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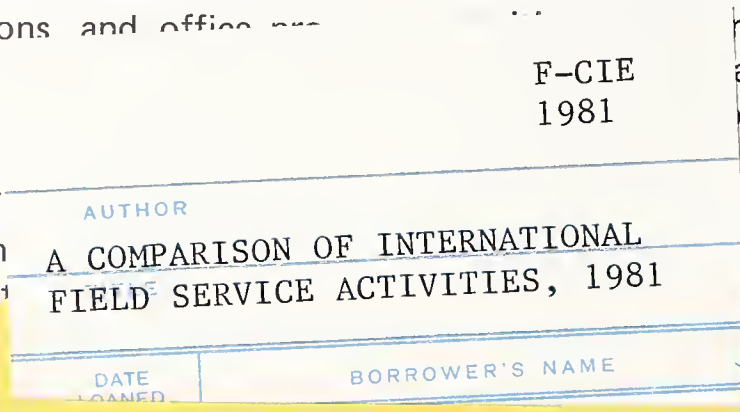
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A COMPARISON OF INTERNATIONAL
FIELD SERVICE ACTIVITIES, 1981

DECEMBER 1981



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A COMPARISON OF INTERNATIONAL FIELD SERVICE ACTIVITIES, 1981

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**A COMPARISON OF INTERNATIONAL
FIELD SERVICE ACTIVITIES, 1981**

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I INTRODUCTION

I INTRODUCTION

- This report is produced as part of the 1981 Field Service Programmes of Europe and the United States. The report provides a summary analysis of the differences between market places, user attitudes, and vendor approaches in Western Europe and the U.S.
- The basic data in this report have been drawn from interviews and analyses done in preparing the 1981 Annual Reports for the European and U.S. Field Service Programmes.
- The objectives of this report are to:
 - Provide a basic information source and data base for managers with responsibilities and interests in both markets.
 - Highlight the similarities and differences in the two market places.
 - Illustrate opportunities for field service vendors.
 - Consolidate the two major market areas for the field service industry.
 - Compare user attitudes and highlight differences in expectations.
 - Evaluate the lessons that can be learned from vendor experiences in both markets.

- Examine pricing, marketing, and cost differentials between Western Europe and the U.S.
- The study focuses on the major equipment categories of:
 - Large and medium mainframes.
 - Small business systems.
 - Minicomputers.
 - Peripherals.
 - Data terminals.
 - Word processors.
- INPUT invites client comments on this report or any other aspect of INPUT's Field Service Programmes.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

A. INTRODUCTION

- The two market places of Europe and the U.S. continue to be influenced and impacted by similar factors.
 - Inflation and high interest rates continue to squeeze profit margins.
 - The influence of many first-time users strains field service organisations as they respond to more user induced faults.
 - The shortfall in quality engineers means that demand outstrips supply with little hope of any significant short-term improvement.
 - New and alternative maintenance techniques have been introduced to improve the productivity of engineers and cope with user demands.
 - There is the desire to cross-train software and hardware engineers yet the lack of understanding of how this can be successfully accomplished.
 - Fluctuation in exchange rates and the unstable money market cloud the achievements of many field service organisations.

- The shift in user investment into the low end of the market is causing a move away from the traditional predominance of large and medium mainframe systems.
 - As low-end equipment, such as terminals, small business machines, and peripherals, have higher maintenance charges in relation to selling price, overall field service revenues increase faster than the value of the installed base.
 - Most of the expansion in field engineering is occurring in this low-value equipment market, some organisations expanding at rates beyond the control of many managers.

B. WESTERN EUROPEAN/U.S. MAINTENANCE REVENUE COMPARISONS

- By 1986, a total of \$28.4 billion will be spent on maintenance in the two market places.
 - The U.S. will have just over 67% of this, \$19.1 billion, increasing at an average annual growth rate of about 20%.
 - Western Europe, with a growth rate of 17.5%, a little less than the U.S., will reach \$9.2 billion by 1986.
- This shift in revenue is dramatically affected by the exchange rate and, with the current unstable nature of the money markets, care must be used in looking at these figures.
- As can be seen in Exhibit II-1, the current (1981) levels of maintenance revenue amount to \$11.8 billion being generated by a total 178,000 maintenance personnel.

EXHIBIT II-1

WESTERN EUROPEAN AND U.S. MAINTENANCE REVENUE
AND PERSONNEL GROWTH, 1980-1986

YEAR	MAINTENANCE REVENUE (\$ billions)		MAINTENANCE PERSONNEL (thousands)		REVENUE PER PERSON (\$ thousands)	
	UNITED STATES	WESTERN EUROPE	UNITED STATES	WESTERN EUROPE	UNITED STATES	WESTERN EUROPE
1980	\$ 6.4	\$ 3.5	100	52	\$ 58	\$ 67
1981	7.7	4.1	123	55	63	75
1982	9.2	4.8	136	58	67	83
1983	11.0	5.6	151	61	73	92
1984	13.2	6.6	163	64	80	103
1985	16.0	7.8	176	67	91	116
1986	19.1	9.2	190	69	100	133
AAGR (PERCENT)	20.0%	17.5%	11.3%	4.8%	9.5%	12.1%

- The average revenue per person is \$69,000; by 1986 this will reach an average of \$117,000.
- Western Europe shows the greatest increase in revenue per person, helped by the smaller growth of maintenance personnel and the more compact market place.
- Western Europe's greater revenue per person is further helped by the fact that in Europe a high charge rate for equipment is standard practice, more than offsetting the increased operating costs resulting from higher compensation packages, taxes, and overheads.
- A shortage of good quality engineers exists in both areas and this is accelerated by:
 - A declining requirement for skilled engineers and a need for more board swappers, with greater reliance on testers and depot repair.
 - Greater use of alternative maintenance techniques, such as remote diagnostics.
 - Improved engineer productivity.
 - Better management understanding and techniques.
- Despite these trends it will still be very difficult to fulfill the personnel requirements, and the competition for good engineers and technicians will become fiercer on both sides of the Atlantic.

C. THE WESTERN EUROPEAN AND U.S. MARKETS

- In many ways Western Europe and the U.S. could be considered from a purely technical standpoint as one large market place.

- Technology advances at breakneck speed leaving many field engineers exposed technically, a traditional area of strength.
 - The falling cost performance curve is leveling out.
 - Similar innovative maintenance techniques are being tried.
 - Japan is active in both market places.
 - A realisation of the need for more professionalism within field service operations is accepted by all.
- The real differences in the market places become apparent in user attitudes, expectations, and requirements.
 - In Western Europe, this breaks down even further to a country level with, for example, the West German user of small business systems having higher levels of expectation on response than a U.K. user. This is highlighted in Exhibit II-2.
 - In West Germany, small business system users have become dependent upon their systems for day-to-day activities while in the U.K. users often regard them with less dependency.
 - The U.K. temperament and lack of computer related education also lower their expectations. The British Government, acutely aware of this fact, has launched an information program entitled IT82 (Information Technology 82) to educate the U.K. businessman in the importance of computers.
 - The distribution of maintenance vendor responses to INPUT's survey is shown in Exhibit II-3, and some interesting characteristics of the field service environments are indicated:

EXHIBIT II-2

SMALL BUSINESS SYSTEMS - MEAN TIME TO RESPOND:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES

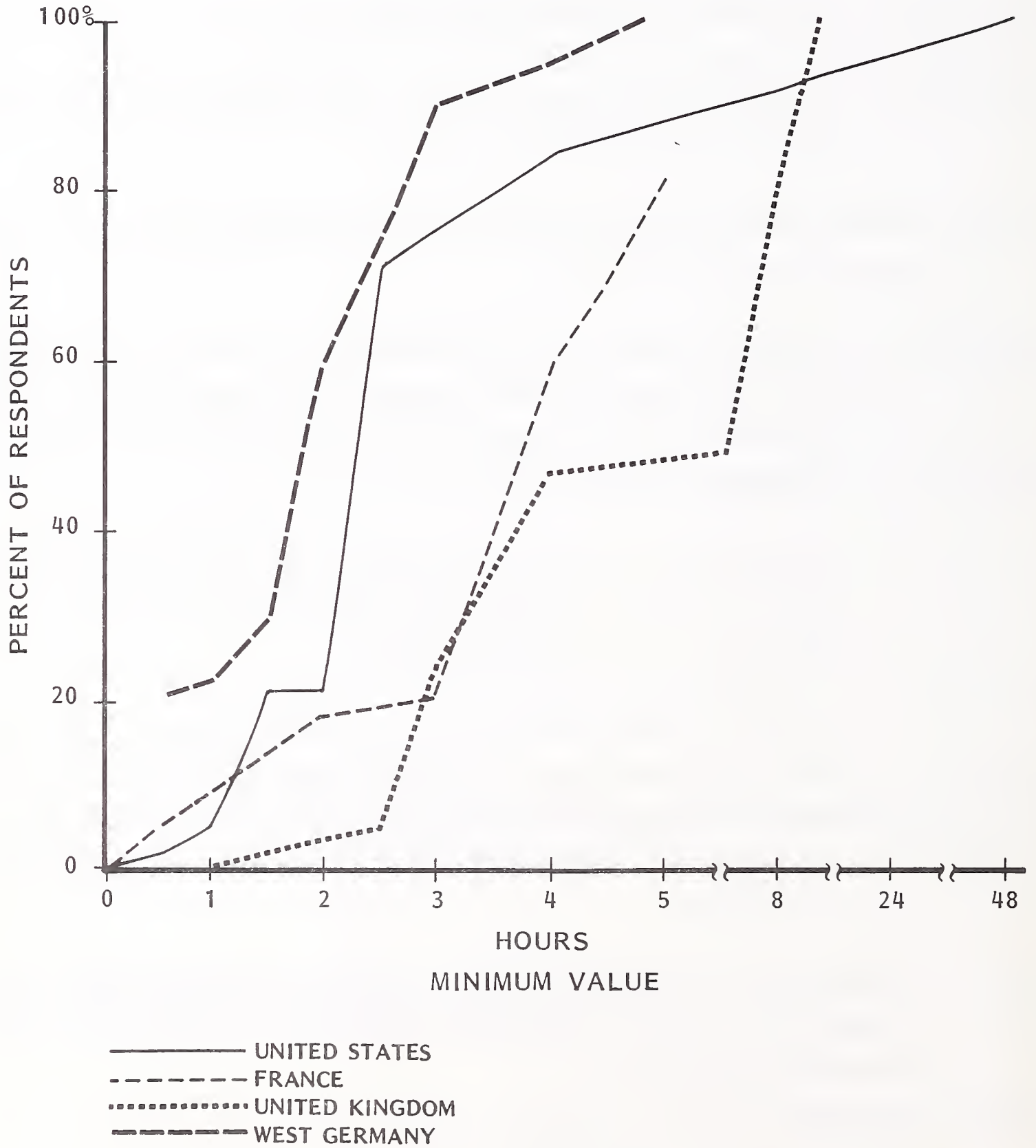


EXHIBIT II-3

LARGE AND MEDIUM MAINFRAME MAINTENANCE VENDORS
IDENTIFIED BY USER RESPONDENTS

VENDOR	PERCENT OF RESPONDENTS			
	UNITED STATES*	FRANCE	UNITED KINGDOM	WEST GERMANY
IBM	60%	48%	27%	67%
ICL	-	8	36	-
Honeywell	13	-	10	1
Burroughs	1	3	9	-
Honeywell-Burroughs	-	34	-	-
NAS	10	-	-	-
Siemens	-	1	-	14
Amdahl	5	-	-	-
Univac	3	-	6	6
DEC	-	-	6	1
Hewlett-Packard	-	-	2	-
NCR	-	-	2	1
CDC	1	1	2	1
Philips	-	2	-	-
MDS	-	-	-	1
Nixdorf	-	-	-	2
Other	7**	3	-	6
TOTAL	100%	100%	100%	100%

* Total United States Responses: 83

** Other United States Responses are Hitachi, Infonet, CDC, Magnuson, Sorbus, Burroughs

- IBM's dominance appears to be significantly less in the United Kingdom and France than in the U.S. and West Germany.
- U.S. vendors seem to be the most prevalent competitive force in the four geographic areas.
- IBM, Honeywell, and CDC were represented in all four countries.
- Burroughs and Univac were represented in three of the four countries.

D. USER RATING OF VENDORS

- Users were asked to rate hardware maintenance vendors; these combined U.S. and Western European assessments are shown in Exhibit II-4.
 - IBM, Nixdorf, CDC, DEC, Hewlett Packard, and Honeywell are generally well received by their users.
 - As ratings are subjective and often reflect the immediate situation, the point differences in average rating scores are not very significant and the table is included from a pure interest standpoint.
- Several maintenance vendors have significant disparity between U.S. and Western European perceptions.
 - Nixdorf, Texas Instruments, Honeywell, Prime, and ITT rate significantly higher in the U.S. than in Western Europe.
 - NCR and CDC do better in Western Europe than their corresponding operations in the U.S.

EXHIBIT II-4

USERS' RATINGS OF
HARDWARE MAINTENANCE VENDORS

VENDOR	AVERAGE RATING			
	UNITED STATES	FRANCE	UNITED KINGDOM	WEST GERMANY
Burroughs	3.0	3.2	3.5	3.0
CDC	3.3	4.3	3.8	3.8
Data General	2.5	-	3.6	-
DEC	3.9	3.6	3.8	3.9
Hewlett-Packard	3.9	3.8	3.8	3.6
Honeywell	4.4	3.2	3.5	3.1
IBM	4.4	3.8	3.8	4.0
ITT	4.0	3.4	3.0	3.1
Memorex	3.3	3.6	3.4	3.1
NCR	2.0	3.6	2.2	3.8
Nixdorf	5.0	3.1	3.6	3.7
Prime	4.3	2.9	3.2	3.1
Texas Instruments	4.5	3.2	3.0	2.7
Univac	3.6	3.0	3.1	3.1
AVERAGE	3.7	3.4	3.4	3.4

RATING: 5 = HIGH, 1 = LOW
- : NO DATA

E. PERSONNEL

- A common problem being faced by all vendors is the change in basic engineering skills, placing the traditional engineer under pressure, as shown diagrammatically in Exhibit II-5.
- Field service is a labour-intensive, event-driven industry and, in the past, problems have been solved by recruiting people; this is increasingly difficult.
- Field service organisations realise the need to improve individual and organisational productivity and improve the return on investment within the industry.
- Complex circuitry on single boards requires far more equipment and knowledge to fix than the average engineer has available.
 - Time spent repairing beyond board level is less productive than having the engineer move on to the next problem and return the failed board to a central repair function.
- Based on the figures shown in Exhibit II-6, the average salary for a qualified field service engineer is \$17,900 in Western European countries compared with \$18,900 in the U.S.
 - The average European salary is just over 5% less than the U.S. counterpart in basic monetary terms, not a significant difference.
 - It is in the area of fringe benefits that the difference becomes apparent: four to five weeks' holiday is normal in Western Europe, even six weeks is not considered excessive, dramatically different from the two- to three-week standard in the U.S.

EXHIBIT II-5

TRADITIONAL ENGINEER
UNDER PRESSURE TO CHANGE

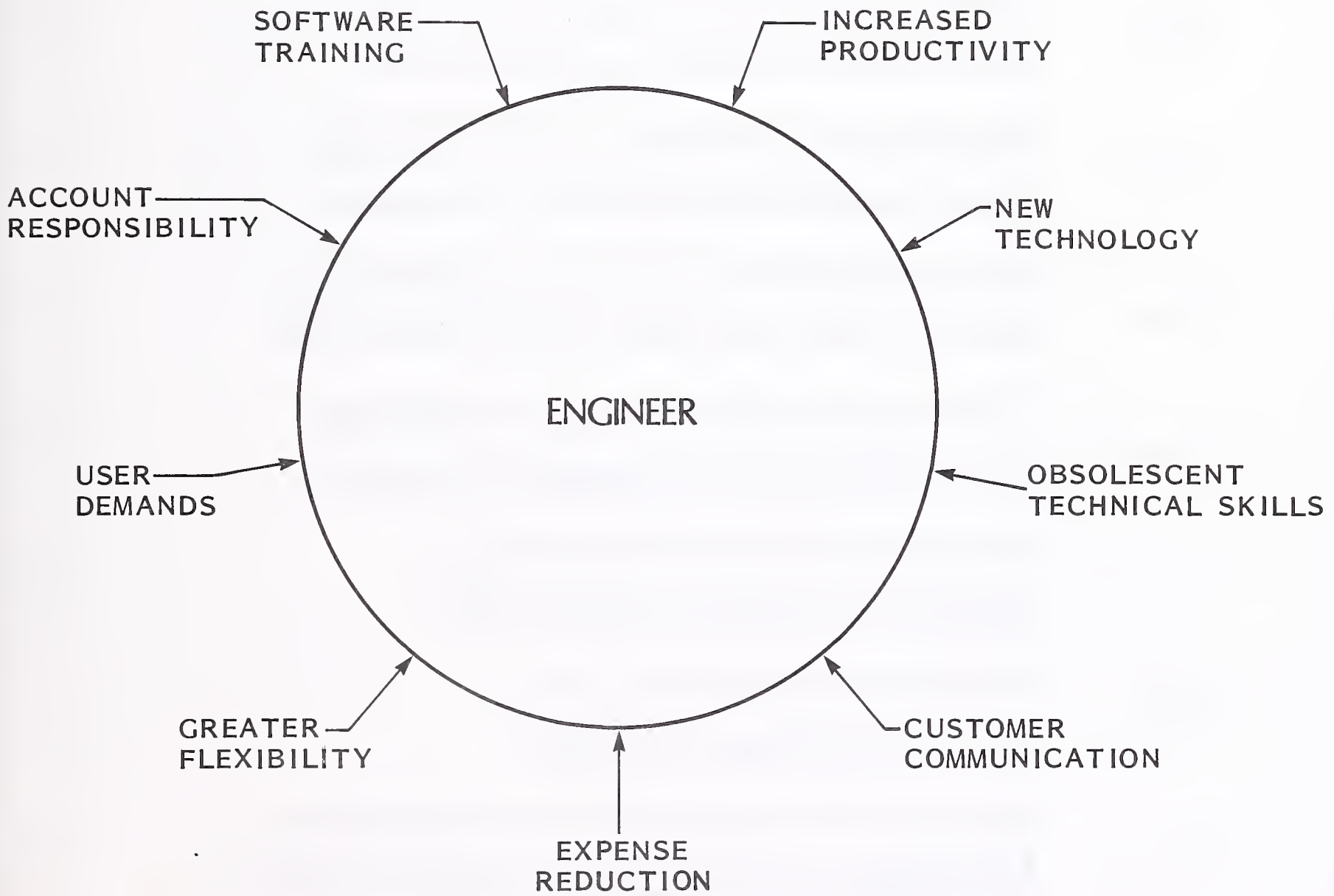
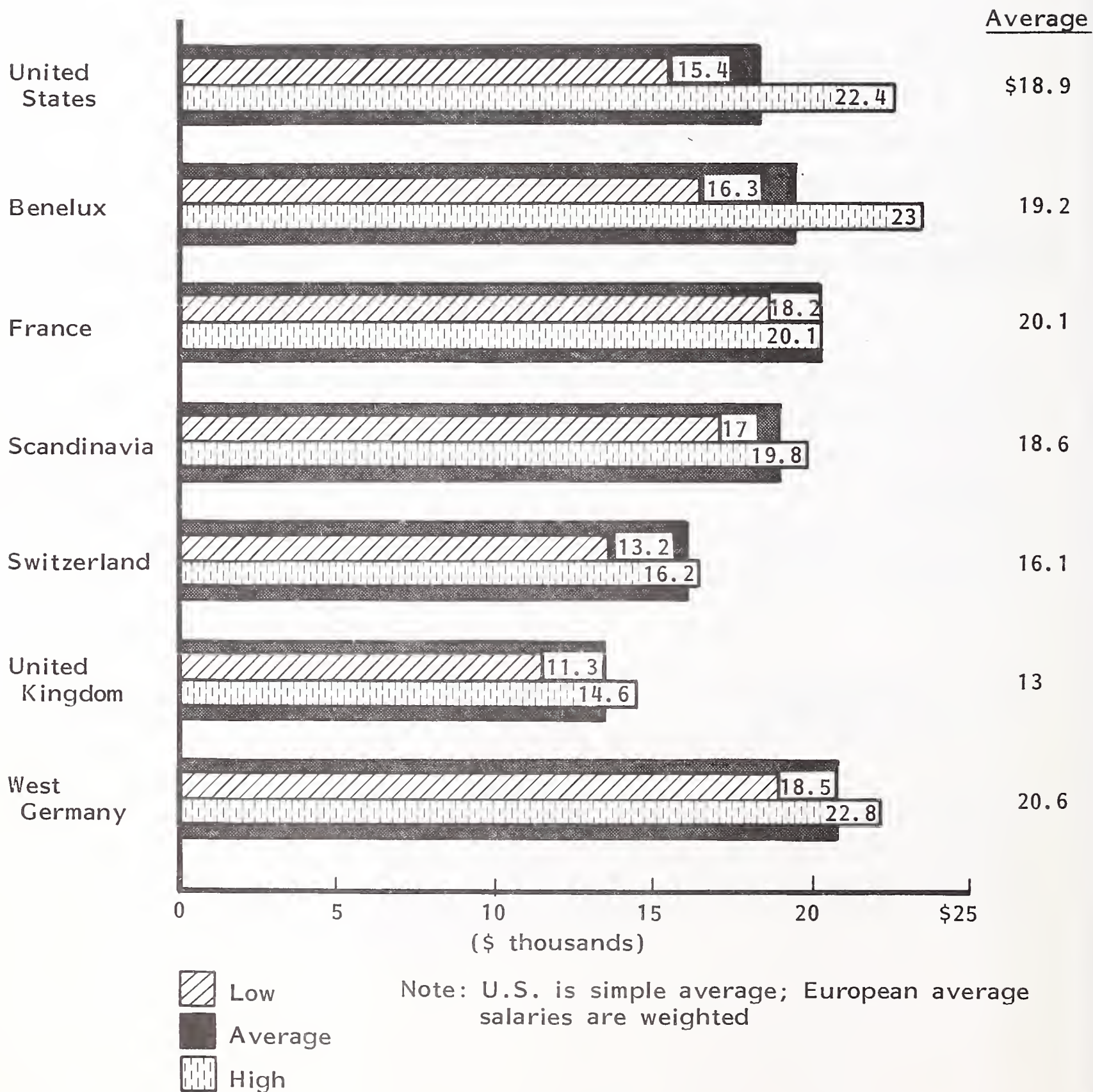


EXHIBIT II-6

QUALIFIED FIELD SERVICE ENGINEER SALARY RANGES
AND AVERAGE SALARIES



- Fringe benefits in the form of pensions, cars, and insurance are far more common in Western Europe.
- It should be noted that the conversion of European salaries to U.S. dollars is based on conversion rates as of October 1, 1981.
 - If, for instance, the U.K. salaries had been converted in January 1981 then the qualified field service engineer's salary would have been \$17,000 rather than the reported \$13,000.

F. CONCLUSIONS

- Western Europe is no closer to being a common market than it was last year. Each country must be treated on its own.
 - User requirements and expectations vary.
 - The 'development' of each market place varies and what is possible in one country may be a year or two away in another.
 - Western Europeans do not like being considered as one group of people; nationalistic tendencies are strong and exercise strong national chauvinism.
- Management techniques and skills must be strengthened.
 - Greater understanding of the motivation of engineers is required.
 - Financial implications of running a profit centre must be realised and addressed.

- Realisation is needed that system availability is more important than response time and the business must be geared to this principle.

III USER SURVEY COMPARISON

III USER SURVEY COMPARISON

A. INTRODUCTION

- This section analyses field service areas where significant differences exist between EDP users in Western Europe and the U.S.
- User attitudes are changing dramatically in Western Europe, led by the West German user, and coming close or even surpassing those set by the U.S. user. In the 1980 comparison report, the overall conclusion was that Western European users were less demanding than their U.S. counterparts; this is no longer true in many cases.
 - However, Western European users are still willing to pay more than current maintenance rates for improved service.
 - Noticeable differences by country still exist, with the U.K. being less demanding than other Western European countries.
- In Western Europe, there is a growing trend to use the equipment more by extending shifts and working days without a corresponding increase in maintenance coverage.
 - Vendors must decide how to cope with this trend.

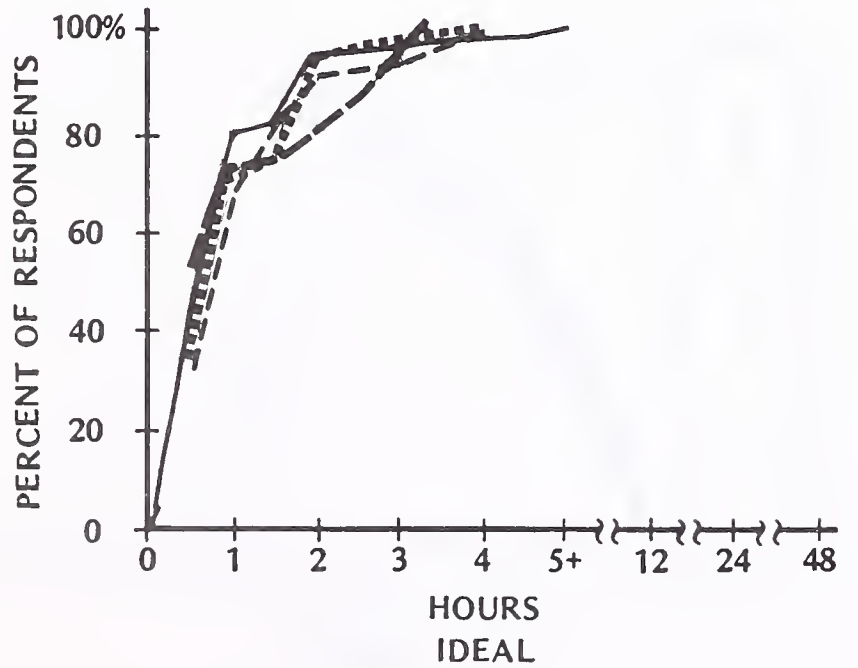
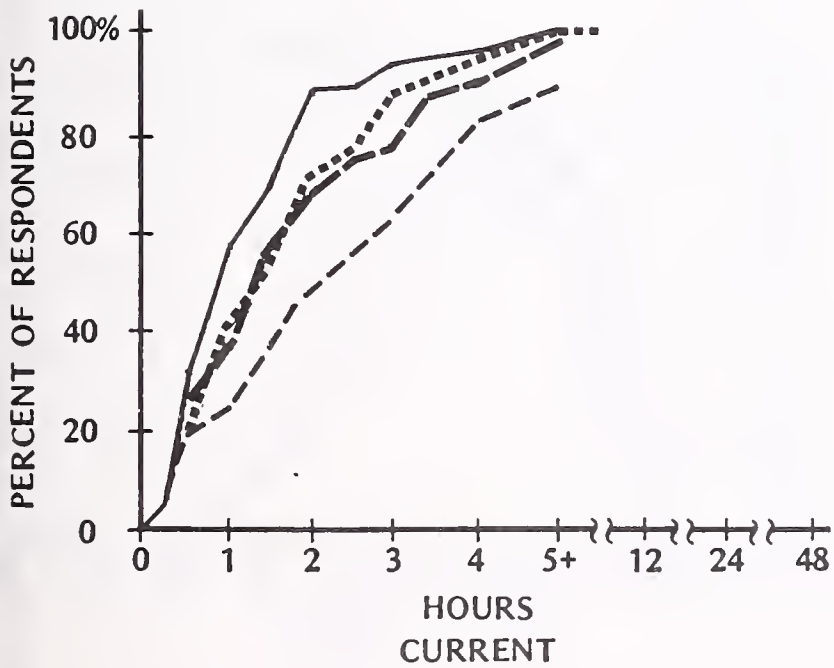
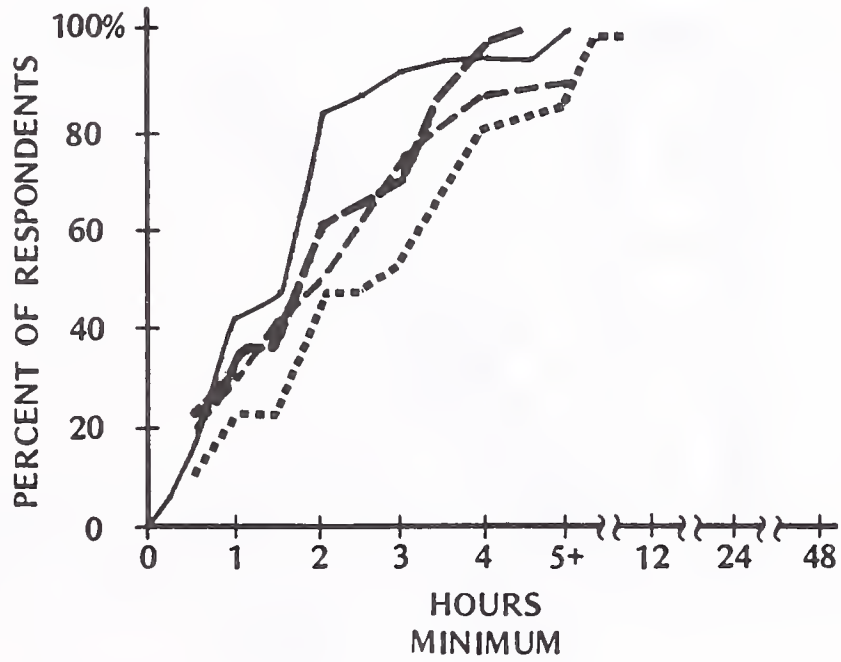
- U.S. users still use their equipment more than the Western European user.
- Western European users are coming to grips with the overselling that took place in the late 1970s and early 1980s and slowly reversing the gross underutilisation of capacity that was inherited.
 - France has further to go in this area as a government policy of guaranteed support of national computer industries has meant a higher level of overselling than in other Western European markets.

B. COMPARISON OF REQUIREMENTS FOR RESPONSE AND REPAIR TIMES

- The general picture in Western Europe is that of users expecting and often demanding improved response and repair times to keep pace with greater U.S. user expectations for level of service.
- Exhibits III-1 through III-14 contain data, plotted in a cumulative format, for mean time to respond and mean time to repair various equipment classifications. The three different sets of data for each response and repair category are:
 - Minimum value, or that number of hours regarded by the user as the minimum acceptable performance of the maintenance vendor.
 - Current value, or the actual number of hours experienced at the moment, on average.
 - Ideal value, or the number of hours that the user would ideally like to see as the service performance.
- Data are provided for five categories of hardware equipment.

EXHIBIT III-1

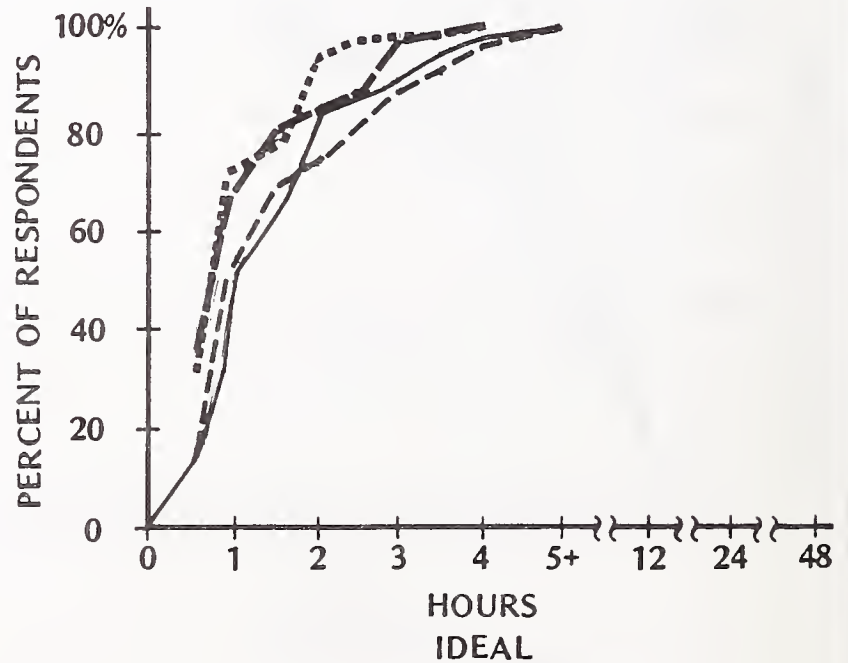
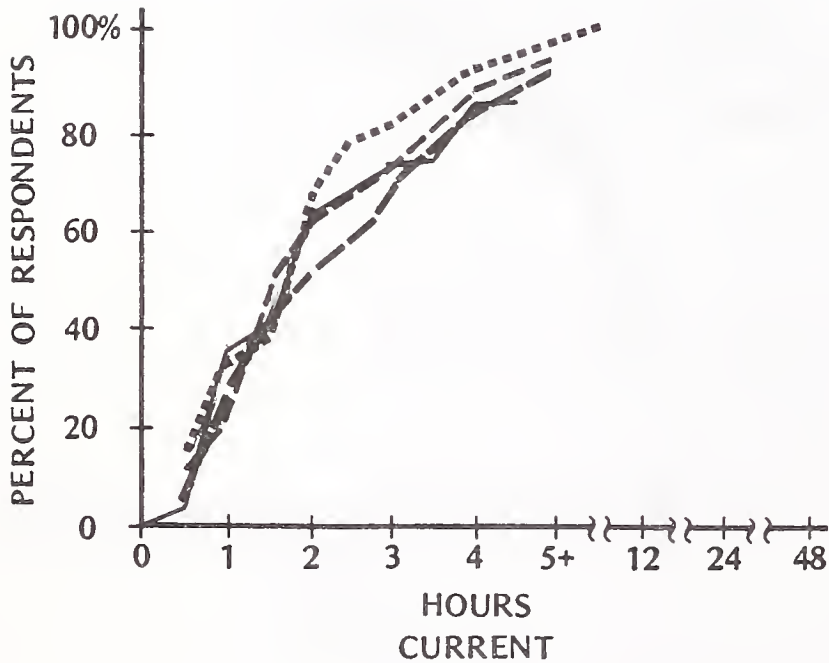
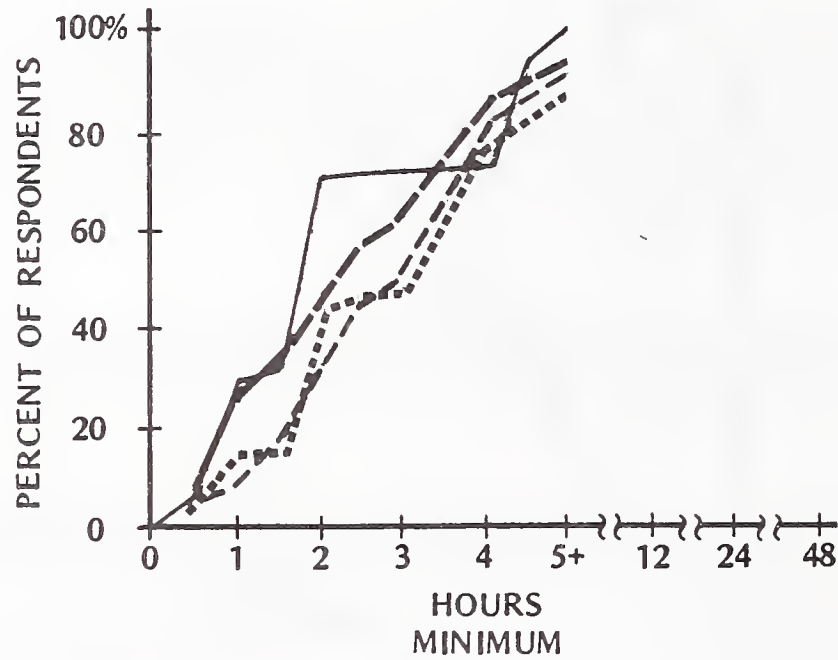
MAINFRAMES - MEAN TIME TO RESPOND:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
- - - FRANCE
- UNITED KINGDOM
- · - · - WEST GERMANY

EXHIBIT III-2

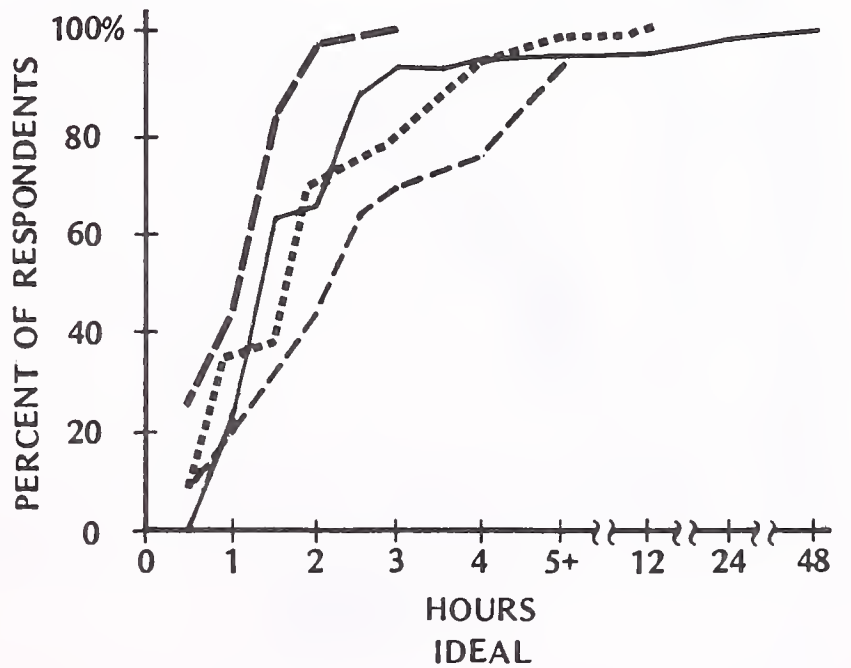
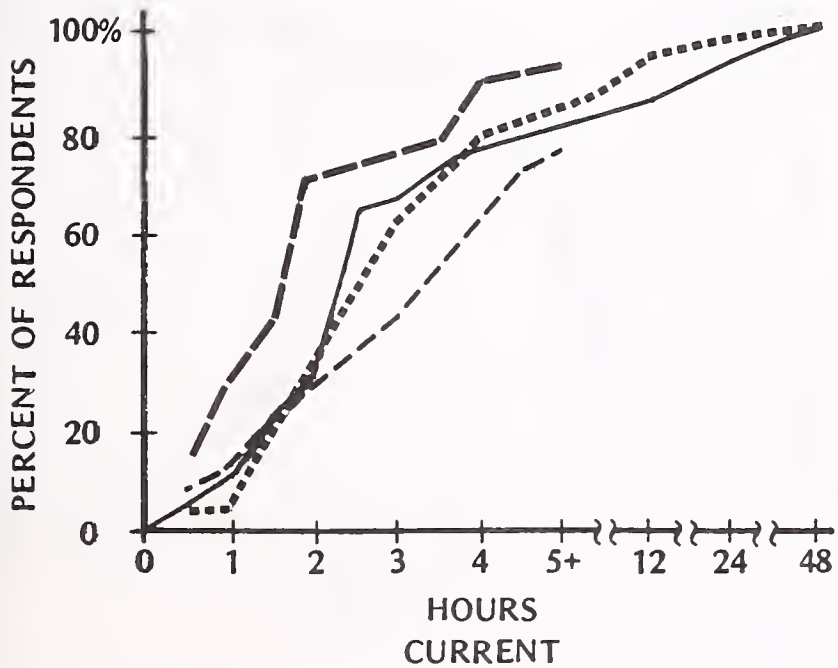
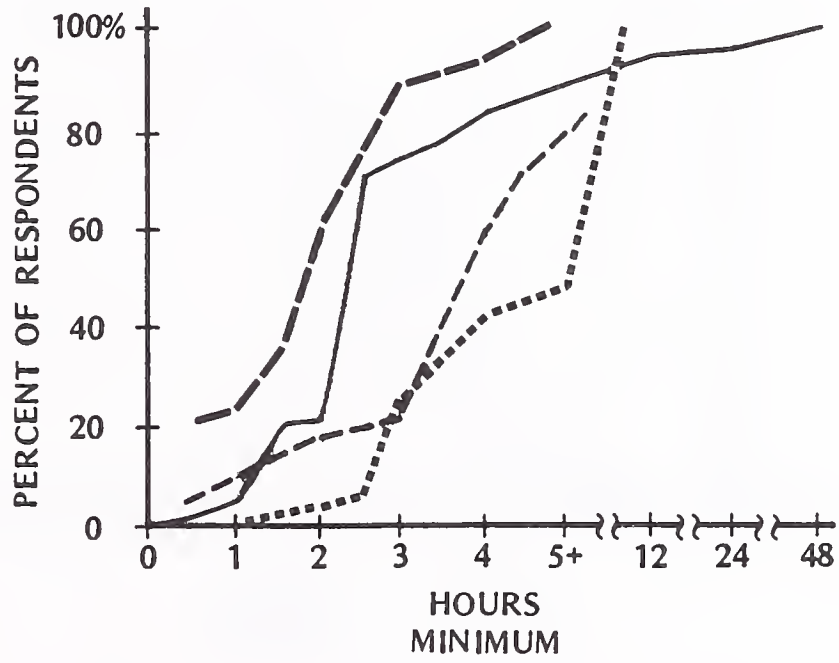
MAINFRAMES - MEAN TIME TO REPAIR:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
- - - - FRANCE
- UNITED KINGDOM
- — — — WEST GERMANY

EXHIBIT III-3

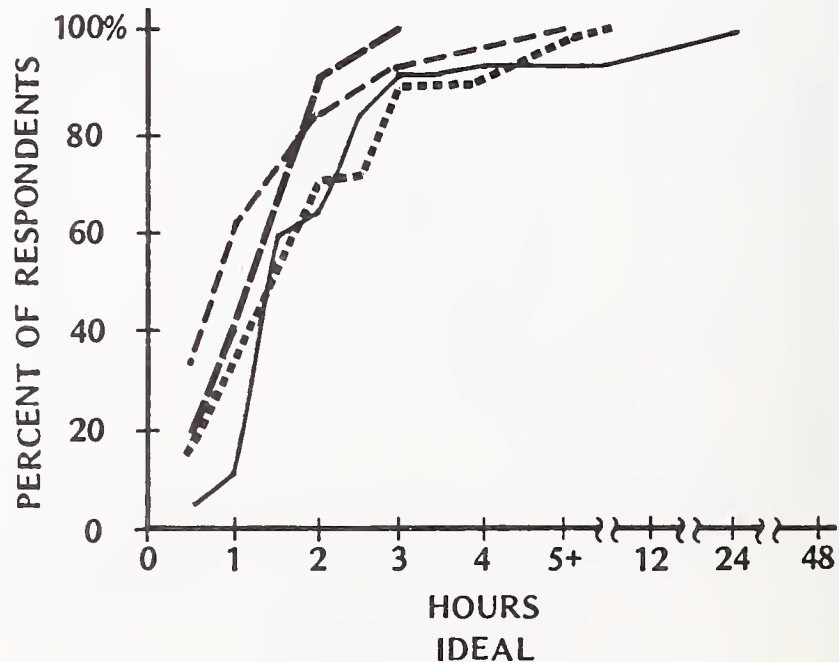
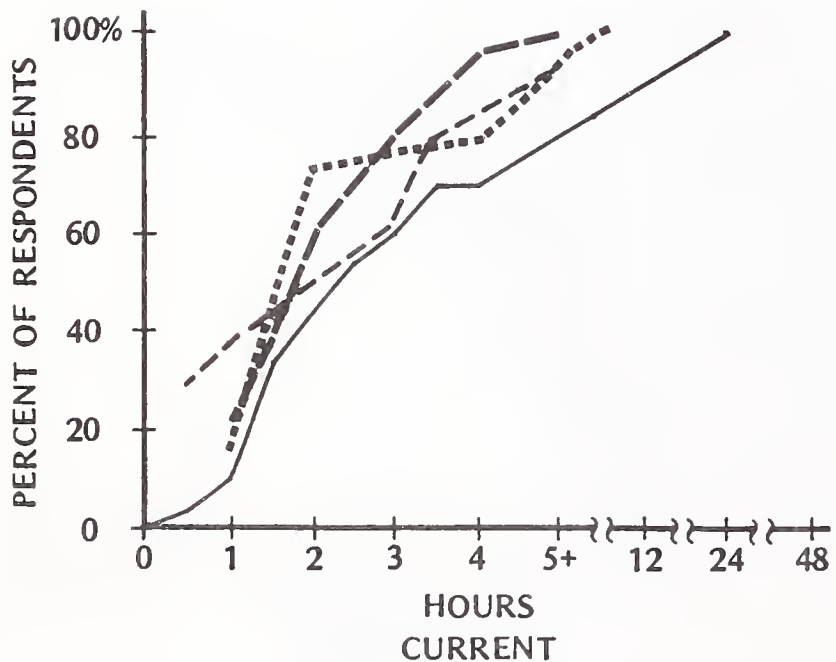
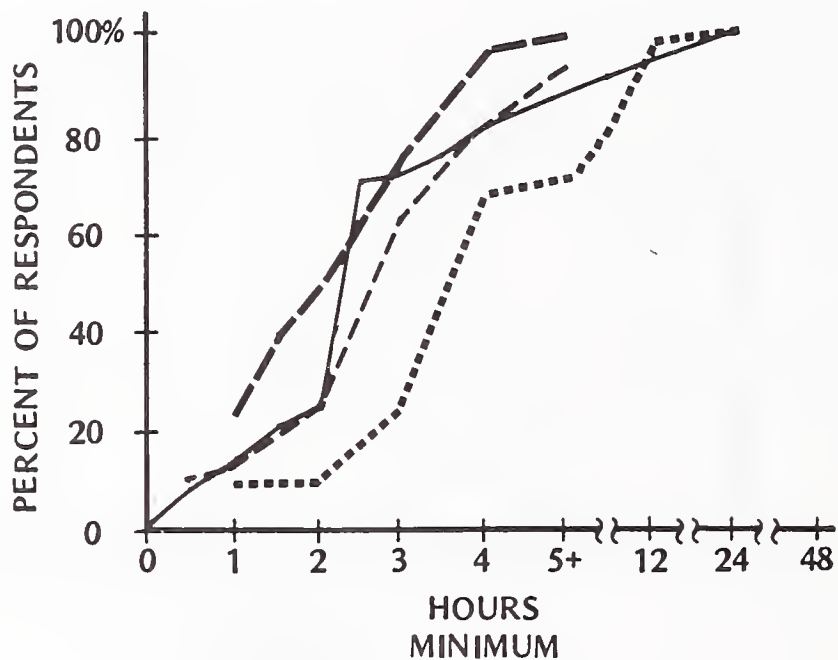
SMALL BUSINESS SYSTEMS - MEAN TIME TO RESPOND:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
- - - - FRANCE
- UNITED KINGDOM
- - - - WEST GERMANY

EXHIBIT III-4

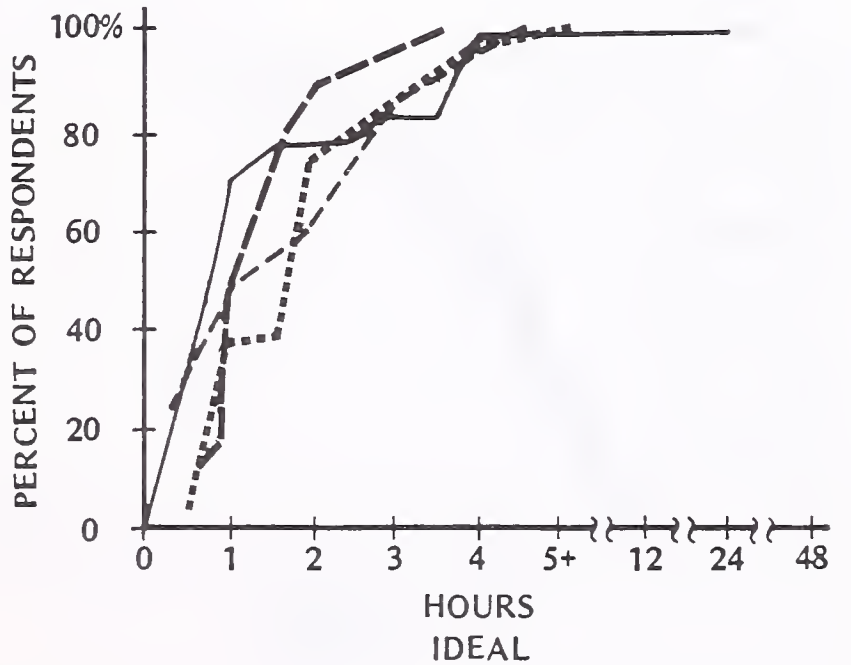
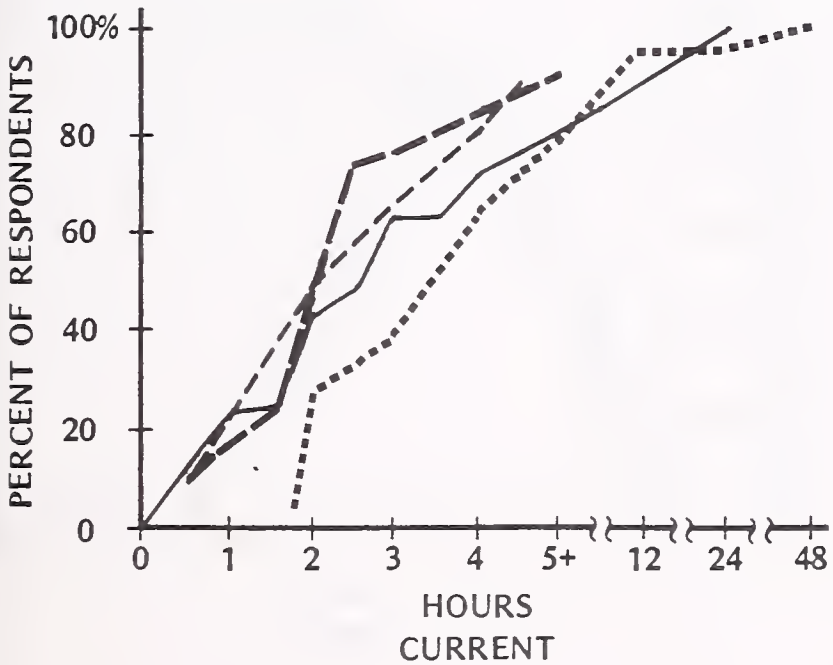
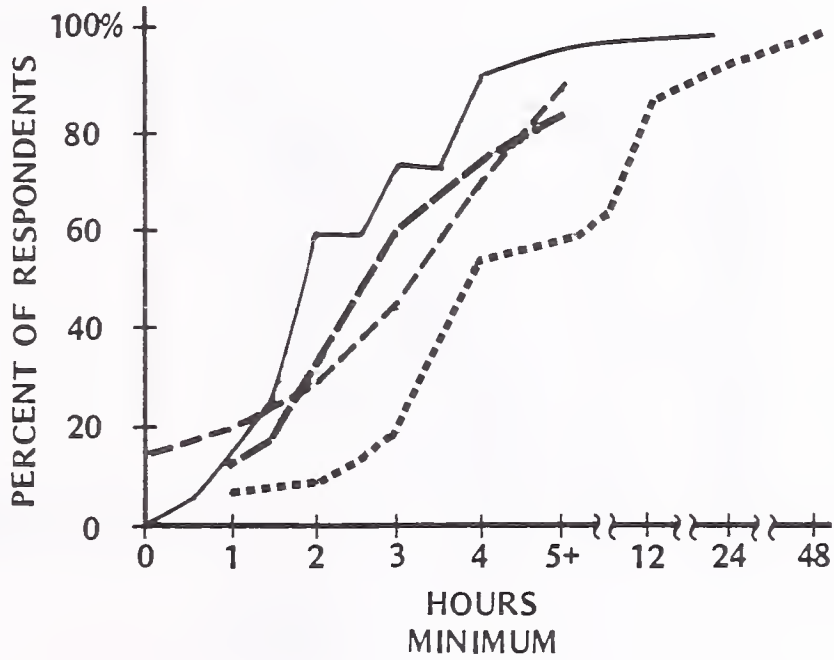
SMALL BUSINESS SYSTEMS - MEAN TIME TO REPAIR:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
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EXHIBIT III-5

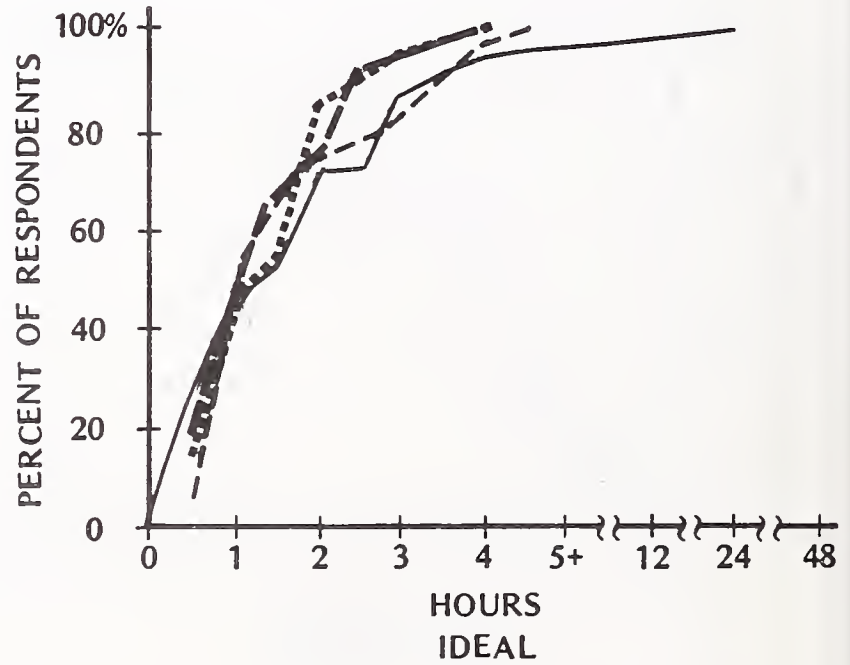
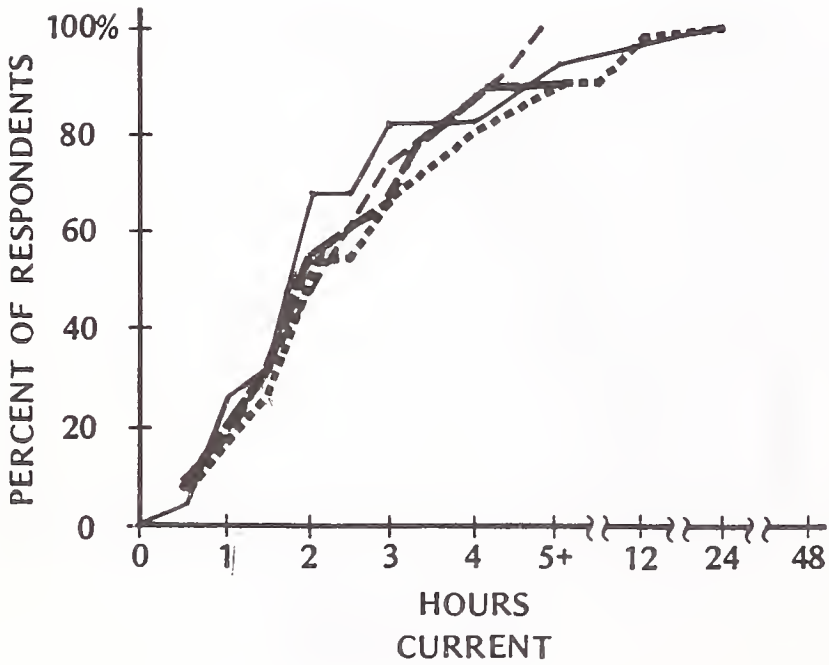
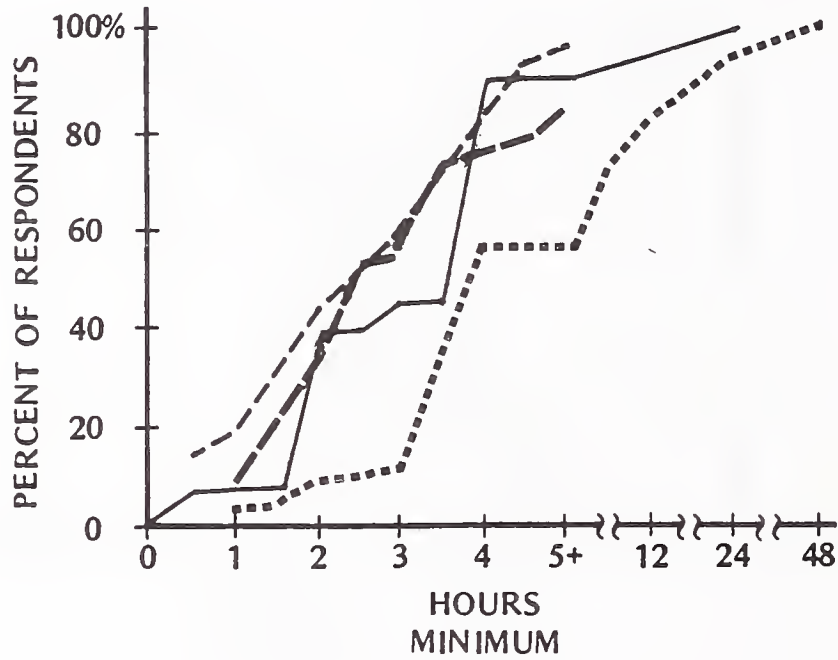
MINICOMPUTERS - MEAN TIME TO RESPOND:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
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- UNITED KINGDOM
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EXHIBIT III-6

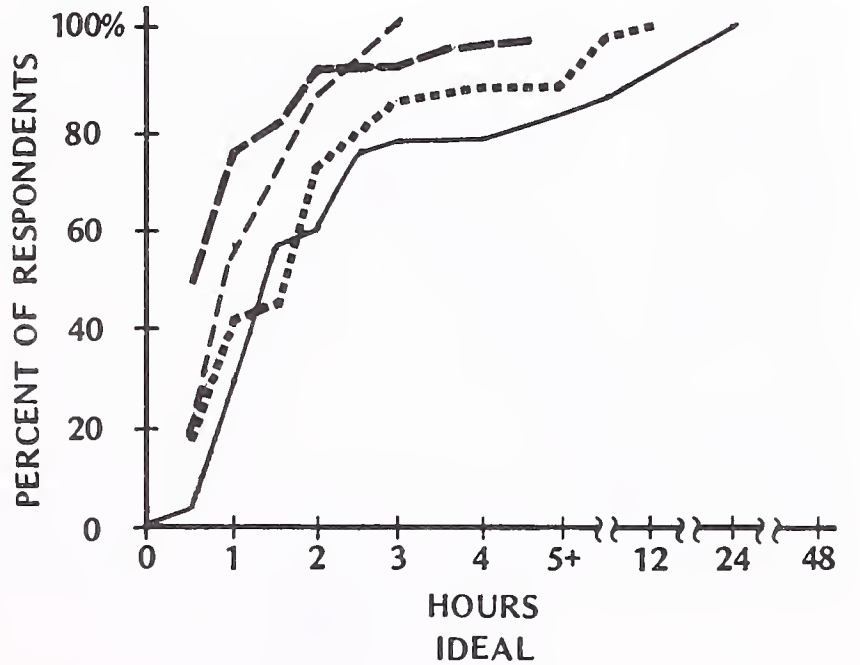
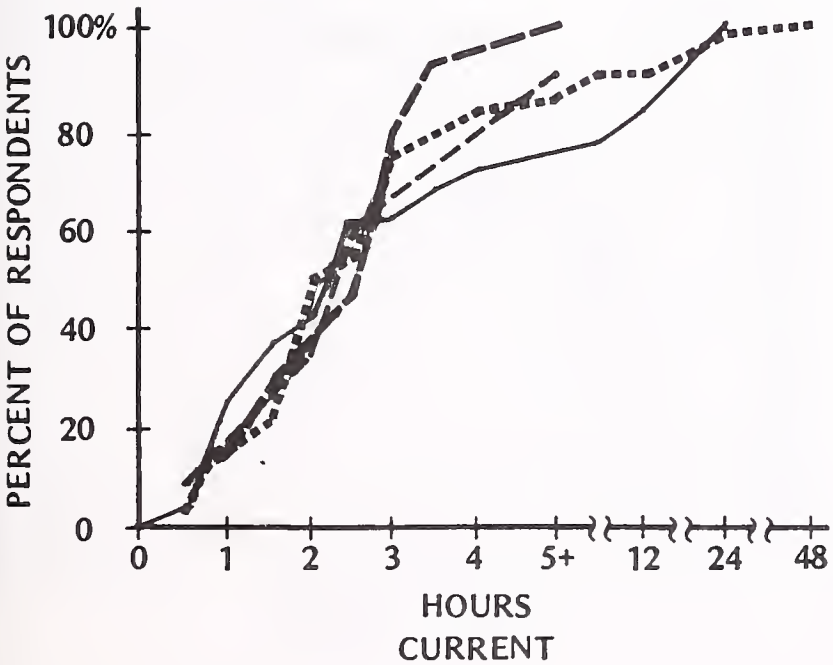
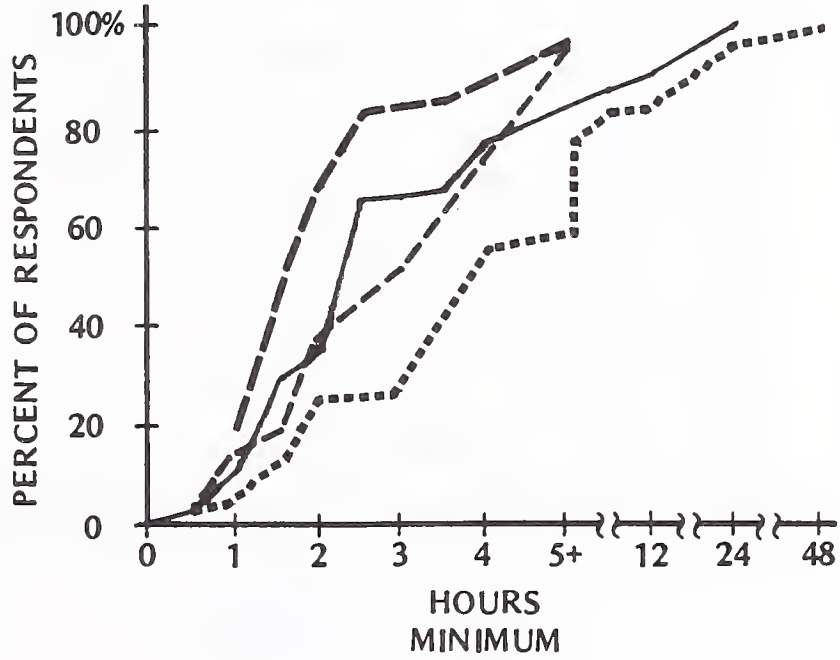
MINICOMPUTERS - MEAN TIME TO REPAIR:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
- - - - - FRANCE
- UNITED KINGDOM
- · - · - WEST GERMANY

EXHIBIT III-7

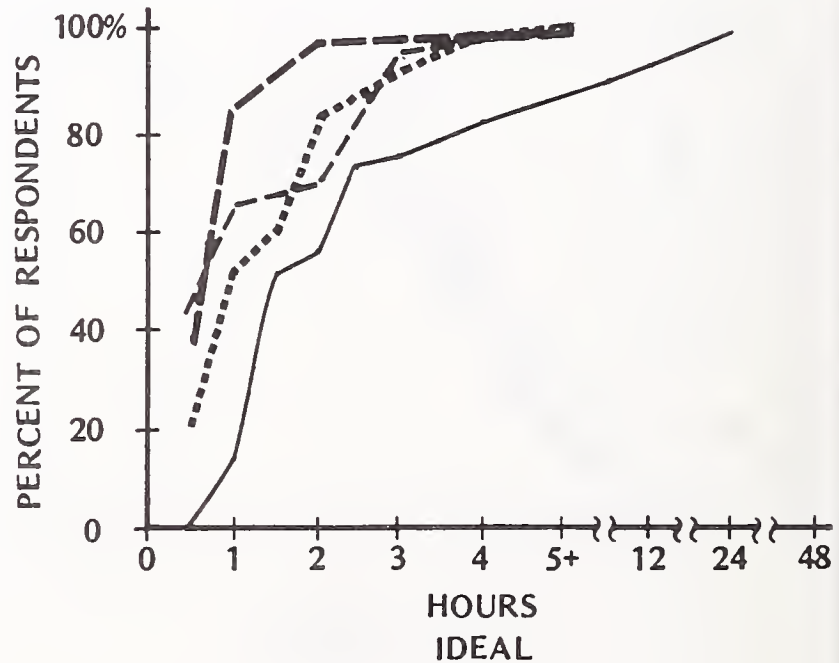
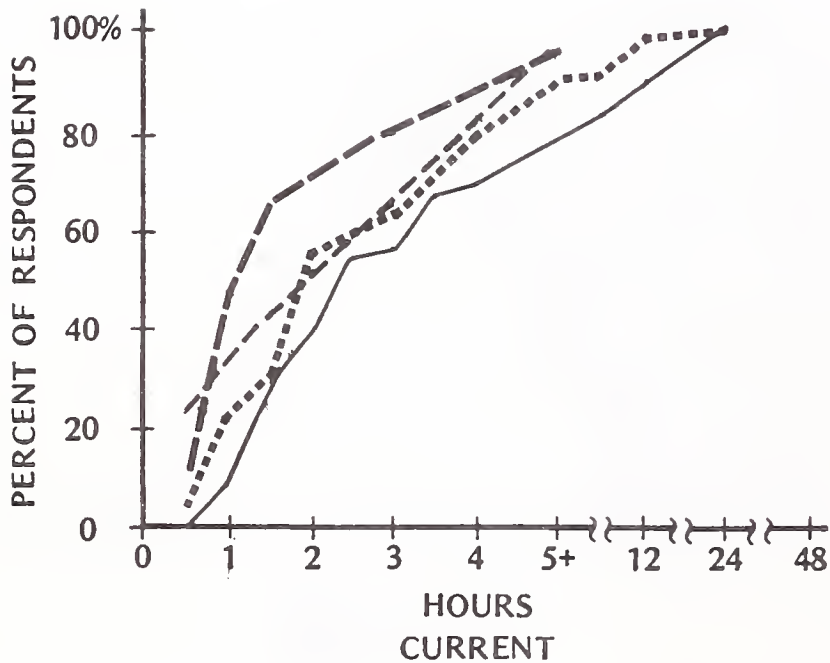
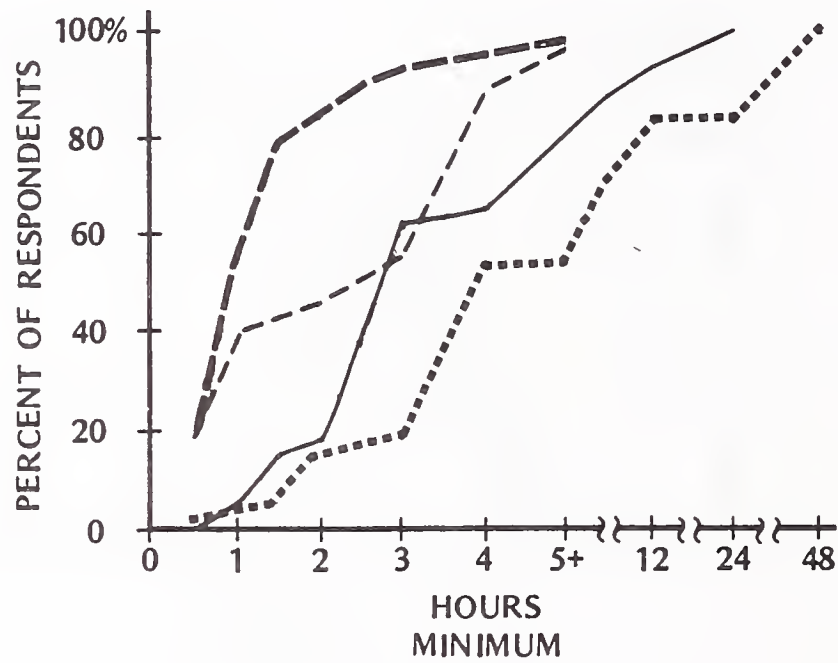
PERIPHERALS - MEAN TIME TO RESPOND:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
- - - FRANCE
- UNITED KINGDOM
- . - . WEST GERMANY

EXHIBIT III-8

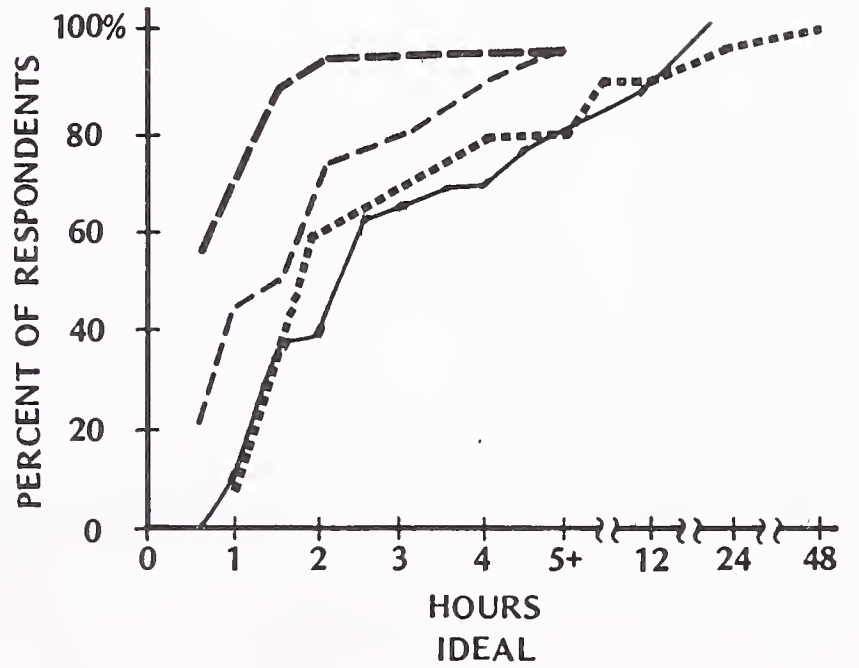
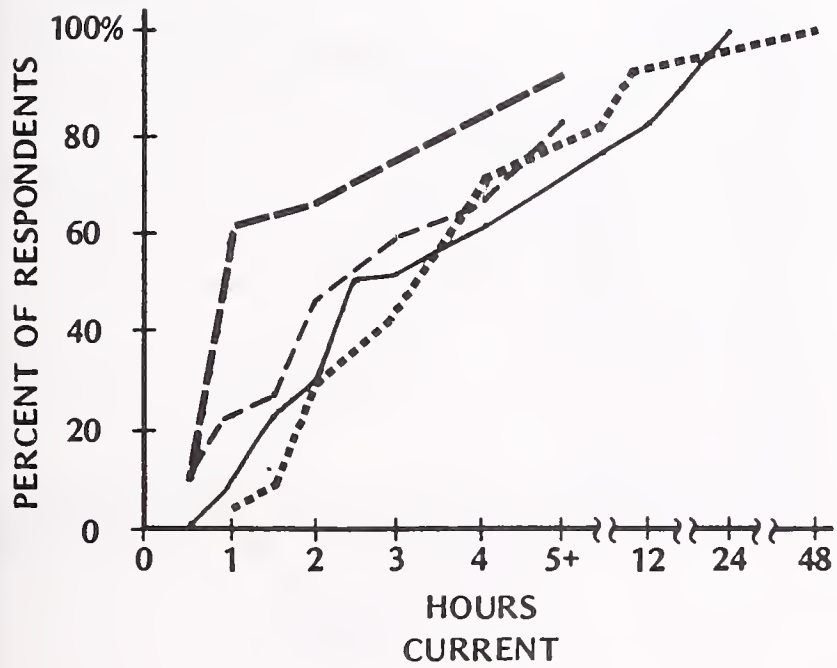
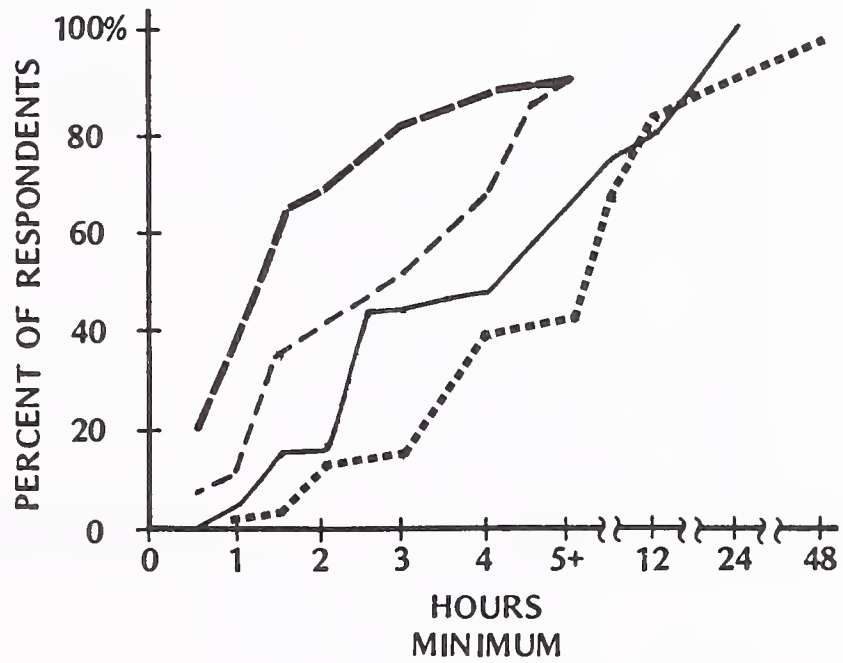
PERIPHERALS - MEAN TIME TO REPAIR:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
- - - - FRANCE
- UNITED KINGDOM
- · - · WEST GERMANY

EXHIBIT III-9

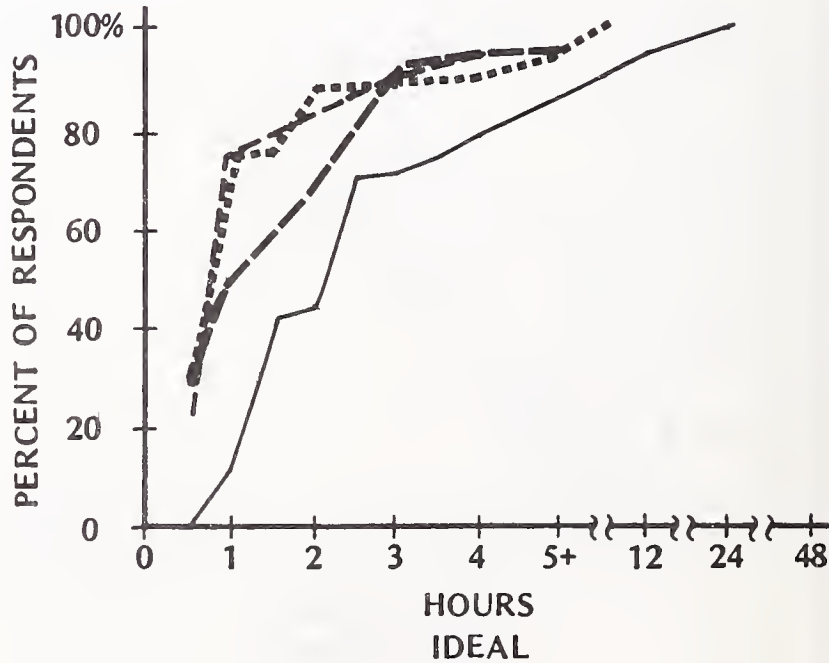
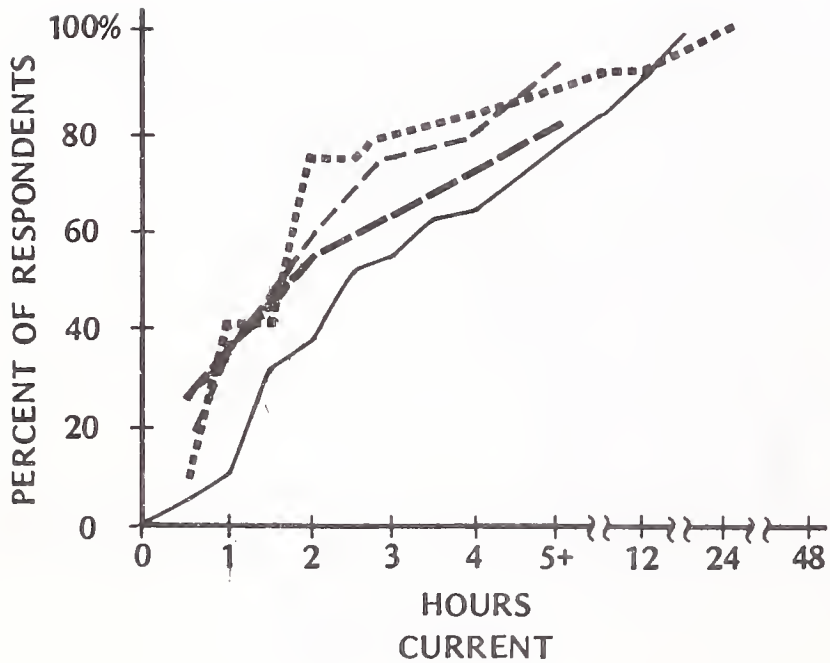
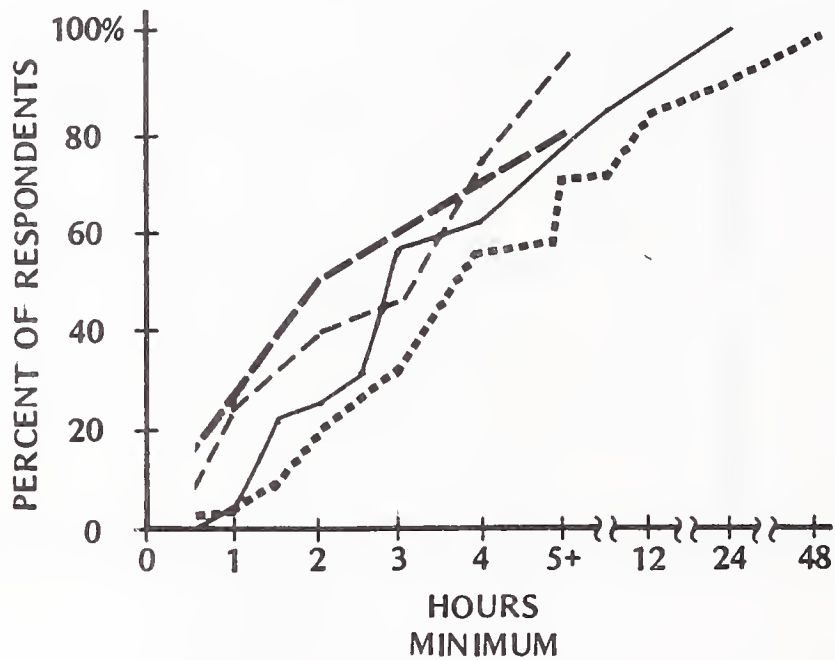
DATA TERMINALS - MEAN TIME TO RESPOND:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
- - - FRANCE
- UNITED KINGDOM
- . - . WEST GERMANY

EXHIBIT III-10

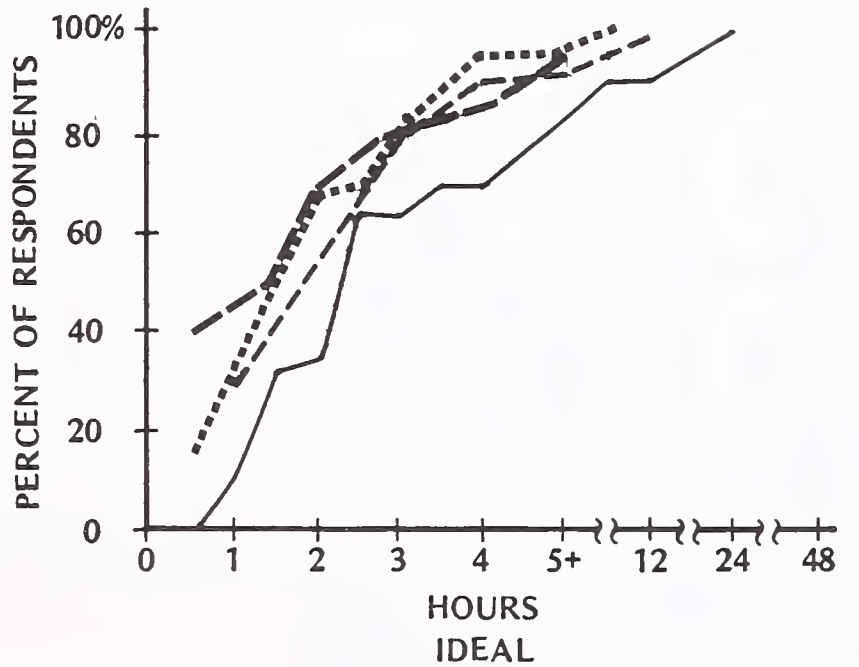
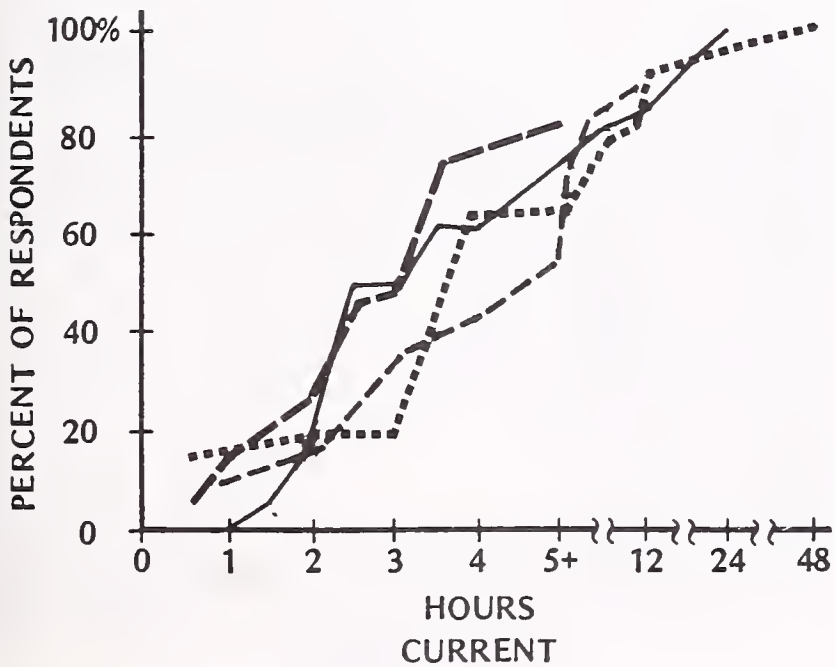
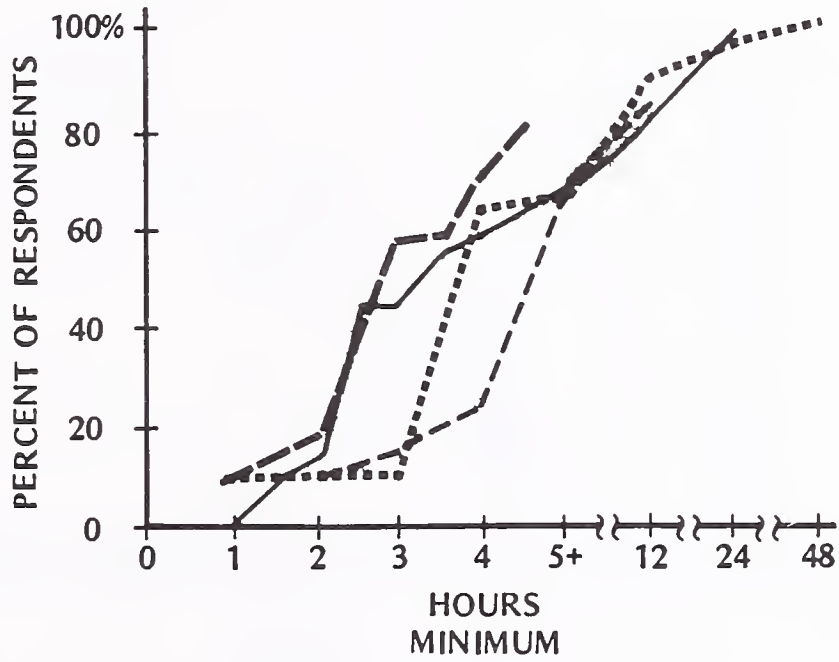
DATA TERMINALS - MEAN TIME TO REPAIR:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
- - - FRANCE
- UNITED KINGDOM
- . - . WEST GERMANY

EXHIBIT III-11

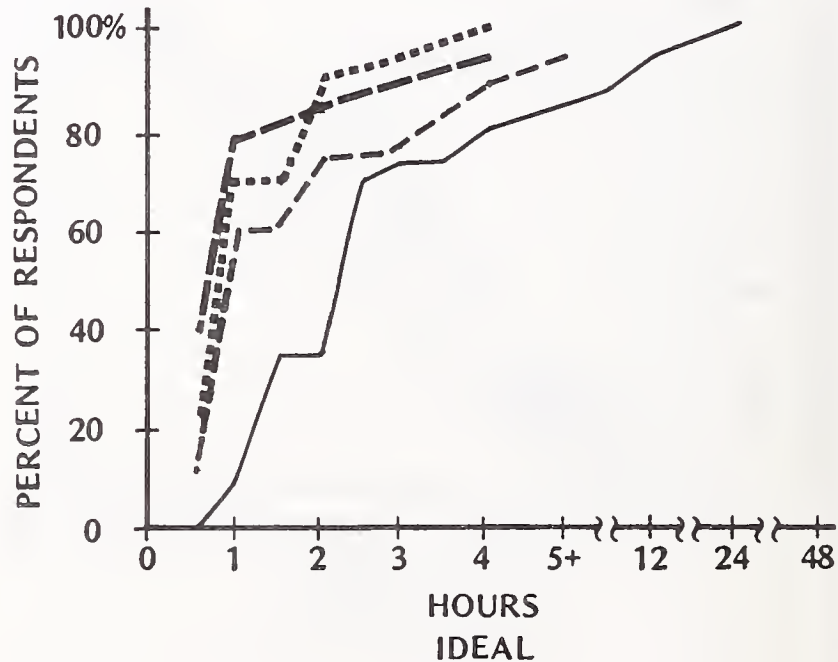
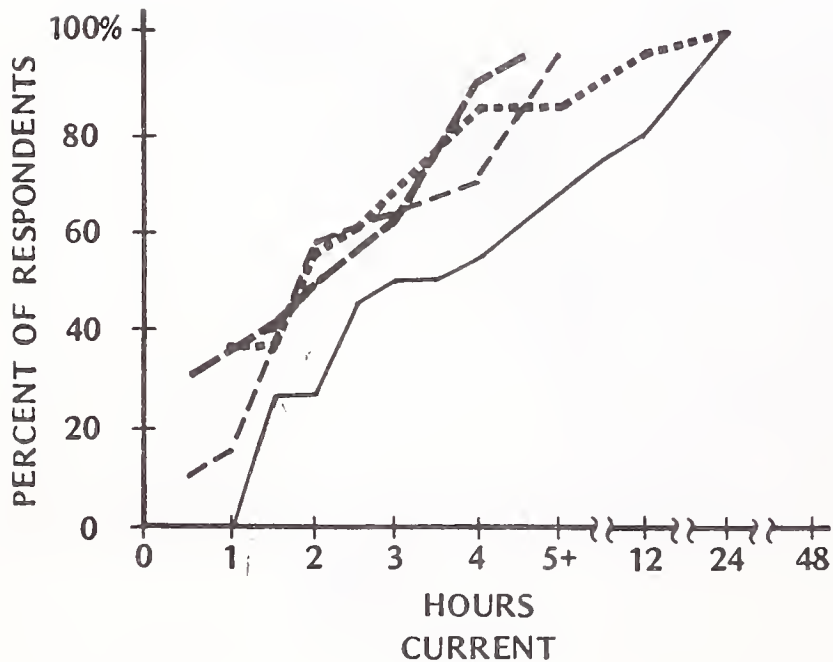
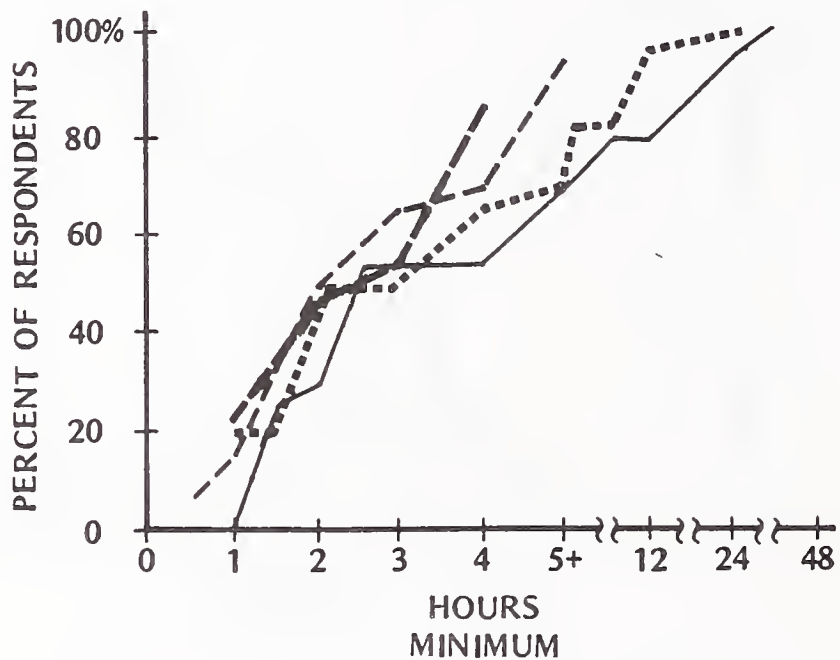
WORD PROCESSORS - MEAN TIME TO RESPOND:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
- - - FRANCE
- UNITED KINGDOM
- . - . WEST GERMANY

EXHIBIT III-12

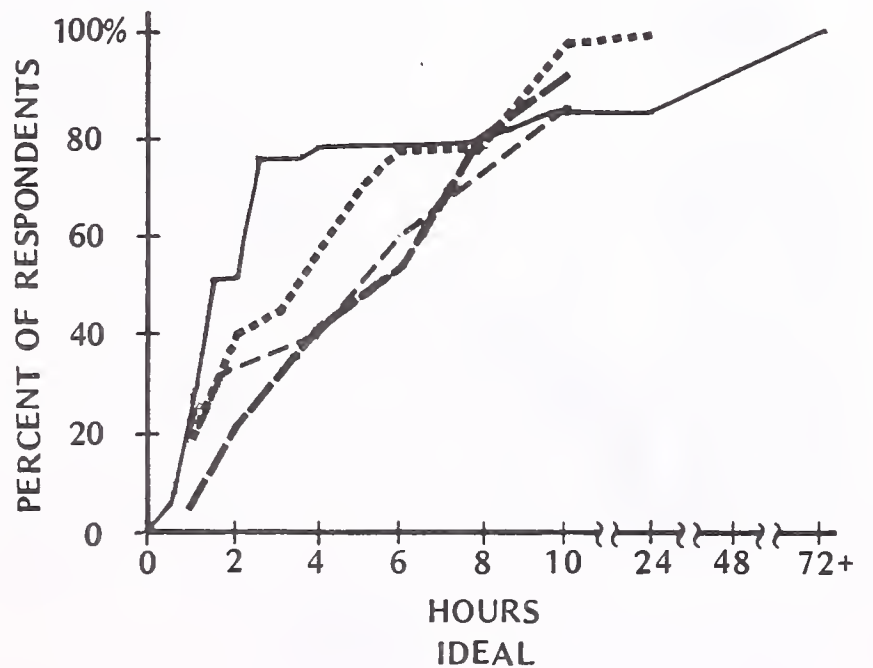
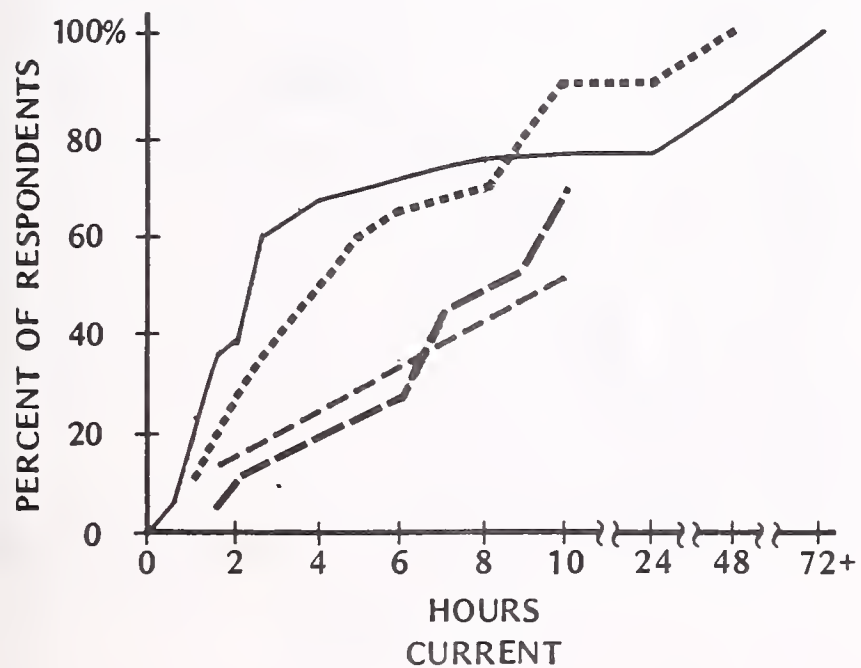
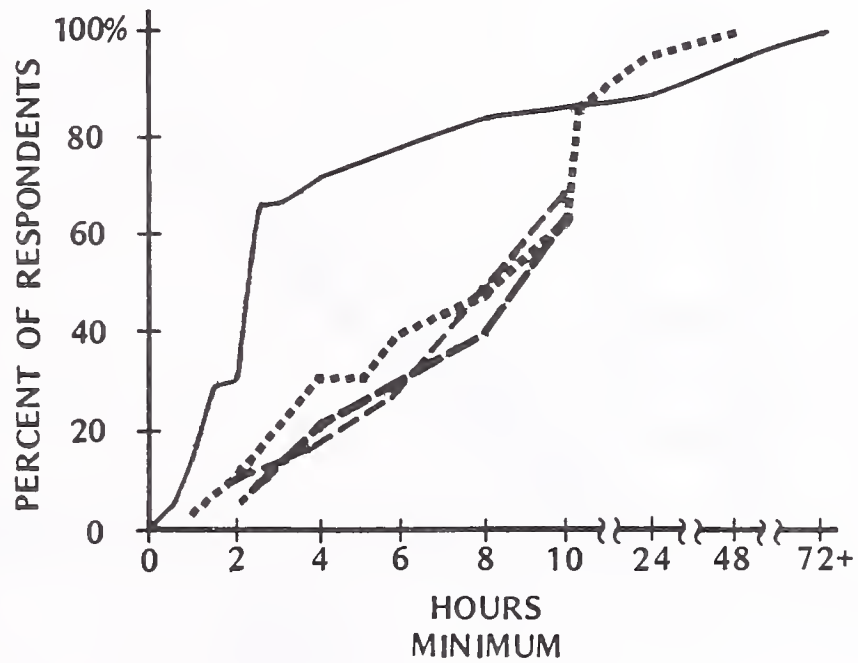
WORD PROCESSORS - MEAN TIME TO REPAIR:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
- - - FRANCE
- UNITED KINGDOM
- . - . WEST GERMANY

EXHIBIT III-13

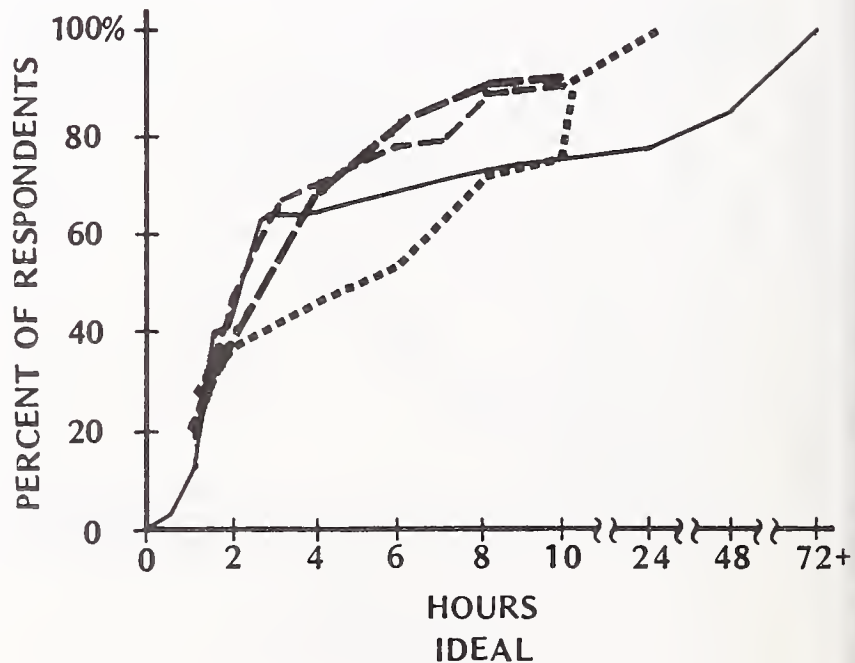
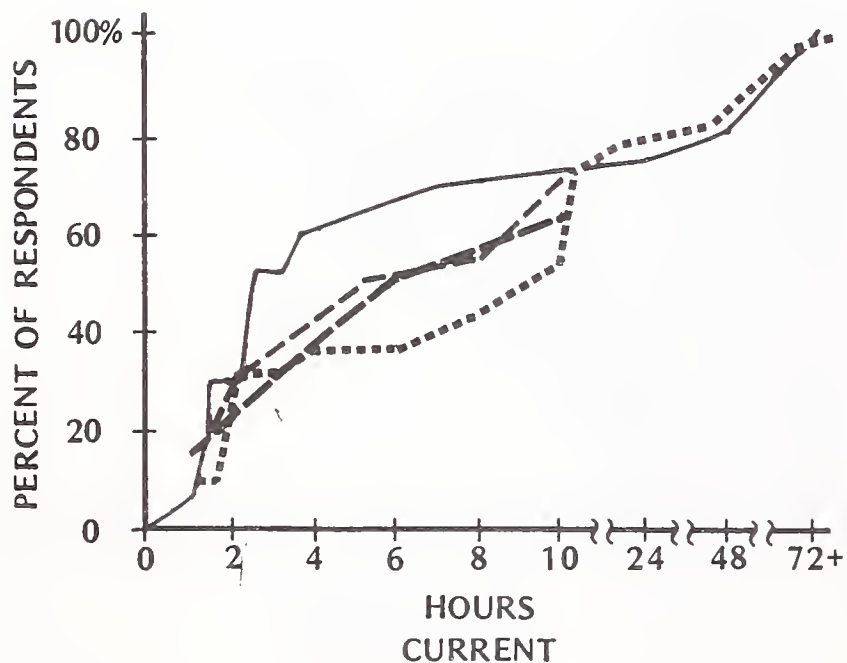
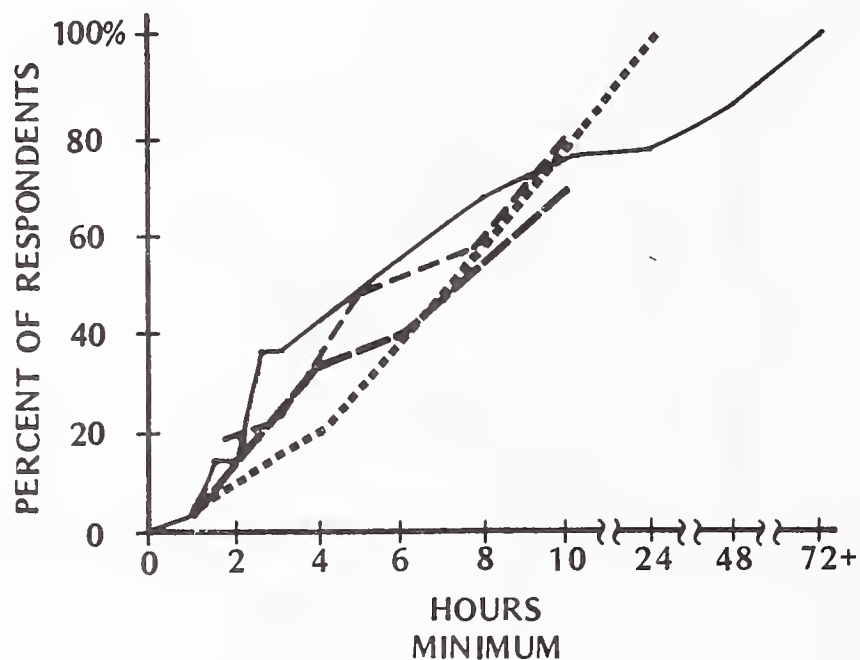
SYSTEMS SOFTWARE - MEAN TIME TO RESPOND:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
- - - FRANCE
- UNITED KINGDOM
- · - · - WEST GERMANY

EXHIBIT III-14

SYSTEMS SOFTWARE - MEAN TIME TO REPAIR:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- UNITED STATES
- - - - - FRANCE
- UNITED KINGDOM
- · - · - WEST GERMANY

- Mainframes, including both large and medium.
 - Small business systems.
 - Minicomputers.
 - Peripherals.
 - Data terminals.
 - Word processors.
- In addition, data have been included on maintenance of systems software, an area often currently out of the field engineering manager's control but, with current market developments, certain to come within his domain eventually.
 - In interpreting the data provided, it is best to examine the value for a majority of the users, such as the 80% point, so as to eliminate extreme views.
 - However, in general, expectations for service are greater in the U.S. than in Western Europe. This is expressed by the more stringent minimum requirements of the U.S. user relative to both response and repair times.
 - The higher expectations of U.S. users extend to the various types of hardware surveyed as well as to systems software.
 - The notable exception to this are users of minicomputers and word processing terminals. For these two categories, users have similar minimum response and repair requirements in the U.S. and Western Europe.
 - This may indicate target markets for field service in the U.S. Since service expectation levels are lower for U.S. minicomputers and word

processors, the marketing task facing field services organisations may be more profitably addressed.

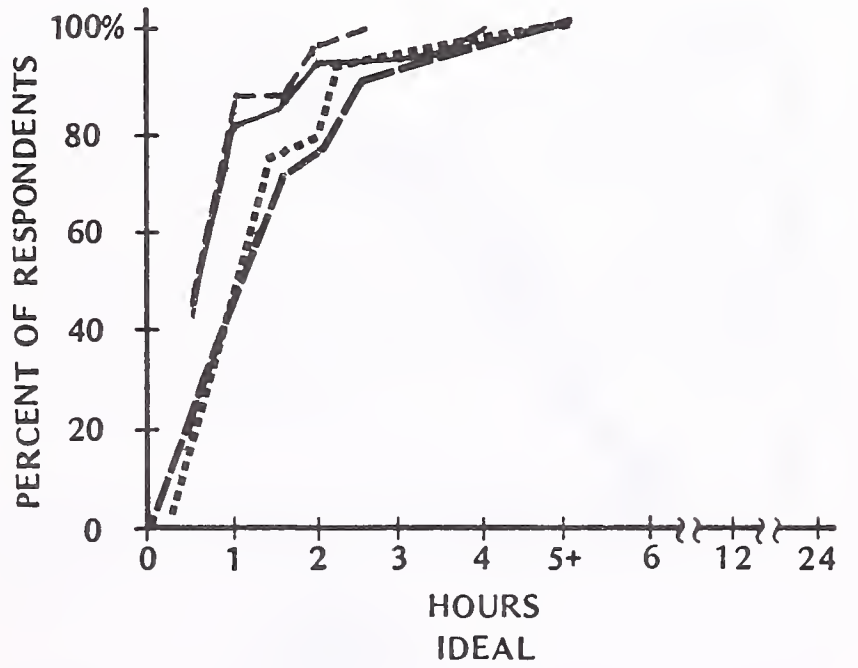
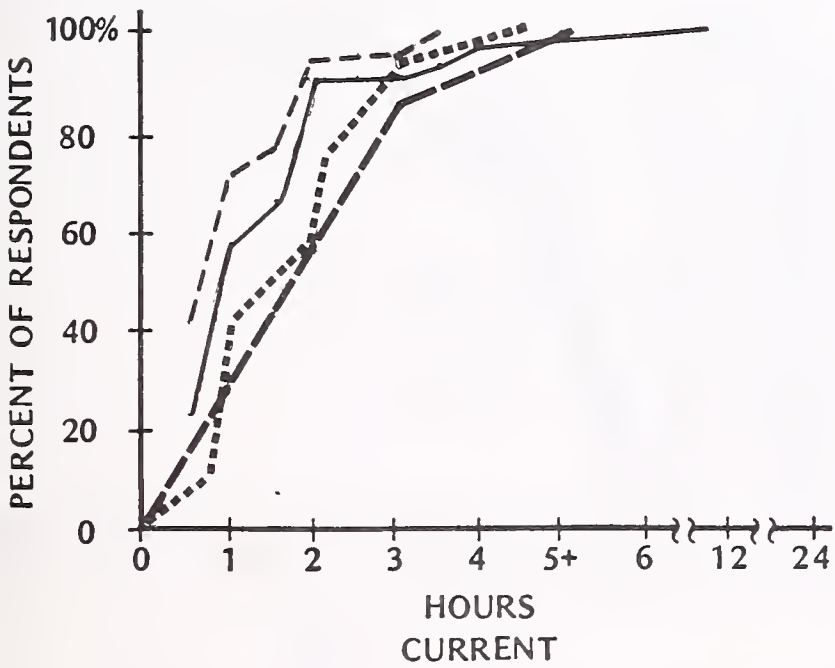
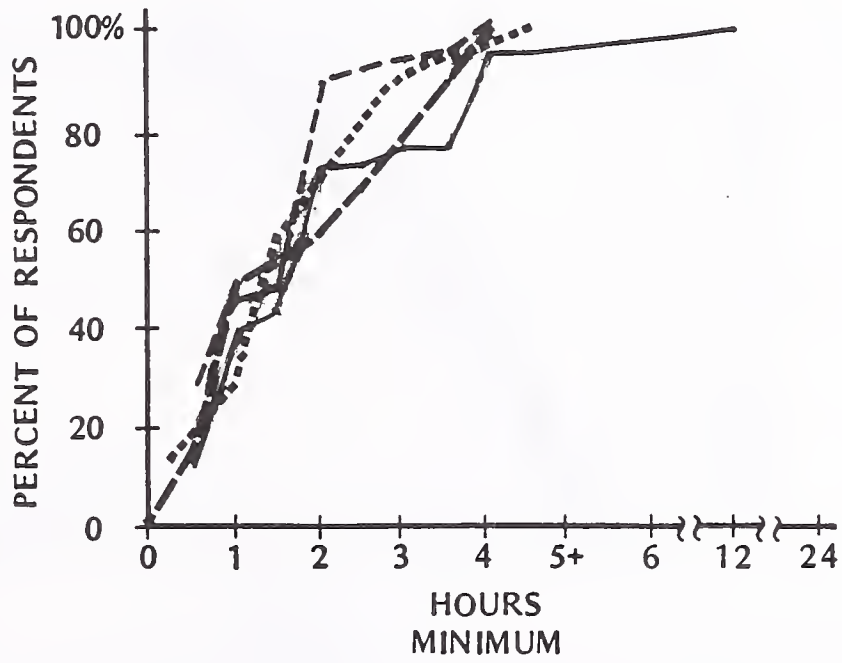
- The data in Exhibits III-1 through III-14 also indicate the quicker response times experienced by U.S. users as compared with Western European users, while the actual repair times are much the same in the U.S. and Western Europe.
 - This may indicate an awareness by U.S. vendors of the importance of the personal services aspect of maintenance. Hence there has been an emphasis on quicker response times.
 - This may also be due to a recognition by Western European users of the multinational environment in which their vendors are operating. Based on this recognition, Western European users' expectations would be adjusted accordingly.
- For systems software, U.S. users have higher expectations and report quicker response times than their Western European counterparts.

C. IBM VERSUS NON-IBM USERS

- Data from user respondents in Exhibits III-15 and III-16 show IBM and non-IBM response and repair times. These both reflect some of the overall environmental characteristics depicted in Exhibit III-1.
 - Significant differences between IBM's position in Western Europe and IBM's position in the U.S. are not apparent.
 - The quicker response times expected in the U.S. by both IBM and non-IBM users are shown in Exhibit III-15.

EXHIBIT III-15

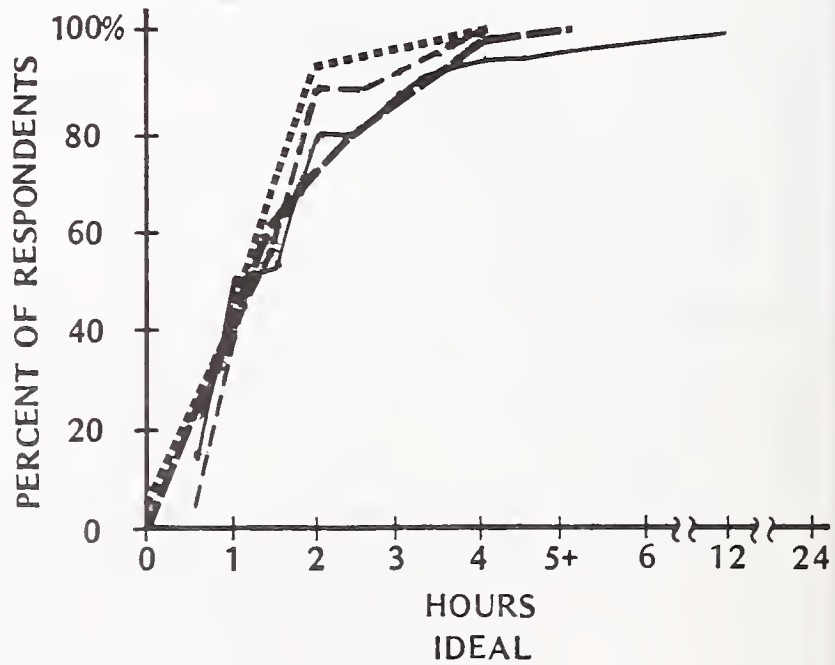
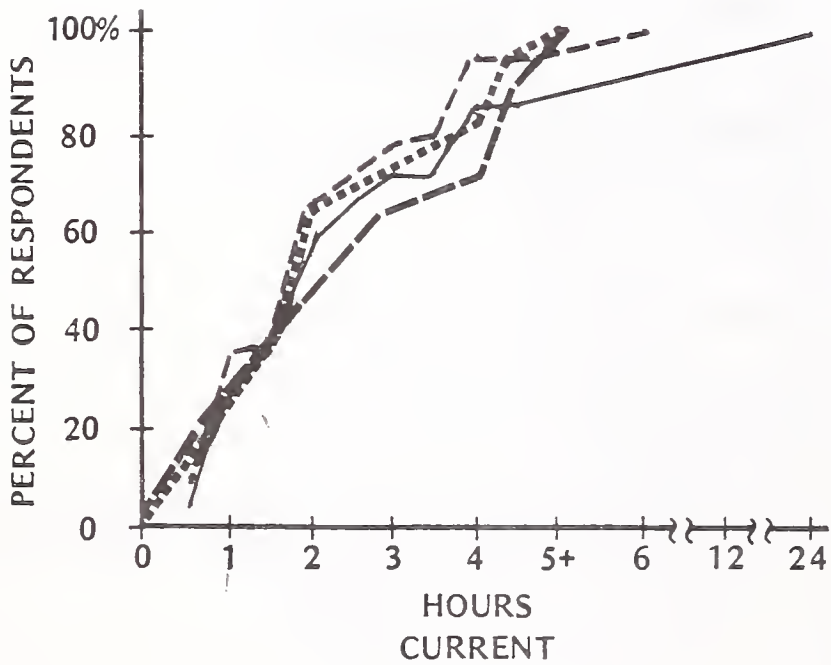
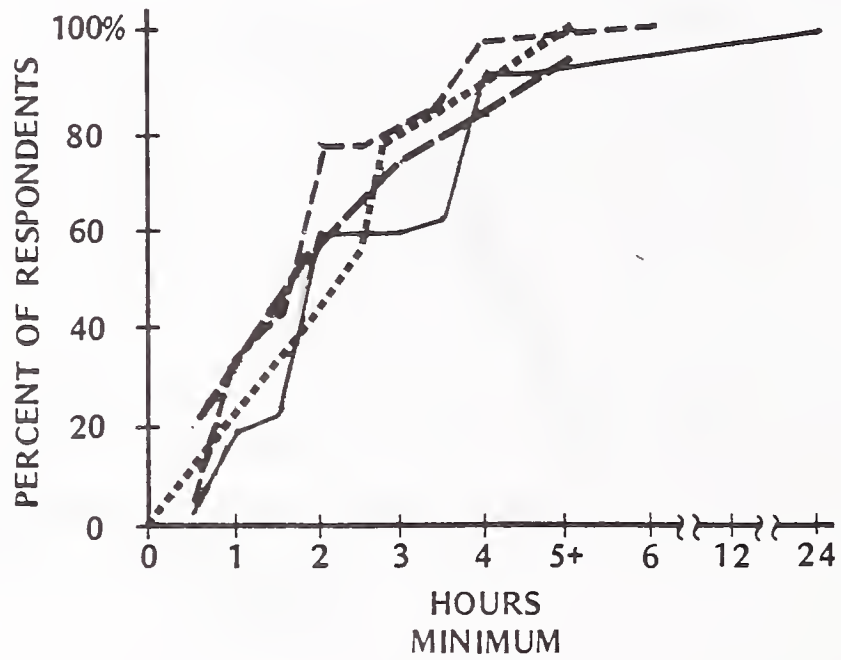
MAINFRAMES - MEAN TIME TO RESPOND - IBM AND OTHERS:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- IBM (U.S.)
- - - - - OTHER (U.S.)
- IBM (EUROPE)
- · - · - OTHER (EUROPE)

EXHIBIT III-16

MAINFRAMES - MEAN TIME TO REPAIR - IBM AND OTHERS:
WESTERN EUROPEAN AND UNITED STATES USER RESPONSES



- IBM (U.S.)
- - - OTHER (U.S.)
- IBM (EUROPE)
- · - · - OTHER (EUROPE)

- IBM overall response in all equipment categories does not maintain the mainframe trend and is closer to the non-IBM users.
- IBM's dominant position will ensure that IBM is used as the 'norm' of the industry against which others will be judged.
 - IBM's image clouds many users' judgements, and allows IBM to offer a perceived better service without necessarily exceeding or bettering their competition's service.
- To quote one user, 'No one's ever been fired for buying IBM'.

D. SYSTEM AVAILABILITY

- By scanning the uptime figures in Exhibit III-17, the high performance levels of field service organisations in Western Europe and the U.S. are immediately apparent.
 - The average for all equipment types is 95.2% uptime, certainly a performance record which leaves room for only marginal improvement.
 - Equipment usage is less in Western Europe than in the U.S. and affords the opportunity for Western European field engineers to work out of system time to improve overall uptime figures.
 - Western Europeans tend to be less demanding in defining uptime than their counterparts in the U.S.
- A key equipment area in which U.S. performance varies from Western Europe's is minicomputers.

EXHIBIT III-17

USER RESPONDENTS' SYSTEMS AVAILABILITY

TYPE OF EQUIPMENT	PERCENT OF UPTIME							AVERAGE BY EQUIPMENT TYPE
	UNITED STATES	FRANCE	UNITED KINGDOM	WEST GERMANY	BENELUX	SCANDINAVIA		
Mainframes	96.2%	96.2%	96.7%	97.2%	97.3%	97.8%	96.9%	
Small Business Systems	93.5	93.0	90.0	95.6	92.0	96.0	93.4	
Minicomputers	90.6	94.1	93.8	94.1	95.4	97.0	94.2	
Peripherals	92.7	93.4	96.2	97.8	97.4	98.1	95.9	
Data Terminals	95.6	98.7	97.2	96.4	97.1	96.8	97.0	
Word Processors	96.3	95.6	94.5	93.8	93.2	94.4	94.6	
Applications Software	94.1	93.8	92.0	94.4	94.0	92.9	93.5	
Systems Software	96.0	90.8	97.0	96.8	98.1	97.8	96.1	
	Total							95.2%

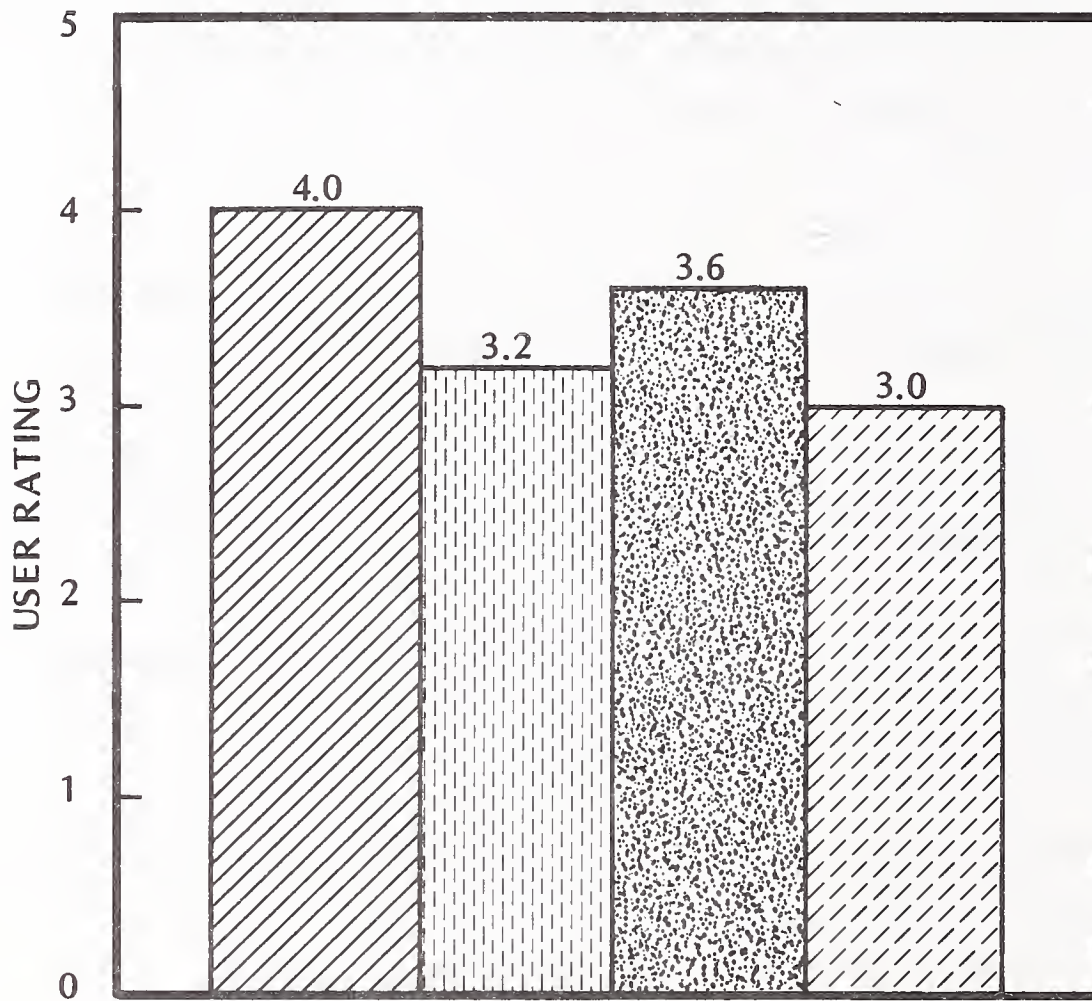
- The U.S. average uptime is 90.6% compared with 94.9% in Western Europe.
- As was stated for Exhibits III-5 and III-6, minicomputers represented an exception to higher U.S. users' expectations and experiences for response and repair times.
- Taken together, these two facts indicate that the minicomputer service environment is different from the norm in the U.S. for response and repair times; minicomputer service is quite similar to that experienced by Western European users and, relative to uptime, it is somewhat lower.
- There is a growing awareness among users that uptime or system availability is a clear measure of system hardware performance.
 - While vendors are hung up on response and repair times they are losing sight of what users want.
 - More users are looking for some form of penalty for uptime falling below a certain level.
- Improving uptime falls in an exponential curve, getting progressively harder to improve as uptime increases.

E. USER SATISFACTION LEVELS

- Exhibit III-18 through III-26 reflect the levels of satisfaction reported by users in Western Europe and the U.S.

EXHIBIT III-18

USER SATISFACTION WITH QUALITY OF
MEDIUM AND LARGE MAINFRAME MAINTENANCE



COUNTRY

1 = POOR, 3 = AVERAGE, 5 = EXCELLENT

 UNITED STATES

 FRANCE

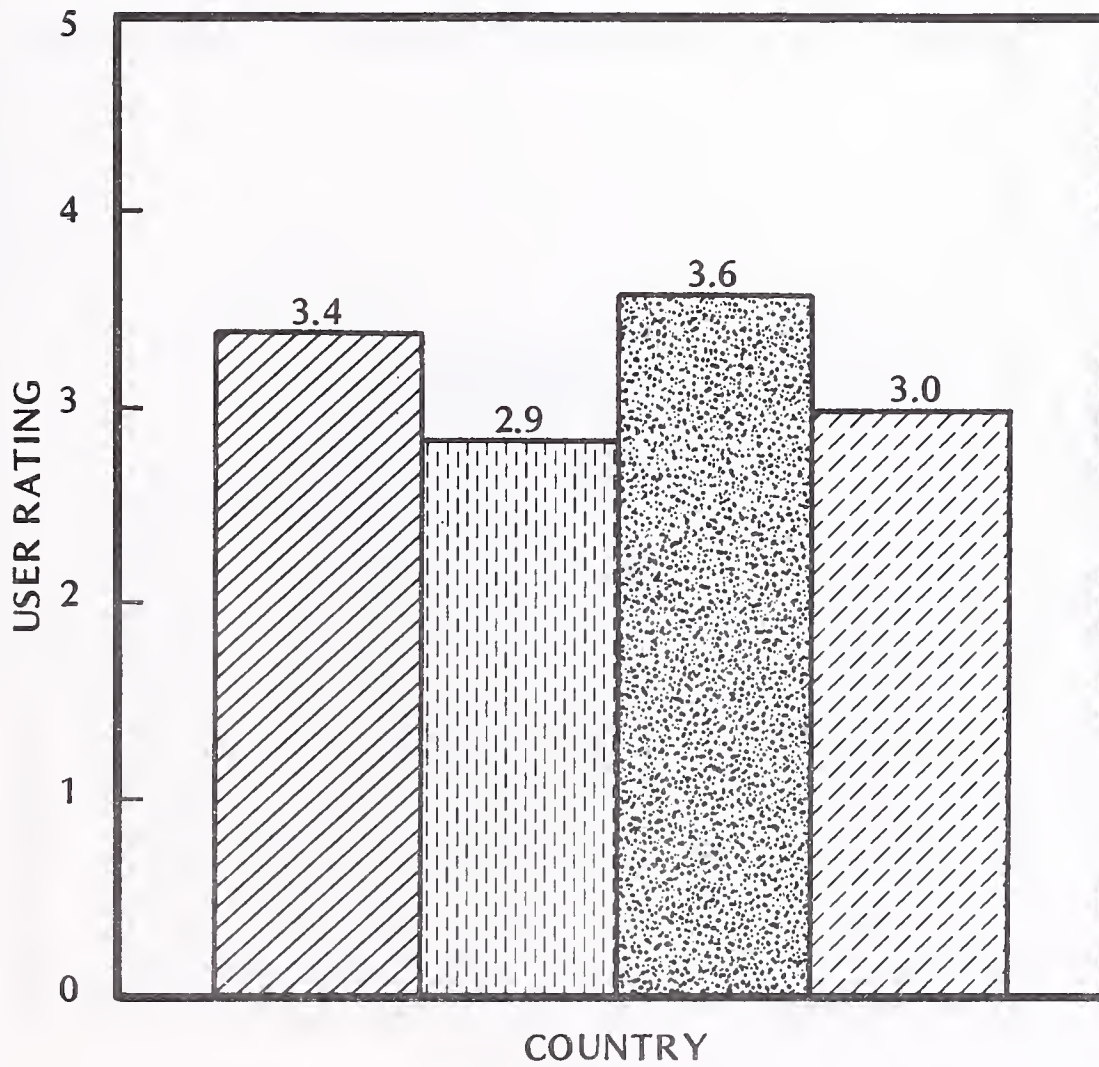
 UNITED KINGDOM

 WEST GERMANY

AVERAGE EUROPE = 3.3

EXHIBIT III-19

USER SATISFACTION WITH QUALITY OF
SMALL BUSINESS SYSTEM MAINTENANCE



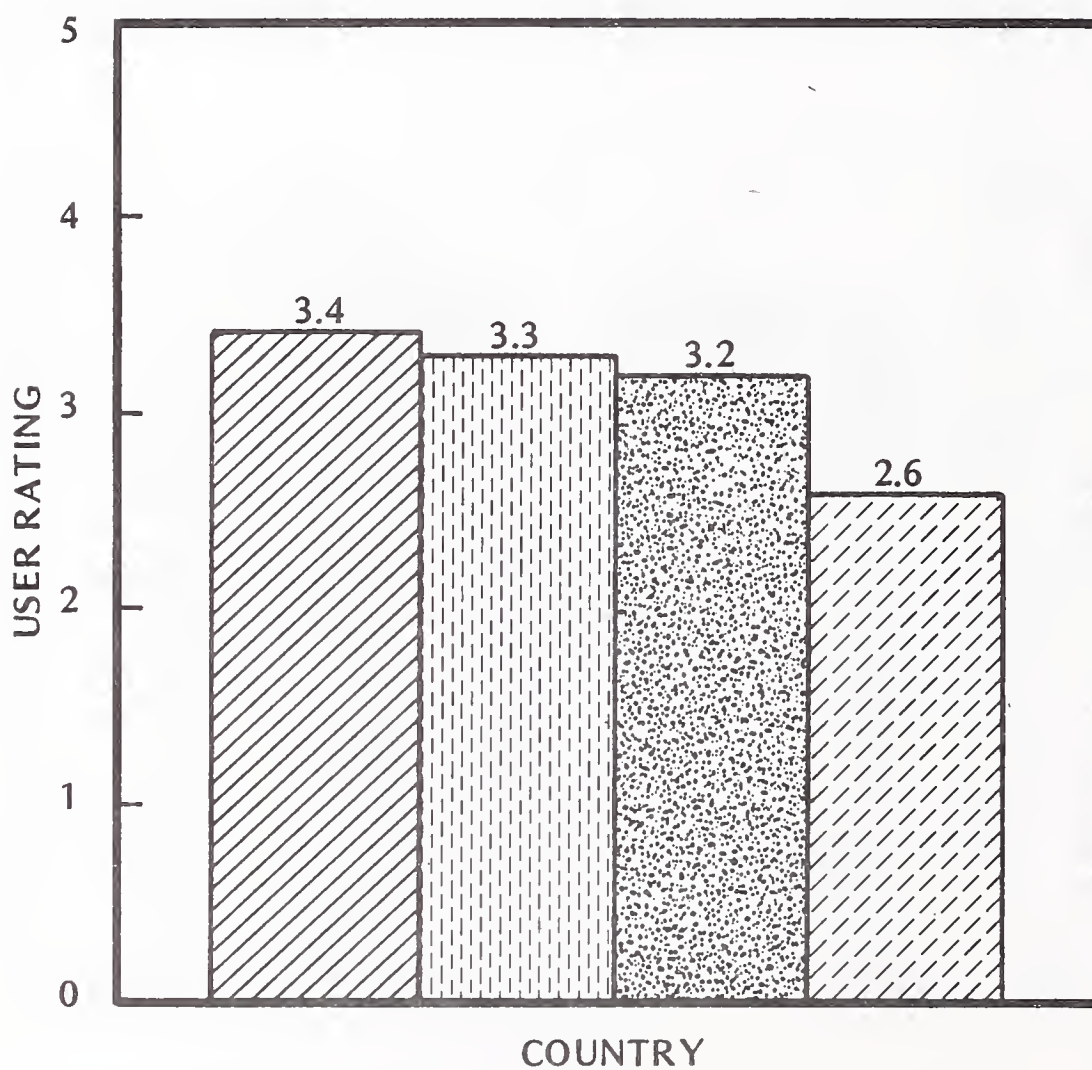
1 = POOR, 3 = AVERAGE, 5 = EXCELLENT

-  UNITED STATES
-  FRANCE
-  UNITED KINGDOM
-  WEST GERMANY

AVERAGE EUROPE = 3.2

EXHIBIT III-20

USER SATISFACTION WITH QUALITY OF
MINICOMPUTER MAINTENANCE



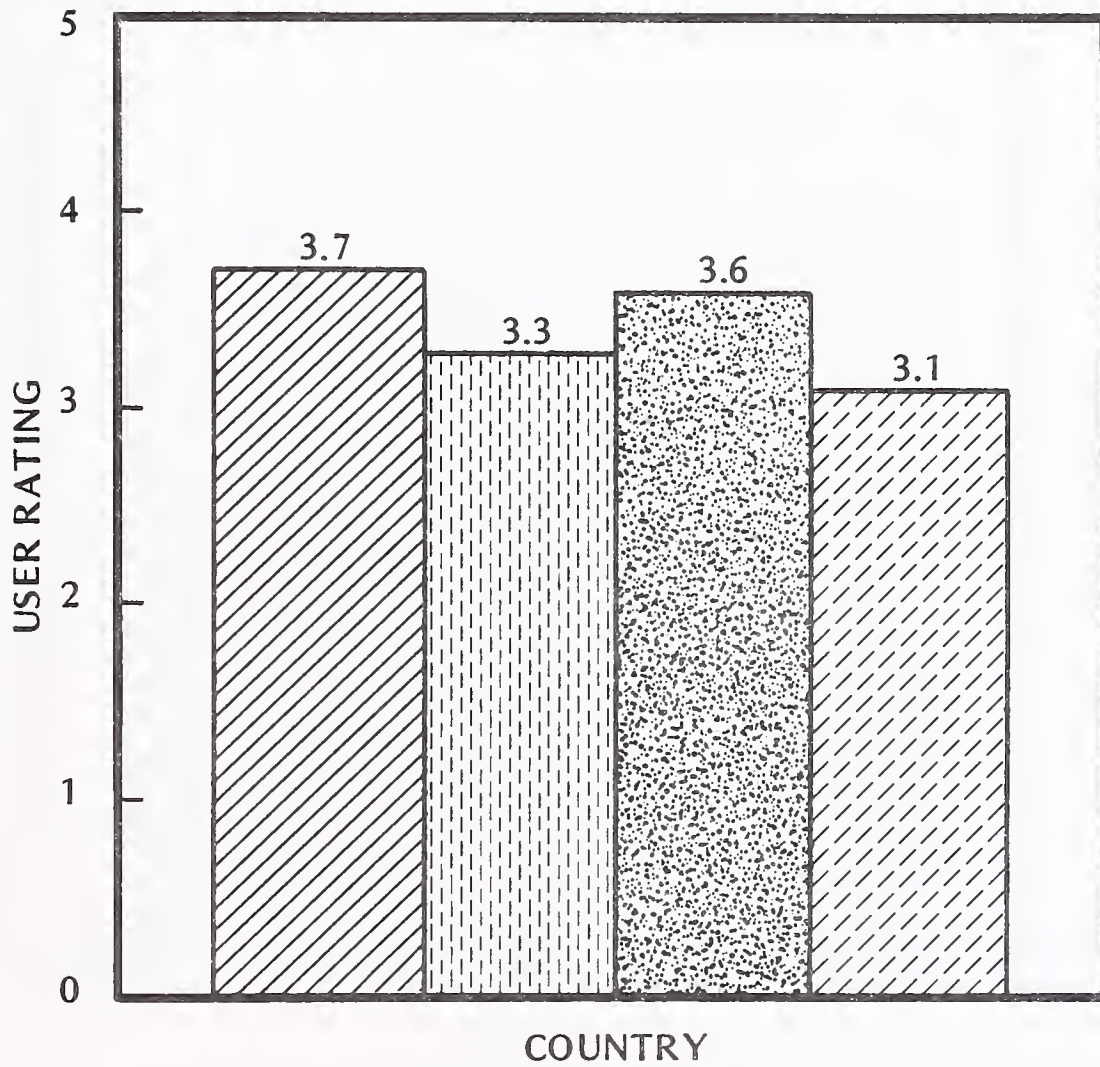
1 = POOR, 3 = AVERAGE, 5 = EXCELLENT

-  UNITED STATES
-  FRANCE
-  UNITED KINGDOM
-  WEST GERMANY

AVERAGE EUROPE = 3.0

EXHIBIT III-21

USER SATISFACTION WITH QUALITY OF PERIPHERAL MAINTENANCE



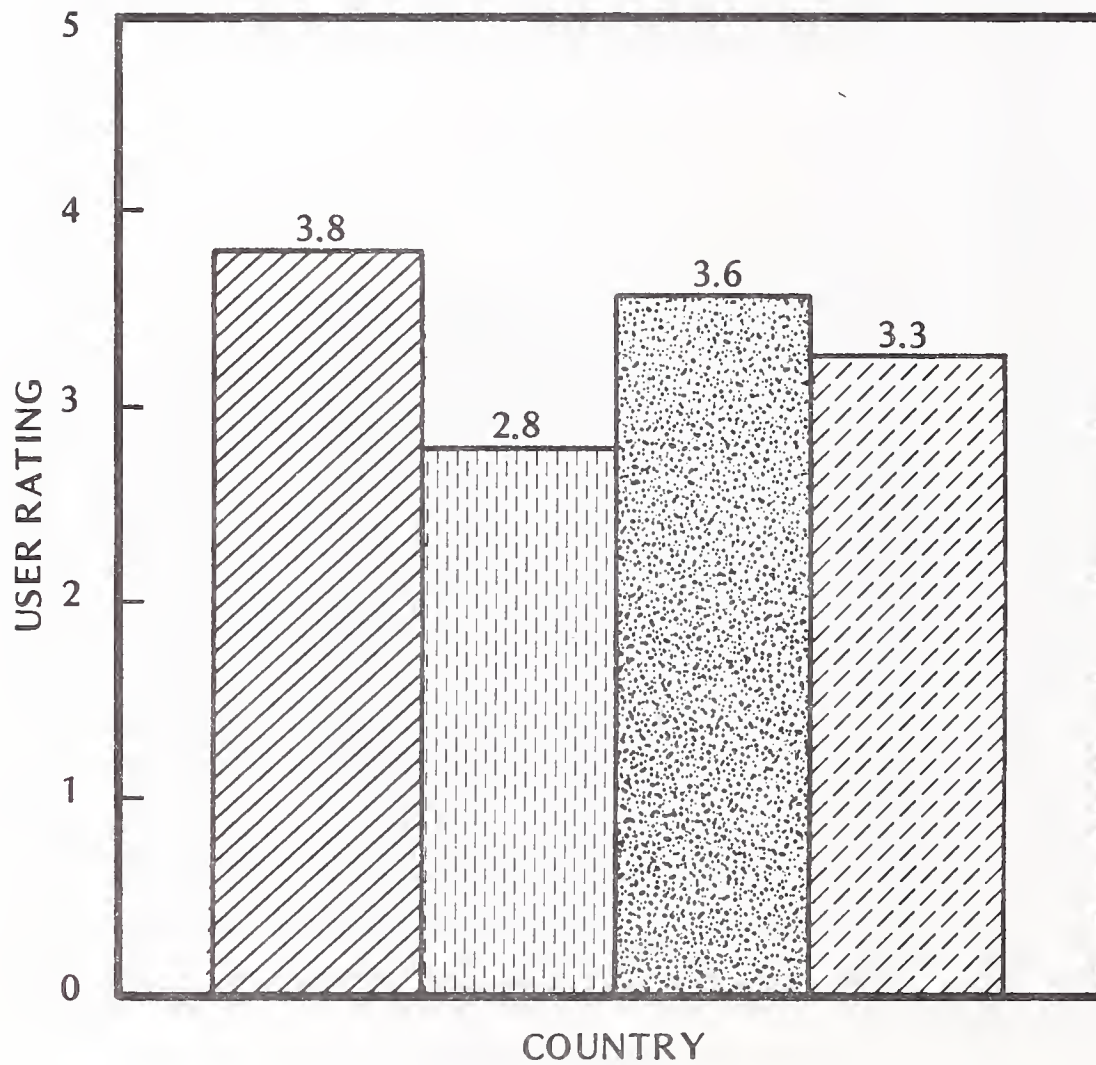
1 = POOR, 3 = AVERAGE, 5 = EXCELLENT

-  UNITED STATES
-  FRANCE
-  UNITED KINGDOM
-  WEST GERMANY

AVERAGE EUROPE = 3.3

EXHIBIT III-22

USER SATISFACTION WITH QUALITY OF
DATA TERMINAL MAINTENANCE



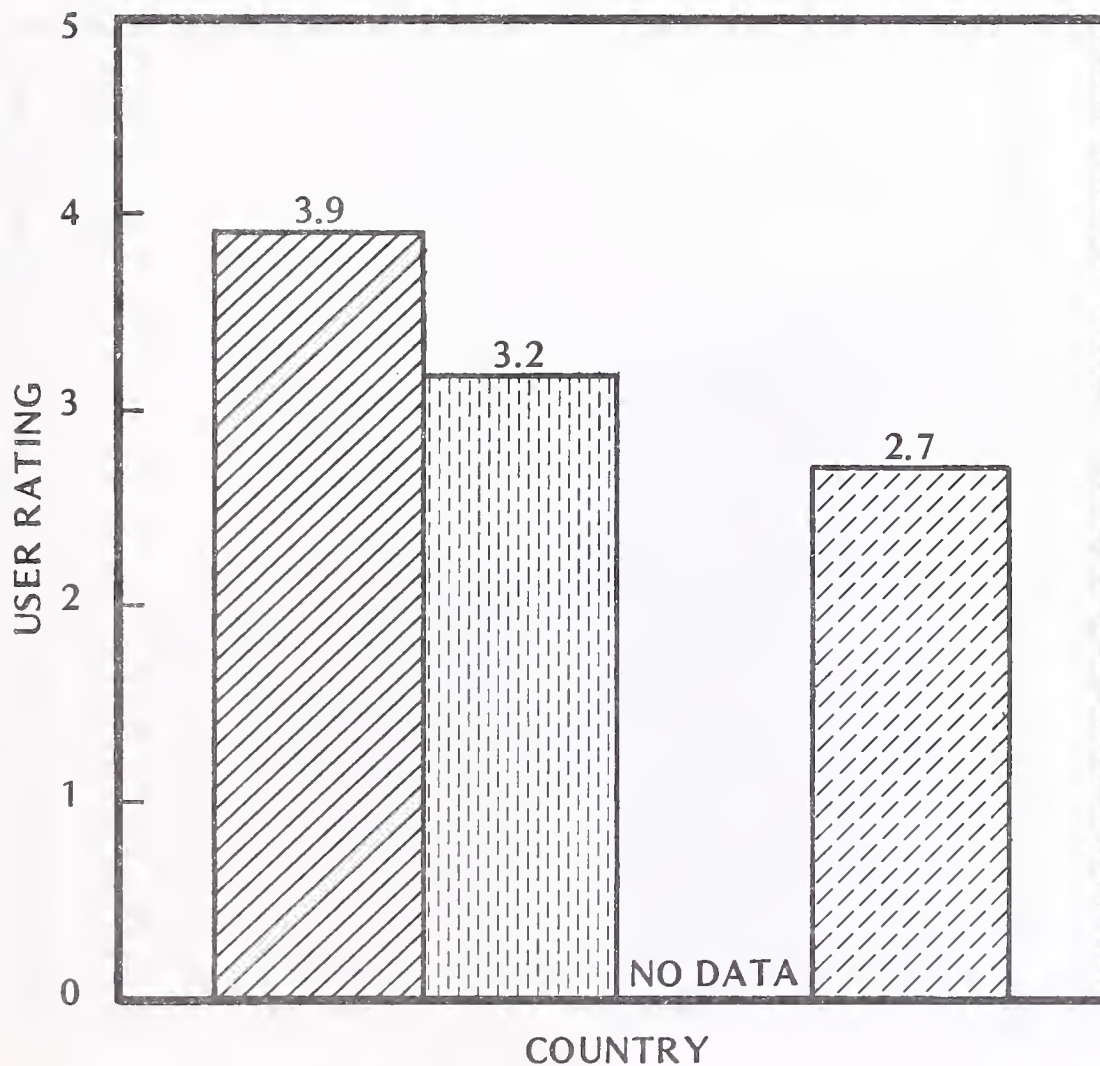
1 = POOR, 3 = AVERAGE, 5 = EXCELLENT

-  UNITED STATES
-  FRANCE
-  UNITED KINGDOM
-  WEST GERMANY

AVERAGE EUROPE = 3.2

EXHIBIT III-23

USER SATISFACTION WITH QUALITY OF
WORD PROCESSOR MAINTENANCE



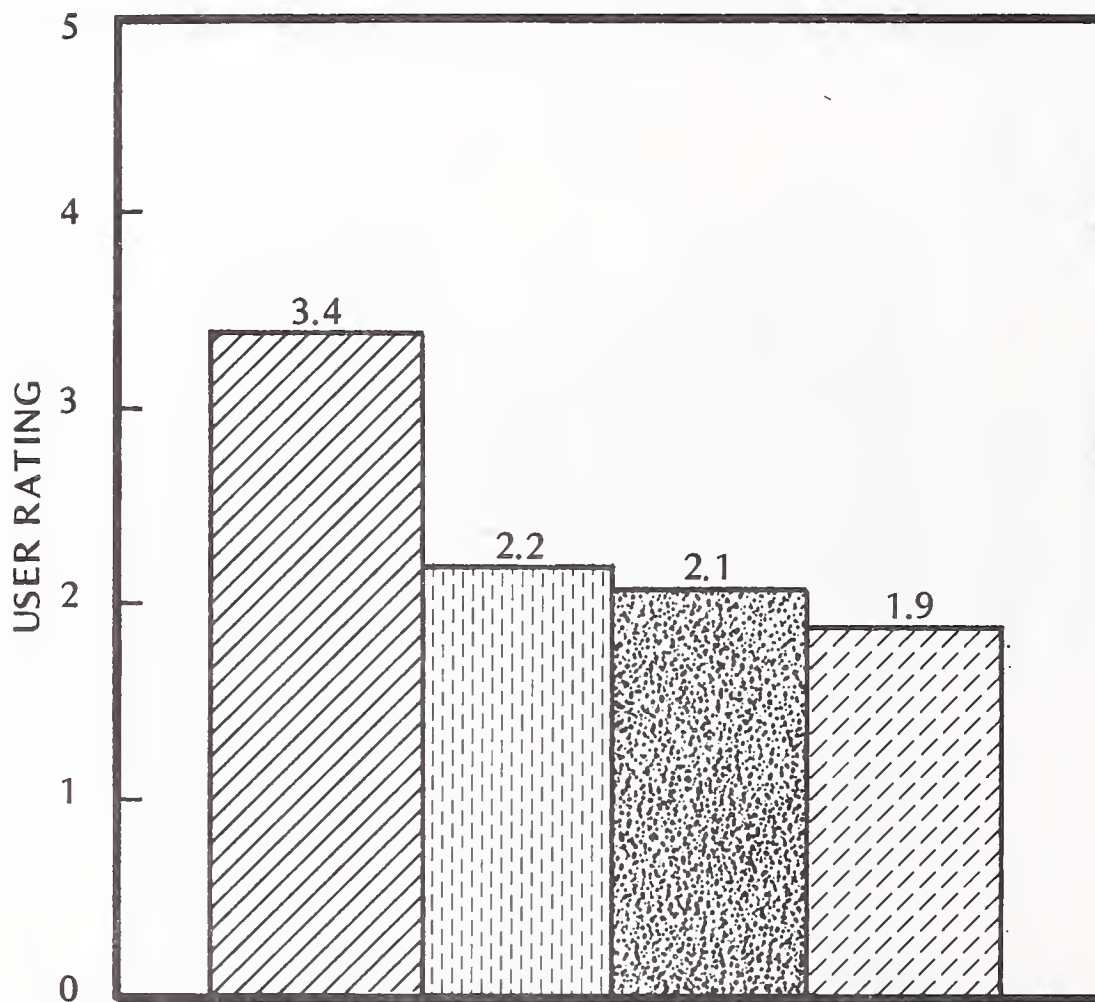
1 = POOR, 3 = AVERAGE, 5 = EXCELLENT

-  UNITED STATES
-  FRANCE
-  UNITED KINGDOM
-  WEST GERMANY

AVERAGE EUROPE = 3.0

EXHIBIT III-24

USER SATISFACTION WITH QUALITY OF APPLICATIONS SOFTWARE MAINTENANCE



COUNTRY

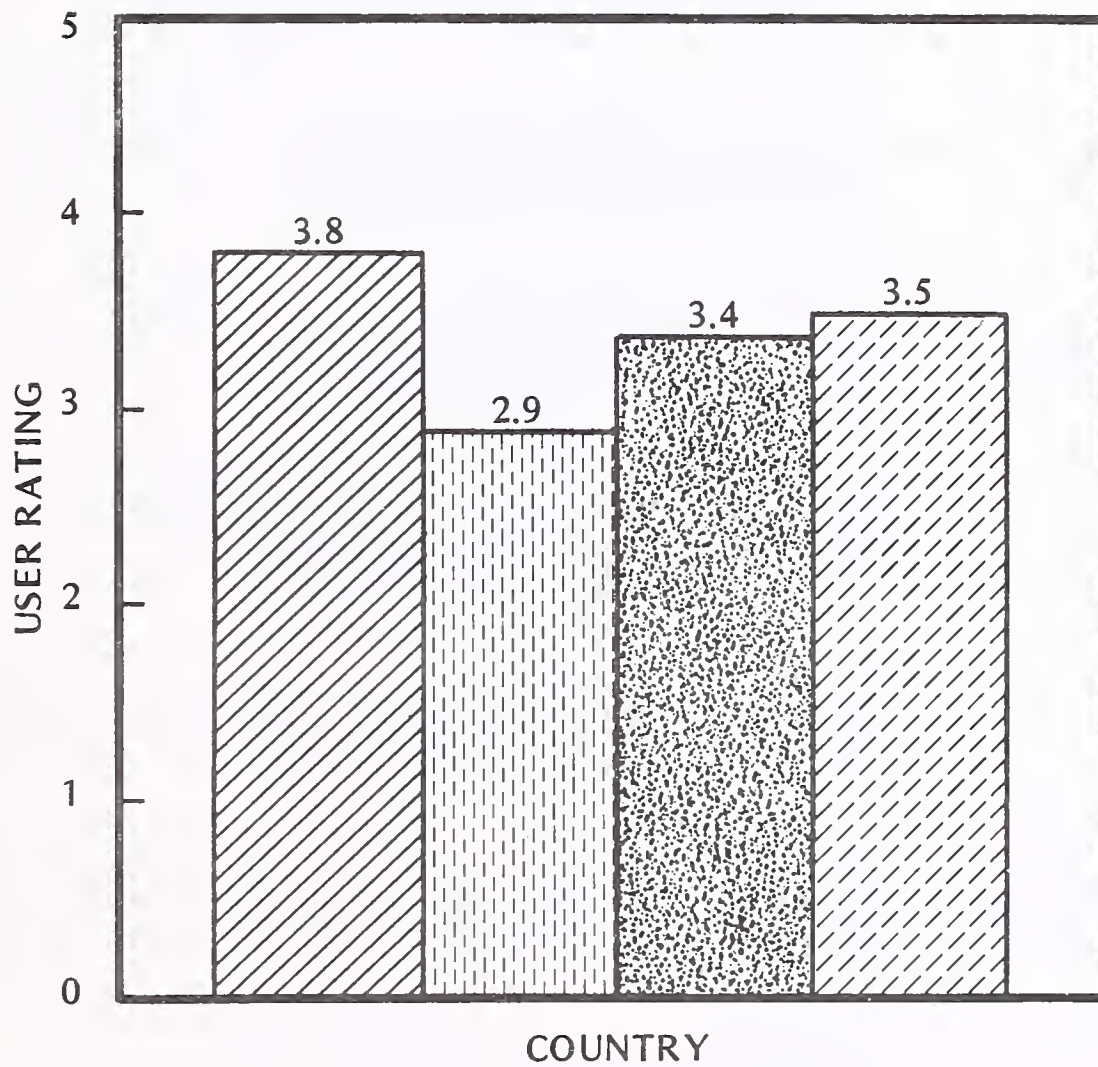
1 = POOR, 3 = AVERAGE, 5 = EXCELLENT

-  UNITED STATES
-  FRANCE
-  UNITED KINGDOM
-  WEST GERMANY

AVERAGE EUROPE = 2.1

EXHIBIT III-25

USER SATISFACTION WITH QUALITY OF
SYSTEMS SOFTWARE MAINTENANCE



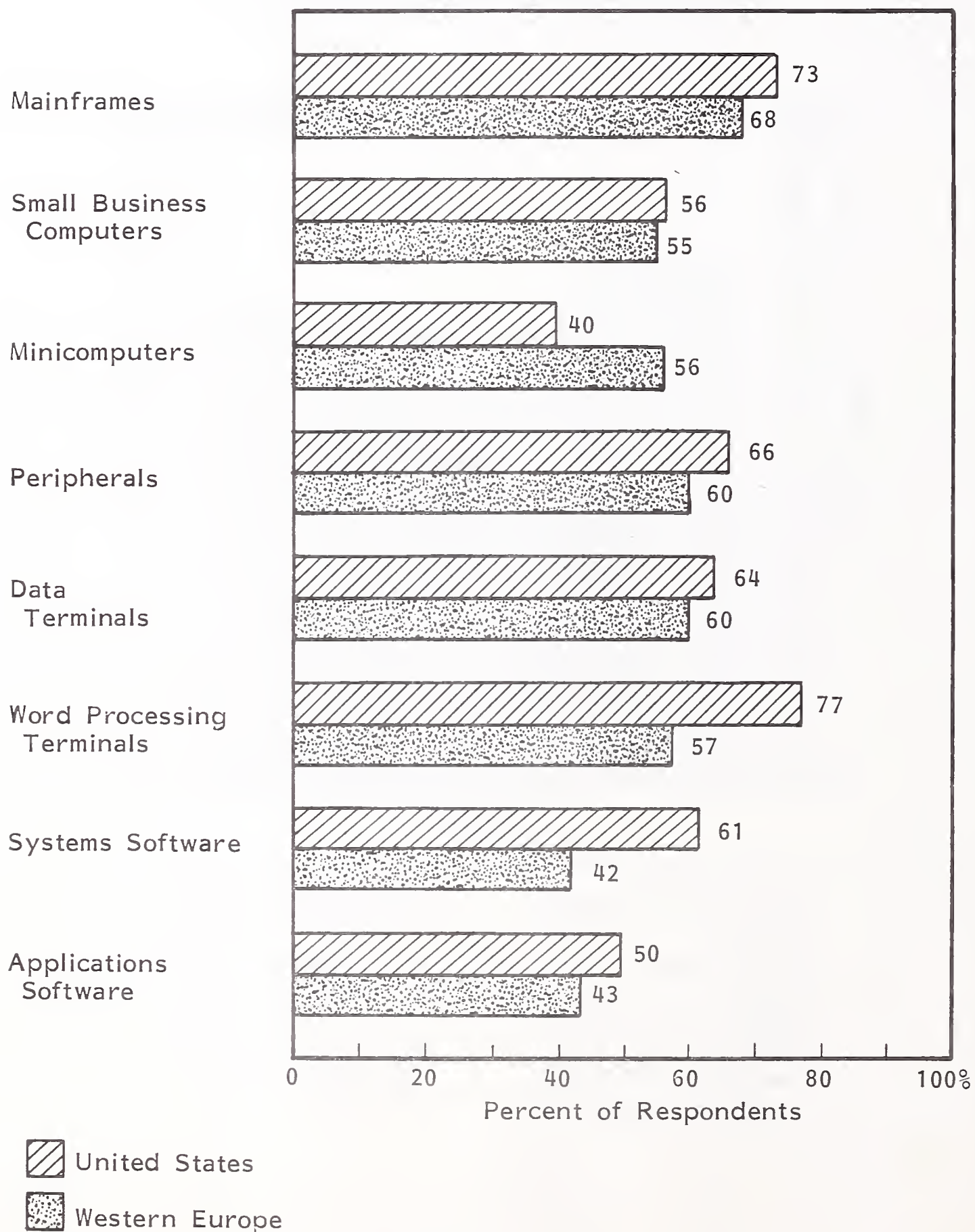
1 = POOR, 3 = AVERAGE, 5 = EXCELLENT

-  UNITED STATES
-  FRANCE
-  UNITED KINGDOM
-  WEST GERMANY

AVERAGE EUROPE = 3.3

EXHIBIT III-26

PERCENT OF RESPONDENTS REPORTING
HIGH LEVELS OF SATISFACTION WITH MAINTENANCE



- Combining the U.S. figures in these exhibits gives an average U.S. user a satisfaction level of 3.6, 0.5 better than the combined Western European responses.
- U.K. users were the most satisfied in Western Europe with an average of 3.3; as seen in earlier exhibits they also tend to have low expectation levels.
- West German users with an average of 2.9 are least satisfied.
- Minicomputers was the only category in which Western European user responses had a greater value than the U.S. user responses.
 - Significantly better responses were received in the U.S. for applications software, word processing, mainframe systems, and systems software.
- In Western Europe, applications software maintenance is in an unsatisfactory state and leaves considerable room for improvement.

F. USER MAINTENANCE ISSUES

- In Exhibits III-27 and III-28, the responses by users to the importance of maintenance issues are tabulated.
 - Exhibit III-27 is the sum of all users on a country by country basis.
 - Exhibit III-28 breaks the users down into IBM users and non-IBM users.
- Users in the U.S., as do their counterparts in Europe, rate inherent equipment availability (reliability and uptime) as most important.

EXHIBIT III-27

USERS' RATINGS OF IMPORTANCE OF
MAINTENANCE ISSUES

MAINTENANCE ISSUE	UNITED STATES	FRANCE	UNITED KINGDOM	WEST GERMANY	AVERAGE
Escalation Procedures	3.7	3.0	4.0	3.3	3.5
Equipment Reliability	4.4	4.7	4.8	4.7	4.7
Price of Maintenance	3.8	4.5	4.3	2.8	3.9
Remote Diagnostics	2.7	2.5	4.3	3.0	3.1
Repair Time	4.2	3.5	4.5	4.7	4.2
Response Time	4.3	4.2	4.5	4.8	4.5
Software Maintenance	3.6	3.5	4.0	3.0	3.5
Support Centres	3.3	3.2	3.0	3.3	3.2
Uptime	4.5	3.5	3.5	3.3	3.7
*All Maintenance Issues	3.8	3.6	4.1	3.7	3.8

Rating:
1 = Low
5 = High

EXHIBIT III-28

USERS' RATINGS OF IMPORTANCE OF
MAINTENANCE ISSUES, IBM VERSUS NON-IBM

MAINTENANCE ISSUE	IBM		NON-IBM	
	U.S.	WESTERN EUROPE	U.S.	WESTERN EUROPE
Response Time	4.0	4.5	4.5	4.6
Repair Time	4.0	4.5	4.4	4.6
Remote Maintenance	2.5	2.8	3.2	2.7
Escalation Procedures	3.8	4.2	3.6	3.8
Price of Maintenance	3.1	4.3	4.5	4.3
Equipment Reliability	4.1	5.0	4.7	4.8
Support Centres	3.0	3.2	3.5	3.3
Software Maintenance	3.4	4.2	3.8	4.0

Rating :

1 = Low

5 = High

- Once the equipment fails, attention focuses on the response time and then the repair time.
- Users are less interested in the mechanics of returning the system to a working state (i.e., escalation, diagnostics, and support centres).
- The price of maintenance seems only moderately important, reinforcing INPUT's belief that users are willing to pay for service.
- In comparing IBM users' and non-IBM users' ratings on importance of maintenance issues there are few differences.
 - The most significant difference between IBM and non-IBM maintenance issues are maintenance pricing in the U.S. and escalation procedures in Western Europe.

IV VENDOR SURVEY COMPARISON

IV VENDOR SURVEY COMPARISON

A. INTRODUCTION

- This section is a comparative analysis of the data provided by Western European and U.S. field service executives of significant maintenance vendors in mainframes, small business systems, minicomputers, peripherals, terminals, and word processors.
- In Western Europe, a total of 46 vendor organisations were interviewed, the majority operating on a country basis. In the U.S., INPUT interviewed vendors from all parts of the U.S. mainland.
- The actual size of the field service organisation interviewed ranged from below 50 engineers to organisations with more than 5,000 field engineers.
- Senior executives normally took part in the survey and appeared to INPUT interviewees to be very open, including traditionally delicate financial matters.
- Generally speaking, the problems facing field service managers on both sides of the Atlantic were common.
 - Field service remains a customer-event-driven, labour-intensive industry.

- The balance between service and profit is far from easy.

B. VENDOR EQUIPMENT AVAILABILITY

- The vendor believes he provides better equipment availability than the user reports (Exhibits III-17 and IV-1).
- It is time that vendors and users got together to define equipment availability.
 - It is apparent that there is a lack of dialogue between user and vendor; many vendors are so locked into response times that they are deaf to user definitions that need a degree of interpretation to match vendor figures.

C. COSTS OF TYPICAL FAULT CALL

- There is a considerable apparent difference between direct labour cost (percentage of total fault call) in Western Europe, which averages 26%, versus the U.S., which is 53%, as shown in Exhibit IV-2.

D. SALARIES

- The subject of salaries is important to every engineer but often overestimated by field service management as a major motivator.
 - Paying the right salary has a nominal effect and does not result in increased productivity.

EXHIBIT IV-1

VENDOR RESPONSES TO
EQUIPMENT AVAILABILITY

EQUIPMENT TYPE	AVERAGE UPTIME (percent)	
	UNITED STATES	WESTERN EUROPE
Mainframes	98.9%	98.0%
Small Business Systems	99.0	97.6
Minicomputers	98.2	97.0
Peripherals	97.4	95.8
Data Terminals	98.7	95.4
Word Processors	97.9	97.0

EXHIBIT IV-2

COST BREAKDOWN OF TYPICAL FAULT CALL

COSTS	UNITED STATES	FRANCE	UNITED KINGDOM	WEST GERMANY	BENELUX	SCANDINAVIA	SWITZERLAND
Average Cost (U.S. Dollars)	N/A	\$276	\$248	\$380	\$265	\$315	\$239
Direct Labour (percent)	53%	20%	29%	25%	32%	27%	21%
Travel Labour (percent)	17.5%	15%	14%	18%	16%	17%	9%
Parts and Materials (percent)	21%	15%	20%	17%	12%	16%	31%
Travel Expense (percent)	6%	10%	9%	15%	17%	16%	20%
Burden and Overhead (percent)	N/A	40%	28%	25%	23%	24%	19%
Average Number of Calls Per Week Per Engineer	N/A	6.5	7.5	6.3	5.0	7.0	8.5

N/A = NOT AVAILABLE

- A salary rise is short lived in its motivational effect; after six to eight weeks it is forgotten.
- Percentage increases in salaries are higher in Western Europe except for field service line managers. U.S. line managers received more than twice the percentage increase of their Western European counterparts, as shown in Exhibit IV-3. This exhibit highlights two facts:
 - Inflation is greater in Western Europe than in the U.S.
 - In Western Europe, the fact that effective management is related to the type and quality of people employed has yet to be fully realised.
- Salaries for each employee classification are not significantly different in Western Europe compared with the U.S., as shown in Exhibit IV-4.
- Western European salary ranges, in terms of spread are triple those of the U.S. in the FE trainee classification and more than double in the software support engineer classification.
- A common complaint reported to INPUT was that engineering salaries are depressed by the relatively low level of compensation of senior field engineer managers and executives.
 - A major small business computer manufacturer in the U.K. advertised for a country field service manager with a salary increase of \$40 and was deluged with applications from field service managers from similar positions.
 - The true contribution of field service must be realised and salaries commensurate with that level of responsibility paid.

EXHIBIT IV-3
 AVERAGE ANNUAL FIELD SERVICE EMPLOYEE SALARIES -
 PERCENT INCREASE IN AVERAGE SALARY, 1980-1981
 (U.S. \$ thousands) *

EMPLOYEE CLASSIFICATION	UNITED STATES		BENELUX		FRANCE		SCANDINAVIA		SWITZERLAND		UNITED KINGDOM		WEST GERMANY	
	AVERAGE SALARY ¹	PERCENT INCREASE ²	AVERAGE SALARY	PERCENT INCREASE	AVERAGE SALARY	PERCENT INCREASE	AVERAGE SALARY	PERCENT INCREASE	AVERAGE SALARY	PERCENT INCREASE	AVERAGE SALARY	PERCENT INCREASE	AVERAGE SALARY	PERCENT INCREASE
FE Trainee	\$15.24	7.6%	\$16.80	10.5%	\$20.00	4.8%	\$16.40	11.2%	\$15.20	10.4%	\$ 9.80	10.4%	\$20.10	5.2%
Qualified Field Engineer	18.90	7.8	19.20	10.5	20.10	5.2	18.60	10.8	16.10	11.1	13.00	10.4	20.60	5.2
Senior Field Engineer	22.30	7.2	21.40	10.2	22.10	5.1	21.70	13.1	17.30	9.8	14.60	10.2	26.10	5.0
Hardware Support Engineer	24.72	5.6	22.60	10.2	23.60	5.0	23.90	12.5	19.20	9.8	16.30	10.1	23.70	5.1
Software Support Engineer	25.08	8.7	25.10	10.6	22.40	4.5	21.80	15.0	23.40	11.3	17.00	12.8	24.20	6.0
Line Manager	30.45	19.3	27.60	10.4	32.30	5.5	28.50	9.8	27.10	10.0	21.70	10.9	32.80	5.5

1 = AVERAGE OF THE HIGH AND LOW AVERAGE 2 = PERCENT INCREASE OF HIGH AND LOW AVERAGE
 * CONVERSION RATES AS OF OCTOBER 1, 1981

EXHIBIT IV-4

FIELD SERVICE SALARY RANGES
(U.S. \$ thousands)*

EMPLOYEE CLASSIFICATION	UNITED STATES		BENELUX		FRANCE		SCANDINAVIA		SWITZERLAND		UNITED KINGDOM		WEST GERMANY	
	FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO	FROM	TO
FE Trainee	\$12.64	\$17.84	\$12.40	\$19.00	\$18.68	\$20.68	\$15.90	\$16.80	\$12.59	\$14.73	\$ 8.78	\$11.36	\$19.80	\$24.54
Qualified Field Engineer	15.42	22.44	16.30	23.00	18.16	20.14	17.00	19.80	13.20	16.15	11.31	14.64	18.51	22.82
Senior Field Engineer	18.23	26.38	17.50	23.90	20.50	23.80	20.00	23.80	14.01	17.77	12.70	15.97	23.68	26.04
Hardware Support Engineer	20.43	29.01	18.45	26.60	22.15	24.47	21.80	25.90	15.39	19.14	13.68	17.63	20.66	24.54
Software Support Engineer	21.37	28.80	21.00	30.50	21.22	23.28	19.90	23.80	19.40	24.37	14.09	17.14	21.52	24.54
Line Manager	24.51	36.38	22.10	34.00	31.28	34.16	25.50	30.60	23.36	26.56	17.35	22.26	27.55	34.01

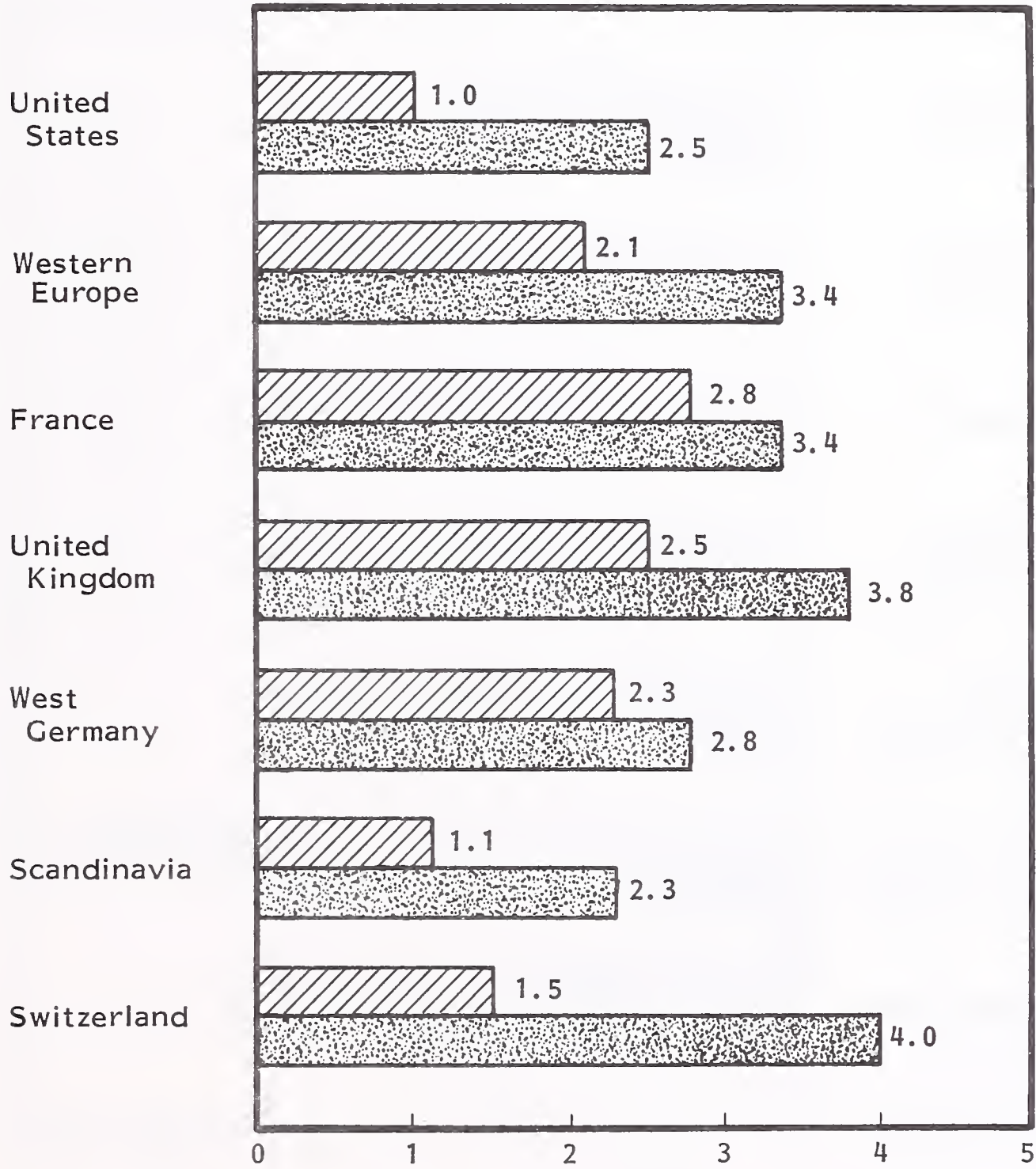
*CONVERSION RATES AS OF OCTOBER 1, 1981

E. WORK FORCE SOURCES

- Exhibits IV-5 through IV-9 reflect the reported sources of hiring field service people.
 - According to U.S. vendors, the order of priority is trade schools and the military followed by recruitment from competition, in-house resources, and finally 'off the street'.
 - Western European vendors cited the most important and current sources of hiring field service people as trade schools and competition, then came military, in-house, and 'off the street'.
- Projecting into 1986, U.S. and Western European vendors both agreed that there would be more 'off the street' people recruited into field service.
- With the growing importance of software there was also a trend reported of recruiting a higher level of entrants, mainly university graduates, than the traditional lower levels of entry.
 - Some field service managers feel threatened by this trend.
 - The recruitment of high calibre type engineers will accelerate the move to a two-tier engineer organisation.

EXHIBIT IV-5

VENDOR RATINGS OF FIELD SERVICE PERSONNEL SOURCES,
1981 AND 1986:
'OFF THE STREET'



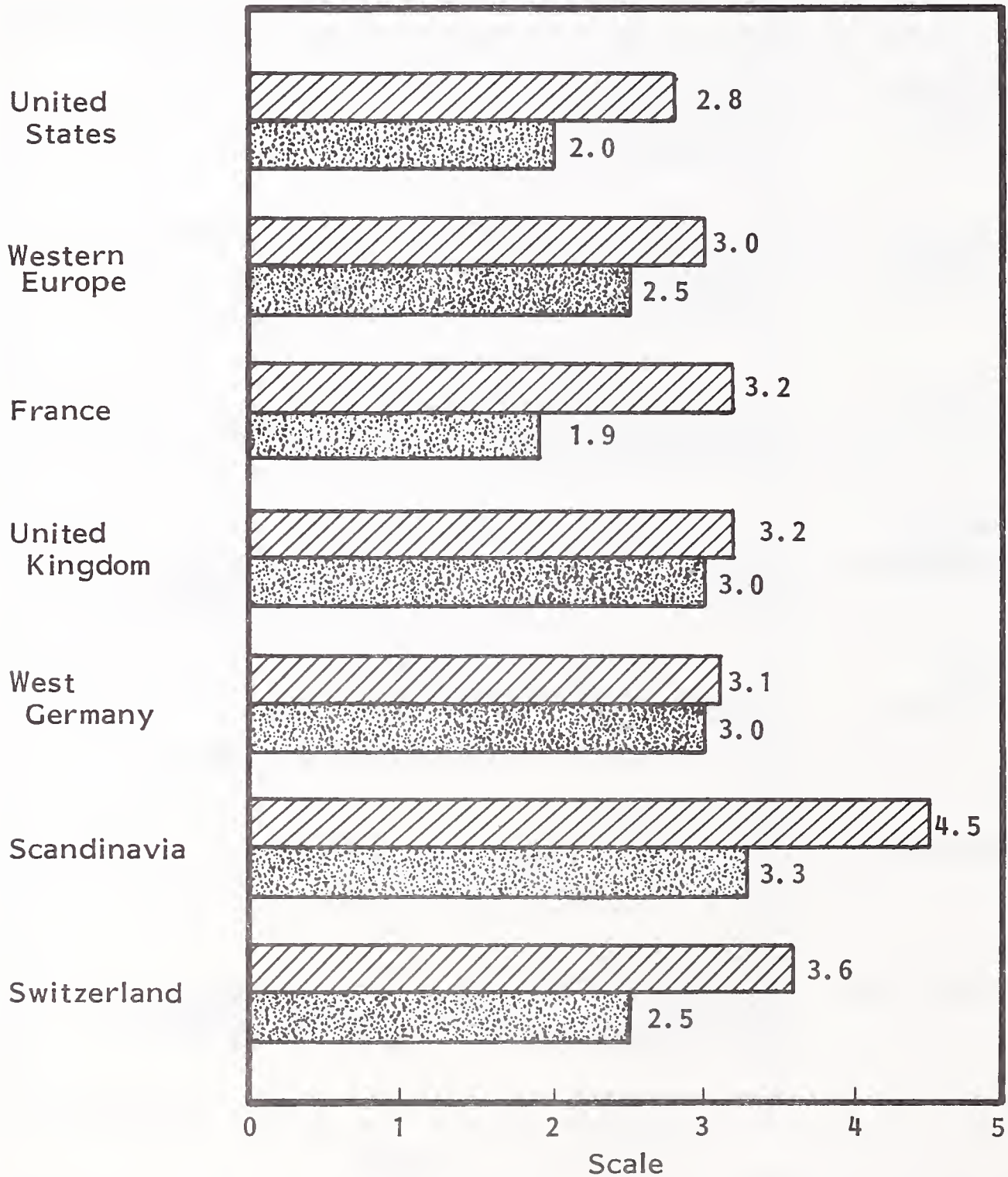
SCALE: 1 = UNIMPORTANT, 5 = VERY IMPORTANT

1981

1986

EXHIBIT IV-6

VENDOR RATINGS OF FIELD SERVICE PERSONNEL SOURCES,
1981 AND 1986:
RECRUIT FROM COMPETITION



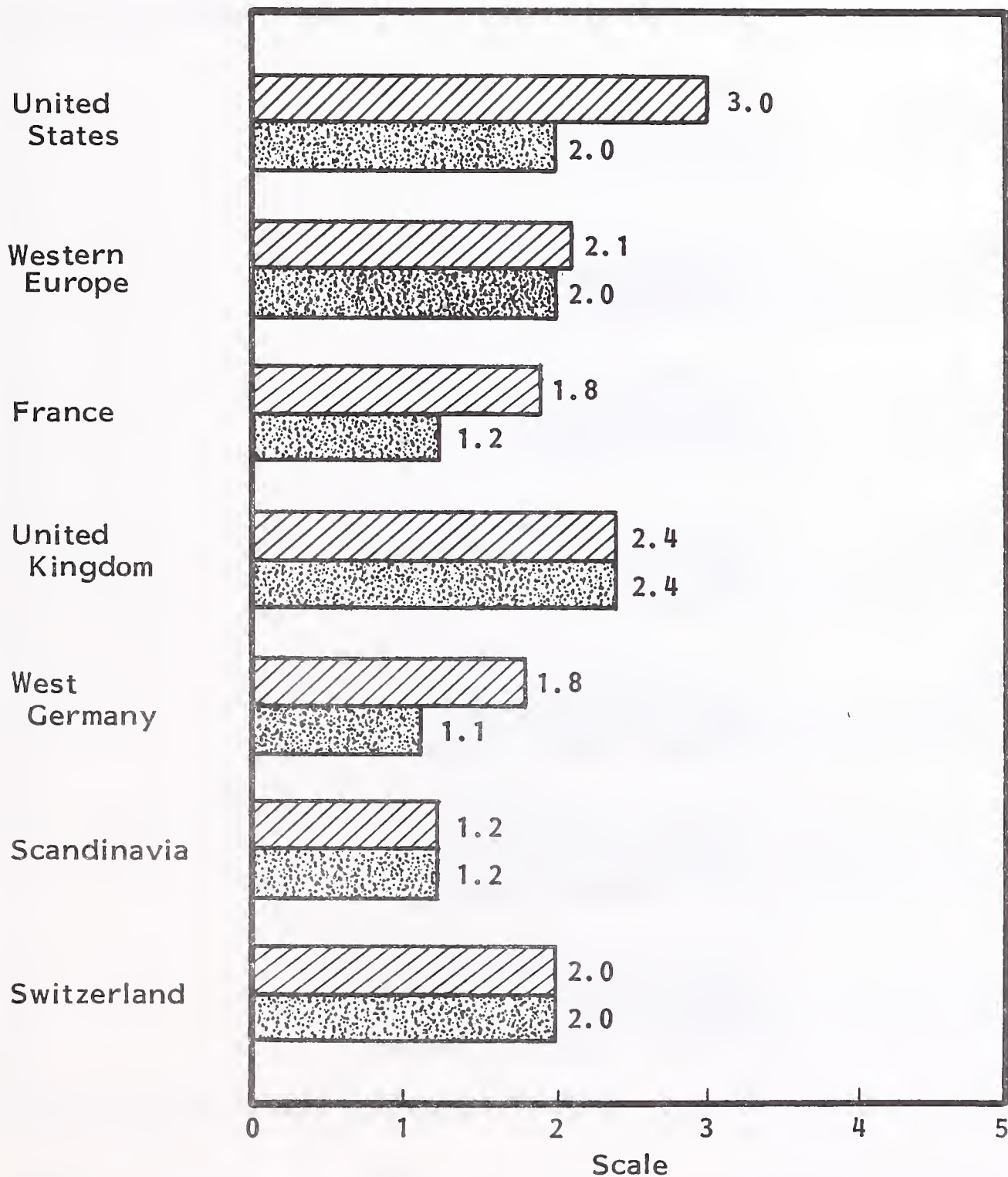
SCALE: 1 = UNIMPORTANT, 5 = VERY IMPORTANT

▨ 1981

▩ 1986

EXHIBIT IV-7

VENDOR RATINGS OF FIELD SERVICE PERSONNEL SOURCES,
1981 AND 1986:
MILITARY PERSONNEL TRAINEES



SCALE: 1 = UNIMPORTANT, 5 = VERY IMPORTANT

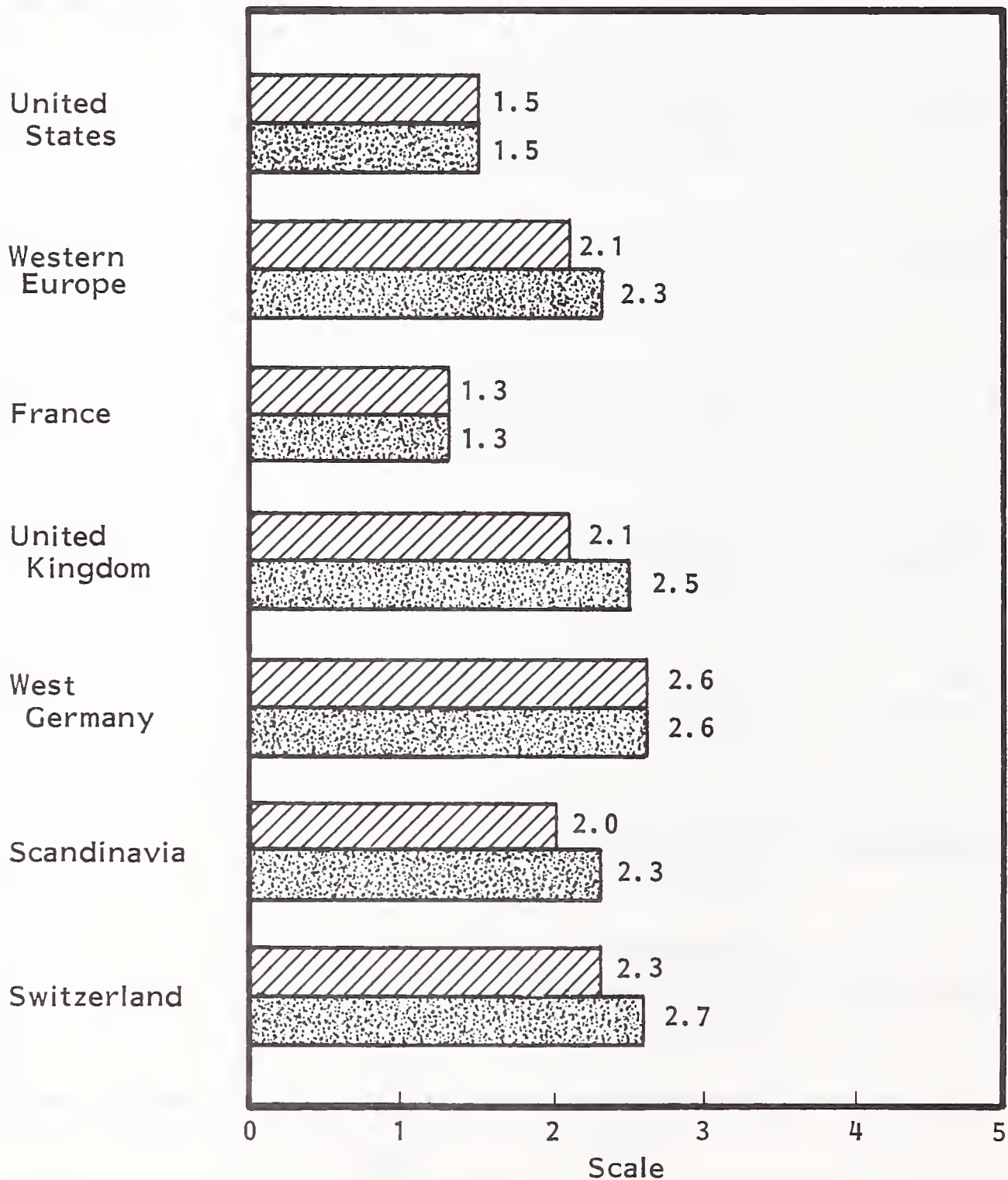
1981

1986

EXHIBIT IV-8

VENDOR RATINGS OF FIELD SERVICE PERSONNEL SOURCES,
1981 AND 1986:

RECRUIT FROM OTHER FUNCTIONS WITHIN THE COMPANY



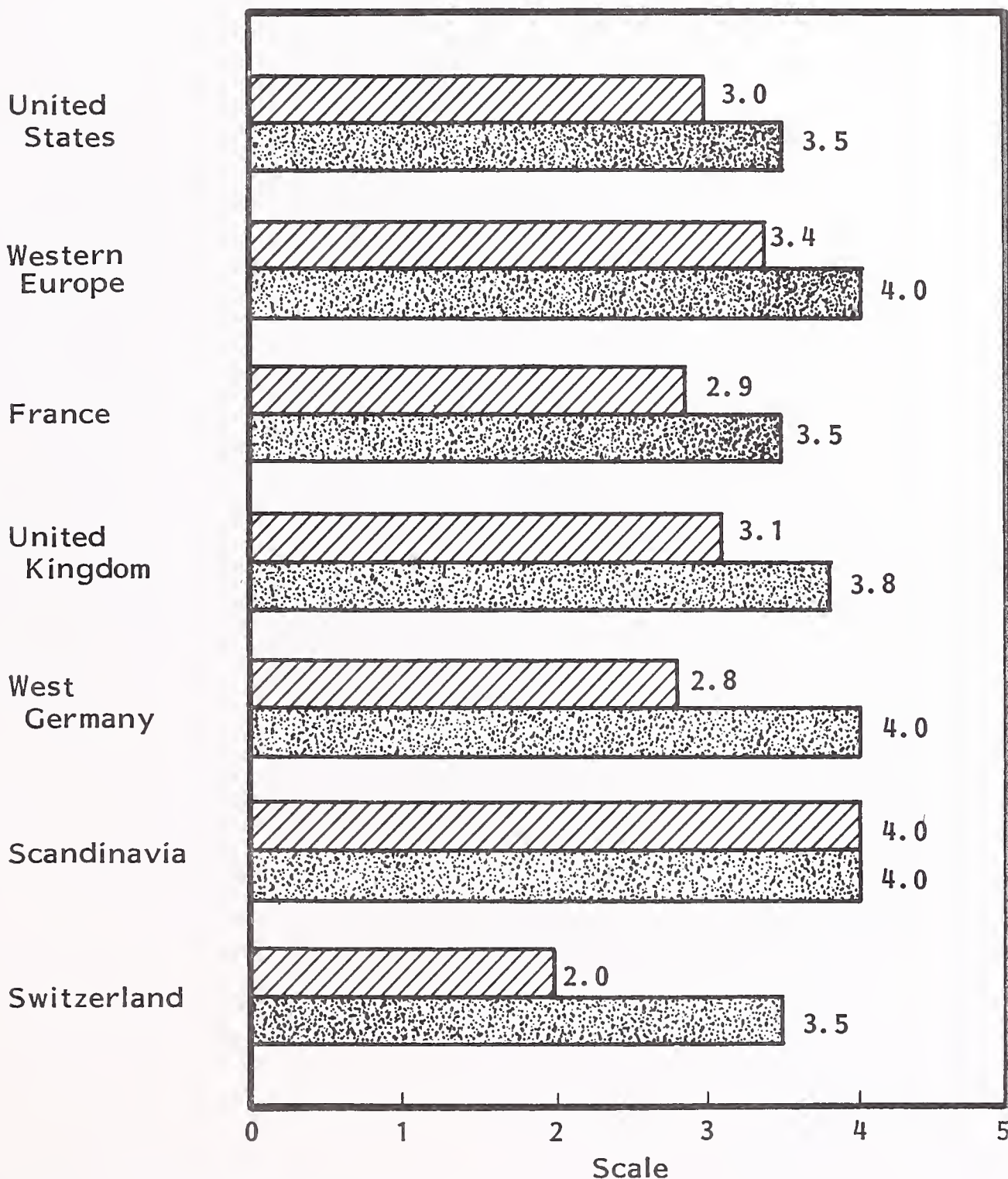
SCALE: 1 = UNIMPORTANT, 5 = VERY IMPORTANT

 1981

 1986

EXHIBIT IV-9

VENDOR RATINGS OF FIELD SERVICE PERSONNEL SOURCES,
1981 AND 1986:
TRADE SCHOOLS



SCALE: 1 = UNIMPORTANT, 5 = VERY IMPORTANT

 1981
 1986

