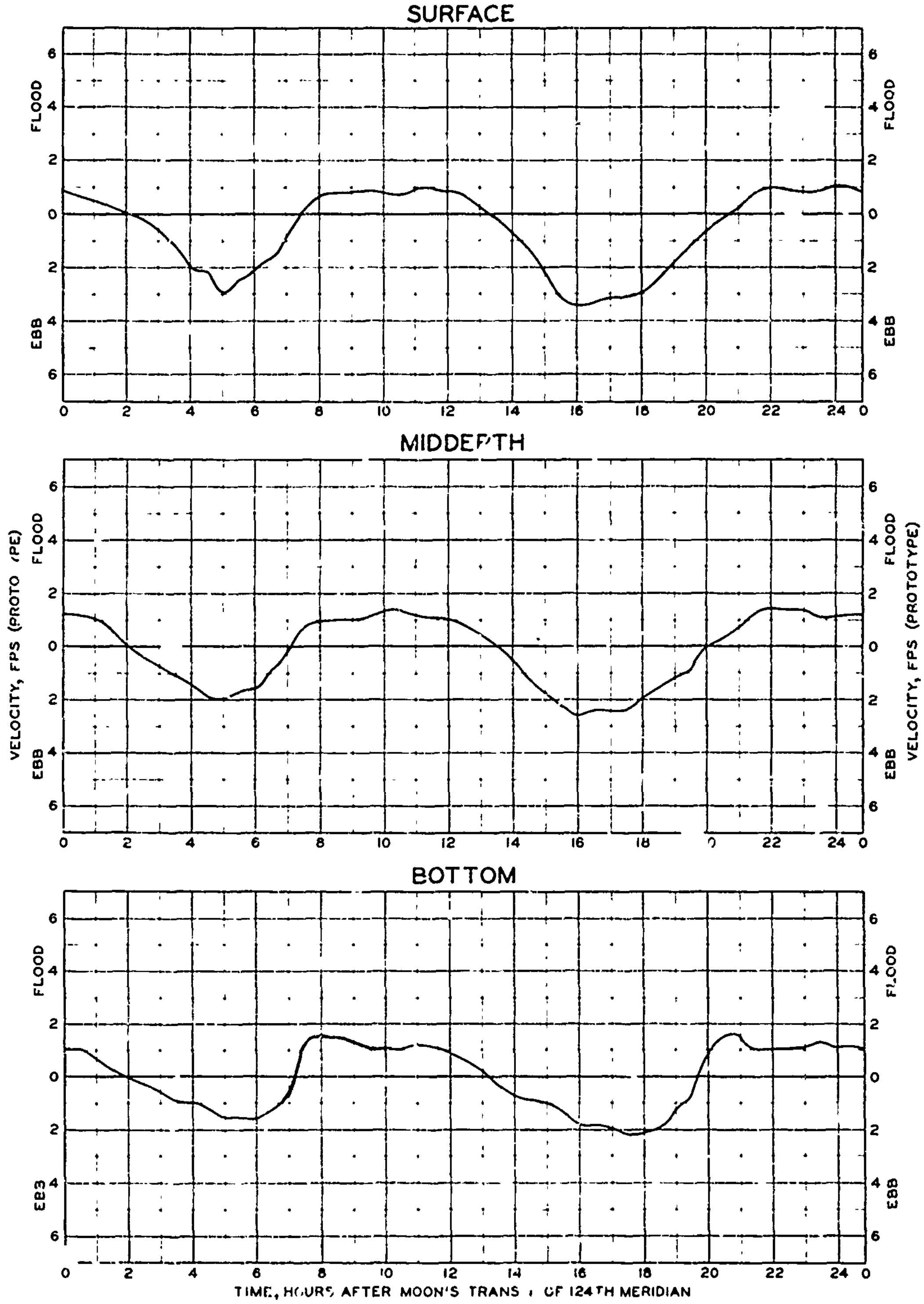
STATIONS - BAY CITY, GOOSE ISLAND AND CROSSOVER CHANNEL



MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

TIDE HEIGHTS
BASE TEST CONDITIONS
STATIONS--ABERDEEN PORT DOCK, SOUTH ABERDEEN AND MONTESANTO



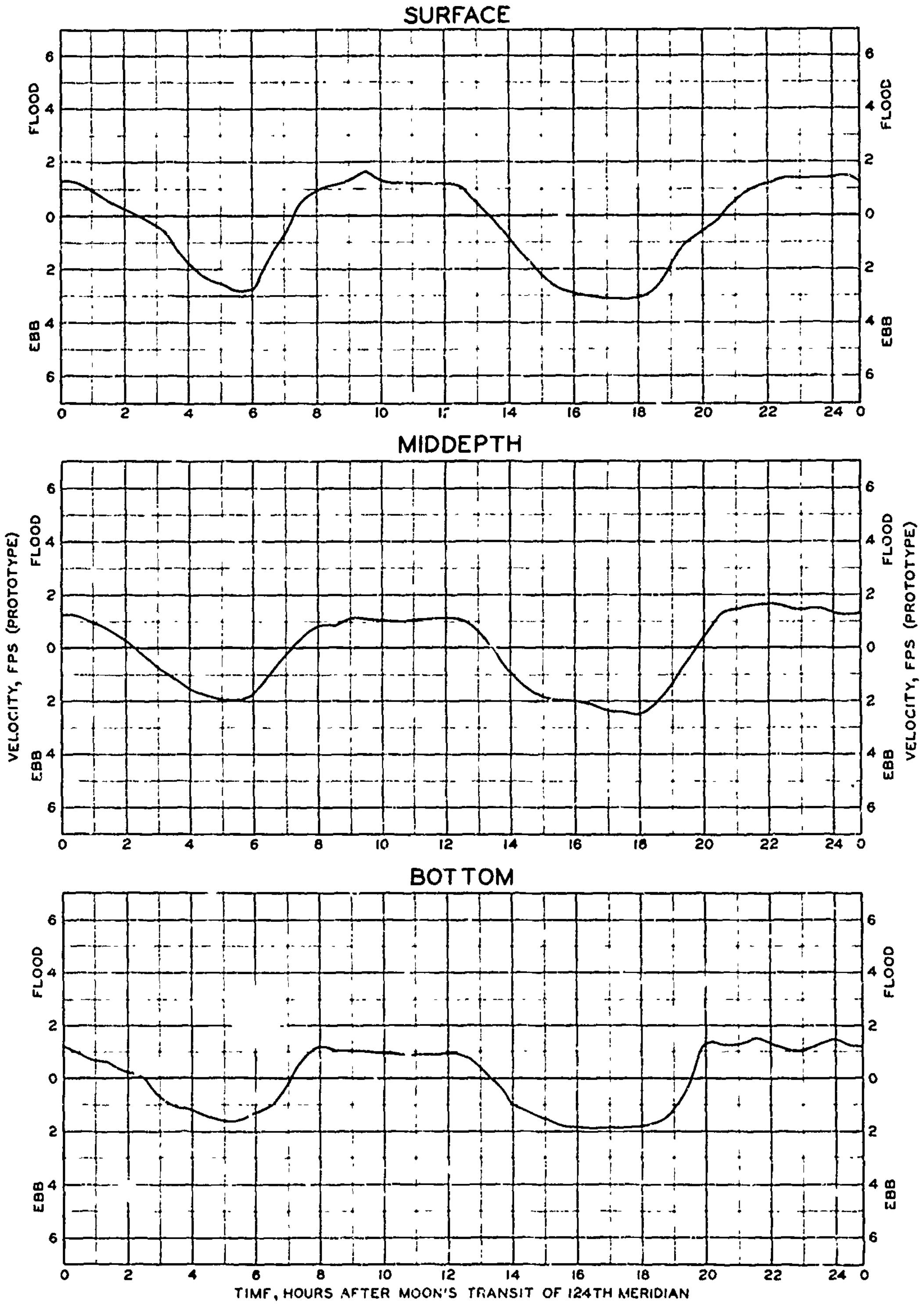
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 19
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

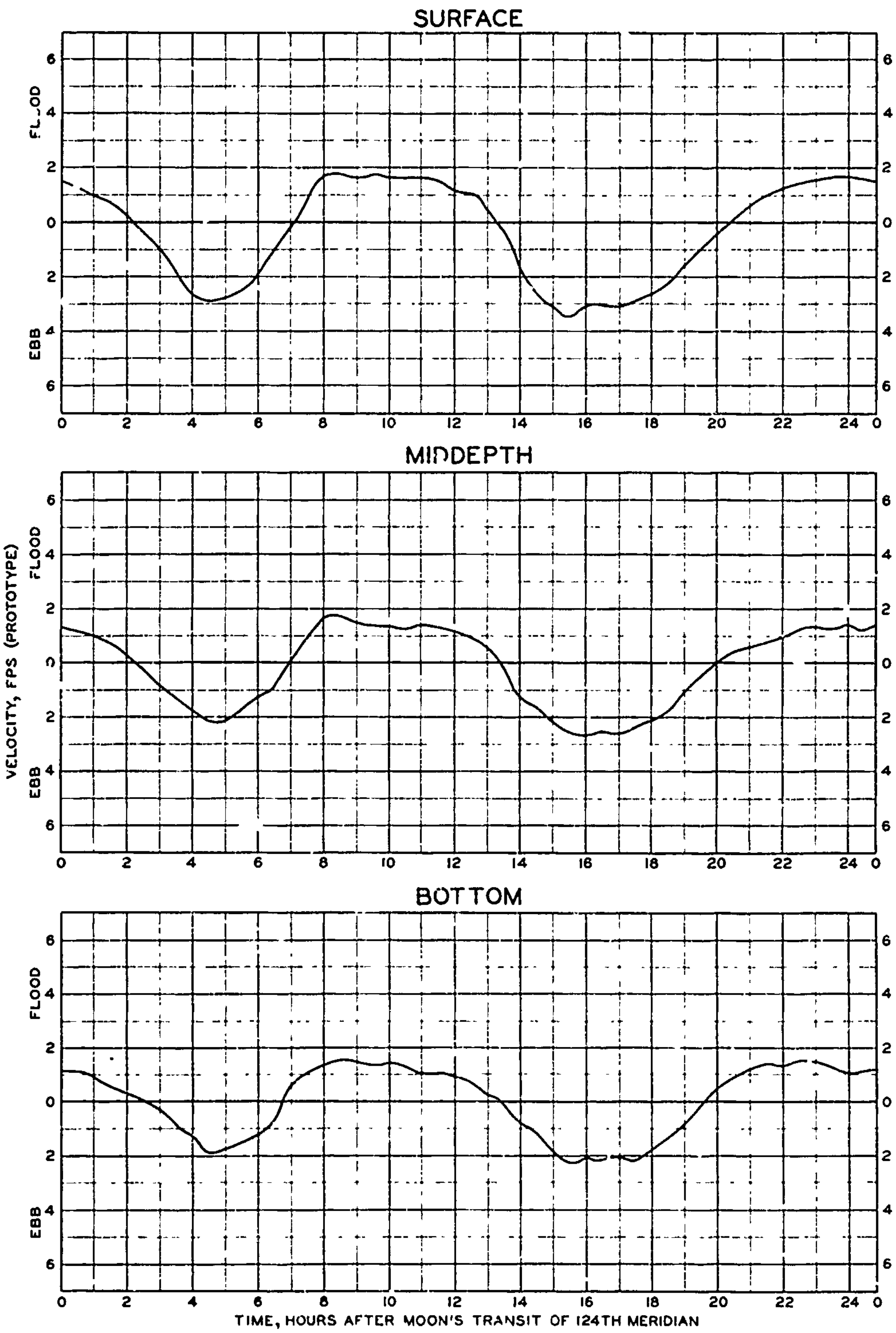
TIDE MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 20
SURFACE, MIDDEPTH AND BOTTOM

PLATE 114



MODEL TEST DATA

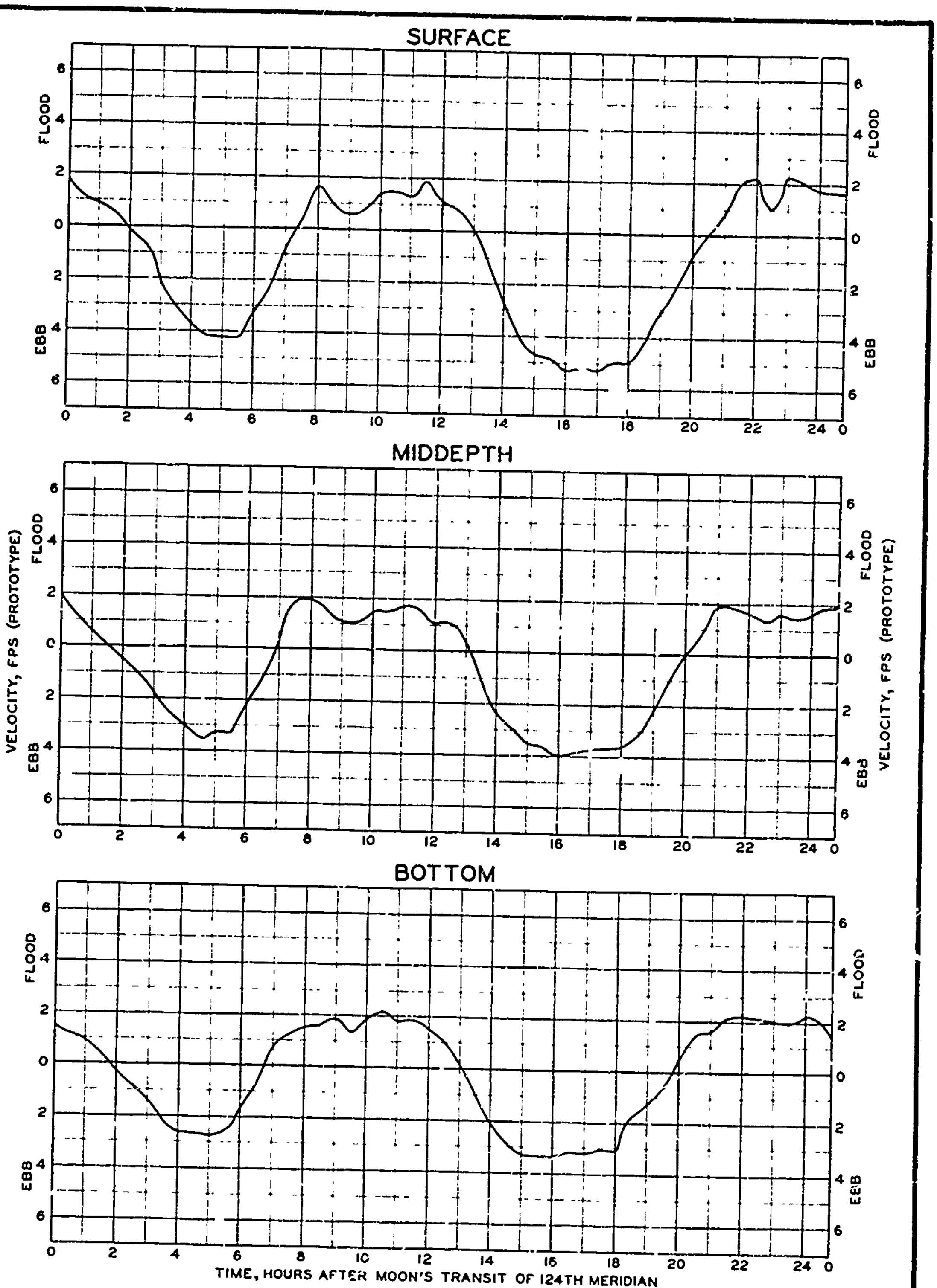
TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 21
SURFACE, MIDDEPTH AND BOTTOM

PLATE 115



MODEL TEST DATA

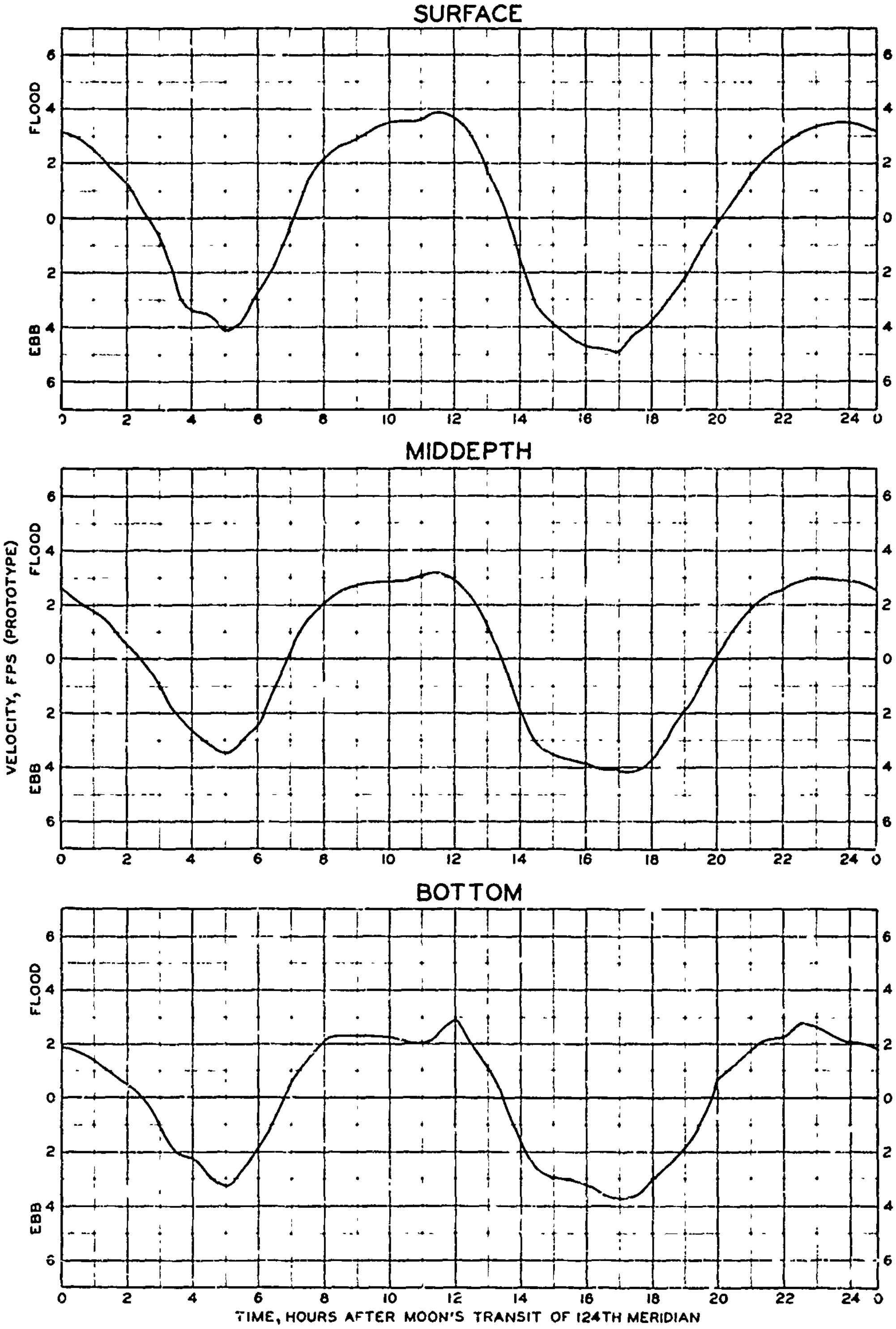
TIDE	MEAN
FRESH WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 22
SURFACE, MIDDEPTH AND BOTTOM

PLATE 116



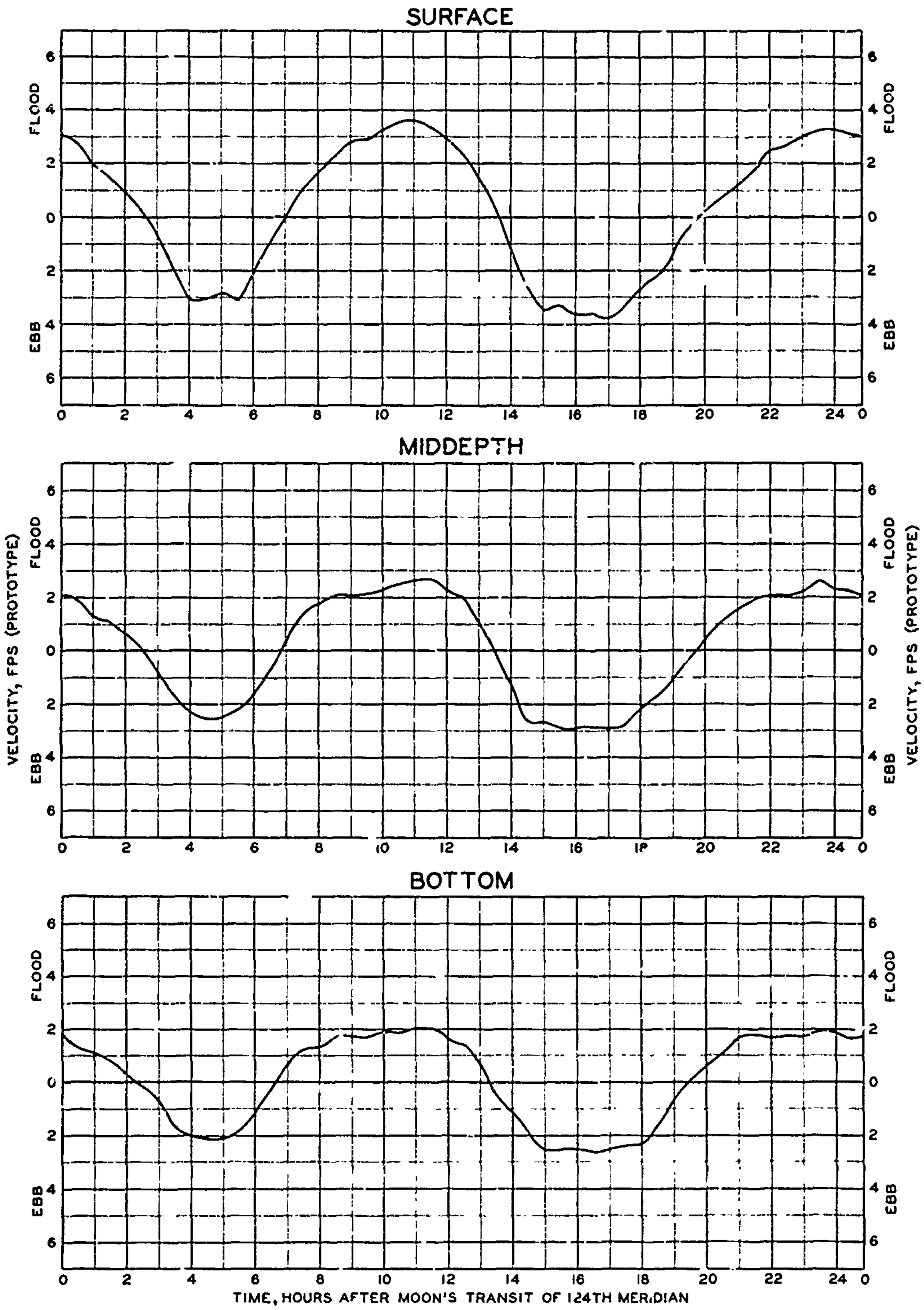
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

—·— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 23
SURFACE, MIDDEPTH AND BOTTOM



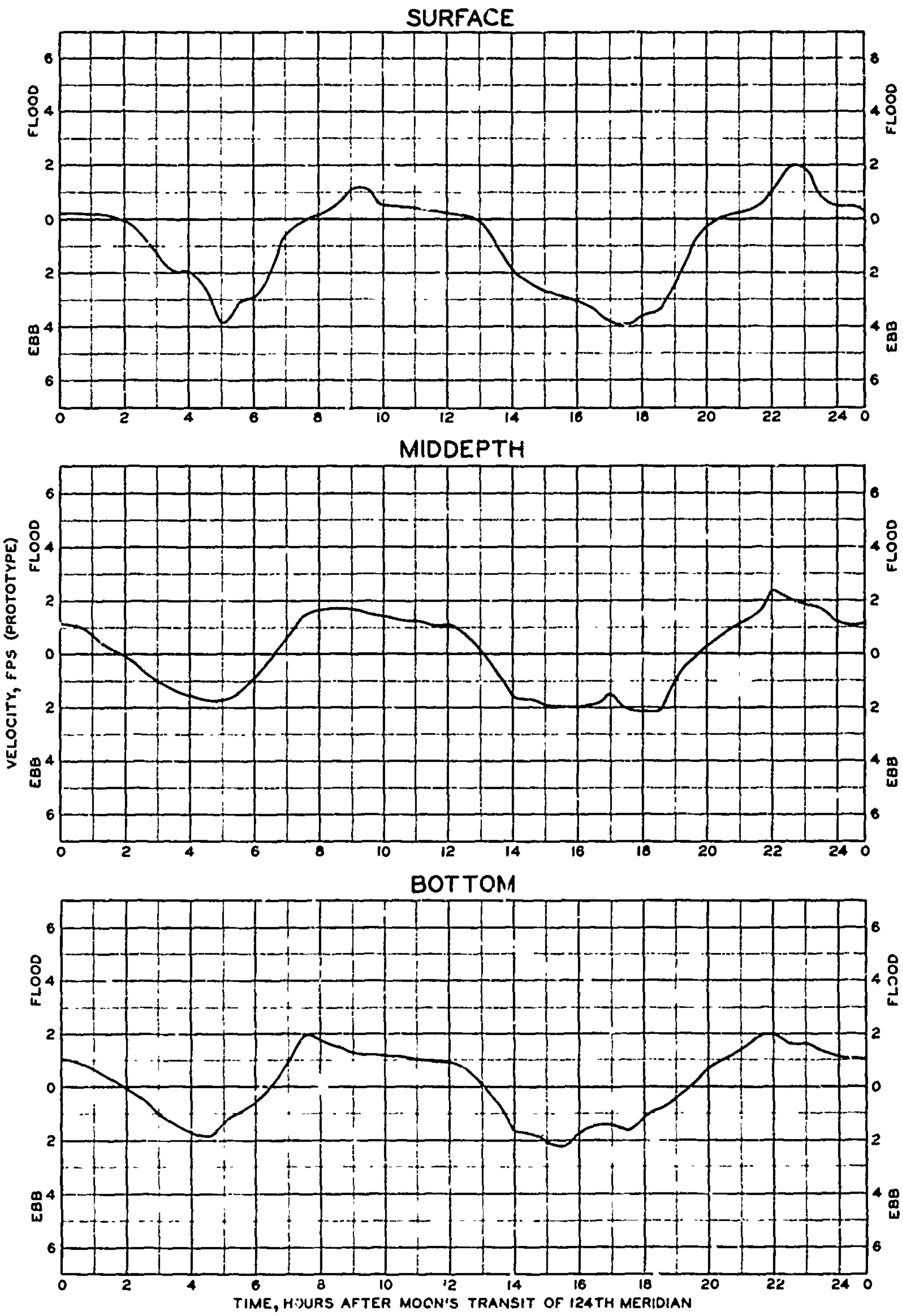
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 24
SURFACE, MIDDEPTH AND BOTTOM



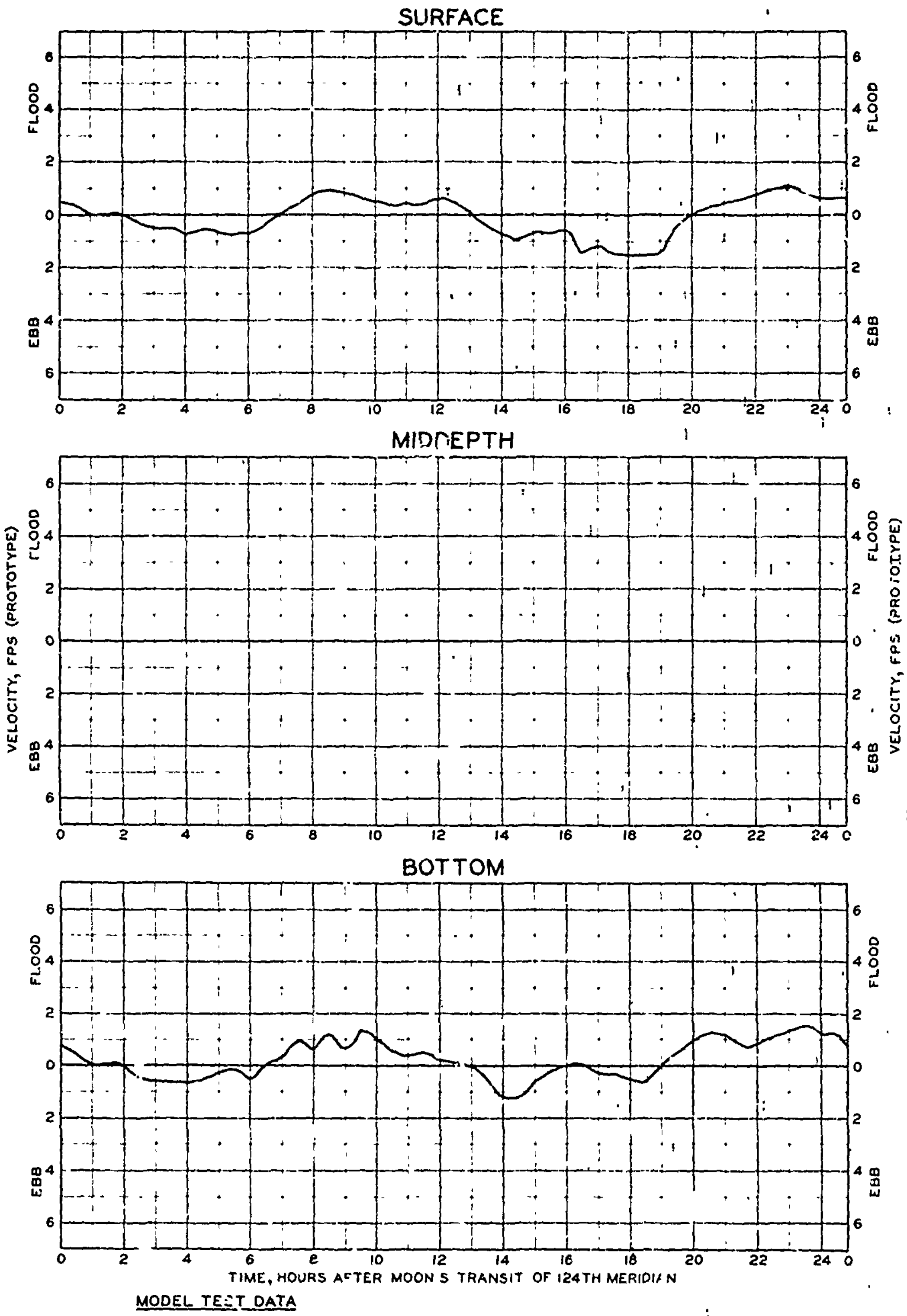
MODEL TEST DATA

TIDE MEAN
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 25
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

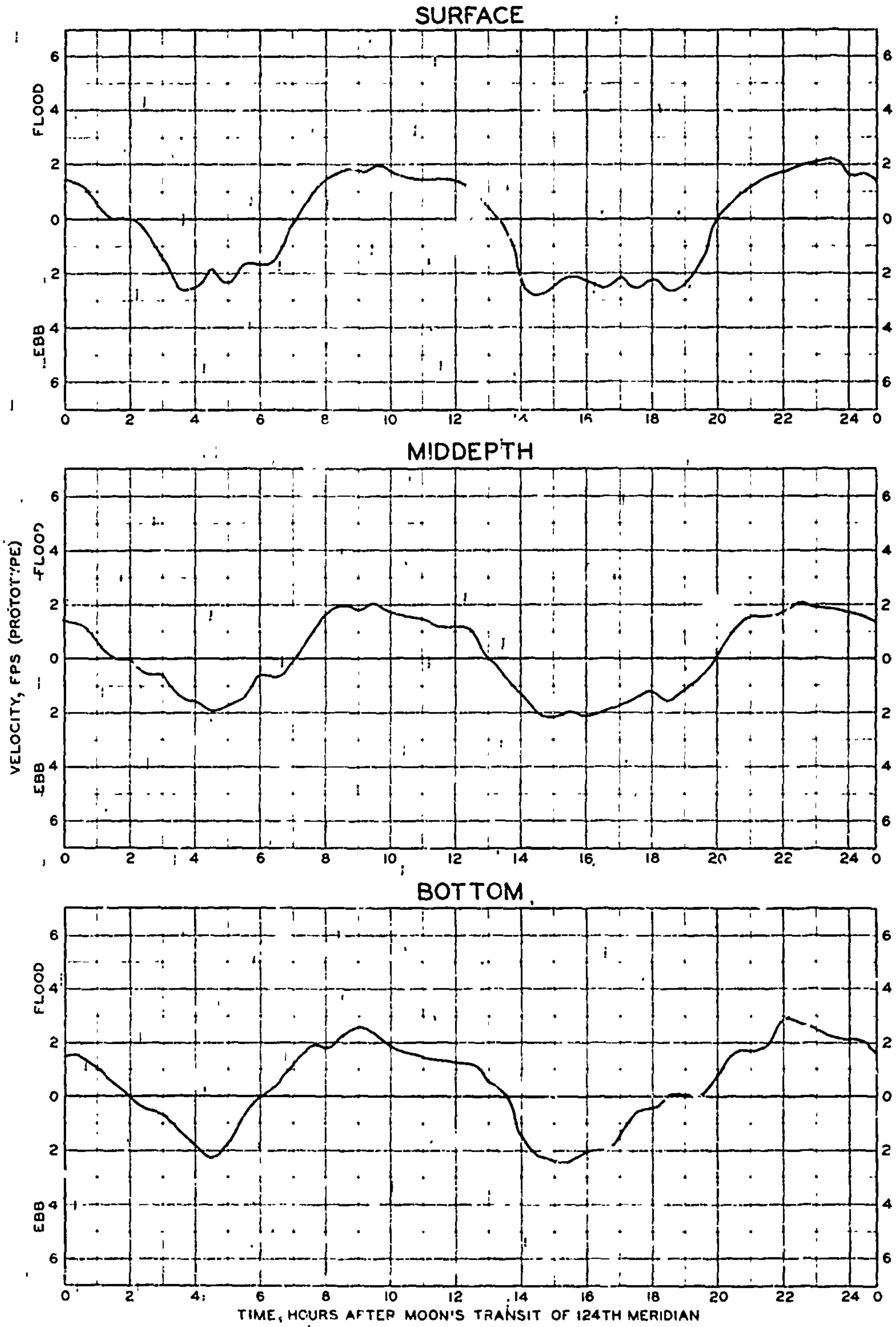
TIDE MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 25A
SURFACE AND BOTTOM

PLATE 120



MODEL TEST DATA

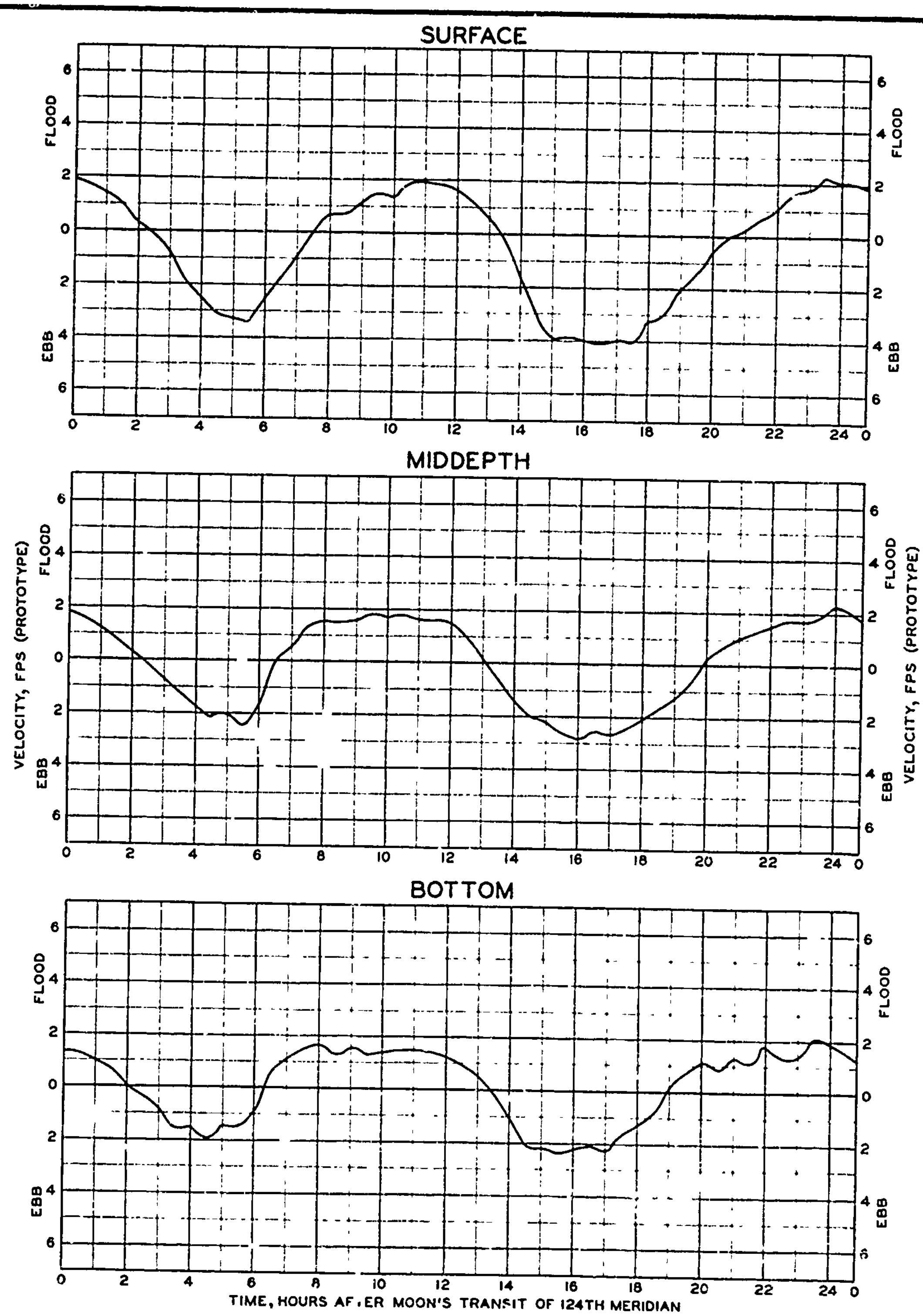
TIDE MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 25B
SURFACE, MIDDEPTH AND BOTTOM

PLATE 121



MODEL TEST DATA

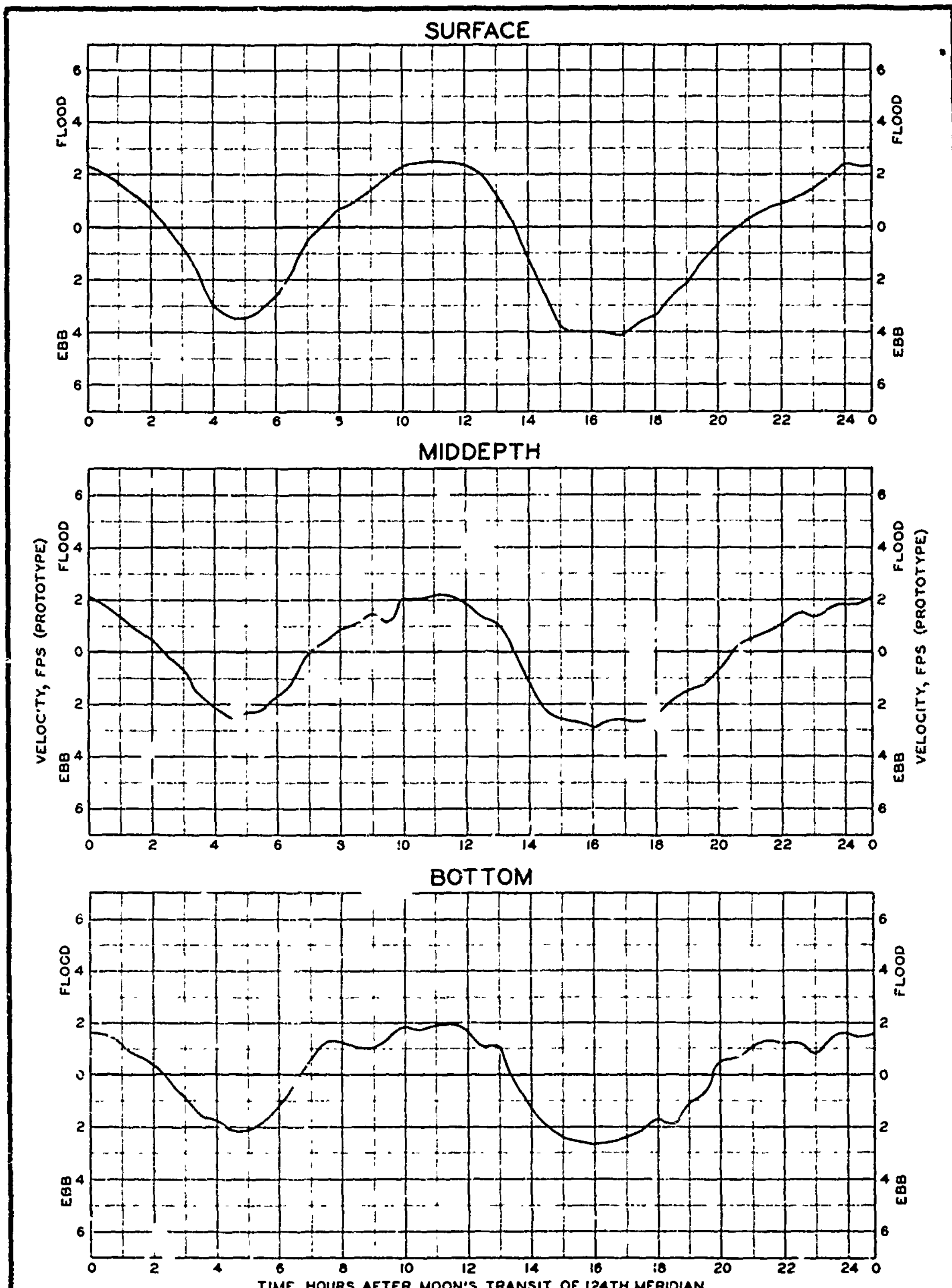
TIDE . MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 26
SURFACE, MIDDEPTH AND BOTTOM

PLATE 122



MODEL TEST DATA

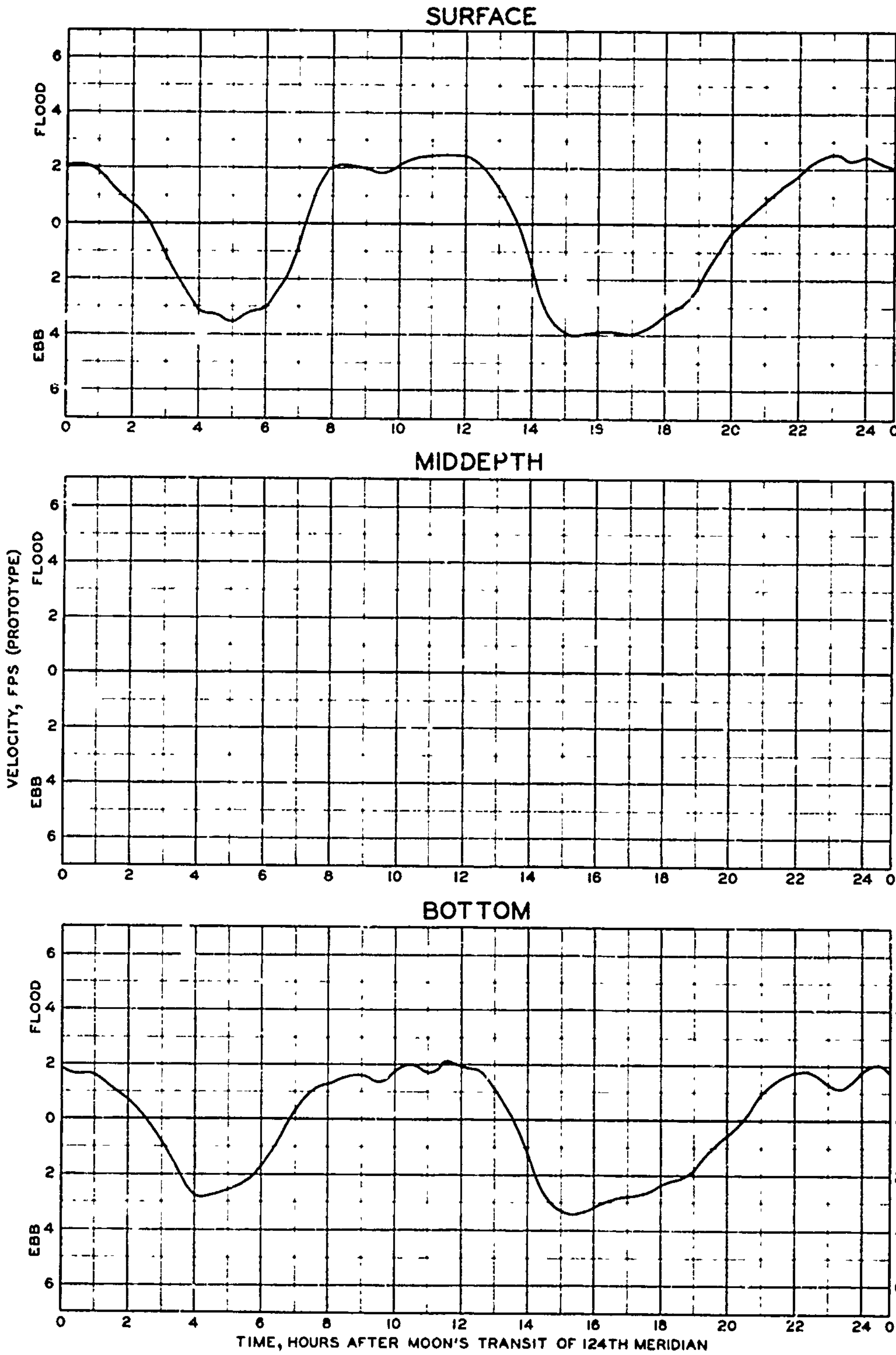
TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 26A
SURFACE, MIDDEPTH AND BOTTOM

PLATE 123



MODEL TEST DATA

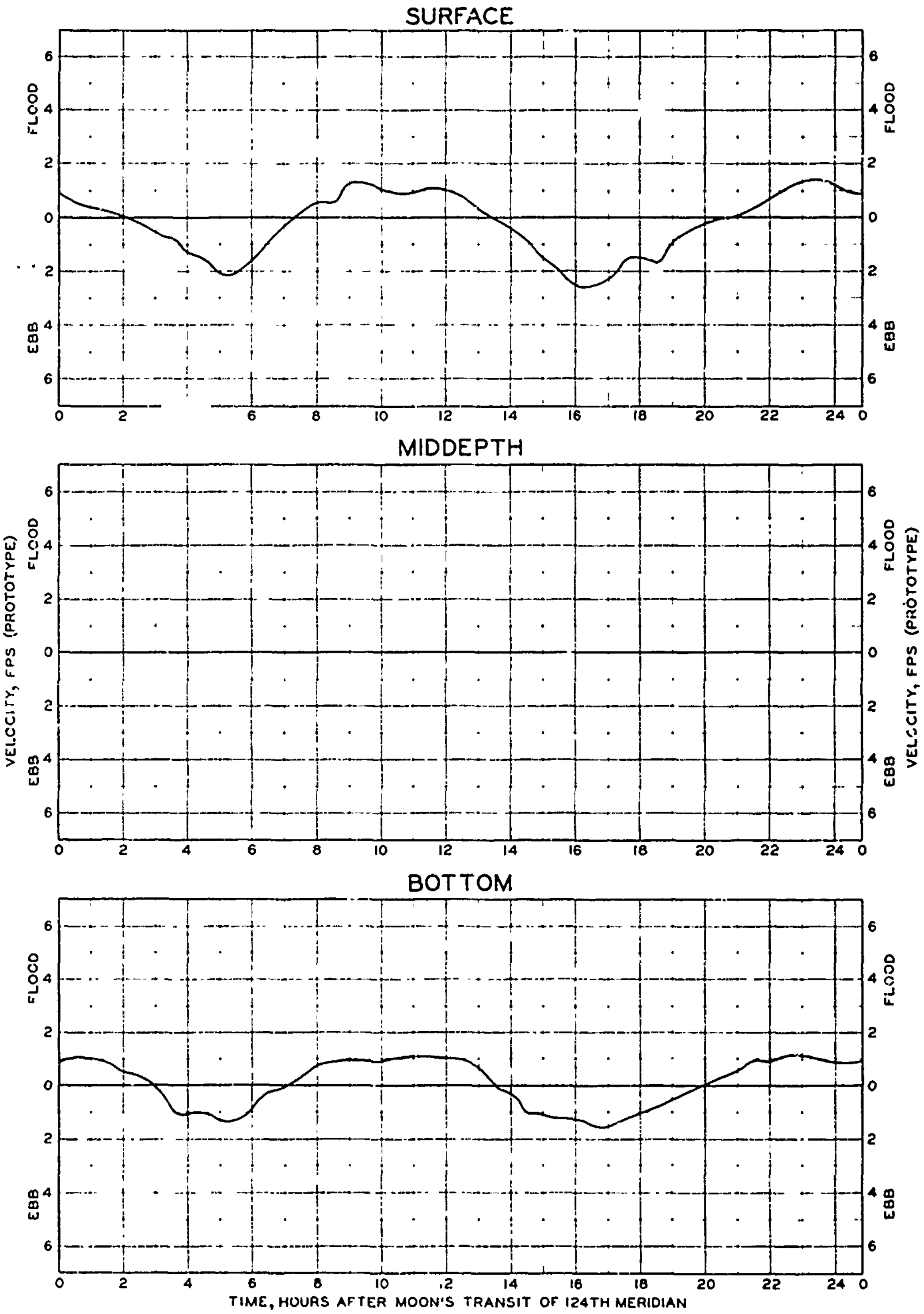
TIDE . . . . MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY. 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 27
SURFACE, MIDDEPTH AND BOTTOM

PLATE 124



MODEL TEST DATA

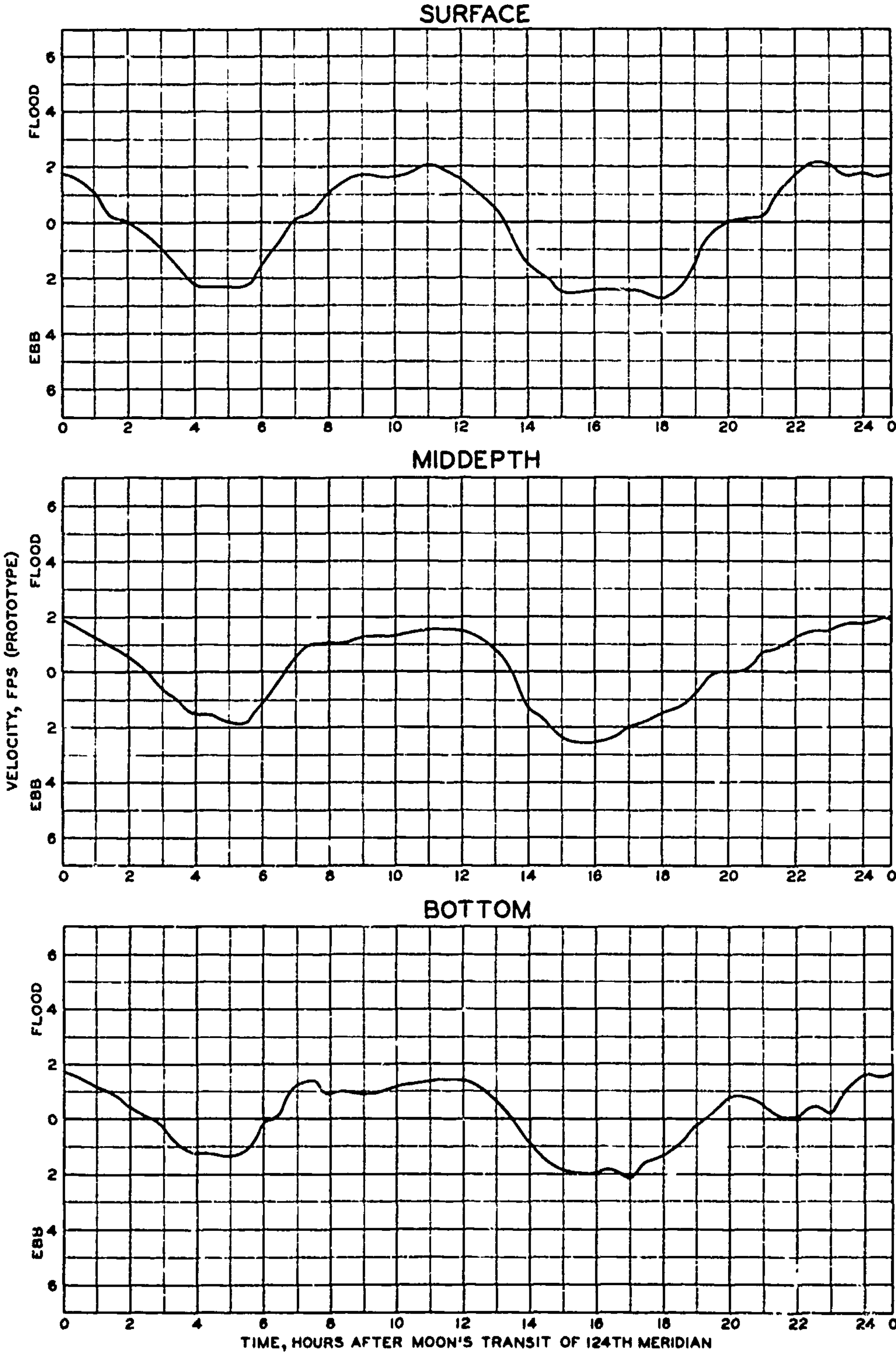
TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 28
SURFACE, MIDDEPTH AND BOTTOM

PLATE 125



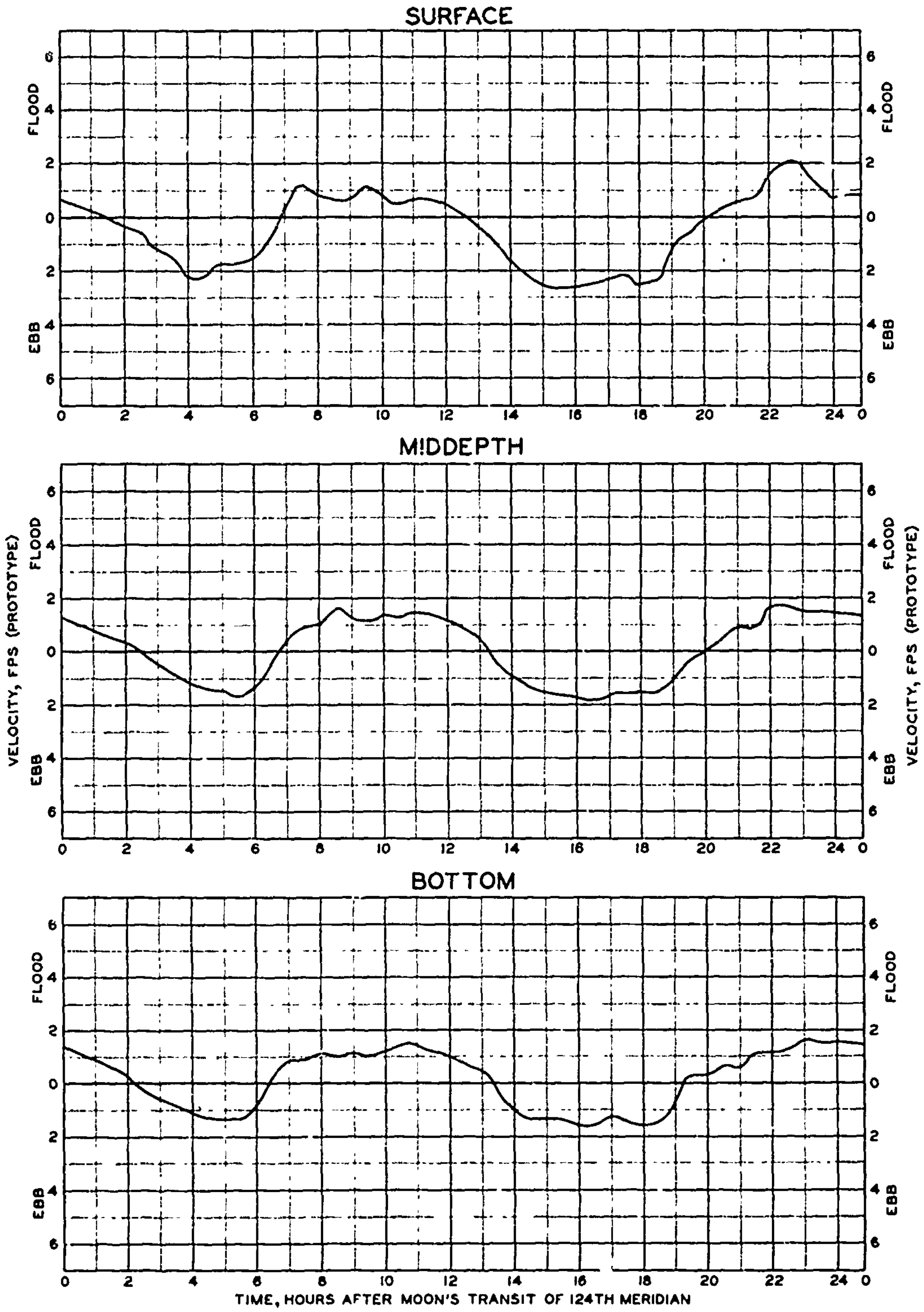
MODEL TEST DATA

TIDE .... MEAN
FRESH W[illegible] DISCHARGE ...11,400 CFS
SOU[illegible] [illegible]ITY .. 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 29
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

TIDE . MEAN
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . 33.0 PPT

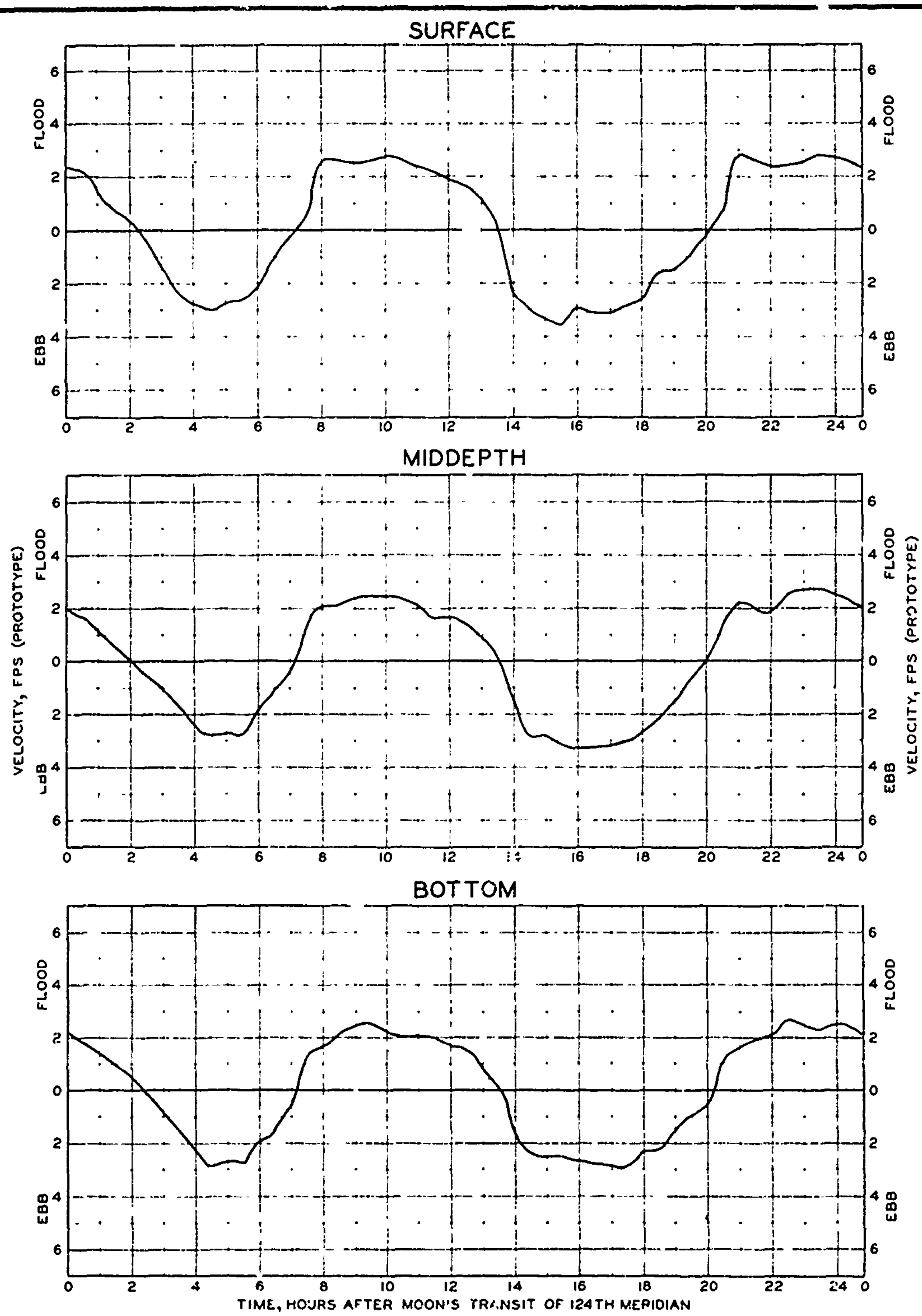
LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES

STATION 30

SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

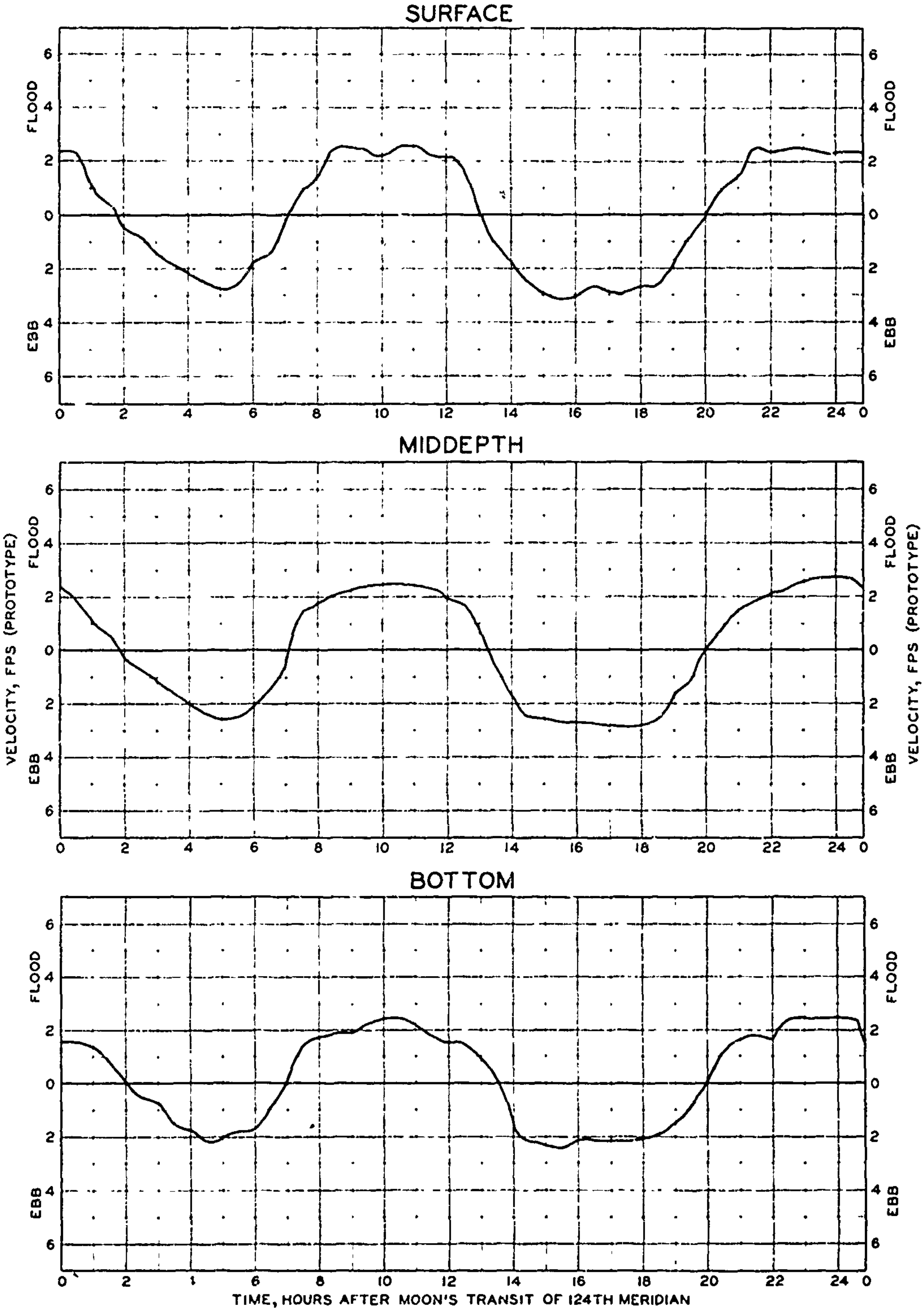
TIDE MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 31
SURFACE, MIDDEPTH AND BOTTOM

PLATE 128



MODEL TEST DATA

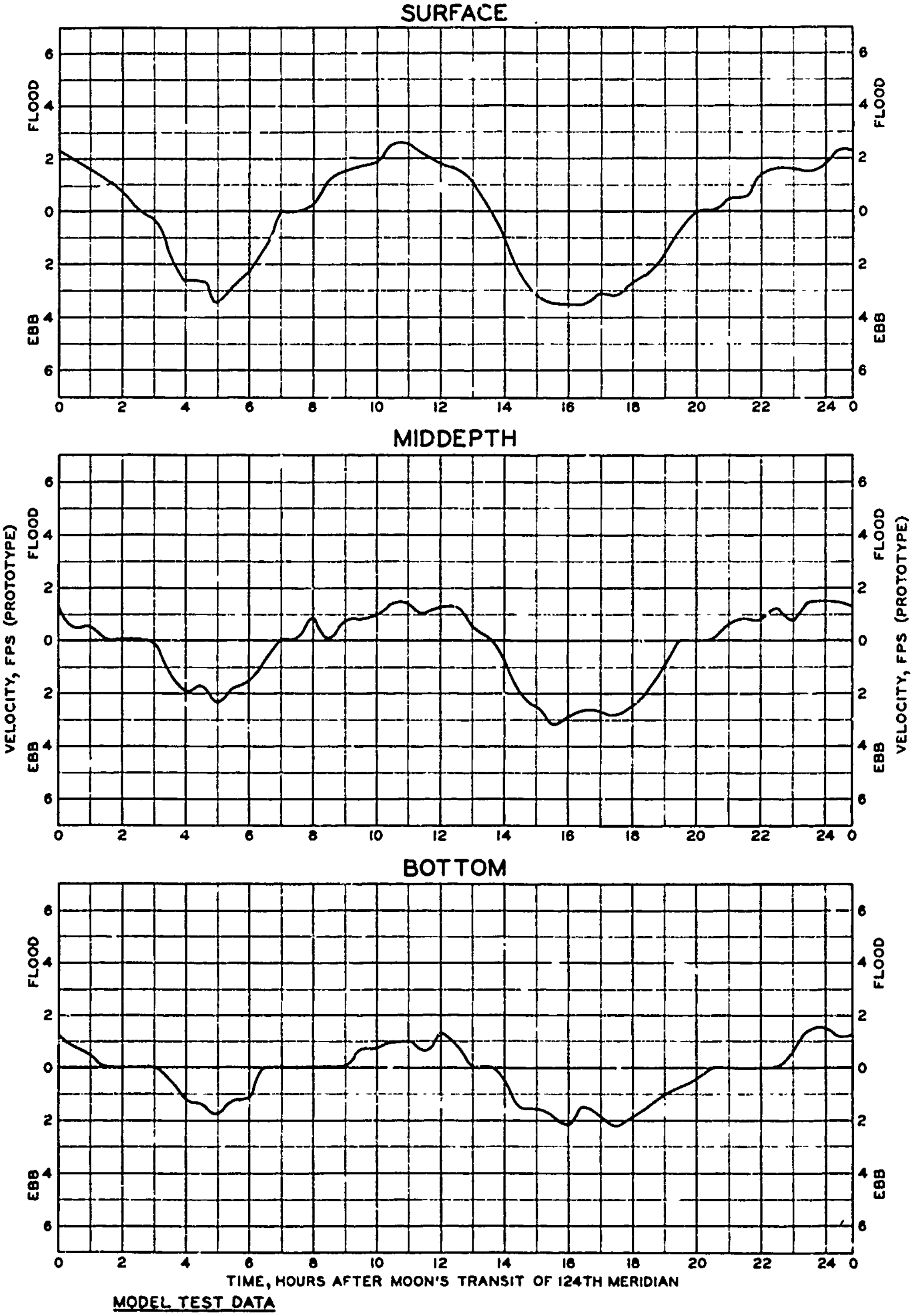
TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 31A
SURFACE, MIDDEPTH AND BOTTOM

PLATE 129



MODEL TEST DATA

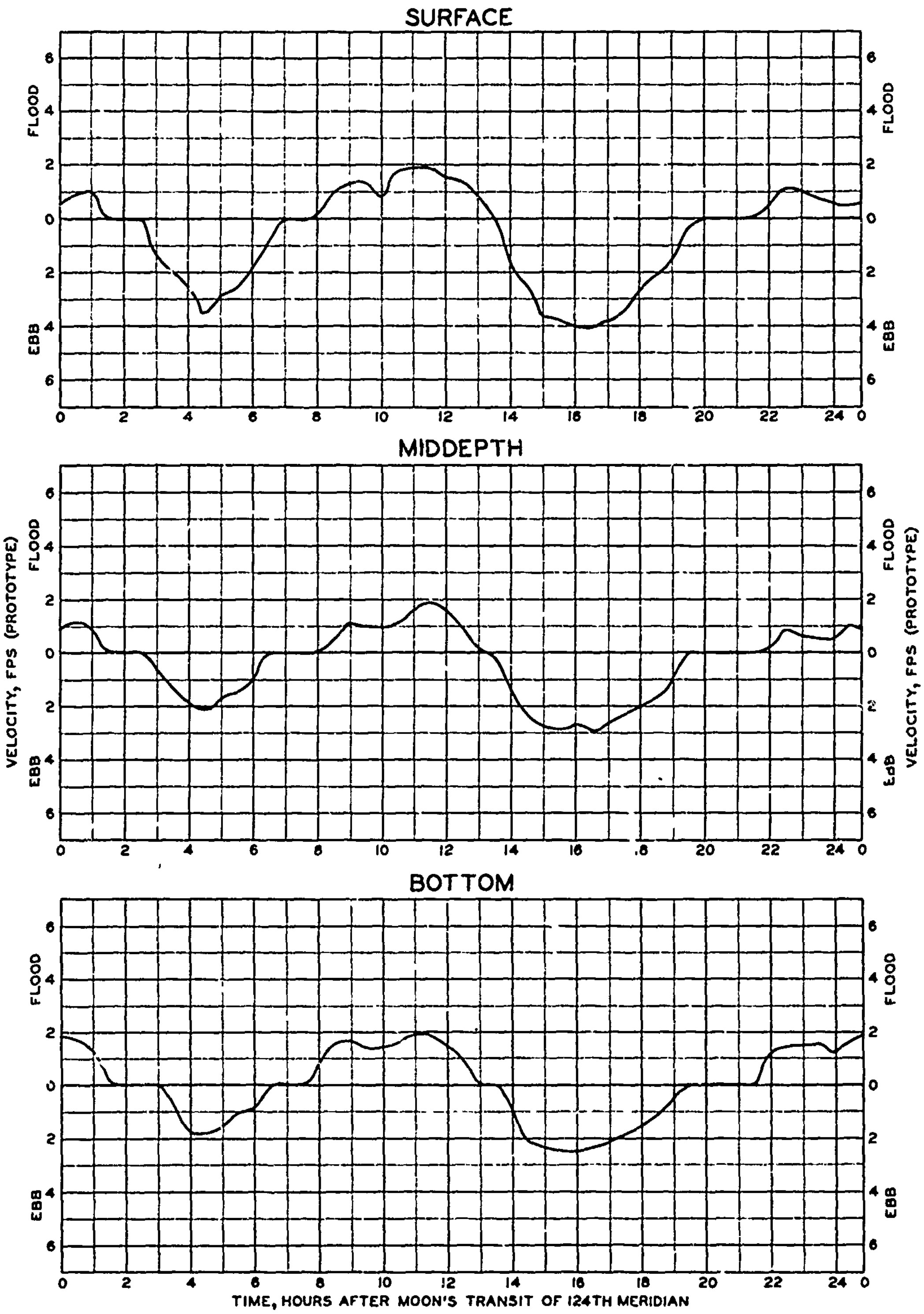
TIDE . . . . MEAN
FRESH-WATER DISCHARGE ... 11,400 CFS
SOURCE SALINITY . . . . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 32
SURFACE, MIDDEPTH AND BOTTOM

PLATE 130



MODEL TEST DATA

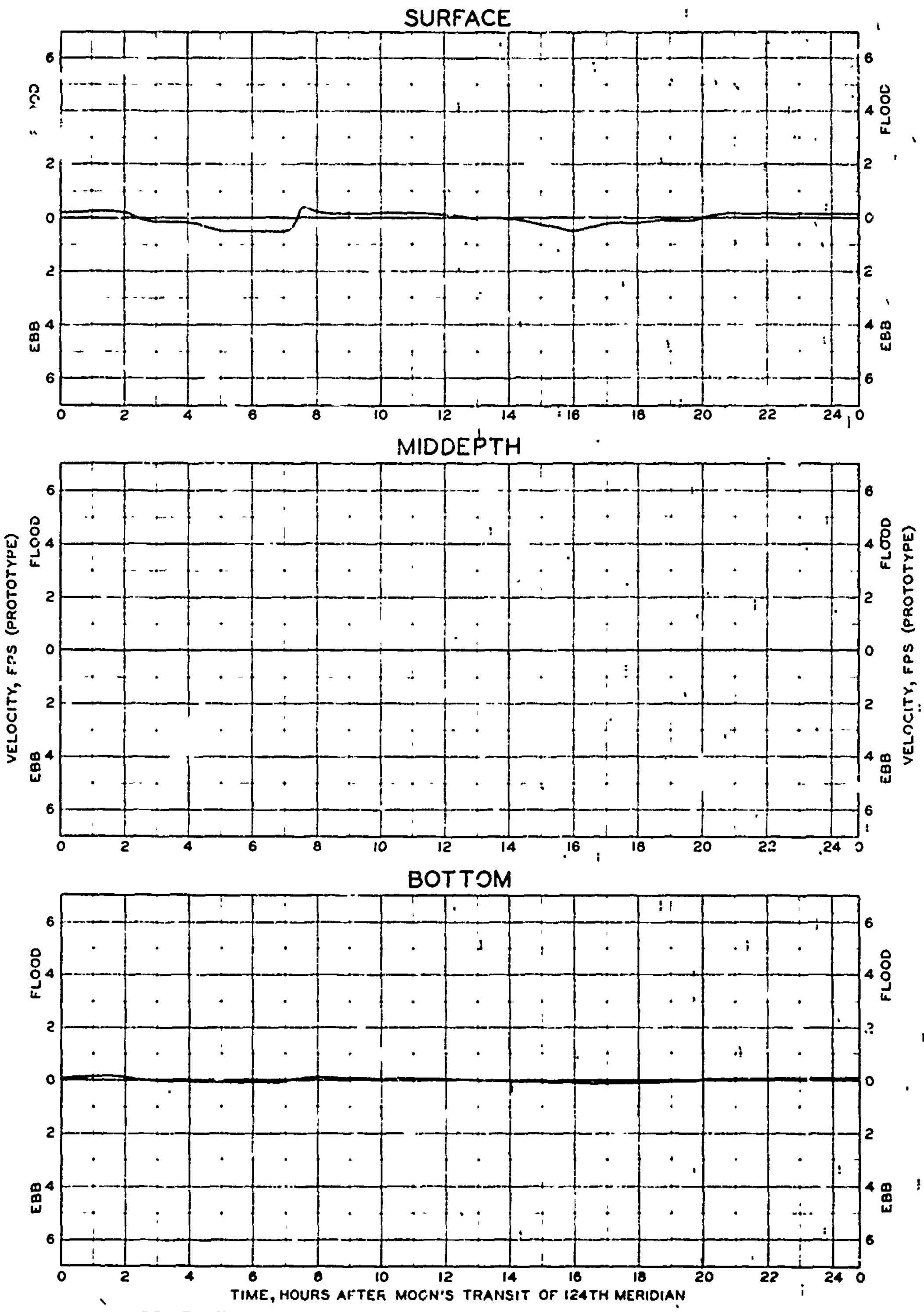
TIDE .... MEAN
FRESH-WATER DISCHARGE ... 11,400 CFS
SOURCE SALINITY ...... 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 33
SURFACE, MIDDEPTH AND BOTTOM

PLATE 131



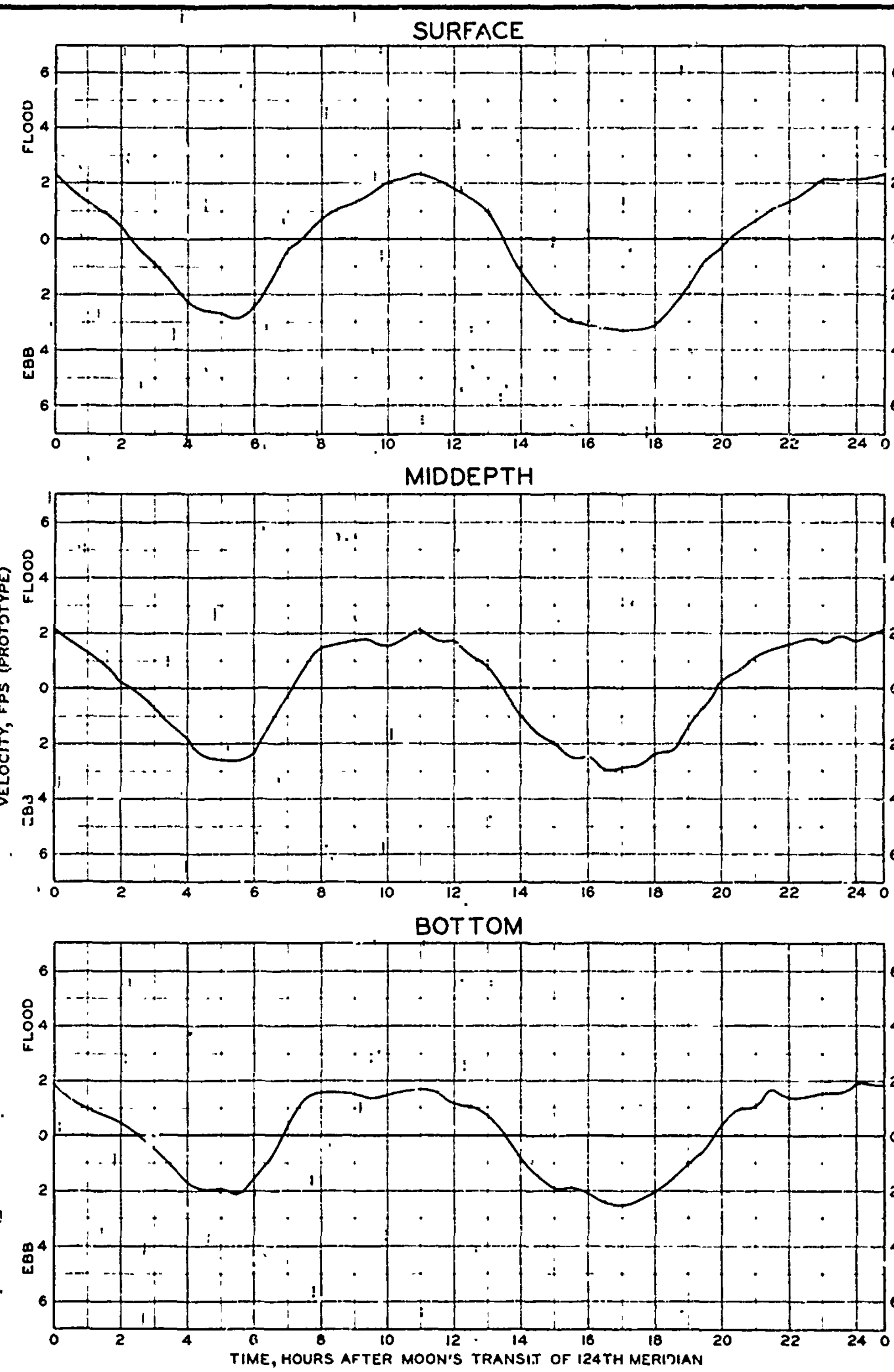
MODEL TEST DATA

TIDE MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 34
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

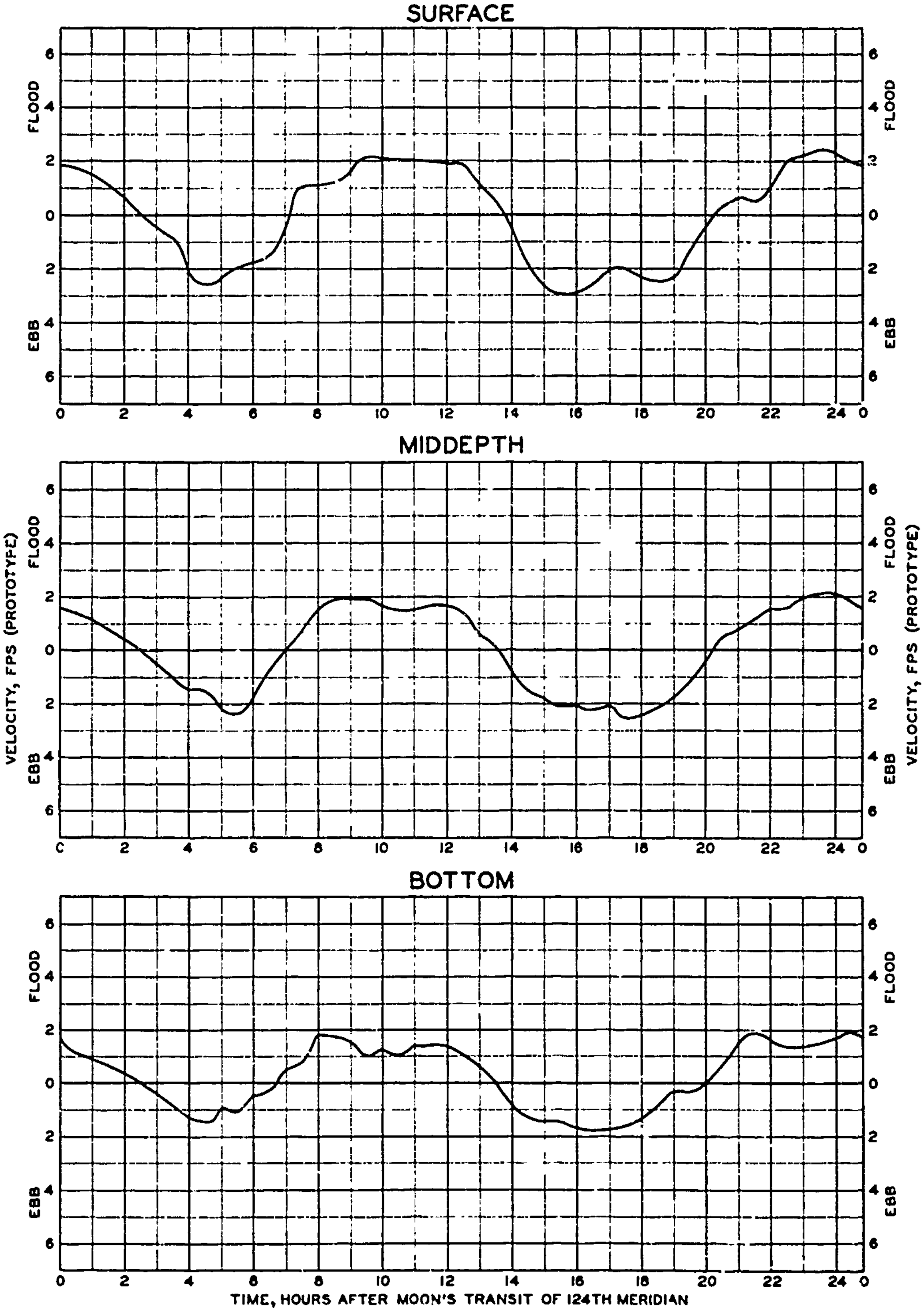
TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 35
SURFACE, MIDDEPTH AND BOTTOM

PLATE 133



MODEL TEST DATA

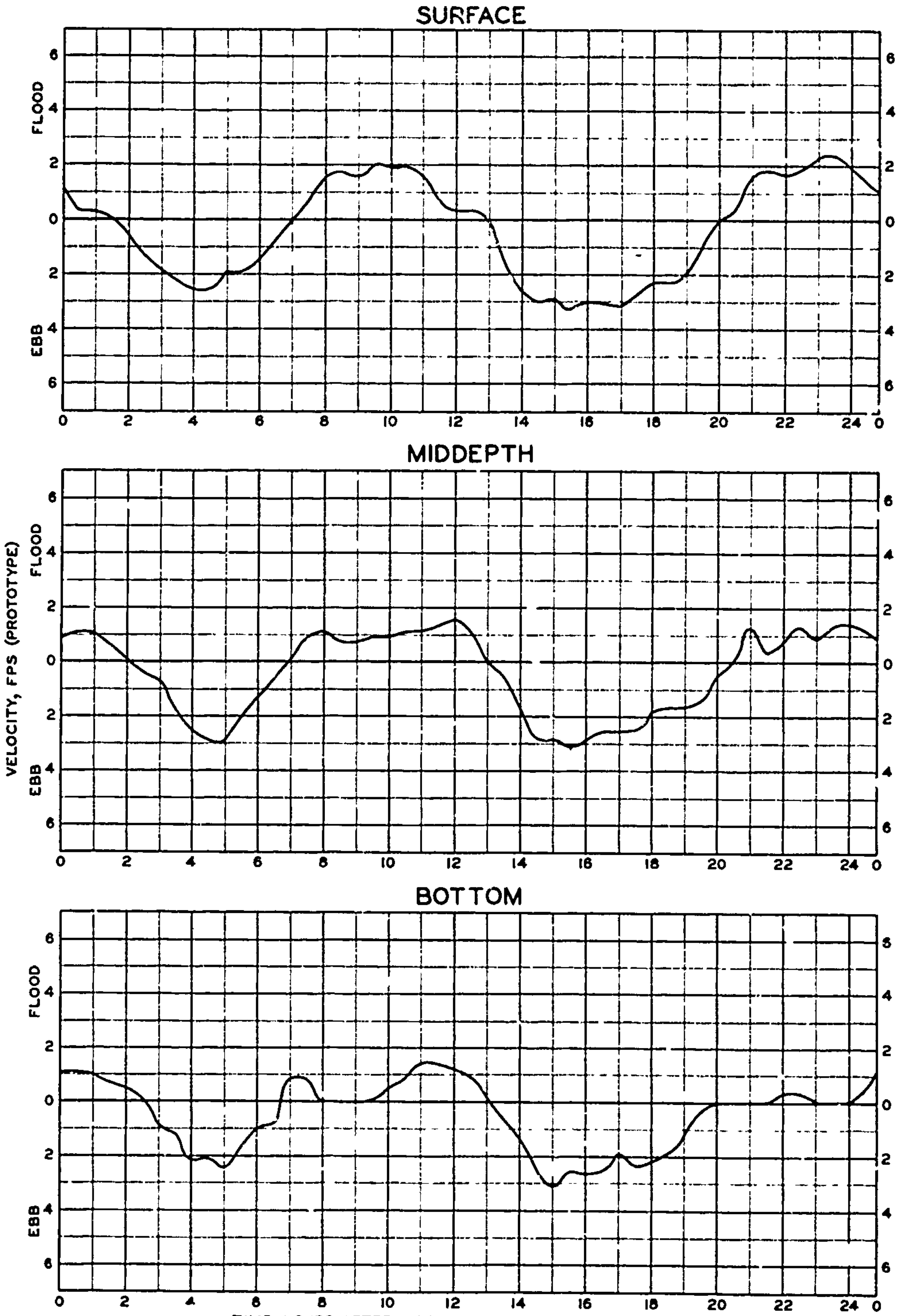
TIDE . MEAN
FRESH-WATER DISCHARGE . .11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 36

SURFACE, MIDDEPTH AND BOTTOM



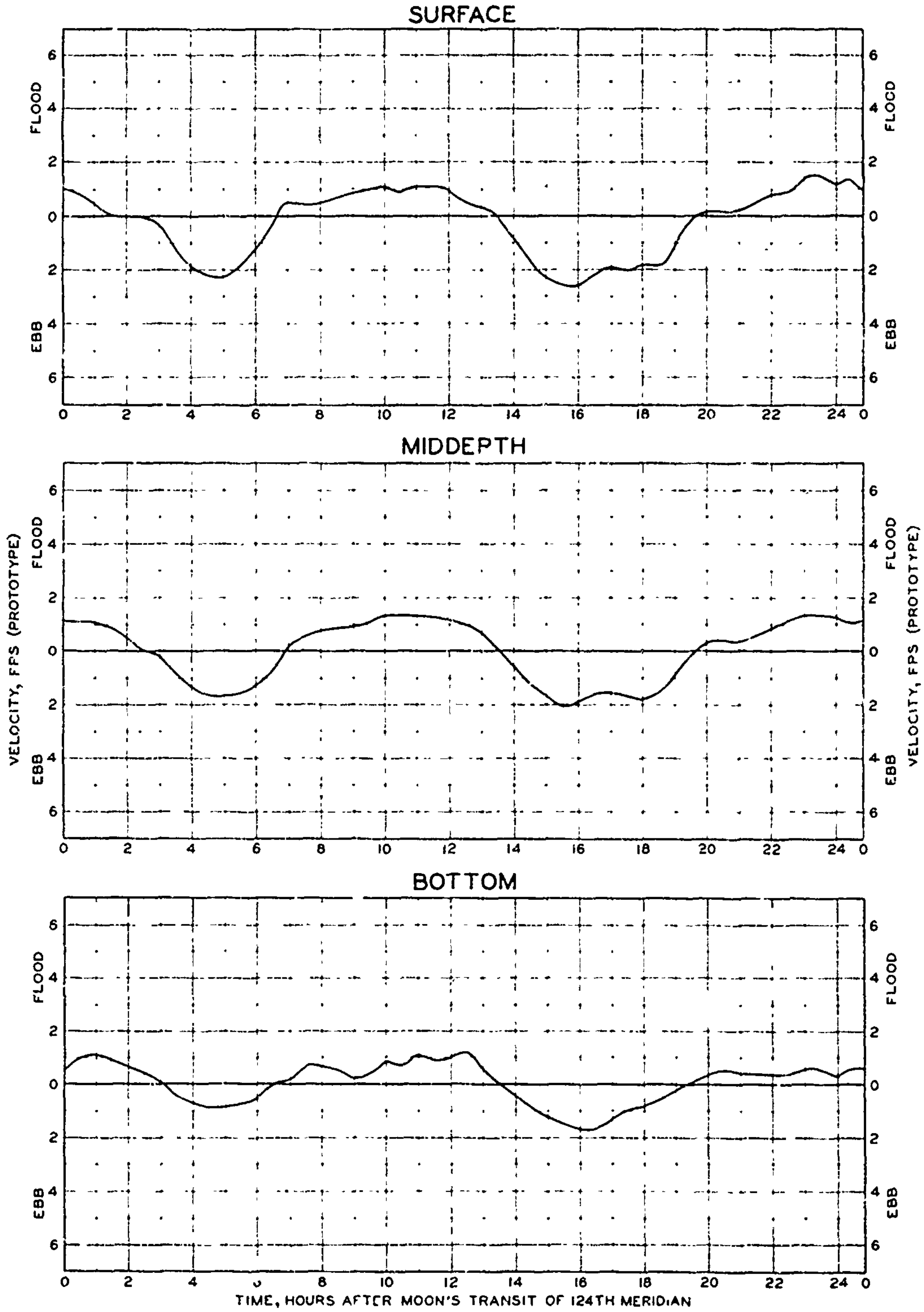
MODEL TEST DATA

TIDE .. . . . MEAN
FRESH-WATER DISCHARGE . .11,400 CFS
SOURCE SALINITY. 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 37
SURFACE, MIDDEPTH AND BOTTOM



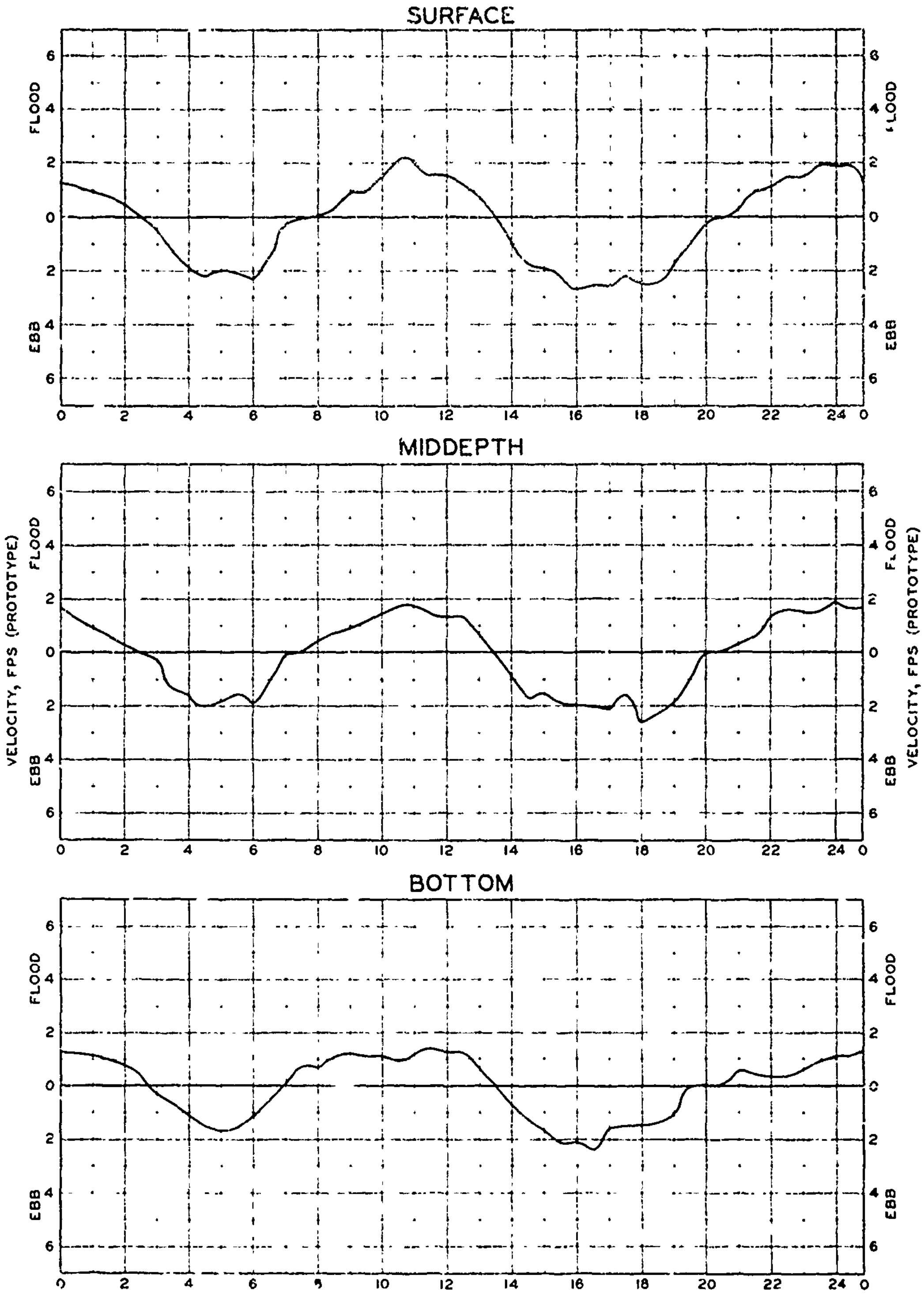
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	330 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 38
SURFACE, MIDDEPTH AND BOTTOM



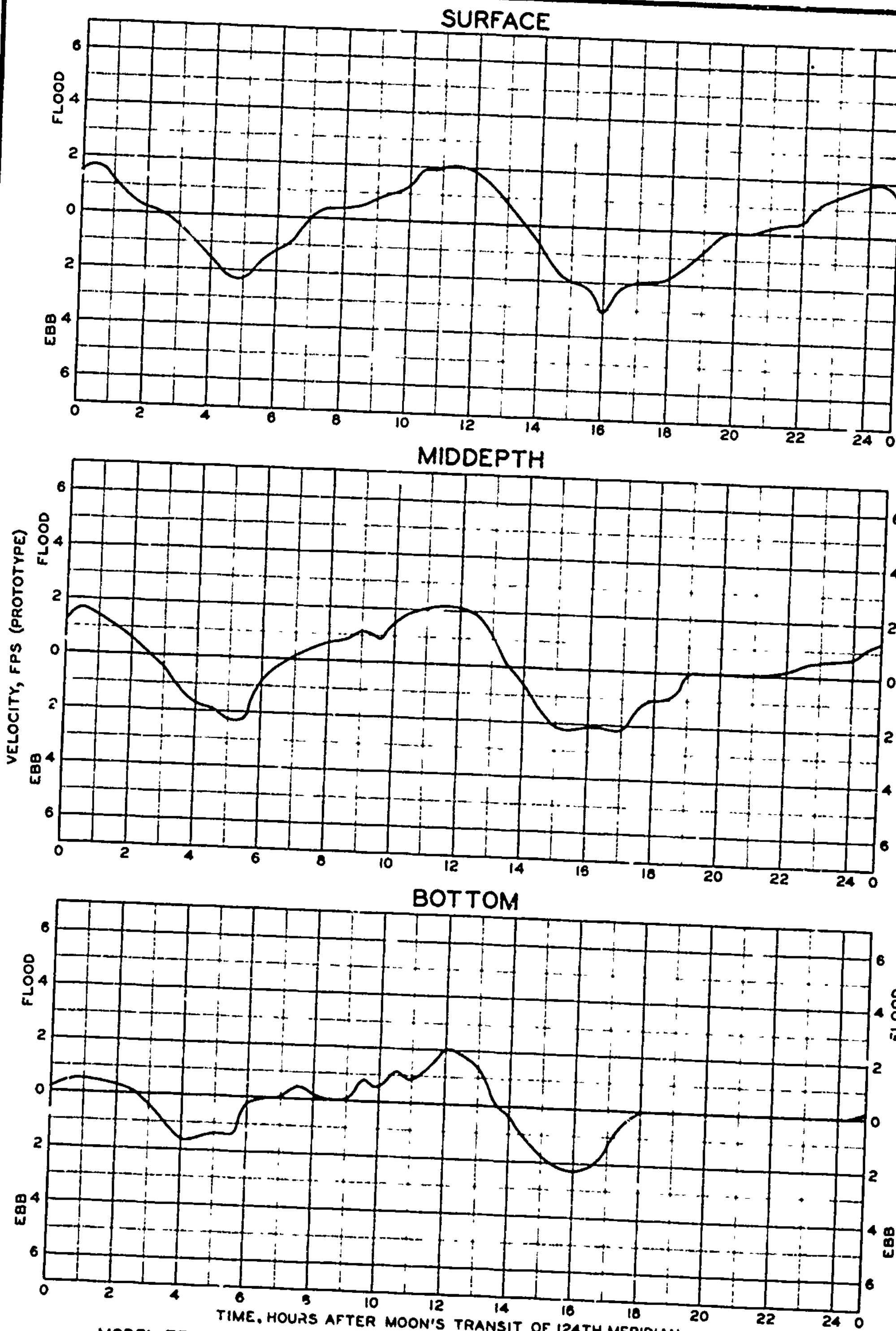
MODEL TEST DATA

TIDE	MEAN
FRESH WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 39
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

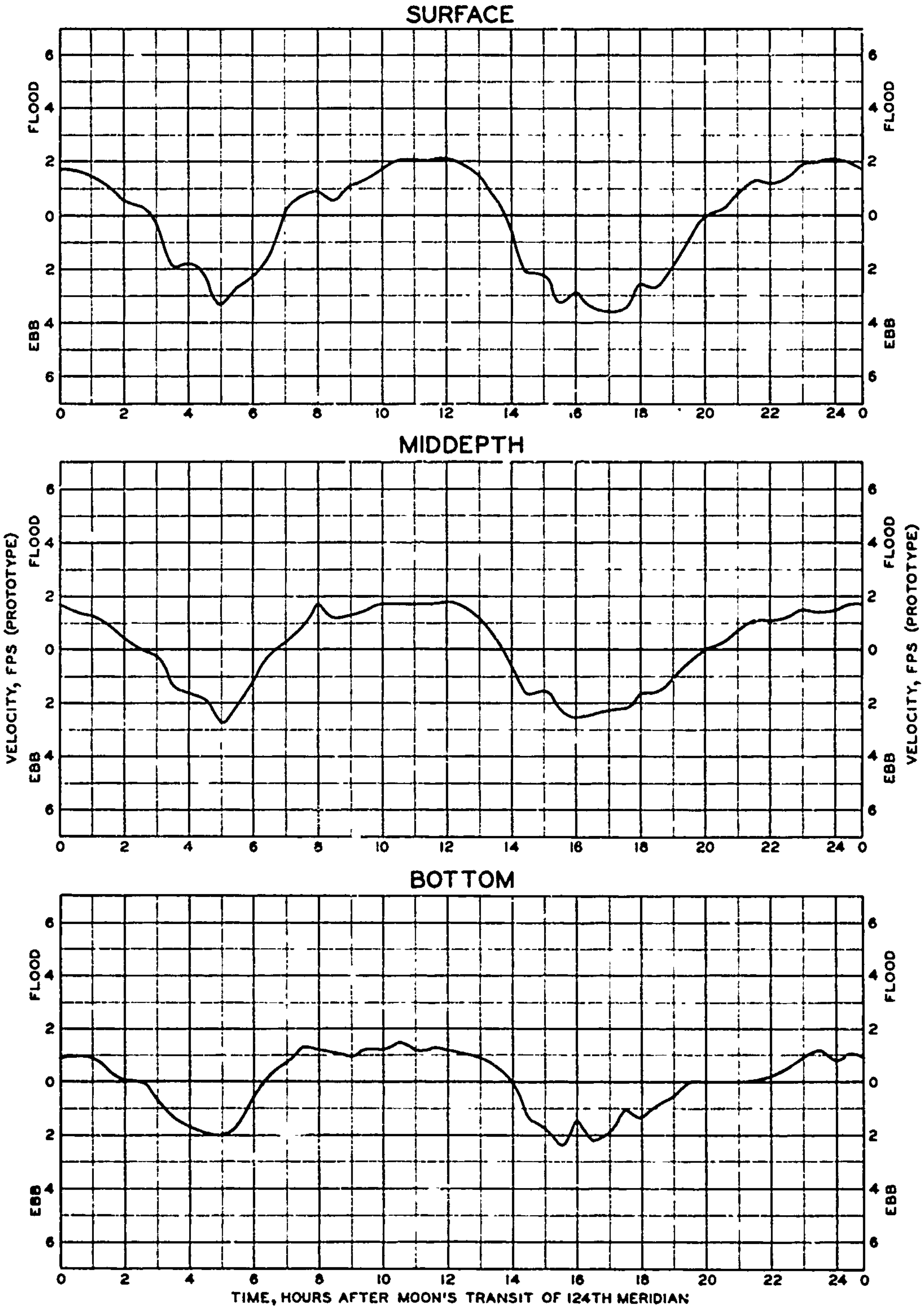
TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 40
SURFACE, MIDDEPTH AND BOTTOM

PLATE 138



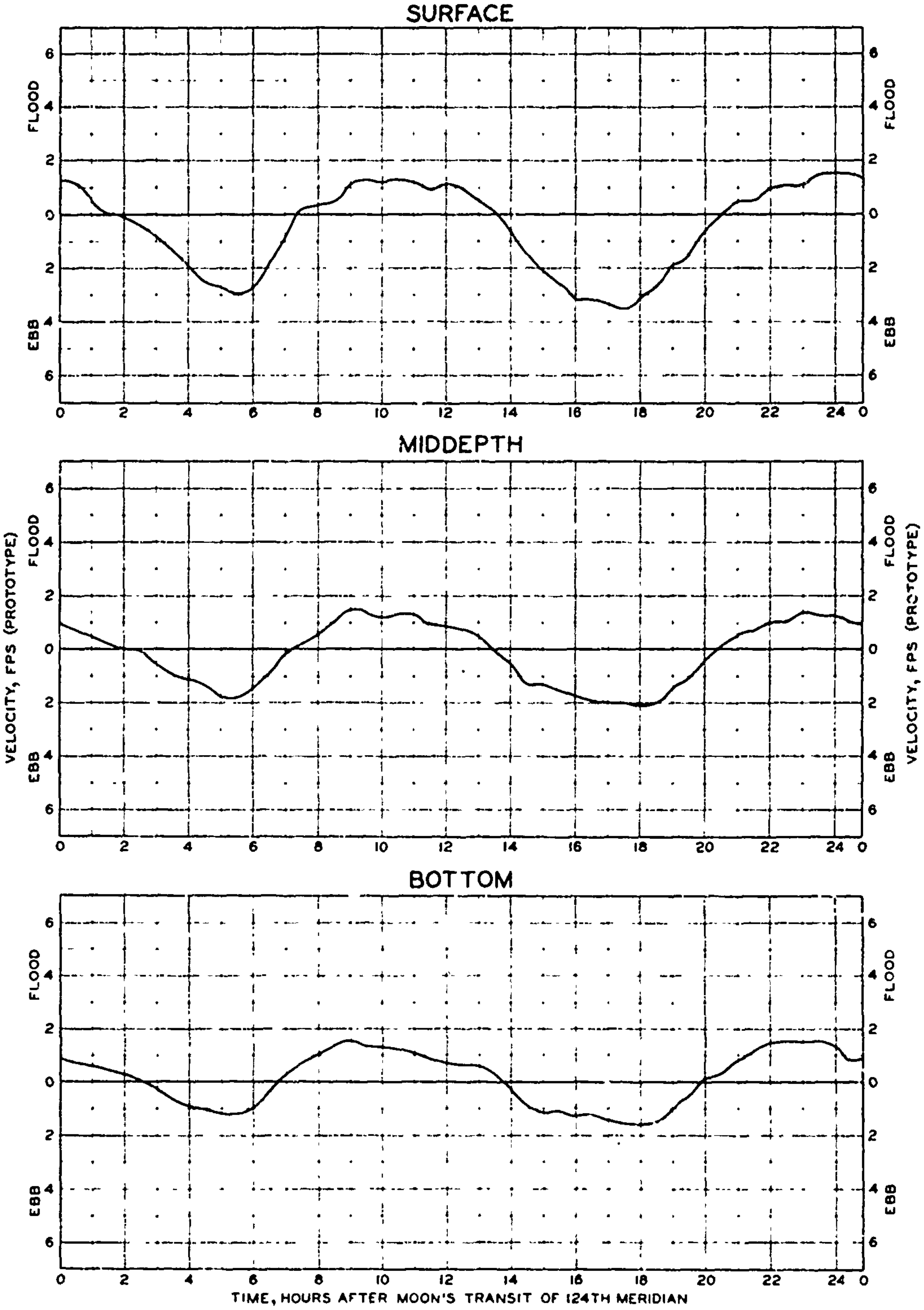
MODEL TEST DATA

TIDE . . . MEAN
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 41
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

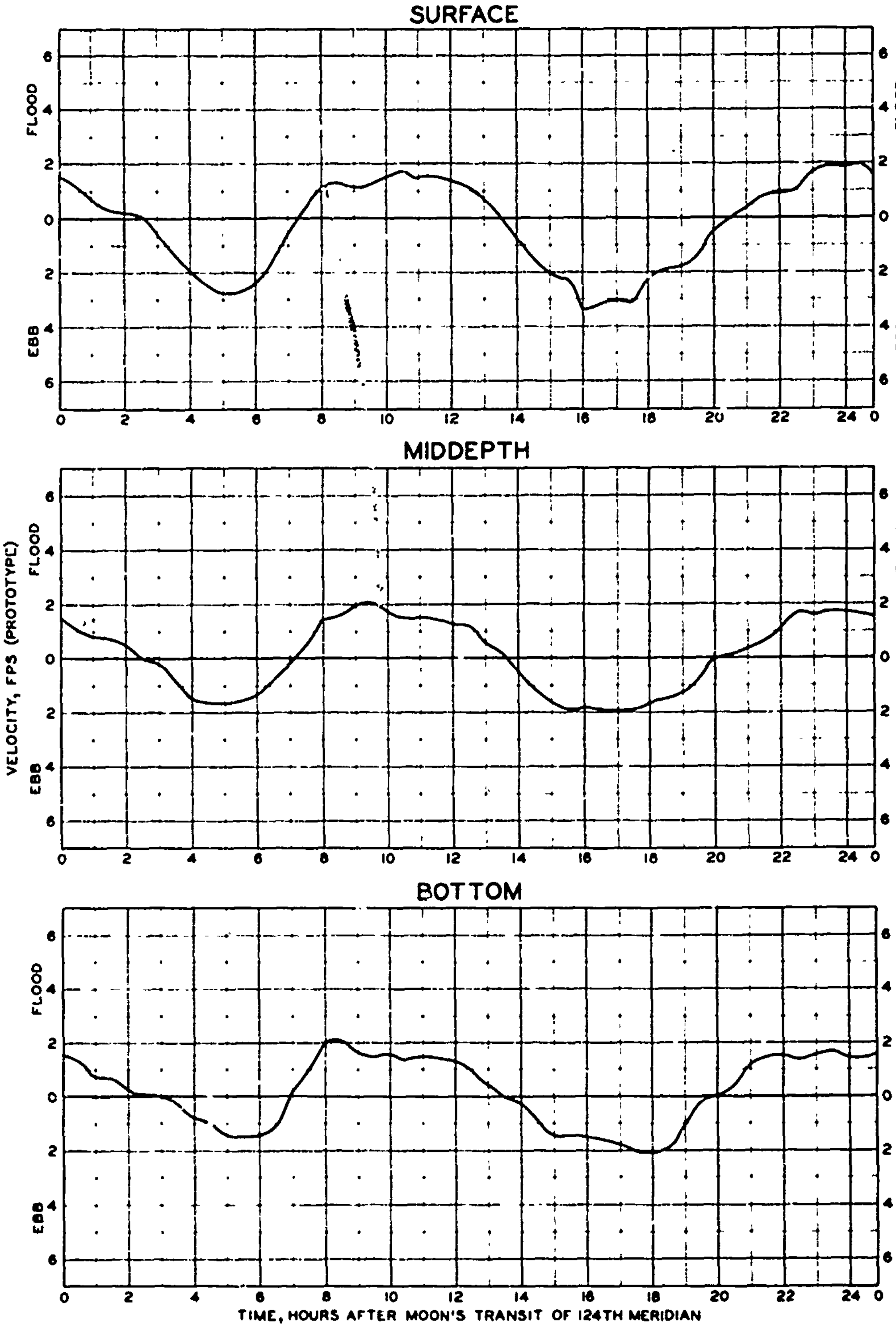
TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 42
SURFACE, MIDDEPTH AND BOTTOM

PLATE 140



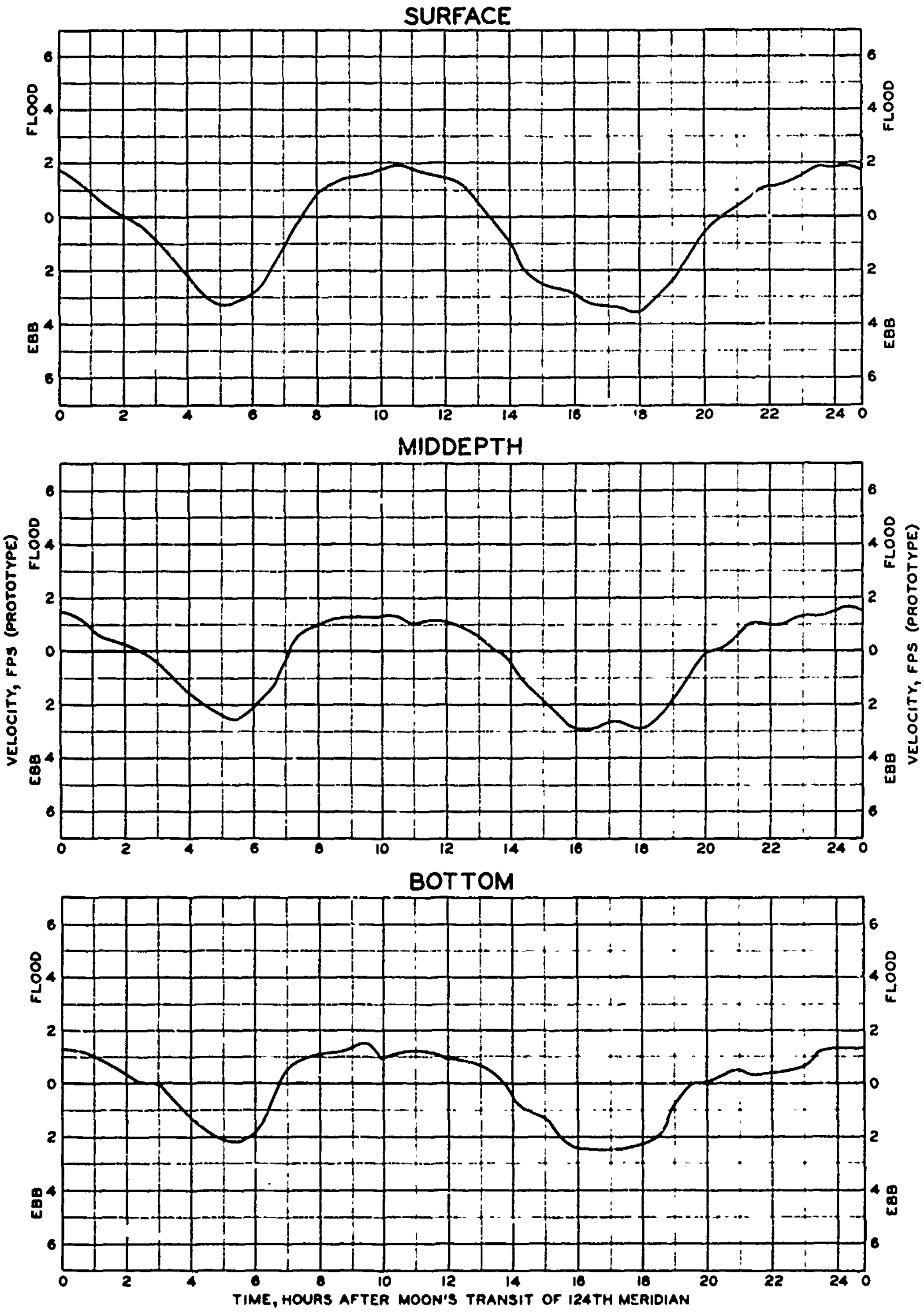
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 43
SURFACE, MIDDEPTH AND BOTTOM



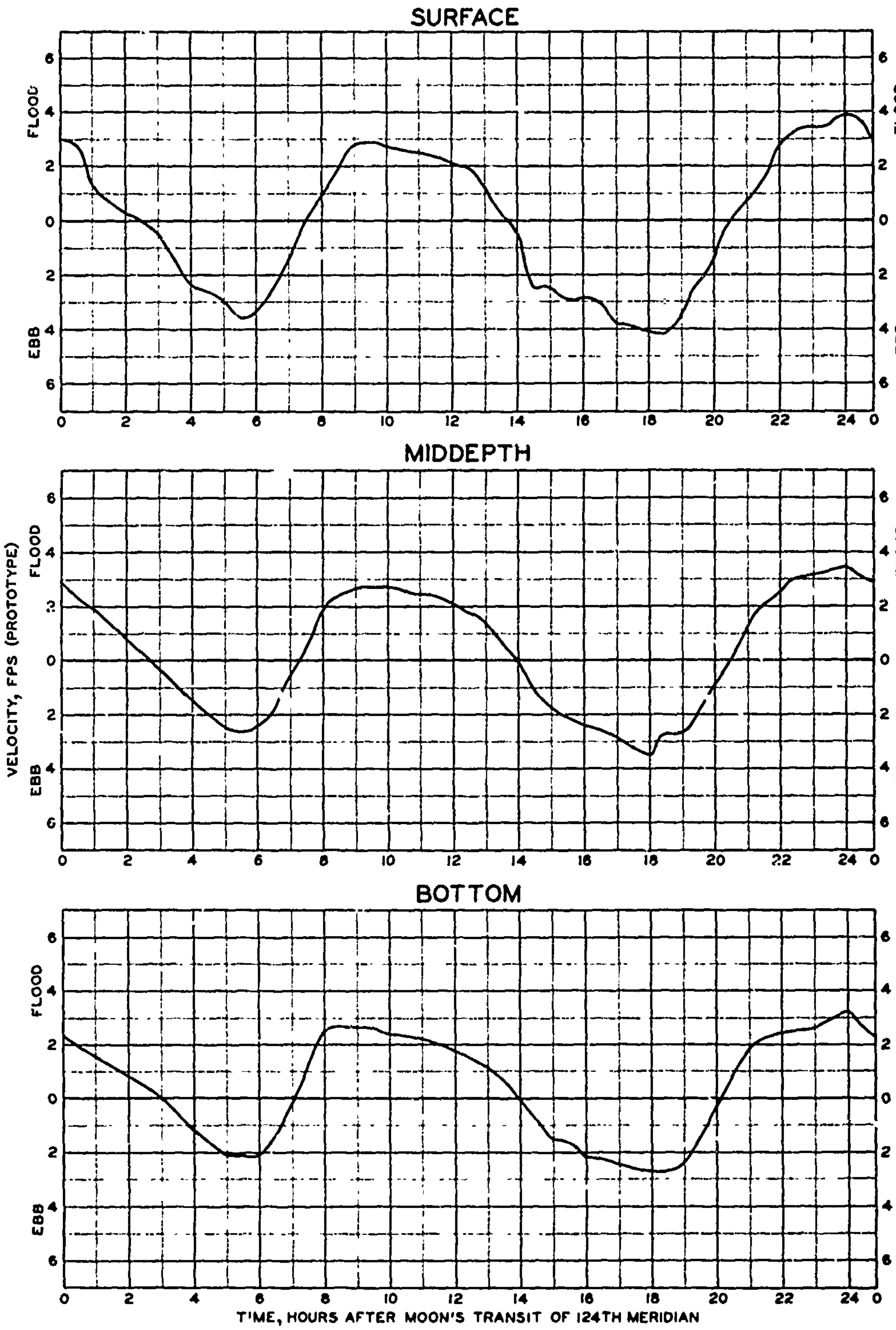
MODEL TEST DATA

TIDE .. .. . . MEAN
FRESH-WATER DISCHARGE . . . 11,400 CFS
SOURCE SALINITY. . . . . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 44
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

TIDE . MEAN
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY . 33.0 PPT

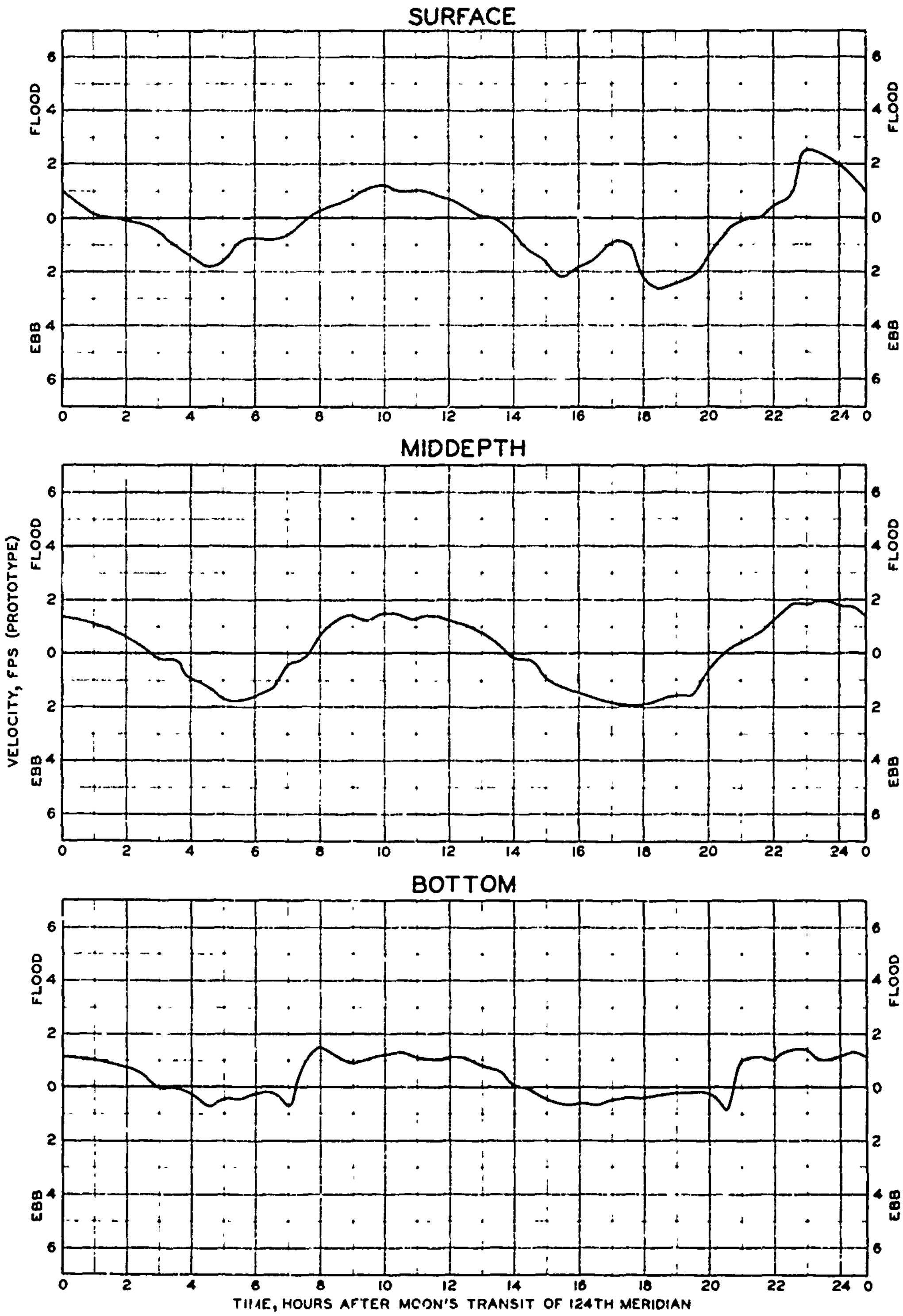
LEGEND

——— BASE TEST

BASE TEST CURRENT VELOCITIES

STATION 45

SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

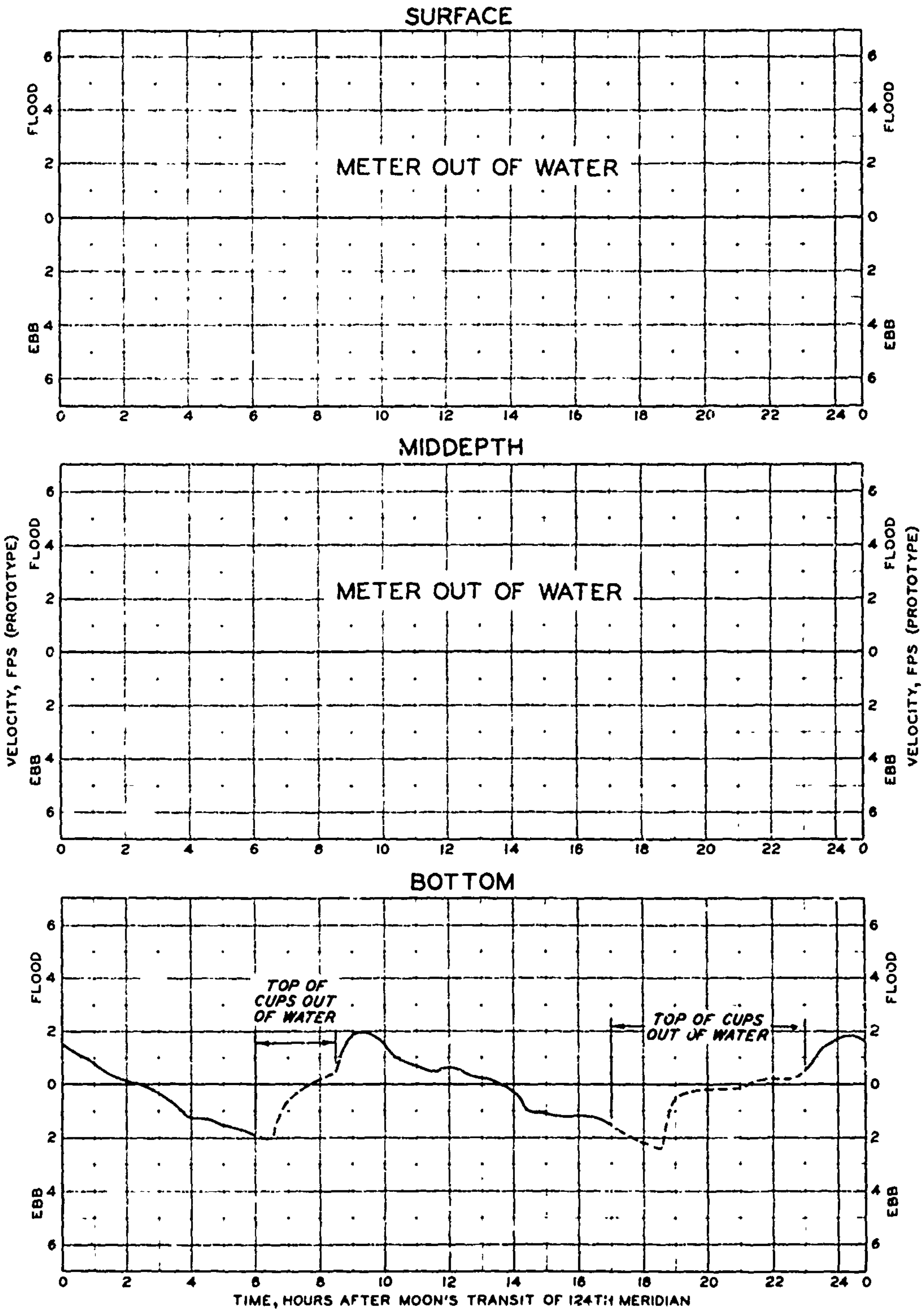
TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 46
SURFACE, MIDDEPTH AND BOTTOM

PLATE 144



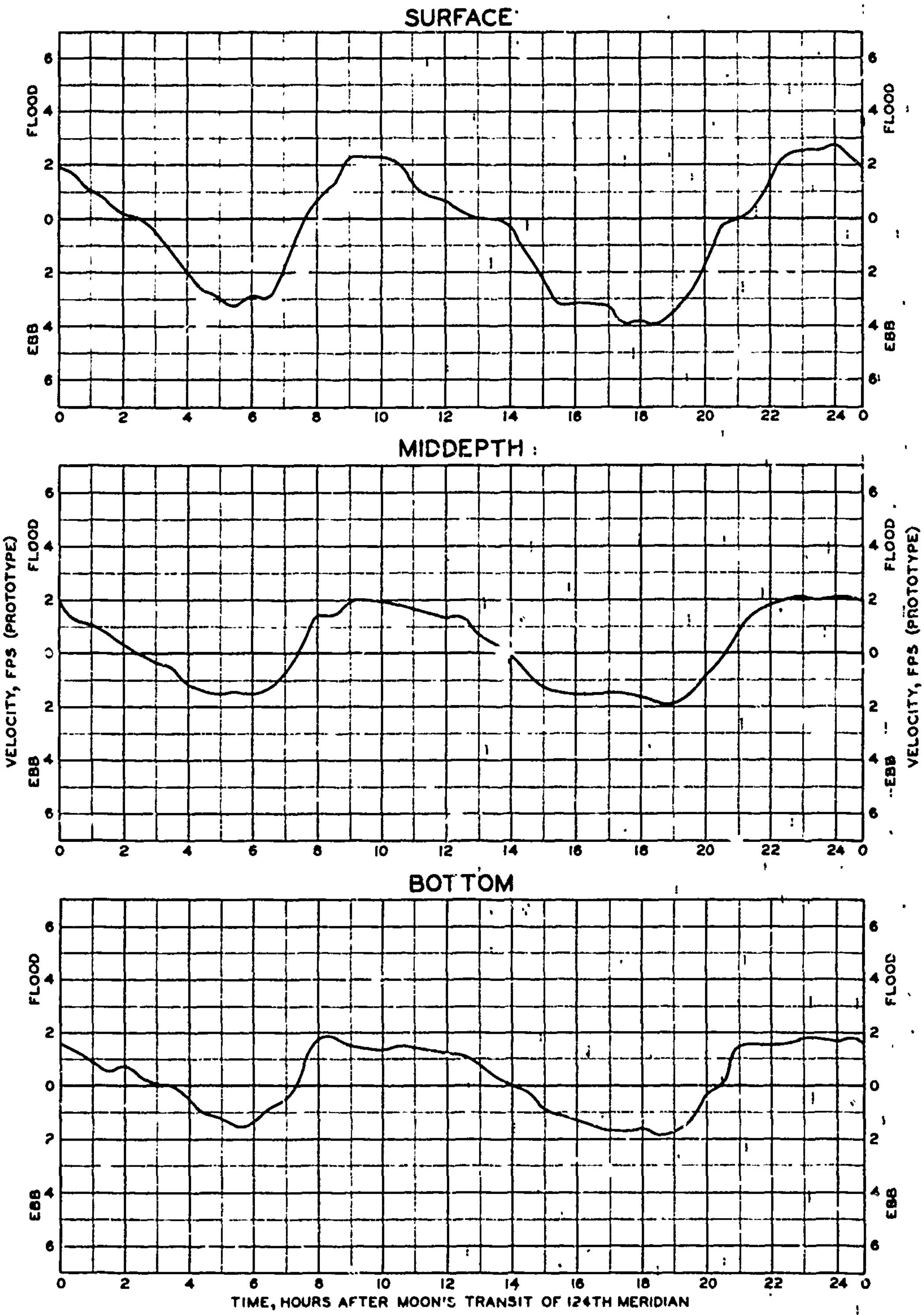
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 47
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

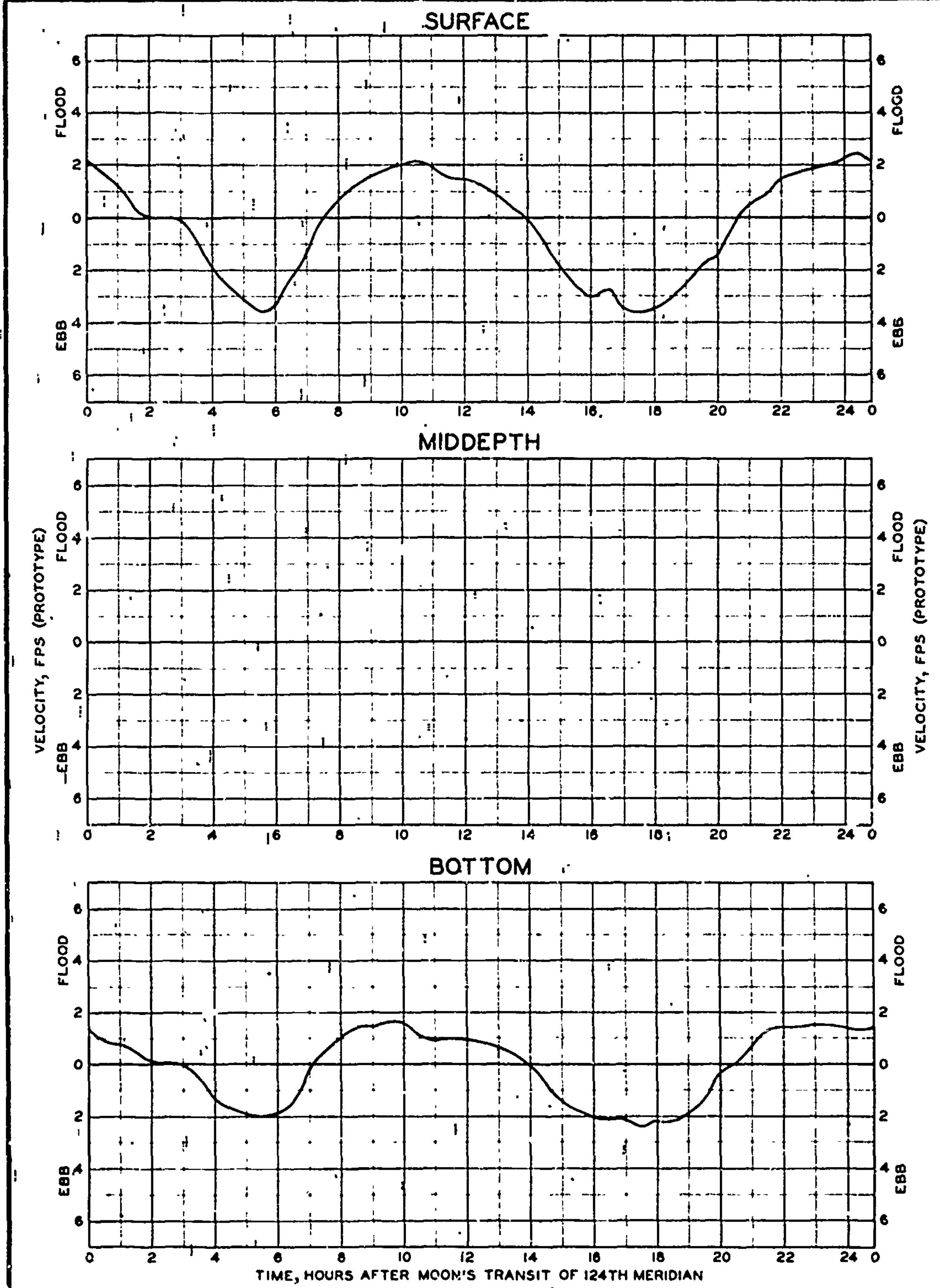
TIDE . . . . MEAN
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY. . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 48
SURFACE, MIDDEPTH AND BOTTOM

PLATE 146



MODEL TEST DATA

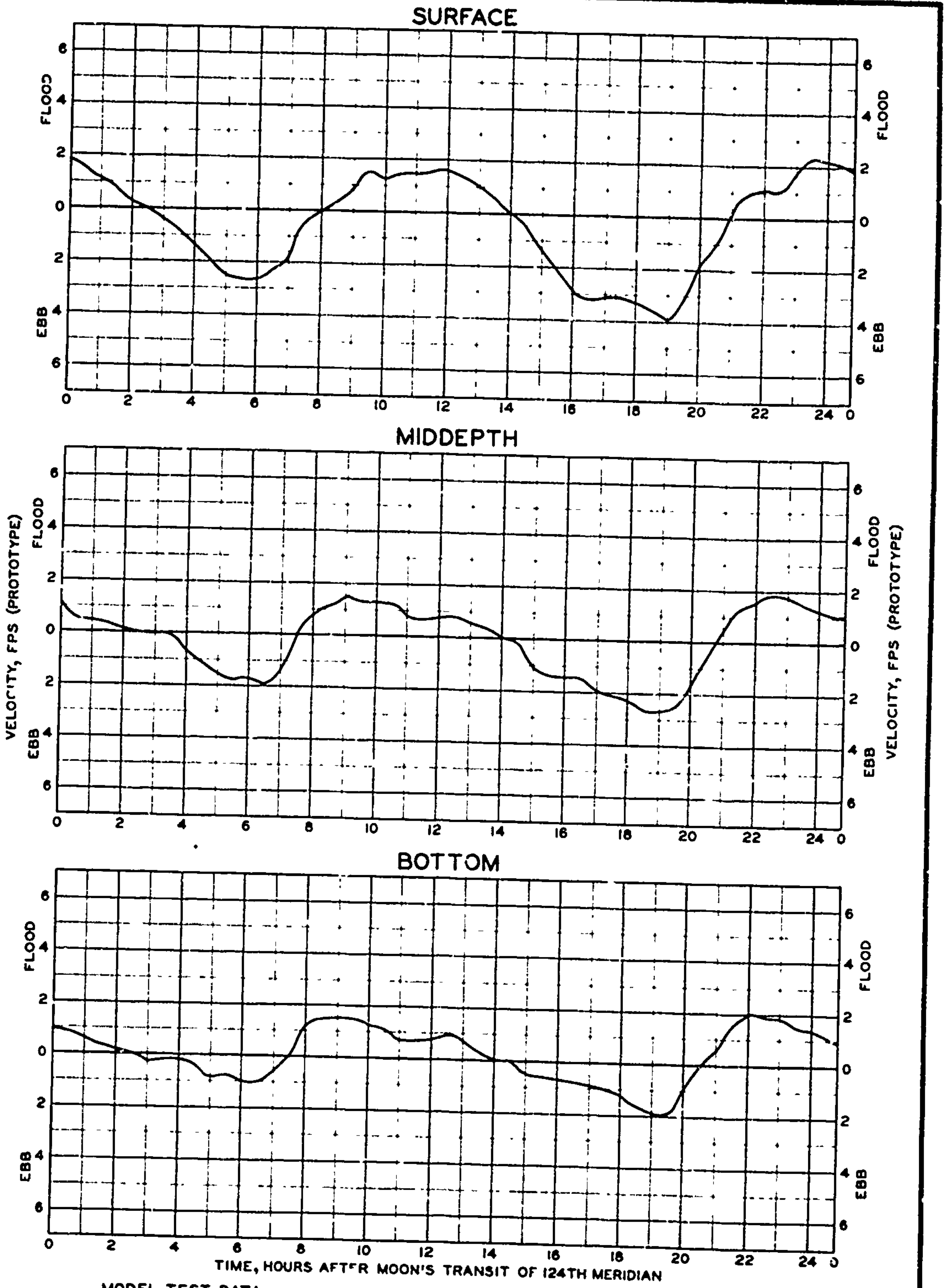
TIDE . MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 49
SURFACE, MIDDEPTH AND BOTTOM

PLATE 147



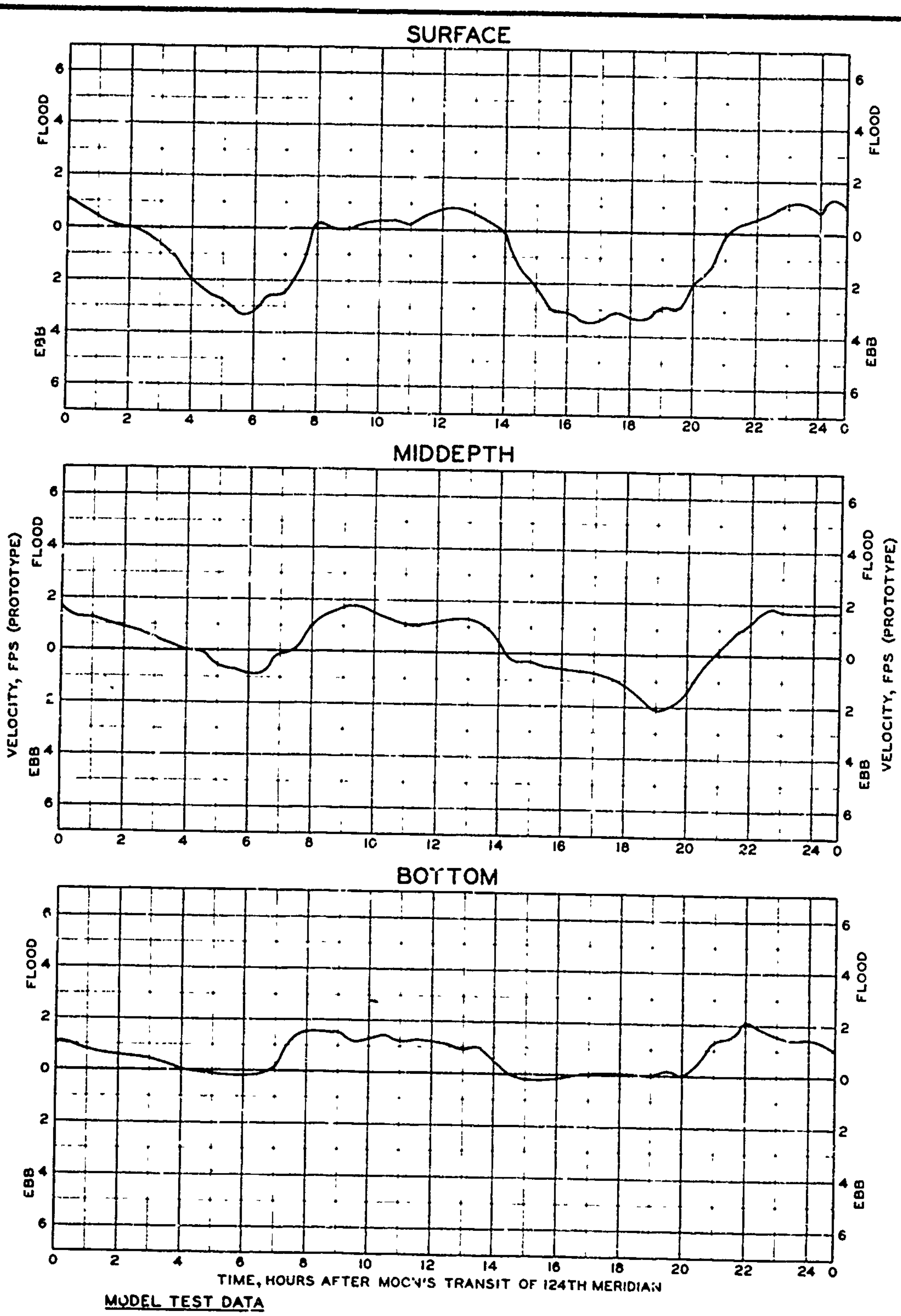
MODEL TEST DATA

TIDE . MEAN
FRESH-WATER DISCHARGE ... 11,400 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 50
SURFACE, MIDDEPTH AND BOTTOM



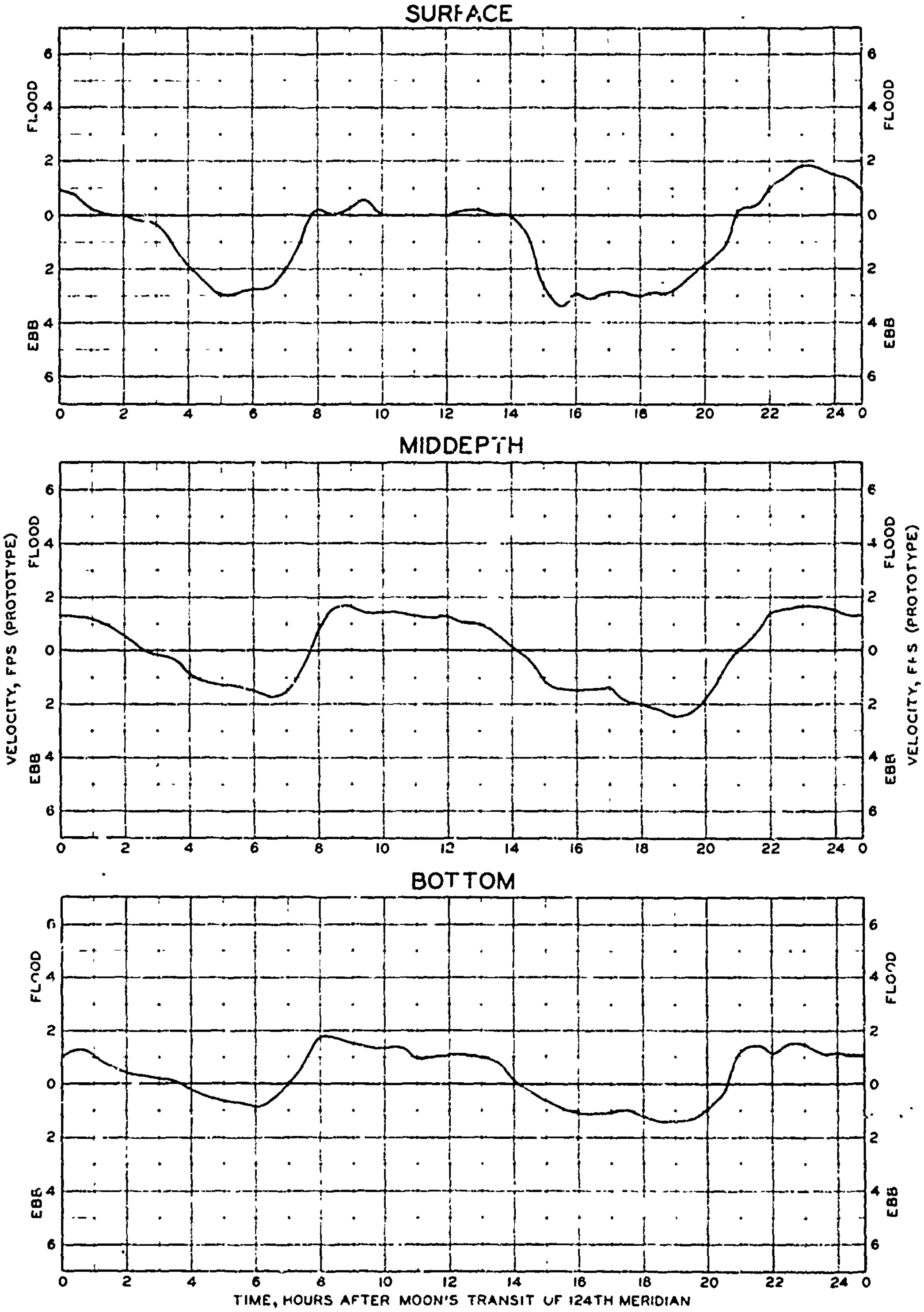
MODEL TEST DATA

TIDE . . . MEAN
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 51
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

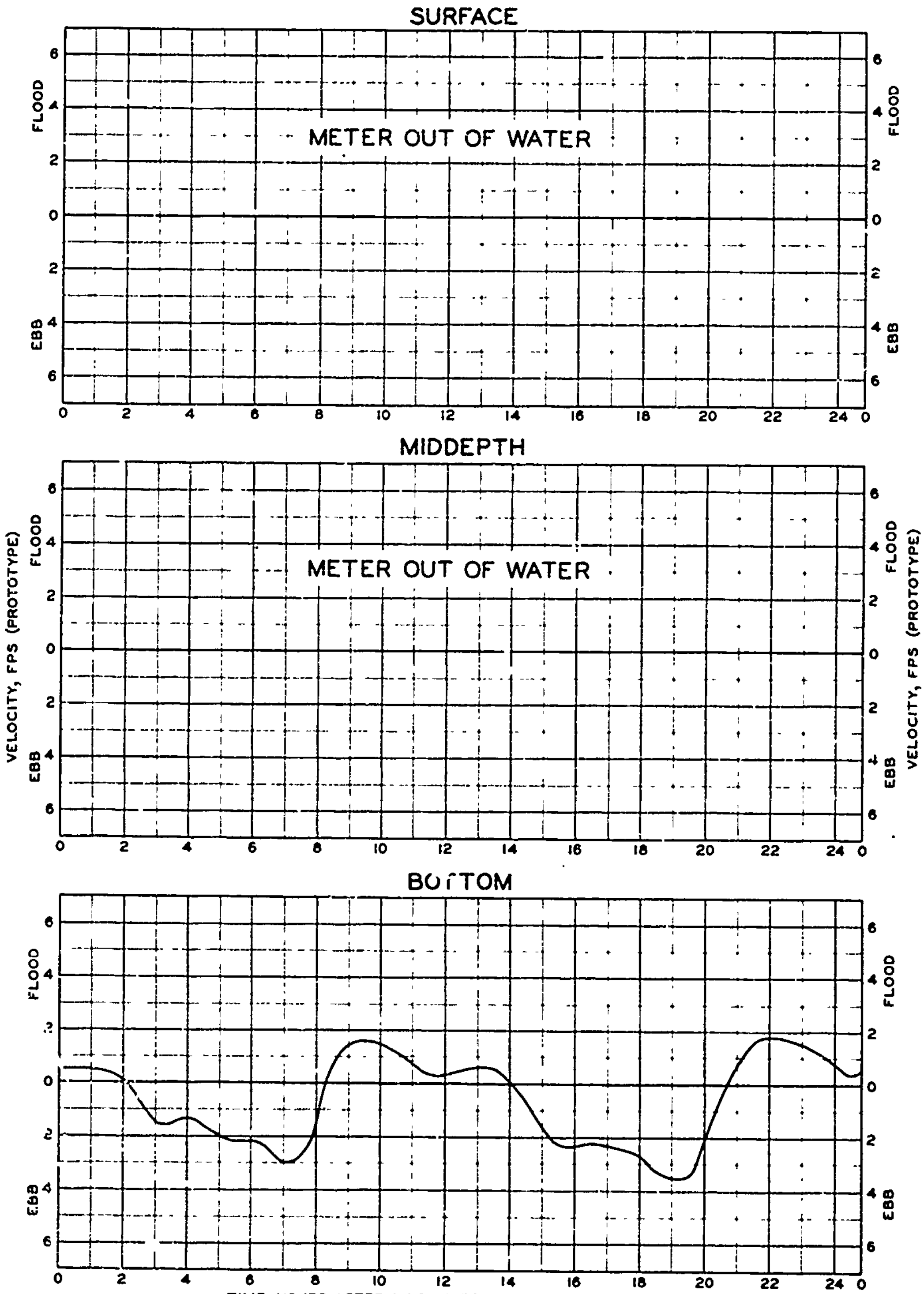
TIDE MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 52
SURFACE, MIDDEPTH AND BOTTOM

PLATE 150



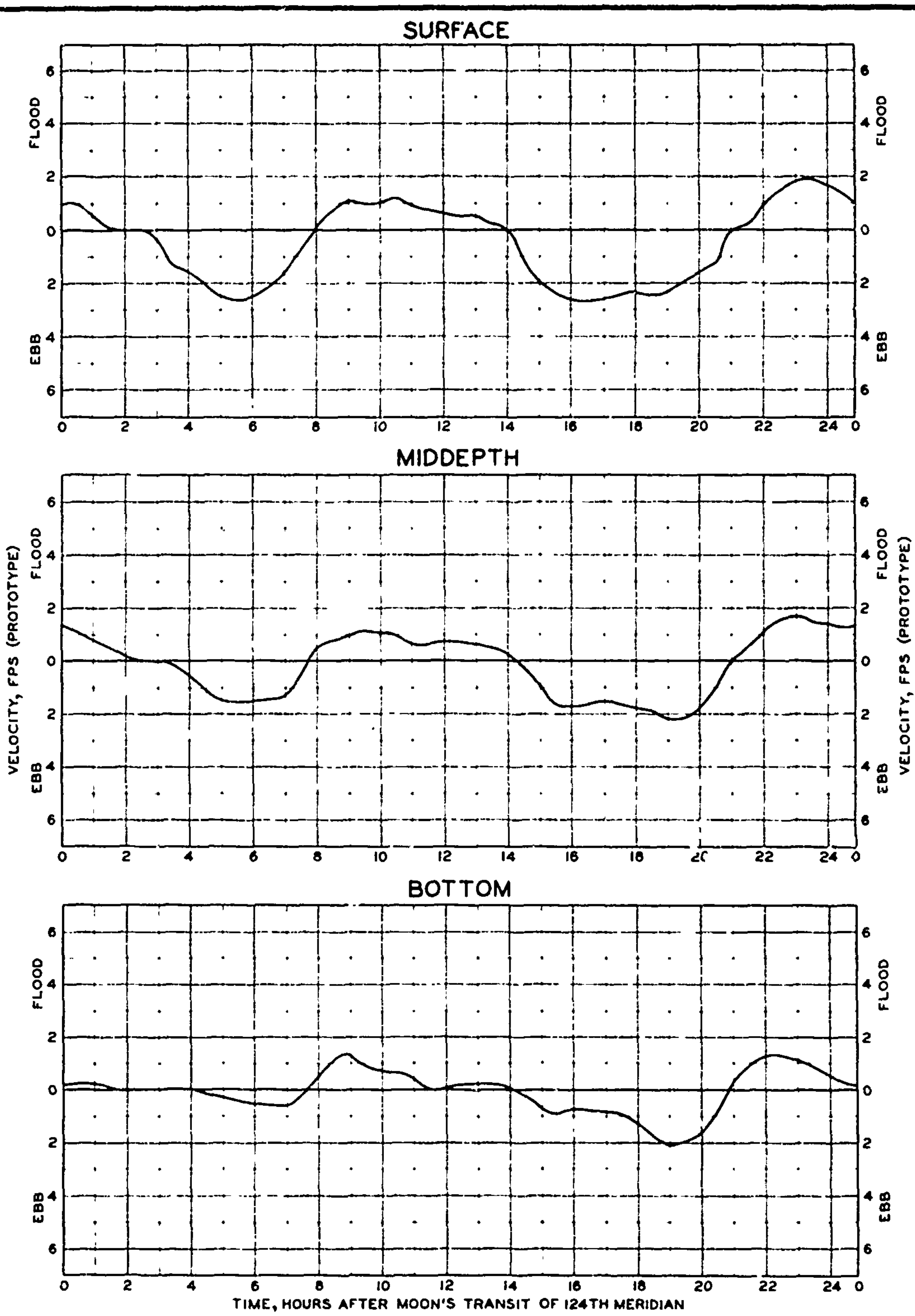
MODEL TEST DATA

TIDE . . . MEAN
FRESH-WATER DISCHARGE . . . 11,400 CFS
SOURCE SALINITY . . . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 53
SURFACE, MIDDEPTH AND BOTTOM



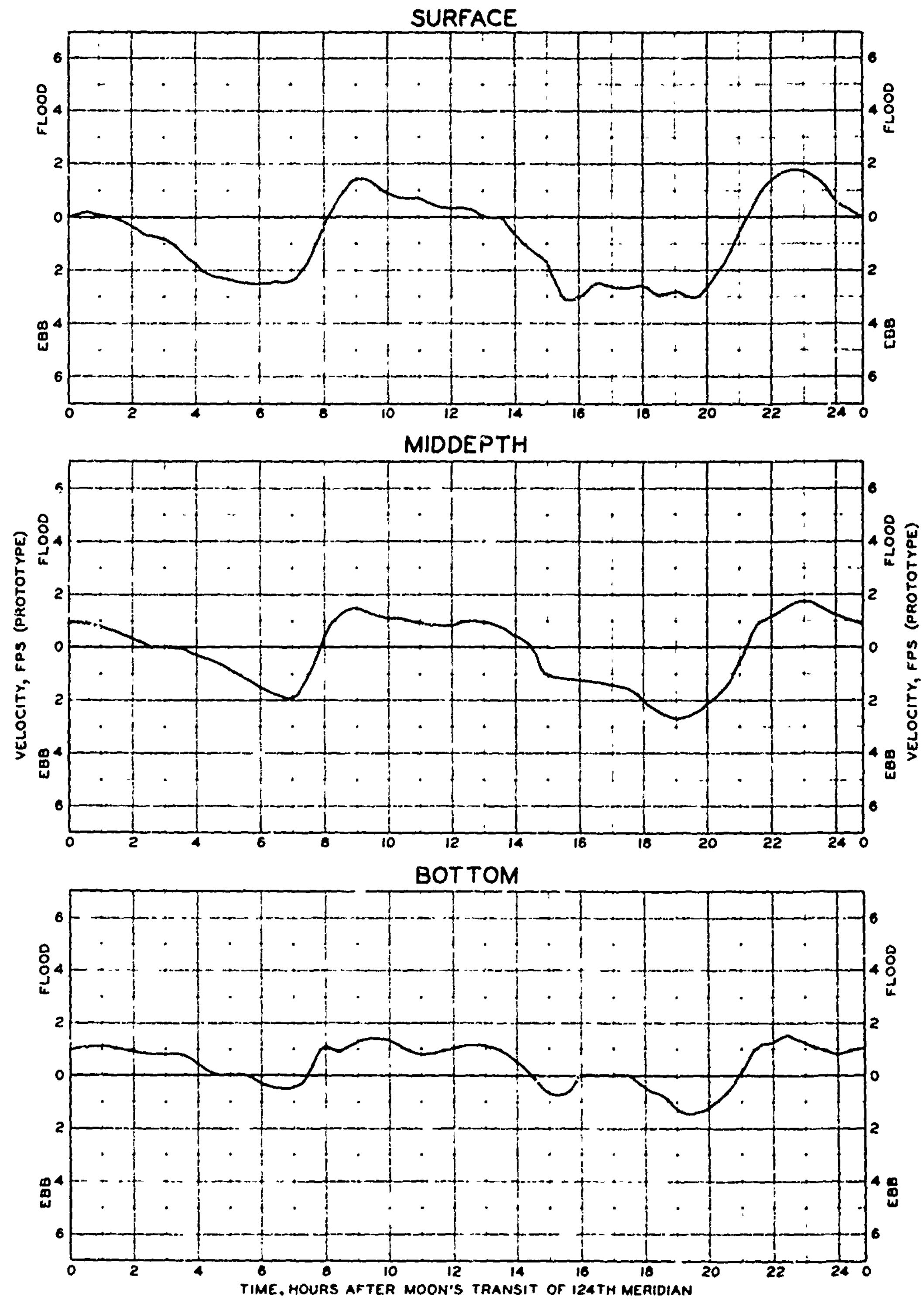
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 54
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

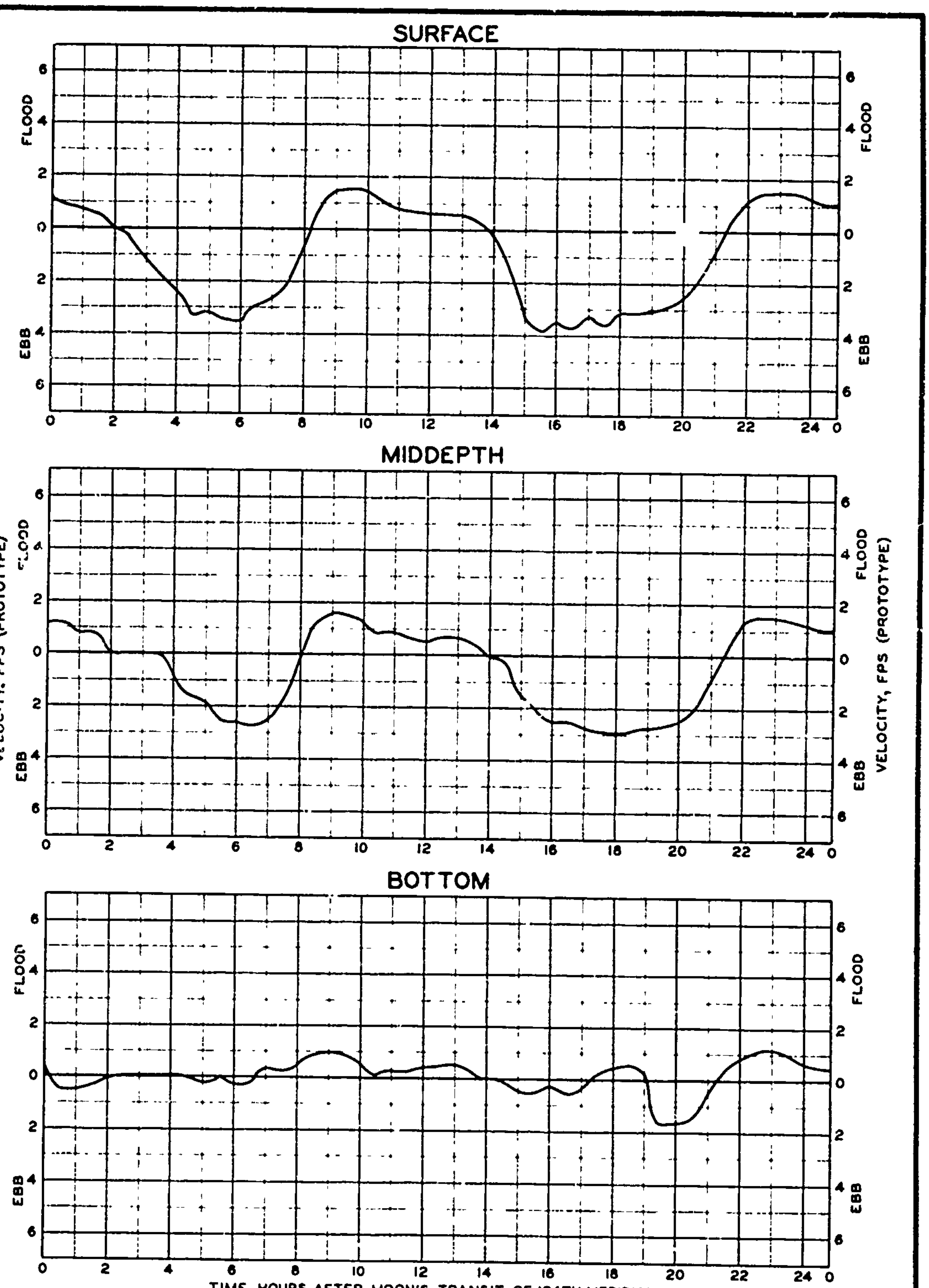
LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES

STATION 55

SURFACE, MIDDEPTH AND BOTTOM



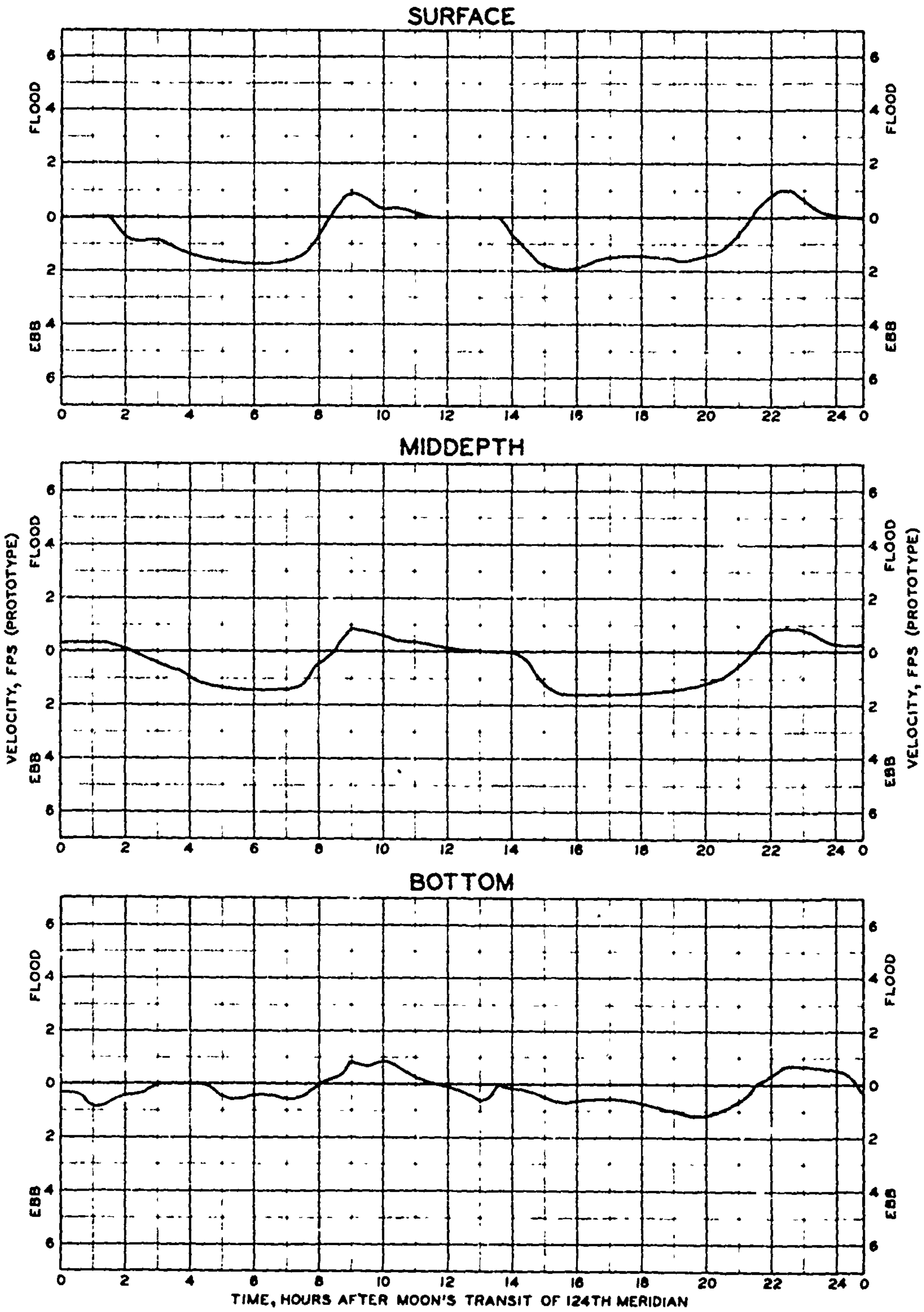
MODEL TEST DATA

TIDE MEAN
FRESH-WATER DISCHARGE . .11,400 CFS
SOURCE SALINITY. . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 56
SURFACE, MIDDEPTH AND BOTTOM



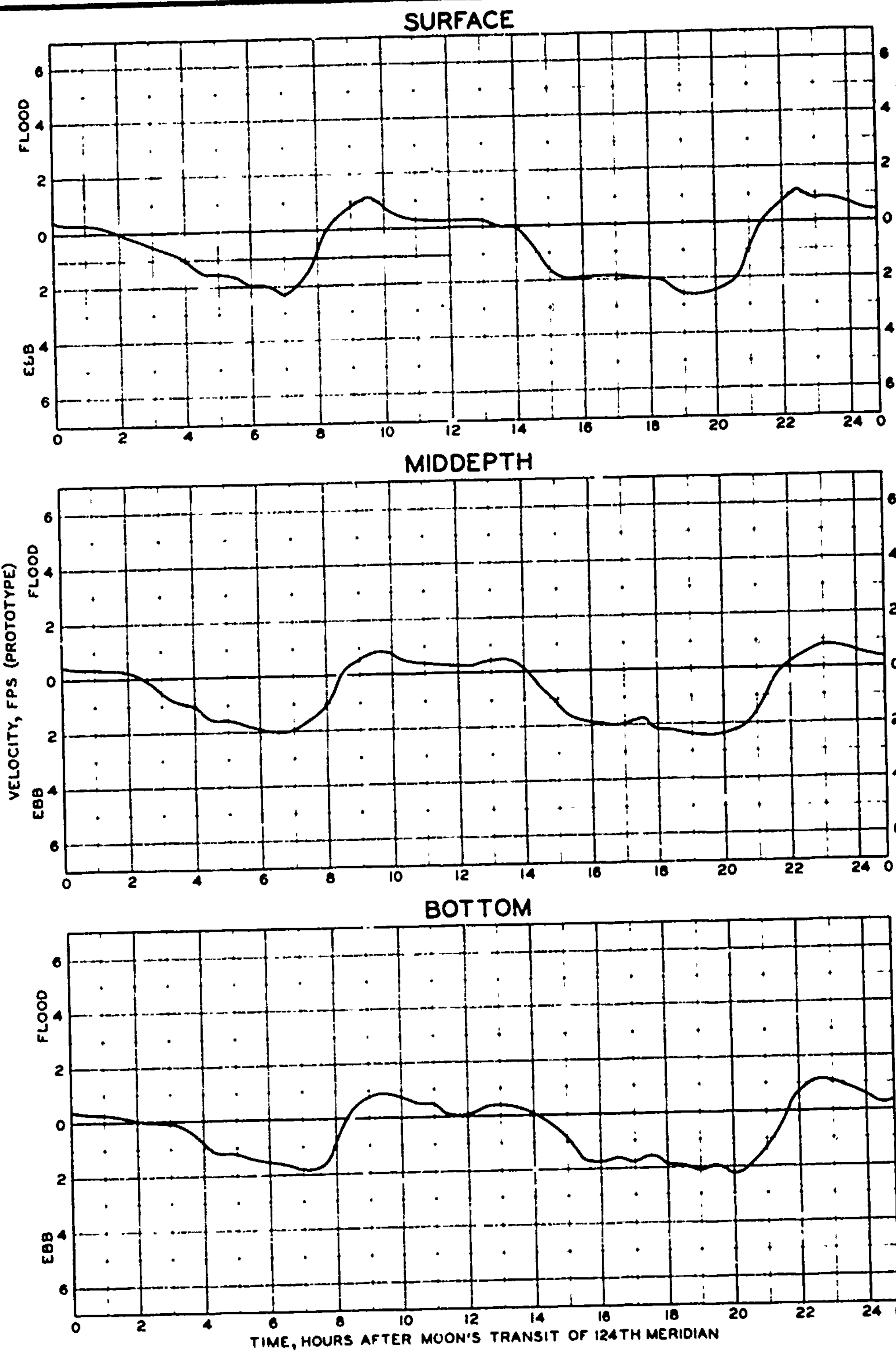
MODEL TEST DATA

TIDE . . MEAN
FRESH-WATER DISCHARGE . . 11,400 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 57
SURFACE, MIDDEPTH AND BOTTOM



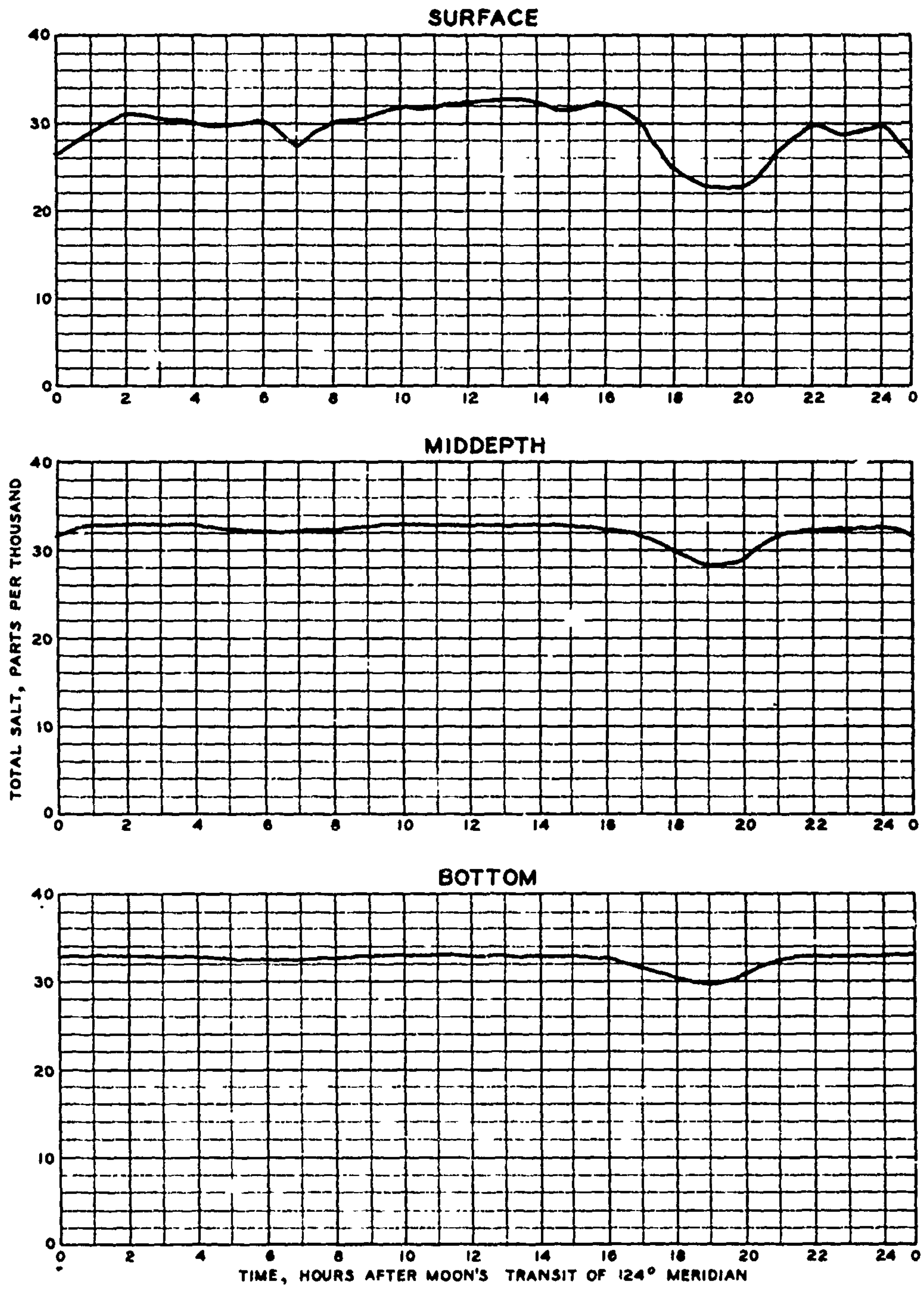
MODEL TEST DATA

TIDE MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
CURRENT VELOCITIES
STATION 58
SURFACE, MIDDEPTH AND BOTTOM



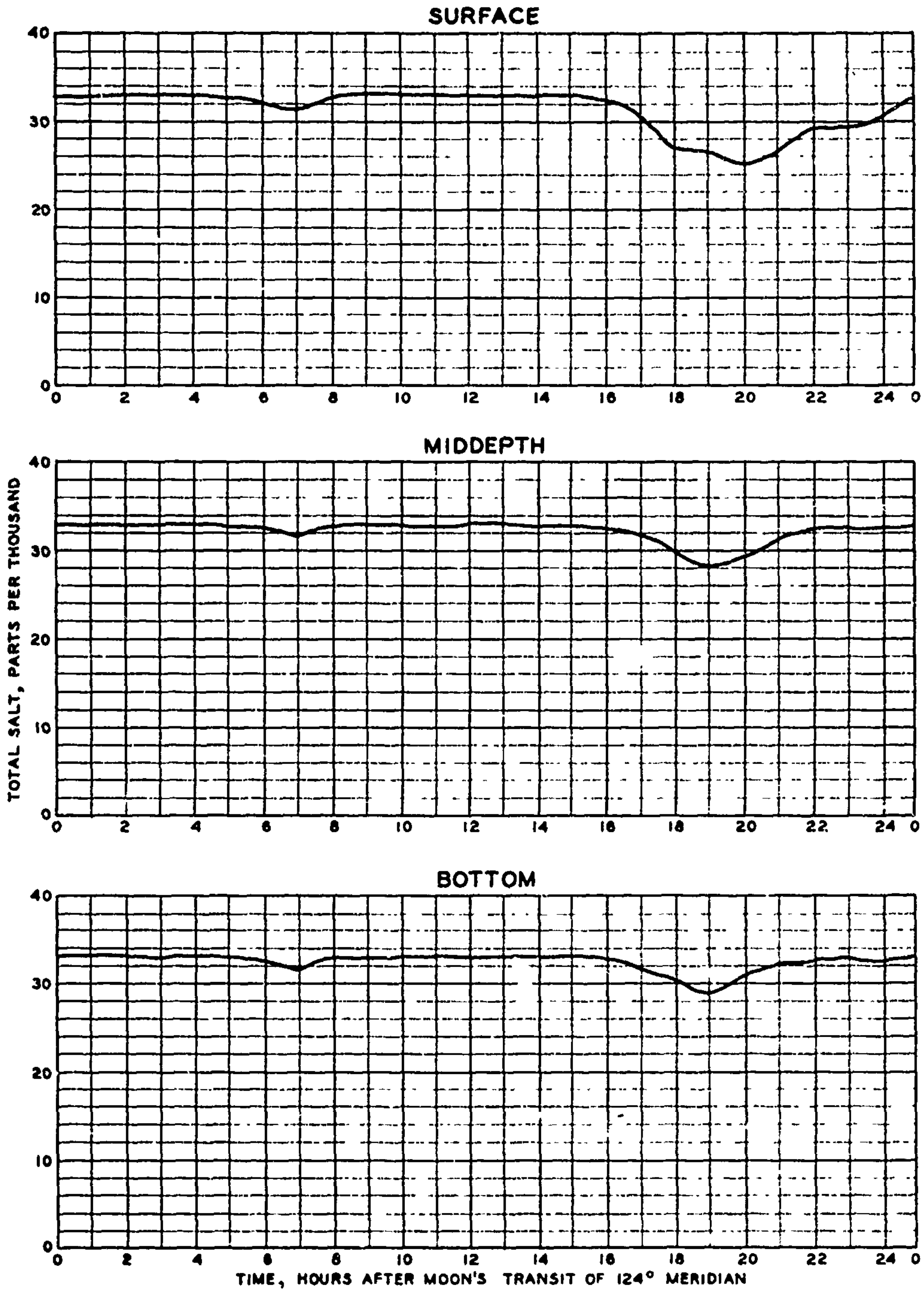
MODEL TEST DATA

TIDE . . . . MEAN
FRESH-WATER DISCHARGE. 11,400 CFS
SOURCE SALINITY. .. 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 19
SURFACE, MIDDEPTH AND BOTTOM



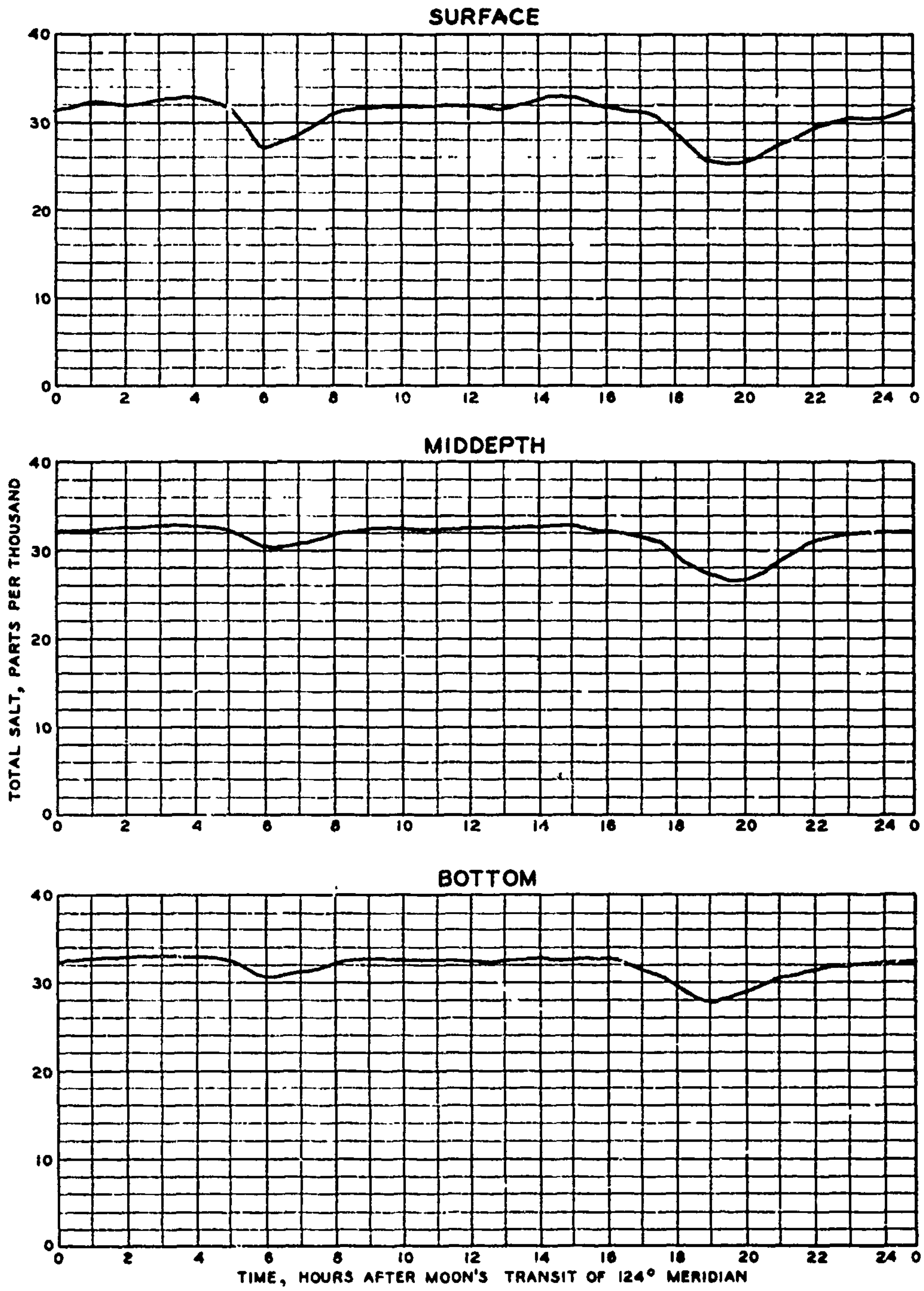
MODEL TEST DATA

TIDE . . . . MEAN
FRESH-WATER DISCHARGE....11,400 CFS
SOURCE SALINITY. . . . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 20
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

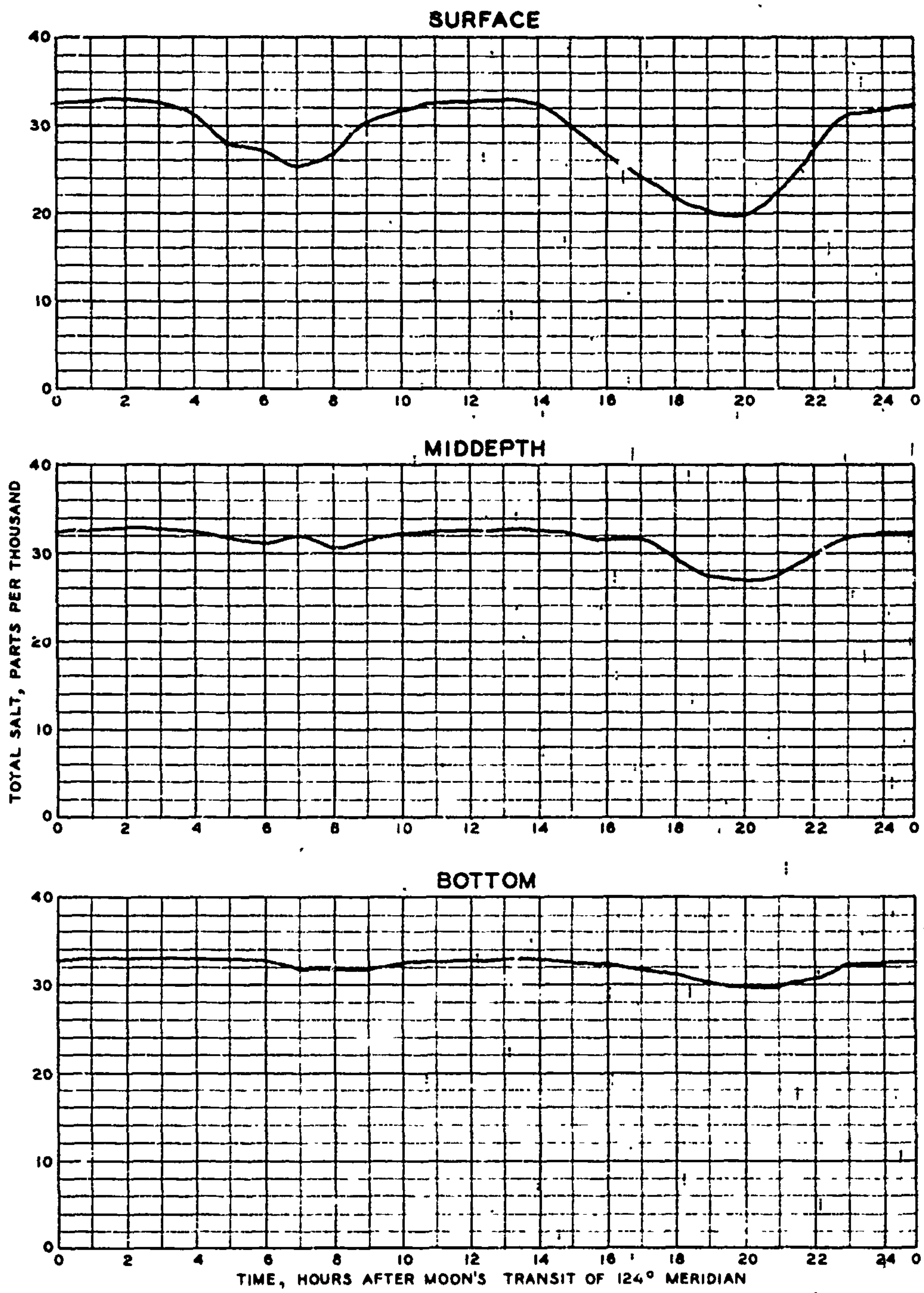
TIDE . .. MEAN
FRESH-WATER DISCHARGE ...11,400 CFS
SOURCE SALINITY. .. . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 21
SURFACE, MIDDEPTH AND BOTTOM

PLATE 159



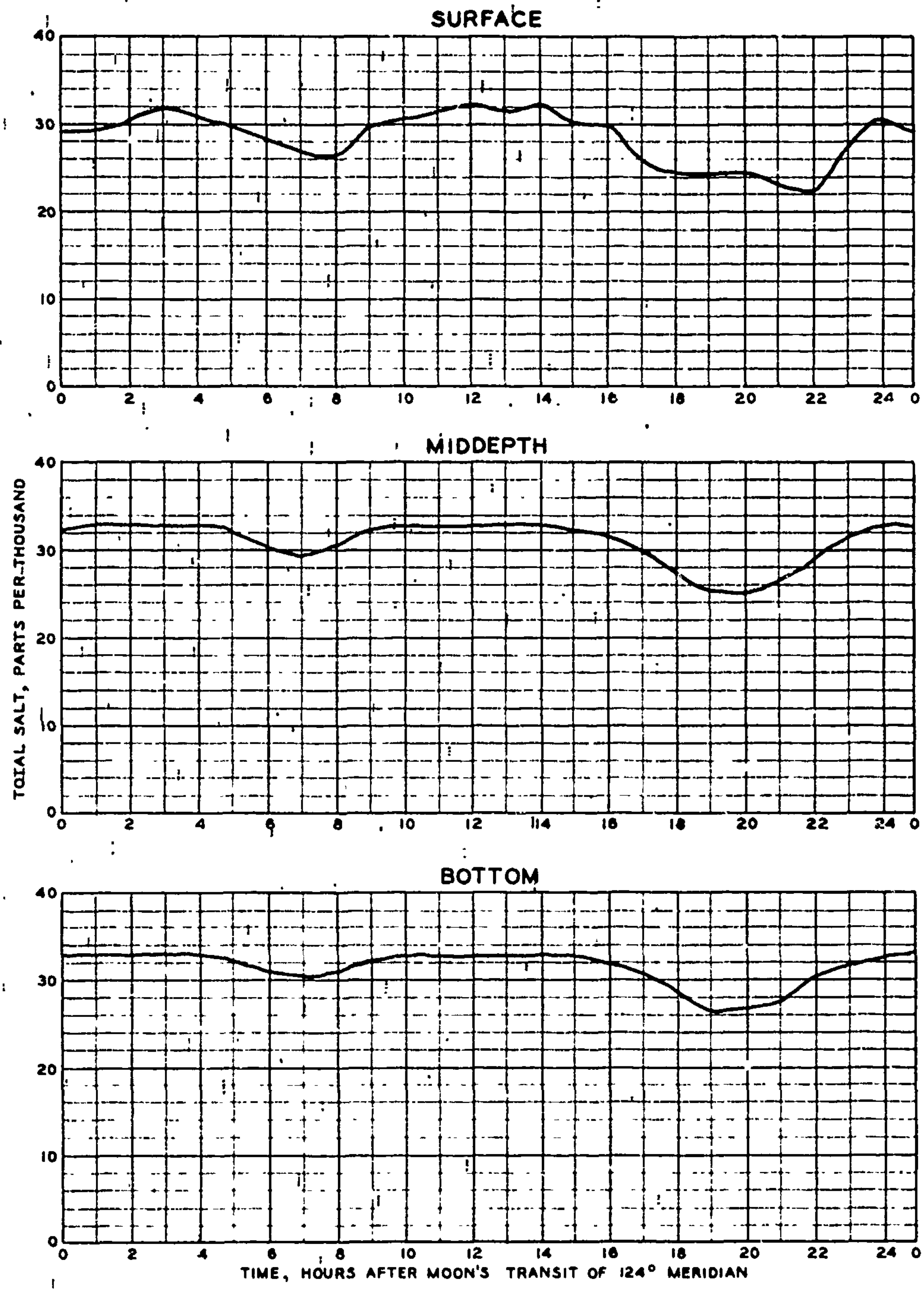
MODEL TEST DATA

TIDE .. MEAN
FRESH-WATER DISCHARGE . .11,400 CFS
SOURCE SALINITY.. . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 22
SURFACE, MIDDEPTH AND BOTTOM



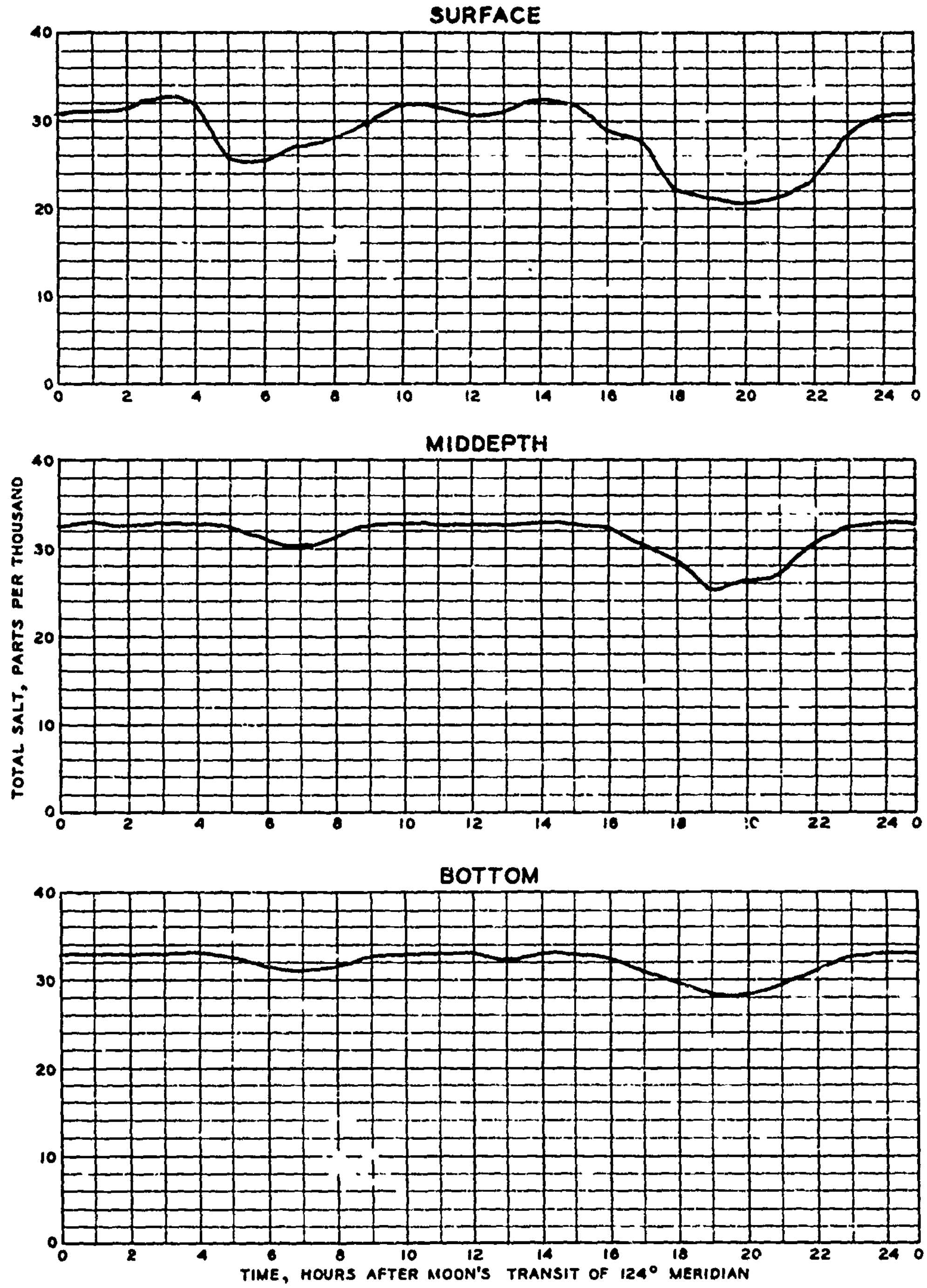
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 23
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

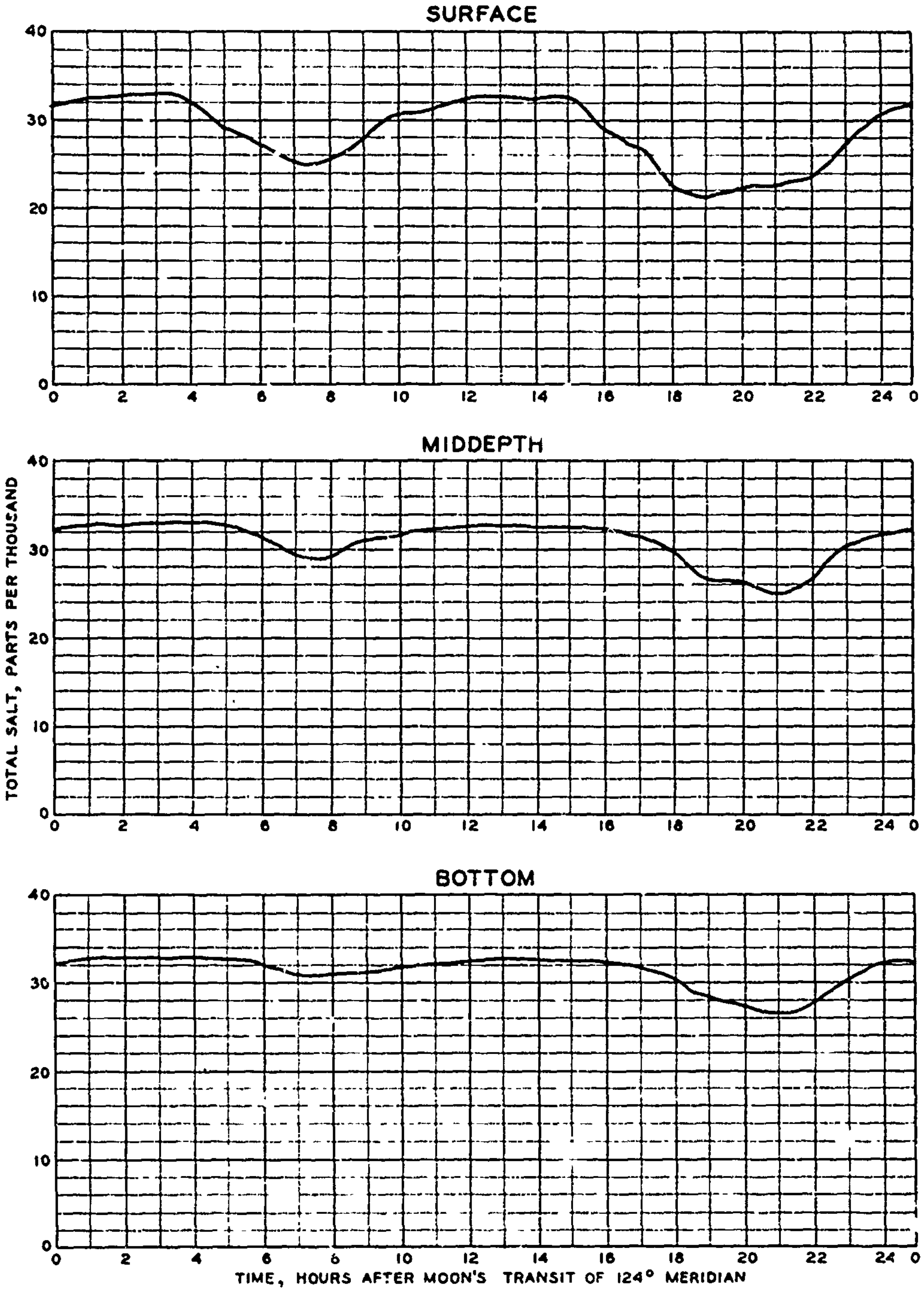
TIDE . . . . . . MEAN
FRESH-WATER DISCHARGE . . . 11,400 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 24
SURFACE, MIDDEPTH AND BOTTOM

PLATE 162



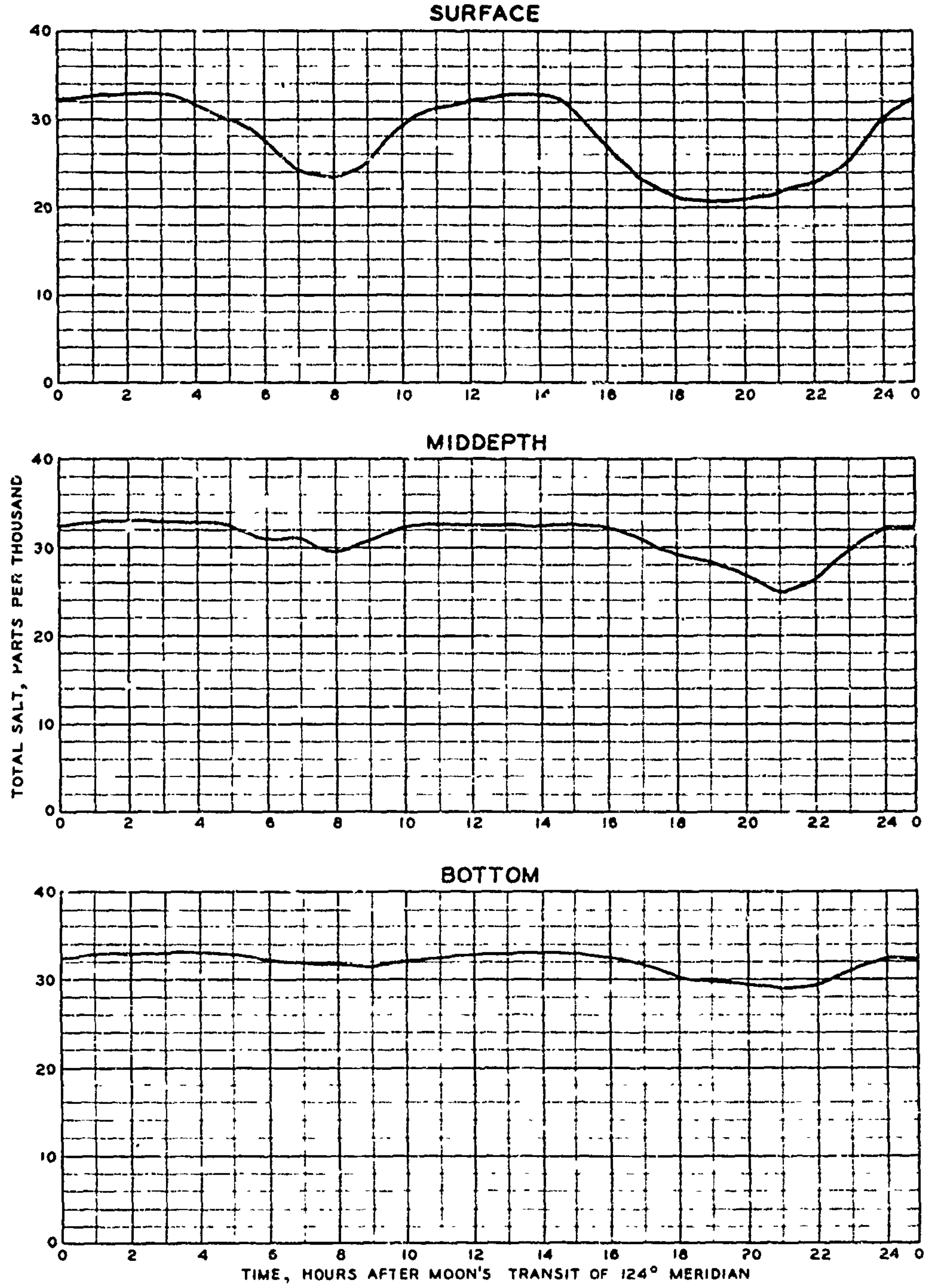
MODEL TEST DATA

TIDE . . . MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY. . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 25
SURFACE, MIDDEPTH AND BOTTOM



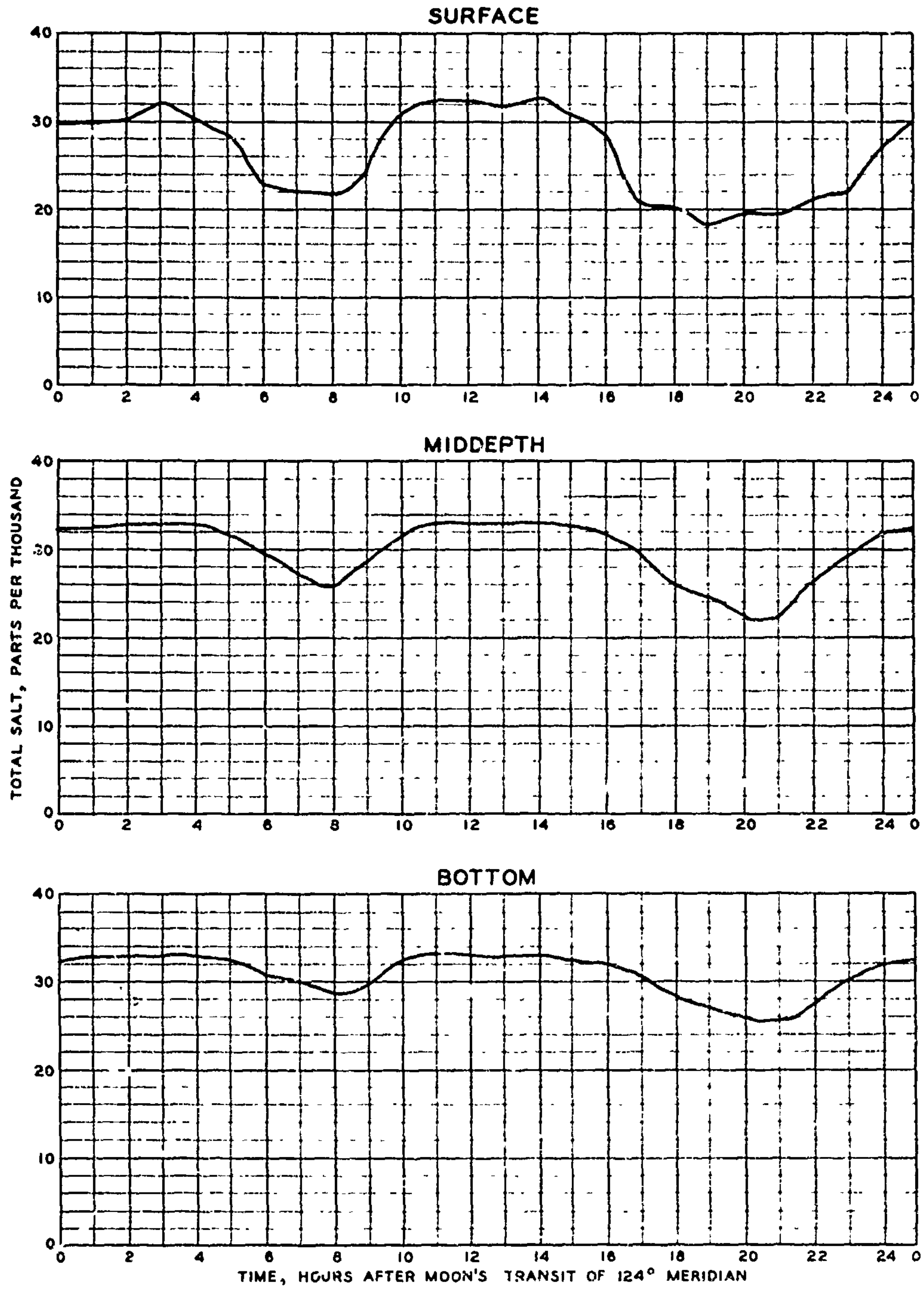
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 26
SURFACE, MIDDEPTH AND BOTTOM



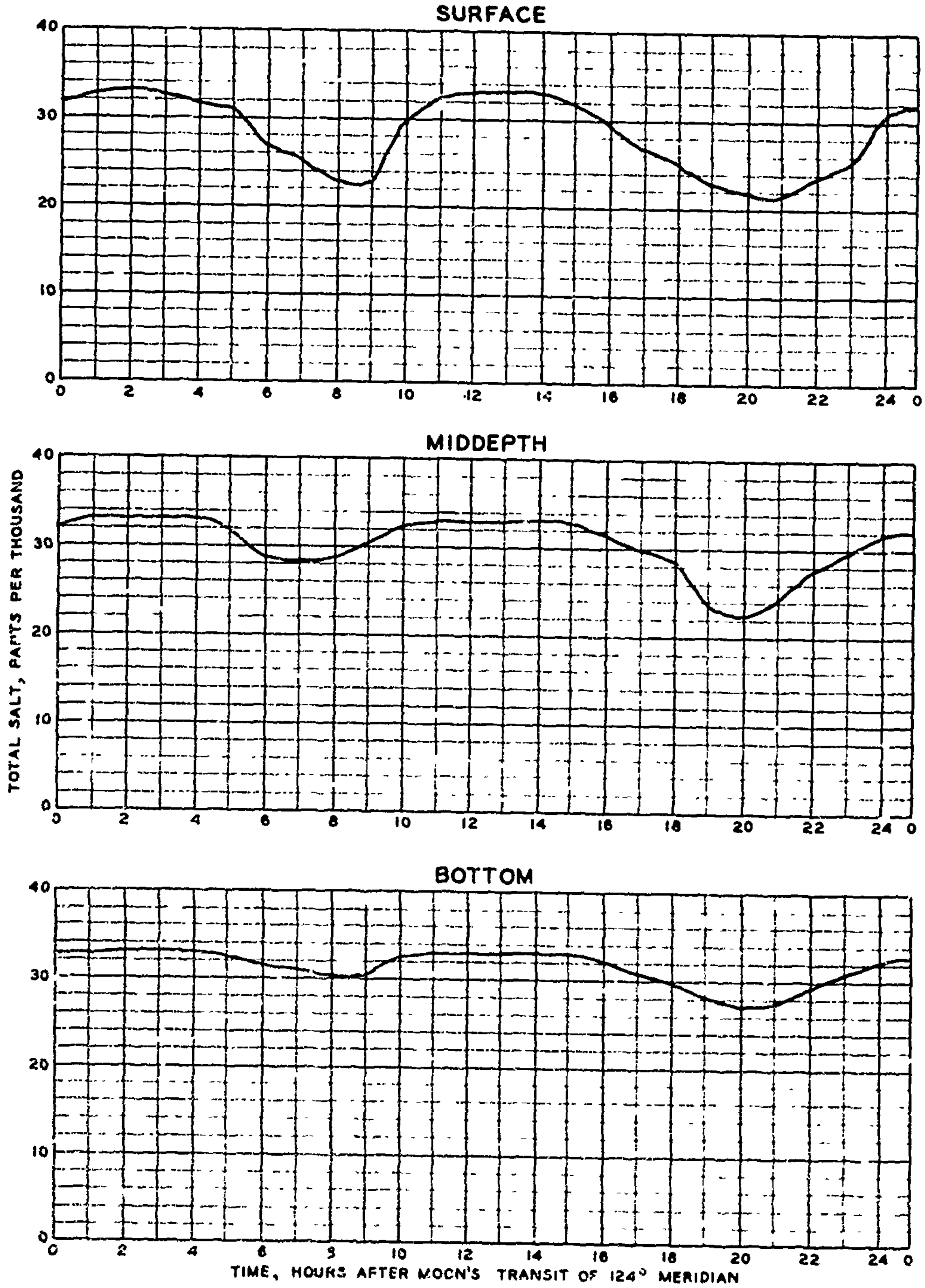
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 26A
SURFACE, MIDDEPTH AND BOTTOM



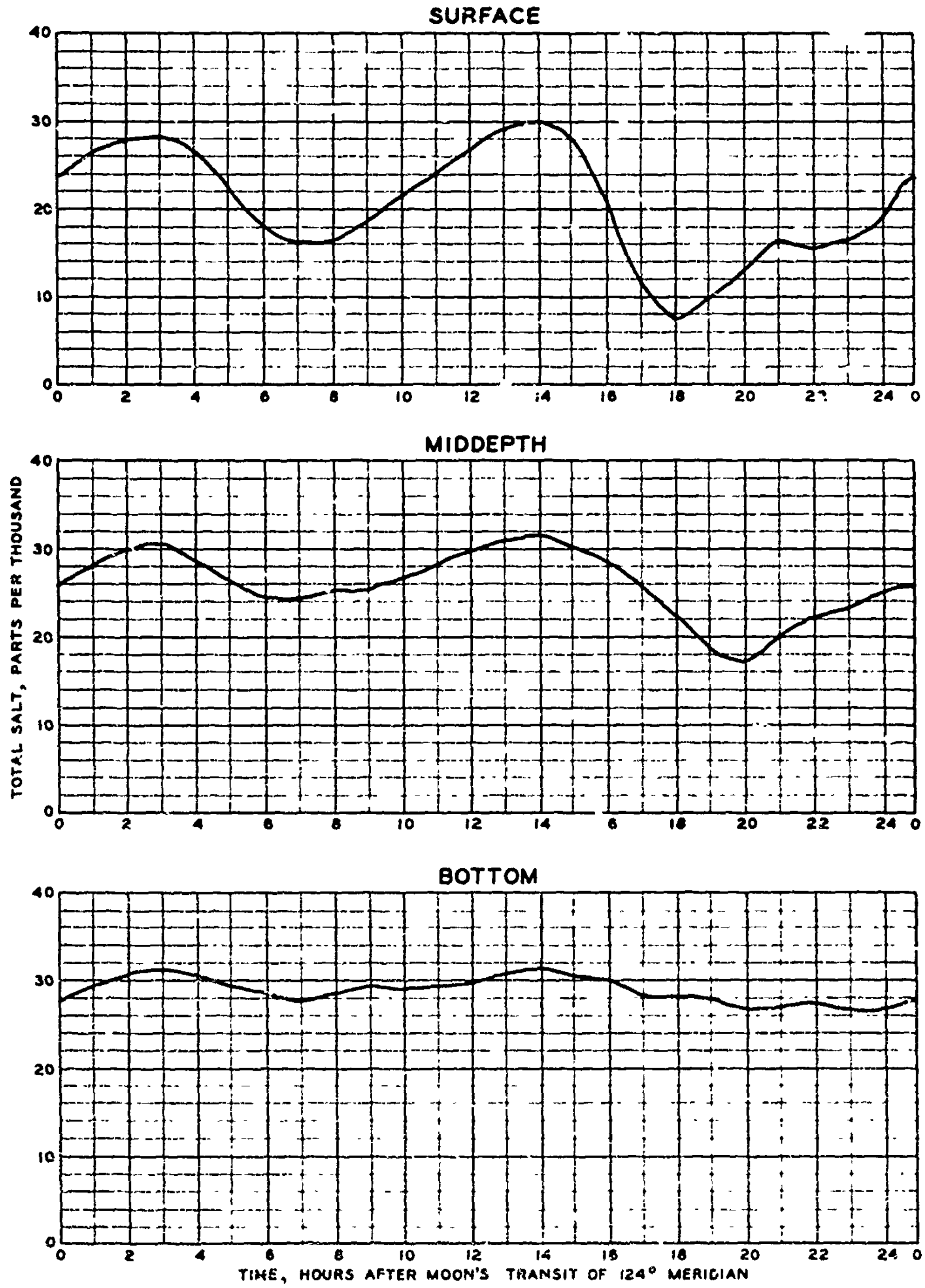
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 27
SURFACE, MIDDEPTH AND BOTTOM



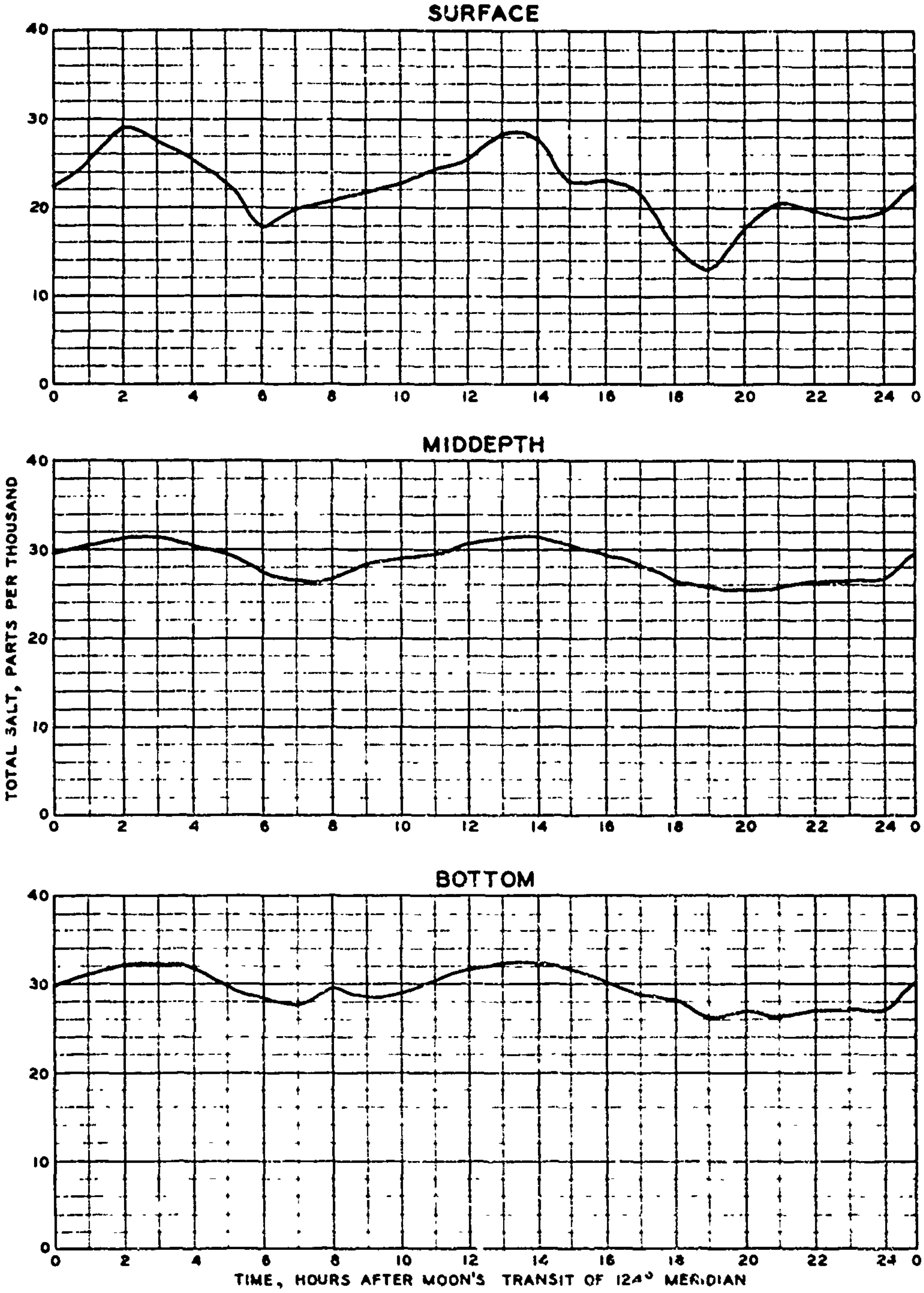
MODEL TEST DATA

TIDE MEAN
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 28
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

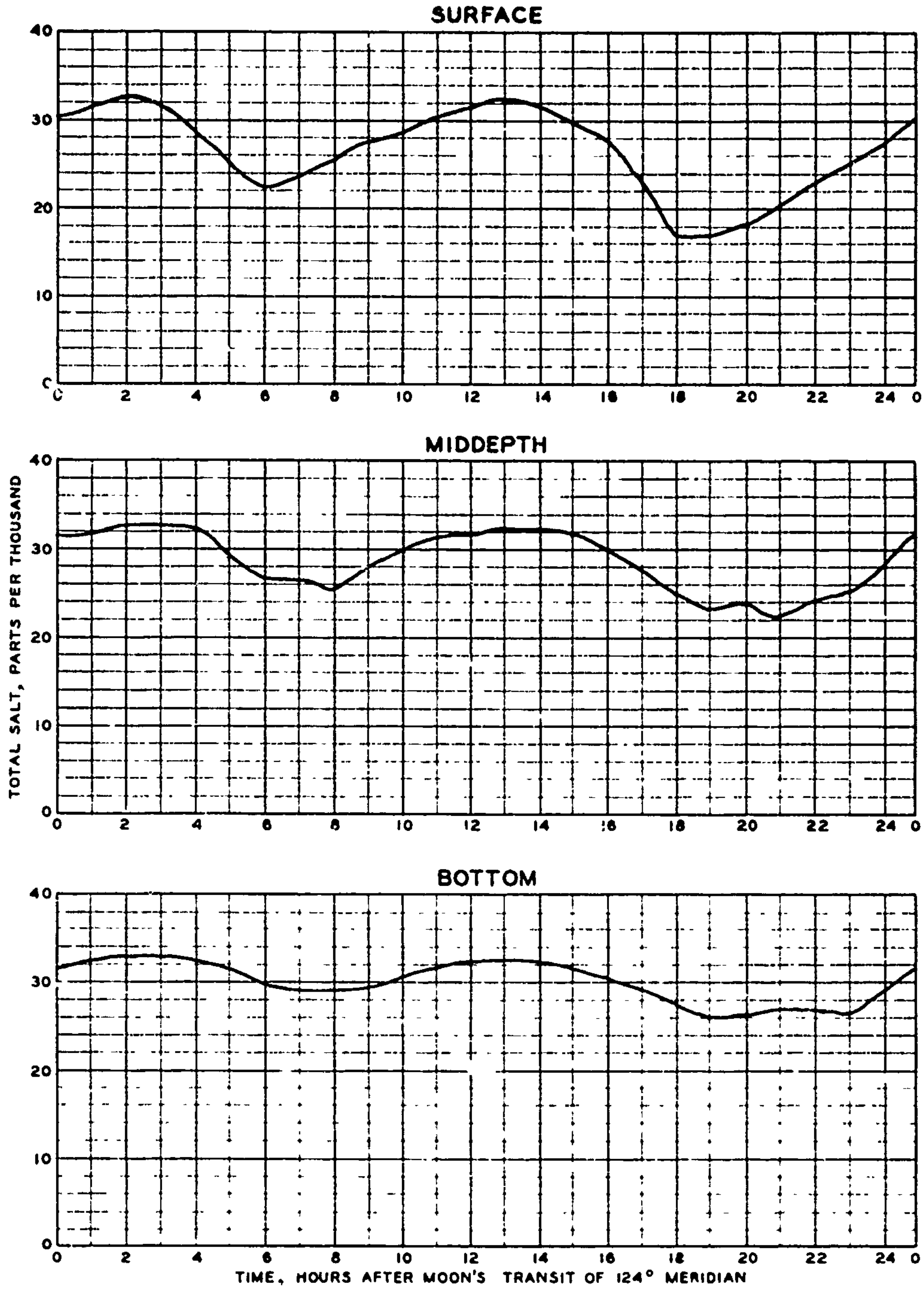
TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 29
SURFACE, MIDDEPTH AND BOTTOM

PLATE 168



MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

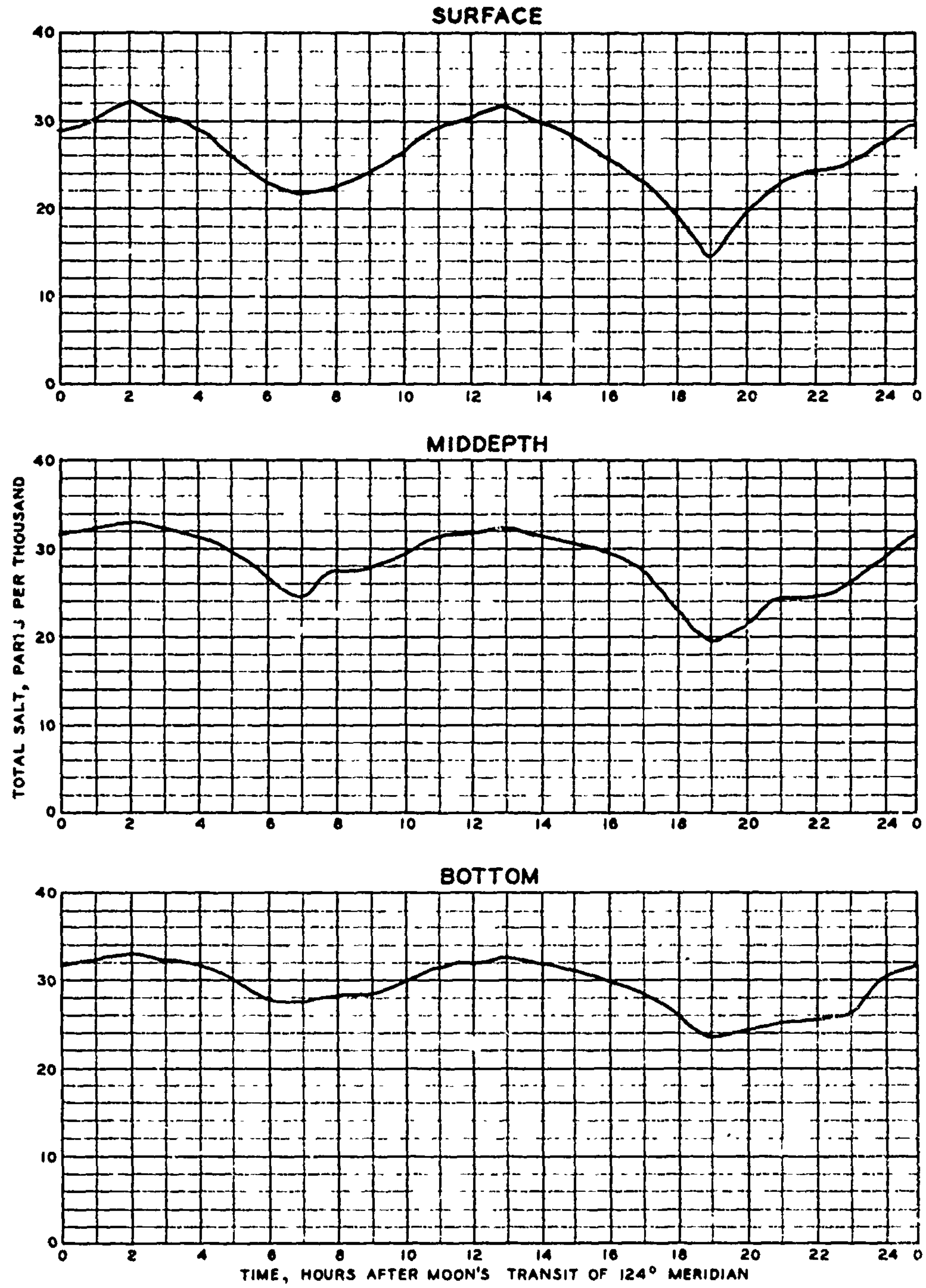
LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS

STATION 30

SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

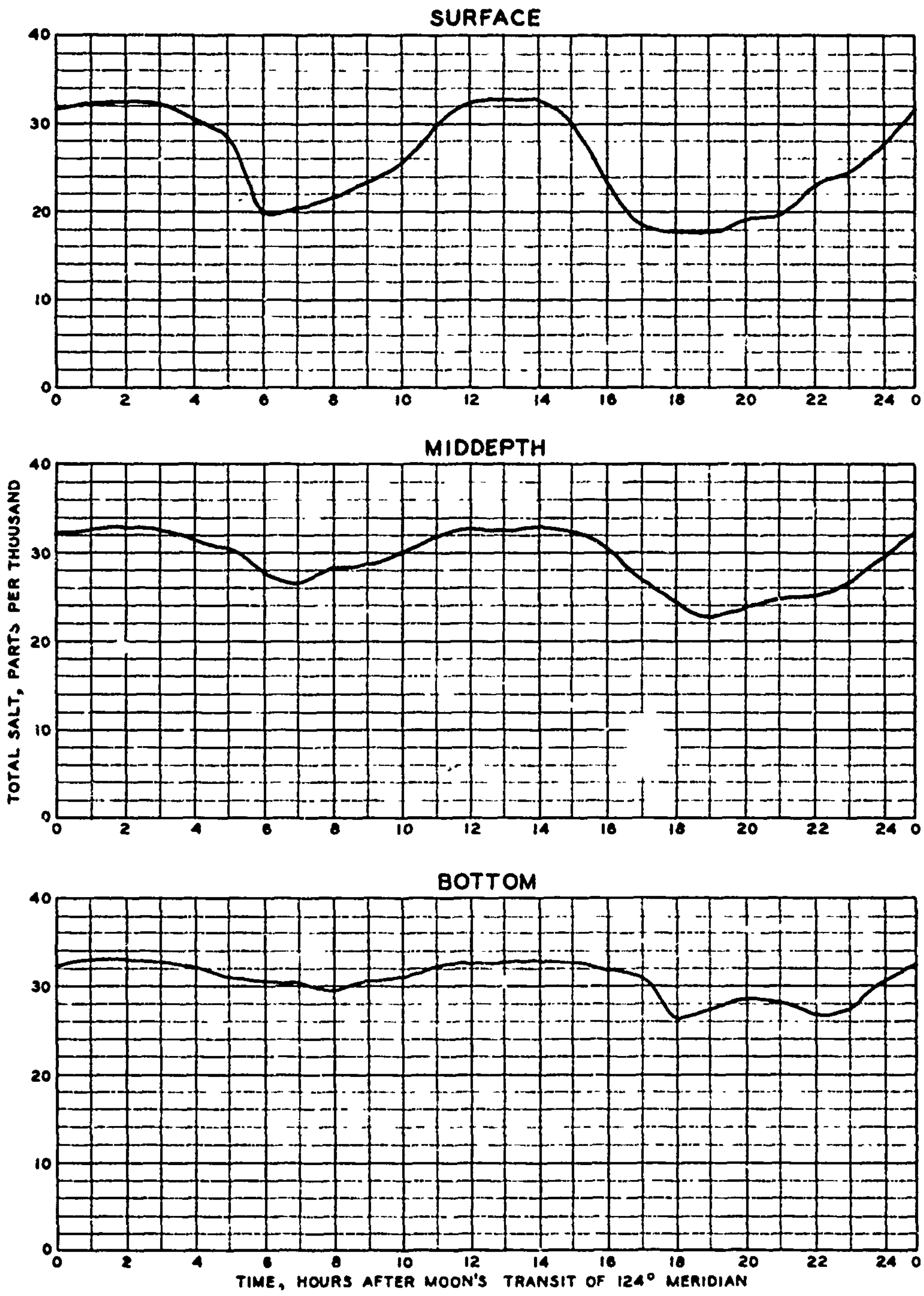
TIDE MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 31
SURFACE, MIDDEPTH AND BOTTOM

PLATE 170



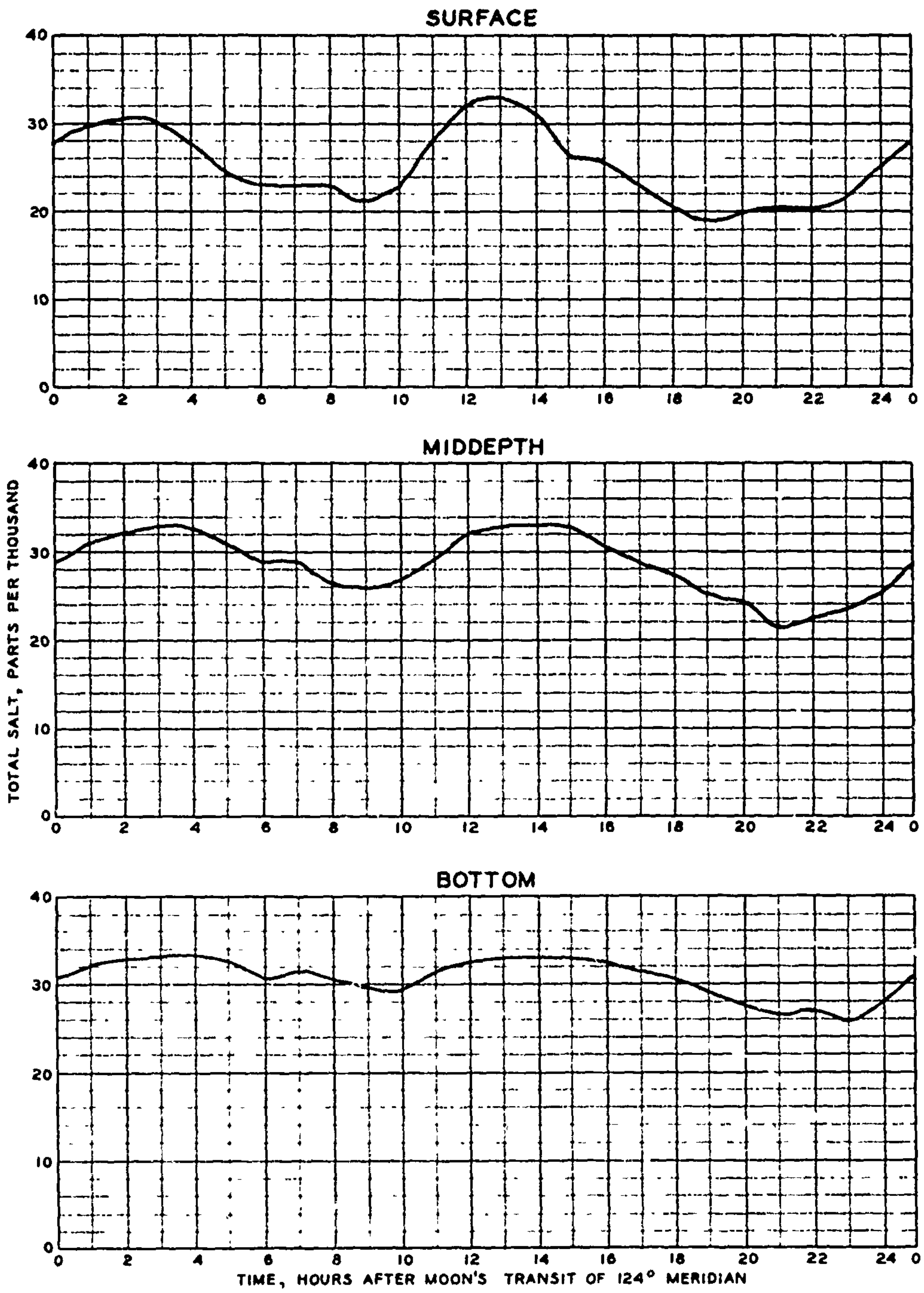
MODEL TEST DATA

TIDE . . MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 32
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

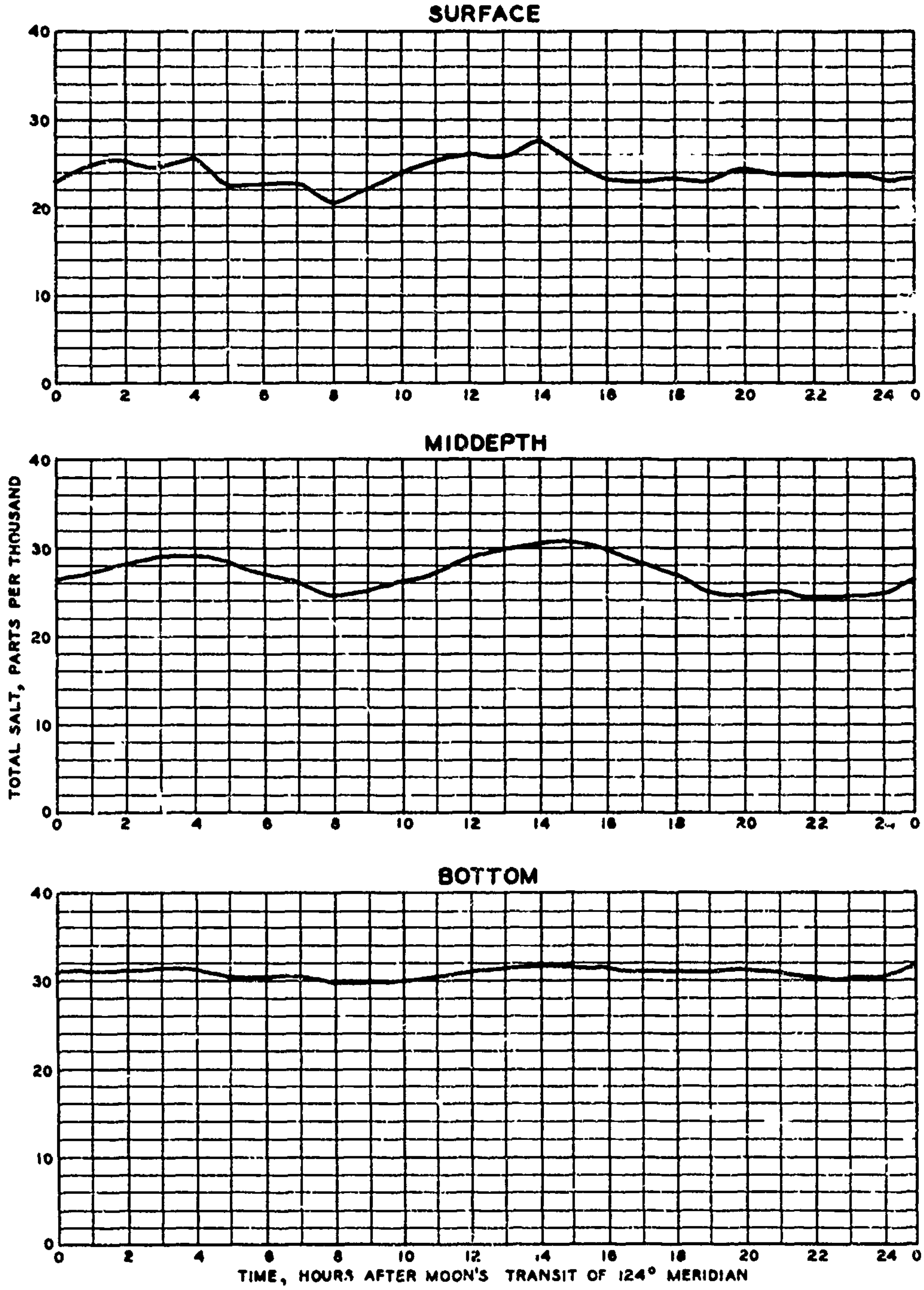
TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 33
SURFACE, MIDDEPTH AND BOTTOM

PLATE 172



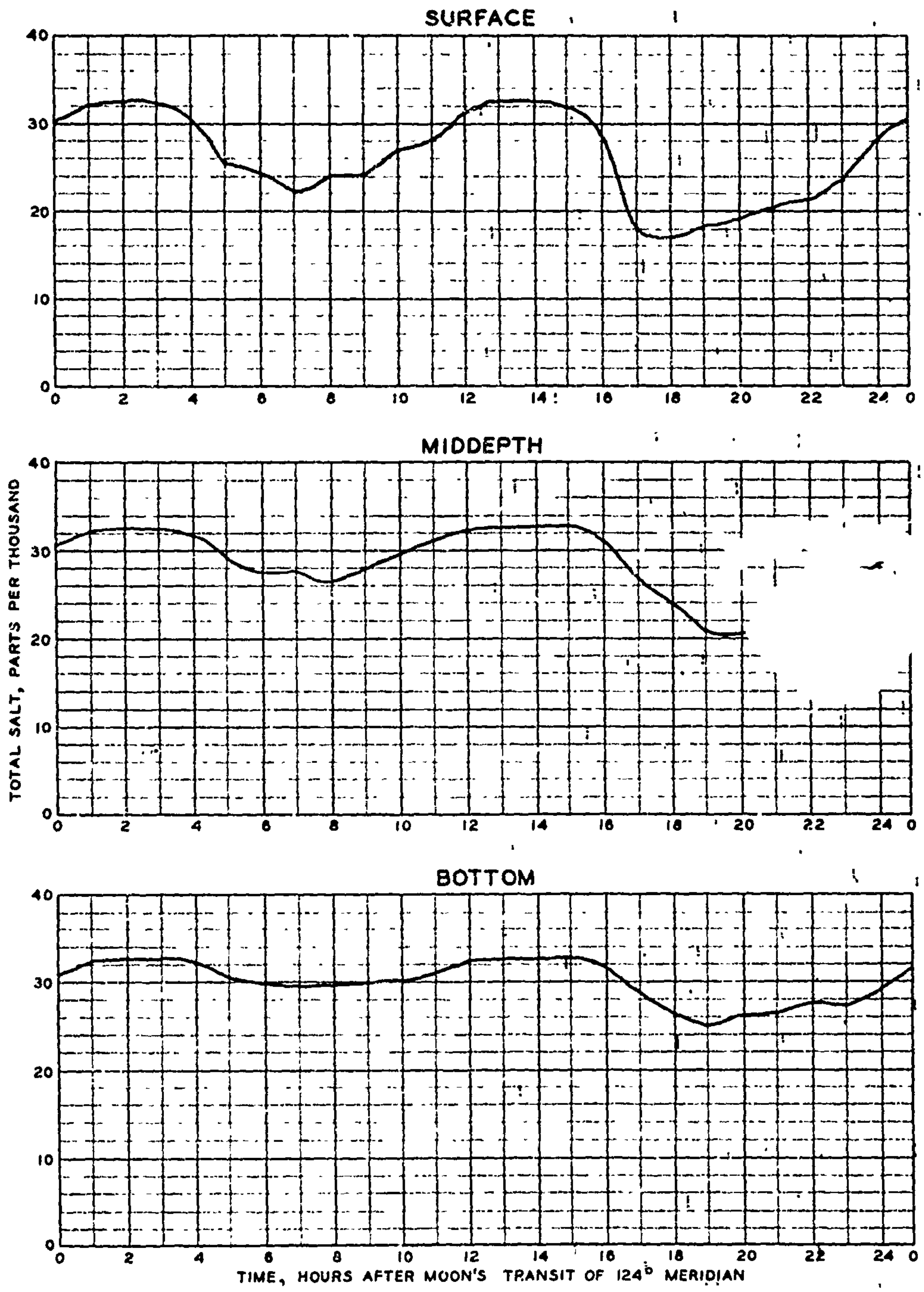
MODEL TEST DATA

TIDE . . ..MEAN
FRESH-WATER DISCHARGE . .11,400 CFS
SOURCE SALINITY . . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 34
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

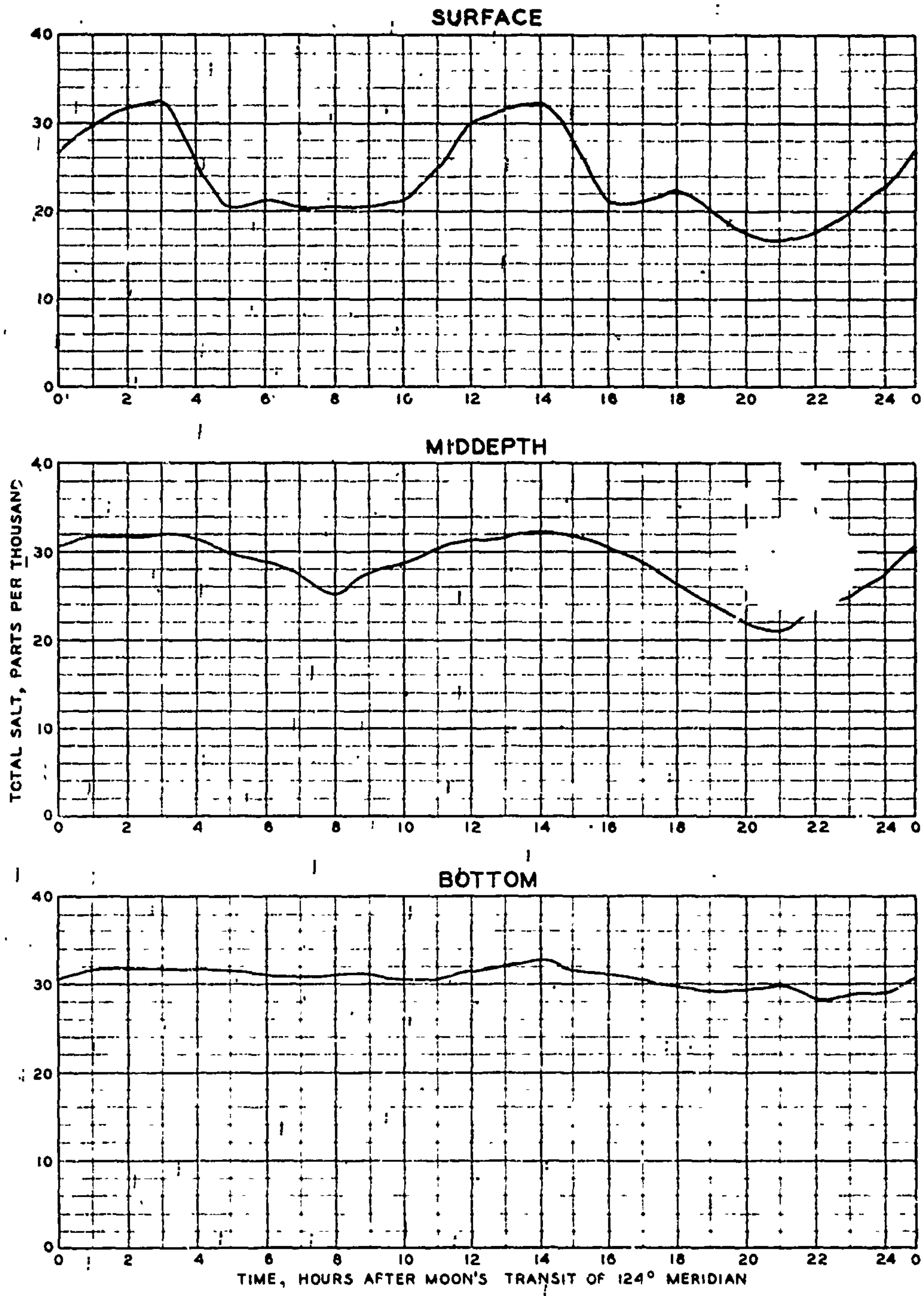
TIDE . . MEAN
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 35
SURFACE, MIDDEPTH AND BOTTOM

PLATE 174



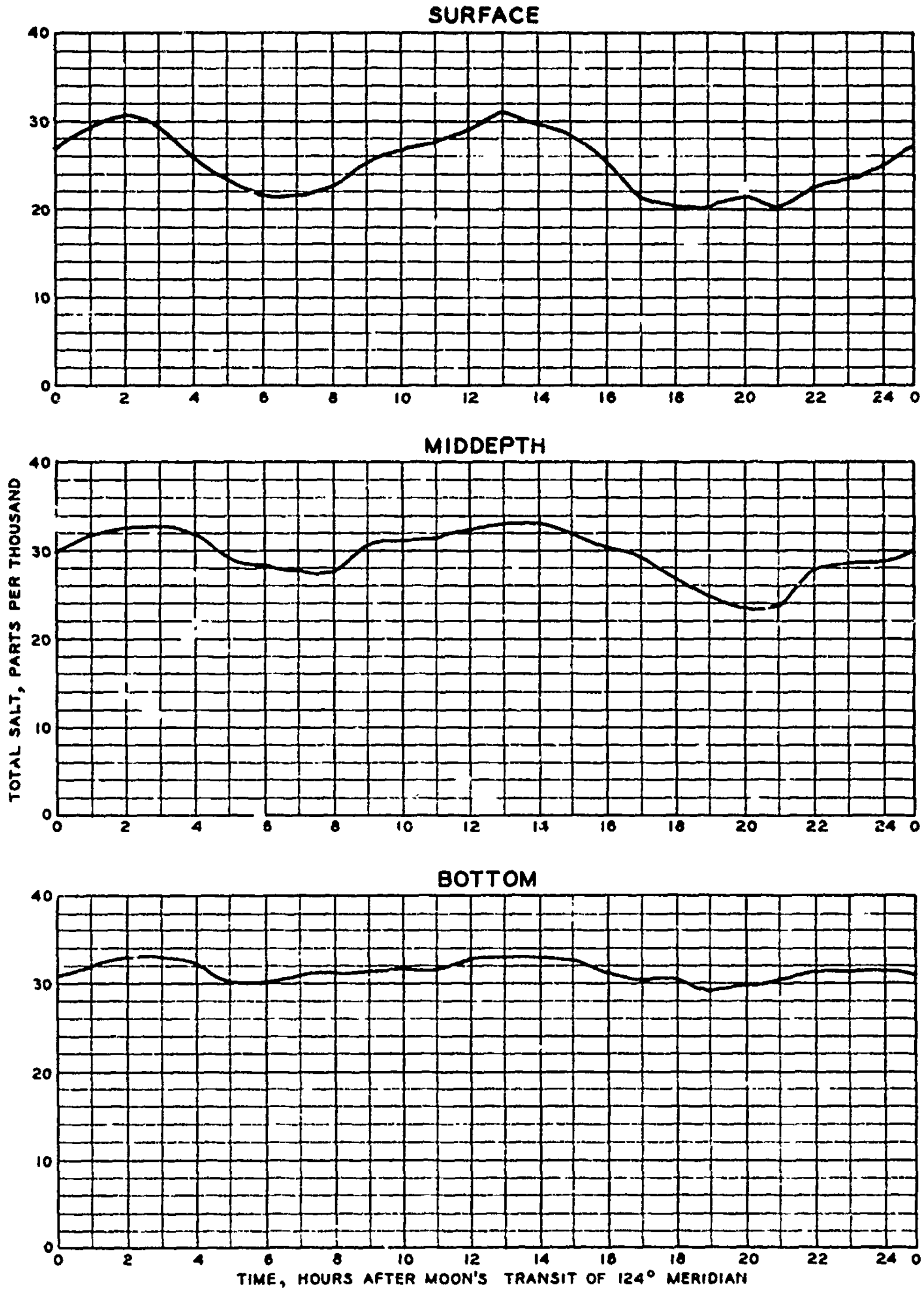
MODEL TEST DATA

TIDE MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 36
SURFACE, MIDDEPTH AND BOTTOM



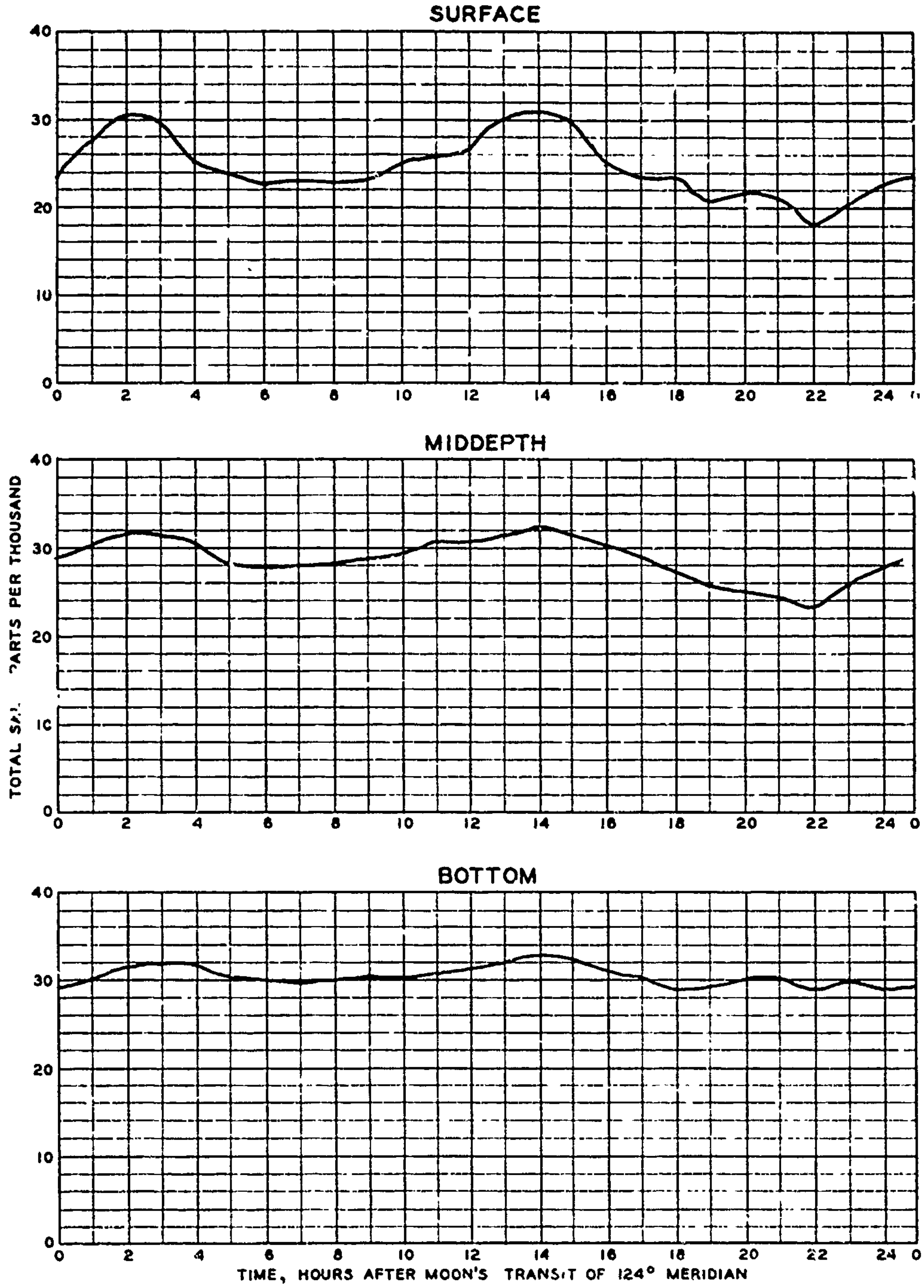
MODEL TEST DATA

TIDE . MEAN
FRESH-WATER DISCHARGE. 11,400 CFS
SOURCE SALINITY... 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 37
SURFACE, MIDDEPTH AND BOTTOM



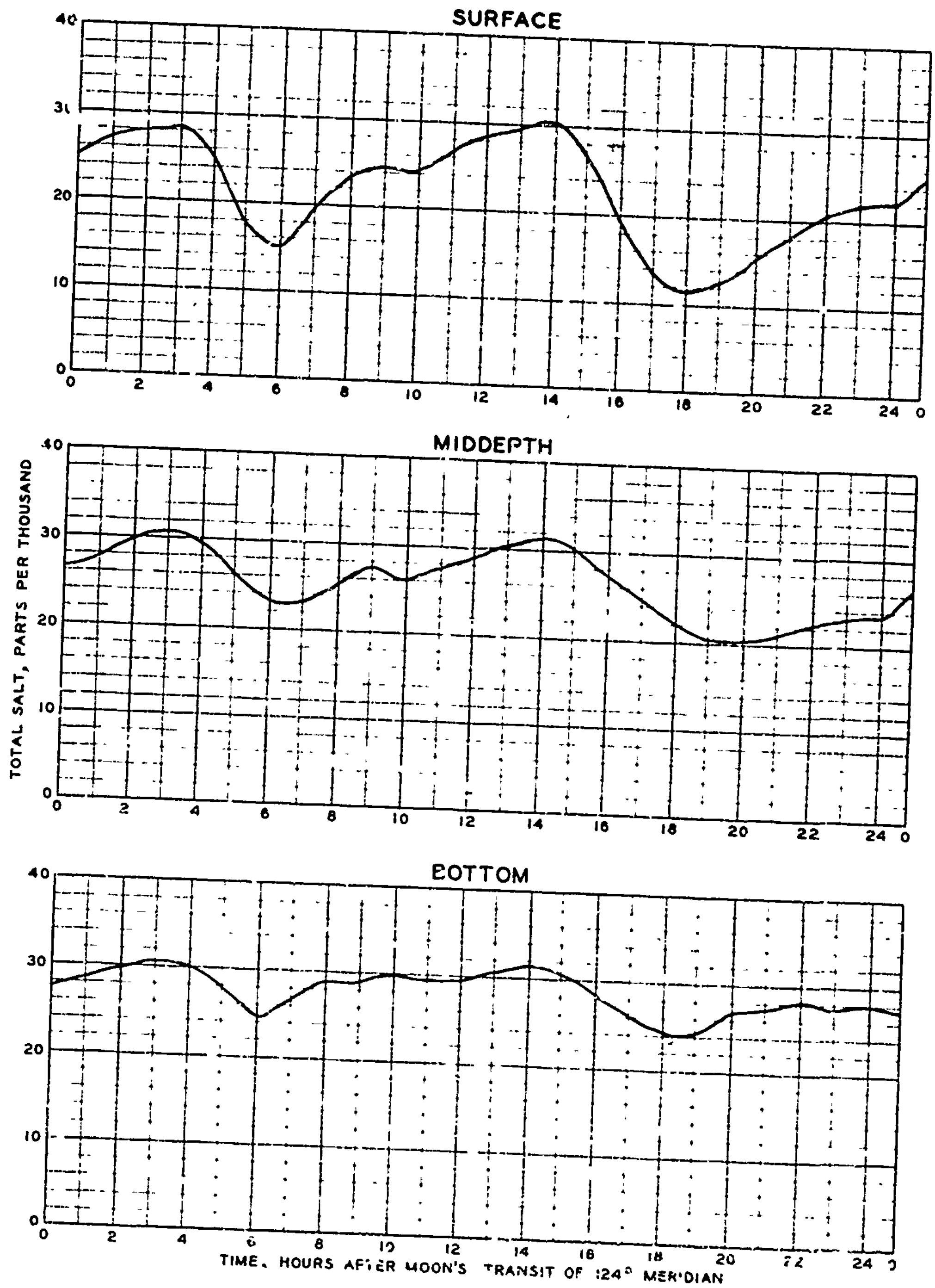
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 38
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

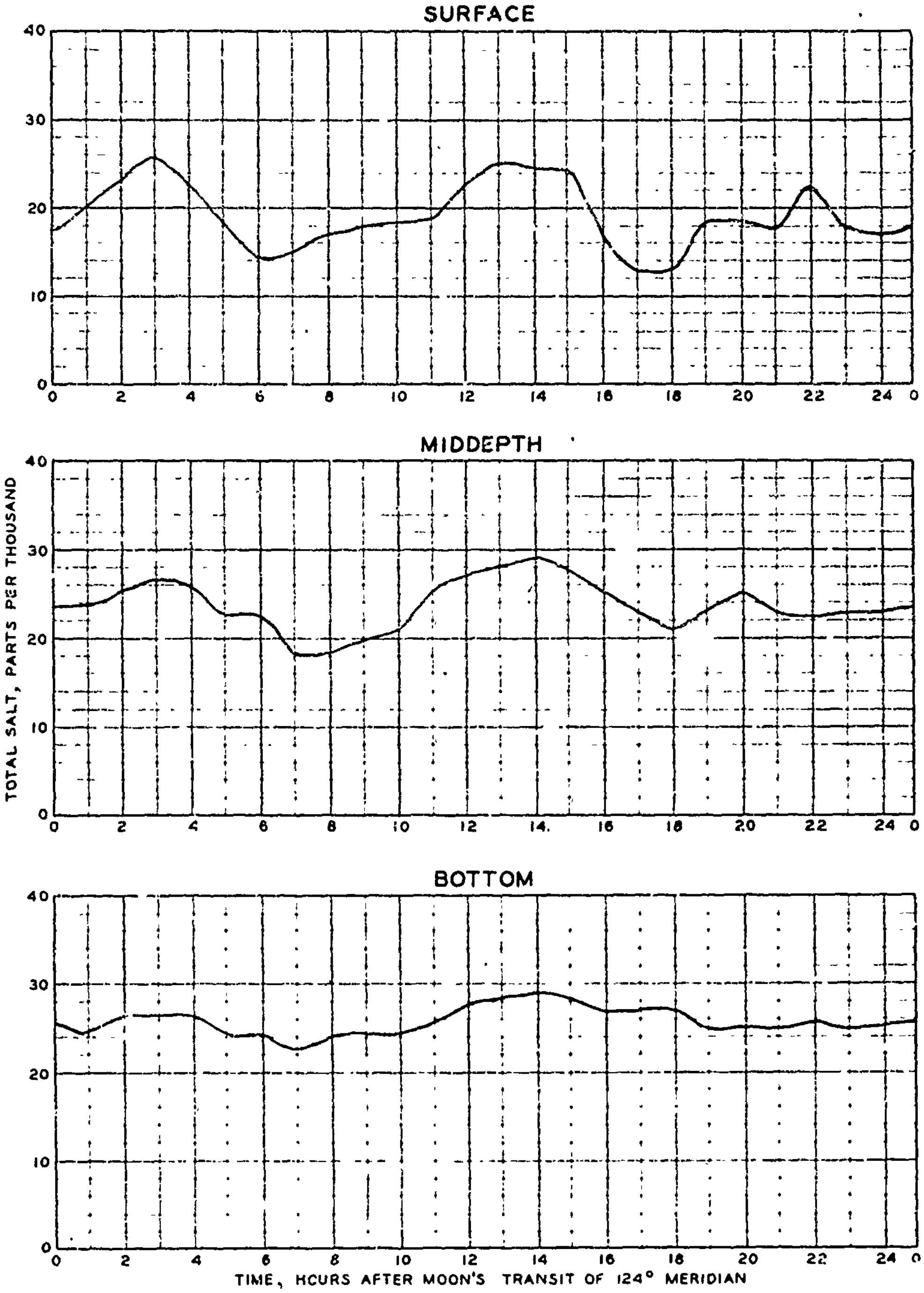
TIDE MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 39
SURFACE, MIDDEPTH AND BOTTOM

PLATE 178



MODEL TEST DATA

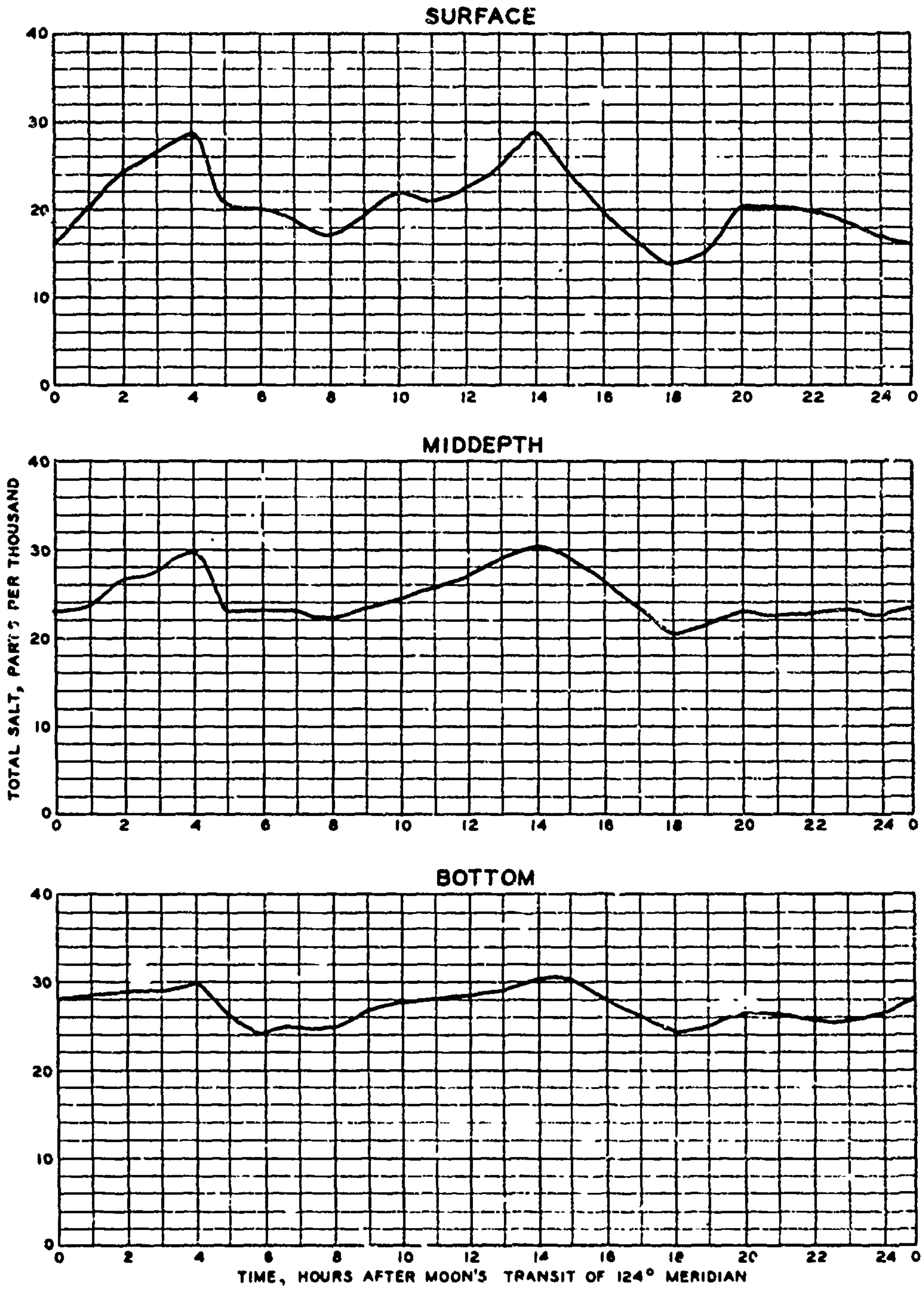
TIDE MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 40
SURFACE, MIDDEPTH AND BOTTOM

PLATE 179



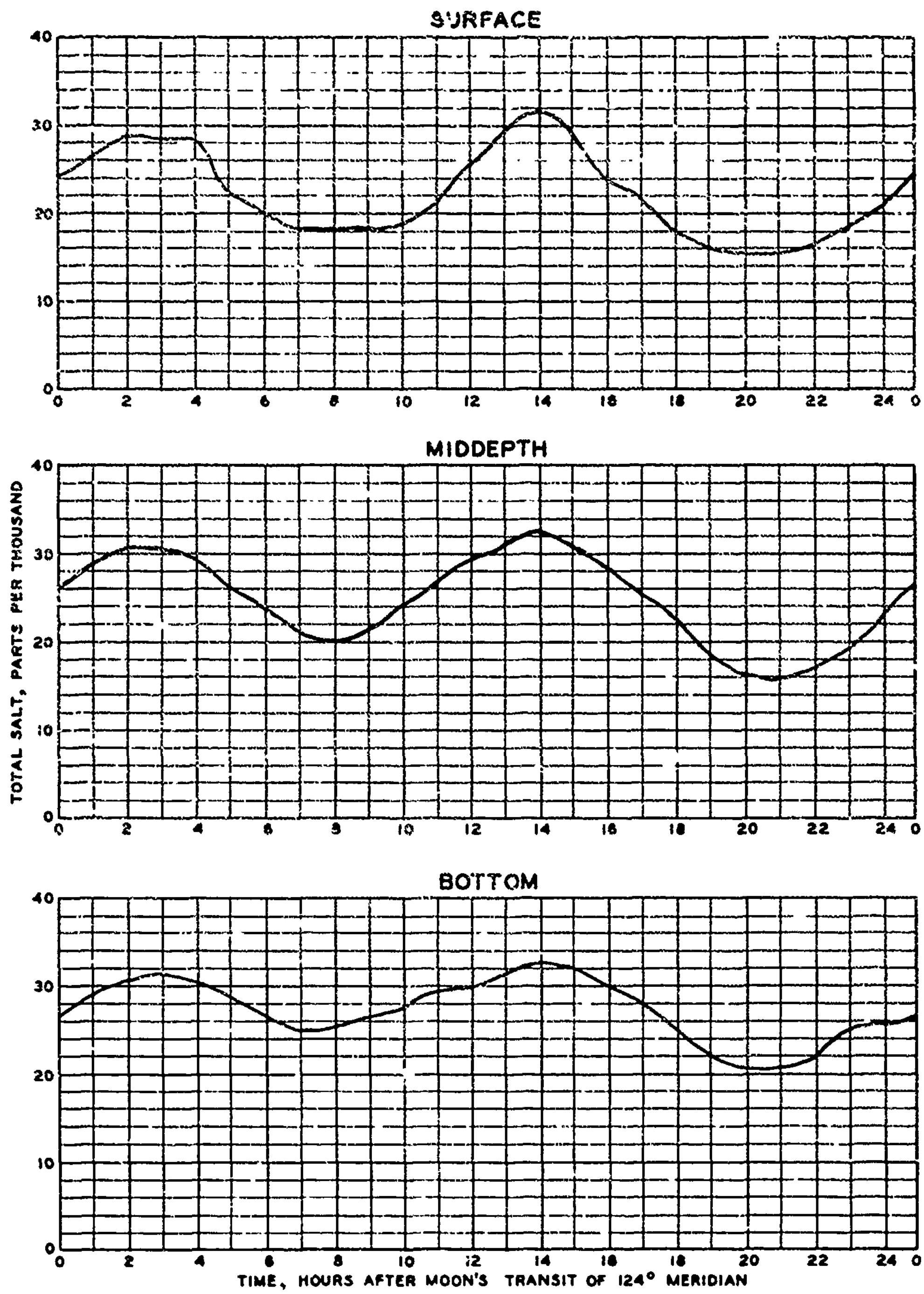
MODEL TEST DATA

TIDE : MEAN
FRESH-WATER DISCHARGE. 11,400 CFS
SOURCE SALINITY. . . . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 41
SURFACE, MIDDEPTH AND BOTTOM



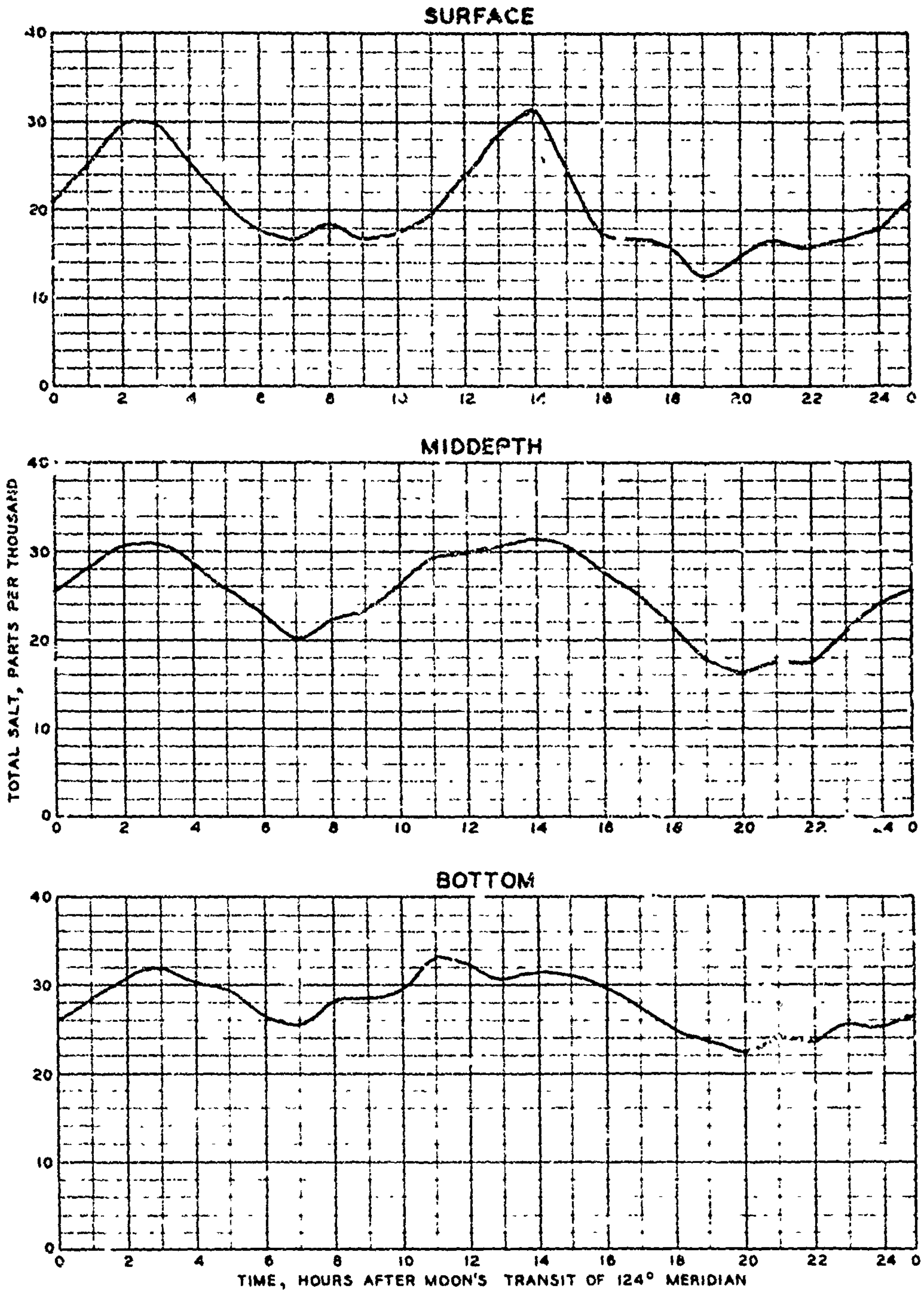
MODEL TEST DATA

TIDE . . . . . MEAN
FRESH-WATER DISCHARGE. 11,400 CFS
SOURCE SALINITY... ... 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 42
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

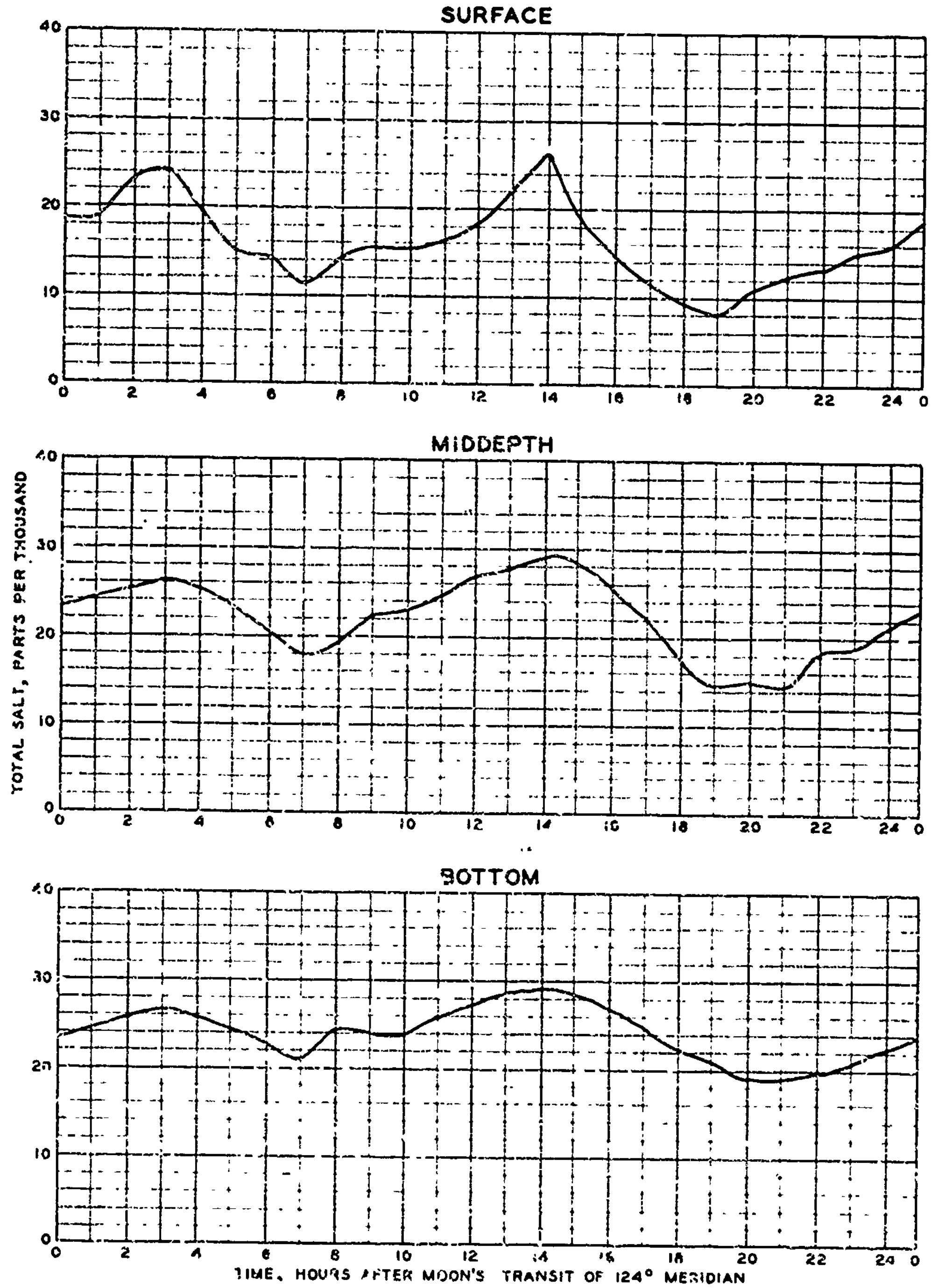
TIDE . . . MEAN
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 43
SURFACE, MIDDEPTH AND BOTTOM

PLATE 182



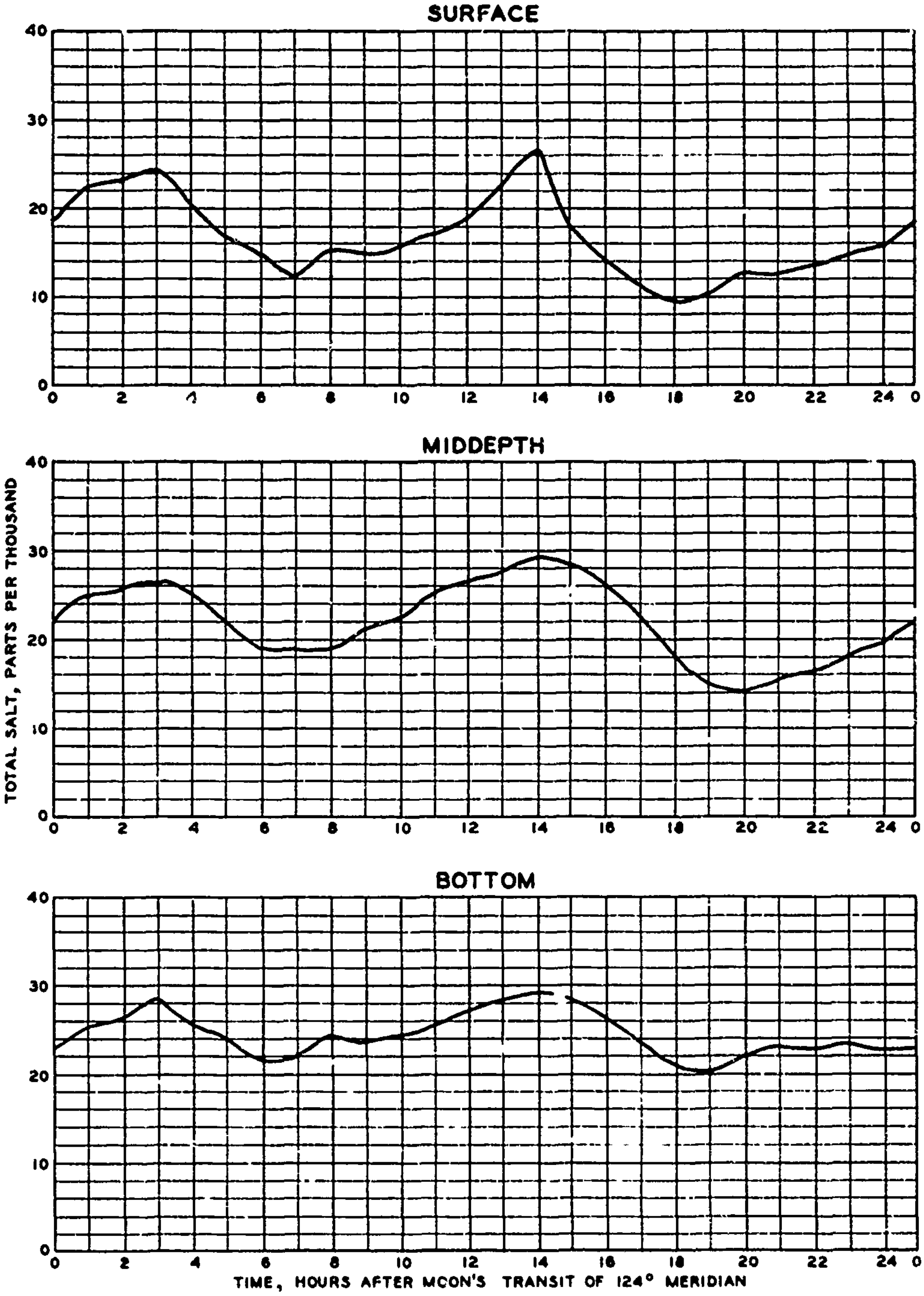
MODEL TEST DATA

TIDE . . . MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 44
SURFACE, MIDDEPTH AND BOTTOM



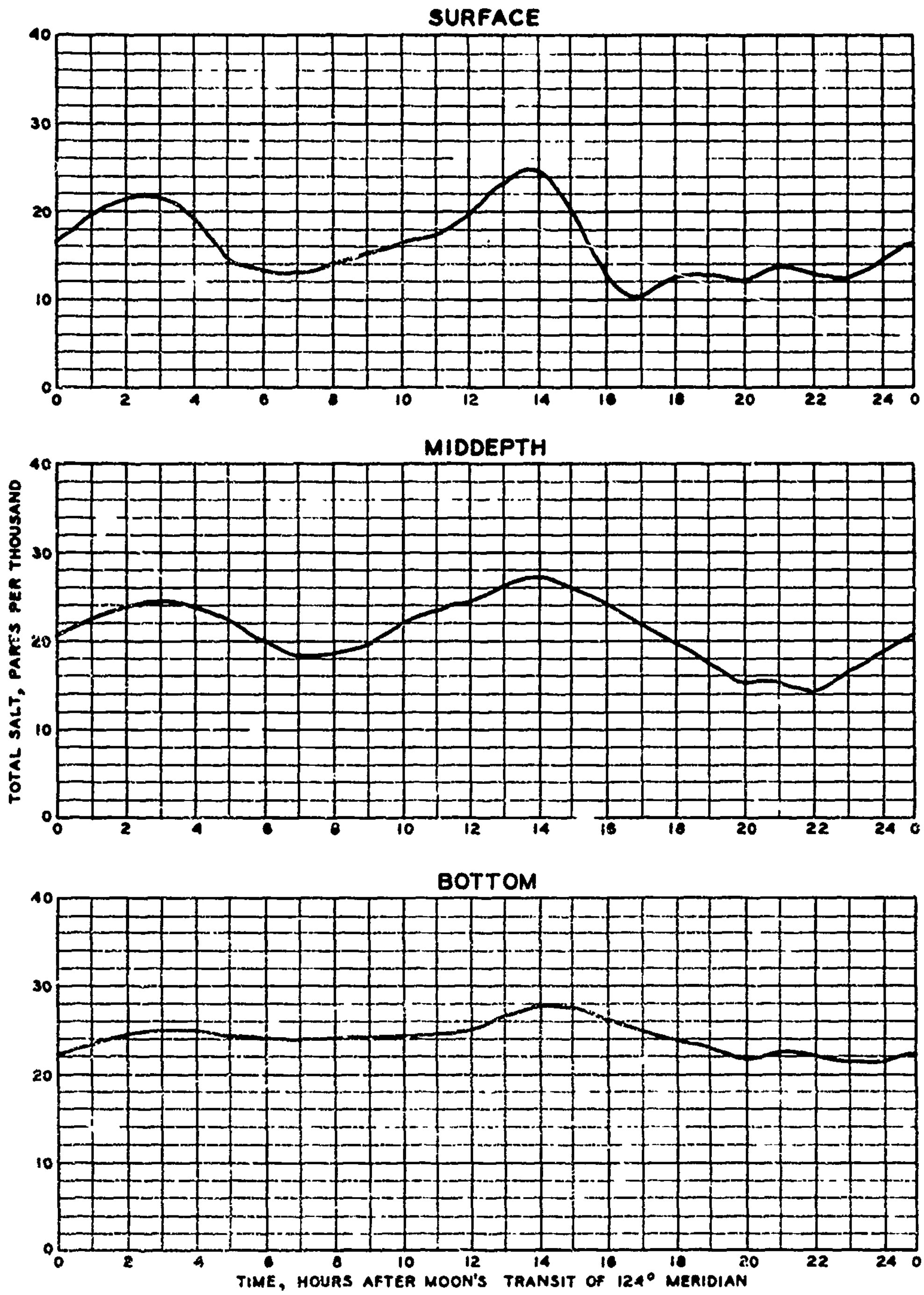
MODEL TEST DATA

TIDE . . . . MEAN
FRESH-WATER DISCHARGE ... 11,400 CFS
SOURCE SALINITY . . . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 45
SURFACE, MIDDEPTH AND BOTTOM



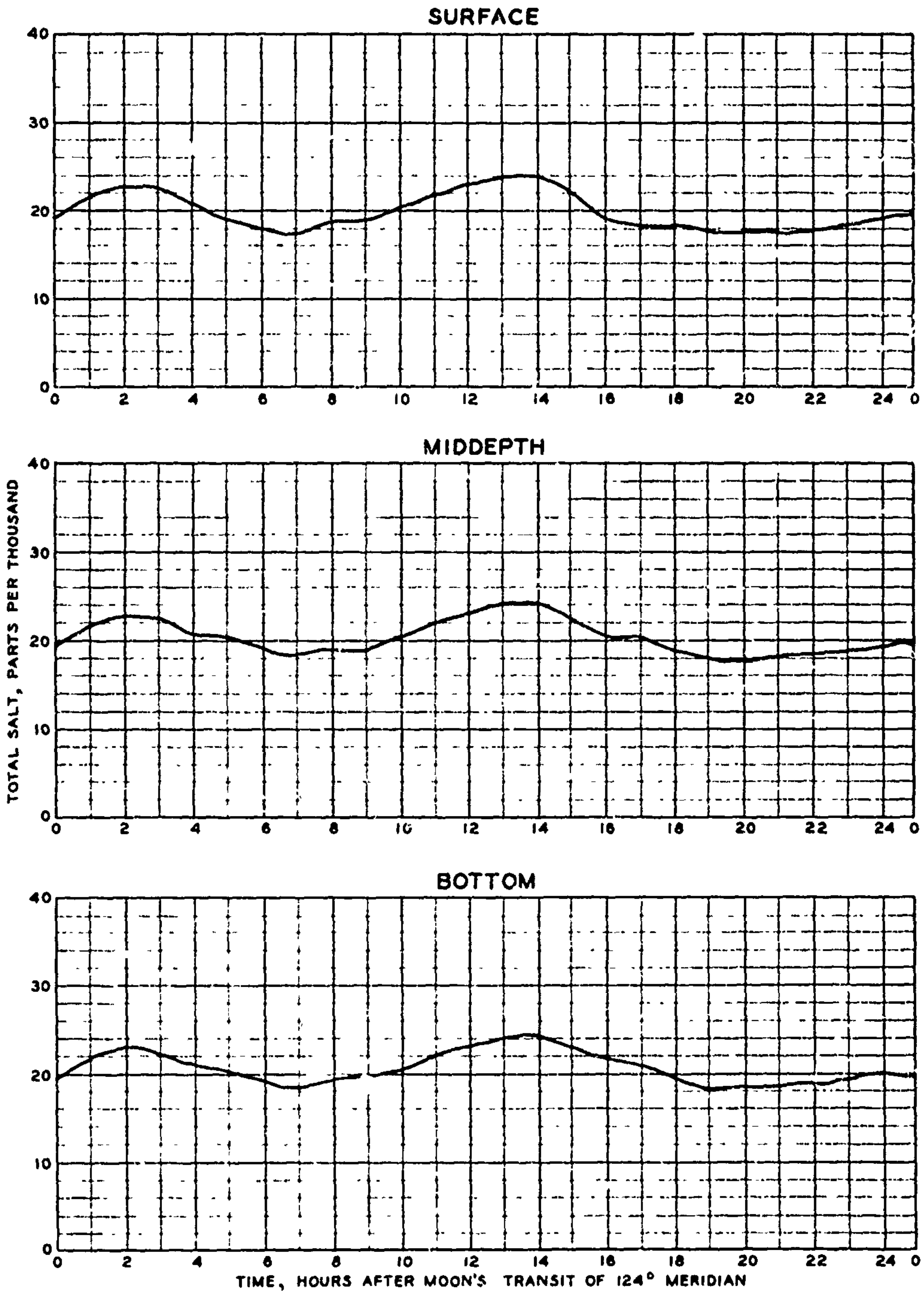
MODEL TEST DATA

TIDE . . . . MEAN
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY . . . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 46
SURFACE, MIDDEPTH AND BOTTOM



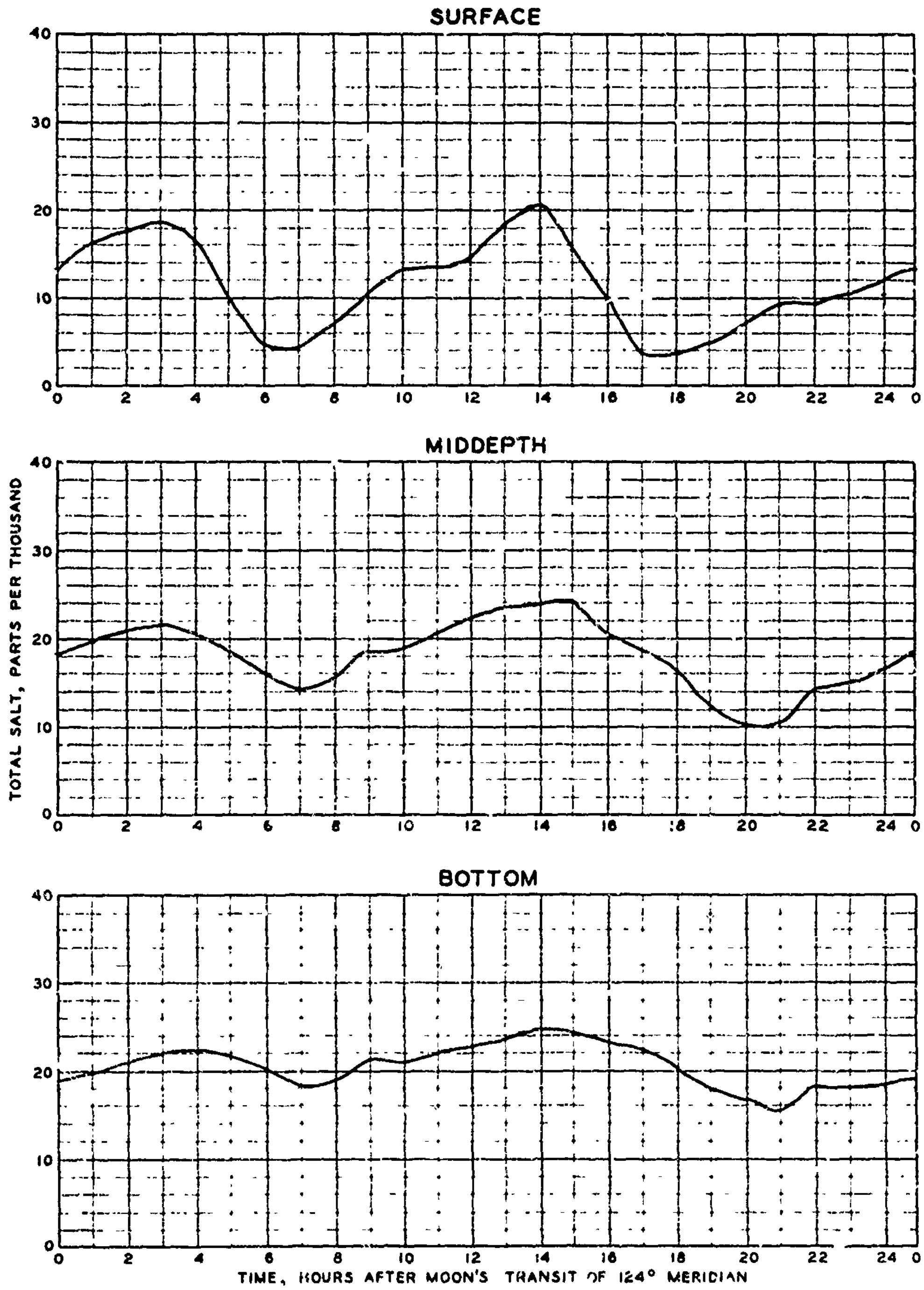
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 47
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

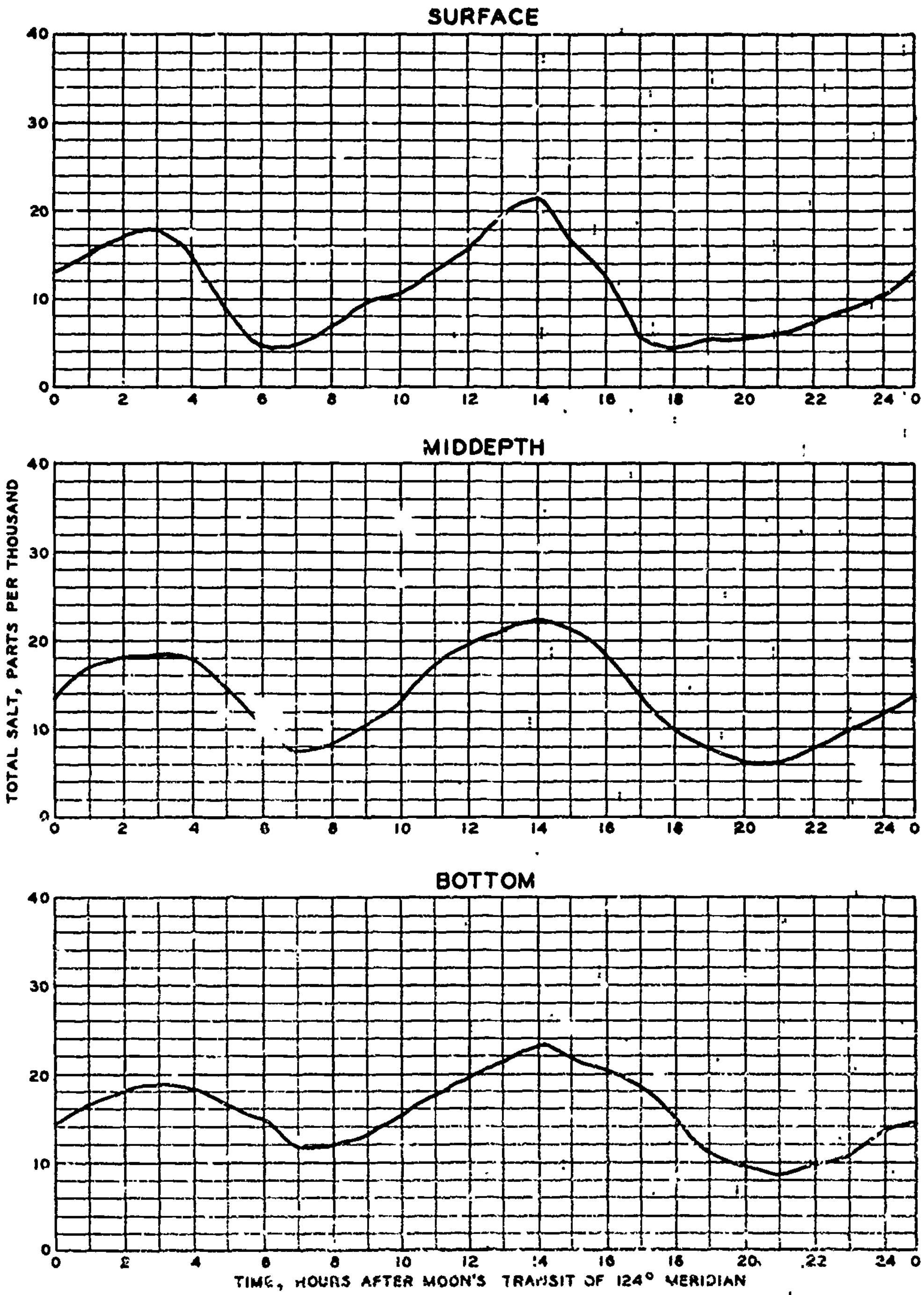
TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 48
SURFACE, MIDDEPTH AND BOTTOM

PLATE 187



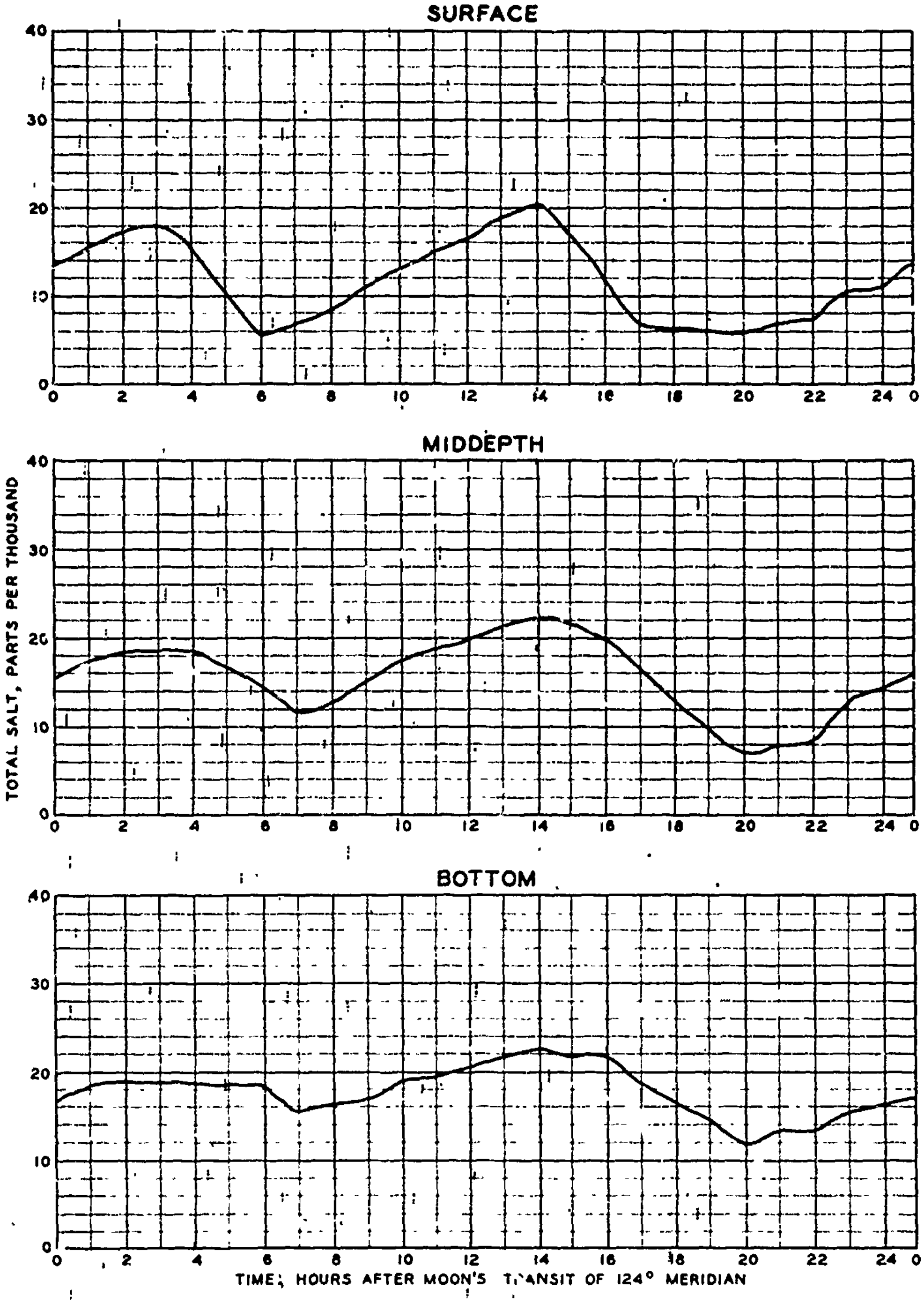
MODEL TEST DATA

TIDE . MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY . 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 49
SURFACE, MIDDEPTH AND BOTTOM



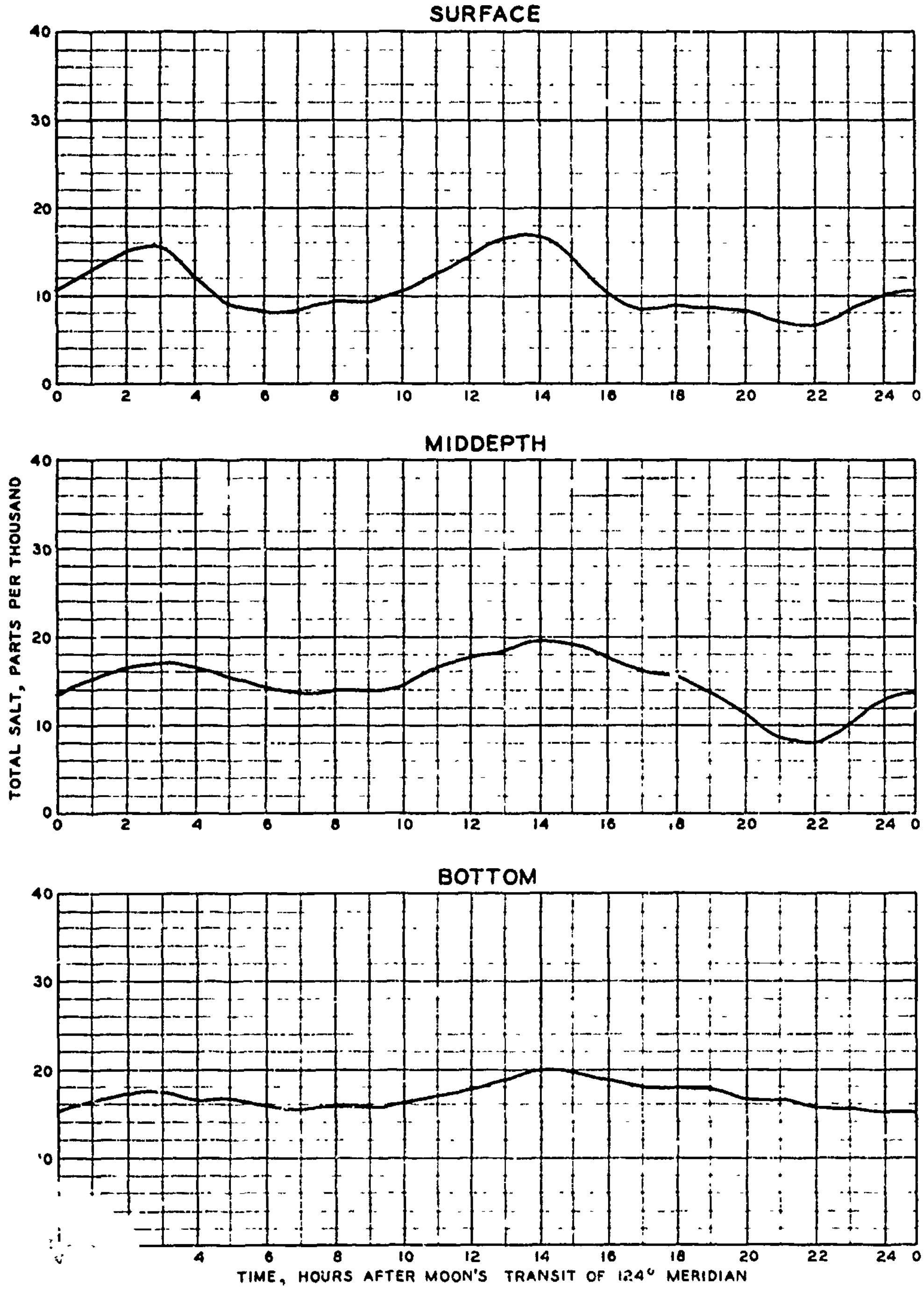
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 50
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

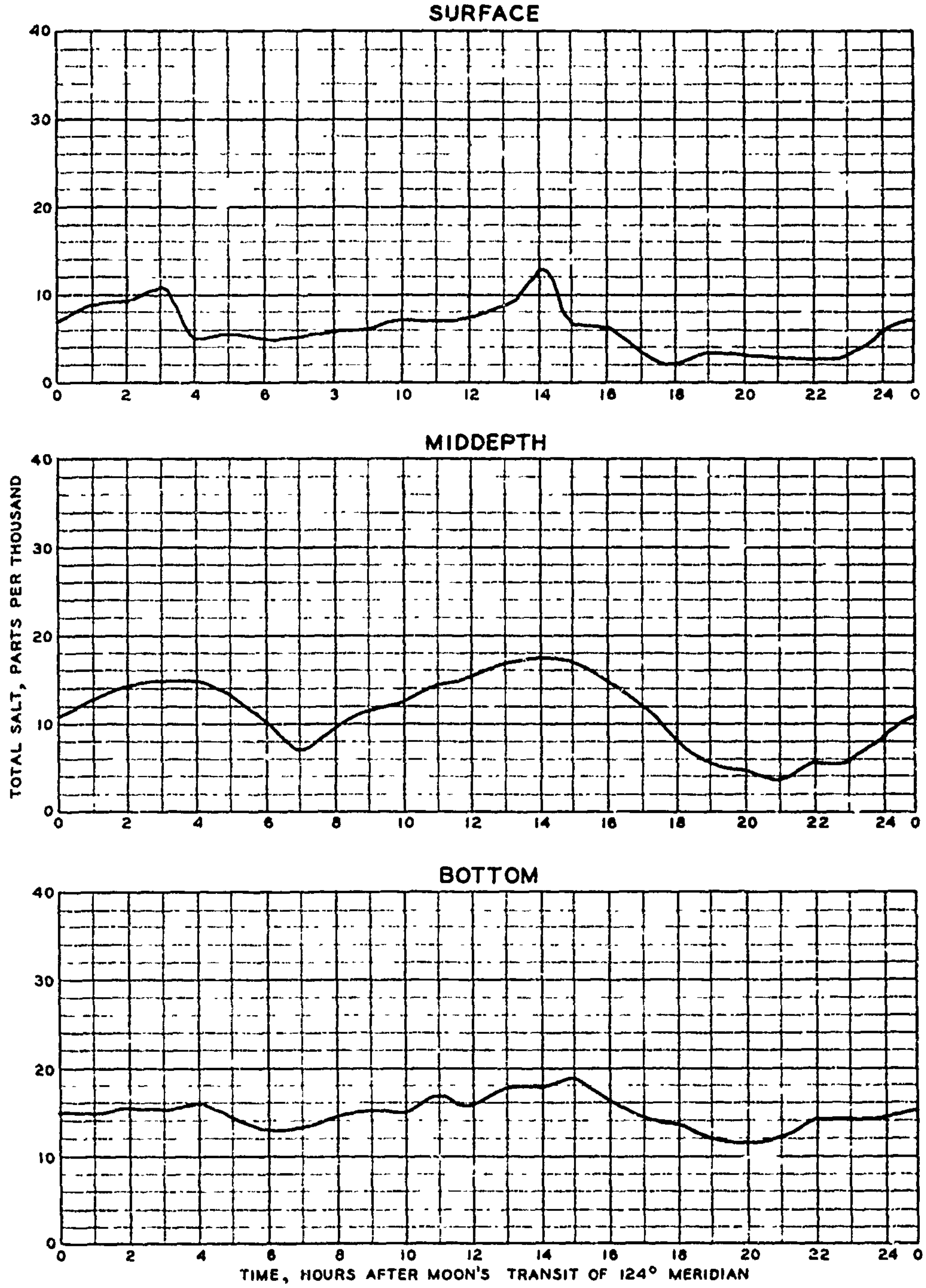
TIDE MEAN
FRESH-WATER DISCHARGE 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 51
SURFACE, MIDDEPTH AND BOTTOM

PLATE 190



MODEL TEST DATA

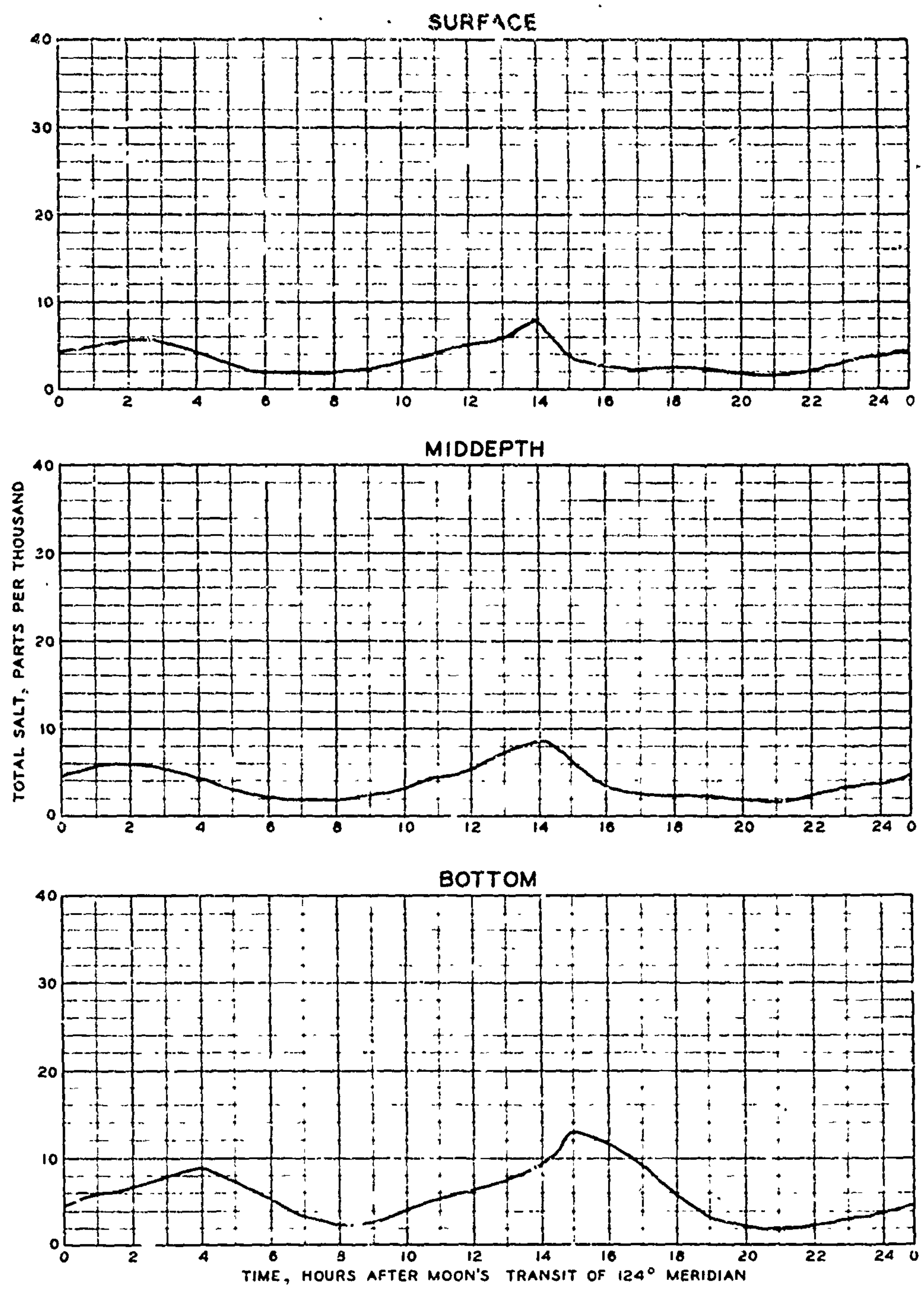
TIDE . MEAN
FRESH-WATER DISCHARGE . 11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 52

SURFACE, MIDDEPTH AND BOTTOM



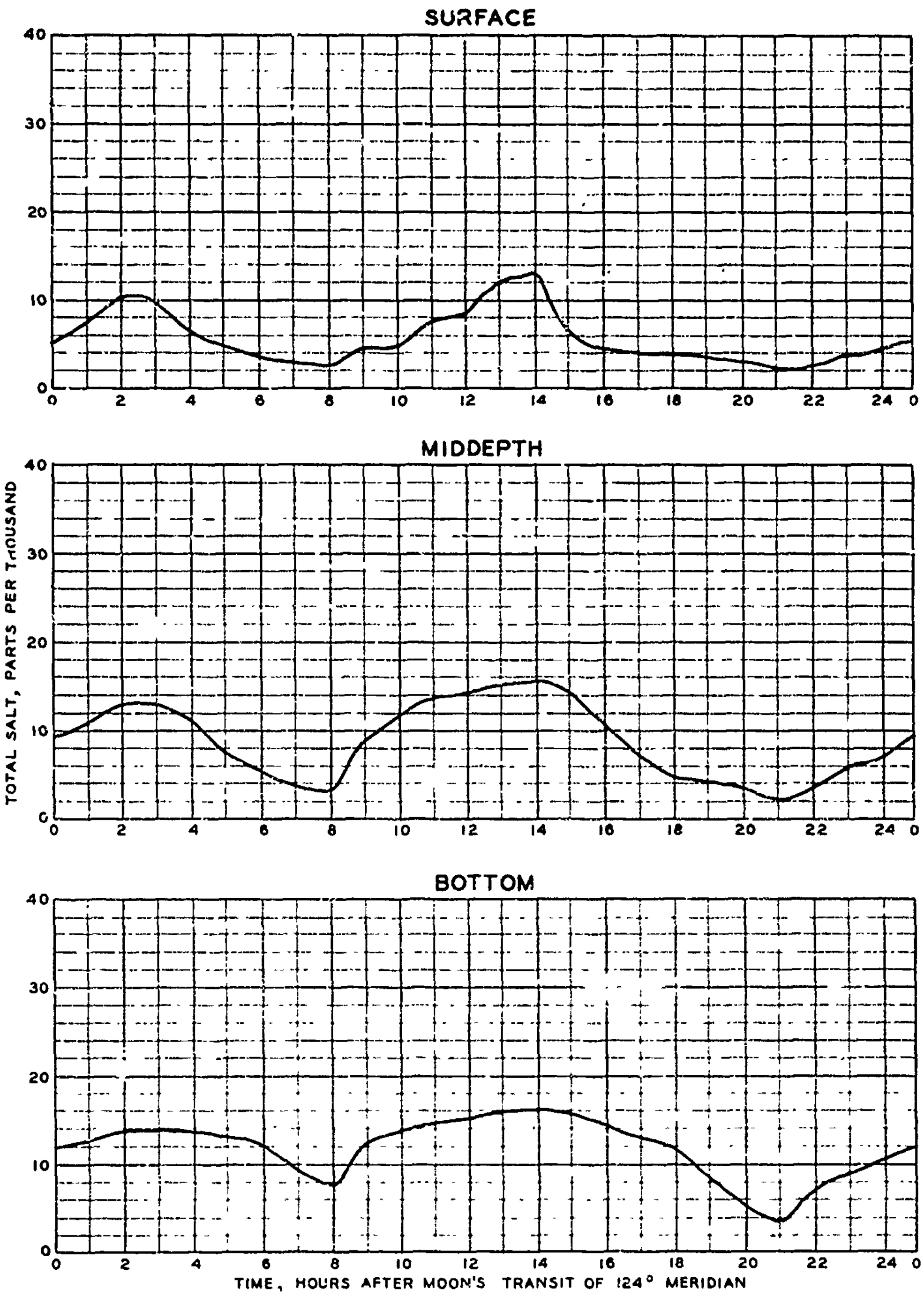
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 53
SURFACE, MIDDEPTH AND BOTTOM



MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

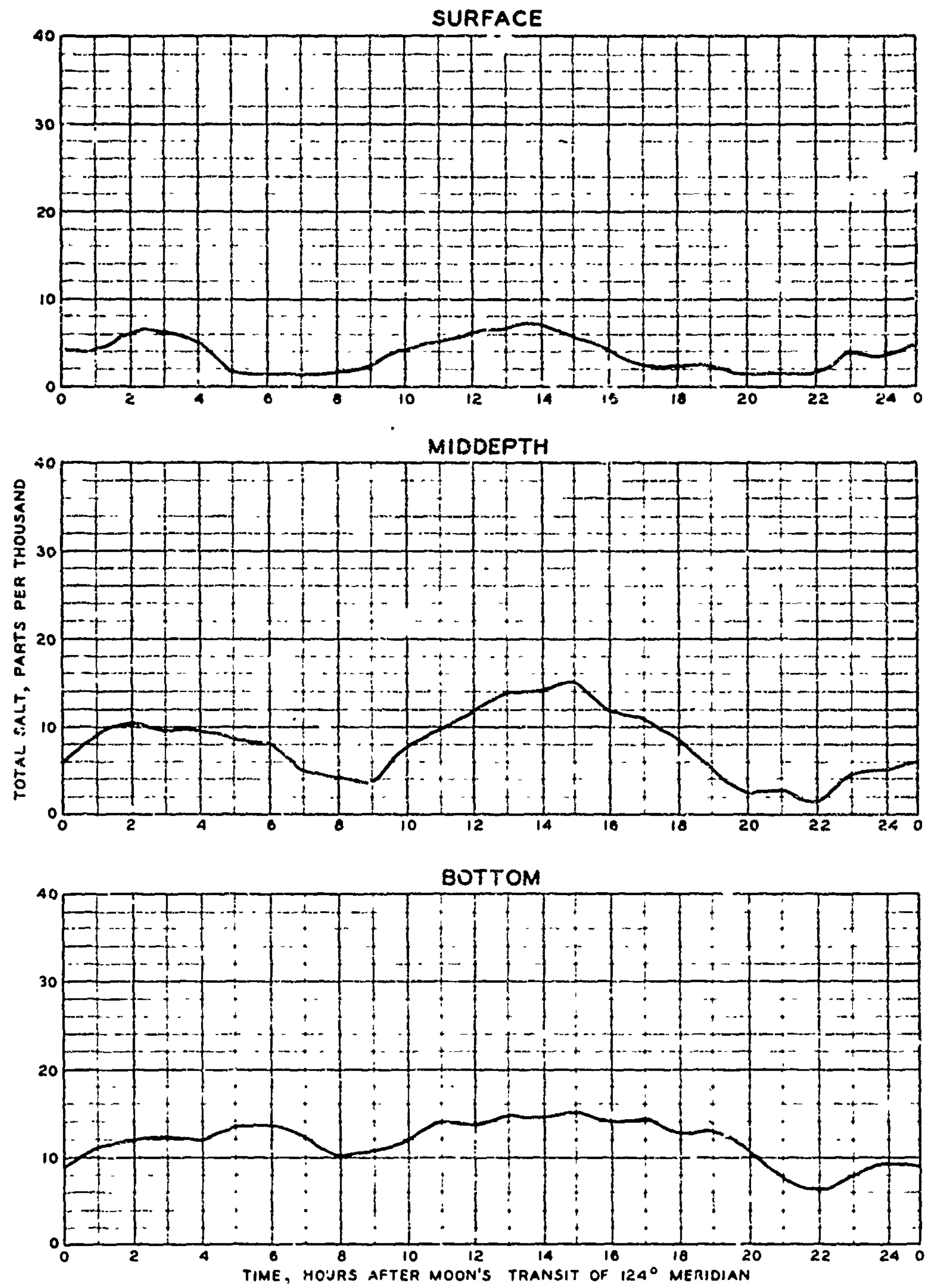
LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 54

SURFACE, MIDDEPTH AND BOTTOM

PLATE 193



MODEL TEST DATA

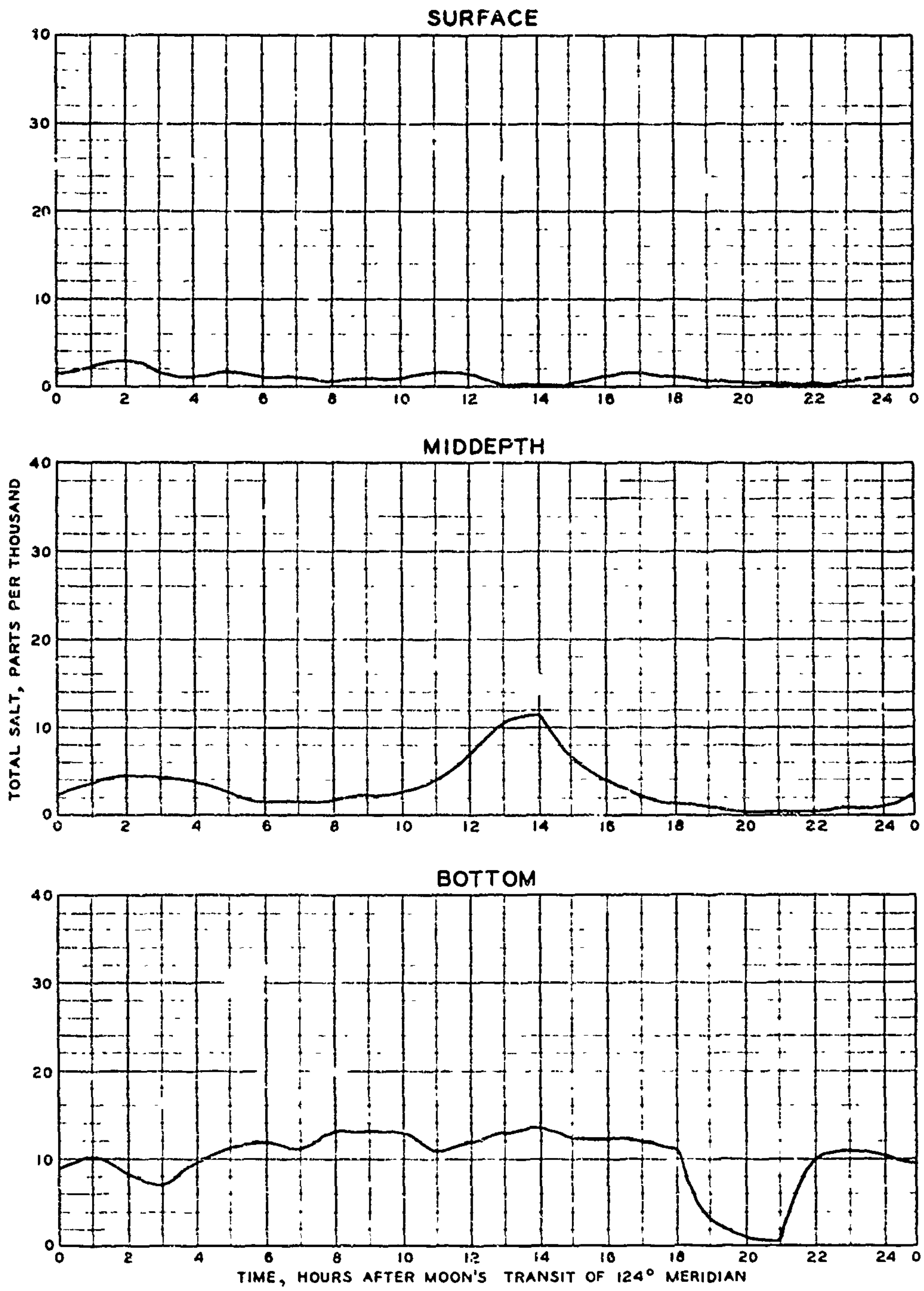
TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 55
SURFACE, MIDDEPTH AND BOTTOM

PLATE 194



MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

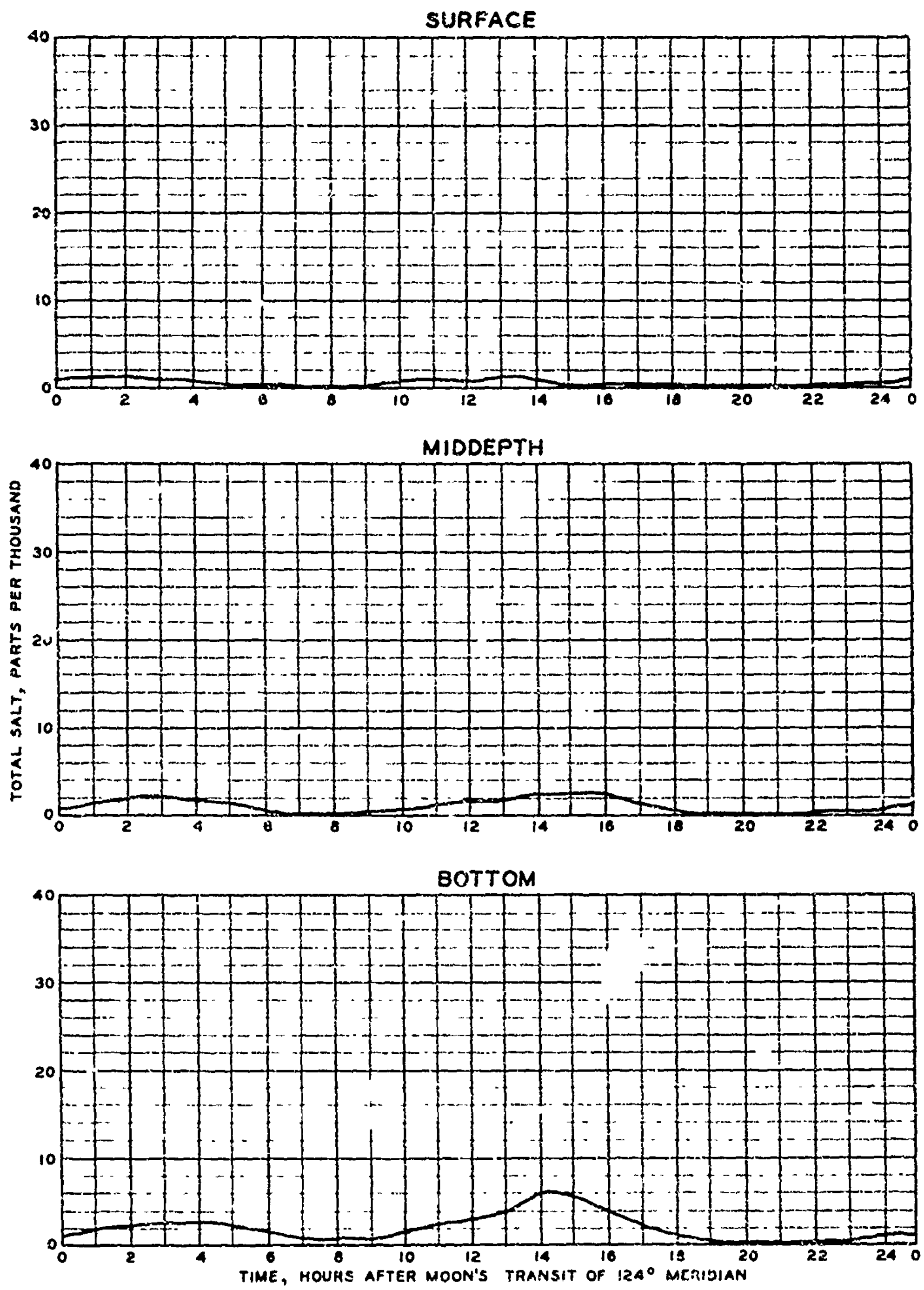
LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 56

SURFACE, MIDDEPTH AND BOTTOM

PLATE 195



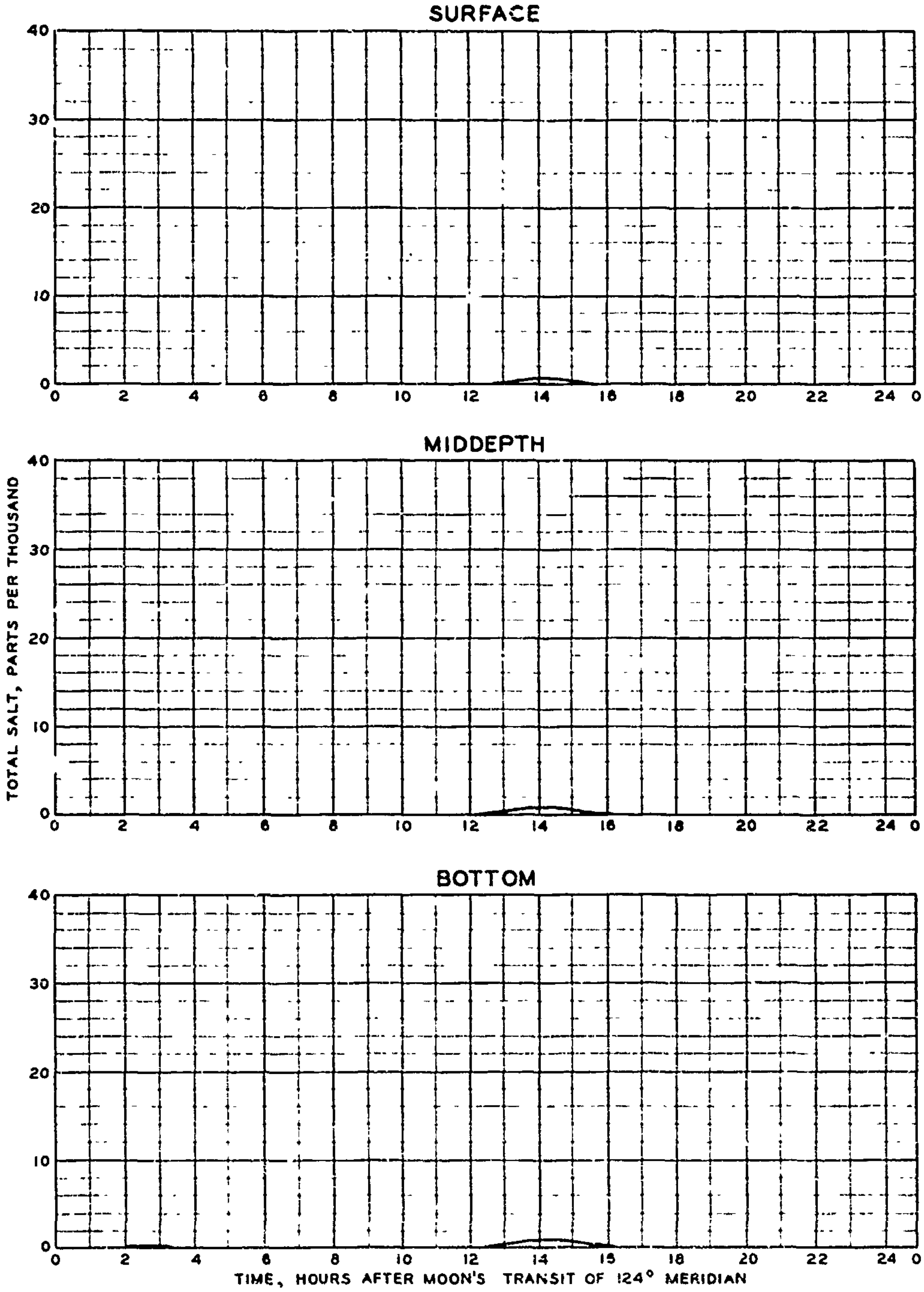
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 57
SURFACE, MIDDEPTH AND BOTTOM



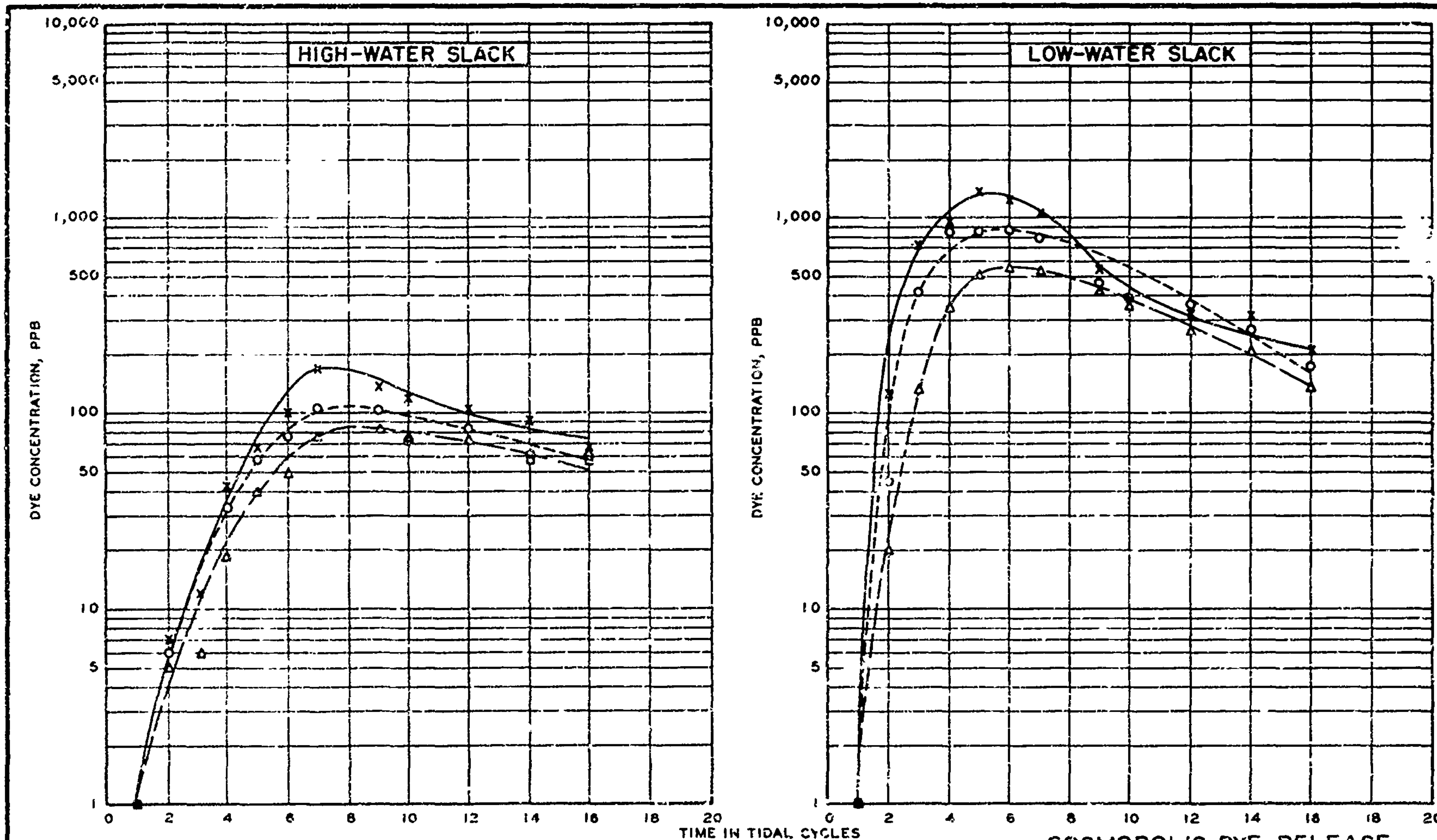
MODEL TEST DATA

TIDE MEAN
FRESH-WATER DISCHARGE .11,400 CFS
SOURCE SALINITY 33.0 PPT

LEGEND

——— BASE TEST

BASE TEST
SALINITY OBSERVATIONS
STATION 58
SURFACE, MIDDEPTH AND BOTTOM



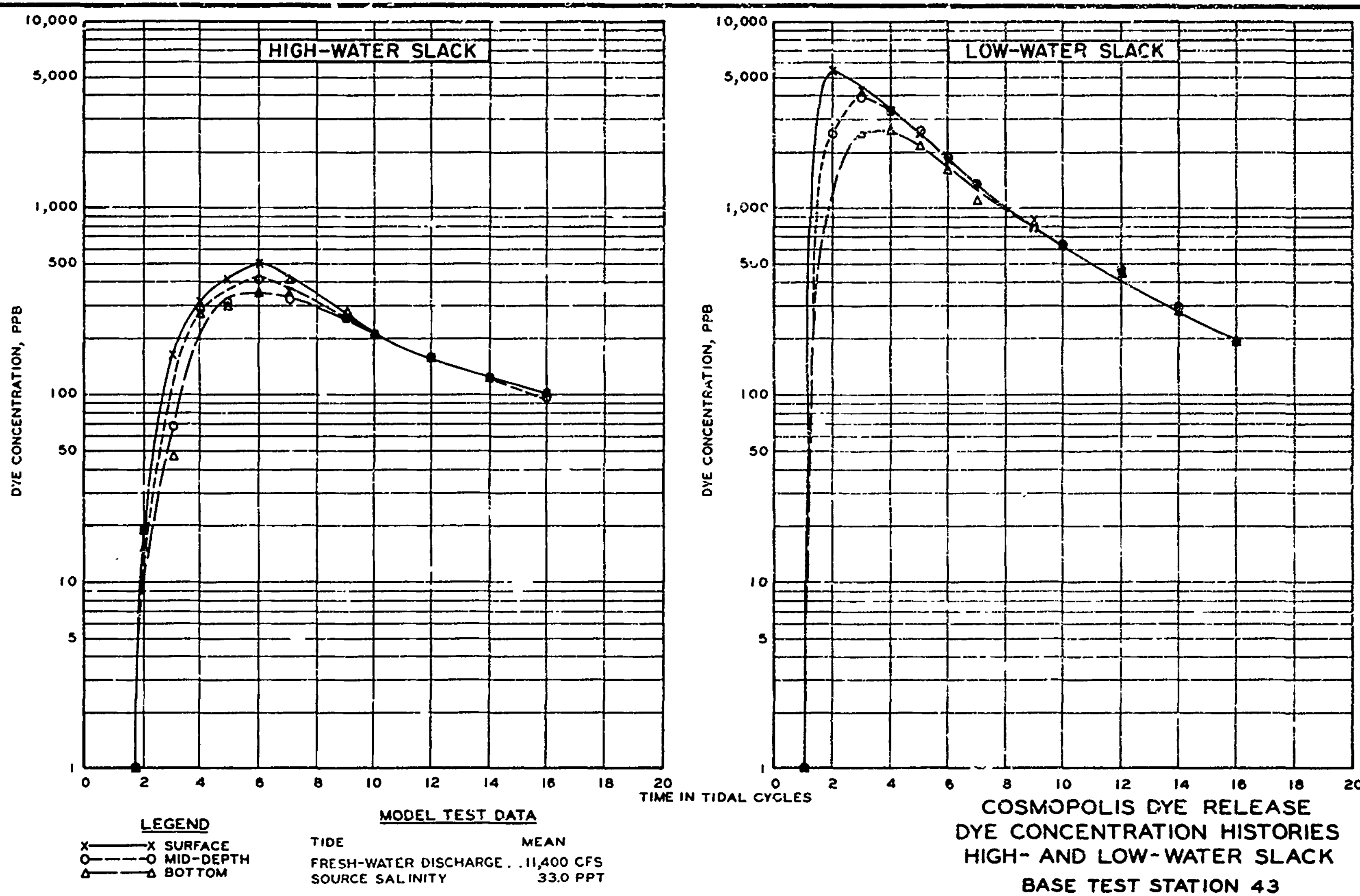
LEGEND

x——x SURFACE
o- - -o MID-DEPTH
Δ——Δ BOTTOM

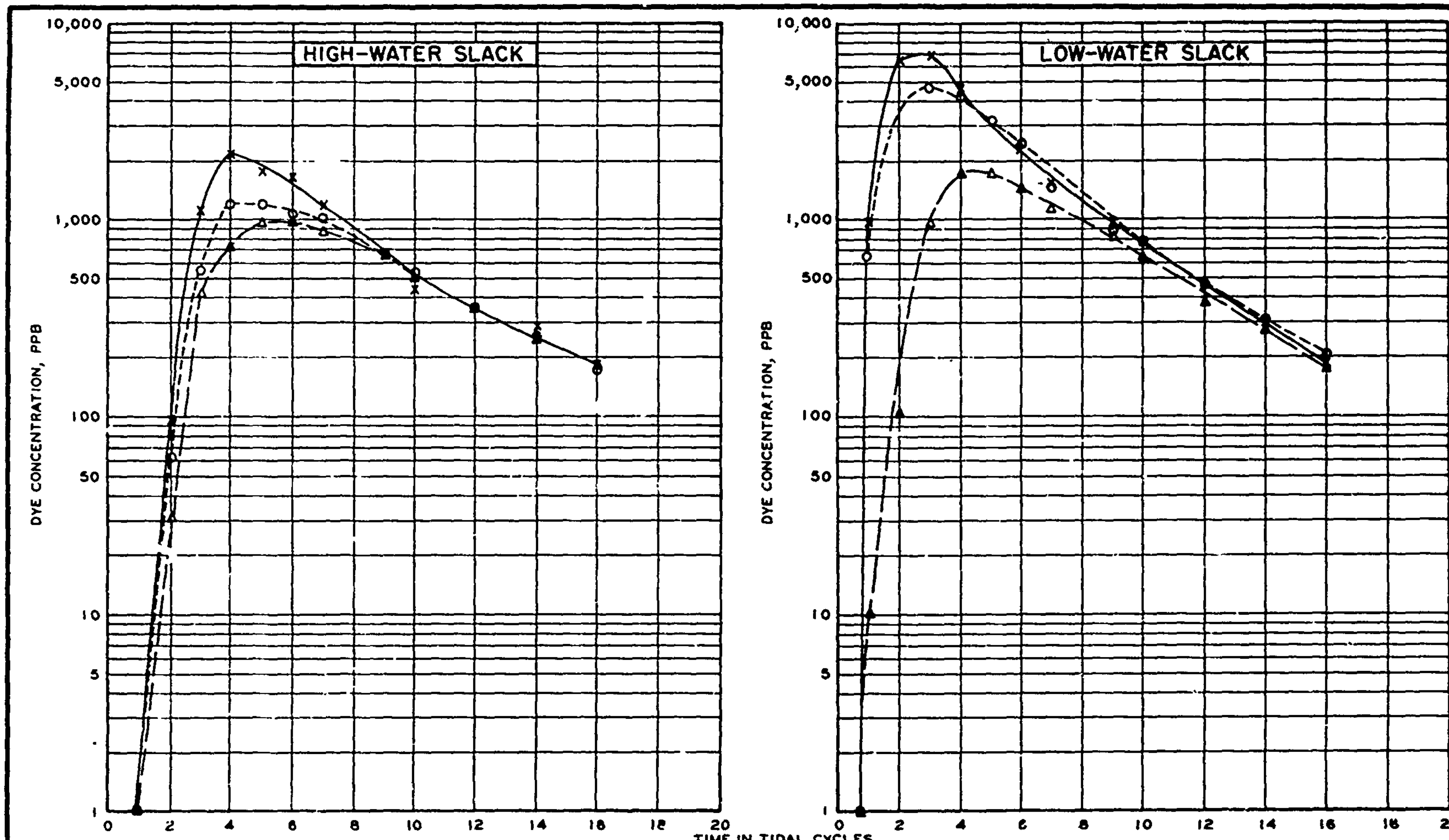
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

COSMOPOLIS DYE RELEASE
DYE CONCENTRATION HISTORIES
HIGH- AND LOW-WATER SLACK
BASE TEST STATION 23



COSMOPOLIS DYE RELEASE
DYE CONCENTRATION HISTORIES
HIGH- AND LOW-WATER SLACK
BASE TEST STATION 43



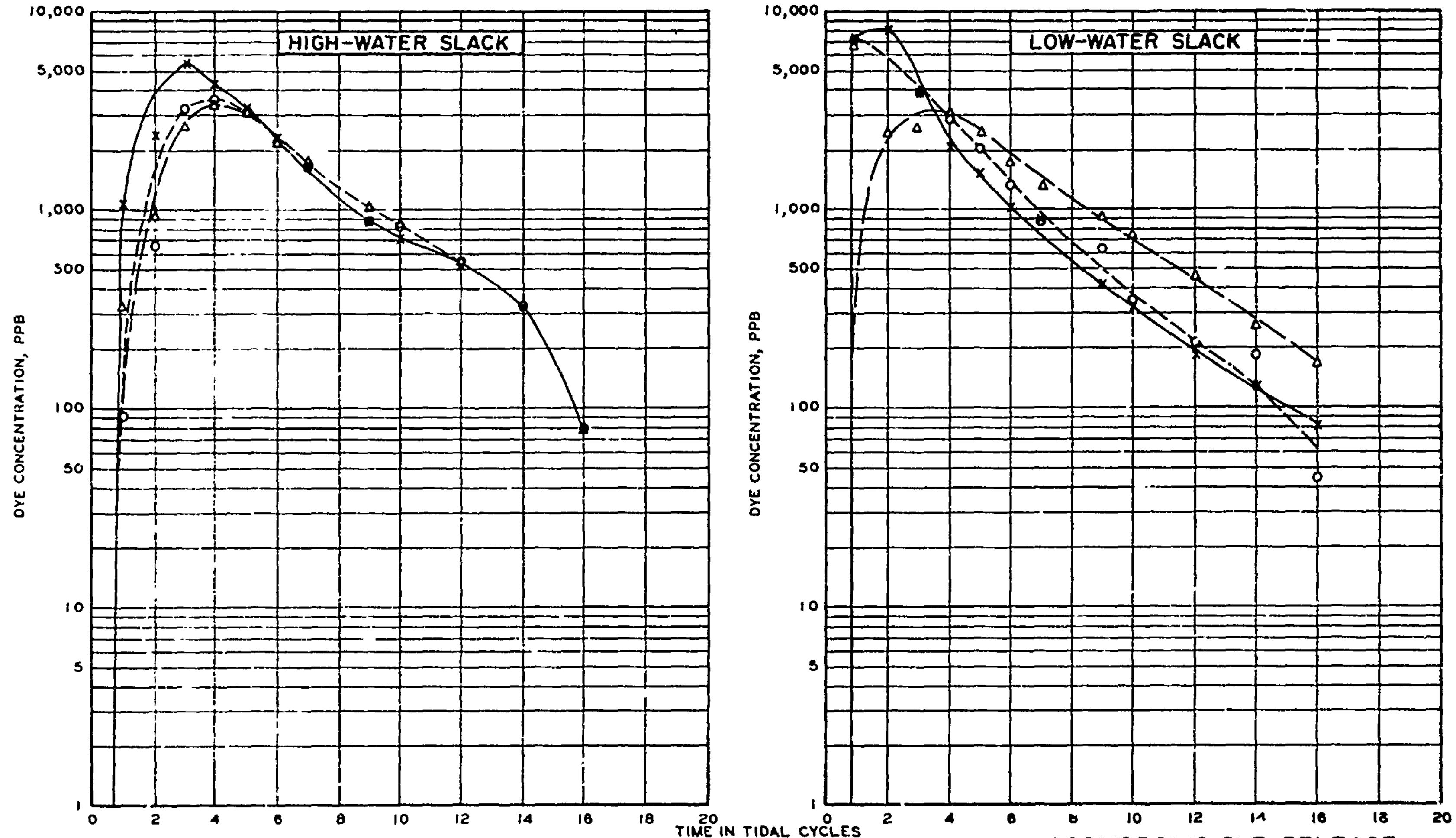
LEGEND

X——X SURFACE
O– – –O MID-DEPTH
Δ— —Δ BOTTOM

MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

COSMOPOLIS DYE RELEASE
DYE CONCENTRATION HISTORIES
HIGH- AND LOW-WATER SLACK
BASE TEST STATION 46



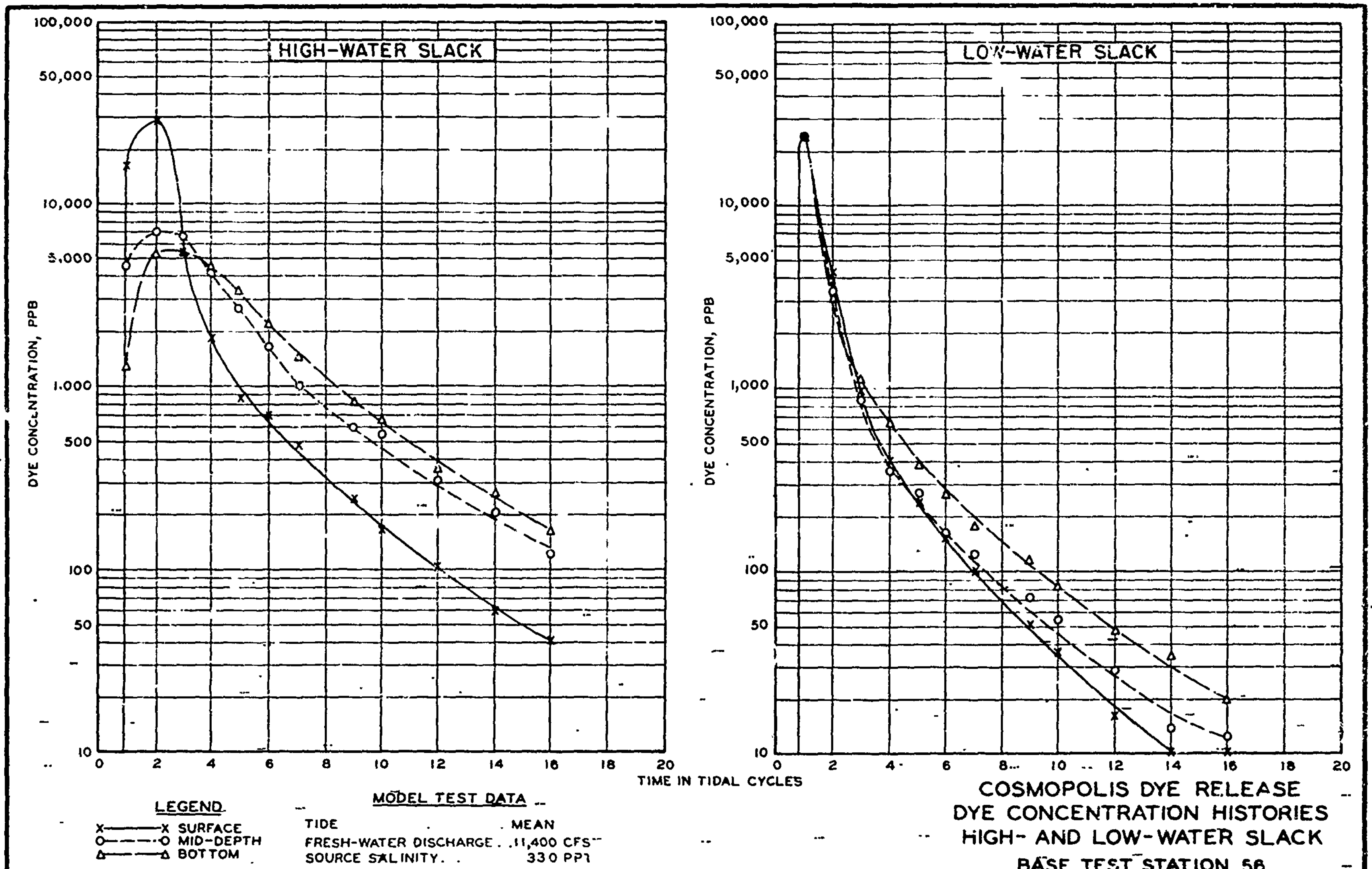
LEGEND

X——X SURFACE
O– – –O MID-DEPTH
Δ——Δ BOTTOM

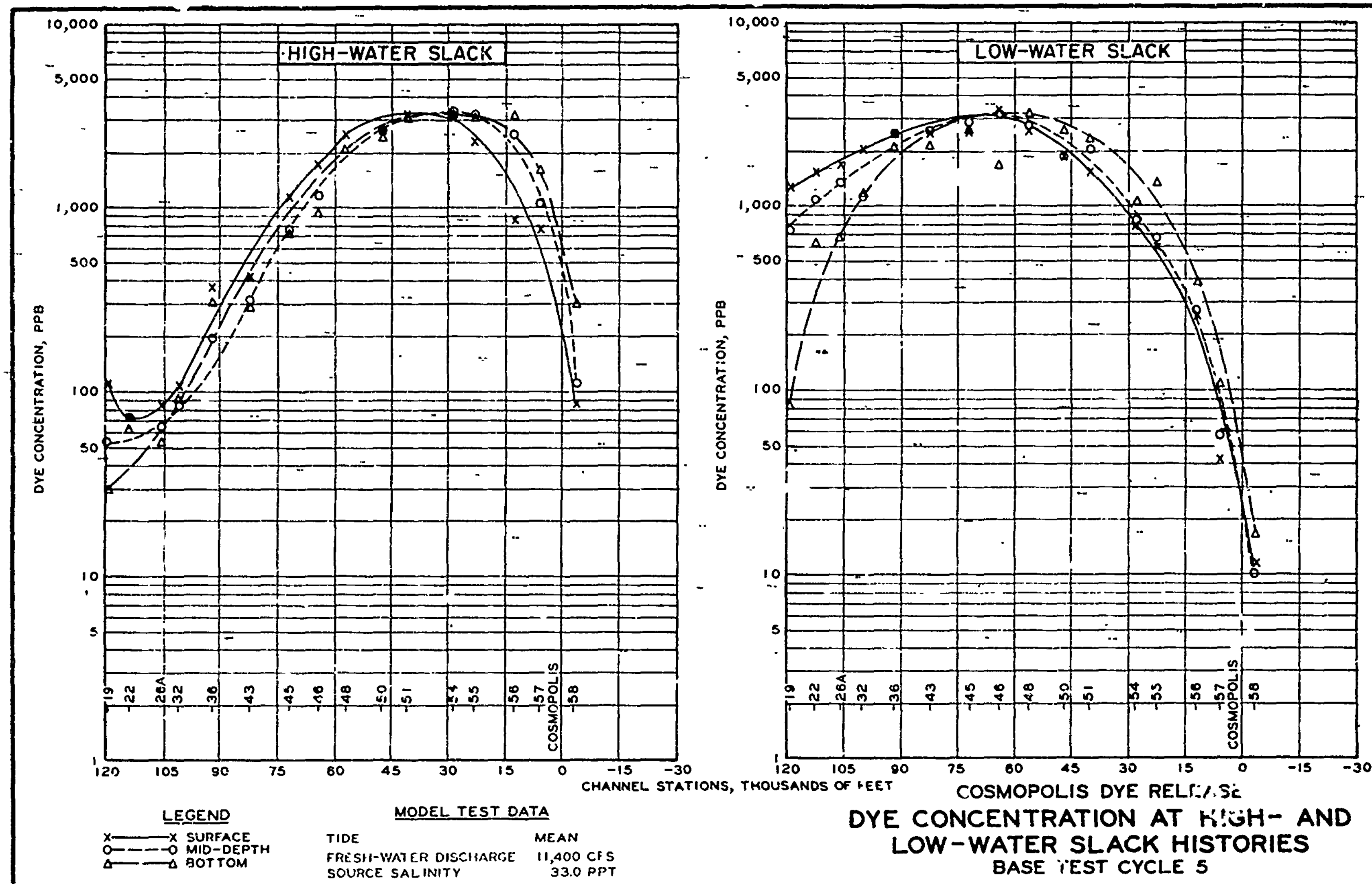
MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

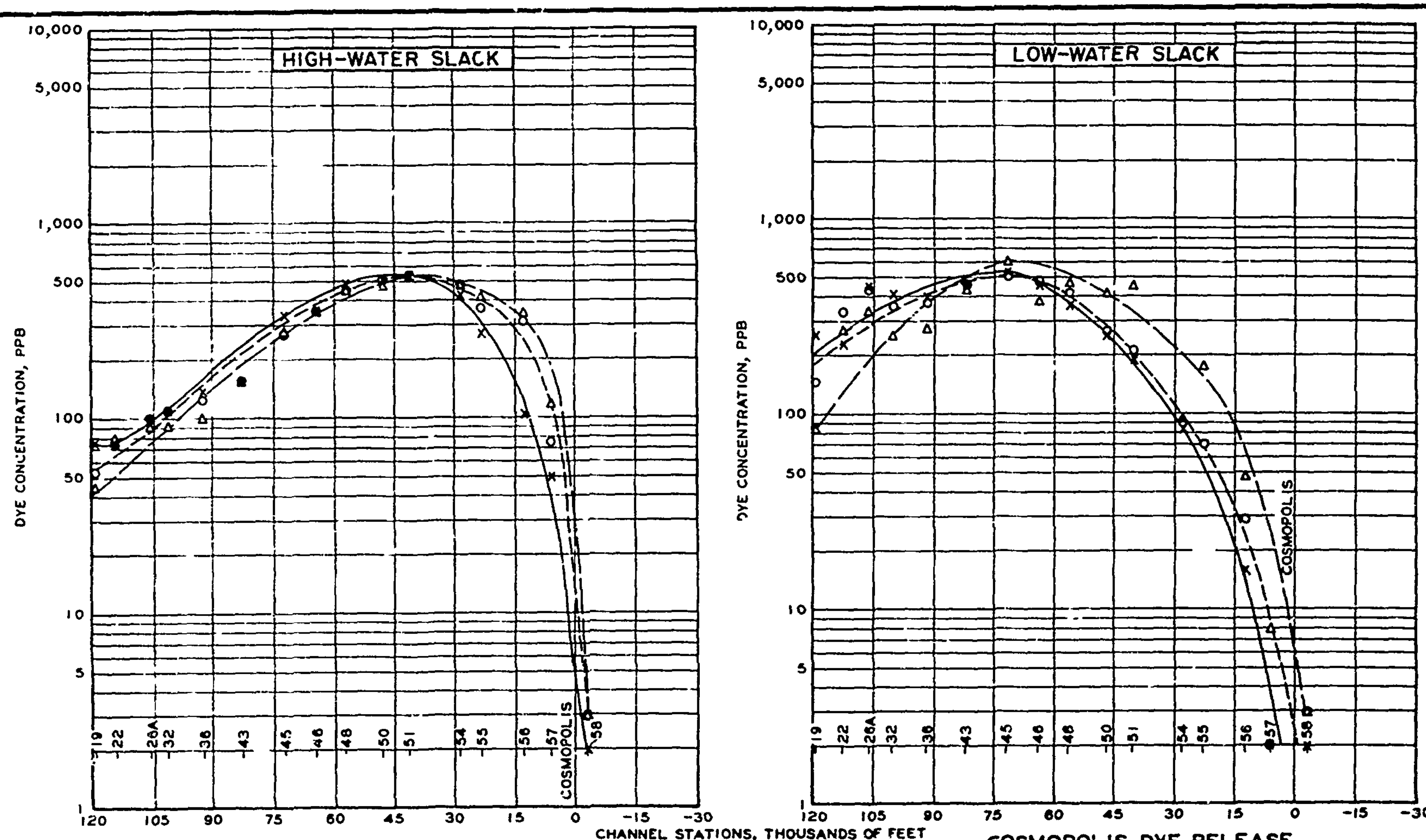
COSMOPOLIS DYE RELEASE
DYE CONCENTRATION HISTORIES
HIGH- AND LOW-WATER SLACK
BASE TEST STATION 51



COSMOPOLIS DYE RELEASE
DYE CONCENTRATION HISTORIES
HIGH- AND LOW-WATER SLACK
BASE TEST STATION 56



DYE CONCENTRATION AT HIGH- AND LOW-WATER SLACK HISTORIES
BASE TEST CYCLE 5



COSMOPOLIS DYE RELEASE

LEGEND

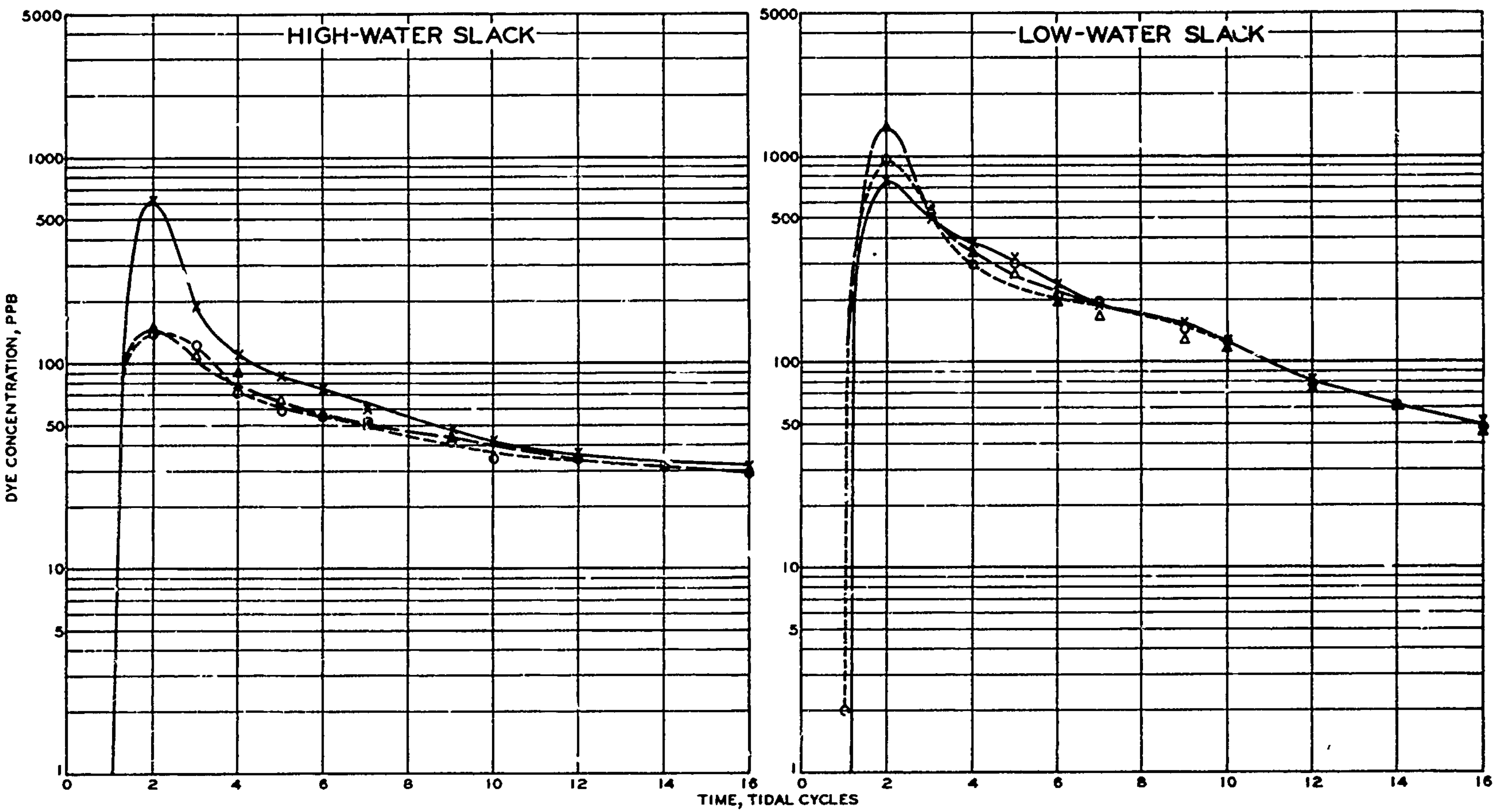
X———X SURFACE
O- - - -O MID-DEPTH
Δ———Δ BOTTOM

MODEL TEST DATA

TIDE	MEAN
FRESH-WATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

DYE CONCENTRATION AT HIGH- AND LOW-WATER SLACK HISTORIES

BASE TEST CYCLE 12



LEGEND

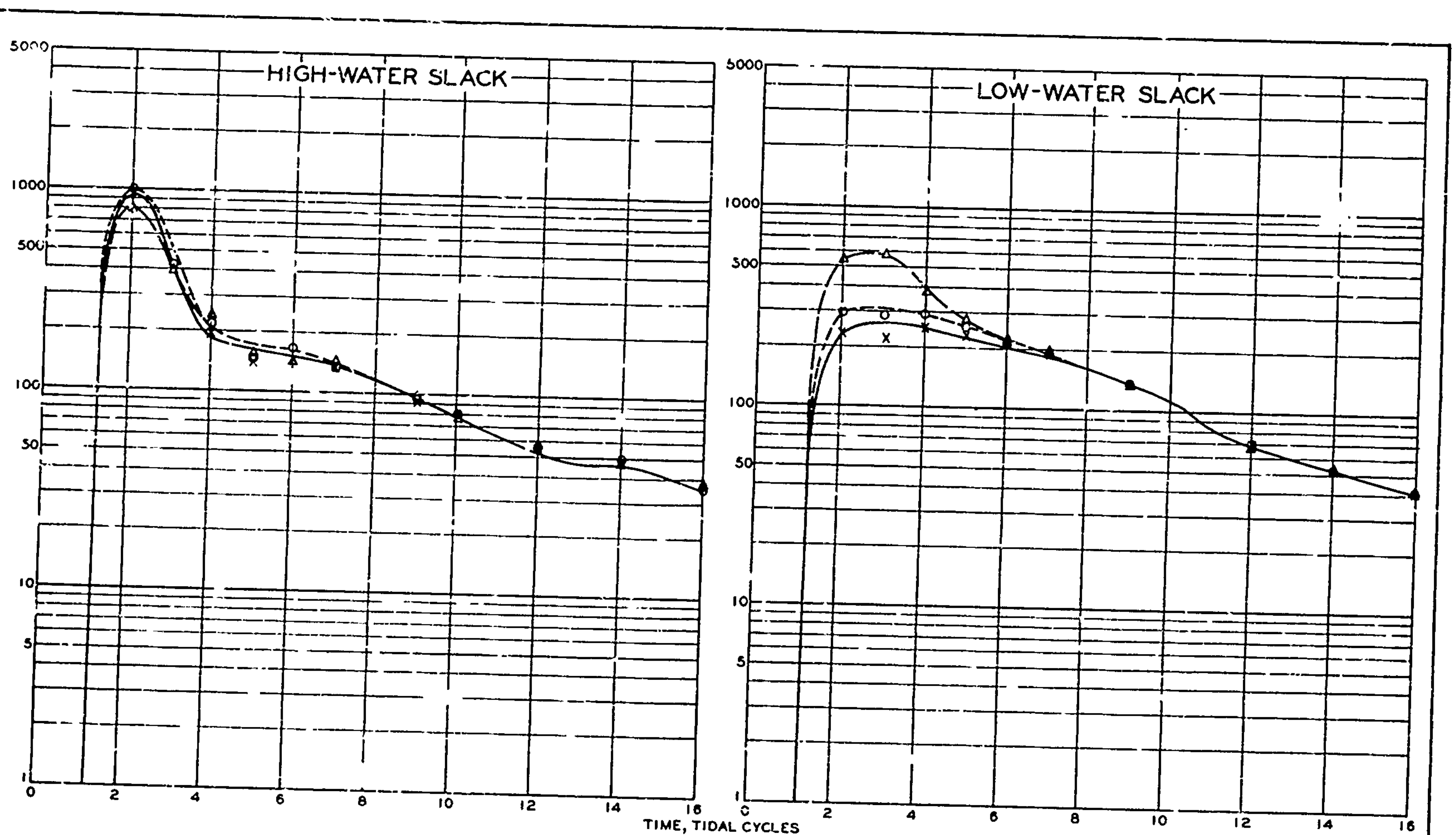
X———X SURFACE
O— — —O MIDDEPTH
Δ———Δ BOTTOM

MODEL TEST DATA

TIDE · MEAN
FRESHWATER DISCHARGE · · 11,400 CFS
SOURCE SALINITY · · · 33 0 PPT

SOUTH JETTY DYE RELEASE
DYE CONCENTRATION HISTORIES

HIGH- AND LOW-WATER SLACK
BASE TEST STATION 23



LEGEND

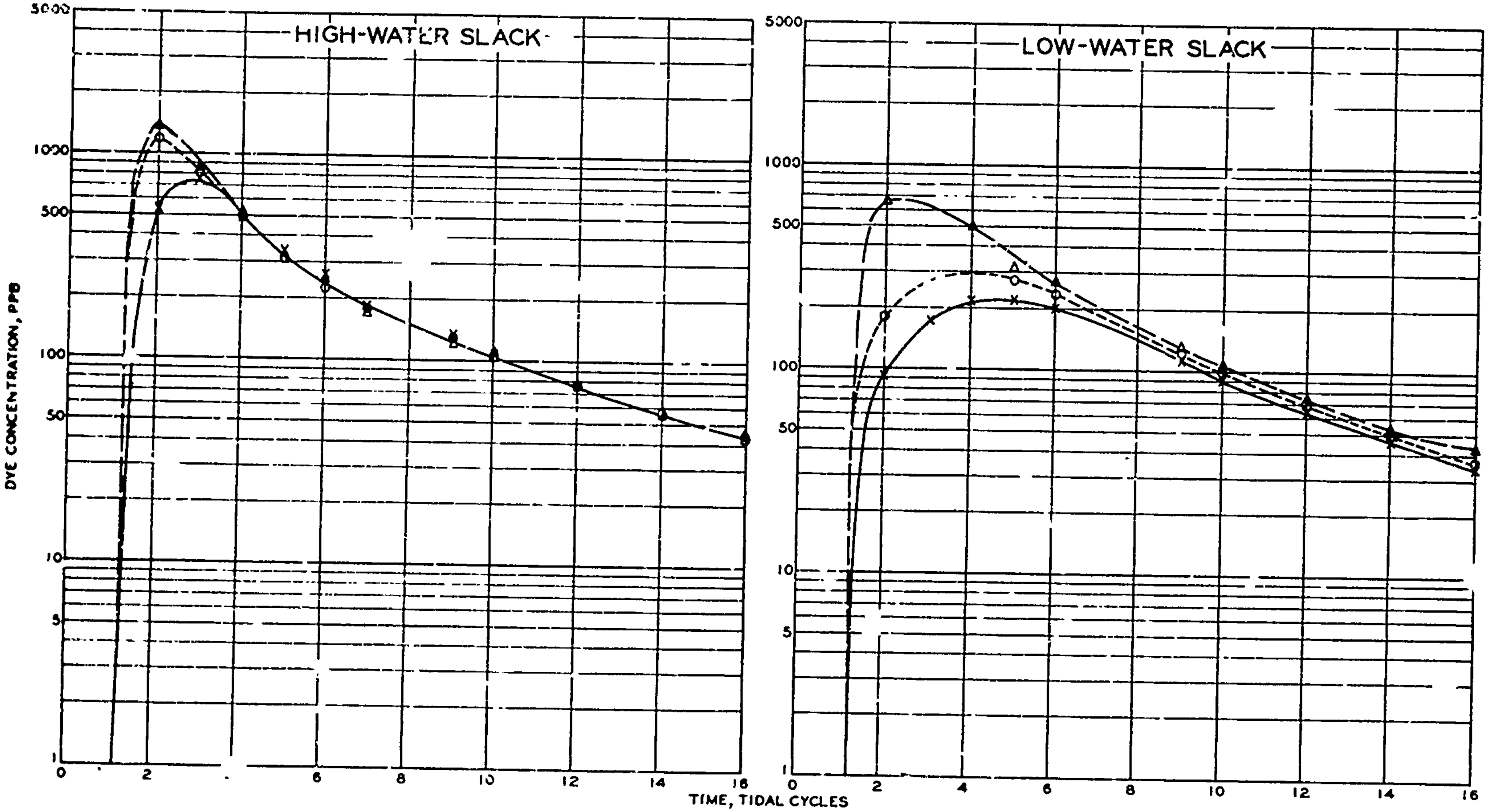
- X——X SURFACE
- O– – –O MIDDEPTH
- Δ—·—Δ BOTTOM

MODEL TEST DATA

TIDE	MEAN
FRESHWATER DISCHARGE ·	11,400 CFS
SOURCE SALINITY ·	33.0 PPT

SOUTH JETTY DYE RELEASE DYE CONCENTRATION HISTORIES

HIGH- AND LOW-WATER SLACK
BASE TEST STATION 43



LEGEND

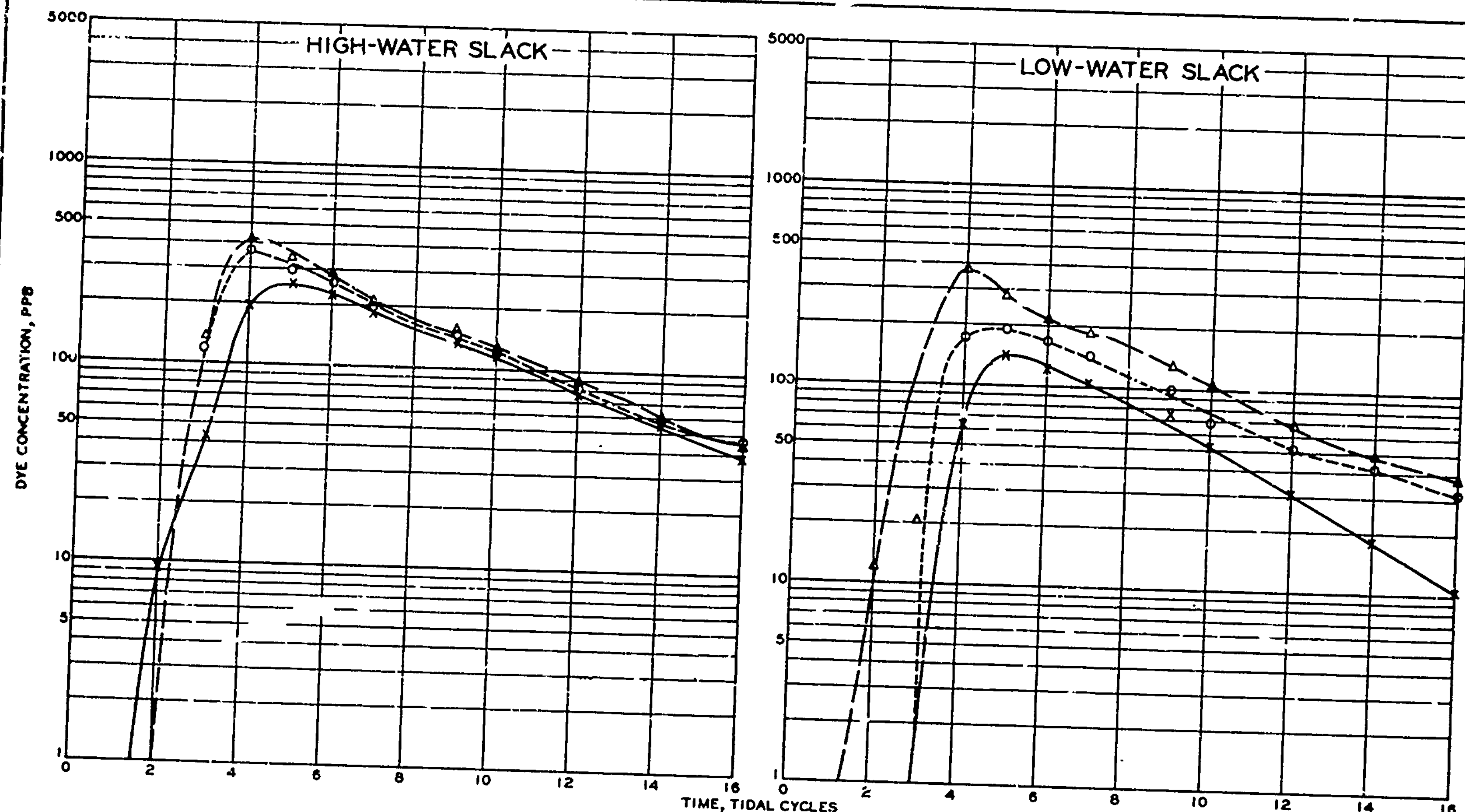
- x—x SURFACE
- o- - -o MIDDEPTH
- Δ—Δ BOTTOM

MODEL TEST DATA

TIDE	MEAN
FRESHWATER DISCHARGE ·	11,400 CFS
SOURCE SALINITY ·	33.0 PPT

SOUTH JETTY DYE RELEASE
DYE CONCENTRATION HISTORIES

HIGH- AND LOW-WATER SLACK
BASE TEST STATION 46



LEGEND

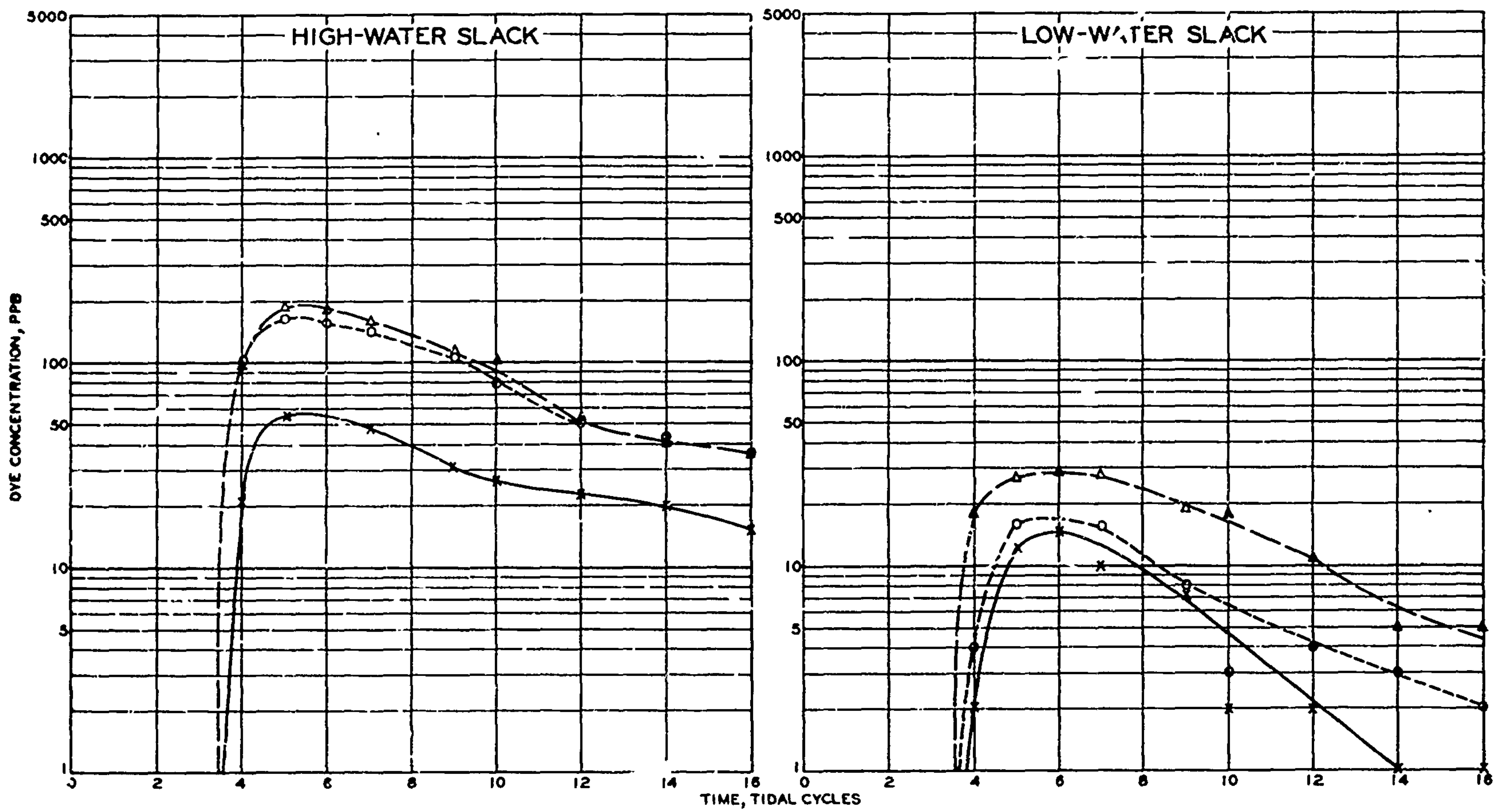
- x——x SURFACE
- o- - -o MIDDEPTH
- Δ——Δ BOTTOM

MODEL TEST DATA

TIDE	MEAN
FRESHWATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33.0 PPT

SOUTH JETTY DYE RELEASE DYE CONCENTRATION HISTORIES

HIGH- AND LOW-WATER SLACK
BASE TEST STATION 51



LEGEND

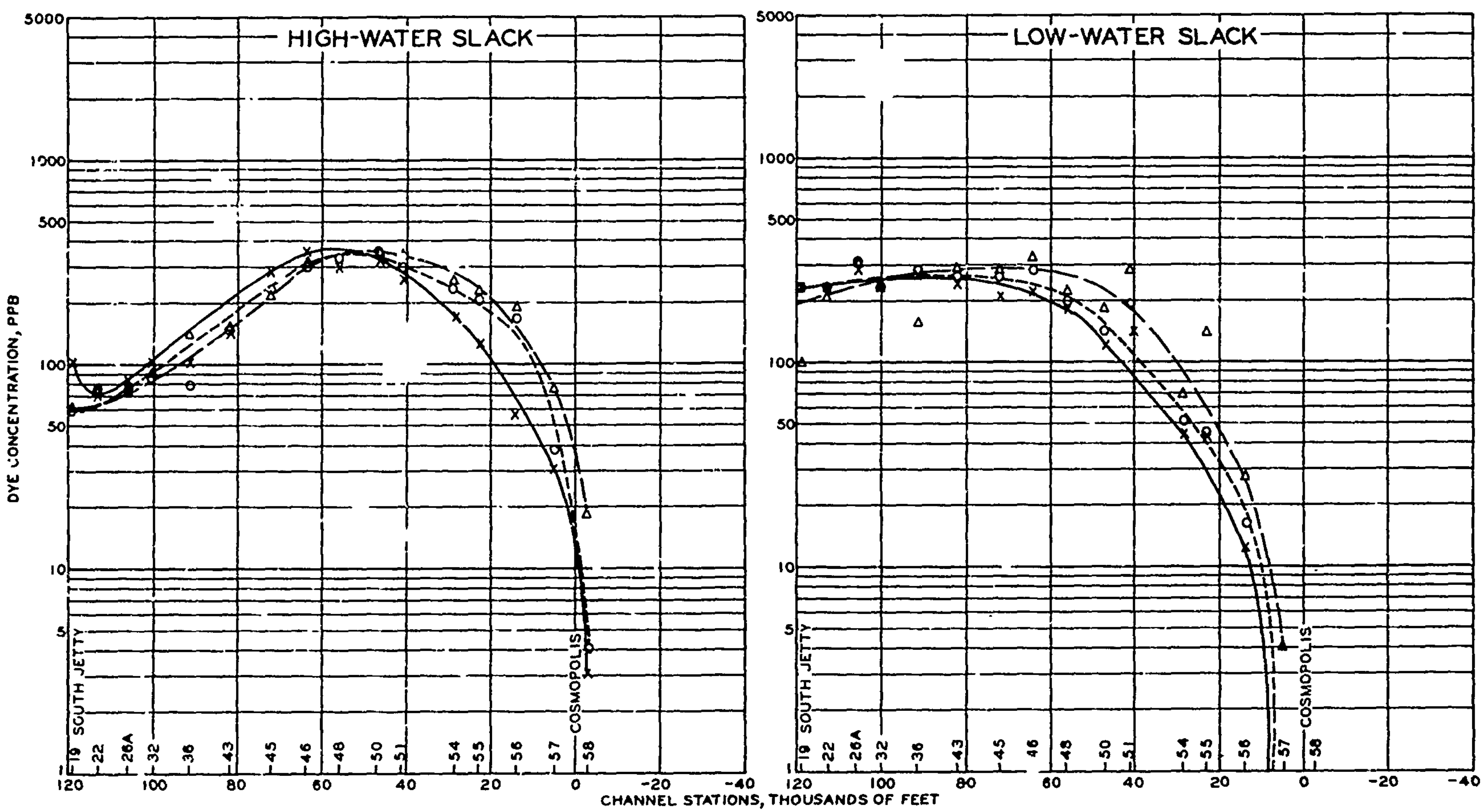
- SURFACE
- MIDDEPTH
- BOTTOM

MODEL TEST DATA

TIDE . . . MEAN
FRESHWATER DISCHARGE . . . 11,400 CFS
SOURCE SALINITY . . . 33.0 PPT

SOUTH JETTY DYE RELEASE
DYE CONCENTRATION HISTORIES

HIGH- AND LOW-WATER SLACK
BASE TEST STATION 56



LEGEND

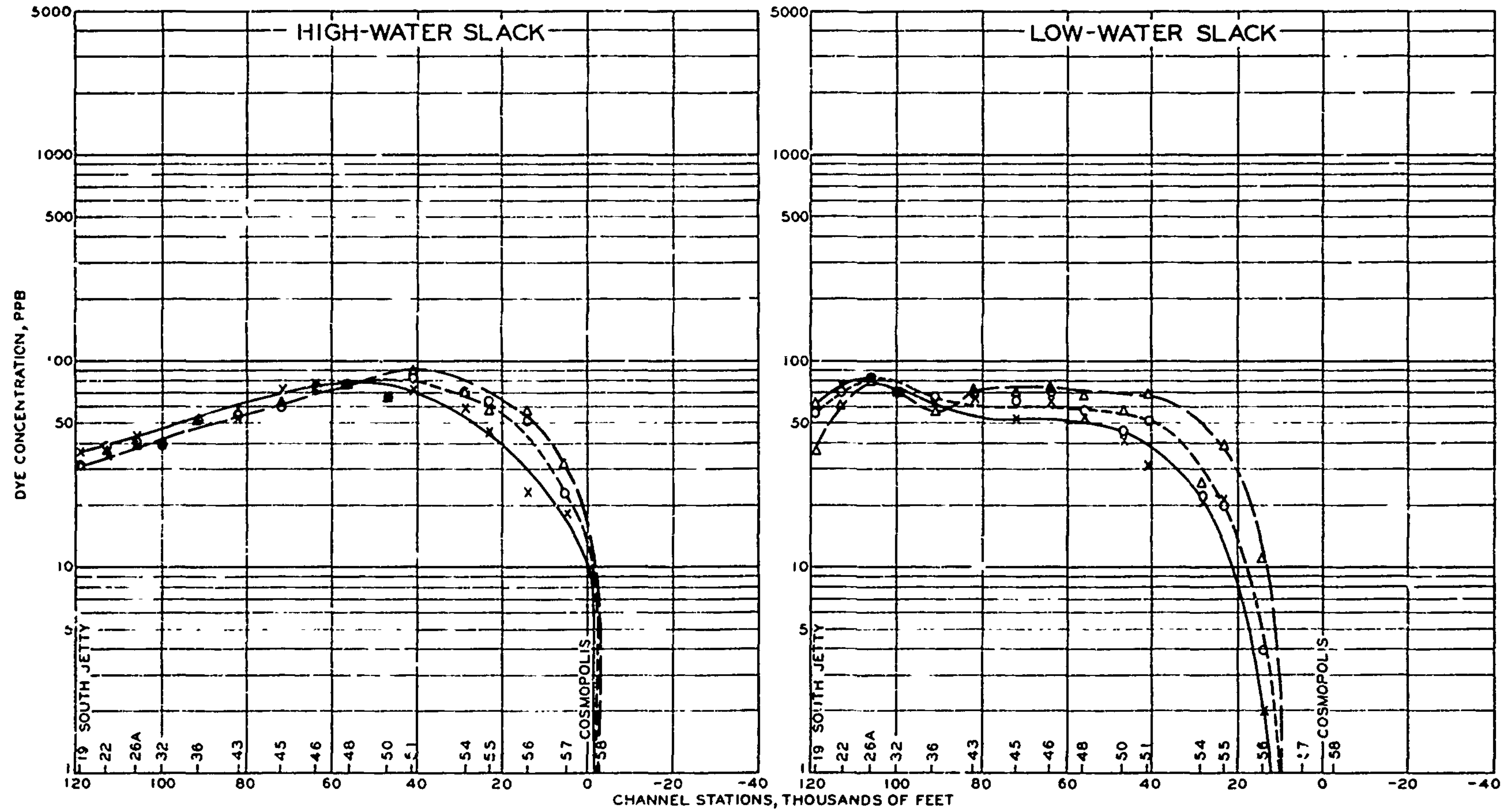
- SURFACE
- MIDDEPTH
- BOTTOM

MODEL TEST DATA

TIDE	MEAN
FRESHWATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33 C PPT

SOUTH JETTY DYE RELEASE DYE CONCENTRATION PROFILES AT HIGH- AND LOW-WATER SLACK

BASE TEST CYCLE 5



LEGEND

x——x	SURFACE
o- - -o	MIDDEPTH
Δ— —Δ	BOTTOM

MODEL TEST DATA

TIDE	MEAN
FRESHWATER DISCHARGE	11,400 CFS
SOURCE SALINITY	33 0 PPT

SOUTH JETTY DYE RELEASE
DYE CONCENTRATION PROFILES AT
HIGH- AND LOW-WATER SLACK

BASE TEST CYCLE 12

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