OSCAM AIR Data Management Tool (Simplified) Reference

Version 2.0

August 2008

INTRODUCTION

Version 2.0 of this document incorporates VAMOSC's upgrade to Business Objects XI.

This document is intended to provide users of the Operating and Support Cost Analysis Model (OSCAM) Air model with a process to download Visibility And Management of Operating and Support Costs (VAMOSC)* maintenance data and transform it into a format that can be input into OSCAM utilizing the Data Management Tool (DMT). This reference document is specific to the simplified input functionality of the DMT. The VAMOSC database does not currently provide data to the level of insight required to populate the detailed DMT dataset. The processes described in this document do not fully encompass the solution set of ways to populate data into the DMT. The intent of this document is to provide users with the means to utilize the DMT while providing the basic skill set needed to further refine the methods presented here.

The DMT offers OSCAM Air users the ability to input low-level maintenance cost data down to the 7 digit Work Unit Code (WUC) level into the OSCAM Air model. A Work Breakdown Structure (WBS) is utilized to categorize the cost groups of the system being estimated. Cost data is fed in at the 2, 4, 5, or 7 digit WUC level, but only at the lowest level included in the WBS. All cost data is then aggregated upwards to their individual parent codes where it can be analyzed at the macro level. Through use of the DMT, the OSCAM model can operate at the sub-system or even the component level, allowing estimators to quickly perform trade studies, Reduction of Total Ownership of Cost studies (RTOC), obsolescence studies, quickly identify cost drivers, as well as other analysis, and assess their potential impacts on the total Life Cycle Cost (LCC) of the system.

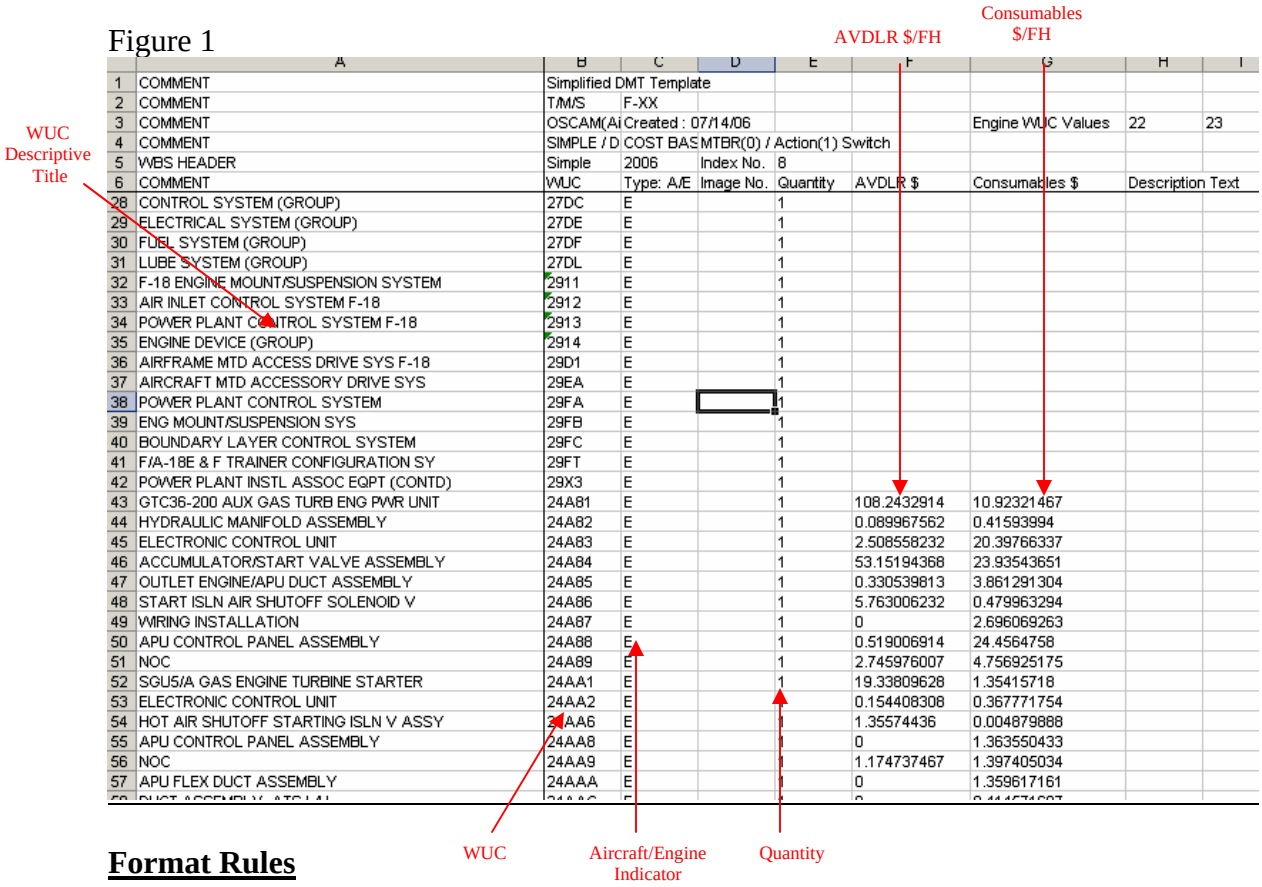
Data can be fed into the DMT in a variety of ways from any existing data sources. The OSCAM models were designed to readily accept VAMOSC data, therefore making the transition from a VAMOSC data pull to DMT acceptable format the most time efficient method available. VAMOSC maintains two universes that are capable of supplying data that will satisfy the technical requirements of the DMT. The Naval Aviation Maintenance Subsystem Reporting (NAMSR) and Naval Aviation Maintenance Subsystem Reporting Plus (NAMSR+) universes contain Aviation Depot Level Repairable (AVDLR) and total consumables cost data. The detailed cost data can be analyzed by WUC for any give Type Model Series (TMS) or Type Equipment Code (TEC). It is the ability to tie unscheduled maintenance costs to WUCs that makes NAMSR and NAMSR+ a compatible data provider to the DMT. A third universe, the Aviation Type/Model/Series Reporting (ATMSR) universe supplies analysts with accurate flight hour usage by TMS. The flight hour data is used to develop dollar per flight hour costs, needed for the DMT, from the raw data provided by NAMSR and/or NAMSR+.

** Note: More information on VAMOSC and the individual data universes can be found at www.navyvamosc.com*

DATA TRANSFORMATION & UPLOAD

Loading data into the DMT requires users to follow a very specific format to generate a usable WBS that will be recognized. Figure 1 is an example of how DMT data must be formatted in Excel. All data in Figures is fictitious.

Figure 1



	A	B	C	D	E	F	G	H	I
1	COMMENT	Simplified DMT Template							
2	COMMENT	T/M/S	F-XX						
3	COMMENT	OSCAM(Ai	Created : 07/14/06				Engine WUC Values	22	23
4	COMMENT	SIMPLE / D	COST BAS	MTBR(0) / Action(1) Switch					
5	WBS HEADER	Simple	2006	Index No.	8				
6	COMMENT	WUC	Type: A/E	Image No.	Quantity	AVDLR $	Consumables $	Description Text	
28	CONTROL SYSTEM (GROUP)	27DC	E		1				
29	ELECTRICAL SYSTEM (GROUP)	27DE	E		1				
30	FUEL SYSTEM (GROUP)	27DF	E		1				
31	LUBE SYSTEM (GROUP)	27DL	E		1				
32	F-18 ENGINE MOUNT/SUSPENSION SYSTEM	2911	E		1				
33	AIR INLET CONTROL SYSTEM F-18	2912	E		1				
34	POWER PLANT CONTROL SYSTEM F-18	2913	E		1				
35	ENGINE DEVICE (GROUP)	2914	E		1				
36	AIRFRAME MTD ACCESS DRIVE SYS F-18	29D1	E		1				
37	AIRCRAFT MTD ACCESSORY DRIVE SYS	29EA	E		1				
38	POWER PLANT CONTROL SYSTEM	29FA	E		1				
39	ENG MOUNT/SUSPENSION SYS	29FB	E		1				
40	BOUNDARY LAYER CONTROL SYSTEM	29FC	E		1				
41	F/A-18E & F TRAINER CONFIGURATION SY	29FT	E		1				
42	POWER PLANT INSTL ASSOC EQPT (CONTD)	29X3	E		1				
43	GTC36-200 AUX GAS TURB ENG PWR UNIT	24A81	E		1	108.2432914	10.92321467		
44	HYDRAULIC MANIFOLD ASSEMBLY	24A82	E		1	0.089967562	0.41593994		
45	ELECTRONIC CONTROL UNIT	24A83	E		1	2.508558232	20.39766337		
46	ACCUMULATOR/START VALVE ASSEMBLY	24A84	E		1	53.15194368	23.93543651		
47	OUTLET ENGINE/APU DUCT ASSEMBLY	24A85	E		1	0.330539813	3.861291304		
48	START ISLN AIR SHUTOFF SOLENOID V	24A86	E		1	5.763006232	0.479963294		
49	WIRING INSTALLATION	24A87	E		1	0	2.696069263		
50	APU CONTROL PANEL ASSEMBLY	24A88	E		1	0.519006914	24.4564758		
51	NOC	24A89	E		1	2.745976007	4.756925175		
52	SGU5/A GAS ENGINE TURBINE STARTER	24AA1	E		1	19.33809628	1.35415718		
53	ELECTRONIC CONTROL UNIT	24AA2	E		1	0.154408308	0.367771754		
54	HOT AIR SHUTOFF STARTING ISLN V ASSY	24AA6	E		1	1.35574436	0.004879888		
55	APU CONTROL PANEL ASSEMBLY	24AA8	E		1	0	1.363550433		
56	NOC	24AA9	E		1	1.174737467	1.397405034		
57	APU FLEX DUCT ASSEMBLY	24AAA	E		1	0	1.359617161		

Format Rules

- If the word "COMMENT" is entered anywhere in Column A the corresponding Row becomes a documentation field for the user. The DMT will not recognize any of the fields to the right of the COMMENT entry.
- All fields must be in Excel "text" format. No numerical formats will be accepted by the DMT.
- Costs are entered only at the lowest level, i.e. not at the 2 or 4 digit level if the data is pulled at the 5 digit WUC level. If cost is entered at the "parent" level, it will be overwritten by the aggregation of the "children" when the data is loaded into the DMT. Figure 1 illustrates proper data entry techniques. Only the 5 digit WUC entries have costs reported with them. The 4 digit codes are left blank because their costs will become the summations of the lower level data once it is entered into the DMT.
- Costs are entered as dollars per flight hour.
- The DMT differentiates Engine and Aircraft parts in Column C, Engine = E Aircraft = A.

- All “children” WUCs have parents to map to, i.e. if there is a 12345 there must be a 1234 and 12 entered as well. If there is not a child-parent relationship built into a dataset, the DMT will automatically generate parents with no descriptive designation. The user can alter the dataset to enter the appropriate description if “unknown parents” are created.
- Data can only be entered at the 2, 4, 5, and 7 digit WUC level.

VAMOSC Data Pulls

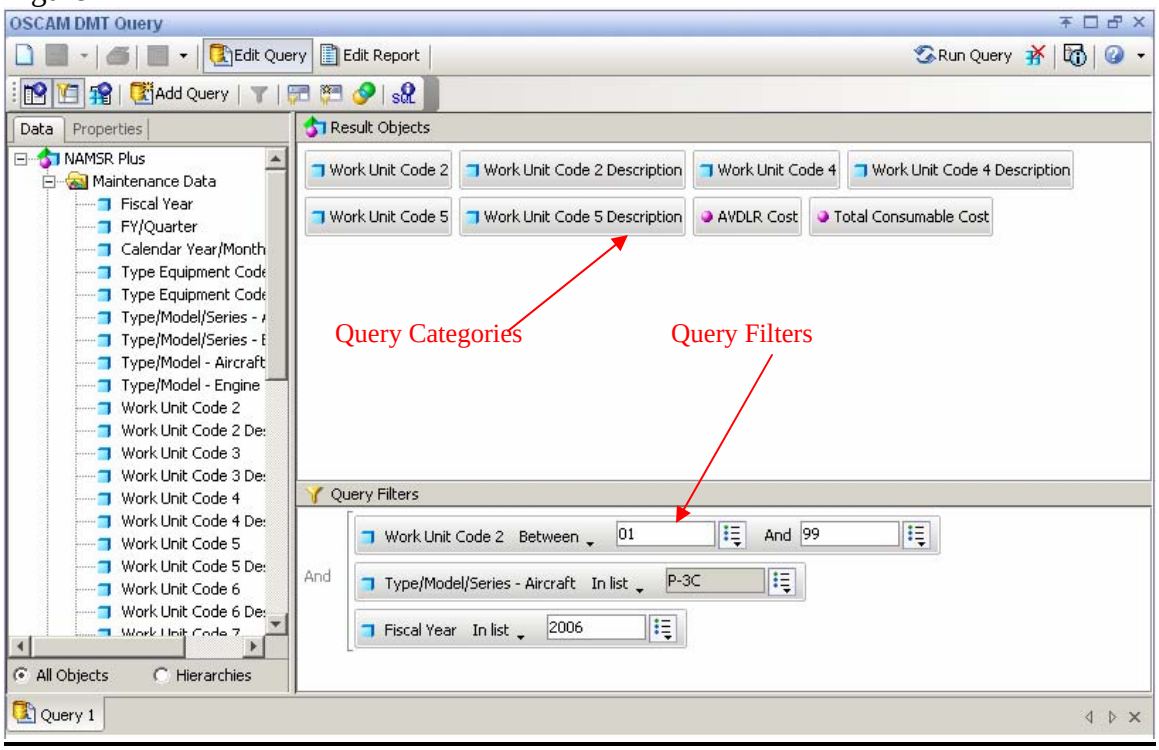
All of the data needed to populate the simplified DMT is accessible in the ATMSR, NAMSR, and NAMSR+ universes within VAMOSC. Creating the proper data query in and of itself is not a difficult process; it is the use of the data that requires careful thought and consideration by the analyst. The areas of data collection and data completeness will be discussed further in the Data Issues & Concerns section of this document.

A simple example that can be applied to DMT use would be a one-year pull of maintenance cost data for a TMS at the 5 digit WUC level. The data query should include the following categories:

- Work Unit Code 2
- Work Unit Code 2 Description
- Work Unit Code 4
- Work Unit Code 4 Description
- Work Unit Code 5
- Work Unit Code 5 Description
- AVDLR Cost
- Total Consumables Cost

Figure 2 is representative of the query needed to complete a one-year maintenance pull for a specific TMS.

Figure 2



A screenshot of how the data query is constructed in NAMSR. Data Queries must be filtered by Fiscal Year, Type/Model/Series – Aircraft, and Work Unit Code 2. The analyst can focus on WUCs of interest by altering the constraints of the Work Unit Code 2 filter.

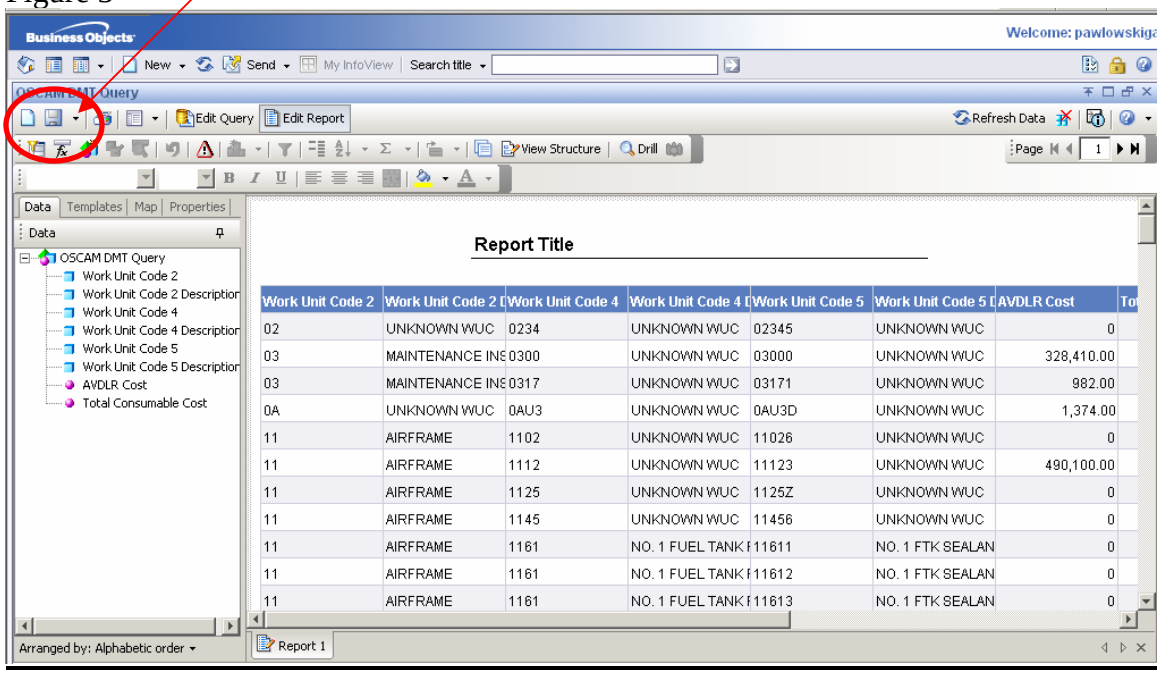
The pull that is generated by the described query is the recommended format to use when queries advance to multiple fiscal years. The results data is then sorted through the use of pivot tables and subsequently transformed into DMT format more readily than if the query was setup in a crosstab format. There are two steps to transferring data from VAMOSC to Excel that will assist in a smooth transition to DMT loadable data.

1. Save the data from VAMOSC onto your computer as an Excel file. This is now an option under the "Save" button drop down as "Save to my computer as"
2. Copy and "Paste Special" the data into the DMT Input Worksheet, available at **www.oscamtools.com**, as values only

Once the VAMOSC query has been successfully completed, there will be a save option presented in the upper left hand side of the VAMOSC navigation window. Figure 3 highlights where the "Save" dropdown is on the VAMOSC report screen.

Save Dropdown

Figure 3



The next step is to manipulate the data into a format that will be recognized by the DMT. To create a file that the DMT will accept, the user can either build their own worksheet or use the template provided at **www.oscmatools.com**. The file, "Data Management Tool Generator.xls", will take the analyst step by step through the process of transforming a VAMOSC query into a DMT dataset automatically through the use of macros. **The OSCAM template has an accompanying user guide that includes a step by step process walk-through (included in this document as Appendix C).**

To create a data file from scratch, follow these steps:

1. Create a blank tab in the workbook where analysis is being performed
2. Open the Excel file that was just created from the VAMOSC query
3. Copy the data from the saved excel file that was just opened, including the data titles.
4. Navigating back to the blank tab, select the "paste special" feature, and paste the copied data as "Values" only

Following these steps will start the importing process and begins with figure 4. Figure 5 highlights what option should be selected in the paste special menu box.

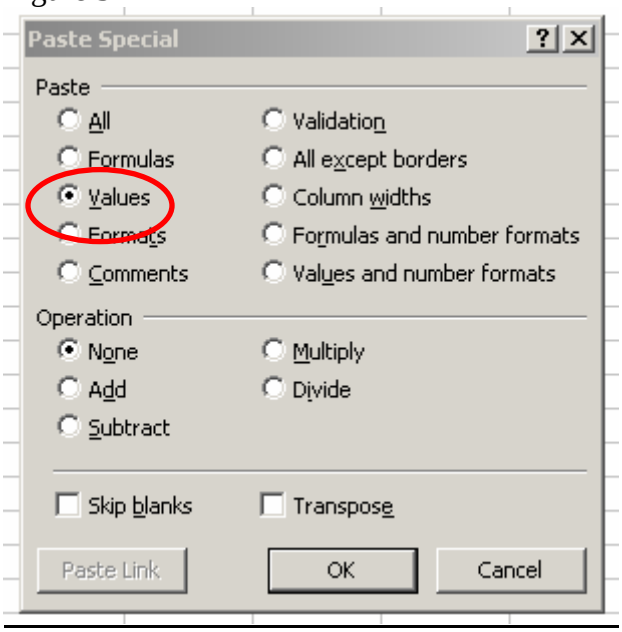
Figure 4 - All Data is Fictitious

Report Title

Work Unit Code 2	Work Unit Code 2	Work Unit Code 4	Work Unit Code 4	Work Unit Code 5	Work Unit Code 5	AVDLR Cost	Total Consumable
02	UNKNOWN WUC	0234	UNKNOWN WUC	02345	UNKNOWN WUC	0	18.66
03	MAINTENANCE IN	0300	UNKNOWN WUC	03000	UNKNOWN WUC	328,410.00	19,487.63
03	MAINTENANCE IN	0317	UNKNOWN WUC	03171	UNKNOWN WUC	982.00	0
0A	UNKNOWN WUC	0AU3	UNKNOWN WUC	0AU3D	UNKNOWN WUC	1,374.00	2.56
11	AIRFRAME	1102	UNKNOWN WUC	11026	UNKNOWN WUC	0	87.87
11	AIRFRAME	1112	UNKNOWN WUC	11123	UNKNOWN WUC	490,100.00	19,530.75
11	AIRFRAME	1125	UNKNOWN WUC	1125Z	UNKNOWN WUC	0	3,240.41
11	AIRFRAME	1145	UNKNOWN WUC	11456	UNKNOWN WUC	0	66.74
11	AIRFRAME	1161	NO. 1 FUEL TANK	11611	NO. 1 FTK SEALAN	0	3.61
11	AIRFRAME	1161	NO. 1 FUEL TANK	11612	NO. 1 FTK SEALAN	0	30.78
11	AIRFRAME	1161	NO. 1 FUEL TANK	11613	NO. 1 FTK SEALAN	0	0
11	AIRFRAME	1161	NO. 1 FUEL TANK	11614	NO. 1 FTK SEALAN	0	64.71
11	AIRFRAME	1161	NO. 1 FUEL TANK	11616	NO. 1 FTK SEALAN	0	24.88
11	AIRFRAME	1161	NO. 1 FUEL TANK	11617	NO. 1 FTK SEALAN	0	43.41
11	AIRFRAME	1161	NO. 1 FUEL TANK	11619	NOC	0	3,200.26
11	AIRFRAME	1162	NO. 2 FUEL TANK	11621	NO. 2 FTK SEALAN	3,747.00	2,677.64
11	AIRFRAME	1162	NO. 2 FUEL TANK	11622	NO. 2 FTK SEALAN	0	9.65

Copy all data to the Clipboard, including the column headings

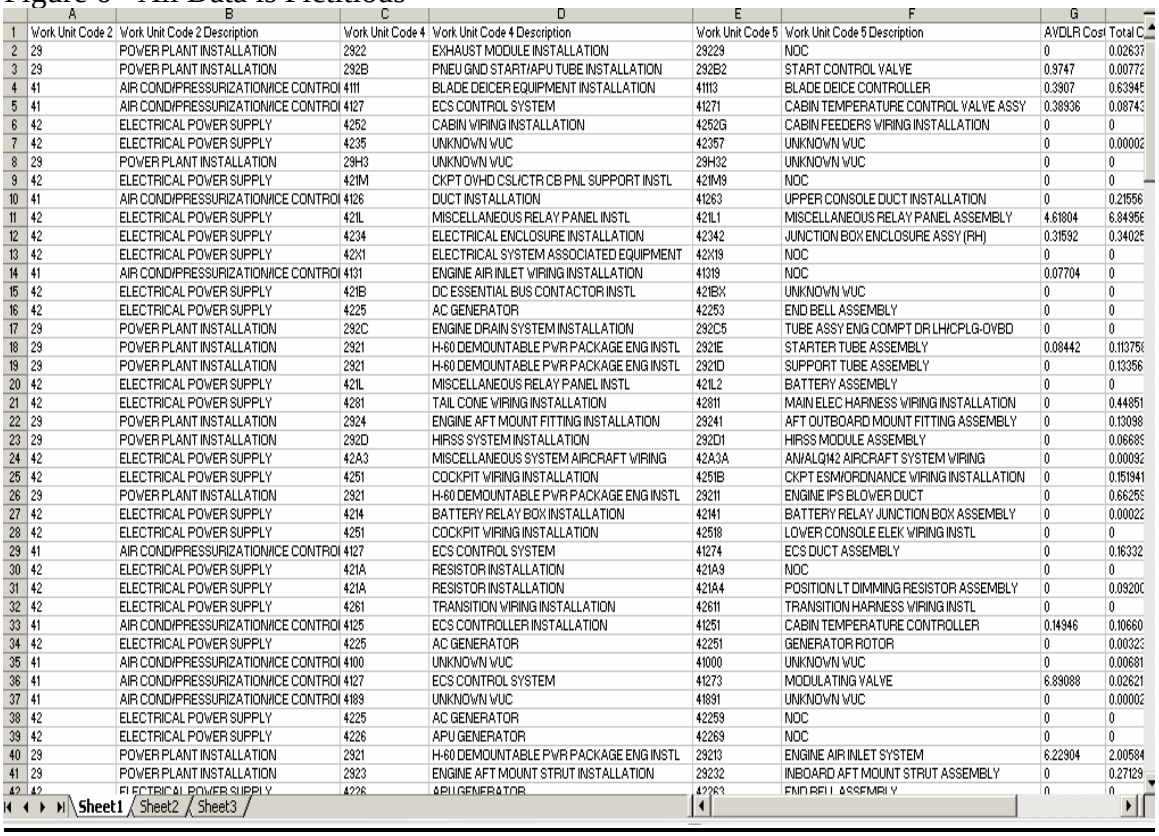
Figure 5 -



Paste the data in as Values, as shown above

The final formatting steps involve translating the AVDLR and Total Consumables Costs into $/FH from $/Yr. Analysts can obtain flight hours for any TMS through a data pull in the ATMSR universe. By taking the total dollars per year figures reported by NAMSR+ and dividing those by the flight hours per year reported in ATMSR the analyst can derive a cost per flight hour. The worksheet can now be converted entirely into the text format that will allow entry into the DMT. The analyst should be left with a table resembling Figure 9. Extremely small numbers may result from the conversion of total costs to costs per FH. When they are converted to text Excel will automatically convert them to scientific notation. In this instance the scientific notation is acceptable. When uploaded into the DMT, the scientific notation will be recognized as number and treated as such. Scientific notation only causes errors when it is found in the WUC designators.

Figure 6 - All Data is Fictitious



	A	B	C	D	E	F	G	
1	Work Unit Code 2	Work Unit Code 2 Description	Work Unit Code 4	Work Unit Code 4 Description	Work Unit Code 5	Work Unit Code 5 Description	AVDLR Cost	Total C
2	29	POWER PLANT INSTALLATION	2922	EXHAUST MODULE INSTALLATION	29229	NOC	0	0.02637
3	29	POWER PLANT INSTALLATION	292B	PNEU GND START/APU TUBE INSTALLATION	292B2	START CONTROL VALVE	0.9747	0.00772
4	41	AIR COND/PRESSURIZATION/ICE CONTROL	4111	BLADE DEICER EQUIPMENT INSTALLATION	41113	BLADE DEICE CONTROLLER	0.3907	0.63945
5	41	AIR COND/PRESSURIZATION/ICE CONTROL	4127	ECS CONTROL SYSTEM	41271	CABIN TEMPERATURE CONTROL VALVE ASSY	0.38936	0.08743
6	42	ELECTRICAL POWER SUPPLY	4252	CABIN WIRING INSTALLATION	4252G	CABIN FEEDERS WIRING INSTALLATION	0	0
7	42	ELECTRICAL POWER SUPPLY	4235	UNKNOWN WUC	42357	UNKNOWN WUC	0	0.00002
8	29	POWER PLANT INSTALLATION	29H3	UNKNOWN WUC	29H32	UNKNOWN WUC	0	0
9	42	ELECTRICAL POWER SUPPLY	421M	CKPT OVHD CSL/CTR CB PNL SUPPORT INSTL	421M9	NOC	0	0
10	41	AIR COND/PRESSURIZATION/ICE CONTROL	4126	DUCT INSTALLATION	41263	UPPER CONSOLE DUCT INSTALLATION	0	0.21556
11	42	ELECTRICAL POWER SUPPLY	421L	MISCELLANEOUS RELAY PANEL INSTL	421L1	MISCELLANEOUS RELAY PANEL ASSEMBLY	4.61804	6.84956
12	42	ELECTRICAL POWER SUPPLY	4234	ELECTRICAL ENCLOSURE INSTALLATION	42342	JUNCTION BOX ENCLOSURE ASSY (RH)	0.31592	0.34025
13	42	ELECTRICAL POWER SUPPLY	42X1	ELECTRICAL SYSTEM ASSOCIATED EQUIPMENT	42X19	NOC	0	0
14	41	AIR COND/PRESSURIZATION/ICE CONTROL	4131	ENGINE AIR INLET WIRING INSTALLATION	41319	NOC	0.07704	0
15	42	ELECTRICAL POWER SUPPLY	421B	DC ESSENTIAL BUS CONTACTOR INSTL	421BX	UNKNOWN WUC	0	0
16	42	ELECTRICAL POWER SUPPLY	4225	AC GENERATOR	42253	END BELL ASSEMBLY	0	0
17	29	POWER PLANT INSTALLATION	292C	ENGINE DRAIN SYSTEM INSTALLATION	292C5	TUBE ASSY ENG COMPT DR LH/CPLG-OVBD	0	0
18	29	POWER PLANT INSTALLATION	2921	H-60 DEMOUNTABLE PWR PACKAGE ENG INSTL	2921E	STARTER TUBE ASSEMBLY	0.08442	0.11375
19	29	POWER PLANT INSTALLATION	2921	H-60 DEMOUNTABLE PWR PACKAGE ENG INSTL	2921D	SUPPORT TUBE ASSEMBLY	0	0.13356
20	42	ELECTRICAL POWER SUPPLY	421L	MISCELLANEOUS RELAY PANEL INSTL	421L2	BATTERY ASSEMBLY	0	0
21	42	ELECTRICAL POWER SUPPLY	4281	TAIL CONE WIRING INSTALLATION	42811	MAIN ELEC HARNESS WIRING INSTALLATION	0	0.44851
22	29	POWER PLANT INSTALLATION	2924	ENGINE AFT MOUNT FITTING INSTALLATION	29241	AFT OUTBOARD MOUNT FITTING ASSEMBLY	0	0.13098
23	29	POWER PLANT INSTALLATION	292D	HIRSS SYSTEM INSTALLATION	292D1	HIRSS MODULE ASSEMBLY	0	0.06689
24	42	ELECTRICAL POWER SUPPLY	42A3	MISCELLANEOUS SYSTEM AIRCRAFT WIRING	42A3A	AN/ALQ142 AIRCRAFT SYSTEM WIRING	0	0.00092
25	42	ELECTRICAL POWER SUPPLY	4251	COCKPIT WIRING INSTALLATION	4251B	CKPT ESM/ORDNANCE WIRING INSTALLATION	0	0.15194
26	29	POWER PLANT INSTALLATION	2921	H-60 DEMOUNTABLE PWR PACKAGE ENG INSTL	29211	ENGINE IPS BLOWER DUCT	0	0.66259
27	42	ELECTRICAL POWER SUPPLY	4214	BATTERY RELAY BOX INSTALLATION	42141	BATTERY RELAY JUNCTION BOX ASSEMBLY	0	0.00022
28	42	ELECTRICAL POWER SUPPLY	4251	COCKPIT WIRING INSTALLATION	42518	LOWER CONSOLE ELEK WIRING INSTL	0	0
29	41	AIR COND/PRESSURIZATION/ICE CONTROL	4127	ECS CONTROL SYSTEM	41274	ECS DUCT ASSEMBLY	0	0.16332
30	42	ELECTRICAL POWER SUPPLY	421A	RESISTOR INSTALLATION	421A9	NOC	0	0
31	42	ELECTRICAL POWER SUPPLY	421A	RESISTOR INSTALLATION	421A4	POSITION LT DIMMING RESISTOR ASSEMBLY	0	0.09200
32	42	ELECTRICAL POWER SUPPLY	4261	TRANSITION WIRING INSTALLATION	42611	TRANSITION HARNESS WIRING INSTL	0	0
33	41	AIR COND/PRESSURIZATION/ICE CONTROL	4125	ECS CONTROLLER INSTALLATION	41251	CABIN TEMPERATURE CONTROLLER	0.14946	0.10660
34	42	ELECTRICAL POWER SUPPLY	4225	AC GENERATOR	42251	GENERATOR ROTOR	0	0.00323
35	41	AIR COND/PRESSURIZATION/ICE CONTROL	4100	UNKNOWN WUC	41000	UNKNOWN WUC	0	0.00681
36	41	AIR COND/PRESSURIZATION/ICE CONTROL	4127	ECS CONTROL SYSTEM	41273	MODULATING VALVE	6.89088	0.02621
37	41	AIR COND/PRESSURIZATION/ICE CONTROL	4189	UNKNOWN WUC	41891	UNKNOWN WUC	0	0.00002
38	42	ELECTRICAL POWER SUPPLY	4225	AC GENERATOR	42259	NOC	0	0
39	42	ELECTRICAL POWER SUPPLY	4226	APU GENERATOR	42269	NOC	0	0
40	29	POWER PLANT INSTALLATION	2921	H-60 DEMOUNTABLE PWR PACKAGE ENG INSTL	29213	ENGINE AIR INLET SYSTEM	6.22904	2.00584
41	29	POWER PLANT INSTALLATION	2923	ENGINE AFT MOUNT STRUT INSTALLATION	29232	INBOARD AFT MOUNT STRUT ASSEMBLY	0	0.27129
42	42	ELECTRICAL POWER SUPPLY	4226	APU GENERATOR	42263	END BELL ASSEMBLY	0	0

Sheet1 Sheet2 Sheet3

All the data has now been properly formatted to be accepted by the DMT. Construction of the DMT template can now be accomplished through the use of pivot tables. Pivot tables are created in Excel, and are used to sort and filter large groups of data into manageable and useful tables. For a tutorial in the use and creation of pivot tables follow the link to the Microsoft Office Online Help Desk, **http://office.microsoft.com/training/training.aspx?AssetID=RC010136191033**. In this case, by creating separate pivot tables for the 2, 4, and 5 WUC, a complete DMT table can be constructed. The need for six tables, 3 each for AVDLRs and Consumables,

exists because the parent-child relationship must be constructed. By creating a separate table for each distinct WUC category, the data can be copied and pasted into one worksheet that can be loaded into the DMT. Figures 7, 8, and 9 show the format that Pivot tables should emulate.

Figure 7 – 2 Digit AVDLR Table - All Data is Fictitious

A10 f_x

	A	B	C	D
1				
2				
3	Sum of AVDLR Cost			
4	Work Unit Code 2	Work Unit Code 2 Description	Total	
5	29	POWER PLANT INSTALLATION	18.08628	
6	36	UNKNOWN WUC	0	
7	41	AIR COND/PRESSURIZATION/ICE CONTROL	28.16088	
8	42	ELECTRICAL POWER SUPPLY	6.82802	
9				
10				
11				
12				
13				

Figure 8 – 4 Digit AVDLR Table - All Data is Fictitious

A3 fx Sum of AVDLR Cost

	A	B	C
1			
2			
3	Sum of AVDLR Cost		
4	Work Unit Code 4	Work Unit Code 4 Description	Total
5	2921	H-60 DEMOUNTABLE PWR PACKAGE ENG INSTL	16.04914
6	2922	EXHAUST MODULE INSTALLATION	0
7	2923	ENGINE AFT MOUNT STRUT INSTALLATION	0
8	2924	ENGINE AFT MOUNT FITTING INSTALLATION	0
9	2925	ENGINE CONTROLS QUADRANT INSTALLATION	0
10	2927	FUSLG NO. 1/2 ENGINE CONTROLS INSTL	0.12246
11	2928	ENGINES MIDSECTION WATER WASH INSTL	0.46608
12	2929	ENG SPEED CONTROL POTENTIOMETER INSTL	0
13	292A	ENGINE START SPEED SWITCH INSTALLATION	0
14	292B	PNEU GND START/APU TUBE INSTALLATION	1.4486
15	292C	ENGINE DRAIN SYSTEM INSTALLATION	0
16	292D	HIRSS SYSTEM INSTALLATION	0
17	292E	WATER WASH INSTALLATION	0
18	29H3	UNKNOWN WUC	0
19	36BY	UNKNOWN WUC	0
20	4100	UNKNOWN WUC	0
21	4104	UNKNOWN WUC	0
22	4111	BLADE DEICER EQUIPMENT INSTALLATION	8.2677
23	4112	MAIN ROTOR DISTRIBUTOR BOX INSTL	5.67834
24	4113	MAIN ROTOR BLADE SLIPRING ASSEMBLY	0
25	4114	TAIL ROTOR BLADE SLIPRING ASSEMBLY	0
26	4116	BLADE DEICE CONTROL PANEL	0.46608
27	4118	COCKPIT OUTSIDE AIR TEMP SENSOR INSTL	0
28	4121	ECS TEMPERATURE CONTROL PANEL ASSEMBLY	0

Figure 9 – 5 Digit AVDLR Table – All Data is Fictitious

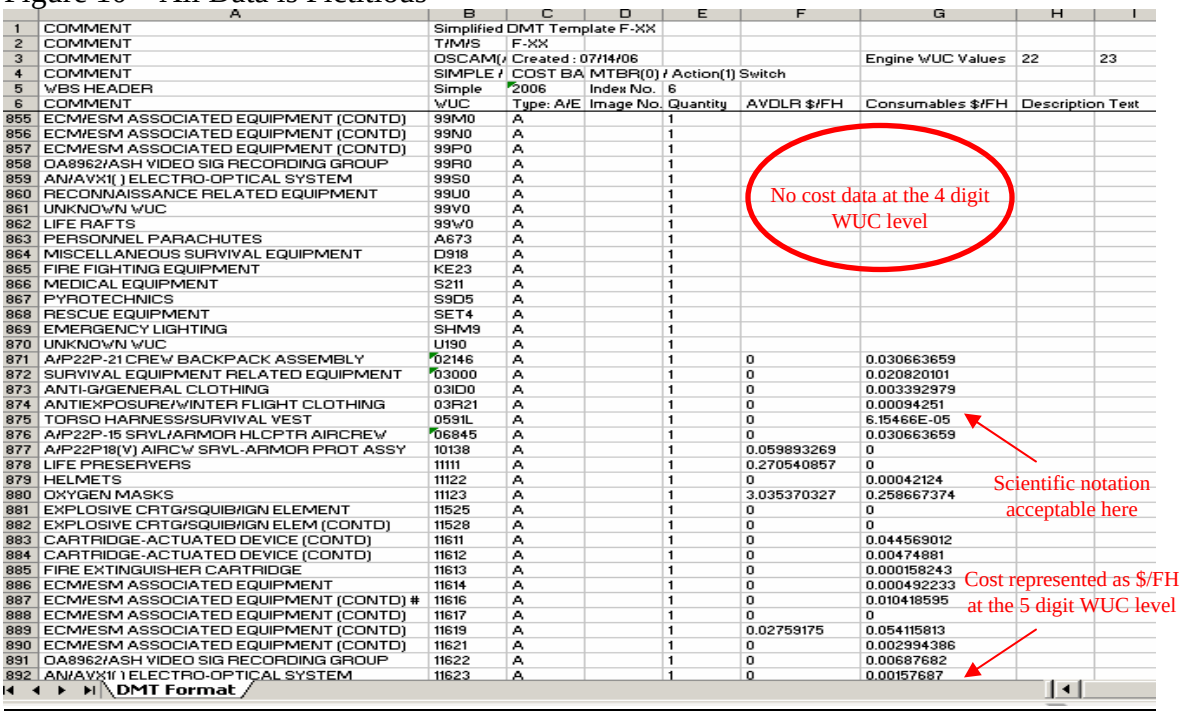
A4 fx Work Unit Code 5

	A	B	C
1			
2			
3	Sum of AVDLR Cost		
4	Work Unit Code 5	Work Unit Code 5 Description	Total
5	29211	ENGINE IPS BLOWER DUCT	0
6	29212	ENGINE ASSEMBLY	0
7	29213	ENGINE AIR INLET SYSTEM	6.22904
8	29214	CLAMP INSTALLATION	0.0591
9	29215	PNEUMATIC STARTER ASSEMBLY	8.36152
10	29216	TAIL PIPE ASSEMBLY	0.03582
11	29217	ENGINE OUTPUT SHAFT ASSEMBLY	1.03878
12	29218	ENGINE AIR INLET CROTCH ASSEMBLY	0
13	29219	NOC	0
14	2921A	FUEL/LUBRICATION SYSTEM LINES INSTL	0
15	2921B	WIRING INSTALLATION	0.24046
16	2921C	DESWIRL DUCT	0
17	2921D	SUPPORT TUBE ASSEMBLY	0
18	2921E	STARTER TUBE ASSEMBLY	0.08442
19	2921F	CENTER BODY	0
20	2921G	ENGINE SUPPORT TUBE	0

Always ensure that WUC code comes prior to WUC description in the pivot table. Placing the description first will lead to unmanageable data tables.

The basic DMT Template can be downloaded at **www.oscamtools.com**. The worksheet "DMT Format" in the Data Management Tool Generator is in proper DMT format. It is important to note that there are formulas present in the "DMT Format" worksheet. Once all data has been populated into the worksheet the analyst will be required to change all formats to text. The final template prior to upload should be a similar format as in Figure 10.

Figure 10 – All Data is Fictitious



	A	B	C	D	E	F	G	H	I
1	COMMENT	Simplified DMT Template F-XX							
2	COMMENT	T/M/S	F-XX						
3	COMMENT	OSCAM(A	Created : 07/14/06				Engine WUC Values	22	23
4	COMMENT	SIMPLE A	COST BA	MTBR(0) /	Action(1)	Switch			
5	WBS HEADER	Simple	2006	Index No.	6				
6	COMMENT	WUC	Type: A/E	Image No.	Quantity	AVDLR $/FH	Consumables $/FH	Description Text	
855	ECM/ESM ASSOCIATED EQUIPMENT (CONTD)	99M0	A		1				
856	ECM/ESM ASSOCIATED EQUIPMENT (CONTD)	99N0	A		1				
857	ECM/ESM ASSOCIATED EQUIPMENT (CONTD)	99P0	A		1				
858	OA8962/ASH VIDEO SIG RECORDING GROUP	99R0	A		1				
859	AN/AVX1( ) ELECTRO-OPTICAL SYSTEM	99S0	A		1				
860	RECONNAISSANCE RELATED EQUIPMENT	99U0	A		1				
861	UNKNOWN WUC	99V0	A		1				
862	LIFE RAFTS	99W0	A		1				
863	PERSONNEL PARACHUTES	A673	A		1				
864	MISCELLANEOUS SURVIVAL EQUIPMENT	D918	A		1				
865	FIRE FIGHTING EQUIPMENT	KE23	A		1				
866	MEDICAL EQUIPMENT	S211	A		1				
867	PYROTECHNICS	S9D5	A		1				
868	RESCUE EQUIPMENT	SET4	A		1				
869	EMERGENCY LIGHTING	SHM9	A		1				
870	UNKNOWN WUC	U190	A		1				
871	A/P22P-21 CREW BACKPACK ASSEMBLY	02146	A		1	0	0.030663659		
872	SURVIVAL EQUIPMENT RELATED EQUIPMENT	03000	A		1	0	0.020820101		
873	ANTI-G/GENERAL CLOTHING	03ID0	A		1	0	0.003392979		
874	ANTIEXPOSURE/WINTER FLIGHT CLOTHING	03R21	A		1	0	0.00094251		
875	TORSO HARNESS/SURVIVAL VEST	0591L	A		1	0	6.15466E-05		
876	A/P22P-15 SRVL/ARMOR HLCPTR AIRCREW	06845	A		1	0	0.030663659		
877	A/P22P18(V) AIRCW SRVL-ARMOR PROT ASSY	10138	A		1	0.059893269	0		
878	LIFE PRESERVERS	11111	A		1	0.270540857	0		
879	HELMETS	11122	A		1	0	0.00042124		
880	OXYGEN MASKS	11123	A		1	3.035370327	0.258667374		
881	EXPLOSIVE CRTG/SQUIB/IGN ELEMENT	11525	A		1	0	0		
882	EXPLOSIVE CRTG/SQUIB/IGN ELEM (CONTD)	11528	A		1	0	0		
883	CARTRIDGE-ACTUATED DEVICE (CONTD)	11611	A		1	0	0.044569012		
884	CARTRIDGE-ACTUATED DEVICE (CONTD)	11612	A		1	0	0.00474881		
885	FIRE EXTINGUISHER CARTRIDGE	11613	A		1	0	0.000158243		
886	ECM/ESM ASSOCIATED EQUIPMENT	11614	A		1	0	0.000492233		
887	ECM/ESM ASSOCIATED EQUIPMENT (CONTD) #	11616	A		1	0	0.010418595		
888	ECM/ESM ASSOCIATED EQUIPMENT (CONTD)	11617	A		1	0	0		
889	ECM/ESM ASSOCIATED EQUIPMENT (CONTD)	11619	A		1	0.02759175	0.054115813		
890	ECM/ESM ASSOCIATED EQUIPMENT (CONTD)	11621	A		1	0	0.002994386		
891	OA8962/ASH VIDEO SIG RECORDING GROUP	11622	A		1	0	0.00687682		
892	AN/AVX1( ) ELECTRO-OPTICAL SYSTEM	11623	A		1	0	0.00157687		

It is important to note on Figure 10 that cost data is only reported at the lowest level of the data pull, in this case the 5 digit WUC. Both the 4 and 2 digit WUCs are entered only as descriptive references. By structuring the data this way a parent-child structure can be created in the DMT where the low-level data automatically aggregates upward to its appropriate parent code.

Excel files cannot be directly loaded into the OSCAM DMT. The version of OSCAM Air that is being used will drive how the data needs to be loaded into the DMT. For users of Version 2.0 the following steps must be taken:

1. The .xls files must first be converted to .wbs files before the DMT will accept the properly formatted data. To accomplish the file conversion the analyst must first ensure that there is only the single tab in the workbook. If there are other tabs present simply copy the tab into a new book.
2. Use the File drop down on the menu bar and choose “Save As”.
3. The intermediary step of saving the .xls file as a .txt, tab delimited file must be taken before the data can be converted to a .wbs.
4. Once in the file is in .txt form, use Windows Explorer to change the file extension from .txt to .wbs.

For users of version OSCAM Air 3.0 only the first three steps need to be taken. Version 3.0 will readily accept .txt files into the DMT.

The process for creating a dataset, either in .wbs or .txt format, which can be loaded into the DMT, is complete. The example just used in this document defines one specific case

to be used in the DMT. Many other, more complex, data pulls can be constructed that will require the analyst to include additional steps when creating their DMT ready datasets. For example, pulling VAMOSC data across multiple fiscal years or including engine cost data that reports to the Type Equipment Code (TEC) rather than the TMS will require creating a representative cost over the number of years pulled and rolling in the additional engine cost data into the TMS cost data. "Data Issues & Concerns" will address the complexities that will need to be addressed by the analyst when creating a DMT dataset.

DATA ISSUES & CONCERNS

The example shown in the "Data Transformation and Upload" section, while valid, does not address issues that the analyst must confront in order to ensure that a WBS contains costs that truly reflect the desired system. The concerns raised in this section are meant to create awareness and provoke thought by the analyst on how to account for the data issues facing the estimating community. General discussion on the data issues will be put forth, but the analyst must research these areas further in order to address them in their own estimates. There are four main topics that must be addressed when using data from the NAMSR or NAMSR+ universes before a dataset can be considered reflective of an entire aircraft. The topics are first listed in brief and then discussed in further detail.

- The data in VAMOSC does not aggregate upward from more specific WUCs (7 or 5 digit) to more general categories (TMS or 2 digits). This means that cost data pulled at the 5 digit WUC level will not roll up and reconcile with cost data pulled at the 2 digit WUC level. The net result is that the lower the level that the analyst is working at, the more risk there is for data exclusion.
- Engine maintenance and cost data is not entirely captured in a TMS pull. Much of the data is reported against the Engine TEC and must be gathered and incorporated separately.
- Engine cost data is reported both to engine specific TECs and a catch-all TEC that houses cost data for similar engines. For example, the P-3C and the EP-3E share variants of the same engine. Roughly 10% of the costs reported against TECs beginning with THN are captured against THNB and THNH, the TECs for the P-3C and EP-3E variants. The remaining 90% is captured in the catch-all TEC THNX and is not traceable back to the P-3C or EP-3E specifically.
- Cost data in NAMSR and NAMSR+ under reports when compared to ATMSR. ATMSR contains a more accurate representation of what the fleet actually spends on AVDLR and Consumables.

Low Level Data Pulls

Analysis performed by the OSCAM Program Management team has shown that for helicopters, cost data reports a lower dollar amount for consumables and AVDLR if it is pulled at the 5 digit WUC and aggregated up to 2 digits as opposed to if the data were pulled at the 2 digit WUC to begin with. Specifically, the study showed "data loss" between 14-54% for consumables and 10-57% for AVDLR. A complete analysis has not been performed for jet or turbo-prop platforms, but initial trends exhibit a similar pattern to that seen in the helicopters. Maintenance reporting in the fleet currently reflects the practice of tying maintenance actions, and their associated costs, to WUCs of any length. The fleet practice leads to costs being allocated directly to higher level WUC codes like the 2 digit. VAMOSC does not employ a methodology to filter down costs reported at the "parent" levels down to the "children". The analyst needs to be aware that if they are feeding low-level data into the DMT in an attempt to define the maintenance costs of a system, they need to make an adjustment to account for the cost data that is reported directly to the "parent" WUCs. It is recommended to limit data pulls to the 5 digit WUC

level. Data degradation becomes severe when pulling at the 7 digit WUC level and defending any methodologies used to account for the "data loss" becomes exceedingly difficult. There are a number of avenues an analyst can pursue to counteract "data loss".

- New "children" WUCs can be created and inserted into the DMT dataset for every "parent" code. The "children" would represent the loss in data from one level of indenture to the next. In other words, the analyst can create a placeholder WUC at the 5 digit level that represents the costs at a 2 digit WUC level less the rolled up costs of its existing 5 digit WUC "children".
- A methodology can be developed to flow "lost data" back to the existing "children" WUCs from the "parent". An example of this would be to analyze what percentage of cost each 5 digit WUC currently represents under its "parent" and spread the "lost cost data" accordingly.

A unique circumstance exists when attempting to roll up consumable costs from VAMOSC. If a query is run to pull consumable costs at the 2 digit WUC, they will not roll up to the cost generated by a query at the TMS level. The TMS level pull will have larger costs than the 2 Digit WUC pull. The driving force of the "lost data" is consumables of record type 67, bin replaceable parts. Bin replaceable parts are consumables that are kept at the maintenance activity that are common to many repairs on the aircraft serviced by that maintenance activity. These parts are issued without a record of a specific WUC, and therefore the parts are charged against the TMS as a whole rather than any specific WUC within the TMS. Generally, there is a 5 to 10 percent discrepancy between a 2 digit WUC query and a TMS query. The same methodologies discussed above can be employed to combat the issue of bin replaceable parts.

Engine Cost Data

In NAMSR and NAMSR+, engine cost and maintenance data is captured and reported separately from the TMS cost and maintenance data. For an analyst to model an entire system (aircraft + engine), multiple queries must be made in VAMOSC. The general structure of the data pull will be nearly identical query in Figure 2, with the only differentiator being the inclusion of either "Type/Model/Series – Aircraft" or "Type Equipment Code – Engine" (Appendix B includes a cross-reference table to link TMS to the appropriate TEC).

The more serious issue concerning the inclusion of engine data is that much of the cost data is bucketed in a "catch-all" engine TEC. All engines have a unique 4 digit engine TEC that identifies them. Variants of the same basic engine have TECs that share the first 3 digits, but are then identified with a unique character in the 4th placeholder. The previous example described the situation of the P-3C and the EP-3E which both use variants of the T56 engine. There are a number of repairs on engine parts that do not track down to the variant level and are therefore recorded at one less level of indenture resulting in VAMOSC recording costs against a TEC ending in the character "X". Depending on whether or not variants of a specific engine type exist, anywhere from 0% to 90% of the cost data can be reported in the catch-all. One possible solution to

allocating the catch-all data would be to allocate costs based on the flight hour distribution between the TMS. However, it is the responsibility of the analyst to develop and defend a methodology to apply the catch-all data to the system being estimated.

NAMSR & NAMSR+ Internal Methodologies

The ATMSR, NAMSR, and NAMSR+ universes all report the expenses incurred by the Fleet for depot level repairables and consumables. However, the costs reported by NAMSR and NAMSR+ are different in significant ways from the output generated in the ATMSR Universe. NAMSR and NAMSR+ use methodologies that are based on maintenance data gathered from the AV-3M database. The AV-3M database pulls data directly from the Maintenance Action Forms (MAF) that are generated in the fleet at the maintainer level as maintenance occurs. The maintenance actions are then cross-referenced against price-files that are created by the VAMOSC Program Management team to generate yearly cost totals. (For a more detailed description, download the NAMSR User Manual from **www.navyvamosc.com**). The ATMSR reports costs using the expenses reported by Commander, Naval Education and Training Command (CNET) and Chief of Naval Operations (CNO) Flying Hour Program (FHP). The methodology employed in NAMSR and NAMSR+ will always underreport AVDLR and consumables cost in comparison to ATMSR. The AVDLR cost discrepancies are driven by the fact that the NAMSR price files are built using net price vice a combination of net price and standard price. Net price is the cost of a repairable if a carcass for the repair is returned. Standard price is utilized when a part can no longer be repaired and a replacement must be ordered or no carcass was turned in. The net result of solely utilizing net price is in the NAMSR universe all repairs have a carcass return associated with them, something that does not happen in reality. When a part is deemed irreparable, a new part must be bought at the higher (standard) price. ATMSR is able to capture both net and standard price repairs because it is reporting actual fleet expenditures and therefore reports higher costs. Analysis has revealed that the discrepancy between universes typically runs between 5% and 20%. The cost reporting difference between ATMSR and NAMSR for consumables is different in nature from the AVDLR variation. Consumables, by definition, are not repaired and therefore are only subject to a standard price when replacement becomes necessary. The main cause of the disparity is that the flying hour cost reports from CNET and CNO contain data such as non-stock numbered materials and supplies which cannot be captured by NAMSR, which reports by NIIN. Further analysis by the OSCAM Program Management team shows differences up to 50% for some TMS. It should be noted that the percentages referred to in this section were developed by aggregating TMS and TEC data, where appropriate.

The data issues involved with working with any data source can vary in complexity and significance. The issues discussed in this document highlight the focus that any analyst will need to give data integrity to ensure sound analysis when utilizing the DMT.

APPENDIX A: ACRONYM LIST

ATMSR	Aviation Type Model Series Report
AVDLR	Aviation Depot Level Repairables
CNET	Commander, Naval Education and Training
CNO	Chief of Naval Operations
DMT	Data Management Tool
FH	Flight Hour
FHP	Flying Hour Program
LCC	Life Cycle Cost
MAF	Maintenance Action Form
NAMSR	Naval Aviation Maintenance Subsystem Reporting
NAMSR+	Naval Aviation Maintenance Subsystem Reporting Plus
NIIN	National Item Identification Number
OSCAM	Operating and Support Cost Analysis Model
RTOC	Reduction of Total Ownership Cost
TEC	Type Equipment Code
TMS	Type/Model/Series
VAMOSC	Visibility and Management of Operating and Support Costs
WUC	Work Unit Code

APPENDIX B: TEC – TMS CROSS REFERENCE

TMS	TEC	Sharing TECs	Sharing Platforms
SH-60B	TYCA	TYCB,TYCC, TYCH, TYCX	SH-60F, HH-60H, MH-60S, CATCH-ALL
SH-60F	TYCB	TYCA, TYCC, TYCH, TYCX	SH-60B, HH-60H, MH-60S, CATCH-ALL
HH-60H	TYCC	TYCA, TYCB, TYCH, TYCX	SH-60B, SH-60F, MH-60S, CATCH-ALL
S-3B	TTEC	No other significant TECs	
P-3C	THNB	THNH, THNX	EP-3E, CATCH-ALL
EP-3E	THNH	THNB, THNX	P-3C, CATCH-ALL
F/A-18A	TXAA	TXAC, TXAE, TXAG, TXAX	F/A-18B, F/A-18C, F/A-18D, CATCH-ALL
F/A-18B	TXAC	TXAA, TXAE, TXAG, TXAX	F/A-18A, F/A-18C, F/A-18D, CATCH-ALL
F/A-18C	TXCA, TXAE	TXCB, TXCX, TXAA, TXAC, TXAG, TXAX	F/A-18D, CATCH-ALL, F/A-18A, F/A-18B, F/A-18D, CATCH-ALL
F/A-18D	TXAG, TXCB	TXAA, TXAE, TXAX, TXCA, TXCX	F/A-18A, F/A-18C, CATCH-ALL, F/A-18C, CATCH-ALL
F/A-18E	T4AA	T4AB, T4AX	F/A-18F, CATCH-ALL
F/A-18F	T4AB	T4AA, T4AX	F/A-18E, CATCH-ALL
EA-6B	JHKB	No other significant TECs	
CH-46E	TJLA	TJLX	CATCH-ALL
AH-1W	TYAD	TYAX	CATCH-ALL
MH-60S	TYCH	TYCA, TYCB, TYCC, TYCX	SH-60B, SH-60F, HH-60H, CATCH-ALL
CH-53E	TNRA, TNSA	TNRB, TNRX, TNSB, TNSX	MH-53E, CATCH-ALL, MH-53E, CATCH-ALL
AV-8B	TURA, TUSA	TURB, TUSB	TAV-8B, TAV-8B
E-2C	THWB, THZA	THWC, THWX	C-2A, CATCH-ALL
UH-1N	TSAB	TSAX	CATCH-ALL
C-130T	THPM	THPA, THPG, THPK, THPL, THPX	LC-130F, KC-130F, KC-130R, KC-130T, CATCH-ALL
LC-130F	THPA	THPG, THPK, THPL, THPM, THPX	KC-130F, KC-130R, KC-130T, C-130T, CATCH-ALL
KC-130F	THPG	THPA, THPK, THPL, THPM, THPX	LC-130F, KC-130R, KC-130T, C-130T, CATCH-ALL
KC-130R	THPK	THPA, THPG, THPL, THPM, THPX	LC-130F, KC-130F, KC-130T, C-130T, CATCH-ALL
KC-130T	THPL	THPA, THPG, THPK, THPM, THPX	LC-130F, KC-130F, KC-130R, C-130T, CATCH-ALL

APPENDIX C – DATA MANAGEMENT TOOL FILE GENERATOR USER DOCUMENTATION

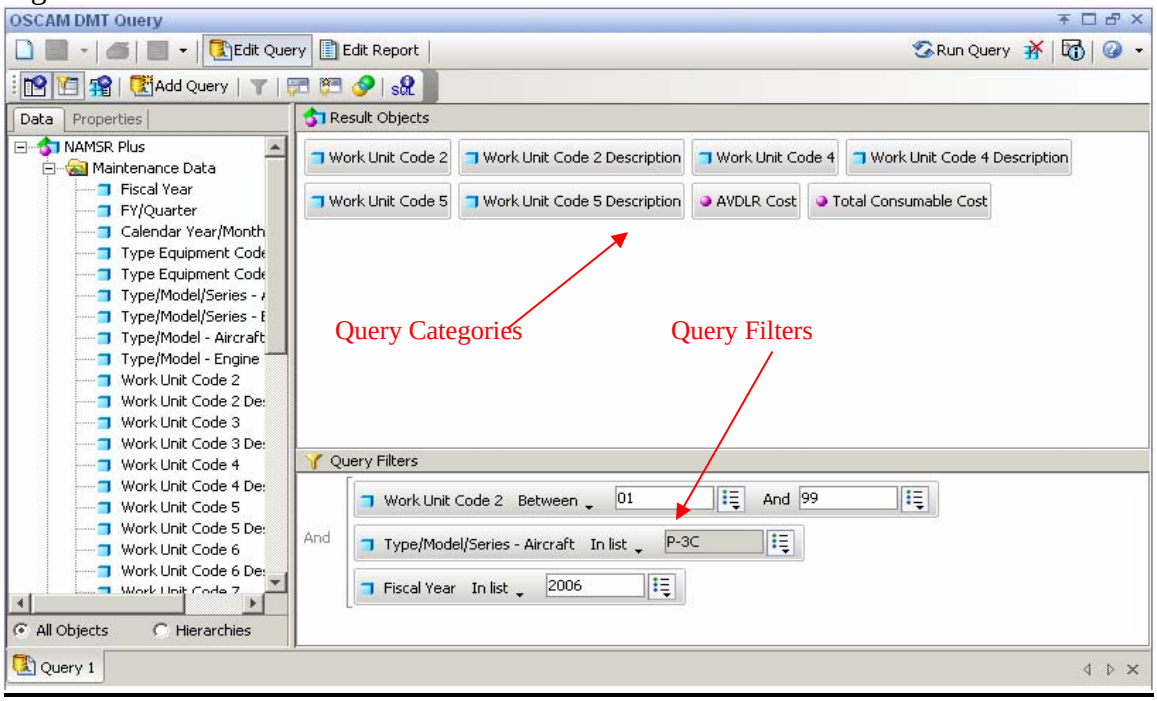
Data Management Tool File Generator User Documentation

The Excel file "Data Management Tool File Generator.xls" is best used as a means to quickly construct a baseline 5 digit WUC Work Breakdown Structure (WBS) for the desired system. Because of the limitations that exist in using data directly pulled from VAMOSC, as discussed in the Simplified DMT Reference Guide, it is best to use this tool to create a roadmap to creating a whole WBS structure complete with cost data. The VAMOSC query should have the following data elements in the following order:

- 2 Digit WUC
- Work Unit Code 2 Description
- Work Unit Code 4
- Work Unit Code 4 Description
- Work Unit Code 5
- Work Unit Code 5 Description
- AVDLR Cost
- Total Consumables Cost

Figure 1is representative of the query needed to complete a one-year maintenance pull for a specific TMS.

Figure 1



A screenshot of how the data query is constructed in NAMSR. Data Queries must be filtered by Fiscal Year, Type/Model/Series – Aircraft, and Work Unit Code 2. The analyst can focus on WUCs of interest by altering the constraints of the Work Unit Code 2 filter.

By saving the data to an Excel file, as previously described in this guidebook, a user can have access to data that can be directly pasted into the Data Management Tool Generator.

The workbook consists of three sheets and a number of macros that are controlled by the four buttons on the lead sheet of the workbook. The sheets that a user will be navigating are "Control", "Source Data", and "DMT Format". The macro buttons are "Run Data Processing", "Run Text Transfer", and "Run NewEntry". Please note that the workbook is built to aid the user to build a .wbs that's lowest level is the 5 digit WUC. It was not built to handle a dataset as large as would be needed to develop a 7 digit WUC structure.

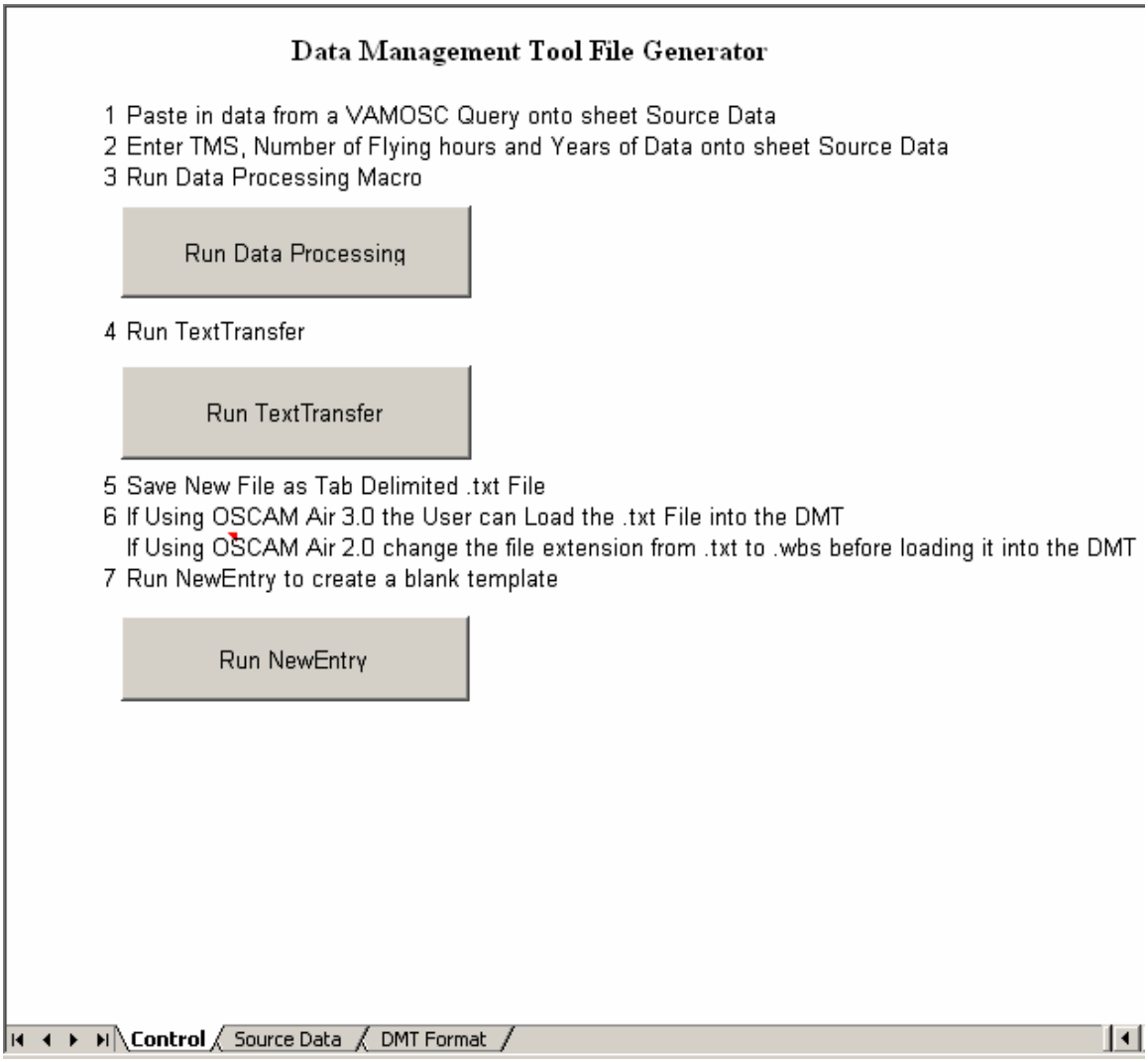
Macro Description – Excel users can utilize the macros by using the buttons on the "Control" worksheet.

- Run Data Processing – The purpose of this macro is to turn the data that was downloaded from VAMOSC into a $/FH cost rather than a $/Yr. This macro also populates the "DMT Format" sheet.
- Run Text Transfer – "Run Text Transfer"will make a copy of the worksheet "DMT Format" and export it to a new Excel workbook and convert it entirely to text format. The user will then only needs to save the new workbook as a .txt file, change the file extension to .wbs, and then load it into the DMT to have a working DMT file.
- Run NewEntry – The purpose of this macro is to prepare the workbook to receive a new .csv file. All relevant fields are reset to blanks and the workbook will return to the original state as it was upon download.

Worksheet Description

- Control – This worksheet is where all macros are run from in the workbook. A step by step process for loading data into the worksheet and into the DMT is also present on the sheet.
- Source Data – The main function of this tab is to enter descriptive data of your data in cells B1, B2, and D1. VAMOSC data can be imported by pasting data directly from VAMOSC query saved as an Excel file
- DMT Format – This is the output sheet that the user will ultimately be loading into the DMT.

Process – Snapshot of the “Control” Worksheet



This process will generate a WBS for the dataset that it was provided.