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CENTRAL WATER & POWER COMMISSION

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VOL. I

Director :

D. V. JOGLEKAR, B.E., M.I.E. (IND.)

Errata (to Figures)

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	2	Fortnal	Fort Wall
	5	Plow	Flow
	6	Refergnces	References
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	7a	Pfching	Pitching
7	1	Canai	Canal
	1	Bachwara	Bichwara
	2	Flcw	Flow
	2	Gandar	Gandak
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11	3	Chamble	Chambal
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	3	Curve	Curve
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12	1	Gauge wall	Gauge Well
	4	Measurment	Measurement
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	5	Cofeer Dam	Coffer Dam
	5	Flood	Flood
14	7	Opfrating	Operating
	9	Grest	Crest

(Errata to Figures)—contd.

Item No.	Figure No.	For	Read	
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	1	Pressube	Pressure	
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19	1	Scale 1"=20	Scale 1"=20'	
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	15	Interval	Interval	
	17	Indivivual	Individual	
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FOREWORD

The scope of the work carried out by the Research Station has materially increased during the year and with additional equipment for which orders have been placed, a further substantial increase is anticipated.

New area has been acquired for expanding the activities in respect of River and Canal Hydraulics and Navigation. The work on leading and return channels, supply chambers, etc., is in progress in this area. In the new set up, it is proposed to circulate water up to a maximum of 100 cusecs during dry months of March to June when the water level in the lake gets low. For this purpose a high level tank, a low level tank and a pump house have been constructed. Four units of pumps out of five have been received and are being fitted in the pump house between the low level tank and the high level tank. The rating tank 500 ft. long, 12 ft. wide and 7 ft. deep has been completed and an electrically operated carriage will be obtained shortly. It will then be possible to calibrate current meters, pilot tubes and also carry out tests with models of small ships.

It is proposed to set up a fully equipped concrete laboratory, also a large Froude (Navigation) tank 850 ft. long, 30 ft. wide and 15 ft. deep. These proposals have been framed and are being forwarded to Government for approval. Modern improvements in the designs of ships have been made possible through the experimental technique evolved in testing models of ships in Froude tanks in various countries of the world. It is time that India makes a determined start in this direction.

Two Experts from UNESCO have been associated with the work at this Station, namely, Dr. R. V. Baud for Photoelasticity, and Mr. A. F. Mogensen for Navigation, harbour problems, wave studies, break-water designs, etc. These experts are also imparting training to members of staff of the Research Station. Dr. Baud has assisted in the fitting up of the photoelastic laboratory. A Case Polariscopes has now been obtained. This will enable us to carry out tests with large-scale models where body load is the main consideration for earth dams. Also, Seismic Refraction and Resistivity Equipments have been obtained during the year. Both these instruments will be useful for carrying out foundation investigation by geophysical methods. Similarly, Oscillographs have been obtained for recording wave characteristics in harbour models. It is now proposed to obtain a high-speed camera (giving pictures up to 14,000 frames per second), which will be very useful in high-speed variation phenomena such as cavitation, air entrainment, etc. In certain problems like fluctuating pressures in models of siphons and deep-seated sluices, it is very essential to record instantaneous pressures. For this, electrical cells are very suitable. Attempts are being made to obtain these from abroad and also getting them made locally.

As usual the River and Canal Hydraulics and Navigation Sections were the most busy Sections. The problem of training the Narbada River at Broach (to check the deep scour near the pier of the Railway Bridge) was successfully solved and the problem of the Watrak river at Kaira (to arrest

erosion of the left bank upstream of Kaira town and the right bank and right embankment of the road bridge downstream of the town) is under investigation.

Experiments to determine the suitability or otherwise of the different sites for road-cum-rail bridge across Ganga at Mokameh and at Patna were completed. In this connection, it is recommended that the model technique followed by this Research Station, namely, that training measures should be tested not only under existing conditions but also under conditions of the worst possible attack expected from the river, should form an essential part of any further experiments of this nature.

Important model experiments were conducted to test the designs of retaining walls of Hirakud Dam Left Channel Spillway, and to study the alternative alignments of Kakrapar weir on River Tapi. A series of tests were also made for the discharge characteristics and dissipation of energy of:—

Hirakud Dam conventional and upturned deep-seated sluices,

Subsidiary Dam Spillway of Hirakud Dam Project, and

Proposed Kotah Barrage.

These tests were carried out by Dr. S. K. Roy, Chief Research Officer, assisted by Shri P. M. Damle, Research Assistant for which they deserve credit.

Useful results were obtained for increasing the co-efficient of discharge of Weir Regulators of Ghataprabha Left Bank Canal, by means of providing bellmouth entry and smooth expansion downstream. The co-efficient was thus increased from 0.64 to 1.3.

An economic design for Falls for Hirakud Project was evolved for different discharges and different drops both for Flumed and Unflumed conditions. Further basic research on the design of Falls is in hand.

On the Navigation side, experiments were continued to evolve training measures for the improvement of navigability in some of the difficult reaches of the Hooghly like Fulta, James and Mary, Sankrail and Howrah.

The problem of Head Water Supply of the Hooghly and its effect on Navigation are being studied closely and all relevant data is being analysed. Final proposals were made to arrest silting in the Harbour Channel at Cochin by means of blocking the Mattancherry Channel. Experiments to reduce the "Range" in Madras Harbour were completed in a model with vertical exaggeration of 20. Experiments in a geometrically-similar model will now be taken in hand.

The Station gave expert advice for the improvement of water supply for Tata Iron and Steel Works, Jamshedpur and for Nagpur town.

Geophysical investigations for Foundations were made at alternative dam sites at Ukai on River Tapi—Kakrapar Project. Advantage was taken during the working of Siphon No. 7 and the undersluices at Hirebhasgar during the last monsoon season to carry out vibration studies.

In the Physics Section, the study of stress analysis of Engineering Structures by means of photoelastic method was the main feature. The assistance of Dr. Baud, the UNESCO Expert in this subject is acknowledged.

The most notable and interesting investigation carried out by the Physics Section is in connection with vibration characteristics of the Hirebhasgar Dam due to working of siphon No. 7 under cavitation conditions and due to working of undersluices. This is probably the first kind of investigation of this type carried out in India. Special mention is made of Dr. Gurdas Ram, Chief Research Officer and Shri S. K. Guha, Assistant Research Officer (Physics) for this original work.

This Soil Section was busy with the study of Shear Characteristics of Soils by triaxial compression tests, and with study of physical properties of black cotton soil. Soil analyses were also continued for exploration of suitable materials for the earth dam across the River Tapi.

Peak runoff in the Mahanadi Basin was analysed by the Unit-Hydrograph method in the Statistical Section. Statistical analysis was also made of the tidal data in connection with Head Water Supply of the river Hooghly.

Of late there has been a very great demand for carrying out model experiments at Central Water and Power Research Station. With the reorganisation of the Station into various sections which have now come into being, it has been possible to carry out intensive basic as well as applied research with good results. The programme for the next year will be still more intensive and of special importance.

A high standard of research has been maintained at the Research Station. Shri D. V. Joglekar, Director, Dr. R. C. Hoon, Deputy Director and other officers and members of the staff have contributed to the successful operation of the Section and deserve full credit for the efficient operation of the Research Station for the year.

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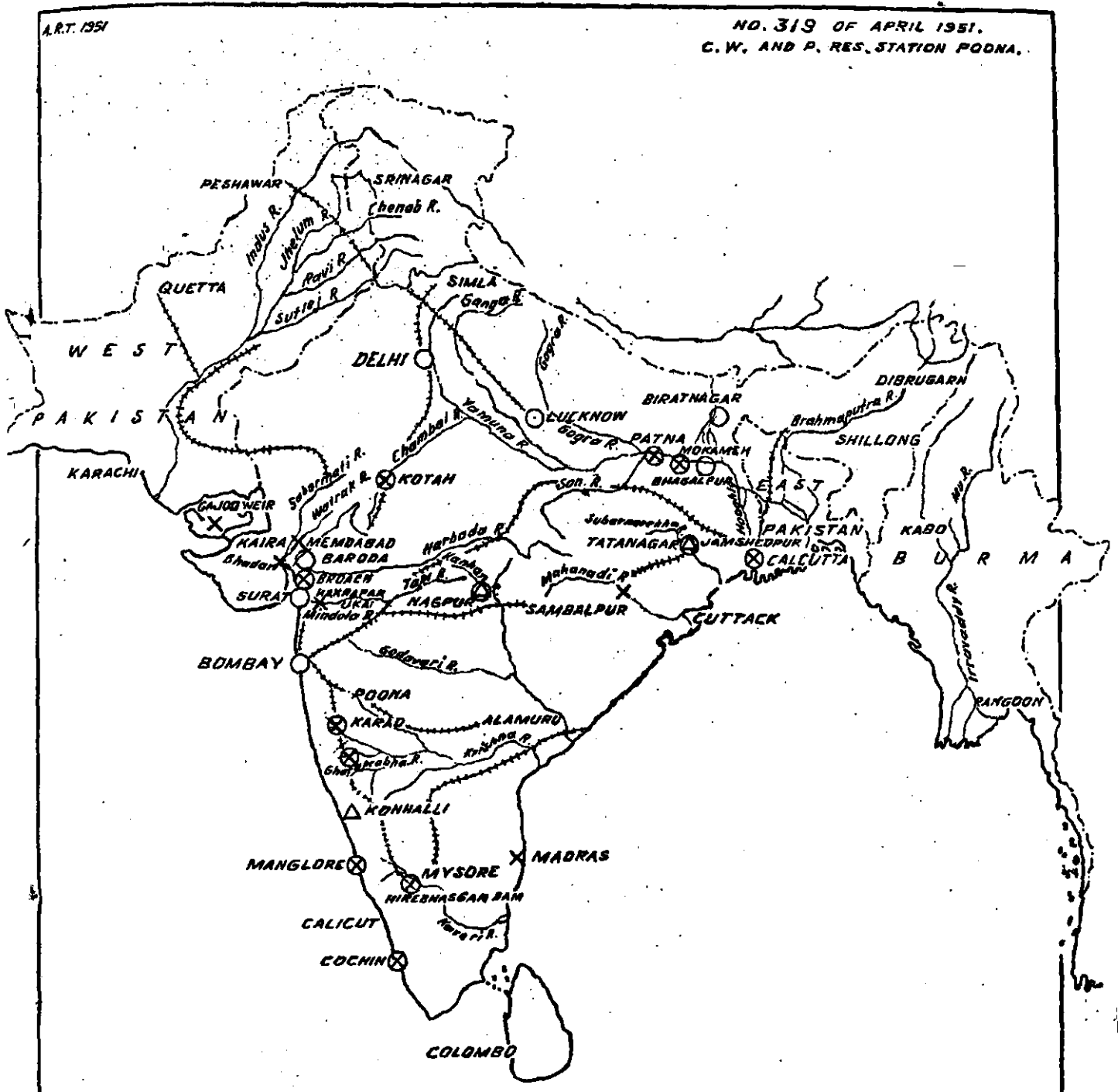
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FIG. 1.
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C O U N T R I E S
1951

SCALE: 1" = 320 MILES

COMP. BY: *M. Singh*
TRACED BY: DESHPANDE & PARKHI.
9 APRIL 1952

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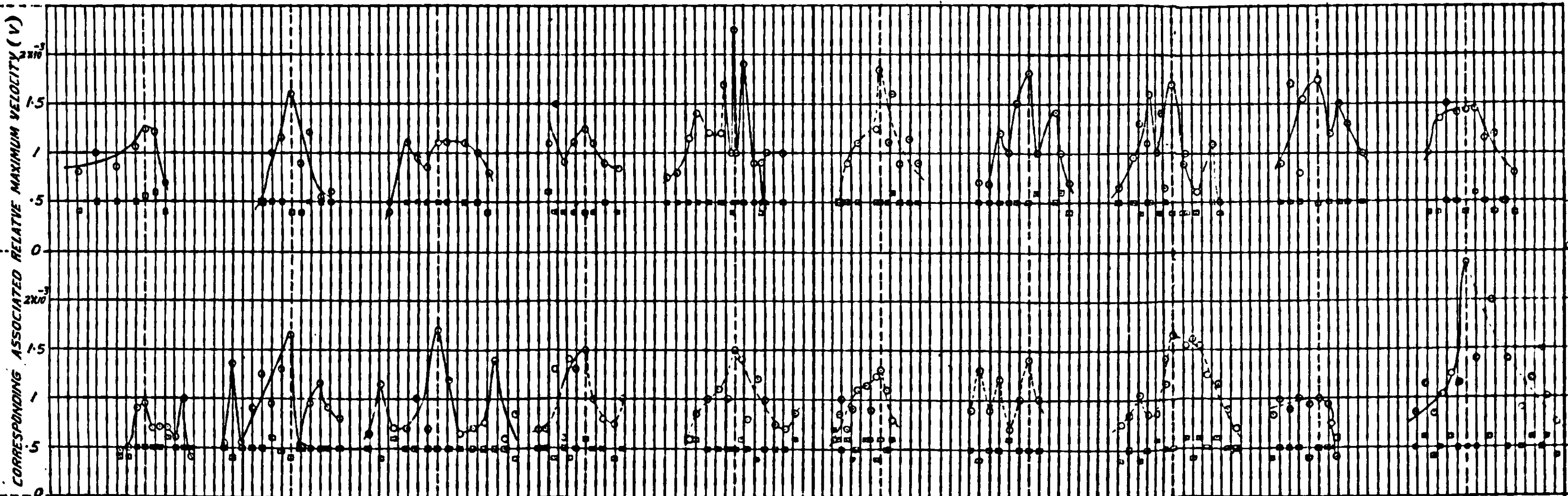
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RECORD WITH GEOPHONES ON DAM
STATION ⑤ AND DOME OF SIPHON NO. 7

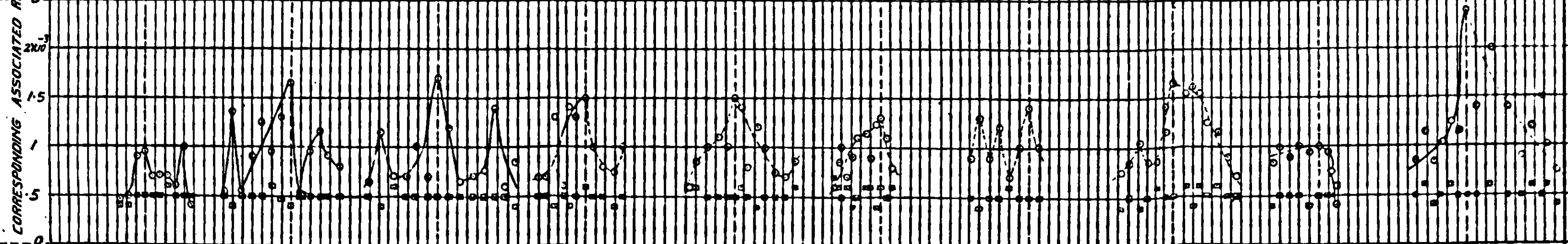
STATION OF
OBSERVATION

ON THE DAM -
STATION OF OBSERVATION ⑤

ON THE DOME OF SIPHON NO. 7 -
STATION OF OBSERVATION ⑥



PERIOD OF INDIVIDUAL WAVE
IN WAVE-GROUP (T)
IN SECOND



PERIOD OF INDIVIDUAL WAVE
IN WAVE-GROUP (T)
IN SECOND

FIG. 19

HIREBHASGAR DAM - 5, D G

ANALYSIS OF STRUCTURE OF TYPICAL WAVE GROUPS
DURING PRIMED STAGE ON THE DOME ⑥ OF SIPHON NO. 7
AND ON THE DAM STATION ⑤

REFERENCES -
PERIOD OF INDIVIDUAL WAVE IN WAVE GROUP (T) □
CORRESPONDING ASSOCIATED RELATIVE MAXIMUM VELOCITY (V) ○

EACH SMALL DIVISION REPRESENTS AN INTERVAL OF FIVE WAVES WITHIN THE GROUP

EACH SMALL DIVISION REPRESENTS AN INTERVAL OF TEN WAVES WITHIN THE GROUP

COMPONENT OF
VIBRATION

VERTICAL

PERPENDICULAR TO THE AXIS OF DAM

PARALLEL TO THE AXIS OF DAM

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