

***FY2005 OSCAM Ship Historical Datasets
Depot Maintenance Data Guide***

Both schedule and cost data were updated for certain ship classes in the FY05 OSCAM historical datasets. Table 1-1 shows which datasets were updated for cost and schedule. The table also provides the datasource of the update. A detailed explanation of methodology follows.

Schedules were not available for all historical dataset classes. Therefore, not every historical dataset has the depot maintenance schedule populated. In some cases, the depot maintenance schedule has been updated, but there was not sufficient data to update the cost section. This results in a populated schedule but no populated costs. There are also select availability types within a ship class that may not have cost data populated due to lack of data and no acceptable analogy to another availability type.

Table 1-1: Updated Ship Classes

<i>Ship Class</i>	<i>Updated Schedule</i>	<i>Data Source</i>	<i>Updated Costs</i>	<i>VAMOSOC Data</i>
AD-14CL				
AD-37CL				
AD-41CL				
AE-21CL				
AE-23CL				
AE-26CL	X	1996 OPNAV 4700		
AFS-1CL				
AGDS-2CL				
AGF-03CL	X	2000 OPNAV 4700		
AGF-11CL	X	2004 OPNAV 4700		
AGSS-555CL	X	2004 OPNAV 4700		
AO-177CL	X	1996 OPNAV 4700		
AO-51CL				
AOE-1CL	X	2004 OPNAV 4700		
AOE-6CL	X	2000 OPNAV 4700		
AOR-1CL	X	1996 OPNAV 4700		
AR-05CL				
ARL-1CL				
ARS-38CL				
ARS-50CL	X	2004 OPNAV 4700		
ARS-6CL				
AS-11CL				
AS-19CL				

<u>Ship Class</u>	<u>Updated Schedule</u>	<u>Data Source</u>	<u>Updated Costs</u>	<u>VAMOSOC Data</u>
AS-31CL				
AS-33CL	X	1996 OPNAV 4700		
AS-36CL				
AS-39CL	X	2004 OPNAV 4700	X	AS 39 Class
ASR-07CL				
ASR-21CL				
ATF-148CL				
ATS-1CL				
AVM-1CL				
AVT-16CL				
AVT-59CL				
BB-61CL				
CG-16CL				
CG-26CL				
CG-47CL	X	2004 OPNAV 4700	X	CG 47 Class
CGN-09CL				
CGN-25CL				
CGN-35CL				
CGN-36CL	X	1996 OPNAV 4700		
CGN-38CL	X	1996 OPNAV 4700		
CV-41CL				
CV-59CL				
CV-63CL	X	2004 OPNAV 4700		
CV-67CL	X	2004 OPNAV 4700		
CVN-65CL	X	2004 OPNAV 4700	X	CVN 65 and CVN 68 Classes
CVN-68CL	X	2004 OPNAV 4700	X	CVN 65 and CVN 68 Classes
DD-963CL	X	2004 OPNAV 4700	X	DD 963 Class
DDG-2CL				
DDG-37CL				
DDG-51CL	X	2004 OPNAV 4700	X	DDG 51 Class
DDG-993CL				
FF-1037CL				
FF-1040CL				
FF-1052CL				
FF-1098CL				
FFG-1CL				
FFG-7CL	X	2004 OPNAV 4700	X	FFG 7 Class
LCC-19CL	X	2004 OPNAV 4700	X	LCC 19 Class

<u>Ship Class</u>	<u>Updated Schedule</u>	<u>Data Source</u>	<u>Updated Costs</u>	<u>VAMOSOC Data</u>
LHA-1CL	X	2004 OPNAV 4700	X	LHA 1 and LHD 1 Classes
LHD-1CL	X	2004 OPNAV 4700	X	LHA 1 and LHD 1 Classes
LKA-113CL				
LPD-1CL				
LPD-4CL	X	2004 OPNAV 4700		
LPH-2CL	X	1996 OPNAV 4700		
LSD-28CL				
LSD-36CL	X	2000 OPNAV 4700		
LSD-41CL	X	2004 OPNAV 4700		
LSD-49CL	X	2004 OPNAV 4700		
LST-1179CL	X	2000 OPNAV 4700		
MCM-1CL	X	2004 OPNAV 4700		
MCS-12CL	X	2000 OPNAV 4700		
MHC-51CL	X	2004 OPNAV 4700		
MSO-422CL				
PC-1CL	X	2004 OPNAV 4700		
PHM-1CL				
SS-576CL				
SS-580CL				
SSBN-598CL				
SSBN-616CL				
SSBN-627CL				
SSBN-640CL				
SSBN-726CL	X	2004 OPNAV 4700	X	SSBN 726 Class
SSGN-726CL	X	2004 OPNAV 4700		
SSN-21CL	X	2004 OPNAV 4700		
SSN-575CL				
SSN-578CL				
SSN-585CL				
SSN-594CL				
SSN-597CL				
SSN-608CL				
SSN-637CL	X	2000 OPNAV 4700		
SSN-640CL				
SSN-671CL				
SSN-685CL				
SSN-688CL Fit 1	X	2004 OPNAV 4700	X	SSN 688-718
SSN-688CL Fit 2	X	2004 OPNAV 4700	X	SSN 719-773
SSN-688CL Fit 3	X	2004 OPNAV 4700	X	SSN 719-773

Schedules

The OPNAV 4700 is issued each year by the Chief of Naval Operations. The document outlines the depot maintenance philosophy for each active ship class in the fleet by providing the depot level availability representative intervals, durations, maintenance cycles, and repair mandays.

Depot maintenance schedules have been updated in the FY05 historical datasets based on the most recent OPNAV 4700 document that the ship class was listed in of the documents available to the OSCAM team (1992, 1996, 2000, 2004). Some ship classes have schedules provided for both regular and FDNF (forward deployed naval forces). In cases where this occurred, the regular schedule was used. The notional schedules given were extrapolated into the future for a platform life of 35 years.

Costs

Data was extracted in TY\$ from the VAMOSC Detailed Ships Universe, Public Shipyards folder for the ship classes referenced in table 1 for repair and FM (fleet modernization) work. (Each depot availability with data in VAMOSC is considered to be a datapoint for the remainder of the discussion.) VAMOSC contains data from FY93-FY04 (at the time of the historical dataset update) for material costs, labor costs, overhead costs and total mandays of effort by availability. Only public shipyards provide this level of detail to VAMOSC and accordingly, only public shipyard data was used in this depot maintenance update. Depot availabilities often start in one fiscal year and continue in another. Accordingly, the cost for a single depot availability often spans more than one fiscal year. To account for these possibilities, any datapoint with data in FY93 or FY04 was removed as a potentially incomplete datapoint which could not be included in the analysis.

The remaining datapoints were matched to the Fleet Modernization Program Management Information System (FMPMIS) file that was provided by the VAMOSC Program Manager. This file contains the master list of all overhaul types and durations for all ships in the fleet. By matching the datapoints in the FMPMIS file to the datapoints in VAMOSC, dry-docking availabilities could be distinguished from non-dry-docking availabilities (VAMOSC currently does not make this distinction). This was done so that the correct costs were associated with the correct availability type in the overhaul schedule. Once the datapoints were isolated for the different types of availabilities, the costs were escalated from TY\$ to CY06\$ using the April 2005 NCCA published OMN Composite weighted inflation index, base year 2006. The data was summed across years to find the total labor cost, total material cost, total overhead cost, and total mandays of effort for each datapoint. This provided the total normalized datapoints for each historical availability. The total mandays for each availability was converted to total personmonths using the conversion of 21 working days per month.

Figures 1 and 2 give a simplified example of finding datapoints. A fictitious Ship Class X (SCX) is used for demonstration. Figure 1 shows what would be extracted from the VAMOSC Detailed Ships Universe. This was a valid datapoint for SCX since no data was in the first or last year pulled. The total column provides the information necessary for the calculations. Next the datapoint was matched against the FMPMIS list. Figure 2 gives an example of data from the master file. By looking at Figure 2 one can see that it is for an availability on the SCX that happened from year B until the middle of year D. This is a match for the data in figure 1. The only change to make is that the VAMOSC data be marked to reflect that it is a DSRA datapoint.

		Year A	Year B	Year C	Year D	Year E	TOTAL
SCX	SRA manhours		5000	5000	1000		11000
SCX	SRA material \$		600000	250000	50000		900000
SCX	SRA labor \$		500000	500000	100000		1100000
SCX	SRA overhead \$		625000	625000	125000		1375000
SCX	FM manhours		1000	2500	500		4000
SCX	FM material \$		120000	125000	25000		270000
SCX	FM labor \$		100000	250000	50000		400000
SCX	FM overhead \$		102500	256250	51250		410000

Figure 1: Extract from the VAMOSC Detailed Ships Universe (fictitious data)

SCX	01/01/BB	05/26/DD	DSRA	Norfolk NSY
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Figure 2: Extract from FMPMIS Master File (fictitious data)

Once all the costs were normalized to CY06\$ and the mandays were normalized to manmonths, the following calculation was performed for each datapoint:

$$\frac{\text{total public material \$}}{\text{total personmonths}} = \text{material \$/personmonth}$$

A calculation was also performed on each datapoint that represented repair work (non-FM) to find the strikerate. The calculation was:

$$\frac{\text{total personmonths}}{\text{total availability duration}} = \text{average \# of personnel working during availability}$$

Next, data was extracted from the VAMOSC Ships Universe on CPM (Centrally Provided Materials) Costs. Data was extracted by ship class in FY06\$. Costs were matched as closely as possible by year and hull number to the set of datapoints used above. An additional query was done to pull information on the amount of FM work done at public and private yards. These percentages were used to determine the amount of CPM that can be attributed to public yards.

Datapoints for the same types of availabilities were averaged together to create the inputs for the OSCAM historical datasets. The following are the inputs that are populated in the historical datasets and the data used in each one.

Planned overhaul duration: taken from the durations given in the OPNAV 4700

Strikerate: Strikerate is the maximum amount of workers that you can have working on the ship at any one time. The strikerate for the ship class is assumed to be the maximum of the individual calculations shown above to find the average number of personnel working during the availability. The strikerate is assumed to be the same for all availability types within a ship class.

CPM \$K/overhaul: This data is based on the information extracted from the VAMOSC Ships Universe.

Mod personmonths/CPM \$K factor: Using the information gathered on CPM public yard work from the VAMOSC Ships Universe, this factor was found by dividing the total personmonths of modernization work per ship per year by the CPM \$K per ship per year at public yards. This factor is assumed to be the same for all availability types within a ship class.

Mod material \$K/personmonth: This is the average of the material \$K/ personmonth calculation above for the FM datapoints.

Repair personmonths/overhaul: This is the average of the total personmonths of effort for the repair work (non-FM) datapoints.

Repair material \$K/personmonth: This is the average of the material \$K/ personmonth calculation above for the repair (non-FM) datapoints.

The above inputs are determined for each of the availability types that appear in the dataset for a particular ship class. This was then matched against the availability types scheduled in the OPNAV 4700 for that particular ship class. Some assumptions needed to be made in order to match the historical datapoints to the future required availabilities. For example, the VAMOSC LCC 19 class data shows SRA and DPMA type availabilities; the OPNAV 4700 shows availability types of DSRA, SRA, and ISRA. For the dataset update, the historical SRA data was mapped into the SRA availabilities, and the DPMA data was mapped to the DSRA availabilities. The ISRA availabilities were populated with the SRA data as this was assumed to be the most similar type of availability. Table 2 lists the ship classes that have had costs updated and shows how the historical data was mapped into the current maintenance schedule.

Table 2: Availability Mapping

<u>Ship Class</u>	<u>Availability Types</u>	<u>Historical Data Used to Populate</u>
AS-39CL	DPMA	DPMA
AS-39CL	PMA	PMA
CG-47CL	DMP	DMP
CG-47CL	DSRA	DSRA
CG-47CL	SRA	SRA
CVN-65CL	ESRA 1	not populated
CVN-65CL	ESRA 2	not populated
CVN-65CL	ESRA 3	not populated
CVN-65CL	EDSRA 1	EDSRA
CVN-65CL	EDSRA 2	EDSRA
CVN-65CL	EDSRA 3	EDSRA
CVN-68CL	RCOH	not populated
CVN-68CL	DPIA 1	DPIA 1
CVN-68CL	DPIA 2	DPIA 1
CVN-68CL	DPIA 3	DPIA 1
CVN-68CL	PIA 1	PIA 1
CVN-68CL	PIA 2	PIA 2
CVN-68CL	PIA 2	PIA 2
CVN-68CL	PSA-SRA	SRA
DD-963CL	DSRA	ESRA/DSRA
DD-963CL	SRA	SRA
DDG-51CL	DSRA	ESRA/DSRA
DDG-51CL	SRA	SRA
FFG-7CL	DSRA	DSRA
FFG-7CL	SRA	SRA
LCC-19CL	DSRA	DPMA
LCC-19CL	SRA	SRA
LCC-19CL	ISRA	SRA
LHA-1CL	DPMA	DSRA/DPMA
LHA-1CL	PMA	SRA
LHD-1CL	DPMA	DSRA/DPMA
LHD-1CL	PMA	SRA
SSBN-726CL	ERP	ERP
SSBN-726CL	ERO	EOH
SSN-688CL Flt 1	ERO	ERO
SSN-688CL Flt 1	DSRA	DSRA
SSN-688CL Flt 2	ERO	not populated
SSN-688CL Flt 2	DMP	DMP
SSN-688CL Flt 2	DSRA 1	DSRA
SSN-688CL Flt 2	DSRA 2	DSRA
SSN-688CL Flt 3	ERO	not populated
SSN-688CL Flt 3	DMP	DMP
SSN-688CL Flt 3	DSRA 1	DSRA
SSN-688CL Flt 3	DSRA 2	DSRA

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