How Frank Worsley Navigated

A NavList Chronology of Frank Worsley Related Posts

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* Frank Worsley, Master Navigator
* How Worsley Navigated [Was Navigation and Whaling]
* Image of Sextant Used by Worsley
* Worsley's Chronometer(s)?
* Transcription of Worsley's Log
* Astronomical Time. was Re: Transcription of Worsley's Log
* Updated Transcript of Worsley’s Log
* Cape Belsham
* Point Wild Location
* Shackleton Speaks about his 1907 Expedition
* Worsley's Epitome
* Cape Belsham, At Last!!
* Worsley wrote a JOKE
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* Cape Belsham and Point Wild relocated on Chart 29104

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### Re: Navigation and whaling

**From:** Frank Reed  
**Date:** 2009 Feb 18, 22:59 -0800

**Source:** <http://fer3.com/arc/m2.aspx/Navigation-whaling-FrankReed-feb-2009-g7359>

Brad, you wrote:

"Argument Side Two: All log books show careful navigation."

I would say it his way: the great majority of log books on ordinary whaling

vessels show normal ocean navigation. I've already mentioned two significant

exceptions, specifically coastal whaling and to some extent ocean whaling

when they were on the "whaling grounds". And there's overlap: sometimes

whaling vessels would sail halfway around the world just to sail along a

coast where there was good hunting.

And you wrote:

"the fundamental argument that all captains must have navigated because all

log books show navigation fails the logic test."

Ah, logic. It's the mathematician's friend and the historian's enemy. History

has the annoying habit of being most illogical! :-) Of course, almost all of

us who take an interest in the history of navigation are students of math,

science, and engineering first, and "historians" second and in only a limited

way. We've all learned the lesson of mathematical logic that it takes only a

single counter-example to disprove any theorem. But what you discover in

history is that there are counter-examples to every statement. That's not

because there are no useful statements that we can make about history. It's

because history is diverse and there are exceptions to every rule. It is

decidedly NOT logical. So if you can find one single exception, it doesn't

mean you throw out the statement.

But let's consider your logical argument. It hinges on the speculation of the

existence of at least a few and maybe a bunch of illiterate captains (and all

of his officers would have to be illiterate, too, since the logbook could be

kept by any of them). So... anyone know why this would be extremely

unlikely?? Hint: why did they keep logbooks anyway?

"I am finding it difficult to find the truth in the definition of navigation

here. Is the implication that the whaling captains did not determine

latitude? Are we just discussing the determination of the longitude? With

the regular trade betwixt the old world and the new, well prior to the

solving of the longitude, it is clear that captains were navigating without

this determination. Are we saying that those captains did not navigate?"

Anything you do to determine your position in latitude and longitude COUNTS as

navigation. In the nineteenth century, they kept their latitude every day,

mostly using Noon Sun but occasionally using stars and exotic sights. For

longitude, on American merchant vessels, before 1835 (VERY roughly) longitude

was determined by dead reckoning with checks by lunars now and then, and

after 1835 longitude was determined by chronometer with checks by lunars now

and then (though lunars rapidly disappeared at sea after 1850). Even in the

latter half of the nineteenth century, some captains still used dead

reckoning for longitude and apparently they did so with some skill.

Finally, just to set some terms on the history of this, it's worth

distinguishing a few periods of American whaling. There was relatively little

ocean whaling before about 1835. There was a huge boom, often known as "peak

whaling" during the 1840s and 1850s -- let's extend that a little and make it

1835 to 1865. And then there was a gradual decline and transition in whaling

during the late 19th century (due to the discovery of petroleum in 1859 and

also do the significant losses of the Yankee whaling fleet during the Civil

War). Let's extend that somewhat different whaling epoch to 1900. And there's

the limited small-scale whaling that occurred after 1900 until the end of

traditional whaling about 1925. So for the sake of this discussion, I'm going to

refer to these periods in American whaling:

1) Early Whaling: before 1835

2) Peak Whaling: 1835-1865

3) Post-war Whaling: 1865-1900

4) Late Whaling: 1900-1925

The style and quality of navigation varies in these different periods. In

which of these periods would you look to find a functionally illiterate

whaling captain? The Charles W. Morgan had one (who still kept a logbook, by

the way). Maybe it's surprising that this was in the Late Whaling period...

-FER

PS: I may be a while answering posts this week. Trying to get some work done..

### Frank Worsley, Master Navigator

**From:** Brad Morris  
**Date:** 2009 Feb 20, 14:39 -0800

**Source:** <http://fer3.com/arc/m2.aspx/Frank-Worsley-Master-Navigator-Morris-feb-2009-g7375>

Hi George

Frank Worsley's Navigational Log Book, to include the journey of the Caird

does in fact live in a museum!!!

www.CanterburyMuseum.com

Christchurch, New Zealand

Collection: Worsley, Frank MS540

Item description: Logbooks and Papers relating to voyage of Endurance to Antarctica and Return

You specify which pages you want by date, and pay NZ$1 for each page plus NZ$5

for airmail. They offer B&W and Color images, the price above is for B&W.

I asked for the pages relating to the voyage of the Caird and GOT THEM!!!!! I

haven't studied them in detail, cause I am waiting for a dull day. They are

fairly legible, but not totally. The color might be better.

What I would like to know is if he just sailed down a latitude line or went great circle.

For some reason, they will not just give you the whole log book, you can only get parts.

They also carefully restrict reproduction of the documents, so while I do have

them, I can't share them with the group. Once I tease out the data, I think

I can share that, but I don't think George will be able to wait.

Best Regards

Brad

### Re: Navigation and whaling

From: Brad Morris  
**Date:** 2009 Feb 19, 08:48 -0800

**Source:** http://fer3.com/arc/m2.aspx/Navigation-whaling-Morris-feb-2009-g7361

Agreed Frank.

I will even offer up that exemplar of navigation, Frank Worsley, who navigated

by time sights, on that famous sail from Elephant Island to South Georgia

island in the 1900's. His account is offered in his book and in his

navigation log book which lives in a museum. Was that appropriate 50 years

after Sumner provided his method? Some would argue that it wouldn't meet the

navigation standard of the day, yet it is hard to argue with success.

I saw two highly intelligent folks (you and George) locked in a cross argument

and was hoping to break the log jam. Apparently, the jam is broken!

Best Regards

Brad

### Re: Navigation and whaling

**From:** George Huxtable  
**Date:** 2009 Feb 20, 21:26 -0000

**Source:** http://fer3.com/arc/m2.aspx/Navigation-whaling-Huxtable-feb-2009-g7373

Brad Morris wrote these intriguing words-

"I will even offer up that exemplar of navigation, Frank Worsley, who

navigated by time sights, on that famous sail from Elephant Island to South

Georgia island in the 1900's. His account is offered in his book and in his

navigation log book which lives in a museum. Was that appropriate 50 years

after Sumner provided his method? Some would argue that it wouldn't meet

the navigation standard of the day, yet it is hard to argue with success."

====================

Can Brad tell us more about that "navigation log book which lives in a

museum", please? Which museum? Has it ever been made publicly available? Is

it indeed legible, after all it's been through? I would love to discover

more about that journey.

Worsley's own account, in "Shackleton's Boat Journey" (1933; my edition is

1940), though thoroughly gripping, is frustratingly short on navigational

detail, and he offers no maps at all. The same journey is described in

similar words elsewhere; in Shackleton's "South" (1919; mine is 1983), with

a few maps; in Worsley's "Endurance; an epic of polar adventure" (1931; mine

is 1999), no maps; and in "Shackleton's Captain", a biography of Worsley, by

John Thomson (1999), more (but still inadequate) mapping.

For information on South Georgia today, I can thoroughly recommend

"Antarctic Oasis" (1998), by Tim and Pauline Carr, who have thoroughly

explored every nook and cranny in their 100-year-old 28ft. engineless wooden

ketch, being also curators of the South Atlantic whaling museum there. The

stunning photographs in this book are a delight.

===================

Now for the navigation on that amazing journey from Elephant Island. As Brad

says, it's hard to argue with success. But the voyage, and its navigation,

we’re not entirely successful; if they had been, that perilous crossing of

the island would not have been necessary, because the original intention had

been to round the NW corner of South Georgia to reach a whaling station

directly. But Worsley honestly admitted, when nearing the island, that he

couldn't be sure of his position within 10 miles or so, and Shackleton then

sensibly concluded that in that case, such an approach would run the risk of

missing the island altogether, and being swept East past it. Worsley's

difficulty with his Sun altitudes was partly the fleeting and indistinct

appearances of the Sun, but far worse, the guesswork in determining the

horizon, from so low down in such big seas.

On the thirteenth day, Worsley tells us that he had so far been able to get

the Sun only four times, two of these being mere snaps or guesses through

slight rifts in the clouds. Yet, after each such observation, he presents us

with a latitude and longitude, stated to the nearest arc-minute. How could

he do that, when a single Sun sight can provide only a position line, so one

can only obtain a longitude by assuming a latitude? Such positions must have

been heavily reliant on the dead-reckoning.

The most interesting reference to navigation was on the fourteenth day, 7

May 1916, when at 9:15 am the Sun's limb was clear, though the horizon was

misty. He continues- "The lateness of the hour, and the misty horizon, made

a poor observation for longitude. At noon, the Sun's limb was blurred by a

thick haze, so I observed the center for latitude. Error in latitude throws

the longitude out, more so when the latter is observed, as now, too near

noon."

I would go along with Brad, in presuming that Worsley had gone back to

navigational techniques of the previous century. He seems to be avoiding

chart-based position lines by instead directly calculating his longitudes

from a before-noon Sun observation, using an observed noon-Sun latitude. And

we may guess why, when we read of conditions aboard the 22ft canvas-decked

James Caird, when any paper had become sodden, and there was no vestige of

any sort of chart-table. Not that the alternative, using printed tables,

would have been easy either.

The whole journey was a remarkable achievement for the six participants, for

the James Caird, and not least for their Primus stove, which kept them

alive, and was finally abandoned on the mountain descent into Grytviken,

after the last of its fuel had gone.

George.

### Re: Frank Worsley, Master Navigator

**From:** George Huxtable  
**Date:** 2009 Feb 21, 10:36 -0000

**Source:** <http://fer3.com/arc/m2.aspx/Frank-Worsley-Master-Navigator-Huxtable-feb-2009-g7377>

With apologies to those who have only a slow download, I attach some mapping

that deals with the James Caird's passage from Elephant Island to South

Georgia.

Brad had asked- "What I would like to know is if he just sailed down a

latitude line or went great circle."

Neither, really.

The point about latitude sailing was that it worked even if you had no

longitudes, but Worsley still had a chronometer, which had remained pretty

trustworthy.

On a passage of 800 miles, there's little difference between rhumb-line

sailing and great-circle sailing.

You will see quite a lot of disagreement between those maps, attached, which

will be no surprise. Worsley acknowledged how crude his navigation was, and

the details of the wild approach to South Georgia were no more than sketchy.

The most "authentic" map was indeed Worsley's own, from "Shackleton's Boat

Journey", which I was quite wrong to describe, in a previous posting, as

"having no maps". It has just this one map, of considerable value.

The other maps are more recent interpretations of the passage, by John

Thomson, in "Shackleton's Captain" (1999), and in "Antarctic Oasis", by Tim

and Pauline Carr (1998). But they can only have had Worsley's log, and map,

to work from. However, the Carrs have also visited the bay of the landfall,

their own track being shown as well, so they have real "local knowledge".

Worsley's map shows an initial course shaping more Northwards, intending to

round the NW end of South Georgia toward the whaling stations, but then,

after the change of plan, heading directly for the SW-facing coast, which is

quite barren of any occupants.

I hope that Brad, when he has investigated his copy of Worsley's log, will

kindly transcribe for us some of its more interesting bits, with some

calculations, if they remain legible. Worsley noted that at the time he had

found his own figurings, written with frostbitten fingers in mittens,

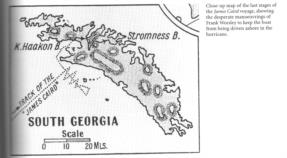
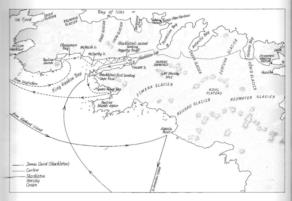
difficult to read.

In my last posting, I mentioned the "mountain descent into Grytviken", but

got that wrong. The whaling station that was first reached was at Husvik;

Grytviken being quite a way further East.

George.

**Attached File:**  [[](http://fer3.com/arc/img/107377.thomson-1.jpg)](http://fer3.com/arc/img/107377.thomson-1.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107377.thomson-1.jpg)  
**Attached File:**  [[](http://fer3.com/arc/img/107377.thomson-2.jpg)](http://fer3.com/arc/img/107377.thomson-2.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107377.thomson-2.jpg)  
**Attached File:**  [[](http://fer3.com/arc/img/107377.worsley.jpg)](http://fer3.com/arc/img/107377.worsley.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107377.worsley.jpg)  
**Attached File:**  [[](http://fer3.com/arc/img/107377.carr.jpg)](http://fer3.com/arc/img/107377.carr.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107377.carr.jpg)

### Re: Navigation and whaling

From: Frank Reed  
Date: 2009 Feb 22, 05:31 -0800

Source: [fer3.com/arc/m2.aspx/Navigation-whaling-FrankReed-feb-2009-g7385](http://fer3.com/arc/m2.aspx/Navigation-whaling-FrankReed-feb-2009-g7385)

"I will even offer up that exemplar of navigation, Frank Worsley, who

navigated by time sights, on that famous sail from Elephant Island to South

Georgia island in the 1900's. His account is offered in his book and in his

navigation log book which lives in a museum. Was that appropriate 50 years

after Sumner provided his method? Some would argue that it wouldn't meet the

navigation standard of the day, yet it is hard to argue with success."

I would say that it's a common misconception that Sumner lines, or other

celestial lines of position, came into use very soon after they were

popularized in articles and books in the nineteenth century. But the evidence

says otherwise. Worsley was not working below the navigational standard of

the day. That WAS the navigational standard of the day. Indeed, even in the

Second World War, a great many merchant vessels were navigated by that

standard method of Noon Sun for latitude and time sights for longitude. They

didn't plot celestial LOPs. Why this took so long is an interesting question.

The short answer is presumably the obvious one: the "new navigation" offered

no practical advantages.

### Re: Navigation and whaling

**From:** Frank Reed  
**Date:** 2009 Feb 22, 05:36 -0800

Source: fer3.com/arc/m2.aspx/Navigation-whaling-FrankReed-feb-2009-g7386

George H, you wrote:

"I would go along with Brad, in presuming that Worsley had gone back to

navigational techniques of the previous century."

Celestial lines of position were not the norm until well into the twentieth

century. But it would be interesting to compare the navigation at earlier

points in this expedition, before things became desperate. Did they use LOPs

at any point? Or was it latitude by meridian altitudes and longitude by time

sights even when they had the luxury of warm quarters and dry charts?

-FER

### Re: Frank Worsley, Master Navigator

**From:** Brad Morris  
**Date:** 2009 Feb 23, 10:18 -0800

**Source:** [fer3.com/arc/m2.aspx/Frank-Worsley-Master-Navigator-Morris-feb-2009-g7401](http://fer3.com/arc/m2.aspx/Frank-Worsley-Master-Navigator-Morris-feb-2009-g7401)

Hi George

I dug out my reproduction of Worsley's log for the voyage of the Caird.

Frank Worsley indicates that he only had 4 fixes for the entire journey. I

seem to be missing 2 pages so I can only confirm some of the data. I have

written to the Museum to get this rectified and when I have all of the data I

will complete the story. One further note, as George has pointed out, this

data is extremely hard to read. This is not some crisp typewritten log book.

On 24 April 1916, Worsley takes the lower limb of the sun at Wild Camp (on

Elephant Island) for the purposes of rating the chronometer. 62 deg S, 54.5

deg W

On 26 April, Worsley takes the lower limb of the sun. I haven't figured out

what he does with this yet. 59 deg 46' S, 50 deg 48' W

On 29 April, Worsley has an observation (not denoted) 58 deg 38' S 50 deg 0' W

here is where the gap in my reproduction is...I will straighten this out!

On 7 May, Worsley has 3 lower limbs of the sun, they give his position as 54

deg 26' S 40 deg 44' W, then 54 deg 23' S 39 deg 40'W and finally 54 deg 38'

S 39 deg 36' W; at various times of the day

On 8 May, Worsley sights land at 12:30 and gives a neat sketch of the

appearance of S.Georgia Island, and denotes that there is a glacier in one

mountain pass.

These seem to be in agreement with Worsley's chart as presented to the group

by George. Until we have that 4th observation and logbook, we will not truly

know why he sailed a latitude line from 5 May to 8 May. The predominant

current in the Southern Ocean there is from west to east. It appears as if

he set out from Wild Camp (by his notes) NNE and sailed up until he reached

the latitude of S.Georgia, and then headed due east.

Best Regards

Brad

### Re: How Worsley Navigated [Was Navigation and Whaling]

**From:** Brad Morris  
**Date:** 2009 Feb 23, 10:35 -0800

Source: fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-feb-2009-g7402

Hi Frank

It is important to differentiate between various portions of the expedition.

1) Boat navigation from New Zealand through the South Ocean and into the Pack Ice.

2) Trapped in the Pack Ice.

3) The phenomenal 800 mile journey in the James Caird

I have not investigated (1), although Shackleton gives precise Lat Long

coordinates. I would be very surprised if Worsley used an alternate method

here. That is, I think he used noon latitude and AM/PM longitude.

When trapped in the pack ice, Shackleton indicates that the team used a

theodolite and his sextant (probably with an artificial horizon) to "equal

effect", down to a temperature which he specifies but escapes my memory. We

have already briefly discussed lunar occultations, performed with a

telescope. There is no doubt that the expedition is very mathematically

adept. What form this is will have to wait until I get more log book data.

When on the journey, Worsley used a Heath Hezzanith Sextant. This sextant

tours with the Caird. The sextant has multiple features. It has multiple

scopes and an attachable binocular (!). Many of the scopes have the lines as

indicated by Bowditch to be used to adjust the parallelism of the scope to

the arc. Further, there is a star scope and many eye piece filters. Quite

the advanced sextant, with so many options.

Best Regards

Brad

### Re: How Worsley Navigated [Was Navigation and Whaling]

**From:** George Huxtable  
**Date:** 2009 Feb 24, 00:08 -0000

**Source:** fer3.com/arc/m2.aspx/How-Worsley-Navigated-Huxtable-feb-2009-g7403

Brad wrote-

"It is important to differentiate between various portions of the

expedition.

1) Boat navigation from New Zealand through the South Ocean and into the

Pack Ice.

2) Trapped in the Pack Ice.

3) The phenomenal 800 mile journey in the James Caird."

I would divide it further. During the period between Endurance being trapped

and when she sank, they had access to all their chartroom gear, and could

navigate just as when she was under way, using chartroom and chart-table.

They had to leave much equipment behind after taking to the ice dragging

boats.

Then when they got out of the ice, there was real boat-navigation again, to

reach Elephant Island.

"I have not investigated (1), although Shackleton gives precise Lat Long

coordinates. I would be very surprised if Worsley used an alternate method

here. That is, I think he used noon latitude and AM/PM longitude."

On ship, positions might have been obtained by crossing a morning position

line, drawn on a chart at right angles to the Sun's calculated azimuth, with

a noon latitude line. Or they might have been obtained by trig calculation

of longitude, knowing noon latitude, as was done in pre-Sumner days. Unless

the working was shown, it might not be easy, just from the resulting

position, for us to decide on which method was in use.

But once the vessel had sunk, and chartroom and chart-table had gone, then

chart-based plotting methods would have become far more difficult.

"When trapped in the pack ice, Shackleton indicates that the team used a

theodolite and his sextant (probably with an artificial horizon) to "equal

effect", down to a temperature which he specifies but escapes my memory. "

I wonder how near to the freezing point of Mercury his local temperatures

got, and if he somehow needed to keep it warmed.

"When on the journey, Worsley used a Heath Hezzanith Sextant. This sextant

tours with the Caird. The sextant has multiple features. It has multiple

scopes and an attachable binocular (!). Many of the scopes have the lines as

indicated by Bowditch to be used to adjust the parallelism of the scope to

the arc. Further, there is a star scope and many eye piece filters. Quite

the advanced sextant, with so many options."

We have to tread rather carefully here. Was Worsley, in those words,

describing his own sextant? Because on the boat journey, he wrote about the

sextant that was taken- "This sextant, one of Heath's, had been presented to

Hudson, Navigating Officer of the Endurance. I found it more convenient for

use in the boat than my own".

George.

### Re: How Worsley Navigated [Was Navigation and Whaling]

**From:** Brad Morris  
**Date:** 2009 Feb 23, 19:31 -0800

**Source:** fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-feb-2009-g7405

Hi George

The type of sextant (Heath Hezzanith) and its use for the journey cannot be

disputed. The exact sextant used by Worsley tours with the James Caird and

can be seen (but not handled) by visitors. Who originally used it or owned

that sextant prior to the journey, while technically correct, is IMHO kind of

irrelevant. It is the sextant that Worsley used on that journey, for his

reasons. I can see why Worsley chose this sextant, it has every feature you

could ever dream of.

So I went the additional step. I took the photographic evidence of the

sextant and tracked it down. I found the same make and model sextant with

all of the options as shown in the image. It clearly is a high-end sextant

as can be seen by all of the features and the arc accuracy presented herein.

Fantastically, all of those lines in the telescope tubes are present, just as

Bowditch calls for and they are unbroken. There are eyepiece shades in

addition to the normal shades, as well as every other bit of kit (including

the key and screw driver). Paid an outrageous price for it and giggled all

the way home. It was mine! Spent the next few months getting the mirrors

re-silvered and then adjusting all of the optics per Bowditch's 1849

description. The index and horizon mirrors are perpendicular to the arc and

parallel to each other when the nonius is very close to zero. The rising

telescope feature is present and the telescopes are parallel to the arc,

using Bowditch's method. I am thrilled, to say the least.

There is a sight tube, two inverting scopes (4 & 11 powers) and two erect

scopes (3.5 and 4 powers), one of which is a large aperture star scope. It

also has the binoculars which attach to the rising telescope feature. I have

shot lunars with it (you don't realize how heavy it is until you hold it at

those weird angles for minutes at a time!) as well as the standard altitude

shots.

The patent "greatest angle clamp" is there as well as the patented box clip

that holds the sextant in place.

The arc is divided to 150 degrees, yet the useful range is only to 125

degrees, as it is a vernier type. The final divisions yield measurements to

to 10".

At this juncture, I would like to have the arc calibrated but as we all know,

those services just don't exist anymore. I keep hoping Frank will determine

the economic feasibility of his calibration methodology alluded to in earlier

posts. But until then, I am forced to use the National Physical Laboratory

record of 1921 of my sextant, which shows ZERO minutes and ZERO seconds for

every reading from 15 degrees to 120 degrees. Naturally, the device should

have worn over the years. Maybe Bill Morris can comment on the evenness of

wear over the years. Uneven wear would contribute to an eccentricity and may

throw that unbelievable calibration certificate out.

The National Physical Laboratory certificate claims it is a "CLASS A", does

anyone know the classifications at the NPL?

At this point, you have to ask yourself if Worsley chose poorly. Given the

feature set and the fact that the expedition would have obtained the greatest

accuracy possible (zero point zero error) then this sextant is an obvious

choice.

Best Regards

Brad

### Re: How Worsley Navigated [Was Navigation and Whaling]

**From:** Bill Morris  
**Date:** 2009 Feb 24, 01:08 -0800

**Source:** fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-feb-2009-g7407

G'day, Brad

On the front cover of John Thomson's biography of Frank Worsley "Shackleton’s

Captain", there is a painting showing Worsley taking a sight with a ladder-

frame sextant. Can you confirm that this is a correct representation?

I have a Heath Hezzanith three ring framed instrument from the same period

without calibration certificate, so cannot see whether it has maintained its

accuracy. However, I also have a Hughes ladder-frame sextant with an NPL

certificate from 1920. Like yours, it has zero correction throughout the arc.

This of course does not mean literally zero error, as the absolute limit of

reading is 10 seconds. Even then, for me there is often uncertainty as to

which of two or three pairs of graduations line up, despite being aided by a

stero-microscope at X 15 power. I will try to re-calibrate it over the next

few days and will report back. Because of the uncertainty in reading the

Vernier, I would not attach too much importance to the results.

I would not expect a well-built and carefully maintained sextant to have much

wear even after a life time of daily use. The bearing is lightly loaded and

moves slowly over a small arc. A plain bearing in, say, an electric motor

would be subject to more wear under greater loading in ten minutes of

running.

Bill Morris

Pukenui

New Zealand

### Re: How Worsley Navigated [Was Navigation and Whaling]

**From:** George Huxtable  
**Date:** 2009 Feb 24, 14:46 -0000

**Source:** [fer3.com/arc/m2.aspx/How-Worsley-Navigated-Huxtable-feb-2009-g7410](http://fer3.com/arc/m2.aspx/How-Worsley-Navigated-Huxtable-feb-2009-g7410)

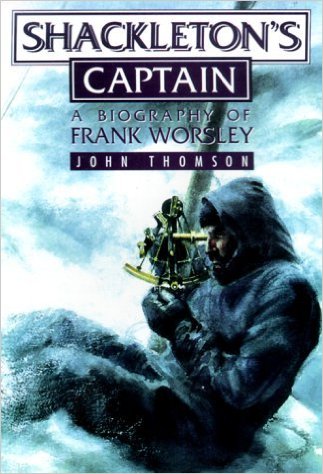
Bill Morris wrote

"On the front cover of John Thomson's biography of Frank Worsley

"Shackleton’s Captain", there is a painting showing Worsley taking a sight

with a ladder- frame sextant. Can you confirm that this is a correct

representation?"



To see what Bill is talking about here, you can go to mazon.com, under "books" enter "shackleton's captain", and you will see a thumbnail picture of the cover. This you can enlarge, to see about as much detail as there is in the cover itself.

There's nothing that I could find, within the book, to acknowledge who made that picture, but it appears that someone has at least gone to the trouble of picturing an instrument of the right era. From the angling of the fine-adjust knob, it looks to me like a clamp-on shoe type of Vernier, not an endless-tangent model.

I can echo Bill's comment, about reading a Vernier sextant to within 10 arc-seconds-

"Even then, for me there is often uncertainty as to which of two or three

pairs of graduations line up, despite being aided by a stero microscope at

X 15 power." I haven't had such optical horse-power at hand, but have

exactly the same problems, using the magnifier that's fitted to my own

Vernier sextant. It seems to be nearing the limit of perception. How

mariners managed to read such an instrument at night, in the dim glow of a

cabin lamp or a candle, quite defeats me.

=========================

Brad had some interesting words to say about his recent acquisition: indeed,

something to take a pride in. It may well correspond with Worsley's

description of the Heath instrument that he used on the Caird, which had

previously been presented to Hudson. But why, I wonder, did Worsley find it

more convenient for use on the boat than his own?

Brad wrote- "I can see why Worsley chose this sextant, it has every feature

you could ever dream of."

and ended- "At this point, you have to ask yourself if Worsley chose poorly.

Given the feature set and the fact that the expedition would have obtained

the greatest accuracy possible (zero point zero error) then this sextant is

an obvious choice."

For Worsley's task in hand, none of that "feature set", range of optics,

high accuracy, were in any way relevant. Indeed, for that job, of snatching

a rough altitude from a small craft in a big sea, he might just as well

have removed the telescope altogether.

==========================

There's an comment from Worsley about his chronometer, for which he only

managed to get a rating from a glimpse of the Sun on their very last morning

on Elephant Island. He wrote- "This English chronometer, an excellent one of

Smith's, was the sole survivor, in good going order, of the twenty-four with

which we set out in the Endurance."

Twenty four!! I suppose than not all would be the gimballed instruments in

mahogany boxes that first come to mind. Many would be pocket chronometers

for the intended sledge journeys, which would be required to return to base

from an expedition to the pole.

George Huxtable

### Re: How Worsley Navigated [Was Navigation and Whaling]

**From:** Brad Morris  
**Date:** 2009 Feb 24, 10:49 -0500

**Source:** [fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-feb-2009-g7411](http://fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-feb-2009-g7411)

Gentlemen

I have examined the book cover and yes, that appears to be the

appropriate ladder sextant. Since it is a painting (and clearly not a

photograph, hehehe, like they brought a camera) then we can permit the

artist some degree of leniency with regards to the angle of the endless

tangent angle adjustment knob. I will check tonight to see if my knob

is at the same angle.

In regards to reading the Vernier, there is a small sheet of translucent

glass, mounted perpendicularly to the arc. Its purpose is to diffuse

the light over the arc where you are attempting to read it. You hold

the light parallel to the arc, not pointed at the arc, rather at the

back of the translucent glass. I use a small red LED but I do agree

with George's point, it is a little tough to read. Once you get used to

it, it isn't so bad. Am I reading it to 10"? I doubt it, but I do take

extra-ordinary care to assess the reading. I use the scintillation of

the light on the graduations to make the final call and yes, it is

always a judgment call. Thanks Bill for the assessment of wear and

eccentricity.

George makes an excellent point about which sextant. I foolishly

assumed he picked the best one available. Maybe it was the only one

available! There was discussion about how overloaded the boats were

when they journeyed from the ice to Elephant Island. Perhaps they

ditched the other sextants, retaining the best one? The logbook does

not carry down to seconds when the reduction is performed, only to the

nearest minute of degrees. So clearly, he didn't use the terrific

accuracy inherent in the sextant.

There are two chronometers I have found images of which purport to be

the ones used by Worsley. One is the box gimbaled type, while the other

is a pocket watch type. I can lend no clarity which one is correct, in

particular which one was used on the journey.

The log book has a note in the margin which states "Lat proved to be

correct within about 2m. Long ditto but Chron was much slower than I

had allowed which made us about 20 miles of distance further xxxx than

obs showed". Try as I might, I could not read what word he has for

xxxx, however, if the chronometer was slower than expected; then NavList

can tell me, was that east or west? The chronometer rate determined at

Elephant Island was 5 seconds slow per day.

I have been contacted by Canterbury Museum. The missing page of the log

is on its way! Honorable folks. The page missing clearly contains 4

May, 5 May and 6 May, so some more clarity will be had about the

decision making process Worsley entertained, when it arrives.

Best Regards

Brad

### Image of Sextant Used by Worsley

**From:** Brad Morris  
**Date:** 2009 Feb 24, 08:40 -0800

**Source:** fer3.com/arc/m2.aspx/Image-Sextant-Used-Worsley-Morris-feb-2009-g7412

Hi Bill

Here is an image of the sextant used by Worsley. I did not take the image,

but found it on the internet. I contact the individual who took it and he

confirmed that it is of the sextant that tours with the James Caird

You may judge for yourself as to the correctness of the painting on the cover

of the book relative to this sextant.

Best Regards

Brad

**Attached File:**  [[](http://fer3.com/arc/img/107412.sextant-of-the-caird-(shackleton).jpg)](http://fer3.com/arc/img/107412.sextant-of-the-caird-%28shackleton%29.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107412.sextant-of-the-caird-(shackleton).jpg)

### Re: Image of Sextant Used by Worsley

**From:** Clive Sutherland  
**Date:** 2009 Feb 24, 22:00 -0000

**Source:** fer3.com/arc/m2.aspx/Image-Sextant-Used-Worsley-Sutherland-feb-2009-g7418

This enlargement is taken from a photograph of Capt Worsley taking a sunsight (but not unfortunately from the James Caird). The caption given for this photo is copied below I think that the sextant is probably the same one shown by Brad.

CAPTION

"Worsley, here pictured using a sextant,"

Shackleton had written in South, 'I had a

very high opinion of his accuracy and

quickness as a navigator - an opinion that

was only enhanced during our [open boat]

journey.'

Clive

### Worsley's Chronometer(s)?

**From:** Brad Morris  
**Date:** 2009 Feb 24, 14:21 -0800

**Source:** fer3.com/arc/m2.aspx/Worsleys-Chronometers-Morris-feb-2009-g7420

Gentlemen

I went back and present herein the two chronometers which claim to be the one

used by Worsley. Obviously, they both can't be right.

This one is from the National Maritime Museum in Greenwich, England and is a

Thomas Mercer boxed, gimbaled chronometer.

http://www.nmm.ac.uk/server/show/conMediaFile.2279

This one is from the James Caird Society, a pocket watch type chronometer

http://www.jamescairdsociety.com/shackleton-news.php?id=102901

The James Caird Society article also contains an image of Worsley using the

sextant without an artificial horizon to check his location, while trapped in

the ice. The US Navy published a book in the early 1950's called "Naval

Arctic Operations Handbook" in which they indicate that this practice is

feasible if you estimate the height of the ice around you and use that as

your 'sea level'. Then the height of your eye above the height of the ice

around you will yield the correction for dip.

Best Regards

Brad

### Re: Image of Sextant Used by Worsley

**From:** Bill Morris  
**Date:** 2009 Feb 24, 21:01 -0800

**Source:** fer3.com/arc/m2.aspx/Image-Sextant-Used-Worsley-Morris-feb-2009-g7421

Thanks, Brad.

It looks like a Mark I bell sextant frame with the Hezzanith rapid reader.

It's the first time I've seen a sextant with five index shades. The Galilean

star scope seems to have a relatively large objective for the time, with

screw focusing.

The painting, by Arthur Shilstone, is quite close and shows Worsley using a "X

1" 'scope, i.e. a sighting tube (pace George Huxtable). I hope I won't

infringe copyright by posting an image of the front cover, for purposes of

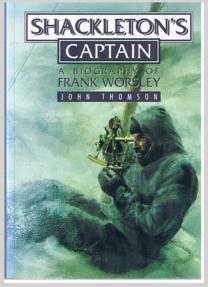
review...

Calibration of similar quality Hughes sextant is proceeding - slowly.

Bill Morris

Pukenui

New Zealand

**Attached File:**  [[](http://fer3.com/arc/img/107421.document-(6).pdf)](http://fer3.com/arc/img/107421.document-%286%29.pdf)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107421.document-(6).pdf)   [http://fer3.com/arc/images/vu-icon.png](http://docs.google.com/viewer?url=http://fer3.com/arc/img/107421.document-(6).pdf)

### Re: How Worsley Navigated [Was Navigation and Whaling]

**From:** Brad Morris  
**Date:** 2009 Feb 25, 09:57 -0500

**Source:** [fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-feb-2009-g7425](http://fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-feb-2009-g7425)

The missing page has arrived. It is the muddiest image of all, so bear

with this.

On 4 May, Worsley performs an observation and reduction. He determines

his latitude to be 55 deg 31'S and his longitude to be 44 deg 13'W

On 5 May, Worsley estimates his position to be 54 deg 30'S and 42 deg

36' W, by dead reckoning. They see a bird.

On 6 May, Worsley estimates his position to be 54 deg 26' S and 40 deg

44' W, again by dead reckoning.

I would like to revise my speculation at this point. South Georgia

Island has a northern most point at Bird Island, around 54 deg 0'S. The

southernmost point of SGI is around 54 deg 50'S. It appears as if

George was right, they tried to sail directly to SGI from Elephant

Island. When they reached the appropriate mid-point of the latitude of

SGI (54 deg 30'S), they found no island! Gasp! Was it east or west?

With Bird Island just over 38 degrees W, I speculate that they chose to

steer east.

Best Regards

Brad

### Re: Image of Sextant Used by Worsley

**From:** Brad Morris  
**Date:** 2009 Feb 25, 09:32 -0500

**Source:** fer3.com/arc/m2.aspx/Image-Sextant-Used-Worsley-Morris-feb-2009-g7426

Hi Bill

One of the 'shades' is clear. I haven't quite figured out what the use

of that shade is.

The star scope suffers from an unfortunate mechanical weakness, in that

the screw adjustment, while parallel to the longitudinal axis, is offset

from that axis. This provides a moment by which the mechanical fixings

at the attachment point have become loose. The star scope can be used,

but it takes quite a bit of time to get into focus as the adjustment no

longer works as desired. I am considering having this tweaked at a

machine shop so that it functions properly again.

There are two scopes which look nearly identical to the one presented in

the cover image. One is exactly as you say, a sighting tube. The other

is a low magnification scope. They can be seen in the sextant image in

the lower left hand corner of the box. The low magnification scope has

the two parallel wires by which you can obtain the parallelism of the

scope to the arc. Which one was used for the painting would be very

hard to tell.

Best Regards

Brad

### Re: Image of Sextant Used by Worsley

**From:** Bill Morris  
**Date:** 2009 Feb 25, 17:56 -0800

**Source:** fer3.com/arc/m2.aspx/Image-Sextant-Used-Worsley-Morris-feb-2009-g7433

Brad,

Are you sure that the shade is clear glass? I wonder whether it might not be a

cylindrical lens, used as an astigmatiser to draw out the image of a star

into a line.

In a previous post, of your Heath and Co sextant, you wrote :

"At this juncture, I would like to have the arc calibrated but as we all know,

those services just don't exist anymore. I keep hoping Frank will determine

the economic feasibility of his calibration methodology alluded to in earlier

posts. But until then, I am forced to use the National Physical Laboratory

record of 1921 of my sextant, which shows ZERO minutes and ZERO seconds for

every reading from 15 degrees to 120 degrees. Naturally, the device should

have worn over the years. Maybe Bill Morris can comment on the evenness of

wear over the years. Uneven wear would contribute to an eccentricity and may

throw that unbelievable calibration certificate out."

To try to answer your question, I have recalibrated my Hughes and Son vernier

sextant of the same period. It is a ladder frame instrument and has a Class A

NPL certificate dated 1920, showing zero error every 15 degrees to 120

degrees. In a previous posting, I have commented that I would not expect much

wear, and the zero error must take into account that the instrument cannot be

read to better than 10 arc seconds, probably rather less for most of us with

older eyes. The graduations have nice sharp edges, without chatter marks in

the depths, and are as easily readable as nearly any other vernier scale i

have come across. I read them with the Ramsden magnifier provided and lots of

blue-white light.

Do not attach too much importance to my having given the error to the nearest

second. This is justified probably only for the 15 degree reading which, on

account of the method used, is in effect an average of 24 readings of the

sextant. A better interpretation of the results might be "broadly in

agreement with NPL certificate."

**Sextant Reading Error**

**Degrees arcseconds**

**0 0**

**15 -4**

**30 +7**

**45 +9**

**60 +3**

**75 -1**

**90 +6**

**105 +3**

**120 -7**

Bill Morris

Pukenui

New Zealand

### Re: Image of Sextant Used by Worsley

**From:** Brad Morris  
**Date:** 2009 Feb 25, 19:52 -0800

**Source:** fer3.com/arc/m2.aspx/Image-Sextant-Used-Worsley-Morris-feb-2009-g7434

Hi Bill

The clear shade is an astigmatiser. I just tried it on a star without

worrying about the horizon. Sure enough, I saw a line. Reaching around, I

rotated the clear shade out of the optical path and got the typical star

point. Just add that to the feature set. Thanks for solving that little

mystery for me, although in retrospect, it was silly of me not to think of

that myself!

There is a small clamp that can be attached to the arc. It is labeled the

"greatest angle clamp". I believe that the observer places it on the arc

prior to meridian crossing, with the clamp pressed against the index arm. The

clamp is not clamped, rather, it is loose on the arc. The observer takes

sights as normal, which moves the greatest angle clamp to ever higher angles

on the arc. Eventually, the meridian crossing occurs. The index arm no

longer moves the clamp. The observer tightens down the clamping screw and

can then move the index arm precisely back to the greatest angle. Wonderful

little feature for LAN.

Thanks very much for the data on the calibration of your Class A sextant from

NPL. I do have some questions, if you don't mind.

Was that bidirectional or unidirectional? A bi-directional set runs up the

scale and then back down the scale, stopping in the same locations. A

unidirectional data set merely marches up (or down the scale), stopping in

the same locations from the same direction. For a micrometer type device,

then the unidirectional approach would be preferred, due to gear lash and

lost motion. For a vernier device, the accuracy and repeatability is not

affected by the gear lash in the same way, so I suggest a bidirectional

approach might be more representative. That is, the vernier reading is a

function of the index arm on the arc.

How many bidirectional or unidirectional runs did your data consist of?

We need to differentiate between the accuracy of the data and the

repeatability of the data. The accuracy would be the numerical average

while the repeatability at each point would be the statistical 3 sigma

evaluation of all data for one arc location.

I suspect that the NPL merely provides us the accuracy figure of merit and not

the repeatability, which would be affected by many factors, including

temperature.

Best Regards

Brad

### Re: How Worsley Navigated

**From:** George Huxtable  
**Date:** 2009 Feb 26, 14:42 -0000

**Source:** fer3.com/arc/m2.aspx/How-Worsley-Navigated-Huxtable-feb-2009-g7438

Brad Morris wrote-

"I would like to revise my speculation at this point. South Georgia

Island has a northern most point at Bird Island, around 54 deg 0'S. The

southernmost point of SGI is around 54 deg 50'S. It appears as if

George was right, they tried to sail directly to SGI from Elephant

Island. When they reached the appropriate mid-point of the latitude of

SGI (54 deg 30'S), they found no island! Gasp! Was it east or west?

With Bird Island just over 38 degrees W, I speculate that they chose to

steer east."

================

Why on Earth does Brad feel the need to speculate about this? With respect,

his speculation makes no sense at all. He simply has to read what Worsley

wrote; has he done that?

As I explained before, the original intention was to head Northeasterly to

round the NW corner of South Georgia (Willis Islands, Bird Island, Cape

North), all rugged rocks, to reach the inhabited whaling stations in inlets

along the Northern coastline. To do that, the navigation had to be good

enough to keep North of those hazards, yet to ensure sighting the land to

avoid being blown Eastwards past it by the prevailing wind. To achieve that,

reasonable visibility would be called for. Worsley considered his

observations were good to only 10 miles or so, and Shackleton decided that

wouldn't be sufficient accuracy. I reckon that was a seamanlike and

pragmatic choice, even though the alternative was to change course Eastwards

toward the unknown and uninhabited South coast, and then cross the mountains

of the interior, as had never been done before.

As Worsley's text and his map of the journey makes clear, that change of

plan, and change of course, was made some days before South Georgia was

expected to show up. Not at all as Brad surmised.

==================

Let's try to clear up some other matters.

Chronometers.

Brad posted this-

"I went back and present herein the two chronometers which claim to be the

one used by Worsley. Obviously, they both can't be right.

This one is from the National Maritime Museum in Greenwich, England and is a

Thomas Mercer boxed, gimbaled chronometer.

http://www.nmm.ac.uk/server/show/conMediaFile.2279

This one is from the James Caird Society, a pocket watch type chronometer

http://www.jamescairdsociety.com/shackleton-news.php?id=102901 "

Brad is right to be skeptical. Worsley's testimony is clear; that he used a

Smith chronometer, just as illustrated by the James Caird Society. Samuel

Smith specialized in such pocket instruments, though also made standard

gimballed ship-chronometers. The Smith name survived to modern times as

Smith's Industries. That pocket-chronometer, intended for sledging parties,

would have been more appropriate for the small-boat journey than a big

mahogany box type.

Worsley's words were, about the morning of the day on which they left

Elephant Island

"Immediately after breakfast the Sun came out obligingly. The first sunny

day with the horizon clear enough to get a sight reading for my

chronometer.", with a footnote- " This English chronometer, an excellent one

of Smith's, was the sole survivor, in good going order, of the twenty-four

with which we set out in Endurance".

So the Greenwich museum claim seems quite unjustified, and I will contact

Richard Dunn at NMM to point that out.

Moral: don't accept anything without questioning. Be skeptical about what

anyone tells you; that includes what I tell you.

=================

The James Caird society's web page, that Brad referred to above, also shows

Worsley perched on what is presumably the "lookout station" to take a Sun

observation. That's one of Hurley's superb pictures, in "South" (but not,

unfortunately, in my cheapo paperback edition, published by Century, which

had been shorn of all plates and of Shackleton's fold-out map).

That lookout station must have been constructed when the expedition was

living on the ice, a mile and a half away from where Endurance sank. It

would have given a view of approaching leads in the ice or other movements.

It would also serve the purpose for which Worsley was using it, of providing

an elevated viewpoint for measuring altitudes, that allowed a clear view of

the distant ice-horizon, clear of local ridges and hummocks. That was

important, because they needed to find out, from accurate celestial

observations, the speed and drift-direction of the ice that trapped them.

They needed that, to discover if that motion on its own would take them out

of the ice-trap, or if they needed to set off across the ice to escape (it

was the latter). That was also the purpose of the occultations, to determine

any slow drift of their chronometers.

The lookout must have provided an insecure perch when an Antarctic wind was

blowing. One false step would have had serious consequences.

That Hurley photo doesn't provide enough detail to show much about the

sextant in use, but the glimpse of the scope that it affords looks like an

immense night-glass, similar to the scope shown in the photo that Clive

Sutherland enlarged in [7418]. That picture isn't in "South", from what I

can tell, but appears in Roland Huntford's "Shackleton's voyages", which I

don't have (yet). (That shouldn't be confused with the same author's

biography of Shackleton, which I have.). The enormous telescope shown in

that picture looks rather inappropriate for the Sun job in hand, and out of

proportion with the area of the sextant's mirrors; it's a bit of a puzzle,

to me. Contrary to Clive, the sextant shown in that picture looks to me to

have a frame that differs from the one in the box, that Brad copied to us.

Clive has told me that photo seems to relate to Shackleton's last voyage on

"Quest", the expedition on which he diad, of a heart attack, at Grytviken in

South Georgia.

Brad, could you tell us a bit more about the touring exhibition, please? I

am aware that Caird travels around the World a lot now, from her London home

at Dulwich College (Shackleton's old school) who own her. Where was she when

you visited? (Can you still call a vessel named "James Caird a "she", I

wonder?).

Some Caird exhibitions in the past have used a replica craft, not that I'm

suggesting that here. I understand that one such exhibition was arranged

some 10 years ago by the American Museum of Natural History (if I've got

that right) with gee-whiz computer visuals, but a "replica" Caird.

==========================

When Brad has done with contemplating the angle of his knob, we would

welcome some information about the observations. Did Worsley provide time

and altitude for each sighting, and give any details of his working, to

arrive at his quoted lat and long? Or did he just provide the result?

George.

### Re: Worsley's Chronometer(s)?

**From:** Brad Morris  
**Date:** 2009 Feb 26, 08:42 -0500

**Source:** fer3.com/arc/m2.aspx/Worsleys-Chronometers-Morris-feb-2009-g7440

I wrote to the James Caird Society about the chronometers and here is

what they had to say:

The chronometer and a small watch were bequeathed to SPRI in 1943 by

F.A. Worsley, with the information recorded in the accession register

that they were used for navigation during the voyage of the lifeboat

James Caird from Elephant Island to South Georgia. Frank Worsley

recorded that "this chronometer, an excellent one of Smith's, was the

sole survivor, in good working order, of the twenty-four with which we

set out in the Endurance."

So Frank Worsley solves this little dilemma for us himself!

Best Regards

Brad

-----Original Message-----

From: NavList@fer3.com [mailto:NavList@fer3.com] On

Behalf Of bmorris{at}tactronics.com

Sent: Tuesday, February 24, 2009 5:21 PM

To: NavList@fer3.com

Subject: [NavList 7420] Worsley's Chronometer(s)?

Gentlemen

I went back and present herein the two chronometers which claim to be

the one used by Worsley. Obviously, they both can't be right.

This one is from the National Maritime Museum in Greenwich, England and

is a Thomas Mercer boxed, gimbaled chronometer.

http://www.nmm.ac.uk/server/show/conMediaFile.2279

This one is from the James Caird Society, a pocket watch type

chronometer

http://www.jamescairdsociety.com/shackleton-news.php?id=102901

The James Caird Society article also contains an image of Worsley using

the sextant without an artificial horizon to check his location, while

trapped in the ice. The US Navy published a book in the early 1950's

called "Naval Arctic Operations Handbook" in which they indicate that

this practice is feasible if you estimate the height of the ice around

you and use that as your 'sea level'. Then the height of your eye above

the height of the ice around you will yield the correction for dip.

Best Regards

Brad

### Re: How Worsley Navigated

**From:** Brad Morris  
**Date:** 2009 Feb 26, 11:07 -0500

**Source:** fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-feb-2009-g7441

I surrender George. With the dispute in maps, I wanted to see the

navigational log to attempt to resolve the dispute. I retract my

speculation. Yes, I have read the books, I just haven't referenced them

recently.

I wish I knew the location of the Caird, so I could obtain better images

of the sextant. If we accept the image of the sextant used, then I can

tell you that there almost no doubt in my mind that the sextant I have

is the twin of the one used. Further, there are two components missing,

for which we can see spaces in the box, now vacant. The first component

missing is a shade that attaches to the back of the telescope tubes. It

goes into a slot on the right hand wall. The greatest angle clamp and

one of the two eye shades are there. The gap is visible right beyond it

for that second eye shade. The other component missing from the sextant

used is an inverting scope. It is held in the block of wood with the

large round hole, just over the index mirror. I can see the other

components are present. I can see nothing else missing. Note that the

binoculars are standing in the case at the mounting location, but not

held in the case as designed.

Now that I am done "contemplating the angle of my knob" (hehehe), I can

easily give you one of the reductions, attached herein.

Best Regards

Brad

### Re: Image of Sextant Used by Worsley

**From:** Bill Morris  
**Date:** 2009 Feb 26, 12:14 -0800

**Source:** fer3.com/arc/m2.aspx/Image-Sextant-Used-Worsley-Morris-feb-2009-g7447

Brad, You wrote:

"Thanks very much for the data on the calibration of your Class A sextant from

NPL. I do have some questions, if you don't mind.

"Was that bidirectional or unidirectional? A bi-directional set runs up the

scale and then back down the scale, stopping in the same locations. A

unidirectional data set merely marches up (or down the scale), stopping in

the same locations from the same direction. For a micrometer type device,

then the unidirectional approach would be preferred, due to gear lash and

lost motion. For a vernier device, the accuracy and repeatability is not

affected by the gear lash in the same way, so I suggest a bidirectional

approach might be more representative. That is, the vernier reading is a

function of the index arm on the arc.

"How many bidirectional or unidirectional runs did your data consist of? "

I'm not sure that I understand the question. I think it's to do with backlash

(or gear lash). In a micrometer instrument, ideally the final motion should

be such as to load the thrust face of the worm shaft bearing, rather than the

anti-backlash spring (read my book, The Naked Nautical Sextant, for detailed

anatomy). For most sextants, this is in the direction of reducing readings.

In SNO-T/Freibergers and some Hughes sextants, it can be ignored as they rely

on bearings in which backlash can be adjusted out. In the Hughes sextant I

reported on, the vernier tangent screw is opposed by a spring-loaded plunger,

the same sort of pattern as used in theodolites. I always made the final

motion against the spring, in case the action of the spring was imperfect and

perhaps provided a little more motion to the index arm after setting.

I reported the actual method of calibration in NavList post number 4356. In

essence, 15 degrees of the sextant scale are used as an optical caliper to

subdivide a straight line (180 degrees) twenty-four times, so that two

autocollimators end up with their axes at a nominal 7 1/2 degrees. This

involved forty-eight settings of the vernier, twenty four at 0 degrees and

twenty-four at 15 degrees. I can't think clearly enough about these matters

to decide whether I should divide the standard deviation of 5.1 (see below)

by the root of 24 or 48. The sextant error at 15 degrees is thus either 3.6

+/- 1

or 3.6 +/-0.7.

The corrected angular separation of the autocollimators is then used to

calibrate each fifteen degree interval. I took each reading four times on the

way up and only once on the way back down (this is tedious work and requires

a lot of concentration). Of course, each fifteen degree interval could be

done in the same way as the first fifteen degrees, but as the process takes

about two hours of careful, plodding work, I ask to be excused the task.

The least graduation on the Hilger and Watt autocollimators is 0.2 seconds. A

mis-setting of 1 second is easy to see. I have checked their calibration

using a small angle generator and slip gauges and am confident of their

accuracy to one second.

I suppose there is a possibility of bias, favoring approach of the vernier

index more from one direction than the other, but it would apply equally to

the readings at each end of the interval and can therefore probably be

ignored if the bias is truly systematic.

You also wrote:

"We need to differentiate between the accuracy of the data and the

repeatability of the data. The accuracy would be the numerical average

while the repeatability at each point would be the statistical 3 sigma

evaluation of all data for one arc location."

To try to answer your question, I re-set the vernier to zero thirty times and

recorded the variation with an autocollimator.

n = 30; sample standard deviation = 5.1; standard error of the mean = 0.93.

For the non-statistician (e.g. me), I think this means that in a series of

results, about 64 % can be expected to fall into the range +/- 5 and 95 %

into the range +/- 10 from the true value. If I'm wrong, I'm sure there are

plenty of physicists waiting to pounce!

"I suspect that the NPL merely provides us the accuracy figure of merit and

not the repeatability, which would be affected by many factors, including

temperature."

I'm sure you're right. The collimators at the NPL were set up using a

theodolite (we are not told with how many repetitions or the probable error

of setting) and the error was taken from the reading of the instrument being

tested. The temperature question was raised in the thread that followed from

post 4356 and I gave a simple illustration.

(If this discussion continues, should the thread name perhaps be changed?)

Bill Morris

Pukenui

New Zealand

### Fw: Re: How Worsley Navigated

**From:** George Huxtable  
**Date:** 2009 Feb 28, 15:16 -0000

**Source:** [fer3.com/arc/m2.aspx/Fw-How-Worsley-Navigated-Huxtable-feb-2009-g7468](http://fer3.com/arc/m2.aspx/Fw-How-Worsley-Navigated-Huxtable-feb-2009-g7468)

The attachment Brad sent, showing Worsley's calculations when nearing (but

still well out-of-sight-of) South Georgia, is intriguing. I've attached

Brad's transcription again here.

Those were crucial observations for the James Caird. That was the only day

on which Worsley was able to observe both a noon Sun altitude, for latitude,

and an away-from-noon Sun altitude, which with that latitude, could then

provide longitude, though both were somewhat uncertain. It was because of

those uncertainties that Shackleton decided to head for the South coast of

the island, which then called for that famous mountain-crossing to be made.

The attached page appears to deal only with the morning Sun sight, and I

would guess that the reduction for the later noon observation has been

detailed on another page. At noon, the Sun disc was unclear, so that Worsley

had to do his best by observing the height of the center of the fuzz, rather

than a limb.

I am a bit hampered by not having a 1916 Nautical Almanac. Many such

almanacs appear to have been digitized, but not, it seems, that one. I can

look it up next visit to the Bodleian library in Oxford, but if anyone knows

of a public source, or has a copy himself, that would be helpful; either the

British or US version. All that's needed is, for May 7th (and for May 6th

and 8th also) Sun declination and Equation of Time at Greenwich noon. Of

course, such backwards predictions are available from modern sources, but it

would be nice to see what the Almanac actually states. For comparison, I've

just taken these quantities for the same day, May 7th, of a recent year,

which will be within a few arc-minutes of the right value.

Brad was right to deduce that the navigation was done by calculating a

longitude numerically, and not by a St Hilaire technique calling for Sun

azimuth and providing a position line. It would be interesting to discover

whether Worsley had been using those same old techniques, rather than the

"new navigation", the previous year, at times when Endurance had been a

real moving ship, and he had a full chartroom at his disposal.

After all that it's been through, it's remarkable that the log can be read

at all, and clearly Brad has made a good job of transcribing it, because

much of the numbering seems to be consistent. However, there are several

things about it that I don't understand (yet). With Brad's help, we might

yet unravel the whole thing.

==============================

The following details are mainly for Brad, in the hope that he can use them

to improve and annotate his transcription. It remains somewhat tentative,

and calls out for corrections. Here goes-

Left hand column. This first figure, 5.10.14, is, I expect, related to

chronometer reading, in hours, minutes, seconds. Whether it's actually GMT,

or perhaps time-to-go until noon GMT, I haven’t deduced yet (and suspect the

latter). I presume the 13-minute adjustment must be a correction for

presumed chronometer error, but if so, it's surprising that it's given only

in whole minutes, not minutes-and-seconds. The next number will, I presume,

be the correction for Equation of Time at noon of that day, to end up with a

corrected time of 5h 26m 47s.

For now, we will leave this column and move right to what I take to be the

Sun lower-limb altitude reading of 9º49' The letters and numbers that follow

it, (P.M. N68ºE14 5.2.13.0=23') make no sense to me.

Below that is a correction of 8' (the 54º, crossed out, was presumably a

mistake, as Brad states). It's likely that 8' is Worsley's standard

correction, made each time for a Sun altitude, combining semidiameter, dip,

and his sextant's index error.

Now things get interesting, as he computes the hour-angle of the Sun, from

standard trig formulae. I will attach a page from "Norie's Navigation"

(1900) page 326 that explains the procedure, which is his Method 1..

Start with the corrected altitude, of 9º57'. Add to it the estimated

latitude, of 54º 33' This differs a bit from his stated noon latitude of 54º

38', perhaps because of the Northing estimated in the interval to noon. Also

add the South Polar distance, of 106º 52', to arrive at a sum, for the

three, of 171º 22'. (I need to explain South Polar distance, which is the

angle between the Sun's declination at that moment which is presumably 16º

52' N, and the South Pole, which is 90ºS, so therefore 90º +16º 52'. (To be

accurate, what's required is thedeclination, not at Greenwich noon, but a

few hours before then, when the observation was made. Without the right

Almanac, I don't know whether or not that was made, but it probably was)).

Those three angles added up to 171º 22' (I hope you're checking Worsley's

arithmetic along with me). That sum is to be halved, to give 85º 11', which

we can call the "half-sum", and the sum itself will not be used further. And

next, we take away, from that half-sum, the number we first thought of, the

altitude of 9º 57', to arrive at 75º 44', which we can call the "remainder".

Now we have obtained all the necessary angles for the spherical-trig

calculation, to be done by 5-figure logs. All the numbers are to be treated

as positive ones.

What Worsley had to do next is to add together the following

latitude 54º 33' log sec = .23658

polar dist. 106º 52' log cosec = .01910

half-sum 85º 41' log cos = .87662

remainder 75º 44' log sin = .98640

and adding all these together = .11870

Check it yourself. You will note that in this operation Worsley simply

discards any whole numbers that may arise to the left of the decimal point

He just doesn't care. What any such integer would do is to multiply or

divide the end-result by a factor of 10, and Worsley knows perfectly well

(within that factor of 10) the ball-park figure in which his end-result has

to lie. This was a common attitude taken by navigators, who are repeating,

day after day, similar calculations in which only the fine details vary, and

they always knew, more or less, what the answer was going to be.

Of course, Worsley would have had (by that time, soggy with damp) tables

giving directly logs of all the trig functions, which you may not own. But

you can always get logs (to base 10) of angles (in degrees, not radians) in

two successive steps of a scientific calculator, or a computer. Perhaps

three steps, because you will probably need to get sec from 1 / cos, and

cosec from 1 / sin.

If you compare those columns of numbers, above, with the table Brad has

provided, you will see that Brad has transcribed every digit correctly, but

there are some intervening dots and colons which could be removed, and the

log numbers near the bottom have slipped upwards a notch; there should be a

blank space to the right of 171.22.

I diverted when we had calculated that log of .11870, so let's get back to

it now. This is actually the log haversine (log hav) of the hour angle.

Worsley's log trig tables would have included such a table, for which you

have to search for the value .11870, and find the hour angle, or the time

before local apparent noon (at 1 hour = 15 º) that it corresponds to. For

nearly the whole range of times that are practical with this method, the

appropriate prefix integer was 9 (and Worsley would have known that well),

so if we look up the time corresponding (or nearly so) tp 9.11870, we find

that the nearest entry is for 9.118711, for 2hrs 50m 03sec, which was the

result we needed (or if you prefer, an equivalent angle of 42º 30' 45").

Here we need another diversion, for those that haven't come across

haversines before. The haversine is another trig function, which has the

advantage that it never goes negative, so is particularly suitable for log

calculations. Hav of angle A is defined as (1 - cos A) /2, and is always in

the range 0 to +1. [You may occasionally come across the versine of an angle,

which is (1 - cos A), in the range 0 to +2, and logically, a haversine is

half of the versine.] Occasionally a log hav table might also be named a

"log sine square" table, because it also happens that hav A= (sin A/2)

squared.

Anyway, let's get back to the hour angle Worsley deduced, of 2hrs 50min

03sec. If we go back to the furthest left-hand column, we left off after

writing down 5 26 27, which seems to be the time of that morning observation

from Greenwich apparent noon. Now we see that below it, Worsley has written

in his deduced time to local apparent noon, from the Sun altitude, 2 hrs 50

min 03 sec. And then he subtracts, to provide the time difference between

them, 2hr 36 min 44 sec, which is the time difference between local apparent

noon and Greenwich apparent noon. And then he has converted that into an

angle difference, at 15º per hour, to be 39º 11', which is, of course, the

local Westerly longitude.

The next entry, adding another 25' to that longitude, is a bit of a puzzle

to me. We see that the latitude he has underlined, in the top right corner,

differs a bit from the value that was used in the previous calculation. Did

this reflect a revision of the previous presumed latitude, which resulted

from the noon observation? And then, did he somehow adjust the longitude to

allow for that revision in latitude? That's one possibility, but there may

be others. The revised value, marked "39º 34' Noon", can't reflect ground

gained in the period up to noon, because it shows a 25-minute increase in

Westerly longitude, and the Caird was travelling largely Eastward.

I take it that the underlined values at top right of the page indicate

Worsley's best estimates of position at noon on May 7th, and fit in, as far

as one can tell, with the position marked on his map.

Just below, the figures corresponding to Bird Island make little sense. Its

modern position is 54º S, 38ºW, within a very few miles.

Below that is a mention of "Laith Harb.", which should be Leith, and a

figure 51, which might show its distance from Bird Island, and the 121 may

represent a total estimate of miles-to-go, to Leith, before the plan

changed. There's a lot of unwarranted supposition in that.

I hope that the analysis I've provided will give Brad enough clues to tease

out the final details, perhaps in conjunction with other pages from the log..

It's been an enjoyable bit of detective work, and may well have errors to be

uncovered.

George.

----- Original Message -----

From: "Brad Morris"

To:

Sent: Thursday, February 26, 2009 4:07 PM

Subject: [NavList 7441] Re: How Worsley Navigated

I surrender George. With the dispute in maps, I wanted to see the

navigational log to attempt to resolve the dispute. I retract my

speculation. Yes, I have read the books, I just haven't referenced them

recently.

I wish I knew the location of the Caird, so I could obtain better images

of the sextant. If we accept the image of the sextant used, then I can

tell you that there almost no doubt in my mind that the sextant I have

is the twin of the one used. Further, there are two components missing,

for which we can see spaces in the box, now vacant. The first component

missing is a shade that attaches to the back of the telescope tubes. It

goes into a slot on the right hand wall. The greatest angle clamp and

one of the two eye shades are there. The gap is visible right beyond it

for that second eye shade. The other component missing from the sextant

used is an inverting scope. It is held in the block of wood with the

large round hole, just over the index mirror. I can see the other

components are present. I can see nothing else missing. Note that the

binoculars are standing in the case at the mounting location, but not

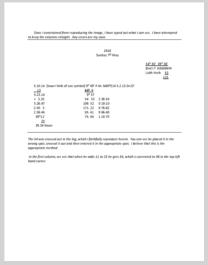
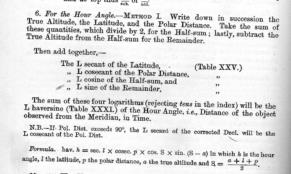
held in the case as designed.

Now that I am done "contemplating the angle of my knob" (hehehe), I can

easily give you one of the reductions, attached herein.

Best Regards

Brad

**Attached File:**  [[](http://fer3.com/arc/img/107468.7may1916.pdf)](http://fer3.com/arc/img/107468.7may1916.pdf)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107468.7may1916.pdf)   [http://fer3.com/arc/images/vu-icon.png](http://docs.google.com/viewer?url=http://fer3.com/arc/img/107468.7may1916.pdf)  
**Attached File:**  [[](http://fer3.com/arc/img/107468.norie.jpg)](http://fer3.com/arc/img/107468.norie.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107468.norie.jpg)  
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[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107468.worsley2.jpg)

### Re: Fw: Re: How Worsley Navigated

**From:** Frank Reed  
**Date:** 2009 Feb 28, 10:11 -0800

**Source:** [fer3.com/arc/m2.aspx/Fw-How-Worsley-Navigated-FrankReed-feb-2009-g7474](http://fer3.com/arc/m2.aspx/Fw-How-Worsley-Navigated-FrankReed-feb-2009-g7474)

George H, you wrote:

"All that's needed is, for May 7th (and for May 6th and 8th also) Sun

declination and Equation of Time at Greenwich noon. Of course, such backwards

predictions are available from modern sources, but it would be nice to see

what the Almanac actually states."

Any good modern source will differ only a few seconds of arc from printed

almanac data for that era. As luck would have it, I have an American Nautical

Almanac for 1916 within arm's reach. So here's the data for those dates from

that almanac as well as the same from my online Nautical Almanac.

From the AmNA(1916):

GMT(old) Dec EqT

May 6 00h 16º 31.4' 3m27.8s

May 6 12 16º 39.7 3 30.0

May 7 00 16º 48.1 3 32.2

May 7 12 16º 56.3 3 34.1

May 8 00 17º 04.5 3 36.0

May 8 12 17º 12.6 3 37.6

From my online NA:

GMT(new) Dec GHA Sun EqT(GHA Sun/15)

May 6 12h 16º 31.4' 0º 51.9' 3m27.6s

May 7 00 16º 39.8 180º 52.5 3 30.0

May 7 12 16º 48.1 0º 53.0 3 32.0

May 8 00 16º 56.4 180º 53.5 3 34.0

May 8 12 17º 04.5 0º 54.0 3 36.0

May 9 00 17º 12.7 180º 54.4 3 37.6

Enjoy.

-FER

### Re: How Worsley Navigated

**From:** Brad Morris  
**Date:** 2009 Feb 28, 20:06 -0800

**Source:** [fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-feb-2009-g7484](http://fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-feb-2009-g7484)

Hi George

Frank Worsley repeated exactly this form for each reduction on the journey.

That is, for each observation, the method by which he resolves his position

is identical. There are several days for which there are no observations,

and Frank Worsley estimates his position via DR.

While it may take some time, I will get a complete transcription of the

logbook for the journey up to the group. It is quite difficult to tease some

of the characters out of the text. These few pages are fascinating, and I

urge you to get your copy from the Canterbury Museum in New Zealand. There

are some features which cannot be conveyed in a transcription, like the

sketch of South Georgia Island as they approached.

The reduction already transcribed was the easiest to read, and that took well

over 1 hour to get right. Every character must be letter perfect, or the

desired detail is lost. I was determined to get it right.

Thanks very much for figuring out the reduction method.

Best Regards

Brad

### Re: How Worsley Navigated

**From:** George Huxtable  
**Date:** 2009 Mar 1, 13:49 -0000

**Source:** [fer3.com/arc/m2.aspx/How-Worsley-Navigated-Huxtable-mar-2009-g7488](http://fer3.com/arc/m2.aspx/How-Worsley-Navigated-Huxtable-mar-2009-g7488)

This is a follow-up to my posting yesterday, trying to follow the details of

a page in Worsley's log, from the James Caird's voyage to South Georgia.

It's mainly for Brad, and for anyone else who may take an interest. Brad's

transcript of that page is attached (again). Also, the corresponding page

from Worsley's account, in his "Shackleton's boat journey". There seems to

be a discrepancy between them, which I can't understand.

The written account clearly says that a (poor) observation was made at 9.45

am, and then again at noon. The 9.45 must refer to local time, because at

9.45 am GMT, it was still dark. So he is talking about an initial

observation, a couple of hours or so before noon, which is certainly getting

a bit close to noon for a good time-sight; presumably why he refers to the

"lateness of the hour" as a shortcoming. There's no mention of any other

observation, later that day

However, the left column, of Brad's transcribed log, must surely be

representing times. And a Greenwich time of 5.10.14 , if it represents

chronometer time of 5hrs 10 min 14 sec, will be well AFTER local noon, which

must be at about 2 hrs 40 min or so after Greenwich noon. So it's therefore

an afternoon observation, not a morning one. Which presumably explains the

"P.M.", written on the same line.

That has no effect on the spherical trig calculation of local hour angle at

the time of the observation, which ended up with 2hrs 50 min 03 sec, which

is symmetrical about local noon, and would apply exactly the same pm as am,

except that the hour-angle would be offset in the opposite direction. All

this makes the time calculation, and the resulting longitude, a lot more

understandable.

An afternoon observation, made over 5 hours after Greenwich noon, also fits

in better with the values that Worsley used for Sun declination and for

Equation of time, which were roughly halfway between the predictions for

Greenwich noon on 7 May and for the following midnight, based on the

information Frank Reed provided.

========================

Yesterday, trying to understand the final adjustment that had been made to

longitude, in the left-hand column, of 25', I wrote- "The revised value,

marked "39º 34' Noon", can't reflect ground gained in the period up to noon,

because it shows a 25-minute increase in Westerly longitude, and the Caird

was travelling largely Eastward." That assumed that the time-sight had been

made in the morning.

However, if the longitude observation had been made after noon, not before

(as now seems likely), and Worsley wanted to back-track it to estimate the

position they had been in at their local noon, then as they were travelling

Eastwards, that would require shifting their position further West, just as

he actually did. Such a 25' change would presume a speed of Easting of 5

knots, which does seem rather much for such an under-canvassed craft as

Caird.

========================

But if this reassessment, that it was an afternoon time-sight, is correct,

why on Earth did Worsley write that it was at 9.45 am? Was he, I wonder,

writing from memory, and separated from his log-book? It's very strange. Any

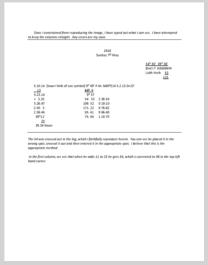
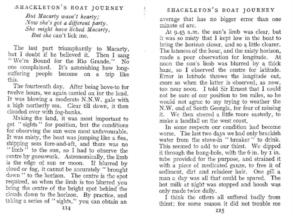
ideas?

George.

contact George Huxtable, at george{at}hux.me.uk

or at +44 1865 820222 (from UK, 01865 820222)

or at 1 Sandy Lane, Southmoor, Abingdon, Oxon OX13 5HX, UK.

**Attached File:**  [[](http://fer3.com/arc/img/107488.7may1916.pdf)](http://fer3.com/arc/img/107488.7may1916.pdf)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107488.7may1916.pdf)   [http://fer3.com/arc/images/vu-icon.png](http://docs.google.com/viewer?url=http://fer3.com/arc/img/107488.7may1916.pdf)  
**Attached File:**  [[](http://fer3.com/arc/img/107488.worsley3.jpg)](http://fer3.com/arc/img/107488.worsley3.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107488.worsley3.jpg)

### Re: How Worsley Navigated

**From:** Brad Morris  
**Date:** 2009 Mar 1, 13:25 -0800

**Source:** [fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-mar-2009-g7496](http://fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-mar-2009-g7496)

Hi George

There are three observations and therefore 3 reductions on that day and page.

I chose the last one, because it was the easiest to transcribe. Ha! It’s all

relative, you should see some of the pages.

The reduction provided was not the 9:45 AM reduction, and yes, there is a

notation in the log about how indistint the sun was for that observation.

There is a second observation around noon, also not provided in the

transcription. Finally, there is the third observation this day, which is

part of the transcript provided. Worsley is not consistent with regards to

the page/day scheme. Some pages have as many as three days. This page has

three observations.

I wanted to help your understanding. It is clear that the written accounts in

the books are not providing line for line accuracy relative to the logbook.

This is clearly a case of just that kind of writer's license.

To re-iterate, there are 3 observations on this day. This is a PM

observation. I have not provided a transcript of the entire page, rather,

just the one that was easiest (ha!) to transcribe.

Best Regards

Brad

### Re: How Worsley Navigated

**From:** George Huxtable  
**Date:** 2009 Mar 2, 00:22 -0000

**Source:** [fer3.com/arc/m2.aspx/How-Worsley-Navigated-Huxtable-mar-2009-g7499](http://fer3.com/arc/m2.aspx/How-Worsley-Navigated-Huxtable-mar-2009-g7499)

Brad has now clarified that Worsley observation for 7 May, and things are

starting to fit together. I look forward to seeing a transcription of the

rest of that page to fill in the jigsaw.

A few more suggestions for Brad to ponder-

At the top, against "Bird Island", he has given N56E68W. I wonder if this

might instead be transcribed as N56E (that is, a course of 56º E from North,

or 056º), followed by 68 M, rather than 68W. That might correspond to

course-and-distance to Bird Island, and then another 53 miles to Leith,

adding up to 121 miles altogether to Leith. Just a thought.

At the right-hand end of a long line of obscure numbers, ending with 13.0 =

23', is this perhaps stating that at that latitude, 13.0 miles corresponds

to 23' of longitude, which is nearly, if not precisely, true. Just before

that does it perhaps read N68º E, corresponding to a course being made?

Just below the chronometer reading is the figure of 13, which I take to be

chronometer error of exactly 13 minutes and zero seconds. It would be

interesting to see if this number changes each day by a few seconds, due to

the chronometer rate being inexact.

Just below the sextant reading is a figure of 8', which I expect might be

Worsley's routine figure for overall sextant correction, in which case it

should be just about the same each time, except perhaps for a bit of

refraction.

Brad might keep an eye open for these matters.

Brad wrote- "The reduction provided was not the 9:45 AM reduction, and yes,

there is a notation in the log about how indistint the sun was for that

observation."

In Worsley's text, what he said was that it was the horizon that was misty

at 9.45 am, and then the Sun limb was clear. It was the noon observation

that was affected by a blurry Sun.

George.

### Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 2, 11:16 -0800

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7512](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7512)

Hi George

Rather than keep you on pins and needles, waiting for an entire transcription,

I thought I would give an each day as I go.

Herein find 24 April 1916, where Worsley attempts to rate his chronometer.

This is the first day, when he makes his departure from Wild Camp. In the

previous day he writes "Cape Belsham" but in this day he writes "C.Belsxxxx",

I assumed he was making reference to the same location.

There are several places where I cannot read his handwriting or there is a

smudge in the text, making it most illegible. Perhaps we can tease it out by

inference. The hardest part is to place the characters as he has them in his

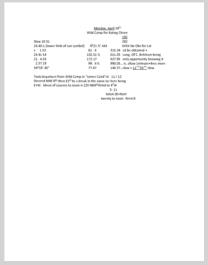
log. He strays from the lines from time to time, making this not exactly as

it appears in the images I have.

Anyway, here is the first installment!

Best Regards

Brad

**Attached File:**  [[](http://fer3.com/arc/img/107512.the-log.pdf)](http://fer3.com/arc/img/107512.the-log.pdf)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107512.the-log.pdf)   [http://fer3.com/arc/images/vu-icon.png](http://docs.google.com/viewer?url=http://fer3.com/arc/img/107512.the-log.pdf)

### Re: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 3, 07:22 -0800

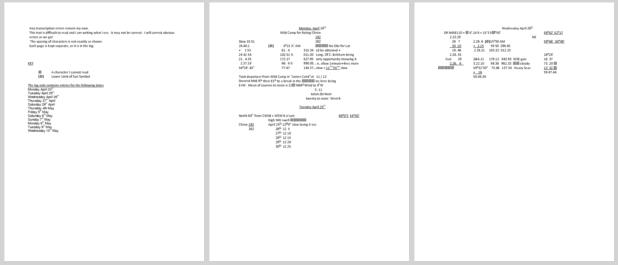
**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7536](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7536)

Here is today's installment of Worsley's Log

It now is inclusive of dates 24April -> 26April, 1916

Best Regards

Brad

**Attached File:**   
[](http://fer3.com/arc/imgx/f1-The-Log.pdf)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/f1-The-Log.pdf)   [http://fer3.com/arc/images/vu-icon.png](http://docs.google.com/viewer?url=http://fer3.com/arc/imgx/f1-The-Log.pdf)

### Re: How Worsley Navigated

**From:** Brad Morris  
**Date:** 2009 Mar 3, 07:32 -0800

**Source:** [fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-mar-2009-g7538](http://fer3.com/arc/m2.aspx/How-Worsley-Navigated-Morris-mar-2009-g7538)

George is 100% correct, the notation by Bird Island is N56E 68 M. Worsley's

handwriting isn't exactly the best, nor is my eyesight!

Whoops!

Best Regards

Brad

### Re: How Worsley Navigated

**From:** George Huxtable  
**Date:** 2009 Mar 3, 23:39 -0000

**Source:** [fer3.com/arc/m2.aspx/How-Worsley-Navigated-Huxtable-mar-2009-g7549](http://fer3.com/arc/m2.aspx/How-Worsley-Navigated-Huxtable-mar-2009-g7549)

Brad has kindly sent further transcribed pages, from Worsley's log of the

Caird voyage, and I propose to do my best to decode them. Now we have

largely cracked the working of one observation, I expect the others will

follow without too much hassle.

But there are quite a few pages, so this is likely to run and run.

Which leads me to this question. Is this a dialogue just between Brad and

me, or is anyone else taking an interest? If anyone else is following the

matter, please post a note to say so (even just one such request will do).

Otherwise we will, if Brad agrees, take the discussion off-list.

I've been following up a few contacts. I have an old friend who has actually

crossed South Georgia, in Shackleton's tracks, about 25 years ago. He has

alerted me to a publication, in a Geographical Journal, of an article

describing a survey of Elephant Island in 1970, with fold-out map. I hope a

copy will arrive soon. He has also pointed me to a book by Dunnett, founder

of the James Caird Society, called "Shackleton's Boat", ISBN 0948028025.

This appears to be now out of print, and available second-hand (from the US,

mostly) at an eye-watering price. I've located a copy that's a bit less

eye-watering, and hope to see it soon. I am told that it contains

transcriptions from the Worsley log (about which more anon).

I've also made some enquiries of my own at Canterbury Museum, where the

original log is held. Explaining my interest, I asked if anyone else had

analyzed those observations, as there's no point in the same thing being

done twice. They told me that an American had made enquiries , back in

November, and kindly offered to put us in touch. This evening, he phoned me,

and it turns out to be a navigator with whom I had had dealings some years

ago, concerning the Lewis and Clark expedition. It is a small world we

occupy, those interested in celestial nav. It turns out that he has a copy

of the Dunnett book, in which he tells me that Worsley's log has been

incompetently transcribed, by someone who clearly had no idea what all those

numbers meant. Anyway, he and I and Brad seem to be thinking along similar

lines. I will try to entice him into Navlist.

George.

### Fw: Transcription of Worsley's Log

**From:** George Huxtable  
**Date:** 2009 Mar 4, 14:15 -0000

**Source:** [fer3.com/arc/m2.aspx/Fw-Transcription-Worsleys-Log-Huxtable-mar-2009-g7559](http://fer3.com/arc/m2.aspx/Fw-Transcription-Worsleys-Log-Huxtable-mar-2009-g7559)

Following an expression of continuing interest from Bob Stacy, I'll keep

this discussion on-list, then.

Brad has kindly provided further pages of transcription, on website

http://www.fer3.com/arc/imgx/f1-The-Log.pdf .

I will start with the day of departure of the James Caird from Elephant

Island, April 24 1916. There seem to be minor discrepancies between what

Worsley wrote in his book "Shackleton's Boat Journey", and the log account

(for example, he says they started half an hour after noon, but the log

seems to differ, unless we should be reading the numbers for departure time

as 12 1/2 rather than 11/12. Discrepancies shouldn't surprise us much. These

events happened in 1916; Worsley first wrote about them in 1931, in

"Endurance", with little navigational detail, but his boat journey account

didn't appear until 1940. He may not even have had his log to hand to

refresh his memory of events 24 years earlier.

Much of what I will write below is somewhat tentative, but I'm getting

increasingly confident that the jigsaw is falling into place, bit by bit.

There seems to be a clear error in Brad's transcription (or in Worsley's

figuring) in the left column, where 2.37.19 is written when it should be

3hrs 37 min 19 sec, the difference between the two times written above it.

It appears that by that date, Worsley was reckoning his chronometer to be

late on GMT by 10 min 52 sec. The log for earlier parts of the journey,

which Brad may not have, might explain how he arrived at that figure. Star

occultations, as we have discussed already, may have played a part in the

process.

Worsley talks about an observation for "rating" his chronometer on that day,

but there's a subtle difference between what he was doing, which was finding

out the error of his chronometer on GMT, and what we normally understand by

"rating".

Rating normally calls for at least two observations of Sun or star, taken at

the same spot but one or more days apart in time, to determine how much each

day the chronometer was gaining or losing. From the entries on the next

page, he appears to be assessing the chronometer as losing 5 seconds per

day; that's what we refer to as its "rate", and presumably it had been so

assessed from its previous history. [That explains the question that arose

in an earlier posting [7468], where the chronometer error for May 7th was

given as 13 minutes, no seconds being stated. I didn't expect that Worsley

was just using a whole number of minutes as a rough approximation. He could,

and perhaps should, have stated it to be 13 min 0 sec. It fits together,

now.]

Just before departure, on the morning of April 24th, came the only

opportunity to observe the Sun. Such a single observation provided no chance

to reassess the rate, so he had to stick with 5 sec losing per day. What

Worsley had to do that morning, his first sight of the Sun since he arrived

on land for the first time for a year, was to assess his longitude as best

he could from the known geography of Elephant Island at that time, and

compare that with the longitude obtained from an observation of the Sun,

away from noon. Any divergence must relate to an error of the chronometer.

That's the calculation that all those numbers for 24th April refer to.

The calculation he had to make required accurate knowledge of his latitude.

But around noon they were frantically busy loading Caird and setting off; no

chance of a noon Sun observation then. So Worsley had to rely on whatever

paper records of the position of Elephant Island they possessed. Remember,

there was no initial intention for the expedition to go anywhere near it.

Presumably, he would have it on a chart, but at what scale? It's given as a

stated position in the tables with Norie's Navigation (1914), which they

were likely to possess, as "summit 61º 11' S, 54º 50' W". There are indeed

several summits, some distance apart, so that information is less helpful

than it might be. Worsley needed the position for Camp Wild, on the Northern

coast, rather toward the Eastern end.

After that preamble, let's look at his numbers for that day.

The left column starts with his initially-presumed chronometer error, and

the chronometer reading at the moment of observation. There is no pair of

times, observed and corrected, such as we saw recorded on May 7th, so

presuming Worsley accounted for that error, he must on this occasion have

made the correction "in his head", and noted only the corrected time.

Anyway, that's what we will assume for now, but note that it's an

assumption.

Next is a correction for equation of time, which looks about right, so 24hrs

41 m 54 sec should be the Greenwich Time of apparent noon, if the

chronometer error is exact..

Now go to the next column, which gives the recorded Sun altitude to be 8º 21

1/2' , and that it's an a.m. sight. Note that there's no stated correction

for index error, dip, refraction, so all we can assume here is that Worsley

has made any necessary correction before noting the result. Not recommended

practice, and not how he works on May 7th, but there it is.

Then, working down that column- The next figure is the assumed latitude,

taken from Worsley's best estimates of the geography of Elephant Island, in

the absence of an observation. Here I think Worsley's figure of 61º 04' is a

bit in error. From more modern mapping, I would put Wild camp at something

like 61º 08'S, which is quite a serious discrepancy, as that gives rise to

a clock-error that causes an error in longitude of several times that 4'

error in latitude. So already, before Caird even sets off, there is a

potential error in her longitude, of the order of 10' or so. I hope to get

more definitive mapping for Elephant Island, soon.

Next, we have the Sun's South Polar distance, or 90º + Sun dec, of 102º 51

1/2', which corresponds, then, to Sun dec. of 12º 51 1/2', a reasonable

value for that date. Next is the sum of the three angles above, next is that

sum halved, and finally, the remainder after the original Sun altitude has

been subtracted from the half-sum. This is exactly the same pattern as we

saw for May 7th.

And now to the right-most column for some five-figure log-trig values, just

as for May 7th, as follows-

log sec lat; log cosec polar distance; a gap opposite sum-of-three; log cos

half-sum; and log sine remainder, the overall sum of these logs amounting

to x.14437, where we neither know or care much about calculating the value

of x, as the log simply has to end up as somewhere near 9.

Next we look up, in the log haversine table, the angle, or equivalent time,

for which the log hav turns out to be 9.14437, and we get 2h 55m 25 sec.

Seeing that it's before noon, we subtract from 24, to give 21h 4m 35 sec,

the time with respect to local apparent noon. (Remember that in the

conventions of those days, 24 h corresponded to noon, not midnight)

The difference between those times, converted to degrees at 15 degrees per

hour, should correspond to the longitude of the observation point, worked

out by Worsley to be 54º 19' 45". Worsley doesn't lell us what true

longitude he took for his observation point, but from the result concludes

that his chronometer was actually more slow, by 1 minute 4 sec, than the 10

min 51 sec he had been assuming, or 11min 55 all told. That, then, becomes

the basis for the chronometer correction from then on, but increasing by 5

sec each day.

Near the bottom, Brad shows "mean of couses to noon is 22XN64m Wind to 4'".

I can't make much sense of all that but invite to consider whether it might

start with "NExN..." instead. I don't want to put letters into his mouth,

but Northeast by North would be pretty near to the overall course after

steering 8miles North northeast, then 1 mile East. Is that a plausible

reading?

I will leave it there for now.

George.

### Re: Fw: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 4, 07:36 -0800

**Source:** [fer3.com/arc/m2.aspx/Fw-Transcription-Worsleys-Log-Morris-mar-2009-g7561](http://fer3.com/arc/m2.aspx/Fw-Transcription-Worsleys-Log-Morris-mar-2009-g7561)

The time of departure from Wild on the 24th is very close to the margin and

quite muddled. I can't be sure exactly what it says. This might take

another set of eyes on the reproduction (or perhaps the color reproduction,

which I did not purchase). Canterbury Museum prohibits further reproduction

and I chose to respect that. For now, I will leave this alone in the log.

The left hand column, where I had transcribed 2.37.19, should read 3.37.19

Worsley's twos and threes look very much alike and in particular, this is

very lightly written. Since I expect that Worsley knows how to subtract two

numbers, I have corrected this item. My error.

I don't have other parts of Worsley's log and so am unable to determine how he

knows his chronometer is late by 10m52s. When we get through this, I will

approach Canterbury Museum around the occultation dates given so we can see

how he treats this data. For now, we must accept his rating. He is, after

all, the navigator and we are just along for the ride.

I have the very latest charts for the Antarctic Peninsula, to include Elephant

Island. That will have to wait until I can scan it in and post. I need a

few days for this, so bear with me.

At the bottom of 24 April, there is jumble of characters which is crammed into

a very small space. It appears to be keeping track of course and speed for

his DR. It is most assuredly a mess and incredibly hard to transcribe.. I

have changed the 22 into illegible characters.

The dots appear quite plainly in his logarithmic values. They look to be

placeholder marks so he doesn't add up the wrong numbers. That is, when he

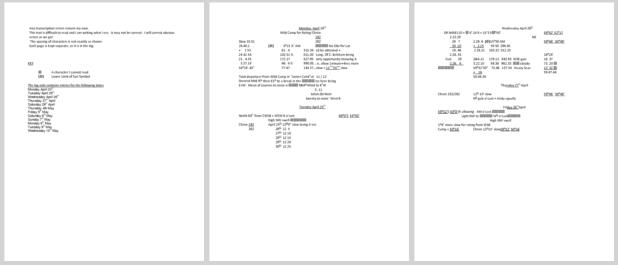
writes 298.85 (corresponding to 59Deg50Min), the dot is there. It appears

midway up, not exactly at the base, but the intention is plain.

I have updated the log to get us as far as 28 April. Enjoy!

Best Regards

Brad

**Attached File:**   
[](http://fer3.com/arc/imgx/f2-The-Log.pdf)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/f2-The-Log.pdf)   [http://fer3.com/arc/images/vu-icon.png](http://docs.google.com/viewer?url=http://fer3.com/arc/imgx/f2-The-Log.pdf)

### Re: Transcription of Worsley's Log

**From:** George Huxtable  
**Date:** 2009 Mar 5, 17:20 -0000

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Huxtable-mar-2009-g7565](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Huxtable-mar-2009-g7565)

A few further notes about Worsley's log pages of the boat journey with

Shackleton from Elephant Island to South Georgia in 1916.

Brad has added to his pages of transcription, on website

http://www.fer3.com/arc/imgx/f1-The-Log.pdf .

Referring to the log for the date 24th April-

Brad's transcription refers to a "break in the xxxxx ice". I wonder if that

might be pack ice, possibly brash ice; might either fit?

The time of the observation is given as 24.40 1, which I expect is the GMT,

from the chronometer, and we have presumed that the correction for the

chronometer being slow by 10 min 51 sec has already been made.

That's an odd way to denote a Greenwich time after Greenwich noon, isn't it?

Remember, in those days, the Greenwich day started at Greenwich mean noon,

so 0 hrs GMT for 24th April corresponded to noon, halfway through the civil

day of 24th April. That was the way Greenwich dates and times were noted in

almanacs of that era, recorded in Astronomical Time, which ran 12 hours

later than ordinary civil time. To everyone's confusion, though I imagine

that navigators had got accustomed to it, and thought it to be the natural

and unchangeable order of things.

But it seems odd that Worsley notes a time, 40 minutes after Greenwich noon,

as 24.40.01, and not 00.40.01 . I suppose it's no more illogical that our

present habit of referring to 40 minutes after noon as 12:40 pm rather than

00:40 pm. Perhaps it's the old reluctance to use zero as a number on its

own, that I suspect relates to Roman numerals, which were always used on

clock dials, and which lacked a symbol for zero. Presumably, for Worsley the

GMT, twenty minutes later, would suddenly change from 24.59.59 to 01.00.00.

Anyway, it's convenient that the time has in that way been enhanced by 24

hours, because it then makes it simpler to subtract from it the Local

Apparent Time of 21 hrs 04 min 35 sec, derived from the observation of the

Sun.

From the difference between Greenwich Apparent Time, 24 hrs 41 min 54 sec,

and that Local Apparent Time, Worsley deduced the longitude of his

observation point to be 54º 19' 45" West, but that depends on the value

assumed for chronometer error, 10 min 51 sec, being correct. If it was, that

longitude would correspond with the longitude of his observation point. He

doesn't tell us, on that page, what value he has taken for the longitude of

Wild Camp; does he do so elsewhere, I wonder? Perhaps we can work it

backwards, from that deduced longitude, and the correction he found it

necessary to make to the chronometer, of 64 sec of time. That implies a

change of 16' of longitude, which means, if I've applied it in the right

direction, that Worsley thought his true longitude, at Wild camp, to be 54º

45' 45".

Now I have received a copy of the Geographical Journal for September 1972,

with a nice report of a British Joint Services expedition to Elephant Island

in 1970, with a superbly detailed fold-out contoured map and claiming

accurate survey. That confirms, pretty well, the latitude of Wild Camp that

I suggested in a previous posting as 61º 08' S (though now I would revise my

estimate to 61º 07') and which Worsley had taken to be 61º 04'. And that map

provides a true longitude of 54º 52' for the camp, 6 miles further West that

Worsley seems to have thought it was. That wouldn't, in itself, be a great

surprise. I doubt whether such obscure Antarctic islands had been systematic

surveyed with any great accuracy, especially for longitude.

So if he had a modern value for the longitude of Wild camp, then he would

have increased his chronometer error by another 24 sec to adjust for that

extra 6 miles, to make the chronometer error on that day 12 min 19 sec, not

11 min 55 sec. Then that would increase by 5 sec per day, as before.

If Worsley was setting off with such an discrepancy in his initial

longitude, affecting has assessment of chronometer error, that would stay

with him all the way to South Georgia. Not Worsley's fault, and there was

nothing he could do to fix it. When he admitted to Shackleton, nearing South

Georgia, that he couldn't be sure of his position to within 10 miles, quite

a lot of that error must have been inbuilt from the start.

George.

### Re: Transcription of Worsley's Log

**From:** Paul Hirose  
**Date:** 2009 Mar 05, 15:08 -0800

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Hirose-mar-2009-g7568](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Hirose-mar-2009-g7568)

George Huxtable wrote:

> That's an odd way to denote a Greenwich time after Greenwich noon, isn't it?

> Remember, in those days, the Greenwich day started at Greenwich mean noon,

> so 0 hrs GMT for 24th April corresponded to noon, halfway through the civil

> day of 24th April. That was the way Greenwich dates and times were noted in

> almanacs of that era, recorded in Astronomical Time, which ran 12 hours

> later than ordinary civil time.

You're correct that zero hours astronomical time came 12 hours after

zero hours civil time of the same date. But that made the astronomical

time of an event 12 hours \*earlier\* (i.e., less than) than the

corresponding civil time.

One way to remember the difference between the astronomical, civil, and

nautical day is to arrange the names in alphabetical order: 0000

astronomical = 1200 civil = 2400 nautical (same date for all).

The change to the meaning of GMT commencing in 1925 was controversial.

For example, in 1921 The Observatory published several letters to the

editor on the subject:

http://adsabs.harvard.edu/cgi-bin/nph-abs\_connect?ref\_stems=Obs....44&jou\_pick=YES&return\_req=no\_params&end\_year=2009

(Search the page for the word "time", and note that the articles are in

reverse chronolgical order.)

--

I filter out messages with attachments or HTML.

### Astronomical Time. was Re: Transcription of Worsley's Log

**From:** George Huxtable  
**Date:** 2009 Mar 6, 11:17 -0000

**Source:** [fer3.com/arc/m2.aspx/Astronomical-Time-was-Transcription-Worsleys-Log-Huxtable-mar-2009-g7570](http://fer3.com/arc/m2.aspx/Astronomical-Time-was-Transcription-Worsleys-Log-Huxtable-mar-2009-g7570)

Thanks to Paul Hirose for correcting my statement that "Astronomical Time ran

12 hours later than ordinary civil time." He is, as usual, absolutely

correct. The Astronomical day started at noon, 12 hours after the

corresponding civil day started, so from then on the Astromical Times on the

same day were 12 hours less.

Perhaps I should add the astronomical time at midnight was 12 hours, and

after midnight it continued to increase up to 24 hours as the next noon

approached. But over that morning , midnight to noon, when astronomical time

was 12 hours greater than civil time, the dates differed by one. The civil

date changed at midnight, just as we're used to now, but the astronomical

date didn't (until noon), so over the morning the astronomical date lagged,

by a day less than the civil (calendar) date.

I find the whole business dreadfully confusing, and hope I haven't spread my

own confusion to Navlist, too badly.

What I haven't resolved in my mind is how day-names were treated in an

almanac which worked in astronomical time, before 1925. Surely, Sunday

didn't turn into Monday on the stroke of noon, or they wouldn't have been

able to hold morning and evening church Sunday services on the same day.

How, then, did they tie together date (day number of month) with day-name,

in Astronomical time?

George.

### Fw: Image of Sextant Used by Worsley

**From:** George Huxtable  
**Date:** 2009 Mar 6, 23:03 -0000

**Source:** [fer3.com/arc/m2.aspx/Fw-Image-Sextant-Used-Worsley-Huxtable-mar-2009-g7574](http://fer3.com/arc/m2.aspx/Fw-Image-Sextant-Used-Worsley-Huxtable-mar-2009-g7574)

Brad wrote, about the sextant that had been used on the Caird voyage-

| Here is an image of the sextant used by Worsley. I did not take the

image, but found it on the internet. I contact the individual who took it

and he confirmed that it is of the sextant that tours with the James Caird

|

| You may judge for yourself as to the correctness of the painting on the

cover of the book relative to this sextant.

I now have a copy of "Shackleton's Boat", by H M Dunnett, who founded the

James Caird Society. That provides a picture of the sextant that they claim

was used by Worsley on the voyage. Not Worsley's own sextant, however; he

stated that he borrowed Hudson's (Endurance's navigator) for the voyage,

because he found it easier to use on the boat (without saying why). The two

pictures are not identical, but it looks as though the sextant is. It all

fits.

That instrument, you can tell from the angle of the spindle for the

adjustment knob, is a Heath Hezzanith "endless tangent" model, which doesn't

use a shoe and clamp, which would call for resetting when it reached the end

of its range. It was constructed just like a micromter sextant, except that

its angle wasn't measured by turns of a calibrated drum, but by a Vernier

scale. Indeed, one turn of the drum didn't need to correspond to one degree

of observed angle; the pitch of the rack could be (and usually was) much

finer than that. It was a half-way step in the transition from Vernier to

micrometer sextant, but made no great demands for accurate machining of rack

and worm. I wonder if the endless tangent was the feature that Worsley

liked, which his own sextant didn't provide?

George.

**Attached File:**  [[](http://fer3.com/arc/img/107574.sextant-of-the-caird-(shackleton).jpg)](http://fer3.com/arc/img/107574.sextant-of-the-caird-%28shackleton%29.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107574.sextant-of-the-caird-(shackleton).jpg)  
**Attached File:**  [[](http://fer3.com/arc/img/107574.worsley-6.jpg)](http://fer3.com/arc/img/107574.worsley-6.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107574.worsley-6.jpg)

### Re: Fw: Transcription of Worsley's Log

**From:** George Huxtable  
**Date:** 2009 Mar 6, 23:46 -0000

**Source:** [fer3.com/arc/m2.aspx/Fw-Transcription-Worsleys-Log-Huxtable-mar-2009-g7575](http://fer3.com/arc/m2.aspx/Fw-Transcription-Worsleys-Log-Huxtable-mar-2009-g7575)

Now that I have a copy of H M Dunnet's "Shackleton's Boat" (1996), I can

report on what it says about "Worsley's log of the boat journey" in part V.

He starts by claiming "Worsley's log of the boat journey is preserved at the

Scott Polar Research Institute. It was found in a suitcase full of papers

bequeathed to the Institute by Sir James Wordie's successors".

and later "Worsley's log. Transcribed by J M Wordie ... from the original

in Worsley's second work book."

That's a bit of a surprise, in view of the evidence that the original

manuscript log was available to Brad from the Canterbury museum in New

Zealand. There can't be two such originals.

I've tackled the curator of the library of the Scott Institute about this,

and she accepts that what they have there may be a "fair copy" of that log,

not the original itself. Unfortunately, their archive is in a state of

upheaval at present, and won't be accessible again until July.

I won't reproduce Dunnet's 6 pages of log transcripts here, but will copy it

to Brad, who will find it helpful, off-list . It looks as if Wordie has been

able to transcribe words that have eluded Brad (he may have been familiar

with Worsley's handwriting / figuring, and closer in touch with the events

and terminology) so putting the two documents together should be productive.

However Dunnet omits all of Worsley's spherical-trig calculations that have

been providing us with a bit of fun. I wonder when they got left off? Are

they in Wordie's own transcript? Just a set of boring old numbers that

nobody can understand, perhaps?

One of the quantities that has puzzled me is that on two occasions when

Worsley refers to his chronometer he provides the numbers "192 / 262",

without explanation. What I suspect now is that this may just be a serial

number which identifies that chronometer (even if it was the only one

aboard).

George.

### Re: Fw: Image of Sextant Used by Worsley

**From:** Brad Morris  
**Date:** 2009 Mar 6, 17:00 -0800

**Source:** [fer3.com/arc/m2.aspx/Fw-Image-Sextant-Used-byWorsley-Morris-mar-2009-g7577](http://fer3.com/arc/m2.aspx/Fw-Image-Sextant-Used-byWorsley-Morris-mar-2009-g7577)

Hi George

The helical screw is mounted on a spring mounted hinge, which keeps the screw

in contact with the teeth milled into the back of the arc.

When you press the release, the screw lifts off of the arc and you can easily

move the helical screw to another section of the arc.

You could (with a lot of effort) use the adjusting knob to move the vernier

from one end of the arc to the other, but who would want to?

Best Regards

Brad

### Re: Fw: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 6, 17:04 -0800

**Source:** [fer3.com/arc/m2.aspx/Fw-Transcription-Worsleys-Log-Morris-mar-2009-g7578](http://fer3.com/arc/m2.aspx/Fw-Transcription-Worsleys-Log-Morris-mar-2009-g7578)

Hi George

I will go with that assessment of the numbers 192/262. They do seem to be

some sort of identifying mark in the log, without other meaning. It always

follows the "Chron." word, without fail.

I would hazard a guess that his habit was to identify WHICH chronometer he was

dealing with. Other sections of the log would clear this up, when multiple

chronometers were available.

Best Regards

Brad

### Re: Image of Sextant Used by Worsley

**From:** George Huxtable  
**Date:** 2009 Mar 7, 07:16 -0000

**Source:** fer3.com/arc/m2.aspx/Image-Sextant-Used-Worsley-Huxtable-mar-2009-g7579

Brad wrote, about his sextant

The helical screw is mounted on a spring mounted hinge, which keeps the

screw in contact with the teeth milled into the back of the arc.

When you press the release, the screw lifts off of the arc and you can

easily move the helical screw to another section of the arc.

You could (with a lot of effort) use the adjusting knob to move the

vernier from one end of the arc to the other, but who would want to?

=================

What Brad has described above is the standard arrangement for engaging worm

with rack, which applies to every micrometer sextant, and to some Vernier

sextants; those with the "endless tangent screw" feature.

Other Vernier instruments used a short screw for fine positioning of the

arm, that usually worked against a spring, in a shoe which could be clamped

on to the arc in an appropriate spot, allowing a few degrees of adjustment

before the screw ran out of thread. To make big changes, to get the index

arm to roughly the right place, you freed the clamp and shifted the arm

without using the screw.

This arrangement could be frustrating if you are following an object as it's

continually rising or descending, as eventually the fine-adjustment runs out

of range, forcing you to slacken the clamp, readjust the screw to bring it

to mid-range again, then reclamp. Indeed, the standard adjusting screw and

clamp screw were often fiddly objects, which would be hard to work with

gloves on. I can see the particular advantage of the endless tangent in

those cold waters.

The endless tangent, and the standard micrometer arrangement, both avoid

this difficulty; they never run out of range. And just as Brad says, to make

big changes, you press a button or lever to disengage the worm from the

rack, which allows the arm to swing freely; then release, when the worm

clicks in to the nearest notch in the rack. It's far more convenient.

George.

### Re: Fw: Image of Sextant Used by Worsley

**From:** Bill Morris  
**Date:** 2009 Mar 7, 11:18 -0800

**Source:** [fer3.com/arc/m2.aspx/Fw-Image-Sextant-Used-byWorsley-Morris-mar-2009-g7583](http://fer3.com/arc/m2.aspx/Fw-Image-Sextant-Used-byWorsley-Morris-mar-2009-g7583)

Here's a labelled photo of a Heath sextant of the same period, to supplement Brad's explanation.

Bill Morris

Pukenui

New Zealand

**Attached File:**   
[](http://fer3.com/arc/imgx/Heath-vernier-detail.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/Heath-vernier-detail.jpg)

### Re: Fw: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 7, 20:33 -0800

**Source:** [fer3.com/arc/m2.aspx/Fw-Transcription-Worsleys-Log-Morris-mar-2009-g7587](http://fer3.com/arc/m2.aspx/Fw-Transcription-Worsleys-Log-Morris-mar-2009-g7587)

Hi George (and to all those folks following Worsley's Journey)

First I want to thank you for the Dennett Transcription, but it is clear that

the person who did that equally had trouble. For example, on the 24th of

April, the transcription has them "rathing" the chronometer, not rating the

chronometer. Further, not one of the reductions is given, just a note that

there is an observation. The Dennett Transcription has helped me with a few

words I could not read however, and for that I am grateful.

On the 24th, Worsley talks about a break in the XXXXX ice. Dennett has that

as "stream" ice. It may very well be that word, but H.O.Pub 609 "Functional

Glossary of Ice Terminology" 1952 has no entry for "stream ice". In my copy

of "Endurance, An Epic of Polar Adventure" Worsley ;1933 Worsley refers to

this as an "encircling line of pack ice". Since "stream" could be the word,

I have made it so.

An interesting bit is that the Dennett Transcription shows log entries for 30

April thru the 3rd of May, something Canterbury Museum said that they did not

have. I will approach them for resolution

The log is now updated to the 6th of May 1916. The data for 4 May is nearly a

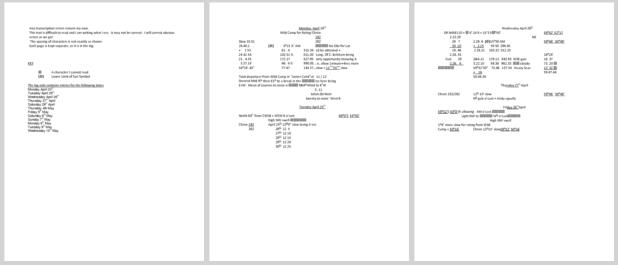
black blob. At best, we only can get a partial reconstruction of the data.

This is the worst of the lot. Other dates are much clearer. I beg

forgiveness for all the errors I have probably made, the log book is a mess.

Best Regards

Brad

**Attached File:**   
[](http://fer3.com/arc/imgx/f3-The-Log.pdf)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/f3-The-Log.pdf)   [http://fer3.com/arc/images/vu-icon.png](http://docs.google.com/viewer?url=http://fer3.com/arc/imgx/f3-The-Log.pdf)

### Re: Fw: Transcription of Worsley's Log

**From:** George Huxtable  
**Date:** 2009 Mar 8, 09:02 -0000

**Source:** [fer3.com/arc/m2.aspx/Fw-Transcription-Worsleys-Log-Huxtable-mar-2009-g7591](http://fer3.com/arc/m2.aspx/Fw-Transcription-Worsleys-Log-Huxtable-mar-2009-g7591)

Frank wrote-

Brad, you wrote:

"Dennett has that as "stream" ice. It may very well be that word, but

H.O.Pub 609 "Functional Glossary of Ice Terminology" 1952 has no entry for

"stream ice". "

If you go to the Google Books Advanced Search page and enter "stream ice"

in the exact phrase box and then set the max date to, say, 1920, you will

find a number of hits that define this term. Maybe it's no longer accepted

terminology?

As long as it fits the crossword-puzzle, "stream-ice" is certainly the

correct reading. But there's no need to stray so far from Worsley's text to

find that term; it occurs several times in his "Shackleton's boat journey",

though not, I think, in his "Endurance". For technical detail, "Boat

Journey" is certainly the best book to read.

Shortly before departure, Worsley with Shackleton had ascended a 150 ft rock

to take a look around. They saw a broad band of ice, about 2 miles offshore,

that threatened to surround the island. These were broken-up floes and

streams of ice carried on the current from Bransfield Strait. "Grounded

bergs indicated shoal patches, but troubled us not at all. They served us

well by breaking the line of stream ice and making two gaps, one of which

looked a promising opening through the imprisoning ice-chain which encircled

this isle of desolation."

George.

### Re: Transcription of Worsley's Log

**From:** Frank Reed  
**Date:** 2009 Mar 8, 13:10 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-FrankReed-mar-2009-g7594](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-FrankReed-mar-2009-g7594)

Henry H, you wrote:

"The word "stream", as you all undoubtedly know, has many nautical

connotations. According to HO 220, it may be used in connection with ice to

describe ... "A long narrow area of drift ice, usually consisting of small

fragments detached from the main belt, and drifting under the influence of

wind or current." ... My copy of this pub is dated 1956."

Yes, that fits well with the definitions from the period. The "Sailor's

Word-book" by Smyth and Belcher (1867) has, "STREAM-ICE. A collection of

pieces of drift or bay ice, joining each other in a ridge following in the

line of current. (See Sea-stream.)" and for the latter, "SEA-STREAM. In polar

parlance, is when a collection of bay-ice is exposed on one side to the

ocean, and affords shelter from the sea to whatever is within it."

-FER

### Re: Fw: Image of Sextant Used by Worsley

**From:** Brad Morris  
**Date:** 2009 Mar 9, 08:33 -0700

**Source:** [fer3.com/arc/m2.aspx/Fw-Image-Sextant-Used-byWorsley-Morris-mar-2009-g7604](http://fer3.com/arc/m2.aspx/Fw-Image-Sextant-Used-byWorsley-Morris-mar-2009-g7604)

Hi Bill

That is functionally identical to the construction on (what we now accept to

be the same model as) Worsley's Sextant.

There are some slight differences in materials, in that there is more shiny

brass, but this is inconsequential.

Thanks for clarifying this to the group. I should have thought to add a picture.

Best Regards

Brad

### Re: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 9, 08:30 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7605](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7605)

I accept the group consensus. "Stream Ice" it is!

I have updated the log to include 7May1916. This date has THREE observations.

In places where I was unable to make out the characters, the Dennett

Transcription provided guidance and yes, the words then make a little more

sense (Thanks George!)

Before the entire list tells me I have a typographical error on 7May, the log

really shows 54D38'39D3'6 (not 54D38' 39D36' which you would expect). I

believe that Worsley just had some sloppy penmanship here.

Note the number of cross outs on the PM observation. It looks like Worsley

couldn't make up his mind which one he liked, but finally settled on .14

Likewise, he crosses out the 54, which is in the wrong place.

On the 4th and the 7th, Worsley makes the notation "BC" or "B.C." Does anyone know what this means?

I think it fairly clear now that Worsley was steering directly to Bird Island

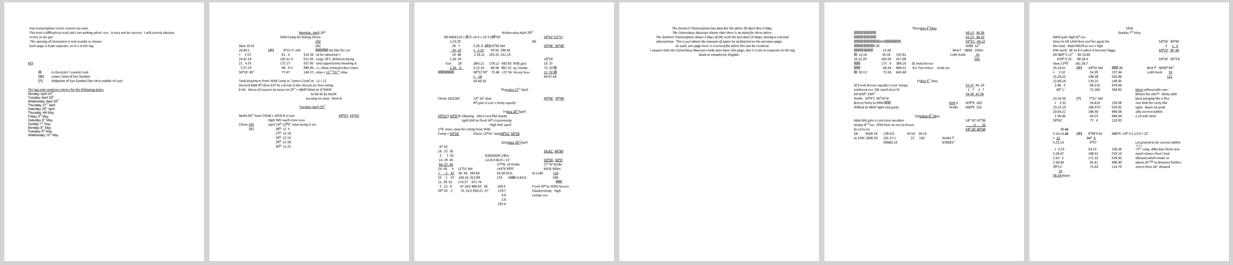
on a great circle route, and then on to Leith Harbor on the other side of

South Georgia Island. In several places in the log, he determines direction

and distance to Bird Island and then adds the 53 miles more to Leith Harbor.

Best Regards

Brad

**Attached File:**   
[](http://fer3.com/arc/imgx/f4-The-Log.pdf)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/f4-The-Log.pdf)   [http://fer3.com/arc/images/vu-icon.png](http://docs.google.com/viewer?url=http://fer3.com/arc/imgx/f4-The-Log.pdf)

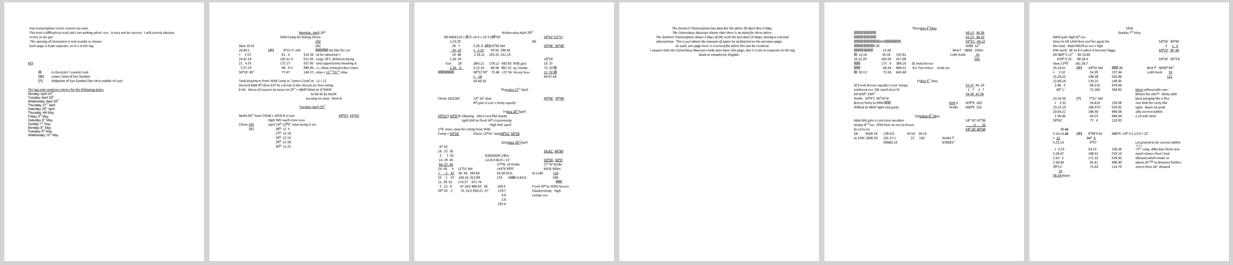
### Re: Transcription of Worsley's Log

**From:** George Huxtable  
**Date:** 2009 Mar 10, 19:26 -0000

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Huxtable-mar-2009-g7621](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Huxtable-mar-2009-g7621)

Comments on Brad's latest conclusions, which seem to be coming together

nicely, at-

**Attached File:**   
[](http://fer3.com/arc/imgx/f4-The-Log.pdf)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/f4-The-Log.pdf)   [http://fer3.com/arc/images/vu-icon.png](http://docs.google.com/viewer?url=http://fer3.com/arc/imgx/f4-The-Log.pdf)

..

About the numbers 192 / 262, which occurred more than once when the

chronometer was mentioned, and which we speculated might be some sort of

identification number for that instrument-

In [7420], Brad had written, about what we've been taking to be Worsley's

pocket chronometer-

This one is from the James Caird Society, a pocket watch type chronometer

http://www.jamescairdsociety.com/shackleton-news.php?id=102901

If you follow that link to see the face of that chronometer, down the page,

and expand it up, take a look at the number printed on the face. It's

speculation no longer.

Brad surmised that the plan had originally been to round Bird Island,

because the distance to Bird Island is noted, a number of times. I would not

disagree, but Wallis Island, further West, is also noted in a similar

context. Was Worsley heading for the wide gap between those two islands, in

the first place? In the end, of course, he had to strike for the South coast

instead.

George.

### Re: Transcription of Worsley's Log

**From:** Jeremy C  
**Date:** 2009 Mar 10, 13:42 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-JeremyC-mar-2009-g7623](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-JeremyC-mar-2009-g7623)

It was common up until a few years ago in chronometer rate books to

label each one by serial number in the book as they were often the

same make and model, as well as very close in serial number, if not

sequential.

I have noticed that this has changed recently since ships rarely carry

more than one chronometer these days.

With various time ticks available, and the explosion of logs that need

to be maintained, the chronometer error log has been abandoned. The

last one I saw kept was in 2001 and we had but one chronometer on

board.

My current ship has a chronometer, but it is not treated as such, and

merely serves as a wall clock.

JCA

### Re: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 10, 15:27 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7624](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7624)

Hi George

I had yet one more look at the pocket watch chronometer. You are 100%

correct. There is no doubt now regarding which chronometer he used, which

was the Smith and Son Chronometer 192-262, just like the log states. Sorted!

Further the UK National Maritime Museum's boxed Mercer chronometer is clearly

NOT the one used on the journey. It may have been used on other parts of the

expedition or for raising funds, but it wasn't used on the journey of the

Caird. I would hope that the NMM will re-title the Mercer chronometer to be

something other than "used on the boat journey". They have a very weak case

now.

Nice detective work!

Best Regards

Brad

### Re: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 13, 09:56 -070

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7642](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7642)

Hi George

I have created a spreadsheet which computes the reductions in the same manner

that Worsley did. I used 6 place logarthmic values instead of 5, since I

found the rounding was not identical to the values he used. Further, the

spreadsheet computes the reduction with the characteristic present in the

nautical sense. I have attached this spreadsheet for the general amusement

of the crowd!

One great interest in this is the correction of the transcript. Since the

images of the log are muddled, it is difficult to make out numerical values

at times and some of the notations that I injected into the transcript may

just be artifacts of the image. I have corrected the log for about 4 digits

and 3 notations as a function of the spreadsheet.

The next interest would be in the recreation of the 4 May 1916 data, because

the log image only offers partially readable data. I did not correct the

transcript here because it is still subjective, but I can safely assign some

digits. More to come on this later.

One interesting point came in the reduction of 26 April 1916. The numbers

just didn't seem to make sense, until I realized that the arc-haversine value

he obtained, he mentally performed a supplement computation to get the time

from noon. The arc haversine yields 53 minutes 49 seconds, but he wrote down

23 hours 6 minutes and 11 seconds. Further, when he performed the

subtraction of arc-haversine time from chronometer time, he added 24 hours to

2.28.21, so his result was 3.22.10. This was a puzzlement until I came to

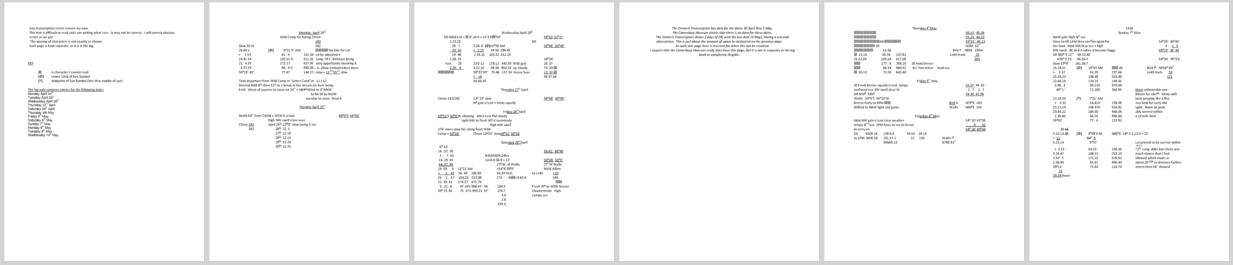
the realization and is now clear.

The updated transcript is attached.

Best Regards

Brad

**Attached File:**   
[Worsley-Method.xls](http://fer3.com/arc/imgx/Worsley-Method.xls)

**Attached File:**   
[](http://fer3.com/arc/imgx/f6-The-Log.pdf)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/f6-The-Log.pdf)   [http://fer3.com/arc/images/vu-icon.png](http://docs.google.com/viewer?url=http://fer3.com/arc/imgx/f6-The-Log.pdf)

### Re: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 16, 17:58 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7657](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7657)

Hi George

Now that I have some confidence in the digits and have the spreadsheet, I can

next investigate his chronometer and chronometer error. On 7May1916, Worsley

indicates that his "chron[ometer] was much slower than I had allowed"..

While we can only estimate his rate, we can certainly investigate his initial

error.

On 24Apr1916, Worsley writes that the longitude of Cape Belsham is his only

opportunity of "rating" his chronometer. The important criteria in this

calculation are an exact knowledge of his latitude, longitude, the alitutde

of the body and the chronometer reading.

I examined my navigational charts of the Antarctic Penninsula and extracted

the position of Cape Belsham. The chart number is 29104 (NSN 7642014012241)

"King George Island to Clarence Island" with Elephant Island smack in the

middle of the chart. Cape Belsham is clearly marked. I make the latitude to

be South 61 degrees 6 minutes 22 seconds and the longitude to be West 54

degrees 53 minutes 45 seconds.

Next, I used my spreadsheet to enter exact values. On 24Apr1916, Worsley

writes that his chronometer was slow by 10 minutes 51 seconds and then

proceeds to use 24.40.1 as his chronometer reading. From this we can expect

that his chronometer actually read 24.29.10 (+10.51 = 24.40.1). Using

24.29..10; the equation of time for the day 1 minute 53 seconds and the exact

latitude, I can vary the chronometer error until the precise longitude is

obtained.

To obtain the precise longitude, I must use 13 minutes 28 1/2 seconds. That

is, while Worsley makes his chronometer 11 minutes 55 seconds slow, I am an

ADDITIONAL 2 minutes 33 1/2 seconds slower.

That is a substantial difference, to say the least.

Best Regards

Brad

### Re: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 17, 07:50 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7661](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7661)

Hi George

I make the error in displacement to be 18.54 miles further west. Allow me to explain.

The miles for one degree of longitude, at latitude, can be found by

A = Cos(latitude)\*60. {Dutton, article 202}

So for the equator, we have 60 miles for one degree. Then we can determine

the number of miles in 15 degrees, 15\*A. For the equator this is 900 miles.

B = A\*15

Since 15 degrees in longitude is one hour, we can resolve the number of miles per second

MPS = B/3600

For the equator, this resolves to 0.25 miles per second. Inverting, we get 4

seconds per mile, that familiar saw.

Now let me insert the latitude of Cape Belsham on Elephant Island.

A=Cos(61.10611)\*60 = 28.991 miles for one degree of longitude

B = 28.991 \* 15 = 434.870 miles for 15 degrees

MPS = B/3600 = 0.12079 miles per second

Inverting, we get 8.279 seconds per mile

Finally, we have Worsley's (to him unknown) chronometer error of 2 minutes

33.5 seconds. This is 153.5 seconds. Divide 153.5 by 8.279 and you get

18..54 miles.

We can see the result of this on 8 May1916, when he makes his position to be

South 54 degrees 19 minutes West 39 degrees 36 minutes. He should be able to

reach out and touch South Georgia Island. Yet he cannot see it. At 12:30

that day, he finally does, at an estimated distance of 9 miles.

Best Regards

Brad

### Re: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 17, 18:19 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7664](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7664)

Hi George

I have calculated the chronometer error for Point Wild. While not a

substantial difference for the result from Cape Belsham, it continues show

that Worsley had injected an error from the start.

From Navigational chart 29104 "King George Island to Clarence Island", I

determined the location of Point Wild to be Latitude South 61 degress 6

minutes and 15 seconds, Longitude West 54 degrees 52 minutes 12 seconds.

Point Wild is clearly marked on the chart. I took the northernmost tip to be

Worsley's location.

With this location, we can solve for the chronometer error by injecting the

correct latitude, altitude and chronometer value to solve for the correct

longitude.

The value I obtain is 13 minutes 21.2 seconds. Since Worsley would not have

been able to distinguish 0.2 seconds, lets call it 13 minutes 21 seconds

even. Compare this to 13 minutes 28.5 seconds for Cape Belsham, about 1 mile

away.

Further, compare this to Worsley's value of 11 minutes 55 seconds.

Subtracting 11-55 from 13-21 yields 1 minute 26 seconds. At 8.27 seconds per

mile, he thinks he is about 11 miles further to the east than he really is.

That disagrees with my earlier posting on miles, wherein I in-advertently

added in a minute due to poor arithmetic skills.

Best Regards

Brad

Best Regards

Brad

### Re: Transcription of Worsley's Log

**From:** Henry Halboth  
**Date:** 2009 Mar 18, 08:24 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Halboth-mar-2009-g7667](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Halboth-mar-2009-g7667)

|  |
| --- |
| Hi Brad + George    I believe that I have deciphered Worsley's numbers for April 25th.. He is using the old style format for a Longitude time sight at Latitude 61.4 S, which I presume to mean 61-04 S. The numbers in the right hand column, although separated by decimal points are actually the logarithmic values applicable to the formula employed. I will recalculate and let you know the results asap. Depending on the sun's azimith at the time of observation, the Latitude used may not be that important to the correctness of the Longitude determined.    By the way, until quiet recently at least, there appears to be an international difference of opinion as respects positions on Elephant Island.    Regards,    Henry |

### Re: Transcription of Worsley's Log, Updated

**From:** NavList  
**Date:** 2009 Mar 18, 12:18 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Updated-NavList-mar-2009-g7672](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Updated-NavList-mar-2009-g7672)

Gentlemen

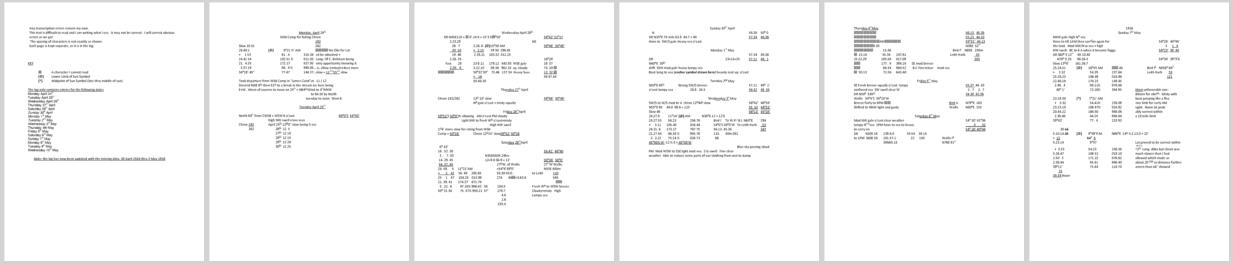
Attached, please find the updated Transcription of Worsley's Log.

Canterbury Museum found the missing page. The transcript now includes the

missing dates of 30 April through 3 May 1916, inclusive.

Best Regards

Brad

**Attached File:**   
[](http://fer3.com/arc/imgx/f7-The-Log.pdf)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/f7-The-Log.pdf)   [http://fer3.com/arc/images/vu-icon.png](http://docs.google.com/viewer?url=http://fer3.com/arc/imgx/f7-The-Log.pdf)

### Re: Transcription of Worsley's Log

**From:** Frank Reed  
**Date:** 2009 Mar 18, 15:11 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-FrankReed-mar-2009-g7673](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-FrankReed-mar-2009-g7673)

Well, what positions were on record for Elephant Island at that time?

Presumably Worsley was well aware that positions in this region could only be

trusted to the nearest five or ten nautical miles. That's good enough for

their purposes.

Here are some quotations from an old guide book to the southern ocean (google a phrase to find it):

First, the position of the cape:

"Cape Belsham, north point of Elephant Island 60d 57' S 54d 56' W."

Second, from the same source, some general comments on sources of positions

(it is not at all uncommon in the 19th and early 20th centuries to find that

the positions from Cook's voyage are still considered the best available):

"7. South Georgia.-Adventure Bay, near the N.W. end of Georgia, and South of

Cape North, is given as described by Captain Weddell. The other points are

given from Captain Cook's Second Voyage, January, 1775.

8. Sandwich Lands.-The Candlemas Isles, Cape Montague, and Southern Thule, arc

given in the Table from Captain Cook's Second Voyage, January and February,

1775; but Captain Biscoe states that the longitudes are about 50' to the

West, which we are apprehensive, requires confirmation.

9. South Shetlands.-The position of these islands are generally

unsatisfactory, with the exception of Deception Island, the station of

Captain Foster's pendulum experiment\*. A chart, published by the Hydrographic

Office, exhibits them much to the eastward, in some cases nearly to the

amount of 2�. In these high latitudes it is without doubt, a difficult task

to fix meridional distances, or absolute positions, with that degree of

accuracy that can be attained in lower latitudes and less rigorous climates.

In the absence of more certain authorities, we have repeated the positions as

given in the former edition." (printed c.1885, the "former edition" was from

the 1850s)

-FER

### Re: Transcription of Worsley's Log

**From:** George Huxtable  
**Date:** 2009 Mar 19, 00:42 -0000

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Huxtable-mar-2009-g7676](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Huxtable-mar-2009-g7676)

Frank wrote-

"Well, what positions were on record for Elephant Island at that time?

Presumably Worsley was well aware that positions in this region could only

be trusted to the nearest five or ten nautical miles. That's good enough for

their purposes."

Yes. They had to accept what they could get. Any error in Elephant Island,

latitude or longitude, would transmit, through consequent chronometer error,

to a continuing error in longitude. We are trying to assess the extent that

such error contributed to his overall longitude error, which he assessed,

(perhaps retrospectively) in his log entry for 7 May as "about 20 miles", as

South Georgia was neared.

Frank added "some quotations from an old guide book to the southern ocean

(google a phrase to find it):"

Frank omitted to provide a title and date for that "old guide book". I have

tried the googling that was suggested, without success.

Worsley is likely to have carried on Endurance up-to date charting of the

area, though we don't know which charts had made their way to Elephant

Island. I would expect that all charts relevant to their likely escape-route

would have been taken. It would make an interesting study to discover what

these might have been, in 1915. (Worsley described the best charting of

South Georgia as being German, to my surprise.) Anyway, to Worsley, charts

are likely to have been more relevant, accurate, and up-to-date than an "old

guide book", unspecified.

My copy of Norie's Navigation has the Tables section dated 1914, and in

that, a position is given for "Elephant Island, summit", at S 61� 11', W 51�

50', but this is particularly unhelpful, as Elephant Island has three

well-separated summits, 10 miles or so apart, of similar height.

George.

### Re: Transcription of Worsley's Log

**From:** George Huxtable  
**Date:** 2009 Mar 19, 00:51 -0000

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Huxtable-mar-2009-g7677](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Huxtable-mar-2009-g7677)

I was just getting round to replying to Henry Halboth's posting about

Worsley's navigation, when a second posting appeared, stating-

"I believe that I have deciphered Worsley's numbers for April 25th. He is

using the old style format for a Longitude time sight at Latitude 61.4 S,

which I presume to mean 61-04 S. The numbers in the right hand column,

although separated by decimal points are actually the logarithmic values

applicable to the formula employed. I will recalculate and let you know the

results asap. Depending on the sun's azimith at the time of observation, the

Latitude used may not be that important to the correctness of the Longitude

determined.

By the way, until quiet recently at least, there appears to be an

international difference of opinion as respects positions on Elephant

Island."

======================

That's interesting, on several counts.

Worsley is turning his back on "New Navigation", and instead, just as Henry

says, deriving longitude from an old-style time-sight of the Sun, away from

Noon.

Brad and I, between us, have worked out how he implemented this calculation,

following exactly Norie's "first method" for time-at-place. This appeared in

posting [7468], with the relevant section from Norie's Navigator (1900)

attached. I attach it again, and ask Henry if this corresponds with the

method he was familiar with, in his days on the bridge. There were many such

methods in use, and navigators had their own favourites. Brad has put

together an Excel spreadsheet that reproduces Worsley's method, logs and

all.

We're able to follow every detail of many of these calculations of local

hour angle of the Sun. This could provide either a measure of chronometer

error if longitude was known (as for Elephant Island) or a measure of of

longitude, assuming the chronometer had been corrected. But these

calculations required a good knowlege of latitude, because at that latitude

and time-of-year, the Sun didn't appear anywhere near the prime vertical.

Worsley had serious problems in establishing his latitudes. He only had

occasional glimpses of the Sun, and an accurate latitude could be deduced

only when the Sun could be seen at or near noon, which happened rarely.. On

the day of departure, 24 April, the Sun made its first appearance since

their arrival on Elephant Island, allowing a morning Sun altitude for a

time-sight to be observed, but a noon observation for latitude was

impossible, as the Caird was loading-up and setting-off at around that time.

So the calculation depended on assumed values for lat and long of Cape Wild,

Elephant Island.. Because the time-sight was less than 3 hours before local

noon, it was very sensitive to the accuracy of that latitude.

===================

It interests me that in the era when radio time checks were widely available

for a chronometer, navigators in Henry Halboth's days were still using

time-sights of the Sun. Was this just a matter of going through a ritual

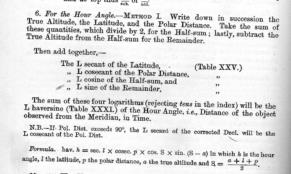
that was by-then already ancient, I wonder, or were those results taken

seriously? I'm sure Henry has many insights of how things were done in days

before the War up his sleeve, if we could persuade him to tell us about

them.

George.

**Attached File:**  [[](http://fer3.com/arc/img/107677.norie.jpg)](http://fer3.com/arc/img/107677.norie.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/107677.norie.jpg)

### Re: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 18, 18:03 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7680](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7680)

Hi Frank

Valid points all.

The determination of chronometer error by the method selected is subject to

errors in the input values, which are (1) latitude (2) altitude and the

estimation of the error is subject to the knowledge of the longitude, so that

the navigational triangle can be solved. Injecting a 1 arc-minute error in

latitude gave me a three arc minute error in longitude for example. Guessing

at or improper knowledge of the values will yield improper chronometer error

determinations. Even Worsley states that his chronometer was slower than he

thought. He must have been aware of this issue.

Your point regarding 'how well he could have known his position" is true. My

library doesn't have the requisite tomes to do the research here, so I will

send a general appeal to the NavList. The expedition sets off from South

Georgia Island on 5 December 1914, two years before the log we are

investigating. This is an outside terminus for published information. If

your information about Cape Belsham predates that, even by alot, it is worth

while knowing. Calling all NavList members, what do you have for either Cape

Belsham or Point Wild, both about a mile apart on Elephant Island.

I will offer my copy of Norie's "Epitome of Navigation" 1848, in which

Elephant Island - Cape Valentine is given as South 61 degrees 5 minutes West

54 degrees 55 minutes. Cape Valentine is the easternmost portion of Elephant

Island. Navigation Chart 29104 gives this as South 61 degrees 7 minutes 15

seconds West 54 degrees 38 minutes 15 seconds. There is a significant

discrepancy in longitude there, about 17 arc minutes. Without an accurate

chart, however, Worsley would not have been able to determine the lat lon of

Point Wild with any degree of accuracy. Why Norie's and not Bowditch?

Because this was an English expedition. Bowditch was from those upstart

colonies hehehe.

The grail of all of this would be the chart(s) that Worsley used. Perhaps we

can share that type of data with the list. If we could see what he used,

then we would have an understanding of the values.

This all begs the point of what Worsley's chronometer error SHOULD have been.

For this I have used the modern navigation chart 29104. Henry has indicated

some international intrigue about some other value and I am sure he will

share that with us. From this we can see what his chronometer error really

was and why he thought he was further east than he really was.

Best Regards

Brad

### Re: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 20, 15:26 -0400

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7709](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7709)

Hi Henry

Thank you very much for your independent confirmation of George’s original assessment of the issue.   The methodology is now un-disputed!   There are some very minor discrepancies in values which attract my attention.

When Worsley writes down his polar distance, he gets 102 degrees 51 ½ minutes.  We can subtract the 90 degrees for the South Pole, leaving a North Declination of 12 degrees 51 ½ minutes.    This is marginally different from the value you used to determine his GAT in part one of your equations of 12 degrees 51 minutes 17 seconds (for a difference of 13 seconds).  I wonder why Worsley would have disregarded the more accurate answer you have provided?

In part two of your explanation, we have exact agreement across the board.  We all get precisely the same logarithmic values.  The sum of the four logarithmic values is also the same.  However, when Worsley looks up (and I calculate) the arc-Haversine of 9.14437, we both get time values of 21-4-36, while you obtain 9-4-35.4.   This is due to rounding on my part, if the resolution is extended I obtain 35.51.  I think this just noise at the truncation point of the logarithmic values (5 places, 6 places, etc).   My question is more basic.  Worsley writes down 21-4-36, rounding off to a whole second.  Would that be prudent for the purposes of determination of chronometer error in his day?  Didn’t the arc-Haversine tables show only  the nearest second?

George and I now concur that Worsley must have taken his observation from Point Wild, which on modern charts is South 61 degrees 5 minutes 22 seconds West 54 degrees 53 minutes 45 seconds.  Worsley used the location of Cape Belsham.  I think he did this because it is so very close by  to Point Wild and because Cape Belsham is listed in some tables as the northernmost point of Elephant Island.    Of course, his tables or charts may have suffered from the difficulty of ascertaining lat lon, in his day, in the polar regions.

Best Regards

Brad

### Re: Transcription of Worsley's Log

**From:** George Huxtable  
**Date:** 2009 Mar 20, 23:13 -0000

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Huxtable-mar-2009-g7710](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Huxtable-mar-2009-g7710)

Thanks to Henry Halboth for confirming Worsley's calculations of the local

time of his morning Sun observation at Elephant Island, before he set off on

the boat journey to South Georgia. It confirms our own calculations too.

There's complete agreement between us all, confirming Worsley's use of

Norie's method 1, fot time-at-place, and the exactness of his calculations.

A look at Brad's transcription, for 24 April, in -

http://www.fer3.com/arc/imgx/f7-The-Log.pdf

and comparison with Henry's numbers, will make that clear

We're most grateful for Henry for adding to our confidence in that way.

However, the relevant location was not, quite, at Cape Belsham, but at Camp

Wild, a couple of miles to the East. That was the beach from which Worsley

made his morning Sun altitude. Cape Belsham came in later, because it was a

prominent headland which would remain identifiably in sight from some way

off, after departure. It's splitting hairs, of course, to distinguish

between two locations so closely spaced. but we are trying to tie down

Worsley's chronometer errors as closely as we can.

Worsley wasn't able to observe his latitude by a noon Sun sight, so had to

take the best value he could for Camp Wild, presumably from a chart, and his

log tells us that he presumed a value of S61º 04'. Unfortunately, because

the morning observation was made within 3 hours of local noon, the resulting

chronometer error was rather sensitive to the correctness of that assumed

latitude. It also depended on the correctness of the assumed longitude of

Wild Camp, which Worsley took to be W 54º 19' 45", according to the log.

Using modern charting (29104), Brad has found, with hindsight, that

Worsley's position was at, or near, South 61 degrees 6 minutes and 15

seconds, Longitude West 54 degrees 52 minutes 12 seconds; see Navlist

[7664]. With that assumption, he has recalculated the actual chronometer

error to be 13 minutes 21.2 seconds, rather than the Worsley assumption of

11 minutes 55 seconds. That timing discrepancy of 86 seconds would stay with

him for the duration of the boat journey. If anyone, such as Henry, is

interested enough, and kind enough, to check over those numbers, Brad and I

would be grateful.

=====================

Things are falling into place nicely now. We're grateful for an off-list

email from occasional Navlist poster Lars Bergman. He has helped us to

interpret the otherwise-runic character string "N68E14 5.2.13.0=23' " as,

successively, course, distance, dlat, departure, and dlong, the quantities

that come straight from a traverse table calculation.

George.

### Re: Transcription of Worsley's Log

**From:** Henry Halboth  
**Date:** 2009 Mar 21, 18:31 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Halboth-mar-2009-g7714](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Halboth-mar-2009-g7714)

|  |
| --- |
| Hi George + Brian,    I attach my completed recap of Worsley's sight for Longitude, demonstrating substantial agreement with his Chronometer Error of 11 minutes 55 seconds, at least to within 4.6 seconds.    My analysis is based on an assumption that his DLo of 1 minute + 4 seconds is to be read as time units as opposed to arc.    Further will follow.    Regards,    Henry |

### Re: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 21, 19:44 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7715](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7715)

Hi George

I have investigated Lars Bergman's statement that Worsley is using a traverse

table for that runic string N68E14 5.2.13.0=23'

I went to Bowditch, 1849. There are several methods of Mercator Sailing.

Worsley most certainly is using Bowditch Case III, "one latitude, course and

distance given, to find the difference of latitude and difference of

longitude". There are three solutions offered (1) by projection (2) by

logarithms (3) by Gunter and (4) by inspection. Upon spot checking a few

cases, it was clear that Lars has it right.

I immediately went ahead and wrote an Excel spreadsheet for each traverse

given. There are quite a few days Worsley uses this method. It appears that

he starts out writing his Lon Lat in the upper right hand corner of the page.

Then he calculates is DR, using the traverse, which yields a new latitude.

This new latitude is used in observation reductions or directly applied to

the top right hand Lon Lat to get a new Lon Lat.

The spreadsheet is attached. You enter values in the white boxes. The boxes

in yellow are the solution by logarithms. The boxes in tan should match the

log book and are simply the table in the form of a formula (sine and cosine,

per Bowditch!)

In doing so, I caught quite a few typographical errors, mostly the decimal

points were in the wrong spot. However, overwhelming majority of the digits

were correct. Because of this, I agree with Lars. He has it right. I

calculated each traverse and examined the logbook images in fine detail,

blown up to absurd character sizes. In some cases, I clearly just typed the

wrong character. I have updated the Log, attached. I have added a suffix of

"traverse corrections" to the filename to differentiate it.

There were some very small discrepancies in comparison of the calculation and

Worsley's log. These three cases are off in the last digit, which is

probably the result of rounding in the tables. This is not significant,

however, I used Worsley's digits in these cases rather than the correct

mathematical value.

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I would also like to propose that Worsley used another Bowditch case to

determine the direction and distance to Bird Island, given several times in

the log. I was puzzled about how he know which way to go, until

investigating the traverse. I came across "the latitudes and longitudes of

two places given, to find the direct course and distance between them."

Whilst I have not checked this yet, since Worsley was clearly using Mercator

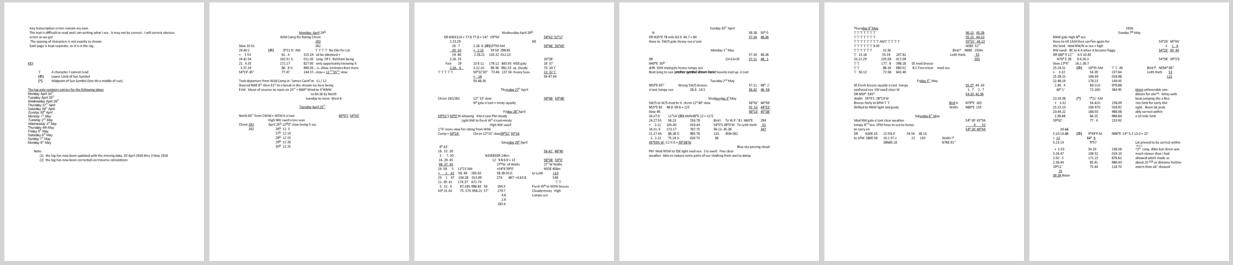
Sailing and this is another case of Mercator Sailing,logically this could be

it. More to follow on this.

Best Regards

Brad

**Attached File:**   
[Worsley-Traverse.xlsx](http://fer3.com/arc/imgx/Worsley-Traverse.xlsx)

**Attached File:**   
[](http://fer3.com/arc/imgx/The-Log,-traverse-corrections.pdf)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/The-Log,-traverse-corrections.pdf)   [http://fer3.com/arc/images/vu-icon.png](http://docs.google.com/viewer?url=http://fer3.com/arc/imgx/The-Log,-traverse-corrections.pdf)

### Re: Transcription of Worsley's Log

**From:** George Huxtable  
**Date:** 2009 Mar 22, 10:02 -0000

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Huxtable-mar-2009-g7716](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Huxtable-mar-2009-g7716)

Thanks to Henry for posting his confirmation of Worsley's calculation of

chronometer error, on departure from Elephant Island.

He wrote-

"My analysis is based on an assumption that his DLo of 1 minute + 4 seconds

is to be read as time units as opposed to arc."

That's surely correct.

What Henry requires is a definitive map of Elephant Island. I have unearthed

a map of Elephant Island, made by a UK joint services expedition in 1970,

which must be about as precise as it's possible to get. It'a a fold-out from

the Geographical Journal, September 1972, part of a paper by the team

leader, Malcolm Burley. That survey is probably the basis for the British

Antarctic Survey data that Henry has mentioned. I will send a scan, covering

the relevant part of the island, directly to Henry, and to anyone else who

asks, rather than publishing such copyright stuff to the list.

I will add a couple of pages of description of the location of Wild camp, as

found in 1970, which includes an amusing account of the conflicts between

the hard-bitten military team and the local wildlife for occupation of the

limited space available. And a page from the diary of Orde-Lees, one of

those who had to await Shackleton's return to Elephant Island.

That Burley map allows the true location of Worsley's observation spot, in

latitude and longitude, to be rather precisely located. As I've written in

earlier mailings, the latitude is important, as Worsley wasn't able to make

a noon observation to measure it, so had to assume the best figure he could

find, presumably from a chart.

With that new data, latitude as well as longitude, we can reassess Worsley's

estimate of chronometer error, based as it was on inaccurate information, of

position of a somewhat different spot from the actual observation site.

Armed with that information, I invite Henry to recalculate Worsley's

chronometer error, to check Brad's calculations, of what Worsley would have

made that error to be if he had known, then, as much about the local

geography as we know, now.

Henry wrote, in his attachment-

"Regardless, because of a simple lack of concrete information, assumptions

have to be made in assessing Worsley's calculations or the whole quest given

up. Anybody's guess is probably as good as mine. He, however, is said to

have been a good navigator and it seems hardly likely that he would have

made as serious an error as has been otherwise postulated."

Nobody is postulating any error in Worsley's work. Indeed, we have found it

to be a textbook example of precision in the most difficult circumstances.

The difference we have deduced from his own assessment of chronometer error

(of no more than a minute-and-a-bit, in time) is due to inaccuracies in the

geographical data available to him, which in the circumstances he could do

nothing about.

George.

### Re: Transcription of Worsley's Log

**From:** Brad Morris  
**Date:** 2009 Mar 22, 15:08 -0700

**Source:** [fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7721](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Morris-mar-2009-g7721)

Hi Henry

I measure the delta between Point Wild and Cape Belsham, both on Elephant

Island, to be 1.5 arcminutes (90 arc seconds) in arc (longitude, not time).

This is based upon the modern chart 29104

http://data.aad.gov.au/aadc/mapcat/display\_map.cfm?map\_id=5823

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Worsley's definition of the latitude and longitude of Cape Belsham is directly

in front of us. On 24 April 1916, he indicates that the distance made good

to noon on 25 April 1916 is NORTH 64 miles. He carefully records his

latitude on 25 April as South 60 degrees 0 minutes and his longitude as West

54 degrees 50 minutes. His latitude on 24 April was 61 degrees 4 minutes.

Hence we can deduce what he thought his longitude of Cape Belsham.

Worsley's Est of Cape Belsham

South 61 deg 4 minutes West 54 deg 50 min

Modern (Chart 29104) of same

South 61 deg 6 min 22 sec West 54 deg 53 min 45 sec

Displacement between the two

3.43 kilometers (2.13 miles)

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What is terrifically interesting is that Worsley, on 24 April 1916, calculates

the longitude at West 54 deg 19 min 45 sec. His estimate of the longitude of

Cape Belsham is West 54 deg 50 min. Thus the delta is 30 min 15 sec. By

simple conversion formulas, this should be 2 minutes 1 second of time.

Yet he records 1 minute 4 seconds of time. Perhaps he understands just how

much trouble he is in when he states "No observation for latitude could be

obtained. Longitude of Cape Belsham is only opportunity of know it is, allow

1 minute 4 second more slow = 11 minute 55 second slow."

This is a 57 second error, using his own estimate of Cape Belsham.

When we inject the modern longitude of Cape Belsham, the error grows.

Best Regards

Brad

### ***Re: Updated Transcript of Worsley's Log***

From: Robin Stuart  
Date: 2017 Jan 25, 12:59 -0800

Source: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Stuart-jan-2017-g37962

Thanks to the image samples that appear at the bottom of the NavList page I came across a thread from February-March 2009 investigating the navigation methods used by Frank Worsley on the voyage of the James Caird from Elephant Island to South Georgia on the Shackleton expedition in 1916. Brad Morris had located Worsley’s original log in the Christchurch Museum, New Zealand and obtained heavily restricted copies covering the period of voyage. Brad, with help from the late George Huxtable, took great pains in transcribing the content and the last version of this valuable resource is posted [here](http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Morris-feb-2014-g26884).

I have spent some time pawing over the transcript and find that all of the navigational calculations can be reproduced with a couple of exceptions.

Worsley performs 2 noon sights and 7 time sights (plus 1 just prior to departure). The method used to reduce the time sights is explained by Henry Halboth in the document attached [here](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Halboth-mar-2009-g7724).

Worsley’s distance to destination and DR calculations in the log are obtained by mid-latitude sailing formulas.

I have made some assumptions about navigational practice at the time and would like to solicit feedback as to whether they are correct, reasonable or otherwise.

  1)    The James Caird leaves Elephant Island at noon (15:40 GMT) the 24th of April, 1916. On each subsequent days an underlined Dead Reckoning (DR) position is recorded on the right of the page. Early in the voyage it is sometimes noted that the DR position was for a 24 hour period. Is it reasonable to expect that it would have been standard practice for Worsley to record a DR position every day at around 15:40 GMT?

  2)    On days where a noon sight or time sight was available a second position appears and is often underlined. It is not the same as the position obtained directly from the sight and I suspect that it is an Estimated Position (EP) obtained by somehow advancing the sight to 15:40 GMT. This is the position that is used as a starting point in computing the DR position on the following day. Would it be normal practice to record an EP advanced to 15:40 GMT in this way?

On 26 and 28 April there are sets of figures on the left which perplex me

24 April

2.23.29

26 7

30 10

----------

19.46 This may be related to the “EP” latitude at right 59°46ʹ

26 April

16 .52.30

3. 7.30

14.29.45

58.37.45 This may be related to the “EP” latitude at right 58°38ʹ

I can’t really fathom exactly what the numbers in the sum represent. Any ideas?

I have gathered the information in the log into a spreadsheet which reproduces the calculations and paints a fairly clear picture of the voyage. The information in the log has also been recorded in a .kml file (attached). After saving the file, clicking it should open it in Google Earth. I have also attached some of the views that can be generated by selecting the appropriate data.

  1)    Track with daily EP’s

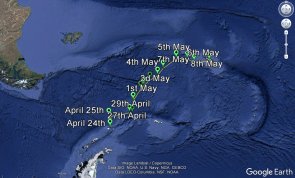
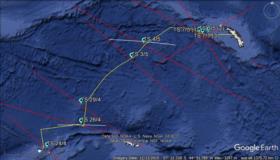
  2)    Time sight (red) and noon sight (white) LoP’s

  3)    Track (yellow) and rhumbline (orange) from Elephant Island to a point 27’ West of Wallis Island. Worsley was aiming here until late in the voyage when, given the uncertainties in their position, Shackleton decided to make for the centre of South Georgia rather than hold off to the west in a storm.

In the original thread there was quite a bit of discussion as to the location and identity of Cape Belsham on Elephant Island which served as a departure point and for calibrating the chronometer. I don't have anything to add other than to note that Worsley’s position for it is 2.8 nautical miles from the modern position and 5.8 nautical miles from the eastern tip which has been suggested as originally being Cape Belsham.

Finally it was pointed out that by 1916 time sights were obsolete and had been replaced by intercept-azimuth LoP’s. Any thoughts as to the practicality of using the modern approach would be in a small boat in heavy seas while lying on a pile of ballast rocks?

Robin Stuart

**Attached File:**   
[](http://fer3.com/arc/imgx/Shackleton.kml)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/Shackleton.kml)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/TrackandEPs.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/TrackandEPs.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/TimeandNoonSightLoPs.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/TimeandNoonSightLoPs.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/TrackandRhumbline.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/TrackandRhumbline.jpg)

### ***Re: Updated Transcript of Worsley's Log***

**From:** Brad Morris  
**Date:** 2017 Jan 25, 23:51 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Morris-jan-2017-g37964>

Hello Robin

I have been convinced that you are indeed correct.  At your behest, I carefully examined Worsley's written characters for May the 4th.  The character in question should be a "7", not a "4".

* 1. Was     “DR N45⁰E40m 49.5 49.5 = 88”
  2. Now is “DR N45⁰E70m 49.5 49.5 = 88”

I have appropriately given you credit in the change log found at the front of my transcript.  The latest version (3.0) is attached.

Brad

Re: Updated Transcript of Worsley's Log

**From:** David C  
**Date:** 2017 Jan 25, 22:51 -0800

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-DavidC-jan-2017-g37965

Finally it was pointed out that by 1916 time sights were obsolete and had been replaced by intercept-azimuth LoP’s. Any thoughts as to the practicality of using the modern approach would be in a small boat in heavy seas while lying on a pile of ballast rocks?

*Nicholls's Concise Guide to Board of Trade Examinations 1917* is a guide to what British mariners were being taught in that period. Of course it does not prove what methods they were actually using. I have attached the contents pages from the 1917 Nicholls's.

Note that the seaman were taught long by chron, meridian altitudes and sumner's method. Looking in the book the latter method was Sumner's chord (four point method). Position was found by plotting.  They were not taught intercept-azimuth LoP's. This is consistant with Blackburne's complaint (discussed in the *Understanding a 1902 Sumner* thread) that the Board of Trade did not examine candidates on either the alt/azimuth sumner or the Mark St Hilaire method.

Changing the subject - what is the difference between a First Mate and an Only Mate?

**Attached File:**   
[](http://fer3.com/arc/imgx/nicholls_1917_a1.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/nicholls_1917_a1.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/nicholls_1917_b2.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/nicholls_1917_b2.jpg)

Re: Updated Transcript of Worsley's Log

**From:** Brad Morris  
**Date:** 2017 Jan 26, 02:08 -0500

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Morris-jan-2017-g37966

More about Cape Belsham.

Worsley makes specific mention of Cape Belsham in the log.  It's a key point for determining his chronometer error, after months on the ice

Therefore, we must examine the data that is contemporaneous to Worsley.  I have found a bunch of Sailing Directions that I will list here.  Keep in mind that Worsely states his position to be S61°4' W54°50' after all is said and done.

The 1855 Ethiopic of South Atlantic Ocean states Cape Belsham, the N. Point of Elephant Island S60°57' W54°56'

The 1867 Ethiopic of South Atlantic Ocean states Cape Belsham, the N. Point of Elephant Island S60°57' W54°56'

The 1877 Directory of the South Pacific Ocean states Elephant Island, E. Summit S61°6' W54°45'

The 1883 Sailing Directions states Cape Belsham, North point of Elephant Island S60°57' W54°56'

Lets limit ourselves to the three direct contemporaneous references, they clearly state "Cape Belsham, the North Point of Elephant Island".  The modern map reference to Cape Belsham is NOT the northern most point of Elephant Island.  It's Cape Yelcho.  See Image of part of Chart 29104.

In the 2009 discussion of this point, there was a large CE discrepancy, based upon the modern definition of Cape Belsham.  The modern day Cape Belsham is 1'15" of arc from Camp Wild. That doesn't align with Worsley's addition to his CE of 1 minute 4 seconds of time.

Dividing the 1 minute 4 seconds of time by 4 seconds per minute of arc in longitude, we get 16 minutes of arc.

I measured 16 minutes of arc with my dividers, and placed one point on Camp Wild.  This is a known location.  16 minutes of arc away is a large outcropping near "The White Company" on Chart 29104 King George to Clarence Island.  See attached image.  Position of the point of this outcropping is S61°5' W55°8'15".

This would have appeared to be the North Point of Elephant Island from Worsley's perspective.  It's unlikely he would have been able to see the modern day Cape Yelcho, it's hidden behind that outcropping near The White Company from Worsley's viewpoint.

Modern day Cape Yelcho is another 13 minutes of arc further on at S61°3'45" W55°21'15".  That's 27'15" from the positions stated in the Ethiopics for old designation Cape Belsham.

So in a remarkable series of nullifying errors, Worsley misidentified The White Company as Cape Belsham, introducing at 13' error to the east.  Modern day Cape Yelcho (old Cape Belsham) is 29 minutes to the west.  Worsley introduces a 64 second of time CE, moving him 16 minutes of arc to the east.  Which places him right about on modern day Camp Wild.

The images that Robin has produced of the track should be shifted 13' of arc to the east, because

1) Cape Belsham, the North point of Elephant Island is his reference point, modern day Cape Yelcho.

2) 16 minutes of arc from the North Point is where Worsley thinks he is in longitude, consistent with his CE correction.

3) The Ethiopics were wrong

4) Worsley misidentified Cape Belsham

5) the errors cancelled each other!

On the page for May 7th, Worsley notes that the "chron was much slower than I had allowed which made us 20 mile further astern."

Worsley has realized the error in longitude as his course is nearly due east that day.  This notation is similar in magnitude to the 13' of arc shown herein.

On May 8th, South Georgia Island is spotted.  The note on May 7th must have been written on May 8th. How else would he know his additional CE, than by sight of South Georgia Island.

Brad

On Jan 25, 2017 8:50 PM, "Robin Stuart" <[NoReply\_Stuart@fer3.com](mailto:NoReply_Stuart@fer3.com)> wrote:

Thanks to the image samples that appear at the bottom of the NavList page I came across a thread from February-March 2009 investigating the navigation methods used by Frank Worsley on the voyage of the James Caird from Elephant Island to South Georgia on the Shackleton expedition in 1916. Brad Morris had located Worsley’s original log in the Christchurch Museum, New Zealand and obtained heavily restricted copies covering the period of voyage. Brad, with help from the late George Huxtable, took great pains in transcribing the content and the last version of this valuable resource is posted [here](http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Morris-feb-2014-g26884).

I have spent some time pawing over the transcript and find that all of the navigational calculations can be reproduced with a couple of exceptions.

Worsley performs 2 noon sights and 7 time sights (plus 1 just prior to departure). The method used to reduce the time sights is explained by Henry Halboth in the document attached [here](http://fer3.com/arc/m2.aspx/Transcription-Worsleys-Log-Halboth-mar-2009-g7724).

...

**Attached File:**  [[](http://fer3.com/arc/img/137966.20170126_011725.jpg)](http://fer3.com/arc/img/137966.20170126_011725.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/137966.20170126_011725.jpg)

### Re: Updated Transcript of Worsley's Log

**From:** Brad Morris  
**Date:** 2017 Jan 26, 03:25 -0500

Source: <http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Morris-jan-2017-g37968>

David

Some facts about Worsley

Born 1872

Went to sea 1887 (age 15)

Third mate 1891 (age 19)

Fifth Officer 1892 (age 20)

Third Officer 1895 (age 23)

Masters Certificate 1900 (age 28)

James Caird 1915 (age 43)

My guess at his navigational exposure would be at his Fifth Officer posting in 1892.  Therefore, examining training for 1917, as you have done, is 25 years too late.

Please find a similar reference for the 1890's, 1900 at the very latest, when Worsley is certified as a master.

Brad

### Re: Updated Transcript of Worsley's Log

**From:** Lars Bergman  
**Date:** 2017 Jan 26, 09:01 -0800

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Bergman-jan-2017-g37972

Robin Stuart asked:

"Is it reasonable to expect that it would have been standard practice for Worsley to record a DR position every day at around 15:40 GMT?"

My answer is no, the DR position was intended to show the position at local apparent noon, not at a specific GMT. When 24 hours is mentioned, I think it was noted only to show that the given course and distance was the last "day's run", not the sum of several days.

Furthermore, Robin asked: "Would it be normal practice to record an EP advanced to 15:40 GMT in this way?"

My answer is no. The latitude obtained from the noon sight was "moved backwards" to be used in the calculation of the am time sight. The longitude obtained from the time sight was then "moved forward" to the time of noon. On some days the course and distance sailed (estimated) between the time of am sight and noon is shown. The underlined position below the DR position is usually the observed position.

A few years ago I had some email discussions with Brad and produced a document with some of my findings. I have now made an update of the document and maybe it can bring some light into the transcript of Worsley's navigational log. I believe that every number in the log could be explained, he probably didn't write down unnecessary information.

Lars 59N 18E

### Re: Updated Transcript of Worsley's Log

**From:** Frank Reed  
**Date:** 2017 Jan 26, 12:12 -0800

Source: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-FrankReed-jan-2017-g37976

Robin Stuart, you wrote:  
"Finally it was pointed out that by 1916 time sights were obsolete and had been replaced by intercept-azimuth LoP’s."

This was incorrect. This opinion tends to arise when armchair historians consult navigation manuals and textbooks and assume that they describe actual practice. Navigation *textbooks* are not the same as navigation *practice*. Of course textbooks do not represent practice, except in rare cases. Worsley's navigational method was quite normal in this period of time, and a large portion, maybe even a majority, of practicing navigators at sea continued to use time sights, not even extended to Sumner lines, as their normal, primary method of working up a longitude from a sight well into the 1940s. Why? Maybe because it works?

If you want to understand navigation history, like any other form of history, you have to look at primary source materials. Imagine if the history of science or the history of mathematics were constructed by reading and interpreting only published articles in journals. That approach yields a cartoon of history where article A leads directly to article B which leads then to article C. How comforting such histories are with the warts of reality erased and expunged. It's all so linear...

Time sights lasted for decades after they're killed off in the cartoon histories. And Sumner lines were a footnote for decades after Charles Sumner's initial publication. And lunars were nearly dead 50-60 years before they disappeared from the exams and textbooks and almanacs. Real history is more complicated. And I should add that the history of celestial navigation is also cultural with different practices applied by different subsets of navigators.

I suspect that many modern navigators have difficulty understanding the twisting strands of the history of our subject because of the static, nearly frozen practices that exist today, at least as exemplified by the licensing exams.

Frank Reed

### Re: Updated Transcript of Worsley's Log

**From:** Brad Morris  
**Date:** 2017 Jan 26, 15:13 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Morris-jan-2017-g37977>

Hello Lars

I spent several hours with your corrections, Here are my findings\

1. Before April 24th.
   1. The 46 is crisp and clear.  The numbers in question match other characters of the same numerical value.
   2. No correction applied
2. April 26th
   1. “fast 29”
      1. YES!  This fact astounded George!  There were two chronometers aboard the Caird.
   2. Five rows on the right.
      1. Sorry, the letters run off the edge of the page and are extremely faint.  I cannot apply a correction here.  Perhaps personal inspection of the actual document will clarify this point.
      2. 15.47.44 is clear however.  Any error must be in the prior 4 rows.
3. April 28th
   1. The 1 min 4 sec of time mentioned is what Worsley wrote
   2. Worsley notes that the chronometer should have been ever slower on 7May (probably written on 8May)
   3. This all revolves around the what Worsley believed Cape Belsham to be.  Please carefully examine my recent thoughts about this.
4. April 29th
   1. The discussion of 3.7.30
      1. It cannot be 3.17.30, as there is one one character between the two middle dots
      2. There DOES however, appear to be a squiggle before the 3.  Does 73.7.30 make more sense?
   2. Interpolation for departure
      1. These characters are extra small compared to the rest of the page and quite faint.
      2. The 2.6 could be a 1.6.
      3. Of the 183.4, only the 3 is in question.  It might possibly be a 2.
      4. There is a smudge below the 183.4   It may read 36x.x  “368.x” maybe???
      5. Any correction here will require further analysis.
   3. Longitude from AM observation
      1. Again, very faint.
      2. There is a muddle of figures here, very hard to see
      3. Will require personal inspection
5. 1st May (as he wrote it)
   1. The tail of the Y in May is over the top of this equation.
   2. There appears to be an extra bump on that tail, leading me to believe it’s the “.”
   3. Correction applied to version 3.1, attached!
   4. Well done Lars!
6. Tuesday 4th May
   1. Apparent time
      1. Part 1
         1. 27.23.8 could possibly read 22.23.8  HOWEVER, the first 2 is clear and does NOT look like the second 2; or even the 2 immediately  following the dot
         2. Robin confirms this correction.  Applied version 3.1
      2. Part 2
         1. 44⁰50’13” should read 44⁰50’15”.  This point was ALSO raised by Robin Stuart.
         2. Correction Applied in version 3.1
7. Friday 5th May
   1. DR N50⁰E90m
      1. There are two characters superimposed here
      2. Written as 90, the characters are the same size
      3. Written as 95, the 5 is heavier and larger, as if Worsley corrected himself
      4. Correction applied in version 3.1
8. Sunday 7th May
   1. To the right of “slow…”
      1. Those characters are tiny
      2. Agree with your analysis.  Correction applied
   2. Add 23 instead of 25 to 39⁰11.  Correction applied
   3. 39⁰3’6 remains correct.  Indisputably so.

ATTACHED, PLEASE FIND THE TRANSCRIPT OF THE LOG, VERSION 3.1

You (and Robin, where appropriate) have been given credit in the log.

Thank you for pointing out my transcription errors

Brad

On Thu, Jan 26, 2017 at 1:03 PM, Lars Bergman <[NoReply\_Bergman@fer3.com](mailto:NoReply_Bergman@fer3.com)> wrote:

Robin Stuart asked:

"Is it reasonable to expect that it would have been standard practice for Worsley to record a DR position every day at around 15:40 GMT?"

My answer is no, the DR position was intended to show the position at local apparent noon, not at a specific GMT. When 24 hours is mentioned, I think it was noted only to show that the given course and distance was the last "day's run", not the sum of several days.

Furthermore, Robin asked: "Would it be normal practice to record an EP advanced to 15:40 GMT in this way?"

My answer is no. The latitude obtained from the noon sight was "moved backwards" to be used in the calculation of the am time sight. The longitude obtained from the time sight was then "moved forward" to the time of noon. On some days the course and distance sailed (estimated) between the time of am sight and noon is shown. The underlined position below the DR position is usually the observed position.

A few years ago I had some email discussions with Brad and produced a document with some of my findings. I have now made an update of the document and maybe it can bring some light into the transcript of Worsley's navigational log. I believe that every number in the log could be explained, he probably didn't write down unnecessary information.

Lars 59N 18E

### Re: Updated Transcript of Worsley's Log

**From:** Brad Morris  
**Date:** 2017 Jan 26, 15:26 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Morris-jan-2017-g37978>

Frank

Thanks for confirming that Worsley navigated, in general, in the way he navigated in the Log.

I cannot imagine for one moment that, in extremis, with his life at stake in huge seas, Worsley would suddenly switch from one form of navigation to another.

Worsely was trained, likely starting in 1892, but his masters license was obtained in 1900.  As I asked earlier, what did the licensing exam test for then????

Brad

On Thu, Jan 26, 2017 at 3:18 PM, Frank Reed <[NoReply\_FrankReed@fer3.com](mailto:NoReply_FrankReed@fer3.com)> wrote:

Robin Stuart, you wrote:  
"Finally it was pointed out that by 1916 time sights were obsolete and had been replaced by intercept-azimuth LoP’s."

This was incorrect. This opinion tends to arise when armchair historians consult navigation manuals and textbooks and assume that they describe actual practice. Navigation textbooks are not the same as navigation practice. Of course textbooks do not represent practice, except in rare cases. Worsley's navigational method was quite normal in this period of time, and a large portion, maybe even a majority, of practicing navigators at sea continued to use time sights, not even extended to Sumner lines, as their normal, primary method of working up a longitude from a sight well into the 1940s. Why? Maybe because it works?

If you want to understand navigation history, like any other form of history, you have to look at primary source materials. Imagine if the history of science or the history of mathematics were constructed by reading and interpreting only published articles in journals. That approach yields a cartoon of history where article A leads directly to article B which leads then to article C. How comforting such histories are with the warts of reality erased and expunged. It's all so linear...

Time sights lasted for decades after they're killed off in the cartoon histories. And Sumner lines were a footnote for decades after Charles Sumner's initial publication. And lunars were nearly dead 50-60 years before they disappeared from the exams and textbooks and almanacs. Real history is more complicated. And I should add that the history of celestial navigation is also cultural with different practices applied by different subsets of navigators.

I suspect that many modern navigators have difficulty understanding the twisting strands of the history of our subject because of the static, nearly frozen practices that exist today, at least as exemplified by the licensing exams.

Frank Reed

[View and reply to this message](http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-FrankReed-jan-2017-g37976)

### Re: Updated Transcript of Worsley's Log

**From:** Brad Morris  
**Date:** 2017 Jan 26, 15:27 -0500

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Morris-jan-2017-g37979

Lars

The remaining issues you raised are

1. Before April 24th.
   1. The 46 is crisp and clear.  The numbers in question match other characters of the same numerical value.
   2. No correction applied
2. April 26th
   1. Five rows on the right.
      1. Sorry, the letters run off the edge of the page and are extremely faint.  I cannot apply a correction here.  Perhaps personal inspection of the actual document will clarify this point.
      2. 15.47.44 is clear however.  Any error must be in the prior 4 rows.
3. April 29th
   1. The discussion of 3.7.30
      1. It cannot be 3.17.30, as there is only one character between the two middle dots
      2. There DOES however, appear to be a squiggle before the 3.  Does 73.7.30 make more sense?
   2. Interpolation for departure
      1. These characters are extra small compared to the rest of the page and quite faint.
      2. The 2.6 could be a 1.6.
      3. Of the 183.4, only the 3 is in question.  It might possibly be a 2.
      4. There is a smudge below the 183.4   It may read 36x.x  “368.x” maybe???
      5. Any correction here will require further analysis.
   3. Longitude from AM observation
      1. Again, very faint.
      2. There is a muddle of figures here, very hard to see
      3. Will require personal inspection

### Re: Updated Transcript of Worsley's Log

**From:** Lars Bergman  
**Date:** 2017 Jan 26, 12:42 -0800

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Bergman-jan-2017-g37981

Brad, enclosed you will find my proposed changes.

Lars

**Attached File:**   
[Proposed-changes-to-Brads-version-3.0.pdf](http://fer3.com/arc/imgx/Proposed-changes-to-Brads-version-3.0.pdf)

### Re: Updated Transcript of Worsley's Log

**From:** Brad Morris  
**Date:** 2017 Jan 26, 16:15 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Morris-jan-2017-g37982>

The Wikipedia page shows Point Wild exactly where 29104 does.

On Jan 26, 2017 3:16 PM, "Robin Stuart" <[NoReply\_Stuart@fer3.com](mailto:NoReply_Stuart@fer3.com)> wrote:

Brad,

        Thanks for this interesting summary. I looks like the modern situation hasn’t really gotten much better! Now there seems to be disagreement between charts and other sources as to where Point Wild is. While all modern sources I have seen place Cape Belsham as the next promontory to the west of Point Wild there are two possible placements for these. The [Wikipedia entry for Elephant Island](https://en.wikipedia.org/wiki/Elephant_Island) shows 2 maps that disagree with each other. I have attached cropped images from the various sources

### Cape Belsham

**From:** Brad Morris  
**Date:** 2017 Jan 26, 15:20 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Morris-jan-2017-g37983

After re-reading my previous post on Cape Belsham, I know I need to clarify.

+++++

Ethiopics

Antarctica is discovered in 1820.  Some time between 1820 and 1855,  a whaler hunting elephant seals determined that the north point of Elephant Island was at S60°57' W54°56'.  The 1855 Ethiopic publishes this data, only 35 years after Antarctica is discovered.

The 1867 and 1883 Ethiopics merely copy the data from the 1855 Ethiopic.

Compare to modern chart 29104.

The most northern point of Elephant Island is now known as Cape Yelcho.  The latitude of Cape Yelcho is S61°3'45".  There is a shoal with exposed rocks to the north of this point.  The northern most exposed rock of that shoal is latitude S60°58'

I would expect that a seaman hunting elephant seals (hence the name of the island) would be able to determine which is the northern most point of Elephant Island.  If he includes the shoal with exposed rocks, then the latitude is correct within 1'.  If he determines that the shoal is separate, then the latitude is only correct to 6'45".

In either event, the northernmost point of Elephant Island is no where near the minor point, today known as Cape Belsham.

++++

Longitude.

The 1855 Ethiopic states the longitude of the north point to be W54°56'.

Modern day Cape Yelcho is at longitude 55°21'15"; for an error of 25'15", an error of 12 nautical miles at S61°.

The shoal has a broad area.  The northernmost rock in that shoal has a longitude of W55°23', for an error of 27', an error of 13 nautical miles at S61°

Can we expect a whaler, prior to 1855, to know his longitude accurately?  Frank, can you clarify this point???

++++++

What can Worsley see?

From his well documented location at Camp Wild, Worsley would not be able to see the low lying shoals north of Cape Yelcho.  They are 35'15" away in longitude, about 17 nautical miles at S61°.  They are below his horizon.

From his well documented location at Camp Wild, Cape Yelcho is blocked from view by an outcropping of rocks known as The White Company S61°5' W55°8'

The outcropping of The White Company would appear to Worsley to be that northern most point.  It's a mere 16'15" away from Camp Wild, 7.9 nautical miles away.

Note the obvious correlation between Worsley's stated 1 minute 4 seconds of chronometer error.  64 seconds divided by 4 seconds per arc minute yields 16' in longitude.  That's extremely close to the measured arc distance of 16'15"

Also, Worsley doesn't know it, but his reference in the Ethiopics misstates the longitude of Cape Belsham, the North point of Elephant Island. To reiterate it's stated in the Ethiopics as W54°56'. That's 25'15" to the east.

Worsley accounted for 16' of arc in his longitude correction. He needed to add another 13' or so of arc to get to Cape Belsham, from The White Company. That's his Cape Belsham, the next point over, modern day Cape Yelcho.  He can't see that.  That's 13'30" further west

++++

The Arithmetic

+25'15" Ethiopic Error east

-13'30" Error west, Worsley ID error

-16'       Chronometer adjust, West

-4'15"    final position relative to Camp Wild in arc, 2 nautical miles to the east of the well documented location of Camp Wild.

### Re: Updated Transcript of Worsley's Log

**From:** Lars Bergman  
**Date:** 2017 Jan 26, 15:21 -0800

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Bergman-jan-2017-g37984

Brad, regarding the crisp and clear 46', now I understand what Worsley did. I am sorry that I have bothered you by this trivial issue. The explanation is:

46' is the dlong from Wallis to the point they were aiming at. Multiply by cos 54°4' and you get 27' departure from Wallis. Worsley often (always ?) write " 27m W of Wallis" to emphazise that the 27 is dep in miles.

Will look into the other remaining issues tomorrow.

Lars

### Re: Updated Transcript of Worsley's Log

**From:** Robin Stuart  
**Date:** 2017 Jan 26, 16:13 -0800

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Stuart-jan-2017-g37985

Brad,

        The Wikipedia page you reference [Wikipedia entry for Elephant Island](https://en.wikipedia.org/wiki/Elephant_Island) has 2 maps on it. The first is consistent with Chart 29104 but the second is not. Nor is Chart 29014 consistent with the [Joint Services Expedition 1970 chart](http://fer3.com/arc/img/107770.elephant-island-1.jpg) which you had posted. Nor is it consistent with the coordinates 61°06'S, 54°52'W for Point Wild given on [this Wikipedia page](https://en.wikipedia.org/wiki/Point_Wild) or the location of the monument which I argued from photos appears to be on the easternmost of the 3 promontories. Please take a careful look at the cropped images I attached to my post <http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Stuart-jan-2017-g37975>  and you'll see 2 instances of each possible placement. It seems to me that Chart 29104 has it wrong! Please let me know if you agree,

Regards,

Robin

### Re: Updated Transcript of Worsley's Log

**From:** Brad Morris  
**Date:** 2017 Jan 26, 20:45 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Morris-jan-2017-g37986>

Robin

1) the first chart of [Wikipedia entry for Elephant Island](https://en.wikipedia.org/wiki/Elephant_Island) has three small points on the northern side of the eastern end of Elephant Island.  The western most of the three has no name, the middle is the modern Cape Belsham, the eastern is denoted Point (Camp Wild)

2) Chart 29104,  <http://fer3.com/arc/img/137966.20170126_011725.jpg> is the most up to date, listing sources to 1997, post dating the joint services chart by 27 years. It has three small points on the northern side of the eastern end of Elephant Island.  The western most point is identified as modern day Cape Belsham, the middle Point (Camp) Wild and the eastern most with no name.

3) [Joint Services Expedition 1970 chart](http://fer3.com/arc/img/107770.elephant-island-1.jpg) has three small points on the northern side, eastern end of Elephant Island.  The western point is un-named, the middle is modern day Cape Belsham and the eastern is Pt (Camp) Wild.

4) The coordinates 61°06'S, 54°52'W for Point Wild given on [this Wikipedia page](https://en.wikipedia.org/wiki/Point_Wild), using 29104, places you right on Point (Camp) Wild on Chart 29104.  Those are the coordinates of Point Wild, per 29104

5) the location of the monument which Robin argued from photos appears to be on the easternmost of the 3 promontories.  Robin, you agree with (1) and (3) but not (2) and (4).

I do not wish to make a mountain out of a molehill. All three points are within 4' of arc, or just under 2 nautical miles from Point 1 to Point 3, with Point 2 roughly in the middle.

At most, we shift the location of Camp Wild 1' of arc east or west, with a variation in time of 4 seconds.  That's not really worth disputing.

If I had to choose 1 definitive map, it would be 29104.  It is part of Portfolio 290, Weddell Sea Antarctic Coast to Princess Martha Coast, consisting of 17 charts overall.  I have the complete set.  It's what navigators in the Antarctic use today.  I have paper copy, so there may be an update.

Brad

On Jan 26, 2017 7:59 PM, "Robin Stuart" <[NoReply\_Stuart@fer3.com](mailto:NoReply_Stuart@fer3.com)> wrote:

Brad,

        The Wikipedia page you reference [Wikipedia entry for Elephant Island](https://en.wikipedia.org/wiki/Elephant_Island) has 2 maps on it. The first is consistent with Chart 29104 but the second is not. Nor is Chart 29014 consistent with the [Joint Services Expedition 1970 chart](http://fer3.com/arc/img/107770.elephant-island-1.jpg) which you had posted. Nor is it consistent with the coordinates 61°06'S, 54°52'W for Point Wild given on [this Wikipedia page](https://en.wikipedia.org/wiki/Point_Wild) or the location of the monument which I argued from photos appears to be on the easternmost of the 3 promontories. Please take a careful look at the cropped images I attached to my post <http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Stuart-jan-2017-g37975>  and you'll see 2 instances of each possible placement. It seems to me that Chart 29104 has it wrong! Please let me know if you agree,

Regards,

Robin

### Re: Updated Transcript of Worsley's Log

**From:** David C  
**Date:** 2017 Jan 26, 22:18 -0800

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-DavidC-jan-2017-g37989

My guess at his navigational exposure would be at his Fifth Officer posting in 1892.  Therefore, examining training for 1917, as you have done, is 25 years too late.

Please find a similar reference for the 1890's, 1900 at the very latest, when Worsley is certified as a master.

My point was that in 1917 the Board of Trade did not examine for intercept/azimuth methods. It is therefore a reasonable assumption that Worsley, who had qualified years before, had not been examined in intercept/azimuth methods. He may have learned the methods informally.

I have a copy of  *A Guide Book to the Local Marine Board Examination* (1875 edition). New examinations had come into use in 1872.The celestial navigation requirements can be summarised thus:

2nd Mate    Meridian Altitude

1st Mate     Long by Chron  &   ex-meridian

Master....

Extra-Master    Lunars, double altitudes, equal altitudes, Sumner's method.

Between 1875 and 1917 lunars were dropped and the Master's ticket upgraded. I note that Worsley was not an Extra Master. We need to know when the Master's ticket was upgraded to know if Worsley had been examined in Sumners. I do not have that information. I think that it is unlikely that he would not have been examined in interecept/azimuth mehods.

**Attached File:**   
[](http://fer3.com/arc/imgx/quals_1875_y1.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/quals_1875_y1.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/quals_1875_z1.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/quals_1875_z1.jpg)  
  
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[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/quals_1875_c1.jpg)

### Re: Updated Transcript of Worsley's Log

**From:** Brad Morris  
**Date:** 2017 Jan 27, 02:25 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Morris-jan-2017-g37990>

Hi David

He may have been examined in intercept and azimuth methods, maybe not.  That really is just speculation at this point.

What Robin wanted to know is if Worsley perhaps navigated differently when not on the Caird.

My response to that for a considerable number of years, is that he used the old methods, just as he did on the Caird.  Why would he switch when his life was in danger.  That would be an additional, frankly unacceptable risk.  It would be error prone to suddenly perform using a method you haven't practiced.  Worsley was exhausted, as were all the others on the Caird.  At times the seas were huge.  That's when he tried out some 'old timey' stuff?  Not very likely and dangerous.

Frank Reed has also indicated that some others used the methods Worsley did, out into the 1940's, so Worsley's use of the method in 1917 is completely unremarkable.

Frank has also presented the theory vs actual practice many times.  It's not just words, Frank has been thru many a logbook.  Similarly, lunars were on the examination for quite some time, long after nobody used them.  Examinations are not a good method to determine how folks navigated in real life.  For that, you go to the logbooks.  Worsley's logbook is right in front of us!  That's how he navigated.

Brad

### Re: Updated Transcript of Worsley's Log

**From:** David C  
**Date:** 2017 Jan 27, 00:02 -0800

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-DavidC-jan-2017-g37991

I think that it is unlikely that he would **not** have been examined in intercept/azimuth methods.

That should read

I think that it is unlikely that he would have been examined in intercept/azimuth methods.

### Re: Updated Transcript of Worsley's Log

**From:** Lars Bergman  
**Date:** 2017 Jan 27, 07:12 -0800

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Bergman-jan-2017-g37994

Brad, you asked "*Does 73.7.30 make more sense?"*regarding April 29th. Yes, indeed! I would like to have it like this:

16°43'          Noon altitude of lower limb as observed with the sextant (in your paper 6°43')  
16 52 30      Corrected altitude  
73   7 30      Zenith distance  
14 29 45      Declination  
58 37 45      Resulting noon latitude

This latitude is then moved southwards to the time of the am sight, by 9.8' of dlat (from " 12 9.8 6.9 = 13 "), making the latitude of the am obs 58°48'.

The longitude of the am obs is 3h22m6s, which equals 50°31'30" (in your document given as 50°31'34"). This am longitude should now be brought forward by the 13' of dlong sailed between am sight and noon, resulting in a noon longitude of say 50°19'. Thus there is a 19' diff to the longitude stated by Worsley, 50°0'. This last value is used in the distance calculation to Wallis, and also brought forward to the next day, so the transcription seems to be correct. One possible explanation could be that Worsley by mistake swapped 13 to 31 and subtracted the latter value from the am sight result.

Regarding the calculation of course and distance to "27m W of Wallis" we can conclude the following:

The difference of latitude is 274' and dlong is 660', as correctly calculated by Worsley. Now he has to convert dlong to departure. As his traverse table doesn't reach as far as 660', he uses half that number and look up the values for 56° and 57° latitude, finding that 330' of dlong equals 184.5' of departure at 56° lat, and 179.7' at 57° lat. The difference between these values is 4.8'. These values are thus correct in your document.

The mean latitude is (54°4' + 58°38')/2 = 56°21'. Linear interpolation then gives the increment as 21/60 · 4.8' = 1.7' to be subtracted from 184.5', giving 182.8'. Alternatively you could say that 21' is very nearly 1/3 degree and one third of 4.8' is 1.6', giving a result of 182.9'.

If we assume that your 183.4' actually is 182.4', then Worsley has subtracted 2.1' from the 56°-value. This corresponds to a mean latitude of 56°26'. The mean lat is most easily found by adding half of dlat to the smallest latitude. If Worsley by mistake read dlat=284' instead of dlat=274' the result would have been 56°26'.

If this suggestion seems plausible, then the following would make sense:

274     660=364.8

184.5  
179.7  
    4.8  
    2.1  
182.4

These values fit the resulting " N53E 458m ". What is your opinion, Brad?

Lars

### Point Wild location

**From:** Robin Stuart  
**Date:** 2017 Jan 27, 09:31 -0800

**Source**: http://fer3.com/arc/m2.aspx/Point-Wild-location-Stuart-jan-2017-g37999

Brad,

       You wrote :” I do not wish to make a mountain out of a molehill. All three points are within 4' of arc, or just under 2 nautical miles from Point 1 to Point 3, with Point 2 roughly in the middle.  At most, we shift the location of Camp Wild 1' of arc east or west, with a variation in time of 4 seconds.  That's not really worth disputing.”

Agreed! For the purposes of analyzing Worsley’s log this question is neither here nor there and and I admit to losing most of my interest in it when in a [previous post](http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Stuart-jan-2017-g37962) I noted “Worsley’s position for it [Cape Belsham] is 2.8 nautical miles from the modern position”.

I am questioning the correctness of labels on modern Marine Charts and I have changed the thread name accordingly.

Although I contend that the 3 promontories in question are unambiguously identifiable and labelled in each of the 4 charts/maps that I [previously attached](http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Stuart-jan-2017-g37975) let’s just focus on the large scale ones; [Chart 29104](http://fer3.com/arc/img/137966.20170126_011725.jpg) and the one from the [Joint Services Expedition](http://fer3.com/arc/img/107770.elephant-island-1.jpg) . I have reattached cropped versions of the area in question. Further since Cape Belsham is the result of somebody’s arbitrary decision let’s exclude it for the moment and focus on Point Wild. This was the site of real historic events and exists in its own objective reality. The fact that so many of us many of us have been engrossed in this shows that it matters.

As laid out in my [earlier post](http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Stuart-jan-2017-g37975) there is a monument on Point Wild and photographs of the area compared to the views from Google Earth (also reattached) suggest that it is on the eastern promontory. The aerial view from Google Earth also shows that the middle promontory is very steep and is an unlikely place for Shackleton’s Wild Camp. The eastern promontory is much flatter and snow free.

The US Geological Survey (USGS) Names Service

<https://geonames.usgs.gov/apex/f?p=gnispq:5:::NO::P5_ANTAR_ID:16588>  has the following entry for Point Wild.

“A point 6 mi W of Cape Valentine on the N coast of Elephant Island, South Shetland Islands. Named Cape Wild by the Shackleton Endurance expedition 1914-16, but Point Wild is recommended for this feature because of its small size and to avoid confusion with Cape Wild on George V Coast. Named for Frank Wild, leader of the party from Shackleton's shipwrecked expedition which camped on the point for four months until rescued in August 1916.”

Note in particular that Point Wild is described as a “small feature”. That fits the eastern promontory but is a stretch for the middle for one.

For Cape Belsham the USGS says <https://geonames.usgs.gov/apex/f?p=gnispq:5:::NO::P5_ANTAR_ID:1210>

“Prominent cape 0.5 mi W of Point Wild on the N coast of Elephant Island, South Shetland Islands.”

So if we find Point Wild we find Cape Belsham or at least its modern designation.

The USGS gives the following coordinates:

Cape Belsham: -61.0833333,-54.8833333

Point Wild: -61.1,-54.8666667

I have plotted these locations with Google Earth (attached) and you can see they don’t really pin the locations down. What’s a poor chart maker to do? If these data were the source for the labels in Chart 29104 they could easily have been misplaced especially given that Point Wild is such a small feature.

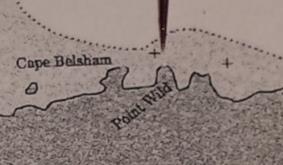
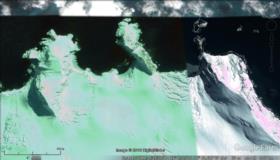
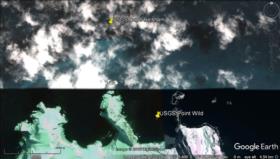
You wrote: “Chart 29104 is the most up to date, listing sources to 1997, post dating the joint services chart by 27 years”.

Maybe but the recent data is more likely to be updates to be limited to satellite and sounding data and is unlikely to involve re-examining the historical labelling of feature labels.

It still seems to me that Chart 29104 has got it wrong!

Regards,

Robin Stuart

**Attached File:**   
[](http://fer3.com/arc/imgx/f1-Chart29104_Cropped.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/f1-Chart29104_Cropped.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/f1-JointSurvey1970_Cropped.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/f1-JointSurvey1970_Cropped.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/f1-CapeBelsham.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/f1-CapeBelsham.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/USGSPositions.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/USGSPositions.jpg)

### Re: Updated Transcript of Worsley's Log

**From:** Brad Morris  
**Date:** 2017 Jan 27, 12:58 -0500

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Morris-jan-2017-g38000

Lars

Reply in parts

++++++

Part one

You wrote

16°43'          Noon altitude of lower limb as observed with the sextant (in your paper 6°43')

16 52 30      Corrected altitude

73   7 30      Zenith distance

14 29 45      Declination

58 37 45      Resulting noon latitude

The 16°43' is close to the inner edge of the page.  So much so that there is a tear in the page from the stitching holding the log together.  What I see is

'6°43'

But I wholeheartedly agree.  The corrected altitude of 16 52 30 can only come from an altitude in proximity, not from an altitude 10° away.  Further (90°-16 52 30)=73 7 30.  That makes perfect sense!

Mystery solved Lars!  Well done!

This will be updated in the next version of the transcript, with a special note about the ripped page and the numerical value reconstruction.

++++++

Part 2

You wrote (in extracted phrases)

As his traverse table doesn't reach as far as 660', he uses half that number [editors note: 330]

Linear interpolation then gives the increment as 21/60 · 4.8' = 1.7'

And you then wrote these numbers

274     660=364.8

184.5

179.7

    4.8

    2.1

182.4

Discussion:

Just under the 274, there is an extremely faint 1.7 Just under the 660, there is an extremely faint 330, half of 660.  I picked these up with a negative (reverse black and white) exposure of the image I have of the log.

The 2.1 is very faint and malformed.  The 2.1 could easily be a 1.6.

As to the resultant 182.4, upon closer inspection, the 2 could be a 3, with the 4 possibly a 9.  So the potential readings are 182.4, 182.9, 183.4 and 183.9.  But I note that 184.5 - 1.6 = 182.9, with the 184.5 being a confirmed value.

Again, under the 182.9, I observe 365.8, which is precisely 2\*182.9.  That appears to confirm the earlier parts.

364.8 is just not there.  It's a reasonably clear 365.8. Worsley's 5's look like 3's, with an additional pen stroke.  Note that the 365.8 here matches precisely to the 365.8 under the 182.9

After reviewing the data, here is what I would propose

274     660=365.8

 1.7     330

184.5

179.7

    4.8

    1.6

182.9

365.8

If this seems right to you, as it does to me, we can update this section of the transcript.

I'd like to apologize for the terrible state of the transcript here.  It's very  faint.  Worsley's penmanship is awful in this spot.  He was performing a quick calculation he knew by heart, so he is just jotting down a few figures.  I have difficulty reading anything at all here.

Brad

On Jan 27, 2017 10:40 AM, "Lars Bergman" <[NoReply\_Bergman@fer3.com](mailto:NoReply_Bergman@fer3.com)> wrote:

Brad, you asked "Does 73.7.30 make more sense?" regarding April 29th. Yes, indeed! I would like to have it like this:

16°43'          Noon altitude of lower limb as observed with the sextant (in your paper 6°43')  
16 52 30      Corrected altitude  
73   7 30      Zenith distance  
14 29 45      Declination  
58 37 45      Resulting noon latitude

This latitude is then moved southwards to the time of the am sight, by 9.8' of dlat (from " 12 9.8 6.9 = 13 "), making the latitude of the am obs 58°48'.

The longitude of the am obs is 3h22m6s, which equals 50°31'30" (in your document given as 50°31'34"). This am longitude should now be brought forward by the 13' of dlong sailed between am sight and noon, resulting in a noon longitude of say 50°19'. Thus there is a 19' diff to the longitude stated by Worsley, 50°0'. This last value is used in the distance calculation to Wallis, and also brought forward to the next day, so the transcription seems to be correct. One possible explanation could be that Worsley by mistake swapped 13 to 31 and subtracted the latter value from the am sight result.

Regarding the calculation of course and distance to "27m W of Wallis" we can conclude the following:

The difference of latitude is 274' and dlong is 660', as correctly calculated by Worsley. Now he has to convert dlong to departure. As his traverse table doesn't reach as far as 660', he uses half that number and look up the values for 56° and 57° latitude, finding that 330' of dlong equals 184.5' of departure at 56° lat, and 179.7' at 57° lat. The difference between these values is 4.8'. These values are thus correct in your document.

The mean latitude is (54°4' + 58°38')/2 = 56°21'. Linear interpolation then gives the increment as 21/60 · 4.8' = 1.7' to be subtracted from 184.5', giving 182.8'. Alternatively, you could say that 21' is very nearly 1/3 degree and one third of 4.8' is 1.6', giving a result of 182.9'.

If we assume that your 183.4' actually is 182.4', then Worsley has subtracted 2.1' from the 56°-value. This corresponds to a mean latitude of 56°26'. The mean lat is most easily found by adding half of dlat to the smallest latitude. If Worsley by mistake read dlat=284' instead of dlat=274' the result would have been 56°26'.

If this suggestion seems plausible, then the following would make sense:

274     660=364.8

184.5  
179.7  
    4.8  
    2.1  
182.4

These values fit the resulting " N53E 458m ". What is your opinion, Brad?

Lars

### Re: Point Wild location

**From:** Lars Bergman  
**Date:** 2017 Jan 27, 10:31 -0800

**Source**: http://fer3.com/arc/m2.aspx/Point-Wild-location-Bergman-jan-2017-g38001

Robin, although the positions are given as degrees with seven decimals

"The USGS gives the following coordinates:  
Cape Belsham: -61.0833333,-54.8833333  
Point Wild: -61.1,-54.8666667 ",

I would say that those values are directly calculated from

Cape Belsham -61°5', -54°53'  
Point Wild       -61°6', -54°52'

so they are not more precise than +/- 0.5'

Lars

### Re: Point Wild location

**From:** Brad Morris  
**Date:** 2017 Jan 27, 14:18 -0500

**Source**: http://fer3.com/arc/m2.aspx/Point-Wild-location-Morris-jan-2017-g38003

Hello Robin

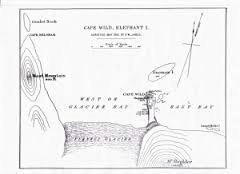
I have found definitive evidence.  Reginald James was part of the Endurance crew, and was one of the men stranded on Elephant Island.  He drew a chart of the encampment on Elephant Island.  It is attached.  It is a terrible image, but cannot find a better one.  However, the shape of the land is easy to make out and you should be able to easily align the shape of the James Chart to the detailed Joint Services Expedition map.

Indisputably then, 29104 is wrong when it names Point Wild. The Joint Services Expedition map is correct when it names Point Wild.

I think you will agree!

Brad

**Attached File:**   
[](http://fer3.com/arc/imgx/f1-JointSurvey1970_Cropped.jpg)

**Attached File:**  [[](http://fer3.com/arc/img/138003.psx_20170127_141158.jpg)](http://fer3.com/arc/img/138003.psx_20170127_141158.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/138003.psx_20170127_141158.jpg)

### Re: Point Wild location

**From:** Brad Morris  
**Date:** 2017 Jan 27, 14:25 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Point-Wild-location-Morris-jan-2017-g38004>

Robin

I wrote

” I do not wish to make a mountain out of a molehill. All three points are within 4' of arc, or just under 2 nautical miles from Point 1 to Point 3, with Point 2 roughly in the middle.  At most, we shift the location of Camp Wild 1' of arc east or west, with a variation in time of 4 seconds.  That's not really worth disputing.”

Er, No Brad!  4' of arc divided into two pieces is 2' or arc apiece.  Point 1 to Point 2 is 2' of arc.  Point 2 to Point 3 is an additional 2' of arc.  We are shifting Point (Camp) Wild 2' of arc east or west.  Not 1' of arc.  Naturally, 2' of arc is 8 seconds in time.

My unprompted error!

Brad

### Re: Point Wild location

**From:** Robin Stuart  
**Date:** 2017 Jan 27, 14:16 -0800

**Source**: http://fer3.com/arc/m2.aspx/Point-Wild-location-Stuart-jan-2017-g38005

Lars,

     Yes I agree the number of decimal places is not a reflection of the accuracy of the position but merely the way the information is stored in the database. I suspect that this +/-0.5 precision is the probable source of the mislabelling of Chart 12409. It should be noted however that the USGS position is 0.7 miles north of its true position so they could have done a bit better,

Regards,

Robin

### Re: Point Wild location

**From:** Robin Stuart  
**Date:** 2017 Jan 27, 14:34 -0800

**Source**: http://fer3.com/arc/m2.aspx/Point-Wild-location-Stuart-jan-2017-g38006

Brad,

       I think that clinches it, good! According to the GNIS data Cape Belsham is the "Prominent cape 0.5 mi W of Point Wild" which would make it the middle of the 3 promontories at least in its modern interpretation. Unfortunately I can't make out enough detail in the sketch you attached to see whether James confirms this identification . I would note that the western most promontory would not be visible from Point Wild which probably makes it a less likely candidate,

Regards,

Robin

### Re: Updated Transcript of Worsley's Log

**From:** Lars Bergman  
**Date:** 2017 Jan 27, 14:34 -0800

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Bergman-jan-2017-g38007

Nice work Brad,

I do however believe that the faint 1.7 below 274 shall be 137, being half of the dlat value. Inspecting the traverse tables Worsley looked for dlat=137 and dep=182.9 and found the closest values at course 53°, distance 229 miles. Multiplied by two gives the distance 458 mls to the target west of Wallis. He had actually no use for the value 365.8, but noted it down from old habit. If my theory holds ...

Lars

### Re: Updated Transcript of Worsley's Log

**From:** Bob Crawley  
**Date:** 2017 Jan 27, 01:28 -080

**Source**: http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Crawley-jan-2017-g37992

Brad - just a note of thanks for posting these fascinating notes. Thanks also to Lars for the extra interpretations which I was just about to request. It strikes me that at some point this should all be consolidated into a paper for posterity.

Regards

Bob Crawley

### Re: Point Wild location

**From:** Robin Stuart  
**Date:** 2017 Jan 27, 14:51 -0800

**Source**: http://fer3.com/arc/m2.aspx/Point-Wild-location-Stuart-jan-2017-g38008

"the USGS position is 0.7 miles north of its true position so they could have done a bit better"...except that in the interests of not running aground it's better to err by placing the position too far to the North than too far to the South.

### Re: Point Wild location

**From:** Brad Morris  
**Date:** 2017 Jan 28, 13:10 -0500

**Source**: http://fer3.com/arc/m2.aspx/Point-Wild-location-Morris-jan-2017-g38022

Robin

The modern designation of Cape Belsham is irrelevant to our duscussion.

Worsley had to determine which land mass was Cape Belsham from the references he had, as there was no neon sign over it!

The only period references to it state "Cape Belsham,  N. point of Elephant Island" and then provide the coordinates.

If you wish to decode the journey, you must determine the chronometer error and in that Cape Belsham.

Brad

On Jan 28, 2017 11:15 AM, "Robin Stuart" <[NoReply\_Stuart@fer3.com](mailto:NoReply_Stuart@fer3.com)> wrote:

At the risk of seeming to flog a dead horse the [NGA Pub. 200 Sailing Directions for Antartica](http://msi.nga.mil/MSISiteContent/StaticFiles/NAV_PUBS/SD/Pub200/Pub200bk.pdf)  says "Cape Belsham, which has a notched peak...”.  I attach a couple of images that show Point Wild to the left of the large ice fall and the notched peak of Cape Belsham to the right,

Robin Stuart

**Attached File:**   
[](http://fer3.com/arc/imgx/ApproachingPointWild.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/ApproachingPointWild.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/ApproachingCapeBelsham.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/ApproachingCapeBelsham.jpg)

### Re: Point Wild location

**From:** Robin Stuart  
**Date:** 2017 Jan 28, 10:37 -0800

**Source**: http://fer3.com/arc/m2.aspx/Point-Wild-location-Stuart-jan-2017-g38023

Brad,

       You wrote: "The modern designation of Cape Belsham is irrelevant to our duscussion."

       I can only reiterate what I [said previously](http://fer3.com/arc/m2.aspx/Point-Wild-location-Stuart-jan-2017-g37999) that "I am questioning the correctness of labels on modern Marine Charts and I have changed the thread name accordingly."

Regards,

Robin

### Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Jan 28, 15:53 -0800

Source: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-jan-2017-g38028

Lars

I examined the text for Saturday 29th April, explicitly for the course and distance calculation to 27 W of Wallis.

Below the dlat of 274, I thought there might be a 1.7.  You replied that it is more probably 137, being half of the dlat.  With the understanding that all of the characters in this section are very faint, the 1.7 is even fainter.  I studied the single character space for quite some time.  Was there a three there?  Yes!, the faintest shadow of a three may be teased from the space.  Far fainter than the surrounding faint text, yet it is there none the less!  Well Done!

The updated Transcript, version 3.2, is attached.

I have added a small section to the author's notes page, in which I directly name contributors to the text.  Yours appears, along with George and Robin.

Brad

**Attached File:**   
[The-Log-revision-3.2.pdf](http://fer3.com/arc/imgx/The-Log-revision-3.2.pdf)

### Re: Cape Belsham

**From:** Brad Morris  
**Date:** 2017 Jan 28, 16:10 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Morris-jan-2017-g38030

Robin

I have found a better image of the encampment on Elepant Island.

It appears in one of the papers by James Wordie (another strandee).  The better image is attached, please take a look.

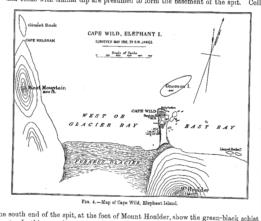
If you look in the upper left hand part of the image, right by Gimlet Rock, you will find a point labeled "Cape Belsham".  This chart was created by Reginal James in 1916 and published in James Wordie.  There can be no more of an authoritative source of what point the men considered to be Cape Belsham, than the men themselves.

Needless to say, it is NOT the "N. point of Elephant Island", not by several miles.  The landmass referred to by the Ethiopics does not appear to be the landmass selected by Worsley.

I retract my earlier discussion as to how the chronometer error was determined.  The discrepancy among the Ethiopic lat/long, Worsley's determined lat/long and how it determined his chronometer error remains unresolved.  Worsley, upon arriving at South Georgia Island is perfectly aware that his chronometer adjustement was not sufficient.

The determination of the CE remains the central problem to the navigation.  In your own words Robin, Worsley would have known if the James Caird was half way up a mountain, stranded on a glacier.

Brad

**Attached File:**   
[](http://fer3.com/arc/imgx/wordie-2.jpg)

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Lars Bergman  
**Date:** 2017 Jan 29, 05:49 -0800

Source: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Bergman-jan-2017-g38037

Thank you, Brad.

On the 28th,  "1m4' more slow" shall probably be "1m4s more slow", with or without underlined s.

On the 26th,

2.23.29  
   26   7  
   30  10  
----------  
   19.46

this shall probably read

2.23.29      or     2.23.29  
2 26   7                  26   7  
2 30 10                  30 10  
----------              ----------  
7 19.46                  79 46

being the sum of three chronometer readings. Divide by three, and you get the mean value 2h26m35s shown below. The mean of the altitudes is perhaps calculated among the x:es top middle or down left?

Apart from the question of CE determination, I now see only two (there may be more) remaining peculiarities:

a) April 26th

16°28'  
16 37  
73.20 x  
13 32 x  
---------  
59 47.44  
  
My impression is that this is the noon observation for latitude. I know that you insist that the last row is correct, but why is the observed position then given as 59°46' above? The next last row should be the declination, 13°32'34" within one or two seconds of arc. Could you please give it another look? As it is now it makes no sense.

b) 4th May

N36E 52 41

Looks like course dlat dep, but the values don't correspond to each other. Please give it a look again!

Lars

### Re: Cape Belsham

**From:** Robin Stuart  
**Date:** 2017 Jan 29, 06:59 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Stuart-jan-2017-g38039

Brad,

That’s a great find! Can you supply a reference to it? I agree that the location of Cape Belsham in the eyes of the expedition has been settled. I notice a position for the HUT on Cape Wild given as 61°5'S 54°50'W.

I had not followed the discussion of chronometer calibration as closely as other aspects but would like to summarize the current state of affairs as I see them.

Worsley assigned a position of 61°4'S 54°50'W to Cape Belsham but believed that the longitude was only approximate stating in his log “Long. Of C. Belsham being only approx. known to us, allow 1minute+4sec more”.  Worsley's source for this position is unknown.

The WGS84 location of Cape Belsham is 61°5.7'S 54°53'W which is just 2 nautical miles from the position used by Worsley. The 3' difference in longitude would introduce an error of 0.2 seconds of time slow in the chronometer calibration.

Let me know what you think and if there is anything more that could be added.

Regards,

Robin Stuart

**Re: Transcript Of Worsleys Navigational Log Book**

**From:** Brad Morris  
**Date:** 2017 Jan 29, 12:09 -0500

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-jan-2017-g38040

Lars

I will examine the areas you have requested for correction.

I had an thought about the chronometer error.

1) Worsley gets the location of Point Wild correct to 1' in longitude, as plotted on Chart 29104.  How he does this is not important.  It's essentially correct.

2) That means his chronometer correction makes the reading of his chronometer align with the longitude.

3) On 7 May, Worsley writes that he should be 20 [nautical] miles astern, but that his latitude is essentially correct.

4) 20 nautical miles at S55° is 34.8', call it 35' of arc.

5) At 4 seconds of time per minute of arc, that's 140 seconds of time, or 2 minutes 20 seconds.

6) the open boat journey takes 15 days total (24 April -》7 May)

The one thing that Worsley never directly tells us is his RATE.  Suppose for a moment, that his rate is 10 seconds per day faster than he expected.  Then the rising sun's altitude will be lower in the sky than expected, leading him to believe that he was further east than he truly was.  This would barely affect his latitude around noon, as the sun's altitude would be only marginally wrong.

That is the theory I am working with now.  It is simple, and requires no machinations about charts, Ethiopics or other external evidence.

Why would his rate change so dramatically?  Perhaps, after months on the ice, the "warmer" climate of the open ocean at Elephant Island and beyond allowed the mechanism to run more freely.  Other theoretical speculation can apply here as well.  To satisfy all of the listed points, his chronometer just has to run slightly faster than before.

Your thoughts??

Brad

On Jan 29, 2017 11:04 AM, "Lars Bergman" <[NoReply\_Bergman@fer3.com](mailto:NoReply_Bergman@fer3.com)> wrote:

Thank you, Brad.

On the 28th,  "1m4' more slow" shall probably be "1m4s more slow", with or without underlined s.

On the 26th,

2.23.29  
   26   7  
   30  10  
----------  
   19.46

this shall probably read

2.23.29      or     2.23.29  
2 26   7                  26   7  
2 30 10                  30 10  
----------              ----------  
7 19.46                  79 46

being the sum of three chronometer readings. Divide by three, and you get the mean value 2h26m35s shown below. The mean of the altitudes is perhaps calculated among the x:es top middle or down left?

Apart from the question of CE determination, I now see only two (there may be more) remaining peculiarities:

a) April 26th

16°28'  
16 37  
73.20 x  
13 32 x  
---------  
59 47.44  
  
My impression is that this is the noon observation for latitude. I know that you insist that the last row is correct, but why is the observed position then given as 59°46' above? The next last row should be the declination, 13°32'34" within one or two seconds of arc. Could you please give it another look? As it is now it makes no sense.

b) 4th May

N36E 52 41

Looks like course dlat dep, but the values don't correspond to each other. Please give it a look again!

Lars

### Re: Cape Belsham

**From:** Brad Morris  
**Date:** 2017 Jan 29, 12:43 -0500

Sources: <http://fer3.com/arc/m2.aspx/Cape-Belsham-Morris-jan-2017-g38041>

I went back to the chart 29104, for the purposes of defining Worsley's geographic error.

I've updated my copy of 29104 to put the place names right.

Using the coordinates that Worsley wrote in his log (and Reginald James wrote on his chart) we have S61°4' W54°50'.  I placed that location on the chart, using standard plotting tools.  It is the small circle with cross just to the NNE of Point Wild.

See image.

Measuring the distance from where the point is today, to where Worsley thought it,  Worsley is to the north 1'15" and to the east 1'E.

Converting the latitude error to nautical miles we have

1'\*cos (61)=.484 nautical miles east

The longitude is along a great circle, no conversion truly needed

1'15"=1.25 nautical miles north

A little triangle solution

(1.25^2 + .484^2)^.5= 1.34 nautical miles total error.

Brad

### Worsley's CE

**From:** Lars Bergman  
**Date:** 2017 Jan 29, 10:33 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-CE-Bergman-jan-2017-g38042

Brad, you wrote

"The determination of the CE remains the central problem", in the Cape Belsham thread, and you and Robin and others, in other threads, have put a lot of efforts into finding the exact coordinates for the observation site used for the "rating" observation on April 24th.

Okay, I agree that the observation is sensitive to errors in both latitude and longitude.

One issue that requires further research is how the longitude of Elephant Island was determined on the chart (or maybe table) used by Worsley. It could very well be that the longitude was primarily derived from the longitude of South Georgia. Then the longitude difference could be approximately correct, although the absolute longitude values may differ a lot from modern sources.

Now to some general remarks, not necessarily in the most logical order.

On April 26th and May 3rd, some other watch than the chronometer is used for timing the observations. This watch has errors "fast 29" and "slow 46" respectively. These values must have been obtained by comparison with the chronometer 192/262 shortly before or after each observation.

On April 25th there is a table of chronometer errors. This table, or its extension, is used throughout the voyage, the last entry is shown on May 7th.

On April 28th there is a note "allowing 1m4s more slow rating from Wild Camp = 50°16' " and Worsley accordingly adds 16' to the westerly longitude, from 50°0' to 50°16'. It is however not clear where he got the initial 50°0'. No DR course and distance is shown.

Likewise, on April 26th, Worsley adds 16' to his longitude obtained by the am sight. On the other hand, he neglects to reduce the am longitude for the easting made between the am sight and noon. Mistake, or ...? Anyway, he must have been confused by the large discrepancy between DR and observed noon positions.

Furthermore, we have the cryptic entry on the 24th: "allow 1 minute + 4 sec more slow = 11min55sec slow".

Clearly, these last 1m4s is included in the CE table used for the voyage. But why were they included? Although Worsley was aware that the latitude and longitude were only approximately known when observing for "Rating Chron", how did he know which sign possible errors had?

The 1m4s or 16' adjustment made on the 26th and 28th seems to be additional to the 1m4s mentioned (and included) on the 24th.

Now, let us have a look at the "rating" observation itself.

The calculation of the hour angle is done with a half minute of arc precision, the latitude is "the best available" and the declination (polar distance) is correct to a half minute. So the resulting local apparent time of 21h4m35s is "as near he can make it". The equation of time is correct to the second.

I presume that the chronometer showed 24h29m10s at the time of observation. Then,

LAT    21h 4m35s  
EoT           1  53  
----------------------  
LMT   21    2  42  
long     3  39  20   (54°50'W)  
----------------------  
GMT  24  42    2  
CT     24  29  10  
---------------------  
CE       0  12  52  slow

The sun bears nearly northeast, so the sensitivity of CE to an error in latitude is approximately 9s per arcminute of latitude, and some 12s per arcminute of altitude. And 4s per arcminute of longitude error.

The note on May 7th (inserted later, after landfall) says that they were about 20 miles "further astern than observation showed". 20 miles at latitude 54° equals 34' of longitude, or 2m16s. The "correct" CE used on that day should thus have been 15m16s instead of 13m0s.

April 24th   CE 12m52s  
May 7th            15  16  
-----------------------------  
        13d              2m24s                 giving the rate 144s/13d = 11s per day, instead of the used value of 5s per day.

This was "my 2 cents",

Lars 59N 18E

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Jan 29, 15:57 -0500

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-jan-2017-g38045

ROBIN

I added a few columns to your spreadsheet.

They Are:

W - Worsley's chronometer is running faster than he wants.  Seconds

X - convert to minutes of arc

Y - nautical miles of longitude at the LATITUDE.  Y27 (yellow) shows an accumulation of 19.4 miles.  I am sure you could make this 20

Z - from your longitude, subtract out the minutes of arc (col x.)  IN MINUTES OF ARC

AA - convert to whole degrees

AB - the remaining minutes

One debatable point.  Do we update DR positions with the chronometer?  I think NO!

Please add a second course to the kml for comparison

Brad

On Jan 29, 2017 12:35 PM, "Brad Morris" <[NoReply\_Morris@fer3.com](mailto:NoReply_Morris@fer3.com)> wrote:

Lars

I will examine the areas you have requested for correction.

I had an thought about the chronometer error.

1) Worsley gets the location of Point Wild correct to 1' in longitude, as plotted on Chart 29104.  How he does this is not important.  It's essentially correct.

2) That means his chronometer correction makes the reading of his chronometer align with the longitude.

3) On 7 May, Worsley writes that he should be 20 [nautical] miles astern, but that his latitude is essentially correct.

4) 20 nautical miles at S55° is 34.8', call it 35' of arc.

5) At 4 seconds of time per minute of arc, that's 140 seconds of time, or 2 minutes 20 seconds.

6) the open boat journey takes 15 days total (24 April -》7 May)

The one thing that Worsley never directly tells us is his RATE.  Suppose for a moment, that his rate is 10 seconds per day faster than he expected.  Then the rising sun's altitude will be lower in the sky than expected, leading him to believe that he was further east than he truly was.  This would barely affect his latitude around noon, as the sun's altitude would be only marginally wrong.

That is the theory I am working with now.  It is simple, and requires no machinations about charts, Ethiopics or other external evidence.

Why would his rate change so dramatically?  Perhaps, after months on the ice, the "warmer" climate of the open ocean at Elephant Island and beyond allowed the mechanism to run more freely.  Other theoretical speculation can apply here as well.  To satisfy all of the listed points, his chronometer just has to run slightly faster than before.

Your thoughts??

Brad

On Jan 29, 2017 11:04 AM, "Lars Bergman" <[NoReply\_Bergman@fer3.com](mailto:NoReply_Bergman@fer3.com)> wrote:

Thank you, Brad.

On the 28th,  "1m4' more slow" shall probably be "1m4s more slow", with or without underlined s.

On the 26th,

2.23.29  
   26   7  
   30  10  
----------  
   19.46

this shall probably read

2.23.29      or     2.23.29  
2 26   7                  26   7  
2 30 10                  30 10  
----------              ----------  
7 19.46                  79 46

being the sum of three chronometer readings. Divide by three, and you get the mean value 2h26m35s shown below. The mean of the altitudes is perhaps calculated among the x:es top middle or down left?

Apart from the question of CE determination, I now see only two (there may be more) remaining peculiarities:

a) April 26th

16°28'  
16 37  
73.20 x  
13 32 x  
---------  
59 47.44  
  
My impression is that this is the noon observation for latitude. I know that you insist that the last row is correct, but why is the observed position then given as 59°46' above? The next last row should be the declination, 13°32'34" within one or two seconds of arc. Could you please give it another look? As it is now it makes no sense.

b) 4th May

N36E 52 41

Looks like course dlat dep, but the values don't correspond to each other. Please give it a look again!

Lars

[View and reply to this message](http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Bergman-jan-2017-g38037)

[View and reply to this message](http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-jan-2017-g38040)

**Attached File:** [138045.worsleycalculations-rate.xlsx](http://fer3.com/arc/img/138045.worsleycalculations-rate.xlsx)

### Re: Worsley's CE

**From:** Brad Morris  
**Date:** 2017 Jan 29, 16:06 -0500

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-CE-Morris-jan-2017-g38046

Lars

You wrote

 11s per day, instead of the used value of 5s per day.

Which is precisely the value I gave to Robin in my update to his spreadsheet!! 11 seconds per day

Brad

On Jan 29, 2017 3:59 PM, "Lars Bergman" <[NoReply\_Bergman@fer3.com](mailto:NoReply_Bergman@fer3.com)> wrote:

Brad, you wrote

"The determination of the CE remains the central problem", in the Cape Belsham thread, and you and Robin and others, in other threads, have put a lot of efforts into finding the exact coordinates for the observation site used for the "rating" observation on April 24th.

Okay, I agree that the observation is sensitive to errors in both latitude and longitude.

One issue that requires further research is how the longitude of Elephant Island was determined on the chart (or maybe table) used by Worsley. It could very well be that the longitude was primarily derived from the longitude of South Georgia. Then the longitude difference could be approximately correct, although the absolute longitude values may differ a lot from modern sources.

Now to some general remarks, not necessarily in the most logical order.

On April 26th and May 3rd, some other watch than the chronometer is used for timing the observations. This watch has errors "fast 29" and "slow 46" respectively. These values must have been obtained by comparison with the chronometer 192/262 shortly before or after each observation.

On April 25th there is a table of chronometer errors. This table, or its extension, is used throughout the voyage, the last entry is shown on May 7th.

On April 28th there is a note "allowing 1m4s more slow rating from Wild Camp = 50°16' " and Worsley accordingly adds 16' to the westerly longitude, from 50°0' to 50°16'. It is however not clear where he got the initial 50°0'. No DR course and distance is shown.

Likewise, on April 26th, Worsley adds 16' to his longitude obtained by the am sight. On the other hand, he neglects to reduce the am longitude for the easting made between the am sight and noon. Mistake, or ...? Anyway, he must have been confused by the large discrepancy between DR and observed noon positions.

Furthermore, we have the cryptic entry on the 24th: "allow 1 minute + 4 sec more slow = 11min55sec slow".

Clearly, these last 1m4s is included in the CE table used for the voyage. But why were they included? Although Worsley was aware that the latitude and longitude were only approximately known when observing for "Rating Chron", how did he know which sign possible errors had?

The 1m4s or 16' adjustment made on the 26th and 28th seems to be additional to the 1m4s mentioned (and included) on the 24th.

Now, let us have a look at the "rating" observation itself.

The calculation of the hour angle is done with a half minute of arc precision, the latitude is "the best available" and the declination (polar distance) is correct to a half minute. So the resulting local apparent time of 21h4m35s is "as near he can make it". The equation of time is correct to the second.

I presume that the chronometer showed 24h29m10s at the time of observation. Then,

LAT    21h 4m35s  
EoT           1  53  
----------------------  
LMT   21    2  42  
long     3  39  20   (54°50'W)  
----------------------  
GMT  24  42    2  
CT     24  29  10  
---------------------  
CE       0  12  52  slow

The sun bears nearly northeast, so the sensitivity of CE to an error in latitude is approximately 9s per arcminute of latitude, and some 12s per arcminute of altitude. And 4s per arcminute of longitude error.

The note on May 7th (inserted later, after landfall) says that they were about 20 miles "further astern than observation showed". 20 miles at latitude 54° equals 34' of longitude, or 2m16s. The "correct" CE used on that day should thus have been 15m16s instead of 13m0s.

April 24th   CE 12m52s  
May 7th            15  16  
-----------------------------  
        13d              2m24s                 giving the rate 144s/13d = 11s per day, instead of the used value of 5s per day.

This was "my 2 cents",

Lars 59N 18E

### Re: Cape Belsham

**From:** Robin Stuart  
**Date:** 2017 Jan 29, 13:53 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Stuart-jan-2017-g38050

Brad,

       The scale of Chart 29104 might make it a bit of a blunt instrument for these calculations and the Joint Services Expedition Chart might give different results. When plotted on Google Earth I got 61°5.7'S 54°53'W which is further from Worsley's position than yours. The attached snapshot shows Worsley's position labelled "Cape Belsham (1916)" and you are the "Untitled  Placemark".  It could also be that Google Earth has wrong.

       Here I issue the usual disclaimer that the difference is inconsequential in the overall conclusion....etc, etc.

Regards,

Robin

**Attached File:**   
[](http://fer3.com/arc/imgx/CapeBelshamPlot.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/CapeBelshamPlot.jpg)

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Lars Bergman  
**Date:** 2017 Jan 29, 14:21 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Bergman-jan-2017-g38051

Brad, regarding the mysterious entry "N36E 52 41" on the 4th of May, I have got an idea:

obs'd psn 3rd   56°13'S          45°38'W  
obs'd psn 4th   55  31             44  43  
                         ----------          -----------  
                     dlat    42'N    dlong   55'E

mean lat  55°52'

lat     dep for 55' dlong  
55     31.5  
56     30.8  
        -------  
           0.7

Mental interpolation gives a departure of 31 for the mean lat. By inspection in the traverse table we find the course N36°E and distance 52 miles. The day's run.

So maybe the entry shall be "N36E 52 42", or, still better, "N36E 52 42 55 = 31".

Lars

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Robin Stuart  
**Date:** 2017 Jan 30, 08:19 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Stuart-jan-2017-g38060

Brad,

       I attach 2 kml files.

Shackleton.kml is my orginal file with the positions of Cape Belsham and Point Wild corrected and, following [Lars' input](http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Bergman-jan-2017-g37972), the time stamps for the DR and EP's changed to the LAN at the DR position. Otherwise all numbers in this file are as they appear in the log and reflect Worsley's positions as he believed them to be.

Chronometer Error.kml gives the positions you listed with a track that connects them. You can make adjustments either in the "Places" panel in Google Earth by right clicking and selecting "Properties" and add new items using the menu untill you are satisfied. For some things its easiest just to edit the text in the .kml files. The format is pretty easy to decipher. For some reason the Placemark "Adjusted DR 25/4" will not accept a time stamp.

Robin Stuart

**Attached File:**   
[](http://fer3.com/arc/imgx/f1-Shackleton.kml)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/f1-Shackleton.kml)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/Chronometer-Error.kml)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/Chronometer-Error.kml)

|  |
| --- |
|  |

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 1, 13:53 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38115>

Hello Robin

After a bit of kerfuffle on the home front, I am able to dive back into Worsley's journey.

The file "chronometer error.kml yields a very interesting result.  They are offshore AND they are directly aimed at the large mouth bay, which connects to King Haakon Bay.  This, of course is precisely where the lads ended up.

Is it possible to place two tracks on one KML file?  I think that might tell a better tale.

I must say that I think this is the simplest solution to the complex problem.  The simplest solution is usually the best, as it doesn't involve tortured explanations (like Ethiopics!)   The chronometer rate wasn't 5 seconds per day, it was 11 seconds per day.  The Gordian Knot is untangled.

Brad

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 1, 14:47 -0500

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38116

Lars

I hope I have caught all of your recommended changes.  They are below.

Attached, please find version 3.3

##########

I've updated "1m4' more slow" to "1m4s more slow"

#############

I've updated, on the 26th, from 19 46 to 79 46.  I think this a common mistake of mine.  Worsley's 7's look very much like 1's, and there is only a slight distinguishing mark which differentiates them.  If any more of these pop up, I will be pleased update.

#######

About April 26th

16°28'  
16 37  
73.20 x  
13 32 x  
---------  
59 47.44

You wrote  
  
My impression is that this is the noon observation for latitude. I know that you insist that the last row is correct, but why is the observed position then given as 59°46' above? The next last row should be the declination, 13°32'34" within one or two seconds of arc. Could you please give it another look? As it is now it makes no sense.

My response:

The data runs right to the very edge of the page.  There are squiggles present but for the life of me, I cannot read them. Yes, the declination could be  13°32'34"  but the last 3 characters are completely illegible.

The question then becomes, do we fill in these characters, based upon known computation to fit or do we leave them illegible.

And yes, the 59 47 44 is there, but so is 59 46.  Perhaps the 44 of 59 47 44 is imagined on my part.  This is a very muddy section in his handwriting.

  It is unexplained why Worsley makes that entry.  I agree that the numbers do not agree.  I cannot explain it.

###"#####

b) 4th May

N36E 52 41

Looks like course dlat dep, but the values don't correspond to each other. Please give it a look again!

Could you be clearer what you wish to update Lars?

#########

Brad, regarding the mysterious entry "N36E 52 41" on the 4th of May, I have got an idea:

obs'd psn 3rd   56°13'S          45°38'W  
obs'd psn 4th   55  31             44  43  
                         ----------          -----------  
                     dlat    42'N    dlong   55'E

mean lat  55°52'

lat     dep for 55' dlong  
55     31.5  
56     30.8  
        -------  
           0.7

Mental interpolation gives a departure of 31 for the mean lat. By inspection in the traverse table we find the course N36°E and distance 52 miles. The day's run.

So maybe the entry shall be "N36E 52 42", or, still better, "N36E 52 42 55 = 31".

Response:  Updated to N36E 52 42.

Brad

**Attached File:** [138116.the-log,-revision-3.3.pdf](http://fer3.com/arc/img/138116.the-log,-revision-3.3.pdf)

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Robin Stuart  
**Date:** 2017 Feb 1, 12:53 -0800

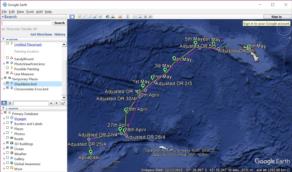
**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Stuart-feb-2017-g38117

Brad,

      Just open both files together in Google Earth; File > Open in the menu. They'll appear in your "Temporary Places" (see attached image). From there you can choose which data sets to display and which not to by selecting individual items or directories. You can create your own directorties under "My Places" and copy whatever data you are interested in. You can inspect and/or edit the information associated with any item by right clicking it in the "Places" panel to the right or in the display and then selecting "Properties". It's all very standard and should be intuitive. I've done the mind-numbing bit of entering the data. You now have huge power and flexibility at your finger tips!

Regards,

Robin

**Attached File:**   
[](http://fer3.com/arc/imgx/GoogleEarth.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/GoogleEarth.jpg)

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Bruce J. Pennino  
**Date:** 2017 Feb 1, 20:06 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Pennino-feb-2017-g38121>

Robin:

This plot is truly amazing. I’ve wondered if anyone had plotted it or I had to go to one of Worsley’s books. I just reread Alexander’s description of the journey and there were several days (several times) when there was total overcast or they were just getting “beat-up”. Does the plot show they got to a specified latitude and then tried to follow the latitude? The small plot in  “The Endurance” does not show them following a line of latitude.

They were very skilled .Of course, being skilled can sometimes also help bring some favorable breaks or good fortune.

Most interesting and very well done!. Best regards.

Bruce

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 1, 20:39 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38123>

Bruce

All of the plots you see in books are just sketches.

The plots Robin produced are directly from the logs.  Worsley's log of the navigation.  You can only find that here, right on NavList

The only item which is in dispute is time!  Reread the discussion about chronometer rate.  We think it the key to the final resolution of position.

Brad

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 1, 20:46 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38124>

Bruce,

You specifically asked if they followed a line of latitude.

Yes, right at the end, the last few days.  They were intending to sail up around Bird Island and down to the whaling harbor.

Shackleton and Worsley had a discussion and Worsley was forced to admit he wasn't perfectly sure of his position.  Instead of Bird Island (just to the N of South Georgia Island), on the last 4 days, they sailed down a latitude line into King Haakon Bay.

I stopped the transcript at the point the lads begin coastal piloting.

One additional feat of navigation remained for Worsley.  He determines that there is a 1' error in latitude at King Haakon bay.  It's in "South", by Shackleton.  When we are done with the journey, I may be convinced to do the same for the celestial reduction at King Haakon bay.  I do have the page from the log ;-)

Brad

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Robin Stuart  
**Date:** 2017 Feb 1, 18:11 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Stuart-feb-2017-g38125

Bruce,

       The information that you see in the [graphic](http://fer3.com/arc/imgx/GoogleEarth.jpg) is just one slice of a much richer dataset that is contained in the file Shackleton.kml. It even includes times at which the sights were made. Examples of additional views that can be generated from the .kml file are attached [here](http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Stuart-jan-2017-g37962)

Regards,

Robin

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Robin Stuart  
**Date:** 2017 Feb 1, 19:17 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Stuart-feb-2017-g38127

Bruce,

You specifically asked: “Does the plot show they got to a specified latitude and then tried to follow the latitude?”

In my assessment the answer is clearly no. [One of the plots](http://fer3.com/arc/imgx/TrackandRhumbline.jpg) attached to [my earlier post](http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Stuart-jan-2017-g37962) shows their EP track along with a rhumbline from Elephant Island to a point 46’ west of Wallis Island on the western end of South Georgia which is where they were initially aiming for. Throughout the voyage Worsley was calculating the distance and course to that and other nearby points in many cases based on DR. I read somewhere that given the greater than 10 mile uncertainty in their position it was Shackleton’s decision late in the voyage to head for the centre of South Georgia rather than try to hold off to the west in the gale. That turn is apparent in the track,

Regards,

Robin

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Lars Bergman  
**Date:** 2017 Feb 2, 05:03 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Bergman-feb-2017-g38136

Brad,

you asked "do we fill in these characters, based upon known computation to fit or do we leave them illegible" concerning the noon latitude calculation on April 26th. If you can't find any traces of numbers that agree, I think you shall leave it as it is. But make a note about it. We cannot exclude the possibility of a mistake from Worsley's side.

Now I think we can explain every single figure in the log to make sense, except three minor issues:

29th April, bottom left, there is a transformation from time 3h22m6s to arc 50°31'34" that correctly should be 50°31'30". Either you have misread, or Worsley perhaps looked at the line for 7s instead of 6s if he used some table for the conversion.

7th May, top left at the pm observation, there is a lonely "30" (above 5.10.14) that I cannot explain. And on the same day we have the observed noon longitude given as 39°3'6 which I would rather read 39°34'.

Lars

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Lars Bergman  
**Date:** 2017 Feb 2, 06:22 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Bergman-feb-2017-g38140

Correction!

In my last post I wrote

"29th April, bottom left, there is a transformation from time 3h22m6s to arc 50°31'34" that correctly should be 50°31'30". Either you have misread, or Worsley perhaps looked at the line for 7s instead of 6s if he used some table for the conversion."

That last statement of 7s instead of 6s is of course erroneous. 1s of time corresponds to 15" of longitude. So there is no plausible explanation to arrive at 34".

Lars

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 2, 10:30 -0500

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38143

Hello Lars

transformation from time 3h22m6s to arc 50°31'34" that correctly should be 50°31'30".

I cannot read the last character, this may have been determined earlier from calculations.  Updated and notes reflect the reason

a lonely "30" (above 5.10.14)

I have updated it to a lonely 39.  I think this and the other crossed out numbers reflect various times, it appears that he is altering the seconds.  As in 5.10.39 and  5.10.14 and 5.10.26 etc

noon longitude given as 39°3'6

I've moved the ' mark to the line above.  There is a mark just above and between the 3 and the 6.  Upon careful inspection, I do not think that the mark was intended to be between them.  As to it being a 4 or a 6, there is no dispute, it's a 6, so 39°36 is given as the noon longitude.  Unexplained is why  "39°364 Noon" appears in the lower left corner, in obvious disagreement.

ATTACHED, please find version 3.4 of the Transcript.

ROBIN and LARS, please note

I may be attending the NavList Conference, schedule permitting.  I think the terms dictated to me about the images of the pages allow me to let you and others observe them, as long as they are not reproduced in any way.  This will allow interested parties to see Worley's actual writing.  Perhaps then the difficulty of this task will become evident

Brad

**Attached File:** [138143.the-log,-revision-3.4.pdf](http://fer3.com/arc/img/138143.the-log,-revision-3.4.pdf)

### Shackleton Speaks about his 1907 Expedition

**From:** David C  
**Date:** 2017 Feb 2, 14:57 -0800

http://fer3.com/arc/m2.aspx/Shackleton-Speaks-about-his-1907-Expedition-DavidC-feb-2017-g38146: http://fer3.com/arc/m2.aspx/Shackleton-Speaks-about-his-1907-Expedition-DavidC-feb-2017-g38146

Many years ago I downloaded an mp3 file in which Shackleton discusses his 1907 expedition. No names are mentioned but given the Worsley's Log  thread I thought that it might be of interest. Did Worsley travel on the 1907 expedition?

<http://valleysignals.org.nz/nautical_astronomy/shackleton.mp3>

I do not think that copyright is an issue but just in case, and given the file size, I have uploaded it to my web site.

If you listen carefully, at the end there is what I consider a human touch. After Shackleton signs off  there is a very faint voice (Shackleton?) saying "Alright?"  (or something similar).

### Re: Point Wild location

**From:** Robin Stuart  
**Date:** 2017 Feb 5, 11:54 -0800

**Source**: http://fer3.com/arc/m2.aspx/Point-Wild-location-Stuart-feb-2017-g38172

Lars,

      Yesterday the USGS GNIS data base was unavailable. Today it's back and now displays latitude and longitude in ddmmss format rather than decimals of a degree

<https://geonames.usgs.gov/apex/f?p=gnispq:5:::NO::P5_ANTAR_ID:16588>

<https://geonames.usgs.gov/apex/f?p=gnispq:5:::NO::P5_ANTAR_ID:1210>

Regards,

Robin

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| |  | | --- | | Antarctica Detail | |  | | |  | | --- | |  | | Antarctica ID: | 16588 | | Name: | Point Wild | | Class: | Summit | | Latitude: | -61.1 | | Longitude: | -54.8666667 | | Elevation: |  | | Description: | A point 6 mi W of Cape Valentine on the N coast of Elephant Island, South Shetland Islands. Named Cape Wild by the Shackleton Endurance expedition 1914-16, but Point Wild is recommended for this feature because of its small size and to avoid confusion with Cape Wild on George V Coast. Named for Frank Wild, leader of the party from Shackleton's shipwrecked expedition which camped on the point for four months until rescued in August 1916. | | BGN: | 01-JAN-53 | | Notes: |  | | Date Entered: |  | | Date Last Modified: |  | |  | | | Antarctica ID: | 16588 | | Name: | Point Wild | | Class: | Summit | | Latitude: | -61.1 | | Longitude: | -54.8666667 | | Elevation: |  | | Description: | A point 6 mi W of Cape Valentine on the N coast of Elephant Island, South Shetland Islands. Named Cape Wild by the Shackleton Endurance expedition 1914-16, but Point Wild is recommended for this feature because of its small size and to avoid confusion with Cape Wild on George V Coast. Named for Frank Wild, leader of the party from Shackleton's shipwrecked expedition which camped on the point for four months until rescued in August 1916. | | BGN: | 01-JAN-53 | | Notes: |  | | Date Entered: |  | | Date Last Modified: |  | |  | | | |
| Antarctica Detail |
|  |
| |  | | --- | |  | | Antarctica ID: | 1210 | | Name: | Cape Belsham | | Class: | Cape | | Latitude: | -61.0833333 | | Longitude: | -54.8833333 | | Elevation: |  | | Description: | Prominent cape 0.5 mi W of Point Wild on the N coast of Elephant Island, South Shetland Islands. The name dates back to about 1822 and is well established in international usage. | | BGN: | 01-JAN-52 | | Notes: |  | | Date Entered: |  | | Date Last Modified: |  | |

### Re: Point Wild location

**From:** David C  
**Date:** 2017 Feb 5, 13:27 -0800

**Source**: http://fer3.com/arc/m2.aspx/Point-Wild-location-DavidC-feb-2017-g38176

      Yesterday the USGS GNIS data base was unavailable. Today it's back and now displays latitude and longitude in ddmmss format rather than decimals of a degree

<https://geonames.usgs.gov/apex/f?p=gnispq:5:::NO::P5_ANTAR_ID:16588>

<https://geonames.usgs.gov/apex/f?p=gnispq:5:::NO::P5_ANTAR_ID:1210>

I  had a look at the USGS GNIS database. I note that  the database is for The United States And Its Territories.   Does the US claim the South Shetland Islands?  Under the 1959 Antarctic Treaty no claims of sovereignty are recognised including those of Britain, Chile and Argentina.

Out of interest I searched for Howland island and Mystic Seaport and can confirm that both these places exist (-;  A minor deficiency in the web site for someone outside the US is that there is no "All" option in the state list, making necessary to guess which state a location is in. Howland was obviously a Minor Outlying Island and Mystic Seaport had to be in a state near a coast so that narrowed down the search.

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Robin Stuart  
**Date:** 2017 Feb 7, 09:03 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Stuart-feb-2017-g38206

I bought a copy of of Shackleton's Boat Journey by Frank Worsley to seek what insights it provides into the voyage of the James Caird. Below are some pieces that I found interesting. They of course raised questions. Answers may be available elsewhere in the book but I would be happy if any Navlist members can provide insight.

Robin Stuart

**Books On Board**

Worsley mentions a number of books that he has in his possession

*        Log
* Navigation books specifically the epitome and Nautical Almanac

He describes making notes in his

*        Navigating/navigation book
*        Diary

*“my navigating books and log were in a pitiable state – soaked through”* p.115

*“My navigation books had to be half-opened… The epitome had had the cover, front and back pages washed away, while the Nautical Almanac shed its pages so rapidly before the onslaught of the seas that it was a race whether or not the month of May would last to South Georgia.”* p.116

*“Quoting from my diary:*

*Pumping and baling on every watch…”* p.119

*“A few scribbled remarks in my navigating book ran: ”Bags and finneskoe moulting at a great rate.””* p.128

*“From my navigation book: “In assisting with the ‘Primus’ I burn my fingers…”* p.134

Which volume is he referring to as the epitome?

Did he have a navigating/navigation book to carry out intermediate calculations that don’t go into log and also record personal note? Did he separately have a diary?

**Concerns about the Voyage**

What surprised me was that Worsley seemed to be reasonably confident about making it to South Georgia but was aware that Shackleton was less so.

*“For me, used to boat work, surf landings and every kind of craft, this passage was an adventure - a too uncomfortable and dangerous one-but still an adventure. To him [Shackleton]…it must have been more menacing, even appalling.”* p.107

**Rogue Wave**

I think today we’d identify this as a rogue wave.

*“The line of white along the southern horizon that he [Shackleton] had taken for clearing sky was, in fact the foaming crest of an enormous sea…The wave that had struck was so sudden and so enormous that I have since come to the conclusion that it may have been caused by the capsizing of some great iceberg unseen and unheard by us in the darkness and the heavy gale.*” p.130

**Missing Digits in Log**

This may explain why he also omits leading digits in the logarithms used in time sight reductions that we see in the transcript.

*“The dead reckoning figures were made one at a time by jabbing the pencil as occasion offered. By strict economy I confined their numbers to twenty-five.”* p.126

**Change of Course**

“I told Sir Ernest that I could not be sure of our position to 10 miles, so he would not agree to my trying to weather the northwest end of South Georgia, for fear of missing it. We then steered a little more easterly, to make landfall on the west coast.” 7th May, p.138

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Robin Stuart  
**Date:** 2017 Feb 7, 09:23 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Stuart-feb-2017-g38207

Brad,

      I attach notes from Shackleton's Boat Journey in which I have extracted any navigational numbers that appear. I have noted where I see disagreements with the transcript. (search for the word "Transcript"). It might be worthwhile taking a look to see whether it changes the interpretation of any of the characters.

      Having done all this work, I assume that what you have is a first generation copy of the original log and not a copy of a copy. How do we know this?

Regards,

Robin

**Attached File:**   
[BoatJourneyvsTranscript.docx](http://fer3.com/arc/imgx/BoatJourneyvsTranscript.docx)

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 7, 13:05 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38208>

Robin

They very much appear to be first generation.  These are photographs of the original.  Or at least I believe so.  I have some pages in b/W and others in color.

Brad

On Feb 7, 2017 12:30 PM, "Robin Stuart" <[NoReply\_Stuart@fer3.com](mailto:NoReply_Stuart@fer3.com)> wrote:

Brad,

      I attach notes from Shackleton's Boat Journey in which I have extracted any navigational numbers that appear. I have noted where I see disagreements with the transcript. (search for the word "Transcript"). It might be worthwhile taking a look to see whether it changes the interpretation of any of the characters.

      Having done all this work, I assume that what you have is a first generation copy of the original log and not a copy of a copy. How do we know this?

Regards,

Robin

**Attached File:**   
[BoatJourneyvsTranscript.docx](http://fer3.com/arc/imgx/BoatJourneyvsTranscript.docx)

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 7, 13:22 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38209>

Robin

George and I thought that the epitome referenced was the "Ethiopic of the South Atlantic" because of the direct mention of Cape Belsham on Elephant Island.  In light of the latest discovery of the designation of the points, I cannot be so sure anymore.  The Cape Belsham designated by Worsley is not the northern most point, nor does the latitude and longitude match that given in the Ethiopic.

And yet there it is all the same.  The name appears and is given much weight by Worsley.  I have found no other references to Cape Belsham, other than the Ethiopic.

The reference to the soaked through log book is very consistent to what I am seeing.  It would explain some of the muddling, as writing on damp pages would have been a struggle.  Other digits appear very faint, or washed out.  All very consistent.

Brad

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Robin Stuart  
**Date:** 2017 Feb 7, 12:27 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Stuart-feb-2017-g38211

Brad,

       From the context it appears that Worsley is using epitome and Nautical Almanac for sight reduction so the former is probably tables of some kind. I would speculate that he may be referring to Norie's "A complete set of nautical tables" even though "A Complete Epitome of Practical Navigation, and Nautical Astronomy" is a distinct work by the same author,

Regards,

Robin

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Lars Bergman  
**Date:** 2017 Feb 7, 14:30 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Bergman-feb-2017-g38213

Robin and Brad,

When Worsley writes about his Epitome, I would guess it was Norie's "Epitome of Practical Navigation", including nautical tables. There were many editions but I have no idea of which one Worsley had.

Regarding the missing leading digits I do not think that Robin's explanation is correct. Worsley talks specifically on DR figures. The DR calculations were done using a traverse table during the voyage. The only time he used logs to calculate course and distance is in the entry above April 24th, when he calculates the track between Cape Belsham and a point 46 minutes of longitude west of Wallis. And on that instance he actually used leading digits.

The missing leading digits in the time sight calculations is rather from old habit, Worsley knew from long experience what the leading digit in the answer would be.

Of the discrepancies between the book and Brad's log, I can explain two of them:

4th May "run N36°E fifty-two miles" is the actual run made between observed noon position on the 3rd and observed noon position on the 4th. The transcript shows the run by DR since previous noon.

5th May "N50°E ninety-six miles" must be a mis-reading by Worsley. The transcript's 95 miles is correct and used for calculating the DR noon position from the observed position obtained on the 4th. It is clearly shown that Worsley subtracts 1°1' from the latitude and 2°7' from the longitude. For 96 miles the values should have been 1°2' and 2°8' respectively. Worsley complains somewhere in his book that he himself had great difficulties to read his own handwriting after a few month.

Lars

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 7, 18:30 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38214>

Robin

I just checked Norie's Epitome, albeit the 1917 edition, and did a search for "Belsham" and for "Elephant".  Nothing found.

I then checked an 1890 version of Norie's Tables.  Nothing for "Belsham".  Two references for "Elephant", but not our Island at all.   Naturally, a later version might contain a Belsham reference.

Why do you think the reference to be Norie?

Brad

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 7, 19:05 -0500

Source: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38215>

Lars

You wrote

Worsley complains somewhere in his book that he himself had great difficulties to read his own handwriting after a few months

Seriously, no kidding, it's really difficult!

Brad

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Don Seltzer  
**Date:** 2017 Feb 7, 22:54 -0500

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Seltzer-feb-2017-g38218

Elephant Island is mentioned in March 1839 By Charles Wilkes (US Exploring Expedition).  According to him, Cape Belsham was the eastern most point.  
  
' On the 6th of March the wind shifted to the northward with snow.  
 On the 7th while making all way to the northward the fog lifted and high land was reported within a short distance of us. A few moments more and we should have been wrecked. This proved to be Elephant Island. We found from its position that we had been set upwards of fifty miles to the eastward in the last four days by the current. We passed to leeward of it. The sea was too high to attempt a landing. In the afternoon it cleared and from our observations we found Cape Belsham, its eastern point ,well placed. We passed between it and Cornwallis Island. The Seal Rocks were also seen and observed upon.'

Don Seltzer

On Tue, Feb 7, 2017 at 2:48 PM, Brad Morris <[NoReply\_Morris@fer3.com](mailto:NoReply_Morris@fer3.com)> wrote:

Robin

George and I thought that the epitome referenced was the "Ethiopic of the South Atlantic" because of the direct mention of Cape Belsham on Elephant Island.  In light of the latest discovery of the designation of the points, I cannot be so sure anymore.  The Cape Belsham designated by Worsley is not the northern most point, nor does the latitude and longitude match that given in the Ethiopic.

And yet there it is all the same.  The name appears and is given much weight by Worsley.  I have found no other references to Cape Belsham, other than the Ethiopic.

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 7, 23:14 -0500

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38219

Don,

Thank you for that!  Interesting how they describe it as the easternmost point.

Did the Wilkes Expedition provide a latitude and longitude?

Brad

On Feb 7, 2017 11:10 PM, "Don Seltzer" <[NoReply\_Seltzer@fer3.com](mailto:NoReply_Seltzer@fer3.com)> wrote:

Elephant Island is mentioned in March 1839 By Charles Wilkes (US Exploring Expedition).  According to him, Cape Belsham was the eastern most point.  
  
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And yet there it is all the same.  The name appears and is given much weight by Worsley.  I have found no other references to Cape Belsham, other than the Ethiopic.

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Robin Stuart  
**Date:** 2017 Feb 8, 05:16 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Stuart-feb-2017-g38222

Brad,

What makes you think that the book that Worsley refers to as "epitome" should contain a mention of Cape Belsham?

You wrote: "Why do you think the reference to be Norie?"

It's because I can't imagine him writing "A Complete Epitome of Practical Navigation, and Nautical Astronomy" in the log!

Worsely must have had some tables with him. He mentions the epitome and Nautical Almanac together and it appears that they were both being opened frequently. I doubt that he would have been too concerned if his Sailing Directions got soggy mid voyage.

Are there any other sets of tables in use athe time that might get the moniker "epitome". There's Bowditch but it was a British expedition. As [Lars notes](http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Bergman-feb-2017-g38213) he could have had an edition that combined text and tables. Maybe he just thought of the tables as the epitome volume 2,

Regards,

Robin

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Don Seltzer  
**Date:** 2017 Feb 8, 08:19 -0500

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Seltzer-feb-2017-g38223

Online I have only come across the text narrative.  There almost certainly should be the detailed navigational recordings and charts available somewhere.

Wilkes's narrative suggests that the location of the Cape had been previously determined.

Don Seltzer

On Feb 7, 2017, at 11:38 PM, Brad Morris <[NoReply\_Morris@fer3.com](mailto:NoReply_Morris@fer3.com)> wrote:

Don,

Thank you for that!  Interesting how they describe it as the easternmost point.

Did the Wilkes Expedition provide a latitude and longitude?

Brad

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 On the 7th while making all way to the northward the fog lifted and high land was reported within a short distance of us. A few moments more and we should have been wrecked. This proved to be Elephant Island. We found from its position that we had been set upwards of fifty miles to the eastward in the last four days by the current. We passed to leeward of it. The sea was too high to attempt a landing. In the afternoon it cleared and from our observations we found Cape Belsham, its eastern point ,well placed. We passed between it and Cornwallis Island. The Seal Rocks were also seen and observed upon.'

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  And yet there it is all the same.  The name appears and is given much weight by Worsley.  I have found no other references

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 8, 17:04 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38226>

Robin

I do believe, quite strongly, that one of  his references should contain the coordinates of Cape Belsham.

One very well known method of calibrating our chronometer is to compare it to a known bit of land when ashore.

Whilst Worsley is undoubtedly a master navigator, it's incredulous to think that he has accurately memorized the latitude and longitude of multiple landmarks in the Antarctic.  Further, prior to being trapped in the ice, Elephant Island was not intended for landing.  Cape Belsham would have been an entirely obscure reference.  Why bother memorizing it at all?

Yet Worsley specifically mentions Cape Belsham in his log book.  He specifically uses it to calibrate his chronometer.  One cannot do that without reference to the coordinates of that known geographic location.

It follows then, that an epitome, a table or a chart in his possession must have Cape Belsham and it's coordinates.  The requirement of coordinates for chronometer calibration drives the issue.

In checking both the Epitome and the Tables, the Norie tomes that I have examined do NOT contain such a reference.   Which leads me to suggest that the reference to the "epitome" may very well NOT be Norie.  That's a much weaker assertion than the requirement that SOME reference must contain Cape Belsham.  He could have had Norie AND another Cape Belsham reference.  Surely two books isn't out of the question.  It just begs the question, why two, when one would do, in a small boat, in extremis when meandering about the Southern Ocean.

Brad

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 8, 17:12 -0500

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38227

Hi Don

Wikipedia suggests that Cape Belsham was a known geographic location since 1822.

We can ascribe it's discovery, therefore, to James Weddell.  More research will be required to determine if he had a chronometer aboard, or if he used a lunar to determine his longitude of Cape Belsham.

Brad

On Feb 8, 2017 4:39 PM, "Don Seltzer" wrote:

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 8, 17:58 -0500

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38228

Don

I retract the James Weddell reference.  The Australian Government may have precisely what we are looking for

<https://data.aad.gov.au/aadc/gaz/scar/display_name.cfm?gaz_id=108659>

Or

Elephant Island ...between King George Island and Clarence Island, South Shetland Islands, was discovered and its N coast roughly charted by Bransfield in late January or early February 1820 (Bransfield, chart, [1820b]); further charted by Fildes in 1820-21 and named Sea Elephant Island after the sea elephant (Mirounga leonina) observed in numbers there (Files, 1821b, chart [5]); also charted by RAE, 29 January 1821. Elephant Island (Powell, 1822b, p.7; chart, 1822a; BA chart 1238, 7.ix.1839; 3205, 23.ix.1949; APC, 1955, p.9; DOS 610 sheet W 61 54 (Ext.), 1-GSGS 1972). **Île Belsham (Cape Belsham, q.v.) (Eyriès and Malte-Brun, 1823, map facing p.237)**. Île Eléphant, Île de l'Eléphant (Powell, 1824a, map facing p.5; 1824b, p.100). Admiralty Island, after the Board of Admiralty (Weddell, chart, [?1824b]). Barrows, Barrows Isle, Barrows Insel (Weddell, 1825a, map facing p.1, map facing p.132; 1827, third end map). Ostrov Admirala Mordvinova, Ostrov Mordvinova, after Adm. Mordvinova of the Imperial Russian Navy (Bellingshausen, 1831b, Vol. 2, p.276; 1831a, sheet 62). Elephanten Insel (Ross, 1847b, end map). Elephant Insel (Neumayer, 1972a, Tafel 2). Elefant Ö (Larsen, 1894a, map p.120). E. Elephant Island (Bartholomew, map, 1898a). Mordinow Insel (Gravelius, 1902, p.172). Elefant-Insel (Cook, 1903, end map). Isla Elefante (Irízar, 1903, map facing p.4; Pierrou, 1970 p.337; Chile. IHA, 1974, p.114). Isla del Elefante (Nordenskjöld, 904b, p.29). Elefant Ön (Nordenskjöld and others, 1904a, Del. 2, end map). Isla del Elefanto (Nordenskjöld and others, 1904-05, Tomo 2, end map). Elefant Eiland (Manen, 1905, Kaart 8 following p.710). Olifants Eiland r [translation of English name] (Ruys, 1905, map following p.88). Olifant Eiland (Easton, 1913, map facing p.278). The island was the landfall of BITAE in 1916 following drift in the Weddell Sea (Cape Valentine, Point Wild, q.v.). Elefant Island (Risting, 1922, p.325). Elephant-Sziget (Shackleton, [1925], p.76). Elefant Øen (Holtedahl and Mosby, 1928, p.233). Elefantøene, Elefant-Öya (Risting, 1929, map p.33, p.61). Elefant-Öen (Aagaard, 1930, end map). The island was recharted by DI, 1933-37. Elephantøia (Isachsen, 1934, p.148). Mordwinowøen, referring to RAE name (Aagaard, 1934, p.413). Barrows I., referring to earlier name (Hobbs, 1939a, p.42). Elefanten Insel (Stocks, chart, 1941). Elephantøya (Aagaard, 1944, p.32). Isla Pardo, after Capt. L.A. Pardo (Pardo Ridge, q.v.) (Chile. IGM map, 1945). Isla Pardo (Isla Elefante), Isla Piloto Pardo (Vila Labra, 1947, p.47, map p.203). Mordrins [sic] Island, as rejected name (USBGN, 1947, p.160). Elefanttisaari (Andersson, 1948, p.47). Mordvinova (Bellingshausen, 1949, map facing p.336). Ostrov Mordvinova (Elefant) (Soviet Union. BSE, 1950, map following p.484). Isla Elefant (Argentina. IGM map, 1952). Wyspa Mordwinowa (Machowski, 1953, map p.90). Elefante Marino [=sea elephant] (Argentina. MM, 1953, p.195). Ostrov Elefant (Guretskiy, 1954, p.461). Elephant (Fisher and Fisher, 1957, p.391). S oni Ostrov [translation of English name] (Bártl, 1958, map facing p.144). Isola Pardo, Isola Elephant (Zavatti, 1958, Tav. 7, 12-13). Ostrov Elefant (Mordvinova) (Soviet Union. AA, 1966, Pl. 24). Elephant's Island (Hardy, 1967, p.301). The whole island was mapped by JSEEI in 1970-71 (Burley, 1971b; 1972). Mordvinov Island (Demenitskaya and others, 1972, p.13). Ostrov Mordvinova (Elephant Island) (Soviet Union. GUGK map 221, 1973). Isla Elephant, as rejected form (Chile. IHA, 1974, p.114).

On Feb 8, 2017 5:12 PM, "Brad M" <[bradley.r.morris---.com](mailto:bradley.r.morris---.com)> wrote:

Hi Don

Wikipedia suggests that Cape Belsham was a known geographic location since 1822.

We can ascribe it's discovery, therefore, to James Weddell.  More research will be required to determine if he had a chronometer aboard, or if he used a lunar to determine his longitude of Cape Belsham.

Brad

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Bruce J. Pennino  
**Date:** 2017 Feb 8, 19:46 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Pennino-feb-2017-g38229>

Some really neat pictures online of the distinctive rocks at Cape Belsham. Wilkes describes them distinctly.

Bruce

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Frank Reed  
**Date:** 2017 Feb 9, 03:24 +0000

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-FrankReed-feb-2017-g38233

Robin Stuart, you wrote:  
"Worsely must have had some tables with him. "

Another issue to bear in mind: the word "epitome" was much more common and generic a hundred years ago and comparable in meaning to "guidebook" or "reference". His "epitome" might have been any number of standard references on navigation --anything with the requisite tables, which are nearly ubiquitous. This is highly standardized navigation of a type that was practiced on nearly every vessel at sea in this era. It's possible that there might be some clue in the numbers somewhere, maybe a single erroneous digit in the sixth place of a logarithm that is a 3 instead of an 8 only in Norie's epitome, but it may equally well be that there is no evidence to decide it. An epitome is a book; that much is all that is certain.

I don't think we need to force all the data into one book, one epitome, either. We can assume that the expedition had numerous printed resources. We can also assume Worsley knew how to tear pages out of books. Any traveler economizing on space knows the trick: rip out the pages you need, and burn the pages for the places you've already visited.

Frank Reed

### Re: Transcript Of Worsleys Navigational Log Book

**From:** David C  
**Date:** 2017 Feb 8, 20:50 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-DavidC-feb-2017-g38234

Are there any other sets of tables in use athe time that might get the moniker "epitome". There's Bowditch but it was a British expedition. As [Lars notes](http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Bergman-feb-2017-g38213) he could have had an edition that combined text and tables. Maybe he just thought of the tables as the epitome volume 2,

What did Worsley mean by "epitome"? I know that some  books of the period used the word epitome in the title. Maybe Worsley was not using it in that sense.  One meaning is "summary" so was he using epitome to simply mean reference book or volume? If so we need to make a list of all books likely to be carried by a British navigator of that period, not just ones with "epitome" in the title.

The obvious ones are Norie, Inmans (RN only?) and Raper. Textbooks of the period often include long lists of other works issued by the publisher. I am sure a long list could be created. Were there any gazetteers other than those in Norie and Raper?

Raper (1902) and Norie (1918) do not (as far as I can tell)  contain any reference to Cape Belsham. Both volumes mention Elephant Island Summit:

Norie (1918) 61° 11' S    54° 50' W

Raper (1902)  61°  6' S   54°   45' W

Raper uses a complicated coding system to describe locations. Elephant Island includes "E.sum" which I interpret as summit on the eastern end of the island but I am not sure. Didn't Wilkes mention the eastern end of the island? Apologies if this has already been covered in what is a long series of threads (-;

### Re: Transcript Of Worsleys Navigational Log Book

**From:** David C  
**Date:** 2017 Feb 8, 22:02 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-DavidC-feb-2017-g38235

See

<https://data.aad.gov.au/aadc/gaz/display_name.cfm?gaz_id=107745>

which includes the following:

"Cape Belsham, referring to E point of Elephant Island (Cape Valentine, q.v.) (Wilkes, 1845, Vol. 1, p.139). "

Therefore is Cape Belsham identical to Cape Valentine?

The next phrase reads "The cape was roughly charted by DI in 1925-27". In other words the next surveys were \*after\* Shackleton's expedition.

Were Shackleton/Worsley  familiar with Wilke's report? Did Worsley believe Cape Belsham to be the eastern point of Elephant Island? When was cape Valentine names and its position determined.

We need to locate Powell's 1824 map (-;

### Re: Transcript Of Worsleys Navigational Log Book

**From:** David C  
**Date:** 2017 Feb 8, 23:11 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-DavidC-feb-2017-g38236

See the last two paragraphs of

<https://www.jstor.org/stable/1788099?seq=1#page_scan_tab_contents>

for some avenues of further research. I have not registered with jstor so have not read this review any further.

However I searched the London Literary Gazette for 1825 and found the following

<https://babel.hathitrust.org/cgi/pt?id=nyp.33433104246644;view=1up;seq=619>

I do not know if this is the article referred to in the review of Hobb's book. A more thorough search of the gazette is needed.

Maybe some research into Captain Weddell is required?

### Re: Transcript Of Worsleys Navigational Log Book

**From:** David C  
**Date:** 2017 Feb 8, 23:31 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-DavidC-feb-2017-g38238

See also

<https://books.google.co.nz/books/about/The_Discovery_of_the_South_Shetland_Isla.html?id=qK8MAAAAYAAJ&redir_esc=y>

Unfortunately  a digitised version is not available at this web site. However something (original journal or this book?) was digitised in 2007 so a search should find it.

In the following review of the book refer to the final three sentances.

"In 1819, William Smith, with a general cargo from Montevideo to Valparaiso, sailed further south round Cape Horn than his predecessors, in the hope of finding favourable winds. He sighted land in 62 S. His report to the Senior Naval Officer in Valparaiso was ridiculed, but on a subsequent voyage he confirmed his discovery, taking surroundings and sailing along the coast. As a result Captain Shirreff, the Senior Naval Officer, chartered his vessel, the brig Williams, and having put Edward Bransfield, the master of his ship, HMS Andromache, in charge, sent her to survey the new discovery. Charles Poynter was one of the midshipmen who sailed with Bransfield. His account of this expedition, which forms the principal part of this volume, recently came to light in New Zealand, and is the only first-hand account of the voyage, during which the Antarctic mainland was sighted for the first time, that appears to have survived. The introduction contains some remarks on the South Shetland Islands, followed by chapters giving a brief look at the history of the Spanish in South America and the British presence in the area, together with the speculation leading to the search for Antarctica and chapters on early nineteenth-century navigation and hydrographic surveying. There were a number of second-hand accounts of William Smith's earlier voyages, and Bransfield's expedition which appeared in reports, journals and books at the time. These are included with brief accounts of other voyages to the South Shetland Islands which took place while Bransfield was in the area, to complete the picture. Poynter's journal explains the reasons behind most of the names given to land features, some of which were not included in the published accounts at the time. There are also three charts and a number of views which are reproduced together with modern photographs of the area. It also contains a large number of geographical positions which enable a track chart of the voyage to be produced."

### Re: Transcript Of Worsleys Navigational Log Book

**From:** David C  
**Date:** 2017 Feb 8, 23:57 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-DavidC-feb-2017-g38239

<https://archive.org/details/avoyagetowardss01weddgoog>

for a pdf of Weddell's book  A voyage towards the South Pole, performed in the years 1822-'24 etc

### Re: Transcript Of Worsleys Navigational Log Book

**From:** David C  
**Date:** 2017 Feb 9, 00:27 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-DavidC-feb-2017-g38240

As usual the bored droids at Google have not scanned the plates in Weddell's book correctly so the detailed map of the South Shetlands that Weddell refers to is incomplete.

However those interested in early 19th century navigation will probably be interested in the appendices. Pages and pages of navigational examples including rating chronometers (Weddell had three), long by chron and lunars. Maybe fork this to a new thread?

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 9, 10:21 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38243>

Frank, you wrote

It's possible that there might be some clue in the numbers somewhere, maybe a single erroneous digit in the sixth place of a logarithm that is a 3 instead of an 8 only in Norie's epitome, but it may equally well be that there is no evidence to decide it.

The clue is Cape Belsham itself.  The expedition records it as the middle Point of the three peninsulas on the north Shore of Elephant Island.  Further, with Cape Belsham less than a mile away, Worsley determines his latitude and longitude, using Cape Belsham as his chronometer reference when ashore. Thus the coordinates in Worsley's log must somehow be made to agree with the reference.

Brad

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Brad Morris  
**Date:** 2017 Feb 9, 10:35 -0500

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Morris-feb-2017-g38244

David

You wrote

Did Worsley believe Cape Belsham to be the eastern point of Elephant Island?

That is a point we can definitively answer.  Robin and I thrashed about on this point until the chart drawn by Reginald James came to light, in a paper by James Wordie.  Both men were with Shackleton.  James' chart shows Cape Belsham as the middle of the three peninsulas, with Point Wild the eastern most of the three peninsulas.  It would be very strange if Worsley did not agree with that designation.

At no time did the expedition identify the easternmost point as Cape Belsham. The expedition did briefly stay at the easternmost point, and termed it Cape Valentine.  Cape Valentine and Cape Belsham were never the same location \*as determined by the expedition\*.

Yet it is clear that earlier references to Cape Belsham do identify it as the easternmost point.  Leading to all types of confusion and merryment!

Brad

On Feb 9, 2017 7:09 AM, "David C" <[NoReply\_DavidC@fer3.com](mailto:NoReply_DavidC@fer3.com)> wrote:

See

<https://data.aad.gov.au/aadc/gaz/display_name.cfm?gaz_id=107745>

which includes the following:

"Cape Belsham, referring to E point of Elephant Island (Cape Valentine, q.v.) (Wilkes, 1845, Vol. 1, p.139). "

Therefore is Cape Belsham identical to Cape Valentine?

The next phrase reads "The cape was roughly charted by DI in 1925-27". In other words the next surveys were \*after\* Shackleton's expedition.

Were Shackleton/Worsley  familiar with Wilke's report? Did Worsley believe Cape Belsham to be the eastern point of Elephant Island? When was cape Valentine names and its position determined.

We need to locate Powell's 1824 map (-;

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Michael Bradley  
**Date:** 2017 Feb 9, 10:00 -0800

**Source**: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Bradley-feb-2017-g38247>

Yeeees

I've been lurking on this one, wondering if anyone would get round to William Smith, local hero of Blyth, Northumberland.  
http://www.blythtallship.co.uk/index.php/expedition refers.

And the said Blyth Tall Ship Project training workshop delivered me a fine replacement steam bent laminated tiller last week. And, apropos not a lot, the replica James Caird was built about ten miles south of Blyth. Local pride satisfied, I'll go quiet again.

Michael Bradley 55 North

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Robin Stuart  
**Date:** 2017 Feb 9, 12:31 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Stuart-feb-2017-g38248

I've finished "Shackleton's Boat Journey" and expanded the notes I had provided previously (below). I come away surprised at the number of times Shackleton chose to go against Worsely's advice and wonder about whether or not they would have still been successful if he had taken it. Some instances are

* Although not in this book - pushing the *Endurance* south into the ice rather than putting the party ashore on a more northerly part of the antarctic coast.
* Whether to moor to ice flows or continue overnight during the voyage to Elephant Island
* Overballasting the *James Caird*
* Not going to the nearby whaling station at Prinz Olaf Harbour
* Not taking a more direct and ultimately less hazardous approach at the very end of the trek to Stromness

At the end of they made it so who knows. A strong theme that comes through is Shackleton's genuine and selfless concern for the well-bing of his men.

**Chronometer**

*“[24th April] Immediately after breakfast the sun came out obligingly. The first sunny day with a clear enough horizon for rating my chronometer.\**

*\* This English chronometer, an excellent one of Smith’s was the sole survivor, in good going order, of the twenty-four we set out with in the Endurance. [Author’s Note]”* p.101

**Ballast**

*“It was too much by about five hundredweight. The overweighting was the cause of Caird’s slowness, stiffness, and jerky motion. It kept us constantly wet all passage, so causing much unnecessary misery. I demurred to Sir Earnest, but other counsels prevailed. He knowing the danger of under ballasting, went to the other extreme*.” p.103

**Books**

Worsley mentions a number of books that he has in his possession

       Log

       Navigation books specifically the epitome and Nautical Almanac

He describes making notes in his

       Navigating/navigation book

       Diary

*“my navigating books and log were in a pitiable state – soaked through”* p.115

*“My navigation books had to be half-opened, page by page, till the right one was reached, then opened carefully to prevent their utter destruction. The epitome had had the cover, front and back pages washed away, while the Nautical Almanac shed its pages so rapidly before the onslaught of the seas that it was a race whether or not the month of May would last to South Georgia.”* p.116

*“Quoting from my diary:*

*Pumping and baling on every watch…”* p.119

*“A few scribbled remarks in my navigating book ran: ”Bags and finneskoe moulting at a great rate.””* p.128

*“From my navigation book: “In assisting with the ‘Primus’ I burn my fingers…”* p.134

Which volume is he referring to as the epitome?

Did he have a navigating/navigation book to carry out intermediate calculations that don’t go into and record personal note? Did he separately have a diary?

**Concerns about the Voyage**

What surprised me was that Worsley seemed to be reasonably confident about making it to South Georgia but was aware that Shackleton was less so.

*“For me, used to boat work, surf landings and every kind of craft, this passage was an adventure - a too uncomfortable and dangerous one-but still an adventure. To him [Shackleton]…it must have been more menacing, even appalling.”* p.107

**Rogue Wave**

I guess today we’d identify this as a rogue wave.

*“The line of white along the southern horizon that he [Shackleton] had taken for clearing sky was, in fact the foaming crest of an enormous sea…The wave that had struck was so sudden and so enormous that I have since come to the conclusion that it may have been caused by the capsizing of some great iceberg unseen and unheard by us in the darkness and the heavy gale.*” p.130

**Missing Digits in Log**

This may explain why he omits leading digits in time sight reductions.

*“The dead reckoning figures were made one at a time by jabbing the pencil as occasion offered. By strict economy I confined their numbers to twenty-five.”* p.126

**Change of Course**

*“I told Sir Ernest that I could not be sure of our position to 10 miles, so he would not agree to my trying to weather the northwest end of South Georgia, for fear of missing it. We then steered a little more easterly, to make landfall on the west coast.”* 7th May, p.138

**Crossing South Georgia**

*“It had never been crossed except where Possession Bay, on the east coast was separated by the previously mentioned saddle, only six miles across from King Haakon Sound [where they landed] on the west coast. Thence three miles more would take you to Prinz Olaf Harbour. I tried to persuade Sir Earnest to make this journey – I knew that it was no use volunteering to go myself; but he would not, for at the time, so far as we knew, the whaling station there was only kept on in the summer. We afterwards found that it was kept running all that winter, and has not since been closed.”* p.187

### Re: Transcript Of Worsleys Navigational Log Book

**From:** Robin Stuart  
**Date:** 2017 Feb 9, 12:51 -0800

**Source**: http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Stuart-feb-2017-g38249

Frank,

       Thanks for the explanation. Good suggestion about looking for errors that might tie down the tables used. The only differences I saw between Worsley's logarithms and my own were in the last digit and I attributed to rounding. Maybe it warrants a closer look. Incidently  Worsley writes his logarithms to 5 decimal places. I wonder if this limits the possible sources or he is just rounding from 6.

You wrote: *We can also assume Worsley knew how to tear pages out of books. Any traveler economizing on space knows the trick: rip out the pages you need, and burn the pages for the places you've already visited.*

I considered the possibility of his taking partial volumes but I don't think that is what he did, at least not intentionally, given the expanded excerpt below.

*“My navigation books had to be half-opened, page by page, till the right one was reached, then opened carefully to prevent their utter destruction. The epitome had had the cover, front and back pages washed away, while the Nautical Almanac shed its pages so rapidly before the onslaught of the seas that it was a race whether or not the month of May would last to South Georgia.”* p.116

The books would be more likely to survive if they started out intact and he wasn't restricted by weight having complained about Shackleton's insistance on overballasting,

Regards,

Robin Stuart

### Cape Belsham

**From:** Robin Stuart  
**Date:** 2017 Feb 9, 13:19 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Stuart-feb-2017-g38250

Brad,

      I suggest this change in thread name because there seems to be a confusing entanglement between two distinct questions

* Where did Worsley get the position of Cape Belsham from?
* What tables did Worsley have with him to reduce time sights, calculate DR etc. and that he seems to refer to as "the epitome"?

The possibility of a "single erroneous digit in the sixth place of a logarithm" that Frank mentions relates to the second on these only.

I may have missed something from much earlier investigations but is there any evidence at all that Worsley obtained the position from the volume he refers to as "the epitome"?

Regards,

Robin

### Re: Cape Belsham

**From:** Lars Bergman  
**Date:** 2017 Feb 9, 14:41 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Bergman-feb-2017-g38251

Robin, et al,

There is one logarithm that indicates that Worsley is using a 6-figure table, but rounding to five figures. That is the last observation on May 7th, where log cos 85°41' is given as 876.62. In a 6-figure table, like Norie's Epitome of 1860, the log is given as 8.876615, which very well could be rounded up to 8.87662. In a 5-figure table it should be given as 8.87661. This is the only instance that I have found with this indication; in two other occasions rounding up of a "five" in the sixth decimal gives correct 5-figure result.

In Norie's Epitome of 1860, there is a 5-figure "Logarithms for finding the Apparent Time or Horary Angle" that, for the "rating" sight of April 24th, with interpolation, gives the time 2h55m25s before noon, or 21h4m35s astronomical time. Using more digits, log sin2(t/2)=9.14437 gives t=2h55m24s. But any 5-figure table would give the same result, so this is no proof ...

This Epitome, the 17th edition of 1860, is the only one that I can find on line.

It gives "Elephant or Barrow's I. - Cape Valentine" as 61°5'0"S, 54°55'0"W.

Finally, a minor remark: On 29th April there is an entry 57s, which most probably shall be read as 57°.

Lars

### Re: Cape Belsham

**From:** Brad Morris  
**Date:** 2017 Feb 9, 18:58 -0500

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Morris-feb-2017-g38252

Robin

[For the puposes of clarity, when I refer to Cape Belsham, I am referring to the middle of the three peninsulas on the north shore of Elephant Island.  The expedition, via the Reginald James chart, in the Wordie paper, identify that as Cape Belsham.]

[There are other landmasses which have been alternatively identified as Cape Belsham.  The eastern most point of Elephant Island is one candidate.  Another is the northern most point, as given in the Ethiopics.  These do not agree with the expedition's  identification.  These are not given any further notice in this response.]

I have no evidence that Worsley obtained the position of Cape Belsham from any specific reference, be it epitome or not.

I'll merely reiterate the same claim as I made before.  Cape Belsham figures prominently in the log.  It is used to determine his chronometer error, using the coordinates of a known landmass, to wit Cape Belsham, in a time tested manner.

I will restate that I find it incredulous that Worsley would have attempted to memorize the coordinates of a multitude Antarctic landmasses.  He must have retrieved the coordinates of Cape Belsham from some sort of reference.

If he did attempt it from memory, he made a real botch of it, as none of the references I have found supply the coordinates Worsley did.  Yet his position as given in the log agrees remarkably with modern charting. This is the nub of the conundrum.

I have never been successful determining precisely which references Worsley had with him.  As Frank indicates, it may be found via a specific typographical error or the like.  My suggestion is that the coordinates given for Point Wild, and the close proximity of Cape Belsham, would be a tell tale in a reference.  In other words, the reference would give close to the same coordinates that Worsley did.  Again, no reference I have found, that includes Cape Belsham, has ever provided such a set of coordinates.

Until recently, all of the published books show Worsley with just one chronometer on the Caird, yet the log clearly indicates the presence of two chronometers on board.  Perhaps the log does indicate further references, but  I did not obtain all of the pages of the log, just the pages of the journey and a scant few others.

We can assume that Endurance had a veritable library of Antarctic references on board.  Again, I am unaware of any comprehensive list.  That doesn't mean it doesn't exist, just that I am unaware of it.  Should such a list exist, it would be a fairly simple matter to search them exhaustively for Cape Belsham.

Another reference that may be the source of the Cape Belsham coordinates is a map.  Several maps showing the Antarctic Peninsula and of course Elephant Island did exist prior to the journey.  The thumbnail of the German map (1912) showed a rather fanciful Elephant Island, albeit with three peninsulas on the north shore.  None were identified as Cape Belsham.  There are obviously many others.  I am firm in my belief that Endurance had as many charts as were available.

Brad

OTHER REFERENCES

I have a hard copy of Moore's Epitome of Navigation, London, 1828.  Whilst it does not provide Cape Belsham or even Elephant Island, it specifically mentions Clarence Island 61°2'S 54°10'W.  Close enough to 29104 yet not accurate.  The coordinates given by Worsley are only 40 arc minutes away, or roughly 20 nautical miles.  I would think perhaps you could see the mountains above the sea!

My hard copy of 1848 Norie's Epitome has Elephant Island, specifically Cape Valentine as 61°5'S 54°55'W.  No indication as to which point is referred to, yet Cape Valentine on 29104 is the eastern most point of Elephant Island.

Interestingly, my 1849 Bowditch states that Cape Valentine is 61°3'S 54°40'W, again with no indication as to which landmass, but agrees quite closely with 29104, there given as 61°8'S 54°40'W

### Re: Cape Belsham

**From:** Brad Morris  
**Date:** 2017 Feb 9, 20:08 -0500**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Morris-feb-2017-g38253

Lars

You are correct!  There is a superscript by both the 56 and the 57 (latitude of departure).  Of course those are degrees.  It is miserably faint in this area, as we have previously discussed

Attached, find version 3.5

Brad

On Feb 9, 2017 5:50 PM, "Lars Bergman" <[NoReply\_Bergman@fer3.com](mailto:NoReply_Bergman@fer3.com)> wrote:

Robin, et al,

There is one logarithm that indicates that Worsley is using a 6-figure table, but rounding to five figures. That is the last observation on May 7th, where log cos 85°41' is given as 876.62. In a 6-figure table, like Norie's Epitome of 1860, the log is given as 8.876615, which very well could be rounded up to 8.87662. In a 5-figure table it should be given as 8.87661. This is the only instance that I have found with this indication; in two other occasions rounding up of a "five" in the sixth decimal gives correct 5-figure result.

In Norie's Epitome of 1860, there is a 5-figure "Logarithms for finding the Apparent Time or Horary Angle" that, for the "rating" sight of April 24th, with interpolation, gives the time 2h55m25s before noon, or 21h4m35s astronomical time. Using more digits, log sin2(t/2)=9.14437 gives t=2h55m24s. But any 5-figure table would give the same result, so this is no proof ...

This Epitome, the 17th edition of 1860, is the only one that I can find on line.

It gives "Elephant or Barrow's I. - Cape Valentine" as 61°5'0"S, 54°55'0"W.

Finally, a minor remark: On 29th April there is an entry 57s, which most probably shall be read as 57°.

Lars

### Re: Cape Belsham

**From:** Don Seltzer  
**Date:** 2017 Feb 9, 21:07 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Cape-Belsham-Seltzer-feb-2017-g38254>

It appears that log books and journals of the officers of the 1838 Wilkes expedition may be available through the National Archives, probably on microfilm.

Don Seltzer

### Re: Cape Belsham

**From:** David C  
**Date:** 2017 Feb 9, 20:23 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-DavidC-feb-2017-g38255

I would like to suggest an alternative version of events (assuming it has not already been discussed). The names Cape Valentine and Cape Belsham were marked on charts dating from 1822. When Worsley decided to use Cape Belsham to rate the chronometer maybe he determined the position from a chart.  If this is the case then Cape Belsham may never have been included in a gazetteer. See the attached image. The position of Cape Belsham is approximately xx 61'    yy 55'. OTTOMH I do not know if this is the position Worseley used.

The chart comes from

The Discoveries of Antarctica within the American Sector, as Revealed by Maps and Documents

William Herbert Hobbs

Transactions of the American Philosophical Society

Vol. 31, No. 1 (Jan., 1939), pp. 1-71

Published by: [American Philosophical Society](https://www.jstor.org/publisher/amps)

DOI: 10.2307/1005573

Stable URL: http://www.jstor.org/stable/1005573

Page Count: 125

Professor Hobbs wrote the paper in an attempt to prove that the British fabricated evidence and that an American was the first to discover the Antarctic continent. That argument is not relevant here. What is important is the material incuded in the paper. It can be viewed on jstor. I registered for the free version so cannot download the pdf.

Hobbs suggested that names on a chart published by Laurie were added by Laurie in London. That lead me to ask who was the Belsham the cape was named after?  A very quick google gave me

**William Belsham** (1752–1827) was an English political writer and historian, noted as a supporter of the [Whig Party](https://en.wikipedia.org/wiki/Whig_%28British_political_party%29) and its principles. He justified the [American Revolution](https://en.wikipedia.org/wiki/American_Revolution) in excusing Americans in their resistance to the demands of England, and he was an advocate of progressive political liberty.

If this was the person who the cape was named after I doubt that mariners would have heard of him. It is more likely that someone in London e.g. Laurie may have known about Belsham.

**Attached File:**   
[](http://fer3.com/arc/imgx/belsham7.jpg)

### Re: Cape Belsham

**From:** Henry Halboth  
**Date:** 2017 Feb 10, 01:18 -0500

Source: http://fer3.com/arc/m2.aspx/Cape-Belsham-Halboth-feb-2017-g38256

Hi Brad,

I have not been following the most recent discussion as closely as I did the previous, however, do feel that two previous posts of mine, which were largely ignored might prove relevent, seeing that "new blood"  has now entered the discussion . Please  refer to.----

**Attached File:** [138256.worsley-project-research-data-2.odt](http://fer3.com/arc/img/138256.worsley-project-research-data-2.odt)  
**Attached File:** [138256.worsley-project-research-data-3.odt](http://fer3.com/arc/img/138256.worsley-project-research-data-3.odt)

### Re: Cape Belsham

**From:** Brad Morris  
**Date:** 2017 Feb 10, 03:33 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Cape-Belsham-Morris-feb-2017-g38257>

Hello David

I have been thinking very hard about Worsley's statement of 24 April.  He writes "Long. Of C. Belsham being only approx'tly known to us".  I've always taken that to mean that he has the coordinates of Cape Belsham but doesn't know which pile of rocks it is.  Your interpretation may differ.  I welcome different viewpoints on this matter.

I think it clear that Worsley had access to charts as well as Epitomies, Gazeteers, Ethiopics and the written records of earlier expeditions.  It is not one to the exclusion of all others, at least IMHO.  Is the meaning "only approx'tly" that the references don't agree?   Does it mean that while the references state there really is a Cape Belsham, there is no agreement among them?

Thank you for the Laurie Chart of 1822.  In the Laurie chart, Clarence Island is present, as is Elephant Island. The chart shows two discernible features of importance to the conversation. Cape Valentine is the eastern most point of Elephant Island and Cape Belsham is the northern most point.  These two capes do appear in numerical form in the references.  Most notably, in the Ethiopics wherein Cape Belsham is the "N.point of Elephant Island".

One other assertion may be made.  The Laurie chart of Elephant Island looks nothing like the modern representation. Frankly, neither does the Steiner chart of 1912.  From this I infer that the charts Worsley had access to are unreliable when it comes to the coupling of named features to physical landmass.  The island must not have been adequately surveyed until post expedition.  This would be another layer of great uncertainty for Worsley and Cape Belsham.

Which leaves me asking, "Was Worsley the luckiest navigator of all?"  After all of the uncertainty in the charts and disagreement among references, he somehow determines the modern coordinates to within a very small margin of error.  While Robin and I have disagreed about the numerical value, there is no quibbling about the fact that it is very nearly spot on.

Worsley does adjust the chronometer by another 1m4s (16 arc minutes to the east) on the 28th of April.  Worsley must therefore think his Point Wild longitude in error [it was not].  If we take Worsley at his word then instead of 54°50'W, it seems the determination of longitude should have been 54°34'. Differing viewpoints welcome here.

I am unsure if Worsley is puzzled, because of his chronometer rate is in error, unknown to him.  Is Worsley mixing the chronometer rate and the Point Wild longitude?  Certainly, they are interrelated.  Lars and I both independently determined the chronometer rate should have been 11 seconds per day, not 5 as Worsley determined.  Yet there is insufficient accumulation of error in only 4 days to account for 16 arc minutes of adjustment.

Brad

### Worsley's Epitome

**From:** Robin Stuart  
**Date:** 2017 Feb 10, 06:37 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-Stuart-feb-2017-g38258

Lars,

      You noted: "In a 5-figure table it should be given as 8.87661."

I don't know what actually done to compute the tables but whether a 5-figure table gives 8.87661 or 8.87662 may depend on the exact method used. If they used some sort of series expansion for log(cos) the final digit could depend on how rapid the convergence is (i.e. how big the unincluded terms can be) and whether convergence is from above, below or alternating. They might have just started with someone elses, say 6 figure, tables for log and cosine and performed multiple look ups to compile the table.

An actual error in the tables would be the clincher but we don't see any in what we have. Alternatively if we do find an error in the particular values in a candidate volume for "the epitome" then it can be excluded.

Regards,

Robin

### Re: Worsley's Epitome

**From:** Frank Reed  
**Date:** 2017 Feb 10, 07:37 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-FrankReed-feb-2017-g38259

Another option to consider: Worsley's Epitome could have been ***Worsley's*** Epitome. In the 21st century, if you were planning an adventure and wanted an encyclopedic reference that would fit in the memory of your smartphone, you might merge sections and extracts from various documents and resources into a single pdf, maybe with a purpose-built index. A century ago, an explorer might well have collected together various pages from key documents including required mathematical tables, unique tables that suited the explorer's tastes, and extensive geographic references culled from many works. You take those down to your neighborhood book binder, and you say, "Make me an *epitome* from all of these pages and resources." Your book binder cuts the pages down nicely and assembles them in a durable binding guaranteed to last for the duration of an antarctic exploration (though not guaranteed to live through a small boat journey in the Southern Ocean). Note: I have no evidence that this is the case; I'm suggesting it primarily to open up the meaning of the word epitome. It doesn't have to be a word from the title of a specific book.

Frank Reed

### Re: Cape Belsham

**From:** Lars Bergman  
**Date:** 2017 Feb 10, 07:39 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Bergman-feb-2017-g38260

Brad, you wrote "Until recently, all of the published books show Worsley with just one chronometer on the Caird, yet the log clearly indicates the presence of two chronometers on board".

Probably not two chronometers. If there were two chronometers onboard, Worsley should have noted the errors for both of them in the log. But they had at least one other timepiece. This other watch were used for timing the observations on April 26th and May 3rd. This watch has errors "fast 29" and "slow 46" respectively. These values must have been obtained by comparison with the chronometer 192/262 shortly before or after each observation.

Lars

### Re: Cape Belsham

**From:** Brad Morris  
**Date:** 2017 Feb 10, 10:57 -0500

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Morris-feb-2017-g38261

Agreed Lars.  One chronometer, one timepiece.

On Feb 10, 2017 10:55 AM, "Lars Bergman" <[NoReply\_Bergman@fer3.com](mailto:NoReply_Bergman@fer3.com)> wrote:

Brad, you wrote "Until recently, all of the published books show Worsley with just one chronometer on the Caird, yet the log clearly indicates the presence of two chronometers on board".

Probably not two chronometers. If there were two chronometers onboard, Worsley should have noted the errors for both of them in the log. But they had at least one other timepiece. This other watch were used for timing the observations on April 26th and May 3rd. This watch has errors "fast 29" and "slow 46" respectively. These values must have been obtained by comparison with the chronometer 192/262 shortly before or after each observation.

Lars

### Re: Worsley's Epitome

**From:** Lars Bergman  
**Date:** 2017 Feb 10, 08:04 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-Bergman-feb-2017-g38262

Robin, you wrote "I don't know what actually done to compute the tables but whether a 5-figure table gives 8.87661 or 8.87662 may depend on the exact method used".

Yes, that is true. However, I have checked a few 5-figure tables:  
  
Roswall (1824), Bowditch (1851), Pettersson (1861), Lindman (1924); they all gives 8.87661.

So if we can find a 5-figure table showing log cos 85°41' = 8.87662 then we have a good indicator of which table Worsley might have used. If not, then we have an indication that he used a 6-figure table.

Lars

### Re: Worsley's Epitome

**From:** Sean C  
**Date:** 2017 Feb 10, 10:01 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-SeanC-feb-2017-g38263

Lars Bergman wrote:

...if we can find a 5-figure table showing log cos 85°41' = 8.87662 then we have a good indicator of which table Worsley might have used.

The "[Kleines Logarithmisch-Trigonometrisches Handbuch](https://books.google.com/books?id=7bU2AAAAMAAJ&pg=PA28&lpg=PA28&dq=log+cos+85%C2%B041%27+%3D+%228.87662%22&source=bl&ots=n_E-Ti-0bb&sig=ssEfHZiYJ1eTi1CYJb5iVvBQcTU&hl=en&sa=X&ved=0ahUKEwjhmvfhi4bSAhXqs1QKHVAiC2AQ6AEIGjAA#v=onepage&q=log%20cos%2085%C2%B041%27%20%3D%20%228.87662%22&f=false)" By Joseph Georg Böhm (1882) appears to give that figure.

Regards,

Sean C.

### Re: Worsley's Epitome

**From:** Brad Morris  
**Date:** 2017 Feb 10, 12:32 -0500

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-Morris-feb-2017-g38264

From my library

Log (cos (85°41'))=

Burton's "High Latitude Edition" (1937)

=8766  [4 place table]

Bowditch "Practical Navigator" (1849)

=87661 [5 place table]

Norie "Epitome of Practical Navigation" (1848)

=876615 [6 place table]

Atkinson "Epitome of the art of Navigation" (1753)

=9.998766 [7 place table, effectively 4]

Thoms "Practice of Navigation at Sea" (1856)

=87661 [5 place table]

Moore "Practical Navigator" (1828)

=876615 [6 place table]

On Feb 10, 2017 11:19 AM, "Lars Bergman" <[NoReply\_Bergman@fer3.com](mailto:NoReply_Bergman@fer3.com)> wrote:

Robin, you wrote "I don't know what actually done to compute the tables but whether a 5-figure table gives 8.87661 or 8.87662 may depend on the exact method used".

Yes, that is true. However, I have checked a few 5-figure tables:  
  
Roswall (1824), Bowditch (1851), Pettersson (1861), Lindman (1924); they all gives 8.87661.

So if we can find a 5-figure table showing log cos 85°41' = 8.87662 then we have a good indicator of which table Worsley might have used. If not, then we have an indication that he used a 6-figure table.

Lars

### Re: Worsley's Epitome

**From:** David C  
**Date:** 2017 Feb 10, 12:33 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-DavidC-feb-2017-g38266

Another option to consider: Worsley's Epitome could have been ***Worsley's*** Epitome. In the 21st century, if you were planning an adventure and wanted an encyclopedic reference that would fit in the memory of your smartphone, you might merge sections and extracts from various documents and resources into a single pdf, maybe with a purpose-built index. A century ago, an explorer might well have collected together various pages from key documents including required mathematical tables, unique tables that suited the explorer's tastes, and extensive geographic references culled from many works. You take those down to your neighborhood book binder, and you say, "Make me an *epitome* from all of these pages and resources." Your book binder cuts the pages down nicely and assembles them in a durable binding guaranteed to last for the duration of an antarctic exploration (though not guaranteed to live through a small boat journey in the Southern Ocean). Note: I have no evidence that this is the case; I'm suggesting it primarily to open up the meaning of the word epitome. It doesn't have to be a word from the title of a specific book.

Agreed that we must not apply a narrow 21st century interpretation to the word *epitome.*

Shackleton  was planning an Antarctic expedition lasting several years. It is reasonable to believe that he would have assembled as much reference material as he could find.  *The Antarctic Manual for the Use of the Expedition of 1901* contains a very large biblography - over 800 entries. Shackleton was third officer on the 1901 expedition so he would have been familiar with this manual.

The manual was digitised by Google but when I looked at Google Books this morning I could not find  the download pdf link. I downloaded the book yesterday but cannot remember where from - you will be able to find it if you want it.

### Re: Worsley's Epitome

**From:** Lars Bergman  
**Date:** 2017 Feb 10, 13:27 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-Bergman-feb-2017-g38267

Sean, you wrote

"The "[Kleines Logarithmisch-Trigonometrisches Handbuch](https://books.google.com/books?id=7bU2AAAAMAAJ&pg=PA28&lpg=PA28&dq=log+cos+85%C2%B041%27+%3D+%228.87662%22&source=bl&ots=n_E-Ti-0bb&sig=ssEfHZiYJ1eTi1CYJb5iVvBQcTU&hl=en&sa=X&ved=0ahUKEwjhmvfhi4bSAhXqs1QKHVAiC2AQ6AEIGjAA#v=onepage&q=log%20cos%2085%C2%B041%27%20%3D%20%228.87662%22&f=false)" By Joseph Georg Böhm (1882) appears to give that figure", i.e. 8.87662. It is interesting to find that the 1870 edition of the same book gives 8.87661.

But I don't think Worsley used Böhm. More probably he used a table designed for nautical use, containing among other things altitude corrections and traverse tables.

Lars

### Re: Cape Belsham

**From:** Robin Stuart  
**Date:** 2017 Feb 10, 13:34 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Stuart-feb-2017-g38268

[In a prior post](http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Stuart-feb-2017-g38248) I provided this information from "Shackleton's Boat Journey".

**Chronometer**

“[24th April] Immediately after breakfast the sun came out obligingly. The first sunny day with a clear enough horizon for rating my chronometer.\*

\* This English chronometer, an excellent one of Smith’s was the sole survivor, in good going order, of the twenty-four we set out with in the Endurance. [Author’s Note]” p.101

Here's additional reference to the chronometer during their overland trek on South Georgia.

“What the others carried I forget – I carried two compasses, binoculars, food, and the Alpine rope, besides the chronometer, with which I navigated the boat.” p.191

“Sir Earnest asked me for the time. It was 6:55. He said  'We’ll listen for the whaling station’s whistle.’” p. 206

This raises the question. Why would he be have carried the chronometer and not left it at the camp with the other three members of the party if an alternative timepiece was available? (Maybe it was broken, lost, heavier or unreliable)

I find it striking that the impression is given in the popular literature that Harrison built H5 and it was all over but it's clear that even in the early 20th century chronometers weren't that reliable and required lots of care and feeding. The Endurance started out with 24 on board!!!!

### Re: Worsley's Epitome

**From:** Brad Morris  
**Date:** 2017 Feb 10, 19:42 -0500

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-Morris-feb-2017-g38269

David

You wrote

Shackleton  was planning an Antarctic expedition lasting several years. It is reasonable to believe that he would have assembled as much reference material as he could find.  The Antarctic Manual for the Use of the Expedition of 1901 contains a very large biblography - over 800 entries. Shackleton was third officer on the 1901 expedition so he would have been familiar with this manual.

Yes, precisely!  In our search for "the one", we may have overlooked the many.  I tried to make this very point before, perhaps unsuccessfully.  Worsley would have access to many resources.  When Worsley writes the longitude of Cape Belsham is only approximately known, it could be that the references do not agree with each other, so which one to trust?? With a library of 800 entries, it is certain that more than just a handful would refer to Cape Belsham.

Brad

On Feb 10, 2017 7:25 PM, "David C" <[NoReply\_DavidC@fer3.com](mailto:NoReply_DavidC@fer3.com)> wrote:

Another option to consider: Worsley's Epitome could have been ***Worsley's*** Epitome. In the 21st century, if you were planning an adventure and wanted an encyclopedic reference that would fit in the memory of your smartphone, you might merge sections and extracts from various documents and resources into a single pdf, maybe with a purpose-built index. A century ago, an explorer might well have collected together various pages from key documents including required mathematical tables, unique tables that suited the explorer's tastes, and extensive geographic references culled from many works. You take those down to your neighborhood book binder, and you say, "Make me an epitome from all of these pages and resources." Your book binder cuts the pages down nicely and assembles them in a durable binding guaranteed to last for the duration of an antarctic exploration (though not guaranteed to live through a small boat journey in the Southern Ocean). Note: I have no evidence that this is the case; I'm suggesting it primarily to open up the meaning of the word epitome. It doesn't have to be a word from the title of a specific book.

Agreed that we must not apply a narrow 21st century interpretation to the word epitome.

Shackleton  was planning an Antarctic expedition lasting several years. It is reasonable to believe that he would have assembled as much reference material as he could find.  The Antarctic Manual for the Use of the Expedition of 1901 contains a very large biblography - over 800 entries. Shackleton was third officer on the 1901 expedition so he would have been familiar with this manual.

The manual was digitised by Google but when I looked at Google Books this morning I could not find  the download pdf link. I downloaded the book yesterday but cannot remember where from - you will be able to find it if you want it.

### Re: Worsley's Epitome

**From:** David C  
**Date:** 2017 Feb 10, 18:08 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-DavidC-feb-2017-g38270

Brad the following seems so obvious that I assume that you have already thought of it (-;

You indicated that you located Worsley's log in the Canterbury (NZ?) museum. Does the museum have a list of all of the Shacketon/Worsley artifacts that they have in their collection? Maybe they have an epitome or two??????

### Re: Worsley's Epitome

**From:** Frank Reed  
**Date:** 2017 Feb 10, 18:23 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-FrankReed-feb-2017-g38271

David C, you wrote:  
"Does the museum have a list of all of the Shacketon/Worsley artifacts that they have in their collection? Maybe they have an epitome or two?"

They might, but how could you tell? The catch again is that an "epitome" is not necessarily a book with the word epitome in the title. It could simply be a privately-bound collection of useful navigational tables and antarctic references --Worsley's own self-published compilation or "epitome," as they would have said back then. Or it could be some other generic collection of tables that Worsley casually referred to as an "epitome". By the way, if this epitome was a Norie, wouldn't you all agree that he would have called it a "Norie"? That was the habit already by this date, I believe. In any case, a museum curator indexing such a collection would probably use some very different name for such tables.

O, if only we knew someone in distant New Zealand who spoke that strange antipodean language and could drop in and ask to look at that upside-down collection...

Frank Reed

### Re: Worsley's Epitome

**From:** Brad Morris  
**Date:** 2017 Feb 10, 21:23 -0500

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-Morris-feb-2017-g38272

David

Ha! I never thought to see if they had anything else.  I was so excited about the log, and remain so, that I never considered to check for anything else.

Perhaps they do indeed have other artifacts.

Brad

On Feb 10, 2017 9:20 PM, "David C" <[NoReply\_DavidC@fer3.com](mailto:NoReply_DavidC@fer3.com)> wrote:

Brad the following seems so obvious that I assume that you have already thought of it (-;

You indicated that you located Worsley's log in the Canterbury (NZ?) museum. Does the museum have a list of all of the Shacketon/Worsley artifacts that they have in their collection? Maybe they have an epitome or two??????

### Re: Worsley's Epitome

**From:** David C  
**Date:** 2017 Feb 10, 20:18 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-DavidC-feb-2017-g38278

Brad when you refer to the Ethiopic I assume that it is the volume by AG Findlay published in 1883. Findlay published another work called *A Directory for the Navigation of the Pacific Ocean Vol 2.* The copy I am looking at is a Google version of a digital reprint in the Cambridge Library Collection. As far as I can tell the original was published in 1851.

Despite the title the book includes details of the South Shetlands. The positions of Elephant Island E Summit and S peak are given but I cannot find Cape Belsham. The list of locations includes a column headed *Authority.* The authority for Elephant Island is given as D'Urville.

Three thoughts:

* D'Urville did not determine the position of Cape Belsham.
* The position of Cape Belsham was determined between 1851 and 1883.
* Examine all volumes produced by Findlay.

### Re: Worsley's Epitome

**From:** David C  
**Date:** 2017 Feb 10, 20:37 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-DavidC-feb-2017-g38281

According to Wikipedia AG Findlay took over the business *Laurie and Whittl*e (London geographical and print publisher) on the death of Richard Holland Laurie in 1858.

I do not know if RH Laurie is the *Laurie of Imray Laurie Norie and Wilson Ltd* but given that in about 1820 Laurie published a chart showing Cape Belsham AG Findlay and Imray, Laurie etc etc  seems to be a promising line of investigation.

### Re: Worsley's Epitome

**From:** Brad Morris  
**Date:** 2017 Feb 11, 00:02 -0500

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-Morris-feb-2017-g38282

Also

<https://books.google.com/books/about/A_sailing_directory_for_the_Ethiopic_or.html?id=I-gNAQAAMAAJ>

With a clear Cape Belsham reference

### Re: Worsley's Epitome

**From:** Brad Morris  
**Date:** 2017 Feb 10, 23:54 -0500

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-Morris-feb-2017-g38283

David

<https://books.google.com/books?id=lmsDAAAAYAAJ>.  "Ethiopic" South Atlantic.  The link is for the 1867, yet there were several revisions, like the 1855.. For Cape Belsham, each just copied the previous.

I am familiar with the volume you are referring to.  Yes, even though it nominally for the Pacific, Elephant Island is in the table.

Brad

On Feb 10, 2017 11:29 PM, "David C" <[NoReply\_DavidC@fer3.com](mailto:NoReply_DavidC@fer3.com)> wrote:

Brad when you refer to the Ethiopic I assume that it is the volume by AG Findlay published in 1883. Findlay published another work called A Directory for the Navigation of the Pacific Ocean Vol 2. The copy I am looking at is a Google version of a digital reprint in the Cambridge Library Collection. As far as I can tell the original was published in 1851.

Despite the title the book includes details of the South Shetlands. The positions of Elephant Island E Summit and S peak are given but I cannot find Cape Belsham. The list of locations includes a column headed Authority. The authority for Elephant Island is given as D'Urville.

Three thoughts:

* D'Urville did not determine the position of Cape Belsham.
* The position of Cape Belsham was determined between 1851 and 1883.
* Examine all volumes produced by Findlay.

### Re: Worsley's Epitome

**From:** David C  
**Date:** 2017 Feb 10, 22:16 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-DavidC-feb-2017-g38285

Are you familiar with the following which was originally published by AG Findlay?

[The general gazetteer, or, Compendious geographical dictionary, in miniature : containing a description of the empires, kingdoms, states ... &c. in the known world ...](http://www.worldcat.org/oclc/85749852) by R Brookes( Book )  
  
30 editions published between 1842 and 1986 in English and  held by 78 WorldCat member libraries worldwide

I have not found an online copy but copies are held in libraries.

### Re: Worsley's Epitome

**From:** David C  
**Date:** 2017 Feb 11, 16:43 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-DavidC-feb-2017-g38295

While browsing the navlist archives I found a comment that copies of Worsley's diaries were in the Alexander Turnbull Library in Wellington. I have not (yet) found replies indicating that someone has had a look at these diaries. The relevant document is

Date: 1916 By: Worsley, Frank Arthur (Commander), 1872-1943Shackleton, Ernest Henry (Sir), 1874-1922

Ref: Micro-MS-0632

Entries made while on Imperial Trans-Antarctic Expedition, 1914-1917 under Sir Ernest Shackleton. Includes diary of voyage of the `James Caird' from Elephant Island to South Georgia, 24 Apr-20 May 1916; diary relating to rescue of Elephant Island party, 16 Jun-25 Dec 1916; manuscript entitled `Shackleton's great boat journey', 1916.

Quantity: 1 microfilm reel(s) positive (ca 200 pages).

Physical Description: Holograph (microfilm)

Provenance: Donor/Lender/Vendor - Donated by the Scott Polar Research Institute, Cambridge, England, 1967

Access restrictions: No access restrictions

Format: 1 microfilm reel(s) positive (ca 200 pages), Diaries, Manuscripts, Holograph (microfilm)

I note that the original is in the Polar Research Institute, Cambridge. Has anyone viewed this diary - either the original or the microfilm?

I quick check shows that the Alexander Turnbull Library is about 18nm SW3/4W of where I am writing this. It is about five minutes walk away from a spot I regularly visit to view/ride on Wellington's trolley buses before they are replaced with noisy, smelly diesels in six months time.  So much for clean, green NZ (-;   (Then there is the radio documentary I heard this morning about badly degraded rivers, mainly due to intensification of dairying, but that is another matter).

If no one has viewed the diary I am happy to have a look at it although I am not making any promises about how soon that would be.

There are no access restrictons so I should be able to do something that Brad is prohibited from doing - give you an example of Worsley's hand writing.

### Re: Cape Belsham

**From:** David C  
**Date:** 2017 Feb 11, 17:52 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-DavidC-feb-2017-g38296

The Alexander Turnbull Library in Wellington has the original of Poynter's journal and chart. Poynter accompanied Bransfield who, after Smith, was the second person to visit the South Shetlands.

Poynter's  Chart of New South Britain   can be viewed here <https://tiaki.natlib.govt.nz/#details=ecatalogue.506544> (click on the view digital record button).

### Re: Worsley's Epitome

**From:** Brad Morris  
**Date:** 2017 Feb 11, 21:01 -0500

**Source**: http://fer3.com/arc/m2.aspx/Worsleys-Epitome-Morris-feb-2017-g38297

Please do go!!

On Feb 11, 2017 7:55 PM, "David C" <[NoReply\_DavidC@fer3.com](mailto:NoReply_DavidC@fer3.com)> wrote:

While browsing the navlist archives I found a comment that copies of Worsley's diaries were in the Alexander Turnbull Library in Wellington. I have not (yet) found replies indicating that someone has had a look at these diaries. The relevant document is

Date: 1916 By: Worsley, Frank Arthur (Commander), 1872-1943Shackleton, Ernest Henry (Sir), 1874-1922

Ref: Micro-MS-0632

Entries made while on Imperial Trans-Antarctic Expedition, 1914-1917 under Sir Ernest Shackleton. Includes diary of voyage of the `James Caird' from Elephant Island to South Georgia, 24 Apr-20 May 1916; diary relating to rescue of Elephant Island party, 16 Jun-25 Dec 1916; manuscript entitled `Shackleton's great boat journey', 1916.

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Physical Description: Holograph (microfilm)

Provenance: Donor/Lender/Vendor - Donated by the Scott Polar Research Institute, Cambridge, England, 1967

Access restrictions: No access restrictions

Format: 1 microfilm reel(s) positive (ca 200 pages), Diaries, Manuscripts, Holograph (microfilm)

I note that the original is in the Polar Research Institute, Cambridge. Has anyone viewed this diary - either the original or the microfilm?

I quick check shows that the Alexander Turnbull Library is about 18nm SW3/4W of where I am writing this. It is about five minutes walk away from a spot I regularly visit to view/ride on Wellington's trolley buses before they are replaced with noisy, smelly diesels in six months time.  So much for clean, green NZ (-;   (Then there is the radio documentary I heard this morning about badly degraded rivers, mainly due to intensification of dairying, but that is another matter).

If no one has viewed the diary I am happy to have a look at it although I am not making any promises about how soon that would be.

There are no access restrictons so I should be able to do something that Brad is prohibited from doing - give you an example of Worsley's hand writing.

### Re: Cape Belsham

**From:** David C  
**Date:** 2017 Feb 13, 18:53 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-DavidC-feb-2017-g38312

I have had a very successful morning. After scanning Worsley's diary for  no more than ten or fifteen minutes the word Belsham jumped out at me. I now know how Worsley determined the position of Cape Belsham!  As I had suggested it was from a chart (more particularly a chartlet).

I cannot find an online version of the document in question but there are physical copies at various libraries including the Alexander Turnbull. Obviously another visit is required.

I copied Worsley's complete diary to a pdf file. I will not post the pdf online for two reasons. First the file size and secondly copyright. Copyright is held by the Scott Polar Reasearch Institute and obviously I did not visit them this morning (-;  I do not know if the diary reveals the name of Worsley's Epitome.

I will contact Brad by private email to give him a link to the diary file.

I am quite relaxed about posting individual pages to navlist for private research purposes. I have attached a copy of the Belsham page. Worsley's handwriting isn't too bad -  I suspect that the diary was written at the end of the Caird journey. Any thoughts?

**Attached File:**   
[worsley\_belsham\_location.pdf](http://fer3.com/arc/imgx/worsley_belsham_location.pdf)

### Re: Cape Belsham

**From:** David C  
**Date:** 2017 Feb 13, 23:00 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-DavidC-feb-2017-g38313

I copied Worsley's complete diary to a pdf file.

Despite all of the hardships Worsley kept a stiff upper lip. He wrote "This day was King Georges Assession 6 years ago. God save the King!"  After all, this was the Imperial Trans-Antarctic Expedition. Although Worsley was born in NZ he was a British subject. NZ did not become fully independant until 1948 when the NZ Parliament became party to the pre-ww2 Statute of Westminster. Worsley died in 1943 so he was never a NZ citizen.  Within my living memory some NZers called Britain "Home" although if anyone did that today they would probably be subject to ridicule and derision.

As an aside, while Shackleton was making heroic efforts to save his men, on the other side of the world millions were being slaughtered on the Western front. I would rather read about Shackleton then WW1 politicians and Generals.

### Re: Cape Belsham

**From:** David C  
**Date:** 2017 Feb 14, 00:01 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-DavidC-feb-2017-g38314

Why was Worsley unable to determine latitide on the day the Caird departed? Was it because the Sun and horizon were clear for the morning sight but not for as noon sight? Or was it because Cape Belsham obstructed the horizon? Google Earth suggests that Cape Belsham would not have obstructed a noon sight.

### Re: Cape Belsham

**From:** Bob Crawley  
**Date:** 2017 Feb 14, 01:17 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Crawley-feb-2017-g38315

David and others - I'm trying to keep up with this topic and wish I'd been following it when vsiting the SPRI in Cambridge last year. If it helps I could go back, about 60nM, and research specific documents but would need some guidance.

Regards

Bob C

### Re: Cape Belsham

**From:** Lars Bergman  
**Date:** 2017 Feb 14, 03:53 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Bergman-feb-2017-g38316

David,

I think they were too eager to leave when the weather was, for once, fine, and didn't have time to wait ashore until noon. They needed daylight to find their way through the ice areas to open water.

Lars

### Re: Cape Belsham

**From:** Robin Stuart  
**Date:** 2017 Feb 14, 04:32 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Stuart-feb-2017-g38317

David,

        Some of the text appears in Worsley’s book “Shackleton’ Boat Journey” that I had [excerpted](http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Navigational-Log-Book-Stuart-feb-2017-g38248) or the log. There are differences however

Diary: “rating my chronometers”

Book: “rating my chronometer”. Elsewhere in the book he only refers to it in the singular.

Diary: “12m52(?)m slow and loosing 7seconds a day”

Log: “April 25th 12M0” slow losing 5 sec”

Regards,

Robin Stuart

### Re: Cape Belsham

**From:** Brad Morris  
**Date:** 2017 Feb 14, 09:53 -0500

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Morris-feb-2017-g38318

David

On Monday, April 24th, Worsley wrote

"No obs for Lat cd be obtained + Long of C.Belsham being only approx'tly known to us, allow 1minute+4sec more slow =11 min 55sec slow"

We take that to mean cloudy, but as you have continued to astound us, I will leave any interpretation of that to you!!

Brad

On Feb 14, 2017 5:45 AM, "David C" <[NoReply\_DavidC@fer3.com](mailto:NoReply_DavidC@fer3.com)> wrote:

Why was Worsley unable to determine latitide on the day the Caird departed? Was it because the Sun and horizon were clear for the morning sight but not for as noon sight? Or was it because Cape Belsham obstructed the horizon? Google Earth suggests that Cape Belsham would not have obstructed a noon sight.

[View and reply to this message](http://fer3.com/arc/m2.aspx/Cape-Belsham-DavidC-feb-2017-g38314)

### Re: Cape Belsham

**From:** Brad Morris  
**Date:** 2017 Feb 14, 09:54 -0500

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Morris-feb-2017-g38319

David

Would you kindly send me Worsley's Diary in a private email?  Thank you!!

Brad

On Feb 14, 2017 5:40 AM, "David C" <[NoReply\_DavidC@fer3.com](mailto:NoReply_DavidC@fer3.com)> wrote:

I copied Worsley's complete diary to a pdf file.

Despite all of the hardships Worsley kept a stiff upper lip. He wrote "This day was King Georges Assession 6 years ago. God save the King!"  After all, this was the Imperial Trans-Antarctic Expedition. Although Worsley was born in NZ he was a British subject. NZ did not become fully independant until 1948 when the NZ Parliament became party to the pre-ww2 Statute of Westminster. Worsley died in 1943 so he was never a NZ citizen.  Within my living memory some NZers called Britain "Home" although if anyone did that today they would probably be subject to ridicule and derision.

As an aside, while Shackleton was making heroic efforts to save his men, on the other side of the world millions were being slaughtered on the Western front. I would rather read about Shackleton then WW1 politicians and Generals.

### Cape Belsham, At Last!!

**From:** Brad Morris  
**Date:** 2017 Feb 14, 11:36 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Cape-Belsham-Last-Morris-feb-2017-g38320>

Gentlemen

Thanks to David, we can now read Worsley's Diary and see what it has to say about Cape Belsham.

Worsley, in his Diary, wrote:

"Immediately after breakfast the sun obligingly came out.  This was the first sunny day with a clear enough horizon to get a sight for rating my chronometers.  This I got, but being unable to get the Latitude of Cape Belsham (where our camp was situated) except for doubtful chartlets in Nordenskjold's Book Antarctica, I assumed the position to be 61°04'S.Latitude 54°50'W.Longitude.  This made my chronometer 12m52s slow + losing 7 seconds per day"

I interpret Worsley's shorthand to be for

Nordenskjold, Otto: "Antarctica: Or Two Years Amongst the Ice of the South Pole", 1901

There is a copy of this online.  I searched Nordenskjold's Book for any references to Elephant Island, Cape Belsham and any charts.  Findings

1) No references to Cape Belsham

2) One reference to Elephant Island, page 415 (the index has this as 416, not significant).  That reference indicates that they could see Elephant Island in the distance, but did not visit it.

3) There IS one chart which included Elephant Island.  I have attached the entire chart and the Elephant Island Detail.

The first thing to notice is that once again, the coastal outline of Elephant Island remains fanciful.  We cannot see any of the three minor peninsulas that appear on definitive charts of the modern era.

Secondly, the grid marks in the chart are WHOLE DEGREES.  On the top, there are markings for 65°, 60° and 55°.  On the left, there are markings for 61°, 62°...67°.

Using a graphical editing program, I scaled the position (61°4'S54°50'W) and placed a red dot on the expanded section.  Please observe that position.  It appears to be on the easternmost point of Elephant Island.

Of great interest is that, in the first usage of the word chronometer in the diary passage, it is clearly PLURAL.  Worsley writes "chronometerS".  The second use has the tail end of the word obscured by the preprinted "TUESDAY [18-348].  None the less, there can be no further doubt of the presence of more than one timepiece.

Of concern is that the Diary states that the chronometer is losing 7 seconds per day, while the Navigational Log states that the chronometer is losing 5 seconds per day.  This discrepancy is unresolved at this time.  Lars and I both independently calculated that the chronometer was losing 11 seconds per day.  However, that includes Worsley's obscure 1m4s chronometer adjustment of 28 April, 5 days into the boat journey.

To answer David's question about when the Diary appears to have been written.  There is a line on 28 April which states "At the end of the boat journey I gave them back to Sir Earnest all washed away at the edges".  So clearly, the Diary is not a daily diary but actually a retrospective.

Brad

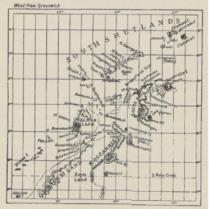
On Feb 14, 2017 5:50 AM, "Bob Crawley" <[NoReply\_Crawley@fer3.com](mailto:NoReply_Crawley@fer3.com)> wrote:

David and others - I'm trying to keep up with this topic and wish I'd been following it when vsiting the SPRI in Cambridge last year. If it helps I could go back, about 60nM, and research specific documents but would need some guidance.

Regards

Bob C

[View and reply to this message](http://fer3.com/arc/m2.aspx/Cape-Belsham-Crawley-feb-2017-g38315)

**Attached File:**  [[](http://fer3.com/arc/img/138320.nordenskjold-page-77.png)](http://fer3.com/arc/img/138320.nordenskjold-page-77.png)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/img/138320.nordenskjold-page-77.png)  
**Attached File:**  [[](http://fer3.com/arc/img/138320.nordenskjold-two-years-antarctica.png)](http://fer3.com/arc/img/138320.nordenskjold-two-years-antarctica.png)

### Re: Cape Belsham

**From:** Frank Reed  
**Date:** 2017 Feb 14, 11:51 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-FrankReed-feb-2017-g38322

Speaking of Nordenskjold's books... I don't know if this has come up in the recent discussions:  
[*What books were taken to the Antarctic 100 years ago?*](http://www.bbc.com/news/magazine-35633374) (from BBC News, one year ago, less ten days).

Frank Reed

### Re: Cape Belsham

**From:** Brad Morris  
**Date:** 2017 Feb 14, 15:38 -0500

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Morris-feb-2017-g38324

Hello Frank

It appears that the list isn't comprehensive, or perhaps Worsley had his own bookshelf.  Where is Nordenskjold's Antarctica?  Where is the Nautical Almanac (presumably the British version)?

Would you mind clarifying the term "took departure from Camp Wild" as it appears in logs?  I vaguely recall that this may mean the observation is out to sea when the landmark is still visible (and therefore not taken on shore at Camp Wild), yet I cannot find your now years old reference.  Would you mind reiterating that point?

Brad

On Feb 14, 2017 3:00 PM, "Frank Reed" <[NoReply\_FrankReed@fer3.com](mailto:NoReply_FrankReed@fer3.com)> wrote:

Speaking of Nordenskjold's books... I don't know if this has come up in the recent discussions:  
[What books were taken to the Antarctic 100 years ago?](http://www.bbc.com/news/magazine-35633374) (from BBC News, one year ago, less ten days).

Frank Reed

### Re: Cape Belsham

**From:** Frank Reed  
**Date:** 2017 Feb 14, 13:13 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-FrankReed-feb-2017-g38325

Brad Morris, you wrote:  
"It appears that the list isn't comprehensive, or perhaps Worsley had his own bookshelf.  Where is Nordenskjold's Antarctica?  Where is the Nautical Almanac (presumably the British version)?"

That's right. It appears to be Shackleton's "light reading" bookshelf. I would guess it was photographed because it told a story about Shackleton's attitudes and interests. Photographing the navigation books would have been akin to photographing the owner's manual of your car.

By the way, I found some links for resources which Robin was looking for (private comm). Here is the [American Nautical Almanac for 1916](https://babel.hathitrust.org/cgi/pt?id=njp.32101043287042;view=1up;seq=5) and here is the British [Nautical Almanac and Astronomical Ephemeris for 1916](https://babel.hathitrust.org/cgi/pt?id=njp.32101050586922;view=1up;seq=7). The British "Abridged Nautical Almanac" already existed in 1916, but it would not have been unusual for a navigator on an important mission to carry the full volume. Here's the [full search results](https://babel.hathitrust.org/cgi/ls?a=srchls&anyall1=all&q1=nautical+almanac&field1=title&op3=AND&yop=between&pdate_start=1915&pdate_end=1916&facet_lang=&facet_format=) for reference, with multiple copies of each.

You asked:  
"Would you mind clarifying the term "took departure from Camp Wild" as it appears in logs?  I vaguely recall that this may mean the observation is out to sea when the landmark is still visible (and therefore not taken on shore at Camp Wild)."  
  
Yes. Think of it this way: it indicates the end of piloting navigation, the end of navigation in reference to shore features, and the beginning of ocean navigation by simple dead reckoning and celestial when possible and convenient. It was up to the navigator to decide when this occurred, but it generally was supposed to indicate the last reasonably certain terrestrially-derived position.

It's important to remember that there were no laws to the practice of navigation. And there were also no absolutes in terminology. For example, I think you're reading too much into that "s" on the end of "chronometers" in one instance. Maybe Worsley sometimes thought of his watch (or whoever's watch) as "nearly a chronometer". Perhaps in discussions with Shackleton later he agreed that this was misleading. History isn't like mathematics; one exception does not disprove a theorem. People contradict their own words. And navigational procedure is always an individual's singular practice, evolving and shifting as circumstances require. This was far more the case in the heyday of astronomical navigation a hundred or two hundred years ago. It's the late 20th century that converted celestial navigation into something rote, formulaic, and militaristic in its regimen.

Frank Reed  
  
PS: Yesterday, after teaching my physics class at Northeast Maritime Institute in Fairhaven, I was sitting in one of the libraries next to the Joshua Slocum collection between a model of Slocum's "Spray" and a model of the "Charles W. Morgan", and in the main classroom next door, I could hear that they were watching a video. It was some documentary... I could catch a few words here and there... "weather..." and "ice..." and then I heard plainly "Shackleton". Aha! Too funny.

### Re: Cape Belsham

**From:** Greg Rudzinski  
**Date:** 2017 Feb 14, 13:25 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Rudzinski-feb-2017-g38326

Kipling and Conrad are no surprise. Conspicuously missing are Melville, London, Verne, Doyle, and Twain.

Greg Rudzinski

**From:**Frank Reed  
**Date:**2017 Feb 14, 11:51 -0800

Speaking of Nordenskjold's books... I don't know if this has come up in the recent discussions:  
[*What books were taken to the Antarctic 100 years ago?*](http://www.bbc.com/news/magazine-35633374) (from BBC News, one year ago, less ten days).

Frank Reed

### Re: Cape Belsham

**From:** Brad Morris  
**Date:** 2017 Feb 14, 16:50 -0500

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Morris-feb-2017-g38327

Hi Frank

Thanks for answering my question about the terminology of "take departure".  I thought I remembered it right but couldn't be sure.

You write

I think you're reading too much into that "s" on the end of "chronometers" in one instance. Maybe Worsley sometimes thought of his watch (or whoever's watch) as "nearly a chronometer". Perhaps in discussions with Shackleton later he agreed that this was misleading.

Worsley's Log clearly indicates that the chronometer was slow and losing seconds per day.  But Worsley also writes "fast 29" in adjusting time on Wednesday April 26th.  That does indicate some *additional* timepiece. It was likely not a chronometer.  But the additional timepiece is noteworthy.

Brad

### Re: Cape Belsham

**From:** David C  
**Date:** 2017 Feb 14, 17:35 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-DavidC-feb-2017-g38332

Bob wrote

David and others - I'm trying to keep up with this topic and wish I'd been following it when vsiting the SPRI in Cambridge last year. If it helps I could go back, about 60nM, and research specific documents but would need some guidance.

I will be revisiting the Alexander Turnbull Library to copy some critical sections for Brad. If there are parts of the microfilm copy that Brad cannot decypher it may be useful to have someone look at the original.

I believe that Worsley's wife  gifted his diaries to the SPRI. Maybe she also donated other documents such as his "epitome"? Having someone visit the SPRI could be very productive.

Maybe you could place yourself on "standby"?  It will be up to Brad to ask for your help  -  at your convenience of course (-;

### Re: Cape Belsham, At Last!!

**From:** David C  
**Date:** 2017 Feb 14, 17:52 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Last-DavidC-feb-2017-g38333

I interpret Worsley's shorthand to be for

Nordenskjold, Otto: "Antarctica: Or Two Years Amongst the Ice of the South Pole", 1901

There is a copy of this online.  I searched Nordenskjold's Book for any references to Elephant Island, Cape Belsham and any charts.  Findings

1) No references to Cape Belsham

2) One reference to Elephant Island, page 415 (the index has this as 416, not significant).  That reference indicates that they could see Elephant Island in the distance, but did not visit it.

3) There IS one chart which included Elephant Island.  I have attached the entire chart and the Elephant Island Detail.

Unfortunately finding Nordensjold's book creates another question. Given the inaccurate, small scale map of Elephant Island how did Shackleton/Worsley know that the Cape they had come ashore next to was called Cape Belsham? This suggests to me that Belsham was mentioned in other books. These other books may not have contained any charts.

### Re: Cape Belsham

**From:** Brad Morris  
**Date:** 2017 Feb 14, 21:06 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Cape-Belsham-Morris-feb-2017-g38334>

Hello Bob

Perhaps you can gather the relevant pages from

* MS 733/2;BJ & MJ Journal, 24 April 1916 to 25 December 1916 [Voyage of [James Caird](https://archiveshub.jisc.ac.uk/search/?terms=%22James+Caird%22) to South Georgia, 24 April to 20 may 1916, rescue of Elephant Island party, 16 June to 25 December 1916 and retrospective account of the boat journey events] 1 volume, holograph

I am interested in material from 24 April through 8 May, when the lads landed on S.Georgia Island.  The term holograph is used when the item is wholly in the handwriting of the author.  MS 733/2 is under Frank Worsley's heading, we can assume that this is primary source material.

<https://archiveshub.jisc.ac.uk/search/archives/7f63871c-b873-34fd-b4f3-d22f2fd92adc?component=61892260-c3ef-3cef-8edd-3c8f646272f6>

Brad

On Feb 14, 2017 8:55 PM, "David C" <[NoReply\_DavidC@fer3.com](mailto:NoReply_DavidC@fer3.com)> wrote:

Bob wrote

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### Re: Cape Belsham

**From:** David C  
**Date:** 2017 Feb 14, 21:11 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-DavidC-feb-2017-g38335

I have found a second Worsley diary in the Alexander Turnbull Library.

The diary I copied yesterday is described thus:

Entries made while on Imperial Trans-Antarctic Expedition, 1914-1917 under Sir Ernest Shackleton. Includes diary of voyage of the `James Caird' from Elephant Island to South Georgia, 24 Apr-20 May 1916; diary relating to rescue of Elephant Island party, 16 Jun-25 Dec 1916; manuscript entitled `Shackleton's great boat journey', 1916.

The second diary is described as follows:

Journal kept during Sir Ernest Shackleton's Imperial Trans-Antartic Expedition in the `Endurance' to the Weddell Sea, 1914-1916. The journal runs, with gaps, from 1 January 1915 to 18 May 1916.

A journal that includes the journey to Elephant Island may contain information about books, charts, sextants etc. A useful question to ask may be  "How did Worsley navigate to Elephant Island?"   There is only one way to find out (-;

As an aside - Frank Worsley's grandfather constructed a road in the Port Hills of Christchurch called  (as you can guess) Worsley Road. That road is the lead item in the news tonight as hundreds of residents are evacuated due to a large bush fire. Two homes have been destroyed so far.

### Re: Cape Belsham

**From:** Robin Stuart  
**Date:** 2017 Feb 15, 05:29 -0800

**Source**: fer3.com/arc/m2.aspx/Cape-Belsham-Stuart-feb-2017-g38337

Brad,

From Bowditch's glossary: 2. The point at which reckoning of a voyage begins. It is usually established by bearings of prominent landmarks as the vessel clears a harbor and proceeds to sea. When a navigator establishes this point, he is said to take departure.

I also intially thought the reference to "chronometers" was telling but have since changed my view. We know that the *Endurance* carried 24 chronometers and so I expect that Worsley would be in the habit of talking about "rating his chronometers" in the plural,

Regards,

Robin

### Re: Cape Belsham, At Last!!

**From:** Brad Morris  
**Date:** 2017 Feb 15, 09:52 -0500

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Last-Morris-feb-2017-g38338

David

I noticed the same thing, but we must take Worsley at his word.  He states that he assumed his position from Nordenskjold's chartlet.  Of course, that's just my opinion.  The evidence at this point is fairly strong.  We have the chart Worsley claimed to use.

You asked

how did Shackleton/Worsley know that the Cape they had come ashore next to was called Cape Belsham.

That has been my question for many years now.  To ask it one more time, Which pile of rocks was Cape Belsham, it's not as if there was a sign post on the island.

My current answer to that, subject to change by new evidence, is simply that they didn't.  Just as Worsley assumed his position, he assumed that the next peninsula over was Cape Belsham.

The maps from 1822 through 1912, to include Nordenskjold's map of 1901, are uniformly atrocious.  The best statement that Worsley could have made is that Cape Valentine is the eastern most point and Cape Belsham is the northern most point, yet he would have to have had access to an extraordinary library of Elephant Island facts.  A place he never intended to visit.

Brad

### Transcript of Worsley's Log, version 3.6

**From:** Brad Morris  
**Date:** 2017 Feb 16, 12:28 -0500

**Source**: <http://fer3.com/arc/m2.aspx/Transcript-Worsleys-Log-version-36-Morris-feb-2017-g38344>

As a function of the offline effort to write an article, we have discovered that the noon observation and reduction  for 26 April has a character we can change from a 7 into a 9.  The arithmetic is then consistent with the determination of Latitude derived.  The text is very washed out here, but the character is a 9.

Version 3.6, attached

Brad

**Attached File:** [138344.the-log,-revision-3.6.pdf](http://fer3.com/arc/img/138344.the-log,-revision-3.6.pdf)

### Worsley wrote a JOKE

**From:** Brad Morris  
**Date:** 2017 Feb 16, 09:30 -0800

Source: http://fer3.com/arc/m2.aspx/Worsley-wrote-JOKE-Morris-feb-2017-g38345

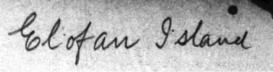
In reading Worsley's 'Diary", we encounter a JOKE, written in his own hand!

The lads have finally landed upon Elephant Island, the sense of relief of being upon dry land for the first time in over a year is palpable.

Worsley writes that Elephant Island "should be spelled El of an Island"  (read this with your best impression of an English/British accent.)

He obviously thought this such a stellar joke that he wrote the name again, in fine handwriting. Attached.

Brad

**Attached File:**   
[](http://fer3.com/arc/imgx/Elofan_Island.jpg)

### Re: Worsley wrote a JOKE

**From:** Noell Wilson  
**Date:** 2017 Feb 16, 13:35 -0800

**Source**: http://fer3.com/arc/m2.aspx/Worsley-wrote-JOKE-Wilson-feb-2017-g38346

As did Shackleton. In SOUTH after a hellish transition from the ice floe to the boats and then finally landing on Elephant Island, Shackleton wrote: "This was the first landing ever made on Elephant Island, and a thought came to me that the honour should belong to the youngest member of the Expedition, so I told Blackborrow to jump over. He seemed to be in a state of almost coma, and in order to avoid delay I helped him, perhaps a little roughly, over the side of the boat. He promptly sat down in the surf and did not move. Then I suddenly realized what I had forgotten, that both his feet were frost-bitten badly. Some of us jumped over and pulled him to a dry place. It was rather a rough experience for Blackborrow, but, anyway, he is now able to say that he was the first man to sit on Elephant Island."

Regards, Noell

### Re: Cape Belsham

**From:** Bob Crawley  
**Date:** 2017 Feb 16, 23:57 -0800

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Crawley-feb-2017-g38351

Brad & David - yes I'll do that, I'm busy for the next couple of weeks anyway. I'll try to get used to his writing in the meantime. It's fascinating to see this story develop.

Regards

Bob

**Mrs Chippy and a tale of two graves**  
**From:** David C  
**Date:** 2017 Feb 17, 19:01 -0800

Two of the men who took part in the Imperial Trans-Antarctic Expedition are buried in the Karori Cemetary in Wellington NZ. According to the book *Shackleton's Captain* Harry McNeish was given a public funeral whereas that of TOH Lees (as he was called on his memorial plaque) was low key. McNeish was buried in a pauper's grave. In 1957 the grave was located and a plaque erected. A  stutue of Mrs Chippy is on the grave. I do not know when it was erected.

I visited the graves today.

A plaque commemorating Lees is in the Old Soldiers section of the cemetary. There is nothing to indicate that Lees was part of a polar expedition. His Polar Medal is not mentioned.

McNeish is in the Church of England section. His plot is easy to find because of Mrs Chippy's statue. His participation in the polar expedition is marked by a plaque on his headstone and on an information board mounted on an adjacent plot. McNeish did not receive the polar medal for what the author of *Shackleton's Captain* calls "one act of madness". I noticed some flowers on McNeish's grave. I do not know who placed them.

When I called in at the cemetary office and asked for directions the receptionist  opened a folder and copied a piece of paper.  It was a map with handwritten instructions to find the graves. Obviously McNeish and Lees have regular visitors.

I have attached some photos and a kml file.

**Attached File:**   
[](http://fer3.com/arc/imgx/lees_1_20170216-51a.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/lees_1_20170216-51a.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/lees_2_20170216-46a.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/lees_2_20170216-46a.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/mcneish_1_20170218_.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/mcneish_1_20170218_.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/mcneish__2_20170218.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/mcneish__2_20170218.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/mcneish_3_20170218.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/mcneish_3_20170218.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/mcneish_4_20170218.jpg)  
[http://fer3.com/arc/images/dl-icon.png](http://fer3.com/arc/imgx/mcneish_4_20170218.jpg)  
  
**Attached File:**   
[](http://fer3.com/arc/imgx/mcneish_lees_graves_5_18-2-2017.kml)

### ***Cape Belsham and Point Wild relocated on Chart 29104***

**From:** Robin Stuart  
**Date:** 2017 Mar 21, 12:09 -0700

**Source**: http://fer3.com/arc/m2.aspx/Cape-Belsham-Point-Wild-relocated-Chart-29104-Stuart-mar-2017-g38689

In a [previous post](http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Stuart-jan-2017-g37975) I pointed out what I believed to be errors in the labelling of Cape Belsham and Point Wild (1916 camp site for the Shackleton expedition on Elephant Island) in [Chart 29104](http://www.oceangrafix.com/chart/detail/29104-King-George-Island-to-Clarence-Island). As a conscientious navigator I provided the information to National Geospatial-Intelligence Agency (NGA) who had issued the chart. It was received with interest as apparently revisions to antarctic charts don't happen that often. It now seems they agree with me and have issued a [Notice to Mariners](http://msi.nga.mil/NGAPortal/msi/query_results.jsp?epi-content=null&beanID=null&viewID=query_results&MSI_queryType=NtMChartCorrections&MSI_generalFilterType=All&MSI_generalFilterValue=-999&MSI_additionalFilterType1=NumberList&MSI_additionalFilterType2=-999&MSI_additionalFilterValue1=29104&MSI_additionalFilterValue2=-999&MSI_outputOptionType1=DisplaySet&MSI_outputOptionType2=-999&MSI_outputOptionValue1=HTML&MSI_outputOptionValue2=-999) the relocates the legends for both Cape Belsham and Point Wild to the south and east. No action so far on Gnomon Rock that should be located off the tip of Point Wild but whose legend sits orphaned off the coast of Elephant island,

Robin Stuart

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|  |
| |  |  |  | | --- | --- | --- | |  | Relocate | Legend "Point Wild" from  61° 07.0' S   54° 53.0' W to 61° 07.3' S   54° 50.8' W | |
| |  |  |  | | --- | --- | --- | |  | Relocate | Legend "Cape Belsham" from  61° 06.1' S   54° 56.4' W to 61° 07.6' S   54° 52.2' W | |

**Re: Cape Belsham and Point Wild relocated on Chart 29104**  
**From:** Brad Morris  
**Date:** 2017 Mar 21, 15:24 -0400

Source: <http://fer3.com/arc/m2.aspx/Cape-Belsham-Point-Wild-relocated-Chart-29104-Morris-mar-2017-g38690>

Well played Robin!!

When they issue the update, I would really like to obtain a copy.  I've already hand annotated the chart, but this is an unexpected and spectacular side effect!

Brad

On Mar 21, 2017 3:19 PM, "Robin Stuart" <[NoReply\_Stuart@fer3.com](mailto:NoReply_Stuart@fer3.com)> wrote:

In a [previous post](http://fer3.com/arc/m2.aspx/Updated-Transcript-Worsleys-Log-Stuart-jan-2017-g37975) I pointed out what I believed to be errors in the labelling of Cape Belsham and Point Wild (1916 camp site for the Shackleton expedition on Elephant Island) in [Chart 29104](http://www.oceangrafix.com/chart/detail/29104-King-George-Island-to-Clarence-Island). As a conscientious navigator I provided the information to National Geospatial-Intelligence Agency (NGA) who had issued the chart. It was received with interest as apparently revisions to antarctic charts don't happen that often. It now seems they agree with me and have issued a [Notice to Mariners](http://msi.nga.mil/NGAPortal/msi/query_results.jsp?epi-content=null&beanID=null&viewID=query_results&MSI_queryType=NtMChartCorrections&MSI_generalFilterType=All&MSI_generalFilterValue=-999&MSI_additionalFilterType1=NumberList&MSI_additionalFilterType2=-999&MSI_additionalFilterValue1=29104&MSI_additionalFilterValue2=-999&MSI_outputOptionType1=DisplaySet&MSI_outputOptionType2=-999&MSI_outputOptionValue1=HTML&MSI_outputOptionValue2=-999) the relocates the legends for both Cape Belsham and Point Wild to the south and east. No action so far on Gnomon Rock that should be located off the tip of Point Wild but whose legend sits orphaned off the coast of Elephant island,

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| |  |  |  | | --- | --- | --- | |  | Relocate | Legend "Cape Belsham" from  61° 06.1' S   54° 56.4' W to 61° 07.6' S   54° 52.2' W | |