INVESTIGATION
of
COSAL CONFIGURATION FILES

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This study investigates and identifies the reasons why ships report 3M usage for items which apparently were not recorded in the FLSIP (Fleet Logistics Support Improvement Program) COSAL (Coordinated Shipboard Allowance List) candidate file maintained at the ICPs (Inventory Control Points). These reasons are identified as: (1) use of substitute/interchangeable items in lieu of original allowance items and (2) recording of changes in equipment configuration files. However, based on the analysis conducted, it does not appear that this condition is a problem in computation of shipboard allowances.

INVESTIGATION OF COSAL CONFIGURATION FILES

REPORT 76

PROJECT 971237

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ABSTRACT

This study investigates and identifies the reasons why ships report 3M usage for items which apparently were not recorded in the FLSIP (Fleet Logistics Support Improvement Program) COSAL (Coordinated Shipboard Allowance List) candidate file maintained at the ICPs (Inventory Control Points). These reasons are identified as: (1) use of substitute/interchangeable items in lieu of original allowance items and (2) recording of changes in equipment configuration files. However, based on the analysis conducted, it does not appear that this condition is a problem in computation of shipboard allowances.

I. INTRODUCTION

The COSAL is the basic document used in the determination of shipboard material inventories. The allowance items on this document are selected by the FLSIP COSAL model from the universe of items which are installed on the ship for which the ship has a maintenance capability to install.

Several studies of the COSAL have been conducted to determine if material support can be improved by changing the FLSIP model. The results of one of these studies, reference (1), indicated that the effectiveness of the FLSIP model, within the limits of the candidate file, was relatively good. For example, that study showed that the current FLSIP model effectiveness was 91% for a destroyer (DD 830). In addition, based on a review of 90 days usage data for two different ships, that study pointed to the fact that 30% of the usage data used in evaluating the model was for items which were never introduced to the model as a candidate for stocking as an allowance item. Thus, it was hypothesized that effectiveness of the COSAL could be increased by improving the quality of the data base used by the FLSIP model.

This study investigates this basic hypothesis (i.e., the data base is incomplete) to determine its validity and, if it is valid, to recommend methods of improving the data base used in the production of FLSIP COSALs.

II. APPROACH

The approach to this study was to obtain and correlate equipment
configuration and usage data. Situations where configuration and
usage data did not correlate are analyzed in order to identify the
causes.

The ships selected for this study were the DD-819, DDG-2, DDG-17,
SSN-653, and AE-18. These ships were selected because records in-
dicated that (1) no major configuration changes had occurred since
the last overhaul and (2) they were considered good 3M reporters.
Selection of these ships based on satisfaction of the first criterion
tended to ensure that the current configuration files at the ICPs
were similar to the configuration applicable to the period of reported
usage. Selection based on the satisfaction of the second criterion
ensured that the usage data reported would be relatively valid with
few voids.

The ICPs (ESO and SPCC) provided equipment configuration files for
each of the selected ships, and the Maintenance Support Office provided
the usage data available in the 3M data bank. The usage data covered
varying time periods: DD-819 (36 months); DDG-2 (42 months); DDG-17
(36 months); SSN-653 (21 months); and the AE-18 (30 months). The data
represent the usage experienced since the previous COSAL was produced
for the ship. These usage data were submitted to a screening
which removed items for which the COSAL does not provide allowance
support. This involved the removal of three types of item usage:

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(1) usage reported in support of the DASH system; (2) usage for
items which are supported by the GUCL (General Use Consumable List);
and (3) usage for items which are recorded at the ICP as being on
the ship but for which the ship does not have a maintenance capability
to install.

The purified usage data were then matched to the COSAL candidate
files maintained at the ICPs. Items for which usage was experienced
but which were not recorded in the candidate files formed the set of
items upon which this analysis was based.

The original intention was to forward these items to the ships
and to have the ships identify the reason why they were used, since
there existed no ICP record of its installation on that ship. This
approach was not followed in an effort to minimize the interference
it would cause during the time of supply overhaul when the workload of
the shipboard storekeeper personnel is very heavy. In lieu of this
approach, visits were scheduled with three of the ships (DDG 2, DDG 17,
DD 819) during which the unmatched usage was correlated with available
shipboard records (e.g., stock balance cards and handwritten entries
on allowance lists) to attempt to identify the causes of the unmatched
usage. These visits also provided an opportunity to interview
appropriate shipboard personnel to determine their familiarity with the
procedures for updating allowance documents.

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III. FINDINGS

The following table displays the results of the analysis of usage
data from the five ships covered by this study:

TABLE I

ANALYSIS OF USAGE TRANSACTIONS

SHIP	DD 819	DDG 2	DDG 17	SSN 653	AE 18
Total No. of Transactions	6,415	12,468	10,708	2,052	1,709
GUCL/DASH	2%	2%	1%	1%	2%
Non-Shipboard Maintenance	3%	2%	2%	6%	2%
Shipboard Maintenance	75%	82%	79%	80%	75%
No. of Unmatched Transactions	20%	14%	18%	13%	21%

This table displays the fact that the amount of usage data which could not
be identified to the candidate file varied from 13% to 20% of that data
reported. An additional 3 - 7% of the usage reported was for material
which is not supported by the COSAL. One significant point is that only
the SSN had a significant amount of usage reported for items which the ship
did not possess the maintenance capability to install. This indicates that
maintenance coding eliminates few items which are used from inclusion as
COSAL candidates. Table I also indicates that the percentage of unmatched
usage records (17% average for the sample ships) is less than the 30% *
figure quoted in reference (1), but still accounts for a significant amount
of the usage data.

A. FREQUENCY DISTRIBUTION OF UNMATCHED USAGE.

The magnitude of the problem is best displayed by the construction of frequency distributions which display the frequency of hits for each unmatched FSN. Table II below displays the distribution of the frequency of usage for unmatched FSNs.

TABLE II

FREQUENCY OF UNMATCHED USAGE PER FSN

USAGE FREQUENCY PER FSN	DD 819	DDG 2	DDG 17	SSN 653	AE 18
1	914	1,024	947	232	239
2	137	171	259	18	31
3	41	81	81	6	12
4	9	15	40	1	6
5	5	16	23	2	4
6	4	5	9	-	2
7	1	5	6	-	1
8	-	4	1	-	1
9	-	1	-	1	-
10	1	4	-	-	-
Greater than 10	3	7	4	-	-
TOTAL FSNs	1,115	1,333	1,370	260	296

This table indicates that approximately 75% of the usage for unmatched FIINs (Federal Item Identification Number) was reported only once by a particular ship. This, in turn, indicates that the majority of the unmatched usage is not of a repetitive nature. However, numerous items did experience a significant amount of usage. This is particularily apparent on the DDG 2 where seven items were demanded more than ten times.

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B. SUBSTITUTE/INTERCHANGEABLE ITEMS.

Research of the stock balance records of DDG 2 provided one answer
to the problem of the unmatched high frequency items. The stock
balance record is maintained by the ship as the basic source of inventory
information. On this document are recorded the issues and receipt of
material. When the ship requisitions an item from the system, an entry
is made on the card which indentifies this event. When the requisitioned
material is received by the ship, this event is also duly noted. If the
ship does not receive the original item requisitioned, but instead receives
a substitute or an interchangeable item, this is also noted.

All unmatched FSNs which experienced more than one recorded usage
were compared to the ships stock balance records. The results of this
comparison identified a large portion of the unmatched usage to sub-
stitute and interchangeable items. The original FSNs for those items
identified as substitutes/interchangeables were matched against the ship
candidate file. Table 3 below displays the results of this match by the
use of three frequency distributions: the first is the original distribu-
tion of the unmatched usage; the second is a distribution of the unmatched
substitute/interchangeable items where the original item was identified
as a COSAL candidate; and the third is a distribution representing the
original modified by the elimination of substitutes and interchangeables.

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TABLE III

DISTRIBUTIONS OF DDG 2 UNMATCHED USAGE

USAGE FREQUENCY	ORIGINAL DISTRIBUTION	ITEMS IDENTIFICATION AS SUB./INTER.	NEW DISTRIBUTION
2	171	49	122
3	81	28	53
4	15	7	8
5	16	6	10
6	5	3	2
7	5	5	-
8	4	4	-
9	1	-	1
10	4	3	1
> 10	7	7	-
TOTAL FSNs	309	112	197

This tables shows that 37% (112 out of 309) of the unmatched stock numbers with two or more demands were items which the ship received from the supply system as substitutes or interchangeables for originally requested items. This analysis was extended to those items which had only one usage reported and it was found that 33% of these items were also recorded as interchangeables or substitutes. Thus overall, approximately 35% of the DDG 2 stock numbers (accounting for 50% of the unmatched usage records) were identified as interchangeable/substitute items.

C. ADDITIONAL CAUSES FOR UNMATCHED USAGE.

There remain two general observations which may provide insight into explaining why some usage data were unmatched to the candidate file. The first of these is the fact that the data used in the

analysis were in effect "aged". This occurred as the result of configuration changes which result in changes in allowance support, and usage data generated by the new configuration do not equally apply to the old configuration. The ship selection criteria were intended to hold this to a minimum, but it did appear in several areas. For example, it was found that 20% of the unmatched usage data reported for support of the surface missile system on the DDG 2 were not in the candidate file at the time the study was conducted because of equipment alternations. Many of these items were, at the appropriate point in time, supported by allowance appendix packages.

Another example of "aged" data occurred in the area of valves. The Ships Parts Control Center has undertaken a program to standardize allowance support for valves which possess the same characteristics. On the DD 819 it was found that 495 APLs (Allowance Parts List) for valves were recorded in the original summary of effective APLs, however, currently only 320 APLs exist in the candidate file. Approximately 30% of the unmatched usage data for valves were for valves which no longer were recorded in the candidate files, but which were included on the ship's original summary of effective APLs.

The final, general observation is that a segment (approximately 10%) of the unmatched usage was for such items as compressed gases, gasket material, sheet metal, and packing material. This type of material is normally included in the GUCL, and would not be supported by the COSAL.

IV. CONCLUSIONS

The basic conclusion of this study is that the problem of unmatched usage data, which implies questionable reliability in the COSAL candidate files, is not as extensive as hypothesized in reference (1). Analysis of usage data from five ships indicated that an average of 17% of the usage data was unmatched to the COSAL candidate files. The major cause of the unmatched usage can be attributed to the dynamics of the systems which support the shipboard inventory. This dynamic situation is best portrayed by the fact that the major cause of the unmatched usage data (50% of the DDG 2 unmatched data) was due to the supply system attempting to be responsive to the requirements of the fleet by providing substitute/interchangeable items when the original item was not in stock.

This action can create problems at other points in the system; the most important being that the configuration files at the ICPs do not contain the proper configuration of the ship. These files and usage data gathered by the 3M system are used in the computation of BRFs (Best Replacement Factors) which are used in the determination of future allowance quantities. Briefly BRFs are computed by dividing total usage by population, where the usage is that reported by the 3M system and the population is based on that recorded in the configuration files. If the recorded population is less than the population from which the usage is derived, then the BRF will be overstated; and if the recorded population is greater than the actual population the BRF will be understated.

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This problem was investigated for the desirability of implement-
ing a program to alleviate it. Investigation has revealed that there
are no mechanized files which could be used to mechanically reference
the substitute and interchangeable items to the original items. This
occurs because the decision to substitute is basically a technical
decision where the characteristics of the required items are matched
to other items in stock and if the critical characteristics match, the
substitute is issued. In addition, there presently exist active
programs for improving the validity of the COSAL candidate files. These
programs utilize both 3M and CASREPT (Casuality Reporting) data to
update/correct the master files from which COSAL candidate files are
extracted.

Interviews with shipboard personnel indicate that there existed a
gap in understanding the importance of informing the cognizant ICP of
any changes in configuration. This gap appeared in cases where sub-
stitute items, which were both items of supply and components, were
received by the ship. The best examples of these are switches and
valves where the item is identified by an FSN and also a CID (Component
Identification). When the substitute item was installed the configura-
tion of the ship changed, but the shipboard personnel did not recognize
this fact and did not initiate action to request a change in allowance
support.

In summary, this study shows that the problem of unmatched usage
data is not as large as originally identified. The major problem
identified (substitute/interchangeable items) should be minimized by
on-going programs to update allowance files.

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APPENDIX A: REFERENCES

(1) ALRAND Working Memorandum 197 of 17 Apr 1970