5500

Diag. Cht. Nos. 5302-2 and 9000-1.

Form 504

U. S. COAST AND GEODETIC SURVEY

DEPARTMENT OF COMMERCE

DESCRIPTIVE REPORT

Type of Survey Hydrographic

Field No. 181 *Office No.* H-5500

LOCALITY

State California

General locality Pacific Coast

Locality Point Buchon to Point Sur

1934

CHIEF OF PARTY

Fred L. Peacock

LIBRARY & ARCHIVES

DATE August 22, 1934

B-1870-1 (1)

5500

Form 537
Ed. Sept., 1929

DEPARTMENT OF COMMERCE

U. S. COAST AND GEODETIC SURVEY

REG. NO. 5500

HYDROGRAPHIC TITLE SHEET

The Hydrographic Sheet should be accompanied by this form, filled in as completely as possible, when the sheet is forwarded to the Office.

Field No. 181

REGISTER NO. 5500

State California

General locality Pacific Coast

Locality Point Buchon to Point Sur (Offshore)

Scale 1:180,000 Date of survey June 10 to Aug. 12 19 33

Vessel U.S.C. & G.S.S. GUIDE

Chief of Party Fred. L. Peacock

Surveyed by Fred. L. Peacock

~~Protracted~~ Plotted by E. E. Garnett

Soundings penciled by R. H. McCarthy

Soundings in fathoms ~~feet~~

Plane of reference M.L.L.W.

Subdivision of wire dragged areas by

Inked by J E Pulaski

Verified by J E Pulaski

Instructions dated March 23, 19 33

Remarks: R.A.R. controlled hydrography and fathometer soundings.

U. S. GOVERNMENT PRINTING OFFICE: 1929

DESCRIPTIVE REPORT
to accompany
R.A.R. Field Sheet No. 181

INSTRUCTIONS:

This work was performed in accordance with the season's instructions dated March ~~25~~ 27, 1933.

CHARACTER OF WORK:

The hydrography on this sheet was done entirely by the Radio Acoustic Ranging method.

The soundings were all obtained by the fathometer except for seven vertical casts distributed over the entire area of the sheet. The depth range is from 500 fathoms to 2100 fathoms with the greater part of the area being over 1000 fathoms in depth.

The east west sounding line spacing is approximately 5000 meters inside the 1000 fathom curve and 10,000 meters inside the 2000 fathom curve. Cross lines parallel to the shore are roughly four miles apart to the 1000 fathom curve and ten miles apart thereafter.

The position interval varies from 15 minutes to 30 minutes according to distance offshore, and type of bombs in use, with supplemental positions for any changes of speed and course. All this is in accordance with standard practice.

The scale of this sheet is 1:180,000.

LIMITS:

The hydrography on this sheet extends from Latitude 36° 10' to Latitude 35° 10' or from Point Sur to a point offshore from Port San Luis. The offshore limit is roughly the 2000 fathom curve with the inshore limit joining R.A.R. Sheet No. 81 along its entire length. This inshore limit is approximately 30 miles offshore. The junction with Sheet No. 81 consists of at least one bomb in common and even more in some places where better delineation is needed.

CONTROL:

The control consisted of four regular hydrophone stations which were in use throughout the season. They were as follows: KVE at Pfeiffer's Point, KVD at Point Piedras Blancas, KVH at Point Buchon, and KVK at Point Arguello. The first two were established by the GUIDE and the last two by the party of the PIONEER. At KVK and KVE the hydrophone remained in place throughout the entire season, but at KVD and KVH trouble developed with the hydrophones and these were

subsequently moved to facilitate the bomb returns and operation of the station. The station at Pfeiffer's Point was placed May 18, 1933, and the location was unchanged throughout the season. Station KVD at Point Piedras Blancas was first installed on June 7, 1933 and then a better location was made on July 27, 1933. Station KVH established by the PIONEER was first placed on May 25, 1933, and then established again on July 12, 1933. This was maintained jointly, both the GUIDE and the PIONEER having operators there. Station KVK was placed by the PIONEER in May 1933, and was continued in operation uninterruptedly throughout the season.

The position of each hydrophone was calculated by the method given in the report on lag tests which will be found in another portion on this report.

DATE OF SURVEY:

Hydrography on this sheet commenced on June 10, 1933, and was completed on August 14, 1933. ✓

TIDAL REDUCERS:

As the hydrography on this sheet was in a minimum depth of 500 fathoms, no tide reducers were entered in accordance with the usual practice at such depths.

APPARATUS CORRECTIONS:

The apparatus corrections for the hydrography on this sheet consisted of a constant fathometer correction, a dial speed correction, and a velocity correction. These corrections were obtained from an analysis of the temperatures, densities, and depths sounded for the season's work. These fathometer corrections have been made the subject of a special report which was forwarded to the Director on February 14, 1934. More detailed information concerning these corrections can be found in this report. The constant fathometer correction was arrived at chiefly by the comparisons with vertical casts and whether the ship was unusually light or deep in the water. Also, variations occurred where a change of hydrophone or oscillator was made. This is taken up in the above mentioned report.

On bomb times a time correction of 0.04 seconds was subtracted from all elapsed times to compensate for the sound build up and instrument lag. A more comprehensive statement can be found in the report on time delay and velocity tests accompanying this report. Filed as Special Report. 1933. PHR

SLOPE CORRECTIONS:

Slope corrections were applied in all cases where the instructions in Special Publication No. 165 warranted their being used. The great majority of these corrections will be found in the vicinity of the submarine mountain in the northwest corner of the sheet. It is felt, however, that the majority of these are questionable because of the impossibility, at present, of determining whether the slopes are

absolutely uniform or not. The bottom is extremely irregular and broken up and though it is felt that in many cases the soundings need some slope correction, a more consistent, and possibly a more accurate picture is given by the uncorrected soundings. It is therefore respectfully requested that the final verification of these soundings be given careful consideration. See review, par. 9.

BOTTOM SPECIMENS:

Six bottom specimens were obtained in the area covered by this sheet. Four of these distributed widely in the locality showed green mud bottom. One on the submarine mountain was rocky bottom, and another in Latitude 35° 20', Longitude 121° 50' showed a rocky bottom. ✓

DANGERS:

There appear to be no dangers to navigation within the limits of this sheet. ✓

COMPARISON WITH PREVIOUS WORK:

In general, the soundings throughout this area check with previous work in this locality. Earlier work in this area was mostly done by dead reckoning, and what comparisons could be made were in good agreement. ✓

COMPUTATION OF VELOCITIES:

The methods of calculating the velocities used on this sheet were based on previous R.A.R. experience, and the results of the season's velocity tests. To arrive at the final velocity used on this sheet the following work was done:

Temperatures and Salinities for the months worked on R.A.R. were carefully plotted and checked. From these theoretical velocities were computed and depth profiles were drawn for each velocity test only. Then assumed mean velocities were computed and compared with the actual measured velocities from the velocity tests. For further information the reader is referred to the Special Report on Sound Velocity Computations included in this report. For depths of over 200 fathoms the velocity used for all R.A.R. control was 1480.5 meters per second.

PLOTTING OF SMOOTH SHEET:

The bombs were plotted in terms of distances from the respective hydrophone stations, which were computed from the elapsed times and the velocities obtained as noted above. Distance circles were drawn from each hydrophone station at intervals of 10,000 meters. A celluloid template subdivided to intervals of 200 meters was used to interpolate between the circles. ✓

Since it was thought more practicable to draw circles from only one hydrophone position at each station, offset holes bearing the same relative position to the center hole as the various other hydrophone locations to that used for the circles were punched in the template, and by orienting the template and marking through the offset corresponding to the hydrophone location desired, arcs parallel to the distance circles were drawn, the intersection of which determined the bomb position.

The template used in plotting accompany this report.

All preliminary work done on tracing paper covering the smooth sheet. Approximate log factors were obtained between bombs at both ends of courses and the dead reckoning was plotted on a separate overlay and fitted in.

Where question arose as to which of two bomb returns or of two groups of returns were probably more correct, those giving the highest millameter reading at the hydrophone were generally accepted, although many instances occurred in which this rule could not be followed. Much greater weight was given to cast iron bombs than to tim bombs, and bombs with three and four intersections were given more consideration than those with two intersections.

Discrepancies between log readings and bomb positions were verified by checking the log against time, which in many cases showed the log reading to be in error and the bomb correct.

Bomb positions which were more than 400 meters in error were rejected.

EXPLANATION OF DEAD RECKONING DIAGRAMS:

The assumption has been made in these diagrams that all drift and all variations from normal log factor are the result of a uniform current of constant strength in one direction, and that drift is the effect of the component of the current perpendicular to the ship's course and variation in log factor the effect of the component parallel to the course, and that the ship's speed is constant.

The normal log factor of the GUIDE for the 1932-33 and 1933-34 seasons has been taken as 1.05. The ship's working speed is about ten knots. The effect of a one knot current parallel to the ship's course would therefore be to increase or decrease the log factor by ten per cent, or approximately to 1.15 or 0.95. Therefore the difference between log factors measured between fixed positions and the normal log factor is a measure of current strength.

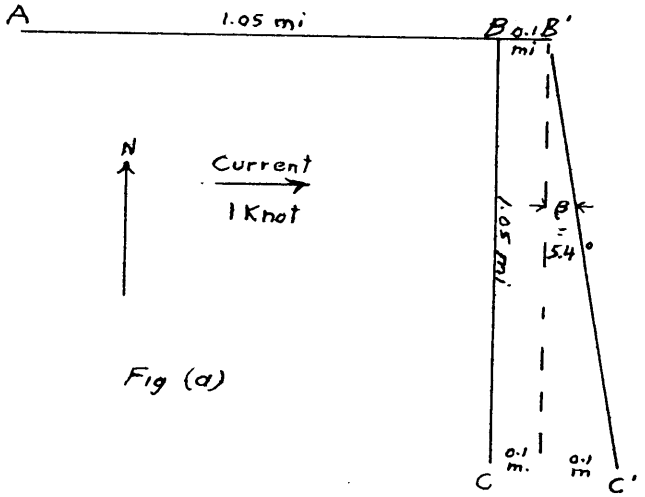


Fig (a)

The relationship between log factor and drift may be obtained from figure (a) at the left. If the ship logs one mile due east and one mile due south in still water its track will be ABC with a log factor of 1.05 in both directions. If an easterly current of one knot exists the track will be AB'C' with a log factor of 1.15 from A to B' and 1.05 from B' to C', and an angle of drift B along B'C'. Tangent B is seen to be BB'/BC, or (1.15 - 1.05, or in general is (LF 1.05) /1.05. This relationship was used to plot diagram 1 on the diagram sheet.

Referring to figure (a) it may be seen that if fixed positions exist at points A and C', the log factor and drift may be obtained by plotting the track ABC, measuring the offset CC' and dividing by the total length of track. The true log factor for closure is then (2.10+ 0.2)/2.10 times 1.05 equals 1.15, from A to B' and 1.05 from B' to C' with an easterly drift of 5.4° obtained by entering diagram 1 with a log factor of 1.15. Similarly, if the closure were made up of a southerly as well as an easterly component, each component would be used separately to obtain the required drifts and log factors. In this case the true direction of the current would be southeasterly and the tangent of its bearing given by the easterly component of closure divided by the southerly component. Its strength would be indicated by the square root of the sum of the squares of the easterly and southerly log factor differences.

On a course at any acute angle α with a current along which the log factor is $1.05 \pm x$, the log factor will be $1.05 \pm (\cos\alpha)x$ and the drift will be that corresponding to a log factor of $1.05 \pm (\sin\alpha)x$. Diagram 2 on the diagram sheet shows this relationship and in diagram 3, "n" is the value of $\cos\alpha$.

Therefore, to balance the dead reckoning between two fixed positions it is necessary to plot the ship's track with normal log factor and zero drift, measure the north-south and east-west components of closure which divided by the total uncorrected log run give the log factor differences; find the log factor difference in the direction of the current and apply the proper drift and log factor corrections to each course in the track.

Since actually the currents are constantly changing both in strength and direction and since wind causes drift but does not appreciably effect the log factor, the diagrams are of practical value only over short intervals of time, usually up to one or two hours, and the dead reckoning obtained must often be modified by consideration of other factors; such as, in RAR work, intermediate bomb returns between

the two originally accepted positions may indicate that the first two positions were two far part to assume a uniformly balanced dead reckoning from one to the other, and so forth.

When a dead reckoning was obtained which appeared correct it was transferred to the smooth sheet and inked. Arcs not passing through position are shown one millimeter in length each side of their perpendicular through the position.

DISCREPANCIES:

The number of discrepancies on this sheet is fairly small considering the extent of the work. Discrepancies resulted principally from the uneven character of the bottom and in some cases erratic behavior of the fathometer.

ABSTRACT OF CROSSING MORE THAN 3% IN ERROR:

Position	Interpolated Sounding	Diff.	%
5-6 A	910		
11-12 A	926	36	4.0
2-3 B	190	N.P.	
45-46 H	1300	80	6.2
11-12 B	1220		
14-15 B	1290	60	4.7
47-48 H	1230		
32-33 N	1948	25	
14-15 L	1923		
44-45 N	1540	160	10.0
5-6 H	1380		
26-27 P	1085	151	13.9
44-45 J	934		
29-30 P	1040	34	3.3
44-45 J	1006		
32-33 P	1060	65	5.8
8-9 H	1125		

Position	Interpolated Sounding	Diff.	%
30-31 J	1150	40	3.4
42-43 P	1190		
43-44 P	1105	95	7.9
61-62 H	1200		
44-45 P	1290	130	9.2
52-53 J	1420		
53-54 Q	1490	60	4.0
10-11 K	1430		
37-38 T	1406	136	9.7
47-48 J	1270		
37-38 T	1100	106	9.6
44-45 P	994		
6-7 W	1908	151	7.9
43-44 V	1857		
57-58 X	1400	69	4.9
65-66 X	1331		
68-69 X	1377	40	3.8
18-19 Y	1417		

An abstract of dead reckoning is included in this report which covers in complete detail the methods used and results of plotting all the bomb positions on this sheet.

Respectfully submitted,

E. E. Garnett,
Civil Engineering Hand,
C. and G. Survey

Respectfully forwarded, approved:

F. H. Hardy,
Chief of Party, C. and G. Survey,
Commanding Ship GUIDE.

G. E. Logan,
Civil Engineering Hand,
C. and G. Survey.

STATEMENT TO ACCOMPANY
R.A.R. Sheet Field No. 181

The smooth plotting of this sheet has been done by Mr. E. E. Garnett, Civil Engineering Hand, and the pencilling of the soundings was done by Mr. R. H. McCarthy, Civil Engineering Hand under the direct supervision of Mr. L. W. Swanson, Lieutenant (j.g.), Coast and Geodetic Survey.

Mr. G. E. Logan, Civil Engineering Hand has drawn the depth curves. The completed smooth sheet has been inspected and is approved.

F. H. Hardy,
Chief of Party, C. & G. S.,
Commanding Ship GUIDE.

August 16, 1934.

STATISTICS
to accompany
HYDROGRAPHIC SHEET FIELD NO. 181
Project No. 140

1933 Date	Day	No. of Soundings RL	RL x 6	V.C.	No. of Positions RL	RL x 6	V.C.	Stat. Miles Sdg. Lines.	Bottom Charact- eristics	Water Samples
6-10	A		61			17		21.7		
6-11	B		60	1		18	1	22.3		
6-12	C		151			10		12.1		
6-13	D		44			10		14.9		
6-23	E		43	1WL		11		17.7		
6-24	F		86	1		27	1	43.8		
6-25	G		245	1WL		59		154.3		
6-26	H		282	3WL		65		155.1		
6-27	J		354	6WL		110		185.5		
7-13	K		255			56		157.1		
7-14	L		160	1WL 1		33	1	123.1		5
7-15	M		168	2WL 1		51	1	133.4		2
7-16	N		194	12WL		45		148.5		
7-17	P		217	4 WL		65		125.3		
7-25	Q		163			56		82.1		
7-26	R		6			4		2.6		
7-29	S		28			15		16.3		
7-30	T		127			38		63.6		
7-31	U		197	7WL 1		64	1	133.9		2
8-10	V		228			48		116.2		
8-11	W		314			63		122.6		
8-12	X		332			73		120.0		
8-13	Y		304	1		67	1	125.8		7
8-14	Z		247	2		74	1	98.5		2
TOTALS			4266	8		1079	7	2196.4		18

Area: 5,500 square statute miles.

SHEET NO. 181
Project 140

BOMBS

Vol. No.	Pint	Returns	Quart	Returns	2 Quart	Returns	C.I.	Returns
1	70	186	22	56			17	47
2	8	16	76	184			32	94
3	1	2	45	115			46	47
4	1	1	53	131	10	14	32	108
5	7	14	58	114	17	36	25	77
6	1.	2	35	112	53	171	18	54
7.	6	19	28	97	11	36		
TOTALS	94	240	317	809	91	257	170	527

Verification Report on H. 5500.

A. The records conform to the requirements of the General Instructions.

B. The field plotting was well done. However, vertical casts were not accompanied by the associated fathometer sounding. ✓

C. Discrepancies in crossings amounting to 5% or less were considered acceptable in these depths. The list of discrepancies, given in the report of the field party, is based on interpolated soundings. With the irregular bottom encountered in this area there is opportunity for different interpolation, and in most cases a different interpolation would give a good crossing. ✓

Many discrepancies listed in the Field Parties report are incorrect; the sounding on one line taking into account slope corrections while the soundings on the cross lines did not.

In the case of (37 - 38T)---(44 - 45P) and (44 - 45N)---(5 - 6H), the steep slope may explain discrepancies of 10%.

Several errors were found in the list of discrepancies. This list has been checked by the verifier and notations made. The crossing differences indicated when soundings from both lines have slope corrections, have not been verified.

See review par. 10 regarding slope correction. ✓ JCL.

* All soundings with slope correction are left in pencil pending further study by Mr. A. L. Shalowitz. (SEE PAR. J) See par. J, below

~~The list of discrepancies must again be gone into when the matter of slope corrections for this sheet is settled.~~

D. Day letters H and J were confused by the field plotter. ✓

E. A sounding of 1999 fathoms at 33 H day (Lat. 35°40', long. 122°55') was not plotted since it is questioned in the records. ✓

F. A sounding of 1908 fathoms 6 - 7 W day (Lat. 35°12', long. 122°35') was not plotted since a better crossing is indicated without this sounding. The echo was weak and the hydrophones noisy at that point. ✓

G. A junction was made with H. 5472 (1932) on the north. The sheet adjoining on the east has not been received in the office at this time. ✓

H. Triangulation Station Point Sur Lighthouse was inked in by the verifier and indicated as a reference station. ✓

I. The curves are incompletely drawn because the soundings with slope correction will effect the 1000 fathom curve. (See Par. C). (CURVES NOW COMPLETED) Nov. 27, 1934 ✓

Respectfully submitted -
S. E. Perkins,
November 16, 1934.

S. E. Perkins

J. THE VERIFIER MADE A STUDY OF THE SLOPE CORRECTIONS AS APPLIED TO THIS SHEET, AND UPON THE RECOMMENDATION OF MR. A.L. SHALOWITZ, THE SLOPE FACTOR WAS NOT USED ON ANY OF THE SOUNDINGS, SINCE THE SCALE IS TOO SMALL TO JUSTIFY THEIR USE.
(NOV. 27, 1934)

Field Records Section (Charts)

HYDROGRAPHIC SHEET No. ..5500

The following statistics will be submitted with the cartographer's report on the sheet:

Number of positions on sheet	..1079
Number of positions checked	2
Number of positions revised	—
Number of soundings recorded	4266
Number of soundings revised	..4..
Number of signals erroneously plotted or transferred	—

Date: 11—16—34

Cartographer: S. E. Perkins

Verification of protracting
Verification & inking of rocks and shoals } by S. E. Perkins Time: 42 3/4

Verification of inking by Time:

Review by Time:

Mr. Ellis

Tae

August 30, 1934

Division of Hydrography and Topography:

✓ Division of Charts:

Tide Reducers are approved in
4 volumes of sounding records for

HYDROGRAPHIC SHEET 5500

Locality **Point Buchon to Point Sur, Coast of California.**

Chief of Party: **Fred L. Peacock in 1933.**
Plane of reference is
ft. on tide staff at
ft. below B. M.

Offshore soundings--due to depth, no reducers are necessary.

Condition of records satisfactory except as noted below:

Paul C. Whitney

Chief, Division of Tides and Currents

H - 5500
Survey No.

GEOGRAPHIC NAMES

Date. Nov. 12, 1934

5302
Chart No.

526
Diagram No.

Names underlined in red approved Nov. 16, 1934.
H. Bacon

*, Approved by the Division of Geographic Names, Department of Interior.

¢, Not Approved by the Division of Geographic Names, Department of Interior.

R, Referred to the Division of Geographic Names, Department of Interior.

Status	Name on Survey	Name on Chart and other Maps as mentioned	New Names in local use	Names assigned by Field	Location
		POINT PIEDRAS BLANCAS			35-40
		Called Piedras Blancas Point on U.S. Geol. Survey Maps.	Retain C&G Form		121-17
		Point Buchon	----	----	35°15'
		" U.S.G.S.			120°53'
		Point Sur	------	-------	36°20'
		" U.S.G.S.			121°53'
		Point Arguello (U.S.G.S.)	------	-----	34°35'
		" U.S.G.S.			120°38'

(M 100)

Section of Field Records

REVIEW OF HYDROGRAPHIC SURVEY NO. 5500 (1933)

Point Buchon to Point Sur (Offshore), Pacific Coast, California.
Instructions dated April 4, 1932 (Guide)
Instructions dated March 27, 1933 (Guide)
Surveyed June 10 to Aug. 12, 1933

Fathometer and Vertical Cast Soundings - R.A.R. Control from Shore Hydrophones.

Chief of Party - Fred L. Peacock.
Surveyed by - Fred L. Peacock.
Plotted by - E. E. Garnett.
Soundings penciled by - R. H. McCarthy.
Verified and Inked by - S. E. Perkins.

1. Condition of Records.

The records are neat and legible and conform to the requirements of the Hydrographic Manual, with the following exception:

a. A number of errors were noted in the D. R. page 6, "Abstract of Crossings more than 3% in error." Also most of the excessive discrepancies in crossings listed in this abstract are the result of crossings on which one line had had a slope correction applied and the other line had not.

2. Compliance with Instructions.

The survey fully satisfies the instructions for the project. The area has been uniformly and systematically covered. The completeness of the Descriptive Report is commendable.

3. Sounding Line Crossings.

Considering the depths involved, the cross lines are satisfactory.

4. Depth Curves.

Within the limits of the survey the usual depth curves may be satisfactorily drawn.

5. Junctions with Contemporary Surveys.

On the north a satisfactory junction is made with H-5472 (1932). The junction with the surveys on the east and south will be considered in the review of those surveys, which as yet have not been received in the office.

6. Comparison with Prior Surveys.

a. H-5204a (1932).

This survey, on a very small scale, shows a single line of soundings, controlled astronomically, which crosses the area of the present survey. Considering the depths involved, the agreement is satisfactory. Within its limits it should be superseded by H-5500 (1933), which is more accurately controlled.

7. Comparison with Charts No's. 5302 and 5002.

Within the area of the present survey the charts are based primarily on an advance copy of a portion of the present survey (H-5500), which is filed as B. P. No. 26564. The soundings on the advance copy are uncorrected fathometer soundings and differ somewhat from the soundings as shown on the smooth sheet. B. P. No. 26564 should, therefore, be superseded by H-5500 (1933). There are a few other soundings on the chart within the area of the present survey, but the origin of these could not be determined. They are in general good agreement with the new work. Inasmuch as the present survey adequately covers the area surveyed, these soundings can be disregarded in future charting.

8. Field Plotting.

The field plotting was very satisfactory.

9. Slope Corrections.

By rigidly applying the rules pertaining to the application of slope corrections as set out in Special Publication No. 165, it was found that for the scale of the sheet the slopes and depths involved were not sufficient to justify corrections to any of the soundings on the sheet.

10. Additional Field Work Recommended.

This survey is complete and no additional field work is required.

11. Superseding Old Surveys.

Within the area covered, the present survey will supersede the following survey for charting purposes: H-5204a (1932) in part.

12. Reviewed by - John G. Ladd, December, 1934.

Inspected by - A. L. Shalowitz.

Examined and approved:

C. K. Green, C. K. Green
Chief, Section of Field Records.

L. C. Talbert
Chief, Division of Charts.

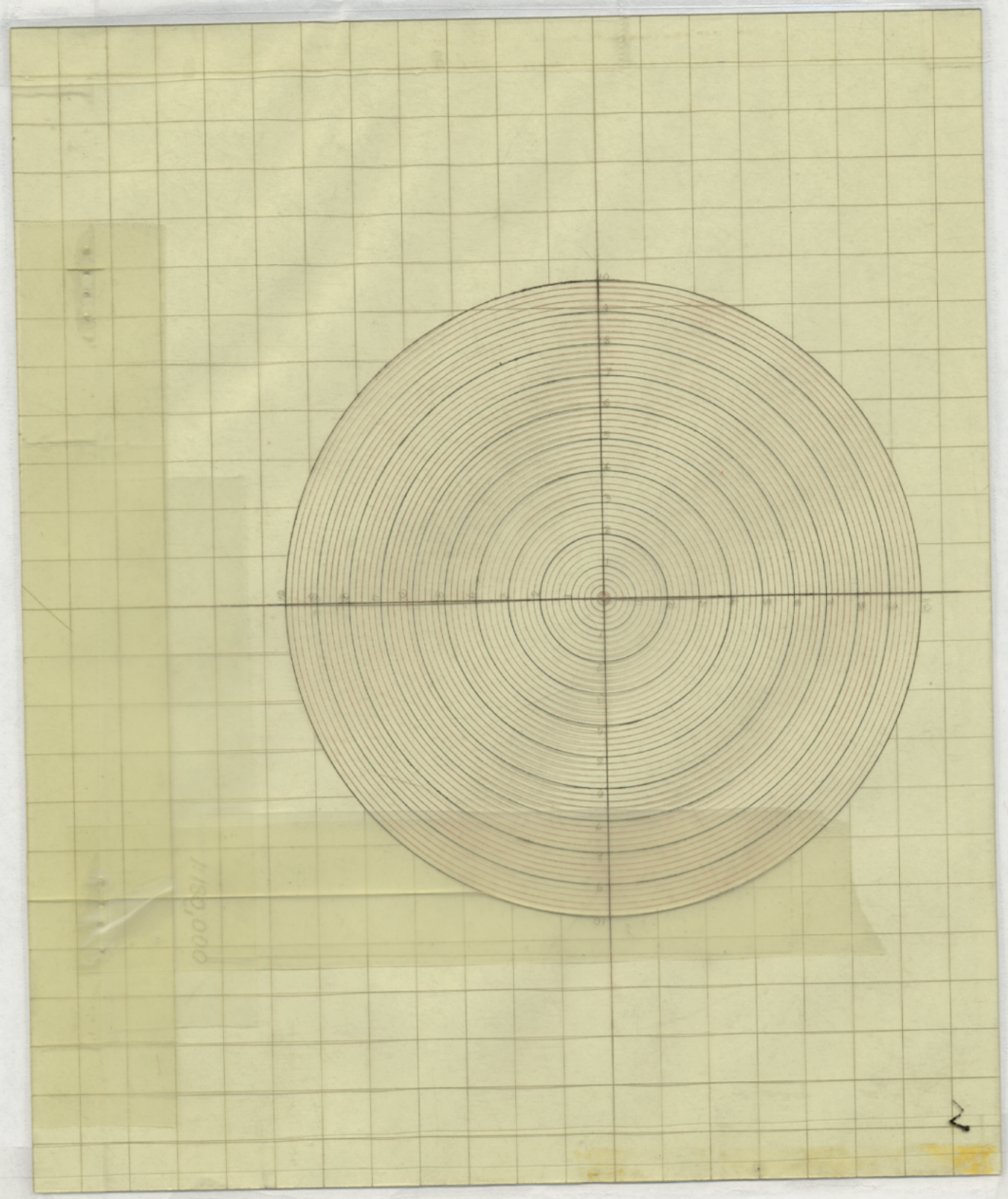
T. J. Gordon
Chief, Section of Field Work

R. R. Lukens
Chief, Division of H. & T.

Applied to drawing of Chart 5302 - Jan 27, 1936 - J.F.W.

PLOTTING TEMPLATE
for
R.A.R. FIELD SHEET 181

H. 5500



Applied to compilation of new chart No. 5020 — L.B.M. Dec 1937

Partially applied to Chart 5021 — S.R 4/1947.