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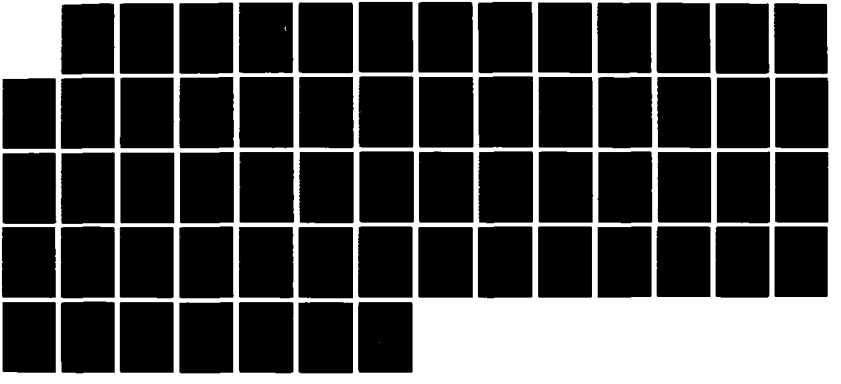

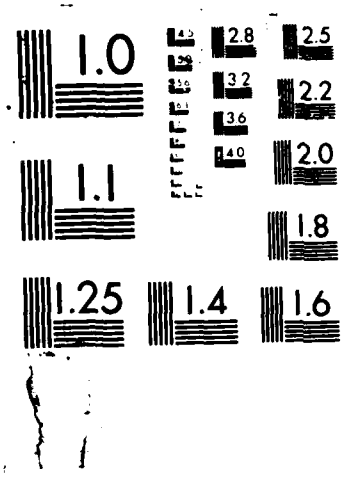
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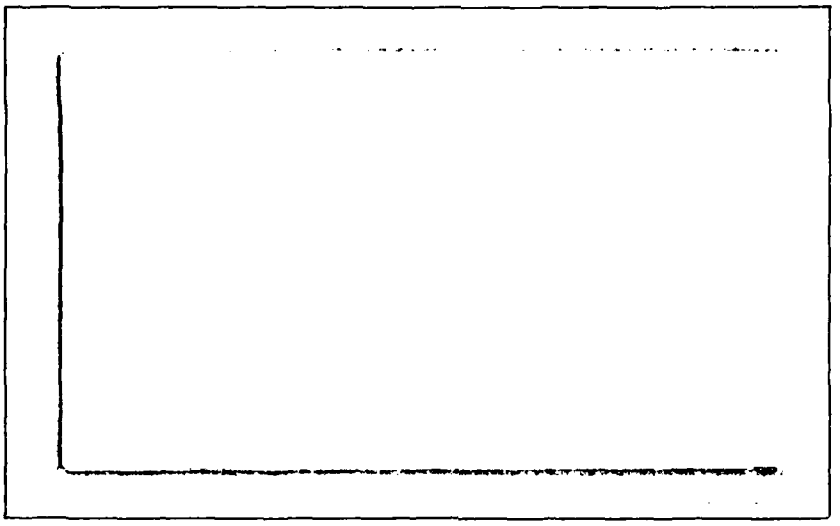

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This study is to identify anomalous conditions, investigate the most significant anomalies, pinpoint the major source of each problem, recommend steps to remedy the most significant anomalies. It contains the results of the study of data from both a test and final run of the C-E system for FY84. This study is intended to provide a background for the development of techniques for monitoring C-E system data quality, and to aid in timely identification and correction of errors in current C-E system products.

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Applied Research in Statistics - Mathematics - Operations Research

COMMUNICATIONS-ELECTRONICS (C-E) SYSTEM:
FY84 DATA QUALITY STUDY

by

Desmatics Staff

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OCT 2 3 1987
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TECHNICAL REPORT NO. 118-11

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TABLE OF CONTENTS

		Page
I.	INTRODUCTION	1
II.	TABLES	4
	A. TMS-NSN TABLE	4
	B. PAS-ORG TABLE	8
	C. OAC/OBAN TABLE	14
	D. UNIT FACTOR TABLE	15
III.	WORK UNIT AN	17
	A. PROGRAM B3	17
	B. PROGRAMS C4 AND C5	20
	C. PROGRAM E1	25
	D. PROGRAM G1	29
IV.	WORK UNIT EX	32
V.	DEPOT MAINTENANCE, REPLACEMENT INVESTMENT, TRANSPORTATION AND PACKAGING	37
	A. MAINTENANCE COST FILE	38
	B. PROGRAM Y4	46
VI.	SUMMARY	54
VII.	REFERENCES	56

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I. INTRODUCTION

Desmatics, Inc., under Contract No. F33600-82-C-0466 is conducting an evaluation of the Communications-Electronics (C-E) subsystem of VAMOSC, the Air Force Visibility and Management of Operating and Support Costs system. The current investigation calls for 1) an identification of significant anomalies in recent C-E data, and 2) the development of data quality parameters for monitoring C-E system data quality.

The statement of work for the first part of this study specifically calls for Desmatics to conduct an examination of recent (FY83 and FY84) C-E system input, intermediate, and output data. The purpose of this examination is to identify anomalous conditions, investigate the most significant anomalies, pinpoint the major source of each problem, and recommend steps to remedy the most significant anomalies.

Desmatics' report on the FY83 C-E system data [4] was completed and approved in June 1986. Following this, a number of changes were made in the system processing based on Desmatics' recommendations. This report contains the results of Desmatics' study of data from both a test and final run of the C-E system for FY84.

As with the FY83 data study, Desmatics made extensive use of the following documents in the study of FY84 data:

C-E System Specification [6]
C-E System Users Manual [10]
C-E System Tutorials [5]
VAMOH Subsystem Specification [7]

A number of input, intermediate, and final output files were obtained for the

study of the FY84 test run data. The final versions of these files, plus some additional ones, were obtained for the study of the data from the final run. The complete set of data files used in the study of FY84 C-E data is listed in Table 1.

The next section of this report discusses the four major tables input to the C-E system: the TMS-NSN, PAS-ORG, OAC/OBAN, and Unit Factor Tables. Section III deals with Work Unit AN, Section IV with Work Unit EX, and Section V with Depot Maintenance, Replacement Investment, and Transporting and Packaging costs. Each of these sections contains a brief statement of the purpose of each test performed, a description of the procedure followed, and the results. Section VI summarizes the findings of the study, and, where applicable, presents recommendations for solving any problems encountered. The last section, Section VII, contains a list of references consulted.

File	Permament File Name
TMS-NSN Table	PJMA2AO
Unit Factor Table	PJMA2CO
OAC/OBAN Table	PJMA2DO
PAS-Organization Table	PJMA3EO
EEIC Table	PJMA3FO
Engineering Cost File	PJMA3HO
Unit TMS File	PJMC5AO
Worldwide Allocation Factors	PJMC5BO
O&S Cost Expenditure File	PJME1AO
Unit Work File	PJMF2AO
C-E ASO Extract File	PIMEEAA
Personnel Data File	PJMB3AO
Assets by Organization	PJMC1BO
Cost Output File	PJMG1AO
Maintenance Cost File	*PJIH1AO
Summed Reportable TMS File	PJIX5AO
Reportable TMS File	PJMXJAO
Application NIIN Cost File	PJMXKAO
Recoverable NIIN Cost File	PJMXLAO
Labor and Material Cost File	PJMXMAO
Mobile Depot Maintenance	PJMXPAO
C-E Inventory File	PJMY2BO
Other Inventory File	PJMY2CO
D041 Format 50 File	PJIY3AO
Recoverable Data Base	PJMYAAO
H036B Four Quarter File	PJIYHAO
Recoverable Cost Data Base	PJMYBAO
Cumulative C-E Base Labor File	PJMM2AO
Base Labor Work 1 File	PJMXBAO
Base Utility Rates File	PJMC2BO
Average Cost File	PJME1CO
C-E MPC Extract (C-E PASs only)	

Table 1. Files Used to Evaluate the Final FY84 C-E Data

* Based on content, assumed to be PJMXTAO

II. TABLES

A. TMS-NSN TABLE

The TMS-NSN Table contains the list of costed C-E equipment by TMS, NSN, SRD and associated base maintenance AFSC. Additional fields contain annual power consumption (KWH) and PMI Hours. A study of the FY84 test and final run C-E TMS-NSN Tables was conducted to determine whether any TMSs were not owned by any organizations in the PAS-ORG Table. The PMI hour and KWH fields in the TMS-NSN Tables were also checked for consistency and validity. In addition, a study was also conducted to determine if multiple records for a TMS on the TMS-NSN Table had the same assigned base maintenance AFSC, and whether all AFSCs on the TMS-NSN Table were current and valid.

Files Used:

TMS-NSN Table - PJMA2A0
Labor and Material Cost File - PJMXMA0
Cost Output File - PJMG1A0
Unit TMS File - PJMC5A0
PAS-ORG Table - PJMA3E0

Procedure:

1. With both test and final run data, the TMS-NSN Table was matched to the Unit TMS File by TMS in order to determine which TMSs are not owned by any organizations on the PAS-ORG Table. For each TMS in the Cost Output File, the Quantity on Hand was summed over PASs owning the TMS. The summed

quantities for each TMS were checked for zeros to determine whether all TMSs in the Cost Output File had reported inventory.

2. The PMI hour and KWH fields in the TMS-NSN Table were checked for inconsistencies for both the test and final runs. TMSs with more than one PMI value reported were checked to determine which value was used in the processing of Base Maintenance Personnel costs. This was accomplished by dividing Support General hours in Table 6-7 by Average Annual Inventory in Table 6-7.

3. The final run TMS-NSN Table, Table 6-7, and the Personnel Data File were all sorted and matched by base maintenance AFSC in order to investigate the validity of TMS-AFSC relationships on the TMS-NSN Table. Consistencies of TMS-AFSC relationships for TMSs with multiple records on the TMS-NSN Table were manually checked.

4. The TMS-SRD relationships on the final run TMS-NSN Table were manually checked for consistency.

Results:

1. Of the 573 unique TMSs in the FY84 test run TMS-NSN Table, 137 had no costed inventory. The FY84 final run TMS-NSN Table contained fifteen TMSs which were neither present in the Unit TMS File nor found to have reported inventory in the Cost Output File. Twelve of the fifteen TMSs are weather equipment which is currently being retained until weather organizations

can be included in the C-E system. The three remaining TMSs are:

TMS	Nomenclature	SRD
FTA013	Manual Telephone Central Office	KD9
GSQ053	Time Signal Set	QAH
GYK019	Radar Course Directing Group	JB4

2. A list containing TMSs with multiple SRDs or NSNs with at least two different PMI values reported in the TMS-NSN Table was provided to the Office of VAMOSC following the test run. Some of these TMSs were deleted from the final run TMS-NSN Table, and PMI values were corrected for some of these TMSs. The following TMSs with multiple SRDs or NSNs had at least two different PMI values reported in the final run TMS-NSN Table:

FGC135	MRC108	TGC028
FRC127V	PRC066B	TRC097A
GPA30	PRC104	TSW007
GRC175	TGC027	TTC022
		UPX014

Support General Hours for TMSs with multiple NSNs or SRDs were derived using the PMI value reported for the first entry of the item on the TMS-NSN Table.

Following the test run, Desmatics provided the Office of VAMOSC with a list of TMSs with multiple SRDs or NSNs having differing KWH values. The TMSs listed below have at least two different KWH values in the final run TMS-NSN Table. In each of these cases, at least one KWH value is zero, but the first entry for a TMS is nonzero:

FGC135	TSC015
FRC127V	TSW007
GPA030	UPA035
GRC175	UPA059
TGC027	UPX014
TGC028	

Two of the TMSs listed above, TGC027 and TGC028, have one entry with a reported KWH value of 99999, and one of zero. The following TMSs with single entries in the final run TMS-NSN Table have a reported KWH consumption of 99999:

FYQ008
TRC089
TRC144
TSC088

3. Three AFSCs on the final run TMS-NSN Table (308X0, 300X0, and 324X0) are not in Table 6-7. On the TMS-NSN Table, AFSC 308X0 is associated with the second of four entries for TMS FTA015. It is apparently a typographical error on the TMS-NSN Table. Base Maintenance Personnel costs for this TMS on Table 6-7 are based on 304X0, the AFSC assigned to the first and all other records for FTA015 on the TMS-NSN Table.

The second AFSC, 300X0, is associated with a single-record TMS, MX8576T, on the TMS-NSN Table. This TMS had both a positive PMI assigned to it on the TMS-NSN Table and corrective labor hours from the D056A system. No Base Maintenance Personnel costs were computed for this TMS because its AFSC, 300X0, was not represented in the Personnel Data File. In a

situation such as this, where there are neither personnel counts nor costs for an AFSC, the Base Labor Allocation Factor is set to zero in Program XD in Work Unit EX, and Base Maintenance Personnel costs will be zero. This is an example of an invalid TMS-AFSC relationship on the TMS-NSN Table. AFSC 300X0 is neither listed as a current or recently replaced AFSC in the FY85 edition of AFR 39-1 [8]. It is either obsolete or a typographical error.

The third AFSC, 324X0, is associated with a single-record TMS, MX9735U, on the TMS-NSN Table. This AFSC is also in the FY84 Personnel Data File, but there were no corrective labor hours reported for this TMS in the D056A system. Base Maintenance Personnel costs are not allocated to TMSs with no reported corrective labor hours in the data files from the D056A system.

4. The final run TMS-NSN Table contained three TMSs with SRDs in the TMS designator field. These records appear on the TMS-NSN Table as follows:

TMS	NSN	NOMENCLATURE
QCM	5985002700963	WHIP ANTENNA SYSTEM
QG2	5411010829193	COMM B SHELTER
QJ7	5410010829190	ANALYSIS/OFFICE SHELTER

B. PAS-ORG TABLE

Desmatics checked both the FY84 test and final run PAS-ORG Tables for accuracy and completeness. Under the current criteria, a C-E organization is

one which has a C-E-related mission, and has a balance of both C-E personnel and equipment.

Files Used:

Personnel Data File - PJMB3A0
PAS-ORG Table - PJMA3E0

Procedure:

1. The FY84 test run Personnel Data File was sorted by PAS and summarized by type of personnel (Operations, Base Maintenance, Administrative, and Supply Support). The total number of TMSs owned by each PAS on the PAS-ORG Table was summed from the Unit Work File. The test run PAS-ORG Table was sorted by organizational type (e.g., Airborne Warning and Control), and the personnel and equipment of each type was examined to determine whether it was an appropriate type to include in the PAS-ORG Table.

   The above procedure was replicated with final run data. The test and final run PAS-ORG Tables were compared, and the types of personnel within each PAS remaining on the final run PAS-ORG Table were analyzed.

2. Both the test run and final run PAS-ORG Tables were checked for accuracy.

Results:

1. Desmatics found a number of PASs on the test run PAS-ORG Table with either C-E operators only or no C-E maintenance personnel. Desmatics also identified certain types of organizations which do not have a balanced mix of C-E personnel and equipment. These include, for example, organizations which are dedicated to testing and training activities. In all, one hundred organizations were determined to be inappropriate. Except for the 13 PASs associated with the 0001 Combat Evaluation Group (deliberately retained by the Office of VAMOSC), all were deleted from the final run PAS-ORG Table. A total of 314 entries were retained on the final run PAS-ORG Table.

   There are 23 PASs on the final run PAS-ORG Table which are assigned five or fewer C-E personnel. A total of ten PASs own only one C-E TMS. Listings of these PASs are contained in Tables 2 and 3. The mix of personnel and equipment in these PASs may be inappropriate for inclusion as C-E organizations on the PAS-ORG Table.

PAS	OPS	MAINT	ADM	SSUP	TOTAL C-E PERSONNEL	TOTAL QOH ALL C-E TMSS
ATOSFYCZ	1	0	2	0	3	4
AYOYFM17	0	5	0	0	5	7
BLOYF5WD	4	0	1	0	5	5
CPOYFQVM	0	1	0	0	1	3
ELOAFFXL	0	1	0	0	1	31
EPOSFH48	1	0	4	0	5	13
GWOSFH5J	1	0	2	0	3	5
HPOYF1P1	0	4	0	0	4	3
INOYFJKL	0	3	0	0	3	4
LSOSFYYX	1	0	2	0	3	7
LSOYFZQL	0	4	0	0	4	11
LYOSFH49	1	0	2	0	3	7
MPOSFH5C	1	0	4	0	5	14
MWOSFH5F	2	0	2	0	4	10
NJOSFH5D	1	0	3	0	4	6
ODOSFH46	0	0	2	0	2	10
OPOSFZBO	1	0	1	0	2	3
RFOSFVGK	1	0	2	0	3	6
RPOYFM85	0	2	0	0	2	4
RPOYFQOO	0	2	0	0	2	5
WEOSFH5H	0	0	3	0	3	10
WEOYFOBZ	0	2	0	0	2	2
WZOSFH47	1	0	3	0	4	7

Table 2: PASs with Five or Fewer C-E Personnel
(FY84 Final Run PAS-ORG Table)

PAS	TOTAL C-E PERSONNEL	OPS	MAINT	ADM	SSUP	TMS	NAME
AXOYFWR9	6	5	1	0	0	MRC117	Radio set
CPOYFJDW	11	7	4	0	0	TTC007	Manual telephone central office
ELOAFOJG	43	0	19	21	3	GSH035	Recorder-reproducer
HBOYFJLH	13	5	6	2	0	FRC148V	Radio set
HVOUFVCQ	54	52	2	0	0	GRC171	Radio set
LKOYFZP7	14	0	12	2	0	FSC078V	Satellite comm. terminal
MLOYPFN1	8	0	8	0	0	MSC054	Comm. central
ODOYFH4M	51	34	14	2	1	FYQ003	Remote comm. central
OPOYF3XT	18	8	7	2	1	R02174P	Radio receiver
TJOYFXS8	8	0	8	0	0	MSC054	Comm. central

Table 3: PASs Owning Only a Single Item of C-E Equipment (FY84 Final Run TMS-NSN Table)

2. Five PASs were found to have duplicate records in the final run PAS-ORG Table:

PAS	ORG
CPOYF3T1	0004CCS70003
CPOYF3T1	0004CIS70003
LPOYFFK7	2151CMN70000
LPOYFFKY	2151ISS70000
LSOYFFS9	2192CMN70000
LSOYFFS9	2192ISS70000
MLOYF4V1	2176CMN70000
MLOYF4V1	2176ISS70000
FXOYFFTR	0005CCS60000
FXOYFFTR	0005CIS60000

These duplications are due to organizational name changes, e.g., from "Communications" (CMN) to "Information Systems" (ISS). Both names were deliberately retained by the Office of VAMOSC in order to capture all equipment from D039 for these organizations.

Six typographical errors were found on the test run PAS-ORG Table, and corrected on the final run PAS-ORG Table as follows:

Incorrect PAS	Correct PAS
PEODFNSW	SJODFNSW
RPODFF76	SJODFF76
BLODFBOH	SJODFBOH
BLODFGJZ	SJODFGJZ
PEODFGJ1	SJODFGJ1
RFODFZ72	SJODFZ72

C. OAC/OBAN TABLE

A study was conducted to determine if all OAC/OBANs on the OAC/OBAN Table have costs in the C-E ASO Extract File. This study was conducted with both FY84 test run and final run OAC/OBAN Tables.

Files Used:

OAC/OBAN Table - PJMA2DO
C-E ASO Extract - PIMEEAA

Procedure:

1. For both the test and final runs, the Reporting OAC/OBANs on the OAC/OBAN Table were matched with those in the C-E ASO Extract File. Records for OAC/OBANs with no H069R costs were extracted for study.

2. The test and final run OAC/OBAN Tables were matched by Reporting OAC/OBAN. Changes made between the test and final run OAC/OBAN Tables were analyzed.

Results:

1. Desmatics found twenty-seven OAC/OBANs in the FY84 test run OAC/OBAN Table with no reported costs in the C-E ASO Extract File. These OAC/OBANs were deleted from the OAC/OBAN Table between the test and final runs.

2. Twenty-seven other OAC/OBANs were added, and an additional 56 deleted between the test and final runs, suggesting that corrections and updates for the final run OAC/OBAN Table were accomplished. However, there are no cost records in the C-E ASO Extract File for the following six Reporting OAC/OBANs on the final run OAC/OBAN Table: 49CM, 49FC, 49HP, 49HQ, 49VA, and 49WC. As discussed in Section II.D, three of these six OAC/OBANs (49FC, 49HQ, and 49VA) also have no PASs associated with them on the Unit Factor Table. These three should be deleted and the remaining three should be validated.

D. UNIT FACTOR TABLE

A study of both the test and final run C-E Unit Factor Tables was conducted to determine if their listed PASs matched those on the PAS-ORG Table, and if their listed OAC/OBANs matched those on the OAC/OBAN Table.

Files Used:

OAC/OBAN Table - PJMA2D0
PAS-ORG Table - PJMA3E0
Unit Factor Table - PJMA2C0

Procedure:

1. For the test run, the PAS and OAC/OBAN of each record in the Unit Factor Table were respectively matched against the PASs in the PAS-ORG Table and

the Reporting OAC/OBANs in the OAC/OBAN Table.

2. The above procedure was repeated with the final run tables to determine if deletions corresponding to those made from the PAS-ORG and OAC/OBAN Tables were made from the Unit Factor Table.

Results:

1. In the test run, each PAS in the Unit Factor Table was present in the PAS-ORG Table and associated with a Reporting OAC/OBAN on the OAC/OBAN Table.

2. The following PAS is on the final run Unit Factor Table but not on the PAS-ORG Table: NJOTFXJ4 (554 Range Group, Nellis AF Base, Nev.). Also, the following PAS is in the PAS-ORG Table but not the Unit Factor Table: NJOSFH5D (1 Combat Evaluation - Radar Bomb Scoring Group, Hawthorne, Nev.). These two PASs will not appear on the Unit Work File and thus the Cost Output File, and costs in each of the 13 cost categories processed by Work Unit AN for items owned by these PASs will be lost.

The following three OAC/OBANs in the OAC/OBAN Table are not associated with any PASs in the Unit Factor Table: 49FC, 49HQ, and 49VA. As discussed in Section II.C, these three OAC/OBANs have no cost records associated with them in the C-E ASO Extract File. These may be either obsolete OAC/OBANs or typographical errors.

III. WORK UNIT AN

Work Unit AN is designed to process information for thirteen C-E system cost categories. These include the four Unit Mission Personnel cost categories (Operations, Base Maintenance, Administrative, and Supply Support), the three Installation Support cost categories (BOS, RPM, and COM), Electric Utilities, Fuel, GDS, and the three Indirect Personnel cost categories (TDY, PCS, and MED). No costs for Operations personnel or Fuel were processed for FY84.

A. PROGRAM B3

In Program B3, C-E personnel records from the C-E MPC Extract Personnel File are selected and classified. Pay and medical costs for these personnel are calculated, appended to the records, and output to the Personnel Data File. Records for Operations, Administrative and Supply Support personnel are accumulated by PAS/FAC combinations for each category. Base Maintenance personnel records are accumulated by PAS and AFSC. Base Maintenance personnel are selected from the C-E MPC Extract Personnel File according to the following criteria [6]: If the FAC is not 2600, 2610, 2620, 35XX, or 38XX, and the AFSC is 3XXXX (except 301X0, 3XXX9, 36200, 307XX or 030XX).

A study of the accuracy of base maintenance AFSCs in the C-E system was conducted. Discrepancies in maintenance AFSCs within C-E processing and their impact on reported Base Maintenance Personnel costs were examined.

Files Used:

Personnel Data File - PJMB3AO
TMS-NSN Table - PJMA2AO
Labor and Material Cost File (Table 6-7) - PJMXMAO

Procedure:

The Personnel Data File, TMS-NSN Table and Table 6-7 were sorted by AFSC. Unique AFSCs from each source were tabulated. The definition of each AFSC [1,8] was examined.

Results:

1. There is a total of 31 unique Maintenance AFSCs in the three FY84 C-E files examined. These are listed by source in Table 4. Twelve of these AFSCs are unique to the Personnel Data File. Four of these, 301X, 302X, 303X, and 305X, are officer codes which apparently are obsolete [8]. Although listed in the selection criteria as exceptions, these four digit codes are nevertheless selected for the Base Maintenance Personnel cost category. Two other AFSCs unique to the Personnel Data File, 352X4 and 362X2, are not cited in the version of AFR 39-1 [1] available to Desmatics.

   AFSC 328X2, also unique to the Personnel Data File, is the duty code for maintenance of Airborne Warning and Control Radar. It is an example of an invalid EAC/AFSC combination which is not recognized as such in C-E processing.

AFSC		EQUIPMENT SPECIALTY	PERSONNEL DATA FILE	TMS-NSN TABLE	TABLE 6-7
301X	*		X		
302X	*		X		
303X	*		X		
305X	*		X		
300X0	*			X	
302X0		Weather	X	X	X
303X1		Air Traffic Control Radar	X	X	X
303X2		Aircraft Control/Warning Radar	X	X	X
303X3		Automatic Tracking Radar	X	X	X
304X0		Wideband Communications	X	X	X
304X1		Navigational Aids	X	X	X
304X4		Ground Radio Communications	X	X	X
304X5		Television	X	X	X
304X6		Space Communications Systems	X	X	X
305X4		Electronic Computer/Switching Systems	X	X	X
306X0		Electronic Comm./Crypto.	X	X	X
306X1	**	Telecommunications Systems	X	X	X
306X2	**	Telecommunications Systems	X	X	X
308X0	*			X	
309X0		Space Systems	X	X	X
316X3		Instrumentation	X		
324X0		Precision Measurement	X	X	
328X2	*		X		
328X3		Electronic Warfare Systems	X		
352X4	*		X		
361X0		Cable/Antenna Systems	X	X	X
361X1		Cable Splicing	X		
362X1		Telephone Central Office Switching	X		
362X2	*		X		
362X3		Missile Control Comm. Systems	X		
362X4		Telephone	X	X	X

* Note: Could not be located [7]

** Note: Changed to 306X3 [1]

Table 4: Base Maintenance AFSCs in FY84 C-E Final Run Files

Of the five remaining AFSCs unique to the Personnel Data File, at least two appear to be legitimate for assignment to C-E personnel. These are 361X1 (Cable Splicing and Installation) and 362X1 (Telephone Central Office Switching Equipment).

One TMS, TTC030 (Electronic Telephone Central Office), is a mobile communications module which interfaces with other telephone equipment [9]. Its assigned AFSC in the TMS-NSN Table is 305X4, the code for Electronic Computer and Switching Systems. This is one example of a possible misassigned AFSC. The proper AFSC for this TMS may be 362X1, the code for Telephone Central Office Switching Equipment.

There are two AFSCs unique to the FY84 TMS-NSN Table, 300X0 and 308X0; these are discussed in Section II.A. It was concluded that they are inaccurate entries in the TMS-NSN Table.

B. PROGRAMS C4 AND C5

One function of Program C4 in Work Unit AN is to match the Assets by Organization File to the TMS-NSN Table by TMS in order to extract the Total Utility KWH figure from the TMS-NSN Table. This figure is used in the calculation of Electric Utilities costs in Program C5, where the Unit TMS File is created. A study of the FY83 Unit TMS File [4] had shown that Electric Utilities costs for some TMSs had been incorrectly calculated as zero, and also that identical Unit TMS Allocation Factors had been output for all TMSs within some organizations. It was postulated that these problems reflected

errors in programming.

Several TMSs on the TMS-NSN Table have multiple records with differing KWH figures. All of these TMSs have at least one zero KWH figure. A study was conducted with test run data to determine if the order in which these records appeared on the TMS-NSN Table affected the processing of Electric Utilities costs.

A study was conducted with final run D039 Format 50 File data to verify the accuracy and consistency of Acquisition Costs, which are reported by NIIN. Since some TMSs are identified by several NIINs, each NIIN may have a different Acquisition Cost. These costs are used in the calculation of the Unit and Worldwide TMS Allocation Factors in Program C5.

The fourth quarter D039 Formats 50 and 100 Files were compared to check the consistency of reported inventories between these two sets of files. The fourth quarter inventory of a TMS on the Format 50 File should be consistent with the inventory of a TMS on the Format 100 File when summed across all owning organizations.

Files Used:

Unit TMS File - PJMC5A0
Base Utility Rate File - PJMC2B0
TMS-NSN Table - PJMA2A0
PAS-ORG Table - PJMA3E0
C-E Inventory File - PJMY2B0
Assets by Organization File - PJMY2A0

Procedure:

1. All records in the FY84 test run Unit TMS File were checked to verify that a unique Unit TMS Allocation Factor had been calculated for each TMS within an organization.

2. Using FY84 test run data, Electric Utilities costs were computed and compared with those in the C-E Unit TMS File. The corresponding Electric Utilities costs of FY83 TMSs were compared. TMSs with multiple records with differing KWH figures for both the FY83 and FY84 test run TMS-NSN Tables were analyzed.

3. The C-E Inventory File was sorted by Acquisition Cost. Records with the ten highest and ten lowest reported Acquisition Costs were extracted for study.

4. The TMS-NSN Table and the C-E Inventory File were matched by NIIN. The TMS designator from the TMS-NSN Table was then appended to the C-E Inventory File records. Records for TMSs with multiple end item NIINs were extracted.

5. The Quantity on Hand for each TMS in the final run Assets by Organization File was summed over all organizations and a temporary file was created. The summed inventories in this temporary file were compared to the fourth quarter inventories in the D039 Format 50 file. Records with nonmatching inventory values were extracted for study.

Results:

1. A unique Unit TMS Allocation Factor for each TMS within an organization was found in the FY84 test run Unit TMS File. This indicates that any programming errors had been corrected between FY83 and FY84. For this reason, the study was not replicated with FY84 final run data.

2. It was found that Electric Utilities costs were calculated as zero for all TMSs with multiple entries on the FY83 TMS-NSN Table in cases where the first record had a Total KWH entry of zero [4]. The FY84 test run TMS-NSN Table was modified so that the first record of multiple records for a TMS had a nonzero KWH field, and nonzero Electric Utilities costs were computed for these TMSs in Program C5. Electric Utilities costs generated by Desmatics with FY84 test run data matched those in the Unit TMS File. For this reason, the study was not replicated with FY84 final run data.

3. Table 5 lists the TMSs with the ten highest and ten lowest Acquisition Costs on the FY84 C-E Inventory File. Two TMSs (GRA006 and GSC037) have a reported cost of zero. One TMS (UYQ014V) has a reported cost of one dollar, and another (TSC062) has a reported cost in excess of 100 million dollars. These four records are obviously anomalous. The remaining records may or may not be anomalous. However, Desmatics does question the inclusion of items in the C-E system with the very low Acquisition Costs that appear in some of these records.

TMS		NIIN	NAME	ACQ COST
TSC062		010662443	Comm Central	$ 110,330,000
GKC001	*	010346197	Satellite Tracking Set	11,250,000
GKC001	*	010346198		11,250,000
GKC001	*	010346199		9,675,000
FYQ005		008750229	Elec Data Comm Central	9,017,000
MST0T1A		011054656	Elec Warfare Training Set	5,925,110
GKC001	*	010346203	Satellite Tracking Set	5,760,000
FSC078V		010079401	Satellite Comm Terminal	5,200,000
TPN019V		004092815	Landing Control Central	4,635,000
FYQ008		008752826	Data Display Central	4,467,000
SSAU060		007807561	Log Periodic Antenna	150
CV0425U		002633326	Telegraph Converter	145
TA312PT		005032775	Telephone Set	119
SSAM263		007283246	Dual Audio Amplifier	100
SSHS051		009472412	Antenna Select Switch	100
SSCA260		008829356	Compressor Amplifier	80
SSIA265		004218212	Intercom Audible Alarm	55
UYQ014V		010036579	Comm Computer	1
GRA006		006444554	Control Group	0
GSC037		010556235	Comm Central	0

Table 5: Items with the Ten Highest and Ten Lowest Reported Acquisition Costs (FY84 C-E Inventory File).

4. There are 62 TMSs on the FY84 C-E Inventory File with multiple NIINs with different Acquisition Costs for some or all of the NIINs. Eighteen TMSs had questionable differences in reported Acquisition Costs for their various NIINs. These TMSs are listed in Table 6. At least three of these TMSs exhibit what appear to be genuine anomalies. These are: FRC165V with two NIINs whose Acquisition Costs differ by a factor of ten, TSC062 with two NIINs whose costs differ by over 109 million dollars, and UYQ014V with one NIIN costing over $370,000 and one costing only one dollar.

3. There are 199 records involving 189 TMS with nonmatching fourth quarter inventories in the D039 Format 50 and Format 100 Files. In many of these records, however, the Format 100 File figures are consistent with Format 50 File figures from one or more of the other three quarters. Items with the worst apparent discrepancies are listed in Table 7. All 10 TMSs with zero Average Annual Inventory have positive inventories in the Format 100 File. In three instances these inventories are substantial: PRC041 (100), PRC047 (195), and PRC066B (651).

C. PROGRAM E1

In Program E1, TDY costs from H069R are summed by OAC/OBAN and output to the C-E O&S Cost Expenditure File. In addition, BOS and COM costs are summed by PEC and output to the Average Cost File.

BOS costs (PEC=xxx96) and COM costs (PEC=xxx95 or PEC=33112 where RC/CC=xx26xx or xx38xx) are obtained from H069R. These costs are summed by OAC/OBAN and PEC in VAMOH and written to the C-E ASO Extract File. BOS costs

TMS	NIIN	ACQ COST
AM6864	5008169331	$ 350
AM6864	5000559679	460
AM6864	5001757782	1186
CV0425U	5002633326	145
CV0425U	5009859088	1000
FCC032V	5008944629	21800
FCC032V	5009136555	125000
FPS077V	0001189661	2000
FPS077V	0009795393	2573
FPS077V	0001300781	4000
FPS077V	0001189660	10000
FPS077V	0008748532	24486
FRC165V	0010282691	36000
FRC165V	0010282692	360000
FTA015	5007547487	2000
FTA015	5009881008	2370
FTA015	5000663808	3175
FTA015	5008565978	12800
GKC001	0010346203	5760000
GKC001	0010346199	9675000
GKC001	0010346197	11250000
GKC001	0010346198	11250000
GMD002	0007531862	29966
GMD002	0009820021	128581
GMQ010B	0006704846	438
GMQ010B	0006704849	1159
GMQ010B	0006704848	1494
GMQ010B	0006704847	2045
GMQ010B	0006704850	2163
GMQ010B	0006510470	7299
GMQ013A	0005575838	$ 3740
GMQ013A	0005812000	5834
GMQ013A	0005575839	8831
GMQ013A	0005514830	18405
GRR024	0001233945	612
GRR024	0010346087	2497
GRR024	0010226392	2566
GRR024	0010288035	2566
GRR024	0010362760	3280
ID1631A	0009371486	200
ID1631A	0001791854	850
M028ASR	5008670275	409
M028ASR	5000453872	2163
M028ASR	5001085505	2250
M028ASR	5000210763	3040
M028ASR	5000210748	12020
TMQ015	0002235098	688
TMQ015	0009916342	2909
TSC062	5004437414	553625
TSC062	5010662443	110330000
TTC030	5002422757	50000
TTC030	5001998746	481500
UYQ014V	0010036579	1
UYQ014V	0010036578	371121
302	5008639649	2668
302	5008639651	8525
302	5008639650	9189
302	5007399615	12850

Table 6: TMSs with Multiple NIINs with Inconsistent Acquisition Costs (FY84 C-E Inventory File)

TMS	NIIN	FORMAT 50 QUARTERS 1	2	3	4	FORMAT 100 SUM
AM6864	000559679	1	1	1	1	6
AM6864	001757782	8	8	8	8	29
CEI9771	008135275	66	68	65	73	82
CV2624	002203623	0	0	0	0	2
FRA086	000561512	317	332	349	277	322
GMQ011	006638084	4	4	4	4	8
GMQ032	010572370	14	14	17	14	6
GRA006	006444554	0	0	0	0	9
GRC171	002498957	2177	2304	1197	2137	988
GRC171	010894566	806	676	491	935	881
GRC175	001345367	210	230	263	194	208
GRC175	005524995	63	61	57	63	5
GRC211	010900614	148	91	40	194	193
GRC212	011327204	0	0	0	0	1
GRM032	009925735	0	1	1	0	1
GSC037	010556235	0	0	0	0	1
GSH13 14	009626782	13	11	12	9	16
GS0080	000451092	128	132	130	128	179
GS0080	009977313	137	136	136	74	116
ID1457G	008249936	0	0	0	0	1
ID1631A	001791854	34	36	37	38	50
MDL 8100	003777020	7	7	7	7	11
MODEL40	010094322	10	6	6	14	8
MODEL40	010230676	103	101	98	105	108
MRC107	004817596	288	288	288	330	344
MRC114	009515441	0	0	0	0	1
MX9735U	004325044	11	11	12	10	15
PRC041	008893997	0	0	0	0	100
PRC047	008613539	0	0	0	0	195
PRC066B	001164467	0	0	0	0	651
RD0217	005520722	92	111	111	70	111
R00240U	000797153	10	10	10	10	13
R00510G	010431586	2	2	1	2	6
R1655URR	001771554	94	101	107	89	101
S389	009880302	0	0	0	0	6
TNH021A	010049007	9	9	10	7	14
TPS068	010591447	2	3	0	2	5
TT637U	004715065	72	74	34	39	53

Table 7: TMSs with Large Differences in Reported Fourth Quarter Inventories in the D039 Format 50 and Format 100 Files (FY84).

are passed to the C-E ASO Extract File as PEC=00096, and COM costs as PEC=00095 or 00012.

COM costs for FY84 were developed similarly to BOS costs: COM costs were summed from the C-E ASO Extract File and output to the Average Cost File, where a worldwide COM cost per person is computed. This cost per person is then applied in Program G1 (discussed in Section III.D.) to personnel counts at each C-E organization, and allocated to TMSs with the Unit TMS Allocation Factor.

A study was conducted to determine if the processing of TDY costs is working as intended, and if BOS and COM costs are summed correctly to the Average Cost File.

Files Used:

OAC/OBAN Table - PJMA2D0
C-E ASO Extract File - PIMEEAA
Average Cost File - PJMB3C0

Procedure:

1. Program E1 was replicated with FY84 final run data, and the O&S Cost Expenditure File created by Desmatics was compared to the one produced by the C-E system.

2. BOS and COM costs from the C-E ASO Extract File were summarized and compared with those in the Average Cost File.

Results:

1. The O&S Cost Expenditure File created by Desmatics was identical to the one created by the C-E system, indicating tha TDY costs are computed as intended in Program E1. Desmatics found 341 records with negative cost amounts which reflect reimbursements to previous cost charges in H069R. Fuel costs were carried through to the O&S Cost Expenditure File for FY84, but not further due to the lack of a functional algorithm for the allocation of these costs.

2. The total BOS cost and COM cost in the Average Cost File were found to be identical with costs computed by Desmatics.

D. PROGRAM G1

In Program G1, the last major program in Work Unit AN, costs are allocated to TMSs in thirteen categories and output to the Cost Output File. In Desmatics' previous study of Program G1 with FY83 data [4], it was found that costs for all categories were processed by the C-E system as intended except for the following: Fuel, COM, and TDY. Fuel costs were not computed for FY84.

Three problems had been found in the FY83 analysis of TDY: 1) TDY costs were not always summed correctly over CAIG Cost Account Code, 2) The PAS Allocation Factor, which relates the total number of personnel at a PAS to the total number of personnel at all PASs within an OAC/OBAN, was not correctly computed when there was more than one PAS per OAC/OBAN, and 3) a single TDY

cost amount was repeatedly allocated to each TMS owned by all PASs within an OAC/OBAN. Each of these problems reflects programming errors.

A study was conducted to determine if these programming errors in Program G1 were corrected for FY84. In addition, a study was conducted to determine whether the new COM cost method, similar to the BOS cost method, had been implemented properly.

Files Used:

Unit Work File - PJMF2A0
O&S Cost Expenditure File - PJME1A0
Average Cost File - PJME1C0
Cost Output File - PJMG1A0

Procedure:

1. Program G1 was replicated in part to produce COM costs, which were then compared to those costs in the Cost Output File produced by the C-E system. Desmatics used the Unit TMS Allocation Factor and personnel counts in the Unit Work File, and the COM cost per person in the Average Cost File.

2. Program G1 was also replicated in part to produce TDY costs, which were then compared to those in the Cost Output File. Unit TMS Allocation Factors and personnel counts used in the computation of PAS Allocation Factors were obtained from the Unit Work File. TDY cost records (CAIG Cost Account Code 306.2) were extracted from the O&S Cost Expenditure

File.

Results:

1. COM costs developed by Desmatics were identical to those in the Cost Output File produced by the C-E System.

2. The TDY costs computed by Desmatics were identical to those in the Cost Output File, indicating that the programming errors which had been found in the FY83 study had been corrected.

IV. WORK UNIT EX

Work Unit EX is composed of programs which build a series of data tables culminating in the production of the Maintenance Cost File. This section deals only with that part of Work Unit EX in which Base Maintenance Personnel costs are computed: Programs XB and XD. These two programs were examined to verify that they are working as intended.

In Program XB, corrective labor hours from the Cumulative C-E Base Labor File are summed over SRD to the TMS level, generating the Base Labor Work 1 File. In Program XD, Support General hours, Base Labor Allocation Factors and Base Maintenance Personnel costs are computed. Support General hours for a TMS are computed by multiplying the Average Annual Inventory and PMI hour figures from the Summed Reportable TMS File. For a given TMS, the numerator of its Base Labor Allocation Factor is the sum of its Support General hours and corrective labor hours. The denominator is the product of the number of personnel in the Personnel Data File with the AFSC assigned to that TMS times the average annual available duty hours for a C-E maintenance person.

Files Used:

Labor and Material Cost File (Table 6.7) - PJMXMA0
Summed Reportable TMS File - PJIX5A0
Cumulative C-E Base Labor File - PJMMC2A0
Base Labor Work 1 File - PJMXBA0
TMS-NSN Table - PJMA2A0
Personnel Data File - PJMB3A0

Procedure:

1. Corrective labor hours from the Cumulative Base Labor File were summed over SRD to the TMS level. Corrective labor hours summed by Desmatics were then matched by TMS to the Base Labor Work 1 File. Corrective labor hours from the Base Labor Work 1 File were matched by TMS to Table 6-7 to verify that they were transferred to this table properly.

2. Support General hour computations were checked by multiplying PMI hours from the TMS-NSN Table by the Average Annual Inventory in Table 6-7. Also, Table 6-7 was checked for zeros in the Support General hour field. If zeros were found then the Average Annual Inventory and PMI hours were checked to determine the source of the zeros.

3. Using Table 6-7, the Base Labor Allocation Factors were computed by adding Support General hours and corrective labor hours and dividing this sum by AFSC manhours. Labor costs allocated to each TMS were checked by multiplying its Base Labor Allocation Factors by its AFSC costs.

4. The TMS-NSN Table was matched to the Personnel Data File by AFSC. TMSs with AFSCs on the TMS-NSN Table but not on the Personnel Data File were then matched to the Base Labor Work 1 File to determine if corrective labor hours were reported for them. If corrective labor hours were reported for these TMSs, Table 6-7 was examined to determine if labor costs were computed for them.

Results:

1. Corrective labor hours from the Cumulative Base Labor File are correctly summed to the TMS level in program XB and transferred to Table 6-7 appropriately in Program XD.

2. Support General hours are computed correctly. However, 68 TMSs have no Support General hours reported in Table 6-7. For 61 of these TMSs, this is due to reported PMI hours of zero in the TMS-NSN Table. Five additional TMSs have reported Average Annual Inventories of zero. The two remaining TMSs have both PMI hours and Average Annual Inventories of zero. The seven TMSs with reported Average Annual Inventories of zero are:

TMS	Corrective Labor Hours	Allocated Costs
GRA006	70.7	785
GRC212	9848.6	109449
GSC037	6882.9	85113
MRC114	109.0	1251
PRC041	91.2	1013
PRC047	393.1	4368
PRC066B	1611.9	17912

It may be legitimate to have a reported PMI value of zero. However, the legitimacy of TMSs with Average Annual Inventories of zero is questionable, especially since the seven TMSs listed above have positive QOH in the D039 Format 100 File (see Section V).

3. Base Labor Allocation Factors are processed as intended. However, Base Labor Allocation Factor are not calculated for TMSs when no Corrective

Labor hours are reported in the Base Labor Work 1 File. This occurs even when a TMS has PMI hours reported in the Summed Reportable TMS File. This is because the Summed Reportable TMS File and the Base Labor Work 1 File are matched on TMS and only data for matched TMSs is accumulated for Table 6-7. Ninety-four TMSs having PMI hours had no labor costs allocated to them because corrective labor hours were reported as zero. These are shown in Table 8. For those TMSs with corrective labor hours (434), labor costs were allocated correctly.

4. There are two AFSCs (300X0 and 308X0) in the FY84 TMS-NSN Table which are not in the Personnel Data File. As discussed in Section II.A., AFSC 308X0 is apparently a typographical error since its associated TMS, which has multiple records on the TMS-NSN Table, has another assigned AFSC which is used in processing base labor costs. AFSC 300X0 is associated with TMS MX8576T in the TMS-NSN Table.

   This TMS has corrective labor hours of 21.5 reported in the Base Labor Work 1 File and PMI hours reported as 50.0 in the TMS-NSN Table. No labor costs were allocated to this TMS since there is no record for its assigned AFSC in the Personnel Data File.

TMS	TMS	TMS
118 1	GRN026	SSIA523A
1469011	GSC029	SSLL024
2PTFB15	GYK019	SSLV082
74B1	GYM014	SSLV094
AL0025	IP0991UR	SSLV912
ASL105	IP1125	SSMG330
C08904G	IP1207UR	SSRC137
C10524	J3577G	SSTD290
C10736	J3578G	SSTS831
C9884U	J3639G	SSTU854
CP1403	MA0005	SSVA475
CPS009	MD1066G	SSVA477
CU2174G	MOD 2003	SSVC815
CU2175G	MPN013B	SSVS833
CU2176G	MPQ00T2	TCI503
CV0591A	MU0698G	TCI623
CV1689G	000926	TD0570
CV2624	001770G	TD0687
CV3260UR	01756G	TD922AV2
CW1154G	OZ11A/TS	TD983U
EV0007	PNA2BSS	TDM101
FCC097	PNA7SS	TFC101
FGC134	QCM	TFC212
FRA037	QG2	TMQ025
FRC171V	R2131V6	TS1671G
FRR075	RP237G	TS2606
FSA082	SA2045	TS3645VG
GGC015V7	SSDU063	TSQ096
GGC15V6	SSER618	TT289
GMQ010B	SSHM276	TTC028
GPA127	SSHS051	UGC050
		UTH002

Table 8. TMSs with Reported PMI Hours (TMS-NSN Table), No Reported Corrective Labor Hours (D056A), and No Reported Base Maintenance Personnel Costs (FY84).

V. DEPOT MAINTENANCE, REPLACEMENT INVESTMENT, TRANSPORTATION AND PACKAGING

Depot Maintenance, Replacement Investment, and Transportation and Packaging costs are all allocated with Recoverable Allocation Factors (RAFs). The RAFs and the costs for these three categories are developed in a series of programs in Work Units Y2, Y3 and EX.

Work Unit Y2 consists of a group of programs in which components of [illegible] are identified, Recoverable Allocation Factors are computed, and the Recoverable Data Base File is built. This file contains records [illegible] item NIIN and all recoverables identified for that NIIN with [illegible] for each. Also included are the base condemnations, depot condemnations, [illegible] unit prices of the recoverables, and the Average Annual Inventory [illegible] application (end item) NIINs.

Work Unit Y3 consists of only one program, YB (Build Depot [illegible]). In Program YB, depot maintenance (program) costs and production quantities for each end item and recoverable NIIN in the Recoverable Data Base are extracted from the H036B Four Quarter File and appended to their records to produce the Recoverable Cost Data Base File. Zeros are appended to records with no match in the H036B File.

The Depot Maintenance costs in the Recoverable Cost Data Base file are allocated in Program X8 (Build Table 3-4) in Work Unit EX. Replacement Investment costs are also computed and allocated in this program. Transportation and Packaging costs are computed in the next program in Work Unit EX, XA (Build Table 5).

This section deals with a study of input, intermediate and output data

related to these three cost categories. Also, Program Y4 in Work Unit Y2 was replicated. In this program recoverables for end items in the C-E Inventory File are identified, and their RAF numerators are computed. Processing was not replicated beyond this point because of the lack of intermediate C-E files necessary for identifying the cause of discrepancies between files generated by Desmatics, and those generated by the C-E system. These studies were done in order to trace, as far as possible, the sources of the large number of zeros reported for Depot Maintenance, Replacement Investment, and Transportation and Packaging costs in the FY84 C-E O&S Cost Reports.

A. MAINTENANCE COST FILE

The Maintenance Cost File is produced in Program XI in Work Unit EX. This is the last program involved in the development of total costs for the five Logistic Support Cost (LSC) categories: Depot Maintenance, Replacement Investment, Transportation and Packaging, Maintenance Material, and Base Maintenance Personnel. In addition, this file contains Medical and PCS costs for Base Maintenance personnel, as well as the Average Annual Inventory for each end item in the TMS-NSN Table.

Cryptological and cryptologic-related equipment (identified by a Qxx Standard Reporting Designator-SRD) is assigned to the AFCSC for depot-level repair. AFCSC does not report to the H036B system. The only H036B costs and production quantities available for these TMSs are those for components common to TMSs assigned to facilities which do report to this system.

Desmatics examined the Maintenance Cost File to determine the full extent of the lack of costing in three categories: Depot Maintenance, Replacement

Investment and Transportation and Packaging. Table 5 was studied in order to determine the effect of incorrect or missing weight data on Transportation and Packaging costs. Table 3-4 was examined to assess the effect of RAFs of zero on the reporting of the cost categories. The extent of zero Depot Maintenance costs resulting from the lack of cost data from AFCSC was also assessed.

Files Used

Mobile Depot Maintenance Cost File - PJMXPA0
Maintenance Cost File - PJMXIA0
TMS-NSN Table - PJMA2A0
Application NIIN Cost File (Table 3-4) - PJMXKA0
Recoverable NIIN Cost File (Table 5) - PJMXLA0

Procedure:

1. The FY84 Maintenance Cost file and the Mobile Depot Maintenance (MDM) Cost File were sorted by TMS and matched. MDM costs were then removed from reported Depot Maintenance Costs and a temporary file was created. Records in this file containing zero Depot Maintenance, Replacement Investment or Transportation and Packaging costs were then extracted. The number of zeros reported in each of the three cost categories was counted.

2. Records on Table 3-4 containing zero RAFs and nonzero Program Costs, Base Condemnations or Depot Condemnations were extracted for study.

3. Records on the TMS-NSN table with Qxx SRDs were extracted and matched to the list of TMSs known to be assigned to AFCSC for repair as of 1982 [2]

(A more recent version of this list is not available to Desmatics.) Matching records were further matched to the Maintenance Cost File and Depot Maintenance costs were extracted.

Records for TMSs with Qxx SRDs identified as being assigned to AFCSC for repair were matched to the Maintenance Cost File, and Depot Maintenance costs were examined. These records were also matched to Table 3-4, and records for their recoverables were extracted and examined.

The remaining TMSs on the TMS-NSN Table with SRDs of Qxx were also matched to the Maintenance Cost File and Table 3-4 in order to examine their reported Depot Maintenance costs and identified recoverables.

4. Table 3-4 was matched to the TMS-NSN Table by Application NIIN and the SRD was appended to each record on Table 3-4. This table was then sorted by Recoverable NIIN, and counts of Recoverable NIINs, unique Recoverable NIINs and unique Recoverable NIINs with zero program costs were obtained. These three counts were also obtained for 1) records for TMSs identified by Qxx SRDs and 2) records for TMSs identified by non-Qxx SRDs.

5. Records in Table 3-4 with zero Unit Costs were extracted for study.

6. Table 5 was examined in order to determine how many records contained a Packaged Weight of zero. In addition, the Packaged Weight field was scanned for nonnumeric data.

Records on Table 5 containing zero Packaged Weights and nonzero Production Quantities, Base Condemnations or Depot Condemnations were extracted for study.

7. The FY83 and FY84 versions of Table 5 were both sorted and matched on NIIN. Matching records with nonzero Packaged Weights which were inconsistent between the two fiscal years were extracted for review.

Results:

1. There are 368 TMSs in the FY84 Maintenance Cost File with zero Depot Maintenance costs. For three additional TMSs (302, FSA004 and GRA081), the reported Depot Maintenance costs are only for Mobile Depot Maintenance costs from the C003K System. There are 361 TMSs with zero Transportation and Packaging costs, and 453 with zero Replacement Investment costs.

2. There are 31 instances in which costs were not allocated to an end item because of a zero RAF. Thirteen TMSs were affected by this problem. These TMSs, along with the number of recoverables with zero RAFs and the dollars not allocated, are listed in Table 9.

Six TMSs in Table 9 (CV2624, GRC212, GSC037, PRC041, PRC066B, and S389), have zero reported Depot Maintenance, Replacement Investment, and Transportation and Packaging costs for FY84. All six of these also have a reported Average Annual Inventory of zero, the cause of the lack of allocation of these costs. For the remaining TMSs the zero RAFs result

TMS	RECOVERABLES AFFECTED	TOTAL CONDEMNATIONS	UNALLOCATED COSTS DEPOT MAINT	R I
CV2624	1	125	$437,499	$496,875
FYQ008	1		346	
FYQ059	1		3,278	
GKC001	3		5,532	
GRC212	5		4,639	
GSC037	1		236	
MPQ00T2	1		220	
MSQ077	1		1	
PRC041	1		3,351	
PRC066B	7	16	322,539	65,546
S389	3	10	97,317	11,034
TSC60V3	1		4,865	
UPX023	5		6,762	
	--			
	31			

Table 9. Costs Unallocated Because of Zero RAFs (FY84 Table 3-4).

in undercosting in these categories.

3. There is a total of 263 TMSs on the TMS-NSN table with SRDs of Qxx. Ninety-one of these were identified as being assigned to AFCSC for repair. They are listed in Table 10. All 91 have zero Depot Maintenance costs for FY84. Forty-five have one or more recoverables listed in Table 3-4.

There are 172 TMSs in the TMS-NSN Table with Qxx SRDs, not on Desmatics' list [2] of items assigned to AFCSC for repair. All but two have zero Depot Maintenance costs. A check of Table 3-4 revealed that costs for both TMSs were incurred by single recoverables with RAFs of one. The two TMSs with reported Depot Maintenance cost are:

TMS	Recoverable NSN	RAF	Depot Maint. Reported Cost
FYQ67V10	4920010387257	1	$585
R1828V	5820000039785	1	652

Since Desmatics' list of TMSs assigned to AFCSC is out of date, no definitive conclusions can be drawn regarding these findings. It should be noted, however, that if either of the two TMSs above is reparable at AFCSC, the RAFs for these recoverables should not be 1.

4. Of the 22,019 records on Table 3-4, 21,267 (96.6%) are associated with TMSs with SRDs other than Qxx. The remaining records are associated with TMSs with Qxx SRDs.

TMS	TMS	TMS	TMS	TMS
ASL105	FYQ084	MD1066G	R1625UR	TNH025
CP0931G	FYQ086V	MD714GV	R1655URR	TN0556G
CP0982G	GGC15V6	MD975UR	R2129	TS1671G
CP1256VG	GSH024	MU0644G	R2130GRR	TS2606
CV0591A	GSH052V	MU0698G	R2131V6	TS3637G
CV1689G	GSH13 14	MX10077G	SA2149UR	TS3645VG
CV2624	GSH19AV1	OA9034V	SSLV19	TT289
CV3257UR	GSH28V2	OL245GYC	TCA004	TT359FGC
CV3258UR	GSH33V4	000926	TD0570	TT628U
CV3260UR	GSQ076	001770G	TD0687	TT636U
CW1154G	GXH007	01756G	TD1212G	TT637U
C10439G	GYK025V	PDP11 45	TD922AV2	TT753G
DS0008	IP0991UR	RD0353	TD983U	UGC114
EU0008	IP1125	RD0376VG	TH145C	UNH017A
EV0007	IP1159A	RD0422G	TNH013	UXH009V
FRA086	J3399G	RP0242VG	TNH021	UYK015V
FSH13V1	MD0938G	RP237G	TNH021A	WJ8730A
FSH13V2	MD0976G	RS111B	TNH021B	XR7524
				3955BE28

Table 10. TMSs Which are Assigned to AFCSC for Repair [2] and Which Have Zero Depot Maintenance Costs for FY84.

A total of 13,274 unique Recoverable NIINs are represented in Table 3-4. Of this total, 11,062 (83.3%) had no reported program costs. Of these 13,274 unique Recoverable NIINs, 12,572 are associated with non-Qxx SRDs (10,363 (82.4%) of these had zero program costs reported). The remaining 713 unique Recoverable NIINs are associated with cryptological or cryptologic-related equipment. Out of these 713 unique Recoverable NIINs, 708 (99.3%) had zero program costs. These results suggest a significant mismatch between the D041 files used in the C-E system and the H036B data for all C-E equipment.

5. There are five recoverables on Table 3-4 with reported Unit Costs of zero. The recoverables with zero unit costs are as follows:

RECOVERABLE NIIN	TMS
009774378	FYQ005
006444554	GRA006
010556235	GSC037
010222660	GTC028
010433362	GTC028

None of these recoverables had any reported base or depot condemnations, therefore they did not cause any underallocation of Replacement Investment costs.

6. Of the 22,019 records on the FY84 Table 5, 1,382 have a Packaged Weight of zero. These zeroes affect 467 TMSs. There are two records with "REV" (indicating weight data is unavailable) in the Packaged Weight field.

These recoverables and the TMSs affected are:

RECOVERABLE NIIN	TMS
010707880	GPN020
011307759	LP1013

There are 33 records on the FY84 Table 5 with a zero Packaged Weight and nonzero Production Quantities, Base Condemnations or Depot Condemnations. They are listed in Table 11. T&P costs for FY84 are understated for these TMSs.

7. There are 300 records with nonzero reported packaged weights which are inconsistent between FY83 and FY84. These 300 records represent 193 unique recoverables. These recoverables were identified to 104 TMSs during FY84 C-E System processing. The 30 recoverables with the greatest absolute difference in reported packaged weights between the two fiscal years are listed in Table 12.

B. PROGRAM Y4

In Program Y4 (Level of Indenture Removal) recoverables are identified to all end item NIINs in the C-E Inventory File, and the RAF numerators for these recoverables are computed. For first level recoverables, RAF numerators are computed using the Average Annual Inventory of the end item from D039 Format 50 Records and QPA and Application Percentage from D041 Format 50 records. For recoverables at levels of indenture below the first, RAF numerators are computed by replacing the Average Annual Inventory of the end item with the

RECOVERABLE NIIN	TMS AFFECTED	PRODUCTION QUANTITY	CONDEMNATIONS BASE	CONDEMNATIONS DEPOT	PACKAGED WEIGHT
011375968	FXQ004	5	0	0	0
011479140	FXQ004	1	0	0	0
001827223	GPN012	2	0	0	0
011287324	GPN020	3	0	0	0
010651678	GPN022	5	0	0	0
011265557	GPN022	1	0	0	0
006582792	GRN020A	4	0	0	0
011549023	GSH034	1	0	0	0
011194211	GSH33V4	0	0	2	0
010693669	GSN012	3	0	0	0
005763077	GSQ120V1	6	0	0	0
010222660	GTC028	4	0	0	0
010433362	GTC028	1	0	0	0
009128949	MSQ002	0	0	1	0
011072549	MST0T1A	0	0	3	0
011217395	OY0059M	1	0	0	0
011217395	OY0060M	1	0	0	0
003714337	OY0060M	2	0	0	0
002862128	SO0517G	2	0	0	0
009128949	S389	0	0	1	0
009128949	TGC027	0	0	1	0
004542571	TLQ011	1	0	0	0
010684266	TNH021A	0	1	0	0
004092815	TPN019V	4	0	0	0
009128949	TRN026	0	0	1	0
010498079	TSC053	1	0	0	0
009128949	TSC062	0	0	1	0
011213736	TSC10	67	0	0	0
010700645	TSC60V1	1	0	0	0
000097970	TSC60V1	1	0	0	0
009128949	TSC60V2	0	0	1	0
011315158	TSQ93V3	1	0	0	0
009128949	TSW007	0	0	1	0

Table 11. Recoverables Having Zero Packaged Weights with Reported Production Quantities or Condemnations (FY84 Table 5).

RECOVERABLE NIIN	TMSs AFFECTED	WEIGHT FY83	WEIGHT FY84	ABSOLUTE DIFFERENCE
005004447	URN005	160	1134	974
004360206	GRN027V	1076	125	951
001189661	FPS077V	1665	1024	641
005215149	MPN013A MPN013B MPN014G MPN014H	440	100	340
004929820	GRN019A	780	1077	297
010838526	MST0T1A	174	462	288
010838527	MST0T1A	174	462	288
010838528	MST0T1A	174	462	288
010838529	MST0T1A	174	462	288
004360135	GRN027V	178	415	237
001189662	FPS077V	640	876	236
010905009	MST0T1A	24	218	194
001300781	FPS077V	771	955	184
010548789	GPN020	807	979	172
006499235	TLQ011	280	391	111
005621917	MPS011	250	360	110
010832858	MST0T1A	352	462	110
001453029	GMQ030	116	10	106
010395010	FPN062	420	316	104
001373964	GPA131V	405	508	103
009419728	FMN001	125	202	77
010674734	FRC117	133	63	70
002446710	FYQ007	71	3	68
002691748	MPQ00T2	80	18	62
010410557	FPN062	3	63	60
005203703	TSQ096	8	65	57
003714364	OY0059M	373	325	48
004257547	FRN037	86	43	43
001533723	OY0059M	42	3	39
001646626	TIQ002	77	113	36

Table 12. Recoverables with FY84 Packaged Weights which Differ from FY83 Packaged Weights (Table 5).

the RAF for the recoverable's next higher application NIIN.

A reported Average Annual Inventory of zero for an end item results in computed RAF numerators of zero for all of its first level recoverables. Also, any D041 Format 50 records with zeros in the QPA or Application Percentage fields result in computed RAF numerators of zero. If a recoverable has a zero RAF numerator, all lower level recoverables which map through it also have RAFs of zero.

Desmatics replicated Program Y4, and at the same time tracked the zeros in these critical fields in the input data to determine where they were entering into the processing of RAFs. The effect of these zero RAFs on reported costs was examined.

Files Used

TMS-NSN Table - PJMA2A0
Application NIIN Cost File (Table 3-4) - PJMXKA0
D041 Format 50 File - PJIY3A0
C-E Inventory File - PJMY2B0

Procedure:

1. Desmatics counted all records in the D041 Format 50 File which had (1) both a zero QPA and Application Percentage, (2) a zero QPA with a nonzero Application percentage, or (3) a nonzero QPA with a zero Application Percentage.

2. Records from the C-E Inventory File with a reported Average Inventory of

zero were extracted.

3. Program Y4 was replicated. Recoverables were mapped to end items through three levels of indenture below the end item, and RAF numerators were computed. Records from the D041 Format 50 File with a zero QPA or Application Percentage were extracted and the levels of indenture at which they entered the processing were recorded. Records for identified recoverables with both a nonzero QPA and Application Percentage but a RAF numerator of zero were extracted. All extracted records were matched by Application (end item) NIIN to NIINs in the TMS-NSN Table to determine how many end items were affected by these D041 system records.

Results:

1. Of the 153,343 records in the D041 Format 50 File, 6,000 records had both a zero QPA and zero Application percentage. An additional 133 records had zero QPAs only, and 672 others had zero application percentages only. These 6,805 records represent 4.4% of the entire file.

2. Of the 708 TMSs on the C-E Inventory File, 10 had Average Annual Inventories of zero. These are:

TMS	NIIN
CV2624	002203623
GRA006	006444554
GSC037	010556235
GRC212	011327204
ID1457G	008249936
MRC114	009515441
PRC041	008893997
PRC047	008613539
PRC066B	001164467
S389	009880302

As shown in Table 7 in Section III, all 10 TMSs with zero Average Annual Inventory had positive inventories in the Format 100 File. In three instances these inventories were substantial: PRC041 (100), PRC047 (195), and PRC066B (651). The last record of the C-E Inventory File is an anomalous record with no TMS designator, an NSN field filled with nines, and all other fields filled with zeros. However, this record does not interfere with RAF processing in any way.

3. Desmatics identified 21,686 first level recoverables, 1,960 second level recoverables, and only two third level recoverables. No fourth level recoverables were identified. These figures compare favorably to the 22,019 records on Table 3-4 which contains a record for each recoverable and end item to the fourth level of indenture, and in which any records with identical recoverable and end item application NIINs have been consolidated.

Of the 6,805 records on the D041 Format 50 File with zero QPAs and/or Application Percentages, 837 were selected at the first level of indenture, and 16 at the second level in Program Y4. There were no third

or fourth level recoverables with zeros in either of these two fields. It appears that these particular D041 records may be responsible for a substantial portion of the 1107 records in Table 3-4 with reported RAFs of zero. In all, the recoverables were associated with 85 TMSs. Table 13 lists the 85 TMSs as well as the number of recoverables identified at the first and second level which contained zero QPAs and/or Application Percentages.

There were fourteen instances in which a second level recoverable had a RAF numerator of zero solely because it mapped through a first level recoverable with a RAF numerator of zero (i.e., the second level recoverable had both a QPA and Application Percentage greater than zero). Thirteen TMSs were affected. These are:

FYQ003	*FYQ018*	**GSQ120V1*
FYQ005	GSC038V1	MSQ002
FYQ006	GSC038V2	MSQ077
FYQ008	GSQ039V1	S389
		TRN026

*NOTE: This TMS had two second level recoverables affected.

TMS	First Level	Second Level	TMS	First Level	Second Level
CPS009	9	0	MD0976G	3	0
CV1689G	1	0	MPN013A	1	0
FPN016	0	1	MPN013B	1	2
FPN062	1	0	MPN014E	1	0
FRC075	1	0	MPN014F	1	1
FRC096	1	0	MPN014G	2	0
FRC125	2	0	MPN014H	1	1
FRC126	2	0	MPN014J	1	0
FRC39AV	3	1	MPQ00T2	8	0
FRR095	1	0	MPS011	3	0
FSC078V	1	0	MRC085	3	0
FSH009	3	0	MRC105V	1	0
FTC047	1	0	MRC107	1	0
FYQ003	3	0	MRC116	2	0
FYQ005	560	0	MSQ002	4	0
FYQ006	17	0	MSQ077	18	0
FYQ007	1	0	RD0376VG	1	0
FYQ008	34	0	RO0510G	1	0
FYQ018	2	0	SN0398G	3	0
FYQ059	1	0	TNH021A	1	0
GGC058	1	0	TPN019V	2	0
GKA005	1	0	TPS043E	3	0
GKC001	53	1	TPS068	2	0
GPA030	2	0	TPX042	1	0
GPA131V	1	0	TRC097A	0	1
GPN020	2	0	TRC144	2	0
GPN022	2	0	TRN026	1	1
GRC117V	1	0	TSC053	4	1
GRN020B	0	1	TSC062	1	0
GRN027V	1	0	TSC107	2	0
GRR023	1	0	TSC60V2	1	0
GRR024	1	0	TSC60V3	1	0
GRT021	1	0	TSM109	2	0
GRT022	1	0	TSQ061	2	0
GSH036	1	0	TSQ096	18	0
GSH19AV1	3	0	TSQ93V3	1	0
GSH33V4	3	0	TTC022	1	0
GSQ120V1	0	4	TT470FGC	1	0
GSQ175	1	0	TT471FGC	1	0
GYK019	1	0	UGC33AX	2	0
GYQ039V1	0	1	UPA062C	1	0
IP1159A	7	0	WJ8730A	2	0
MD0938G	1	0			

Table 13. TMSs Associated with Recoverables with Reported QPA or Application Percentage of Zero (FY84 D041 Format 50 File).

VI. SUMMARY

This report has presented the results of a study conducted by Desmatics to assess the quality of the data in the C-E system output products for FY84. The purpose of this study, which complements a previous Desmatics study using FY83 data [3], was to identify anomalous data in the FY84 products, and trace the source of this anomalous data in order to correct it. It should be noted that a number of changes were made in the system processing based on recommendations suggested following the assessment of FY83 data. The current effort included a validation of these changes.

Desmatics examined the four AR Tables, and portions of Work Units AN, EX, and Y2. In addition, a number of input, intermediate, and output files were examined in order to find some explanation for the large number of zeros reported in the Depot Maintenance, Replacement Investment and Transportation and Packaging cost categories.

In general, the remaining problems seen in FY84 with some of the data elements in the AR Tables are relatively minor, and can be traced to a failure to update these tables completely in Work Unit IA before annual processing begins. Desmatics has a number of suggestions to improve both the quality and efficiency of this process. They are discussed in depth in another report in this series [3], published concurrently with this one.

The programs in Work Units AN and EX which were checked or replicated are processing data as intended. Although the Unit and Worldwide TMS Allocation Factors are being processed as intended the denominators are overstated because they include only the value of C-E items owned by C-E PASs.

Desmatics replicated Program Y4 (Level of Indenture Removal) in Work Unit Y2. Without the necessary intermediate C-E system files for comparison, Desmatics could not confirm that this program was working as intended. However, the similar number of recoverables identified by Desmatics and in the C-E system strongly suggest that it is.

It appears that the problem with reported costs for Depot Maintenance, Replacement Investment, and T&P are due to a number of factors. These are, primarily, the lack of cost data for cryptologic-related equipment (Qxx SRDs) in the H036B input, as well as the apparent lack of recoverable data for these items in the D041 files used in the C-E system. In addition, there appears to be a mismatch between recoverables identified for TMSs with SRDs other than Qxx and the H036B cost data. This suggests that the data in the D041 files used in the C-E system is incomplete, possibly because of the lack of records for interchangeable and substitutable components for these items.

VII. REFERENCES

1. Airmen Classification, Air Force Regulation 36-1, Washington DC, Department of the Air Force, 1982.

2. Communications-Electronics (C-E) Depot Support, Air Force Technical Manual TO-00-25-108, Tinker AFB, OK, Oklahoma City Air Logistics Center/MMEDT, 1982.

3. Communications-Electronics (C-E) System: Data Quality Parameters, Technical Report No. 118-12, Desmatics, Inc., 1987.

4. Communications-Electronics (C-E) System: Data Quality Study, Technical Report No. 118-10, Desmatics, Inc., 1986.

5. Office of VAMOSC, "C-E System Tutorials," Wright-Patterson AFB, OH, HQ AFLC/LMVRW, 1984.

6. Office of VAMOSC, Communications-Electronics System Specification (D160A), Wright-Patterson AFB, OH, HQ Air Force Logistics Command, 1983.

7. Office of VAMOSC, Subsystem Specification of the Preprocessor (VAMOH), Wright-Patterson AFB, OH, HQ Air Force Logistics Command, 1985.

8. Officer Classification, Air Force Regulation 39-1, Washington, DC, Department of the Air Force, 1977.

9. Tactical Air Control System Equipment, Tactical Air Command Pamphlet 55-43, Langley AFB, VA, HQ Tactical Air Command, 1981.

10. Visibility and Management of Operating and Support Cost Program, Ground Communications-Electronics (C-E), Air Force Regulation 400-31, Volume III, Washington, DC, Department of the Air Force, 1982.

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