DYNACOMP

VALDEZ

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*** SEE THE USER NOTES SECTION FOR YOUR PARTICULAR COMPUTER ***

VALDEZ - A SUPERTANKER SIMULATION

MAIN DOCUMENTATION
(ALSO NORTH STAR VERSION)

VALDEZ is a microcomputer simulation of supertanker navigation in the Valdez region of Alaska. See the attached figure. Valdez is the terminal port for the Alaskan oil pipeline. To get to Valdez harbor, supertankers must enter Prince William Sound from the North Pacific and cross that body of water to Valdez Narrows. Crossing this sound is complicated by the presence of islands, moving icebergs, and other supertankers heading for the North Pacific. Valdez Narrows itself is very treacherous as the passage is only 900 meters wide. Careful maneuvering (in the presence of tides) is required.

The program carefully simulates the above real life features of supertanker navigation in the following ways:

1) The movement of the supertanker under your control is simulated through equations which describe the effects of drag, inertia and engine performance.

2) A detailed map of the Prince William Sound area is stored bit-wise in the computer's memory. The storage is fairly efficient and covers a 256 x 256 element grid. The spacing between the grid points is 500 meters. Included on this grid are the coastline and islands as they appear on a recent Rand-McNally map.

3) The passage to Valdez is complicated by the presence of icebergs which originate from the Columbia Glacier. These icebergs are included in the simulation. Their motion is governed by the tides.

4) The tidal patterns of the Prince William Sound area are also simulated both with respect to time and position. These tides must be particularly reckoned with when entering the Narrows as there is not much room for error.

5) Other supertanker traffic is included. This traffic consists of several ships following a course from Valdez to the Pacific. This oncoming danger is particularly acute within the Narrows and harbor area.

Operation of the simulation is straightforward. Most of the prompts are self-explanatory. The reader is referred to the attached annotated run listings for examples. However, to avoid confusion, a few of the responses will be discussed here. Observe that there is also an "instructions" option when running the program in the full version (17 kilobytes for the program plus 8 kilobytes for the map).

Because the map is very detailed (256 by 256), it is stored in the computer's memory in a bit-wise manner. The map is located outside the program space used by BASIC. This means that the usual practice of setting the user memory size to the maximum available must not be followed. Where

this map memory space is to reside depends on the memory bound set by the user. In the North Star BASIC case, one can use the memory above BASIC by responding to "WHERE IS THE MAP TO BE STORED IN MEMORY (DECIMAL):?" with a value one greater than the MEMSET number given earlier (see the sample run listing). For example, if the top of memory was set to 48000 via the MEMSET command, then the map storage could start at 48001. Note that the map requires 8 kilobytes of memory! The map may also be stored starting at location 0 in memory. This would use the entire region in front of the standard location of the DOS. The program runs perfectly well with the map in that location, but the DOS is affected and will not save programs properly later. However, the DOS can simply be reloaded after exercising the simulation. In summary, the user must decide on where to store the 8 kilobyte map and must be sure that the region is safe from unintentional alteration by BASIC. In general, if the program memory boundary can be set 8192 bytes lower than the maximum available, while still leaving enough space to run the program, there should be no problem.

The simulation can be run in several modes. The program will ask whether or not an open sea exercise is desired. If the answer is "Y," then a blank map will be loaded (i.e., no coastline or islands). In this mode one can practice maneuvering the supertanker. As the other ship and iceberg traffic is overlaid on this map, you can practice precision navigation in chasing and ramming other ships. This is not an easy task as the other ships are also moving, and careful navigation is required for interception. Remember, supertankers do not respond to controls quickly. Large masses do not change direction and speed without considerable effort.

If you answer "N" to the open sea practice simulation question, there is another decision point. The next question is whether or not the Prince William Sound map should be loaded. The reason for this question is that you may have ended one round of simulation and want to start again. Because the map is still in the computer's memory, there is no reason to reload it. Note that loading the map takes some time because it is so large. If you answer "Y," the map will be loaded. If instead the answer is "N," and the VALDEZ map had not been previously loaded, then the radar display will reflect whatever random patterns there are in the reserved region of memory. This will often look like many irregularly distributed islands, and can be used as a map in itself. The objective then would be to not run aground.

If the Prince William Sound map is loaded, some realistic navigation can be performed. As the map is extensive, you can simply sail around the sound, circumnavigate islands, travel up fiords, and so on. You can also attempt the challenge of mooring at Valdez. First, you have to get to the harbor. Second, you have to pull up to a floating pipeline terminal located at a particular position. There are also requirements on the orientation of the tanker at final docking. These requirements are given in the "instructions" included in the full version of the program, and also listed separately.

Control of the ship is through the rudder and two engines. The rudder control is given in degrees (-45 to +45), and the engine power is given in percent. For example, full ahead would be 100(%), half reverse would be -50(%). Having two engines comes in handy in case one breaks down (which

can happen!). The prompts for these controls are self-explanatory as are the status displays. However, the radar display requires some discussion.

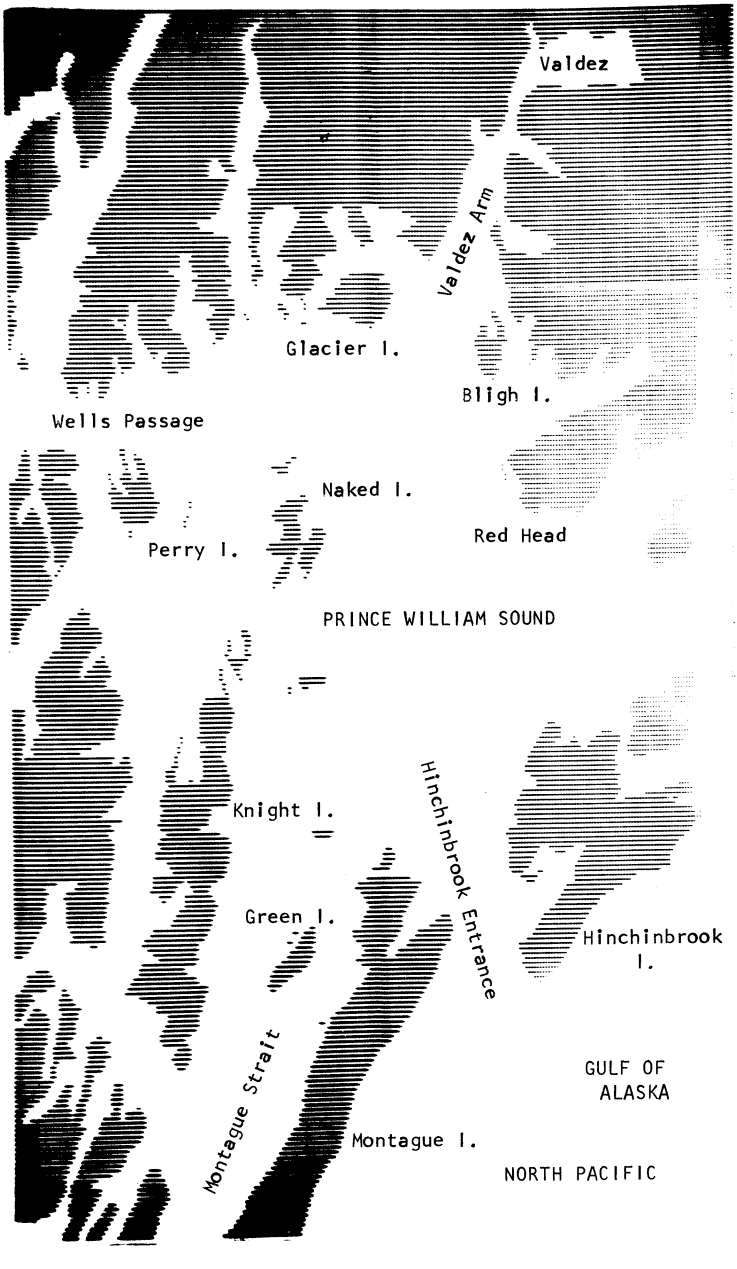
The simulation behaves as if the fog is very thick and the information is all electronic. As the Coast Guard maintains very tight monitoring of the traffic in the sound, the locations of all other traffic is known fairly accurately. However, curious as it may be, even when ships see one another, they still manage to collide. To aid the captain in avoiding collisions and skirting coasts, variable range radar is supplied. This radar has magnifications of 1x, 2x, 4x, 8x, 16x, and 32x. A magnification of 1 gives the highest resolution and will show everything within range. A magnification of 32 has a course resolution, but will display the entire map (the region outside the map is shown as land). You will find that the various magnifications are very useful. Note that responding to the radar range factor prompt with a "0" will skip the plot. Skipping the radar display is often desirable as it takes some time to print; it is 16 by 16 grid elements, and the map must be unraveled from memory.

The display portions of the simulation were designed to be compatible with terminals having line widths of 32 or more characters. This placed a limit on the size of the radar display. For those with wider terminals, the appropriate change can be made in the FOR/NEXT loop arguments in the radar display subroutine. This might be desirable since for radar range factors larger than 1, there is a strong possibility that other ship and iceberg traffic will be missed because of the reduced resolution.

In running the simulation, most of the execution time is spend calculating the ship and iceberg movements. The motion is calculated in 10 iterative steps. During periods of excitement, the delay becomes particularly apparent. However, if you consider the number of calculations performed, as well as the completeness of the simulation, the time gap is really not that great.

Additional Comments:

The computer map is square and laid out in the following way. The lower left corner is designated as the origin. Its coordinates are X=0 kilometers and Y=0 kilometers. The upper right hand corner is at X=127.5 kilometers and Y=127.5 kilometers. Up is North; right is East. The supertanker starts its simulated course at X-125 kilometers, Y=0. This is very close to the lower right corner. The initial course direction is -45 degrees off North, which is Northwest. This course is in the direction of Hinchinbrook Entrance, but not exactly. Some course correction is required to accurately enter the passage. Once within the pass, a due North course is advised. This will bring the ship into the vicinity of Valdez Arm, which leads to the Narrows and thence to the port. A considerable amount of navigation is necessary to pass through the arm to the port. The final mooring coordinates are X=108 kilometers and Y=123 kilometers.



VALDEZ map as contained in the computer's memory. The actual map is square with 256 grid elements on a side. The display above was created by printing the memory contents as blanks (for "0") and asterices (for "1"). Lines of asterices give the appearance of TV raster lines, and indicate the resolution provided in the simulation.

'VALDEZ' IS A COMPUTER SIMULATION OF SUPERTANKER TRAFFIC IN THE PRINCE WILLIAM SOUND AREA OF ALASKA. THE OBJECT OF THE SIMULATION IS TO MANEUVER A LARGE SUPERTANKER THROUGH THE SOUND AND VALDEZ NARROWS TO AN OIL PIPELINE TERMINAL AT VALDEZ.

THE SIMULATION IS COMPLICATED BY SEVERAL REALISTIC PROBLEMS. FIRST, A DENSE FOG IS ASSUMED. THIS REQUIRES ALL NAVIGATION TO BE PERFORMED USING COMPASS HEADINGS AND RADAR DISPLAYS. THE RADAR DISPLAY IS MULTIPLE RANGE AND IN THE SHORT RANGE SETTING HAS A RESOLUTION OF 500 METERS. THIS RESOLUTION IS PARTICULARLY IMPORTANT IN PASSING THROUGH THE NARROWS WHERE THE LEEWAY IS ONLY 900 METERS. ANOTHER DANGER IS OTHER SEA TRAFFIC, INCLUDING BOTH SHIPS AND ICEBERGS. A CONSIDERABLE AMOUNT OF SHIPPING IS LEAVING VALDEZ HARBOR AND PASSING THROUGH THE NARROWS. THIS ONCOMING TRAFFIC MUST BE AVOIDED. THESE SHIPS FOLLOW A PARTICULAR SEA LANE, BUT THE DEPARTURES ARE RANDOM. THE ICEBERG TRAFFIC IS REALISTICALLY MORE RANDOM. THE ICEBERGS ORIGINATE AT THE TIP OF THE COLUMBIA GLACIER AND ARE SUBJECT TO THE TIDES, WHICH ARE ALSO SIMULATED. THE ICEBERGS THEREFORE MOVE SLOWLY, BUT CROSS THE SEA LANES.

TWO BASIC CONTROLS ARE AVAILABLE TO THE CAPTAIN. THEY ARE ENGINE POWER (TWO ENGINES) AND HELM (RUDDER). IT IS ASSUMED THAT A CONTROLLED HELM IS IN PLACE SO THAT ONCE THE COMMAND IS SET, IT REMAINS UNTIL INTENTIONALLY ALTERED.

THE SIMULATION IS AN EXERCISE IN PRECISION NAVIGATION. THE NAVIGATION IS RELATIVE TO A 256 X 256 GRID HAVING 500 METER SPACINGS. ALL DISTANCES ARE IN METERS. THE PORT IS LOCATED AT GRID POSITION X=108 KILOMETERS (LONGITUDE) AND Y=123 KILOMETERS (LATITUDE). FINAL MOORING IS NEXT TO A FLOATING PIPELINE TERMINAL. THE ANCHOR WILL BE DROPPED UNDER THE FOLLOWING CONDITIONS:

POSITION: WITHIN 100 METERS OF TERMINAL
HEADING: BETWEEN 80 AND 100 DEGREES OFF NORTH
SPEED: LESS THAN 0.7 KILOMETERS/HOUR

COLLIDING WITH ANOTHER SHIP OR AN ICEBERG ENDS THE SIMULATION. SO DOES RUNNING AGROUND. A COLLISION REPORT IS GIVEN DESCRIBING THE DAMAGE.

THE SIMULATION MAY BE EXERCISED IN TWO GENERAL WAYS. BY CLEARING A PATCH OF SEA WHEN GIVEN THE OPTION YOU CAN PRACTICE WIDE RANGING MANEUVERS AS WELL AS ATTEMPT TO INTERCEPT OTHER SHIPS. BY LOADING THE PRINCE WILLIAM SOUND MAP, THE FULL SIMULATION MAY BE EXERCISED.

REMEMBER, SUPERTANKERS ARE BIG AND SLUGGISH IN HANDLING. CAREFULLY PLAN YOUR COURSE!

Instructions as they are printed out when running the 25 kilobyte version of VALDEZ. The instructions option has been removed from the compressed versions.

Sample listings for the North Star version of VALDEZ. Other versions are similar.

```
MEMSET 31600
READY
```

- Set the memory boundary such that at least 8K (8192) bytes of memory are free for map storage, with also 8K available to run the program. In the example shown (North Star, using Release 4 BASIC), approximately 8100 bytes are available for the program.

```
LOAD VALDEZC
READY
```

- Load the compressed version of VALDEZ. The full version requires in excess of 17 kilobytes for the program itself, and an additional 8 kilobytes for the map. The compressed versions are built from the 17K program by removing REM statements, blanks, and by concatenating.

```
RUN

VALDEZ - A SUPERTANKER SIMULATION

NORTH STAR VERSION NSCV1.0
COPYRIGHT 1979 BY DYNACOMP
WEBSTER, NEW YORK
```

- Other versions available include compressions for the 16K Level II TRS-80 and 16K PET.

```
SIMULATION BEGINS.....

INPUT A NO. BETWEEN 0 AND 1000?46
```

- This randomizes the distribution of icebergs and ships.

```
WHERE IS THE MAP TO BE
STORED IN MEMORY (DECIMAL): ?31601
```

- Input the first free memory location. Normally this is one greater than the memory bound.

```
IS THIS TO BE AN OPEN
SEA PRACTICE SIMULATION (Y/N): ?N
```

- If "Y", then a clear patch of sea is prepared instead of the map.

```
IS PRINCE WILLIAM MAP LOADED (Y/N): ?N
LOADING PRINCE WILLIAM SOUND MAP....
```

- If "Y", the program assumes the map has already been loaded into the memory region indicated above. Not clearing the sea or loading the map will result in a randomized pattern unless the map had been loaded in an earlier play.

```
STATUS
------
TIME:  9.35 HOURS
POSITION:
     125 KM EAST
     0 KM NORTH
WATER SPEED:  18.9 KM/HOUR
TIDE:  4.9 KM/HOUR SOUTH
HEADING : -45 DEGREES OFF NORTH
PORT ENGINE POWER:  75%
STARBOARD ENGINE POWER:  75%
HELM:  0 DEGREES
```

- The supertanker always starts from the same location (near the lower right of the map).
- South is general; it might be southeast.
- Current direction of travel.
- The engines supply power additively. Power can range from -100% to +100%.
- Angle of the rudder. When moving forward, a positive angle corresponds to turning right.

```
RADAR RANGE CONTROL
-------------------

RADAR RANGE FACTOR: ?32
GRID INCREMENT:  16 KILOMETERS

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CONTINUE?Y
```

- The navigational display. Open sea is shown as dots; land, icebergs and other ships as asterices. The radar range factors allowed are 0, 1, 2, 4, 8, 16 and 32. A "0" input is used to skip the display. If the supertanker were in the center of the map, a range factor of 16 would display the map in its entirety. The area outside the map boundaries is treated as solid land. In the example to the left, the upper right hand quadrant represents the stored map. The other three quadrants are outside the map boundary. The "0" denotes the location of the supertanker. The radar display is always centered on this ship. The resolution is poor when using high magnifications. However, some of the large features shown on the attached map are apparent in this display.

```
DISPLAY OTHER TRAFFIC (Y/N): ?Y
```

- The "CONTINUE" prompts are designed for 16 line video monitors. The object is to keep the data from scrolling of the screen before it is read.

```
LAST REPORTED SHIP POSITIONS
----------------------------

 1    X= 91.1    Y= 120.4
 2    X= 88.5    Y= 116.3
 3    X= 79.5    Y= 76.1
 4    X= 83.4    Y= 108.1
 5    X= 79.5    Y= 32
 6    X= 85.6    Y= 111.7

CONTINUE?Y
```

- The number of ships and their initial locations are chosen according to the random number generator seed given above. These ships follow a set course from Valdez, down the Valdez Arm, across the Prince William Sound, through the Hinchinbrook Entrance and into the Gulf of Alaska.

```
LAST REPORTED ICEBERG POSITIONS
-------------------------------

 1    X= 71    Y= 85.6
```

- The icebergs drift with the tide.

```
CONTINUE?Y

ENGINE CONTROL
--------------

STATUS: PORT  75% AHEAD
   STARBOARD  75% AHEAD

CONTINUE CURRENT STATUS (Y/N)?Y

RUDDER CONTROL
--------------

STATUS:  0 DEGREES  RUDDER

CONTINUE CURRENT STATUS (Y/N)?Y

HOW MANY MINUTES IS THIS SPEED
AND HEADING TO BE MAINTAINED: ?30


STATUS
------
TIME:  9.85 HOURS
POSITION:
     117.56 KM EAST
     6.91 KM NORTH
WATER SPEED:  21.4 KM/HOUR
TIDE:  .5 KM/HOUR SOUTH
HEADING : -45 DEGREES OFF NORTH
PORT ENGINE POWER:  75%
STARBOARD ENGINE POWER:  75%
HELM:  0 DEGREES

RADAR RANGE CONTROL
-------------------

RADAR RANGE FACTOR: ?8
GRID INCREMENT:  4 KILOMETERS

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CONTINUE?Y

DISPLAY OTHER TRAFFIC (Y/N): ?Y

LAST REPORTED SHIP POSITIONS
----------------------------

 1    X= 86.3   Y= 112.8
 2    X= 83.7   Y= 108.7
 3    X= 79.5   Y= 67.1
 4    X= 79.5   Y= 100.3
 5    X= 79.5   Y= 23
 6    X= 80.8   Y= 104.1

CONTINUE?Y

LAST REPORTED ICEBERG POSITIONS
-------------------------------

 1    X= 70.9   Y= 85.2

CONTINUE?Y
```

- Engine power can range from -100% to +100%. Each engine can be individually controlled. It is possible for an engine to fail without warning. Also, engine damage occurs with collisions.

- The rudder is controlled by inputting an angle. 20 degrees left rudder would be set by answering the question to the left with "N", and then responding with "-20" when prompted.
- This is how long the ship will travel before a new command may be entered. It is as if the ship controls were set and the captain went for coffee.

- Time has increased by 0.5 hours.

- The ship has moved 7.44 kilometers to the west, 6.91 kilometers to the north; a total of about ten kilometers.
- Note, the tide is changing slowly.
- Same heading as before. However, note that the heading is relative to the map and the tide causes the actual course direction to be a little different.

- A good value for long range scanning.

- The lower left part of Hinchinbrook Island is visible. The entrance to the sound is on the far side of this. The present course is at 45 degrees and intersects this arm. A course change will be necessary.

- Note that the supertanker has moved on the map. This can be seen relative to the map boundary.

  If there were other ship traffic within the field of view of the radar, it would have one chance in sixty-four (8x8) of being displayed because of the low resolution.

Note that this ship has moved about five kilometers to the west and about eight to the south. It is travelling down Valdez Arm.

This ship has moved nine kilometers south. It is exiting the Hinchinbrook entrance and heading into the Gulf of Alaska.

-The iceberg has moved south 0.4 kilometers.

A different example showing a collision

```
STATUS
------
TIME:  9.37 HOURS
POSITION:
     79.32 KM EAST
     74.3 KM NORTH
WATER SPEED:  19 KM/HOUR
TIDE:  .5 KM/HOUR SOUTH
HEADING : 5 DEGREES OFF NORTH
PORT ENGINE POWER:  75%
STARBOARD ENGINE POWER:  75%
HELM:  5 DEGREES RIGHT RUDDER
```

- Ship is located between Naked Island and Red Head; open water.
- Course almost due north. A course correction had been made recently in order to head more directly into Valdez Arm.
- Still in the process of correcting course.

```
RADAR RANGE CONTROL
-------------------

RADAR RANGE FACTOR: ?1
GRID INCREMENT:  .5 KILOMETERS
```

- Maximum resolution is used here as there is likely to be other shipping in the area.

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CONTINUE?Y

DISPLAY OTHER TRAFFIC (Y/N): ?Y

LAST REPORTED SHIP POSITIONS
----------------------------

 1    X= 90.9    Y= 120.2
 2    X= 88.3    Y= 116
 3    X= 79.5    Y= 75.8
 4    X= 83.2    Y= 107.9
 5    X= 79.5    Y= 31.7
 6    X= 85.4    Y= 111.4

CONTINUE?Y

LAST REPORTED ICEBERG POSITIONS
-------------------------------

 1    X= 71    Y= 85.6

CONTINUE?Y

ENGINE CONTROL
--------------

STATUS: PORT  75% AHEAD
   STARBOARD  75% AHEAD

CONTINUE CURRENT STATUS (Y/N)?Y

RUDDER CONTROL
--------------

STATUS:  5 DEGREES  RIGHT RUDDER

CONTINUE CURRENT STATUS (Y/N)?Y

HOW MANY MINUTES IS THIS SPEED
AND HEADING TO BE MAINTAINED: ?5

**************************
**************************

COLLISION WITH SUPERTANKER!!!

***MAJOR COLLISION***
TAKING ON WATER
ENGINE STATUS FOR PUMPING:
     PORT:  34%
     STARBOARD:  0%
PUMP POWER INSUFFICIENT. SINKING.
READY
```

- Something has appeared on the radar display. Since we know that the current supertanker location is in open water, the radar target is either another ship or an iceberg.
- According to the display, the target is ahead about 1.5 kilometers.
- This is the other ship. This is determined by comparing the position of our ship as given under "STATUS" above with the positions on this list. Ship #3 is ahead 1.5 kilometer north, 180 meters east. We are heading right for it!
- There is also an iceberg roughly fifteen kilometers away.
- No change. We are going to see what happens when there is a collision.
- The other ship is travelling south at 14 kilometers per hour (slow because it is loaded), and we are travelling north at 19 kilometers per hour. The impact speed will be 33 kilometers per hour and occur in less than two minutes.
- A considerable amount of engine power has been lost; too much. The pumps can not keep up.

Successful mooring example. Getting to this position is difficult.

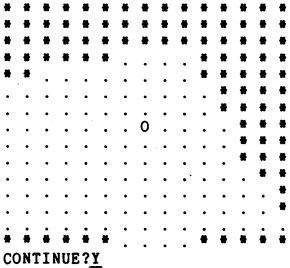
```
STATUS
------
TIME:  9.35 HOURS
POSITION:
     107.8 KM EAST
     123.19 KM NORTH
WATER SPEED:  .7 KM/HOUR
TIDE:  .5 KM/HOUR SOUTH
HEADING : 85 DEGREES OFF NORTH
PORT ENGINE POWER:  0%
STARBOARD ENGINE POWER:  0%
HELM:  0 DEGREES
```

- The object is to get to the mooring position which is located at X=108 kilometers (north), Y=123 kilometers (east).
- This is the maximum speed at which the anchor may be dropped. Some headway must be maintained as there is a tide to be overcome.
- The tide is actually toward the south-southwest (SSW).

```
RADAR RANGE CONTROL
-------------------

RADAR RANGE FACTOR: ?1
GRID INCREMENT:  .5 KILOMETERS
```

- Here is a chance to get a view of the east end of valdez harbor area. Compare this with the map.



- Compare the scale here with the attached map. Other areas which offer interesting challenges in navigation are Wells Passage and Montague Strait. Getting into the hook in Hinchinbrook Island (off Hinchinbrook Entrance) is difficult, as are some of the fiords.

```
CONTINUE?Y

DISPLAY OTHER TRAFFIC (Y/N): ?N
CONTINUE?Y
```

- No need to check on other traffic. None is visible on the radar display.

```
ENGINE CONTROL
--------------

STATUS: PORT STOPPED
        STARBOARD STOPPED
CONTINUE CURRENT STATUS (Y/N)?Y
```

- This is a tricky choice. If forwards engines are used, the mooring speed will be exceeded. If reverse engines are used, there may not be enough headway against the tide. In any case the mooring position is only a few hundred meters off.

```
RUDDER CONTROL
--------------

STATUS:  0 DEGREES  RUDDER

CONTINUE CURRENT STATUS (Y/N)?N
HELM CONTROL (DEGREES): ?-30
```

- A feeble attempt is made to turn into the tide.

```
HOW MANY MINUTES IS THIS SPEED
AND HEADING TO BE MAINTAINED: ?3

STATUS
------
TIME:  9.4 HOURS
POSITION:
     107.82 KM EAST
     123.16 KM NORTH
WATER SPEED:  .7 KM/HOUR
TIDE:  .5 KM/HOUR SOUTH
HEADING : 85 DEGREES OFF NORTH
PORT ENGINE POWER:  0%
STARBOARD ENGINE POWER:  0%
HELM:  30 DEGREES LEFT RUDDER
```

- Note that the tide has carried the ship 30 meters south while the headway was only 20 meters.

- Travelling so slow, we can not expect the left rudder to have much effect.

```
RADAR RANGE CONTROL
-------------------

RADAR RANGE FACTOR: ?0
```

– No point in displaying; there has been nearly no change in position.

```
DISPLAY OTHER TRAFFIC (Y/N): ?N
CONTINUE?Y

ENGINE CONTROL
--------------

STATUS: PORT STOPPED
        STARBOARD STOPPED
CONTINUE CURRENT STATUS (Y/N)?Y

RUDDER CONTROL
--------------

STATUS:  30 DEGREES  LEFT RUDDER

CONTINUE CURRENT STATUS (Y/N)?Y

HOW MANY MINUTES IS THIS SPEED
AND HEADING TO BE MAINTAINED: ?20
```

– The only thing to do now is to drift into the mooring area.

```
DROP ANCHOR!!!
OIL DEBARKATION POSITION REACHED
SAFELY. CONGRATULATIONS.
TIME IS  9.74 HOURS

READY
```

We made it!

```
RADAR RANGE CONTROL
-------------------

RADAR RANGE FACTOR: ?1
GRID INCREMENT:  .5 KILOMETERS

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CONTINUE?Y

DISPLAY OTHER TRAFFIC (Y/N): ?Y

LAST REPORTED SHIP POSITIONS
----------------------------

 1    X= 90.8    Y= 119.9
 2    X= 88.2    Y= 115.7
 3    X= 79.5    Y= 75.4
 4    X= 83    Y= 107.6
 5    X= 79.5    Y= 31.4
 6    X= 85.3    Y= 111.1

CONTINUE?Y

LAST REPORTED ICEBERG POSITIONS
-------------------------------

 1    X= 71    Y= 85.6
```

An example of "ghosts"

Ghosts are mysterious small islands which appear after the simulation has been run more than once without loading in a "fresh" map. What happens is that when a simulation has ended, either by collision or successful mooring, the iceberg and ship markers are not removed and show up as land on the next map unless a new map is loaded. For example, of the two images shown to the left, one represents a moving ship while the other is a ghost. Which is which?

Which of these ships (if any) corresponds to the radar images above?

To find out you can:

1) Compare your location against the radar display and ship location list.
2) See which one is stationary (land)
3) Run one down to see what type of collision has occurred.

*** REFER TO THE USER NOTES CORRESPONDING TO YOUR VERSION OF VALDEZ***

APPLE II PLUS VERSION

Congratulations on your purchase of the Apple II version of VALDEZ. We believe you will find VALDEZ to be both an informative and enjoyable simulation. VALDEZ is a unique program which contains a 65536-point map of the Prince William Sound area of Alaska. This map is specially encoded within the program and is "visible" through the radar display.

The Apple version of VALDEZ is very similar to the North Star version, with a few exceptions which are due to the particular hardware and software properties of the Apple II. The North Star documentation may be generally used to understand the operation of VALDEZ, but with the following changes:

1) The VALDEZ map is automatically loaded with the program. This program is recorded on both sides of the cassette for cassette users. The user does not have the option, as in the North Star version, of loading an "open sea" map. This is an improvement made possible by the software structure of the Apple II.

2) VALDEZ was advertised to run within 16 kilobytes of program memory. However, a "16K" Apple II Plus really has only about 14 kilobytes free for programming. Also, program storage in the Apple II appears to be considerably less efficient than in the TRS-80 or North Star. We have, therefore, shortened the program to accommodate these deficiencies. The result is that there is no error check on the random number generator seed requested by the program. There is also no check on the validity of the radar range multiplier input. For the random number generator input, the proper range of values is 0 to 1. For the radar range, the proper values are 0, 1, 2, 4, 8, 16, and 32.

Because of the high degree of compression, listings of the program are very difficult to read. Also, a program listing will not disclose the map. The map is loaded as part of the BASIC program, but will not be displayed under the command "LIST."

For those Apple owners having disk systems, the program on cassette may be loaded and directly saved on disk. Do not run the program before saving as the map will be affected (ghost ships may appear on your display later).

You should experience few problems loading the cassette. As an Apple user, you are probably aware that the tape recorder tone level should be set to maximum, and the volume adjusted. In using the Apple II Plus, we have found the volume adjustment to be less critical than expected if the following procedure is used. After setting the volume and tone levels, type "LOAD" and start the recorder. Immediately type the carriage return which completes the command. If, at the beginning of the tape, the Apple responds with "ERR," stop the tape immediately. Turn off the computer (for some reason, a simple RESET is not sufficient). Turn the computer back on, type "LOAD," start the tape recorder, and quickly type a carriage return. Often the program will successfully load following this procedure. It may be that the greatest volume sensitivity is at the transition from the no-program signal to the signal corresponding to the continuous tone lead-in. After the transition is passed, you can be reasonably sure of a good load.

You should experience no difficulty in loading and running VALDEZ. If you do, please feel free to contact DYNACOMP. Our goal is to make you a satisfied customer.

PET/CBM VERSION

Congratulations on your purchase of the PET/CBM version of VALDEZ. We believe you will find VALDEZ to be both an informative and enjoyable simulation. VALDEZ is a unique program which contains a 65536-point map of the Prince William Sound area of Alaska. This map is specially encoded within the program and is "visible" through the radar display.

The PET/CBM version of VALDEZ is very similar to the North Star version, with a few exceptions which are due to the particular hardware and software properties of the 16K PET/CBM. The North Star documentation may be generally used to understand the operation of VALDEZ, but with the following changes:

1) The VALDEZ map is automatically loaded with the program. This is an improvement made possible by the software structure of the Commodore computer. However, a small price is paid in that five "POKES" must be made before the program can be run:

NEW PET/CBM ROM	OLD PET ROM
a) POKE 42,200	a) POKE 124,200
b) POKE 43,28	b) POKE 125,28
c) POKE 52,190	c) POKE 134,190
d) POKE 53,32	d) POKE 135,32
e) POKE 16383,255	e) POKE 16383,255

2) VALDEZ was advertised to run within 16 kilobytes of program memory. However, as a "16K" PET/CBM has only about 15 kilobytes of usable memory, we have shortened the program to accommodate the available memory space. The result is that there is no random number generator seed requested by the program (the PET supplies its own). There is, in addition, no check on the validity of the radar range multiplier input. For the radar range, the proper values are 0, 1, 2, 4, 8, 16 and 32.

Because of the high degree of compression, listings of the program are very difficult to read. Also, a program listing will not disclose the map. The map is loaded as part of the BASIC program, but will not be displayed under the command "LIST."

The program on cassette may be loaded and directly saved for back-up purposes. Do not run the program or make any changes (including the "POKES") before saving as the map will be affected (ghost ships may appear on your display later).

You should experience no difficulty in loading VALDEZ. Type "LOAD" and start the recorder. Immediately depress the RETURN key which completes the command. If you do have loading problems, please note that a back-up copy of the program has been recorded on side B of the cassette. If you cannot load either side of the cassette or if you have problems in running this simulation, please feel free to contact DYNACOMP. Our goal is to make you a satisfied customer.

24K ATARI CASSETTE VERSION

The ATARI version of the supertanker simulation differs from that discussed in the main documentation (attached) in the following important ways. In this version, the map is loaded using a separate program. This program is much more general in its operation and does not depend on the specifics of the cassette storage system used. The result is that a program must be loaded and executed to unencode and store the large map (256 by 250 elements).

The procedure is to load the map routine and run it. The program will automatically establish the memory location at which the map storage is to start. The map loading program will "poke" into memory a highly compressed representation of the map element values contained in its data statements. While doing so, it will print out an asterisk for each block of 800 elements loaded. There are 80 such blocks in total. The reason for printing out the asterisk is to let the user know the program is working properly. Upon completion of this routine, load the next program, VALDEZ, and run it.

VALDEZ behaves slightly different from the run listing examples shown in the main documentation in that it does not ask where the map is stored, and assumes that the map loading has already been done.

When loading this simulation, leave the "PLAY" button on the tape recorder depressed. The map program will load and execute for several minutes. It will then prompt for the second program which is on the same side of the cassette. These two programs are repeated on side B of the cassette for back-up.

If there are any loading errors for either of the two programs, simply reload the offending program. The map elements previously loaded are not affected until VALDEZ is finally loaded and run.

ATARI DISKETTE VERSION

The ATARI disk version of VALDEZ is very similar to the North Star version discussed in the following documentation. However, one step in the procedure discussed is that documentation has been removed. In the ATARI variant, it is not necessary to allocate and specify the location of the map storage region. Simply load the program called "MAP" and run it (as in the cassette version). Then load "VALDEZ" and run.

CP/M MBASIC VERSION

The CP/M MBASIC version of VALDEZ is very similar to the North Star version, with a few exceptions which are due to the particular software properties of MBASIC. The North Star documentation may be generally used to understand the operation of VALDEZ, but with the following difference.

The VALDEZ map is automatically loaded by the program. However, memory space must be allocated for map storage during the MBASIC initialization sequence. Slightly more than 8K bytes must be reserved. The procedure for

doing this is simple. We will use as an example the nominal 40K North Star version of the CP/M operating system. To run this version 44K bytes of memory must be available, the extra 4K bytes being I/O and work space required beyond the 40K boundary.

MBASIC is normally loaded under the default option which uses all available memory:

> MBASIC

Doing this with the 40K North Star version results in the following message:

{Heading}

18169 bytes free

In this case, there is no memory allocated for the map. To create 8200 (the number needed) bytes of reserved memory, we perform the following calculation:

(40 times 1024) - 8200 = 32760

We use this value in the initialization procedure as follows:

> MBASIC /M:32760

MBASIC will now load and display 8200 bytes less free memory. Now VALDEZ may be loaded and run. When the program asks for where the map is stored, respond with 32761 (one more than 32760).

In a nutshell, the object is to reserve 8200 bytes of map memory located where CP/M and MBASIC will not disturb it and tell VALDEZ where this map memory starts.

Because of the high degree of compression, listings of the VALDEZ program are very difficult to read. Also a program listing will not disclose the map.

TRS-80 CASSETTE VERSION

The TRS-80 version of the supertanker simulation differs from that discussed in the main documentation (attached) in the following important ways. In this version, the map is loaded using a separate program. This program is much more general in its operation, and does not depend on the specifics of the disk or cassette storage system used. The result is that a program must be loaded and executed to unencode and store the large map (256 by 250 elements; the map has been shortened slightly) into memory.

The map loading routine is called "M." The procedure is to load the routine and run it. The program will ask for the memory location at which the map storage is to start. This is answered with the same value as would be used in the example shown in the attached documentation. Taking the 16K version of the Level II BASIC TRS-80, this means that the response to "MEMORY SIZE?" (when the computer is first started) should be one location lower (24766) to avoid overlap between the map storage space and the

"stack" (the region where important information is stored when executing BASIC). After receiving this, the map loading program will "poke" into memory a highly compressed representation of the map element values contained in its data statements. While doing so, it will print out an asterisk for each block of 800 elements loaded. There are 80 such blocks in total. The reason for printing out the asterisk is to let the user know the program is working properly. Upon completion this routine will prompt you to load the "VALDEZ" simulation program.

VALDEZ behaves slightly different from the run listing examples shown in the main documentation in that it asks where the map is stored, but does not load it as it assumes that the map loading has already been done.

Since the TRS-80 video display is wider than 32 characters, the TRS-80 version of VALDEZ has been modified to make use of this width and present a more square radar display. The alterations were made by adding spaces to the strings A8$, B9$ and "O---." See lines 35, 36, and 96 of the program listing. To reduce the radar display width back to 32 characters, remove two spaces from each of those strings (from each group of three spaces in A8$).

The first program on side A is the map loading program. It is followed by the simulation program, VALDEZ. The programs are duplicated on side B.

If there are any loading errors for either of the two programs, simply reload the offending program. The map elements previously loaded are not affected until VALDEZ is finally loaded and run.

As a final reminder, load and run the map processing routine first, answering the memory location question (e.g., 24767 in the 16K Level II BASIC TRS-80 case). Then run the main program, again answering its memory question with the same value. The computer start-up memory size should be set to one less than this value (24766 in the case of the above-specified TRS-80). This is easy to forget when in a hurry.

EXAMPLE OF LOADING COMMANDS:

```
CLOAD
(Computer Response)
RUN
(Computer Response)
24767
(Computer Response)
CLOAD
.............
```

TRS-80 DISKETTE VERSION

The VALDEZ program requires that memory be reserved for placement of the map of the VALDEZ environs. The memory location used for the disk version is different from that of the cassette version of the program. When entering BASIC, use the following number for the memory size prompt:

When running the VALDEZ program, enter the following number for the map location:

-30720

Note that the minus sign is required for proper operation. You may wish to change the numbers in your documentation to these figures.