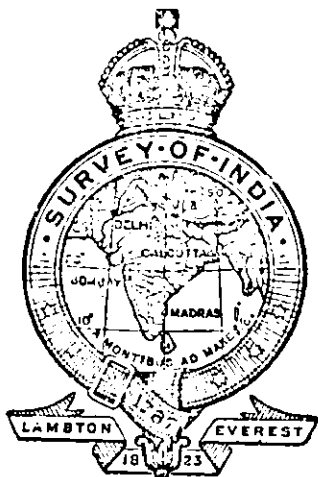


SURVEY OF INDIA GENERAL REPORT

1934.



From 1st October 1933
To 30th September 1934

PUBLISHED BY ORDER OF

S BRIGADIER H. J. COUCHMAN, D.S.O., M.C.
SURVEYOR GENERAL OF INDIA.

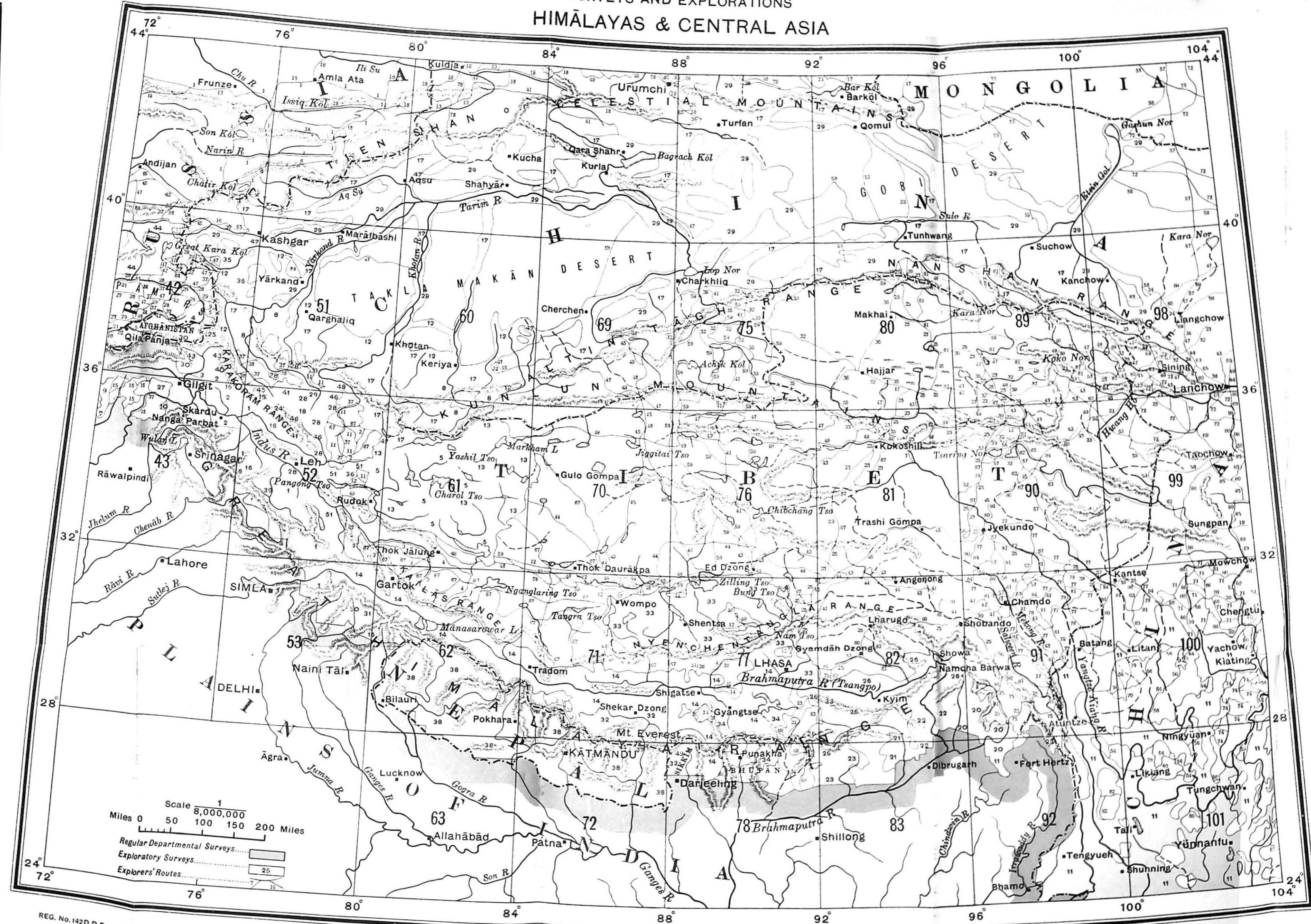
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CALCUTTA,
1935.
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REFERENCES TO EXPLORERS' ROUTES

Ref. No.	Nos. of I/M Sheets involved	Explorer	Season
1	52	N. Severtsoff	1864-68
2	52,61,62,71	W.H. Johnson	1865
3	61,62	Nain Singh (Pundit)	1865-67
4	42	Kalian Singh (G-K)	1868
5	81	Mirza Shuja (The Mirza)	1868-69
6	77	V. Kaulbars	1869
7	81	N.M. Prjivalsky	1871-73
8	77	Kishan Singh (A-K)	1872
9	42	Ata Muhammad (The Mullah)	1873-74
10	42	Abdul Subhan (N-A)	1873-74
11	51,52	Kishan Singh (A-K)	1873-74
12	52,70,71,77	Nain Singh (Pundit)	1873-75
13	77	Sosnoffsky	1875
14	43	Lala (L)	1875-76
15	77	Ata Muhammad (The Mullah)	1876-78
16	42	Kurapatkin	1876-77
17	42	P.U. Rafailow	1876-77
18	42	A. Regel	1876-79
19	99	W.J. Gill	1877
20	42	W. Oshonin	1878
21	42	Mukhtar Shah (M-S)	1878-81
22	42	Abdul Subhan (N-A)	1878-81
23	80,81,89,90,98,99	N.M. Prjivalsky	1879-80
24	98	H. Michaelis	1879-81
25	77,80,81,82	Kishan Singh (A-K)	1879-82
26	89,90,91,100	Sarat Chandra Das (D-C-S)	1879 & 82
27	42	A. Regel	1882-83
28	42	Ivanoff	1883
29	42	Bondersky & Putiata	1883
30	100	A. Hosie	1883
31	77	Lama U.G.	1883
32	60,69,75,80,89,90,98	N.M. Prjivalsky	1884-85
33	71	Hari Ram (M-H)	1885-86
34	78	Rinzin Nimgyal	1885-86
35	75,80,81,89	A.D. Carey	1885-87
36	98	M. S. Bell	1887
37	42,43,51,52	P.E. Youngusband	1887-89
38	42,51	Grombehevsky	1889
39	89,90,91,98,100	W.W. Rockhill	1889
40	98	G. Grijimalo	1889
41	75,76,82,91	J. Bonvalot	1889-91
42	42	St. G.R. Littledale	1890
43	76,80,81,82	W.W. Rockhill	1891-92
44	89,90,91,98	W.W. Rockhill	1891-92
45	70,71,76,77	H. Bower	1891-92
46	81,82,91	J.L. Deutreuil de Rhins	1891-94
47	42,60,69,70,71,77,81,82	J.L. Deutreuil de Rhins	1891-94
48	90,98	St. G.R. Littledale	1893
49	80,89,98	Sven Hedin	1894-97
50	42,51,60,69,70,71,76,77	St. G.R. Littledale	1895
51	52,61,69,70,71,76,77	St. G.R. Littledale	1895
52	70,76,81,89,90,98	M.S. Welby	1896
53	98,99,100	C. Bonin	1896
54	100	T.L. Bishop	1896
55	100,101	de Vaulserre	1898
56	80,99	K. Futtorer	1898-99
57	92,100,101	E. Amundsen	1898-99
58	90,98	B. Th. Ladyghin	1899-1900
59	91,92,100,101	C.H.D. Ryder	1899-1900
60	89,90,91,98	P.K. Kozloff	1899-1901
61	90,91,98	A.N. Kaznakoff	1899-1901
62	52,61,69,70,71,75,76,77,80	Sven Hedin	1899-1902
63	101	R.L. Jack	1900
64	80,89	V.A. Obrucheff	1902?
65	89,90,99	W. Filchner	1903-05
66	100	J. Baco	1904-10
67	98	C.D. Bruce	1906
68	42,98,101	C. Clementi	1906-08
69	100	W.N. Fergusson	1906-07
70	52,61,62,70,71,77	Sven Hedin	1906-08
71	71,77	J.C. White	1906-08
72	98,99	E. Teichman	1907-08
73	100	J.R. Muir	1908
74	100	J.W. Brooke	1908
75	98,99	P.K. Kozloff	1909
76	98	O.R. Coates	1910
77	100,101	W.N. Fergusson	1910
78	76	F.M. Bailey	1911
79	90,91,100	D. Carruthers	1911
80	91,100	E. Teichman	1916
81	101	O.R. Coates	1916-17
82	82,90,91,98,99,100,101	F. Kingdon Ward	1921
83	90,91,100	G. Pereira	1921-23
84	92	L. King	1922
85	92	J.W. Gregory	1922
86	77,82	F. Kingdon Ward & Earl Cawdor	1924
87	90,91,98,100	C.R. Spear	1925
88	99	J.F. Rock	1925
89	91,99,100	G. Thompson	1926
90	61,62,71,77,81,89,90,98	W. Filchner	1926-28
91	42	W.E. Rickmers	1928
92	51	A. Stein	1932
93	91	F. Kingdon Ward	1933
94	91	Ronald Kaulback	1933

SURVEYS AND EXPLORATIONS
HIMALAYAS & CENTRAL ASIA



REG. No. 142D.D.D. 1934-500

Published under the direction of Brigadier H.J. Couchman, D.S.O., M.C., Surveyor General of India.
1934.

International boundaries are approximate.

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REFERENCES TO EXPLORATORY SURVEYS

Ref. No.	Nos. of I/M Sheets involved	Explorer or Agency	Season	Scale of Survey
1	52,53	Survey of India	1842-1910	1"=2m & 4m
2	42,43	Martin Conway	1892	1"=2m & 4m
3	42	Gilgit Survey	1892-93	1"=2m & 4m
4	42	Pamir Boundary Commission	1893	1"=2m & 4m
5	52,61	H.I.P. Deasy	1896	1"=8m
6	52	A. Neve	1896-1910	1"=2m
7	43	Malakand Field Force	1897-98	1"=8m
8	42,51,60,61	H.I.P. Deasy	1897-99	1"=8m
9	43	Sher Jang	1898	1"=4m
10	43	Lal Singh	1899	1"=2m
11	91,92	C.H.D. Ryder	1899-1900	1"=4m
12	100,101			
13	42,51,60	A. Stein	1900-01	1"=8m
14	52,61	C.G. Rawling & A.J.G. Hargreaves	1903	1"=8m
15	53,62,71,77,78	C.H.D. Ryder	1904	1"=1m, 2m & 4m
16	52,43	T.G. Longstaff	1905-07	1"=4m
17	52,43,52,60,61,69,75,80,89	Hullock Workman & A. Stein	1906 & 08	1"=4m
18	52	T.G. Longstaff	1909	1"=4m
19	52	Duke of the Abruzzi	1911	1"=4m
20	82,91,92	C.P. Gunter	1911-12	1"=4m
21	82,83	C.G. Lewis	1911-12	1"=4m
22	82,83	O.H.H. Trenchard	1911-13	1"=4m
23	83,92	E.H. Cavdew & P.G. Huddleston	1911-14	1"=4m
24	52	Hullock Workman	1912	1"=1m
25	42	K. Mason	1913	1"=8m
26	77,82,83	H.T. Morhead	1913	1"=2m
27	43	Lal Singh	1913-14	1"=2m
28	51,52	F. de Filippi	1913-14	1"=2m & 4m
29	42,51,52,60,69,75,80,89,98	A. Stein	1913-15	1"=4m
30	42	Hunza Valley & Taghdumbash Pamir Survey	1915 (Map)	
31	53	Iaitan Kuan	1920	1"=1m
32	71,77,78	H.T. Morhead & E.O. Wheeler	1921	1"=1m & 4m
33	71,77,82	E.O. Wheeler	1922	1"=4m
34	77,78	F.M. Bailey & H.R.C. Mendo	1922	1"=4m
35	42	C.P. Skrine	1922-24	1"=2m
36	52	Khushal Khan	1924	1"=2m
37	72	H.T. Morhead	1924	1"=1m
38	62,63,71,72	Nepal Survey Detachment	1924-27	1"=4m
39	52	R. Allhusen	1925	1"=4m
40	52	Ph. C. Visser	1925	1"=2m
41	42	K. Mason	1926-27	1"=2m & 4m
42	52	E. Trinkler	1927	1"=100,000
43	42	H.P. Montagnier	1927	1"=2m & 4m
44	42	W.R. Rickmole	1928	1"=2m
45	52	Duke of Spoleto	1929	1"=2m
46	52	Ph. C. Visser	1929-30	1"=2m
47	42,60	A. Stein	1930	1"=4m
48	51	E. Trinkler	1930	1"=100,000
49	74	Paul Bauer	1931	1"=2m
50	53	St. J. Birnie	1931	1"=2m
51	52	H. de Terra	1932	1"=2m
52	100	R.L. Burdall & A.B. Emmons	1932	1"=2m

Helio S. I. O. Dehra Dun

SURVEY OF INDIA
GENERAL REPORT
1934



From 1st October 1933
To 30th September 1934

PUBLISHED BY ORDER OF
BRIGADIER H. J. COUCHMAN, D.S.O., M.C.
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1935.

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P R E F A C E

THE HISTORY AND WORK OF THE SURVEY OF INDIA.

The first authoritative map of India was published by D'Anville in 1752, when the exploration of the then unknown India was still largely in French hands. It had been compiled from routes of solitary travellers and rough charts of the coast.

The Survey of India may be said to have been founded in 1767—ten years after the battle of Plassey—when Lord Clive formally appointed Major James Rennell the first Surveyor General of Bengal, at that time the most important of the East India Company's possessions, though there were earlier settlements in Madras and Bombay.

Rennell's maps were originally military reconnaissances and latterly chained surveys based on astronomically fixed points, and do not pretend to the accuracy of modern maps of India based on the rigid system of triangulation commenced at Madras in 1802 and since extended over and beyond India. Even now however the *relative* accuracy of these old maps makes them valuable in legal disputes, as for instance in proving that the holding of a Bengal landowner was a river area at the time of the Permanent Settlement of 1793, so that he is debarred from its benefits.

From these beginnings, this department has gradually become primarily responsible for all topographical surveys, explorations and the maintenance of geographical maps of the greater part of Southern Asia, and also for geodetic work.

Geodesy means the investigation of the size, shape and structure of the earth, and the geodetic work of the department consists of primary (or geodetic) triangulation, latitude, longitude and gravity determinations. From these the exact "figure" of the earth is obtained, whereby points fixed by triangulation can be accurately located on its curved surface. This system of fixed points holds together all topographical and revenue surveys, and the existence of such a system from the early days of the department has avoided the embarrassments caused in other countries where isolated topographical surveys have been started without a rigid framework, with the inevitable result that they could not be fitted together.

A geodetic framework is therefore essential in any large survey, but there are a number of other activities, all of these ultimately utilitarian, which can be suitably combined with it and the following are some of those which have been carried out in India:

- Precise levelling for the determination of heights;
- Tidal predictions and publication of Tide Tables for forty ports between Suez and Singapore;
- The Magnetic survey;
- Observation of the direction and force of gravity;
- Astronomical observations to determine latitude, longitude and time;
- Seismographic and meteorological observations at Dehra Dūn.

Indian geodesy has disclosed by far the largest known anomalies of gravitational attraction in the earth's crust, which have recently led to a reconsideration of the whole theory of isostasy.

Topographical Surveys.—In the past this department used to carry out the large scale revenue surveys for most of India, and was still conducting this work for Central and Eastern India and Burma in 1905.

Though revenue survey is primarily a record of individual property boundaries and is unconcerned with the surface features, ground levels and exact geographical position essential to a topographical survey, it was on the whole found economical to carry out both surveys together.

By 1905 however, the small scale topographical surveys compiled from the large scale revenue maps had fallen seriously in arrear, owing to the relatively slower pace and incompleteness of the latter, on which "waste" non-revenue-paying areas are normally shown blank.

An authoritative Survey Committee appointed by the Government of India considered the position in 1905. It was feared that a separation of the topographical and revenue surveys might result in a wasteful duplication of work and two overlapping but mutually discrepant systems of mapping. These objections were met by a ruling that the basis of both systems of survey should be identical and provided either by the Survey of India or under its supervision.

Subject to this principle, the remaining revenue surveys were handed over to the provinces, who had always paid for them as part of the overhead charges of revenue collection, and the Survey of India was enabled to concentrate its energies on a complete new series of modern topographical maps in several colours on the 1-inch to 1-mile scale.

This new series had been rendered necessary by the natural demand for more detailed information to be shown on maps, especially as regards the portrayal of hill features by contours, proper classification of communications and—more recently—air traffic requirements.

It was intended that this 1905 survey should be completed in twenty five years, and then revised periodically every thirty years. Owing however to the war and more recent retrenchments, only two thirds of the programme had been completed by 1932, in spite of the reduction of scale for the less important areas.

Although new surveys are carried out every year, covering from thirty to sixty thousand square miles—an area roughly that of England—the maps of a large part of the country are still over 50 years old, printed mostly in black only, and have hill features shown by roughly sketched form lines or hachures; such changes in town sites, canals and communications as have been embodied in them have not been surveyed on the ground, but are entered from data gathered from outside sources.

Owing to the serious financial situation in 1931, the establishment of the department was severely cut down and its annual expenditure halved, in consequence of which the modern survey of India cannot now be completed before 1950.

The obsolescence of the present series of modern maps of India is shewn in the second index map at the end of this report.

Large Scale Surveys.—Surveys and records of international, state and provincial boundaries have always formed an important item of topographical work, and in recent years numerous Guide Maps have been published of important cities and military stations where the 1-inch to 1-mile scale is inadequate.

Miscellaneous.—While expending on topographical and geodetic work all funds allotted by imperial revenues, the department is prepared to undertake or aid local surveys, on payment by those concerned, such as

Forest and cantonment surveys;

Riverain, irrigation, railway and city surveys;

Surveys of tea gardens and mining areas, with such control levelling as is necessary for these operations.

Administrative assistance is also given, and executive officers lent, in aid of the revenue surveys of various provinces and states.

The Printing Offices at Calcutta and Dehra Dūn are always at the disposal of other Government departments, for such work as the printing of special maps, illustrations for reports and all diagrams for patents.

The Mathematical Instrument Office of this department assists all Government departments, as well as non-officials, by maintaining up-to-date instrumental and optical equipment and by manufacturing and repairing instruments which would otherwise have to be replaced from abroad.

Military Requirements and Air Survey.—The Department is also responsible for all survey operations required by the army, and is in a position to meet the rapidly increasing complexity of modern military requirements, especially in air survey.

In view of its high military importance, air survey work for civil purposes is receiving all possible assistance, and continuous research is being carried on in the latest methods of mapping from photographs taken from the ground and in the air.

The flying and photography for air mapping done by this department are at present carried out by the Royal Air Force or the Indian Air Survey Company, a commercial firm with headquarters at Dum Dum.

Administration is in the hands of the Surveyor General under the Education, Health and Lands Department of the Government of India.

The Headquarters Office is at Calcutta under the Assistant Surveyor General, and there are four Directors, one for the Map Publication and other technical offices at Calcutta, and three for three of the five Survey of India Circles into which the country is divided; the other two Circle areas (covering Burma and South India) are administered personally by the Surveyor General.

Of the three Circle Directors, one also administers the Geodetic Branch at Dehra Dūn in addition to his topographical survey Circle.

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4. " " " $\frac{1}{4}$ -inch scale	"
5. India and Adjacent Countries Series, 1/M scale	"
6. Carte Internationale, 1/M scale	"
7. Southern Asia Series, 1/2M scale	"
Coloured Spectacles for viewing anaglyphs	in pocket in back cover.

GLOSSARY.

Scales are referred to as follows:—

- (i) by their representative fraction, e.g. "1/25,000",
- (ii) for scales which are multiples of 1/1,000,000—"1/M scale", "1/6M scale" &c., which mean "1/1,000,000 scale", "1/6,000,000 scale" &c.;
- (iii) for scales smaller than 4 miles to one inch—"50-mile scale", "8-mile scale" &c., which mean "scale of 50 miles to one inch" "scale of 8 miles to one inch" &c.;
- (iv) for scales of and larger than 4 miles to one inch—"¼-inch scale", "½-inch scale", "4-inch scale", "16-inch scale" &c., which mean "scale of ¼ inch to one mile" &c., &c.

Serial numbering of Survey of India maps. The system of numbering will be evident by a reference to the Indexes at the end of this report, e.g.

Sheets 65, 78 &c. are sheets on the 1/M scale;

Sheets 65K, 78F &c. are ¼-inch sheets;

Sheets 65K/N.W., 78F/S.E., &c. are ½-inch sheets;

Sheets 65K/1, 78F/16 &c. are 1-inch sheets.

Abbreviations.—U. S. S. denotes Upper Subordinate Service.

L. S. S. denotes Lower Subordinate Service.

U. S. Officer denotes Upper Subordinate Officer.

L. S. Officer denotes Lower Subordinate Officer.

P. L. O. denotes Photo.-Litho. Office (Calcutta).

P. Z. Section denotes Photo.-Zinco Section (Dehra Dūn).

D. O. denotes Drawing Office.

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2. Seasons of survey and revision	" "
3. Maps published on 1 inch and $\frac{1}{2}$ inch scales	" "
4. " " " $\frac{1}{4}$ inch scale	" "
5. The India and Adjacent Countries Series, 1/M scale		...	" "
6. Carte Internationale du Monde, 1/M scale	" "
7. The Southern Asia Series, 1/2 M scale	" "

SURVEY OF INDIA

MODERN TOPOGRAPHICAL SURVEYS AND COMPILATION

on scales ranging from 4 inches to 1 mile to 1/8 inch to 1 mile.



N. B. The index shows all topographical work brought on to the true longitude since 1905. Previous topographical work, in the blank areas was about two miles out of position, being based on the old longitude of 1815.

SYSTEM OF NUMBERING SHEETS.

THE 1/4" SERIES forms the basis of numbering for sheets on all scales. It consists of sheets $\epsilon \times \epsilon$ on the scale of 1:1,000,000, whose numbers are shown on the Index thus: 55

QUARTER-INCH SHEETS—Each 1/4" sheet is divided into 16 sheets of scale quarter-inch to one mile, lettered A-P as shown on the Index. The name of each quarter-inch sheet is therefore written thus: 55.K

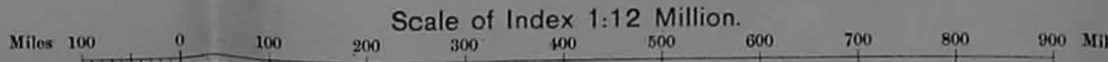
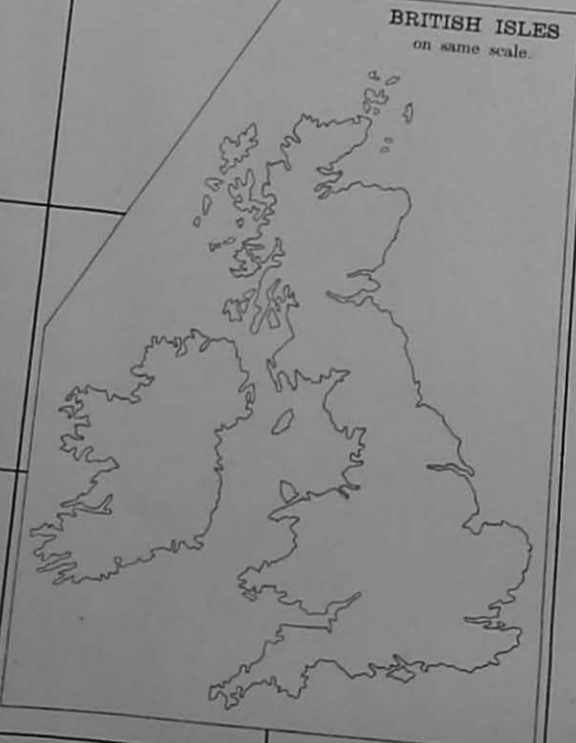
HALF-INCH SHEETS—Each 1/2" sheet is divided into four half-inch sheets, named respectively N.W., N.E., S.W., S.E. The name of a half-inch sheet thus takes the form: 55.K.N.E.

ONE-INCH SHEETS—Each 1" sheet is divided into 16 one-inch sheets, numbered from 1-16 as here shown. The name of a one-inch sheet thus takes the form: 55.K.12

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

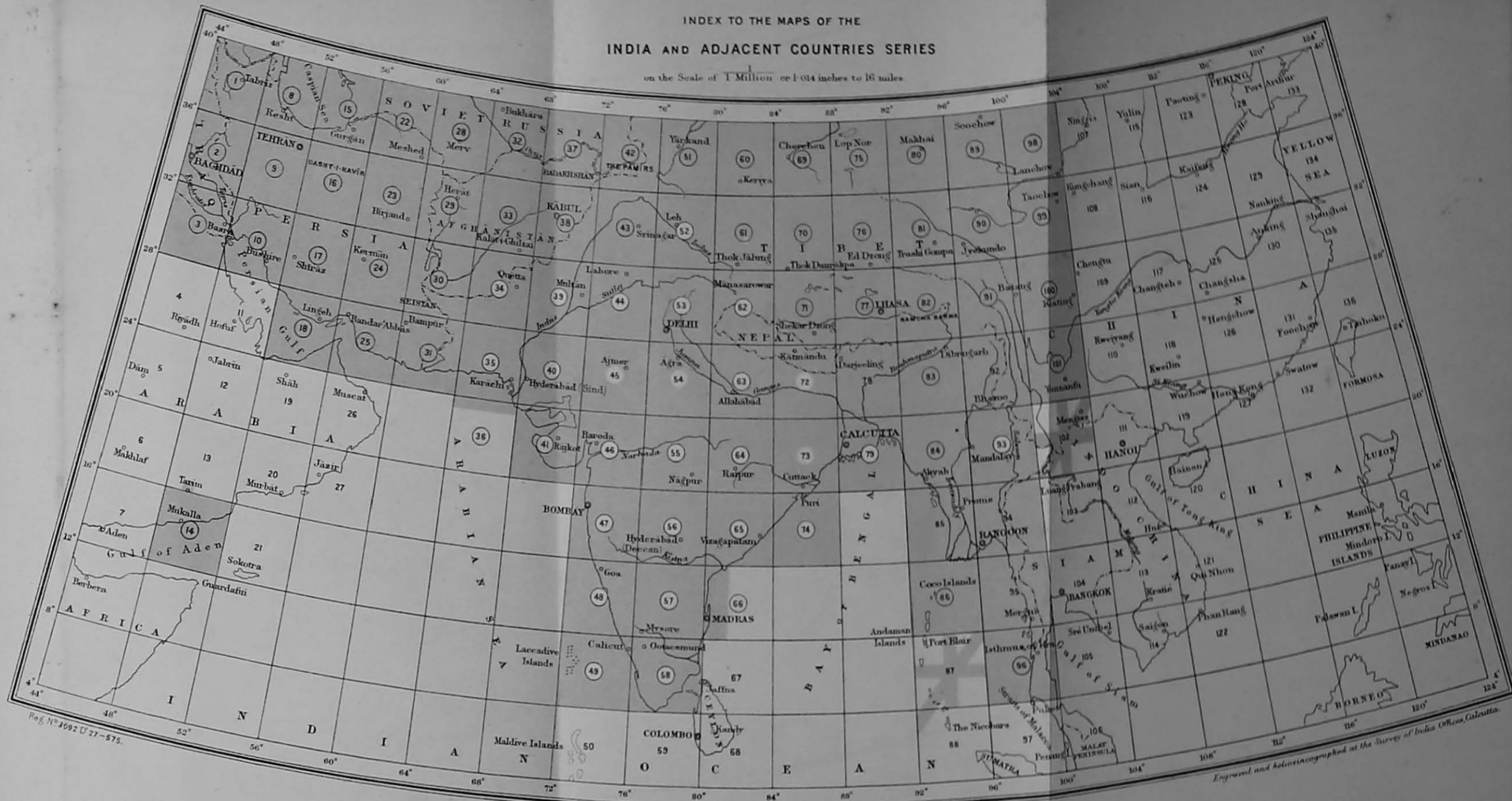
MODERN TOPOGRAPHY
up to 30th September 1934.

- REFERENCES.**
- MODERN SURVEYS (since 1905).**
Scale 1 inch to 1 mile, and over: about 1 inch to 1 mile: 1 inch to 1 mile, and less:
 - MODERN COMPILATION (since 1905).**
Scale 1 inch to 1 mile, and over: about 1 inch to 1 mile: 1 inch to 1 mile, and less:
 - CURRENT SURVEYS** are further distinguished by marks as follows:
Surveyed last season: 1933-34:
Proposed for survey in 1934-35:
(with red initials or numbers to indicate the unit concerned)



INDEX TO THE MAPS OF THE
INDIA AND ADJACENT COUNTRIES SERIES

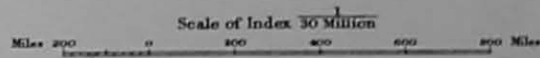
on the Scale of 1 Million or 1:64 inches to 16 miles



Ref. No. 3092 D 27-575.

Engraved and heliogravure at the Survey of India Office, Calcutta.

Published under the direction of Brigadier H.J. Couchman, D.S.O., M.C., Surveyor General of India, 1934.



FOR THE YEAR 1933-34.

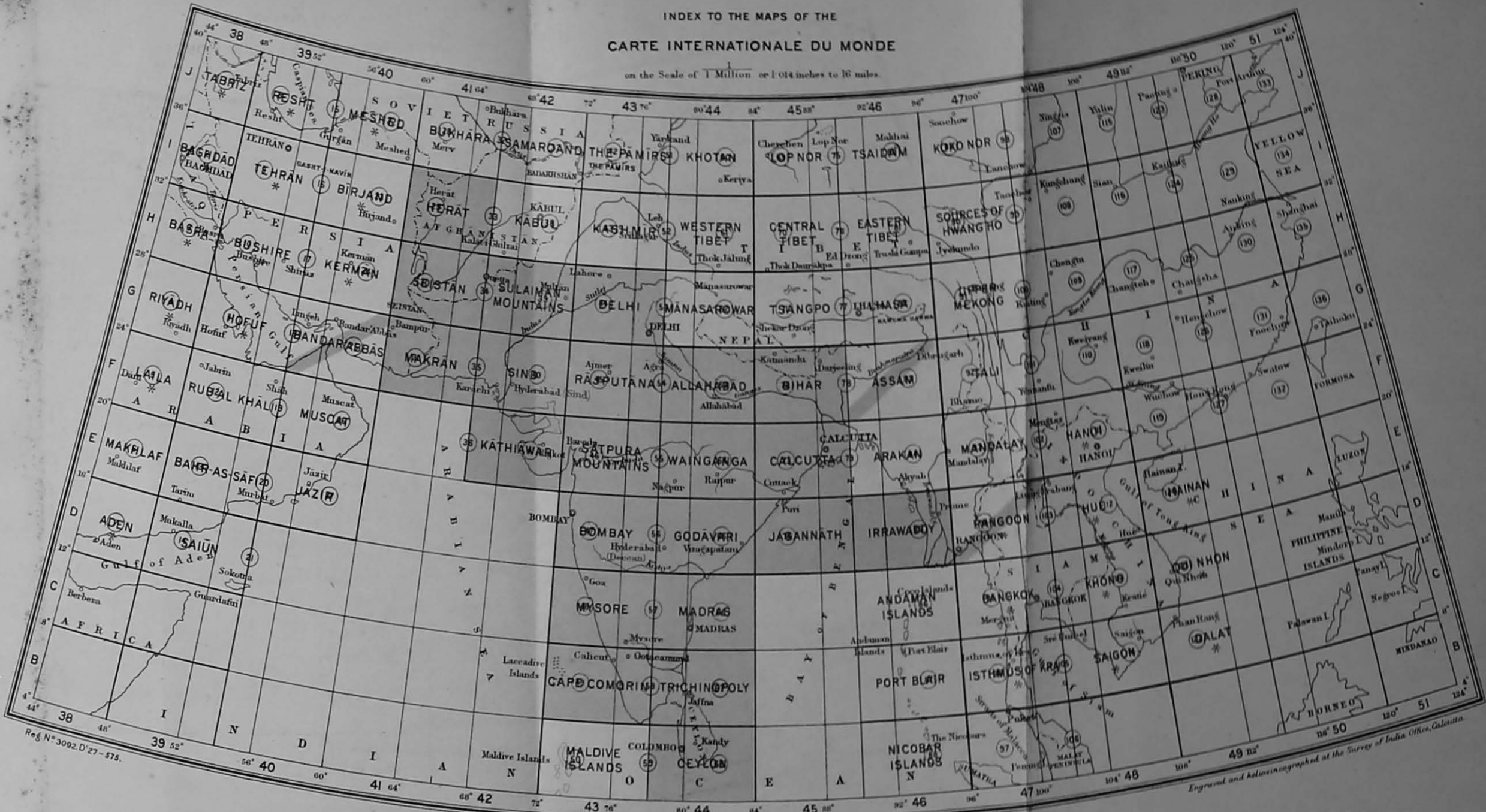
REFERENCE

Maps published, Editorial Edition only		Half Engr.
" " " Political & Layered Editions		
" " " Provisional Editions (in Black & Brown only)		
" " " in hand		

Sheets published during the financial year 1933-34-54, 53 (Rev. edn.).

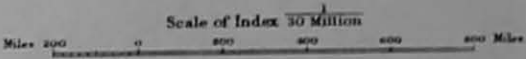
INDEX TO THE MAPS OF THE
CARTE INTERNATIONALE DU MONDE

on the Scale of 1 Million or 1:625,000 inches to 16 miles.



Reg. N° 3092. D'27-575.

Published under the direction of Brigadier H. J. Couchman, D.S.O., M.C., Surveyor General of India, 1934.



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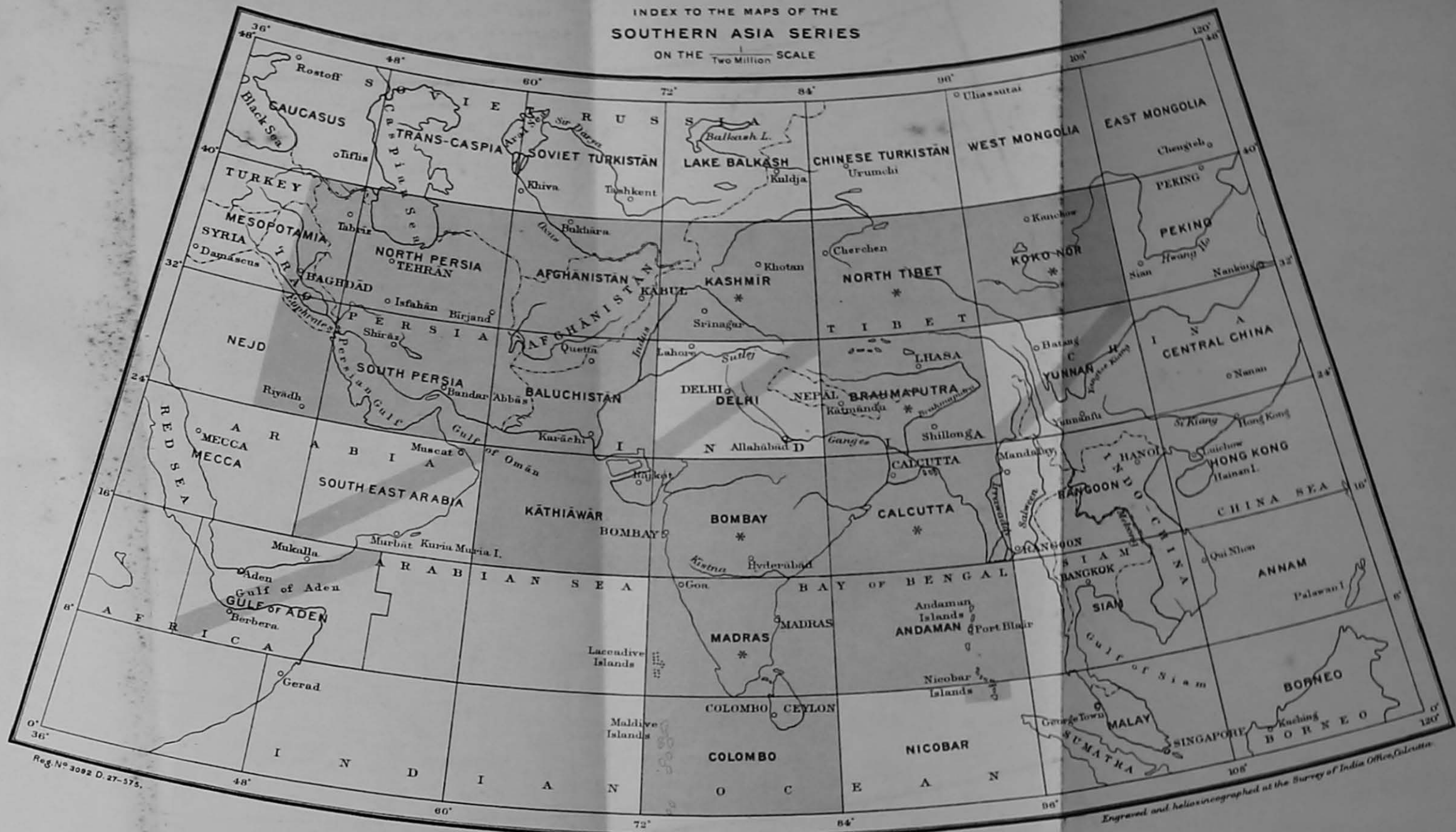
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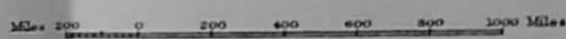
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