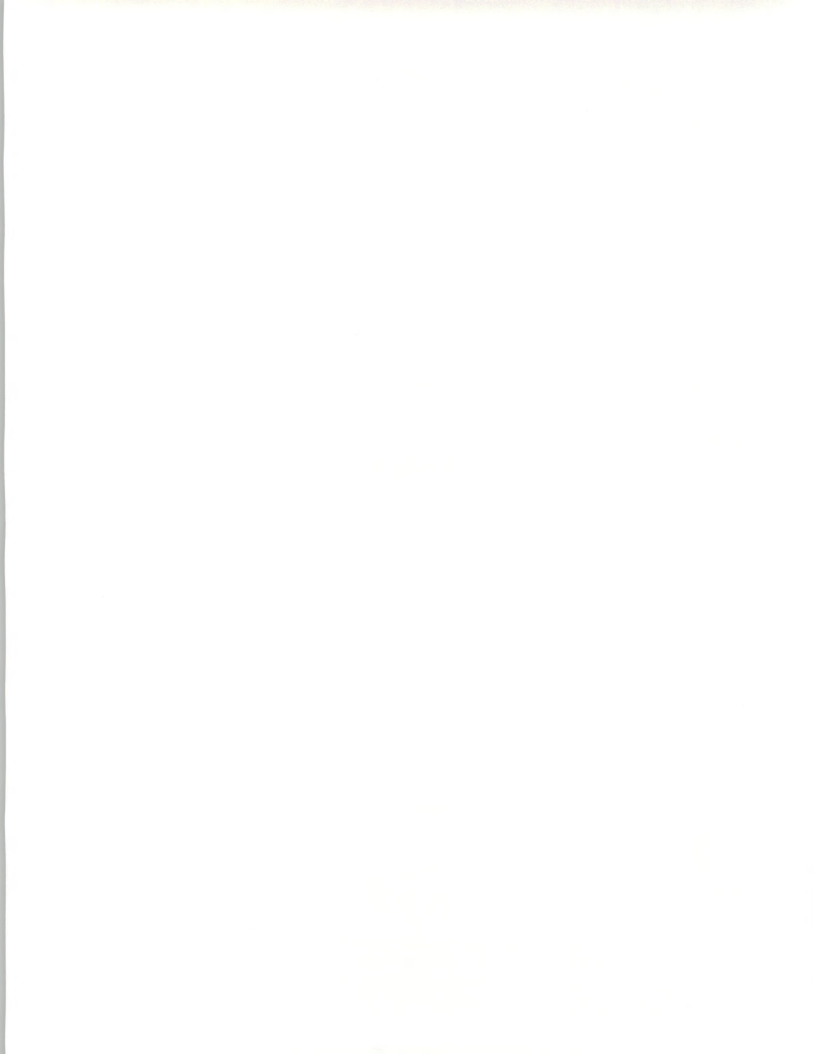


**Altos Computer Systems**

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**Customer Support  
Evaluation**



# **Altos Computer Systems**

Evaluation of:

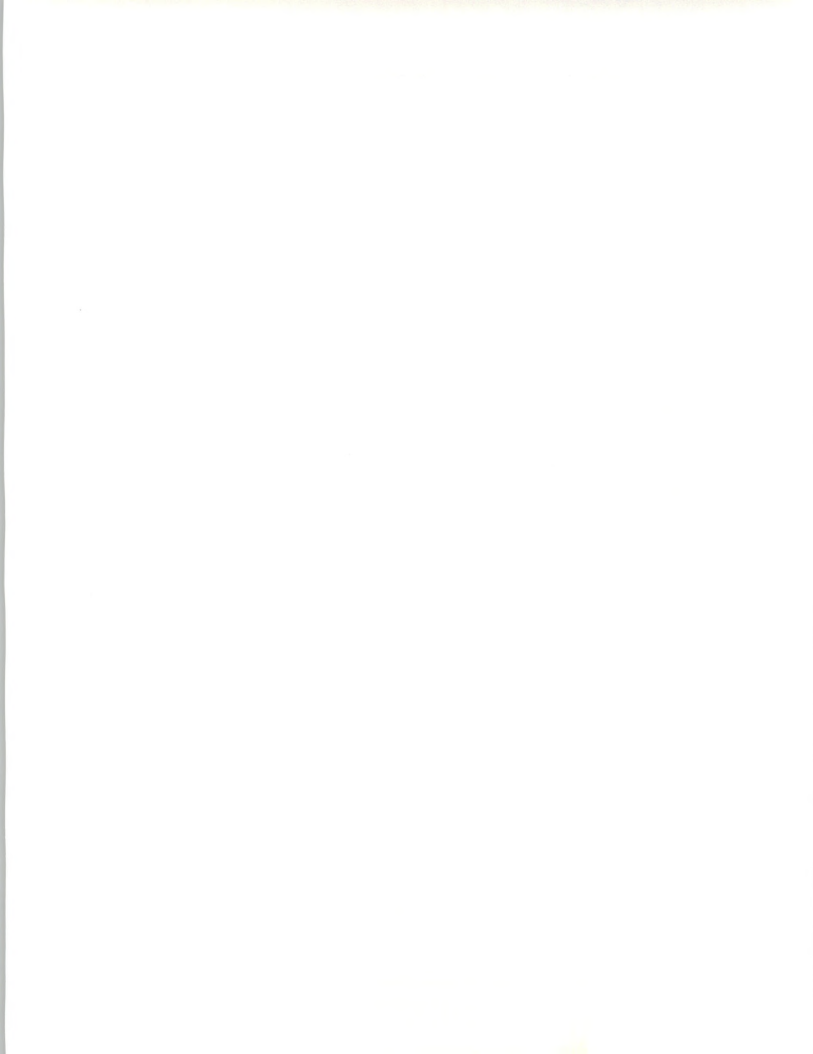
- Customer support
- Maintenance operations
- Policies
- Procedures



# Altos Computer Systems

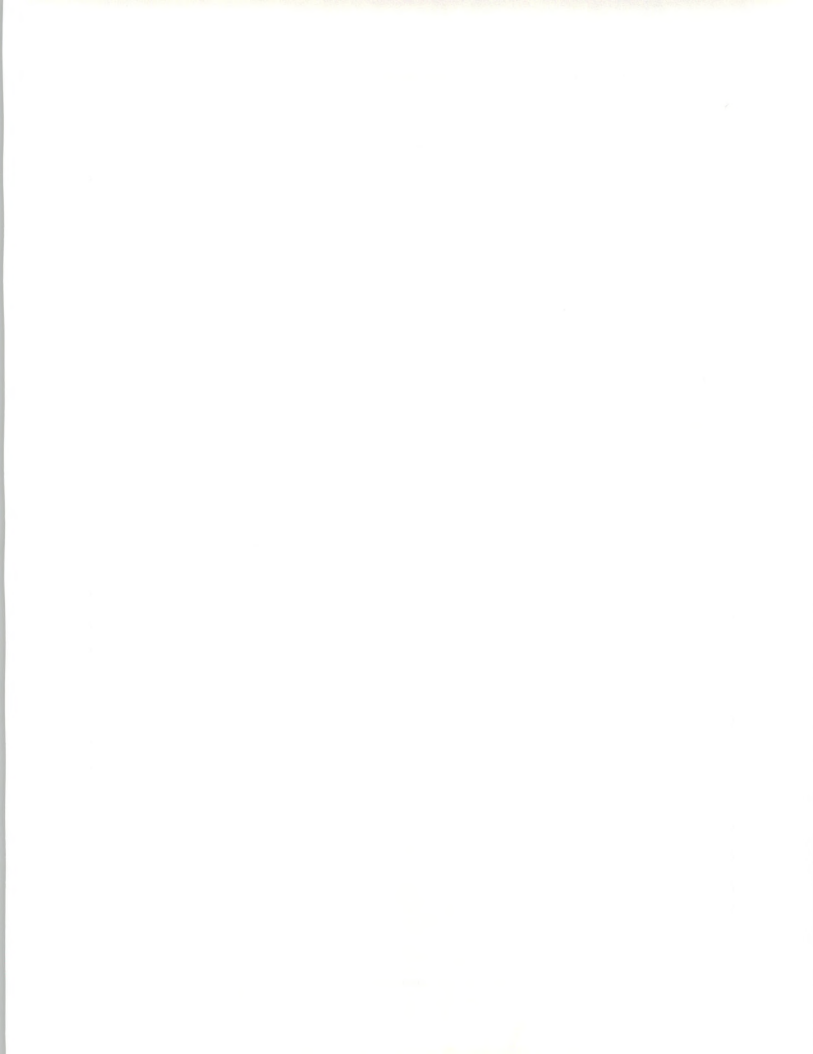
## Agenda:

- Objectives
- Methodology/Scope
- Overview
- Dealer/User Feedback
- Customer Support Interviews
- Other Altos Interviews
- Vendor Comparisons
- Conclusions/Recommendations



## Objectives

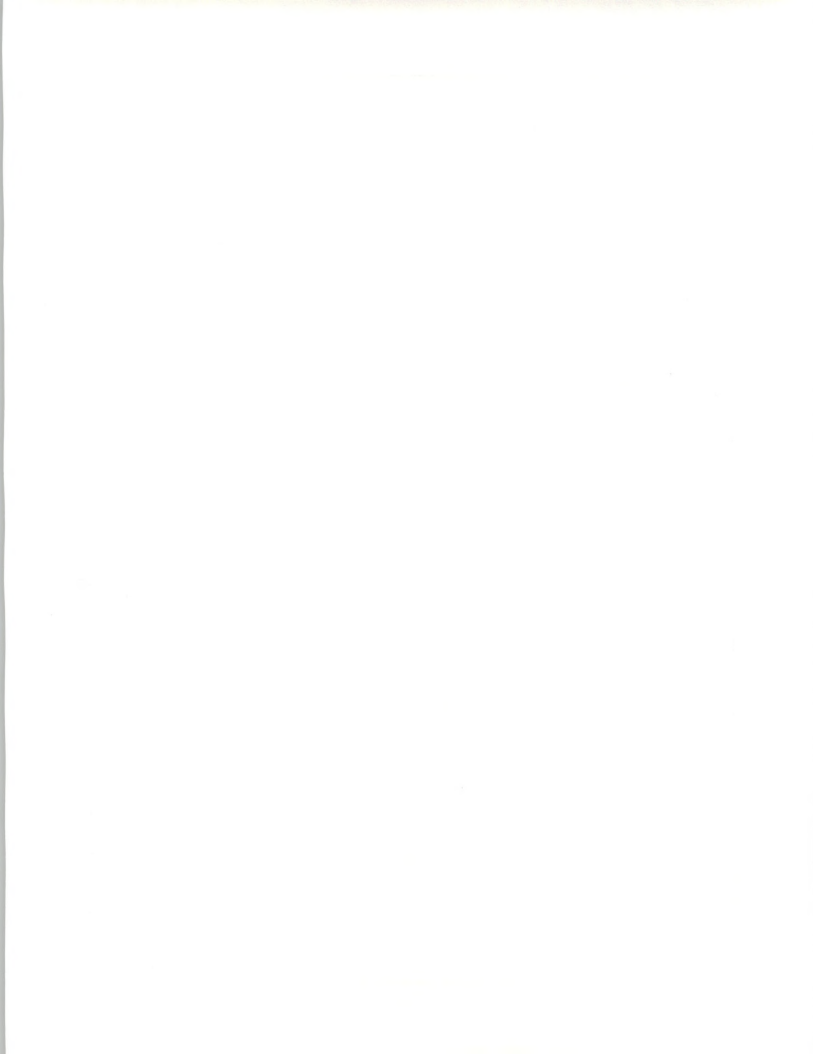
- Evaluate customer support and maintenance functions
- Compare current policies, procedures, and operations with leading competitors
- Recommend the changes required to support the marketing of Altos products and to achieve the objective of making Altos "the Nordstrom's of the computer industry"





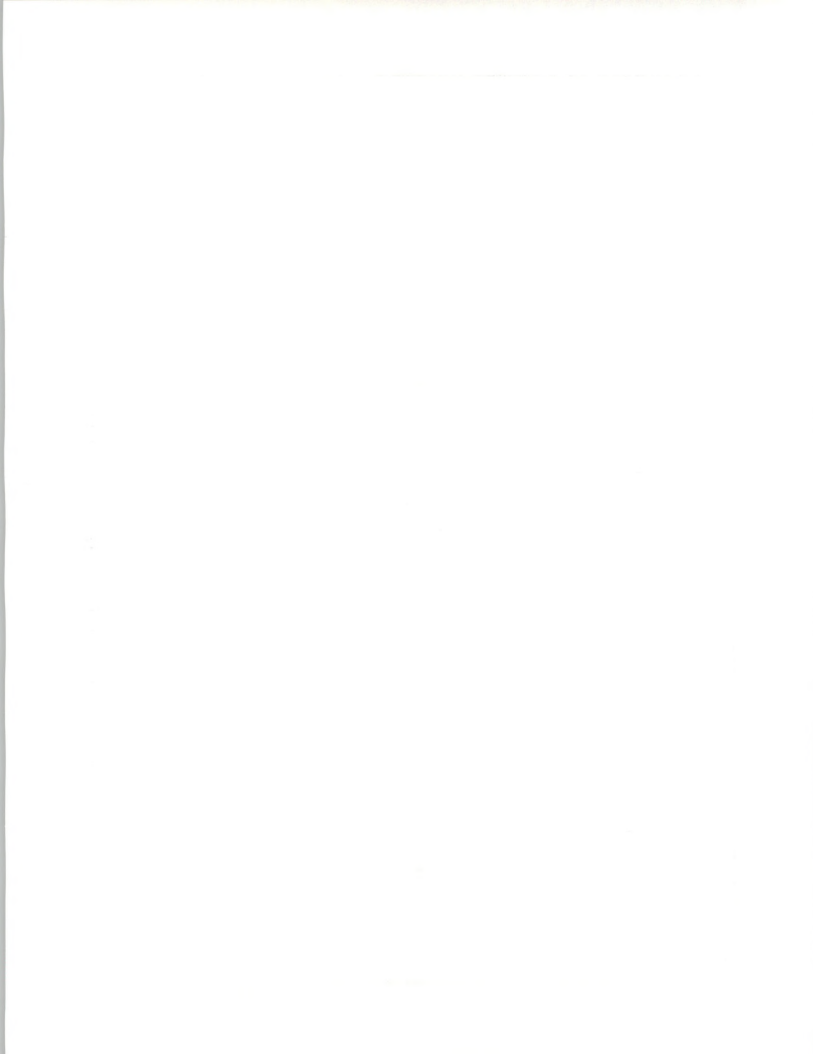
## Methodology/Scope

- Interview Altos executives, managers, employees
  - Customer support
  - Marketing
  - Manufacturing
  - Engineering
  - Logistics
  - Finance
- Review and analyze dealer/user feedback
  - Reseller advisory board tapes
  - Ted Drysdale's field trips
  - Customer complaints
- Review support center procedures
  - Response center
  - Systems specialists
  - Hardware specialists
  - Number and type of products
  - Contract offerings
- Gather information and compare specific practices and procedures with primary competitors
  - Compaq
  - DEC
  - IBM
- Develop conclusions and recommendations



## Overview

- Key problem areas
  - Quality
  - Management/Measurement system
  - Cost accounting
  - Communications
  - Customer support
  - Separate charge offerings
  - Teamwork
- Key recommendations
  - Implement symptom/fix search capability
  - Implement early ship program
  - Formal sign off at product announcement and first customer ship
  - Implement service design objectives
  - Implement key measurements (customer support, engineering, manufacturing)
  - Provide most support to dealers without fee
  - Release technical information to dealers/servicers
  - Implement electronic link to dealers/servicers
  - Add additional manpower to support center until problems are managed down
  - Increase warranty to 1 year on-site

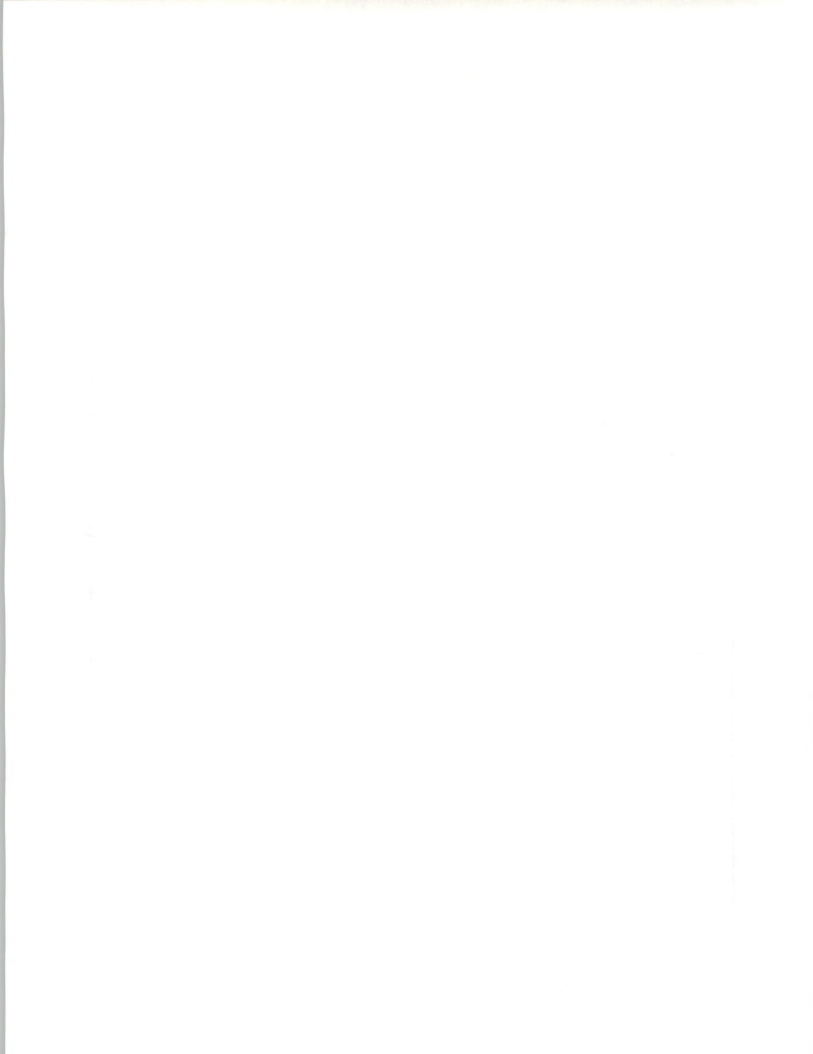


## Dealer/User Feedback

Source: Reseller Advisory Board Tapes

### Communications

- Lack of adequate pre-sales information on technical problems
- You should publish problems with hardware and software. Also make the information available via terminal—Others do it!
- Better feedback is needed on what action is being taken to resolve open problems
- Dealer involvement is needed to establish priorities for resolving open problems
- Communication links are very weak in light of critical user applications



## Dealer/User Feedback

Source: Reseller Advisory Board Tapes

### Separate Charge Offerings

- "You are charging me \$1,000 per year for an 800 number to log your problems"
- Altos warranty is not adequate
  - Competition is much better
  - You can't charge a customer to go on-site to correct a warranty problem
- Training courses are too expensive and often not high quality
- It appears Altos has the intent of not giving good service
  - Call back tomorrow costs less
  - Ship parts today costs more
  - No contract = no service



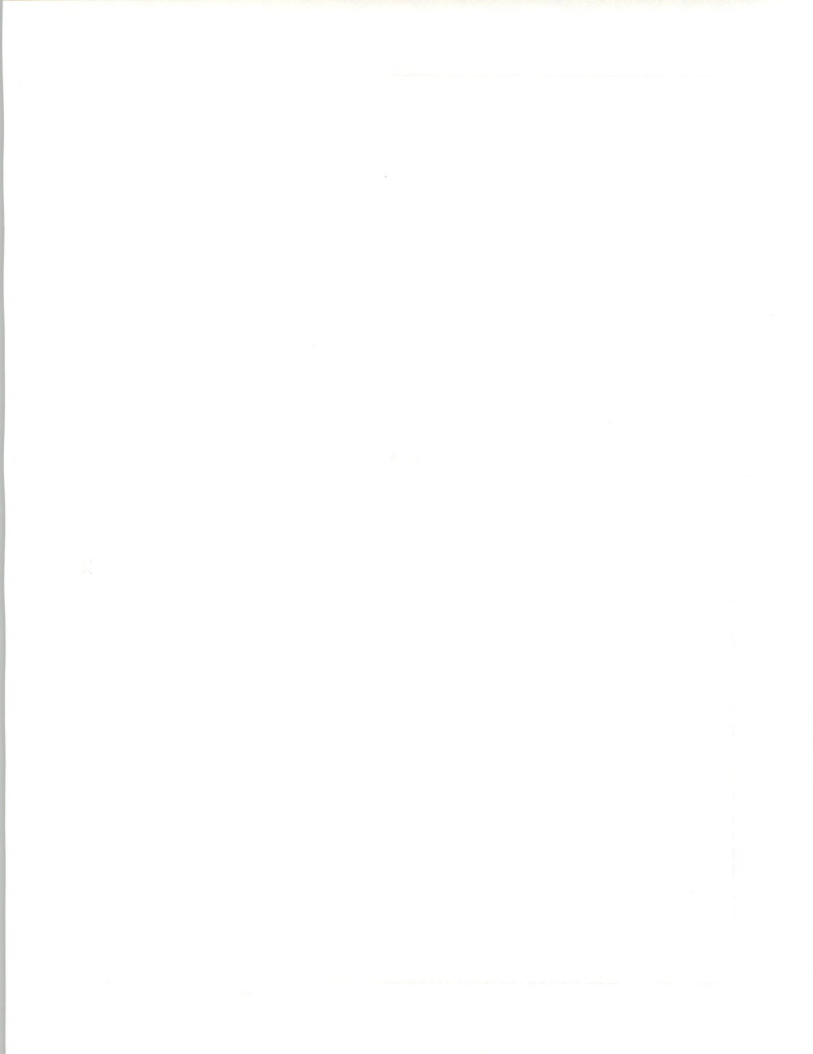


## Dealer/User Feedback

Source: Reseller Advisory Board Tapes

### Quality

- Find the problems before you send us the products. More user testing!
- It is not clear that Altos has a beta test policy
- It is imperative that all support be in place before a product is shipped

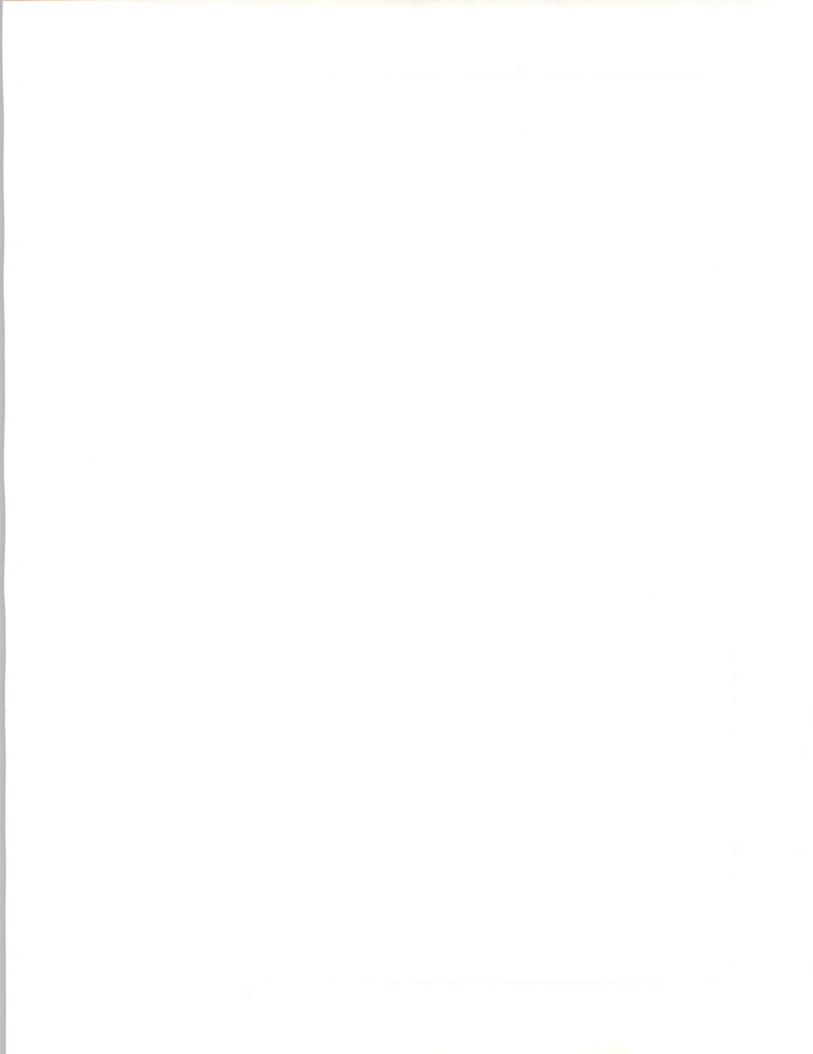


## Dealer/User Feedback

Source: Drysdale's Visits

- Dealers think Altos has a serious attitude problem (i.e., arrogant!)
  - Preannounce products
  - Take orders and ship before we are ready
  - Charging for support
  - Visa card screening
- Customer support not working partially due to lack of training
- Customer support doesn't understand that the key mission is to serve the customer

Drysdale's Conclusion: The objective should be to make Altos "The Nordstrom's of the computer industry"



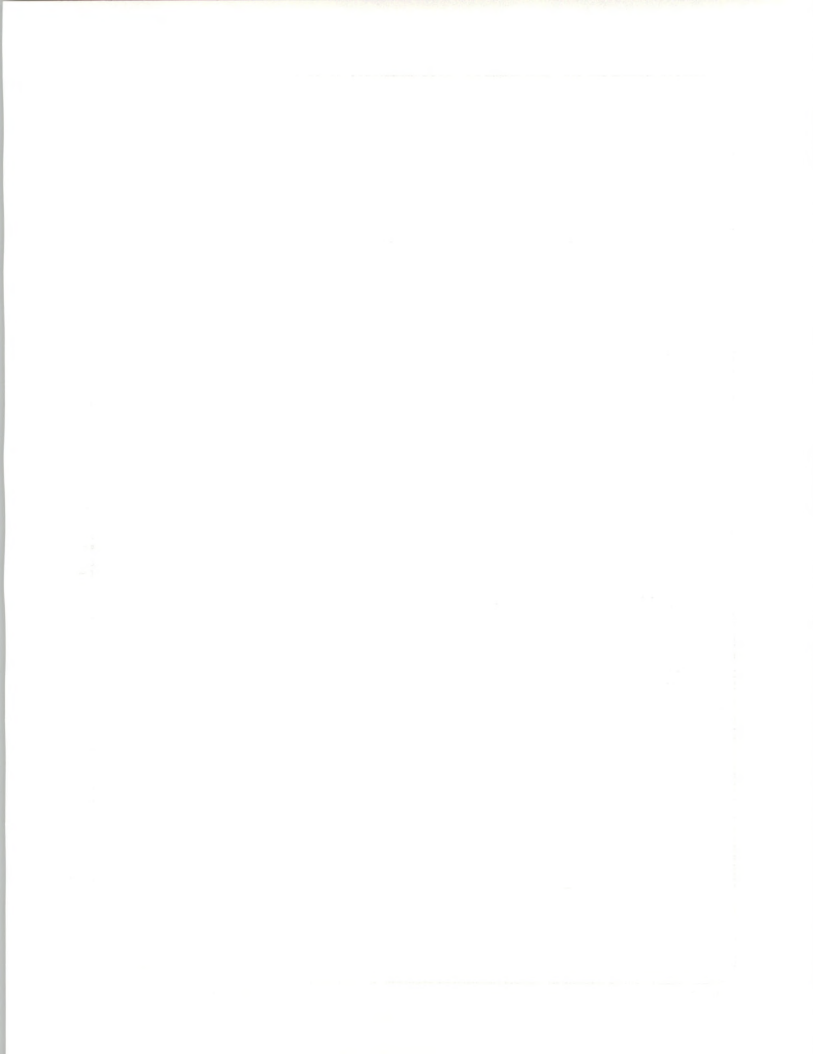
## Dealer/User Feedback

### Summary

- You are not communicating with me relative to hardware and software problems
- "You TAX us!" It appears intent is not to give good service
- Altos needs to get in front of problems
  - Support in place before shipment
  - User test prior to volume shipments
- Overall attitude problem

### Conclusion

- The concerns are very serious and reputation is a long way from Nordstrom's.



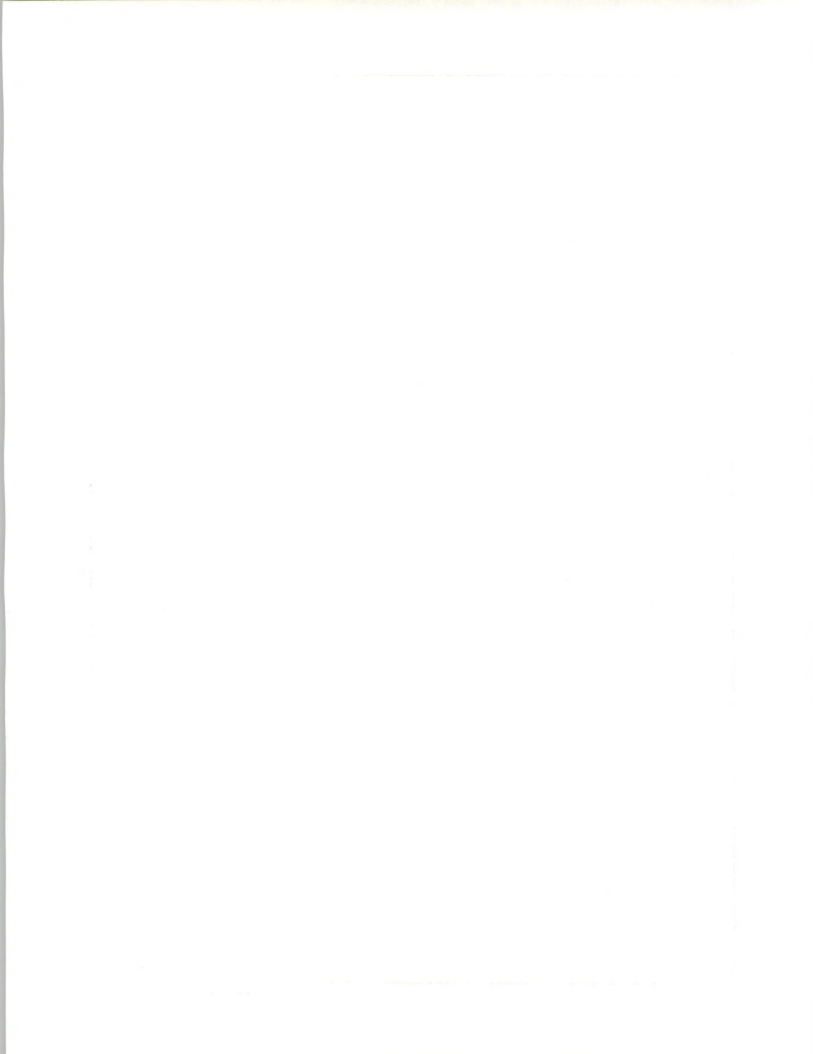
# Customer Support Interviews

## Communications

- Products are shipped before technical support is trained, documentation is available, and spare parts are available
- Customers are upset because we don't tell them of problems
- ECO's are not communicated to technical support
- Our customers are very angry about getting shunted around within Altos when seeking answers to problems
- The software problem report is for internal use only

## Summary

- Communications are a major problem
  - Internal
  - External

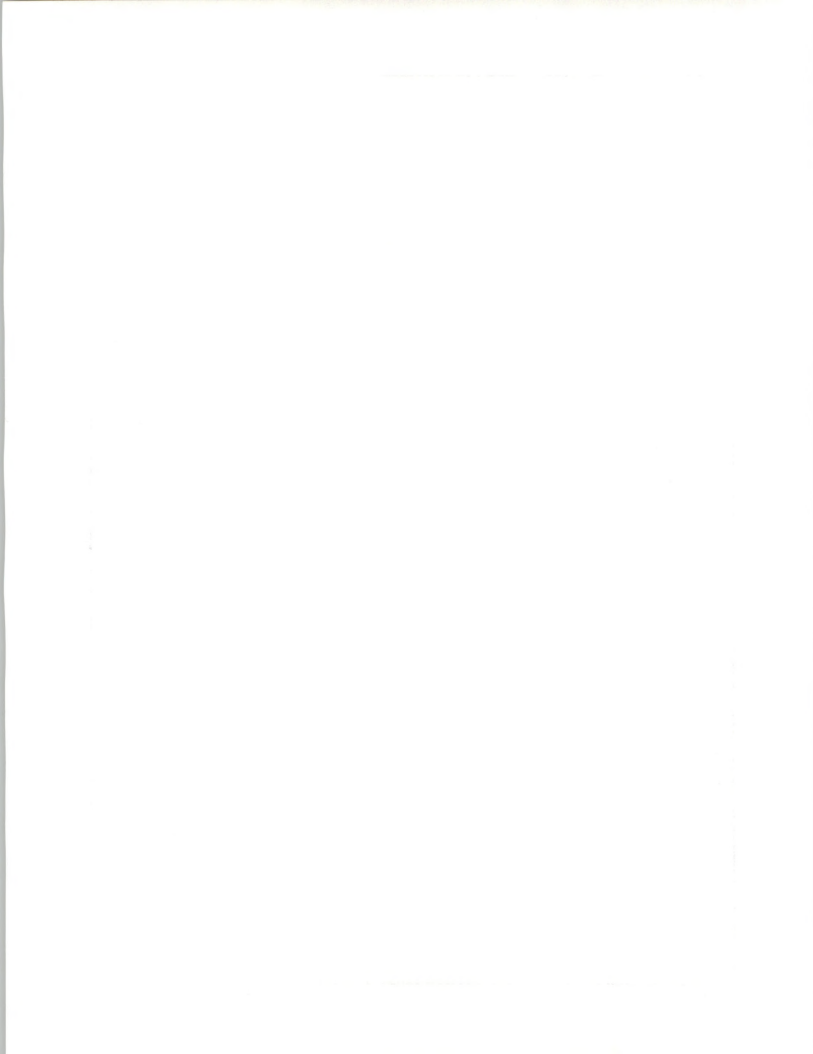




## Customer Support Interviews

### Quality

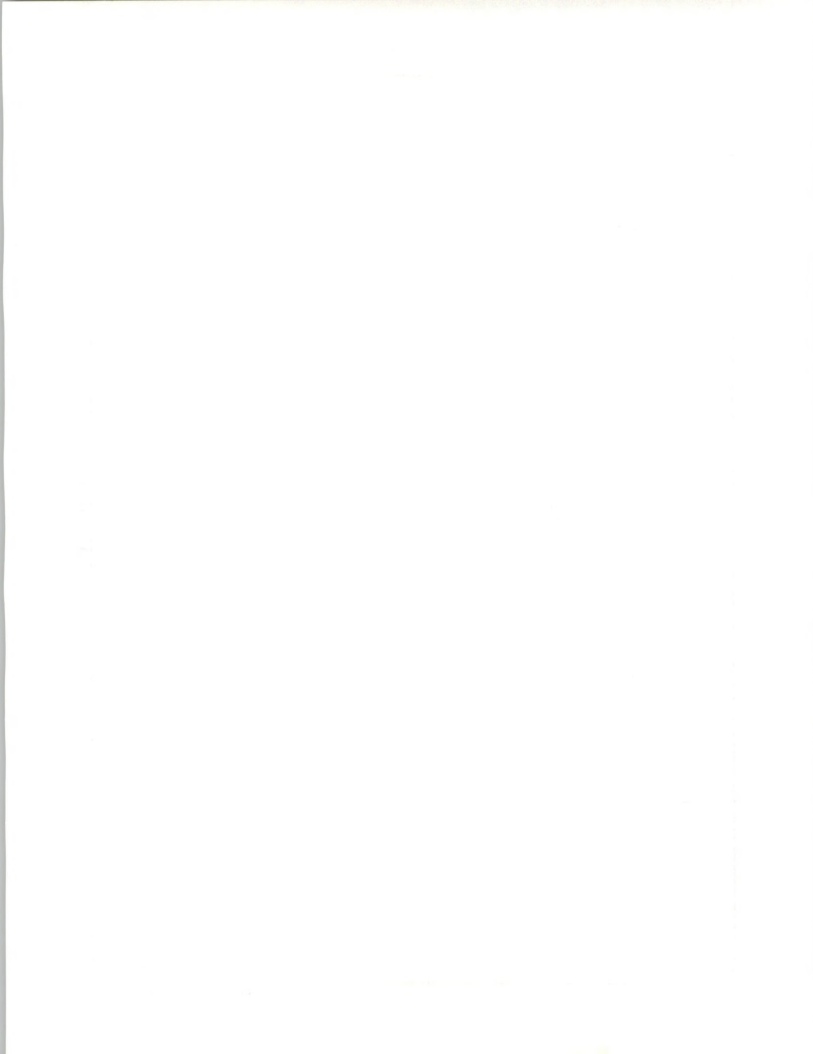
- Altos hasn't introduced a product yet that hasn't been recalled
- Altos diagnostics are not very good. They should be in the operating system
- Software releases are being shipped before adequate testing
- Schedule has not permitted time for Beta test
- Field changes are only installed as required. Therefore, subsequent changes to software may not be tested at all levels
- Software is our number one problem
- A recent warranty study found an average of 1.2 warranty calls per machine in the first ninety days



## Customer Support Interviews

### Organization/Measurement System

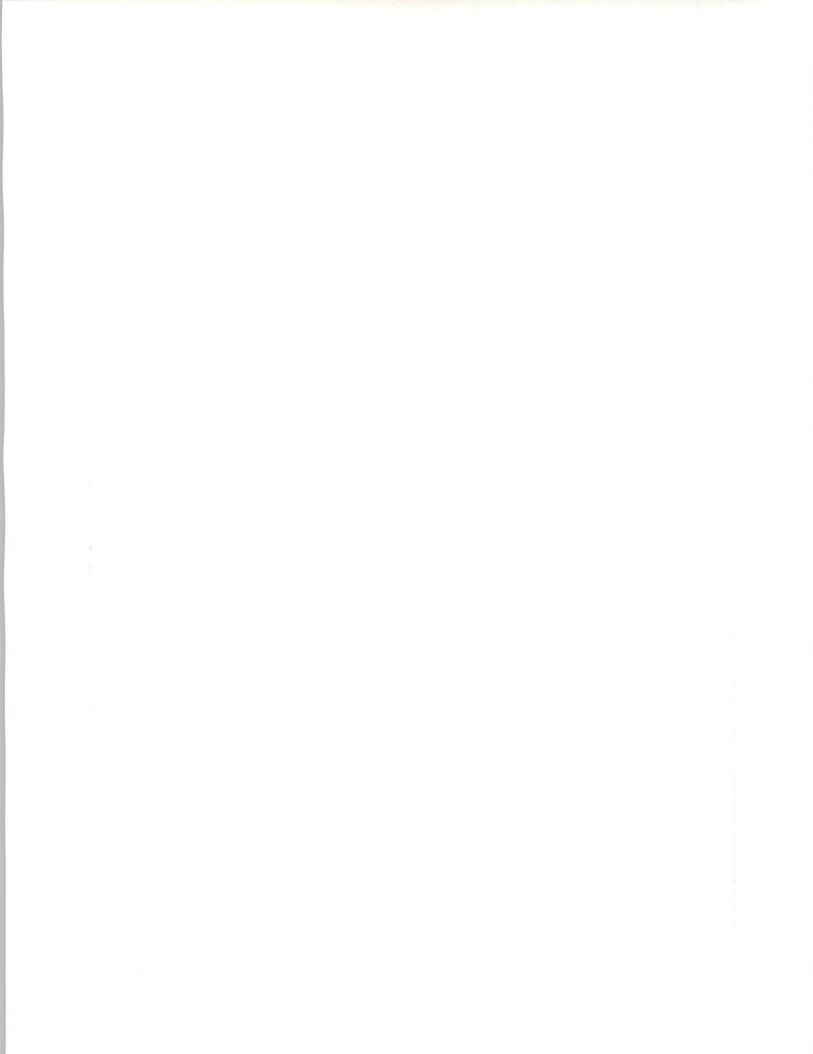
- No product cost accounting systems is in place to tie back warranty and customer support costs to product
- We can't give answers on open problems if engineering doesn't give us answers
- A serious attitude problem exists in software engineering (i.e., "Its not my problem!")
- No maintenance manuals are available on the 500, six months after first customer ship



## Customer Support Interviews

### Parts Logistics

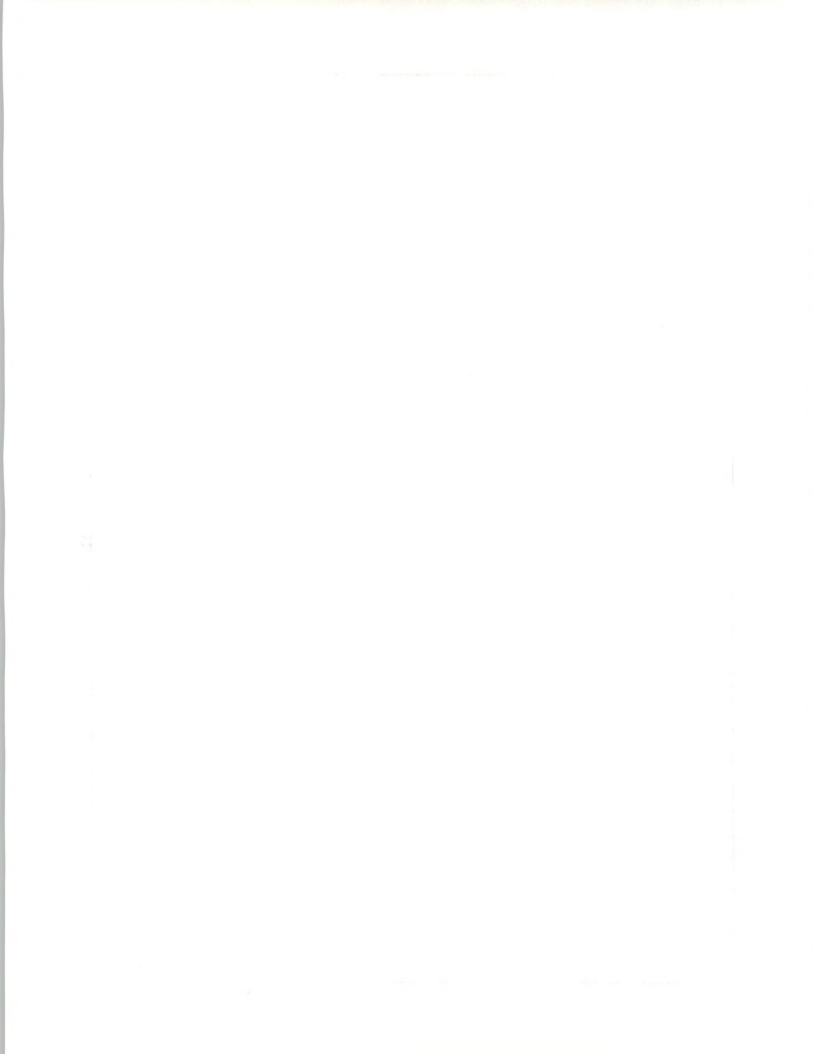
- The key customer complaints in logistics are as follows:
  - We don't always ship the same day usually because we are out of stock
  - We charge full price for a new part upon shipment and withhold credit on old part until it is received
- When parts are short, new build schedule has taken precedence over existing installed customers
- Parts orders are screened for a credit check before being sent to logistics—sometimes this causes a significant delay



## Customer Support Interviews

### Customer Support Operations

- No symptom/fix search capability is available to identify previously discovered problems
- No download software patch capability is in place though technically feasible
- We are responsible for over 500 software product versions plus the Altos hardware products
- In 1988, 54,525 calls were handled by the response center and 24,266 work orders were opened
- No measurements exist on length of time to close problems and backlog by specialists





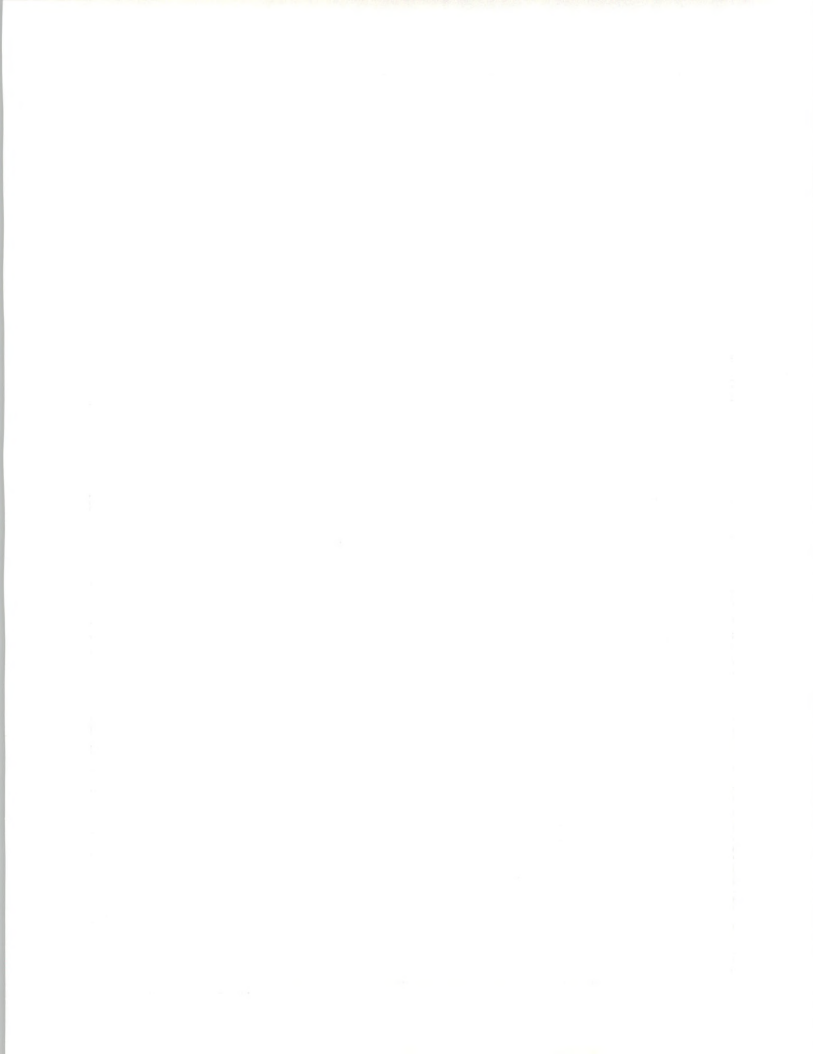
## Other Altos Interviews

### Communications

- Products are being shipped before technical support is trained
- Dealers are upset because we don't tell them about software problems
- Field change notices and Altos Field Bulletins have not been going out
- Engineering change orders are not being communicated to technical support

### Quality

- Beta Test doesn't always happen and we have no early ship user test program
- Technical quality problems are about 70% software and 30% hardware
- The warranty extension study indicates 1.2 calls per box during the first ninety days



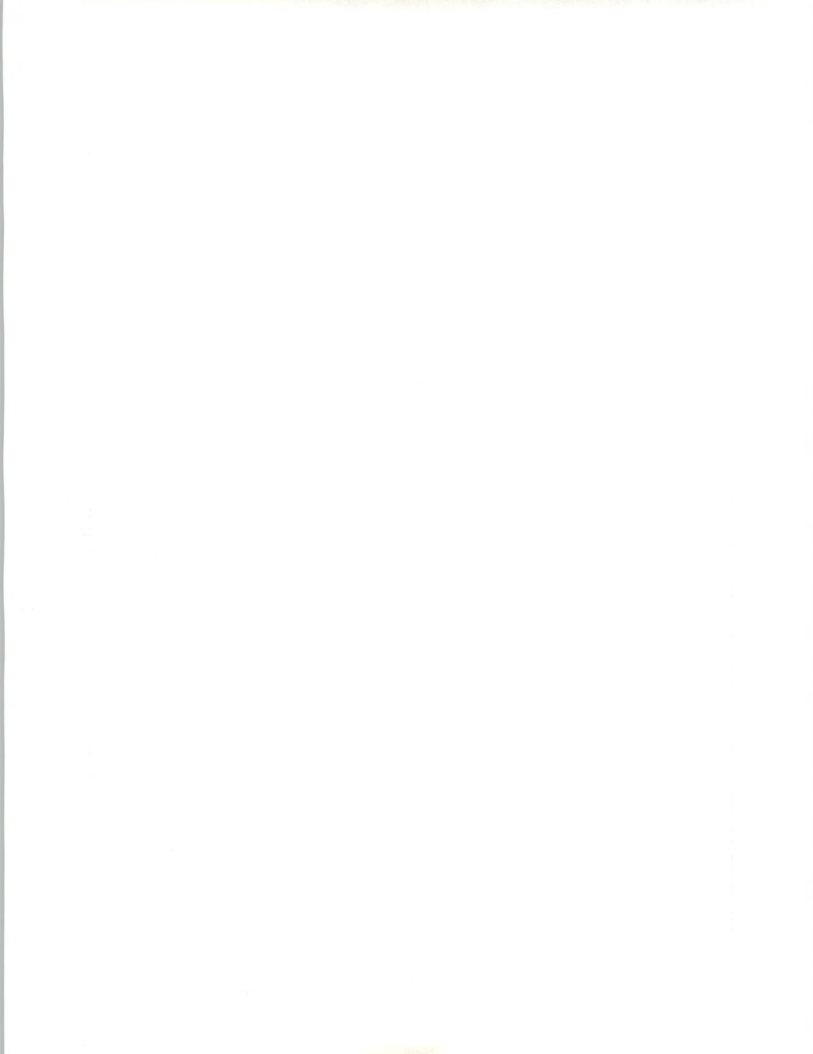
## Other Altos Interviews

### Logistics

- Clearly the policy should have been and is now that installed customers get first priority on parts
- Parts logistics measurement is only after logistics gets the order. Order entry and credit check times are not measured
- Parts logistic measurements indicate 83% to 90% of parts are shipped within 24 hours

### Customer Support Operations

- No one is satisfied with the response center. Can we eliminate the call back to the customer?
- The technical support personnel appear to be "burned out." Perhaps we should let them swap with the engineers for awhile
- Software packages are commercially available to do symptom/fix searches
- Under UNIX, software problems reports could come in electronically and responses can be sent electronically



## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
Warranty	90 days depot*	1 year on-site thru dealers 1 year depot thru COMPAQ	1 year depot	1 year depot on PC** 1 year on-site all other except 3 year on-site for selected workstations
Warranty provided by	Authorized Dealers Altos	Dealers COMPAQ repair and exchange authorized services	DEC	Dealers IBM NSD
How reimbursed for warranty parts used	Parts credit on return	A check upon return of the old part	N/A***	Exchange for new parts
How reimbursed for warranty labor	Depot \$62.50 per incident on-site min. \$125. + \$62.50/30 to 150 mile-\$250 max.	A flat fee each call based on type of problem (per part used)	N/A	A flat fee for each call based on type of problem
Are dealers offered incentives to sell service offerings?	Yes	N/A	Yes	Yes

\* Verbal-on-site for model 1000 and above, w/i 150 miles

\*\* PC is on-site for CSA and MRSA customers

\*\*\* N/A—not applicable

**INPUT**



## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
Item required to certify others to service products	Required/ Separate Charge	Required/ Separate Charge	Required/ Separate Charge	Required/ Separate Charge
Hardware Training	Yes/Yes	Yes/No	N/A*	Yes/No (number limited)
Software Training	Yes/Yes	N/A	N/A	Yes/No
Spare Parts Inventory	Yes/Yes	Yes/Yes	N/A	Yes/Yes
Hardware Documentation	Yes/Yes***	Yes/No	N/A	Yes/No
Software Documentation	Yes/Yes***	N/A	N/A	Yes/No
Telephone Support	Yes/Yes	No/N/A	N/A	Yes/NA**
MVET Provide Warranty Service	No	Yes/N/A*	N/A	Yes/NA

\* Not Applicable (DEC does not "authorize" others to perform service)

\*\* A customer service counter is required which handles both telephone and walk-in requests

\*\*\* Included with training

**INPUT**





## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM**
How is the following information provided to dealers?	How*/Charge	How*/Charge	How*/Charge	How*/Charge
Open Hardware Problems	C and AFB/ Yes	P***/No	B/No	B/No
Open Software Problems	C/Yes	N/A	B/No	B/No
EC Change Notices (HDW)	C/Yes	P***/No	B/No	B/No
Software Temporary Fixes	C/Yes	N/A	B/No	B/No
Software Updates	C/Yes	N/A	B/No	B/No

\* How— P—Paper  
 E—Electronic  
 B—Both paper and electronic  
 C—Call only  
 AFB—Altos Field Bulletin

\*\* IBM has an electronic dealer bulletin board system that allows data base search. IBM reports that they have not had to make EC changes on PCs and do not have many application software products.

\*\*\* Technical bulletins, service advisories

**INPUT**



## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
How is the following information provided to end users? Is there a separate charge?	How*/ Separate Charge	How*/ Separate Charge	How*/ Separate Charge	How*/ Separate Charge
Open Hardware Problems	C and AFB/ Yes	P**/No	B/No	P/Yes
Open Software Problems	C/Yes	N/A	B/No	B/No
EC Change Notices (HDW)	C/Yes	P**/No	B/No	P/Yes
Software Temporary Fixes	C/Yes	N/A	B/No	B/No
Software Updates	C/Yes	N/A	B/No	B/No

\* How—     P—Paper  
               E—Electronic  
               B—Both paper and electronic  
               C—Call only  
               AFB—Altos Field Bulletin

\*\* Technical update bulletins

**INPUT**



## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
Are new products "user tested" before starting regular shipments?				
Hardware	No	Yes	Yes	Yes, internal for PCs external for others' products
Software	No	N/A	Yes	Yes, internal for PCs external for others' products
Are "end users" required to call the dealers for call screening	Yes, unless they buy tech support contract	Yes	N/A*	Yes
If users' dealer is out of business or refuses to help, does the company take the call?	Yes at a charge**	No**	N/A*	No**

\* Not Applicable

\*\* They are referred to another dealer if possible!

**INPUT**



## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
Is Telephone technical support provided to the following, and is there a separate charge for this support?	Telephone Support/ Charge	Telephone Support/ Charge	Telephone Support/ Charge	Telephone Support/ Charge
Dealers who do not service	Yes/Yes	N/A*	Yes/No	N/A*
Dealers who service	Yes/Yes	Yes/No	N/A	Yes/No
Authorized Servicers	Yes/Yes	Yes/No	N/A	N/A
End Users	Yes/Yes	No/N/A	Yes/Yes	No/N/A
Is a responsible time guaranteed for telephone technical support?	Yes	No	No	No**
What is the average response time?	24 hours	3 minutes	Depends on product and contract	Information not available

\* Not applicable

\*\* Objective is 80% in less than 2 hours; high priority is 100% in 1 hour.





## Vendor Comparison

	1000 Dealers ALTOS	2800 Dealers WW COMPAQ	DEC	2000 Dealers IBM
Is technical support hotline centrally located or in several locations?	Central	Central	3 locations in USA	Central
Are specialists immediately accessible or is the dealer usually called back?	Called back	Called back	Called back	Called back
Do operators log in the calls and provide status reports?	Yes	Yes	Yes	Yes*
How is the success of the hotline measured?	Response time # complaints	Response time vs. objectives	Customer satisfaction survey	Response time close out time customer satisfaction survey
How many calls per day do tech reps handle?	?	60	Proprietary	Proprietary**
How are tech reps trained?	Altos formal classes, on-the-job, phone experience, meetings	Formal classroom on each product	Formal hardware and software training, programmed instruction	Formal hardware and software training, self study courses

\* IBM also has an electronic mail system in conjunction with their data base search that allows dealers to log in customers rather than through the response center operator.

\*\* In 1988 the center logged in 265,000 calls.

# INPUT



## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
How many tech reps per dealer?	? 1000/11	Proprietary	Proprietary	Proprietary
How is the productivity of the tech reps improved?	?	Electronic Data Bases Level 1 Level 2 Escalation	Symptom/fix search measurements co-locate hardware and software experts	Symptom/fix search training response and close out measurements
How are problems reported to your support center accepted?				
Hardware	Verbally-Yes 85% Mail/Fax-Yes 15% Electronically-No	Verbally-Yes Mail-Yes Electronically-Yes	Verbally-Yes Mail/Fax-Yes Electronically-Yes	Verbally-Yes Mail/Fax-Yes Electronically-Yes
Software	Verbally-Yes 85% Mail/Fax-Yes 15% Electronically-No	N/A	Verbally-Yes Mail/Fax-Yes Electronically-Yes	Verbally-Yes Mail/Fax-Yes Electronically-Yes



## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
Are dealers allowed to return parts if overstocked?	Yes*	Yes	N/A**	Yes, limited to certain part #s
Are dealers charged extra for fast delivery on parts?	Yes, expedited—\$100/line item Counter/counter—\$150	No	Yes	Yes, if not warranty—\$25/line item
If "yes", does the charge cover the following? Fast Delivery	Yes	N/A	Yes	Yes
Same Day Shipping	No	N/A	No	Yes
What type of parts discounts do you provide to authorized dealers and services? Flat	Yes—40%	No	No	33%
Volume	No	No	Yes	No

\* Within 6 months, 15% of parts (up to \$1 million) for parts credit.  
Restocking fee—20%

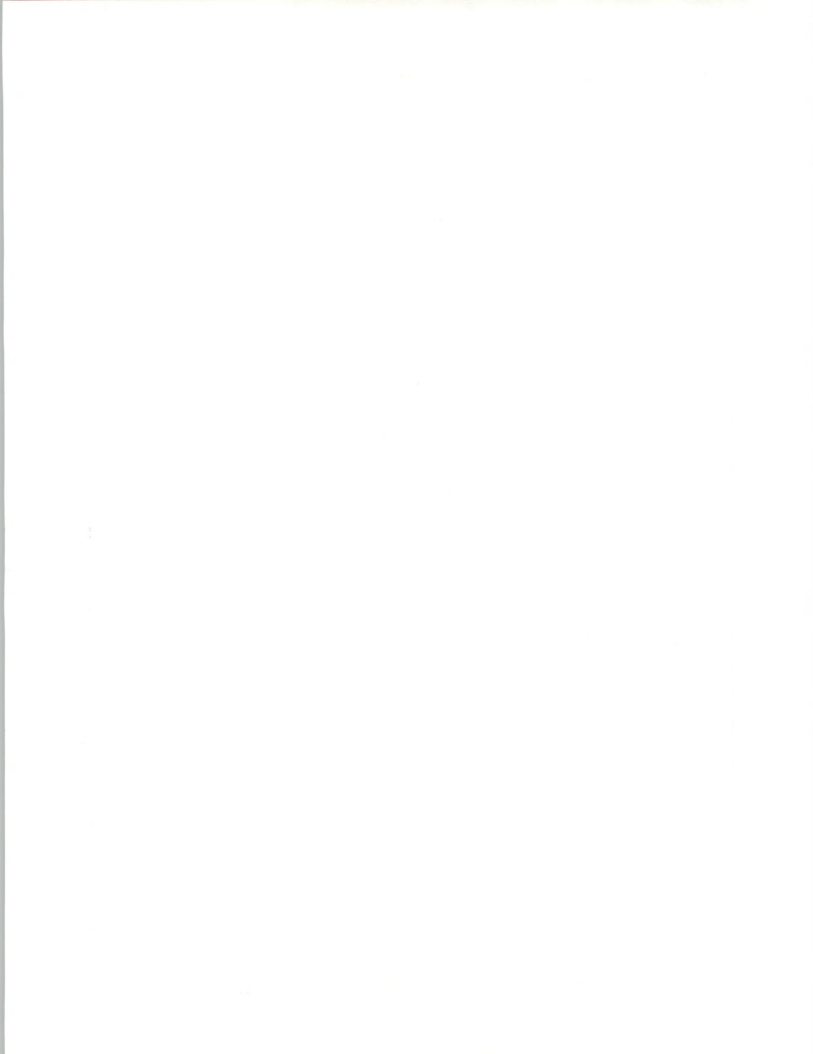
\*\* Not Applicable

**INPUT**



## Conclusions

- The new quality organization was a good decision!
- To achieve a "Nordstrom" reputation, everyone must be involved and feel responsible for customer support
- Disciplines and objectives in product design, product announcement, product release, and product support are needed
- The response center log entry into the problem management system should be retained
- Significant improvements are possible in technical support
- Cost recovery for most dealer support should not be separately priced
- Warranty should be increased





## Recommendations

### Customer Support

- Implement additional measurements
  - Length of time to close calls
  - Number of calls by specialist
  - Open calls by how long open
  - Number of customers per open problem
  - Formal complaint tracking system
  - Total parts waiting time including credit check
- Increase warranty to one year on-site
- Implement same day parts shipment if order received by 2 p.m. at no additional charge except delivery
- Implement "no charge" phone support to dealers and authorized servicers
- Provide "no charge" training to dealers within limits
- Implement electronic mail to dealers and authorized servicers at "no charge"
- Merge Altos on-site technical support with other customer support group
- Move from 3 to 1 authorized service organizations



## Recommendations

### Customer Support

- Extend customer support hours to match time zones—5:30 a.m. to 5:30 p.m.
- Release software and hardware problem data to dealers and authorized servicers
- Implement symptom/fix search capability
- Implement download patch capability via modem
- Move parts, software updates, and documentation directly to department involved (Interface to dealers)
- Implement formal escalation procedure to company president or "assigned duty" executive
- Use touch tone call selection and record top problems under each major software package
- Add additional head-count to customer support area until level of problems are reduced



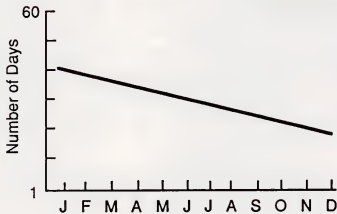
## Product Development

- Implement a formal sign-off procedure to assure customer support capability
  - Product announcement
  - First customer ship
- Implement an "Early Ship" program (customer test)
- Measure engineering on open-problem status and action plan
- Implement service design objectives
  - Failure rate
  - Service cost percentage
  - Remote diagnostic capability
  - Resident Q. & A. data base
- Implement cost accounting back to product manager for customer support and warranty costs



1.

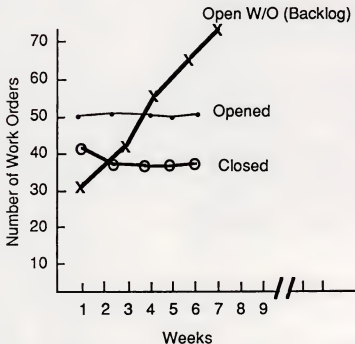
### AVERAGE LENGTH OF TIME TO CLOSE WORK ORDERS



Source: Archive data/month  
 Calculate: # days lapsed per W/O closed  
 Plot: 1. Overall  
 2. By group  
 3. By specialist  
 4. By product

2.

### WORK ORDER DYNAMICS



Source: Archive data/week  
 Total open work orders

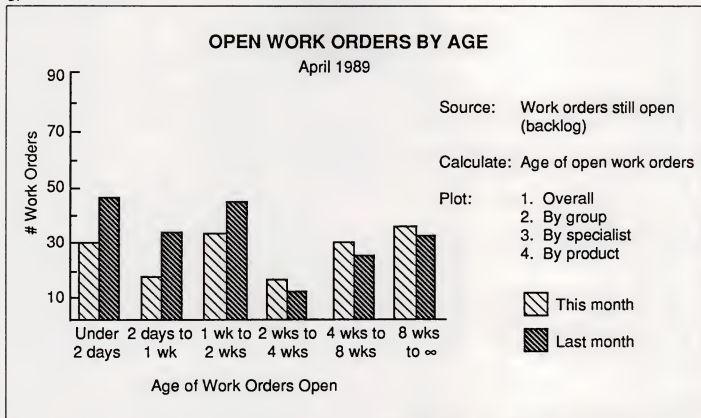
Calculate: # opened/week  
 # closed/week  
 Open backlog = Starting balance  
 + W/O opened  
 - W/O closed

Plot: 1. Overall  
 2. By group  
 3. By specialist  
 4. By product

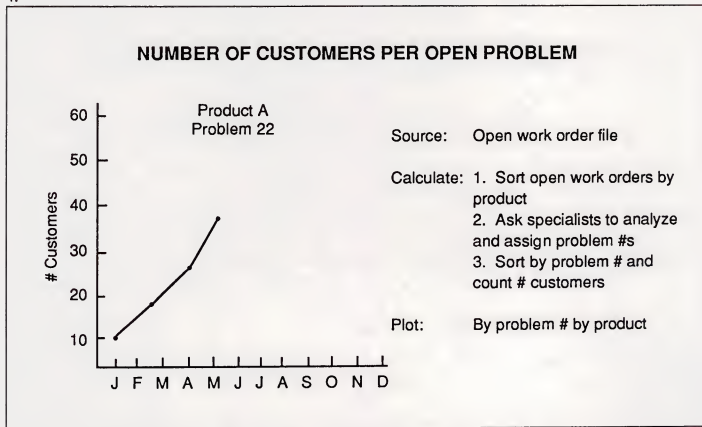




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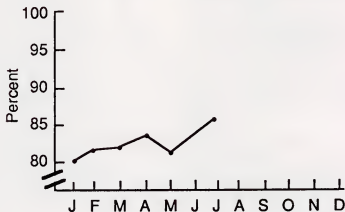
4.





5.

### PERCENT PART ORDER LINE ITEMS SHIPPED THE SAME DAY ORDERED



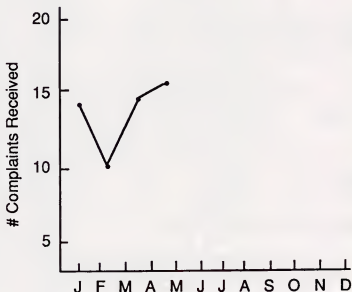
Source: Parts order system. Count day ordered time as prior to credit check.

Calculate: Match day ordered to day shipped by line item to determine # shipped. Count # line items by day ordered. Calculate %.

Plot: % by month

6.

### DEALER/CUSTOMER COMPLAINTS



Source: Send memo to all Altos Mgmt. that copies of all complaints be sent to one person at headquarters (written and verbal should both be documented)

Calculate: # received/month

Plot: 1. Overall  
2. By product  
3. By region



DONE  
WAITING FOR BUDDY TO  
CALL

FAX COVER SHEET

TO: Andrea Jeris

LOCATION INPUT - MT View

FROM: Buddy Stigler

INPUT HARTSDALE

DATE: \_\_\_\_\_

NUMBER OF PAGES: 1 OF 9

CONFIDENTIAL: YES \_\_\_ NO  URGENT: YES \_\_\_ NO

DESCRIPTION:

Please update per handwriting  
inserts and make 15 copies  
on 8 1/2 X 11 - No bidding necessary -  
I will want some sent to Alkos  
and some to me - will call you  
tomorrow or Friday

Handwritten text at the top of the page, possibly a title or header, which is mostly illegible due to fading.

Main body of handwritten text, consisting of several lines of cursive script that are extremely faded and difficult to decipher.

Handwritten text at the bottom of the page, likely a signature or footer, which is also mostly illegible.

## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
Are dealers allowed to return parts if overstocked?	Yes*	Yes	N/A**	Yes, limited to certain part #s
Are dealers charged extra for fast delivery on parts?	Yes, expedited—\$100/line item Counter/counter—\$150	NO	Yes	Yes, if not warranty—\$25/line item
If "yes", does the charge cover the following? Fast Delivery	Yes	N/A	Yes	Yes
Same Day Shipping	No	N/A	No	Yes
What type of parts discounts do you provide to authorized dealers and services? Flat	Yes—40%	NO	No	33%
Volume	No	NO	Yes	No

\* Within 6 months, 15% of parts (up to \$1 million) for parts credit.  
Restocking fee—20%

\*\* Not Applicable

# MEMORANDUM

TO : [Illegible]

FROM : [Illegible]

SUBJECT : [Illegible]

DATE : [Illegible]

1. [Illegible]

2. [Illegible]

3. [Illegible]

4. [Illegible]

5. [Illegible]

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17. [Illegible]

18. [Illegible]

19. [Illegible]

20. [Illegible]



# Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
How many tech reps per dealer?	? 1000/11	<i>Proprietary</i>	Proprietary	Proprietary
How is the productivity of the tech reps improved?	?	<i>Electronic Data Bases Level 1 Level 2 - Escalation</i>	Symptom/fix search measurements co-locate hardware and software experts	Symptom/fix search training response and close out measurements
How are problems reported to your support center accepted?				
Hardware	Verbally—Yes 85% Mail/Fax—Yes 15% Electronically—No	<i>Verbally—Yes Mail—Yes Electronically—Yes</i>	Verbally—Yes Mail/Fax—Yes Electronically—Yes	Verbally—Yes Mail/Fax—Yes Electronically—Yes
Software	Verbally—Yes 85% Mail/Fax—Yes 15% Electronically—No	<i>N/A</i>	Verbally—Yes Mail/Fax—Yes Electronically—Yes	Verbally—Yes Mail/Fax—Yes Electronically—Yes

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for transparency and accountability.

2. The second part outlines the various methods and tools used to collect and analyze data. It highlights the need for consistent and reliable data sources to ensure the validity of the findings.

3. The third part presents the results of the study, showing a clear trend of increasing participation over time. This indicates that the implemented measures have been effective in encouraging more people to get involved.

4. The final part discusses the implications of these findings and offers recommendations for future research and practice. It suggests that continued monitoring and evaluation are necessary to sustain the positive outcomes observed.

## Vendor Comparison

	1000 Dealers ALTOS	2600 Dealers COMPAQ	DEC	2000 Dealers IBM
Is technical support hotline centrally located or in several locations?	Central	Central	3 locations in USA	Central
Are specialists immediately accessible or is the dealer usually called back?	Called back	<i>Called Back</i> ..	Called back	Called back
Do operators log in the calls and provide status reports?	Yes	<i>Yes</i>	Yes	Yes*
How is the success of the hotline measured?	Response time # complaints	<i>Proprietary vs objectives</i>	Customer satisfaction survey	Response time close out time customer satisfaction survey
How many calls per day do tech reps handle?	?	<i>60</i>	Proprietary	Proprietary**
How are tech reps trained?	Altos formal classes, on-the-job, phone experience, meetings	<i>Formal classroom on each product</i>	Formal hardware and software training, programmed instruction	Formal hardware and software training, self study courses

\* IBM also has an electronic mail system in conjunction with their data base search that allows dealers to log in customers rather than through the response center operator.

\*\* In 1988 the center logged in 265,000 calls.

100

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## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
Is Telephone technical support provided to the following, and is there a separate charge for this support?	Telephone Support/ Charge	Telephone Support/ Charge	Telephone Support/ Charge	Telephone Support/ Charge
Dealers who do not service	Yes/Yes	<i>N/A*</i>	Yes/No	N/A*
Dealers who service	Yes/Yes	<i>Yes/No</i>	N/A	Yes/No
Authorized Servicers	Yes/Yes	<i>Yes/No</i>	N/A	N/A
End Users	Yes/Yes	<i>No/N/A</i>	Yes/Yes	No/N/A
Is a responsible time guaranteed for telephone technical support?	Yes	<i>NO</i>	No	No**
What is the average response time?	24 hours	<i>3 minutes</i>	Depends on product and contract	Information not available

\* Not applicable

\*\* Objective is 80% in less than 2 hours; high priority is 100% in 1 hour.

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(Text)

14

(Text)

(Text)

## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
Are new products "user tested" before starting regular shipments?				
Hardware	No	Yes	Yes	Yes, internal for PCs external for others' products
Software	No	N/A	Yes	Yes, internal for PCs external for others' products
Are "end users" required to call the dealers for call screening	Yes, unless they buy tech support contract	Yes	N/A*	Yes
If users' dealer is out of business or refuses to help, does the company take the call?	Yes at a charge**	No**	N/A*	No**

\* Not Applicable

\*\* They are referred to another dealer if possible!

INPUT

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# Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
How is the following information provided to end users? Is there a separate charge?	How*/ Separate Charge	How*/ Separate Charge	How*/ Separate Charge	How*/ Separate Charge
Open Hardware Problems	C and AFB/ Yes	<del>xx</del> P/NO	B/No	P/Yes
Open Software Problems	C/Yes	N/A	B/No	B/No
EC Change Notices (HDW)	C/Yes	<del>xx</del> P/NO	B/No	P/Yes
Software Temporary Fixes	C/Yes	N/A	B/No	B/No
Software Updates	C/Yes	N/A	B/No	B/No

- \* How—  
 P—Paper  
 E—Electronic  
 B—Both paper and electronic  
 C—Call only  
 AFB—Altos Field Bulletin

*xx Technical update Bulletins*

INPUT

1910

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## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM**
How is the following information provided to dealers?	How*/Charge	How*/Charge	How*/Charge	How*/Charge
Open Hardware Problems	C and AFB/ Yes	*** P/No	B/No	B/No
Open Software Problems	C/Yes	N/A	B/No	B/No
EC Change Notices (HDW)	C/Yes	*** P/No	B/No	B/No
Software Temporary Fixes	C/Yes	N/A	B/No	B/No
Software Updates	C/Yes	N/A	B/No	B/No

- \* How—  
 P—Paper  
 E—Electronic  
 B—Both paper and electronic  
 C—Call only  
 AFB—Altos Field Bulletin

\*\* IBM has an electronic dealer bulletin board system that allows data base search. IBM reports that they have not had to make EC changes on PCs and do not have many application software products.

\*\*\* Technical Bulletin, Service Advisories

100

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## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
Item required to certify others to service products	Required/ Separate Charge	Required/ Separate Charge	Required/ Separate Charge	Required/ Separate Charge
Hardware Training	Yes/Yes	Yes/ <i>N</i>	N/A*	Yes/No (number limited)
Software Training	Yes/Yes	<del>Yes</del> N/A	N/A	Yes/No
Spare Parts Inventory	Yes/Yes	Yes/Yes	N/A	Yes/Yes
Hardware Documentation	Yes/Yes***	Yes/ <i>N</i>	N/A	Yes/No
Software Documentation	Yes/Yes***	<del>Yes</del> N/A	N/A	Yes/No
Telephone Support	Yes/Yes	<i>No/N/A</i>	N/A	Yes/NA**
MVET Provide Warranty Service	No	Yes/N/A*	N/A	Yes/NA

\* Not Applicable (DEC does not "authorize" others to perform service)

\*\* A customer service counter is required which handles both telephone and walk-in requests

\*\*\* Included with training

**INPUT**

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## Vendor Comparison

	ALTOS	COMPAQ	DEC	IBM
Warranty	90 days depot*	1 year on-site thru dealers 1 year depot thru COMPAQ	1 year depot	1 year depot on PC** 1 year on-site all other except 3 year on-site for selected workstations
Warranty provided by	Authorized Dealers Altos	Dealers COMPAQ repair and exchange <i>Authorized services</i>	DEC	Dealers IBM NSD
How reimbursed for warranty parts used	Parts credit on return	Exchange for new parts <i>A check upon return of the old part</i>	N/A***	Exchange for new parts
How reimbursed for warranty labor	Depot \$62.50 per incident on-site min. \$125. + \$62.50/30 to 150 mile-\$250 max.	A flat fee each call based on type of problem <i>(in part used)</i>	N/A	A flat fee for each call based on type of problem
Are dealers offered incentives to sell service offerings?	Yes	N/A	Yes	Yes

\* Verbal-on-site for model 1000 and above, w/i 150 miles

\*\* PC is on-site for CSA and MRSA customers

\*\*\* N/A—not applicable

INPUT

# THE HISTORY OF THE

## REIGN OF KING CHARLES THE FIRST

BY JOHN BURNET

IN TWO VOLUMES

THE SECOND VOLUME

CONTAINING

THE HISTORY OF THE

## REIGN OF KING CHARLES THE FIRST

BY JOHN BURNET

IN TWO VOLUMES

THE SECOND VOLUME

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THE HISTORY OF THE

## REIGN OF KING CHARLES THE FIRST

BY JOHN BURNET

IN TWO VOLUMES

THE SECOND VOLUME



## Altos Computer Systems

\* Evaluation of:

- Customer Support
- Maintenance Operations
- Policies
- Procedures

Input

College of Arts & Sciences

Department of Psychology

Psychology 101

Section 001

2023

Final Exam

Final

1

## Altos Computer Systems

### Agenda:

- Objectives
- Methodology / Scope
- Overview
- Dealer / User Feedback
- Customer Support Interviews
- Other Altos Interviews
- Vendor Comparisons
- Conclusions / Recommendations

Input

# 1. The Role of the Teacher

- 1. To create a safe and supportive learning environment.
- 2. To assess individual students' needs and abilities.
- 3. To provide clear instructions and feedback.
- 4. To model effective learning strategies.
- 5. To encourage student participation and collaboration.
- 6. To differentiate instruction to meet diverse learners.
- 7. To use a variety of assessment methods.
- 8. To reflect on their own practice and seek professional development.

## 2. Student Learning

3.

## OBJECTIVES

- Evaluate customer support and maintenance functions.
- Compare current policies, procedures and operations with leading competitors.
- Recommend the changes required to ~~improve~~ support ~~needed~~ the marketing of Altos products and to ~~achieve~~ <sup>achieve</sup> the objective of Making Altos "the Wordstrom's" of the Computer Industry - "

2000-2001

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## METHODOLOGY / Scope

- Interview AT&T Executives, Managers, Employees
  - Customer support
  - Marketing
  - Manufacturing
  - Engineering
  - Logistics
  - Finance
  
- Review and Analyze Dealer/User Feedback
  - Reseller Advisory Board Tapes
  - Ted Drysdale's Field Trips
  - Customer Complaints
  
- Review Support Center procedures
  - Response Center
  - Systems Specialists
  - Hardware Specialists
  - Software Specialists
  - Number and Type of Products
  - Contract offerings
  
- Gather information and compare specific practices and procedures with primary competitors
  - Company
  - D/E/C
  - IBM
  
- Develop conclusions and Recommendations

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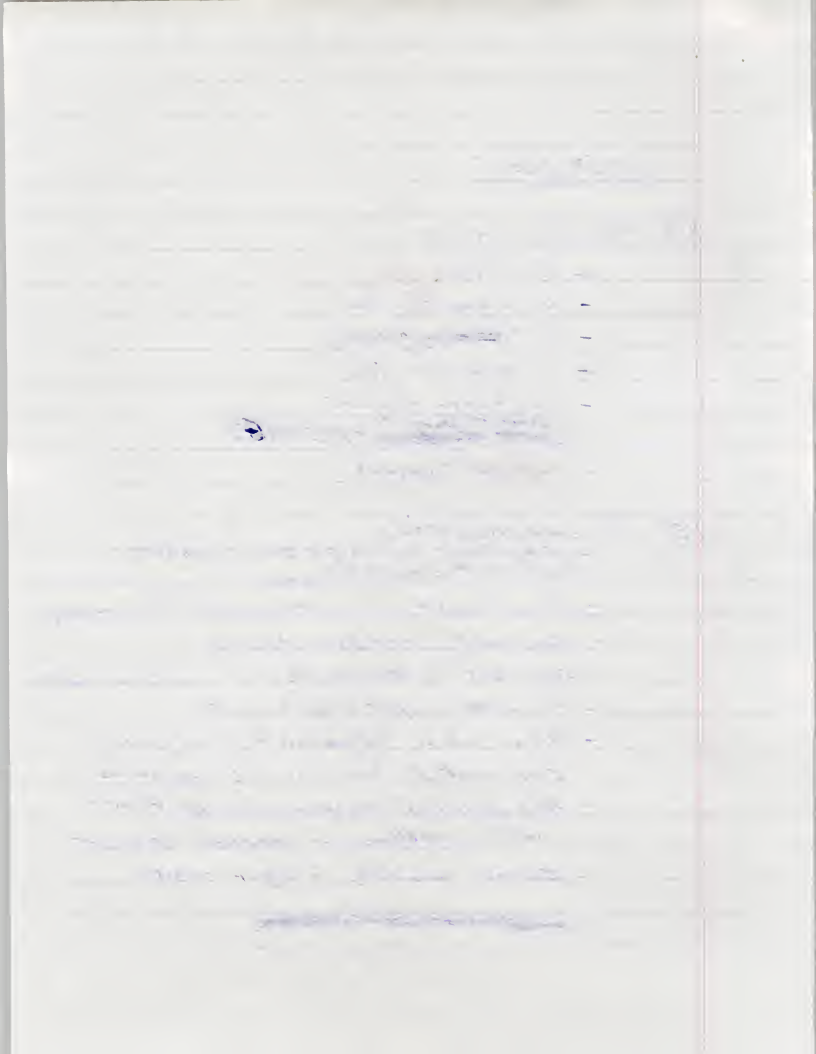
## OVERVIEW

### KEY Problem Areas

- Quality <sup>measurement</sup>
- Management <sup>System</sup>
- cost ~~Accounting~~ Accounting
- Communications
- Customer support
- ~~Separate charge~~ OFFERINGS
- ~~lack of~~ Teamwork

### KEY Recommendations

- Implement symptom/fix search capability
- Implement Early Ship Program
- Formal sign off at Product Announcement and customer ship
- Implement Service Design objectives
- Implement Key Measurements (customer support, Engineering, MKC)
- Provide most support to dealers w/o fee
- Release Technical Information to Dealers/Service
- Implement Electronic LHM to Dealers/Service
- Add Additional Manpower to support center until problems are managed down
- Increase warrants to 1 year on site
- ~~Implement cost Accounting~~



# DEALER / USER Feedback

Source: Reseller Advisory Board Tapes

## Communications

- Lack of adequate presales information on Technical Problems
- You should publish problems with hardware and software. Also make the information available via terminal — other do it!
- Better feedback is needed on what action is being taken to resolve open problems —
- Dealer involvement is needed on setting priorities on resolving open problems —
- Communications <sup>are</sup> <sub>user</sub> ~~are~~ very weak in light of critical applications.

1870

Received of the Treasurer of the State of New York

the sum of \$1000.00

for the purchase of land

in the town of ...

for the purpose of ...

in witness whereof

I have hereunto set my hand and seal

# DEALER / USER Feedback

Source of Reseller Advisory Board Tapes

↳ Separate charge offerings

- "You are charging me \$1,000 per year for an 800 number to log your problems"
- Altos warranty is not adequate
  - competition is much better
  - You can't charge customer to go onsite to correct a warranty problem
- Training courses are too expensive and often not high quality —
- It appears ALTOS has the intent of not giving good service
  - call back tomorrow costs less
  - ship parts today costs more
  - no contract = no service

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## DEALER / USER FEEDBACK

Source: Reseller Advisory Board Tapes

### Quality

- Find the problems before you send us the product. More user testing!
- It is not clear that Altos has a Beta test policy.
- It is imperative that all support be in place before a product is shipped.





## DEALER / USER FEEDBACK

Source: Ted Drysdale's Visits

- Dealers think Altos has a serious Attitude problem (i.e. arrogant!)
  - Preannounce Products
  - Take orders ~~and~~ ship before we are ready
  - Charging for support
  - Visa card screening
  
- Customer support not working partially due to lack of training
  
- Customer support doesn't understand that the key mission is to serve the customer

Drysdale's conclusion:

~~Altos~~ <sup>The</sup> objective should be to make Altos "the Nordstrom's of the Computer Industry" — "

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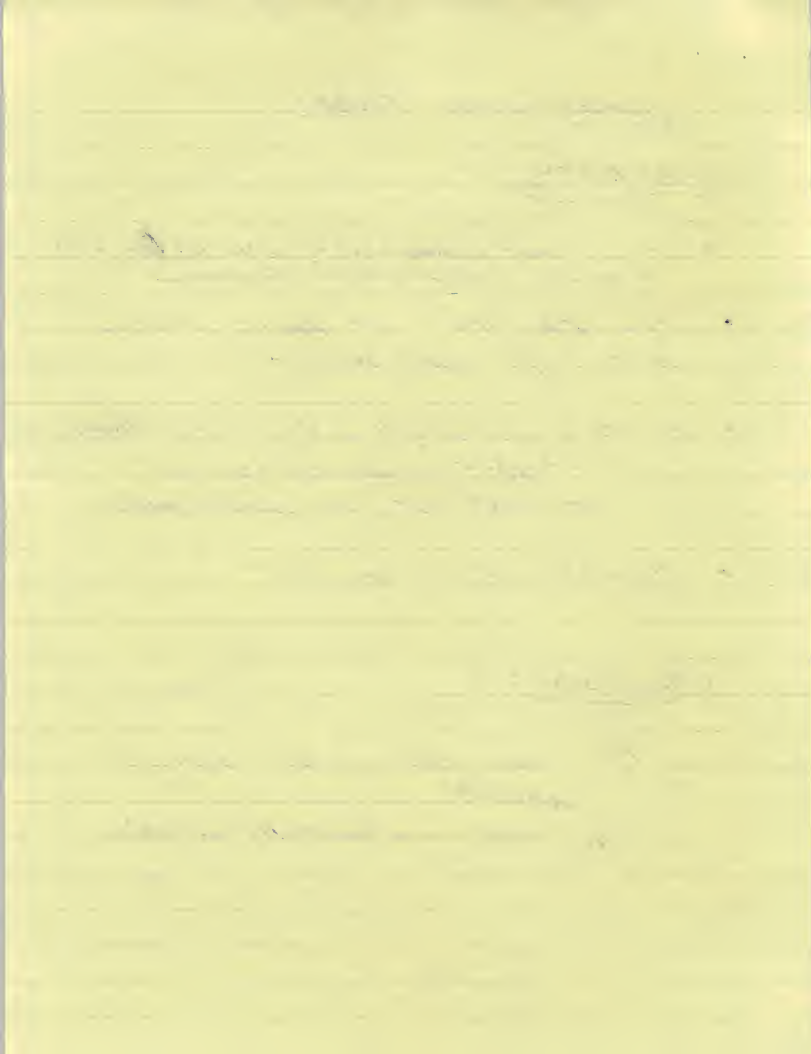
## DEALER/ USER FEEDBACK

### SUMMARY

- You are not communicating with me ~~relative~~ to Hardware and Software Problems
- "You TAX US!" It appears intent is not to give good service -
- ALTOS needs to get in front of problems
  - support in place before shipment
  - USER TEST prior to volume shipments
- Overall Attitude problem

### CONCLUSION:

The concerns are very serious  
 and <sup>reputation is</sup> a long way from Wordstrom's.



# CUSTOMER SUPPORT INTERVIEWS

## Communications

- Products are shipped before technical support is trained, documentation is available and spare parts are available -
- Customers are upset because we don't tell them of problems.
- ECO's are not communicated to Technical Support
- Our customers are very angry about getting ~~shunted~~ <sup>shunted</sup> around within ALTOS - when seeking answers to problems.
- The software problem report is ~~shipped~~ <sup>for</sup> internally ~~use~~ only -

## Summary

Communications are a major problem  
- Internal  
- External



## CUSTOMER Support Interviews

Quality

- Altos hasn't introduced a product yet that hasn't been recalled -
- ~~Out~~ Altos diagnostics are not ~~real~~ <sup>very</sup> good. They should be in the operating system -
- Software releases are being shipped before adequate testing -
- ~~The~~ Schedule has not permitted time for Beta test -
- Field changes <sup>only installed</sup> are as required, therefore subsequent changes to software may not be tested at all levels.
- Software is our number 1 problem
- A recent warranty study found ~~that~~ an average of 1.2 warranty calls per machine in the first ninety days -





## Customer Support Interviews

### Organization / Measurement System

- No product cost accounting system is in place to tie back warranties and customer support costs to ~~the~~ product -
- We can't give answers on open problems if engineering doesn't give us answers -
- A serious attitude problem exists in software engineering (i.e. "It's not my problem!")
- No maintenance manuals are available on the 500, six months after first customer ship -



# CUSTOMER Support Interviews

## Parts Logistics

→ The key customer complaints in logistics are as follows:

1. we don't always ship the same day usually because we are out of stock -
2. we charge full price for a <sup>new</sup> part, and <sup>upon shipment</sup> withhold ~~give~~ credit <sup>on old part until it</sup> ~~on return of old part~~ <sup>is received</sup>.

③

→ when parts are short, new build schedule has taken precedence over existing installed customers -

→ Parts orders are screened for a credit check before being sent to logistics - sometimes <sup>this causes a significant delay.</sup> ~~they stay at the~~ ~~long~~ ~~time~~ -

③



Customer Support <sup>Interviews</sup> ~~Center~~Customer Support Operations

- No ~~SQL~~ Symptom/Fix search capability is available to identify previously discovered problems -
- No download software patch capability is in place though technically feasible -
- We are responsible for over 300 software product versions plus the ALTOS Hardware products
- Response Center unit time is averaging 18 to 23 minutes.
- In 1988, 54,525 calls were handled by the response center and 24,266 work orders were opened -
- No measurements exist on length of time to close problems and backlog by specialists -

1870

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## OTHER ALTOS INTERVIEWS

### Communications

- Products are being shipped before technical support is trained -
- Dealers are upset because we don't tell them about software problems -
- Field change notices and ALTOS Field Bulletins have not been going out -
- Engineering change orders are not being communicated to technical support -

### Quality

- Beta Test doesn't always happen and we have no early ship user test program -
- Technical quality problems are about 20% software and 30% hardware -
- The warranty extension study indicates 1.2 calls per box during the first ninety days -





177

53

## OTHER ALTOS INTERVIEWS

### Logistics

- o Clearly the policy ~~is~~ should have been and is now that installed customers get first priority on parts -
- o Parts logistics measurement is only after logistics gets the order. Order entry and credit check<sup>business</sup> are not measured -
- o Parts logistic measurements indicate 89% to 90% of parts are shipped within 24 hours

### CUSTOMER SUPPORT OPERATIONS

- o No one is satisfied with the response center, can we eliminate the call back to the customer?
- o The technical support personnel appear to be "burned out." Perhaps we should let them swap with the engineers for a while -
- o Software packages are available to do Symptom/Fix searches -
- o Under UNIX, software problems reports ~~can~~<sup>can</sup> come in electronically and responses can be sent electronically

THE HISTORY OF THE UNITED STATES

1776

The first part of the history of the United States is the story of the thirteen original states. These states were founded by British colonists who had come to America in search of a better life. They were the first to establish a system of self-government, and their actions led to the American Revolution.

The second part of the history is the story of the expansion of the United States. This was a period of great growth and discovery, as the nation moved westward and acquired new territories.

THE AMERICAN REVOLUTION

The American Revolution was a war fought between the thirteen original states and Great Britain. The colonists wanted to be free from British rule and to establish their own government.

The revolution began in 1775 with the battles of Lexington and Concord. The colonists won the war, and the British evacuated the colonies. The new nation was born.

The Constitution was written in 1787, and it established the framework of the new government. The Constitution is the supreme law of the land.

The history of the United States is a story of freedom and democracy. It is a story of a nation that has grown from a small group of colonies to a great power.

VENDOR COMPARISON

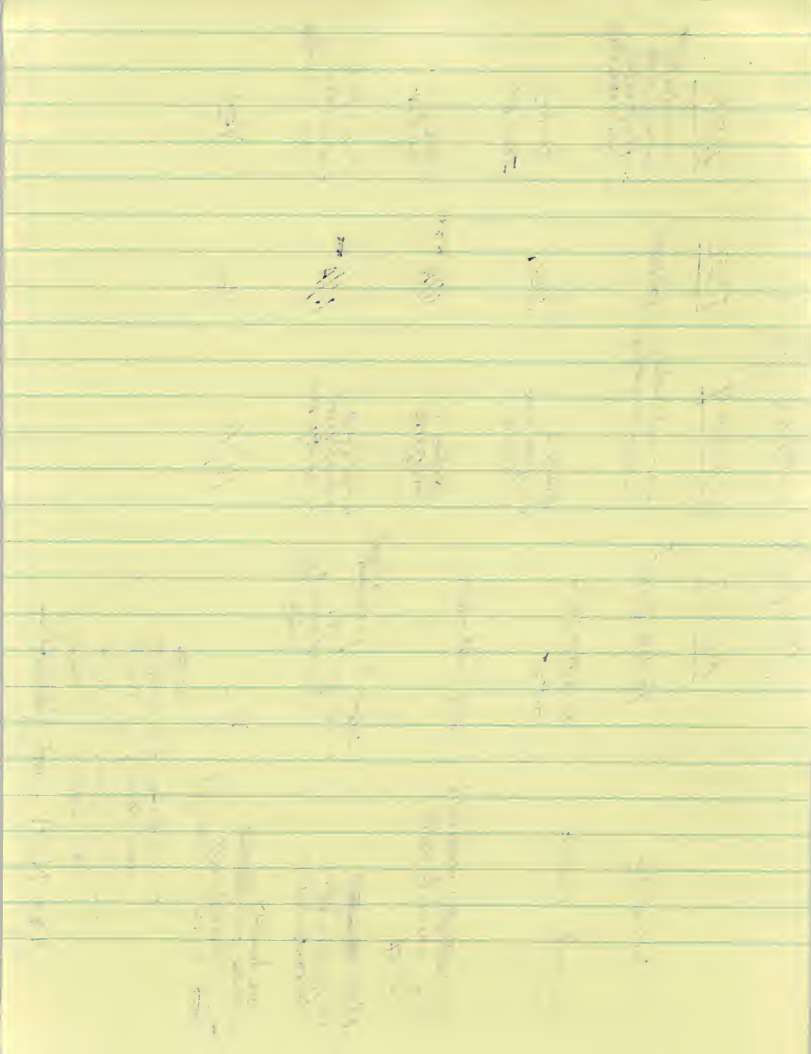
	<u>ALTOS</u>	<u>COMPAQ</u>	<u>DEC</u>	<u>IBM</u>
Warranty	90 days Depot*	1 year on site thru dealers 1 year Depot thru compaq	1 year Depot	1 year Depot on P/C** 1 year on site all other Except 3yr on site for selected workstations
Warranty Provided by	Authorized Dealers Altos+	Dealers Compaq Repair and Exchange	DEC	Dealers IBM WSD
How <del>to you</del> reimbursed for warranty parts used	Parts credit on Return	Exchange for new parts	N/A***	Exchange for new part
How <del>to you</del> reimbursed for Warranty Labor	Depot \$62.50 per hour incident on site min \$25. +\$2.50/50 mile - \$50 50 150 mile MAX	A Flat fee for each call based on type of problem	N/A**	A Flat fee for each call based on type of Problem
Are dealers <del>so new</del> offered <del>services</del> incentives to sell <del>your</del> service offerings?	Yes	N/A	Yes	Yes

MODEL

\* Verbal on site for 1000 and Above, w/ 150 miles

\*\* P/C is on site for CSA and MRSA customers

\*\*\* N/A - not applicable



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VENDORCOMPARISON

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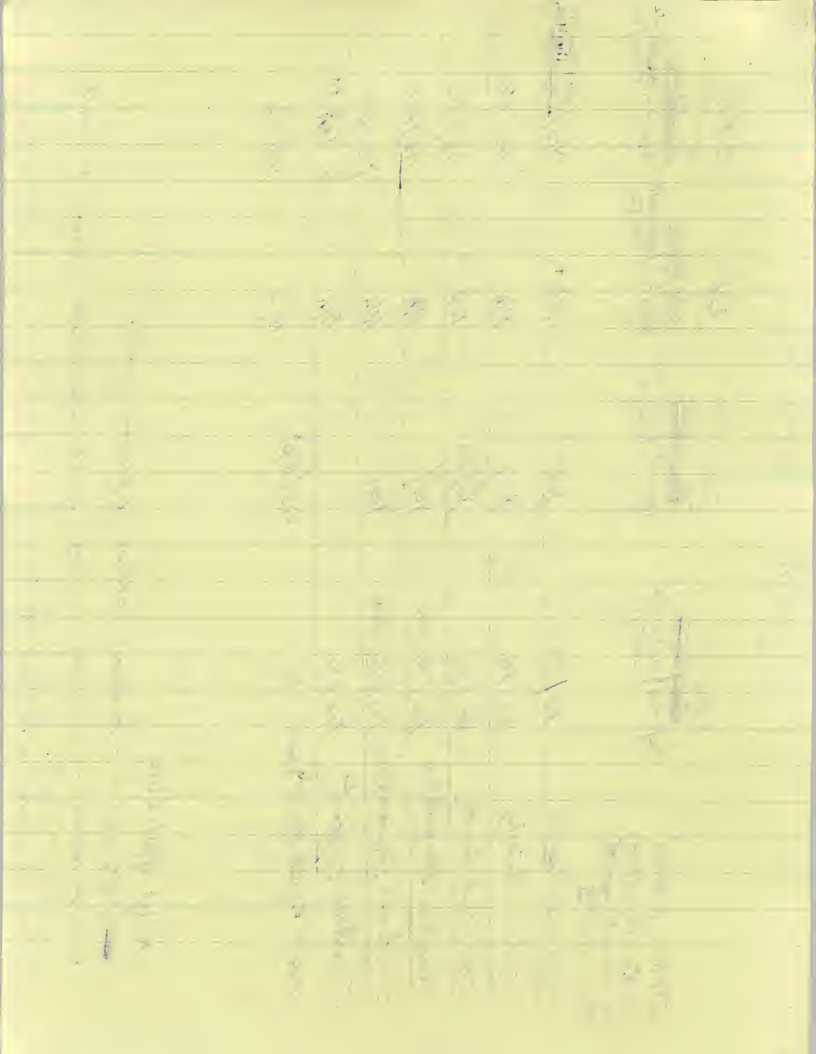
ITEMS Required to Certify others to service <del>your</del> Products	<u>ALTO5</u>	<u>COMPAQ</u>	<u>DEC</u>	<u>IBM</u>
	<del>Req/charge</del> Required / separate charge	<del>Req/charge</del> Required / separate charge	<del>Req/charge</del> Required / separate charge	<del>Req/charge</del> Required / separate charge
Hardware Training	Yes / Yes	Yes /	N/A*	Yes / <del>No</del> <sup>(Number limited)</sup>
Software Training	Yes / Yes	Yes /	N/A	Yes / NO
Spare Parts Inventory	Yes / Yes	Yes / Yes	N/A	Yes / Yes
Hardware Documentation	Yes / Yes **	Yes /	N/A	Yes / NO
Software Documentation	Yes / Yes ***	Yes /	N/A	Yes / NO
Telephone Support	Yes / Yes		N/A	Yes / N/A **
Must Provide Warrantys Service	NO	Yes / N/A*	N/A	Yes / N/A

\* Not applicable

~~DEC~~ (DEC does not "Authorize" others to perform service)

\* \* A customer service counter is required which handles both telephone and walk in requests.

\* \*\* Excluded with Training →



VENDOR COMPARISONS

How ~~do you provide~~ is the following information provided to ~~the~~ Dealers?

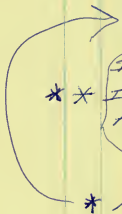
AIROS  
How\*/change

COMPAQ  
How\*/change

DEC  
How\*/change

IBM\*\*  
How\*/change

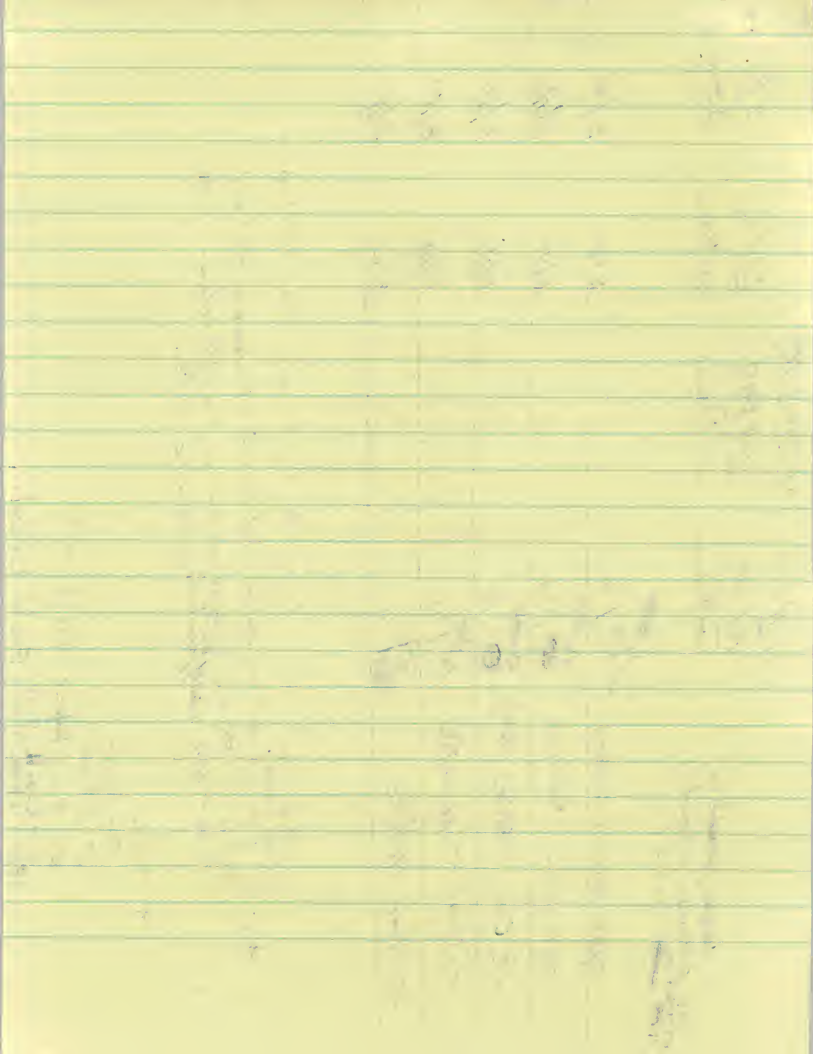
Open Hardware Problems	<del>C</del> <sup>C</sup> / Yes and AFB	/	B/NO	B/NO
Open software Problems	<del>C</del> <sup>C</sup> / Yes	/	B/NO	B/NO
EC Change Notices (HOW)	<del>C</del> <sup>C</sup> / Yes	/	B/NO	B/NO
Software Temporary Fixes	<del>C</del> <sup>C</sup> / Yes	/	B/NO	B/NO
Software Updates	<del>C</del> <sup>C</sup> / Yes	/	B/yes	B/NO



IBM has an electronic dealer-bulletin board system that allows data base search  
\*\* IBM reports that they have not had to make EC changes on PLC's and that in the PLC Area they are supporting very little software since they do not have many application software products.

\* HOW

- P - Paper
- E - Electronic
- B - Both paper + electronic
- C - call only
- AFB - ~~AFB~~ Airos / Field Bulletin





# VENDOR COMPARISON

ALTO 5  
\*How/<sup>separate</sup>charge

COMPAQ  
\*How/<sup>separate</sup>charge

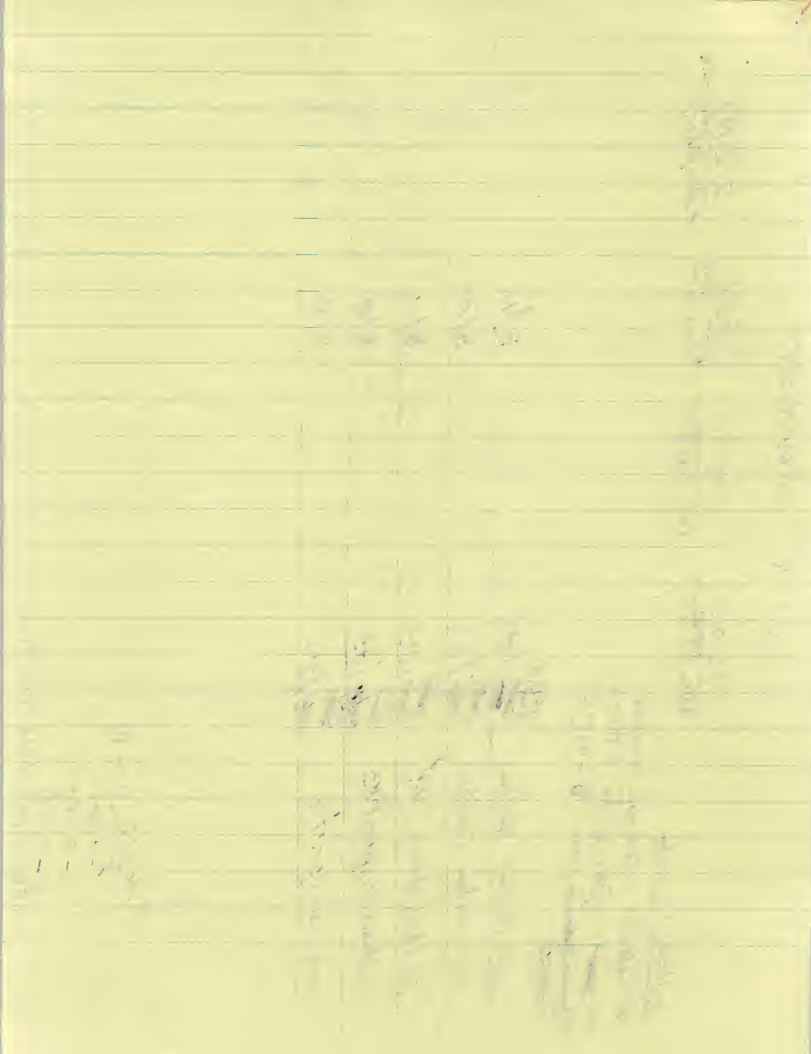
DEC  
\*How/<sup>separate</sup>charge

IBM  
\*How/<sup>separate</sup>charge

How is  
~~Do you provide~~  
the following information provided  
to ~~your~~ end users ~~and~~ is there  
~~any charge~~ <sup>an</sup> separate charge?  
~~for it~~

	AFB <del>call</del>	Yes	B/No	P/Yes
Open Hardware Problems	<del>call</del>	/yes	B/No	P/Yes
Open Software Problems	<del>call</del>	/yes	B/No	B/No
EC Change Notices (H/W <sup>nd</sup> )	<del>call</del>	/yes	B/No	P/Yes
Software Repairs/Fixes	<del>call</del>	/yes	B/No	B/No
Software Updates	<del>call</del>	/yes	B/No	B/No

\*How:  
 C - call only  
 P - Paper  
 E - Electronic  
 B - Both  
 AFB - Altos Field Bulletin



VENDOR COMPARISON

AITOS

COMPAQ

DEC

IBM

~~Do you~~ ~~USER Test~~  
Are New Products "User tested"  
Before Starting  
Regular Shipments?

~~No~~ ~~Internal~~ ~~for~~ ~~PC's~~  
~~External~~ ~~for~~ ~~others~~

Hardware NO

Yes

Yes, internal for PC's  
External for others  
products

~~Software~~

software NO

Yes

" "

~~Do you~~ required  
Are "end users" No call  
the dealers for  
call screening

Yes  
unless they  
buy Tech support  
contract

N/A\*

Yes

If user's dealer is  
out of business or  
refuses to help, does  
the ~~SP~~ take the call?

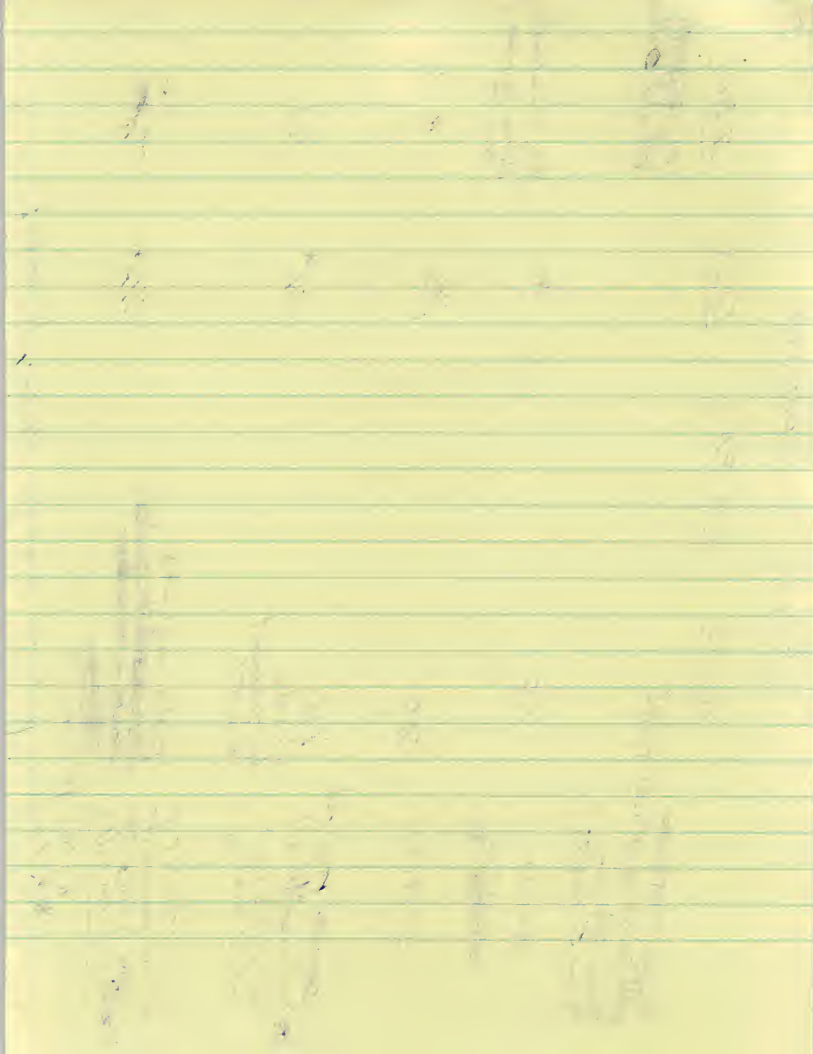
Yes at a charge - \*\*  
~~take the call after effect~~  
~~transfer to another~~  
~~dealer~~

N/A\*

\*\*  
NO ~~SP~~

\* - Not applicable

\*\* They are referred to another dealer, if possible!



# VENDOR COMPARISON

	<u>ALTO</u>	<u>COMPAQ</u>	<u>DEC</u>	<u>IBM</u>
	telephone support / charge	telephone support / charge	telephone support / charge	<del>Provide</del> / charge. Telephone support

~~Do you provide~~  
Is telephone technical support ~~to the~~ provided to the following ~~and do~~ is there ~~charge~~ ~~separately~~ a separate charge for this support?

Dealers who do not service	Yes/Yes		Yes/NO	N/A*
Dealers who service	Yes/Yes		N/A	Yes/NO
Authorized Services	Yes/Yes		N/A	N/A
End-Users	Yes/Yes		Yes/Yes	NO/N/A

Is a response time ~~to you~~ guaranteed ~~response time~~ for Telephone Technical Support?

What is <del>the</del> average response time	24hrs		Depends on Product and contract	Information not Available
--	-------	--	---------------------------------	---------------------------

NO ~~but~~ ~~not~~ ~~available~~ \*\*

\* Not available applicable  
 \*\* Objective is 80% in less than 2hrs, High priority is 100% in 1 hour

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(24)

# VENDOR COMPARISON

2000 Dollars

<u>ALTO</u>	<u>Compaq</u>	<u>DEC</u>	<u>IBM</u>
-------------	---------------	------------	------------

Is ~~your~~ technical support hotline centrally located or in several locations

central

central

~~central~~  
3 Locations in USA

central

Are specialists immediately accessible ~~or is the center~~ ~~or is the center~~ called back -

called Back

called Back

called Back

Do ~~you have~~ operators ~~that~~ log in the calls and provide status reports

Yes

YES

Yes \*

How ~~do you measure~~ <sup>is</sup> the success of the hotline service measured?

Response Time  
# complaints

Customer-Satisfaction Surveys

Response Time  
Close out Time  
Customer-Satisfaction Surveys

How many calls per day do Tech Reps handle?

?

Proprietary

Proprietary \*\*

How are Tech Reps Trained?

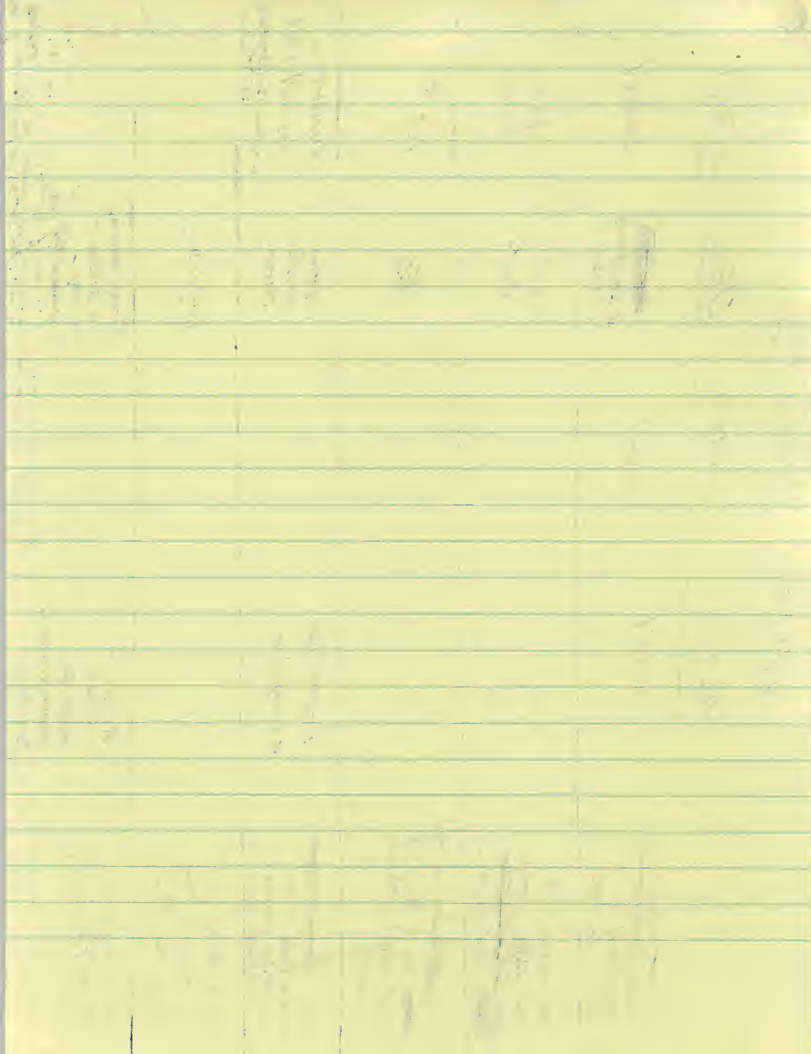
Altos Formal Classes  
On the Job  
Phone Experience  
Meetings

\*\* In 1988 the center logged in 265,000 calls

\* IBM also has an electronic mail system in conjunction with their data base search that allow dealers to log in questions and then through the response center get an

Formal Hardware and Software Training -  
Programmed Instruction

- Formal Hardware and Software Training  
- Self Study Guides





VENDOR COMPARISON

ALTOS

COMPAQ

DEC

IBM

How many Technical Reps per Dealer?  
~~do you have 3~~

7 1000  
11

Proprietary

Proprietary

15  
How do you improve the productivity of the technical Reps improved?

Stick in the Ass  
2 supervisors  
6 hrs

Symptom/Fix Search  
Measurements  
colocate hardware and software experts

Symptom/Fix Search  
Training  
Response & Close out measurements

How are ~~to you~~ ~~hardware~~ ~~problems~~ reported to your support center in the following ways accepted?

Hardware

Verbally Yes 85%

Mail/FAX Yes 15%

Electronically ~~70%~~ ~~70%~~

Yes

Yes

Yes

Software

Verbally Yes 85%

Mail/FAX Yes 15%

Electronically ~~70%~~ ~~70%~~

Yes

Yes

YES



(26)

# VENDOR COMPARISON

(9)

~~Handwritten scribble~~

ALDS

COMPAG

DEC

IBM

Are dealers allowed to return parts if overstocked?

~~NO~~ YES

Yes, limited to certain part #'s

Are Dealers charged Extra for fast Delivery on Parts

Yes

Exp. inst. 100/line Counter/parts also

Yes, if not warranty. 25/line item

If "yes" does the charge cover the following?

Fast Delivery

Yes

Yes

Yes

Same Day shipping

NO

NO

Yes

What Type of Parts Discounts do you provide to Authorized Dealers and servicers

Flat

Yes 40%

~~NO~~

NO

Flat 33%

Volume

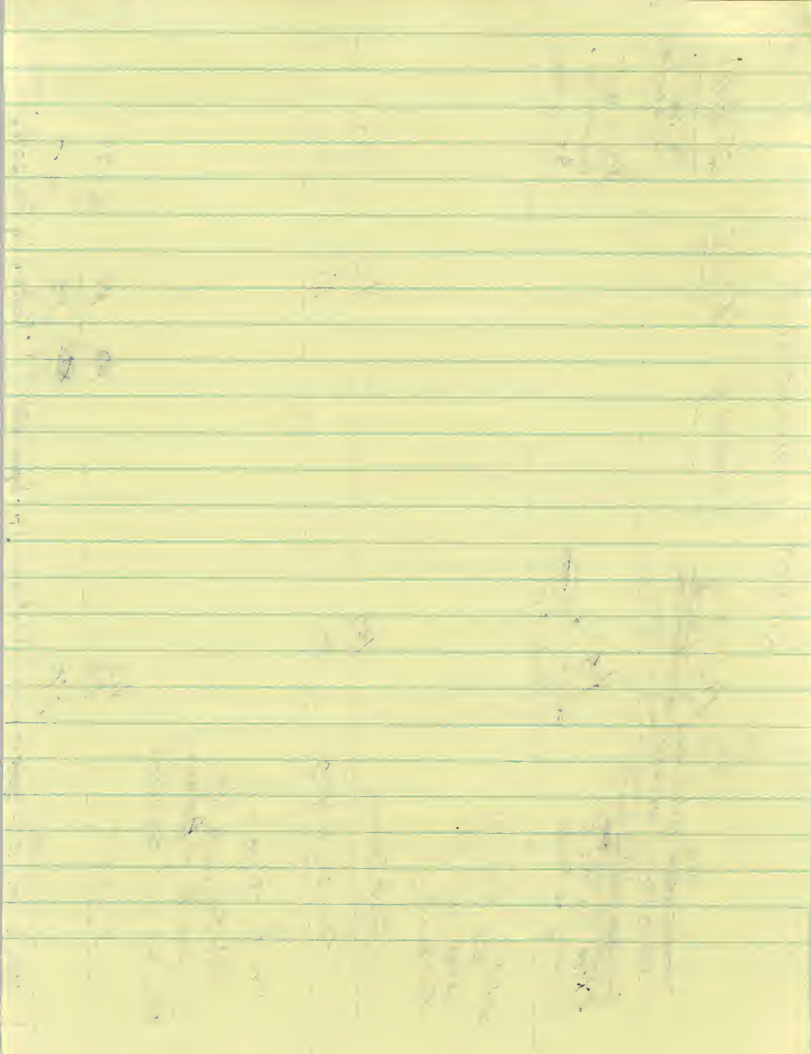
NO

~~NO~~

Yes

NO

\* Within 6 mo., 15% ~~inst~~ at parts (up to \$1 million) For parts credit. Restocking fee 20%.



## CONCLUSIONS

- o The new Quality organization ~~is needed~~ was a good decision!

~~USFR Testing is needed~~

- o To achieve a "Fordstream" reputation, everyone <sup>be involved and</sup> must feel responsible for customer support
- o ~~The~~ Disciplines and Objectives in product design, product Announcement, ~~and~~ product release ~~are needed~~ and product support are needed.
- o the Response center <sup>entry</sup> log into the problem management system should be retained.
- o Significant improvements are possible in technical support. ~~by releasing more information ~~to the~~ ~~customer~~ ~~and~~ ~~building~~ ~~support~~~~
- o ~~To require dealer support~~
- o Cost recovery for most dealer support should not be separately priced.
- o Warranties should be increased

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Third line of handwritten text, continuing the narrative.

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## RECOMMENDATIONS

### CUSTOMER SUPPORT

- Implement additional measurements
  - Length of time to close calls
  - Number of calls by specialist
  - Open calls by how long open
  - Number of customers per open problem -
  - Formal complaint tracking system
  - Total parts waiting time including credit checks
- Increase warranty to one year on site,
- Implement "no charge" phone support to dealers and Authorized servicers -
- Provide <sup>"no charge"</sup> ~~tech~~ training to dealers within limits.
- Implement electronic mail to dealers and Authorized servicers at "no charge"
- Merge Altos on-site technical support with other customer support group -
- Move from 3 to 1 authorized service organizations -

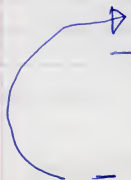




# Recommendations: (cont'd)

## customer support

- Extend customer support hours to match time zones - 5:30 AM to 5:30 PM
- Release software + hardware problem data to dealers + authorized services.
- Implement symptom, fix search capability.
- Implement download patch capability via modem.
- Move parts, software updates, and documentation directly to department involved. (Interface to dealers.)
- + Implement formal escalation procedure to company president or "assigned duty" executive.



- Add additional head-count to customer support area until level of problems are reduced.
- use touch tone call selection and record top problems under each major software package

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## □ Product Development:

- Implement a formal sign-off procedure to assure customer support capability.
  - Product announcement
  - First customer ship
- Implement an "Early Ship" program (customer test).
- Measure engineering on open-problem status + action plan.
- Implement service design objectives.
  - Failure rate
  - Service cost percentage
  - Remote diagnostic capability
  - Resident Q. + A. database!
- Implement cost Accounting back to ~~customer~~ product <sup>Management</sup> for customer support and warranty costs.

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