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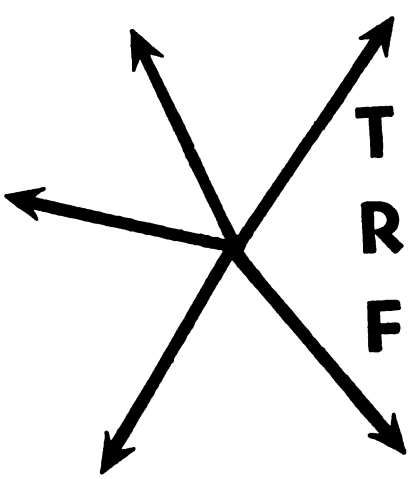

TRANSPORTATION RESEARCH FORUM

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Movement Control for an Integrated Distribution System

Today's agenda announces my subject as: "Movement Control for An Integrated Distribution System." The agenda also allows me but 60 minutes. Hence, I will address myself only to the problem of the handling of military small shipments in the military physical distribution system and, in particular, to outline to you what the Army is currently doing to cut costs and improve service in this area.

Nature of the Problem

Present growth in the volume of small shipments throughout the military logistics system has caused a significant impact on the cost of transportation support and the management and handling of materiel in the military transportation system. This growth is expected to continue for some time to come.

The small shipment problem involves the several existing military distribution systems. Although varying somewhat, depending upon special requirements of various weapons systems and operating forces supported, these systems have much in common. And you will agree, I'm sure, that the effectiveness of any distribution system, military or commercial, is dependent upon such basic elements as the availability and use of personnel, authorized and actual levels of supplies, budget and fiscal policies relative to consumer and stock funds, prescribed requisitioning procedures, location and capacity of storage and issue facilities, location and capacity of port and base facilities, and the availability and use of transportation resources, including its control and management.

Although all of these elements are closely interrelated, it is plain—to me, at least—that transportation is perhaps the most important single function—the key element—in the broad field of physical distribution.

Despite this notion, it would appear that in recent years more attention has been given to other elements of logistic support than to transportation. The result was inevitable—improvements in transportation efficiency have not kept pace with that of other elements of the military logistic system. This trend is illustrated by such major changes as the adoption of new budget and fiscal policies and procedures, greatly expanded use of automation, single line requisitioning, establishment of the Defense Supply Agency and its broad scope of operations, implementation of MILSTRIP and the uniform material issue priority system (UMIPS), trend toward lower levels of supplies throughout the DOD logistics system, and so on.

Suffice it to say that these important changes demanded a great deal of study and consideration. Also, the decisions behind these changes were

**U. S. Army Supply and Maintenance Command*

certainly not void of transportation considerations. However, the point to be made here is that some of these changes have fostered a trend toward increased dependence on transportation. It is precisely this situation that vividly points up the need for the development and adoption of valid changes or sophisticated refinements to the DOD logistics system, in order that the new demands for transportation support can be met effectively. In this connection, changes in the area of transportation policies and shipping techniques such as greater use of shipment consolidation must be sufficiently sound to insure that:

a. responsiveness to the consumer is not compromised,
b. changes are compatible with other elements of the logistics system,
c. net benefits in terms of actual dollar savings can be realized, and
d. over-all peacetime transportation policies can—and will—carry over into any national emergency.

Shipment Consolidation

Shipment consolidation has been used for many years in one form or another to cope with the ever present small shipment problem. Experience has shown that a number of benefits can be realized through the appropriate use of shipment consolidation. On the other hand, there are certain limitations and disadvantages when shipment consolidation is used to excess.

According to several sources, some of the advantages and disadvantages normally attributed to shipment consolidation are:

Advantages	Disadvantages
Reduces documentation and administrative costs.	Increases documentation to the extent that use of parcel post is curtailed.
Reduces packing costs, both labor and material.	Increases packing costs when the cost of pallets, cargo cribs, CONEX containers, etc., are considered.
Reduces material handling charges through much of the transportation cycle.	Increases material handling charges through added accumulation of freight, sorting, handling, and segregation of cargo incident to consolidation and break-bulk point operations.
Reduces transportation charges through more favorable freight rates for larger shipments.	Increases transportation charges through added tare weight, shipment of voids and return of empty shipping containers.
Reduces loss, damage and pilferage of cargo.	Disrupts work schedules throughout the supply and transportation cycle, thereby affecting the efficient utilization of personnel and equipment.
Insures tighter control over freight shipments.	Delays the timely receipt and processing of material by consignees.
Encourages better freight service from carriers.	Increases storage requirements for shipping and receiving.
Decreases ship turnaround time.	Increases pipeline inventory requirements to compensate for materiel being held for consolidation.

It is clear from the foregoing that the control and management of shipment consolidation is highly involved and equally controversial. In the final analysis, the optimum use of shipment consolidation cannot be expressed in terms of hard and fast rules. Rather, it can be best realized through local management, based upon existing conditions and circumstances, and operating within the framework of policy guidelines and uniform procedures established by higher authority.

Shipment Planning

Shipment planning, to be effective, involves consideration of many factors and isolates those which are pertinent in each instance. The factors which must be analyzed include: local availability or frequency of various carrier modes; the relative quality of service provided by each carrier within a mode; distribution of freight between modes and carriers; accurate classification and routing of shipments; compatibility to consolidation of freight composing individual shipments; relative cost of various consolidation techniques; the juxtaposition of time and distance with respect to consignee desires; etc. The factors affecting any given shipment are determined, of course, by the peculiarities of that shipment. Consequently, transportation personnel must be given enough flexibility and time to select the optimum mix of factors which insures transportation economy. This is particularly true for small shipments where consolidation is the key to economy.

Consolidation of small shipments is influenced by or accomplished at a number of places in the logistic cycle. They are: Using activities; Inventory Control Points; Area Freight Consolidation Points; Water and Air Terminals; and, Stock issuing points (e.g. depots or vendors).

Using activities influence the creation of consolidated shipments by the manner in which requirements are submitted. While all items requisitioned by an activity may not be shipped from the same stock issuing point, it is probable that all of any one item will be. Therefore, less frequent requisitioning of larger quantities increases the size of shipments consigned to the user.

Inventory Control Points, as the initial recipient of requisitions, tend to discourage consolidation of small shipments when the various requirements of one customer are filled from multiple supply sources. Also, requisitions submitted concurrently by two or more customers in the same geographical area may be shipped from different supply sources.

Water terminals are natural consolidation points. Small shipments are segregated at a port by addressee or geographical area and block-stowed in a ship according to the port of discharge. In addition, some military water terminals unitize substantial quantities of cargo into CONEX, triple-wall fiberboard, and wood shipping containers. Much of the consolidation or unitization at water ports could not occur elsewhere as economically. For instance, the Brooklyn Army Terminal is the first destination delivery point for most items purchased in the New York City metropolitan area. Approximately one-half of all small shipments received at this port fall in this category and explain, in part, the unitization workload which averages 153,228 measurement tons per year.

Air Terminals are consolidation points similar to water terminals; however, the priority of the cargo places even greater restrictions on the time per-

mitted for consolidation. Generally speaking, under UMIPS, if there is time to hold the cargo for consolidation, it is probable that air movement should not be made. If there is time to spare, a lower cost mode of movement is usually indicated.

Stock issuing points/supply sources have the greatest influence upon small shipment consolidation. The extent of this effort is, however, directly related to MILSTRIP requisitioning procedures, UMIPS depot processing times and shipment planning methods. Selection of the mode and carrier within the mode is dictated by the nature of the material, priority of the requisition and carrier service available. Consolidation of small shipments is currently being accomplished with varying degrees of success owing to the evolution of the military logistics system from manual to automatic means of shipment planning, requisition consolidation and materials handling procedures. The time during which transportation personnel have access to finite shipment planning information is governed by the foregoing factors. The period of time allowed for consolidation of customer requirements either by data processing or transportation personnel has also a direct relationship to effective shipment consolidation and carrier selection.

MILSTRIP-MILSTAMP Implementation. MILSTRIP and MILSTAMP are interpreted and implemented differently, not only by each of the Military Services, but by individual installations within each of the Military Services. This, of itself, is not necessarily bad because of variations between the needs of the services, on the one hand, and the facilities, physical plant, and missions of the installations, on the other. The MILSTAMP manual directs that procedures will be implemented in a standard manner throughout the Department of Defense. It states further that MILSTAMP is to be used as the vehicle to establish realistic time frames throughout the entire DOD logistics system. However, the DOD Logistics Performance Committee has been given responsibility for developing a standard system for measuring supply, warehousing and transportation performance on a uniform basis.

With respect to Army shipment planning procedures, material release orders are received at supply sources (depots) from the appropriate Army Inventory Control Point by transceiver and are introduced immediately into a computer where they are accumulated for a maximum of 24 hours (Issue Priority Groups 1 and 2 are in some cases processed by hand while still others are expeditiously processed through the computer). The computer produces from this input the appropriate DOD Single Line Item Release/Receipt Document (DD Form 1348-1), a Transportation Work Card and separate Shipment Planning Worksheets, listing by Commodity Manager and by consignee all accumulated Material Release Orders. (This is a mechanical consolidation within a 24-hour holding time). The Transportation Work Card and one copy of the Shipment Planning Worksheet are forwarded to the transportation activity for shipment planning. The DOD Single Line Item Release/Receipt Document and the remaining Shipment Planning Worksheets are concurrently forwarded to the warehousing activity for picking, packing, marking, and assembly and/or consolidation of supplies for shipment by the prescribed depot due-out date. Upon receipt of the recapitulated Shipment Planning Worksheets from the warehousing activity, transportation personnel prepare bills of lading and offer shipments to carriers. This is accomplished by another predetermined date printed by the computer on the Shipment Planning Work-

sheets. This date (depot due-out date for the shipment) is determined on the basis of the depot processing cycle segment prescribed in AR 725-50, which is the Army implementation of the DOD MILSTRIP. This AR allows a maximum of 7 calendar days from receipt of combined IPG 3 and 4 material release orders to offering of shipment to a carrier. Less time, of course, is allowed for processing of shipments falling in IPGs 1 and 2. Transportation Officers at Army Depots are not authorized to "hold" shipments beyond the prescribed "depot due-out date" to effect a more economical consolidation, even though he be confident that the shipment will arrive at destination by the required delivery date (RDD) specified by the customer in his requisition. Army supply performance is measured on meeting the prescribed "depot due-out date" and not the customer's specified "required delivery date."

Cost and Volume of Small Shipments

A Defense Traffic Management Service Study shows that during FY 1963 a total of 1,645,260 small shipments weighing 788,818 short tons, exclusive of household goods, were made by the Department of Defense within the continental United States on government bills of lading. These small shipments accounted for 83.6 per cent of all GBL shipments; 3.7 per cent of the total tonnage, and 28.1 per cent of the total cost of commercial shipments, less household goods, during the period studied. The results of the DTMS study are summarized in Table 1, which clearly shows the need for effective shipment planning which will insure optimum consolidation of small shipments with a view toward reducing costs. As noted earlier, the success of individual services in this endeavor is related to their ADP program and their respective interpretation of UMIPS supply processing time frames.

Table 1

DISTRIBUTION OF SMALL SHIPMENTS BY WEIGHT BRACKETS GBL TRAFFIC IN CONUS, FY 1963 (EXCLUSIVE OF HOUSEHOLD GOODS)

Size of Shipment By Weight	No. of Shipments Each Weight Group	Total Weight of Shipments in Weight Group (S/T)	Total Cost of Shipments in Weight Group
1 - 99 lbs.	543,430	12,508	3,551,430
100 - 999 lbs.	730,320	124,252	15,834,800
1,000 - 9,999 lbs.	371,510	652,058	60,764,480
10,000 lbs. & up	322,770	21,032,971	204,820,490
Total	1,968,030	21,821,789	284,968,200
Size of Shipment By Weight	**Per Cent of Shipments**	**Per Cent of Weight**	**Per Cent of Cost**
1 - 99 lbs.	27.6%	.1%	1.2%
100 - 999 lbs.	37.1%	.6%	5.6%
1,000 - 9,999 lbs.	18.9%	3.0%	21.3%
10,000 lbs. & up	16.4%	96.3%	71.9%
Total	100%	100%	100%

The extent to which small shipments may be consolidated is not determined by volume alone. For physically compatible material, the probability that consolidation will occur is determined by the Issue Priority Groupings which segment freight into unreconcilable time brackets. Table 2 shows the distribution of shipments by per cent among the several priority groups. Depending upon the agency shipping, from 39.4 to 80.6 per cent of all GBL shipments, exclusive of household goods, moved within CONUS outside the UMIPS priority system.

Table 2

DISTRIBUTION OF SHIPMENTS BY PER CENT BETWEEN THE PRIORITY GROUPS FOR FY 1963

Service	IPG 1	IPG 2	IPG 3	IPG 4	Shipped Without Priority
Army	2.9%	4.5%	5.6%	16.3%	70.7%
Marine Corps	1.0	5.4	2.0	11.0	80.6
Navy	2.3	7.7	12.4	16.7	61.2
Air Force	10.7	10.2	13.0	10.7	55.4
DSA	2.9	7.8	12.7	37.2	39.4

The large disparity between potential cost reductions reported by various services is directly attributable to variations in service interpretation of UMIPS supply processing time frames or ADP capability. Table 3 summarizes the annual line haul cost reductions attainable through relaxation of UMIPS supply processing time frames and increased consolidation of small shipments at 16 depots.

Table 3

POTENTIAL ANNUAL LINE HAUL COST REDUCTIONS THROUGH EXTENSION OF HOLDING TIME (BEYOND PRESENT TIME ALLOWED BY UMIPS) FOR FURTHER SHIPMENT CONSOLIDATION OF IPG 3 AND 4 MATERIAL REQUIREMENTS

Service	1 Day	2 Days	3 Days	4 Days	5 Days	6 Days	7 Days
Army[1]	$118,188	$257,964	$355,836	$482,244	$600,684	$689,676	$855,828
DSA[2]	72,000	107,196	145,752	181,260	229,848	278,424	339,912
USAF[3]	7,956	15,912	23,868	31,824	39,780	47,736	55,692
Navy[4]	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Totals	$198,144	$381,072	$525,456	$695,328	$870,312	$1,015,836	$1,251,432

1 Potential cost reduction reported by 12 Army depots.
2 Potential cost reduction reported by 3 DSA depots.
3 Potential cost reduction reported by 1 Air Force depot.
4 Inconclusive for Navy stock points due to reasons stated in earlier discussion.

Small Shipment Consolidation Test—Anniston Army Depot

To the end that conclusions reached in a recent DOD study on small shipment consolidations indicated that significant additional economies and logistical advantages could accrue through optimum consolidation of small shipments, the Army on 1 July 1964 inaugurated a "small shipment consolidation test" at the Anniston Army Depot located at Anniston, Alabama.

The purpose of the test is two-fold, namely:

a. To determine what economies can be gained through small shipment consolidation, and

b. To determine whether small shipments can be held beyond the depot due-out date for consolidation and shipped in full load lots to meet customer-specified required delivery dates (RDDs) with no loss in efficiency.

The principal objectives of the test are:

a. To improve consolidation and distribution methods.

b. To reduce small shipment costs.

c. To increase the efficiency of military transportation and supply distribution operations.

d. To optimize standardization of shipment planning routines at Army depots.

e. To reduce performance of routine shipment planning and consolidation functions to automation.

f. To reduce storage-shipping space requirements.

g. To increase shipment processing speed and reduce the physical handling of shipments.

h. To improve supply and transportation documentation accuracy through the use of automation.

i. To effect optimum economical use of containerized movement services (CONEX).

j. To level storage workload associated with stock selection and shipping.

k. Predetermine daily manpower requirements in stock selection and shipping.

Concerning the scope of the test, it covers only Anniston-originated freight shipments for the following volume customers/destinations:

Fort Bragg, N. C.
Fort Benning, Ga.
Fort Knox, Ky.
Fort Campbell, Ky.
New Orleans Army Terminal, La.

Better than 80% of Anniston's outbound freight shipments are for the above destinations. The test period originally was for the period 1 July to 30 September, but was extended to 31 December for the purpose of obtaining additional operating experience considered essential to effect a proper evaluation of the capability of ADP to adequately support the shipment planning program as it relates to the consolidation of small shipments.

Test Guidelines

a. Time constraints (holding time) will not exceed seven (7) days for Issue Groups 3 and 4 material.

b. The required delivery date (RDD) will be the governing factor in determining hold time up to a maximum of 7 calendar days.

c. Single line item requisitions constituting a full load shipment will not be held beyond the depot due-out-date.

d. Shipment planning and ADP programming will be compatible with existing ADP programs at computer-equipped Army Depots.

e. Records will be maintained in order to effect an appropriate evaluation of the economic and logistical advantages accruing under the test.

Concept of Test

a. Procedures will provide for computer application within the ADP capability of present ADP computer equipment at Anniston Army Depot.

b. The computer will store and hold requisition data on small shipments by customer and/or destination in accordance with prescribed time constraints. Commodities involved in test are repair parts and spares.

c. Computer will update and provide a daily printout of the line items held by customer and/or destination.

d. Computer program will provide in the printout of the Shipment Planning Worksheet the estimated weights and cubes totaled by customer and/or destination.

e. The Depot Shipment Planning Office will conduct daily review of the consolidated printout to analyze and determine what shipments should be nominated for release into the depot shipping schedules.

f. The computer will release selected shipments, prepare the shipment planning worksheet and the DOD Single Line Item Release/Receipt Document (DD Form 1348-1s) for shipment planning action.

g. Shipment planning unit will schedule the consolidated requisitions through the storing cycle of stock selection, packing, marking, and final assembly for outloading into a consolidated configuration for onward movement by commercial carrier. This is a preplanned "package" with the mode of transportation, carrier selection, route, and Government bill of lading preassigned. This also provides for assignment of the packing bay and the outloading point carrier equipment will be spotted for loading.

h. Transportation equipment will be ordered to meet scheduled loading date and the Government bill of lading will be prepared and ready on completion of loading and/or scheduled release date.

Interim Test Results

Interim test results achieved to date are discussed in Table 4 below.

Table 4

SMALL SHIPMENT CONSOLIDATION TEST

I. Comparison of consolidated shipments moving to 5 test stations under RDD test concept versus the depot due-out date concept:

Period	Number Shipments Under DDD Concept	Number Shipments Under RDD Concept	Weight of Shipments (lbs.)	Avg. Wgt. Shipments (lbs.)
1st Qtr FY 65	501	63	1,547,430	24,562

Significant in this table is the fact that by shipping against the RDD date rather than the depot due-out date we were able to reduce by 87.5% (from 501 to 63 or 438) the number of consolidated freight shipments made to the 5 test stations during the 1st Quarter of FY 65. Further, we were able to effect a 695% increase (from 3089 lbs. to 24,562 lbs. or a 21,474 lb. increase) in the average weight per consolidated freight shipment moving to the 5 test stations during the July-September period. This also resulted in a substantial reduction in the number of Government Bills of Lading that had to be issued for these shipments.

II. Comparison of parcel post shipments moving to the 5 test stations under the RDD test concept versus the depot due-out date concept.

Period	No. Shipments Under DDD Concept	No. Shipments Under RDD Concept	Weight of Shipments Under DDD Concept (lbs.)	Weight of Shipments Under RDD Concept (lbs.)
4th Qtr FY 64	3,010		24,441	
1st Qtr FY 65	1,298	1,111	10,442	7,215

Of significance here is the fact that we effected during the 1st Quarter FY 65 a 14.4% reduction in the number of parcel post shipments made to the 5 test stations and a 30.9% weight reduction. Also noteworthy is that between the 4th Qtr FY 64 and end of 1st Quarter FY 65 there was a 63.1% reduction in the number (a decrease from 3,010 to 1,111 shipments) of parcel post shipments made to the 5 test stations.

III. Comparison of Transportation Costs under RDD Test Concept versus the depot due-out date concept.

A. **Cost of Freight Shipments:**

Period	Transportation Costs Under DDD Concept	Transportation Costs Under RDD Concept	Cost Avoidance	% Cost Reduction
4th Qtr Fy 64				
1st Qtr FY 65	$29,230.47	$14,822.10	$14,408.37	49.29%

B. **Cost of Parcel Post Shipments:**

4th Qtr FY 64	$ 1,833.00			
1st Qtr FY 65	813.63	$ 584.18	$ 229.45	28.2%

With respect to the cost of freight shipments, you will note that by being able to consolidate shipments against the RDD date in contrast to the depot due-out date that we were able to reduce the cost of consolidated freight shipments to the 5 test stations during the 1st Qtr FY 65 by an impressive 49.29%. And concerning the cost of parcel post shipments the table reflects an equally 28.2% reduction in the cost of moving small lot shipments to the 5 test stations via parcel post during the 1st Qtr FY 65.

IV. **Percentage of shipments in various weight ranges (total shipments):**

	Less than 2,000 lbs.	2,000 lbs. to less than 10,000 lbs.	10,000 lbs. and over
*(Avg 4th Qtr FY 63)	69.3%	7.1%	23.6%
*(Avg 4th Qtr FY 64)	62.4%	10.5%	27.1%
July 1964	60.2%	9.3%	30.5%
August 1964	59.3%	10.8%	29.9%
September 1964	55.1%	13.1%	31.8%

* These average percentages of shipments by various weight ranges are given for background data to indicate trends and comparison with July and August 64 figures. This chart dramatically portrays the results of an effective shipment planning and freight consolidation program. You will note that there has been a progressive decline in the percentage of shipments in the "less than 2,000 lbs." weight range and the progressive increase in the percentage of shipments in the "2,000 lbs. to 10,000 lbs." and "10,000 lbs. and over" weight ranges.

V. **Carrier Performance:**

Carrier performance with respect to meeting customer-specified required delivery dates (RDDs) in the movement of consolidated freight shipments to the 5 test stations during the 1st Qtr FY 65 was as follows:

Period	Percent of Shipments Meeting Prescribed ADD
July 64	80%
Aug 64	83%
Sep 64	Unavailable

All of the shipments involved in the test were tendered to carriers in ample time to meet prescribed required delivery dates at destination. However, due to carrier delays and weekend arrivals, delivery of some shipments was not effected until the following Monday.

SUMMARY

One of the rules for making a technical presentation is to "tell 'em what you're going to tell 'em; tell 'em; and then tell 'em what you told 'em." So, in summary, let me tell you what I told you.

a. Resolution of the small shipment problem calls for much more attention than it has in the past, particularly as the result of the introduction of mechanized techniques for the accomplishment of the freight/shipment planning and freight consolidation functions. While significant progress has been made, the road still to be travelled is a long one before the full economic potential from optimum consolidation of small lot shipments can become a reality. The economic benefits thus far derived from the Anniston small shipment test substantiate this contention.

Conflicting guidelines relative to meeting standard time frames and achieving an optimum amount of shipment consolidation must be reconciled in the interest of understanding and good management.

There has been a distinct shift of small shipment traffic from lower cost to high cost methods.

Although the use of parcel post obviates the need for costly transportation documentation and handling, significant economies can be realized from the consolidation of parcel post eligible shipments with other small lot freight shipments going to the same destination.

Increased monetary economies and logistical advantages are obtainable by consolidating shipments against the required delivery date (RDD) as against the depot due-date, as is the normal current practice.

Presently prescribed time frames for the processing and shipment of material do not normally allow sufficient time to accumulate multiple small lot shipments into economical lower cost load lots or larger less-load lots. Further, transportation time frames with respect to average transit times known or being experienced between consignors and consignees, particularly as regards shipments generating from secondary supply sources are unrealistic.

Some of the anticipated economic advantages to accrue under the test but as yet not measured, are a reduction in the number of packages, reduced packaging costs and lower direct handling costs, and a savings in carrier pickup and delivery time.

The shipper benefits from a reduction in split lots, and increased shipment consolidations, including those moving in containerized movement services (e.g. CONEX), considerably decreases the possibility of loss, damage and pilferage and the tracing of shipments; and reduces transportation documentation requirements.

The preplanning of shipment consolidations has increased the depot's shipping capabilities by an estimated 30-35% without any attendant increase in manpower. This stems largely from the elimination of double and triple handling of shipments as heretofore.

Shipping space requirements have been reduced. Instead of holding/stacking freight on warehouse floor for further consolidation and shipment, we now hold potential consolidated freight shipments in the computer, and once the stock is picked, packed and assembled into a consolidated configuration, it is moved directly off the consolidation/shipping line into carrier equipment for onward delivery to destination. Thus, valuable shipping space is conserved and the double and triple handling of small shipments eliminated.

Concerning future prospects, we have every reason to believe that the test will be successful and attain stated objectives. Consequently we are hopeful to be able to extend the application of the test concept to include the other 9 major Army computer-equipped depots, which we hope will take place around the turn of the new calendar year. Following this we are hopeful that its application can be extended to include shipments out of contractor facility, which might take until 1966 to accomplish. Looking still further ahead into the future, we believe the results of the Anniston small shipment consolidation test will eventually lead to optimized consolidation of small lot vendor shipments and the establishment of through transportation service in the case of overseas shipments.