The purpose of this monograph is to provide insight on useful maintenance data/metrics and their value to maintenance managers and supporting organizations.

It is intended to identify focus areas that will bring the highest return on investment as it relates to mission ready aircraft and the maturation of the maintenance department.

Standard maintenance reports (M-1-6) and the 3M summary are augmented by a maintenance report card and a 6-month planning tool. The below paragraphs will break each one down in detail. The discussion on the 6-month planner will be repeated in the mentoring section.

Accuracy[1]

For any data to be useful, it must be accurate. Optimized Organizational Maintenance Activity (OOMA) is the repository for our maintenance data. The data is used at all levels to support the weapon system. In the past, the supervisory chain of the maintenance department was able to QA the data before it was entered and sent up line. OOMA places that responsibility on the CDI and work center supervisor to ensure that the data is accurate.

Inaccurate data complicates analytical attempts to improve the weapon system or maintenance management process. The end result is reliance on the intuition of the "experience base". This is unacceptable and often counterproductive. This intuition is neither regulated nor duplicated up line. Supporting organizations go searching for their own answers to our problems based on faulty data or their own intuition. There becomes a disparity of information and a conflict of prioritization. Bottomline: It takes longer and cost more money to solve fewer problems with the weapon system.

Figures-1&2 below are comparisons between Aug 2005 and Oct 2005 Non Mission Capable (NMC) Awaiting Maintenance (AWM). Aug was the last data set available before VMX-22 specifically targeted on data accuracy in Oct.

M-3 (Backlog Maintenance) went from 44.3% in Aug to 1.6% in Oct. The increase in M-4 (AWM Off Shift) reflects the reduction in VMX-22's maintenance capability (single shift maintenance) after the transfer of aircraft and personnel to VMMT-204. The disparity in the numbers, assuming available manpower and qualifications per the MMP, indicates that Aug's data is not truly reflective of what was occurring in the maintenance department.

Accurate data is essential to communicate the material condition of the aircraft and capture how the maintenance department's resources are used. This comparison shows

[1] Throughout the MDS, accurate documentation must be a continuous concern. Each uncorrected erroneous document results in a loss of effectiveness of the submitted data and the system in general. Work center supervisors, with the guidance of the analyst, must strive at all times for absolute accuracy. Recurring documentation errors must be recognized and made the subject of the analyst's training program. The importance of accurate and complete data is further emphasized when large scale, Navy wide use of this data is considered. COMNAVAIRFORINST 4790.2 Volume III 1 February 2005

that not all data is accurate. It takes proactive supervision to ensure that accuracy of the data.

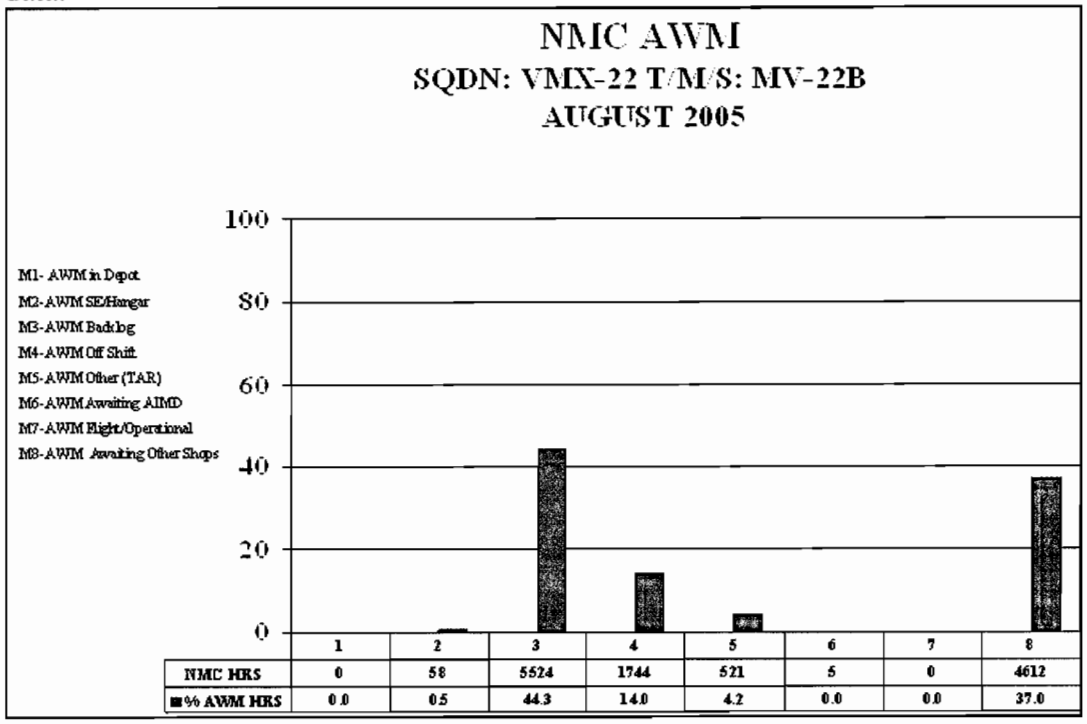


Figure-1

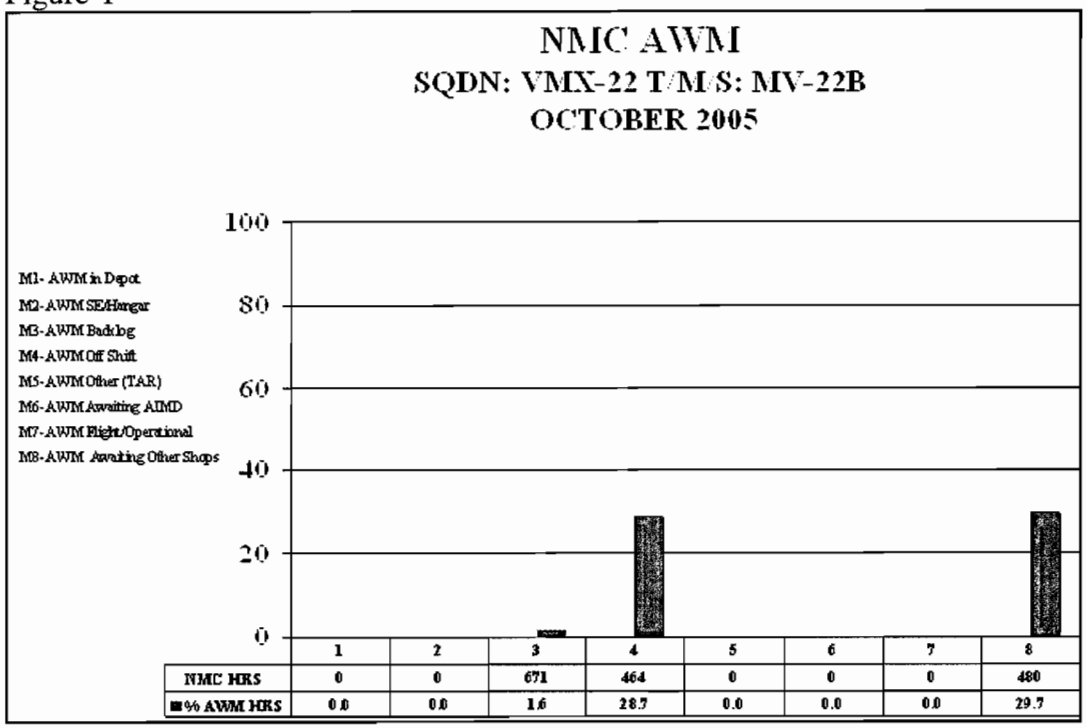


Figure-2

Maintenance and Material Management (3M) Data: "The purpose of the aviation 3M data collection system is to provide information to assist personnel involved in all levels of weapon system design and logistic support to make informed management and investment decisions…Improving upon these readiness drivers requires accurate aviation maintenance data reporting." COMNAVAIRFORINST 4790.2 Volume III 1 February 2005

Of particular interest in the 3M summary is the **Subsystem Capability and Impact Reporting** (SCIR) data from the Maint-3 report. An aircraft accumulates SCIR time when a discrepancy limits the equipment from performing its assigned mission or function during the reporting period. The result is assignment to one of the following categories:

Non-Mission Capable due to Maintenance (NMCM)
Non-Mission Capable due to Supply (NMCS)
Partial Mission Capable due to Maintenance (PMCM)
Partial Mission Capable due to supply (PMCS)

NMCS- From an organizational level perspective the focus is on accurate documentation of supply status. Beyond this it is the supply, logistic and engineering supporting organizations responsibility to meet, predict, and engineer to our requirements.

The breadth and depth of the supply posture reflects provisioning based on expected failure rates. These failure rates are developed through an iterative process of Support Analysis and were based on the Failure Mode Effects and Criticallity Analysis (FMECA's). A business case analysis is applied to the provisioning process to ensure that we provision enough of the right parts and reduce the provisioning of the wrong/unused/defective parts. You can't provision for everything. The cost and the logistic footprint would be unattainable.

Supply shortages occur when parts fail before the planned timeframe or we experience unpredicted failures. The FMECAs were the best guess at the time but the original analysis was based on the combination of fixed wing and rotary wing designs. The process is iterative and is updated as actual data replaces theoretical formulas[2]. This is why system maturity is defined as 60,000 flight hours. Each new technology has its unique challenges and tiltrotor technology does not have the benefit of a predecessor.

The realization that new technology will fail at unpredicted rates requires a supply posture that can effectively react to new demands on the system. This is a delicate balance of push/pull supply.

[2] Support Analysis (SA) is a selective application of scientific and engineering efforts undertaken as part of the system engineering and design process to assist in optimizing logistical support objectives through an iterative process of definition, synthesis, tradeoff, test and evaluation.

NMCM and PMCM traditionally constitute the largest percentage of Mission Readiness impact. Additionally it is the area that maintenance department has the most ability to control. The subcategories are[3]:

M1- AWM in Depot- This is out of the organizational level control.

M2-AWM SE/Hangar- This category is of interest due to support requirements. The direct concern is the extent of SE/Hangar impacts from a shorebased activity. The impacts are likely to be magnified in a shipboard environment with only one operational spread spot in the hangar for MV-22/CH-53 maintenance and a smaller pool of SE gear to manage from.

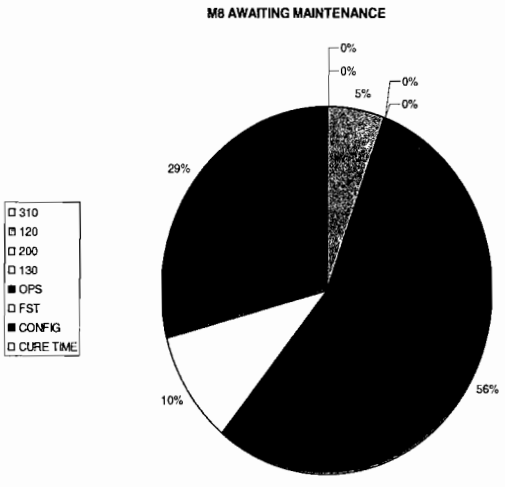
M3-AWM Backlog- This is a management issue. During no-fly periods or light flight schedule period, M3 time may be sacrificed for other non-SCIR maintenance. It must be kept in mind that the majority of maintenance performed is not SCIR related.

M4-AWM Off Shift- Manpower is unavailable due to manning levels or the commands decision to limit work schedule/holidays/weekends.

M5-AWM Other (TAR)- This category is used by the V-22 community to track Technical Assistance Request (TAR) turnaround times. Receipt of the TAR does not fix the technical data. It only provides a response. A Technical Publication Deficiency Request must be submitted and tracked.

M6-AWM Awaiting AIMD- This is out of the organizational level control.

M7-AWM Flight/Operational- This only applies to PMCM. The Mission-Essential Subsystem Matrices (MESM) does not require the degraded component for this specific mission and the Work Order (WO) is AWM because the aircraft is Safe For Flight (SFF) or is flying.



M8-AWM Awaiting Other Shops- Since M-5 is used for TARs M-8 is the catchall. The awaiting other shops would lead you to believe that it is the Facilitate Other Maint/Assist MAFS that is accumulating the time. The Maintenance report card breaks down the individual M-8 work Orders (WOs) and categorize them for trending purposes.

[3] APPENDIX N - Awaiting Maintenance Reason Codes; **COMNAVAIRFORINST 4790.2 Volume III 1 February 2005**

Isolating these categories helps to identify where the biggest return on investments might lie.

Maintenance Report Card: The Maintenance Department Score Card provides additional data than that provided in the 3M summary and draws its data from or expands on the existing Maint-1-6 reports.

Figure-4 chart compares Mission Capable (MC), Full Mission Capable (FMC) and Mission Ready (MR) rates. While the MC and FMC rates are dynamic, Maintenance Control determines MR rates as submitted on the daily AMRR. MR is not an accepted NAMP metric, ***but it is the driving readiness metric.***

> Ready for Tasking (RFT) Aircraft- Although the NAMP refers to RFT aircraft, it does not define it. For our purpose we define a RFT aircraft as a Mission Ready (MR) aircraft that is available for the operational flight schedule and is not undergoing schedule maintenance[4] or awaiting the successful completion of a functional check flight.

The report card concentrates on only the days that the squadron works. The production effort is not penalized for non-workdays. Figure-4 is a modified Maint –1 report broken down by each work day. The information below applies to Fig-4.

MC% = TOTAL EIS HRS - (NMCS + NMCM) HRS /TOTAL EIS HRS X 100

FMC% = TOTAL EIS HRS - (NMCS + NMCM + PMC) HRS /TOTAL EIS HRS X 100

MR% = TOTAL EIS HRS - (NMCS + NMCM + PMC(or selected EOC codes)+ SCHEDULED MAINT+AWAITING TEST) HRS /TOTAL EIS HRS X 100

> PMC hours for the MR rates are adapted for the mission requirements of the flight schedule. PMC for the FMC rate are determined solely by the MESM.

OOMA is the actual hours documented in the system. The difference between DMMH and OOMA hrs is the addition of off aircraft time.

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[4] NOTE: When scheduled inspection requirements do not require a major disassembly of the aircraft or equipment and thus do not affect mission capability, the aircraft or equipment is considered to be mission capable during the entire portion of the look phase of the inspection. However, if panels and equipment are removed to conduct area inspections and cannot be replaced within a 2-hour time frame, then that portion of the inspection will be considered to have impacted mission capability and will be documented using the appropriate EOC code. Mission capability will be impacted and the appropriate EOC code assigned when an aircraft or equipment reaches the maximum operational limit allowed between scheduled maintenance intervals or a condition exists which makes the aircraft or equipment not safely operable until the inspection is complete. OPNAV 4790 Vol III

Projected is a theoretical production limit based on:

Production MOSs X Average OOMA day = DMMHa
DMMHa X average workdays/ month = Monthly DMMHa
DMMHa/ (DMMH/Flthour) = Max Flt hours Avail
The average OOMA day was defined as 6.5.

Figure 5 is a graphical depiction of the OOMA theoretical limit and the actual OOMA production.

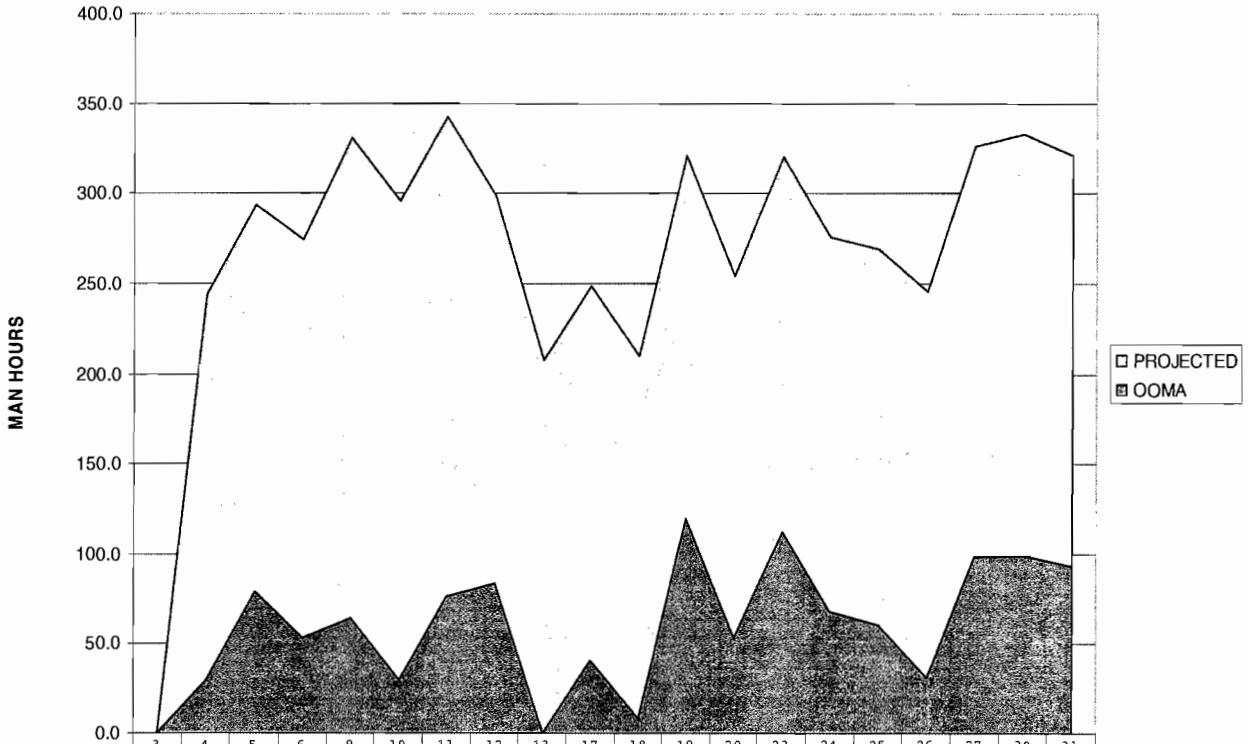
JAN 2006				MAINT MAN-HOURS					FLT HRS		SORTIES	
	MC	FMC	MR	TOTAL ACFT DMMH	DMMH/FLT	TOTAL MAINT DMMH	OOMA	PROJECTED	SCHED	FLOWN	SCHED	FLO
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
4	88.5	88.5	33.3	0.0	4.4	12.9	29.7	214.5	0.0	0.0	0	0
5	85.8	76.9	50.0	131.5	52.6	133.2	79.0	214.5	2.0	2.5	1	2
6	81.6	81.6	50.0	104.8	14.0	104.8	53.3	221.0	7.0	7.5	2	3
9	72.2	72.2	66.7	107.9	9.5	118.4	64.2	266.5	10.0	11.4	4	4
10	77.6	76.2	66.7	113.5	13.7	116.3	29.4	266.5	11.0	8.3	2	3
11	73.6	60.4	50.0	107.7	16.6	111.4	76.0	266.5	11.0	6.5	2	3
12	56.7	41.7	50.0	78.1	15.6	84.6	83.9	214.5	15.0	7.0	3	4
13	50.0	50.0	33.3	2.3	0.7	2.3	0.0	208.0	12.0	10.7	2	2
17	33.9	33.9	33.3	76.3	0.0	79.4	40.7	208.0	5.0	2.1	2	1
18	25.0	25.0	33.3	71.0	14.8	72.0	8.3	201.5	4.0	6.8	3	3
19	40.2	40.0	50.0	112.2	12.1	112.7	119.6	201.5	11.0	9.3	3	3
20	40.0	40.0	33.3	78.9	17.9	78.9	53.2	201.5	4.0	4.4	1	3
23	41.9	41.9	33.3	159.6	0.0	170.3	112.3	208.0	4.0	0.0	1	0
24	58.8	58.8	33.3	140.2	70.1	145.9	67.9	208.0	4.0	2.0	1	1
25	60.4	60.4	50.0	109.9	10.7	112.4	60.9	208.0	8.0	10.3	2	4
26	58.8	58.8	50.0	107.7	18.3	107.7	30.7	214.5	6.0	5.9	2	4
27	50.0	50.0	33.3	144.6	43.8	144.6	98.6	227.5	6.0	3.3	2	2
30	56.1	56.1	16.6	174.0	0.0	174.6	98.8	234.0	4.5	0.0	1	0
31	50.0	50.0	16.6	196.8	0.0	202.1	93.5	227.5	0.0	0.0	0	0
AVG	55.0	53.1	39.2	100.9	15.7	104.2						
						TOTALS	1200.0	4212.0	124.5	98.0	34	42

Figure-4

Figure- 6 depicts the break down of the production hours between scheduled and unscheduled maintenance. This is a graphical representation of the Maint-5 report. On average, scheduled maintenance represents 1/3 or greater of the total maintenance performed. These aircraft are MC/FMC but not MR. The amount of scheduled maintenance required is compounded by the interval. Scheduled inspections are found in the Periodic Maintenance Information Card (PMIC). The most frequent inspection is the 35-hour which take a single shift of maintenance to complete. The PMIC inspections are

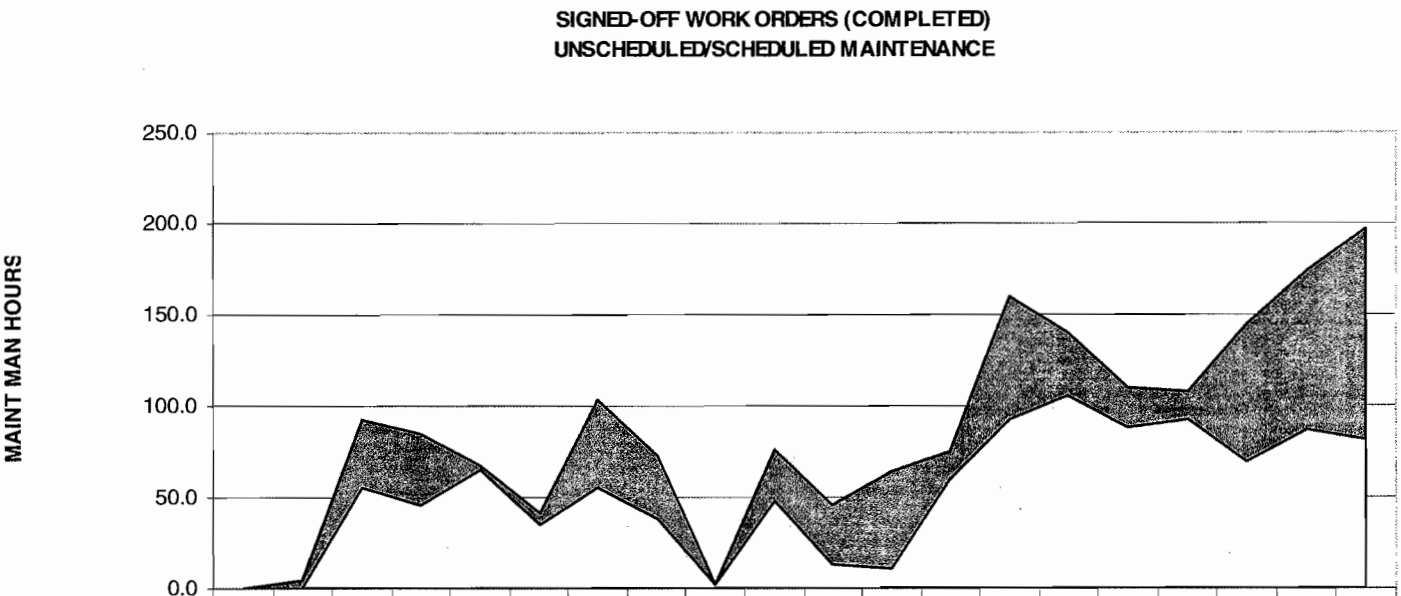
sometimes augmented by special inspections/ERACS/TD incorporation that lengthen the inspection and keep the aircraft from being MR although the MC/FMC numbers do not reflect the impact on the squadron.

Historical note: the 35-hour inspection was originally the daily/turnaround inspection. Early V-22 aircrew and maintainer confidence levels were low and the aircrew/maintainers asked to have the traditional daily and turnaround requirement added to the Maintenance Requirement Card (MRC). The 35-hour inspection grew out of a 1999 incident with the ICDS shaft couplings that had an interim 35-hour inspection requirement. That requirement has long since passed but the 35-hour has remained a growth area with the V-22.



	3	4	5	6	9	10	11	12	13	17	18	19	20	23	24	25	26	27	30	31
PROJECTED	0.0	214.5	214.5	221.0	266.5	266.5	266.5	214.5	208.0	208.0	201.5	201.5	201.5	208.0	208.0	208.0	214.5	227.5	234.0	227.5
OOMA	0.0	29.7	79.0	53.3	64.2	29.4	76.0	83.9	0.0	40.7	8.3	119.6	53.2	112.3	67.9	60.9	30.7	98.6	98.8	93.5

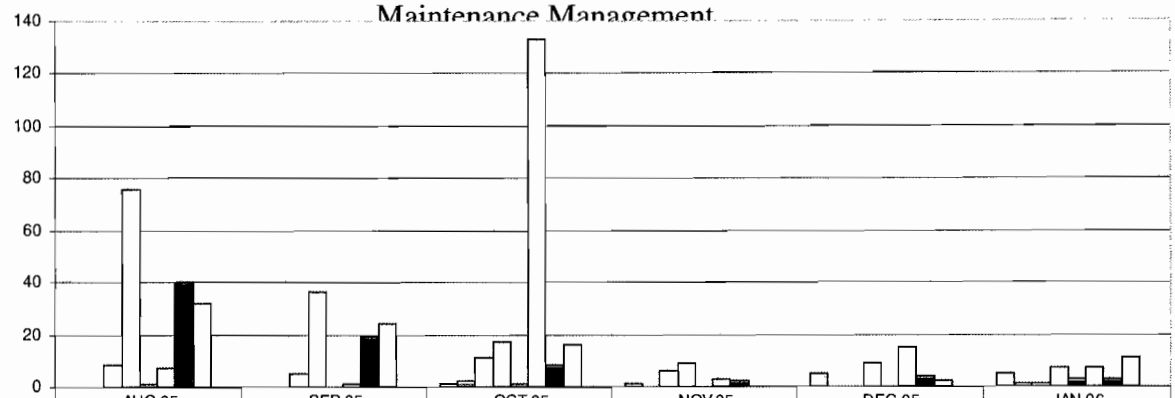
Figure-5



	3	4	5	6	9	10	11	12	13	17	18	19	20	23	24	25	26	27	30	31
SCHED % OF TTL	0.0%	100.0	40.1	46.2	2.8%	14.1	46.5	47.2	0.0%	37.2	72.4	82.8	21.1	42.4	24.5	19.9	14.2	51.9	50.2	58.6
SCHEDULED	0.0	4.4	36.9	39.2	1.9	5.8	48.3	34.3	0.0	28.3	33.1	53.3	15.9	67.6	34.3	21.9	15.3	75.0	87.3	115.4
UNSCHEDULED	0.0	0.0	55.2	45.7	65.1	35.2	55.5	38.3	2.3	47.7	12.6	11.1	59.5	92.0	105.9	88.0	92.4	69.6	86.7	81.4

Figure-6

Fig 7 tracks the squadron's participation in the NAMDRP process. This is essential to ensure that deficiencies are being documented and addressed for future improvements.



	AUG 05	SEP 05	OCT 05	NOV 05	DEC 05	JAN 06
HMR/EI	0	0	1	1	5	5
HMR	0	0	2	0	0	1
EI	8	5	11	6	0	1
TAR	76	36	17	9	9	7
QDR	1	0	1	0	0	3
TPDR	7	1	133	3	15	7
BROKEN PEDD	40	19	8	2	4	3
BROKEN/MISS TOOL	32	24	16	0	2	11
SE MISUSE/ABUSE	0	0	0	0	0	0

Figure-7

The additional reports break down the top drivers by category (TAR/TPDR/EI's/HMR/scheduled/unscheduled maintenance) and UNS. When aggregated, this data can be related to show prioritization by category and UNS to achieve the largest return on investment for MR increases.

Figures-8&9 target the maturation of the maintenance department. A transitioning VMM is designated Core capable in the maintenance department but there is still a maturation requirement. Two maturation metrics for aircrews is flight time and qualifications. Similar metrics for maintainers should be tracked by maintenance time (hands on) and qualifications. The supporting data tracks the actual maintenance by production worker by day for a monthly roll up. This helps to ensure the equitable distribution of maintenance time as appropriate to the training opportunities and billet.

JAN 2006																								TOTALS
NAME	RANK	W/C	3	4	5	6	9	10	11	12	13	17	18	19	20	23	24	25	26	27	30	31	
AN	SGT	120			2.1	5.9	0.4		1.9	1.1		0.2		11.1	1.1	7.7	7.0	5.4	1.5				37.0
BOOHER	LCPL	120							4.9	8.6						0.9	1.1	3.5					23.7
DAVENPORT	GYSGT	120					13.3							5.8			0.8	6.1					40.6
DUNCAN	SGT	120			1.1		13.3		4.9														
LEWIS	CPL	120		1.6	1.6		0.6		3.2	8.6		1.9		11.1	2.8		0.3	5.0	2.0				38.7
MALESHEFSKI	CPL	120		1.6	0.1		2.2		5.0														8.9
MILLER	LCPL	120			1.1				4.3	8.6		1.9		11.5	0.6	4.1	10.7	5.1	2.0				49.9
MOORE	LCPL	120					0.9			1.1		1.7		5.4	0.7	2.6		1.2	1.5				15.1
SHEARER	LCPL	120								2.7		1.9		11.1	0.9	6.1		3.9	1.5				28.1
WAGNER	CPL	120			1.3	1.2	0.9		1.1	1.1				5.3		8.9		4.0					23.8
WESTBROOK	SGT	120			2.4				5.0														7.4
HUDGINS	GYSGT	130		0.8																			0.8
PECK	LCPL	130		13.8			0.4	0.3		6.2		3.6	1.8		2.9				0.6				29.6
PLYLER	LCPL	130		10.7																			10.7
DEFINO	MSGT	200								2.4		1.0			0.2	0.2	1.0						4.8
DOLATO	PFC	200			9.8	9.3	10.9	0.5	0.3	6.8		4.1		0.6	1.2	4.5	6.9	2.9	0.5				58.3
HELMSTAEDTER	SGT	200			2.8		1.9			1.5					4.0	11.1	4.6	2.1	0.5				28.5
JOHNSON	CPL	200															3.8	0.5	0.5				4.8
KAUFMAN	LCPL	200						1.7	4.0	6.8		4.2		2.5	2.5	7.1	3.6	3.7					36.1
LEWIS	SSGT	200														4.6							4.6
PENARANDA	SGT	200			7.8	5.5	1.9	1.7		0.4			0.2	1.3	1.4	2.3		3.7					26.2
SAENZ	LCPL	200												4.7	6.5	4.8	3.8		0.3				20.1
THOMPSON	GYSGT	200														2.3							2.3
TUTTLE	CPL	200			2.5	2.4						2.3		4.6	6.9	6.7	0.8	1.0					27.2
VIERA	LCPL	200			4.4	9.0	8.5	1.7	2.0														25.6
CARNEY	LCPL	230								0.9					0.5		0.6						2.0
JACKSON	SGT	230											0.3										0.3
SINGLETON	CPL	230																	1.5				1.5
BRADY	CPL	310		0.6		4.5		4.1	2.0														11.2
DAYWALT	SGT	310		0.6	4.0		2.8	2.0	4.5	3.3				7.4	4.2			1.8	2.0				32.6
FANDRY	LCPL	310					2.1	1.1	8.0	4.6		6.4	1.5	7.4	4.2			3.9	1.2				40.4
FLEMING	LCPL	310			3.0			0.2															3.2
HORTENSTINE	CPL	310			6.9	5.1			0.2	1.0		2.2	1.5		0.3	9.6	0.2	0.1	4.2				31.3
JAMES	SSGT	310			5.5			4.1	5.0	2.9		1.7						2.1	2.1				23.4
JANKOWSKI	GYSGT	310				2.7																	2.7
JEFFRIES	LCPL	310					1.8	6.8	8.0	2.5			1.5	5.4	2.8	4.5		1.8					35.1
MAHIAI	SSGT	310			3.9												9.5		1.2				14.6
MCQUILLAN	SGT	310			6.9	0.5			4.2						1.1								12.7
NGUYEN	LCPL	310					0.5	5.2		3.8		6.4	1.5	2.0	4.4	3.5		2.1	1.2				30.6
QUEEN	SGT	310			5.5	5.6			0.2					5.4		8.6	0.2		2.2				27.7
SULSER	SSGT	310			1.0				4.2	0.4		1.2				3.5	0.7		1.2				12.2
CUNNINGHAM	SGT	330			2.8	1.6																	4.4
NIELSON	LCPL	330			2.5		0.7																3.2
BAISH	SSGT	020																					0.0
POWLER	GYSGT	020																					0.0
GROSSMAN	CWO4	020																					0.0
MAMAC	SGT	020																					0.0
PHANSIRI	CPL	020																					0.0
POLLOCK	LCPL	020																					0.0
RIDENOUR	SGT	020																					0.0
ROGERS	MSGT	020																					0.0
SKINNER	LTCOL	020																					0.0
TERRELL	SGT	020																					0.0
DOWNEY	SSGT	030																					0.0
ETTINGER	SGT	030																					0.0
FLANAGAN	CPL	030																					0.0
CALVIN	SSGT	040					1.1																1.1
DAWSON	SGT	040																					0.0
MABE	SSGT	040							0.4							1.4	0.8		0.5				3.1
WOOTEN	SSGT	040												7.4	2.4	0.4	0.8		0.5				11.5
LOWERY	CPL	05D																					0.0
MURRAY	CPL	05D																					0.0
THOMAS	SGT	05D																					0.0
MARSTON	SMSGT	DSS																					0.0
			0.0	29.7	79.0	53.3	64.2	29.4	76.0	83.9	0.0	40.7	8.3	####	53.2	112.3	67.9	60.9	30.7	0.0	0.0	0.0	909.1

Figure-8

Figure-9 work center summaries track CDI/QAR sign offs, Daily & Turnaround's (D&T), 14 days (wash rack tows). This helps validate the work center supervisor's execution of his workload distribution while maximizing his training objectives.

NAME	RANK	W/C	PROJ HRS	OOMA HRS	CDQAR	CDQAR SIGN-OFF	CDI	CDI SIGN-OFF	TOW QUAL	14 DAYS	PC	D/T
BRADY	CPL	310	39.0	11.2								
DAYWALT	SGT	310	104.0	32.6			Y	16	Y	4		
FANDRY	LCPL	310	91.0	40.4								
FLEMING	LCPL	310	58.5	3.2							Y	3
HORTENSTINE	CPL	310	104.0	31.3			Y		Y		Y	8
JAMES	SSGT	310	104.0	23.4	Y			8		1		
JANKOWSKI	GYSGT	310	39.0	2.7					Y			
JEFFRIES	LCPL	310	84.5	35.1								
MAHIAI	SSGT	310	65.0	14.6							Y	3
MCQUILLAN	SGT	310	84.5	12.7					Y		Y	5
NGUYEN	LCPL	310	84.5	30.6								
QUEEN	SGT	310	104.0	27.7			Y	8		2	Y	10
SULSER	SSGT	310	104.0	12.2								
CUNNINGHAM	SGT	330	39.0	4.4			Y	1				
NIELSON	LCPL	330	104.0	3.2								

Figure-9

6-month planner

The old cliché that "people don't plan to fail, they fail to plan" has merit. The 6-month planner is a tool that consolidates the maintenance department's plans by individual and by shop. Proper use of this tool will allow you to predict what your MMP will look like for the next 6 months. It also ensures that the necessary training and qualifications are being scheduled. The planner provides work center supervisors a tool to run their shop while communicating the plan department wide for integration, supportability and de-confliction efforts. *This stuff doesn't just happen. You have to plan it and fight to ensure that it gets executed.*

Below are examples of certain worksheet in the 6-month planner workbook.

Figure 10 tracks availability using a color legend for unavailability periods.

Figure 11 tracks Support Equipment (SE) qualifications and list the SE quals required by MOS.

Figure 12 is the MOS roadmap. This tracks individual's attainment and planned goals for MOS training requirements by grade.

Work Center	Rank	Name			MOS	Mar-06																											
		Last	First	MI		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
020	SSgt				6116																												
	Sgt				6156																												
	Sgt				6156																												
	Sgt				6326																												
	Cpl				6046																												
	LCpl				6156																												
	LCpl				6116																												
030	SSgt				6046																												
	Sgt				6046																												
	Sgt				6046																												
	Cpl				6046																												
	Cpl				6046																												
05D	Sgt				6156																												
	Cpl				6116																												
	Cpl				6042																												
130/230	GySgt				6048																												
	Sgt				6531																												
	Cpl				6531																												
	LCpl				6531																												
	LCpl				6048																												
	LCpl				6048																												

Legend
Weekend/Holiday
PFT
Rifle Range
Pistol Range
Gas Chamber
BST/EST
FASO
SE Phase I
[illegible]
Annual Leave
[illegible]
TAD (PME, school, meeting, site survey, etc)
Ordnance Certifications (TM, TL, QASO)
CDI/CDQAR/QAR Qualification

Figure-10

	SE requiring an Operator's License (Reference: COMNAVAIRFORINST 4790.2 Vol V Chapt 17 Fig 17-3)																																	
NAME	MIGHTY MITE	GATORS	ACU-20/M	A/M26M-3	A/M26U-4	A/M27T-3	A/M27T-5	A/M27T-6	A/M27T-7	A/M32-A-108	A/M32C-17	A/M32C-21	A/M32M-18A	A/M32M-24	A/M37M-2	A/M42M	A/M42M-2A	A/M47A-1	A/M48A-5	A/M48M-4	A/S32A-30	A/S32A-30A	A/S32A-31	A/S32A-31A	A/S32A-32	A/S32A-35	A/S32A-36	A/S32A-37	A/S32A-42	A/S32A-44	A/S32K-1D	A/S32M-14	A/S32M-16	A/S32M-17
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
	L																					L							L					
	L				L					L																			L					
	L	L	L		L			I		L						L	I				L	L						L	L					
	L		L							L											L	L							L					
	L	L																																
	L				L					L																								
	L	I						I		I							I																	
	M	M																				M							M					
	M	M																				M							M					
	M	M																				M							M					
	I	I																				M							M					
	M	M																				M							M					
	L	I	I		L					L							L					L							L					
	L									L																			L					
	I	I																																
	L	I	M	I	I					I						M	I					I							M					
		M	M							I						M	M					I							M		M			
	L	M	M	I	I					I						M	M					I							M		M			
	L	I	M	I	I					I						M	I					I							M		M			
	L	I	I	I	I			I		I						M	I					I							I					
	L	I	M	II	II					II						M	M					II							II					

Legend
M: MOS required/No record of training
I: Phase I complete
II: Phase II complete
L: Licensed

MOS	Basic Requirements
6116 Flightline Mechanic	**1,2,3,6,10,14,16,17,22,29,45,56,59,70**
6156 Airframe Mechanic	**1,2,3,5,8,10,16,17,22,29,32,36,37,45,46,56,58,59,70**
6326 Avionics Technician	**10,16,22,29,36,56**
6046 Maint Admin Clerk	**1,2,22,29**
6042 IMRL Manager	**1,2,22,29**
6048 ALSS Mechanic	**1, 2, 3, 4, 16, 17, 22, 29, 36, 45, 46, 68**
6531 Ordnance Tech (OMA)	**1, 2, 3, 16, 17, 22, 29, 31, 36, 45, 46**
6176 V-22 Crew Chief	**1,2,3,6,10,14,16,17,22,29,45,56,59,70**
6072 GSE Hyd/Pne/Str Mech	**1,2,3,4,5,6,8,10,17,20,22,29,32,43,45,46,56,57,59,70**

Figure 11

MOS: 6156, MV-22 Tilt Rotor Airframe Mechanic																	
Ref: TECOM Continuum and MOS Roadmaps at http://www.tecom.usmc.mil																	
Rank	Training Requirement	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name
Pvt - PFC	Recruit training	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	MCT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Aviation Structural Mechanic (N23WSG2)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Aviation Structural Mechanic (O-Lvl)(N23WSH2)	X	X	X	X	X	X		X	X	X	X		X	X	X	X
	MV-22 Airframe Structures (M0568G1)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	NAMP Indoctrination	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	NAVOSH Indoctrination	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	MOJT (MCO P4790.20)	X	X	X	X	X	X		X	X		X					X
	Hydraulic Contamination Analysis Certification		X		X	X	X	X	X	X	X	X	X	2/06	X	X	X
	Tire and Wheel Certification		X		X	X	X	X	X	X	X	X	5/06	4/06	4/06	4/06	X
	Applicable SE Licenses					2/06	X	2/06	2/06	2/06	2/06	2/06	5/06	3/06	3/06	3/06	X
	MCI 0033/34/35 Fundamentals of Marine Corps Leadership (recommended)	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
	MCI 605AP Aviation Maintenance WC Supervisor	X	X			X	X					X	X				
	MCI 606AP Aviation QA Supervisor		X			X	6/06			X		X					
	MCI 0055 HAZMAT/HAZWASTE Marine							X		6/06							
	A Message to Garcia	X				X	X	X	X			X					X
	Rifleman Dodd					X		X									X
	The Killer Angels					X		X									
	The Soldier's Load																
	The Defense of Duffer's Drift	X						X									
	Black Hawk Down					X		X									
	Constitution of the United States							X	X								
LCpl	ITSS/MATMEP Level III				X	X	X	6/06	X	X	X	X					
	FASO VIDS/SCIR Course (D-555-0038)					X											
	FASO DTPL Course (D-555-0023)	X				X	X		X								X
	Commence QA CDI Syllabus				X	X	X		X	X		2/06					
	Commence Enlisted NATOPS APU Turn-up Qualification Training					X	X	X	X	X	X	X	2/06				X
Cpl	Obtain QA CDI Certification				X	X	X		X	X		2/06					
	ITSS/MATMEP Level IV					X	X										
	Obtain APU Turn-up Qualification				X	X	X	X	X	X	X	X	5/06				X
	Commence CDQAR Training Syllabus				X	X	X										
	Aircraft Corrosion Course (C-600-3183)	X					7/06		5/06	6/06	X	8/06					
	Aircraft Paint/Finish Course (C-600-3182)						7/06		5/06	6/06	X	8/06					
	Respiratory Protection Program Management Course (A-493-0072)	X					X				X						
	FASO Naval Aviation QA Course (D-555-0006/0046)					X											
	Aviation Gas Free Engineering Course (C-600-3000)					X											
	FASO Naval Aviation O-Level WC Supervisor Course (D-555-0045/0036)					X											
	FASO Naval Aviation O-Level Maintenance Control Course (D-555-0040)																
	Corporal's Course							X	X		4/06						
	MCI 8010 Sergeant's Distance Education Program	X	X			X	X	X	X	6/06	X	6/06					X
	The Red Badge of Courage					X		X				X					
	Battle Leadership							X									
	With the Old Breed at Pelelieu and Okinawa																
	The Bridge at Dong Ha							X									
	Gates of Fire							X									
	The United States Marines: A History							X									
	The Last Full Measure																
	Flags of Our Fathers							X									
	Fields of Fire																
	Tip of the Spear																
Sgt	Obtain CDQAR Certification					X	X										
	SNCO Academy Sergeant's Resident Course	X				X		X									
	MCI 8100 SNCO Career Distance Education Program	X				X	5/06	X	6/06								4/06

MOS: 6156, MV-22 Tilt Rotor Airframe Mechanic																	
Ref: TECOM Continuum and MOS Roadmaps at http://www.tecom.usmc.mil																	
Rank	Training Requirement	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name
	Safe for Flight Certification	X	3/06														
	FASO ATPL Management (D/E-555-0007)					X	X		X								
	Senior Enlisted Aviation Maintenance Course (C-600-3210)																
	Obtain QAR Certification				X	X											

Figure-12