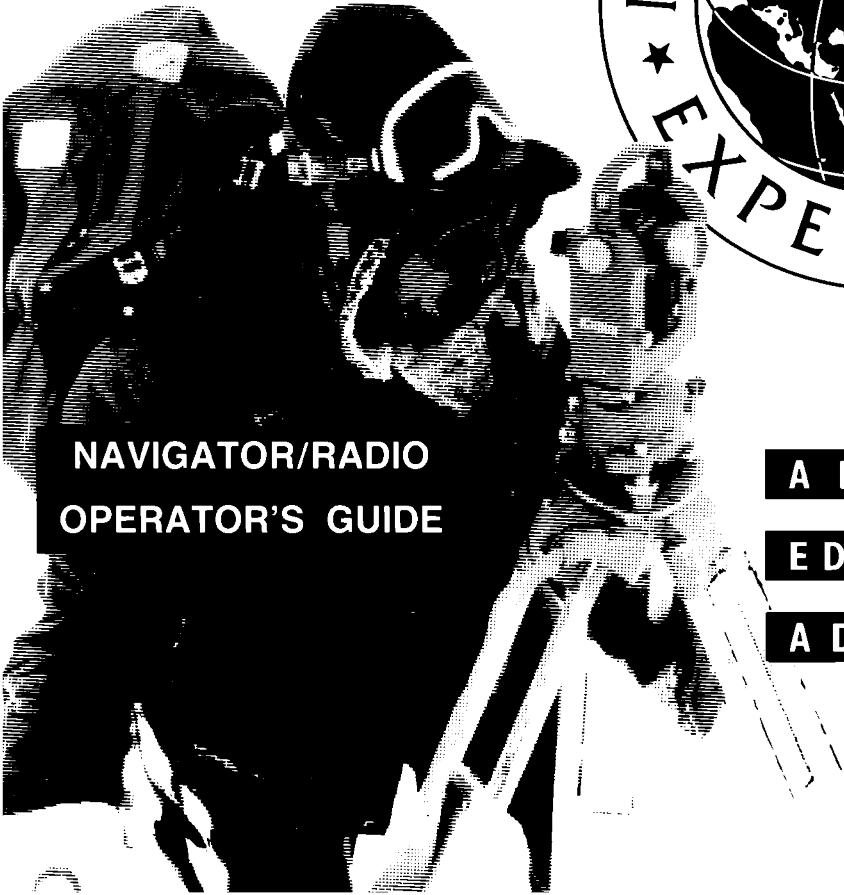
BBC DOMESDAY SYSTEM

INTERACTIVE VIDEODISC

NORTH ★ POLAR ★ EXPEDITION ★



NAVIGATOR/RADIO OPERATOR'S GUIDE

A MULTI-ROLE EDUCATIONAL ADVENTURE

NAVIGATOR.

Your task will be to determine the team's position at the end of each day and inform Base, but there are a number of problems peculiar to the Arctic.

Firstly the ice is continually in motion through the effect of wind and currents. Secondly there are no permanent landmarks. Thirdly compasses are inaccurate so near to the Magnetic North Pole. Fourthly poor visibility may hide the sun for days at a time.

To locate Your Position

The most accurate position-giving instrument is the theodolite which is a sophisticated version of the traditional sextant used by mariners for centuries. Using the theodolite you would take a shot of the sun at its zenith at noon every other day, using a chronometer to tell the time accurately. The sun shot enables the angle between the sun and horizon to be precisely measured and since this varies for each latitude and day of the year you can calculate the degree of latitude through a set of tables which gives those variables (see below). Longitude would be measured by taking sun shots every 2 minutes during a half hour period either side of noon.

The highest angle reading is the local noon and this, when arc is converted to time, gives your longitude as one minute of Time, relative to GMT, equates to one minute of Longitude. During the expedition your position will be calculated by the computer - but you will need to check it regularly for accuracy. Note. On a real theodolite the sun filter **must** be fitted.

To obtain Direction for Travel
A compass reading giving a northerly line of progress is normally sufficient, although you must subtract from it the relevant Magnetic Variation depending on the current position. You will be asked to estimate the angle between the North Pole and the Magnetic North Pole and then adjust the Compass bezel, in order to allow for the considerable Magnetic Variation prevalent in this part of the world, using the icons shown, (remember that Magnetic North is to the east of the Pole). Then line up the needle with the bezel. You are then required to turn in either direction until the compass is correctly aligned for your direction of travel. Lastly you must choose a suitable Landmark from among those circled to give the team an easy reference feature on which to steer.

Dead Reckoning.
If the sun does not appear for some time, as in early March, when it is still below the horizon or because the weather is too bad, it is necessary to calculate your current location based on distance travelled since your last sunshot. Note that one nautical mile of northerly progress (you are on the sea ice and therefore your progress is measured in nautical miles) is equivalent to one minute of Latitude North, often expressed as '. You must enter your new location.

Theodolite.
A simulation of the operation of a theodolite is provided in the Journey Phase and you can either elect to perform it manually or let the computer perform it automatically for you. If you decide to tackle it yourself, you will be asked to level the instrument using the icons shown so that the graphics bubbles are centred over each other. You will then be asked to adjust the sight upwards or downwards until the (graphics) sun appears in the range finder.

Using the reading of nn °nn ' displayed when the instrument is correctly aligned, you must look up the relevant data in the tables below to find the correct Latitude to be entered in the box at the top of the screen. Note that it is assumed that you will be progressing on a Northerly Longitude of 62°W directly from Alert to the Pole. You must enter ° using the D key and N or W.

Navigational Table 1

Obs. Alt°	6°	7	8	9	10	11	12	13	14	15	16	17	18	19	20	25	30	35
Corr. Mins.	5'	7	7	8	9	9	10	10	10	10	11	11	11	11	11	12	12	12

Navigational Table 2 Sun's declination for 1989.

	Mar.	Apr.	May	Jun.		Mar.	Apr.	May	Jun.
1	7°31S	4°36N	15°07N	22°09N	21	0°18N	11°55	20°13	23°26
2	7°08	4°59	15°07	22°12	22	0°42	12°15	20°25	23°25
3	6°45	5°22	15°43	22°20	23	1°05	12°35	20°36	23°25
4	6°22	5°45	16°01	22°27	24	1°29	12°55	20°48	23°24
5	5°59	6°08	16°18	22°34	25	1°53	13°14	20°59	23°23
6	5°36	6°31	16°35	22°40	26	2°16	13°34	21°09	23°21
7	5°31	6°53	16°51	22°46	27	2°38	13°53	21°19	23°19
8	4°49	7°16	17°08	22°51	28	3°03	14°12	21°29	23°16
9	4°26	7°38	17°24	22°57	29	3°26	14°31	21°38	23°13
10	4°02	8°00	17°55	23°06	30	3°50	14°49	21°47	23°10
11	3°39	8°22	17°55	23°06	31	4°13		21°56	
12	3°15	8°44	18°10	23°10					
13	2°52	9°06	18°25	23°13					
14	2°28	9°30	18°40	23°16					
15	2°04	9°49	18°54	23°19					
16	1°40	10°10	19°08	23°21					
17	1°17	10°32	19°22	23°23					
18	0°53	10°53	19°35	23°24					
19	0°29	11°14	19°48	23°25					
20	0°06	11°34	20°01	23°26					

Navigational Table 3. Correction for Longitude (50°,60°,70°W).

Declination.	0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	21°	21.5°	22°	22.5°	23°
50°W	3'	3'	3'	3'	3'	3'	3'	3'	2'	2'	2'	1'	1'	1'	1'	1'
60°W	4'	4'	4'	4'	4'	4'	3'	3'	3'	3'	2'	2'	2'	1'	1'	1'
70°W	5'	5'	4'	4'	4'	4'	4'	4'	3'	3'	2'	2'	2'	2'	1'	1'

NAVIGATIONAL TABLES -EXAMPLE OF USE-

1. Take the altitude of the Sun from our noon sunshot - say 10°.
2. Add the correction for the height of the Observer's eye above sea level, taken as 10 feet during this Expedition, related to the observed altitude of the sun, in this case 10° gives 9' , thus 10°+9'=10°9'S (see table 1)
3. Subtract this from 90° to (obtain the Zenith Distance) 90° - 10°9'=79°51'N
4. Look up the Sun's Declination for the required date (see table2) - say 6th April gives 6°31'N
5. Look up the correction for your Longitude (see table 3) and add it to the Sun's declination to give "True Declination" say at 62°W gives +4' 6°31+4'=6°35'N
6. Add the Zenith Distance to the True Declination - 79°51'+6°35'=86°26'N
7. Your position is therefore **86°26N 62°W**

RADIO OPERATOR.

Regular radio contact with Base must be maintained in case of emergency but also to organise rendezvous with aircraft, order up supplies, send scientific reports, inform the outside world of progress and maintain contact for morale purposes. The principal information you would pass on is, however, the team's current location so that if an emergency occurs Base has a reasonably up-to-date location, bearing in mind the continually shifting nature of the ice pack.

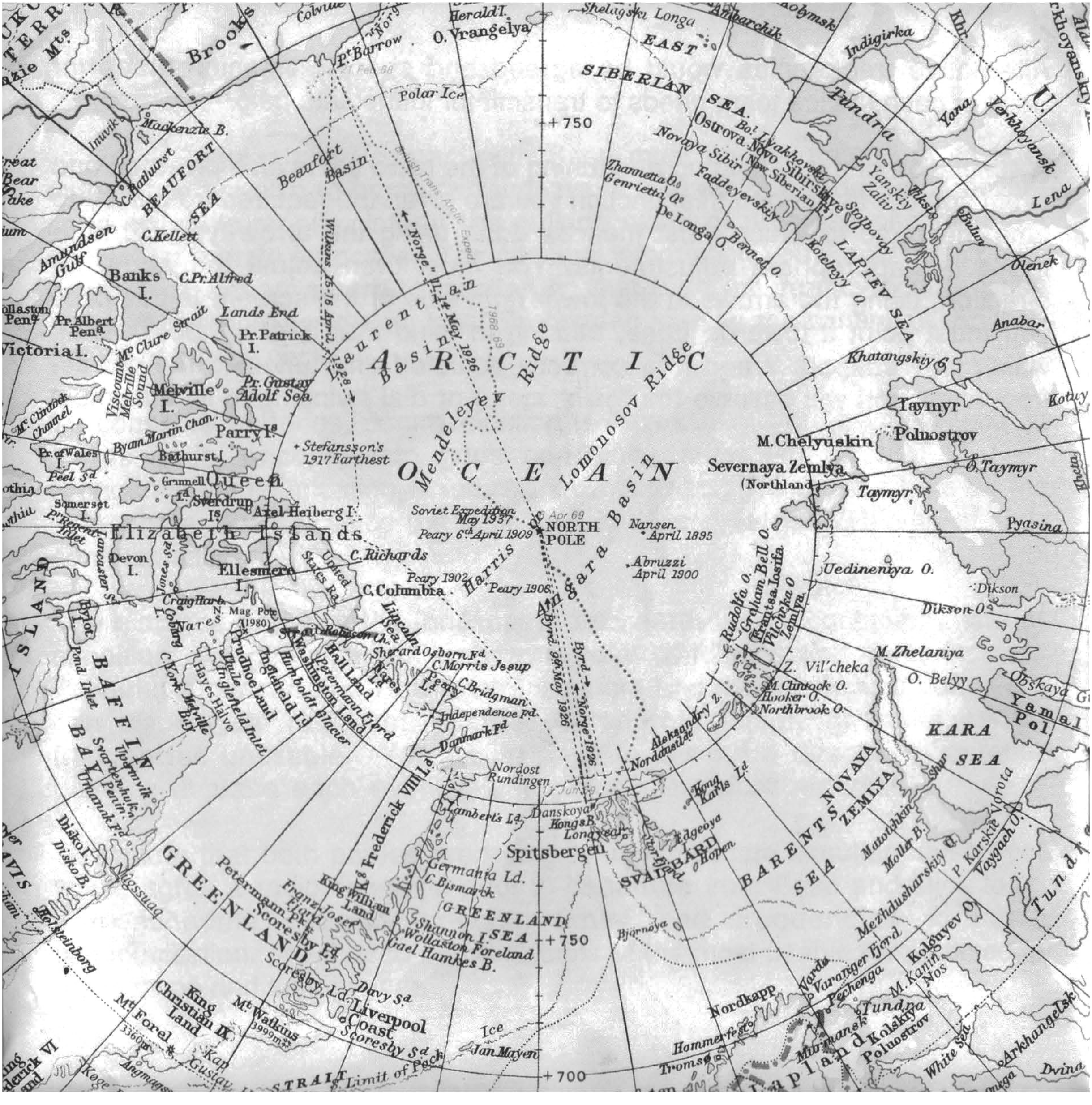
To conserve batteries, communication is necessarily brief and normally in Morse code, except when good conditions allow use of voice. High Frequency communication which relies on bouncing the radio waves off the ionosphere is used, since the distances are too great for VHF/line of sight communications.

The distance between the ionosphere and earth varies continually and its condition changes with sun activity, auroral conditions and other factors. Powerful American and Russian transmitters and meteorological conditions can also cause radio reception to deteriorate rapidly or make certain frequencies unusable. You would have to lay out a directional antenna pointing at Base each evening and recover it before nightfall.

To ensure that both parties are trying to communicate simultaneously, you would agree a radio schedule prior to departure from Base and stick to it. The schedule dictates specific times and frequencies for daily communication. It is based on predictions of the most usable frequencies for the location and time of year.

Alternative frequencies would be agreed and specific listening times for Base in case the ice team needs to transmit for immediate help.

A simulation of the setting up and tuning of the radio set is also provided and when you opt to perform this function you are given the required frequency to tune the radio to which must then be done using the arrow-type icons to make the appropriate adjustments. You must then adjust the aerial for direction, using the arrows at the lower right side of the screen. In this case you must point it towards Base, bearing in mind that it is a Dipole aerial, which is T shaped. When it is correctly adjusted and tuned to the correct frequency, you will observe the "gain" meter or dial swinging to its maximum reading on the right.



ARCTIC OCEAN
NORTH POLE
Herald I.
O. Vrangelya
Shelagski
Longa
Ambarchik
Kolymsk
Indigirka
EAST SIBERIAN SEA
Polar Ice
+750
Pt. Barrow
Brooks
Colville
Inuvik
Mackenzie B.
BEAUFORT SEA
Beaufort Basin
Great Bear Lake
Amundsen Gulf
C. Bathurst
C. Kellett
Banks I.
C. Pr. Alfred
Lands End
Wollaston Pen.
Pr. Albert Pen.
Victoria I.
Mc Clure Strait
Viscount Melville Sound
Pr. Patrick I.
Pr. Gustav Adolf Sea
Melville I.
Mc Clintock Channel
Byam Martin Chan.
Parry Is.
Pr. of Wales I.
Bathurst I.
Peel Sd.
Stefansson's 1917 Farthest
Grinnell
Queen Elizabeth Islands
Somerset I.
Sverdrup Is.
Axel Heiberg I.
Pr. Regent Inlet
Lancaster Sd.
Devon I.
Jones Sd.
Ellesmere I.
C. Richards
C. Columbia
United States Ra.
Craig Harb.
N. Mag. Pole (1980)
Nares
Coburg I.
Bylot I.
Pond Inlet
BAFFIN BAY
Lincoln Sea
Robeson Ch.
Hall Land
Peterman Ld.
Nares Ld.
Sherard Osborn Fd.
C. Morris Jesup
Peary Ld.
C. Bridgman
Independence Fd.
Danmark Fd.
Washington Land
Humboldt Glacier
Inglefield Ld.
Prudhoe Land
Thule
Inglefield Inlet
C. York
Melville Bay
Hayes Halvo
Upernavik
Svartenhuk Penin.
Umanak Fd.
Disko I.
Disko B.
Holsteinborg
Nordost Rundingen
Lambert's Ld.
Frederick VIII Ld.
GREENLAND
Peterman Pk.
Franz Josef Fjord
King William Land
C. Bismarck
Germania Ld.
Shannon I.
Wollaston Foreland
Gael Hamkes B.
Scoresby Sd.
Scoresby Ld.
Davy Sd.
Liverpool Coast
King Christian IX Land
Mt. Forel
3360m
Mt. Watkins
3999m
Ice
Jan Mayen
Limit of Pack
+700
GREENLAND SEA
Spitsbergen
Danskoya
Kongs B.
Longyear
Edgeoya
Hopen
SVALBARD
Bjørnøya
Nordaustlandet
Kong Karls Ld.
Aleksandry Z.
BARENTS SEA
NOVAYA ZEMLYA
Matochkin Shar
Moller B.
Mezhdusharskiy O.
Vaygach O.
P. Karskie Vorota
Kolguyev O.
M. Kanin Nos
Varanger Fjord
Pechenga
Nordkapp
Hammerfest
Tromsø
Murmansk
Kolskiy Poluostrov
Lapland
White Sea
Arkhangelsk
Dvina
Tundra
KARA SEA
Yamal Pol.
Obskaya Guba
O. Belyy
M. Zhelaniya
Z. Vil'cheka
M. Clintock O.
Hooker O.
Northbrook O.
Rudolfa O.
Graham Bell O.
Zemlya Frantsa Iosifa
Vilcheka Zemlya
Dikson
Dikson O.
Uedineniya O.
Pyasina
Taymyr
O. Taymyr
Severnaya Zemlya (Northland)
M. Chelyuskin
Taymyr Poluostrov
Kotuy
Khatangskiy G.
Anabar
Olenek
Bulun
Lena
Tiksi
Yanskiy Zaliv
Yana
Verkhoyansk
Tundra
LAPTEV SEA
Stolbovoy O.
Kotelnyy O.
Bennett O.
De Longa O.
Zhannetta O.
Genrietta O.
Bol. Lyakhovskiy
Ostrova Novo Sibirskiye (New Siberian Is.)
Novaya Sibir
Faddeyevskiy
Laurentian Basin
Mendeleyev Ridge
Lomonosov Ridge
Harris Basin
Angara Basin
Soviet Expedition May 1937
Peary 6th April 1909
Peary 1902
Peary 1906
Nansen April 1895
Abruzzi April 1900
Wilkins 15-16 April 1928
"Norge" 11-14 May 1926
Byrd 9th May 1926
Byrd
Norge 1926
British Trans Arctic Exped.
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