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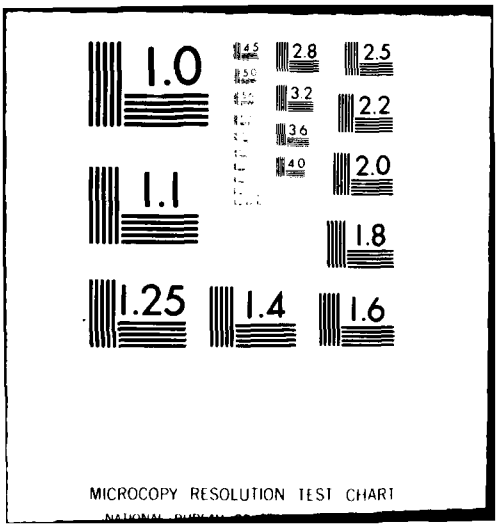
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MAXIMUM RELEASE QUANTITY EDITS UNDER MOBILIZATION

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JANUARY 1980

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

A mathematical model is used within CCSS to detect and reject large and possibly erroneous quantities requisitioned by the retail level. The effectiveness and impact of this model on requisitions generated during a mobilization was questioned. Data from the MOBEX-78 exercise was applied against the current and other edit models to determine the reject rates. Results indicate fewer rejects would occur in a mobilization environment than in peace.

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SUMMARY

1. Background

During the Mini-Mobex exercise conducted at Ft. Bragg, NC, an evaluation was made of logistic performance under a mobilization environment. One of the areas examined was the effectiveness of wholesale edits. Five percent of the requisitions generated during the exercise were rejected at the wholesale level, 40% of these by the Maximum Release Quantity (MRQ) edit.

Two questions were formulated based on these results. Under a mobilization scenario, would the MRQ rejects adversely affect Army readiness? Would the proposed MRQ based on the average requisition size result in an unacceptable number of rejects? A substantial increase in MRQ rejects would imply mobilization requisitions were for much larger quantities than in peace time.

Inventory Research Office (IRO) was asked to evaluate the current and proposed average requisition size MRQ edits using data generated during MOBEX-78.

2. Scope

This study is limited to evaluating secondary items requisitioned from Army Materiel Readiness Commands during the MOBEX-78 exercise using catalog data as of May 1979.

3. Objective

Determine the impact of the current and proposed MRQ edit checks on requisitions submitted under a mobilization scenario.

4. Methodology

Catalog data was obtained from each MRC consisting of the MRQ and data elements necessary to compute the proposed MRQ. Army requisitions from MOBEX-78 were applied against this data to generate statistics on rejection rates for both models.

CHAPTER I

MRQ MODELS

1.1 Current Maximum Release Quantity Edit Procedures

The current MRQ model is based on each items variance to mean (VMR) ratio.

$$VMR = \exp\left(\frac{11.354 \times LN(AYD)}{18.2619 + LN(UP)}\right)$$

$$MRQ = k \times (\max(3.93 \times VMR - 6.71, VMR) \text{ for } VMR \leq 20$$

$$MRQ = k \times (2.6 \times VMR + 20) \text{ for } VMR > 20$$

where

AYD = Worldwide Average Yearly Demand

UP = Unit Price

The "k' factor is to be determined by each MRC. For non-stocked items the MRQ is the maximum end article application quantity.

All Army requisitions are subjected to the MRQ edit check unless a 2L advice code is present. In this case the quantity ordered is accepted as valid and the requisition filled.

When a requisition fails the MRQ check, the MRQ quantity is shipped and the remainder is rejected with a CS advice code notifying the customer of the MRC's action.

1.2 Proposed Average Requisition Size Maximum Release Quantity

Inventory Research Office performed a study (Ref 1) which found that a MRQ edit based on the item's average requisition size was more cost effective in detecting erroneous quantities than the current VMR model. In developing this model it was assumed the requisitioned quantities are geometrically distributed. The MRQ was set to the mean requisition size plus three standard deviations. If the quantities ordered were truly geometrically distributed, the edit would reject erroneously 1% of the requisitions. The formula for the proposed MRQ is

$$MRQ = ARS + 3\sqrt{ARS \times (ARS-1)}$$

where ARS = average requisition size. A minimum MRQ of 3 was established.

For non-stocked items, the maximum end article application was retained as the MRQ but a lower bound was set at 3. Additionally the policy to allow 2L requisitions to bypass the edit was also retained.

The policy to fill up to the MRQ quantity was evaluated in the IRO study. It was determined that the more cost effective policy would be to fill the average requisition quantity when the MRQ was exceeded.

CHAPTER II

RESULTS - CURRENT MRQ

Table 1 below depicts the results of applying the mobilization requisitions against the current MRQ policy. TSARCOM has been broken out into the aviation and troops support elements since the MOB exercise was conducted prior to the consolidation of files at TSARCOM. Also at TSARCOM, the k multiplier has been set at .3, thus resulting in a MRQ 1/3 lower than the other MRCs.

TABLE 1

ALL REQUISITIONS, CURRENT MRQ

MRC	REQUISITIONS	REJECTS	PERCENTAGE
CERCOM	6170	279	4.5%
Aviation	4703	987	20.9%
Troops Support	3683	352	9.6%
ARRCOM	14945	452	6.8%
MICOM	659	20	3.0%
TARCOM	24901	259	1.0%
TOTAL	55061	2349	4.3%

Table 2 breaks the requisitions down by stocked and non-stocked. This was done because stocked items use the VMR model for the MRQ and non-stocked the maximum end article application quantity. The end article application MRQ rejected an abnormally high number of requisitions as compared to the VMR MRQ. Where only 2% of the requisitions are for non-stocked items, 19% of the rejects resulted from the end article MRQ.

TABLE 2

STOCKED/NON-STOCKED REQUISITION - CURRENT MRQ

	STOCKED			NON-STOCKED		
MRC	REQUISITIONS	REJECTS	PERCENTAGE	REQUISITIONS	REJECTS	PERCENTAGE
CERCOM	5941	195	3.3%	229	84	36.7%
Aviation	4552	931	20.5%	151	56	37.1%
Trps Spt	3620	336	9.3%	63	16	25.4%
ARRCOM	14598	293	2.0%	347	159	45.8%
MICOM	657	18	2.7%	2	2	100%
TARCOM	24595	129	.5%	306	130	42.5%
TOTAL	53963	1902	3.5%	1098	447	40.7%

CHAPTER III

RESULTS - AVERAGE REQUISITION SIZE MRQ

Table 3 shows the results of applying the mobilization requisition against the AIQ MRQ scheduled for implementation in an upcoming CCSS releases. The reject rates for this MRQ are higher than the current MRQ model. To offset this, a AIQ model was recommended to be implemented concurrently at the retail level. Requisition failing the retail screen would be validated and if correct passed to the MRCs with a 2L advice code preventing wholesale rejects. This recommendation has not been acted upon and therefore was not included as part of the analysis.

TABLE 3

ALLREQUISITIONS, AIQ MRQ

MRC	REQUISITIONS	REJECTS	PERCENTAGE
CERCOM	6170	364	5.9%
Aviation	4703	426	9.1%
Troop Support	3683	204	5.5%
ARRCOM	14945	1016	6.8%
MICOM	659	19	2.9%
TARCOM	24901	672	2.7%
TOTAL	55061	2701	4.9%

Table 4 shows the rejects by stocked and non-stocked. The non-stocked rejects rates are lower because a lower bound of 3 was set for all MRQs and secondly if the item had a non-zero AIQ, the AIQ model was used to compute the MRQ

TABLE 4

STOCKED/NON-STOCKED REQUISITIONS - AIQ MRQ

	STOCKED			NON-STOCKED		
MRC	REQUISITIONS	REJECTS	PERCENTAGE	REQUISITIONS	REJECTS	PERCENTAGE
CERCOM	5941	308	5.2%	229	56	24.5%
Aviation	4552	387	8.5%	151	39	25.8%
Trps Spt	3620	194	5.4%	63	10	15.9%
ARRCOM	14598	873	5.9%	347	143	41.2%
MICOM	657	17	2.6%	2	2	100%
TARCOM	24595	565	2.3%	306	107	34.9%
TOTAL	53963	2344	4.3%	1098	357	32.5%

CHAPTER IV

MOBILIZATION VS PEACE - TARCOM

If the number of MRQ rejects were higher during mobilization than in peace, this would imply that the MOB quantities requisitioned were higher than in peace. To address this question, 24399 requisitions from August and September 1979 were collected from TARCOM. These requisitions were used as input to the computer program that produced the mobilization results. The statistics are shown in Table 5.

TABLE 5

MOBILIZATION VS PEACE (TARCOM) CURRENT MRQ

MOBILIZATION			PEACE		
REQUISITIONS	REJECTS	PERCENTAGE	REQUISITIONS	REJECTS	PERCENTAGE
24901	259	1.0%	24399	831	3.4%

The average size of the requisition for peace was twice that of the mobilization quantities.

The most logical explanation for this statistic is that during peace the customer will order a full EOQ. During a mobilization environment, the customer will requisition quantities to bring his stock up to the RO. On average this quantity will be one-half of the EOQ.

CHAPTER V

RETAIL MRQ MODELS

The most effective means to cut rejects at the wholesale level, in mobilization or peace, is the use of pre-edit models at the retail level.

The retail item manager can validate large quantity requisitions by phone with the originating unit. If valid, the requisition would be passed to the wholesale system with a 2L advice code to prevent a MRQ reject.

The model and procedures are described in IRO Report 220, "Analysis of Large Requisitions." The mathematical model is the average requisition size MRQ. The procedures described are for a SAILS edit on their non-divisional customers. This can be adapted to divisional editing within DLOGS (DS4) or SAILS.

Currently the Log Center is working on a tasking from DA DCSLOG to develop the retail edits and item manager procedures.

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