

Aarong/BRAC

Aarong Business Process Re-engineering

Communication, Monitoring and Decision Making

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Executive Summary

The Aarong business process re-engineering proposal recommends "change" in three areas: the communication system, the monitoring system and the decision making system.

The communication system can be improved in three areas: between the shops and central service by altering the present forms; between central service and producers to ensure sequential order delivery; and internally - within Aarong. Presently, information flow is top to bottom; however, the lower hierarchy have invaluable comments that must reach upper management.

Aarong has recently adopted a computerized inventory monitoring system (CIMS) which has improved the efficiency of data collection but has several shortcomings. The proposals calls for an integrated CIMS that uses "design specific" software. By having design specific data three benefits result:

1. Popular selling items are kept in sufficient stock which will increase sales levels
2. Inventory levels can be reduced because only popular designs will be stocked
3. Allow sales assistants to focus on the customer rather than manual stock keeping

The present CIMS provides the third benefit only. An integrated CIMS will not be cheap - the table presents the total hardware and software costs (in 000's Taka) for a Local Area Network (LAN) and a UNIX system:

	LAN	UNIX
Low implementation	3431	1843
Medium implementation	4411	2151
High implementation *	5913	2576

Nonetheless, the projected income statements for the years 1994-1995 indicate profits would be significantly higher as compared to the present system. Under "medium implementation" for the more expensive LAN option, profits are higher in four out of the five years (assuming incremental sales growth of 1% and a reduction in inventory interest expense of 5%).

Profit	1994	1995	1996	1997	1998	1999
LAN	28078	33539	41692	51659	63846	78750
Present System	28078	33696	40435	48522	58226	69872
Incremental under LAN	0	-156	1257	3137	5620	8878

The final area for change is the product reorder decision making system. Presently, it is done primarily at the shops, but some categories are reordered from Central Service. The proposal calls for the centralization of all product reorder decisions to Central Service and the adoption of a "category management" system, with an individual responsible for selected categories in *all* of the shops. This centralization will be made possible by an integrated CIMS.

In summary, the implementation of the "communication" recommendation will improve the shop product requisition system and allow Aarong management to identify problems before they start. The implementation of the "monitoring" and centralized "decision making" systems will increase sales and lower interest expense. This will positively impact the women production workers by providing them with more work and more pay.

The Change Process

Strategic Planning Process GUIDES

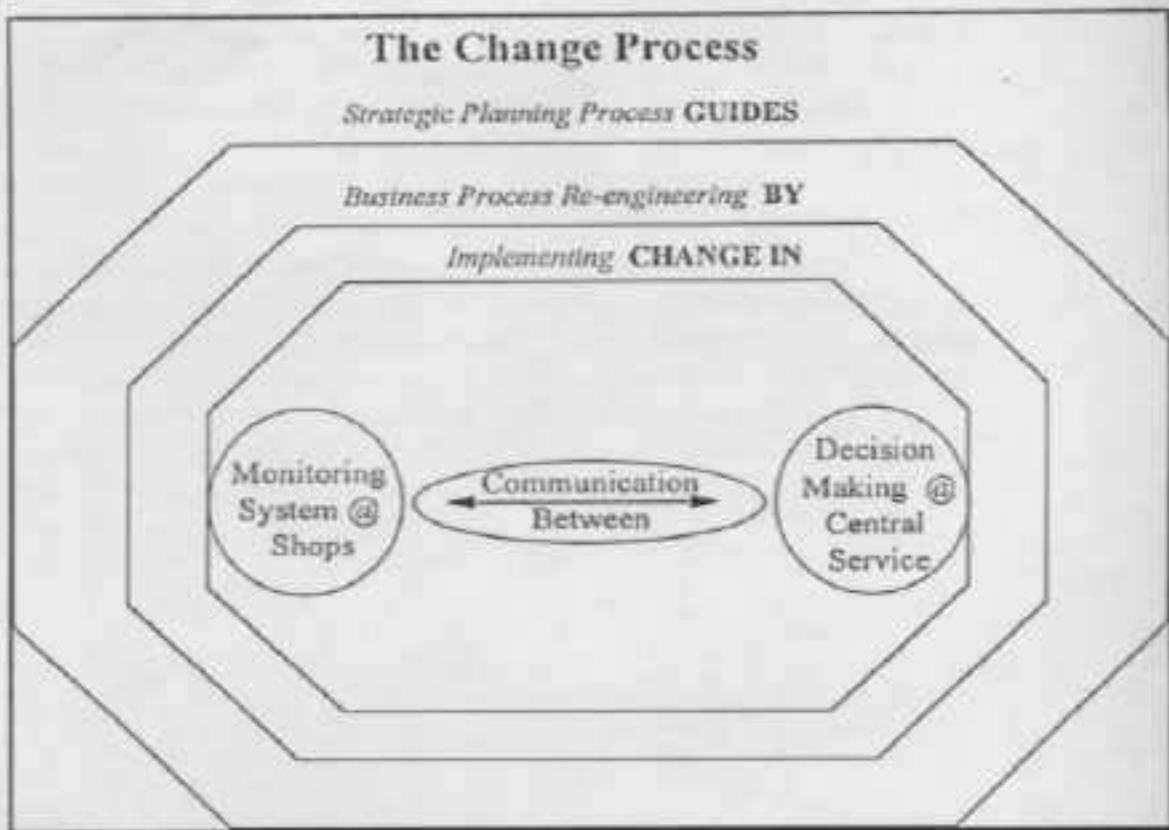
Business Process Re-engineering BY

Implementing CHANGE IN

Monitoring
System @
Shops

Communication
Between

Decision
Making @
Central
Service



Introduction

The initial intent of this paper was to present a proposal for a computerized inventory monitoring system (CIMS) for Aarong stores. However, to limit the scope of the paper to a CIMS would leave it incomplete for two reasons:

1. Presently, there is a well established system of monitoring at the shop level and communication with Central Service (CS). This has made the shops and CS interdependent. The addition of a CIMS into an interdependent system will necessarily lead to changes in the relationship. It is critical the impact and reverberations of these changes be identified, understood and managed in the change process.
2. During the past five months, through formal and informal meetings with Aarong management and staff, several valuable suggestions have been made. They are not directly related to CIMS, but deserve presentation.

Consequently, this paper takes a holistic approach. It will propose some far-reaching changes in communication, monitoring and decision making. It considers not only CIMS at the shop level, but also the communication flow between the shops and CS, and who should make the product reorder decision. In effect, it considers Aarong as a whole.

For change to work it needs a plan. The facing exhibit illustrates that a strategic planning process must encompass and guide changes to the Aarong system. Since the changes to the business process are broad, it is termed business process re-engineering. The re-engineering involves implementing the communication, monitoring and decision making changes.

The question which clearly begs asking is "Why Change?". Aarong has been a great success since its inception and will likely continue its present growth rate. Aarong management, the shops and the Ayesha Abed Foundation have done a truly commendable job in developing Bangladesh's most successful arts and crafts retailer. However, it is this same success and sales growth that is now overloading the present systems. Maintaining the present communication, monitoring and decision making will in fact constrain future growth domestically and abroad.

A final note on change. Aarong management, namely the Advisor, the Aarong General Manager and the Shop General Manager must fully endorse any change package that is decided upon or it will not be properly implemented. They must be strong proponents of the changes and assume strong leadership to communicate it throughout the organization. Throughout the change process, they must be mindful of the impact of change on the people within the organization and the Aarong culture.

Why Change?

Communication

There exist two areas for improved communication flow: (1) between shops, CS and producers and (2) internally.

Shops, Central Service and Producers

- ☒ *Between shops and CS:* Shops place product requisition orders with CS. When the delivery is eventually made to the shops from CS, the number of products delivered is sometimes less than the number of products requisitioned. Therefore, the shop manager is uncertain whether to reorder the remaining amount, to wait for it to arrive or take no action.
- ☒ *Between CS and producers:* Some producers consistently deliver orders out of sequence. If a producer has received several orders, they may produce the easiest ones first and neglect the more difficult orders. This can play havoc with the shop inventory system if they are not receiving deliveries in the sequence which they were requisitioned.

Internal Communication Flow

Aarong is a hierarchical organization with information flowing from top to bottom, which is a prerequisite for effective management. Nonetheless, the lower management and shop floor workers may have valuable suggestions which are not communicated to upper management because a system for bottom to top information flow is not present.

Monitoring

Aarong has historically used manual monitoring of shop stock position. This requires individual sales clerks from each department to track the receipt and sales of products and isolate the popular selling products - this system has three inherent weaknesses:

- ☒ Each department in each of the five shops must have at least one woman who is intimately familiar with the product line. The stock balance ledgers must be accurately maintained and re-order decisions made daily. This consumes a great deal of time.

- ❑ The ledgers record the stock balance of the products, but not of specific designs. Therefore, it is the responsibility of the shop clerk to mentally note which designs are popular so that these can be reordered. Clearly, this imprecision results in some popular designs not being reordered. This is a significant problem because sales are lost if popular products are not in stock.
- ❑ Inventory levels which are too high. This occurs for two reasons: (1) To assure adequate customer selection, inventory levels are maintained at three times the monthly sales rate to ensure popular designs are in stock. (2) It is difficult to isolate slow moving items, therefore they can remain in stock for months which inflates inventory levels.

Realizing these shortcomings, Aarong has commendably adopted a computerized inventory monitoring system. This will remedy the first problem. However, the product code is not design specific, therefore the computer output can not provide design specific information. So, sales are still being lost due to stock-outs of popular design - problem 2 still remains, and inventory levels are still too high - problem 3 still remains. A computer system is a significant investment and it must aim to be more than a one-third improvement over the manual monitoring system.

The present system provides the following reports to management: stock balances, sales, and product receipt and issue on a daily, weekly or monthly basis. However, a fully integrated computer system could provide significantly more information to management: design specific stock balances, age of inventories, identification of slow moving or fast moving designs, profit per square foot, labour hours sold per square foot, and export order completion reports. With these detailed reports available to management, there is a risk of information overload. But with proper system design and information distribution it can empower management to make accurate decisions without time consuming manual calculations. Additionally, it will free the shop sales clerk to perform their duty - which is sell, not maintain stock balance reports.

Decision Making

Presently, most of the reorder decisions are made at the shop level. CS is responsible for ordering five categories: women's, gent's and children's garments; household items and panjabees. Three people at CS make the reorder decisions regarding these five categories. The remaining fourteen categories are reordered directly from the shops. Assuming one sales assistant monitors each of the remaining fourteen categories and the shop manager makes the reorder decision; this translates into fifteen people per shop or seventy five people for all the shops. This is inefficient and increases the probability of error.

By centralizing decision making three benefits result:

- ❑ economies of scale are gained because tasks are not replicated in the individual shops

Appendix 13-a

Notes to Income Statements under the UNIX option:

Total Cost UNIX option:

- Based on PraDeshta Ltd. proposal (Appendix 3-d)

Financing and Expenses for ^{UNIX} LAN Medium Implementation:

- The medium option was chosen because of the combination of lower cost and reasonable check-out speed
- Principle repayment: Assumed five year principle repayment
- Interest Expense: Assumed 14% interest on the "principle" balance
- Depreciation Expense: Assumed five year straight line depreciation

Interest Savings from Decreased Inventory

- Interest savings: As stated in the text, 89% of interest charges are due to carrying inventory. Aarong management estimated that inventory could be reduced 33% with design specific information. Therefore, interest expense can be reduced 29.37%

Income Statement with ^{UNIX} LAN system

- Sales: Estimated to increase at 23% (as compared to 20%)
- Cost of Goods Sold: Estimated to increase at 23% (as compared to 20%)
- Administrative Expense: Estimated to increase at 20% (assumed the 3% incremental sales increase could be covered with the same administrative expenses)
- Principal, interest expense, and depreciation expense: Copied from the "financing" section
- Interest savings: Copied from the "interest savings" section
- Incremental profit: Compares profit under the LAN option and the present system

Appendix 13-b

Sales:

- Increased at 21% per year (a 1% incremental increase over the "no change" option)

Interest Expenses

- Reduction of 5% over the "no change" option

13-a

Total Cost UNIX Option Fixed	Hardware			Software	Total	Variable (per year)	
	Computers	Scanner	CRCC				
Low Implementation	1318	428	0	95	1842	Maintenance	47
Medium Implementation	1534	531	0	95	2160	Maintenance	52
High Implementation	1785	708	0	95	2578	Maintenance	58
Financing and Expenses for Medium Implementation							
		1895	1896	1927	1998	1999	
Principal		430	430	430	430	430	
Interest Exp.		301	240.8	180.6	120.4	60.2	
Total		731	670.8	610.6	550.4	490.2	
Interest Savings from decreased inventory (32% of interest inventory charged)							
		1994	1995	1996	1997	1998	1999
Interest	11554	13864.8	16637.36	19905.31	23959.37	29750.05	
Savings	0	4072.092	4886.51	5863.812	7036.576	8443.889	
BRAC - Aaring							
Projected Income and Expenditure Statement in Taka (000's)							
For the years 1995-99							
LAN Option							
	1994	1995	1996	1997	1998	1999	
Revenue							
Sales	319510	392997.3	483386.7	584555.6	731316.7	909518.3	
Other Income	215.26	75831.7	80997.44	37196.93	44636.31	53663.58	
Total Income	341036	418829.5	514384.1	621752.5	775952.9	963181.8	
Cost of Sale Sold	237804	292498.8	359773.7	442521.6	544301.8	685481	
Gross Profit	103232	126328.6	154610.4	179230.9	231650.4	277700.8	
Expenses							
Admin Exp.	75152	90182.4	108218.9	129882.7	156835.3	187302.2	
Principal	0	430	430	430	430	430	
Interest Exp.	0	301	240.8	180.6	120.4	60.2	
Maintenance		52	52	52	52	52	
Total Exp.	75152	90865.4	108941.7	130525.3	158437.6	187744.4	
Interest Savings	0	4072.092	4886.51	5863.812	7036.576	8443.889	
Net Expenses		86893.31	104055.2	124661.4	149401	179100.5	
Profit	28078	39428.27	50555.28	64579.48	82249.42	104880.4	
Profit present system	28078	33898	40435.2	48572.24	58238.60	69672.03	
Incremental Profit	0	5740.272	10120.08	16007.24	24010.73	34208.38	

13-b

Total Cost LAN Option							Variable (per year)	
Fixed	Hardware			Software	Total			
	Computers	Scanner	LNCC					
Low Implementation	1219	438	0	85	1842	Maintenance	47	
Medium Implementation	1534	521	0	85	2140	Maintenance	52	
High Implementation	1785	708	0	85	2578	Maintenance	58	
Financing and Expenses for Medium Implementation								
		1895	1895	1897	1898	1899		
Principal		430	430	430	430	430		
Interest Exp.		301	240.8	180.8	120.4	80.2		
Total		731	670.8	610.8	550.4	480.2		
Interest Savings from decreased inventory (5% of interest inventory charge)								
		1894	1895	1896	1897	1898	1899	
Interest	11054	12004.8	14837.76	19005.31	23058.37	28750.05		
Savings	0	593.24	831.888	998.2656	1197.918	1437.502		
BRAC - Aaring								
Projected Income and Expenditure Statement (in \$K) of								
For the years 1995-99								
LAN Option								
	1994	1995	1996	1997	1998	1999		
Revenue								
Subsidiary/FN/	219510	200007.1	461794.0	500031.5	664896.1	828720.7		
Other Income	21520	25831.3	30987.44	37196.93	44838.31	53962.58		
Total Income	241030	412438.5	898782	903228.4	729534.4	882290.2		
Cost of Gds Sold	227904	207742.8	548188.8	421294.3	509754	618802.3		
Gross Profit	132126	124695.5	150623.2	181944.1	219780.4	263487.9		
Expenses								
Admin Exp.	75152	80182.4	108219.8	129807.7	155835.2	187002.2		
Principal	0	430	430	430	430	430		
Interest Exp.	0	301	240.8	180.8	120.4	80.2		
Maintenance	52	52	52	52	52	52		
Total Exp.	75152	80965.4	108941.7	130525.3	156437.6	187544.4		
Interest Savings	0	593.24	831.888	998.2656	1197.918	1437.502		
Net Expenses		80272.18	108108.8	129527	155239.7	186106.9		
Profit	28078	34423.3	42513.4	52417.1	64540.71	79380.88		
Profit: present system	28078	51086	40438.2	48522.34	58220.89	69972.03		
Incremental Profit	0	727.3	2078.203	3894.881	6314.024	8908.95		

- ☒ centralization of information at CS allows them to effectively transfer understocked or overstocked products between the individual shops
- ☒ information overload on the shop managers is avoided

This concludes the presentation of the three problem areas for Aarong and the rationale for change. Attention will now be turned to the solutions by providing a quantitative and qualitative analysis of the options.

Communication

Between Shops and Central Service

<i>Recommendation</i>	<input checked="" type="checkbox"/> Include "requisition number" on requisition form <input checked="" type="checkbox"/> Create a "discrepancy form"
<i>Cost</i>	\$ Printing New Requisition Forms: Tk 2100/1000 forms (BRAC Printers) \$ Printing New Discrepancy Forms: Tk 2100/1000 forms (BRAC Printers)
<i>Benefit</i>	<input checked="" type="checkbox"/> Increase accuracy of shop requisition system

The solution to matching shop requisitions with the later delivery lies in altering the forms. The exhibit below illustrates that a requisition is made by the shop for 100 items. If the present requisition form is altered to include a requisition number (Appendix 1-a) this number will allow the order to be tracked through the production process. When the finished product arrives at the shop it can be matched with a requisition form. By matching the requisition with the delivery, the shop can keep track of the goods it is expecting and will know when a requisition has not been completely filled. Each of the five shops will have a number: 1-5. This digit will indicate the specific shop and the following digits will identify the specific order. If the quantity delivered does not match the quantity requisitioned, a "discrepancy form" (Appendix 1-b) must be filled by CS to explain the discrepancy to the shop manager. As an example, from the discrepancy form exhibit, the form would state: 10 items rejected and 10 items not delivered, and the shop manager would be instructed to wait for the remaining 20 items to arrive.

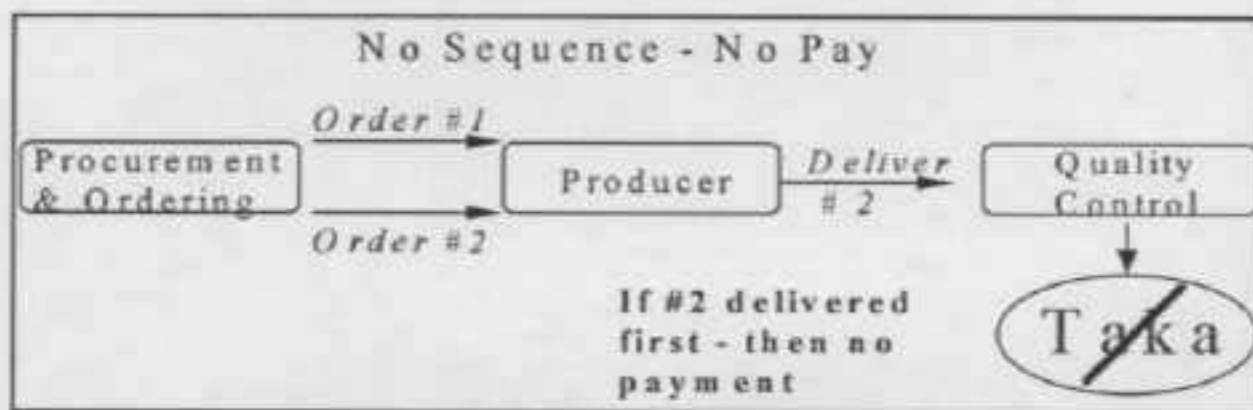


Between Central Service and Producers

<i>Recommendation</i>	<input checked="" type="checkbox"/> Withhold producer payment if delivery is not in sequence
<i>Cost</i>	\$ Negligible: maintenance of a producer order book could be done by Procurement & Ordering at a negligible incremental cost
<i>Benefit</i>	<input checked="" type="checkbox"/> Increased accuracy of shop requisition system

The solution to producer delivery out of sequence lies in recording the distribution of orders and matching this with the subsequent delivery. As exhibit 3 illustrates, if a producer delivers order #2 before order #1, payment will be withheld. This will ensure delivery sequence discipline.

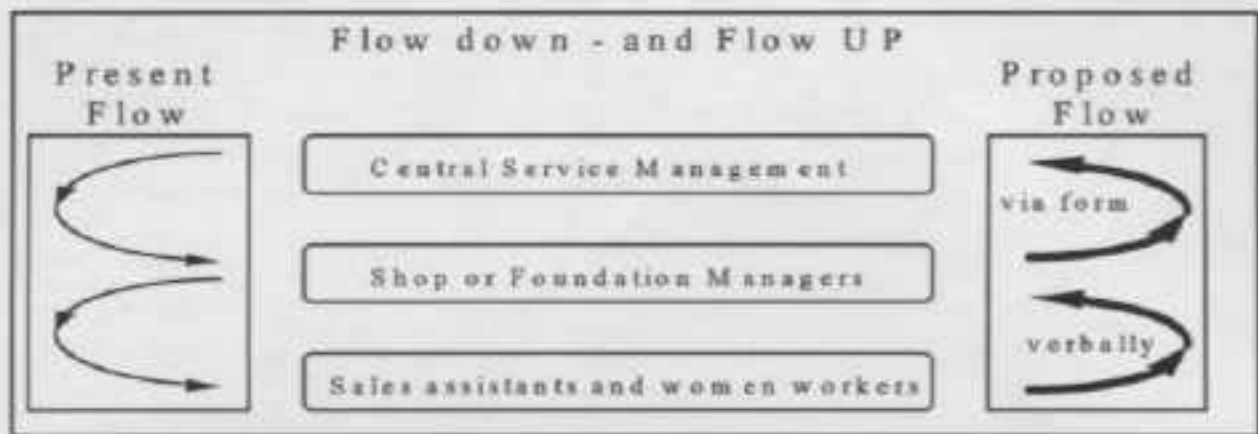
Exhibit 3



Internal Communication Flow

<i>Recommendations</i>	<input checked="" type="checkbox"/> Establish bi-weekly meetings which will permit information to flow bottom to top
<i>Cost</i>	\$ At the shops: 1319 Taka bi-weekly At the subcenters: 1350 Taka bi-weekly
<i>Benefit</i>	<input checked="" type="checkbox"/> Shops: Improved customer service <input checked="" type="checkbox"/> Foundation: Improved working conditions and higher productivity

As stated, the present communication flow is almost exclusively top to bottom. But, the bottom of the hierarchy can provide invaluable feedback to management. This feedback can come from two groups: sales assistants and Foundation workers (center and subcenter). Sales assistants are in direct contact with customers and are required to perform administrative duties. They may communicate comments from customers that will improve customer service and they may suggest efficiency improvements in the administrative system.



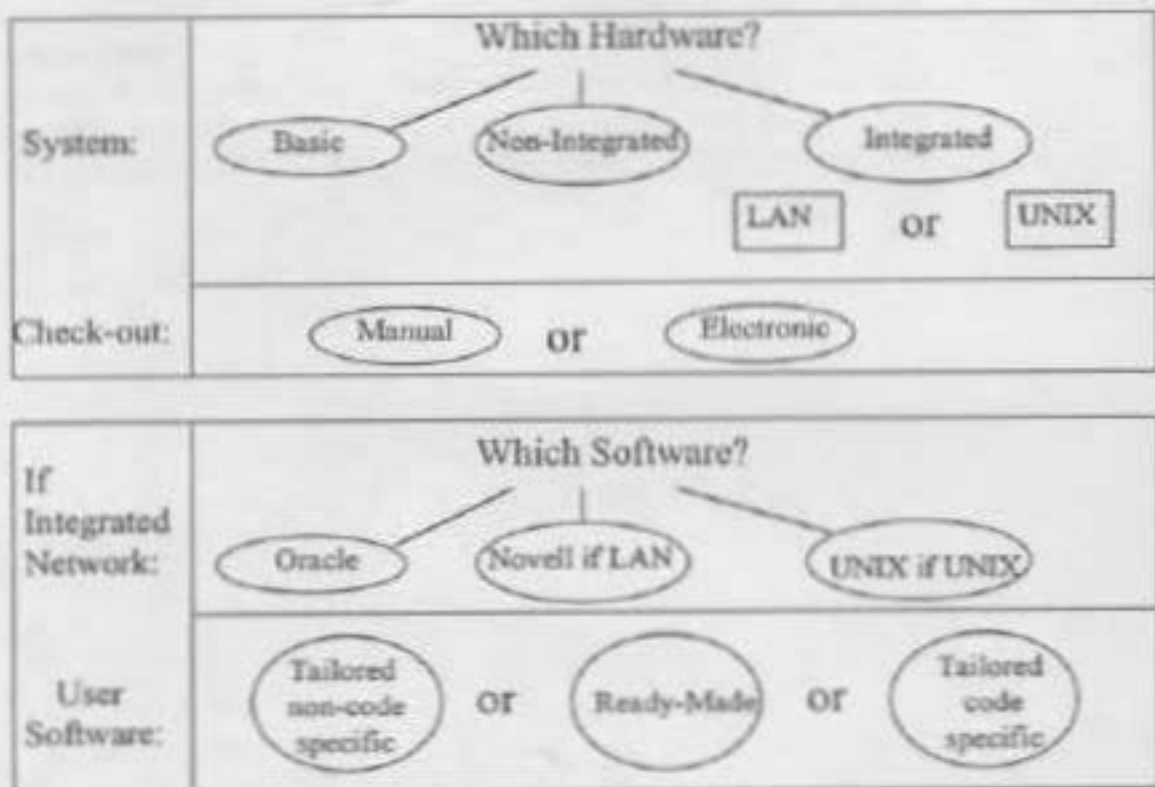
Foundation workers - the "raison d'être" of Aarong - are acutely aware of production problems because it impacts them directly. Comments such as: "we have little work", "equipment is broken" and "not being paid regularly" must reach senior management so they can take immediate corrective action. This upward information flow is illustrated in the exhibit above. Information flow is altered from uni-directional to a circular flow. This can be achieved with formalized bi-weekly meetings - the mechanics of which are presented below.

	Shop Floor Workers	Foundation Workers	
		Center	Subcenter
<u>Group Meetings:</u>			
<i>Where</i>	-on the shop floor	-in the individual production department	-in the subcenters
<i>When</i>	-bi-weekly (09:30-10:00 hrs)	-bi-weekly during PO visits	-bi-weekly during PO visits
<i>Meeting Participants</i>	-shop manager and sales assistants	-group leader and PO	-group leader and PO
<i>Upward Flow Mechanism</i>	-from shop manager to CS via form	-from group leader to PO to Foundation management	-from group leader to PO to Foundation management

Including all the Foundation workers (estimated at 6500) in the formal bi-weekly meetings makes this initiative prohibitively expensive. However, during the course of a day, a group leader could approach the women individually and receive their comments. The group leader could then meet bi-weekly with the PO. The number of meetings would be approximately 120 (# of subcenters). The PO would receive an estimated 15 Taka per meeting and the group leaders receiving 7.5 Taka per meeting (half hour of overtime pay). The PO could relay any relevant information to the Foundation via form (Appendix 2). In the shops, the meetings could take place on the shop floor, with managers receiving 15 Taka per meeting and sales assistants 7.5 Taka per meeting. The floor managers could then relay the relevant information to CS (Appendix 2).

A potential problem is the willingness of employees to make constructive criticism which will be sent upward in the hierarchy - particularly in a group setting. If this is the case, the shop floor manager could meet with the sales assistants individually and solicit their feedback in a non-formalized environment. This is a potentially less threatening way of receiving their feedback. As an additional incentive, employees with beneficial suggestions could be rewarded with an employee of the week or some other type of recognition. This is practised in my culture; however, I do not know whether group recognition in the Bangladesh culture is a proper reward mechanism.

Decisions...Decisions...



Monitoring

This section of the report represents the central part of the proposal - it involves the highest investment and the most change. The objective of this section is not to give Aarong/BRAC a definitive recommendation on the appropriate system. Rather, it will systematically present the options that are available by providing a qualitative and quantitative analysis of each. This information, in combination with a detailed system study by a computer programmer or consulting firm will allow Aarong/BRAC to make the appropriate choice.

The adoption of an integrated computerized inventory monitoring system is a big step. The system would have the power to replace virtually all the manual record keeping duties and provide a host of additional information to management. Clearly, this would involve significant change in some employee job descriptions and alter the way information is communicated. In essence, it could change the Aarong business process, which is business process re-engineering.

Management should be cautioned on three points before the computer options are addressed in detail.

1. It is essential that the appropriate hardware and software be selected from the outset. If an inappropriate selection is made, Aarong can become locked into a system that does not satisfy its needs - and remedying this would be costly indeed. Therefore, Aarong/BRAC must make an informed and educated selection.
2. A computerized inventory monitoring system (CIMS) facilitates information gathering and analysis - it is an enabler of change which will improve efficiency. However, it is not a magical solution to all problems and expectations must be set accordingly.
3. Adoption of an integrated CIMS will involve a change in corporate culture because it will impact employee responsibilities at the shops and Central Service. Aarong management must be aware of this and assure the employees understand why change is taking place and provide complete training on the new system.

The facing exhibit provides a visual framework of the options available to Aarong. Decisions must be made at two levels: hardware and software. For hardware there is a choice of a basic system, a non-integrated system or an integrated system. For checkout hardware there is a decision between manual and electronic. Regarding software, the "general software" options are Oracle, Novell and UNIX if an integrated hardware network is selected. Once this has been chosen the end-user software package must then be selected.

Hardware

Recommendations	<input checked="" type="checkbox"/> Investment in an integrated network computer system <input checked="" type="checkbox"/> Commission a detailed system study - one for a LAN system and one for a UNIX system	
Unresolved Issues	? Which system: LAN or UNIX? ? Which level of implementation: low, medium or high?	
Cost (in 000 Taka)	LAN (no scanner)	UNIX (no scanner)
<i>Low implementation</i>	2444.9	1404.5
<i>Medium implementation</i>	3189	1619.5
<i>High implementation</i>	4399.8	1870.5

Basic System

This option is the present system that is installed in the Banani shop. It involves placing a single computer in the manager's office at each of the five shops. At the close of the day, the data is manually entered into the computer and reports are generated weekly or monthly and printed out. The principle strength of this system is the low investment. However, it has significant weaknesses, namely it can not be on-line (meaning there is a delay between a transaction and the data entry) and it can not accommodate a software that is "design specific".

A design specific software requires a code that identifies each individual product. Therefore, the database would be very large. Aarong stores are continuously adding new products and deleting others; therefore, to maintain the integrity of the database, these changes must be continuously updated. In an integrated network (i.e. the computers in CS and the shops are all connected), the updating can be done automatically from the computer at CS. However, when the system is not connected - in the case of the basic system - these updates must be done manually with diskettes, preferably on a daily basis. Considering the location of the five shops, the manual distribution of updates to shops is prohibitive. It could easily turn into a logistical and recordkeeping nightmare - which is the antithesis of an effective computer system. Therefore, a non-integrated system can not use design specific software.

Strengths	Weaknesses
<input checked="" type="checkbox"/> Low Investment	<input checked="" type="checkbox"/> Not on-line
<input checked="" type="checkbox"/> Minimal training required (managers only)	<input checked="" type="checkbox"/> Can not use "design specific" software
<input checked="" type="checkbox"/> Low maintenance	
<input checked="" type="checkbox"/> Ease of programming	

In terms of cost, only one computer and printer is required per shop, so the investment is limited:

Hardware Requirement	Quantity	Rate (000 Tk)	Total (000 Tk)
Stand-alone computer	5 - Shops 1 - Central Service	50-60Tk	300-360 Tk
Printer	5 - Shops 1 - Central Service	approx. 15 Tk	90 Tk
Total			390-450 Tk

Though this system has several strengths, the true measure of a system is its usefulness to Aarong Management. Since the system can not accommodate a "design specific" software it is unable to provide management with exact information on specific products. This is a key requirement of Aarong Management. The present system is helpful, but it needs to capture design specific information to be fully useful. Therefore, I believe this option should not be fully implemented.

Non-Integrated System

The exhibit facing presents the configuration for a non-integrated system. It calls for stand-alone computers (similar to the basic system), but they are placed on the shop floor and operated by the sales assistants. This improves on the basic system by allowing data to be entered at the time of the purchase; however, it suffers from the same problem as the basic system: it can not accommodate "design specific" software. Therefore, the non-

integrated system is a marginal improvement over the basic system, but since each shop would require several computers, the cost would be four to five times. In addition, sales assistants would require training and computer maintenance would be higher. The marginal improvement of this system over the basic system does not justify the significantly higher investment. So, this system should not be considered as a viable option.

Aarong/BRAC management should be cautioned because in discussions with BRAC computers this option appears to be receiving serious consideration. However, I believe the previous information would indicate this may not be the appropriate choice. If further investment is to be made into the Aarong computer



system, it is essential the improved system meet all of Aarong's needs. To achieve this, I believe an integrated network is required.

Integrated Network System

Stated simply, an integrated network allows the computers to be linked, therefore they can communicate with each other. This is essential if information needs to be continuously updated; as would be the case with a design specific coding system. The update could be made in the Central Service computer (main server) and distributed throughout the network to the five shops and the individual computers. Similarly, product specific information (e.g. sales and stock) could be communicated from the shops to the CS main server for analysis.

With an integrated network the number of computers per shop is variable. A "high" number of computers will offer rapid customer checkout, but at a greater cost; conversely, a "low" number of computers will offer slower customer checkout, but at a lower cost. In presenting the cost estimates for an integrated network, three implementation levels have been chosen: low, medium and high. The "low implementation" level matches the present number of cash checkouts in the shops. The "high implementation" level was chosen to meet peak sales periods.

For your information, Appendix 3a-d presents proposals from four computer consulting and programming companies. They are presented in alphabetical order. It should be noted that the costs are in most cases unit costs or hourly rates. For them to provide an exact total cost will require they do a detailed system study of the Aarong requirements. Based on the information I have provided them, they have all recommended an integrated network system. This system has two options: a Local Area Network (LAN) or a UNIX system. Each of these will now be analyzed in detail.

Local Area Network



The exhibit illustrates that in a LAN, the individual computers (work stations -WS) on the shop floor are connected to a central, more powerful computer (server). The work stations communicate with the server. Since workstations have their own harddrive they can work independently and are able to communicate between workstations. The fact the work stations have a hard drive translates into a higher cost. There are several strengths and weaknesses for a LAN as compared to a UNIX system:

Strengths	Weaknesses
<input checked="" type="checkbox"/> Workstation independence: If server fails or is over-loaded, WS can continue operating at same speed	<input checked="" type="checkbox"/> Higher cost than UNIX
<input checked="" type="checkbox"/> High availability of quality software	<input checked="" type="checkbox"/> Potentially complex programming
<input checked="" type="checkbox"/> User friendly if properly programmed	<input checked="" type="checkbox"/> Lower security
<input checked="" type="checkbox"/> Addition of WS without hardware (server) upgrade	<input checked="" type="checkbox"/> Installation and networking more complex
<input checked="" type="checkbox"/> Widely used in Bangladesh	

Appendix 4-a presents the costs for a LAN system. Please refer to the assumptions to interpret the prices. In summary, the cost in 000's Taka:

	Fixed Cost	Variable Cost	Total Cost
<i>Low implementation</i>	1265	1178	2444
<i>Medium implementation</i>	1265	1922	3189
<i>High implementation</i>	1265	3134	4399

UNIX

The exhibit illustrates that a UNIX system has WS connected to a main server, but not to each other. The WS do not have a hard drive, so they cannot think for themselves. They have only a keyboard and a monitor and are called "dumb terminals". Therefore, they must use the main server as their brain. Since the WS do not have a hard drive they are significantly less than a WS in a LAN system. The main difficulty with a UNIX system is the WS dependence on the server (brain) because if the server crashes or is overloaded the entire system is affected. There are several strengths and weaknesses for a UNIX as compared to a LAN system:



Strengths	Weaknesses
<input checked="" type="checkbox"/> Lower Cost	<input checked="" type="checkbox"/> Dependence on central server
<input checked="" type="checkbox"/> Ease of programming if experienced with UNIX	<input checked="" type="checkbox"/> Not widely used in Bangladesh
<input checked="" type="checkbox"/> Higher security	<input checked="" type="checkbox"/> Limited range of available software
	<input checked="" type="checkbox"/> Higher system maintenance costs
	<input checked="" type="checkbox"/> Lack of experienced programmers

Appendix 4-b presents the costs for a UNIX system. Please refer to the assumptions to interpret the prices. In summary, the cost in 000's Taka:

	Total Cost
<i>Low implementation</i>	1319.6
<i>Medium implementation</i>	1534.5
<i>High implementation</i>	1785.5

Recommendations: System

There are four options open to Aarong. As shown, the basic and non-integrated system are not feasible if design specific product information needs to be continuously updated. The choice is therefore between LAN and UNIX. There is a considerable cost difference between the two. A LAN is more costly. However, it is better suited to the Bangladesh environment since programmers have greater experience with LAN and the system requires less maintenance.

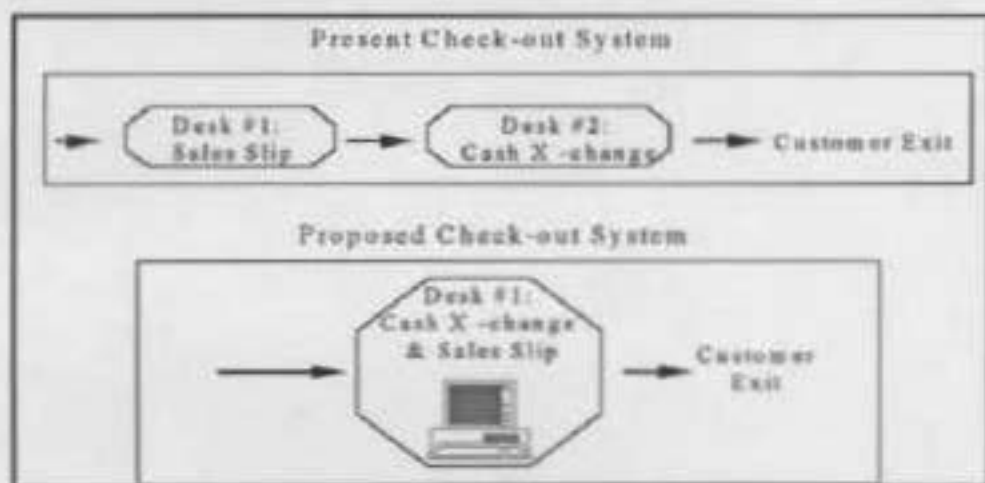
A detailed system study should be commissioned in order to determine the appropriate system and implementation level. Since the computer consulting firms I have met are biased towards LAN or UNIX, two independent studies should be performed by two competing consulting firms - one examining each option. For the LAN study, I recommend Leading Edge Technologies given their experience in a LAN environment and their familiarity with BRAC computers. For the UNIX study, I recommend PraDeshta Ltd given their experience in a UNIX environment.

Checkout Hardware

Data Entry

The exhibit illustrates that an integrated network would allow the first desk - the sales slip counter to be eliminated since this function could be performed by the computer, namely the printing of the sales slip. This would lead to two benefits: increased checkout speed and allow the sales assistant to do customer service, rather than writing sales slips. The table provides a comparison between the present two desk system and a single computerized desk with a manual keyboard data entry versus a scan system. The times for the two desk system are based on time motion studies at Banani shop and the keyboard and scan times are estimated based on past experience (All times in seconds).

# of products purchased	Double Desk System			Single Desk System	
	Desk 1	Desk 2	Total	Keyboard Entry	Scanner Entry
1 product	45	30	75	45	30
2 products	60	30	90	50	35
3 products	75	35	110	55	40
4 products	90	40	130	60	45
5 products	105	45	150	65	50



The single desk system is far more efficient since the two tasks are collapsed into one desk. The decision then must be made between the manual keyboard entry system or the scanner entry system (Appendix 5 presents information on scanner equipment). The table presents the costs and benefits of a scanner entry system. Appendix 6 presents the cost analysis of a scanner under the LAN system and appendix 4-d under the UNIX option. It should be noted that PraDeshta Ltd. is responsible for providing the majority of the scanning information.

Benefits	Cost (000 Taka)		
		LAN	UNIX
<input checked="" type="checkbox"/> No limitations on code length	Low implementation	457	438
<input checked="" type="checkbox"/> Greater accuracy	Medium implementation	633	532
<input checked="" type="checkbox"/> Greater speed	High implementation	834	706

Cash Exchange

The cash exchange at the checkout counter may be manual (present system) or electronic. The electronic system would use a "cash register cum computer" (CRCC) to record all transactions, to maintain the cash balance and to store the

cash. The CRCC is an option only if the LAN system is chosen. The appeal of the UNIX system is the low cost of the Work Stations; however, if these were replaced with expensive CRCC's, the system would cost more than the LAN system. The greater and the "weaknesses" associated with a UNIX system make this option unviable.

The incremental cost of CRCC in a LAN system are as follows:

	Incremental Cost (000Tk)	Units	Differential Cost
<i>Low implementation</i>	55	8	440
<i>Medium Implementation</i>	55	15	825
<i>High implementation</i>	55	23	1265

While a CRCC would provide greater accuracy and accountability, there exist several weaknesses with the system. Maintenance of the CRCC would be difficult in Bangladesh, it may be difficult to purchase all the units and checkout speed would be only marginally faster than a scanner system with a manual cash.

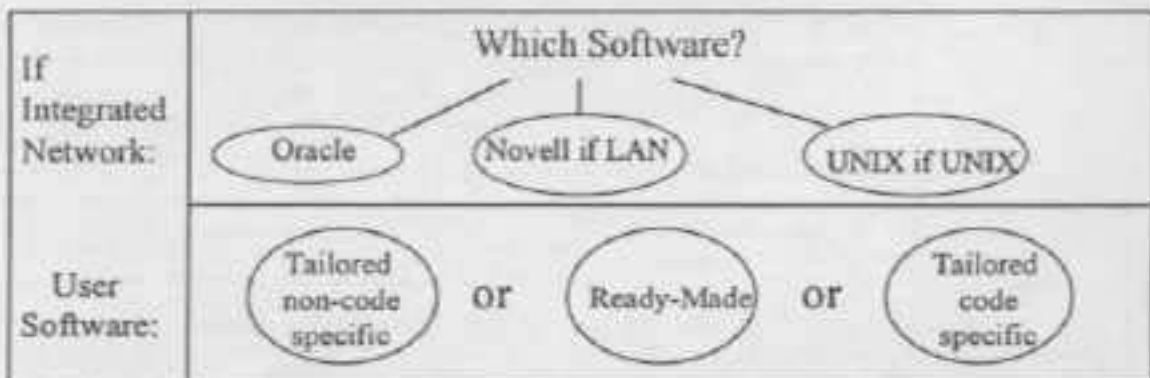
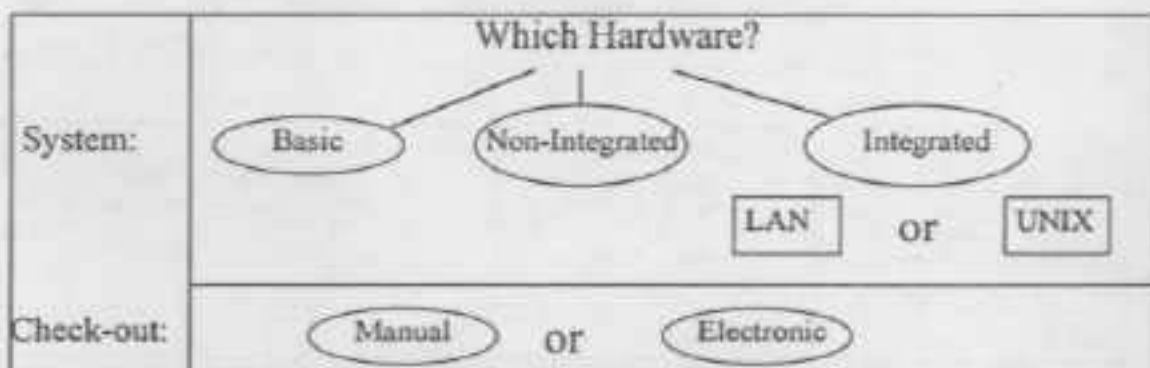
Recommendations: Checkout

	Recommendations	Rationale
Data Entry	Scanner system	<input checked="" type="checkbox"/> essential for lengthy code (error rate too high with keyboard) <input checked="" type="checkbox"/> much greater speed than manual
Cash Exchange	Manual	<input checked="" type="checkbox"/> Cost of CRCC is prohibitive <input checked="" type="checkbox"/> CRCC offers only a marginal benefit

Software

<i>Recommendations</i>	<input checked="" type="checkbox"/> Implement an individually tailored software program which records design specific information	
	<i>LAN System</i>	<i>UNIX System (not including training or implementation)</i>
<i>Cost (in 000 Taka)</i>	\$ Low implementation: 529 Medium implementation: 589.5 High implementation: 679	Low Implementation: 85 Medium Implementation: 85 High Implementation: 85
<i>Benefit</i>	<input checked="" type="checkbox"/> Increase Sales <input checked="" type="checkbox"/> Decrease interest expense by decreasing inventory <input checked="" type="checkbox"/> Allow sales assistants to focus on customer service	

Decisions...Decisions...



Before presenting the three options available to Aarong, it may be helpful to clarify "what is software". Once hardware has been selected, a computer programmer writes a series of instructions that will tell the computer what to do and when to do it. The programmer does this using a computer language. In effect, the software tells the computer what to do with the data and which types of reports to generate. Once the software has been developed, it is possible to change it and instruct the computer to do new things with the data. However, it can be difficult and expensive, therefore, it is imperative that Aarong be certain what type of information it wants from the computer before development takes place.

Software Options

The facing exhibit illustrates that once the hardware is chosen, the software selection must be made at two levels: the general software (Oracle, Novell or UNIX) and the end-user software (basic, ready-made or design specific). The three "general software" options pertain to an integrated network system only, a basic or non-integrated system could use the Disc Operating System (DOS).

For end-user software the three options are:

1. **Basic Software package:** This name has been given to the present system installed in the Banani shop. It is a significant improvement over the manual system, however, it suffers from several shortcomings which were presented in the "Why Change" section. Since the code does not incorporate design specific information, the report generation is limited.
2. **Ready-Made package:** This generic software is pre-programmed and ready for installation. An example of this software is provided in appendix 7 - Real World Inventory Systems. It is versatile and can be used in a wide range of retail settings. However, the fact that it is transferable from a retail environment, such as Aarong, to a wholesale or warehouse environment means that it will not be an exact fit with a specific environment and it will not meet all of management's requirements. As compared to an individually tailored package, which can meet 90%-100% of management needs, the computer consultants estimate that a ready-made package could only meet 60%-70% of Aarong management needs.
3. **Design Specific package:** Similar to option 1, which is individually tailored, option 3 is an improvement because it incorporates a design specific code and is individually tailored for the Aarong environment. Consequently, it is capable of generating a wider range of reports. This package will now be investigated in detail.

Recommendations

Since an integrated network is being proposed, the general software decision rests between Oracle, UNIX and Novell. Based on consultation with the computer programmers, Oracle is not required. It is more costly than UNIX or Novell and it performs relational database manipulations which are not required in the Aarong environment. Therefore, the decision is between UNIX or Novell and this is

Menu	Report	Description
1	a) Stock Balance and Rate of Sale b) Reorder Points c) Trial	a) Provide the stock balances and the rate of sale for each product b) Captures all the products that have reached their reorder level based on report (a) c) List separately all the balances and rate of sale for trial items
2	a) Age of Inventory b) Dead Items	a) Lists the average age of inventory for the selected item b) Isolates the items that are not selling over an extended period so they can be marked down
3	a) Design Popularity	a) Allows design department to compare the popularity of selected collections and designs
4	a) Profit per square foot b) Labor sold per square foot	a) Allows a profitability comparison between competing categories based on square footage occupied b) Compares the number of production labor hours sold between competing categories
5	a) Sales	a) Provides daily, weekly and monthly sales information
6	a) Producer deliver schedule	a) Records the orders and deliveries of producers to assure they maintain delivery sequence
7	Export a) Customer Files b) Order completion report. c) Sales	a) Lists the orders that have been delivered and the orders in-process for each customer b) Provides the status (completed or not) of each customer order c) Provides the sales by customer and geographical region

dependent on the type of hardware that is chosen (this decision should be made in conjunction with the computer programmers). A UNIX system will require UNIX general software and a LAN system will require Novell general software.

For end-user software, the best choice is design specific software. The basic options does not provide design specific information. The ready-made package would not meet all of Aarong needs. Design specific software will now be examined in more detail.

Design Specific Software

Code

This software is obviously based on the assumption that a code can be devised that permits each individual product to be identified. Appendix 8 presents a coding system that uses two types of codes to track "fashion items" and "non-fashion items" to identify and monitor specific items. This information can be used to generate several types of reports.

Management Reports

The reports have been designed in conjunction with Aarong management and attempt to duplicate the present "report system" and add several more informative reports. The reports have been divided into seven menus. By selecting a menu the user can extract information on sales, stock balances, design popularity ect. The information can be viewed for all shops or a specific shops and the user can specify a category (silver) or subcategory (pach dana sagorika silver earrings). Appendix 9 provides an example of the "menu" screen and "Menu 1" reports. The facing table provides a brief summary of the information that can be extracted from each menu.

The present "basic" software system installed in the Banani shop provides information on Menu 1 (stock balance, rate of sale and reorder points) and Menu 5 (sales); in addition it provides stock issue and receipt data. Since the proposed software is design specific it can provide further information from the five remaining menus.

Two menus should be given specific attention. Menu 2, the age of inventory, is based on an average figure. This figure is only valid if it is chosen for a design specific product (e.g. pach dana sagorika earrings). If the average age of inventory is calculated for an entire category (e.g. silver earrings) the data is not accurate, because some items have been stocked for a long time and some items only for a short time.

There have been questions surrounding Menu 4, which present data on profit per category per square foot and labor hours sold per category per square foot. The profit data could compare the profitability of different categories that occupy the same shop floor. If there was a significant difference in profitability, this would be a signal to increase the size of the of the higher profitability one at the expense of the lower profitable category. Since the goal of Aarong is not profit maximization, rather providing employment to target group women workers, the second

The Ups and Downs of Computerization



Sales

• Popular designs
in stock

+



Costs

• Interest
Savings

+



**Personnel
Resources**

• Increased
Customer Focus

= Benefits
of CIMS

calculation should also be performed. It would measure the number of production "labor hours" sold for each category. This would isolate the categories that are providing the most work to the target group women based on the square footage occupied on the shop floor. I believe this to be valuable information since it provides a more accurate and sophisticated measure than the profit per category and tracks the ultimate goal of Aarong: to sell the target women "labor hours".

Costs

The costs for a design specific software is divided into (1) development costs and (2) implementation costs. The development costs are based on quotations from computer consultants presented in Appendix 3. Implementation costs have been calculated based on consultation with Aarong management and staff. The table provides a cost summary (for complete analysis see Appendix 10 for LAN or Appendix 4-d for UNIX).

	<i>LAN System</i>	<i>UNIX System (not including training or implementation)</i>
<i>Cost (in 000 Taka)</i>	\$ Low implementation: 529 Medium implementation: 589.5 High implementation: 679	Low Implementation: 85 Medium Implementation: 85 High Implementation: 85

Benefits

The benefits from a design specific software package are threefold (facing exhibit): (1) increased sales, (2) interest savings and (3) employee time savings.

1. Sales Growth: Increased sales are fuelled by two sources: an increase in the "number of consumers" and an increase in "purchase amount per consumer". To increase the number of consumers, Aarong has been opening new shops and using marketing to attract new consumers. An increase in the amount of purchases per consumer comes from the consumer having more money and from more high demand products being available. A design specific software package will promote growth by allowing these high demand products to be available. As stated, the present manual or computer system is not able to accurately track specific designs. Therefore, once some popular selling items are sold out, they may not be reordered - the design dies and so does the potential sales growth. The design specific software will allow these popular items to be identified and reordered which will drive sales growth. Aarong management estimates that sales would increase a minimum of 3% with this system.

2. Interest Savings: Interest is charged to Aarong by BRAC at the rate of 14%. In discussions with Aarong accountants, it is my understanding that the BRAC loan is used to cover "advances" and "inventory stock"; with advances accounting for 11% of the loan and inventory stock account for the remaining 89% (based on BRAC - Aarong Balance Sheet, As at 30th June, 1994, Total of 1994). Therefore, 89% of the interest expense is attributable to inventory.

The Aarong policy is to maintain inventory levels at three times the monthly sales rate. This is done to protect against stock-outs of popular designs and to provide a sufficiently wide selection to the consumer. This policy makes sense if Aarong has only subcategory specific information (i.e. the sales and stock of Tangail Cotton Sarees, but not the sales and stock of specific Saree designs) and it is effective in maintaining sufficient stocks of most items. However, it leads to inventory levels that are too high - which leads to costly interest expense.

Since it takes approximately one month between shop requisition and delivery, theoretically, Aarong should have only one month of inventory in stock. Though this is overly optimistic, Aarong management estimates that with design specific information it could lower inventory levels to two times monthly sales (down from three times). This is a decrease of 33% and would result in a subsequent decrease in inventory interest expense by 33%. In addition, slow moving products (i.e. on the shop floor for over six months) could be easily identified and sold at a reduced price. This would also have a positive effect on interest expense.

3. Time Savings: In discussions with Aarong management and the Banani shop manager, it was estimated that sales assistants spend one hour of the five and a half hour shift monitoring and maintaining stock balance ledgers (18% of the shift). Shop managers spend two hours of the shift monitoring stock balances and generating reports (36% of the shift). Using the Banani shop as an example, the table presents the hours per shift allotted to these administrative duties and the hours allotted to customer service.

	# of workers/shift	Hours on admin duties	Hours on customer service	Total hours on admin duties	Total hours on customer service
<i>Sales Assistant</i>	8	1	4.5	8	36
<i>Manager</i>	1.5	2	3.5	3	5.25
<i>Total</i>				11	41.25

Therefore, in a single day (two shifts), 22 hours are spent doing administrative duties and 82.5 hours are spent on customer service. In a year (6 days * 50 weeks), this translates into 6600 hours spent performing administrative duties. Banani accounts for approximately 10% of non-export sales. If sales per employee are considered to be equal in each of the five shops, then the time spent on administrative duties at Banani shop are 10% of the total. This means the five shops combined spend 66,000 hours per year doing administration. This is 66,000 hours that could be spent providing greater customer service.

At central service, it is estimated five people spend one and a half hours per day performing administrative duties (monitoring and report generation). This translates into 7.5 hours per day (assuming 8 hour day) and 2063 hours per year (assuming 5.5 days per week and 50 weeks per year). Therefore, the theoretical time savings in the Aarong system is 68,063 hours per year. Two points should be noted. First, the present computer system will reduce this figure substantially, the

exact amount remains to be seen. The second point is the automation of the monitoring process will still require some administrative tasks to be done at the shops and central service, however, they will be significantly less than the present level.

Cost Summary

The table presents the total hardware and software cost (in 000 Taka) for each option with a scanning system (note: the UNIX option does not include software training or software implementation).

	LAN	UNIX
Low implementation	3431	1843
Medium implementation	4411	2151
High implementation	5913	2576

Projected income statements have been prepared for the years 1995-1999 for each option and compared to a "no change" option (Appendix 11). The "no change" option assumes a growth rate of 20% for sales and expenses. With the new CIMS, the assumptions are a 3% incremental sales growth per year (23%) and a 33% decrease in inventory levels (which translates into a 29% decrease in interest expense).

The table below provides the incremental profit for a "medium implementation" LAN system over the "no change" option (see Appendix 12-a for details and assumptions).

	1994	1995	1996	1997	1998	1999
Incremental Profit (in 000 Taka)	0	4856	9299	15299	23328	33987

The table below provides the incremental profit for a "medium implementation" UNIX system over the "no change" option (see Appendix 13-a for details and assumptions).

	1994	1995	1996	1997	1998	1999
Incremental Profit (in 000 Taka)	0	5740	10120	16057	24022	34618

If more realistic assumptions are adopted: incremental sales growth 1% (21%) and decreased interest expense 5%, the incremental profits are significantly higher than the "no change" option. The table provides a summary of the incremental profits (see Appendix 12-b for LAN and 13-b for UNIX details).

	1994	1995	1996	1997	1998	1999
Incremental Profit (in 000 Taka)						
LAN	0	-156	1257	3137	5620	8878
UNIX	0	727	2078	3894	6314	9508

Decision Making

As stated in the "why change" section, the number of people involved in the present manual product reorder decision making process is very high (one sales assistant for each of the fourteen categories which are reordered from the shops and the shop manager = 75 people for the five shops). Whereas only three people make the reorder decision at CS for the remaining five categories. The present computer system will reduce this figure substantially. On average, two managers per shop and the three people at Central Service will be required; however, this figure still translates into 14 people in the Aarong system.

Under the proposed integrated network system with design specific software, there is a definite risk of information overload on the shop managers since they will have access to almost fifteen reports. In addition, stock balances will no longer be maintained at the subcategory level (# of silk panjabees), but at the design specific level. This translates into thousands of individual stock balances. In effect, the new computer system could paralyze the decision making process of the shop manager because too much information is available.

Both of these problems can be remedied by adopting a centralized "category management" system. Category management calls for managing each of the nineteen categories as a separate entity. Each category would be operated to make a profit or to sell labor hours at a non-profit basis. Therefore, an individual would be responsible for monitoring stock balances, reorder points, design popularity and making the appropriate reorder decisions. If an individual became intimately familiar with several categories (four to five), they could master the information generated from the new system and perform all the sophisticated manipulations that are possible. In essence, information overload would be avoided.

By centralizing this category management system at Central Service, the reorder decision making process would be transferred from the shops to CS. Five people (managing four to five categories each) could perform all the decision making duties for the nineteen categories. The category managers would keep the shop managers abreast of their product reorder decisions with daily summary reports and could liaise with them at weekly group meetings.

Benefits

- ☑ The number of people in the decision making process would be reduced to five - as compared to 14 under the present computer system and 145 under the manual system

- ☑ Category managers would not be information overloaded because they would only be monitoring four to five categories (as opposed to shop manager monitoring nineteen) from all of the five shops. Economies of scale would be achieved in information management.
- ☑ Free shop managers and sales assistant from monitoring and decision making to allow them to focus on customer service

Costs

	Number of people	Rate (000 Taka)	Total
Training (one-time)	5	10	50
Salary (yearly)	5	120	600

This recommendation proposes a fundamental change in the product reorder decision making process. Centralization of decision making is not only logical and efficient, but essential if a design specific software package is adopted.

The Change Process

Strategic Planning Process GUIDES

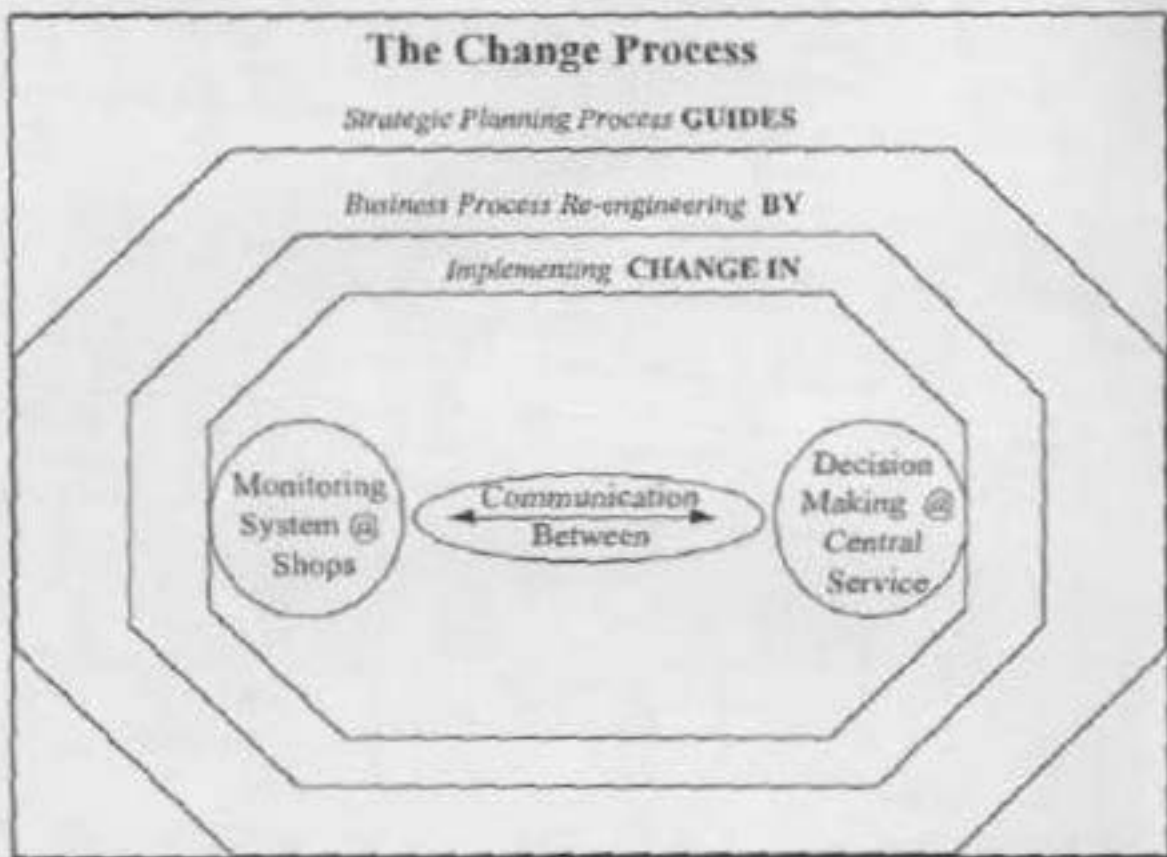
Business Process Re-engineering BY

Implementing CHANGE IN

Monitoring
System @
Shops

Communication
Between

Decision
Making @
Central
Service



Recommendations & Implementation

The facing exhibit illustrates the three proposed areas of change: monitoring, communication and decision making. These functions are interdependent and vitally important to the effective operation of Aarong. A change in one area will have an effect on the other areas because of the interdependence - and a failed attempt at change in one of the areas will have a negative impact on the others. So, it is essential that change not be haphazard or piece-meal. Therefore, change or "business process re-engineering" of the magnitude proposed in this report must be planned, monitored and evaluated. In essence, it requires a "strategic planning process" to guide the change.

The strategic planning process should involve the appointment of an individual or team of Aarong managers to lead the change. The "change leaders" must meet and decide on yearly and quarterly targets before the implementation begins. At the end of each quarter, the team should assess its progress with a monitoring and evaluation report.

A brief implementation plan will now be presented for each of the specific recommendations.

Communication

Shops to Central Service

Recommendation:	<input checked="" type="checkbox"/> Adoption of new requisition forms that allow the individual requisitions to be matched with deliveries <input checked="" type="checkbox"/> Development of a discrepancy form that will explain any discrepancy between the number requisitioned and the number received
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Implementation

Who:	Team Leader: Rob Chowdhury	Team Members: Shop Managers and Quality Control Manager
Duties:	Explain rationale for new forms and provide training/explanation on form completion	Accurately maintain new requisition and discrepancy forms
When:	Implementation can occur within one month	
Monitoring and Evaluation:	Performed by Mr. Chowdhury and shop managers	

Central Service to Producers

Recommendation:	<input checked="" type="checkbox"/> Maintenance of individual producer order ledgers that lists the sequence of orders given. If producers deliver out of sequence then payment is withheld
-----------------	---

Implementation

Who:	Procurement & Ordering: Ms. Coleta and S.A. Hasib
Duties:	Maintenance of producer ledgers and verification of the delivery sequence before signing cash memo
When:	Implementation can occur within one month
Monitoring and Evaluation:	Procurement & Ordering

Internal Communication

Recommendation:	<input checked="" type="checkbox"/> Bi-weekly staff meetings with sales assistants at the shops and production workers at the Foundations and subcenters
-----------------	--

Implementation

	Shops	Foundation and Subcenters
Who:	Team leader: Rob Chowdhury Team members: Shop managers	Team leader: Mr. Asit Team members: PO's and group leaders
Duties:	Team members: meet bi-weekly with staff to receive their suggestions and communicate info to Aarong management	Team members: meet bi-weekly to receive worker comments and communicate their suggestions to Foundation management
When:	Within two months	After present productivity problems have been remedied
Monitoring & Evaluation:	By team leaders	By team leaders

Monitoring

Recommendation:	<input checked="" type="checkbox"/> Adopt an integrated computerized inventory monitoring system
Team Leader:	<input checked="" type="checkbox"/> Mrs. Shilu Abed
Team Members:	<input checked="" type="checkbox"/> Mr. Sajid, Mr. Iftekar, Mr. Rob Chowdhury and the Design Department

Implementation

Stage 1	<input checked="" type="checkbox"/> Invest in detailed system study by two independent consultants - one for LAN and one for UNIX
<i>Who</i>	LAN system study: Leading Edge Technologies UNIX system study: PraDeshta Ltd.
<i>When</i>	Before February 28 (my departure) since I can communicate information I have learned over the past five months in-person
Stage 2	<input checked="" type="checkbox"/> Selection of a system (LAN or UNIX) and computer consulting firm
<i>Who</i>	BRAC computers in conjunction with Leading Edge Technologies or PraDeshta Ltd.
<i>When</i>	Within 2 months
Stage 3	<input checked="" type="checkbox"/> Translation of present code to design specific code
<i>Who</i>	Procurement & Ordering
<i>When</i>	Within 2 months
Stage 4	<input checked="" type="checkbox"/> Inventory Count
<i>Who</i>	Shops
<i>When</i>	Within one inventory turn (6-8 months)
Stage 5	<input checked="" type="checkbox"/> Training
<i>Who</i>	Sales Assistants, Shop Managers and selected Central Service staff
<i>When</i>	In the last month before system implementation

Decision Making

Recommendation:	<input checked="" type="checkbox"/> Centralization of product reorder decision making <input checked="" type="checkbox"/> Adoption of a "category management" monitoring system
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Implementation

Who:	Team Leaders: Sajid and Iftekar	Team Members: Iftekar, Anis, Tanveer and two shop managers (transferred to Central Service)
Duties:	Develop the "category management" system for each category (i.e. set appropriate stock levels and sales targets)	Perform daily analysis of their assigned categories and communicate their decisions to the shops
When:	<i>Development of the system:</i> 3 months prior to computer system implementation <i>Implementation of the system:</i> Simultaneously with the computer system implementation	
Monitoring and Evaluation:	Performed by team leaders	

This concludes the presentation of the business re-engineering process. In general, the implementation of the communication recommendations will allow Aarong to identify problems before they start and will improve the Central Service delivery system. The implementation of the monitoring and decision making recommendations will allow the shops to more effectively and efficiently meet consumer demand. By better meeting consumer demands at a lower costs, both sales and profits will rise. This translates into two things: (1) increased sales will lead to increased employment of target group women; (2) increased profits will allow for Foundation expansion and higher worker wages - and these two things are the ultimate goal of Aarong.

Appendix 2

Bi-Weekly Meeting Summary Sheet

Provides a summary of the directives given to the employees

Provides a summary of the feedback from the employees, the appropriate action to address the issue and who should perform it

Bi-Weekly Meeting Summary Sheet	
Date:	Name of Subcenter or shop floor:

Directives Given from Management

Feedback from Employees	Appropriate Action	To be performed by whom

Appendix 3

1. Abacus & Automation (appendix 3a)

Recommendation	-Local Area Network (LAN) system
Cost (in 000) Taka	-Note: Total hardware costs are based on outdated specifications which I provided them. Therefore, only unit costs are relevant for hardware.
<i>hardware</i>	-per unit costs are relevant
<i>software</i>	-Taka 300 plus training
Terms and Conditions	
<i>hardware</i>	-Provided
<i>software</i>	-Will be decided upon discussion with the client

2. Datatech Computer Ltd. (appendix 3b)

Recommendation	-Local Area Network (LAN) system with a Novell Network or Lantastic Network operating system
Cost (in 000) Taka	
<i>hardware</i>	-provided per unit costs
<i>software</i>	-Taka 157.5
Terms and Conditions	
<i>hardware</i>	-Not provided
<i>software</i>	-Not provided

3. Leading Edge Technologies Ltd. (appendix 3c)

Recommendation	-Local Area Network (LAN) using an "Aarong point of sale system" and an "Aarong head office management system"
Cost (in 000) Taka	-Note: project costs cover Dhaka area shops and Aarong head office only
<i>hardware</i>	-Taka 1193
<i>software</i>	-Taka 805
<i>cable</i>	-Taka 80
Total	-Taka 2078.7
Terms and Conditions	
<i>hardware</i>	-Provided
<i>software</i>	-Provided

4. PraDeshta Ltd. (appendix 3d)

Recommendation	-A UNIX system
Cost (in 000) Taka	
<i>medium implementation hardware</i>	2066.34
<i>medium implementation software</i>	85
Terms and Conditions	
<i>hardware</i>	-Not provided
<i>software</i>	-Not provided

APPENDIX 3-a

Dated Jan 11th, 1995

To
Mr. Peter Cashion
BRAC \ Aarong
Dhaka

SUB : Submission of estimated hardware and software cost


Dear Sir :

Thank you for asking estimated cost proposal from Abacus & Automation Ltd. Attached herewith is the estimated price proposal for both hardware and software for Computerized Inventory Monitoring System for Aarong.

Please note that there were no technical specifications given in the hardware requirement part of the requirement sheet. Thus, our proposal contains estimated price for the hardware we felt would suite your purpose. Also, our proposal has no estimated cost for Cash register cum Computer, Bar Code Printer, and ready made software package since we need more time to do inquiries on these products. Finally, this proposal has been prepared based on the "Basic System" part of the requirement sheet.

If you have any question about the proposal, feel free to call us. Again, thanks for your time and consideration.

Sincerely,


Manzilul Islam Chowdhury,
Director

PROPOSAL

HARDWARE

L	Description of products	Qty	Unit Price Taka	Total Price Taka
a)	<p>PREMMIA GX P/90 (Server)</p> <p>CPU : 90 MHz Pentium processor design 256 KB second level cache</p> <p>RAM : 16 MB expandable up to 192 MB system total.</p> <p>FDD : 3.5", 1.44 MB</p> <p>HDD : 730 Fast SCSI-2</p> <p>VRAM : 2 MB VRAM expandable to 4MB</p> <p>Monitor : AST 14" SVGA low radiation Color Monitor</p> <p style="text-align: center;">OR</p>	2	270,000	540,000
	<p>PREMMIA GX P/90 (Server)</p> <p>CPU : 90 MHz Pentium processor design 256 KB second level cache</p> <p>RAM : 16 MB expandable up to 192 MB system total.</p> <p>FDD : 3.5", 1.44 MB</p> <p>HDD : 1 GB Fast SCSI-2</p> <p>VRAM : 2 MB VRAM expandable to 4MB</p> <p>Monitor : AST 14" SVGA low radiation Color Monitor</p> <p style="text-align: center;">OR</p>	2	327,000	654,000
b)	<p>BRAVO MS P/90 (Server)</p> <p>CPU : 90 MHz Pentium processor design 64 KB second level cache upgradable to 256KB</p> <p>RAM : 16 MB expandable up to 192 MB system total.</p> <p>FDD : 3.5", 1.44 MB</p> <p>HDD : 730 MB IDE</p> <p>VRAM : 2 MB VRAM expandable to 4MB</p> <p>Monitor : AST 14" SVGA low radiation Color Monitor</p> <p>Ethernet Card : 32 bit</p>	2	205,000	410,000

Sl	Description of products	Qty	Unit Price Taka	Total Price Taka
2	<p>AST Bravo LC 486DX-33 (Work Station)</p> <p>CPU : Intel i-486DX Processor, 33 MHz speed, zero wait state, 8KB integrated cache memory, support for 256 KB second level cache memory, support for 487SX math coprocessor, Upgradability Intel Pentium Overdrive.</p> <p>RAM : 8 MB expandable up to 64 MB system total.</p> <p>FDD : 3.5", 1.44 MB and 5.25", 1.2 MB.</p> <p>HDD : 210 MB IDE</p> <p>I/O Ports : 2 serial, 1 parallel port & 1 PS/2 compatible mouse port.</p> <p>Softwares : MS DOS 6.0 and MS WINDOWS 3.1 AST utility software including Ast Cache disk caching software. ASTSETUP, ASTMENU Common User Interface software, security and complete documentation.</p> <p>Monitor : AST 14" SVGA Non Interlaced low radiation Color Monitor tilt and swivel base</p> <p>Mouse & pad Mouse and AST mouse pad.</p>	6	85,000	510,000
3.a	<p>Printer : Epson LQ1170</p> <p>Type : Dot Matrix Printer</p> <p>Head : 24 pin</p> <p>Print speed : 330 CPS</p> <p>Width : 136 column</p>	8	33,000	264,000
3.b	<p>Printer : HP Deskjet 520 Printer</p> <p>Width : 80 column</p> <p>Print speed : 600 dpi, 33 pages per minute</p>	1	25,000	25,000
4	Tape Drive : 250 MB (Colorado) Internal	1	20,000	20,000
5	<p>UPS</p> <p>SENDON 1200 .</p> <p>1.2 KVA</p> <p>Backup Tim : 12 Minutes</p>	2	30,000	60,000
6	Modem : Internal	5	17,000	85,000
7	Net work C :	20	100	2,000
8	<p>Color Scanner</p> <p>Speed : 400-1200 dpi</p>	1	88,500	88,500



Terms and Conditions for Hardware :

- 1 Warranty : 3 (Three) years warranty for the pentium server proposed.
1 (One) year warranty for Bravo LC, Printer, UPS and others.
- 2 Installation : Free of charge at client's site in the Dhaka city area.
- 3 Delivery : 4(Four) weeks after receiving the confirmed purchase order.
- 4 Payment : Advance.
- 5 Validity : 2 weeks


SOFTWARE :

Topic	Base Offer	Price Taka																						
SOFTWARE	Development of a Computerized Inventory Monitoring System f Aarong	300,000																						
NETWORKING	Installation charge for 3 workstations at Lalmatia shop																							
AFTER SALES	Free of charge for six months																							
MANUAL	A complete user manual.																							
TRAINING	<table border="1"> <thead> <tr> <th rowspan="2">Description</th> <th rowspan="2">No. of Trainee</th> <th colspan="2">Duration</th> <th rowspan="2">Course fees per person</th> </tr> <tr> <th>Hrs/day</th> <th>Days</th> </tr> </thead> <tbody> <tr> <td>Operator</td> <td>4</td> <td>2</td> <td>25</td> <td>800</td> </tr> <tr> <td>Supervisor</td> <td>3</td> <td>2</td> <td>25</td> <td>1200</td> </tr> <tr> <td>Staff</td> <td>4</td> <td>2</td> <td>30</td> <td>1500</td> </tr> </tbody> </table>	Description	No. of Trainee	Duration		Course fees per person	Hrs/day	Days	Operator	4	2	25	800	Supervisor	3	2	25	1200	Staff	4	2	30	1500	3200 3600 6000
Description	No. of Trainee			Duration			Course fees per person																	
		Hrs/day	Days																					
Operator	4	2	25	800																				
Supervisor	3	2	25	1200																				
Staff	4	2	30	1500																				

Terms and Conditions for Software :

Will be decided upon discussion with the client

Authorized Signature


Tanvirul Islam Chowdhury
Director

DATATECH

Computers Ltd.

25/17 No. 45 Road No. 17 (2nd Floor)
Sector CA, Dhaka 1213, Bangladesh
Phone: 96024932/3, 96024933/1
Fax: 96024937/2

Appendix 3-b

23 November, 1994

Mr Peter Cashion
Aarong
Dhaka, Bangladesh

Sub: Short Term LAN based MIS Consultancy

Dear Mr. Cashion

Further to our initial response to the software specification of Aarong's Inventory system, we are enclosing the following as our bid for the above mentioned Consultancy.

- Technical Proposal
- Cost Proposal

We hope you will find the bid in accordance with your requirement. In the meantime if there is any clarification that you may need, feel free to call us.

We look forward to receive your work order.

Thanking you



Najmul Haq
Director

Encl: As above.

Technical Proposal

The Technical Proposal consists of the following:

- **Environment**
 - Operating System
 - Database System
 - Hardware

Inventory System for Aarong
Detail schedule of development

Environment:

Operating System:

Our proposal is based on the more recent Novell Netware or Lantastic Network operating system using combination of DOS & Windows operating environment. In a LAN environment the Server if not properly defined will certainly slow the operation very significantly. Aarong is initially planning to install at least three workstations in the BRAC head office for the management to maintain and retrieve information. Sales centers can have stand alone systems or LAN system of their own if requires. Data from the sales centers can be transported via diskette or by off-line connection telecom connection via modem.

Database:

The Database Engine that we are proposing to develop the Inventory system in is Microsoft Foxpro Relational Database Management System. Foxpro's use on systems as yours has proven to be of excellent value. The system query language, large data handling, and transportability of data under different platforms are the features that makes it stand over other database engines. Moreover, our experience in using Foxpro for software development and support are also advantages.

Hardware Cost Proposal

Serial No.	Description	Approximate Unit Price
1	Novell 3.11 or 4.0 Netware Network Operating System	Tk.4,000/-
2	Artisoft Lantastic 6.0 Network Operating System	Tk.4,000/-
3	Pentium 66 Mhz or Intel 486DX 100 Mhz Main File Server	Tk.1,75,000/-
4	Intel 486DX 66 Mhz File Server	Tk.95,000/-
5	Intel 486DX 33 Mhz Work Station	Tk.75,000/-
6	Intel 486DX 33 Mhz Stand Alone System	Tk.65,000/-
7	Microsoft Foxpro 2.6 Relational Database Management System	Tk.20000/-

Software Cost Proposal

Serial No.	Description	Man Hours	App. Unit Price	Total Cost
1	System Study & Design	50	Tk.750/-	Tk.37,500/-
2	Development & Debuging of Software	200	Tk.500/-	Tk.1,00,000/-
3	Development of User's Manual	50	Tk.300/-	Tk.15,000/-
4	Training of Application Software	10	Tk.500/-	Tk.5,000/-

DATATECH

Computers Ltd.

Hardware:

We are proposing Intel based Pentium 64 Bit 66 Mhz or 486DX 32 Bit 100 Mhz main File Server for the head office and 486DX 32 Bit 66 Mhz File Servers networked sales centers. Individual Workstations will have 486DX 32 Bit 33 Mhz processors. Following are the detailed specifications of the proposed hardware systems.

Serial No.	Description	Quantity
1	Main File Server System Intel Pentium 66 Mhz or 486DX 100 Mhz Central Processor 32 MB RAM with 256 KB External Cache Memory 500 MB Hard Drive with Avg Acc time under 12 ns 5 (five) or more 32 Bit VLBus interface slots Monochrome VGA Display system 1.2 MB and 2.8 MB floppy drive system. 250 MB Tape Backup system 32 Bit network interface card (10Base-T and 10Base-2) 10 MB/Sec	1
2	Sales Center File Server System Intel 486DX 66 Mhz Central Processor 8 MB RAM with 256 KB External Cache Memory 500 MB Hard Drive with Average Access Time under 12 ns 5 (five) or more 32 Bit VLBus interface slots Monochrome VGA Display system 1.2 MB and 2.8 MB floppy drive system. 32 Bit network interface card (10Base-T and 10Base-2) 10 MB/Sec	As Required
3	Stand Alone System Intel 486DX 33 Mhz Central Processor 4 MB RAM with 256 KB External Cache Memory 200 MB Hard Drive with Average Access Time under 19 ns 3 (Three) or more 32 Bit VLBus and 2 (Two) or more 16 Bit interface slots Color VGA Display system 1.2 MB and 2.8 MB floppy drive system.	As Required
4	Work Station System Intel 486DX 33 Mhz Central Processor 4 MB RAM with 256 KB External Cache Memory 200 MB Hard Drive with Average Access Time under 19 ns 3 (Three) or more 32 Bit VLBus and 2 (Two) or more 16 Bit interface slots Color VGA Display system 1.2 MB and 2.8 MB floppy drive system. 16 Bit network interface card (10Base-T and 10Base-2) 10 MB/Sec	As Required
5	Network Printers Hewlett Packard Laser Jet 4 L 4 Pages per minute Printing Speed 300 Dots per Inch Printing Resolution Print Server Network Interface Card	As Required

Appendix 3-c

January 19, 1995

Executive Director
Arrong\BRAC
23/5 Mirpur Road
Shamoli
Dhaka1207

COMPUTERIZATION OF AARONG

Dear Sir

After having studied write ups (dated 1/11/94 and 10/24/94) in detail from Mr Peter Cashion we are convinced that no ready made software will meet the exact or total Information Technologies needs of Aarong.

To meet this unique I.T. requirement we propose a modular system (keeping in mind your functional specs) as follows:

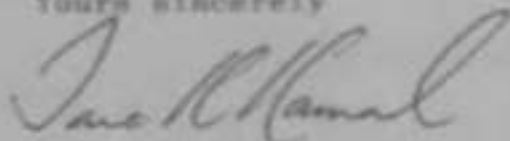
1. Aarong Point Of Sale system (A.P.O.S.)
2. Aarong Head Office Management System (A.H.O.M.S)

The basic description of the above two system is enclosed along with our detailed hardware and software offer. Please note we will draw out exact technical specification of the system after order confirmation which will define number of input/output screens, reports, security features. This technical specification we will confirm and complete with in 30 days of order confirmation.

We assure you that Leading Edge Technologies Ltd will put up its very best endeavor in providing Aarong with a cost effective Information system that will be comparable with any other world class system.

Looking forward to working with you.

Yours sincerely



Tarek Kamal
Managing Director



Aarong Point Of Sale system (A.P.O.S.S.)

This system will sit on the Novel servers in each of the shops in Dhaka city. This system will cover:

1. Invoice generation (with hand held scanner as optional feature), or based on code on product.
2. Automatic updating of store inventory at Point Of Sale.
3. Automatic generation of accounting entries and cash handling at Point Of Sale.
4. Sales statements and analysis reports.
5. Inventory statements, warning reports, indents to R.O., identify dead products.
6. Store general ledger, balance sheet, income expense statement, variance reports.
7. Employee sales performance.
8. Security system to prevent tampering with data and logging of operator I.D. code of each transaction.
9. Ability to exchange data with R.O. and other sister shops through modems.

Jack H. Hamal



Aarrong Head Office Management System (A.H.O.M.S)

1. Import sales data from all Aarrong shops using A.P.O.S.S through MODEMS.
2. Maintain central inventory of all Aarrong shoes as well as warehouses, warning reports, identify dead items.
2. Maintain H.O accounts, consolidated Balance Sheet, Income statements.
4. Central Sales analysis, identify highest selling and lowest selling products.
5. Track and analyse performance of trial products for fixed time period.
6. Purchase order processing, generation, monitoring, warning reports.
7. Track supplier performance.
8. Hold image of various styles on the computer by scanning thru color scanner. Please note only a particular application will be able to access this option at H.O. only.

Jack Khamel



OFFER

HARDWARE	QNTY	PRICE
1. SERVER BRAND: IIS COUNTRY OF ORIGIN: TAIWAN PROCESSOR: 80486DX SPEED: 33 MHZ RAM: 8 MB RAM, 256KB CACHE, VL BUS FDD: 1.44MB FLOPPY DISK HDD: 500MB HARD DISK MONITOR: 14" SVGA LOW RADIATION MONO MONITOR 101 KEY BOARD DESKTOP SLIM CASE, 200W POWER SUPPLY 16 BIT ETHERNET CARD	4	TK 400,000/-
2. WORK STATIONS IIS-WS333 ROCK LAN STATION. (LATEST TECHNOLOGY FROM TAIWAN) PROCESSOR: 80386SX SPEED: 33MHZ RAM: 2MB RAM MONITOR: 14" SVGA LOW RADIATION MONO MONITOR 101 KEYBOARD 16 BIT ETHERNET CARD WITH BOOT ROM	11	TK 352,000/-

Jack Hand



LEADING EDGE TECHNOLOGIES LTD.

Pl. Light Road, Block-A, Mohammadpur, Dhaka-1207, Bangladesh, Tel: 815180, 816206, 811205, Telex: 632487 TMLN DJ, Fax: 880-2-816205, 883132

5. TAPE DRIVE 250 MH TAPE DRIVE WITH QIC CARTRIDGE	4	TK 100,000/-
6. UPS SENDON 500VA	10	TK 130,000/-
7. MODEM MODEMS (8 OFFICE & 3 SHOPS)	4	TK 100,000/-
9. PRINTERS EPSON LX-80 (9 PIN)	8	TK 80,000/-
EPSON LQ-1170 (24 PIN)	1	TK 31,000/-
10. NETWORK CABLE * CABLES - TK 55/YD		
11. COLOR SCANNER (TK 1,25,000) HEWLETT PACKARD COLOURED SCANNER (OPTIONAL)	1	

TOTAL HARDWARE

TK 1,193,000/-



LEADING EDGE TECHNOLOGIES LTD.

11, 12nd Road, Block-A, Mohammadpur, Dhaka-1207, Bangladesh, Tel : 812180, 816296, 811206, Telex : 632487 TMN BJ, Fax : 880-2-816296, 882132

SOFTWARE

1. NOVELL VERSION 3.12 5 USER, ORIGINAL (FOR LALMATIA STORE)	4	TK 200,000/-
2. NOVELL INSTALLATION	4	TK 80,000/-
3. A.P.O.S.S SOFTWARE ARRONG POINT OF SALE SYSTEM CUSTOM MADE FOR ARRONG	1	TK 250,000/-
4. A.H.O.M.S SOFTWARE ARRONG HEAD OFFICE MANAGEMENT SYSTEM	1	TK 250,000/-
5. ORIGINAL COLOR SCANNER OCR SOFTWARE OMNIPAGE-OCR	1	TK 25,000/-

	TOTAL SOFTWARE	TK805,000/-

TOTAL PROJECT COST TK 1,296,000/-

Tas Mahmud



PROJECT COST SUMMARY

1. TOTAL HARDWARE COST	TK 1,193,000/-
2. TOTAL SOFTWARE COST	TK 805,000/-
3. EXPECTED CABLE COST	TK 80,000/- *****

PROJECT COST **TK 2,078,700/-**

ASSUMPTIONS:

1. Above project cost only covers Dhaka area shops.

2. Outside Dhaka area Tk 30,000 will be charged per installation of A.P.O.S.S.

Aarong to bear the travel expense and living expense of two of our engineers.

Jack Hamed



TERMS AND CONDITIONS OF THIS OFFER

1. VALIDITY:

THIS OFFER IS VALID UP TO 28/02/94.

2. ORDER CONFIRMATION

50% ADVANCE & LETTER OF CONFIRMATION

3. DELIVERY OF HARDWARE

25 DAYS FROM ORDER CONFIRMATION, BALANCE VALUE OF HARDWARE MUST BE PAID ON DELIVERY.

4. DELIVERY OF SOFTWARE

30 DAYS FROM ORDER CONFIRMATION, BALANCE 50% WILL HAVE TO PAID WITHIN 10 DAYS OF INSTALLATION.

5. WARRANTY

SERVERS AND WORKSTATIONS TWO YEAR WARRANTY.

ALL OTHER HARDWARES 1 YEAR WARRANTY.

ANY WARRANTY WILL BE ONLY EFFECTIVE IF AN UPS OR STABILIZER IS USED WITH PROPER EARTHING IN SERIES WITH ALL HARDWARE.

6. TRAINING

OPERATOR TRAINING-WILL BE CHARGED @TK 1000/PERSON.

SUPERVISORS-AT THE RATE OF TK 3000/PER PERSON

NOVEL SYSTEM ADMINISTRATOR-AT THE RATE OF TK 10,000/ PER PERSON.

ALL TRAINING WILL BE CONDUCTED AT OUR PREMISES BETWEEN 2:30PM TO 5:00PM.

7. HARDWARE MAINTENANCE AFTER WARRANTY

TK 300/- PER HOUR FOR ENGINEERING TIME & COST OF SPARES, ON WORKING DAYS FROM 9AM TO 5PM. ON DEMAND ANNUAL MAINTENANCE FEE (A.M.F.) BASIS, OFFER CAN BE MADE.

8. MAINTENANCE COST OF SOFTWARE AFTER CONFIRMATION OF SYSTEM SPECIFICATION OR INSTALLATION

ANY NEW REPORT TK 10,000/-

ANY NEW DISPLAY TK 10,000/-

ANY CHANGE THAT AFFECTS SOME OR ALL

MODULES BETWEEN TK 50,000 & TK 100,000/-

Jack Hama



PROJECT TIME PLAN

STAGE 1.

Target: Automate Aarong H.O. and Gulshan branch $T_1 = 0 + 90 \text{ days}$

STAGE 2.

Target: Automate Lalmatia branch

Staff training $T_1 = T_1 + 30 \text{ days}$
Hardware Software setup $T_2 = T_1 + 30 \text{ days}$

STAGE 3.

Target: Automate Mogbasar branch

Staff training $T_1 = T_1 + 30 \text{ days}$
Hardware, Software setup $T_2 = T_1 + 30 \text{ days}$

Jack Hamed



**LEADING EDGE
TECHNOLOGIES LTD.**

PT, Iqbal Road, Block-A, Mohammadpur, Dhaka-1207, Bangladesh, Tel: 815180, 816286, 811205, Telex: 632487 TMM BJ, Fax: 850-2-816266, 883132

January 9, 1995

To
Mr. Peter Cashion
Brac/Aarong
23/5 Nirpur road, Shewoly,
Dhaka-1207

Dear Peter,

I enclosed a brief comparison between NOVELL & UNIX where you will see that the results are overwhelmingly for novell.

Please get back to me if you have any query.

Thanking You

Your Sincerely

Tarak Kamal
Managing Director

PRICE PERFORMANCE COMPARISON BETWEEN
NOVELL & UNIX FOR A FIVE USER NETWORK

NOVELL	UNIX
HARDWARE COST	
1. Price of Server (8MB RAM + 500 MB H.D 486-90 MHZ)	
Tk100,000/-	Tk100,000/-
2. Price of 386 SX 2MB RAM, 40 MHZ SPEED (Tk32,000/-) DISK LESS WORK STATION WITH 16 BIT ALTERNATE CARD WITH BOOT RAM UNIT PRICE X 5	WYSV 120 WORKER
(Tk32,000 X 5) =160,000/-	(Tk32,000 X 5) =160,000/-
3. Ether net card at server end	8 part card at server end
Tk5,000/-	Tk35,000/-
4. Novell 4.11 5 User	Unix 8 User
Tk50,000/-	Tk69,000/-
5. Total cost for hardware for five work station :	
Tk315,000/-	Tk364,000/-

SOFTWARE COST:

- | | |
|---|---|
| 6. Cost of all NOVELL version software
is cheaper than UNIX. | |
| 7. Cost of development low. | Cost of development High. |
| 8. Skilled personnel readily
available in Bangladesh. | Skilled personnel not
readily available. |

ARCHITECTURE:

- | | |
|---|--|
| 9. Novell is based on distributed
processing. | Uses central server for
all processing. |
| 10. User can increase or decrease
his processing power at specific
work station without over loading
the server. Even if heavy processing
is done at one work station, other
process will not get effected as
each work station has its own
processor & RAM. | If processor intensive task
is being run from one work
station i.e. a heavy sort,
indexing performance
other processes will
effected. |



11. More work station can easily
be added & does not need hardware
upgrade.

Size of server, communicating
port may need to be updated

12. Capability and capacity of each
work station is easily upgradable

Not possible without
replacing the work station

13. Resource sharing i.e. All printers
on network is possible.

All printer has to be
connected directly to
server and local printer is
not available to server or
other processes.



Company Confidential - PraDeshta Limited
 Estimate for individual AARONG SHOPS

January 25th 1995

SHOP FACILITIES

Lalmatia	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
HOST	147,800.00	1	1	1	147,800.00	147,800.00	147,800.00
P.O.S.T.	28,000.00	3	7	11	84,000.00	196,000.00	308,000.00
UPS4POST	19,250.00	1	2	3	19,250.00	38,500.00	57,750.00
BPORT	7800.00	0	0	1	0.00	0.00	7,800.00
GENERATOR	80000.00	1	1	1	80,000.00	80,000.00	80,000.00
Stations		4	8	12	331,050.00	462,300.00	601,350.00

Maghbazar	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
HOST	147,800.00	1	1	1	147,800.00	147,800.00	147,800.00
P.O.S.T.	28,000.00	0	1	2	0.00	28,000.00	56,000.00
UPS4POST	19,250.00	1	1	1	19,250.00	19,250.00	19,250.00
GENERATOR	80000.00	1	1	1	80,000.00	80,000.00	80,000.00
Stations		1	2	3	247,050.00	275,050.00	303,050.00

Banani	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
HOST	147,800.00	1	1	1	147,800.00	147,800.00	147,800.00
P.O.S.T.	28,000.00	0	0	1	0.00	0.00	28,000.00
UPS4POST	19,250.00	1	1	1	19,250.00	19,250.00	19,250.00
GENERATOR	80000.00	1	1	1	80,000.00	80,000.00	80,000.00
Stations		1	1	2	247,050.00	247,050.00	275,050.00

Chittagong	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
HOST	147,800.00	1	1	1	147,800.00	147,800.00	147,800.00
P.O.S.T.	28,000.00	0	1	2	0.00	28,000.00	56,000.00
UPS4POST	19,250.00	1	1	1	19,250.00	19,250.00	19,250.00
GENERATOR	80000.00	1	1	1	80,000.00	80,000.00	80,000.00
Stations		1	2	3	247,050.00	275,050.00	303,050.00

Company Confidential - PraDeshta Limited

Appendix 3-d

Base Costing Estimate for AARONG

Code	Each Item Contains	Unit Price
HOST	Main Host 486 CPU, Case/PSU, Keyboard, MONOVga, I/O Card, 8-port, 8MB RAM, Modem, Tape Drive, UNIX OS, 1 KVA UPS, Narrow Carriage NLQ Dot Matrix Printer, Floppy	147,800.00
TERMINAL	RS232, ASCII Terminal	18,000.00
F.O.S.T.	Sales Workstations including, ASCII Terminal, Narrow carriage NLQ Dot Matrix Printer, Cables	28,000.00
SPORT	SPort Additional System	7,800.00
BARCODE	Bar Code Wand, Bar Code Decoder, Cables	25,140.00
BARPRINTER	Bar Code Printer, Heavy Duty	108,120.00
UPS4POST	UPS	19,250.00
PC/LAN	IBM PC with LAN H/w and S/w, 486 CPU, 4 MB of RAM, Mouse, KB, Case, Mono VGA, I/O, Modem, Ethernet Card, LAN Software Single Licence	62,500.00
GENERATOR	Standby Generator for system	80,000.00
LASER	Laser Printer for Reports	80,000.00
DOTMATRIX	Dot Matrix Printer	10,000.00

EXPENSES

			maintenance/yr
SWDEV	Software Development including System Analysis and Design	85,000.00	12,750.00

Without Barcode

			maintenance/yr
LowCost	Hardware Equipment for all 5 stores and Central including Software, TOTAL:	1,319,250.00	
		1,404,250.00	35,106.25
MediumCost	Hardware Equipment for all 5 stores and Central including Software, TOTAL:	1,534,500.00	
		1,619,500.00	40,487.50
HighCost	Hardware Equipment for all 5 stores and Central including Software, TOTAL:	1,785,550.00	
		1,870,550.00	46,763.75

SAMUDRA E. HAQUB
Managing Director/CEO
Peadartha Limited

With Barcode

LowCost	Hardware Equipment for all 5 stores and Central including Software, TOTAL:	1,758,072.00
		1,843,072.00
MediumCost	Hardware Equipment for all 5 stores and Central including Software, TOTAL:	2,066,340.00
		2,151,340.00
HighCost	Hardware Equipment for all 5 stores and Central including Software, TOTAL:	2,491,763.00
		2,576,763.00

Consumables/Year

SUPPLIES	Consumables for Printers/Ribbons Etc., Estimated 100 bar code rolls, 25 ribbons	49,500.00
SWMAINT	Yearly Software Maintenance	15.00%
HWMAINT	Yearly Hardware maintenance	2.50%

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Sylhet	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
HOST	147,800.00	1	1	1	147,800.00	147,800.00	147,800.00
P.O.S.T.	28,000.00	0	1	2	0.00	28,000.00	56,000.00
UPS4POST	19,250.00	1	1	1	19,250.00	19,250.00	19,250.00
GENERATOR	80,000.00	1	1	1	80,000.00	80,000.00	80,000.00
Stations		1	2	3	247,050.00	275,050.00	303,050.00

Central	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
HOST	147,800.00	1	1	1	147,800.00	147,800.00	147,800.00
TERMINAL	18,000.00	2	3	4	36,000.00	54,000.00	72,000.00
LASER	80,000.00	0	0	1	0.00	0.00	80,000.00
DOTMATRIX	10,000.00	0	1	1	0.00	10,000.00	10,000.00
UPS4POST	19,250.00	1	1	2	19,250.00	19,250.00	38,500.00
GENERATOR	80,000.00	1	1	1	80,000.00	80,000.00	80,000.00
Stations		3	4	8	283,050.00	311,050.00	428,300.00

Totals **LowQty** **MediumQty** **HighQty** **LowCost** **MediumCost** **HighCost**
 8 15 23 1,319,250.00 1,534,500.00 1,785,550.00
 P.O.S.T. P.O.S.T. P.O.S.T.

BAR CODING FACILITIES AT WAREHOUSE AND SHOPS

Item	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
BARCODE	25,140.00	8	15	23	170,952.00	263,970.00	375,843.00
PC4LAN	62,500.00	1	1	2	62,500.00	62,500.00	125,000.00
BARPRINTER	106,120.00	1	1	1	106,120.00	106,120.00	106,120.00
GENERATOR	80,000.00	1	1	1	80,000.00	80,000.00	80,000.00
UPS4POST	19,250.00	1	1	1	19,250.00	19,250.00	19,250.00
Sub-Total					438,822.00	531,840.00	706,213.00

GRAND TOTAL 1,758,072.00 2,066,340.00 2,491,763.00

SAUNDRA M. ALLEN
 Director, Information Systems

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Appendix 4-a

Assumptions to accompany LAN hardware cost spreadsheets

1. The hardware costs are based on average Taka price in 000's calculated from the four proposals
2. The hardware costs do not include cash register cum computer and a scanning system since these are optional
3. If a shop has less than three computers, it was assumed no server was needed. A simple modem connection with the individual computers was assumed possible

Hardware Cost: LAN Option Six To 0000

Fixed Costs						Variable Costs					
At Shop			At Central Service			At Shop			At Central Service		
Hardware	Revolving	Quantity	Total	Hardware	Revolving	Quantity	Total	Hardware	Revolving	Quantity	Total
Tap Drive	25	5	125	Central Server	244	1	244	Work Station	85	Server	100
Modem	35	5	175	UPS	21.5	1	21.5	Printer	18	UPS	21.5
Network Cable	1	5	5	Modem	35	1	35	UPS (one h)	18.75		
Printer	30	5	150	Printer	30	1	30				
Generator	95	5	475	Generator	60	1	60				
			865				410.5				1295.5
										80.75	121.5

Variable Cost per office	Lamar	Mighty	Revol	Charging	Syber	OS	Quantity	Rate	Total V.C.
	Quantity	Quantity	Quantity	Quantity	Quantity	Quantity			
Low Implementation									
Work Station		4	1	1	1	1	3	11	896.25
Server		1	0	0	0	0	1	121.5	121.5
Total variable									1118.75
Medium Implementation									
Work Station		8	2	1	2	2	4	18	80.75
Server		1	0	0	0	0	1	121.5	121.5
Total variable									1845.75
High Implementation									
Work Station		12	3	2	3	3	6	28	80.75
Server		1	1	0	1	1	4	121.5	490
Total variable									3027

Summary Six

	Fuel Cost	Variable Costs	sub 1000	Maintenance (2.5%)	SUM
Total Cost Low Implementation	1205.5	1118.75	2385.25	59.63125	2444.881
Total Cost Medium Implementation	1205.5	1845.75	3111.25	77.78125	3189.331
Total Cost High Implementation	1205.5	3027	4232.5	105.8125	4369.013

Appendix 4-b

- Cost submitted by PraDeshta based on requirements I have provided
- Software cost does not include training and implementation costs

Company Confidential - PraDeshta Limited
 Estimate for Individual AARONG SHOPS

January 25th 1995

SHOP FACILITIES

Lalmatia	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
HOST	147,800.00	1	1	1	147,800.00	147,800.00	147,800.00
P.O.S.T.	28,000.00	3	7	11	84,000.00	196,000.00	308,000.00
UPS4POST	19,250.00	1	2	3	19,250.00	38,500.00	57,750.00
8PORT	7800.00	0	0	1	0.00	0.00	7,800.00
GENERATOR	80000.00	1	1	1	80,000.00	80,000.00	80,000.00
Stations		4	8	12	331,050.00	462,300.00	801,350.00

Maghbazar	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
HOST	147,800.00	1	1	1	147,800.00	147,800.00	147,800.00
P.O.S.T.	28,000.00	0	1	2	0.00	28,000.00	56,000.00
UPS4POST	19,250.00	1	1	1	19,250.00	19,250.00	19,250.00
GENERATOR	80000.00	1	1	1	80,000.00	80,000.00	80,000.00
Stations		1	2	3	247,050.00	275,050.00	303,050.00

Banani	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
HOST	147,800.00	1	1	1	147,800.00	147,800.00	147,800.00
P.O.S.T.	28,000.00	0	0	1	0.00	0.00	28,000.00
UPS4POST	19,250.00	1	1	1	19,250.00	19,250.00	19,250.00
GENERATOR	80000.00	1	1	1	80,000.00	80,000.00	80,000.00
Stations		1	1	2	247,050.00	247,050.00	275,050.00

Chittagong	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
HOST	147,800.00	1	1	1	147,800.00	147,800.00	147,800.00
P.O.S.T.	28,000.00	0	1	2	0.00	28,000.00	56,000.00
UPS4POST	19,250.00	1	1	1	19,250.00	19,250.00	19,250.00
GENERATOR	80000.00	1	1	1	80,000.00	80,000.00	80,000.00
Stations		1	2	3	247,050.00	275,050.00	303,050.00

SAJIBUR R. HAQUE
 Managing Director
 PraDeshta Limited

Company Confidential - PraDeshta Limited

Appendix 4-10

Base Costing Estimate for AARONG

Code	Each Item Contains	Unit Price
HOST	Main Host 486 CPU, Case/PSU, Keyboard, MONOVga, I/O Card, 8-port, 8MB RAM, Modem, Tape Drive, UNIX O/S, 1 KVA UPS, Narrow Carriage NLQ Dot Matrix Printer, Floppy	147,800.00
TERMINAL	RS232, ASCII Terminal	18,000.00
P.O.S.T.	Sales Workstations including, ASCII Terminal, Narrow carriage NLQ Dot Matrix Printer, Cables	28,000.00
SPORT	8Port Additional System	7,800.00
BARCODE	Bar Code Wand, Bar Code Decoder, Cables	25,140.00
BARPRINTER	Bar Code Printer, Heavy Duty	106,120.00
UPS4POST	UPS	19,250.00
PC4LAN	IBM PC with LAN H/w and S/w, 486 CPU, 4 MB of RAM, Mouse, KB, Case, Mono VGA, I/O, Modem, Ethernet Card, LAN Software Single Licence	62,500.00
GENERATOR	Standby Generator for system	80,000.00
LASER	Laser Printer for Reports	80,000.00
DOTMATRIX	Dot Matrix Printer	10,000.00

EXPENSES

			maintenance/yr
SWDEV	Software Development including System Analysis and Design	85,000.00	12,750.00

Without Barcode

			maintenance/yr
LowCost	Hardware Equipment for all 5 stores and Central including Software, TOTAL:	1,319,250.00	
		1,404,250.00	35,106.25
MediumCost	Hardware Equipment for all 5 stores and Central including Software, TOTAL:	1,534,500.00	
		1,619,500.00	40,487.50
HighCost	Hardware Equipment for all 5 stores and Central including Software, TOTAL:	1,785,550.00	
		1,870,550.00	46,763.75

SAMUIRA B. HAQUB
Managing Director/CEO
Pradevita Limited

With Barcode

LowCost	Hardware Equipment for all 5 stores and Central including Software, TOTAL:	1,758,072.00
		1,843,072.00
MediumCost	Hardware Equipment for all 5 stores and Central including Software, TOTAL:	2,066,340.00
		2,151,340.00
HighCost	Hardware Equipment for all 5 stores and Central including Software, TOTAL:	2,491,763.00
		2,576,763.00

Consumables/Year

SUPPLIES	Consumables for Printers/Ribbons Etc., Estimated 100 bar code rolls, 25 ribbons	49,500.00
SWMAINT	Yearly Software Maintenance	15.00%
HWMAINT	Yearly Hardware maintenance	2.50%

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Sylhet	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
HOST	147,800.00	1	1	1	147,800.00	147,800.00	147,800.00
P.O.S.T.	28,000.00	0	1	2	0.00	28,000.00	56,000.00
UPS4POST	19,250.00	1	1	1	19,250.00	19,250.00	19,250.00
GENERATOR	80000.00	1	1	1	80,000.00	80,000.00	80,000.00
Stations		1	2	3	247,050.00	275,050.00	303,050.00

Central	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
HOST	147,800.00	1	1	1	147,800.00	147,800.00	147,800.00
TERMINAL	18,000.00	2	3	4	36,000.00	54,000.00	72,000.00
LASER	80,000.00	0	0	1	0.00	0.00	80,000.00
DOTMATRIX	10,000.00	0	1	1	0.00	10,000.00	10,000.00
UPS4POST	19,250.00	1	1	2	19,250.00	19,250.00	38,500.00
GENERATOR	80000.00	1	1	1	80,000.00	80,000.00	80,000.00
Stations		3	4	5	283,050.00	311,050.00	428,300.00

Totals	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
	8	15	23	1,319,250.00	1,534,500.00	1,785,550.00
	P.O.S.T.	P.O.S.T.	P.O.S.T.			

BAR CODING FACILITIES AT WAREHOUSE AND SHOPS

Item	Taka	LowQty	MediumQty	HighQty	LowCost	MediumCost	HighCost
BARCODE	25,140.00	8	15	23	170,952.00	283,970.00	375,843.00
PC4LAN	62,500.00	1	1	2	62,500.00	62,500.00	125,000.00
BARPRINTER	106,120.00	1	1	1	106,120.00	106,120.00	106,120.00
GENERATOR	80000.00	1	1	1	80,000.00	80,000.00	80,000.00
UPS4POST	19,250.00	1	1	1	19,250.00	19,250.00	19,250.00
Sub-Total					438,822.00	531,840.00	706,213.00

GRAND TOTAL 1,758,072.00 2,066,340.00 2,491,763.00

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Bar coding basics for beginners



Jim Panzner

Four times a year, this magazine publishes *Bar Code Quarterly*, filled with stories of successful bar code systems, and information on ever more sophisticated equipment. This non-technical article is written for logistics managers who have not yet been directly exposed to bar coding, but would like a general overview of the subject.

BAR CODE SYMBOLOGIES

It may not be obvious, but many different codes can be used, some more flexible than others. The symbologies, or languages, differ in the number and width of the black and white bars used to represent a given character.

Symbologies may be numeric or alphanumeric, of fixed or variable length. For example, the grocery UPC has a fixed length of 11 numeric digits. Where necessary, scanners and computer systems are designed to read multiple symbologies. This is called autodiscrimination.

As users needed to add more and more information to a package, more and more individual codes were used. This led to the development of "stacked" or "two-dimensional" codes, some of which can hold up to one kilobyte of information in a single code.

HOW THEY WORK

Bar code systems require a computer, bar code scanners, in-house printers if desired, and software to manage the equipment and information.

Scanner types include wand scanners,

hand-held laser guns, and fixed laser scanners (supermarket tabletop type, or line units). The scanned information may be communicated on-line from fixed scanning stations, downloaded in batch mode from hand-held units, or transmitted by radio frequency (RF) in more sophisticated systems.

The bar code links an item to a database. The item may be a generic product or a specific, individual product, package, pallet, book, file, storage area, warehouse, customer, supplier, and so on. Every record in a database can be identified by a bar code.

Here are some brief descriptions of bar code systems at work:

- **Library:** Bar codes on the book and borrower's card are scanned at the time of borrowing. The computer record can identify overdue items (with an automated telephone reminder), calculate fines for late returns, determine the cost of lost items, identify the return of a volume to a different branch, and monitor title and author popularity.

- **Airline baggage management:** Bar coded baggage tags are printed and attached to bags at check-in. The code is linked to the passenger computer record, which includes destination and connecting airports. Relevant information is downloaded to the airline's baggage control computer in all airports on the system.

The system reports bags checked but not loaded, and bags loaded but the passenger not boarded. A misdirected bag can be scanned on the airline's system, and identified with the passenger to whom it belongs.

- **Work-in-progress control:** Bar coded work orders identify all required materials and subassemblies. Bar codes of materials and subassemblies actually picked are scanned, the quantity issued entered, and work order bar codes scanned. Movement is approved or challenged by the system if incorrect.

This system provides real-time information on material usage, labour and machine time and cost, and progress status of the order.

- **Distribution centre control:** Bar codes of incoming materials are scanned, and the system instructs the operator where these should be stored. Upon storage, bar codes of the materials and warehouse locations are scanned, and the system advises whether correct.

The system generates picking slips identifying warehouse locations (sequenced to reduce picking time). As orders are picked, bar codes on picking slips, warehouse locations and items are scanned, and the system advises whether correct. The process is repeated as the order is assembled at the dock.

A real-time RF data communication system such as this improves inventory management speed and accuracy. As well, space utilization is improved, because materials need not always be stored in the same location—the computer knows where they are.

PLAN CAREFULLY

The rapid growth of bar code systems indicates that they work—payoffs of less than one year are common. However, they must be properly planned and implemented. Off-the-shelf or easily modified equipment is usually available, but breaking new ground requires extra care.

An extreme example is Denver's new international airport. Its opening is now 10 months overdue as a result of software errors in the automated baggage system. The original opening was scheduled for November 1993. No new opening date has been set, and losses are running at \$1.1 million (US) per day in interest and operating costs. ■

Jim Panzner is a principal with KPMG Management Consulting, Vancouver. He can be reached at (604) 691-3411.

Palletizing part 2: Robots, design and more

Last month, we took a look at the different types of automatic palletizers, and how they might be used in your facility. Now, we'll explore another option—industrial robots—as well as cost justification and system design issues.

Robots are increasingly being used in manufacturing applications, such as assembly line operations, welding and painting. They are well-suited to fixed-position jobs that are heavy, dirty, hazardous, boring and/or repetitive.

In warehouse and materials handling operations, to date, robots have had fewer applications. This is due to their relatively limited mobility, and the need to keep workers safely out of the operating robot's reach. Many warehouse jobs require greater mobility and worker flexibility than robots can currently offer.

Palletizing often marks the boundary between manufacturing and production. This often boring, repetitive task is generally located at a fixed position, at the end of a production line. Thus, palletizing is one of the few warehousing applications that lends itself to the use of robots.

Robots are best used in lower-speed production applications, in which a variety of product types must be palletized. In this environment, robots allow you to avoid or reduce the expense of several accumulation conveyors, which other palletizers require to handle multiple SKUs (stock-keeping units).

With the right computer controls, robots can handle multiple sizes and shapes on the same pallet or level, as long as a stable layer is formed, which is not something most other palletizers can offer. However, it is important to recognize that a robot has little ability to operate beyond strictly defined parameters.

When considering robotic palletization, some factors to keep in mind include:

- A robot can handle products that range in size from extremely small and light to several hundred pounds. While this strength is an advantage, misapplied, it can cause product damage.
- A robot will not physically tire, and thus can maintain a constant output.

- Movement or placement accuracy can be within tolerances as low as a few thousandths of an inch. While this is an advantage, empty pallet placement is more critical than in manual palletizing.

- Unlike the maximum human reach, some robots can reach as far as 20 feet, or rotate up to 360 degrees from one spot.

- There are a range of motions that can be performed, depending on the robot.

- Most robots will follow your exact instructions, and so require careful programming.

In robotic language, the device at the end of the robot's arm that actually performs the work is called the "end effector." In palletizing operations, there are a variety of mechanical grasps and even vacuum devices available, which are used at the end of the arm for product manipulation.

There are four main types of industrial robots: gantry, cylindrical, spherical, and articulated or jointed-arm. Two of these, gantry and articulated, are usually used for palletizing.

The articulated arm robot could be simply described as operating like a human arm. From a fixed position, articulated robots are restricted to a maximum of three or four palletizing stations, whereas gantry robots can handle up to 20 stations.

Because the ideal application for robotic palletizing—low-volume, multiple SKUs—often requires more flexibility than a fixed-position robot can offer, some palletizing stations have a floor-mounted robot on a track.

Alternatively, a gantry design is used. This gives the robot the mobility to place product on to more pallets than can be reached from a fixed workstation.

This concept is also important for the cost justification of an automated palletizer. Direct labour savings and injury avoidance are usually the most important factors. Reduction of product damage may also help in the justification.

In most manual palletizing lines, palletization starts at the end of the production line. With automation, you are not restricted to this location. Use of a

mobile, single robot to service multiple packaging lines can reduce the total system cost, and increase payout by reducing labour costs.

A word of caution about used palletizers. Palletizers are designed to last a long time, and the price for a used unit can be attractive. But unlike more general purpose material handling equipment, such as counterbalanced lift trucks, each palletizer is custom-engineered for a particular application.

Although the frame may be the same, the stops, turns and control systems are custom-designed. Unless you have access to some really expert help, I suggest you consider a rebuilt palletizer, with performance guaranteed by a reputable supplier.

There are a number of design considerations for automatic palletizers. These include elements like:

- infeed packing line speeds;
- number of products and stacking patterns;
- product stacking heights;
- infeed options (single or multiple lines, floor level or elevated);
- outfeed options;
- controls; and
- system integration, especially with unitizing needs.

For warehouses to use the full potential of automatic palletizers, palletizer technology must advance to the point where it is capable of handling totally random, individual case sizes and shapes. This is the typical output of a pick-to-belt operation, and development of affordable technology to perform this function would greatly expand palletizer potential in the warehouse. ■

A Toronto-based consultant in operations and management, including warehousing and related activities, Dave Luton may be reached at (416) 225-4703.



Dave Luton



PraDeshta Limited

Ground Floor
House 32-E
Road 17/A
Banani, Dhaka 1213
BANGLADESH

Phone: 881800, 881500
Fax: 881800
Country Code: 880
City Code: 2

Chris Grillo
Worthington Data Solutions

Saturday, January 21, 1995

Dear Chris,

Thank you for your fax of the 18th of January, re: WDR RS232 readers and Allegro thermal printer. We had a meeting with our client and other consultants and have the following queries for you:

a) Our application requires adhesive backed labels with bar codes, and a one-line description to be printed on a sticker with the dimensions of 1" (one inch) by only 1/2" (half an inch) on the sides. Ideally, the sticker would be of a type where if an attempt was made to pull the label off, the entire sticker would tear in strips.

Given this limitation, and primarily concentrating on the small size of the labels, would Allegro be still a viable choice for this application?

b) Would the paper used in the printer be able to "cut" to size after printing, or are they in fact separate stickers when they are printed. Please explain in clear fashion as to whether the print paper rolls are actually continuous labels (i.e., do they have to be cut into pieces) or separate labels (i.e., they can be peeled off, one by one).

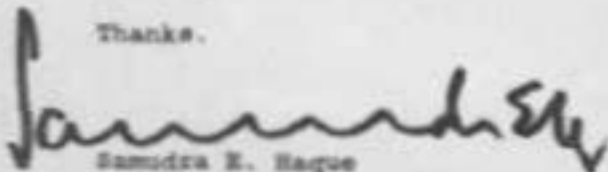
c) We need to get quotes from you on consumable supplies, i.e., cost of printer ribbons, sticker paper rolls, etc. etc.

d) We are impressed by the speed of the Allegro, but are wondering if it would be useful for printing say: "10 pcs of item A", followed by, "50 units of item B", followed by "2 units of item C", followed by etc. etc. Could software packages for it be supplied that could print in batch mode or is it all manually driven and interactive. Can it be used under UNIX or PC?

e) With regard to the different bar coding standards, to fit within the extremely small size of labels, which codes could be miniaturised or used to keep track of 11 (eleven) character size codes?

Sorry for the naive questions, but this would be a first for the entire country!!

Thanks.



Samudra E. Haque

PraDeshta Limited
House-32-E, Road 17/A
Banani, Dhaka 1213
Bangladesh

FAX TRANSMISSION FROM WORTHINGTON DATA SOLUTIONS

Phone: 800-345-4220
408-458-9938



* WORTHINGTON DATA *

Fax: 408-458-9964

Address: 3004 Mission Street
Suite 220
Santa Cruz, CA 95060

WORTHINGTON

DATA SOLUTIONS

To: Samudra E. Haque

Date: 1-20-95

From: Chris Grillo

Page 1 of 1

January 20, 1994
aDehta Ltd.
use 32-E
ad 17/A
nani, Dhaka 1213
ngladesh

RECEIVED 21 JAN 1995

Dear Sir:

Here are the answers to your questions from your FAX dated January 21.

Tamper proof labels are available. I will have to make a call to get prices. The size label you require will limit the number of characters you can encode. With an alpha-numeric code you are limited to about 9.6 characters per inch (cpi). With a numeric only code you can achieve 16 cpi. You need to have .1 inch quiet zone (white space) on both sides of the bar code.

The labels would be separate individual labels.

The labels would cost \$5.00 per roll in 1.00 inch by .375 inch. The 1.00 inch by .50 is not a standard size label and would cost about \$500 for a one time die charge to make. The 1 x .375 inch labels have 5600 labels per roll. A roll of ribbon costs \$13.00 and covers 4 rolls of labels. This assumes a quantity 15 rolls of labels and 6 ribbon rolls. Tamper proof labels would be slightly more.

The LabelRIGHT program can do batches of label jobs. It is a MS-DOS program only.

The most compact code would be code 128 or Interleaved 2 of 5.

FAX TRANSMISSION FROM WORTHINGTON DATA SOLUTIONS

Phone: 800-345-4220
408-458-9938



* WORTHINGTON DATA *

Fax: 408-458-9964

Address: 3004 Mission Street
Suite 220
Santa Cruz, CA 95060

FCS, SOUNDING NO 15A
V0C0030090

WORTHINGTON
DATA SOLUTIONS

To: Samudra E. Haque

Date: 1-18-95

From: Chris Grillo

Page 1 of 5

January 18, 1994

Deshta Ltd.
House 32-E
Road 17/A
Mirpur Cantonment, Dhaka 1213
Bangladesh

Dear Sir:
On the following pages are my recommendations for your needs. Our MDR reader will work with all RS-232 terminals in character mode transmission. Our Allegro thermal printer package is an excellent value for a complete printing package. Please call with any questions.

Sincerely,

Chris Grillo
Sales Engineer

WDR™ Bar Code Readers



"Thanks again and congratulations for creating a great product and backing it up so graciously. Worthington Data has my business — you can count on that!"

**John L. Welduy, President,
Southeast Advantage, Inc.**

Serial Wedge Attachment

This reader is ideal for attachment to UNIX terminals. The WDR Reader can attach to any character mode ASCII terminal. In-line between the host computer and the terminal. To attach a WDR Reader as a serial wedge, simply unplug the cable from the host at the terminal, plug the host cable into the host port of the WDR and, using our supplied cable, connect the terminal port of the WDR to the main port of the terminal. When data is keyed or scanned, the data is transmitted to the host which echoes the data back through the WDR reader to the terminal's screen — the codes appear to have been keyed.

PC Terminals

In addition to any ASCII character mode terminal, the WDR Reader can be configured to work with the many "C-Terminals", Olmitex, Wyac, Lark, Tele-video, and many others used for BPS and

This reader is ideal for attachment to UNIX terminals and will attach to any device that has an RS-232 serial port including micro-computers, mini-computers, multi-user serial terminals, cash registers, etc. . . This reader operates as a "serial wedge" reader with multi-user terminals, passing data to the host and back to the CRT as though the data has been keyed from the keyboard. Multiple WDR's can be daisy chained together on one serial port, responding to a polling program on the host to know when to transmit its data. An optional RS-422 feature is also available providing distances of 4000 feet from the host to multi-dropped WDR's.

Multiple Polled Readers Per Port

The WDR reader also has a protocol allowing multiple readers per serial port. The readers are daisy chained together, up to 32 readers in a chain, and then polled by a host program. The polling program addresses the reader by its configurable ID Character (ASCII 96-127). The WDR Reader sends back data pre-coded by its ID Character.

PortKey™ for Windows includes a program to poll daisy chained or multi-dropped WDR readers, writing output to disk files in the background, while also being able to print labels.

Serial Port to Keyboard Data

For Windows or DOS computers which don't have a compatible bus or keyboard connector, we offer PortKey™, a program which takes data from a serial port and places it into the keyboard buffer. This program uses 2K of RAM memory. When sold with the WDR, PortKey is priced at \$40 per copy. (\$99 if separate).

The Best for Less

The WDR has the same superior read rate, unique to the Worthington Data Readers — at half the prices of other quality manufacturers. Complete with Laser Scanner,

Good News For UNIX Users

The WDR Reader is an excellent choice for UNIX users or those that need an IBM or Mac compatible computer and can't use a keyboard wedge reader. It will hook up to any computer with an RS-232 serial port, including an IBM PC. And you can use almost any scanner with your WDR without any hardware swap-not required!

Collect-Bar™ is an MS-DOS resident program which polls daisy chained WDR readers and then writes their output to disk files in the background, while the host is doing other jobs simultaneously. Collect-Bar requires an AT or PS/2 with a hard disk, MS-DOS 3.1+, and occupies 30K main memory. The license cost per copy of Collect-Bar is \$1.59.

The WDR Specifications:

Feature	Description
Configuration	Wanding supplied items - stored in non-volatile EEPROM memory.
Auto-discrimination of Bar Codes	Code 39, UPC/EAN (supplements code), Colobar, 2 of 5, EAN to ISBN format, matrix 2 of 5, 128, MSI/Plessey, Full ASCII Code 25
Accumulate Mode	Allows the wanding of variable data which is accumulated in reader.
Pre and Postamble	From 3-16 Characters to be transmitted in front or at the end of each bar code read.
Terminator Char.	Select Enter, TAB, or nothing for fill-the-field
Power	115V AC Power Supply - UL and CSA Approved. 220V AC Also Available - TUV Approved
Check Digits	Optional Transmission for all codes. Optional Checking for 128, 39, 12 of 5, MSI
UPC Options	Compressed or Expanded UPC-E. Suppressed transmission of Check Digit & NCC
Beep	Variable Volume Control, Variable Tone Control, Two Most Configurable Beep or Patterns
Protocols	Half Duplex, Full Duplex, Raw/BI, MDX/NAK, Poll/ud, RTS/CTS, ACK/NAK
RS-232 Options	300 - 28,800 Baud Rate, DLE, Even, or None Parity, 7 or 8 Data Bits, 1 or 2 Stop Bits
Physical	3 1/2" x 4 1/2" x 1", 12 or, 25-120 Degree Fahrenheit, FCC Class A Approval
Warranty	2 Years on Decoder and Wand, 30 Day Money Back Guarantee. Latest Model Upgrades - \$100

To order, select the model, the cable interface, and the scanners required from below:

Model No.	Description	Price
R1112	Serial Decoder for Wand or Laser (with power supply)	\$ 294
Serial Cables and Adapters		
F24	Null Modem Female D925 Direct attach to 25 pin COM port	\$ 25
F26	1x D925 Female Patch/cable with 4 pin COM port	\$ 25
F23	2x D925 Male & Female for in-line attachment to terminal	\$ 25
F47	D925 Male & Female for in-line attach to terminal (Kittson)	\$ 25
Scanner Options for all Models (find for order on www.worthington.com)		
F51	Steel Wand - Low Res Visible (Best for Dot Matrix only)	\$ 130
F52	Steel Wand - Med Res Visible (Mixtures of Dot Matrix/Laser)	\$ 130
F53	Steel Wand - High Res Laser or Thermal Transfer only	\$ 130
F72	Symbal Tech 2000 Triggered Laser Scanner (1 year warranty)	\$585
F210	Worthington 200 Triggered Laser Scanner (2 year warranty)	\$585
F75	Worthington 205 Triggered Laser Scanner (18 month warranty)	\$ 685
F82	3" Welch Align CCD Scanner (1 year warranty)	\$ 495
F56	Steel Range Bar Code Scanner	\$ 215
F26	Track 2 Mtg Stripe Scanner	\$ 100
F21	Track 1 Mtg Stripe Scanner	\$ 100
F22	Track 1 & 2 Mtg Stripe Scanner	\$ 150

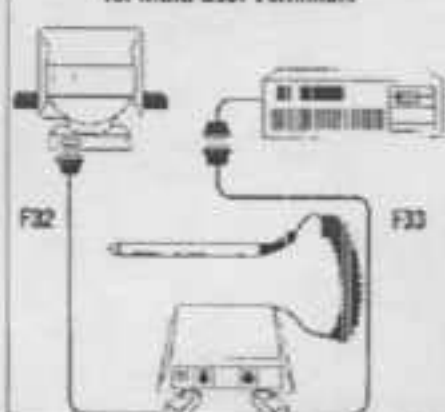
All hand gun lasers are supplied with a laser holder, all wands are supplied with a wand holder, all at no charge.

(See Scanner Options and Lasers for detailed differences)

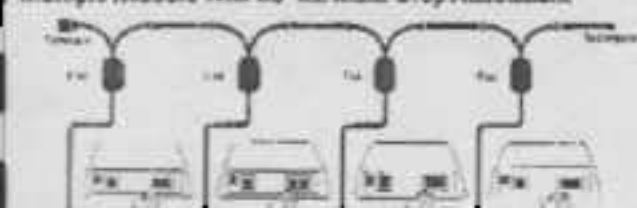
Decoder Example		WDR, Laser, 8 pin Com Port	
1 Model R1112 Decoder	\$294	1 Model R1112 Decoder	\$ 294
1 F23D St. Cable	\$ 25	1 F26 St. Cable	\$ 25
1 F21 Mulliken Bar Wand	\$130	1 205 Worthington Laser Scanner	\$585
Total	\$389	Total	\$984

Rest Assured. Worthington Data will provide you with complete customer support the moment you buy your bar code reader. You'll get a 30 day money back guarantee, a 2 year warranty on your decoder and wand, and unlimited toll free technical support.

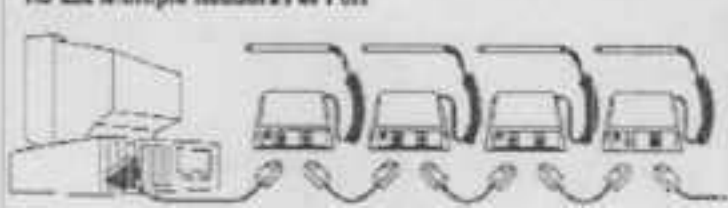
Serial In-line Wedge Attachment for Multi-user Terminals



Multiple Readers with RS-422 Multi-Drop Attachment



RS-232 Multiple Readers Per Port



The Allegro Thermal Transfer Printer



Bundled with
LabelRIGHT™
Thermal Software,
Cable, Ribbon, and
Labels—only \$1895

This is the first thermal transfer printer that we have selected to add to our product line. It is ruggedly built, simple to operate, packed with capabilities, and attractively priced for the PC marketplace. We've packaged it together with our own LabelRIGHT Thermal labeling software, along with a ribbon, roll of labels, and serial cable designed to attach to a serial port — for \$1895 (a \$2065 value).

Why Thermal Transfer

Laser printers offer great speed and excellent print quality and can be used for other tasks in addition to label printing. But if you need one label at a time, or if you need a roll of labels to be automatically applied to boxes on a conveyor line, a thermal transfer printer is the solution. Using special paper labels and general purpose ribbons, the label image can be easily scratched off; but with premium ribbons and/or special laminates or polyester label stock, the label image can be very durable.



get an accurate graphics image. A PCX image up to 4" x 6" can be accommodated with the standard Allegro. If you have a library of PCX images, you can avoid repeated downloading using the Flash EEPROM.

The Allegro prints at 2 inches per second, and can accommodate a label up to 4.65" wide (it prints up to 4" wide), and up to 8.25" long. Its weight is 20 lbs. and its footprint (9.5" x 14.5") is about 1/2 the size of earlier thermal transfer printers. The 2" per second speed is very understated. Other printers have to be slowed down considerably to print bar codes or graphics yet the Allegro handles the job without any slowdown.

Scalable Text

Our font is standard and provides 9 dif-

Easy to Use

A user friendly design streamlines all operations. The uncomplicated control panel has just three functions: Print, Stop/Cancel and Feed. Paper and ribbon loading are simple two-step procedures.

LabelRIGHT Thermal (a \$479 value)

LabelRIGHT Thermal is a labeling program that has features to do just about anything you could require. It's a free format design program — any format, any size. It has a "Graphics Mode" design interface as well as a "Text Mode" design interface. Rotations, reverses, PCX images, lines, bar codes, auto-incrementing fields, label data base maintenance, data file import, and simplified operator interface are all provided in the program. There are also many label design templates provided for ALAG, FOGMARS, Sears, Roebuck's, Logmans, K-Mart, Walmart, etc.

Everything You Need is There

Bundled with the Allegro Printer is a DB25 to DB25 serial cable or DB25 to DB9 serial cable, LabelRIGHT Thermal, one roll each of labels and ribbon, and a head cleaning card. You can select labels and ribbons from the list below. (Other sizes are available 2 weeks ARO.)

- 4" x 6" Premium Labels with general purpose ribbon (for shipping labels)
- 2.5" x 1.25" Premium Labels with Premium II ribbon (for marked items)
- 2.5" x 1" Premium Labels with Premium II ribbon (for UPC or EAN bar labels)

Higher Speed Requirements?

For a faster printer, we offer the Prodigy Plus, also from Fargo Dataman. This printer can print at 6" per second and includes a take-up reel for the printed labels. Bundled with labels, cable, ribbon, and software, the Prodigy Plus is \$2895.

RESELLER PRICING

Thank you for your inquiry on reseller pricing for our products. Reseller pricing is based on either:

- (a) The quantity per purchase order, or
 (b) Historical cumulative quantity, since 6/90 (this date is subject to adjustment).

The following schedule applies to Worthington Data Solutions Software

Quantity Per Order	OR Historical Cumulative Quantity	List Price Discount
1-2	1	30%
3-4	5	35%
5-6	10	40%
7-9	25	45%
10-19	50	50%
20-49	100	55%
50+	200	60%

The following schedule applies to Worthington Data Solutions Bar Code & Magstripe Readers*

Quantity Per Order	OR Historical Cumulative Quantity	List Price Discount
1-4	1	25%
5-9	10	35%
10-99	25	40%
100+	200	45%

The following schedule applies to the Worthington Data Solutions Thermal Transfer Printer Package

Quantity Per Order	OR Historical Cumulative Quantity	List Price Discount
1	1	25%
2-4	5	30%
5-9	10	35%
10+	25	40%

A reader consists of a decoder and scanner. The Laser Scanners, and CCD Scanners maximum discount is 40%. Laser and CCD Scanners sold with non-integrated decoders count as 2 readers. (Wand scanners, slot badge scanners, and magstripe scanners do not count when sold with a decoder).

These discounts are offered to VAR's and dealers who are selling software and equipment for profit to non-related enterprises. New dealers will be required to supply account names, contacts, and phone numbers of at least two other manufacturers or distributors from whom the dealer is buying for resale. In addition, we will frequently request information from Dunn & Bradstreet regarding the type of business requesting dealer status. These precautions are taken to protect the profit margins of genuine dealers.

Our return guarantee for dealers is 45 days, allowing extra time for you to make delivery to your customer and to get any unsatisfactory items back from the customer. (Hardware items must be returned in resellable condition to receive credit).

Drop shipments, direct to your customer, can be arranged for credit card or approved credit sales.

Our other policies apply to dealers also:

- Credit sales to firms with good credit history
- No charge for UPS Blue Shipping
- No charge for COD

Hardware Cost: Scanner System (In Tk '000s)

Fixed Costs

At Warehouse

Hardware	Rate/avg. Quantity	Quantity	Total
Work Station	40	2	80
Thermal printer	106.12	1	106.12
Labels	per year		40
Printer ribbon	per year		30
			266.12

Variable Costs for LAN System

At Shop

Decoder	19.14
Cables	1
Reader Wand	5
	25.14

Variable Cost per shop

	Lalmatia Quantity	Maghbazar Quantity	Banani Quantity	Chittagong Quantity	Syhet Quantity	Quantity	Rate	Total VC
Low Implementation Scanner		4	1	1	1	1	8	201.12
Medium Implementation Scanner		8	2	1	2	2	15	377.1
High Implementation Scanner		12	3	2	3	3	23	578.22

Summary Box

	Fixed Costs	Variable Costs	SUM
Total Cost Low Implementation	266.12	201.12	467.24
Total Cost Medium Implementation	266.12	377.1	643.22
Total Cost High Implementation	266.12	578.22	844.34

Appendix 6

Appendix 7

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Inventory Control

Maintain Optimum Inventory Levels

RealWorld Inventory Control helps you track product usage and costs, and effectively and efficiently maintain inventory at optimum levels.

Having too much cash tied up in slow or non-selling items — resulting out of last-minute orders — can have a major impact on your financial success. With Inventory Control, you'll have complete information about the value of your inventory, quantities on hand, quantities committed and the flow of inventory items sold by your business on a constant basis.

Some of the many features of Inventory Control include:

- Multiple warehouses can be used and the item quantities in each warehouse can be tracked.
- Provides for inventory valuation with LIFO, FIFO, Average or a modified Standard Cost method.
- An unlimited number of balance sheet inventory accounts can be used.
- Customized item labels can be printed.
- Inventory item information can be entered, edited and printed. Two levels of item categories are provided: category and sub-category. These appear as parameters for virtually all Inventory Control reports and "item related" Sales Analysis reports, allowing for better sales and inventory analysis.
- "Kits" are handled. A kit is an item which is assembled from a set of other inventory items.
- Work orders can be used to assemble a kit from a set of other inventory items. You can assign a completion date to a work order to ensure timely assembly.
- Reports related to kits and work orders can be printed, including the *When and Kit Item Cost and Assembly Work Order*.
- Up to eight alternate item numbers can be assigned for an item.
- Vendors in the item record are verified against the Vendor File in Accounts Payable (if used).

- Inventory transactions (including receipts, transfers, sales, credit memos and adjustments) are easily entered and edited, and an edit list and reports can be printed.
- A short and long term inventory transaction register is available.
- Transaction amounts up to 999 million can be entered.
- Quantities sold, returned and used can be tracked for up to 12 prior periods.
- Prices can be adjusted automatically. Various pricing methods are provided when used with Order Entry/Billing.
- Numerous reports such as *Sales Status, Purchasing Advice, Valuation, Usage, ABC Analysis, Inventory Turnover, and Physical Count Worksheets* can be printed.
- Inventory Control can be used independently or interfaced with RealWorld General Ledger, Order Entry/Billing, Professional Invoicing, Job Cost, Purchase Order, Sales Management Solutions, Sales Analysis, REMOTElink, and Report Writer.

The following screen shows the major functions of the package:



Inventory Control can be tailored to meet the needs of your business. You can define warehouses, specific commission and pricing structures, and the inventory valuation method used in your business.

Item Data

With Inventory Control, you can easily add, change, delete and print inventory information. You have the choice of printing a report of inventory items by either item number or item discipline.



Line items for miscellaneous items (those not assigned a permanent description) may be entered through Order Entry/Billing, Professional Invoicing or Sales Management Solutions.

Quantity	Unit	Price	Total	Ext	Tax	Total
1	1	100.00	100.00	100.00	0.00	100.00
2	1	50.00	100.00	100.00	0.00	100.00
3	1	33.33	100.00	100.00	0.00	100.00
4	1	25.00	100.00	100.00	0.00	100.00
5	1	20.00	100.00	100.00	0.00	100.00
6	1	16.67	100.00	100.00	0.00	100.00
7	1	14.29	100.00	100.00	0.00	100.00
8	1	12.50	100.00	100.00	0.00	100.00
9	1	11.11	100.00	100.00	0.00	100.00
10	1	10.00	100.00	100.00	0.00	100.00

In addition to the usual inventory data, you can assign each item a stocking unit, pricing unit and conversion factor, bin or flow location, an ABC code for analysis, last sale date, taxable or nontaxable status and a code to indicate whether backorders are allowed.

Vendor master information can also be entered including vendor number, product number, minimum order, and lead time.

Quantity	Unit	Price	Total	Ext	Tax	Total
1	1	100.00	100.00	100.00	0.00	100.00
2	1	50.00	100.00	100.00	0.00	100.00
3	1	33.33	100.00	100.00	0.00	100.00
4	1	25.00	100.00	100.00	0.00	100.00
5	1	20.00	100.00	100.00	0.00	100.00
6	1	16.67	100.00	100.00	0.00	100.00
7	1	14.29	100.00	100.00	0.00	100.00
8	1	12.50	100.00	100.00	0.00	100.00
9	1	11.11	100.00	100.00	0.00	100.00
10	1	10.00	100.00	100.00	0.00	100.00

Customized item labels can be printed for some or all items, in order by item number, item description, or item location.

RealWorld Inventory Control handles multiple warehouses. You can transfer items from one warehouse to another, and track inventory for each item in each warehouse. You can also maintain "quantity sold" for 12 price periods.

Up to eight substitute items can be set up for each item. These items can be selected in Professional Invoicing and Order Entry/Billing.

is a replacement item for the primary stock item.

Item Pricing

Each inventory item can be assigned its own pricing structure. Eight price structures (such as discount by quantity ordered within customer type, mark up by customer type and pick price by quantity ordered) are available, and each is defined by a different price code type. These flexible pricing methods are only used when Inventory Control is interfaced with Order Entry/Billing or Professional Invoicing.

When an order is entered in Order Entry/Billing, or an invoice is Professional Invoicing, the price of each item on the order will be calculated automatically, based upon the calculation method specified in the item's price code.

Quantity	Unit	Price	Total	Ext	Tax	Total
1	1	100.00	100.00	100.00	0.00	100.00
2	1	50.00	100.00	100.00	0.00	100.00
3	1	33.33	100.00	100.00	0.00	100.00
4	1	25.00	100.00	100.00	0.00	100.00
5	1	20.00	100.00	100.00	0.00	100.00
6	1	16.67	100.00	100.00	0.00	100.00
7	1	14.29	100.00	100.00	0.00	100.00
8	1	12.50	100.00	100.00	0.00	100.00
9	1	11.11	100.00	100.00	0.00	100.00
10	1	10.00	100.00	100.00	0.00	100.00

Prices can be automatically changed for a selected range of items. The prices are changed by calculations based on one of the three prices kept on the item record. Whichever you select determines how prices are changed.

Prices are changed either by adding a dollar amount to the base or by multiplying the base by a percentage. You can also change second and third price levels based on a newly calculated base price.

Inventory Transactions

Inventory transactions are easy to enter and edit. You can process eight different types of entries such as sales, receipts, credit memos, adjustments, transfers, kit assembly, component usage and job usage.

Part No	Part Name	Unit	Price	Stock	Order	Lead	Days
1	100-1000	1	10.00	100	100	10	10
2	200-2000	1	20.00	200	200	20	20
3	300-3000	1	30.00	300	300	30	30
4	400-4000	1	40.00	400	400	40	40
5	500-5000	1	50.00	500	500	50	50
6	600-6000	1	60.00	600	600	60	60
7	700-7000	1	70.00	700	700	70	70
8	800-8000	1	80.00	800	800	80	80
9	900-9000	1	90.00	900	900	90	90
10	1000-10000	1	100.00	1000	1000	100	100

An *Inventory Transaction Edit List* can be printed to ensure that transactions were entered correctly. The *Inventory Transaction Register* provides a paper audit trail and is automatically printed when transactions are finalized.

When *Inventory Control* is used with *Order Entry/Billing* or *Professional Invoicing*, inventory transactions are automatically created from invoices or credit memos. You do not have to reenter them in *Inventory Control*.

Kits and Work Orders

Kits and work orders are supported. A kit is an inventory item which is assembled from a set of other inventory items.

A work order is a request to assemble a kit from its component items. A work order can be "immediate," in which case the kit is immediately available for sale. Alternatively, a work order may be printed, issued and the component items removed from inventory, but the kit is not available for sale until the work order is completed.

A *Kit List* and component *Where-used* report can be printed. A *Kit Price Cost* report shows the selling prices of a kit with the total cost of its components.

Inventory Reports

RealWorld *Inventory Control* provides many reports, which assist in evaluating and controlling stock usage and levels.

The *Stock Status* report shows current stock status (including quantity committed) and value of your inventory items for a warehouse or a range of items, vendors or categories.

The *Purchasing Advice* report shows inventory items that are out of stock or below reorder level. Quantity on hand, quantity committed, quantity sold, quantity on backorder and vendor related information such as lead time for reorder is shown. This greatly assists in purchasing decisions.

The *Inventory Turnover* report shows the number of inventory turns year-to-date. Based on this, the number of turns for the year will be estimated. You can print for either fast moving or slow selling items.

The *Physical Count Worksheet* assists in completing a physical inventory count. Inventory items are listed by location within each warehouse. A specific range of locations, items, or vendors can be printed.

The *ABC Analysis* shows the dollar value of year-to-date sales volume, year-to-date cost of the items sold, and year-to-date gross margin (sales minus costs) for each item. This report separates your items into three classes of dollar value by percentage. You choose what the separation is based on - sales, cost or margin.

The *Valuation* report shows the current value of inventory for one or all warehouses. Part or all of the inventory may be selected. A variety of options allow you to tailor the report to provide the specific data you need.

A *Usage* report provides information on margins, quantity, dollar amount sold and actual cost of sales for each item in your inventory. You can print the report for a range of items or for all items, and for period-to-date and year-to-date.

Partial List of Available Inventory Control Reports

- ARC Analysis
- Automatic Price Change Log
- Committee Code List
- Completed Work Orders Edit List
- Cost Inventory Check
- Distributions to General Ledger
- Issued Work Orders
- Inventory Accounts List
- Inventory Transaction Edit List
- Inventory Transaction Register
- Inventory Turnover
- Item Change Log



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Inventory Control Reports contained

- Items by Item Number
- Items by Item Description
- Kit Item List
- Kit List
- Subinventory List
- Physical Counts Worksheet
- Trans Control List
- Trans List
- Transfering Mirror
- Items by Item Number
- Items by Item Description
- Items by Item List
- Stock Items
- Usage
- Value C/C Account List
- Value List
- Warehouse List
- Warehouse List
- Work Order List List
- Work Order History
- Work Order Register
- Work Order Status
- Work Order Check
- Work Order Issue

Inventory Control Technical Specifications

Items	unlimited
Item Number	13 characters
Item Description	2 lines - each 25 characters
Inventory Control Method	5
Inventory Control	3 characters
Inventory Subcategory	3 characters
Maximum Locations	1,200
Maximum Kit Quantity	99,999,999,999
Kit Component Quantity	999,999
Work Order Number	6 digits
Account Code	4 - 8 digits
Sub Account Code (Profile Control)	0 - 8 digits
Account Description	30 characters
Fields per item Record	36
Lines per Inventory Item	3
Posting Method	2
Maximum Diameter Percent	99.99
Transaction Type	8
Transaction Amount	\$999,999,999.99
Total FIDDTD per Item	\$99,999,999.99
Quantity Sold FIDDTD per Item	999,999,999.999
Price Per Unit Quantity Sold	17
Maximum Quantity On Hand	99,999,999,999
Round Level	99,999,999,999
Item Requisition Code	4 characters
Fluxcode	1 - 10 characters
Number of Transactions in Account Group	5
Number of Values Allowed	14

Inventory Control

Date 01/17/88 Time 11:13 AM		MPC COMPANY		Page 1 of 1	
INVENTORY CONTROL REPORT					
Item No	Item Description	Quantity	Unit Cost	Value	Inventory Type
1	...	1000	...	...	...
2	...	500	...	...	...
3	...	250	...	...	...
4	...	100	...	...	...
5	...	50	...	...	...
6	...	25	...	...	...
7	...	10	...	...	...
8	...	5	...	...	...
9	...	2	...	...	...
10	...	1	...	...	...

Total		2000		...	

Items by Item Description

Date 01/17/88 Time 11:13 AM		MPC COMPANY		Page 1 of 1	
ITEM USAGE REPORT					
Item No	Item Description	Quantity	Unit Cost	Value	Inventory Type
1	...	1000	...	...	...
2	...	500	...	...	...
3	...	250	...	...	...
4	...	100	...	...	...
5	...	50	...	...	...
6	...	25	...	...	...
7	...	10	...	...	...
8	...	5	...	...	...
9	...	2	...	...	...
10	...	1	...	...	...

Total		2000		...	

Item Usage Report

Purchasing Advice Report

Date 05/01/77 Mar 22 1977
 400 Company
 Report 0018 Page 001

Inventory 79.7
 Item 1 range 1 to 1000
 Inventory Status: (See report 0018)
 Number 1 to 1000
 Inventory or other status: (See report 0018)
 Item 1 to 1000
 Item 1 to 1000
 Item 1 to 1000

Item #	Description	Quantity	Unit Price	Quantity	Unit Price	Quantity	Unit Price	Quantity	Unit Price
1
2
3
4

1 Item 1 to 1000
 - End of report -

Inventory Control

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Inventory Valuation Report

Date 05/01/77 Mar 22 1977
 400 Company
 Report 0018 Page 002

Inventory 79.7
 Item 1 range 1 to 1000
 Inventory Status: (See report 0018)
 Number 1 to 1000
 Inventory or other status: (See report 0018)
 Item 1 to 1000
 Item 1 to 1000
 Item 1 to 1000

Item #	Description	Quantity	Unit Price	Quantity	Unit Price	Quantity	Unit Price	Quantity	Unit Price
1
Subtotal	
Total	

1 Item 1 to 1000
 - End of report -

Kit List

Date 05/01/77 Mar 22 1977
 400 Company
 Report 0018 Page 003

Inventory 79.7
 Item 1 range 1 to 1000
 Inventory Status: (See report 0018)
 Number 1 to 1000
 Inventory or other status: (See report 0018)
 Item 1 to 1000
 Item 1 to 1000
 Item 1 to 1000

Item #	Description	Quantity	Unit Price	Quantity	Unit Price	Quantity	Unit Price
1
2
3

1 Item 1 to 1000
 - End of report -



Coding

The code must isolate the product based on its specific design. Two types of codes will be required: (1) for non-fashion items and (2) for fashion items. For non-fashion items, if a specific design of a product is sold out, that specific product will be reordered. However, for fashion items, if a specific design is sold out it will not be reordered because "fashion products" are only produced once.

All non-fashion items correspond with a "written description" which is maintained by the Procurement and Ordering Department (Central Service). This department maintains "producer books" which list all the products of each Aarong supplier. If the code can isolate the category of the product, the producer, the type of product and the written description, then the specific product design can be specified. Once this is done, then the remaining descriptors, such as material, type and size can be tagged to the name in the computer.

Since fashion items are produced only once, Procurement and Ordering does not maintain "written descriptions" of the fashion items because they will not be reordered. However, the Aarong Design Department has recently implemented a "collection number" system. For each season, the Design Department will present several collections for each fashion category. For example, sarrees may have five collections per season and panjabees may have ten collections for the Eid festival. Within each collections, there may be ten to fifteen designs, which are all variants on the collection theme. For coding purposes, this is very convenient. The code must only identify the category (sarree), the collection (#3) and the design (#12) to identify the specific product.

In summary, the table presents the descriptors of fashion and non-fashion coding system.

Fashion Items	Non-Fashion Items
Category	Category
Collection number	Producer
Design number	Item
Material	Written Description number (WD no.)
Type	Material
Trial Item	Type
Size	Trial Item
	Size

An example will help further clarify the two coding systems:

1. Non-Fashion Item:

	Category	Producer	Item	WD no.	Type	Trial	Size
<i>Code</i>	12	14	11	4	3	1	3
<i>Translation</i>	Silver	Dhaka Jewellers	Earring	Pach dana sagorika	Chila	No	Big

In this case, the category is silver (#12), the producer is Dhaka Jewellers (#14), the item is earring (#11) and the written description number (#4) corresponds with "pach dana sagorika". Once the

specific product is isolated, then the remaining information can be tagged in the computer - namely, the type (#3) being chila, the size(#3) being big and whether it is a trial item.

2. Fashion Item

	Category	Collection	Design	Material	Type	Trial	Size
<i>Code</i>	18	10	5				
<i>Translation</i>	Saree	Block Print Cotton	Affiche #5				

The category is Saree (#18), the collection is block print cotton (#10) and the design is affiche (#5). Similarly, once the specific product is isolated, the remaining information can be tagged in the computer - namely the type, the material, the size and whether it is a trial item.

With this coding system specific products can identified and tracked. This information can provide Aarong management with powerful, easily obtainable reports. These will be elaborated upon in the reports section.

Appendix 9

Menu 1 Example

a) Stock balance and rate of sale

<u>Stock balance and rate of sale</u>					
<i>Shop</i>			<i>Date</i>		
Code	Description	Rate/Month	Stock	Last order date	Number of days until reorder

b) Reorder points

<u>Reorder Points</u>					
<i>Shop</i>			<i>Date</i>		
Code	Description	Rate/Month (above the hurdle rate?)	Stock	Suggested reorder quantity	Suggested source

c) Trial product balance

<u>Stock balance and rate of sale of Trial Items Only</u>					
<i>Shop</i>			<i>Date</i>		
Code	Description	Rate/Month	Stock	Reorder (Yes or No)	Suggested Quantity

Appendix 9

Sample Opening Computer Screen of Management Reports

Design Specific Software						
Management Reports						
Menu 1 a) Stock Balance and Rate of Sale b) Reorder Points c) Trial	Menu 2 a) Age of Inventory b) Dead Items	Menu 3 a) Design Popularity	Menu 4 a) Profit per square foot b) Labor sold per square foot	Menu 5 a) Sales	Menu 6 a) Producer deliver schedule	Menu 7 Export a) Customer Files b) Order completion report c) Sales

Choice of Shop (One of five or total)

Choice of Category (One of nineteen)

Choice of Sub-Category

Appendix 10

Assumptions to accompany to Design Specific Software Costs

1. The programming charge was based on a average taken from the three LAN proposals:

Leading Edge Technologies: 500 Tk

Abacus & Automation: 300 Tk

Data Tech 160 Tk

2. Training: The rates from Leading Edge Technologies (operator: 1000Tk; supervisor: 3000Tk and Administrator: 10000Tk) to calculate training costs. The trainees are composed of one operator per computer, one supervisor per shop floor and one administrator for the system.

3. Implementation: Work days were calculated based on consultation with Aarong staff and management

4. Maintenance: One administrator was assumed necessary for the system maintenance

Cost of Design Specific Software

LAN Option

Development

Programming (avg) 320

General Software

Novall Rate (000Tk)	Five User	Ten User	Twentyfive user	Total
Low Implementation	35	88.9	131.5	175
Medium Implementation	175			175
High Implementation	140	88.8		228.8
	175		131.5	306.5

Implementation

	Worker Days	Rate(000Tk)	Totals
Translation/Encoding	31	0.1	3.1
Inventory Count	40	0.1	4
			7.1

Training

Rate(000Taka) per person	Operator	Supervisor	Administrator	Total
Low Implementation	1	3	10	14
Medium Implementation	11	6	10	27
High Implementation	15	9	10	34
	24	12	10	46

Sub-total	Low Implementation	529.1
	Medium Implementation	589.9
	High Implementation	679.6

Maintenance (at 15% yearly)

Low Implementation	79.365
Medium Implementation	88.485
High Implementation	101.94

Total	Low Implementation	608.465
	Medium Implementation	678.385
	High Implementation	781.54

Appendix 11

Notes to Income Statement:

- Sales: The January-June 1994 sales figure was doubled (to equate to a year) and yearly sales growth was estimated at 20%
- Other Income: Estimated to increase 20% per year
- Cost of Goods Sold: Estimated to increase 20% per year
- Total Administrative Expense: Estimated to increase 20% per year

			BRAC - Aarong						
			Projected Income and Expenditure Statement in Taka 1000's						
			For the years 1995-99						
			Jan-June 1994	Full 1994	1995	1996	1997	1998	1999
<i>Sales</i>			159755	319510	383412	460094.4	552113.3	662535.9	795043.1
<i>Other income</i>			10763	21526	25831.2	30997.44	37196.93	44636.31	53563.58
<i>Total income</i>			170518	341036	409243.2	491091.8	589310.2	707172.2	848606.7
<i>Cost of Gds Sold</i>			118902	237804	285364.8	342437.8	410925.3	493110.4	591732.4
<i>Gross Profit</i>			51616	103232	123878.4	148654.1	178384.9	214061.9	256874.3
<i>Total Admin Exp.</i>			37576	75152	90182.4	108218.9	129862.7	155635.2	187002.2
<i>Profit</i>			14039	28078	33696	40435.2	48522.24	58226.69	69872.03

Appendix 12-a & 12-b

Appendix 12-a

Notes to Income Statements under the LAN option:

Total Cost LAN option:

- Fixed Costs: Based on the cost of LAN hardware, scanning system but no cash register cum computer (CRCC)
- Variable Costs: Based maintenance expense of 2.5% of hardware cost

Financing and Expenses for LAN Medium Implementation:

- The medium option was chosen because of the combination of lower cost and reasonable check-out speed
- Principle repayment: Assumed five year principle repayment
- Interest Expense: Assumed 14% interest on the "principle" balance
- Depreciation Expense: Assumed five year straight line depreciation

Interest Savings from Decreased Inventory

- Interest savings: As stated in the text, 89% of interest charges are due to carrying inventory. Aarong management estimated that inventory could be reduced 33% with design specific information. Therefore, interest expense can be reduced 29.37%

Income Statement with LAN system

- Sales: Estimated to increase at 23% (as compared to 20%)
- Cost of Goods Sold: Estimated to increase at 23% (as compared to 20%)
- Administrative Expense: Estimated to increase at 20% (assumed the 3% incremental sales increase could be covered with the same administrative expenses)
- Principal, interest expense, and depreciation expense: Copied from the "financing" section
- Interest savings: Copied from the "interest savings" section
- Incremental profit: Compares profit under the LAN option and the present system

Appendix 12-b

Sales:

- Increased at 21% per year (a 1% incremental increase over the "no change" option)

Interest Expenses

- Reduction of 5% over the "no change" option

12-a

Total Cost LAN Option								
Fixed	Hardware			Software	Total	Variable (per year)		
	Computers	Scanner	CPCC					
	Low Implementation	2444.9	497.24	0	529	3431.14	Maintenance	139.5
Medium Implementation	3189	635.23	0	589.5	4411.72	Maintenance	166.8	
High Implementation	4299.8	824.34	0	679	5913.14	Maintenance	200	
Financing and Expenses for Medium Implementation								
		1995	1996	1997	1998	1999		
Principal		882,344	882,344	882,344	882,344	882,344		
Interest Exp.		617,640.8	494,112.6	370,584.5	247,056.3	123,528.2		
Total		1499,985	1,376,457	1,252,928	1,129,4	1,005,872		
Interest Savings from decreased inventory (32% of interest inventory charge)								
		1994	1995	1996	1997	1998	1999	
Interest		11554	13604.8	18837.76	19665.31	23958.37	28750.05	
Savings		0	4072.092	4888.51	5863.812	7036.575	8443.899	
BRAC - Aarong								
Projected Income and Expenditure Statement (in Take 000's)								
For the years 1995-99								
LAN Option								
		1994	1995	1996	1997	1998	1999	
Revenue								
Sales		319510	392987.3	483388.7	594585.6	731315.7	899518.3	
Other income		215.26	25631.2	30937.44	37196.83	44636.31	53563.56	
Total income		341035	418928.5	514384.1	631782.5	775952	953081.9	
Cost of Goods Sold		237804	292488.8	359773.7	442521.6	544301.6	669491	
Gross Profit		103232	126329.6	154610.4	189240.9	231650.4	283590.9	
Expenses								
Admin Exp.		75152	90182.4	109218.8	129882.7	155635.2	187002.2	
Principal		0	882,344	882,344	882,344	882,344	882,344	
Interest Exp.		0	617,640.8	494,112.6	370,584.5	247,056.3	123,528.2	
Maintenance			167	167	167	167	167	
Total Exp.		75152	91848.38	109762.3	131282.6	157131.6	188175.1	
Interest Savings		0	4072.092	4888.51	5863.812	7036.575	8443.899	
Net Expenses			87777.29	104873.8	125418.8	150095	179731.2	
Profit		29078	38552.29	49734.62	63822.15	81555.42	103859.7	
Profit present system		29078	33686	40435.2	48522.24	58276.88	69872.03	
Incremental Profit		0	4866.267	9299.421	15298.91	23278.73	33987.71	

Total Cost LAN Option										
Fixed	Hardware			Software			Variable (per year)			
	Printers	Computers	Scanner	CNIC	Total					
Low implementation	2444.9	457.24	0	529	3431.14	138.5	Maintenance			
Medium implementation	3189	633.22	0	569.5	4411.72	100.8	Maintenance			
High implementation	4399.8	834.34	0	678	5912.14	209	Maintenance			
Financing and Expenses for Medium Implementation										
Principal	882.544	882.544	882.544	882.544	882.544	882.544				
Interest Exp.	617.6409	494.1126	370.5845	247.0563	123.5282					
Total	1499.005	1376.657	1252.928	1129.4	1005.972					
Interest Savings from decreased inventory (5% of interest inventory charge)										
1994	1995	1996	1997	1998	1999	1999				
11554	13864.8	16637.76	18966.31	23058.37	28750.06					
Design	0	403.24	831.888	998.2956	1197.818	1437.502				
BMAC - Among										
Projected Income and Expenditure Statement (in \$K 000's)										
For the years 1995-99										
LAN Option										
Revenue										
Sales (1% increment)	216510	266607.1	497794.6	566031.5	644804.1	828726.7				
Other income	21528	25831.2	30887.44	37190.83	44850.31	53653.58				
Total income	241038	415438.3	498792	603222.4	729534.4	882300.2				
Cost of Old Sold	237804	287742.8	348188.8	421284.3	509754	618023				
Other Profit	103232	124605.5	150633.2	181944.1	218780.4	268487.9				
Admin Exp.	75152	90182.4	106218.9	129682.7	155436.2	187002.2				
Principal	0	882.544	882.544	882.544	882.544	882.544				
Interest Exp.	0	617.6408	494.1126	370.5845	247.0563	123.5282				
Maintenance	167	167	167	167	167	167				
Total Exp.	75152	91849.38	109762.3	131282.8	157131.8	188735.1				
Interest Savings	0	403.24	831.888	998.2956	1197.818	1437.502				
Net Expenses	81150.14	108826.4	130254.3	155933.7	188737.6					
Profit	280278	235029.32	418027.25	518593.77	638456.71	787593.3				
Profit present system	280278	320386	40435.2	48522.24	58226.88	68872.03				
Incremental Profit	0	-158.608	1257.546	3137.532	5820.014	88878.278				

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