DRTE 9511-40-5 (C)
OUR FILE REF........................

CANADA

DEPARTMENT OF NATIONAL DEFENCE • DEFENCE RESEARCH BOARD

DEFENCE RESEARCH TELECOMMUNICATIONS ESTABLISHMENT

4
OTTAWA/ONTARIO

22 January, 1965.

Dr. G. Reber,
Commonwealth Scientific and Industrial
Research Organization,
Tasmanian Regional Laboratory,
"Stowell", Stowell Avenue,
Hobart, Tasmania,
Australia.

Dear Dr. Reber:

Enclosed please find fxF2 vs. orbit time (and latitude and longitude) for the periods in which you were interested. The error bars should be self-explanatory. Near the hole there is often a possibility of two different interpretations, depending upon the reflection trace chosen; in this case, the error bars apply only to the trace chosen, and are not intended to include the frequency of any other possible interpretation.

I shall look forward to hearing of the results which you obtain.

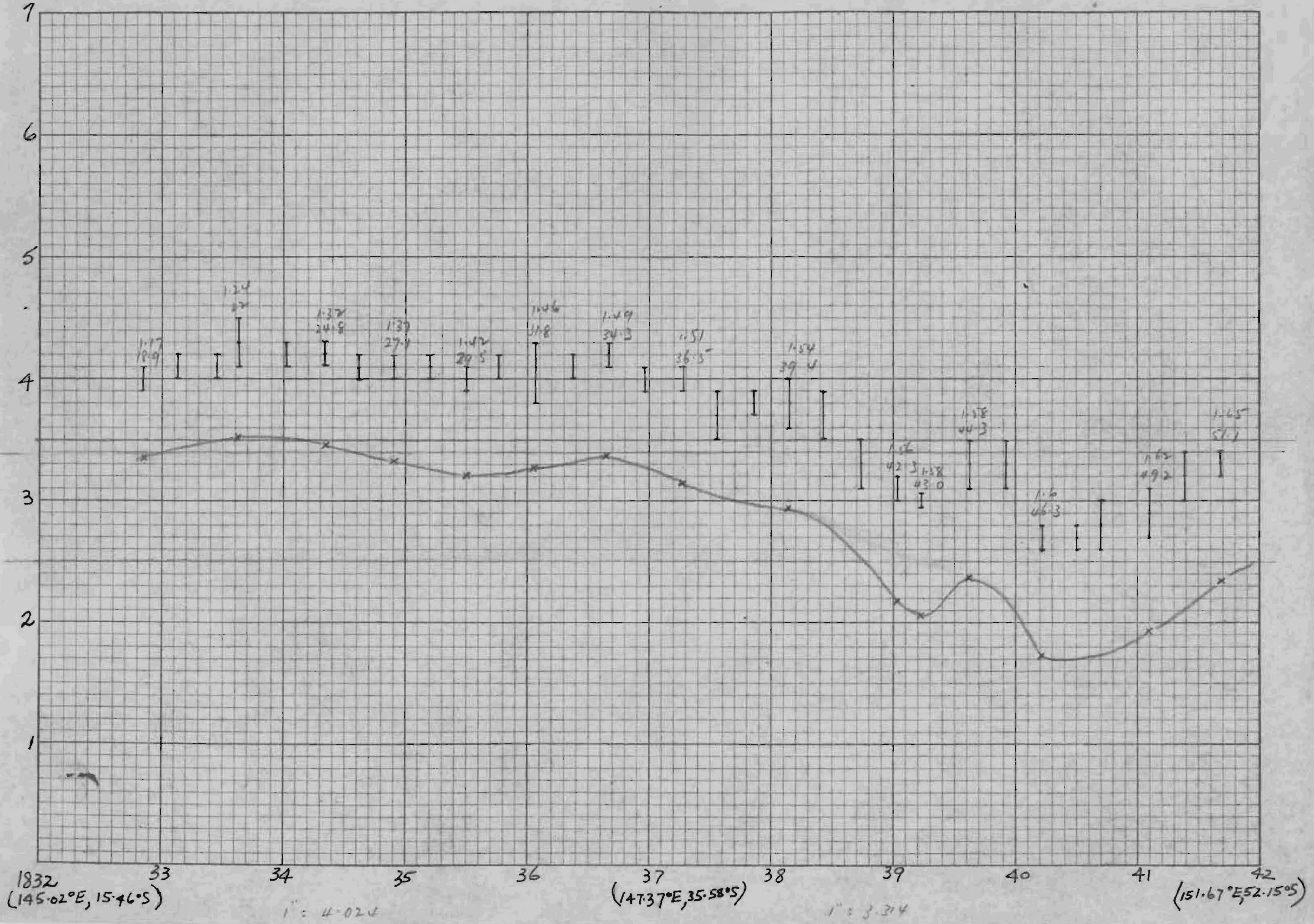
Yours truly,

G.L. Nelms

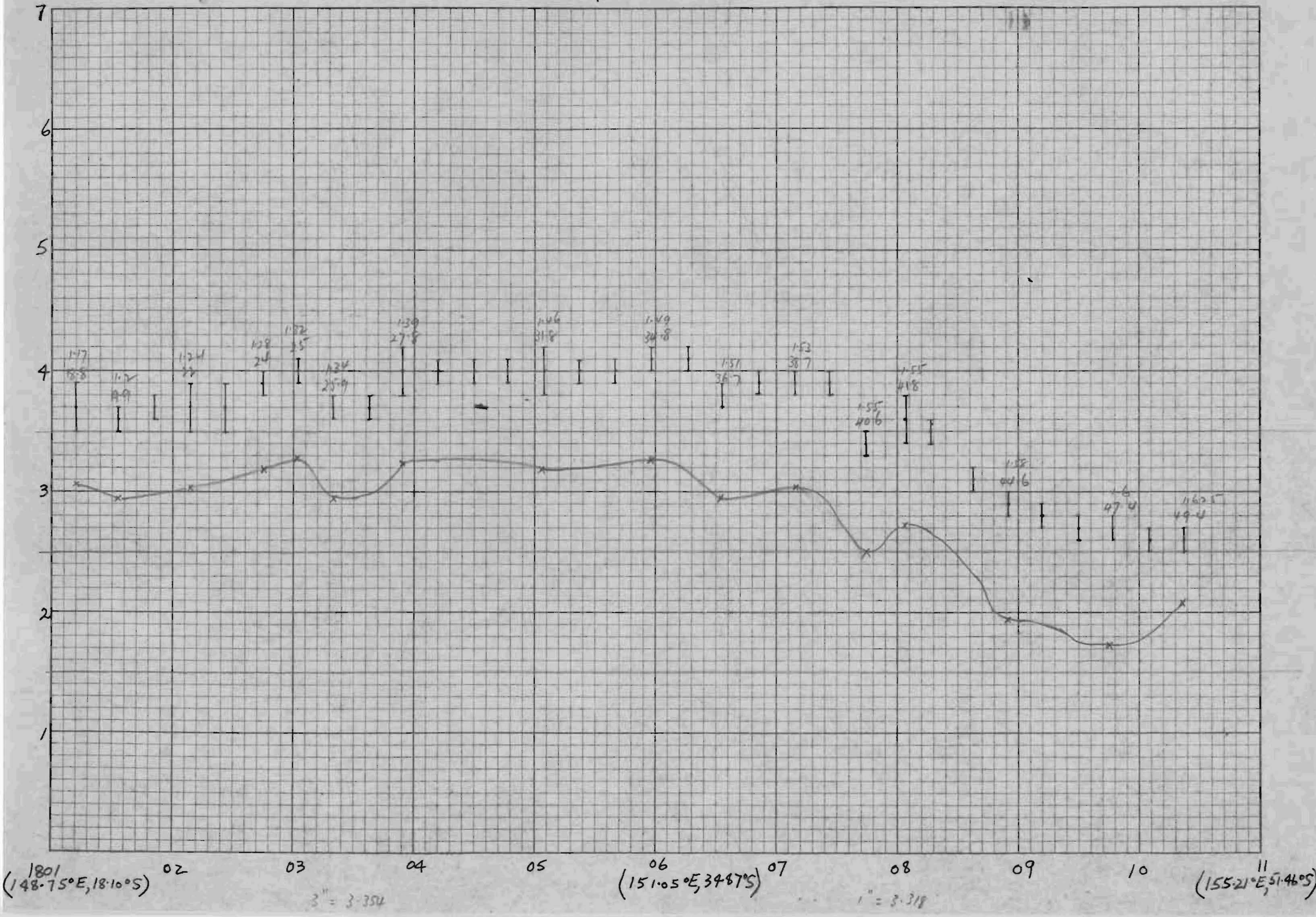
$f_{oo}^2 = f_{x}^2 - f_x f_H$

50M—6-62 (56-2201)

Woomera
Day 048, 1963 · fxF2

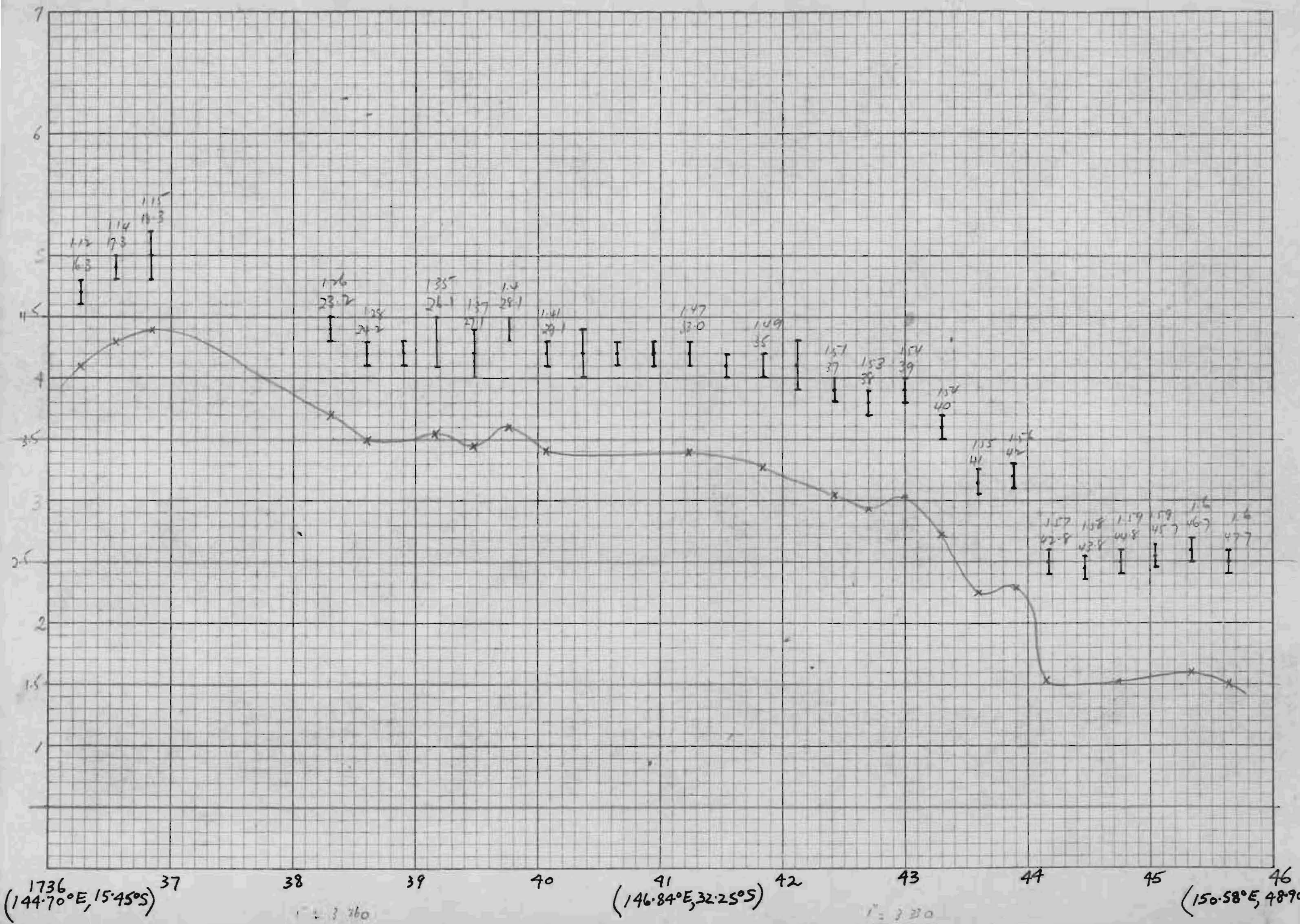


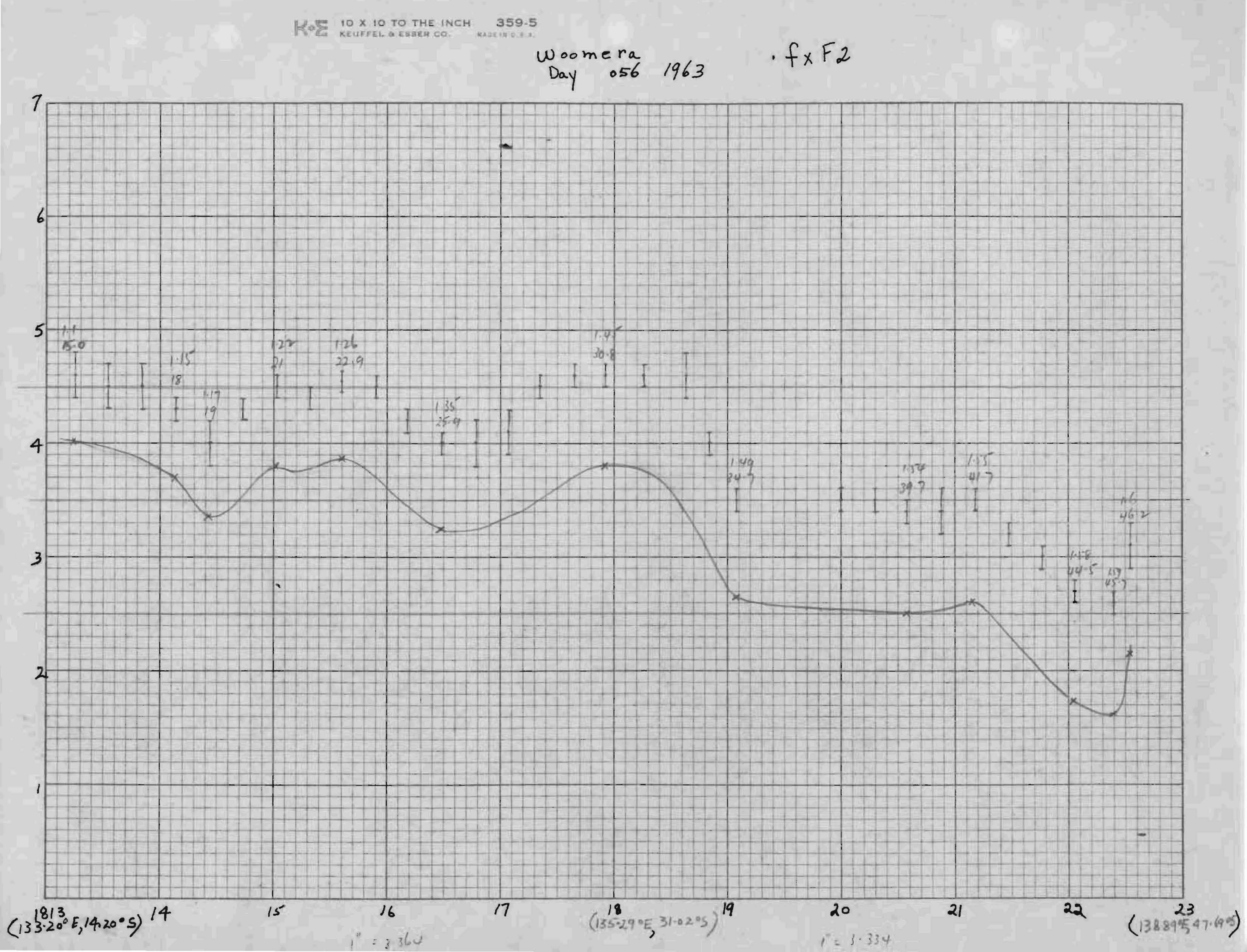
Woomera .fxF2
Day 050, 1963



K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.

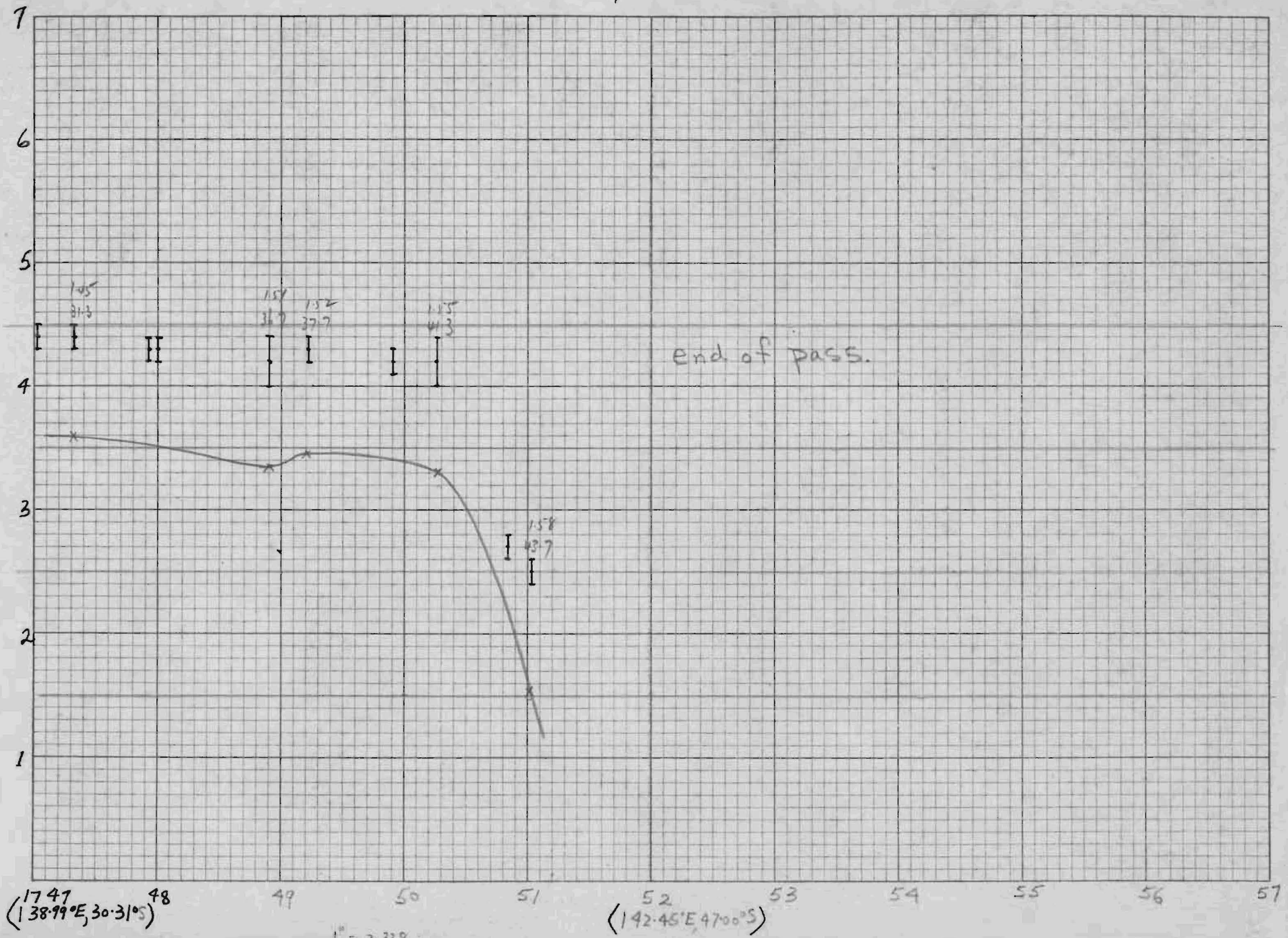
Woomera
Day 055 1963 .fxF2




K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.
Woomera
Day 056 1963
. fx F2
7
6
5
4
3
2
1
1813 (133·20° E, 14·20° S)
14
15
16
17
18 (135·29° E, 31·02° S)
19
20
21
22
23 (138·89° E, 47·19° S)
1" = 3·360
1" = 3·334

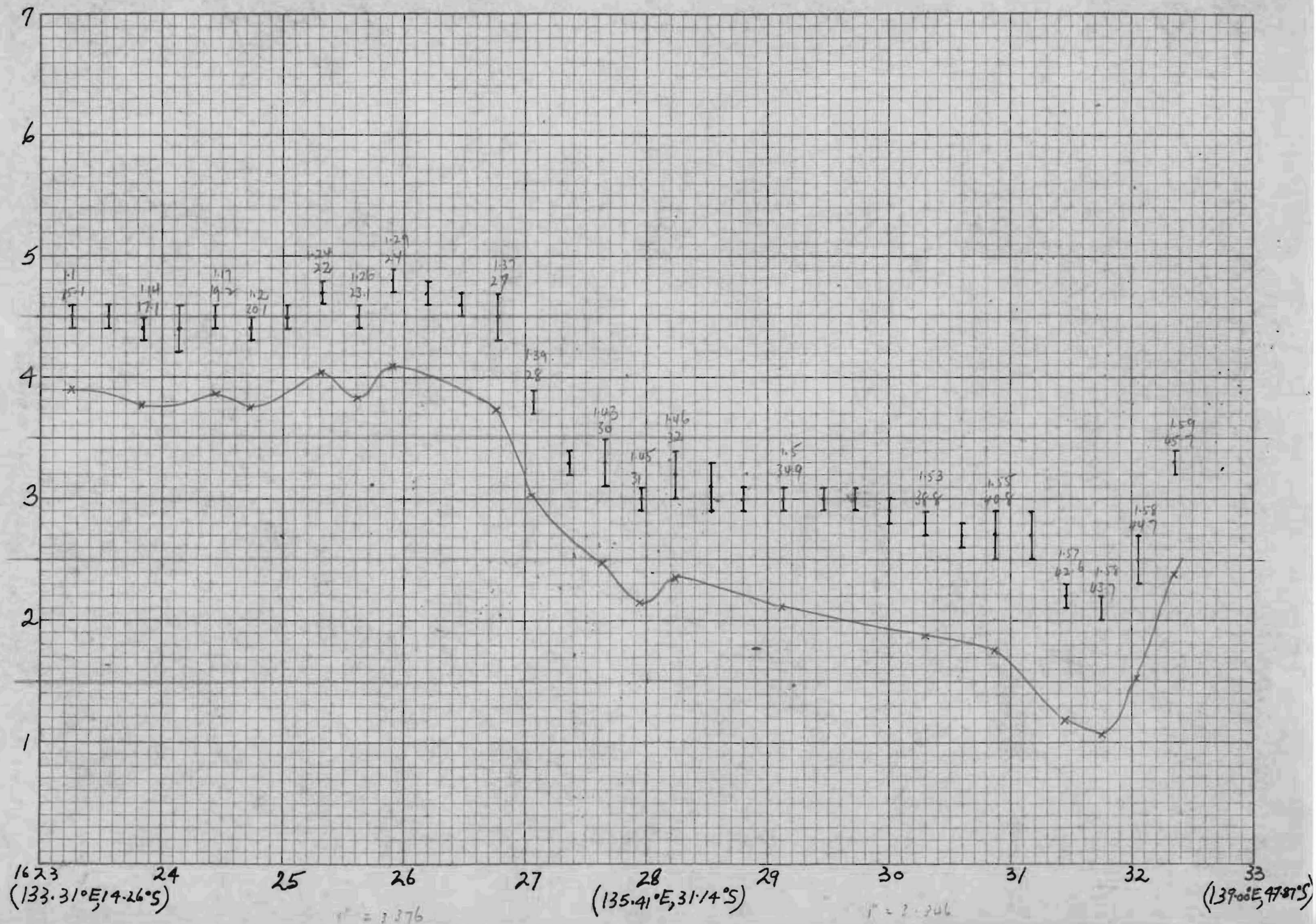
Woomera
Day 058 1963

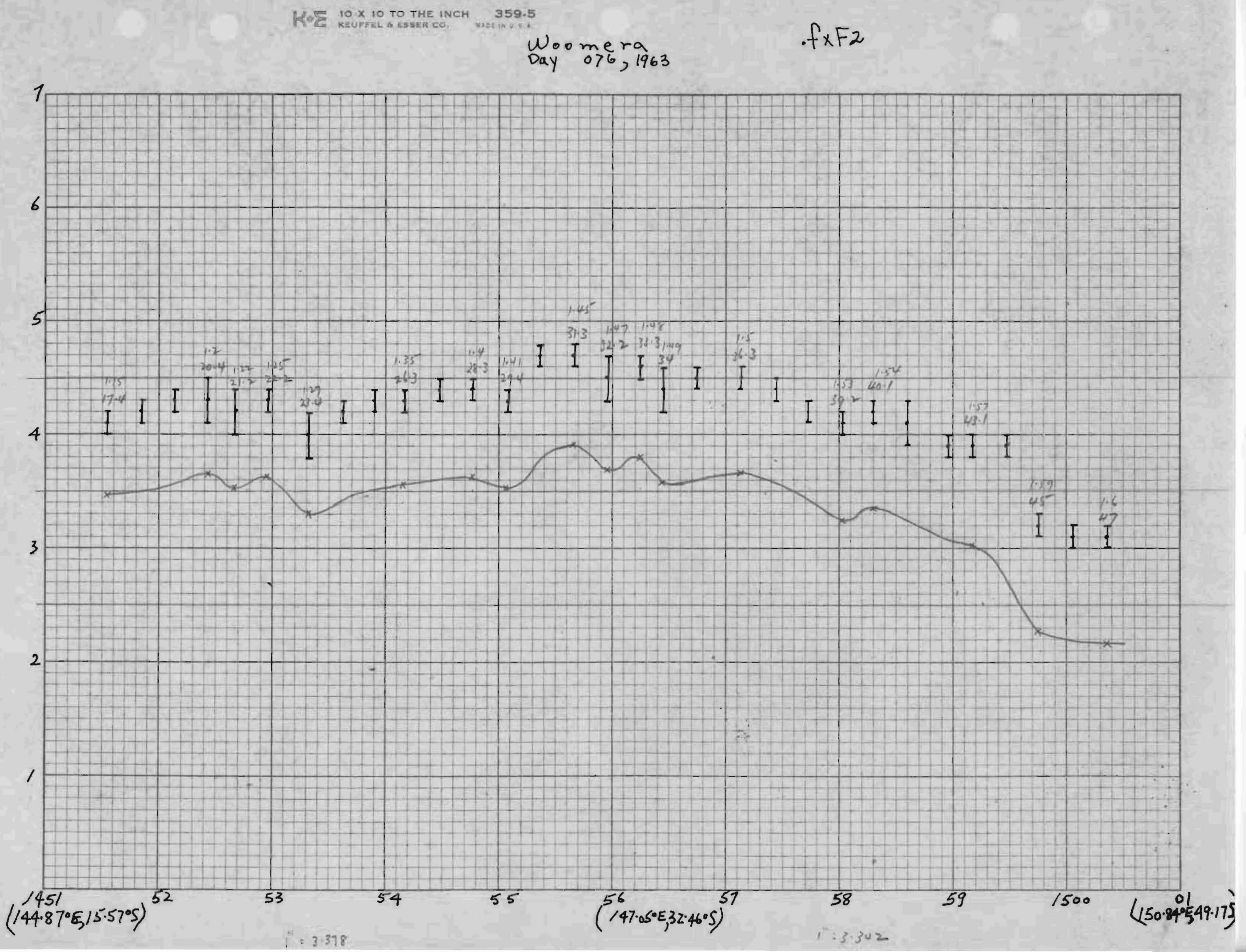
· fxF2



K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.

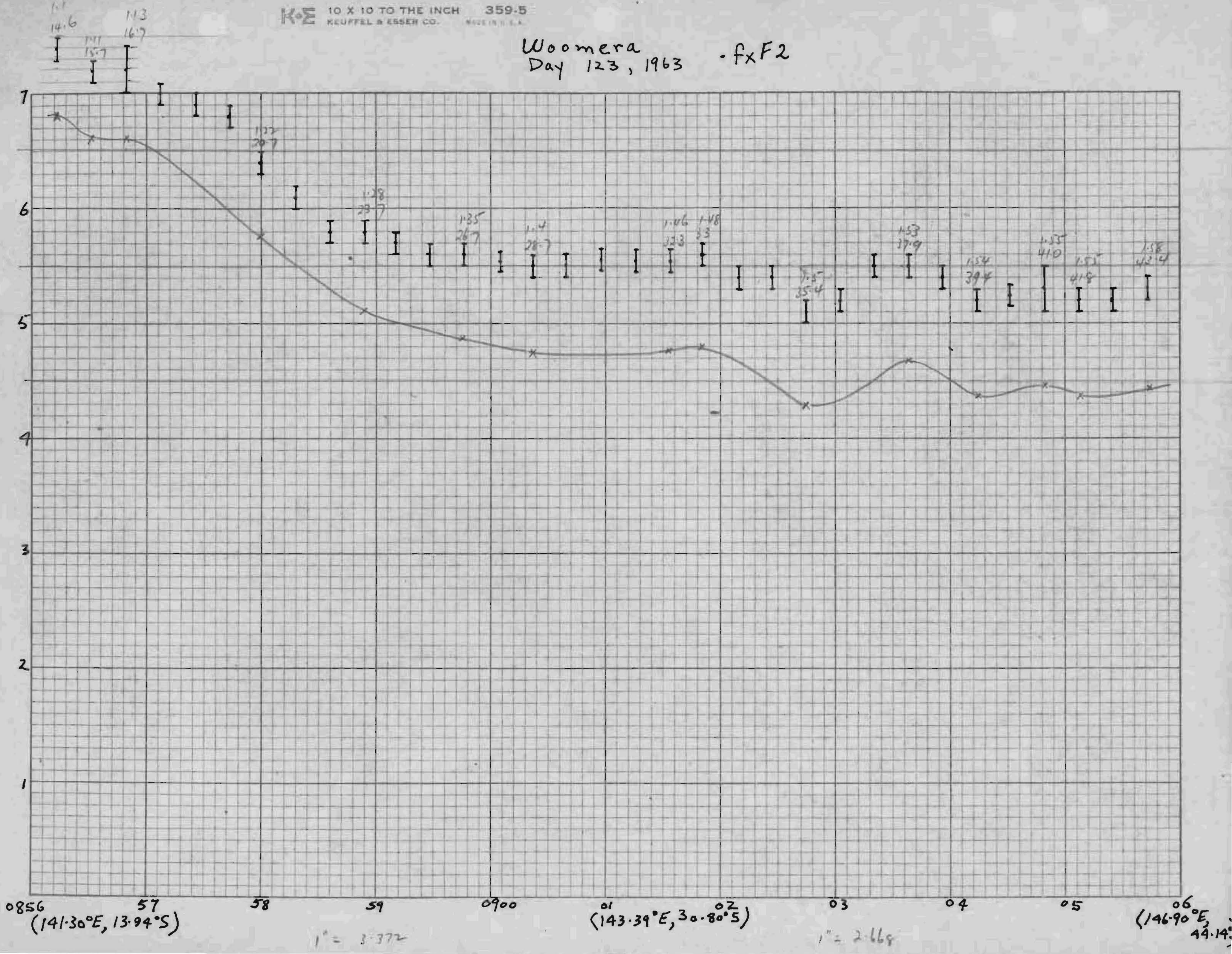
Woomera fxF2
Day 070 1963





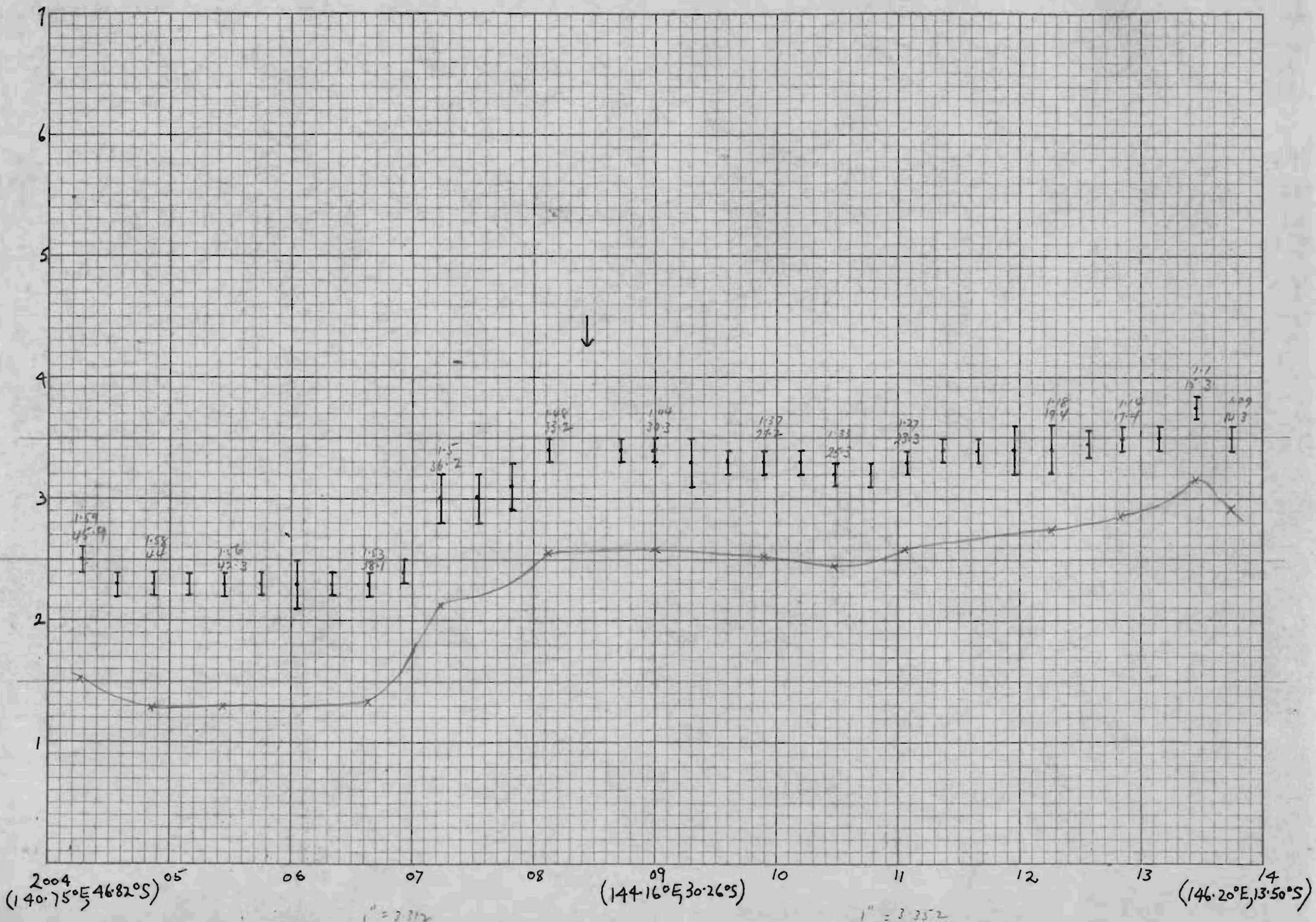
K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.
Woomera
Day 076, 1963
fxF2
1451
(144.87°E, 15.57°S)
52
53
54
55
56
(147.05°E, 32.46°S)
57
58
59
1500
01
(150.84°E, 49.17S)
1" = 3.378
1" = 3.302

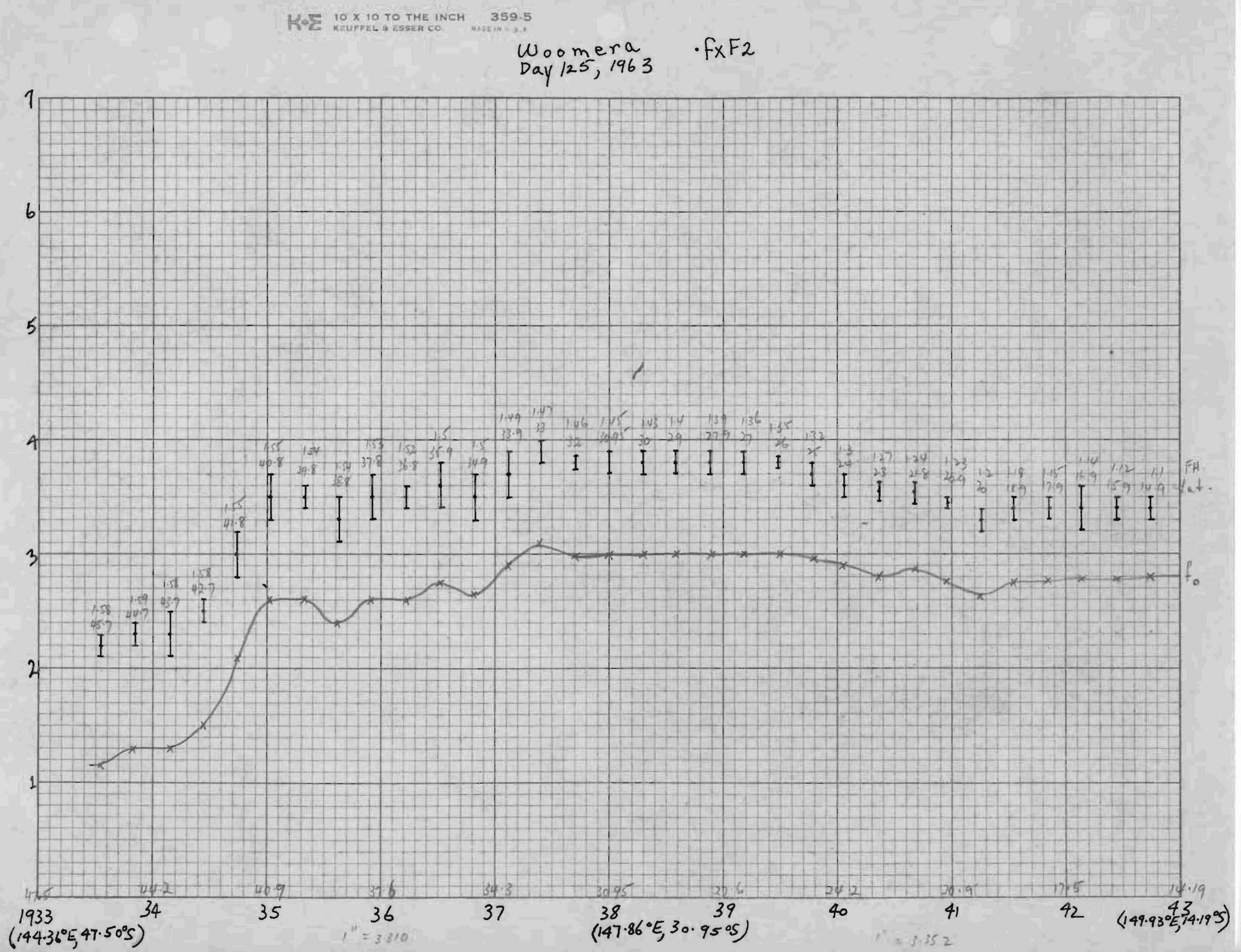
Woomera
Day 123, 1963 · fxF2



·fxF2

Woomera
Day 123, 1963

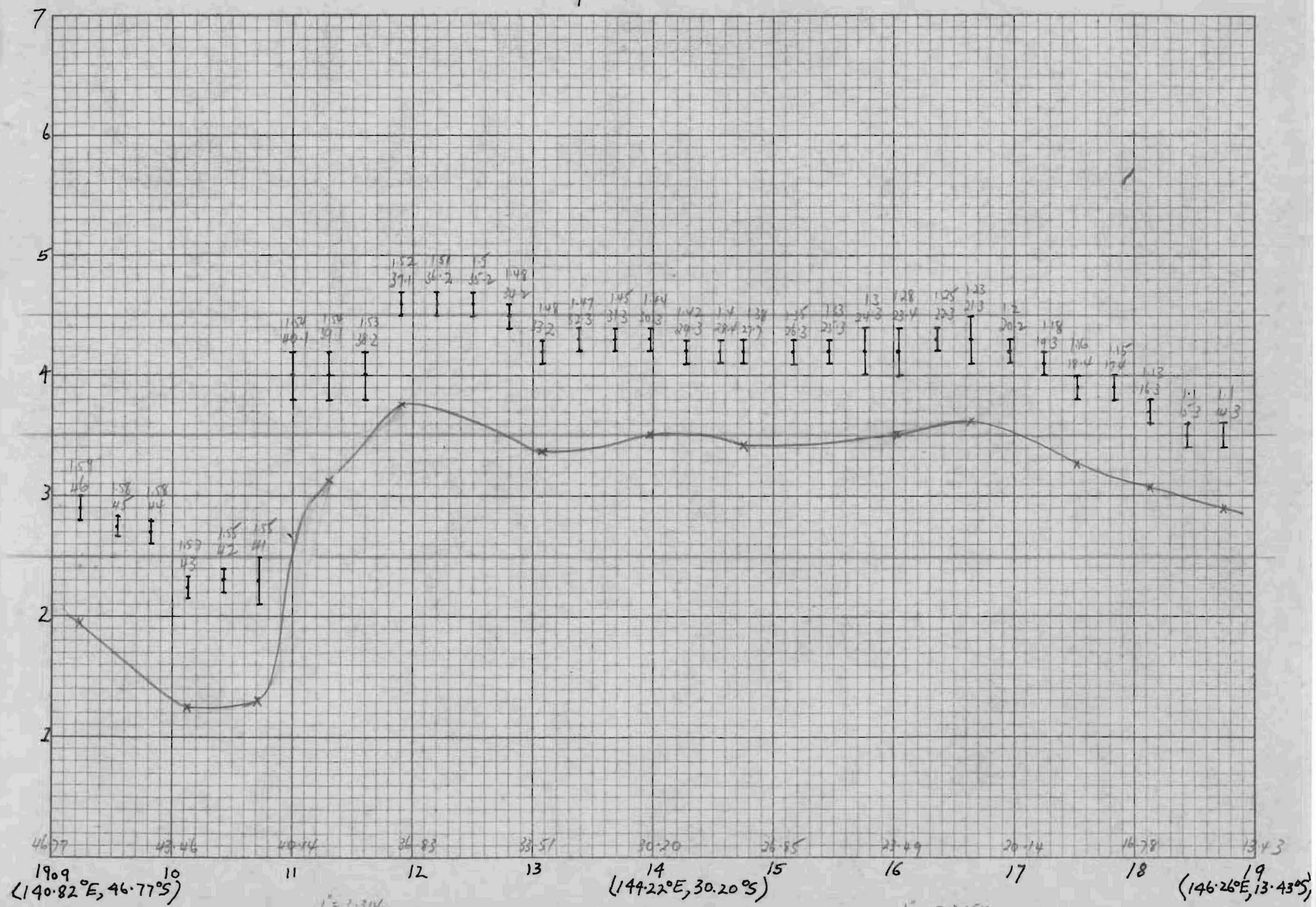


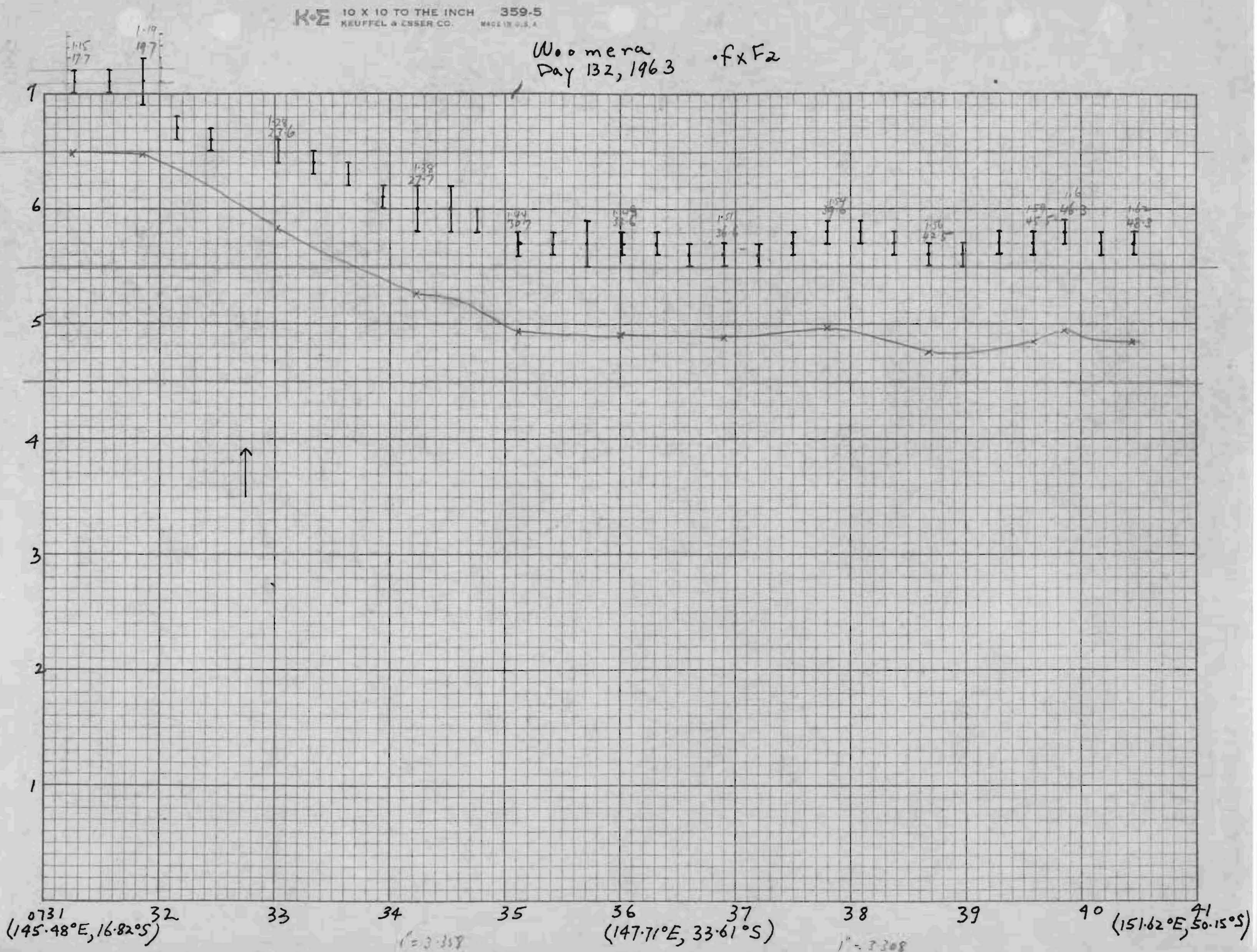


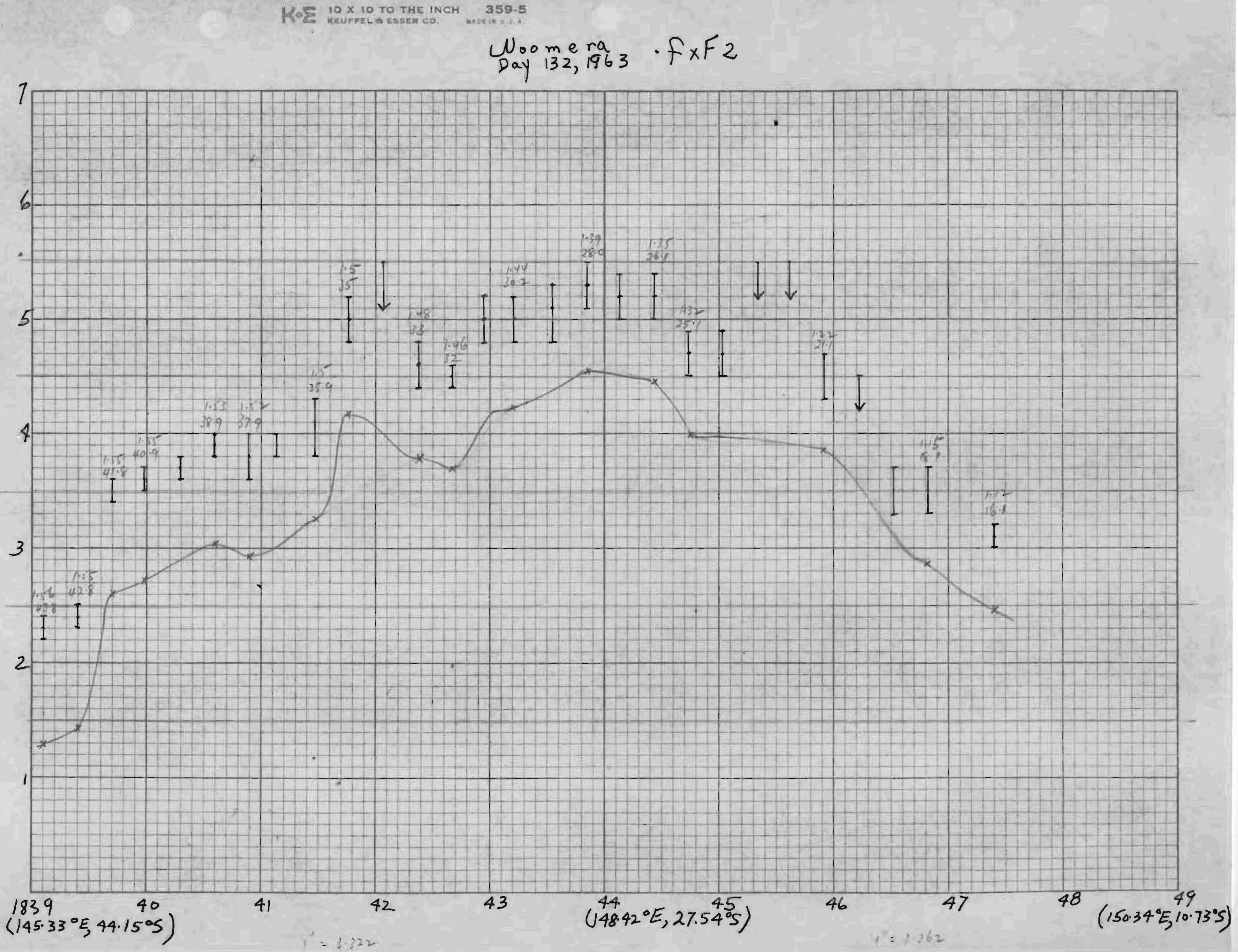
K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO.
Woomera
Day 125, 1963
·fxF2
FH
lat.
f0
1933
(144.36°E, 47.50°S)
(147.86°E, 30.95°S)
(149.93°E, 14.19°S)

K&E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.

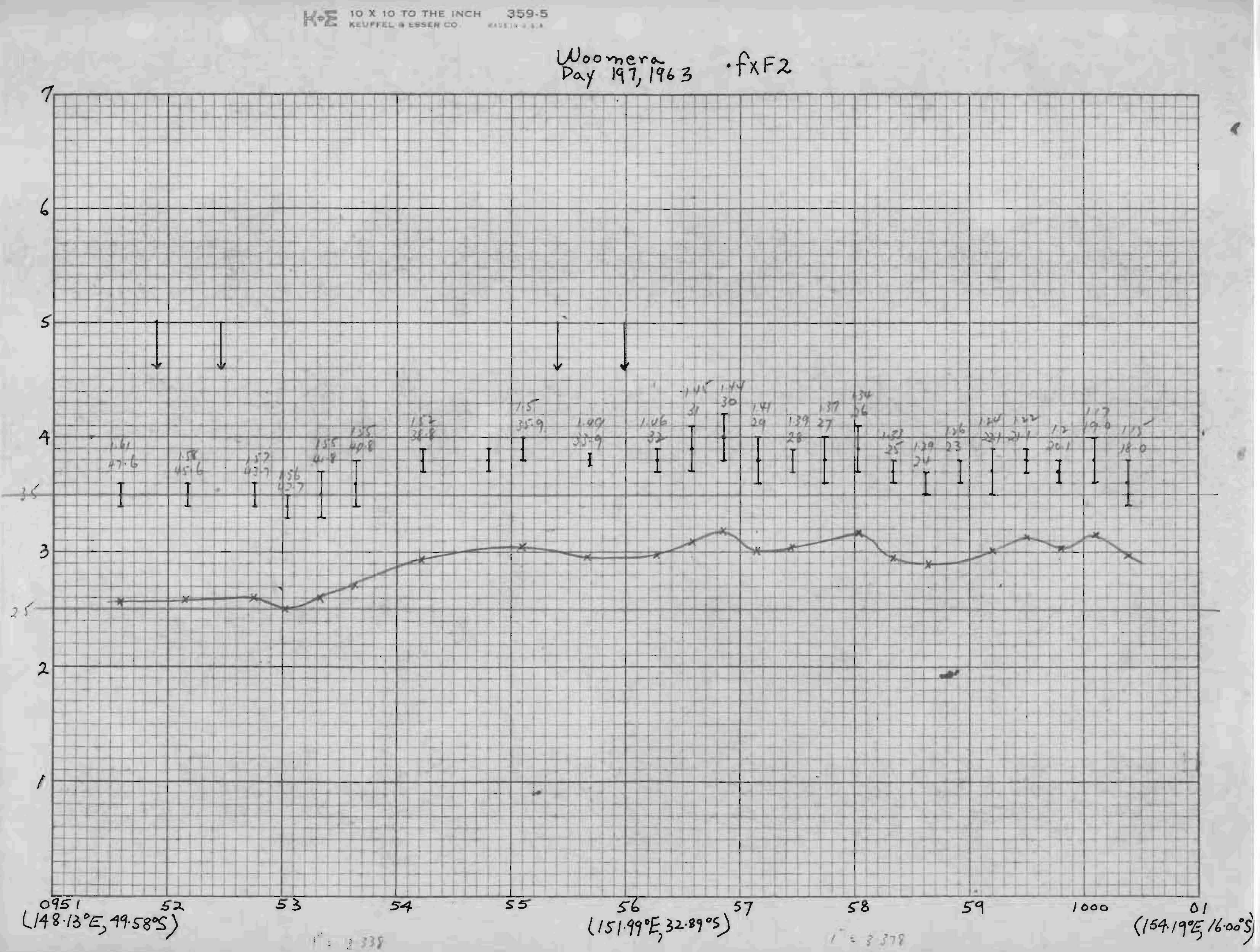
Woomera · fxF2
Day 130, 1963




K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO.
Woomera
Day 132, 1963
fxF2
7
6
5
4
3
2
1
0731
32
33
34
35
36
37
38
39
40
41
(145·48°E, 16·82°S)
(147·71°E, 33·61°S)
(151·62°E, 50·15°S)



K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.
Woomera
Day 132, 1963
· fxF2
7
6
5
4
3
2
1
1839
(145.33°E, 44.15°S)
40
41
42
43
44
(148.42°E, 27.54°S)
45
46
47
48
49
(150.34°E, 10.73°S)


K+E 10 X 10 TO THE INCH 359-5 KEUFFEL & ESSER CO.
Woomera
Day 197, 1963
·fxF2
7
6
5
4
3
2
1
0951
52
53
54
55
56
57
58
59
1000
01
(148.13°E, 49.58°S)
(151.99°E, 32.89°S)
(154.19°E, 16.00°S)

K•E 10 X 10 TO THE INCH 359-5 KEUFFEL & ESSER CO. MADE IN U.S.A.

$f_H = 1.5$

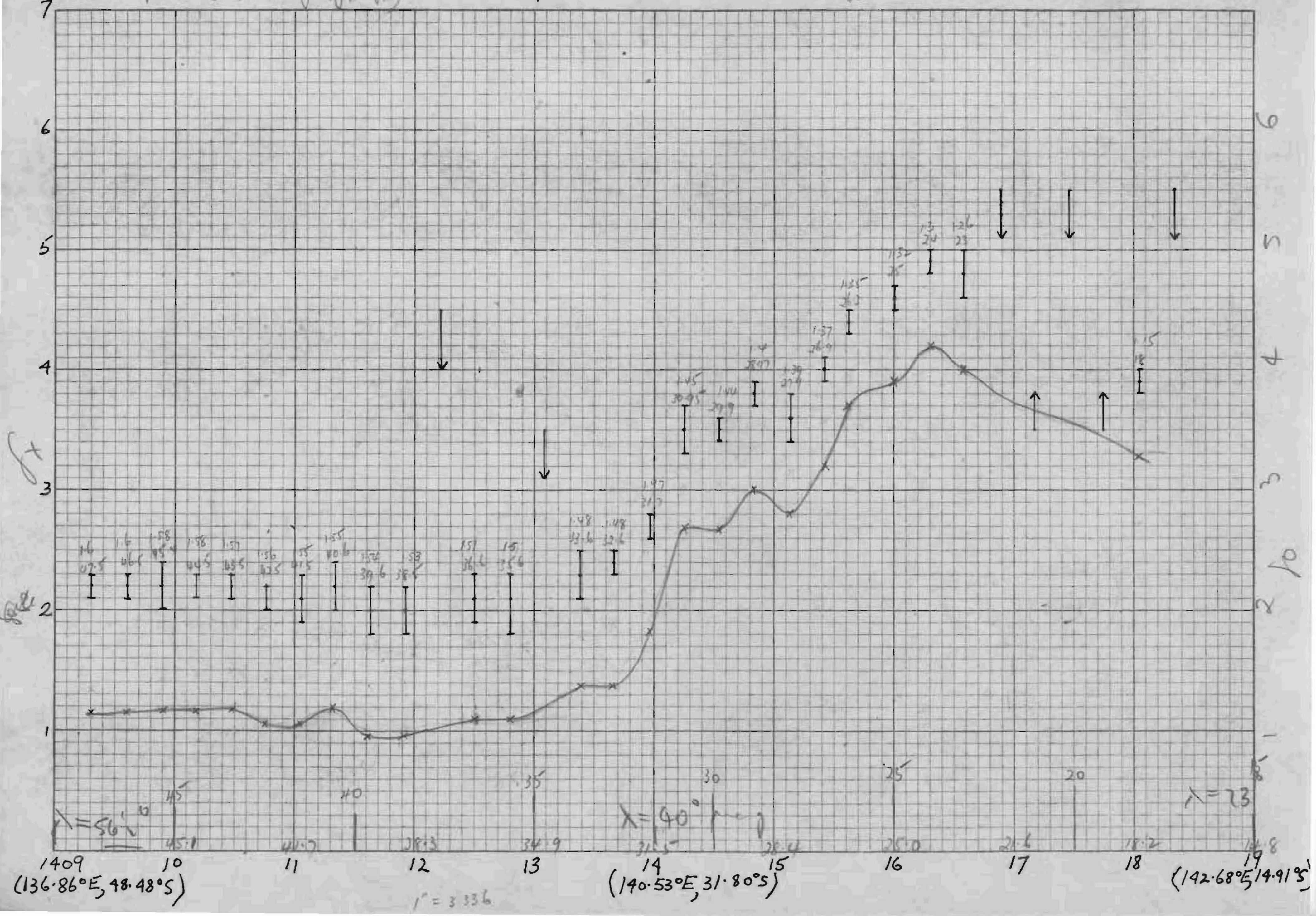
$f_0 = \sqrt{f_x^2 - f_x f_H}$ $\sqrt{f_x(f_x - f_H)}$

Woomera Day 170, 1963 •fxF2•

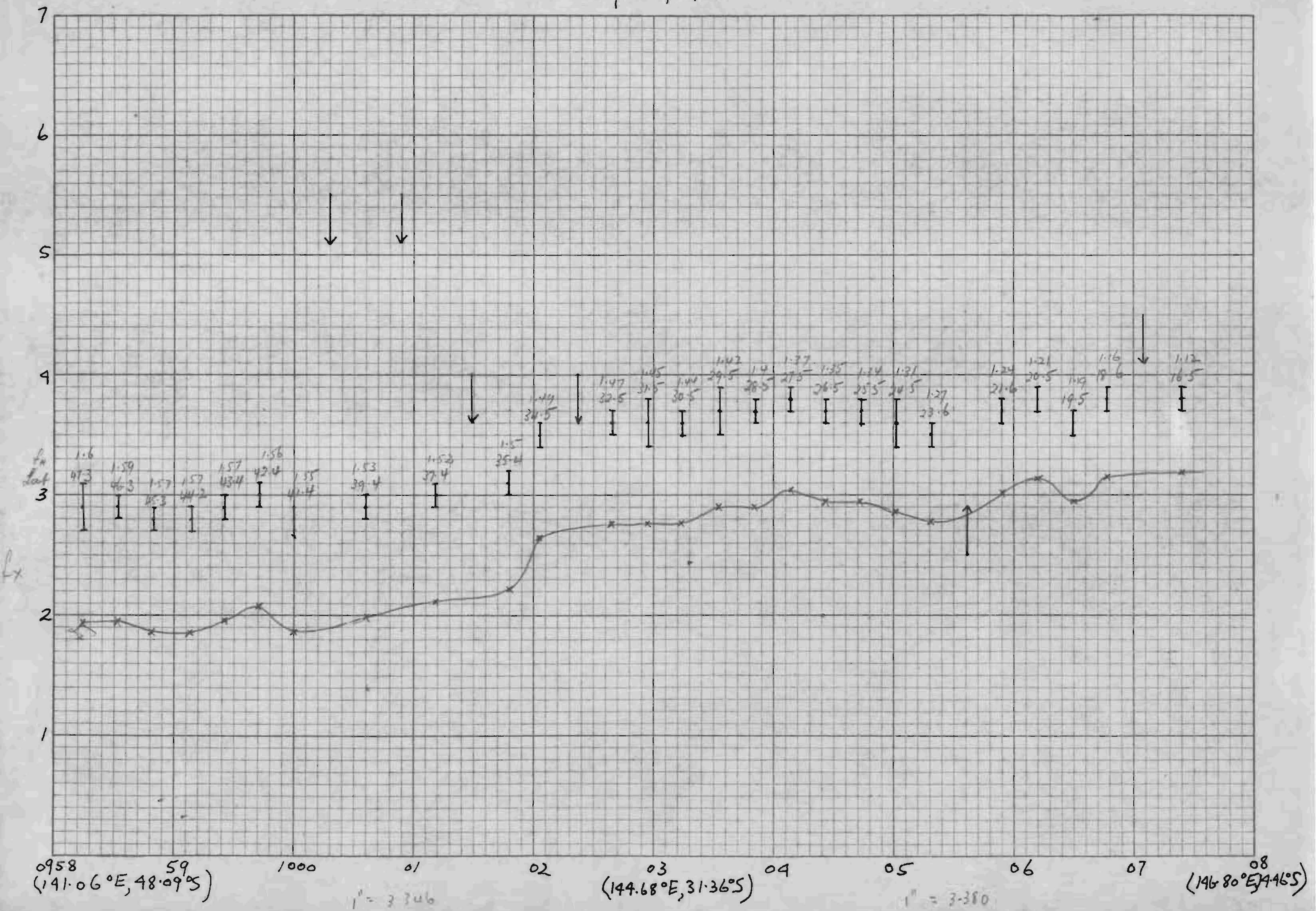
$f_0^2 = f_x^2 - f_x f_H$

4 - 2x1.5 19 June

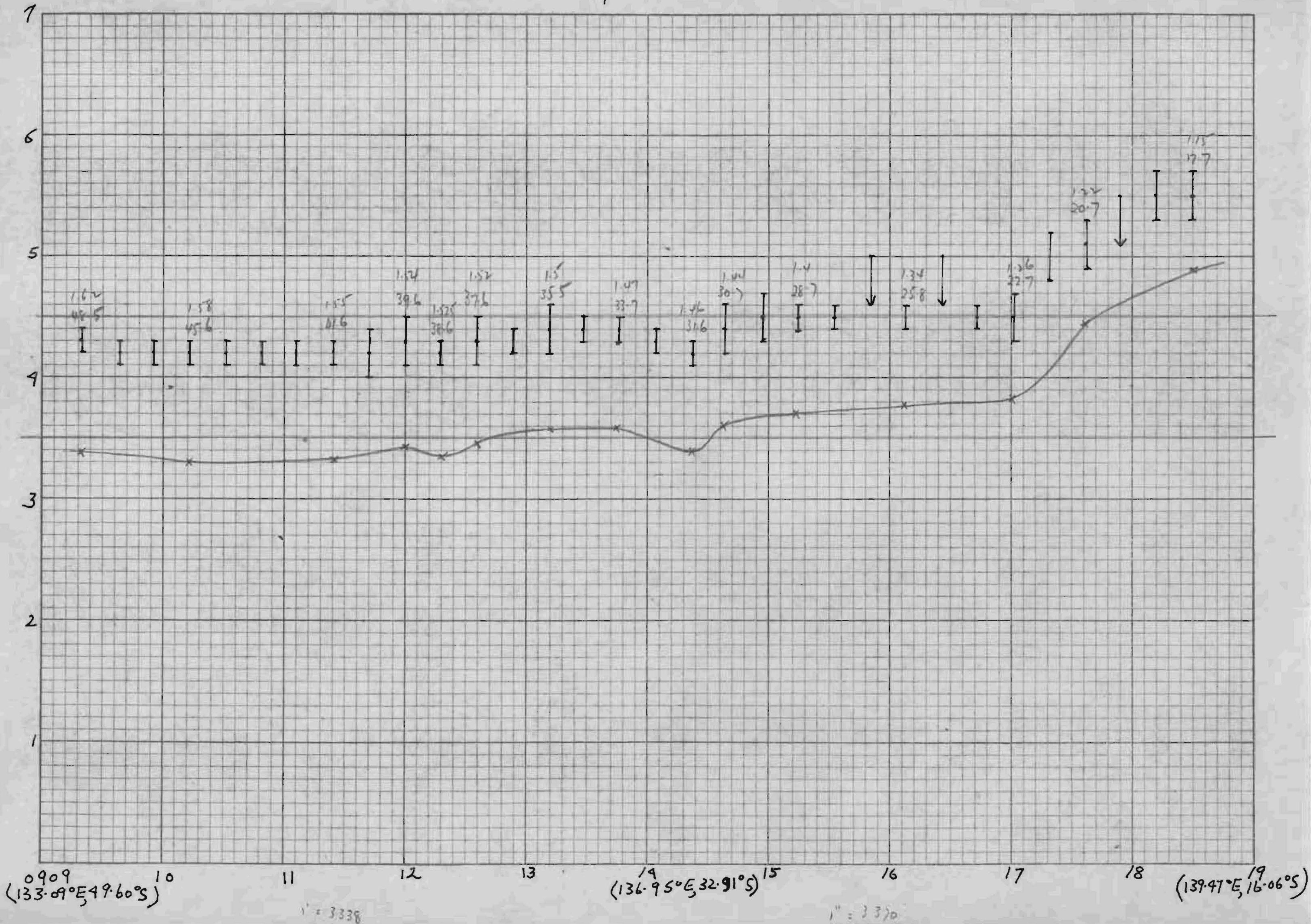
$f_0 = 1$



Woomera
Day 200, 1963 · fxF2

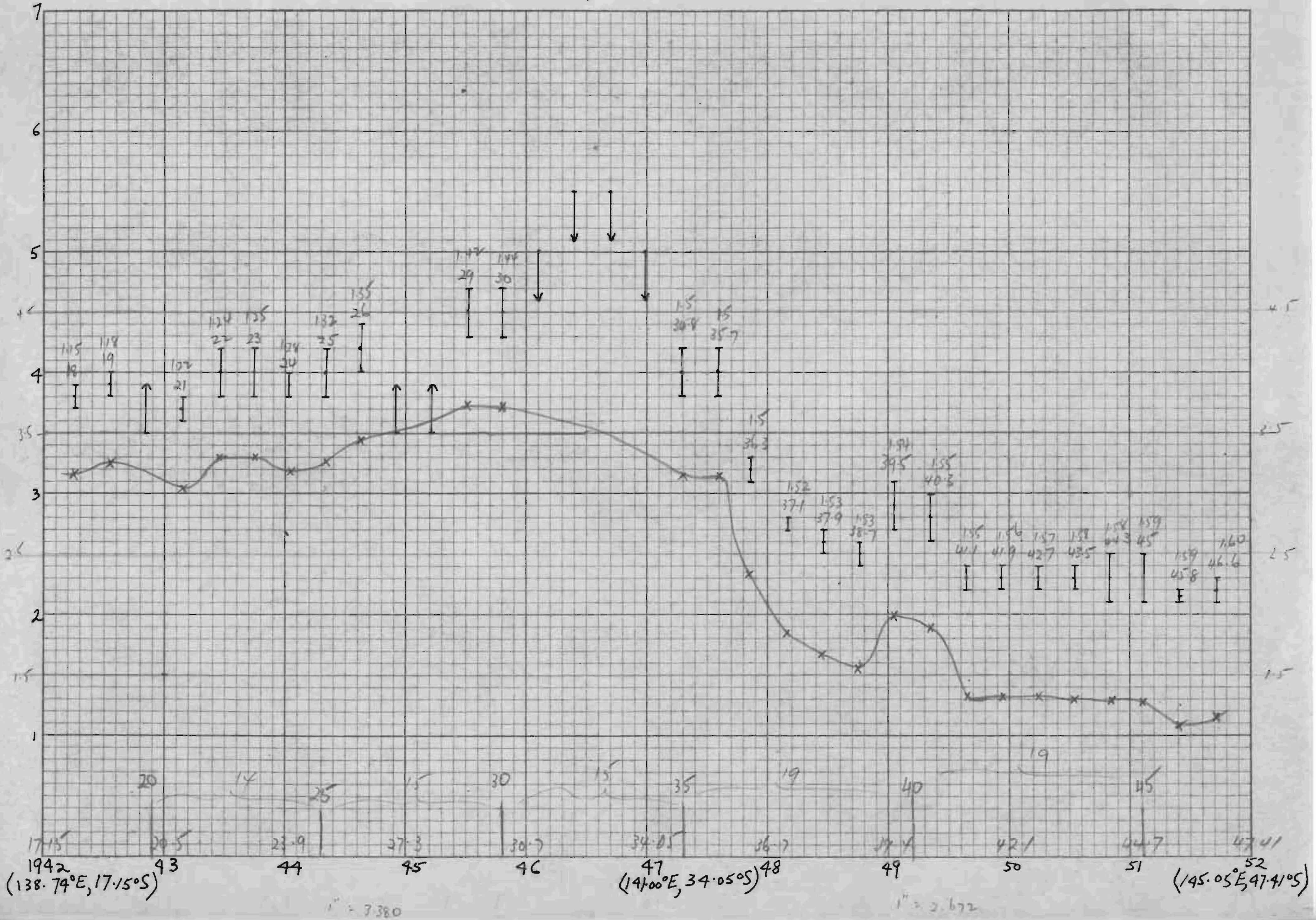


Woomera
Day 210, 1963 ·fxF2



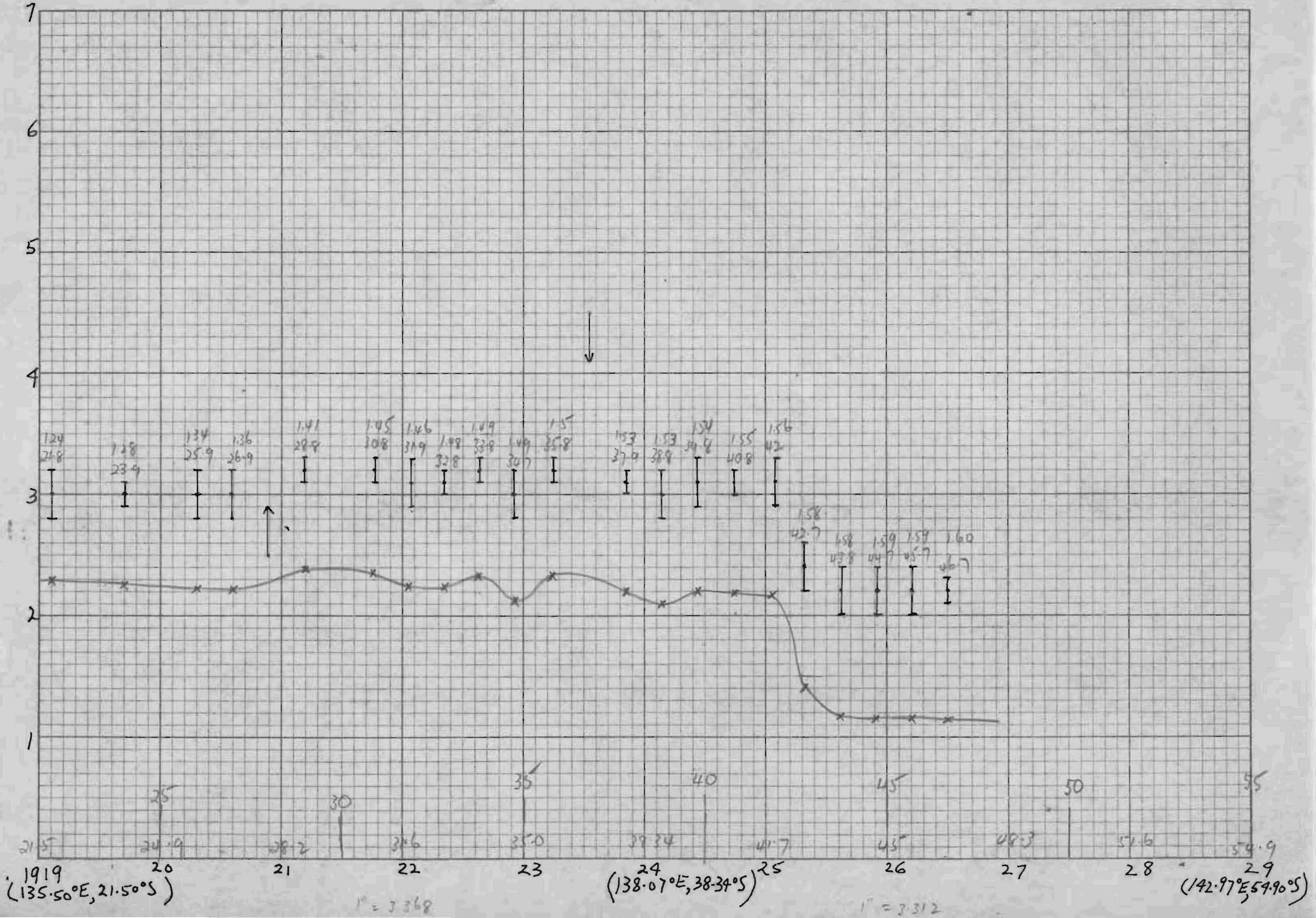
K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.

Woomera
Day 225, 1963 fxF2



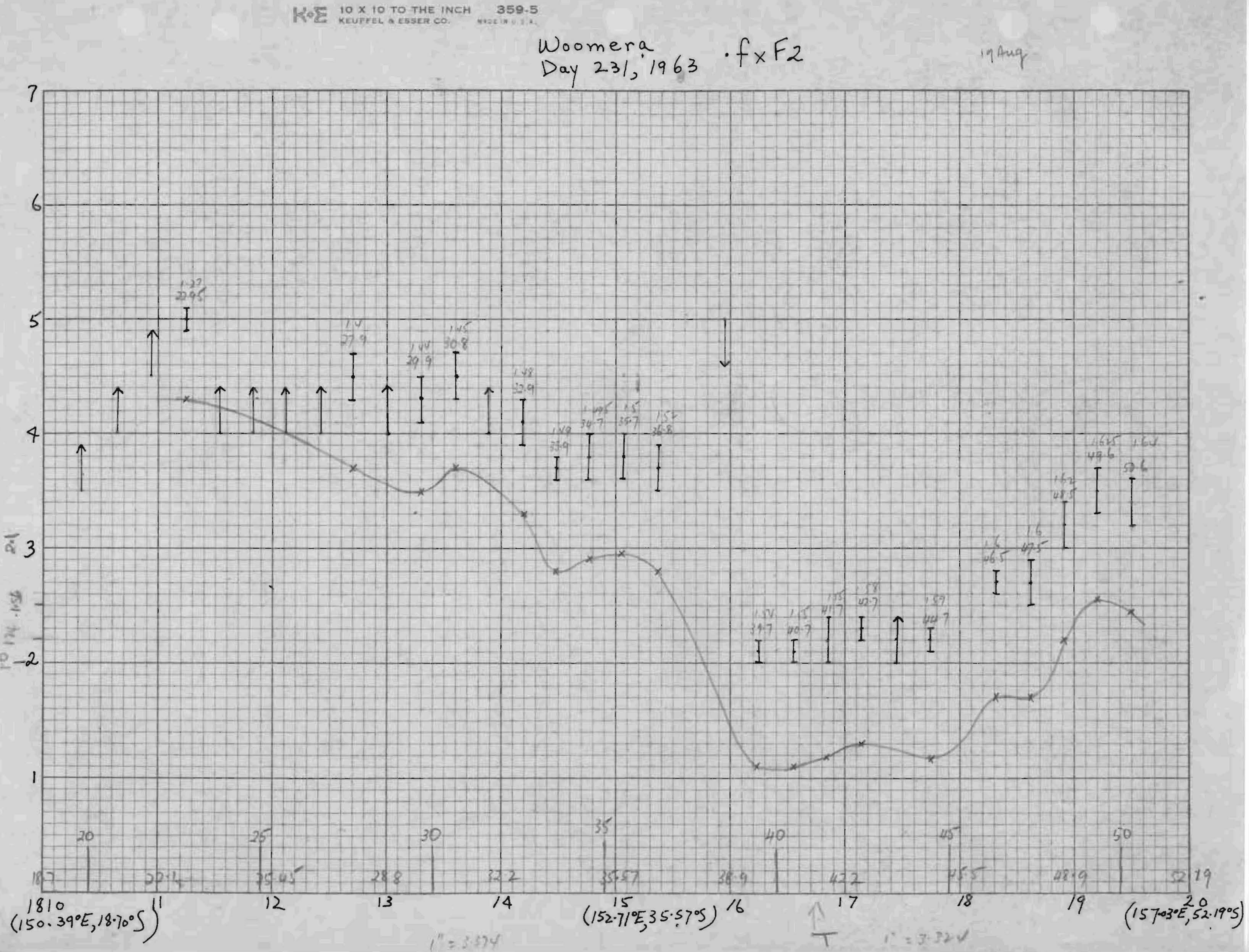
KE 10 X 10 TO THE INCH 359-5 KEUFFEL & ESSER CO.

Woomera
Day 230, 1963 · fxF2

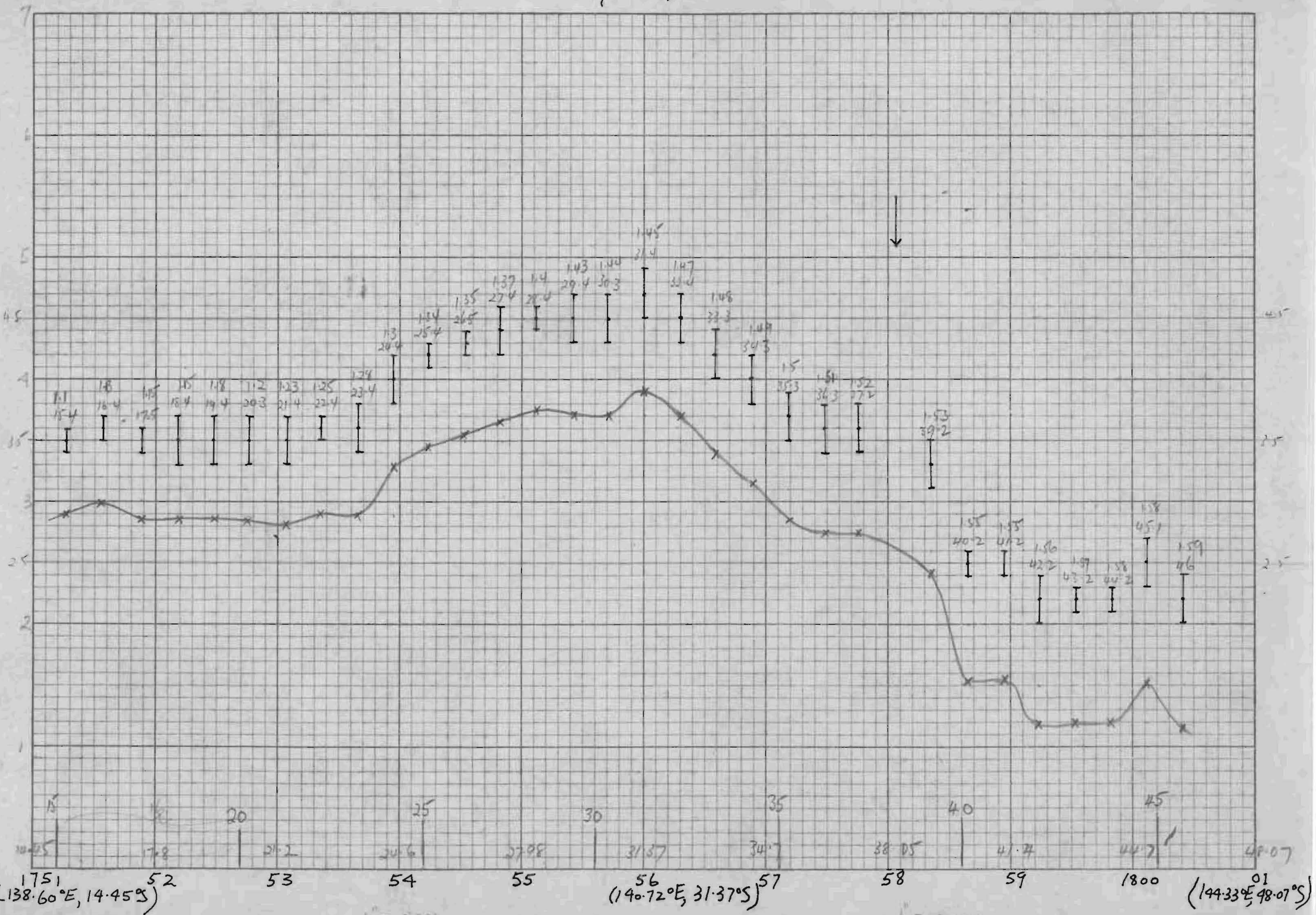


Woomera
Day 231, 1963 · f_xF2

19 Aug

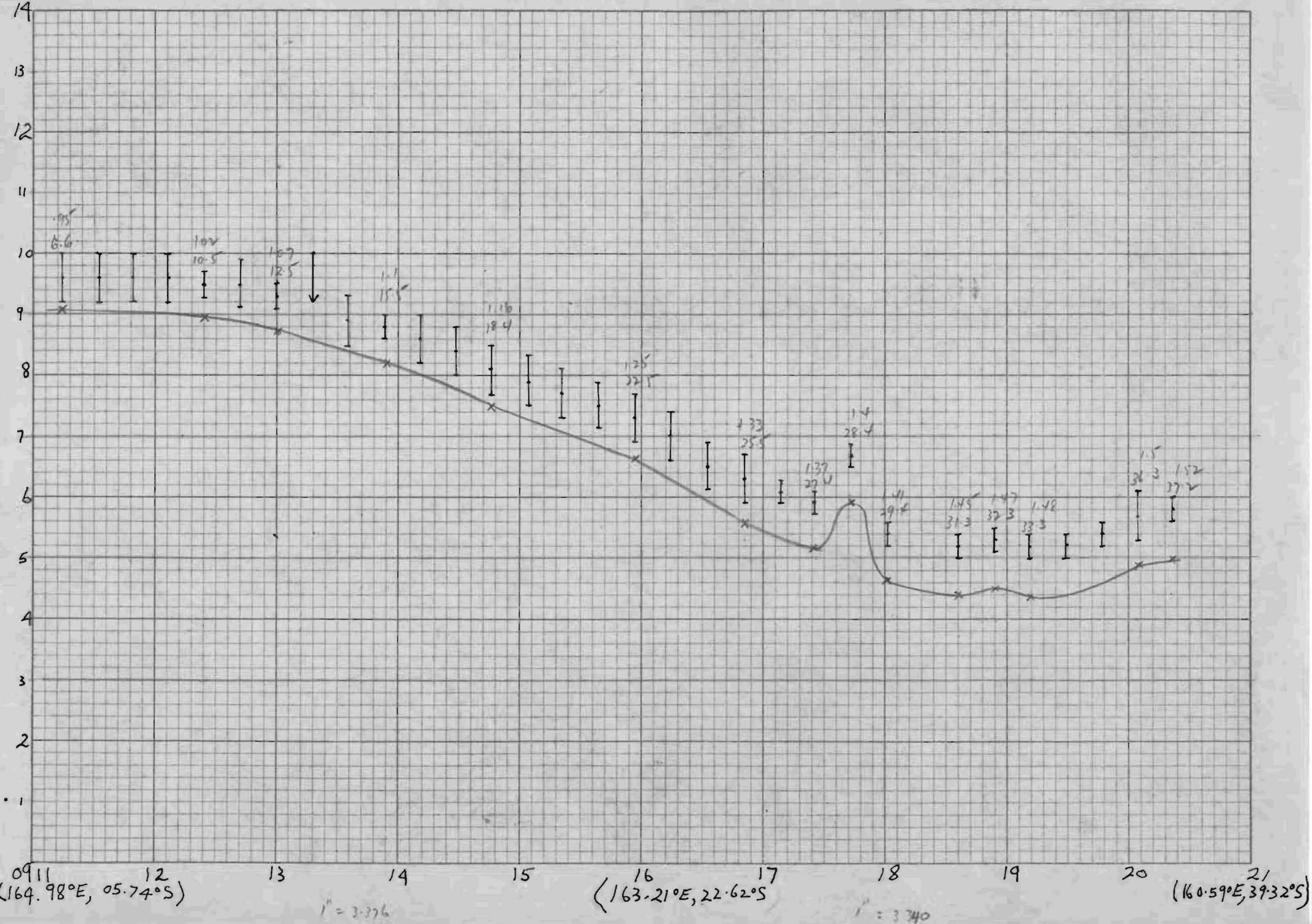


Woomera
Day 239, 1963 ·fx F2



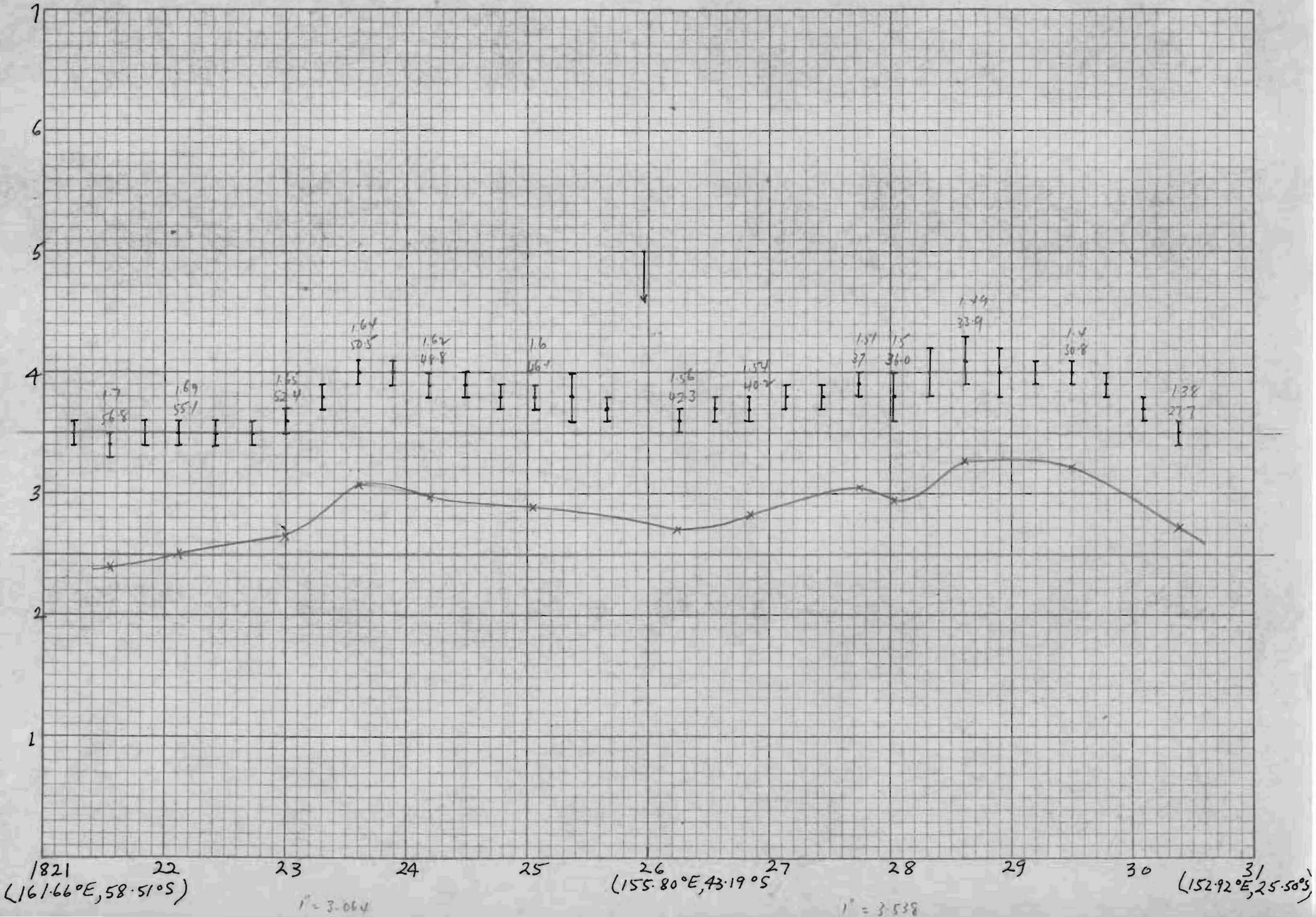
K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.

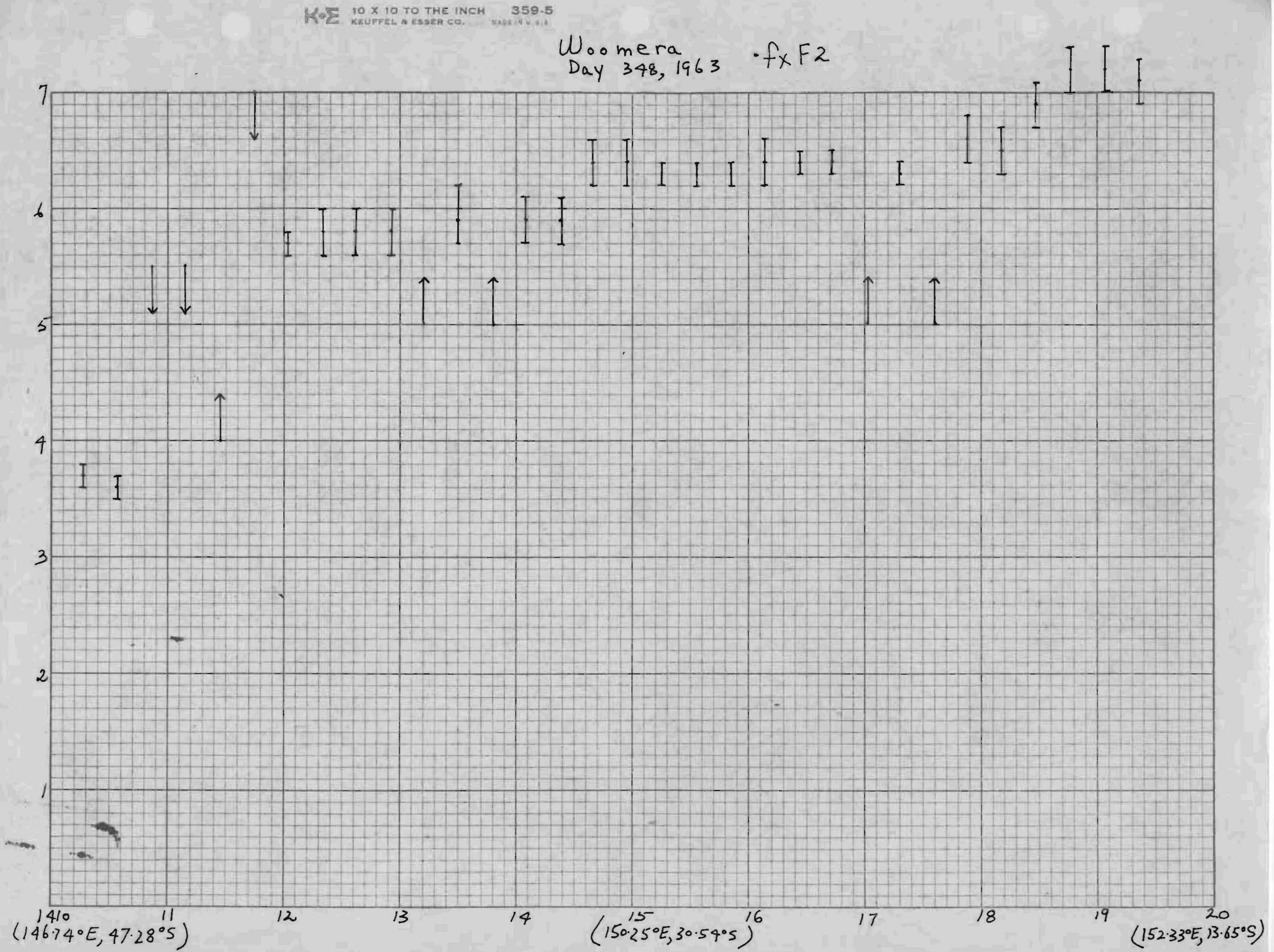
Woomera
Day 307, 1963 · fxF2



K&E 10 X 10 TO THE INCH 359-5 KEUFFEL & ESSER CO.

Woomera
Day 318, 1963 ·fx F2



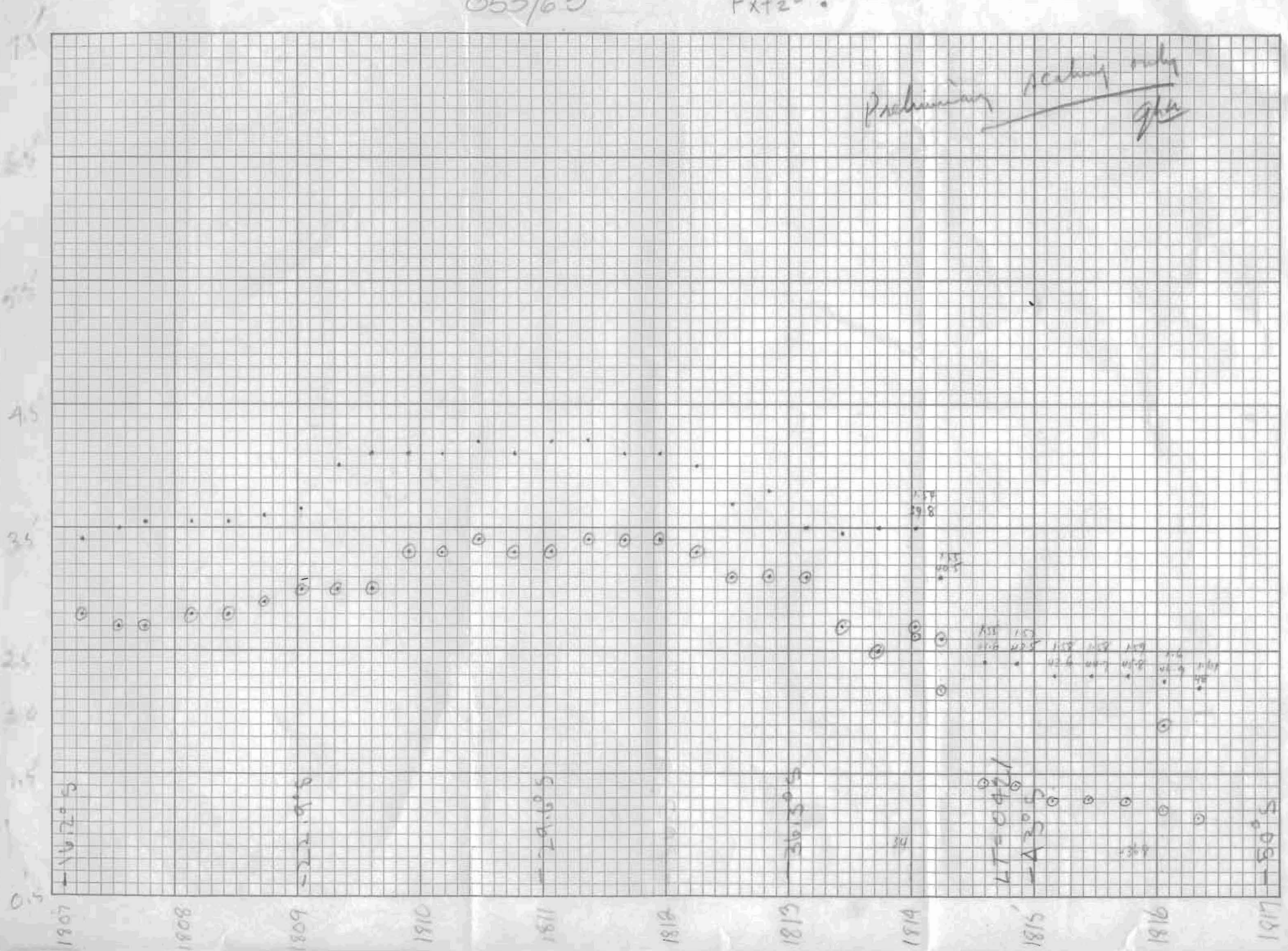

K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.
Woomera
Day 348, 1963
• fx F2
7
6
5
4
3
2
1
1410
(146·74°E, 47·28°S)
11
12
13
14
15
(150·25°E, 30·54°S)
16
17
18
19
20
(152·33°E, 13·65°S)

K+E 10 X 10 TO THE INCH KEUFFEL & ESSER CO. 359-5 MADE IN U.S.A.

053/63

Fofz = ⊙
Fxfz = •

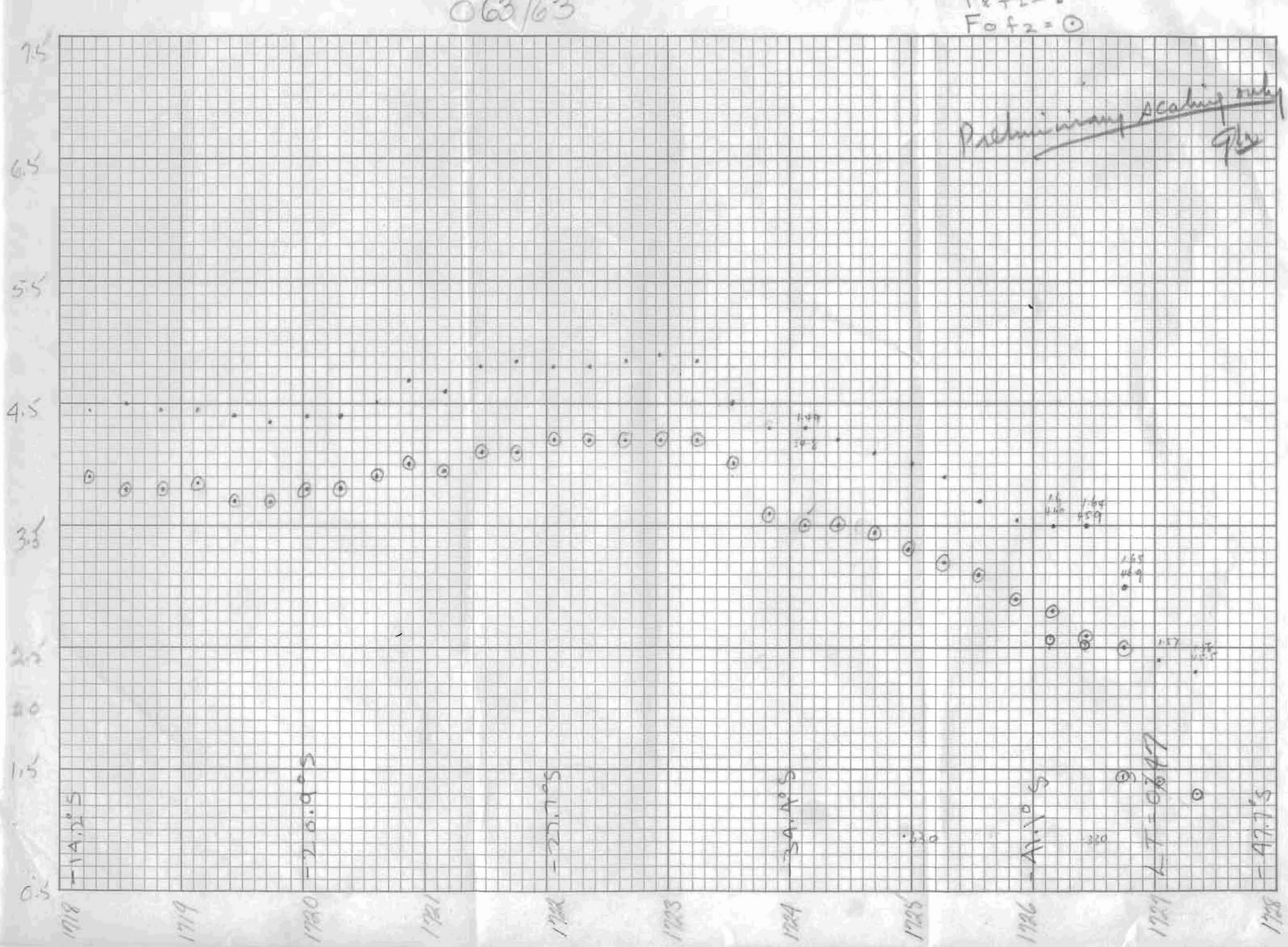
LONG AT 43°S
145.13°



K+E 10 X 10 TO THE INCH 359-5
KEUFFEL & ESSER CO. MADE IN U.S.A.

LONG AT 43°S
137.8°

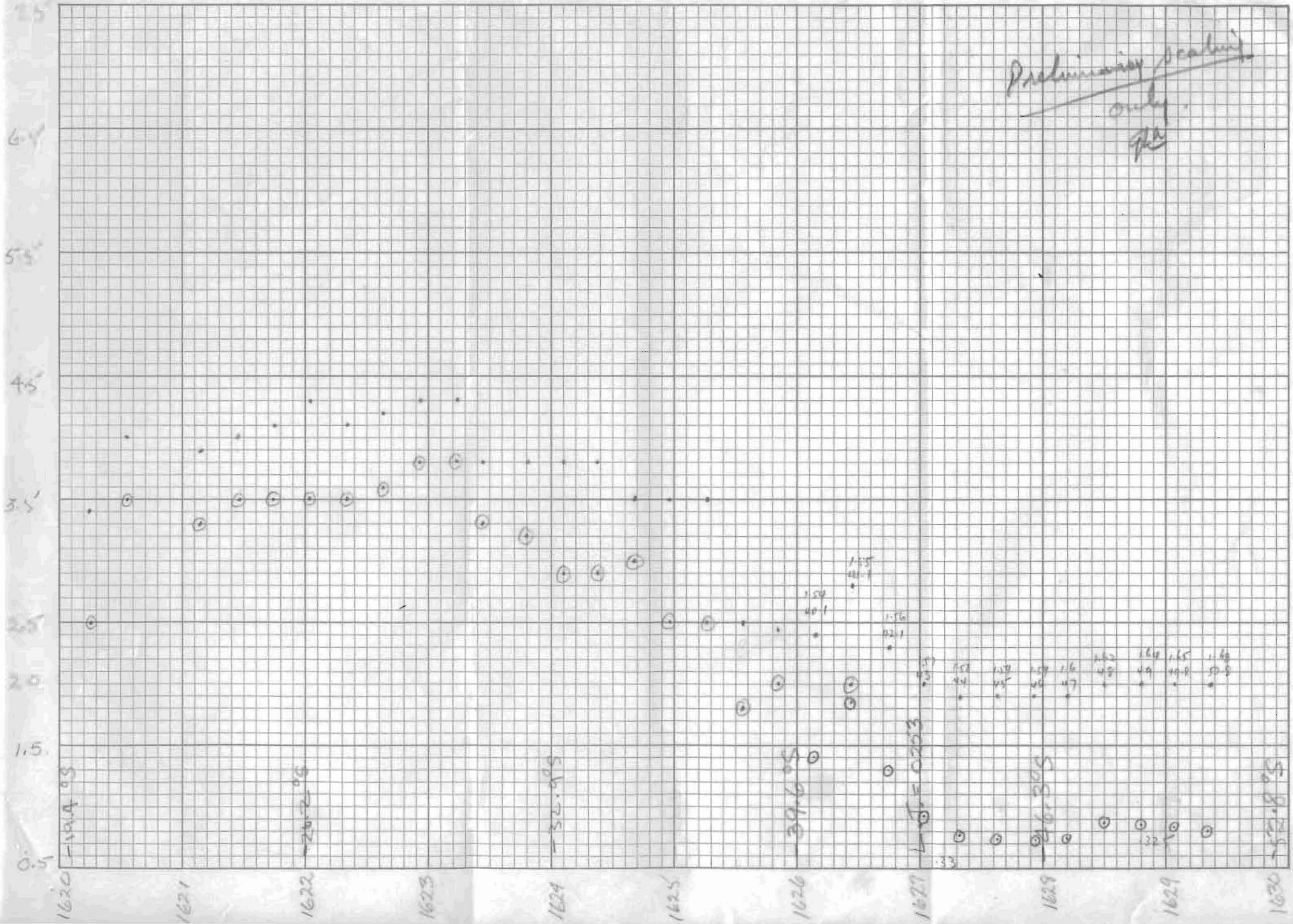
063/63



245-63

Fxf2= ·
Fof2= ⊙

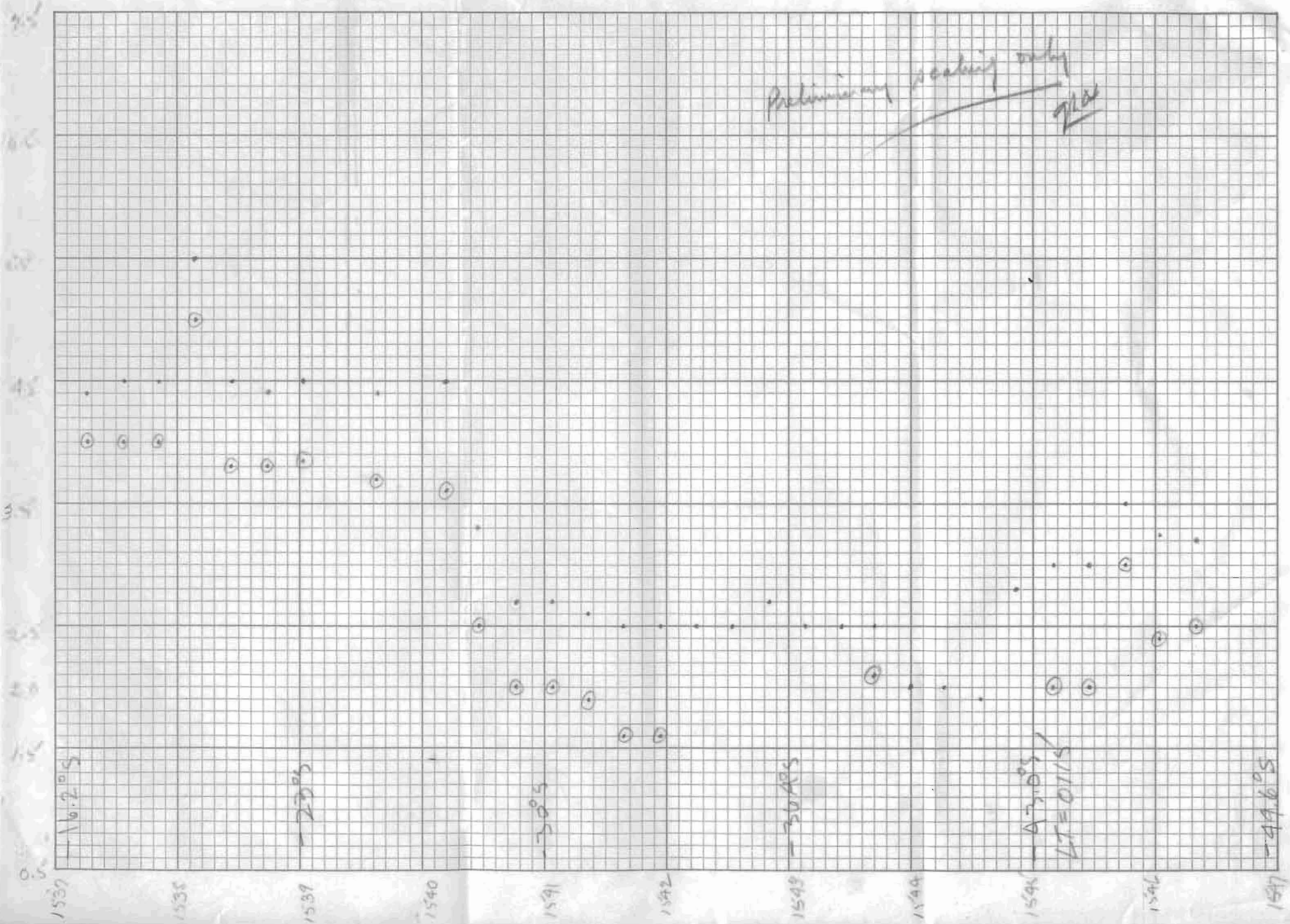
LONG AT 43°S
154.38°



258-63.

Fx fz = •
Fo fz = ⊙

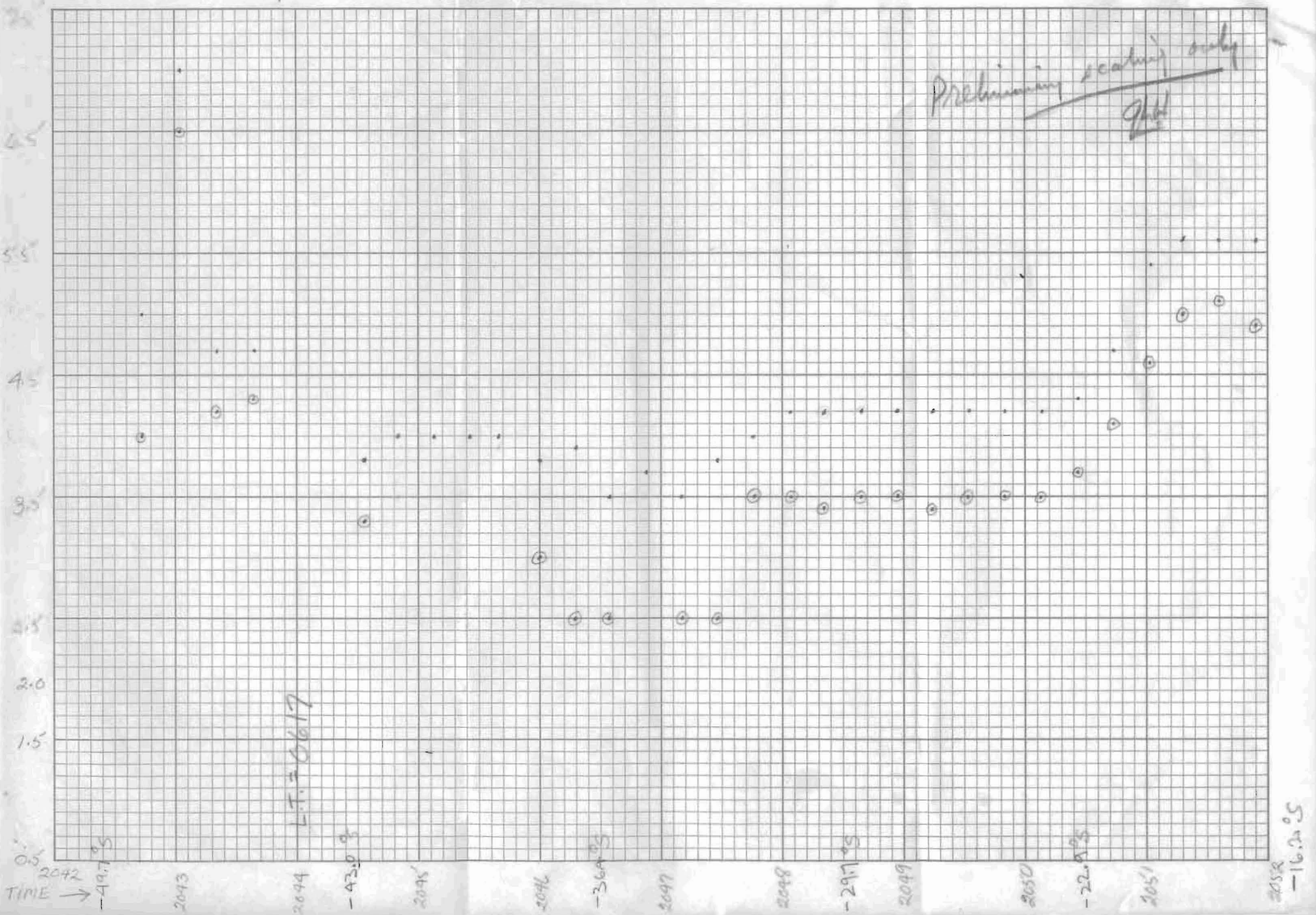
LONG. AT 43°S
139.38°



LONG AT 43°S
139.67°

DAY 302/63.

FxF2 = •
FoF2 = ⊙

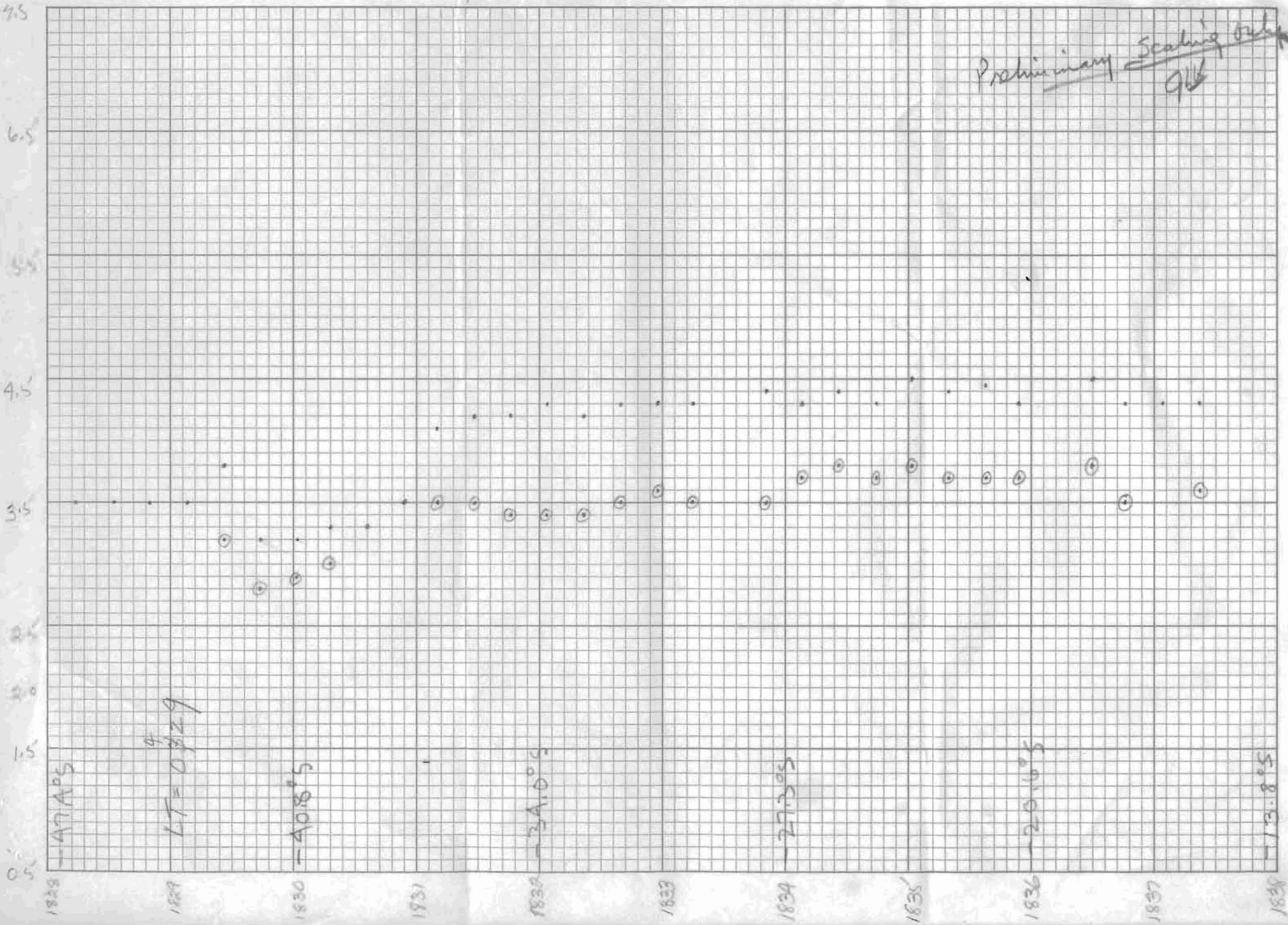


K+E 10 X 10 TO THE INCH KEUFFEL & ESSER CO. 359-5 MADE IN U.S.A.

DAY 321/63

LONG AT 43°5 135.2°

Fxfz = •
Fofz = ⊙



$f_H = 2.8 \times 0.31 \times \dfrac{R}{\left(\frac{6.62}{6.37}\right)^{-3}} \cos^{-3}\lambda\,(1+4\tan^2\lambda)^{-\frac{1}{2}}$ Prof Ellis 19

Geogr. lat. + 8° ν = λ		$\cos^5\lambda$	$\tan^2\lambda$	$4\tan^2\lambda$	$(1+4\tan^2\lambda)^{\frac{1}{2}}$	$2.8\times.31\times R$	~~$\cos^5\lambda(1+4\tan^2\lambda)^{\frac{1}{2}}$~~	~~f_H~~	f_H	$\frac{(1+4\tan^2\lambda)^{\frac{1}{2}}}{\cos^5\lambda}$	f_H
10	18	.7783	.1056	.4224	1.193	.7731	.9285	.0718	.0904	1.5328	1.185 ✓
20	28	.5365	.2827	1.1308	1.459		.7828	.0605	.0762	2.7194	2.1024 ✓
25	33	.4149	.4217	1.6868	1.639		.6800	.0526	.0662	3.9503	3.0540 ✓
30	38	.3039	.6104	2.4418	1.856		.5640	.0436	.0549	6.1072	4.7215 ✓
35	43	.2093	.8696	3.4784	2.116		.4429	.0342	.0431	10.1098	7.8159 ✓
40	48	.1342	1.2334	4.9336	2.436		.3269	.0253	.0318	18.1520	14.0333 ✓
45	53	.0790	1.7609	7.0436	2.836		.2240	.0173	.0218	35.899	27.7535 ✓
50	58	.0418	2.5610	10.2440	3.353		.1402	.0108	.0137	53.8995	62.014 ✓
55	63	.0193	3.8518	15.4072	4.051		.0782	.0060	.0096	209.896	162.271 ✓

geomag.

$\cos^3\lambda$	$\frac{(1+4\tan^2\lambda)^{\frac{1}{2}}}{\cos^3\lambda}$	f_H
.5604	1.3865	1.672
.6882	2.1200	1.639
.5899	2.7784	2.148
.4893	3.7931	2.932
.3912	5.4089	4.182
.2996	8.1308	6.266
.2180	13.0091	10.057
.1488	22.5336	17.421
.0936	43.280	33.460

Geog lat	$\cos^3\lambda$	$(1+4\tan^2\lambda)^{-\frac{1}{2}}$	$\frac{(1+4\tan^2\lambda)^{\frac{1}{2}}}{\cos^3\lambda}$	f_H
10	.5604	.8382	.9741	.7531
20	.6882	.6854	.9959	.770
25	.5899	.6101	1.0342	.800
30	.4893	.5387	1.1009	.851
35	.3912	.4725	1.2078	.934
40	.2996	.4105	1.3701	1.060
45	.2180	.3526	1.6174	1.250
50	.1468	.2982	2.004	1.549
55	.0936	.2468	2.6367	2.038

$\cos l = \frac{1}{2}$

$\cos^5 l = \frac{1}{32}$

$\cos^{-5} l = 32$

tan

$(1+4\tan^2\lambda)^{+\frac{1}{2}} = 4$

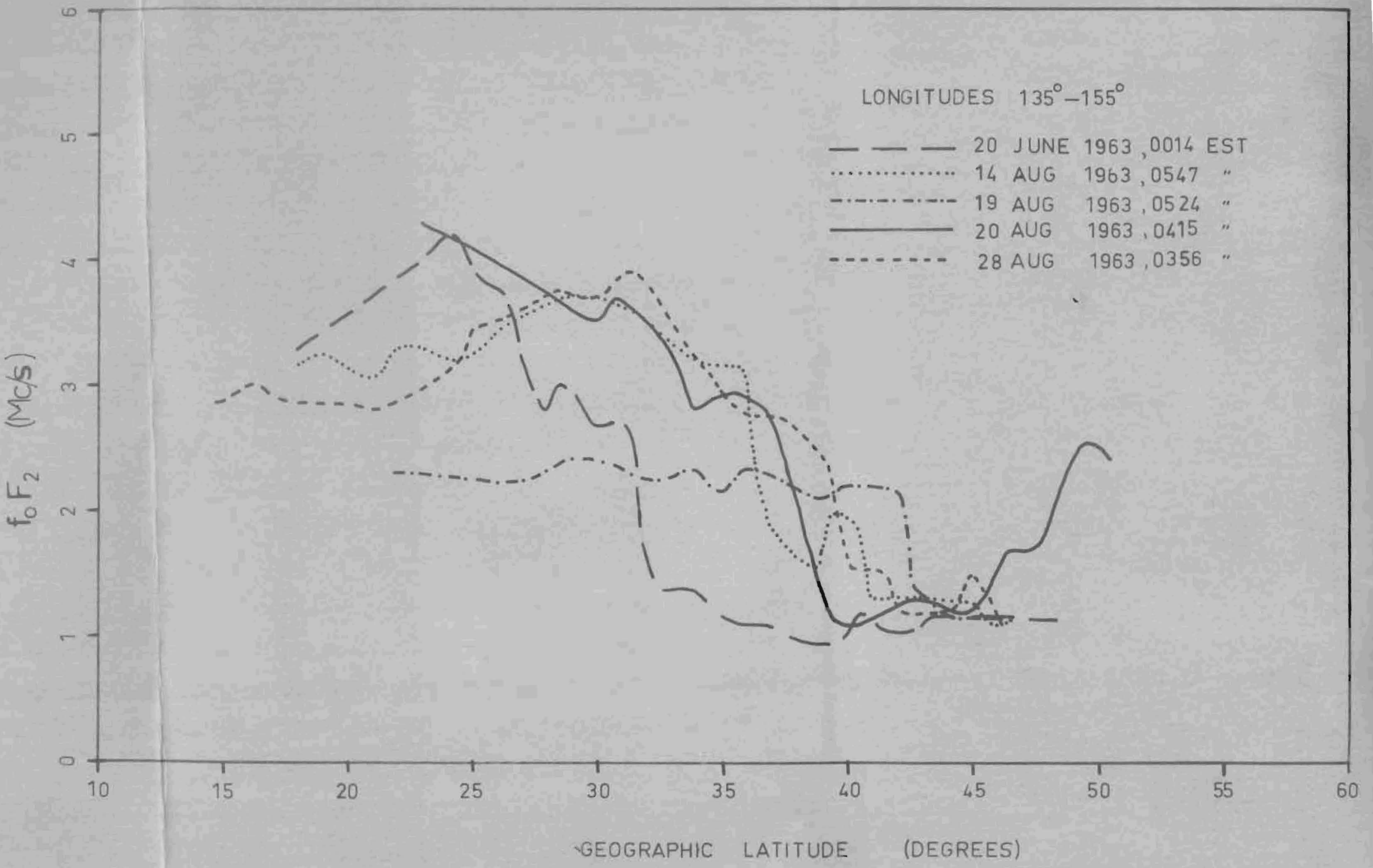
$\cos^3\lambda = \frac{1}{8}$

$\cos^{-3}\lambda\,(1+4\tan^2$

$\lambda = 60$

$f^2 = f_x^2 - f_x f_H$

$\therefore f = \sqrt{f_x(f_x - f_H)}$


LONGITUDES 135°–155°
20 JUNE 1963 ,0014 EST
14 AUG 1963 ,0547 "
19 AUG 1963 ,0524 "
20 AUG 1963 ,0415 "
28 AUG 1963 ,0356 "
f_o F_2 (Mc/S)
GEOGRAPHIC LATITUDE (DEGREES)
0
1
2
3
4
5
6
10
15
20
25
30
35
40
45
50
55
60