

# Patrol Craft Support

During the past few years, the U.S. Navy has increasingly been required to protect friendly and neutral shipping in distant locations. This shipping must be escorted through choke points and frequently has little air cover. Rather than expose destroyers and cruisers throughout the entire transit, an initiative to use high-speed patrol craft has been approved. These craft will be carried in the well of a mother ship to the immediate area before launch. The craft use a modular concept for sensor and weapon loads. Based on the anticipated threat, different sensory and weapons modules may be plugged into the craft. After module installation, a sequence of readiness tests is performed and then the craft are launched. Operational staff indicates that three craft will be used for each mission.

A tender is currently being altered to act as the mother ship. At present an option exists to have either one or two test stations where the modules are installed and tested prior to launch. Fiscal resources exist for the second option, but NAVSEA questions the expenditure. DCNO(Surface) presently does not know what effect on response time the second station would have, but he thinks an important factor in choosing between the alternatives will be the difference in time to launch three craft.

There is some test data available on the use of a single station at a Navy weapons lab. The available data is given below. A launch cycle consists of two basic steps. The first step is the launch step, and it consists of the procedures needed to install and test the modules and to launch the prepared craft. The second step is a preparation step and consists of the procedures needed to prepare the station for the next craft to be launched. Each cycle is essentially the same routine, in spite of the different modules, and does not appear to impact other cycles.

If a second station is installed on the mother ship, there will be some manpower problems. There will be only enough qualified technicians to man one station at a time for the purpose of installing, testing, and launching. They must have one hour off before manning the second station after a successful launch at the first station. However, there will be sufficient crew to prepare the first station for another cycle as soon as a craft is launched.

Your team has been asked to provide DCNO with some analysis to aid in his choice of options.

Things to consider in your analysis:

- Give an idea of the variability of the times, not just averages.
  - Consider box plots and/or confidence intervals.
  - Are differences significant? How do you know?
  - What are the minimum and maximum times that can reasonably be expected to actually occur?
- Test your model's sensitivity to
  - Average launch time,
  - Average preparation time, and
  - Break time.

**Patrol craft launch data**

<b><i>index</i></b>	<b><i>launch (hours)</i></b>	<b><i>prep (hours)</i></b>	<b><i>index</i></b>	<b><i>launch (hours)</i></b>	<b><i>prep (hours)</i></b>
1	3.81	3.05	21	4.00	4.49
2	4.22	1.47	22	4.89	1.99
3	2.37	4.19	23	5.00	3.13
4	2.56	3.54	24	1.34	1.75
5	3.32	1.48	25	4.47	4.54
6	3.94	3.90	26	5.00	2.07
7	3.37	2.63	27	4.47	4.67
8	2.29	3.07	28	2.85	2.30
9	2.93	2.36	29	3.93	2.26
10	3.99	1.82	30	2.64	4.43
11	3.04	4.35	31	3.56	4.36
12	3.11	3.38	32	3.40	3.51
13	3.10	2.85	33	2.39	3.25
14	3.46	2.97	34	2.05	3.50
15	3.76	2.81	35	4.62	3.91
16	2.46	3.25	36	3.25	3.81
17	3.22	2.52	37	3.70	2.23
18	4.16	4.45	38	4.28	1.68
19	4.83	3.65	39	1.99	1.98
20	2.18	2.84	40	2.83	3.37
			41	2.55	3.16