AN EMPIRICAL INVESTIGATION OF THE INTERACTION "MANAGER-TASK" USING A HUMAN INFORMATION PROCESSING APPROACH

TWO VOLUMES

VOLUME: 2

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CASE STUDY : COMPANY A

(A) THE COMPANY

Company A is a small company employing about seventy people. It is a system to manufacture and fit (in part) high quality automobile sunroofs for both UK and foreign markets. Initially the company started off as an importer of sunroofs. However the poor quality of the product meant a large proportion were being returned. It was at this point that Company XZ bought out Company A and decided instead to manufacture its own high quality, leak proof, sunroof. Company XZ acquired 90% of the equity holding in Company A, with the remaining 10% going to the Technical Director of Company A. Company XZ trades locally under the name of Company XY and operates a series of garages. Company XZ's equity is distributed amongst three directors, each owning 20%, with the remaining 40% distributed amongst a number of other stockholders.

Company A appears to have two main business areas. The first is the manufacture of sunroofs. The second is a "fitting service", that is the installation of the sunroofs to the customer's car.

Over the last three years sales have risen from approximately 150,000 to 3,500,000 sterling pounds. Sales at the end of this year (1985) are expected to rise by about 50%. The company not only distributes its products within the U.K. market but also exports them to the E.E.C., Australia, Austria, Canada, New Zealand and the U.S.A. At the end of the last year overseas sales represented 15% of gross sales, and at the end of the present year they are expected to rise to 40% of gross sales. The company has basically two product models, the TX2 and the TVX4, with a new tilt and slide model, the TS3, just beginning to be produced. The company also has a TX3 model under development. 93% of gross profits are generated by sales of sunroofs with the remaining 7% being generated by the fitting service. The company prides itself in having a high quaiity product on the market at a competitive price. Demand for its products at present is far

outstripping supply, and the company is making no real effort at present to increase export sales as it does not yet have the plant capacity to meet new markets. However, a new larger plant was under study, coupled with a new multi-head drilling machine under development, that are both expected to increase substantially production capacity. Management felt that they had no real competitors, because of the high quality nature of their products and market recognition that they were producing the best sunroof on the market at a competitive price.

The company had no formal organisation chart, however one was made up by the analyst according to the perception of the Managing Director, which is shown in Exhibit 1. At the time of the study the Commercial Manager had just been appointed with responsibility for accounts, finance and administration, with two clerks, a part-time bookkeeper and two secretaries reporting to him. The Technical Director was supported by a draughtsman to aid him in the design of the products. A new position, that of a project engineer, had also been created to aid the Technical Director in the design of the products. The Production Manager also had a number of labourers and a forklift operator reporting directly to him. The Fitting Shop Manager had five fitters reporting to him, with a receptionist handling customer services. The accounting function had previously been carried out by a company accountant at Company XZ.

In technological terms the following activities can be recognised:

(a) Aluminium Machining.

Here, aluminium frames, originally in straight bar lengths, are manipulated, shaped and welded into the shape of the sunroof. This activity is at present being carried out by an outside contractor.

(b) Powder Coating.

The machined frames plus jigs are powder coated. This activity is at present being carried out by an outside contractor.

(c) Machine Shop Operations.

Once the frames are received from the aluminium machiners they then go into the machine shop for the machining operations to be carried out. On the trim frame there is just a single mill and drill operation, where the trim frame is loaded onto a machine and that machine carries out all the milling and drilling on that particular frame. Then the frame comes off the machine, and it is deburred by the operator using a wire wheel and a countersome drill to remake the burrs from the drill holes. The frame is then camberred (a manual operation), slotted into a camberred tool, manually pressed down, turned 180 degrees and camberred the other half of the frame. It is then put on a rack until the end of the shift, when it's unloaded into crates ready to go away to be powder coated. The main frame is more complicated, in that there are two machining operations. The front of the main frame has a mill and drill operation carried out on it, which mills in the latch mechanism slot and also mills in the hinge guide slots, changes turrets and then drills the required number of holes. Once the mill and drill operation has been completed, the frame is then taken off and put onto another machine, turned over through 360 degrees and then the clamp screw holes are drilled in the back of the frame. The hinge guide castings are then put on, the frame is then camberred and goes on to be lynched and dressed. It is then packed and crated ready to go to the powder coaters. (see Exhibit 2)

(d) Small Machine Shop Operations.

The small machine shop is responsible for tapping the No.8 cap that is used on top of the roof. The tapping operation is carried out on the cap and on the retainer plate. The small diecasting components are then put on to jigs. The jigs are then crated to be sent away to be powder coated. (see Exhibit 3)

(e) Assembly Shop Operations.

In the assembly shop, operations are carried out in teams of two women. Then one woman picks the frame from the crate at the end of the

bench. First job is to inspect the frame, that is inspect the quality of the powder coating to see if it is satisfactory. If it is satisfactory she attaches the latch bracket frame and the retainer plate with screws and then installs the gasket into the main frame. She then puts the frame onto a woodon rack on a bench ready for the next woman on the line who, at the same time as the woman installing the gasket, is making or attaching all the components to the piece of glass. This involves first inspecting the glass for blemishes and tolerances. If the glass passes the test she then attaches all the components to it, the handle, caps and the hinge blades, and then installs the glass into the main frame, cleans the glass and attaches the main frame to the back of the roof. The roof is then put into a plastic bag with a small bag of components and the necessary installation instructions, which is then put into a cardboard box. (see Exhibit 4)

(f) Sub-Assembly Operations.

In sub-assembly women are employed to cut the trim strip to length, make up the handle assembly and bag the clamp screws to make up a screw kit. (see Exhibit 5)

Five women are employed in sub-assembly and eighteen in the assembly shop operations.

(2) Fitting Services.

Here, a very basic operation is carried out where customers bring in their cars to have the sunroof fitted. Five fitters are employed and they use company made sunroofs in the installation operation. At present 12 to 13 cars are fitted every day. (see Exhibit 6)

The overall flow of materials within the manufacturing division is shown in Exhibit 7 and the site layout for both divisions in Exhibit 8.

ORGANISATIONAL CHART OF COMPANY A

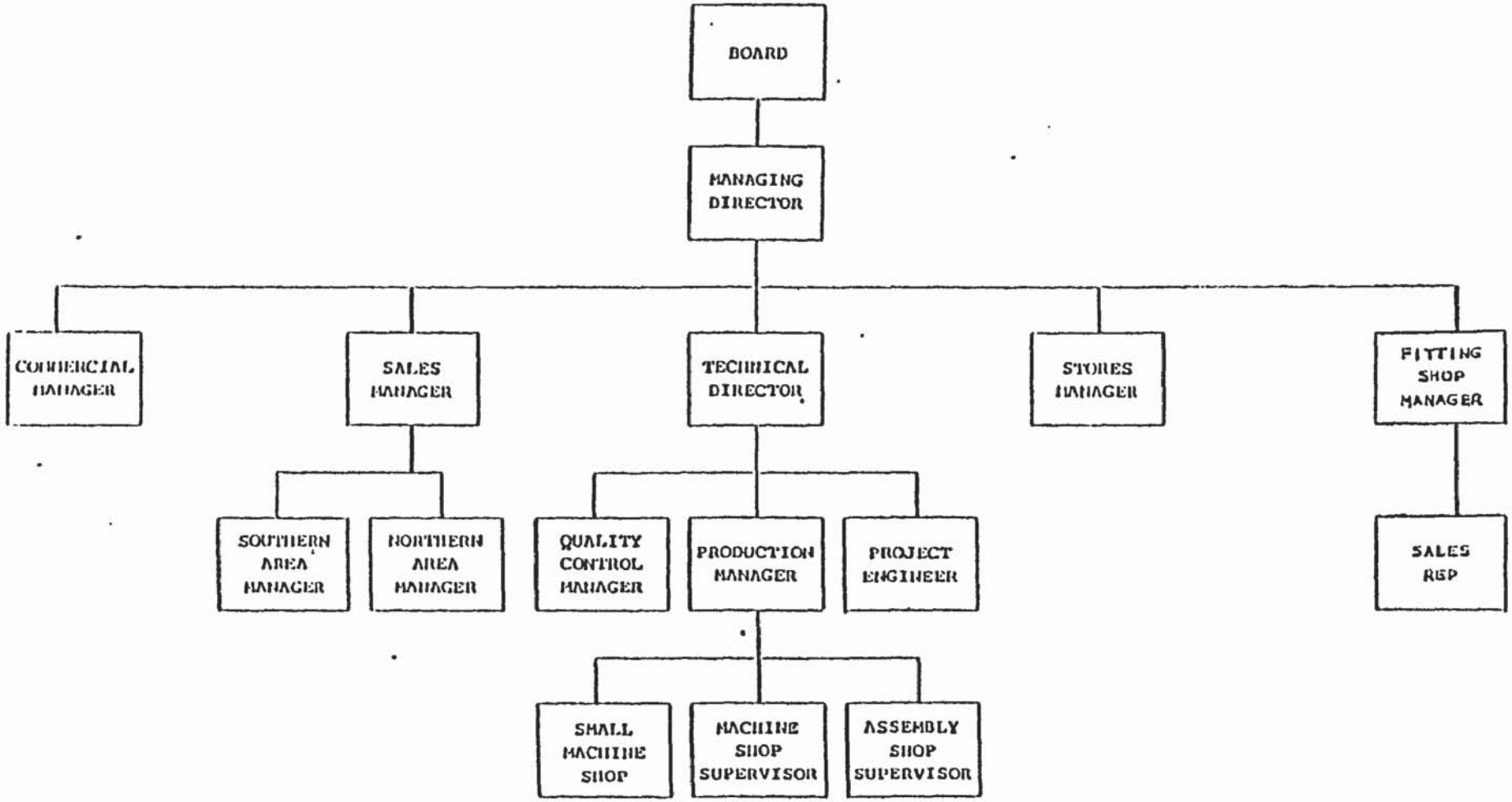


Exhibit 1

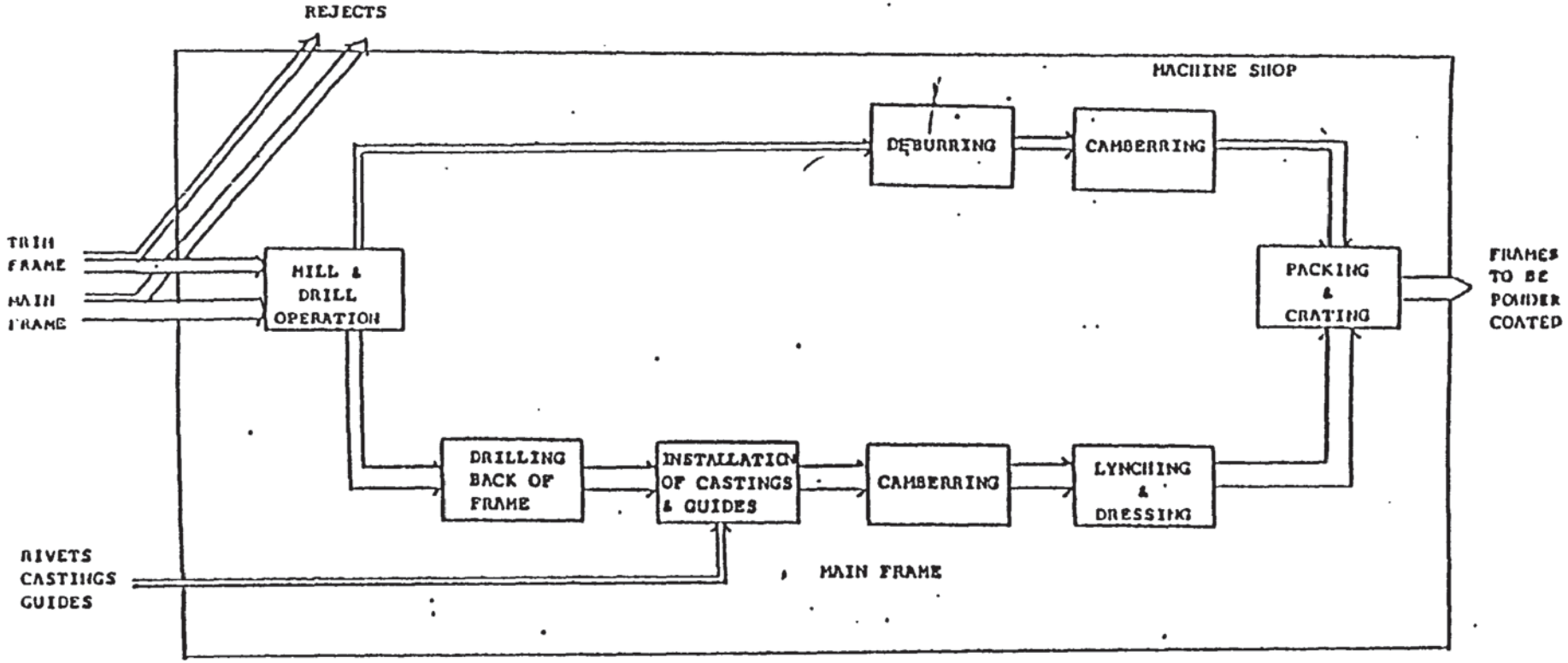
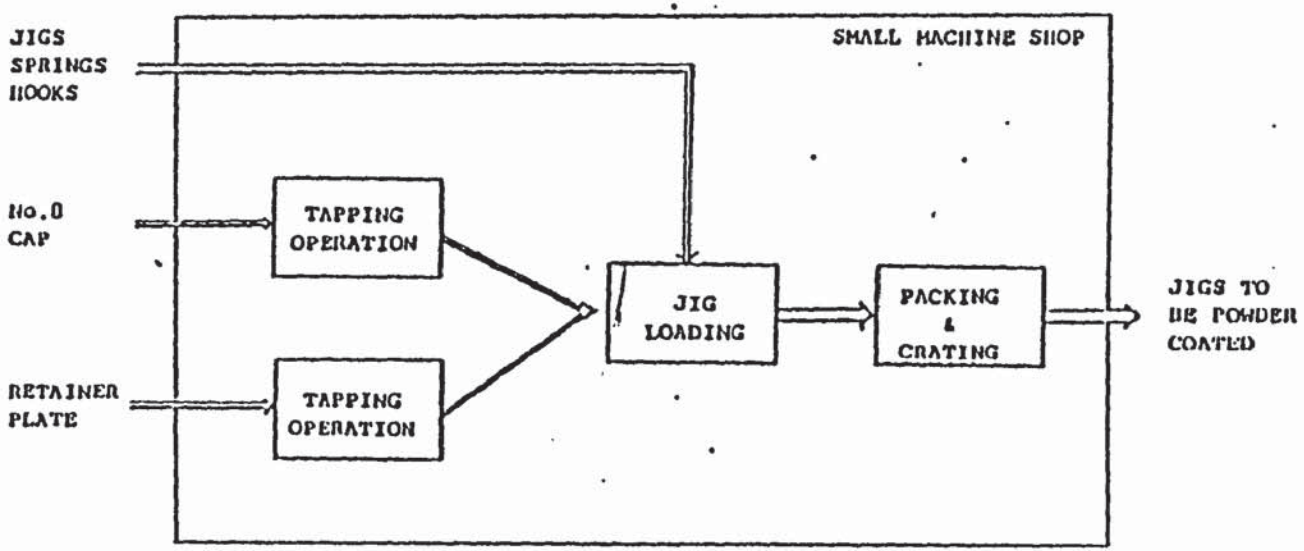

REJECTS
MACHINE SHOP
DEBURRING
CAMBERRING
TRIM FRAME
MAIN FRAME
MILL & DRILL OPERATION
PACKING & CRATING
FRAMES TO BE POWDER COATED
DRILLING BACK OF FRAME
INSTALLATION OF CASTINGS & GUIDES
CAMBERRING
LYNCHING & DRESSING
RIVETS
CASTINGS
GUIDES
MAIN FRAME

EXHIBIT 2


SMALL MACHINE SHOP
JIGS
SPRINGS
HOOKS
No.8
CAP
RETAINER
PLATE
TAPPING
OPERATION
TAPPING
OPERATION
JIG
LOADING
PACKING
&
CRATING
JIGS TO
BE POWDER
COATED

Exhbit 3

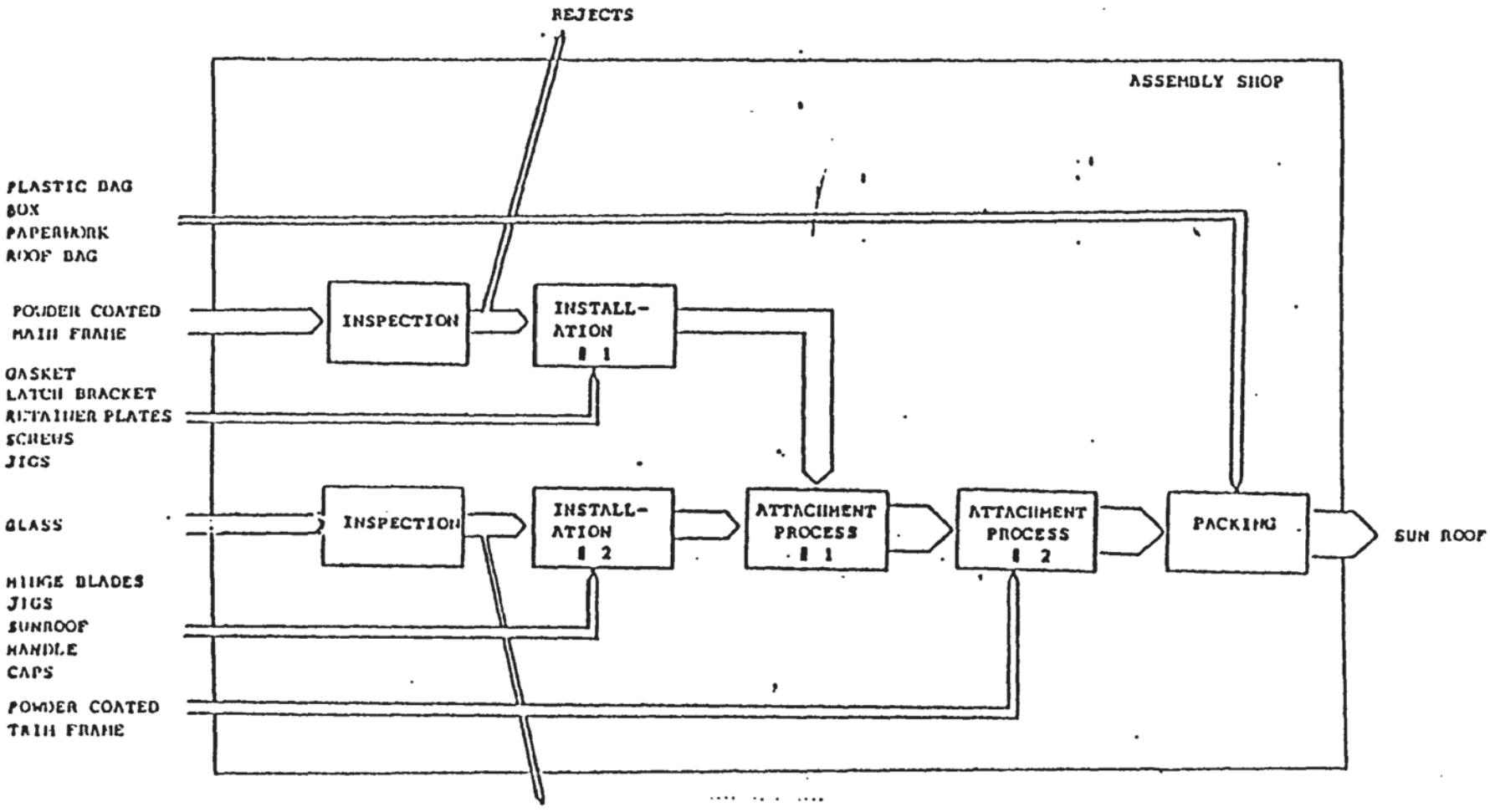

REJECTS
ASSEMBLY SHOP
PLASTIC BAG
BOX
PAPERWORK
ROOF BAG
POWDER COATED
MAIN FRAME
GASKET
LATCH BRACKET
RETAINER PLATES
SCREWS
JIGS
GLASS
HINGE BLADES
JIGS
SUNROOF
HANDLE
CAPS
POWDER COATED
TAIN FRAME
INSPECTION
INSTALL-
ATION
1
INSPECTION
INSTALL-
ATION
2
ATTACHMENT
PROCESS
1
ATTACHMENT
PROCESS
2
PACKING
SUN ROOF
REJECTS

EXHIBIT 4

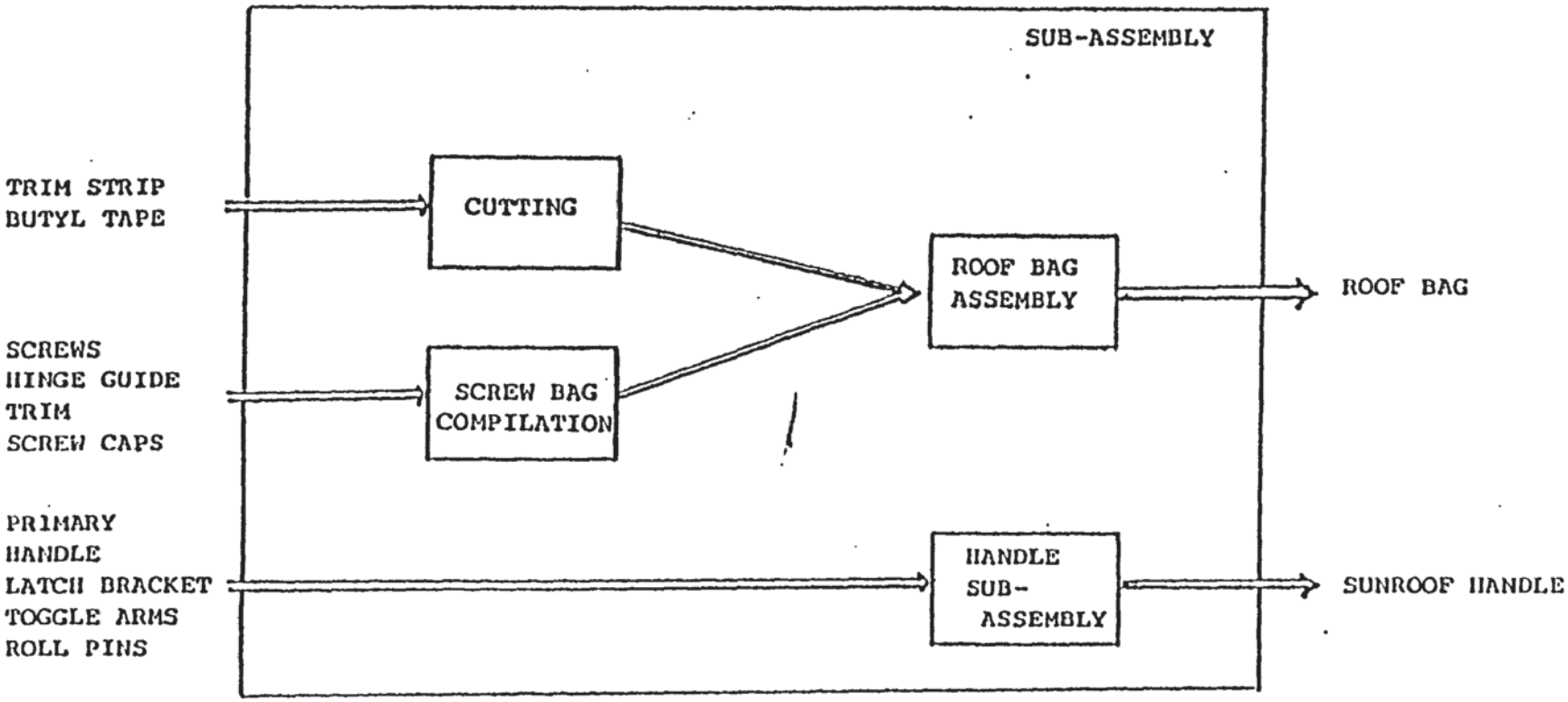

SUB-ASSEMBLY
TRIM STRIP
BUTYL TAPE
CUTTING
SCREWS
HINGE GUIDE
TRIM
SCREW CAPS
SCREW BAG
COMPILATION
ROOF BAG
ASSEMBLY
ROOF BAG
PRIMARY
HANDLE
LATCH BRACKET
TOGGLE ARMS
ROLL PINS
HANDLE
SUB-
ASSEMBLY
SUNROOF HANDLE

EXHIBIT 5 :

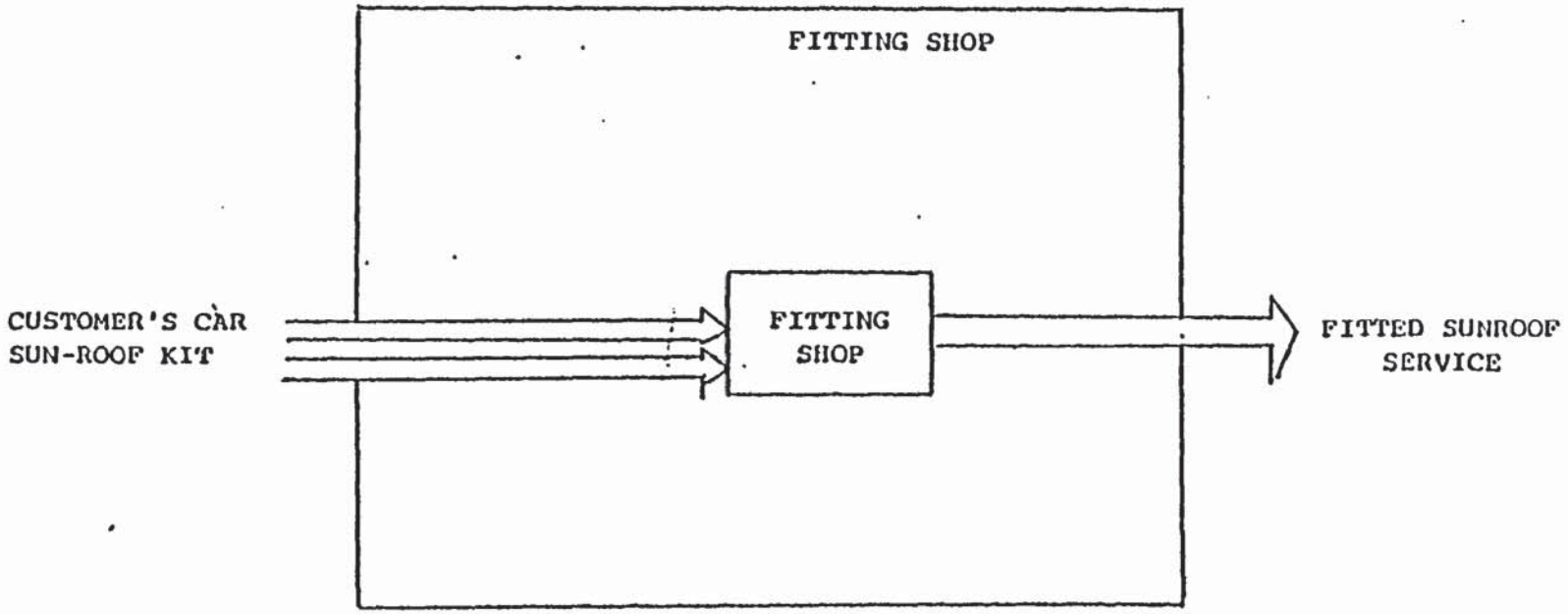

FITTING SHOP
CUSTOMER'S CAR
SUN-ROOF KIT
FITTING
SHOP
FITTED SUNROOF
SERVICE

EXHIBIT 6

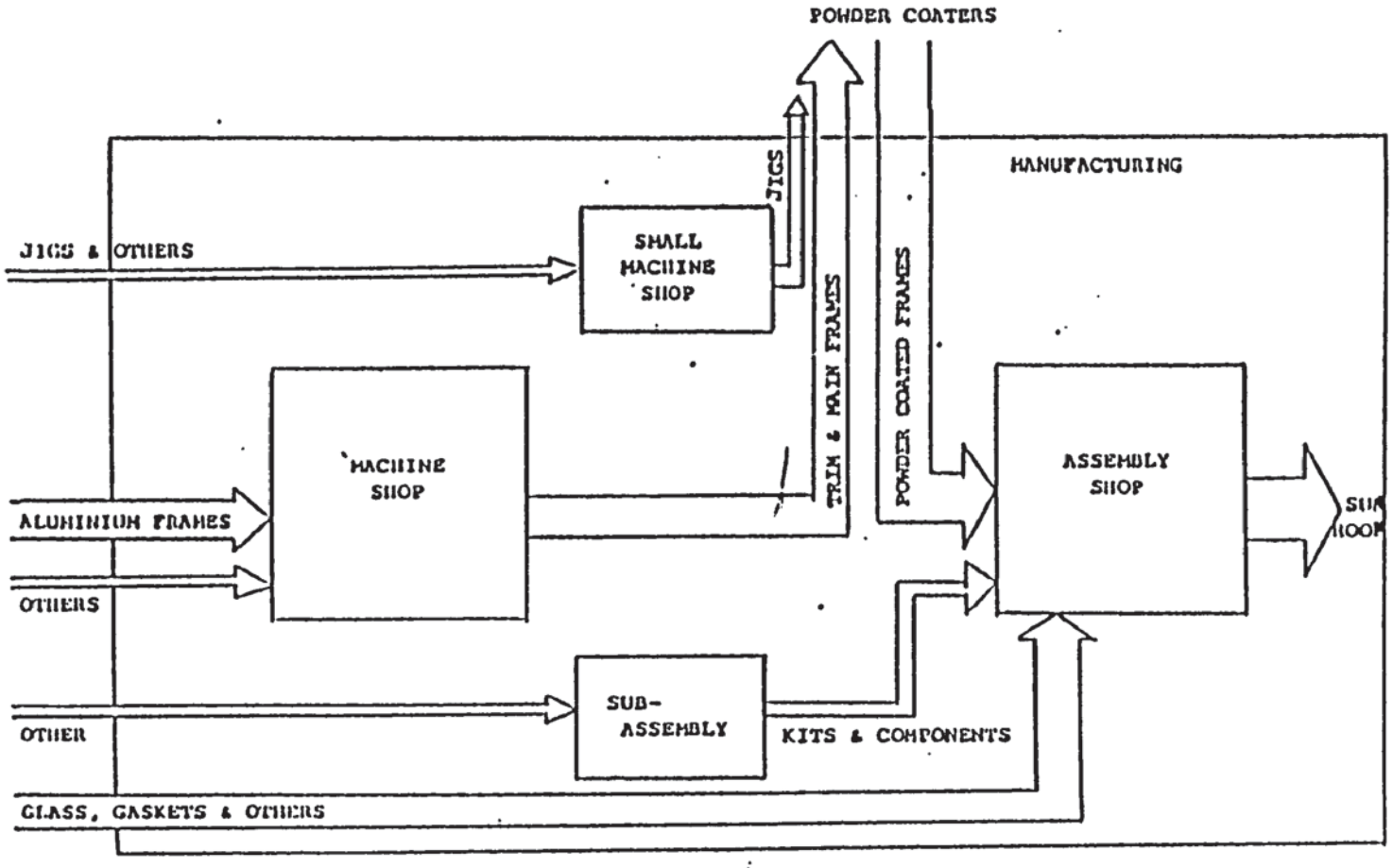
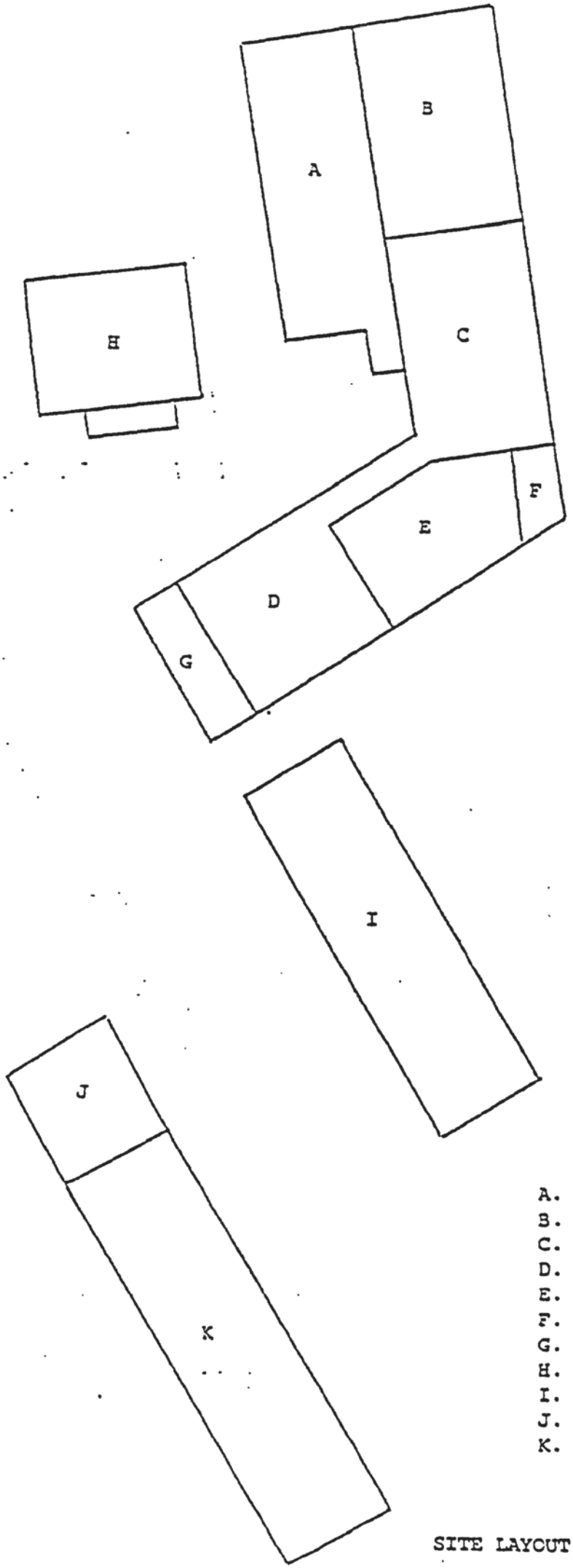

POWDER COATERS
MANUFACTURING
JIGS
JIGS & OTHERS
SMALL MACHINE SHOP
TRIM & MAIN FRAMES
POWDER COATED FRAMES
MACHINE SHOP
ASSEMBLY SHOP
ALUMINIUM FRAMES
OTHERS
SUB-ASSEMBLY
OTHER
KITS & COMPONENTS
GLASS, GASKETS & OTHERS

EXHIBIT 7



A. OFFICES
B. FITTING BAY
C. STORES
D. ASSEMBLY SHOP
E. SUB-ASSEMBLY
F. SMALL MACHINE SHOP
G. PRE-ASSEMBLY STORAGE
H. MACHINE SHOP
I. EXTERNAL STORAGE AREA
J. EXPORT STORES
K. GLASS STORES

SITE LAYOUT

EXHIBIT 3

(B) THE CYBERNETICS OF COMPANY A

Exhibit 9 shows the structural levels which appear necessary for the implementation of Company A business areas. Both Manufacturing and Fitting Services are the company's business areas and each may be seen as a complex activity that requires managerial autonomy. While the Fitting Services Division is well recognised structurally in the company, it is at present not recognised by senior management as a viable system in its own right. In spite of doing business of its own, it is mainly perceived as an aid to manufacturing, in terms of both technical and market feedback. At the time of the study the Managing Director was still hesitant in recognising it as a viable profit centre that needed to expand and compete in the market.

Thus Company A has two sub-systems in its implementation function, Manufacturing and Fitting Services. Within Manufacturing there are two sub-sub-systems:

(1) Machine Shop

(2) Assembly Shop

While in Fitting Services it is only possible to distinguish one activity:

(1) Fitting Shop

The complexity of this activity is fully absorbed at one structural level.

Because they have a degree of discretion and autonomy, all of these units at one structural level have their own particular environments which are part of the overall division and company environment. Company XZ retains an overall financial and long-term-planning discretion. Company A has discretion in marketing and medium-term planning. The two divisions, Manufacturing and Fitting Services, have to some degree, in one form or another, technological and procurement discretion. Within Manufacturing it is also necessary for the two

COMPANY A : UNFOLDING OF COMPLEXITY

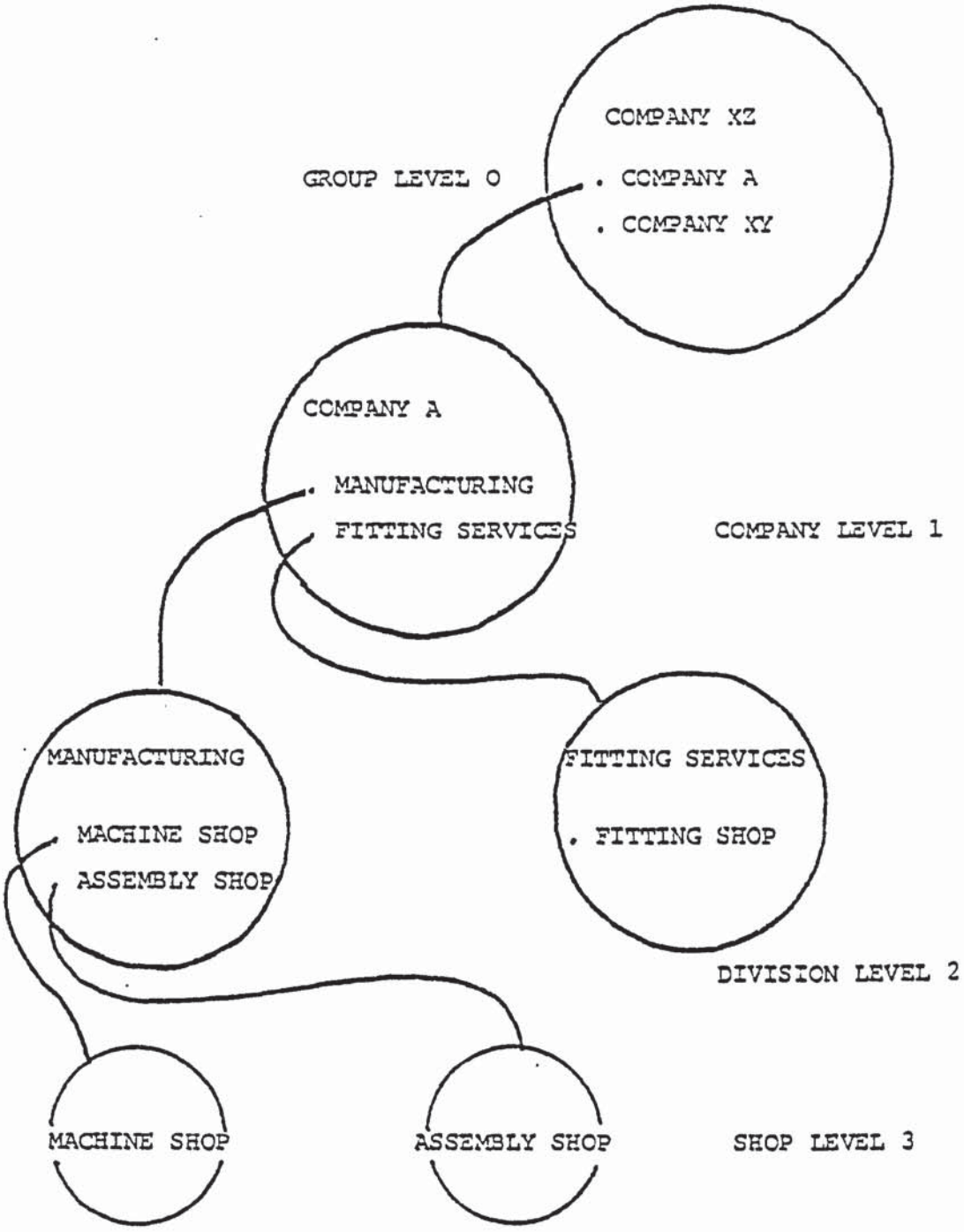


EXHIBIT 9

sub-sub-systems, Machine Shop and Assembly Shop, to have some kind of planning and operational discretion to carry out their activities.

Assuming that there is agreement with the analysis of structural recursion in Company A, it is possible to diagnose some structural problems hindering the effective development and implementation of the company's activities. These problems are explored while discussing regulatory problems as they exist within Company A at the time of the study (May 1985).

Effectiveness Of Regulation

The analyst will study the effectiveness of regulation with reference to Exhibits 10 to 18 which focus attention on the mechanisms of monitoring-control and adaptation for both Company A and each of the divisions.

(1) Effectiveness Of Regulation In The Divisions

(A) Manufacturing

Two primary activities are recognised within manufacturing:

(1) Assembly Shop

At present known as the Assembly Shop and Sub-Assembly Shop operations.

(2) Machine Shop

At present known as Machine Shop and Small Machine Shop operations.

The operational control of these two primary activities is a function which at present is distributed amongst the Production Manager, the Stores Manager, the Managing Director, the Technical Director and the Quality Control Manager. According to the organisation chart, the Technical Director has most of these

people reporting to him, thus overall responsibility for this function should be his. However, he sees his job mainly at the level of 'R & D'. Ultimately, control is being carried out by the Managing Director. The Production Manager is only carrying out some of the functions in relation to the operational control of manufacturing. In fact he perceives his job as mainly materials management and production scheduling. The Quality Control Manager is accountable to the Technical Director, however because the Technical Director is 50% of the time away from his Company A job this has meant that either the day-to-day decisions are being handled by the Managing Director or postponed to be handled by the Technical Director. The Stores Manager is also reporting directly to the Managing Director and is not accountable to anyone within the manufacturing division. However, both quality control and stores are necessary elements in the operational control of manufacturing.

In the analysis of the intelligence activity (system four) of the manufacturing division it is apparent that the function of this system in relation to Manufacturing should be concerned with the viability of manufacturing sunroofs. That is, discussions concerning manufacturing processes, more effective forms of acquiring suppliers, devising long-term plans etc should be the concern of this activity. Evidence of such activities are present. Both the Technical Director and the Sales Manager are clearly linked to this activity by producing new production methods (multi-head drilling method..Technical Director) and by providing market intelligence (i.e. Sales Manager attempting to penetrate new markets by approaching automobile manufacturers to install Company A sunroofs). Overall the Top Management Strategic Committee meetings involving the Managing Director, Technical Director, Commercial Manager and the Production Manager appears to be the mechanism by which these ideas are discussed and transferred. However, no evidence of long-term planning was found, only one year plans are in effect.

In terms of the day-to-day administration of the Manufacturing Division there appears a number of other diagnostic points.

(a) The Managing Director, with reference to Exhibit 10, should be carrying out a system five role with respect to the manufacturing division. However, there is a collapsing effect on his part to a system three role, and in that he is clearly involved in the control of manufacturing operations, not only by his participation in the weekly production meetings, but by his monitoring and direct intervention in the shop floor activities. The nature of the production reports he receives, in the form of shop quantity details, and the present methods of shop expenditure approval are further evidence that he is monitoring at a lower structural level than is required of him in his system five role, or his system three role at the company level.

(b) Oddly enough, the Stores Manager is not involved in storage management; he is not actually managing 'stores', but rather carrying out despatching and commercial operations. Preparation of invoices and terms of payment on goods shipped would appear to be the duties of the Commercial Manager instead of the Stores Manager. At present it seems management of stores is being handled by a combination of the efforts of the Production Manager and the two Shop Supervisors. No monitoring of stock levels or permanent records of stock movement is apparent. The Stores Manager also has problems in getting extra labour to help him at the time of despatching, principally because these roundabout labourers and the forklift operator are accountable to the Production Manager and not to him. His job could be greatly facilitated by an introduction of a stock recording system and to be given direct responsibility for the roundabout labour and forklift operator. This would free the Stores Manager to manage on-site materials and storage. The Stores Manager is at present monitoring production quantities in the Sub-Assembly Shop, an activity that would appear to be the responsibility of the Assembly Shop Supervisor (see Exhibit 15).

(c) The Production Manager is scheduling production on a daily basis, instead of setting out production plans and targets for his shop supervisors. By giving autonomy to his shop supervisors they will be better able to react and schedule what is required of them. The Production Manager is also setting production standards through personal time and motion studies, an activity that is better carried out by the Shop Supervisors themselves given their daily contacts with shop problems. The Machinist or the Small Machine Shop Supervisor as he was sometimes referred to, is reporting directly to the Production Manager. Because of the nature of this activity, it should be controlled by the Machine Shop Supervisor as it necessarily requires coordination with the machine shop as both outputs are going to the powder coaters (see Exhibit 14). The Production Manager is also carrying out coordination of material needs between the Assembly Shop and the Sub-Assembly Shop, an activity of the Assembly Shop Supervisor (see Exhibit 15).

(d) At the shop level, given the routine and repetitive nature of the work carried out in the shops, it seems necessary to monitor job satisfaction amongst the labour force. There is little scope for personal creativity in the activities and no apparent incentive system is in force to ensure continued high productivity.

Overall, at the division level, Manufacturing appears to have technological and procurement discretion, but at the shop level little operational and short-term-planning autonomy is given to the two shop supervisors. Some autonomy at this level is necessary for both the implementation of the activities and the efficient operation of these units.

(B) Fitting Services

At first appearance Fitting Services is seen to be playing three roles, testing, training and installation. However, testing and training are

basically functional activities for the manufacturing division. Testing is an aid to the Technical Department and the Technical Director; in that, it gives important technical feedback by testing new materials and processes on both the company's and customer's cars. It also carries out a training programme for the distributor's inexperienced fitters. This is really an aid to the Sales Department and is a method the company uses to amplify its products with the market (see interaction between company and environment in Exhibits 17 and 18).

Thus, installation is the only business that the fitting services division has. Control of this activity is carried out by the Fitting Shop Manager with the aid of the Sales Representative. The major problem that is apparent at this level is that there is no intelligence activity (system four) for this division, primarily because the company perceives it as an aid to manufacturing rather than a viable system in its own right. No long-term-planning or mechanisms are in existence to ensure the long-term viability of this division, and this may reduce the chances of a viable expansion of this activity.

(2) Effectiveness of Regulation At The Corporate Level

With reference to Exhibit 10 and 11, control of the two divisions, which represent the business areas of the company, rests with the Managing Director, who is aided by the Technical Department, the Commercial Department and the Sales Department. The concentration of efforts are on the Manufacturing Division resulting to some extent in the neglect of the Fitting Services Division. There are neither corporate targets nor a monitoring of the performance of the Fitting Services Division. No overall costing and budgeting systems were in force at the time of the study and no personnel reviews for the fitting services division are requested. The overall auditing of the company's industrial relations is not apparent. Periodic reporting concerning production quantities shows the reports

dealing with shop floor production figures rather than overall variances. This implies that the managing director is monitoring at a lower recursion level than is necessary, and also in terms of performance factors an inefficient system is in use.

In terms of the intelligence function at the corporate level, the only mechanisms in existence are the discussions carried out between the Managing Director and the Technical Director. Given the low level technology of the production processes and products in use and the possible termination of market demand should automobile manufacturers decide to build their own sunroofs, it would be expected that this function would have special importance in the company. However, no apparent formal effort is in existence to study new areas, new investments and possible product diversification.

LEVEL 1

NAME OF THE VIABLE SYSTEM IN FOCUS: COMPANY A

EXHIBIT 10


Aston University
Illustration removed for copyright restrictions

Manufacturing
Level 2

Exhibit 12

Fitting Services
Level 2

Exhbit 13

Machine Shop
Level 3

Exhbit 14

Assembly Shop
Level 3

Exhbit 15

Functions / Recursion	SALES	COSTING	PERSONNEL	ACCOUNTING	ENGINEERING	SCHEDULES	MATERIAL MOVEMENT AND HANDLING	QUALITY CONTROL	PRODUCTION STANDARDS	SUPPLIES	DISPATCHING	PRODUCTION PLANS	MAINTENANCE	FINANCE
Assembly Shop			x			x	x							
Machine Shop			x			x	x						⊗	
Manufacturing			x			⊗	⊗			⊗	⊗	⊗		
Fitting Services	⊗		x			⊗	x	⊗	x					
COMPANY A	⊗	⊗	⊗	⊗	⊗									⊗

EXHIBIT 16

CHART FOUR
EXHIBIT 17

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CHART FOUR

EXHIBIT 18

APPENDIX I

CASE STUDY : COMPANY B

COMPANY B

Introduction And Background To The Company

Company B is an organisation that specialises in the design, manufacturing and installation of windows and curtain-walling. Founded as a manufacturing engineering company 318 years ago, it entered into the market of window manufacturing at the turn of the century. Fifty years ago it employed some 2,500 persons, that has today been reduced to a level of 350 as a result of poor management and lack of market drive. Three years ago the new owners of the company brought in a new Managing Director who has started rebuilding the company following a major reorganisation. The company appears now to be in a growth stage. A new company, GAS, was also formed making what the company calls as the Fastline range of aluminium doors, screens and shop-fronts. Overall company sales fall into two main categories:

(A) Architectural Windows.

Mainly used on large commercial buildings and are specifically manufactured and installed based on individual customer requirements and the company's existing window systems.

(B) Fastline Products (GAS).

Mainly manufactured for retail premises, with little installation work actually carried out.

At the end of the fiscal year 1983 company sales were approximately seven million pounds of which one million pounds represented the sales of GAS Fastline products. For architectural windows it is very rare to find the company in a position other than a sub-contractor to a main building contractor. Initial queries and requests for price quotations come from two main sources, architects and main building contractors. The company employs a number of area sales managers

to amplify the company's image and products in the market. The major problem the company has had of late is that of cash flow, mainly as a result of the company improving its performance from a very low level of turnover in 1983 to more than doubling it in the last two years, and also partially from the nature of the industry in which the company finds itself in where a delay in a payment of £150,000 to £200,000 can seriously strain the company's supplier relations. However, the financial performance of the company in the last two years, in terms of profits, has been good, and better than it has been for many years.

When the Managing Director came to the company a cost-cutting and redundancy exercise was carried out, that has left many individual managers and departments severely overloaded, coupled with a different marketing strategy that has put the company in a position where more intensive design and planning work is needed.

The company perceives itself as a major designer, fabricator and installer of window systems in a highly competitive market. The average length of contract is about one year and ranging in value from £250,000 to £2,500,000 with the average size of contract between £250,000 and £500,000. The Managing Director perceives the company's products are no longer technologically ahead of the market and last October set up a new design and development unit to develop a new window system (curtain walling). An organisation chart representing the managerial structural levels and lines of accountability at the time of the study (July/August 1985) is shown in Exhibit 1.

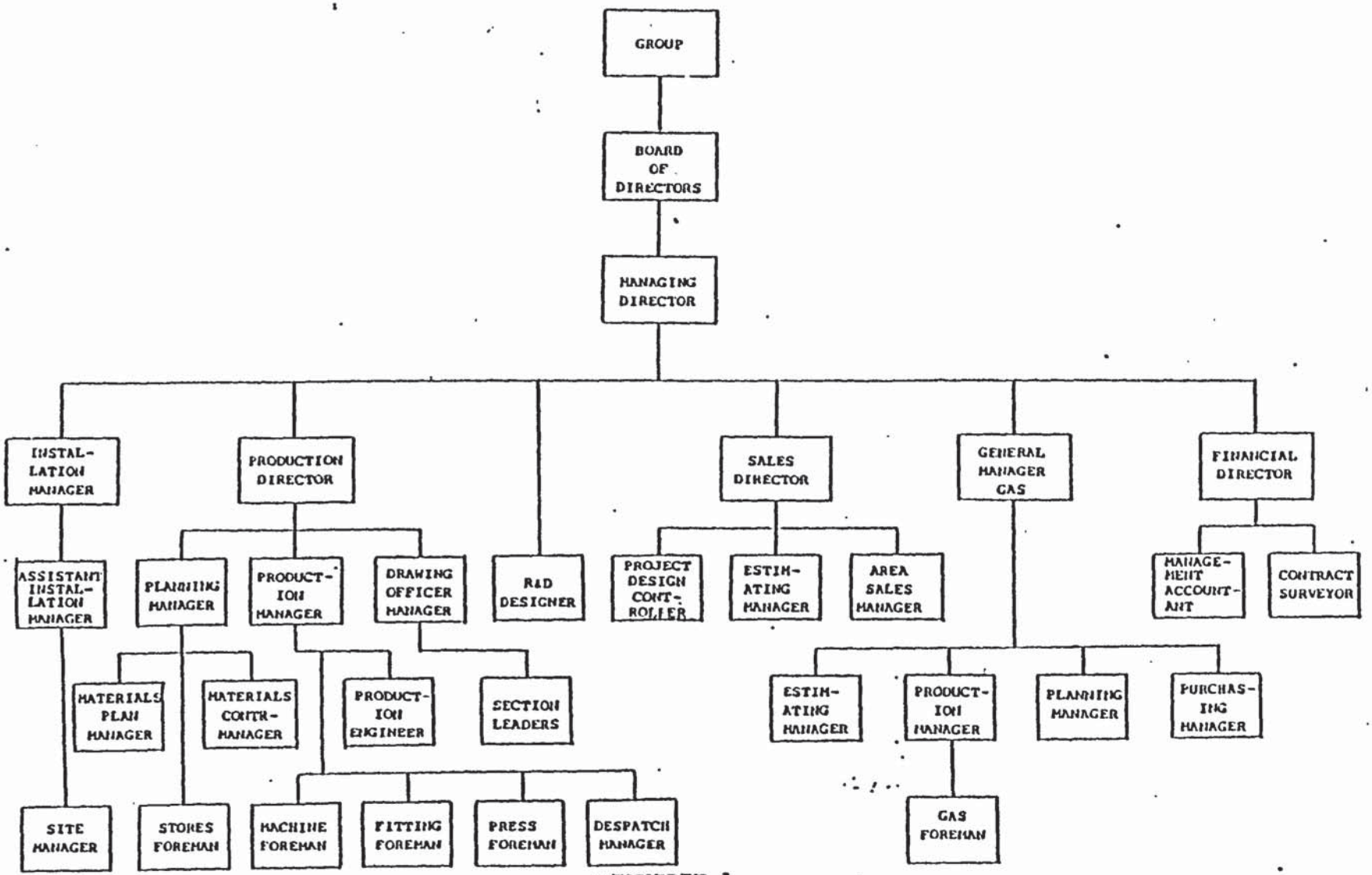

GROUP
BOARD OF DIRECTORS
MANAGING DIRECTOR
INSTAL-LATION MANAGER
PRODUCTION DIRECTOR
SALES DIRECTOR
GENERAL MANAGER GAS
FINANCIAL DIRECTOR
ASSISTANT INSTAL-LATION MANAGER
PLANNING MANAGER
PRODUCT-ION MANAGER
DRAWING OFFICER MANAGER
R&D DESIGNER
PROJECT DESIGN CONT-ROLLER
ESTIM-ATING MANAGER
AREA SALES MANAGER
MANAGE-MENT ACCOUNT-ANT
CONTRACT SURVEYOR
MATERIALS PLAN MANAGER
MATERIALS CONTR-MANAGER
PRODUCT-ION ENGINEER
SECTION LEADERS
ESTIM-ATING MANAGER
PRODUCT-ION MANAGER
PLANNING MANAGER
PURCHAS-ING MANAGER
SITE MANAGER
STORES FOREMAN
MACHINE FOREMAN
FITTING FOREMAN
PRESS FOREMAN
DESPATCH MANAGER
GAS FOREMAN

EXHIBIT 1

THE CYBERNETICS OF COMPANY B

Exhibit 2 shows the recursive levels which appear necessary for the implementation of Company B businesses. While Architectural and Fastline represent the company's two business areas, Manufacturing, Installation and Fastline appear as the primary activities and each may be seen as a complex activity that wants managerial autonomy. All three primary activities are well recognised structurally in the company. Both Installation and Fastline have their complexity fully absorbed at the recursive level one, while for Manufacturing it is possible to distinguish one further level of recursion represented by three sub-sub-systems:

1) Machine Shop
2) Press Shop
3) Fitting Shop

For all the above systems, and given that each has its own particular working environment, they need and somehow they have a degree of discretion and autonomy, dependent on the recursive level they find themselves in. An examination of the operating systems within Company B revealed that the company level retains overall financial, marketing and long-term planning discretion, while all three sub-systems, Manufacturing, Installation and Fastline, have medium-term planning discretion, technological and limited procurement discretion. At the section level the three sub-sub-systems had little planning or operational discretion.

Analysis of Exhibit 2 shows that Installation and Fastline, which both have a relatively lower complexity than Manufacturing, are being regulated at the same level as Manufacturing.

Assuming that the analyst has captured well the recursion in Company B, our purpose is to discuss the mechanism of control and adaptation as perceived by

UNFOLDING OF COMPLEXITY

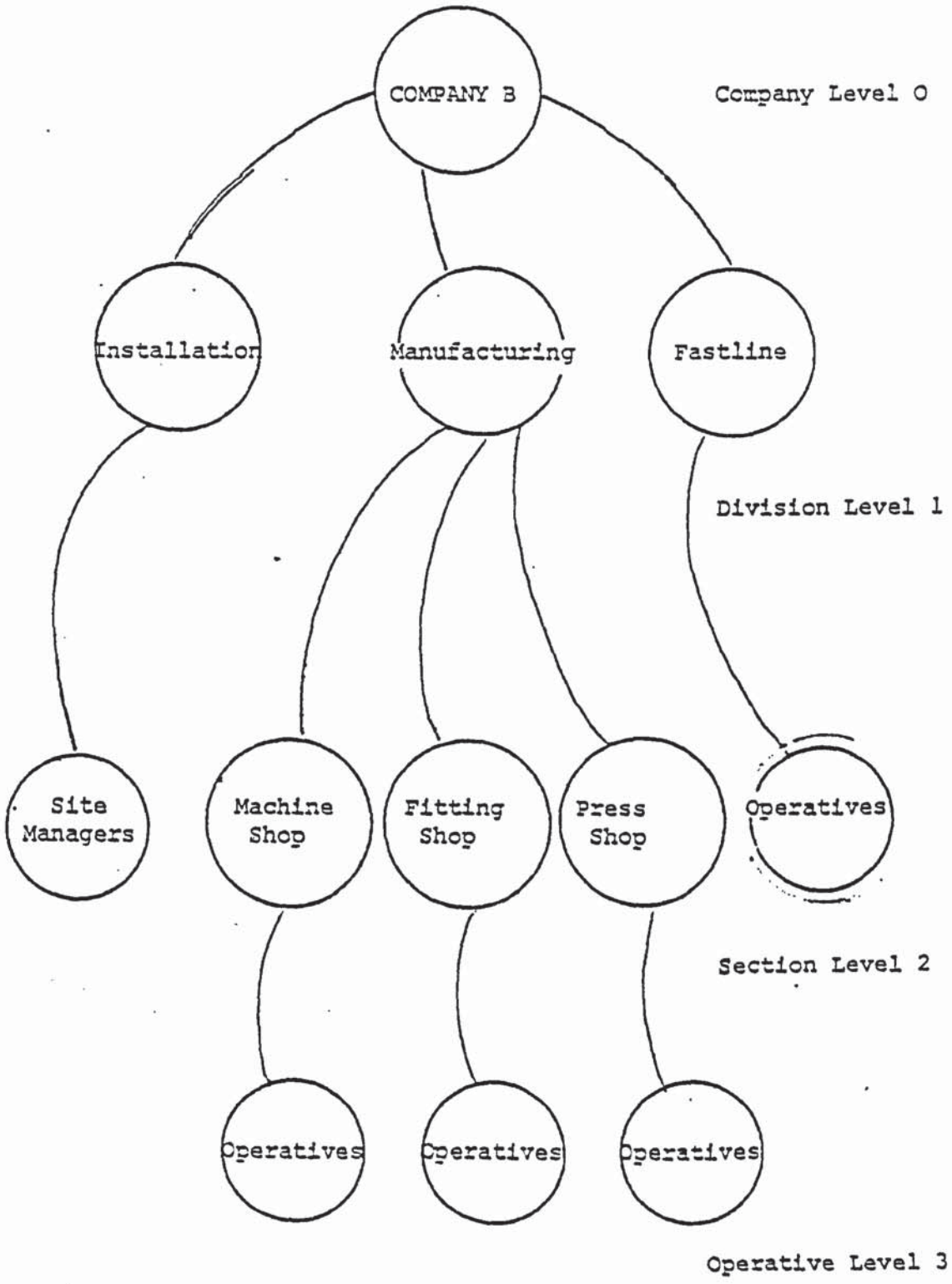


EXHIBIT 2

the analyst in each of these levels. These problems are explored while discussing regulatory problems as they existed within Company B at the time of the study.

Effectiveness Of Regulation

I shall study the effectiveness of regulation with reference to Exhibits 3 and 4 which focus attention on the mechanisms of monitoring-control and adaptation for both Company B and each of the divisions.

Effectiveness Of Regulation At The Company Level

With reference to Exhibits 3 and 4, control of the three primary activities i.e. Manufacturing, Installation and Fastline rests with the Managing Director. At this level he is aided by the Financial Director, the Sales Director, and the Accounting Department. At the company level, it is necessary for him to act as controller of the three divisions and to review and regulate the activities of these three sub-systems. As Managing Director it is also necessary for him to interact with those carrying out system four activities or to undertake such activities himself.

An examination of the operating mode of the Managing Director revealed that he is monitoring industrial relations with respect to Manufacturing and Installation. This he sees as an important activity as the personnel on the Manufacturing shopfloor are represented by trade unions and as a result of cutbacks in manpower levels over recent years these unions have become very involved in operating procedures and performance levels on the shopfloor, thus affecting the overall production performance of the major division in the company. He is also monitoring budget variances, mainly as a result of severe cash flow problems the organisation is facing. In fact the Managing Director

COMPANY LEVEL
RECURSION LEVEL ZERO

NAME OF THE VIABLE SYSTEM IN FOCUS:
COMPANY B

CHART ONE

EXHIBIT 3

EXHIBIT 4

DIAGNOSTIC CHART OF SYSTEM IN FOCUS:

RECURSION NO: Zero
NAME: Company B

spends a considerable amount of time reviewing major expenses, giving very little financial autonomy to the divisions. All major capital plant expenditures have to be approved by him and quite often very minor operating expenses e.g. delivery expenses as well.

With respect to the Sales unit he requires to be informed of all new contracts, estimates given on all enquiries, revision of those estimates and all revenues obtained by the Contract Surveyor from main contractors for work completed. He also receives regular reports from the Production Director of the Manufacturing activity on the sales value of work completed. Altogether his operating mode vis-a-vis the Manufacturing activity is one of respecting the operational autonomy of his managers, allowing them the necessary discretion to operate independently of him. But this does not apply with respect to financial matters or expenditures, in this area he is the day-to-day administrator approving and monitoring all major items.

With respect to the Installation activity he is collapsing his role from that of Managing Director to that of Installation Manager as there is considerable evidence that he is making key operational decisions and monitoring site activities. In fact he sees himself as controller of this activity. The main reason why he is doing this is because Installation has always been for the company an area of concern. Given that the company will only receive funds when the actual windows have been installed on site, it thus becomes of crucial importance for the whole company to finish the installation work as quickly as possible. In trying to ensure that the work is completed on time, the Managing Director initially became involved in the monitoring of site activities, but very quickly the main contractors and architects found it more effective to approach him for decisions rather than go through his Installation Manager. As the Managing Director became more and more involved in the decision-making process of the Installation activity, the Installation Manager's role became more that of a site manager

rather than that of an installation manager. The Managing Director in the role of the Installation Manager is aided by the Assistant Installation Manager whose job it is to order the glass and coordinate installation work in the field. All glass contracts made have to be approved by the Managing Director. The Managing Director is also monitoring the financial performance of this activity in his role of Managing Director, as he receives monthly figures for invoicing from the accounts department with respect to the Installation activity.

Again with respect to the Fastline he is collapsing his role to that of General Manager of this activity, even though he views Fastline as a viable system in its own right and has hired recently a General Manager, an experienced manager, to run its operations. Nevertheless, he sees himself as controller of this activity. Evidence of this comes from his monitoring of the weekly forward loads and the aluminium stock. In fact he shares the role of the administration of this activity with the General Manager. The concentration of the General Manager's activities are in sales and in responding to customer enquiries. The Managing Director has only permitted limited financial autonomy to this sub-system as he approves most of the financial expenditures himself. In his role as Managing Director he reviews the overall financial performance of this activity and monitors it closely. He receives from the General Manager reports on the number of accounts won monthly, the order-in-take by product, margins given on individual contracts and a regular analysis of the forward load. The overall conclusion on the operating mode of the Managing Director is one of restricting the autonomy of his subordinate managers, giving them little independence to operate independently of him. Decision-making is very much centralised. Such detailed control by the Managing Director has to be at the expense of some other factor(s).

As for the Sales Director he sees his role only in with respect to the Manufacturing and Installation primary activities. With the aid of the sales team,

the Project Design Controller and the Estimating Manager, he is marketing and selling windows and curtain-walling systems to architects and main building contractors. In his role as Sales Director at the company level it is also necessary for him to aid the Fastline primary activity in the marketing of shop-fronts and doors. It is also necessary for him to monitor the overall sales performance of this activity. This he does not appear to be doing. His concentration is on the Manufacturing and Installation activities. An overall company marketing strategy encompassing the three primary activities is needed, not only to coordinate efforts but to use limited resources effectively. Reporting to the Sales Director is the Project Design Controller, who is responsible for project design, and the Estimating Manager, who produces estimates for all enquiries coming from architects or building contractors. These two individuals work closely with the Drawing Office Manager of the Manufacturing activity to plan and prepare working drawings for each project.

The Financial Director's role at the company level requires that he monitors the financial performance of the three primary activities, Manufacturing, Installation and Fastline. This he is doing by means of accounting information provided to him by the recently appointed Management Accountant, and by regular reports provided to him by the controllers of the primary activities. He has regular meetings with the Managing Director to review the overall financial performance of the organisation and the budget variances. Lately there has been concern in the company with respect to cashflow, and he monitors this closely by checking on amounts collected by the Contract Surveyor (who reports to him). Previously, due to personnel shortages, he had been forced to collapse his role to that of management accountant, and for a long period of time he prepared the monthly management accounts himself. This activity has now been designated to the responsibility of the Management Accountant. One of his regular duties is also to inform the divisions on their financial performance at

the monthly management committee meeting.

The analysis of system four, i.e. intelligence, activities at the company level reveals very little future planning especially in terms of long-term planning. The organisation is using the monthly management meetings as a mechanism for studying particular problems. It is through the monthly management meetings that the R & D managerial position was set up, reporting directly to the Managing Director, to design a new curtain walling system. The organisation is also using the directors' meetings, involving the Production Director, the Sales Director, the Financial Director and the Managing Director to assess competition, decide on what products should be produced and other aspects that would enable the organisation to become adaptable to its environment. However there are no clearly recognised mechanisms to study potential product diversification, new markets, new technologies and so on. Interviews with individual managers and directors revealed that they spend very little time thinking about where the company will be say five years from now. The overall perception concerning the monthly management meetings is that they are a one way communication channel (top-down), they involve too many managers to adequately discuss specific problems and are not effective in getting one's viewpoint over to the directors. The focus by both the directors and managers is internal rather than external, short-term rather than long-term planning. At a time when the organisation is facing increasing competition, a market in recession and more cost-conscious architects and building contractors, it would be expected that the Managing Director would have already developed the necessary mechanisms to ensure long-term viability and to ensure that intelligence activities are carried out. This he has not done. The reason could be that he is so totally involved in the operational details that he has little time for such an activity.

Effectiveness Of Reculation At The Divisicn Level

Manufacturinq - Recursion Level One

With reference to Exhibit 5, control of Manufacturing rests with the Production Director, the Planning Manager and the Production Manager. In their system three role these managers are aided by the Drawing Office, the Planning Department, the Engineering Department and the Despatch Department.

The Drawing Office is controlled by the Drawing Office Manager, and it is this unit of the organisation that works very closely with the Project Design Controller and the Estimating Manager (both at recursion level zero and reporting to the Sales Director). Project plans received from the Sales Department are passed to the Drawing Office which then carries out detailed drawing work, not only for the Manufacturing Division but also for the the Installation Division. These drawings are then passed to the Planning Department which makes out the cutting and assembly sheets, and orders the materials necessary for the Manufacturing of the windows and the curtain-walling systems. The Planning Manager and the Planning Department carry out very detailed planning work with respect to each contract, setting out start and finish dates on each contract stage of manufacturing and installation. This is a system three activity as well as a system two activity. As a system three activity it sets out particular guidelines for the three primary activities at this next recursion level to follow in the production of the window and curtain-walling systems. As a system two, i.e. coordination, it facilitates coordination between the three shops by stating when each stage of the manufacturing process should start and finish. It also facilitates coordination between the manufacturing activity and the installation activity by establishing when finished products should be handed over to the installation personnel. This whole process facilitates also the work of the Production Manager in monitoring the performance of the three Manufacturing shops.

EXHIBIT 5

DIAGNOSTIC CHART OF SYSTEM IN FOCUS.

RECURSION NO: One
NAME: Manufacturing

At the division level of Manufacturing it is the final responsibility of the Production Director to control and regulate the activities of the three primary activities contained within Manufacturing, these being the Machine, Fitting and Press Shops. He is held accountable by the other directors of the company for the performance of the whole manufacturing process. An examination and analysis of the operating mode of the Production Director revealed that he is monitoring plant performance and industrial relations. He is also reviewing capital plant expenditure requests generated from units within Manufacturing, works-status, and personnel appointments. He also helps the Managing Director to set Fastline medium-term targets. In relation to Fastline, this is basically a consultative role that he carries out with the Production Manager, based on his production experience, to aid the Fastline activity in the manufacturing of its own products. The Production Director is also carrying out medium-term planning for Manufacturing, and influences the formulation of the company budget in relation to future manpower level needs, capital expenditure plans and transport costs. He works very closely with the Planning Manager, Production Manager and the Drawing Office Manager to control and plan production, although he leaves much of the detailed work to be carried out by his subordinate managers.

The Production Manager is not actually 'managing production', that is he does not regulate and plan all of its activities, but rather monitors the activities on the shopfloor to ensure completion of projects on time. The actual management of production relies on the combined efforts of the Production Director, the Planning Manager and the Drawing Office Manager. The Production Manager is provided with production plans, in the form of a project file, that he needs to track through production, and ensure with the aid of the stores people that materials are provided at each stage of production on time. In fact he has no autonomy to schedule the activities of production. The result has been in some cases of project files outlining finishing dates on manufacturing some thirty or

forty days before the actual date the project file is received by the Production Manager. The underlying reason for this could be attributed to the fact that he is not consulted by the Sales Department on the actual situation on the shopfloor, rather the sales department works off expected dates of completion proposed by the Planning Department. The Production Manager also works with the Installation managers to coordinate the despatch of materials to sites, and ensures this is carried out by setting out directives to his despatch foreman. He perceives 'shopfloor safety' to be an important aspect of his owrk, and receives reports from the safety representatives on the shopfloor on any accidents. He monitors closely the rejects on the production line by approving any new material requests, i.e. any material above what has already been planned for and issued to the shopfloor personnel. In relation to shopfloor performance and productivity he prepares a report on the value of work completed and labour performance both for the Production Director and the Financial Director. For the determination of the labour performance he obtains information on the number-of hours worked by his shopfloor personnel from the Wages Section of the Accounting Department. To check production quality he relies solely on the inspection carried out by inspectors on the shopfloor. No apparent reports are generated for him on a regular basis from these inspectors. How well those inspectors do their job is determined by the number of complaints received from site personnel.

The Planning Manager has a very key role in the Manufacturing activity, in fact he represents a key link between the primary activity and its external environment. In this role he is aided by the Materials Planning Manager and the Materials Control Manager. Given that his department plans the manufacturing and installation work, he is quite often held accountable both by people in the Sales Department and in the Manufacturing Division for any program falling behind schedule. Before his department can actually start planning out the project it needs the technical drawings produced by the Drawing Office. Any

delay in the production of these drawings entails a delay in the planning and issuing of cutting sheets to the Production Department. Quite often the drawings are altered, thus resulting in further delays. This requires the Planning Manager to liaise with architects from outside the company to formulate a workable program that ensures the products are received at the building site when needed. A key responsibility of the Planning Department is to order the materials and to ensure that they are received when needed by the Production Department. This requires that the Planning Manager monitors closely delivery dates of materials and the status of suppliers. This he does with his subordinate managers. However this is done without the involvement of the Production Manager. Both the Planning Manager and the Drawing Office Manager spend a considerable amount of time responding to site material enquiries. As Installation is a separate primary activity it would be expected that material enquiries would be handled through the management of that activity in coordination with the Materials Control Manager. This activity would be expected to be the responsibility of the Materials Control Manager whose role should not only be to procure the materials but also to track the materials through the production process. This would in fact centralise material enquiries to one source, thus permitting the two managers, the Planning Manager and the Drawing Office Manager, to manage their departments instead of dealing with operational details. The organisation chart of Company B reveals also that the Stores Foreman is accountable to the Planning Manager for the effective management of stores activities. There is evidence that the Stores Foreman now reports to the Production Manager, rather than the Planning Manager. The Planning Manager is so involved in so many operations that he has actually lost control of Stores. The Stores Foreman found it was easier to coordinate the issue of materials to the shopfloor with the Production Manager rather than go through the Planning Department. The Planning Manager is also reporting to the Production Director on the amounts and values of work issued to the Production Department.

The overall impression of the analyst is that there appears to be a tremendous amount of time spent in troubleshooting by the controllers of this primary activity, mainly due to the poor system two mechanisms in existence to coordinate work through the manufacturing process. Another underlying reason for this is that the three primary activities at recursion level two have very limited autonomy to plan and schedule their work. All the planning is carried out at a higher recursion level. Any complications or delays mean that they have to be referred up the hierarchy. It seems important that these activities should be allowed greater autonomy to plan and schedule their work. Work is further complicated by the fact that Installation controllers are not accountable to the Production Director, who could facilitate the coordination of these two primary activities. Instead the Installation Manager reports to the Managing Director at a higher recursion level.

With respect to system four, i.e. intelligence, activities the analyst found no mechanisms in force to ensure and to study long-term adaptation for this primary activity. Managers were not thinking about the future viability of this activity and little was actually carried out in areas that would ensure the viability and adaptation of this primary activity to its environment. No feedback reports were being received from the Sales Department to generate new ideas in manufacturing and no individual or committee was identified that could show that this primary activity is looking at new manufacturing technologies, product diversification, improved quality on the products being manufactured, the economics of materials and of the manufacturing process. The concentration was rather on the short-term, with a very much internal focus.

Installation - Recursion Level One

Installation is perceived by the Managing Director as a separate entity in its own right. While clearly it can be recognised as a viable system in its own right, it lacks both physical and managerial resources to develop itself into such a type of system. To many managers it is perceived as an extension of the manufacturing process, such that when products are produced on the shopfloor they are then passed on to the installation personnel to install them on the building project. Based on the perception of many managers it acts as a technological process much in the same way as the Press shop or the Fitting shop. Installation could be a major activity by itself and is perceived by senior directors as such.

The complexity of this activity is fully absorbed at this level of recursion as the sites cannot be treated as viable systems. That is, the sites are not striving for viability in the same manner as Installation is. The actual work carried out on the sites is sub-contracted out by Company B to outside firms. When contracts are set-up with architects or building contractors Installation has its own work value and its own time schedule.

Control of this primary activity has already been discussed with respect to the activities of the Managing Director who acts as system three controller for this primary activity. He is aided in this role by the Installation Manager and the Assistant Installation Manager. The administrative work of ordering the glass and coordinating activities with the manufacturing personnel is carried out by the Assistant Installation Manager. For this the Assistant Installation Manager relies on an order information sheet from the Planning department of the Manufacturing activity and field status reports from site personnel. The received order information sheet outlines the quantity and quality of glass needed for each project. The field status reports provide information on how the building process

on site is going on to enable this manager to time exactly when the glass will be needed on the site. The Assistant Installation Manager organises site labour and monitors the site work. He receives site agent reports from the architects representative on the site, and he uses this information to validate the reports that he is receiving from the sub-contractor's fixers. The personnel used on sites are not actually employed by the organisation but rather work for a sub-contractor who is initially hired by Company B for specific projects. This in turn allows him to provide information to the Accounts Department and the Contract surveyor for materials received and installation work completed on site.

With respect to system four, i.e. intelligence, activities the two Installation Managers perceived that long-term planning and adaptation to the environment for this activity is not part of their duties but rather the sole domain of the Managing Director. However the Managing Director had not set up any mechanisms to ensure that studies dealing with identifying the market for installation work, or improving the way materials are installed and so on are actually carried out. This has severely limited the viable expansion of this activity. Managers are not examining potential areas such as product diversification with respect to the Installation activity. Some work is obtained from the Fastline activity with respect to installing windows on commerical premises, but no studies are being carried out to see if it is economically feasible for Installation to enter new markets such as shop-front installation. Overseas markets have not been examined even though it is apparent that competition, facing reduced margins at home, have expanded to new building markets in areas such as the Middle-East.

The complexity of this primary activity is fully absorbed at this level of recursion. Control of this primary activity rests with the General Manager and the Managing Director. With respect to the activities of the Managing Director at this level of recursion, these have already been discussed.

The General Manager perceives his role more with respect to the sales function than with actually administering the day-to-day activities of this primary activity. However this has not stopped him from monitoring the production activities as he is always checking on the outputs of the production process by means of regular verbal reports from the GAS Foreman, who keeps him up-to-date on quality and delivery of products. As part of his sales activity he helps to set margins and discounts with the GAS Estimating Manager. He is also quite involved in responding to customer enquiries, and carrying out sales visits to customers. This is an important activity for him, because he perceives he gains important feedback from his customers on products and quality. In fact the managers of this primary activity are very conscious of their system four, i.e. intelligence, activities mainly through its General Manager and Gas Planning Manager. These two work very closely in the design of new products and in the choice of the products. The General Manager has also concentrated some efforts on new marketing strategies, and results show that he is beginning to penetrate new markets and a wider customer base. He perceives part of the success of wider market penetration is mainly due to prompt delivery and obtaining low-cost high quality materials. In fact he receives regular reports from the Gas Purchasing Manager on specific items that enable him to monitor stock levels and supplier costs. From the Gas Production Manager he receives a report on the number of enquiries made to the company and the weekly sale order intake by value, and a detailed fortnightly schedule of sales orders that need to be prepared and produced.

It was also found that both the GAS Planning Manager and the GAS Production Manager are not monitoring the production process. When orders come in to this primary activity, the GAS Planning Manager prepares the working drawings and sets a production schedule for the people on the shopfloor to follow through when manufacturing the product. The GAS Production Manager is not actually involved in regulating the activities on the shopfloor, generally her task is more the recording and preparing of reports for the General Manager and the Managing Director. For these two managers she reports on new accounts won monthly, order intake by product or sectors, number of quotations made, production forward loads, and margins set. She also produces a report for the Financial Director on potential bad debts. She works closely with the GAS Purchasing Manager to order materials, such as glass.

APPENDIX J

CASE STUDY : COMPANY F

INTRODUCTION

During the months of November and December 1985 interviews were carried out with eighteen directors and managers of Company F. The following report represents the findings of the study. The report is divided into two sections:

Section One: Brief background to the Group and its subsidiaries giving general information on numbers employed, amount of sales, relevant roles, structure and the technological activities involved.

Section Two: A detailed cybernetic analysis based on Stafford Beer's Viable System Model. In this section the analyst attempts to show how the group operated at the time of the interviews in Cybernetic terms and each recursive level in the system is analysed and problem areas are highlighted.

BACKGROUND TO THE COMPANY

Company F is a medium sized company involved in the manufacture and retailing of crystal glass products. Founded by the Barnard family in the late eighteenth century as a crystal glass manufacturer, it has since grown to a size where it now employs over 750 people, with distribution systems in Europe, Australia, Canada and the U.S.A., as well as an extensive distribution system in England, Wales and Scotland.

Company F is the parent group for a number of subsidiaries (see Exhibit 1). It originally marketed its product to select high income customers, but today is attempting to widen its customer base by means of highly competitive pricing strategies and an extensive distribution network.

Subsidiary A is the main manufacturing body of the group and employs over 350 people. This subsidiary has two plants, Plant X and Plant Y. They are both similar in terms of technological activities except for Plant Y is supplied with ready mixed batches of raw materials from Plant X. Plant Y employs some 150 people. The third plant owned by the group is represented by Subsidiary F. This is a much smaller operation as it only carries out the glassmaking operations and none of the decorating work, and relies on Plant X of Subsidiary A for the decorating work. Plant Z employs some 40 people. Crystal glassmaking is a highly labor intensive process, and raw materials represent only a small percentage of the final cost of producing the product. The company prides itself on the close working relationship it has with its labour unions and has negotiated over the years a system where shopfloor personnel are paid on productivity rather than fixed wages. In the glassmaking shop of Plant X over 90 glassmakers blow and shape the glass much in the same way as glass was blown before the turn of the century. All the plants have uniformed guides who show visiting tourists the various stages involved in the making of a crystal piece. Attached to the three

main plants there are factory shops for those visitors wishing to purchase Subsidiary A products.

Subsidiary B employs only five staff who process orders and market special presentation pieces, business gifts, trophies, special items etc for clubs, airlines and other entities. This subsidiary set-up about seven years ago has a sales turnover of over one million pounds and produces a profit of about £60,000 annually. While it relies heavily on products from Subsidiary A, it also purchases many of its products from other companies.

Subsidiary C, set-up in 1984, is at present a small lamp assembly operation using lamp glass bases from Subsidiary A, lampshades and fittings from outside suppliers to produce crystal and colour lamps. Sales in 1985 were approximately £100,000 and is making a very small loss. It markets its products through the group's home and overseas distribution systems and through home market lighting shops. At present it is only employing one employee on the assembly line.

Subsidiary D, set-up in 1985, is a U.S.A. based corporation employing only one sales person. At present it has no sales and it is still trying to set-up a distribution system to market Subsidiary A's products and other subsidiaries' products in the United States.

Subsidiary E, although only established in 1985, is the main marketing and distribution system for the group's subsidiaries and employs some one hundred and twenty five people. It markets through its concession shops and factory shops over 40% of the group's total sales turnover (£11,000,000 is the group's total sales turnover) and is making a very small profit of between £20,000 and £30,000 annually. Furthermore, 95% of its total purchases are from Subsidiary A which acts as the main sales unit for all the subsidiaries' products. Over £3,500,000 of products are sold through the five factory shops and about £1,000,000 of products are sold through its 27 concession shops. The concession shops are areas in large department stores in which the company pays a certain percentage of its sales

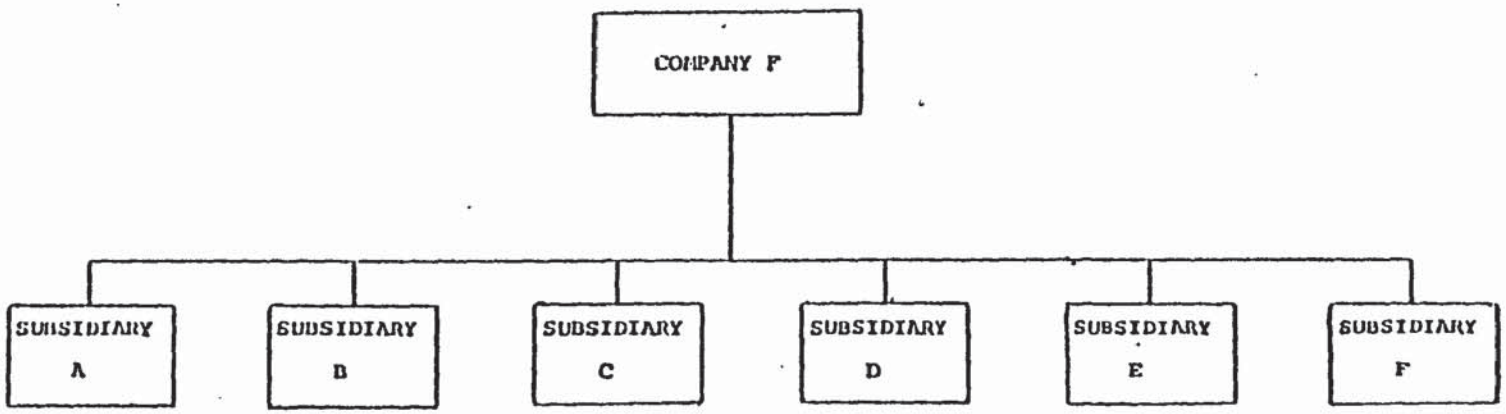
revenues to the management of the store for the right to market its products. The other 60% of the group's sales are processed by the Sales Office of Subsidiary A which markets the group's products through individual retailers and overseas agents, and which number over 400 different accounts.

Control of the group's subsidiaries is administered by a number of Board of Directors composed usually of some three or four members. The group's overall financial performance has been good and is making profits of some £400,000 annually on a sales turnover of £11,000,000.

The group's informal structure meant difficulty for the analyst in structuring an organisation chart, however one based on the perceptions of the managers interviewed is shown in Exhibit 1 to 7.

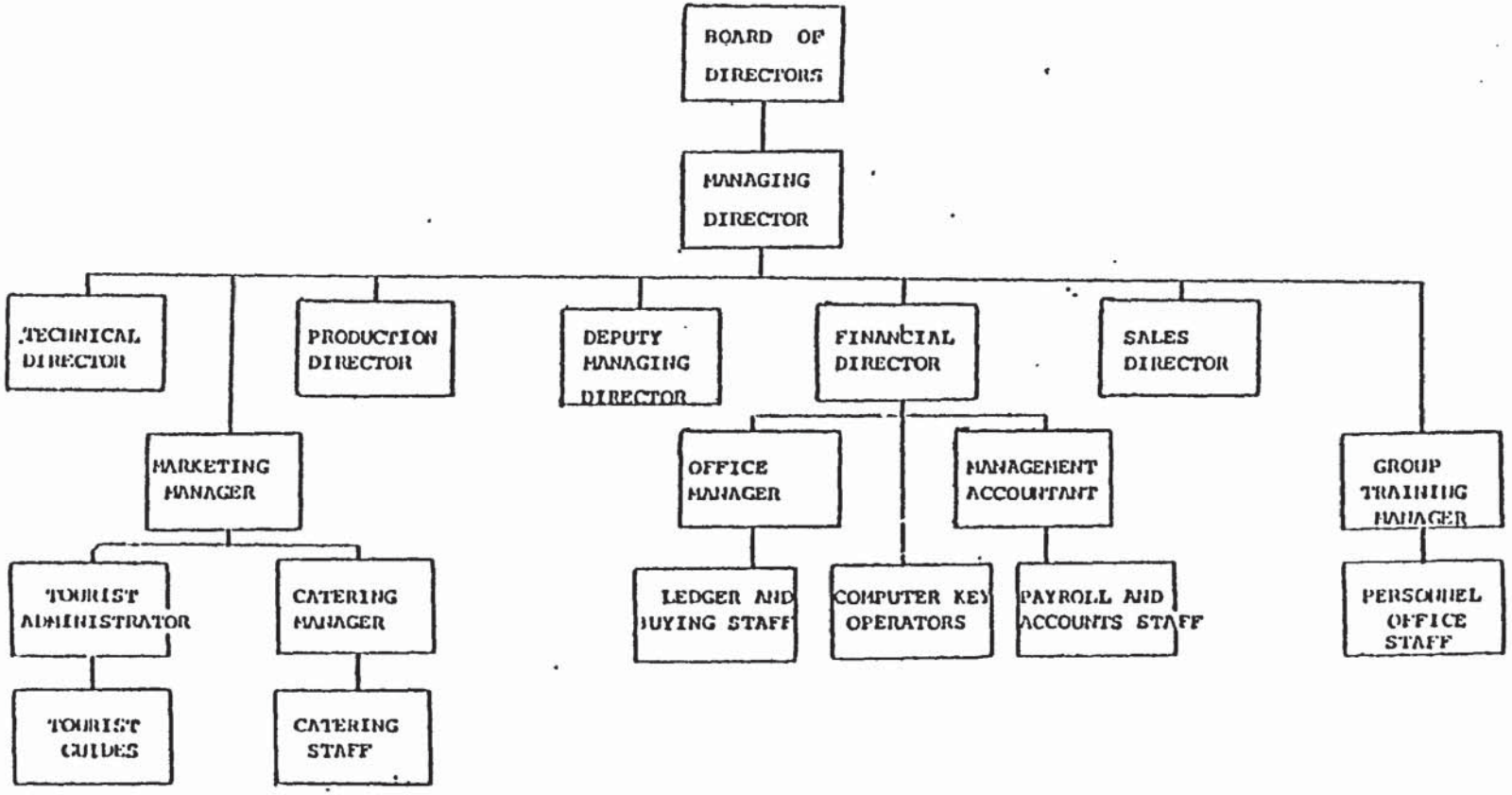
Exhibits 8 to 15 show the units contained within the group and its subsidiaries.

Exhibit 16 shows the product flow between the subsidiaries, and Exhibit 17 shows the product flow within Plant X, which is basically the same as what is happening in Plant Y except that Plant Y has no mixing operation as it receives mixed materials from Plant X daily. Plant Z also has the same product flow but only up to and including the process operation, as the marking and decorating processes are carried out for it by Plant X.



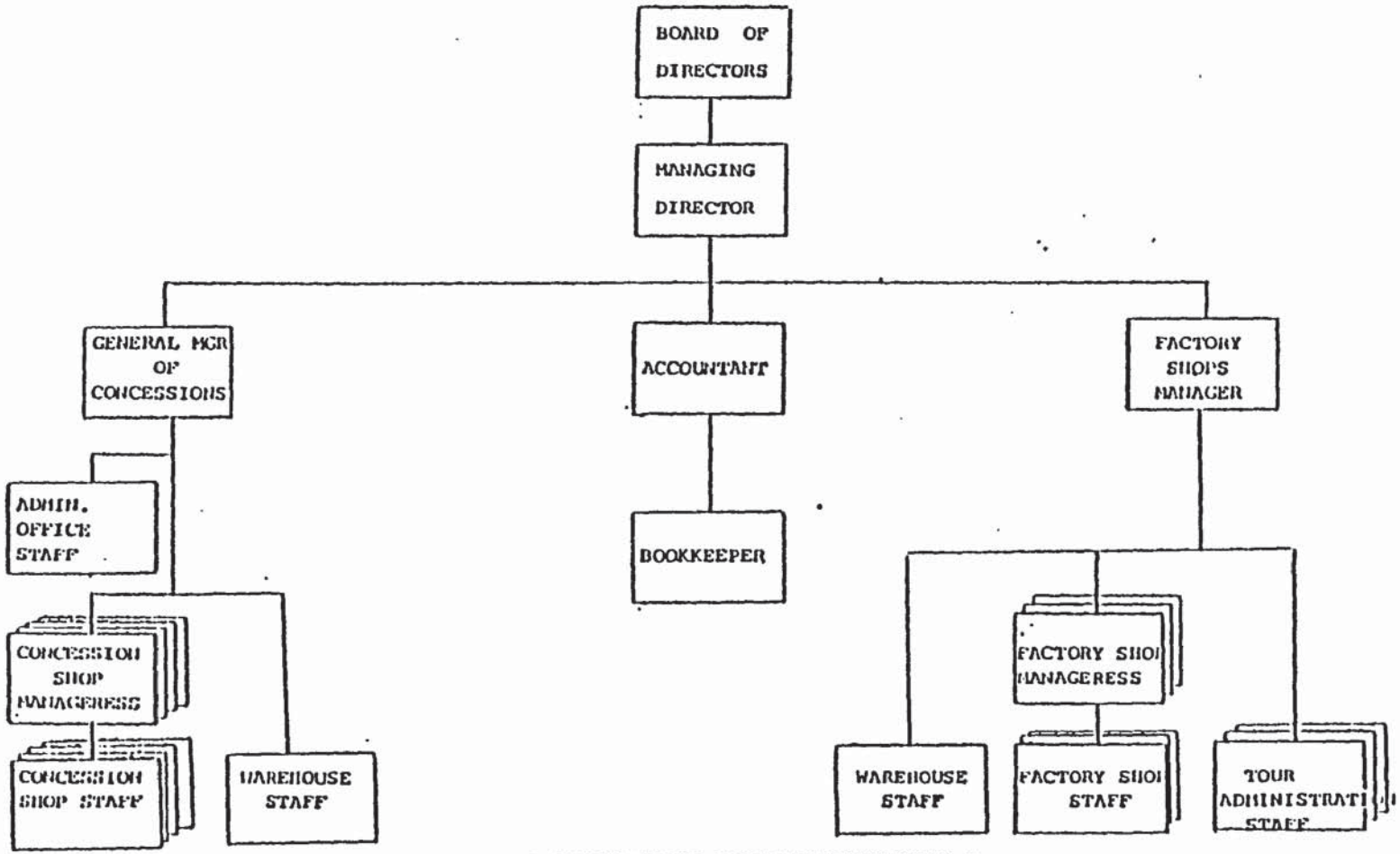
MAIN SUBSIDIARIES OF COMPANY F

EXHIBIT 1



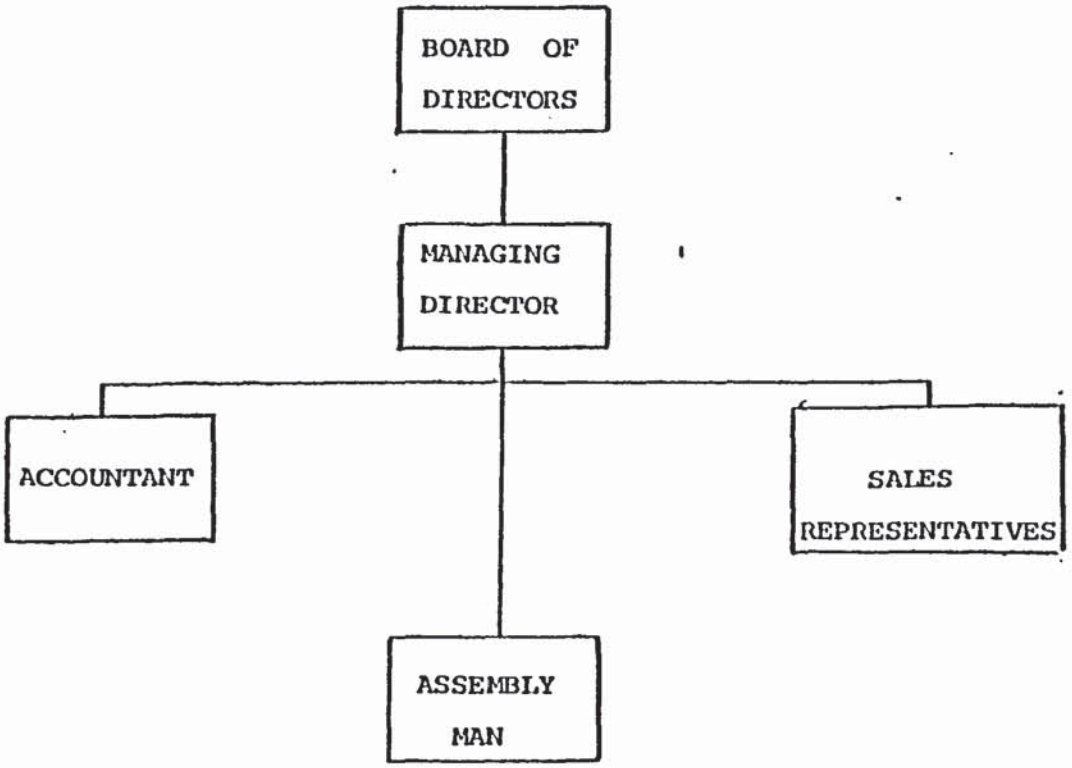
ORGANISATIONAL CHART OF COMPANY F GROUP LEVEL

EXHIBIT 2



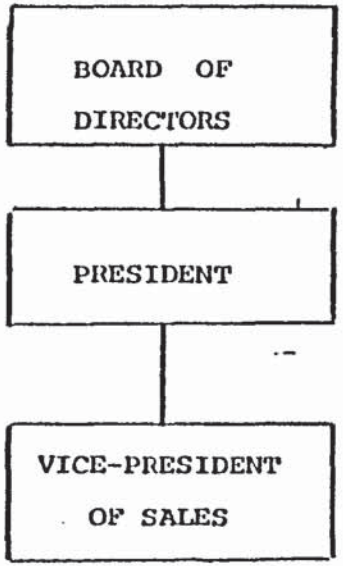
ORGANISATIONAL CHART OF SUBSIDIARY E

EXHIBIT 3



ORGANISATIONAL CHART OF SUBSIDIARY C

EXHIBIT 4

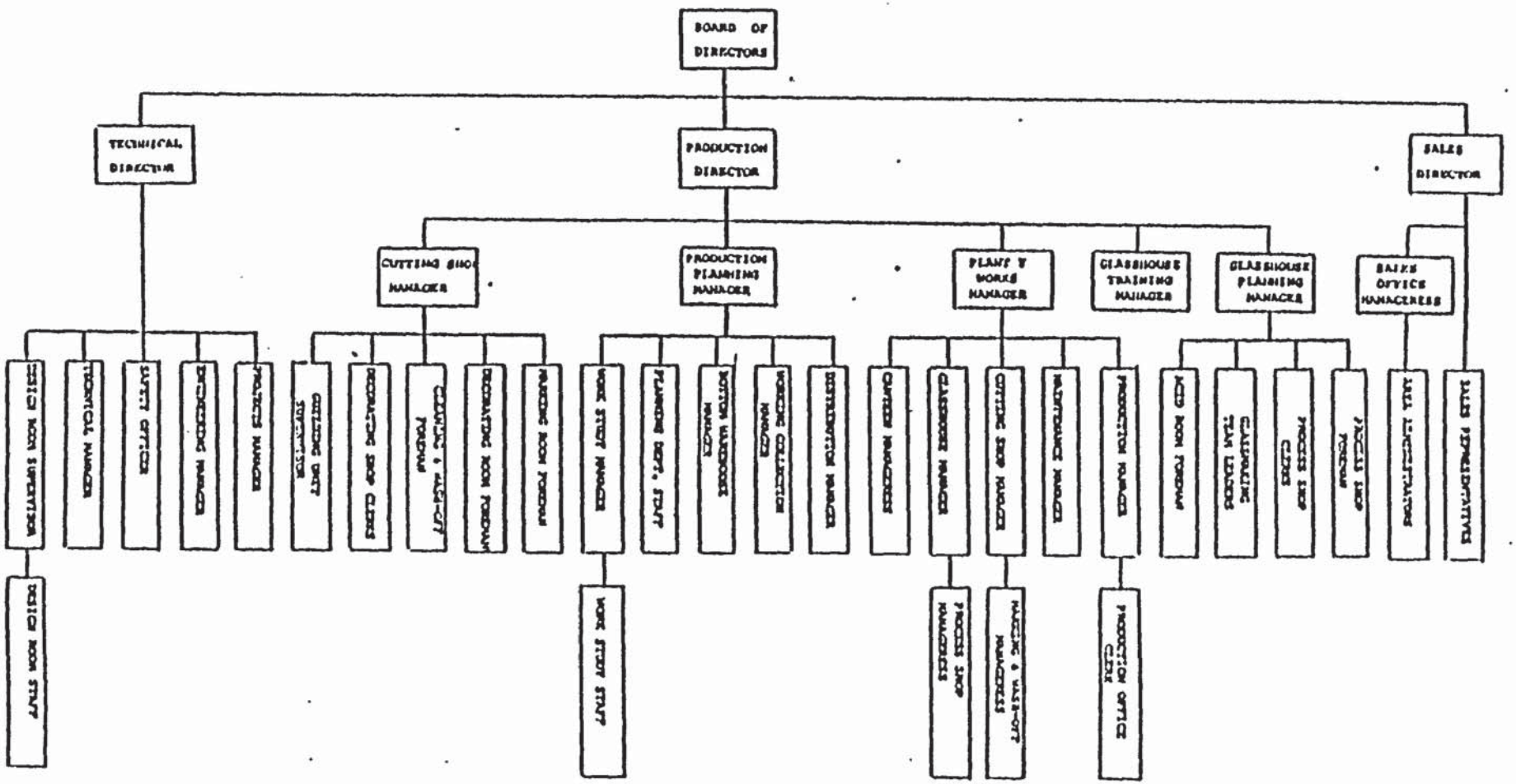


ORGANISATIONAL CHART OF SUBSIDIARY D

EXHIBIT 5

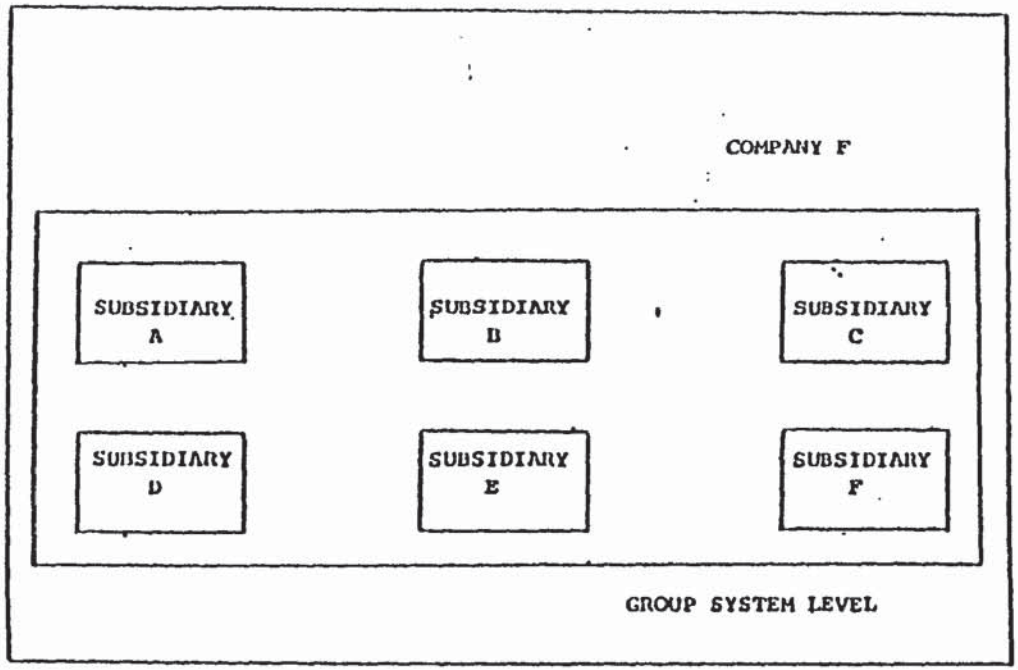
ORGANISATIONAL CHART OF SUBSIDIARY B

EXHIBIT 6



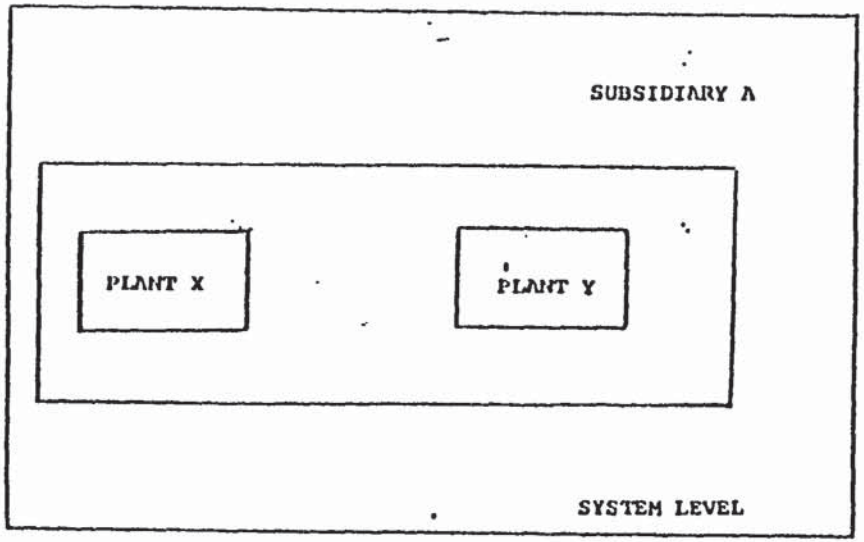
ORGANISATIONAL CHART OF SUBSIDIARY A

EXHIBIT 7



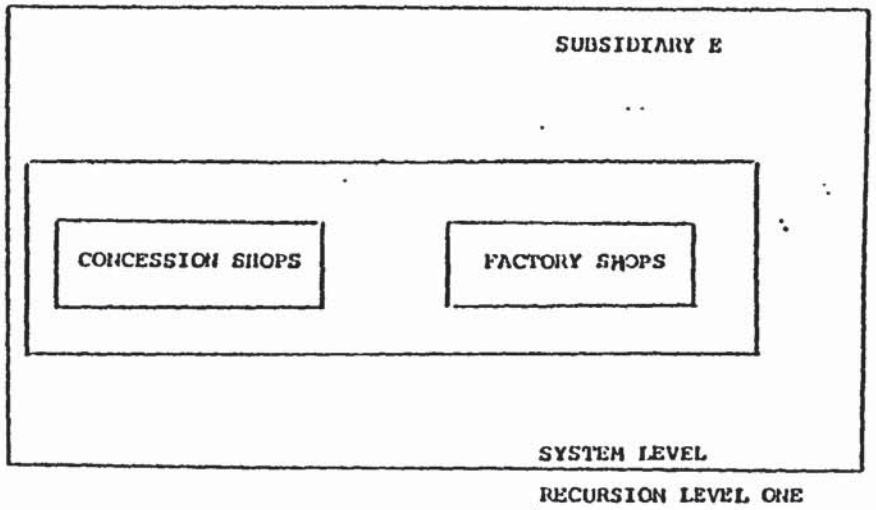
UNITS CONTAINED IN COMPANY F - RECURSION LEVEL ZERO

EXHIBIT 8



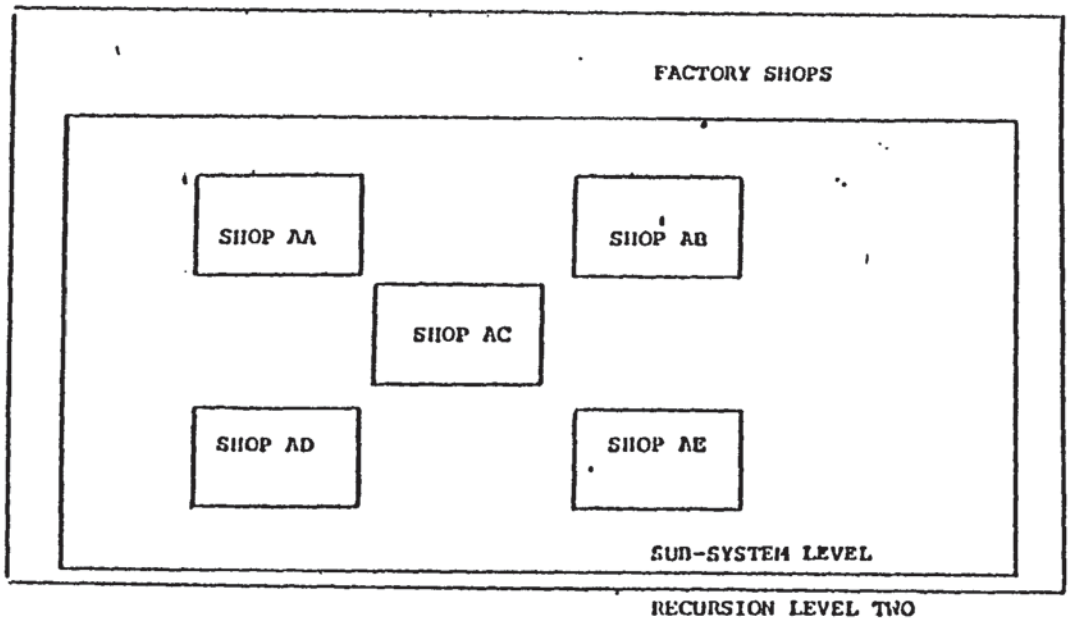
UNITS CONTAINED IN SUBSIDIARY A - RECURSION LEVEL ONE

EXHIBIT 9



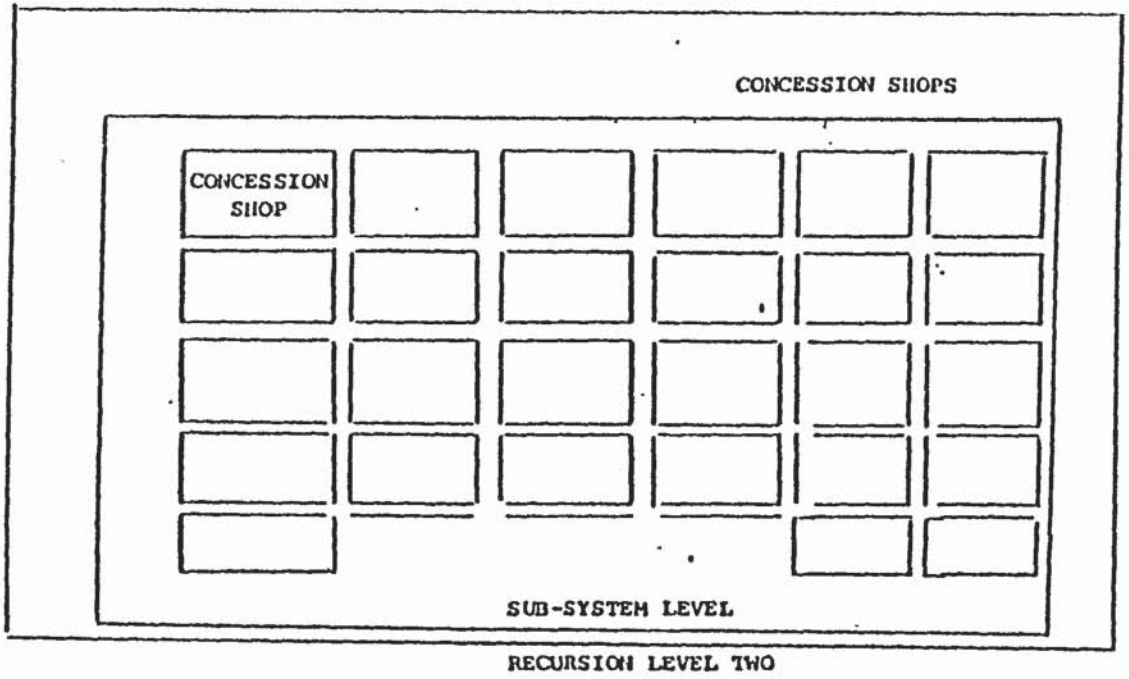
UNITS CONTAINED IN SUBSIDIARY E - RECURSION LEVEL ONE

EXHIBIT 10



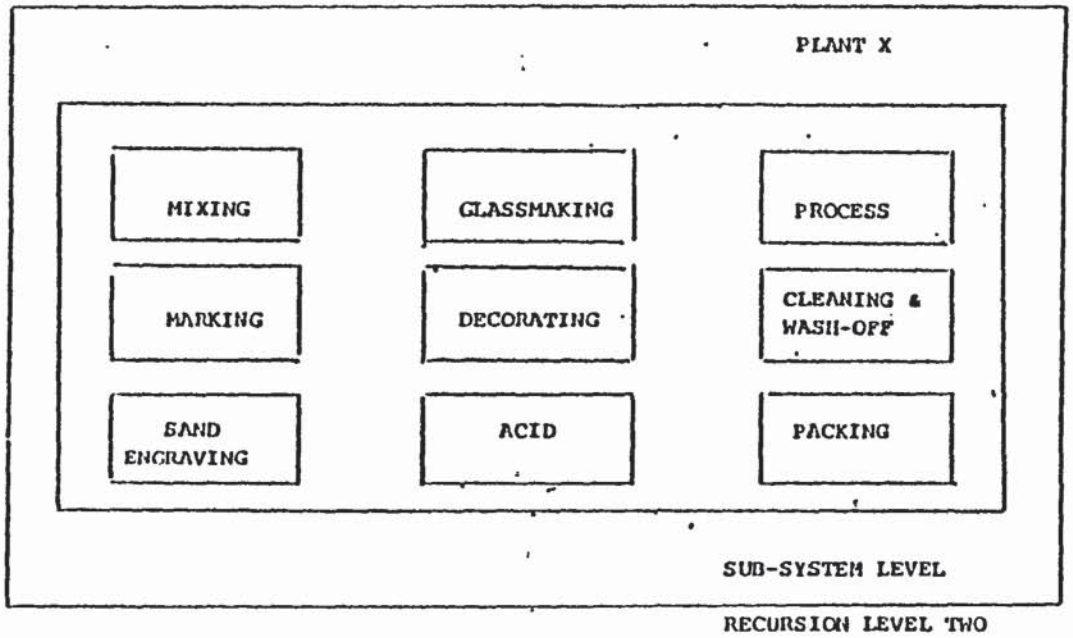
UNITS CONTAINED IN FACTORY SHOPS - RECURSION LEVEL TWO

EXHIBIT 11



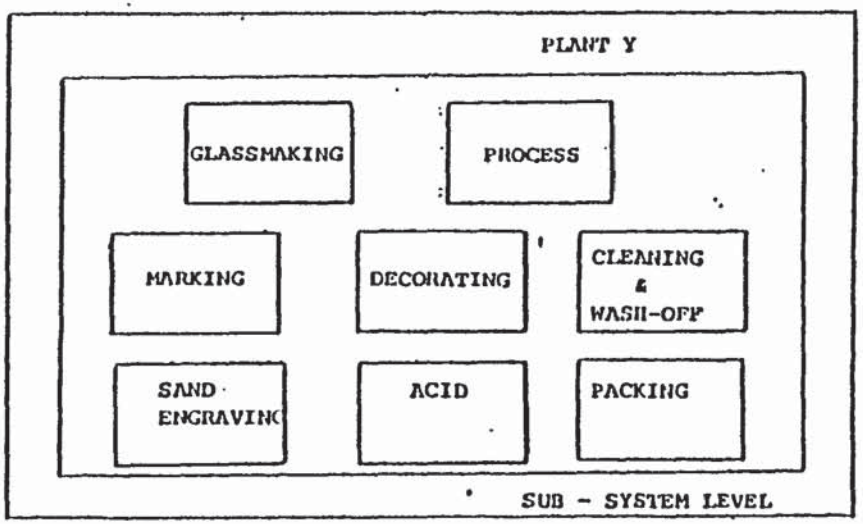
UNITS CONTAINED IN CONCESSION SHOPS - RECURSION LEVEL TWO

EXHIBIT 12



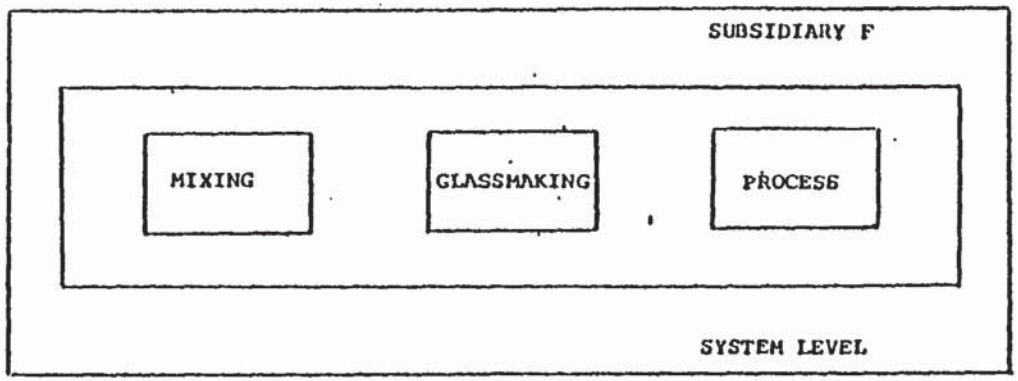
UNITS CONTAINED IN PLANT X - RECURSION LEVEL TWO

EXHIBIT 13



UNITS CONTAINED IN PLANT Y - RECURSION LEVEL TWO

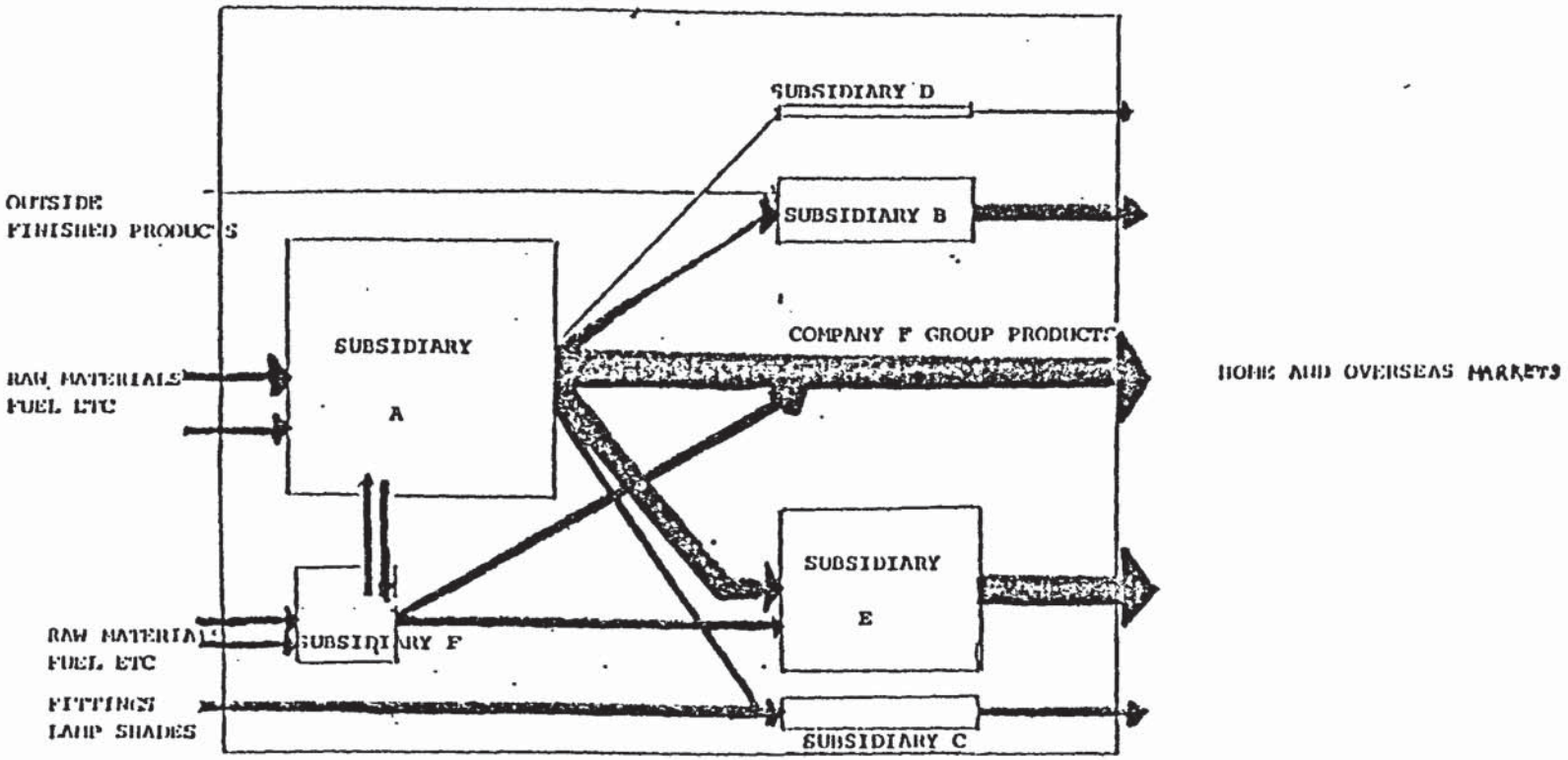
EXHIBIT 14



RECURSION LEVEL ONE

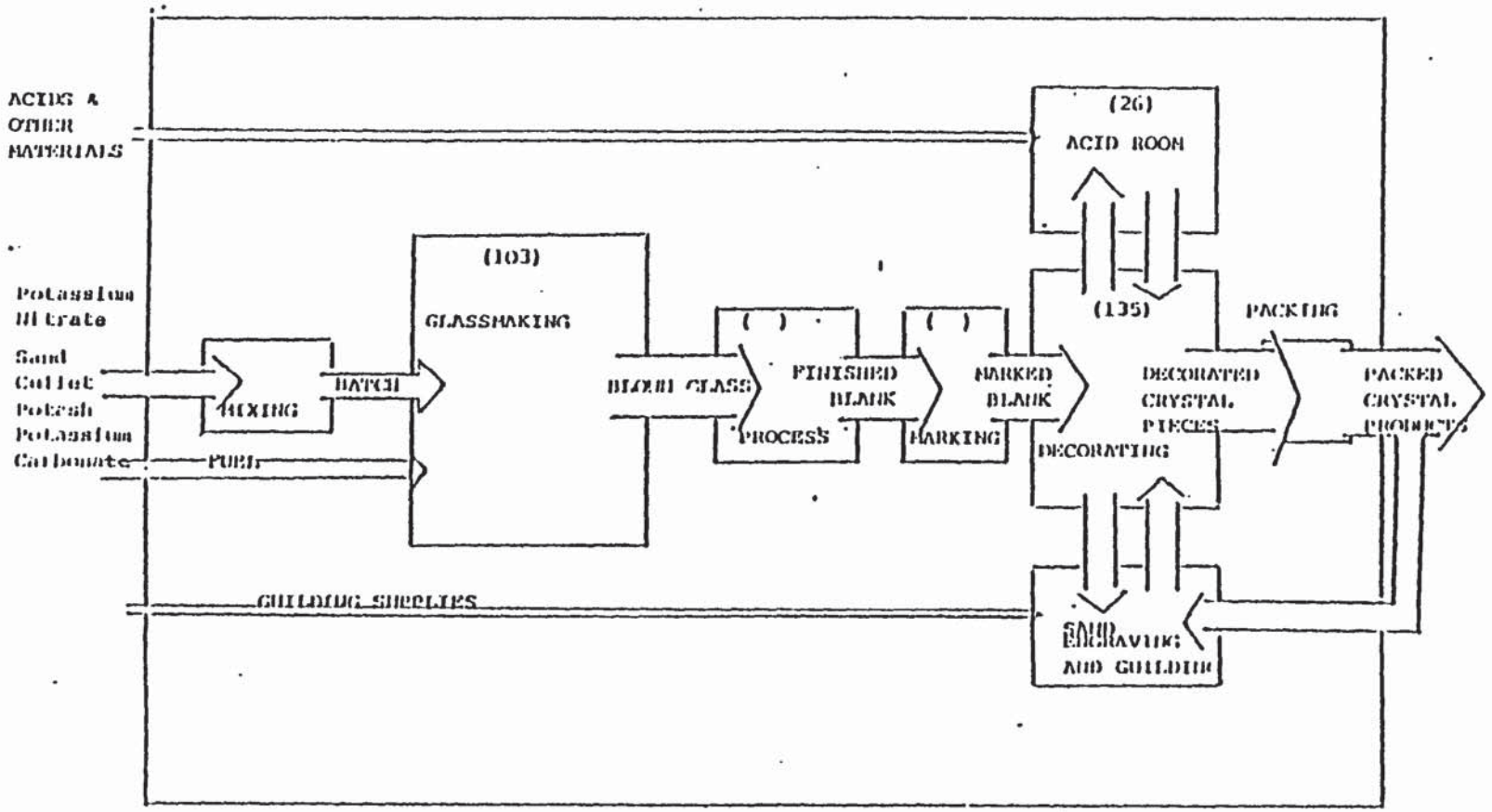
UNITS CONTAINED IN SUBSIDIARY F - RECURSION LEVEL ONE

EXHIBIT 15



FLOW OF PRODUCTS BETWEEN THE SUBSIDIARIES

EXHIBIT 16



PRODUCT FLOW WITHIN PLANT X

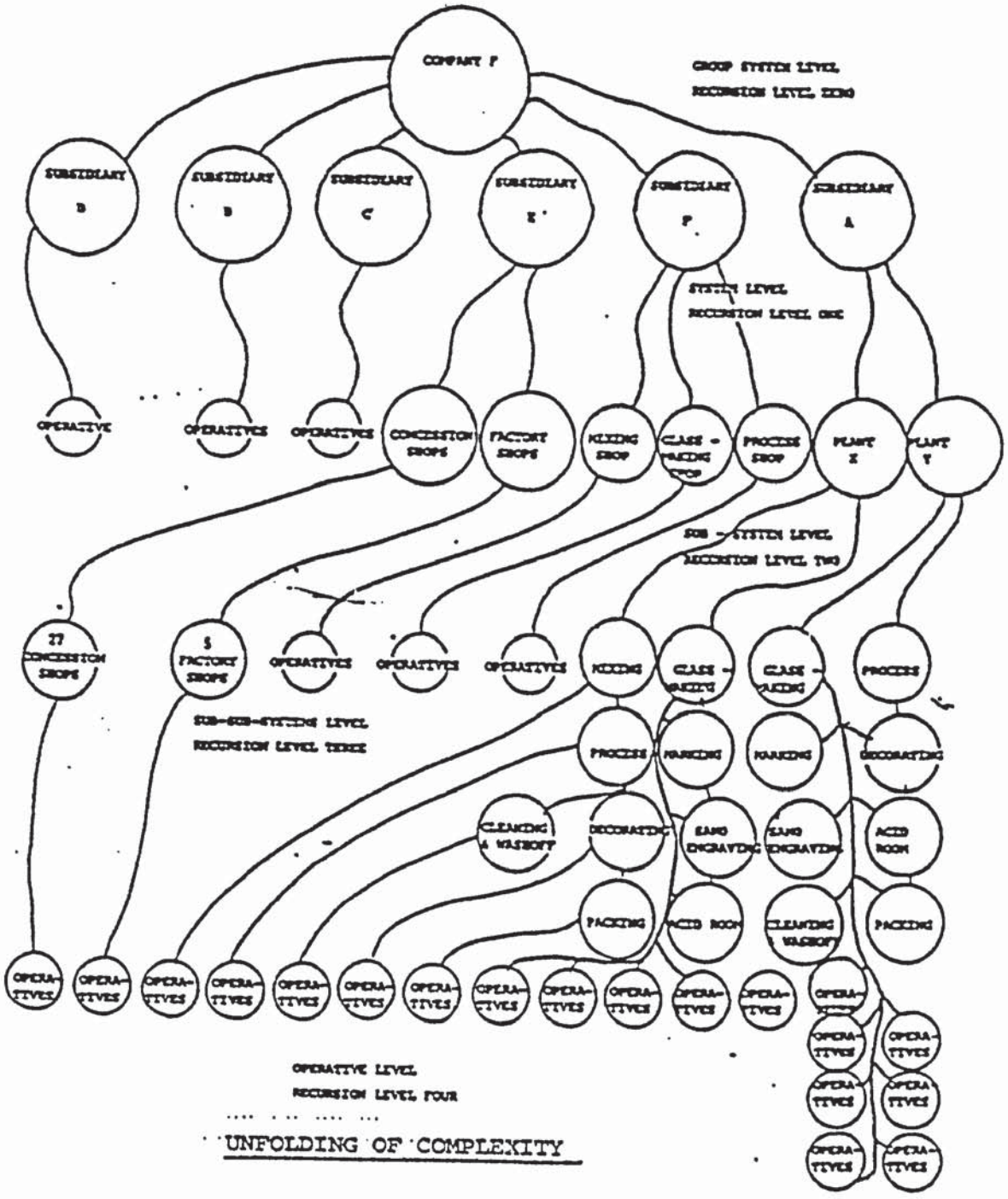
EXHIBIT 17

THE CYBERNETICS OF COMPANY F

Exhibit 18 shows the recursive levels which appear necessary for the implementation of Company F business areas. While Manufacturing and Retailing represent the company's two business areas, Subsidiary B, Subsidiary E, Subsidiary F, Subsidiary A, Subsidiary C and Subsidiary D appear as the primary activities and each may be seen as a complex activity that requires managerial autonomy. All six primary activities are well recognised structurally in the company. Subsidiary B, Subsidiary C and Subsidiary D have their complexity fully absorbed at the recursive level one, while for the other primary activities it is possible to distinguish further levels of recursion. For Subsidiary E both Concession Shops and Factory Shops appear as its sub-systems and each may be seen as a complex activity that requires managerial autonomy. Both of these primary activities are well recognised structurally. It is possible to distinguish one further level of recursion for Subsidiary E represented by the sub-sub-systems contained within each of its two sub-systems. Within Concession Shops there are twenty-seven sub-sub-systems represented by what the company terms as 'shops within shops'. Within Factory Shops it is possible to distinguish five sub-sub-systems represented by:

a) Shop AA
b) Shop AB
c) Shop AC
d) Shop AD and
e) Shop AF.

Again all these sub-sub-systems are well recognised structurally. Within Subsidiary F it is only possible to distinguish one further level of recursion represented by three sub-systems:



UNFOLDING OF COMPLEXITY

EXHIBIT 18

a) Mixing Shop

b) Glassmaking Shop and

c) Process Shop.

Within Subsidiary A, the main manufacturing unit of the group, it is possible to distinguish two main sub-systems represented by the company's two main plants, Plant X and Plant Y. Both of these primary activities are recognised structurally. Within the Plant X sub-system it is possible to distinguish one further level of recursion represented by nine sub-sub-systems, these being:

a) Mixing Room
b) Glassmaking Shop
c) Process Shop
d) Marking Room
e) Decorating Room
f) Sand Engraving
g) Cleaning & Wash-off
h) Acid Room
i) Inspection and Packaging

while in the Plant Y sub-system it is possible to distinguish eight sub-sub-systems, these being:

a) Glassmaking Shop
b) Process Shop
c) Marking Room
d) Decorating Room
e) Sand Engraving
f) Cleaning & Wash-off
g) Acid Room
h) Inspection & Packaging.

For all the above systems, and given that each has its own particular working environment, they need, and somehow they have, a degree of discretion and autonomy. An examination of the operating systems and the relevant transformations being carried out within the various systems revealed that the group system level, recursion level zero, retains long-term financial, marketing and technological discretion. At the system level, recursion level one, all the systems had medium-term planning, financial, marketing and technological discretion. At the sub-system level, recursion level two, the Subsidiary A sub-systems had limited short-term planning discretion. For Subsidiary F it is not

possible to identify the degree of discretion that the various sub-systems have, as none of its managers were interviewed. With respect to Subsidiary E's sub-systems, both Concession Shops and Factory Shops appear to have limited marketing and procurement discretion, while retaining short-term planning discretion. With reference to Subsidiary A's sub-sub-systems, recursion level three, none of the units had operational or planning discretion. With reference to Subsidiary E's sub-sub-systems, recursion level three, both Concession Shops and Factory Shops had limited operational and planning discretion.

Assuming the analyst has captured well the structural recursion in Company F, the next step is to identify, when possible, the mechanisms of control and adaptation in each of the four levels. The reader should recognise that no cybernetic analysis is carried out on Subsidiary F and Subsidiary D as none of their managers were interviewed and thus any diagnosis with reference to these two systems would have to be an abstract understanding rather than concrete operating procedures and existing transformations which their respective managers give closure to.

EFFECTIVENESS OF REGULATION

The analyst will study the effectiveness of regulation with reference to Exhibits 19 and 20 which focus attention on the mechanisms of monitoring-control and adaptation for both Company F and each of its systems.

EFFECTIVENESS OF REGULATION AT THE GROUP SYSTEM LEVEL: RECURSION LEVEL - ZERO

With reference to Exhibits 19 and 20 control of the six major systems, Subsidiary A, Subsidiary B, Subsidiary C, Subsidiary D and Subsidiary E and Subsidiary F rests with the Executive Committee consisting of the Managing Director, Deputy Managing Director, Sales Director, Financial Director, Production Director and Technical Director. They are aided in this role by the group service units and managers consisting of the Marketing Manager, Group Accounts Department and the Group Training Department. At this level the Executive Committee is controlling and monitoring all the systems. At the weekly Executive Committee Meeting all major subsidiaries are presenting reports on their performance coupled with reports from each of the directors in such specialized areas as Sales, Production, Technical etc. It is through this meeting that all major decisions concerning marketing strategies, international expansion programmes, capital plant expenditures etc are taken.

The Group Accounts Department under the control of the Financial Director has the function of providing corporate financial information, controlling and recording financial transactions, settling payments betwen the subsidiaries and raising invoices between the subsidiaries. This department is receiving also quarterly management accounts from Subsidiary B, Subsidiary C and Subsidiary F, monthly management accounts from Subsidiary A and Subsidiary E. It is also

Exhibit 19 (Cont)

CHART ONE

Recursion Level Zero

NAME OF THE VIABLE SYSTEM IN FOCUS.
Company F

CHART TWO

EXHIBIT 20 (Cont)

DIAGNOSTIC CHART OF SYSTEM IN FOCUS:

RECURSION NO: ZERO
NAME: COMPANY F

receiving reports on the weekly-monthly sales turnover from Subsidiary A and Subsidiary E. Subsidiary budgets are also provided. Group Accounts Department then produces corporate management accounts and one year projected cash flows for the Financial Director. The Financial Director sees his task as one of monitoring the overall financial performance of the subsidiaries, setting policy and guidelines on how financial information is produced and ensuring that it is produced by subsidiary accounts departments to set timetables. The only system that is not monitored on a regular basis is Subsidiary D, which is a newly formed subsidiary and at present only providing limited irregular accounting information. There is also evidence that he is monitoring subsidiary budget variances on a regular basis. However the Buying Office, which is part of the Accounts Department, is carrying out functions related to materials ordering and purchasing for the Subsidiary A system, an activity that would be expected to be controlled and monitored one recursion level below, as it is very much concerned with the materials management of the plants.

The Managing Director sees his task less of, actually, managing and controlling the subsidiaries and more as Marketing Director. He is the source for most of the marketing plans and strategies and many of the new and creative ideas on product range expansion and product diversification originate from him. He sees one of his purposes is to challenge existing management techniques used in British industry and to attempt to create a more democratic form of management where the workforce is actively engaged in helping set overall group and company policy. New areas such as woman development programmes are constantly being considered by him and he has given the group system a perception of a system characterized by change and innovation and one that has a very much informal structure and where lines of accountability are set more on what needs to be carried out than strictly guided by a formal organisation chart. In fact the formulation and setting up of such systems as Subsidiary B, Subsidiary C,

Subsidiary D and Subsidiary E are but an expansion of his marketing strategy in getting Subsidiary A products from point of production to customer with as little reliance on middlemen and wholesalers as possible. These systems could easily be mistaken for extensive sales departments, however, each system is striving for viability when one examines their marketing strategies and modes of operation. However, in his concern to expand the marketing system he quite often has to carry out a fire fighting exercise (system two activities to dampen oscillations) through impromptu meetings to review individual system's marketing strategies so that they do not conflict with other systems' marketing strategies and reducing the probability of two salesmen, each from a different system, trying to sell to the same customer the same product. He is not monitoring the overall market performance of the group's systems, however he is very conscious of market research and the need for it to isolate and identify particular markets that are of relevance to the Group. His recent appointment of a Marketing Manager, in order to aid him in this task, only seeks to confirm the point of analysis. Yet this Marketing Manager is carrying out functions which restrict her efforts in the area of marketing research as she has to devote time to operational problems in the areas of catering and tourism. While catering can be seen also as a service to staff and employees, both catering and tourism are strategies used by the company to amplify the sales of Subsidiary E. The overall financial significance of the tourists visiting the plants is only appreciated directly by Subsidiary E, which benefits from sales to customers both in the short term and long term, through its concession and factory shops, and indirectly by the manufacturing plants through increased production in the long-term. The monitoring of number of visitors and comparing those figures to the shop takings, presently being carried out by the Marketing Manager are the functions of the Factory Shop's Manager, two recursion levels below, who has responsibility for Shop AA. Another strategy used by the Managing Director in maintaining control over the six systems is by

the appointment of members of the Executive Committee to the board of directors of the subsidiaries, so for example the Sales Director is also playing the role of non-executive director of Subsidiary E, Managing Director of Subsidiary B and Sales Director of Subsidiary A, and the Production Director is also the Chairman of the Board of Directors of Plant Z and the Production Director of Subsidiary A. While this is an effective method of communicating overall group policy to the systems and ensuring they are adhered to it, however, restricts the abilities of the systems to develop and create policy that is more adaptable to their own particular working environments. It also holds problems with respect to the effective monitoring of these systems in that in some systems the person carrying out the monitoring role happens to be the same individual as the one who is being monitored. A specific example of this is the Sales Director who is monitoring the overall sales performance of Subsidiary B which he controls.

The Technical Director at this level is monitoring competitors' furnace technology and the furnace performance of all three major plants. The monitoring of competitors' furnace technology is basically a system four activity, in that he is aiding the viability of the system by keeping up with technological innovation in areas that concern the system. He is already looking at long-term plans to introduce new technologies into the plants and has numerous interactions with other Executive Committee members concerning this matter. In the monitoring of the performance of the various plants' performance he is carrying out this role only with respect to Plant Z at this level since he is already monitoring the other plants at a lower recursion level in his capacity as Technical Director of the Subsidiary A system.

The Production Director sees his task only in relation to the manufacturing divisions of Subsidiary A and Subsidiary F. Since he is already the Production Director of Subsidiary A and the Chairman of the Board of Directors of Subsidiary F he is already actively involved in their operations. However, his position at the

group level requires him to monitor the production of the other primary activities. This he does not appear to be doing so, for example with Subsidiary C.

The Group Training Manager sees clearly his role and what is required of him, however organisational resources have not been made available to him to ensure the coordination of the subsidiaries' training programme. He is actually operating at the Subsidiary A system level, in that he is actively engaged in that system's training programmes. Since most of the primary activities of the group have not developed well their training programs, the need for the Group Training Manager to coordinate their activities and to ensure the effective use of organisational training resources becomes more important. There does not exist any overall management development programme and the need for some role to get actively involved in this area can only be recognised when understanding the disregard for this area by the management with respect to Plant Y, where poor management is causing control problems. The Education Committee consisting of the Managing Director, Production Director and the Group Training Manager appears to be a mechanism that was set-up to study the group's training needs and to ensure that they were discussed, but there was no evidence that this committee meets at all. The personnel office, an entity accountable to the Group Training Manager, has the task of monitoring and selection of group employees. However, it seems that this office has lost adequate control of its purpose, and selection and placement of group employees has been taken over completely at the subsidiary level. This is no problem, in cybernetic terms, since these subsidiaries should have the autonomy to choose their own employees, it is still the job of the Personnel Office to monitor these activities to ensure that particular standards are adhered to and to produce validated reports for higher level management on the number of employees employed and other data.

The Sales Director perceives his task as one of integrating the selling approaches, coordinating sales of all subsidiaries, determining sales policy and

targeting of group sales efforts. This fits well with what is required of him at the group systems level. He is conscious of all the activities of the sales departments in the subsidiaries and receives regular reports from them. He also has monthly meetings with the sales departments. This is a monitoring strategy of his to validate the reports that he is receiving and a way of ensuring that group sales policy is adhered to. He visits export markets to bring back orders and obtain new ideas from the customers.

With respect to system four activities, intelligence activities, one can only conclude that here is an entity that is very conscious of the need for this important organ of adaptation and there are numerous activities being carried out by individual members of the Executive Committee in terms of marketing research, long-range plans to introduce new technologies, computerization, new distribution outlets. However, there does not exist any formal mechanism to ensure that these studies are carried out, it is rather done through informal meetings, individual efforts and quite often through discussions at the Executive Committee Meeting.

EFFECTIVENESS OF REGULATION AT THE SYSTEM LEVEL

SUBSIDIARY A - RECURSION LEVEL 1

With reference to Exhibit 21, control of Subsidiary A is distributed between the Production Director and the Technical Director. They are aided in this role by the Sales Director, Sales Office, Design Department, the Work Study Department, the Production Planning Department, the Safety Officer and Sales Office. The Production Director sees his task as one of managing production, monitoring industrial relations, production planning and overseeing the training within the plants. The Technical Director perceives his task as dealing with the technical aspects of production, which includes the standard of furnaces, fuel, materials, equipment, maintenance and improvement, and also the welfare, health and safety of production employees. He also perceives his task as one dealing with product development. The Sales Director sees his task as one of monitoring Subsidiary A sales. The work study department has the task to monitor all production statistics and to produce standards of production and performance for both Plant X and Plant Y. The Design Department appears to have the function of reviewing new product needs and carrying out the technical draughting work for all new products. All three directors are accountable to the board of directors of Subsidiary A.

Clearly the role of the Production Director at this level is to control and monitor two primary activities, these being Plant X and Plant Y. However it appears he is operating one recursion below what is necessary. Evidence of this comes from two main sources. The first is in the nature of the reports he is receiving. At Subsidiary A system level, he is only required to monitor the overall performance of the two plants and not to monitor their sub-systems. He is receiving weekly reports on quantities produced, reject rates, operator performances, breakage rates with respect to the Glasshouse and decorating shops

SUBSIDIARY A

EXHIBIT 21

SYSTEM LEVEL
RECURSION LEVEL ONE

of Plant X. He is also receiving daily reports on the amount manufactured in terms of value for the Glasshouse, Decorating Shop and Acid Room. From the warehouse he is receiving a daily despatch report on goods shipped. He makes a weekly visit to Plant Y where he literally does the plant manager's job. From Plant Y he is receiving reports on fuel usage and the number of pots filled. In fact, he is so involved in the direct operational control of the sub-systems that he perceives about fifteen managers are directly accountable to him, while a study of the company's organisational chart reveals that only five should be directly accountable to him; the Cutting Shop Manager, Glasshouse Managers, the Production Planning Manager and the Plant Y Works Manager. He is using the above reports to produce a breakdown of the allowances in each of the sub-systems, such as the Glasshouse, and amount of time spent on development, waiting and day work. The second source of evidence, that he is operating one recursion level below what is necessary is his involvement in the day to day activities of the shopfloor and the numerous committees involved in the coordination of shopfloor activities (system two activities at the sub-system level). Both the Production Director and the Technical Director are involved in the weekly development committee meeting which has the main purpose of coordinating new items from development to final production. This appears to be an activity that should be carried out by the controllers of Plant X who are the Production Planning Manager, the two Glasshouse Managers, and the Cutting Shop Manager. The Production Director is also involved in a daily meeting with the Production Planning Manager, Cutting Shop Manager and the two Glasshouse Managers. In this meeting he reviews facts and figures provided by the planning department, comparing production targets with what has been achieved, and reviewing specific jobs causing problems in production. This activity is being carried out at the right level where system one activities are reporting through direct channel commands to the system three controller. However, there is also

evidence that the Production Director quite often by-passes his subordinate managers and deals directly with shopfloor problems. The overall impression of the operating mode of the Production Director is one in which he is collapsing his role from controller (system three) at the system level to controller at both the plant levels or sub-system level. This could clearly explain why he is overworked, and neglecting the monitoring of some of the major primary activities at the group system level. In cybernetic terms it would seem that he is severely limiting the autonomy of his subordinate managers to operate with some independence from senior management. His direct management of the Plant Y Works has also limited the scope of this primary activity to learn and adapt. While clearly it is understood that this unit might not have the standard of management to run independently of Plant X, this can be overcome by management development training and unleashing the reigns for its managers to develop and learn. However, management development is not an area that has been considered at the Subsidiary A system level, the focus has always been in developing technical skills in the Glasshouse.

The Sales Director at this level is monitoring the sales of Subsidiary A products. Accountable to him are the two sales representatives and the Sales Office which is controlled by the Sales Office Manageress. He is using three different mechanisms in the monitoring of the sales performance of Subsidiary A. The first is through a daily meeting with the Sales Office Manageress, in which he reviews where the orders are originating from, what orders have been despatched and ensures that the sales order bank is not slipping. He reviews account by account the variances between the present year's sales and the previous year's sales. He also monitors the sales budget for this system and makes sure that it is keeping up with predetermined targets. The second mechanism is through a monthly sales meeting which he conducts with the Sales Office Manageress and the two Sales representatives. The third mechanism is by means

of a regular reporting procedure where sales figures are produced for him by the Sales Office.

The Sales Office is processing incoming orders. If the goods required are available in stock they are then passed straight on to the distribution manager for despatch. If not they are passed to the Production Planning Department. It is these orders that are used in the Weekly Production Planning Meeting, where the Plant Y Works Manager, the Glasshouse Manager of Plant Y, the Production Planning Manager and the two glasshouse managers from Plant X meet and discuss where the orders should be produced. In effect it is this system two activity, a coordinating mechanism, which coordinates production in the two plants. In effect they are producing weekly production plans for both plants. It is the Production Planning Department that is processing the incoming orders and monitoring the work values of both plants. This means that the Production Planning department is playing a system three role at the Subsidiary A system level. However, this department is under the control of the Production Planning Manager who is also controller of two other activities, the Inspection and Packaging Shop and the Warehouse at the sub-system level of Subsidiary A.

The Technical Director at this level is carrying out numerous activities. The first as the controller of the maintenance activities within the two plants. In this role he is aided by the Projects Manager who orders the materials and arranges for any sub-contractual work to be carried out. From Plant X he is monitoring the maintenance of the day-to-day production carried out by his Engineering Manager and the workshop fitters. With respect to this plant he is giving considerable autonomy to his Engineering Manager to carry out his function. However, the same is not true with respect to Plant Y. The Maintenance Manager in Plant Y is not accountable to him but to the Plant Y Works Manager. It seems that maintenance problems in Plant Y are not the sole responsibility of one manager, but rather distributed amongst a number of managers. The Technical Director is

monitoring the efficiency of machines and furnaces as he is receiving regular reports from the Production Office Clerk on fuel usage and on the number of pots filled. This shows that the Technical Director is monitoring at too low a level than is necessary. However this is not regular monitoring because the furnaces in Plant Y are relatively new and technologically different from the ones in Plant X, and so the management of Subsidiary A is only monitoring them to the stage where technological problems cease and only routine maintenance problems occur. Technical problems from Plant Y are also dealt with by the Technical Director's subordinates, for two main reasons. The first is that the Projects Manager also happens to be an expert on the machines that they have in Plant Y, and secondly because the Plant Y for a period of time did not have a Works Manager for the Maintenance Manager to report to, so that technical problems were not being filtered at that level but rather spilling over to Plant X. The second role that the Technical Director is carrying out is that of monitoring the welfare and safety of the two Plants' employees. This, he does through his Safety Officer. The Safety Officer arranges the training programmes for the first-aiders for both plants and coordinates them. She also issues safety standards to both plants and monitors the number of accidents on the shop floor. She, in turn, provides a quarterly report to the Technical Director showing only major accidents and total number of minor accidents. The Safety Officer has considerable autonomy to carry out her function, and has financial discretion to purchase medical supplies. The third role that the Technical Director is carrying out is that of development. In this role he is supported by the Design Department and a number of his subordinate managers. He ensures that development of tooling is carried out, new products are discussed and designed and other departments are consulted. These activities are system four activities and are the mechanism by which the Subsidiary A system adapts to the needs of the environment by constantly reviewing market needs for new products and working

with system three people to ensure their production. The ideas for new products originate both from the sales personnel and the customers themselves. This is coupled with innovative ideas to introduce computerisation for sales order entering and production planning. However, the committee looking at this computerisation process does not include a representative from Plant Y. While this system suffers from inadequate market research into its products and their quality, it is however very conscious of this very necessary organ of adaptation, mainly through its Technical Director who is carrying out long term study plans for introducing new production techniques into the plants.

SUBSIDIARY B - RECURSION LEVEL 1

The Cybernetic analysis of Subsidiary B was severely limited in that the analyst was not given access to interview members of staff within this system. However it appears from the discussions carried out with the Managing Director of this system that the complexity of this unit is fully absorbed at this level. Control of this system rests with the Managing Director who also happens to be the Group System Sales Director. The actual operations and processing of orders is carried out by a staff of five. The Managing Director has given considerable autonomy to his staff to operate independently of him. He, however, is monitoring weekly sales and receives details of any large enquiries. In the case of large enquiries he then determines if he should handle them himself or pass them on to this staff to deal with. The overall policy for this system is determined by the Board of Directors which reviews the accounts and approves the yearly budget. With respect to system four activities the extent of activities at this level seems very limited. A limited degree of marketing research is carried out; new distribution systems are not examined, no overall long-term marketing strategies appear to be in force.

SUBSIDIARY C - RECURSION LEVEL 1

This system was only recently set up in 1984 and at present only has one person involved in the technological activities of the system. The complexity of this system is fully absorbed at this level of recursion. Control of the system (system three role) is carried out by a Managing Director who also operates as Sales Director. In this role, he is aided by an accountant and a part-time sales agent who works with the system on a commission basis. The assembly man carries out all technological operations which require practically no technical expertise since all major operations involved in the lamp assembly are actually carried out externally, and all the operator has to do is to assemble them. The Managing Director controls the day-to-day administration of assembly and also supervises the on-site shop. However the administration of the on-site shop appears to be function of the Factory Shops Manager of Subsidiary E and not that of the Managing Director. The accountant is producing regular accounts and providing the board of directors with a financial report on actual sales carried out by the system. Although it is only a recently formed company, this system is very conscious of its system four activities and is examining new distribution systems for the marketing of its products. Within a two year period it has also increased its product range three-fold and is constantly examining new products. However, the system is suffering from lack of market research, and products are often designed and produced with inadequate market research. No studies are being carried out by management to ascertain the feasibility of producing some of the many items needed for the assembly operation; such as fittings and shades.

SUBSIDIARY E - RECURSION LEVEL 1

With reference to Exhibit 22, control of Subsidiary E is carried out by two main roles, the Managing Director and the Financial Director. The Managing Director of Subsidiary E is also operating at the group system level and is the same individual as the Deputy Managing Director. The Financial Director is also the same individual as the Group's Financial Director. These two individuals report to and are accountable to the Board of Directors of Subsidiary E which comprises of these two executive directors and the group system Sales Director who sits on the Board of Directors of Subsidiary E as a non-executive director.

The two directors, Managing Director and the Financial Director, are carrying out system three activities at the Subsidiary E system level by controlling two primary activities represented by the sub-systems Concession Shops and Factory Shops. They are aided in this function by the Subsidiary E Accounts Department. The Managing Director at this level discusses regularly the day-to-day running of Concession Shops and Factory Shops with their respective managers. He is receiving from them weekly and monthly sales figures on each shop. It seems that he is monitoring the primary activities at the Subsidiary E recursion level two, since at this level he should be monitoring the overall performance of each of these sub-systems rather than their individual units. He is also active in the Retail Executive Meeting setting out guidelines on retail personnel training programmes. The Financial Director is also active in the day-to-day running of Subsidiary E but more so on the accounting side of it. In this role he is monitoring the financial performance of the two sub-systems and sets policy on how the accounting information is actually produced. The accountant who is accountable to the Financial Director is receiving information on revenues and expenditures from the administrative office which he then processes and produces profit and loss statements, balance sheets and monthly accounts for the

SUBSIDIARY E

SYSTEM LEVEL
RECURSION LEVEL ONE

EXHIBIT 22

Board of Directors. He also carries out and prepares budgets with the two sub-system managers which is then passed to the Board of Directors for approval. The two sub-systems, concession-shops and factory-shops appear to have considerable autonomy and little day-to-day control is actually applied to them.

With respect to System four activities at this level, little is actually carried out to ensure the continued viability of this system. No apparent market research is carried out, possible new distribution systems are not examined and no long-term plans were apparent to take-on new products and possible product diversification. If this system wishes to maintain its financial viability it is necessary for the directors to strive for a much higher rate of return. Since this system only started in 1985 and 95% of its purchases are from Subsidiary A, it is quite possible that it is caught between having to purchase the products from Subsidiary A at a set price which leaves it little margin when it has to sell them direct to the customers. Modes of advertising would be expected to be an area of considerable research by this system, however little has been carried out in this area. There are no overall marketing plans in force to examine advertising strategies, new product packaging designs, consumer reaction to particular pricing strategies and so on.

EFFECTIVENESS OF REGULATION AT THE SUB-SYSTEM LEVEL

PLANT X - RECURSION LEVEL TWO

With reference to Exhibit 23, control of Plant X rests with four managers, the Cutting Shop Manager, the Production Planning Manager, the Glasshouse Training Manager and the Glasshouse Planning Manager. They are aided in this role by the Distribution Manager, who controls the despatch of the products, the Process and Decorating Shop Clerks who monitor production quantities and process the wage sheets, the Projects Manager, the Engineering Manager and Technical Manager who look after the maintenance of the plants equipment. Reporting to them are a number of foreman and supervisors who control the various operations necessary for the production of the various crystal products.

Responsibility for the sub-sub-systems is distributed amongst the four in the way that the Glasshouse Managers control activities with respect to the Mixing, Glassmaking, Process and the Acid Room. The Cutting Shop Manager controls the activities of the Marking Room, Decorating, Sand Engraving and Guilding, and the Cleaning and Wash-off process. While the Production Planning Manager controls the activities of Inspection and Packaging.

The Shop clerks receive daily job cards which specify quantity produced, and/or rejected etc. from their respective sub-sub-systems which they use to process shop wages. These cards are then passed on to the Work Study Department, one recursion level up, for overall production analysis. The Work Study Department can be called upon to produce standards of performance and time and motion studies for the various operations at this recursive level. The system three controllers are also receiving production plans and glasshouse loading schedules produced by the Production Planning Department. These plans are a result of the discussions carried out at the weekly production planning meeting in which production targets are set for each plant and which the system three

EXHIBIT 24 (CONT.)

DIAGNOSTIC CHART OF SYSTEM IN FOCUS:

RECURSION NO: Two
NAME: Plant Y

Exhibit 23 (Cont)

See Next Page

DIAGNOSTIC CHART OF SYSTEM IN FOCUS:

RECURSION NO: Two
NAME: PLANT X

SUBSIDIARY E

SYSTEM LEVEL
RECURSION LEVEL ONE

EXHIBIT 22

managers are actively involved in. These targets are then passed on to each process by their respective managers and it appears that they are actively monitoring their operations to make sure that they meet these targets. At the Weekly Development Meeting they work with the two directors, Production Director and Technical Director, to coordinate the production of new items on the shop-floor. Any other special orders are coordinated by a progress team, consisting of the controllers of all the sub-sub-systems. This progress team reports to and is accountable to the Production Planning Manager. It is basically a system two mechanism to ensure the effective production of special orders, even though some of the orders might disrupt the regular production flow. The Glasshouse Planning Manager also carries out a materials management role in that he works with the Purchasing Manager (recursive level zero) to plan a programme for material needs. The problems discussed concerning the closure of this system have already been discussed with respect to regulation at the group system level. The Glasshouse Training Manager sets out training programmes and also monitors the quality of the production in the Glasshouse units. The Production Planning Manager also has a weekly meeting with the senior managers of the sub-sub-systems to review the previous week's figures and to coordinate future production orders with respect to Plant X. These senior managers are also reporting daily to the Production Director, to review targets and specific problems on the production line. Maintenance on the production line is carried out by the Engineering Manager who is aided in this role by a team of fitters, electricians etc. However, the Engineering Manager is accountable to the Technical Director and not to any of the system three managers. This gives problems of closure to maintenance problems at this level, as disagreements can only be settled one recursion level up between the two directors.

The routine and repetitive nature of many of the jobs on the production line would give a need to monitor job satisfaction, however none of the managers at

this level are doing this. No operational autonomy is given to the sub-sub-systems; to plan and schedule their own production; to actively participate in short-term planning; and to improving the quality and performance of production. Future Planning is something seen as the domain of only senior directors and managers, and foremen and supervisors are not encouraged through any system to participate and contribute to the overall viability of the system that they are embedded in. Little operational discretion is given to system one controllers and they are closely directed and monitored. System three controllers, with the exception of the technical department managers, quite often collapse their role to that of their foremen and are actively engaged in the direction of shopfloor activities.

The mechanism by which system four activities are discussed appears to be the "Year Committee" which carries out studies on, for example, how to maximize the yield on each stage of production, alternative methods of setting production targets etc. However, their discussions concentrate on improving efficiency, and little seems to be carried out in terms of improving the working environment of their employees, looking at alternative production techniques, examining new machinery and so on.

PLANT Y - RECURSION LEVEL TWO

With reference to Exhibits 24, control of Plant Y rests with the Plant Y Works Manager who is aided in this role by the Production Manager, Maintenance Manager, Cutting Shop Manager, Glasshouse Manager, Canteen Manageress and the Production Office Clerk.

Plant Y seems to have suffered in the past by a poor management capability and had never been treated as an autonomous unit but rather as an extension of the production process of Plant X. It is closely controlled and monitored by the senior managers of Plant X. The Production Director is actively engaged in the day-to-day administration of the plant. The technical maintenance of the plant is still closely monitored by the Technical Director. This has meant that many operational problems needed to be handled at this level are in fact not being filtered and handled, but rather overflowing to the next and higher level of recursion. As a method to overcome this operational problem, the Production Director recently hired the Plant Y Works Manager to control and develop the management capability of this plant (and at the time of the interview the Plant Y Works Manager had just started taking control of the management of the plant). No other manager within this plant was interviewed in order to establish operational procedures and information flows. However, the Plant Y Works Manager is receiving daily reports from each of the operational managers and foremen on their performance in meeting production targets. He is also monitoring absenteeism through a daily report on absentees. He, in turn, is reporting to the Production Director daily on production volumes. He also sees that part of his job is to look after the factory shop. This is an activity of the Factory Shops Manager of Subsidiary E. In fact control of the sales staff and guides of the factory shop is actively monitored by the Canteen Manageress. The Production Office Clerk is producing reports on fuel usage and pots filled for the

EXHIBIT 24 (CONT.)

DIAGNOSTIC CHART OF SYSTEM IN FOCUS:

RECURSION NO: Two
NAME: Plant Y

Technical Director, Production Director and the Technical Manager of Plant X. This shows that these managers are actively engaged in the monitoring of operations that are not at their recursive levels. With respect to the Technical Director this has already been discussed. Glasshouse Training programmes are carried out by the Plant X Glasshouse Training Manager, while safety guidelines and first-aid training are closely monitored by the Safety Officer one recursion level up.

The overall conclusion with respect to the operations and this plant at this level, is that the plant has never been treated as a viable unit despite its apparent need for operational autonomy to develop in a viable manner. Closure to its problems are not handled at this level but rather handled by those at higher recursion levels.

CONCESSION SHOPS - RECURSION LEVEL TWO

With reference to Exhibit 25, control of concession shops rests with the Concession Shops Manager who is aided in this role by an administrative staff and a warehouse department.

The Concession Shops Manager controls and regulates the activities of 27 concession shops. Reporting to him are 27 concession shop manageresses. They provide him with weekly returns showing every sale, itemized and which include the specific discounts given on the sale. While these items are used for both stock and cash control, it would appear that the Concessions Shop Manager is also using them to monitor the sales performance of each shop. Since it is his job to monitor the sales performance of each shop and not the actual sales carried out on each item, this would appear to show that he is monitoring at too low a level. He also receives a monthly comment report from each of the manageresses showing changes in the management of the store, how to increase sales, why the store has lost sales and so on. Sporadic audits of shop performance to validate the reports he is receiving takes shape in the form of six yearly visits to the shops. The Concession Shops Manager uses the weekly returns from the shops to place orders with Subsidiary A and in cases of shortfall in deliveries attempts to find alternative sources from outside the group system. Given the large number of system one operations under his control and of which activities he has to regulate, staffing and recruitment has become an important aspect of his work (as well as setting out training programmes for them).

With respect to system four activities, this manager perceives long-term planning as the sole domain of group directors and managers, and the opening up of new stores is solely dependant on them. No apparent activities are carried out at this level to ensure the continued viability of the system at this level, rather dependence on higher management to decide on what direction to head.

CHART ONE

SUB-SYSTEM LEVEL
RECURSION LEVEL TWO

NAME OF THE VIABLE SYSTEM IN FOCUS:
CONCESSION SHOPS

EXHIBIT 25

Alternative sources of products, marketing studies, market testing, alternative displays, different pricing strategies are not studied and no mechanisms exist to ensure that they are carried out. The focus is internal. No attempts are being made to make the unit adaptable to its environment, to evaluate real-time environmental information and to propose new policies and strategies to handle the markets. The Concession Shops Manager is handling a high variety situation that lacks self regulation and he has little time for system four activities.

FACTORY SHOPS - RECURSION LEVEL TWO

With reference to Exhibit 26, Subsidiary E's factory shops unit is one of the main retailing systems of the group and accounts for nearly one third of the Group's total sales turnover. Control of this important primary activity according to the main roles in the group and senior managers of Subsidiary E rests with the Factory Shops or Retail Manager. In fact, according to the organisation chart, control of the five factory shops rests with the Retail Manager. In reality control of factory shops is distributed amongst a number of managers and disseminated throughout the group structure.

Firstly there is considerable evidence that the sales staff of Shop AD are in fact supervised and monitored by the canteen manageress of Plant Y who is directly accountable to the Plant Y Works Manager of the Subsidiary A System. Secondly there is evidence that the Managing Director of Subsidiary C is controlling and monitoring the operations of shop AC. Thirdly Shop AB shop appears to be controlled and monitored by the Subsidiary F management. Fourthly the Marketing Manager is monitoring the performance of Shop AA. Both the Marketing Manager and the Retail Manager perceive that they have responsibility for tourism. Tourism involves responsibility for the factory guides and other activities. Design of uniforms, factory brochures etc, is carried out by the Marketing Manager who also controls tourism at Plant X through her Tourist Administrator (who carries out bookings and other activities related to tourism. Advertising for tourism) is administered by the Marketing Manager, recursion level zero, and advertising strategies are discussed at the meetings of the Tourism Committee. However, advertising for the factory shops is the responsibility of the Retail Manager. Since tourism has a direct affect on the sales of the factory shops, it seems necessary that this activity should be controlled at this level to ensure coordination of advertising and the efficient use of the group's resources

CHART ONE

EXHIBIT 26

RECURSION LEVEL TWO

NAME OF THE VIABLE SYSTEM IN FOCUS:
FACTORY SHOPS

and other factors. With respect to system four activities, as would be expected with an activity that is disseminated throughout a corporate structure, these activities are non-existent.

APPENDIX K

TABLES AND GRAPHS OF INDIVIDUAL SCORES ON THE THREE QUESTIONNAIRES FOR THOSE MANAGERS IN COMPANY A,B AND F

Cognitive Style of Managerial Roles

Company A

Role	Cognitive Style
Managing Director	ESTJ
Technical Director	ISTP
Sales Manager	ISTJ
Commercial Manager	ISTP
Fitting Shop Manager	ESTJ
Production Manager	ISTJ
Quality Control Manager	ISTJ
Stores Manager	ESTJ

Cognitive Style of Managerial Roles

Company B

Role	Cognitive Style
Managing Director	ISTJ
Financial Director	ISTJ
Sales & Marketing Director	ESTJ
Production Director	ESTJ
General Manager	ESTJ
Installation Manager	ISTP
Assistant Installation Manager	-
Drawing Officer Manager	ISTJ
Project Design Controller	ESTP
Production Manager	ISTJ
Estimating Manager	ISTP
Management Accountant	ISTJ
Planning Manager	ISTJ
Contract Surveyor	ISTP
Gas Production Manager	ESFP
Gas Planning Manager	ENTJ
Gas Purchasing Manager	ESTJ

Cognitive Style of Managerial Roles

Company F

Role	Cognitive Style
Deputy Managing Director	ISFJ
Financial Director	INTP
Technical Director	ENTJ
Sales Director	INTP
Group Training Manager	INTJ
Group Marketing Manager	-
Works Manager	ISTJ
Concession Shops Manager	ESTJ
Factory Shops Manager	ESTJ
Sales Office Manager	INTJ
Accountant	ISTP
Maintenance Manager	INTJ
Work Study Manager	ISTJ
Safety Officer	ESTJ

State-Trait Anxiety Inventory Scores

For Main Managerial Roles

Company A

Role	Scores Y-1	Y-2
	State-Anxiety	Trait-Anxiety
Managing Director	35	34
Technical Director	26	27
Sales Manager	36	36
Commercial Manager	37	35
Fitting Shop Manager	25	32
Production Manager	25	25
Quality Control Manager	47	35
Stores Manager	30	

State-Trait Anxiety Inventory Scores
For Main Managerial Roles

Company B

Role	Scores Y-1	Y-2
	State-Anxiety	Trait-Anxiety
Managing Director	39	34
Financial Director	56	58
Sales & Marketing Director	42	38
Production Director	37	32
General Manager	40	38
Installation Manager	-	-
Assistant Installation Manager	30	29
Drawing Office Manager	41	38
Project Design Controller	30	21
Production Manager	28	30
Estimating Manager	45	45
Management Accountant	20	21
Planning Manager	48	33
Contract Surveyor	43	45
Gas Production Manager	34	28
Gas Planning Manager	30	30
Gas Purchasing Manager	27	29

State-Trait Anxiety Inventory Scores
For Main Managerial Roles

Company F

Role	Scores Y-1	Y-2
	State-Anxiety	Trait-Anxiety
Deputy Managing Director	26	35
Financial Director	24	33
Technical Director	34	35
Sales Director	33	27
Group Training Manager	33	38
Group Marketing Manager	38	31
Works Manager	27	36
Concession Shops Manager	32	-
Factory Shops Manager	35	43
Sales Office Manager	37	49
Accountant	28	-
Maintenance Manager	42	38
Work Study Manager	28	40
Safety Officer	21	24

PERSONAL STRAIN QUESTIONNAIRE SCORES FOR MAIN MANAGERIAL ROLES

COMPANY A

Role	Vocational Strain	Psychological Strain	Interpersonal Strain	Physical Strain	Total
- Managing Director	15	24	19	16	74
Technical Director	22	11	16	12	61
Sales Manager	13	23	17	18	70
- Commercial Manager	14	17	21	16	68
Fitting Shop Manager	15	18	15	13	61
Production Manager	13	13	14	15	55
Quality Control Manager	16	26	14	24	80
Stores Manager	15	15	15	12	57

Personal Strain Questionnaire Scores
For Managerial Roles

Company B

	Vocational Strain	Psychological Strain	Interpersonal Strain	Physical Strain	Total
Managing Director	22	19	13	11	65
Financial Director	33	35	25	32	125
Sales & Marketing Director	17	18	18	25	78
Production Director	14	16	13	17	60
General Manager	18	25	18	19	80
Installation Manager	16	16	18	11	61
Assistant Installation Manager	15	16	12	11	54
Drawing Officer Manager	21	17	13	11	62
Project Design Controller	13	11	12	15	51
Production Manager	16	12	16	13	57
Estimating Manager	25	22	14	17	78
Management Accountant	10	10	13	10	43
Planning Manager	20	24	24	17	85
Contract Surveyor	12	20	25	31	88
Gas Production Manager	11	13	14	16	54
Gas Planning Manager	12	16	18	18	64
Gas Purchasing Manager	14	21	16	16	67

Personal Strain Questionnaire Scores
For Main Managerial Roles

Company F

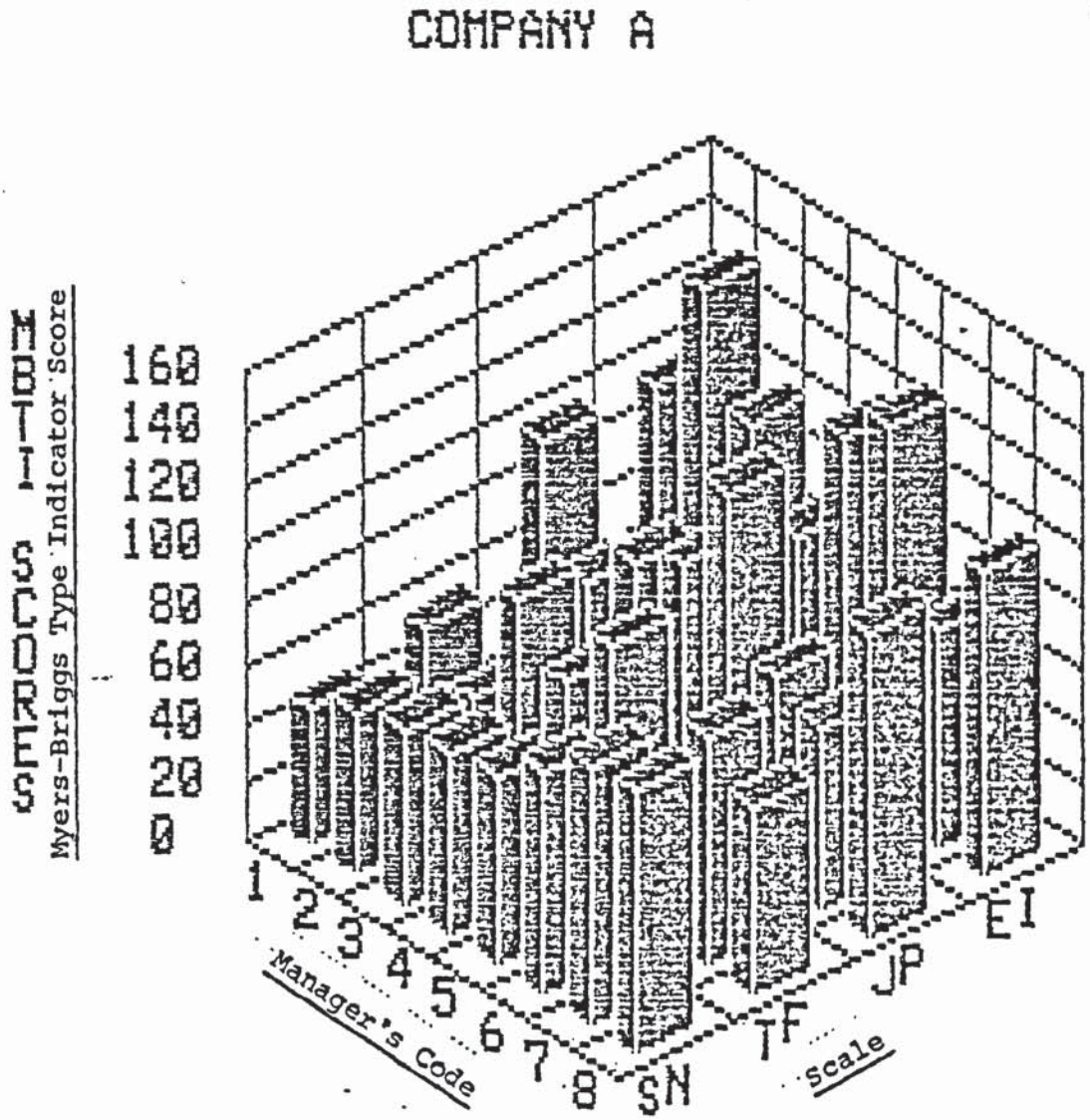
	Vocational Strain	Psychological Strain	Interpersonal Strain	Physical Strain	Total
Deputy Managing Director	16	16	15	17	64
Financial Director	16	21	14	15	66
Technical Director	17	16	14	20	67
Sales Director	15	12	17	15	59
Group Training Manager	15	14	29	15	73
Group Marketing Manager	15	17	17	17	66
Works Manager	15	14	15	13	57
Concession Shops Manager	13	17	15	14	59
Factory Shops Manager	19	24	24	32	99
Sales Office Manager	14	22	22	24	82
Accountant	16	20	15	17	68
Maintenance Manager	22	29	20	18	89
Works Study Manager	15	18	14	15	62
Safety Officer	12	11	10	12	45

Table To Show Key To Managerial Codes For Figures K.10 To K.57

Main Role	Manager's Code
COMPANY A	
Stores Manager	1
Quality Control Manager	2
Sales Manager	3
Fitting Shop Manager	4
Commercial Manager	5
Production Manager	6
Managing Director	7
Technical Director	8
COMPANY B	
General Manager	1
Financial Director	2
Drawing Office Manager	3
Gas Purchasing Manager	4
Estimating Manager	5
Production Manager	6
Planning Manager	7
Sales Director	8
Managing Director	9
Contract Surveyor	10
Management Accountant	11
Project Design Controller	12
Production Director	13
Gas Production Manager	14
Gas Planning Manager	15
COMPANY F	
Deputy Managing Director	1
Company Safety Officer	2
Work Study Manager	3
Plant Y Works Manager	4
Concession Shops Manager	5
Accountant	6
Factory Shops Manager	7
Sales Director	8
Sales Office Manager	9
Technical Director	10
Maintenance Manager	11
Financial Director	12
Group Training Manager	13

Please Note: Manager's were ranked in the coding based on their score on the MBTI Sensation-Intuition Scale, such that the manager scoring the highest continuous score also received the highest code within the respective company.

Myers-Briggs Type Indicator Scores For Managers In Company A (3D)

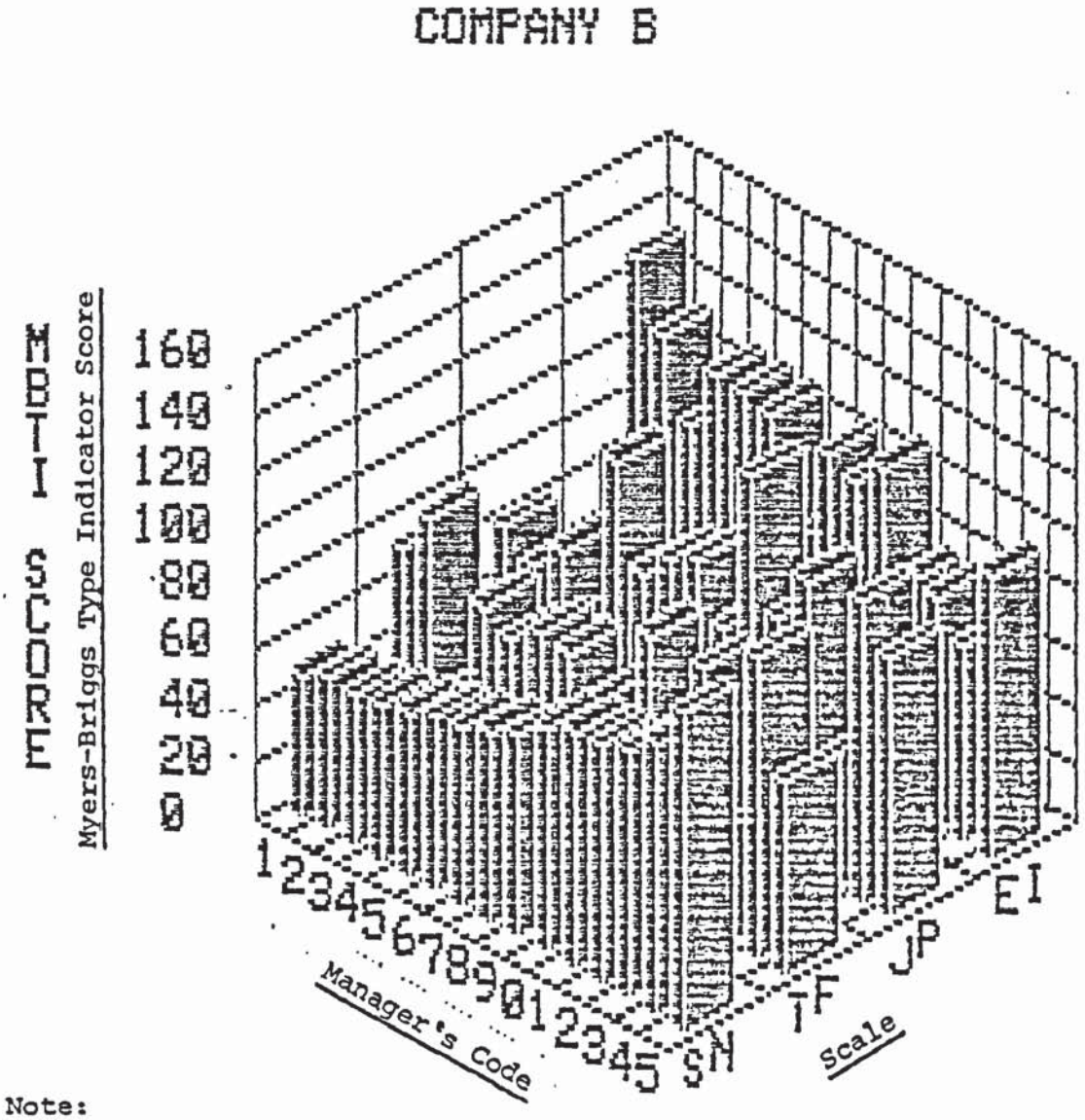


Note: SN - Sensation - Intuition
TF - Thinking - Feeling
JP - Judgement - Perception
EI - Extroversion - Introversion

Fig. K.10

Myers-Briggs Type Indicator Scores For Managers In

Company B (3D)

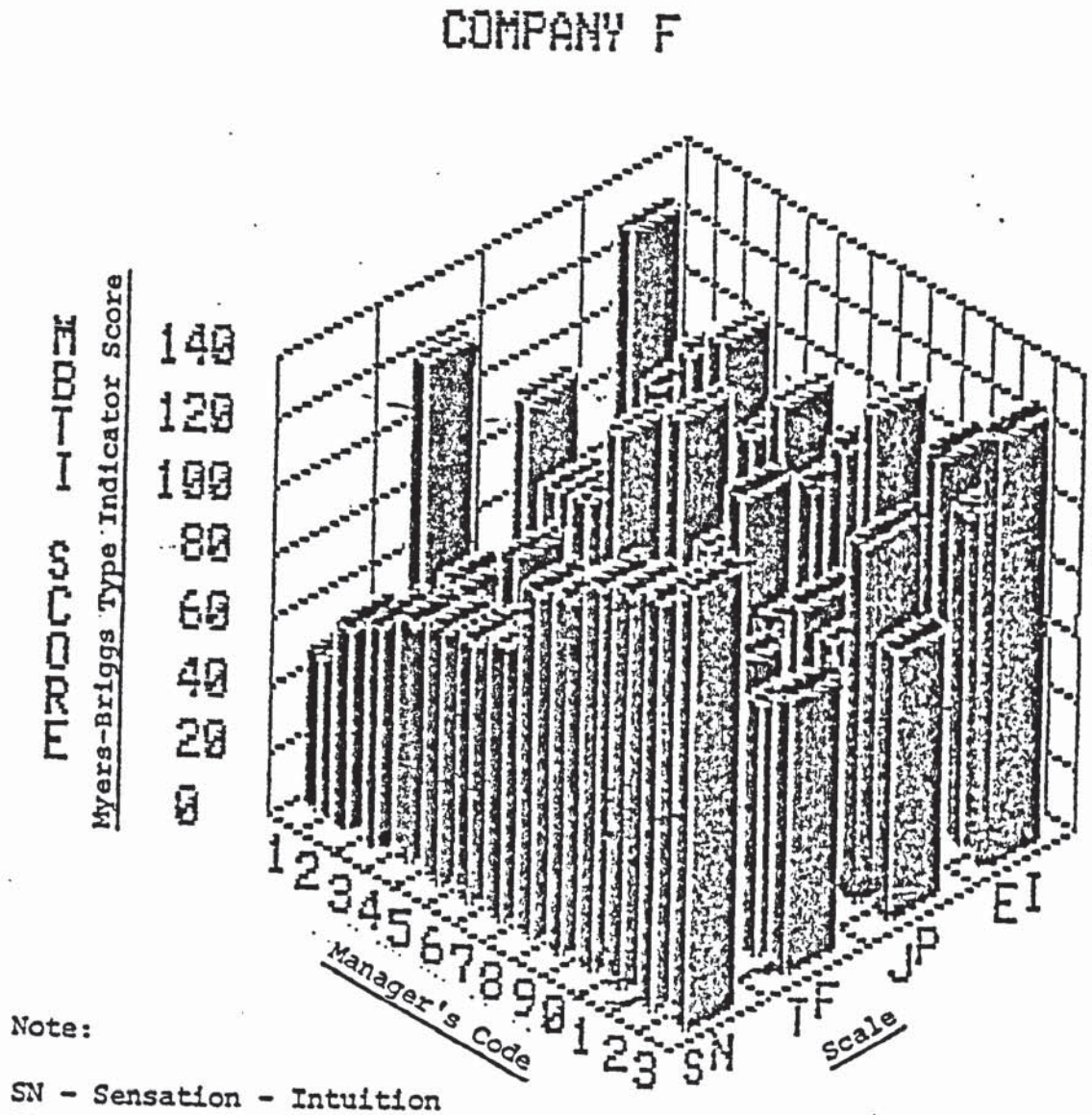


Note:

SN - Sensation - Intuition
TF - Thinking - Feeling
JP - Judgement - Perception
EI - Extroversion - Introversion

Fig. K.11

Myers-Briggs Type Indicator Scores For Managers In Company F (3D)



Note:

SN - Sensation - Intuition
TF - Thinking - Feeling
JP - Judgement - Perception
EI - Extroversion - Introversion

Fig K.12

Myers-Briggs Type Indicator Scores For Managers In Company A

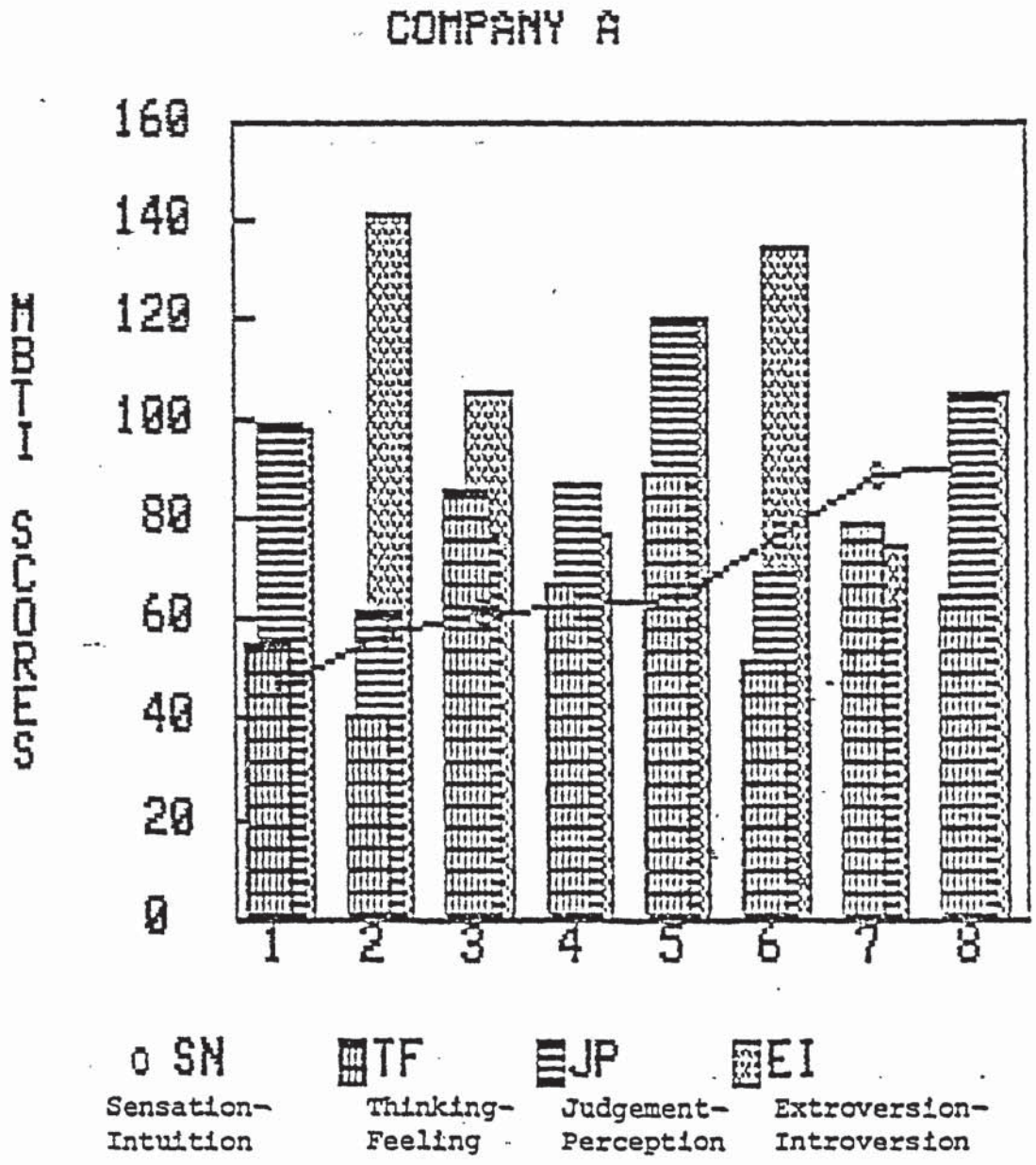


Fig K.13

Myers-Briggs Type Indicator Scores For Managers

In Company B

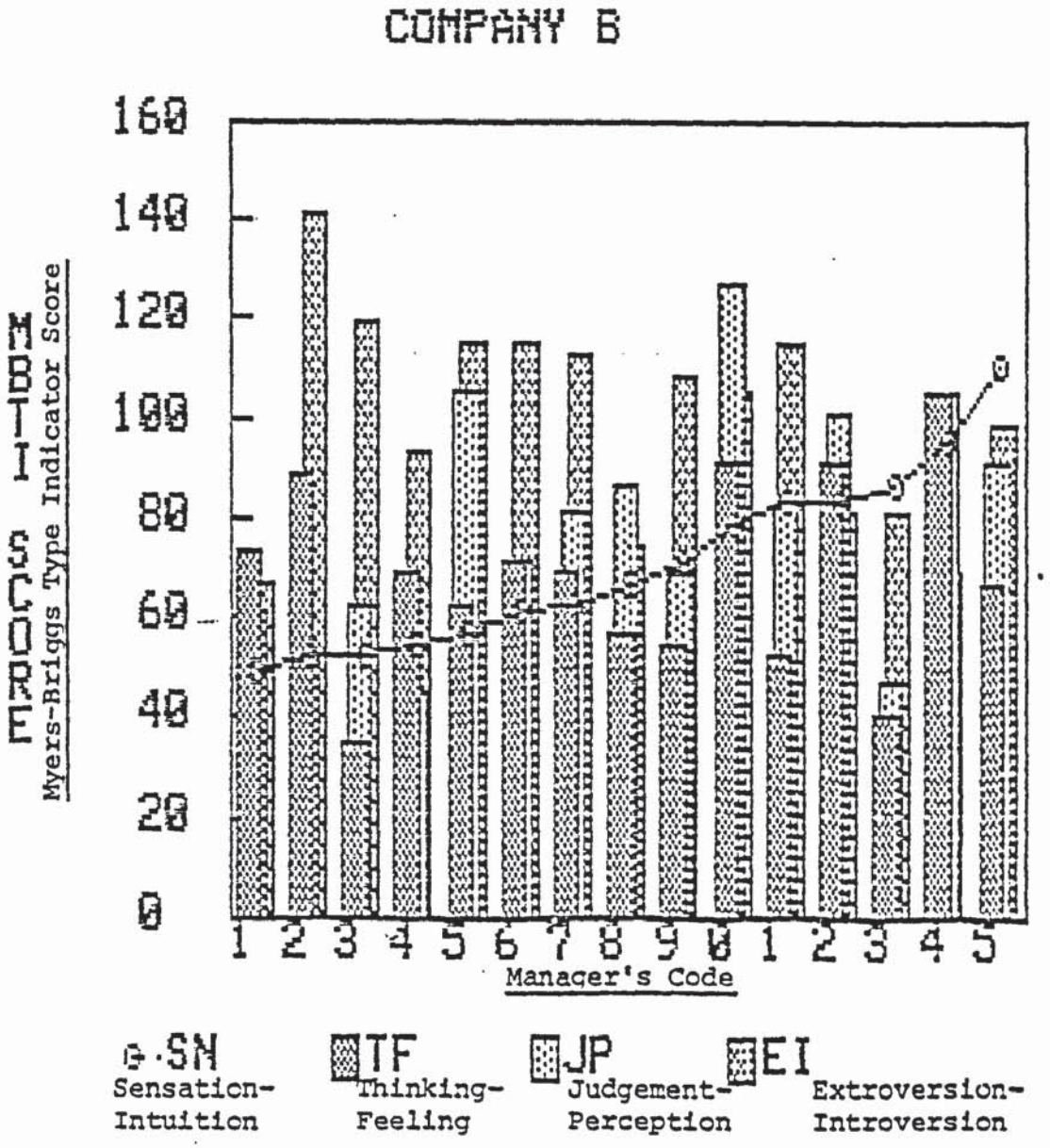


Fig. K.14

Myers-Briggs Type Indicator Scores For Managers

In Company F

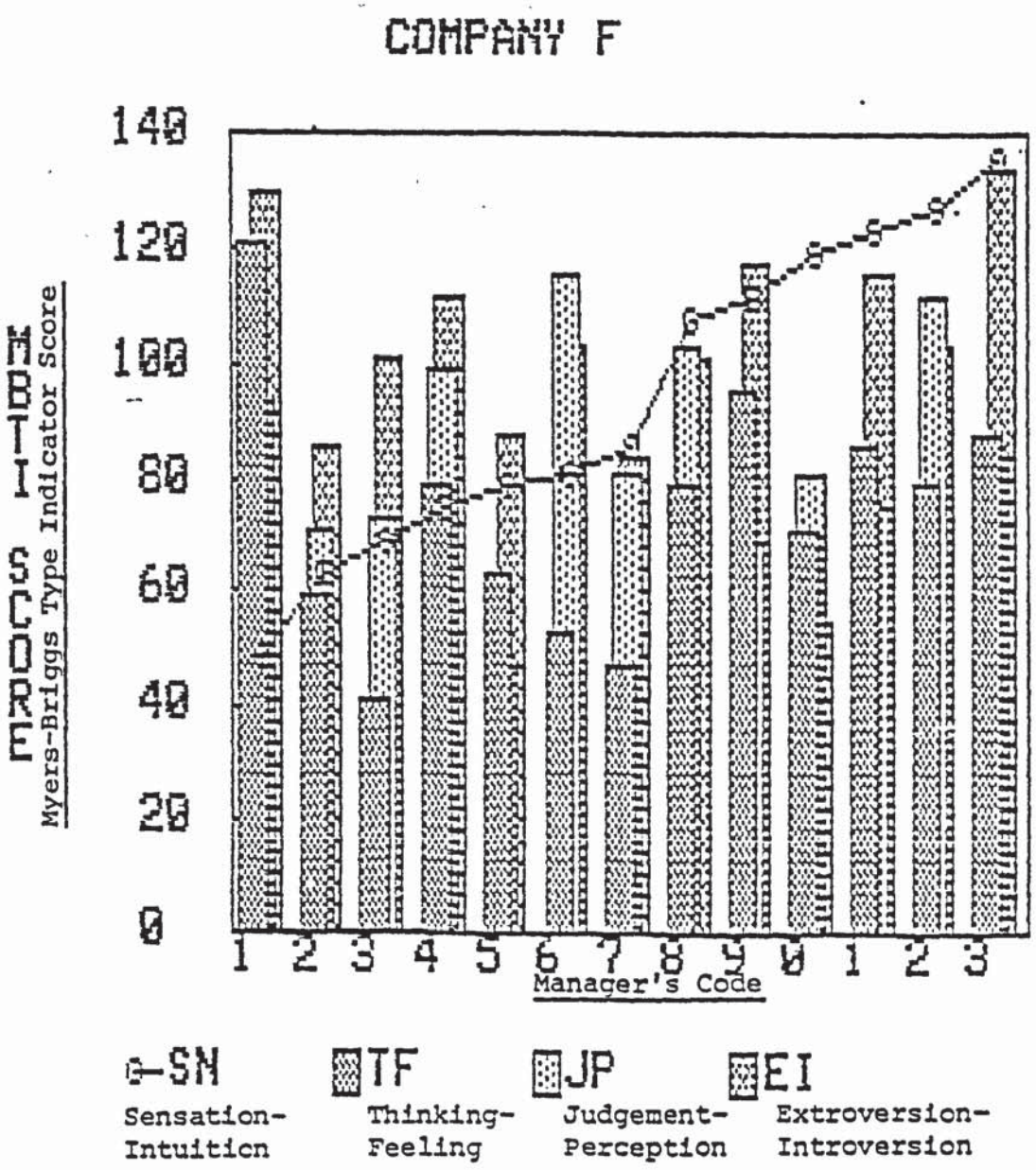


Fig. K.15

Sensation-Intuition Scale Score For Managers In Company A

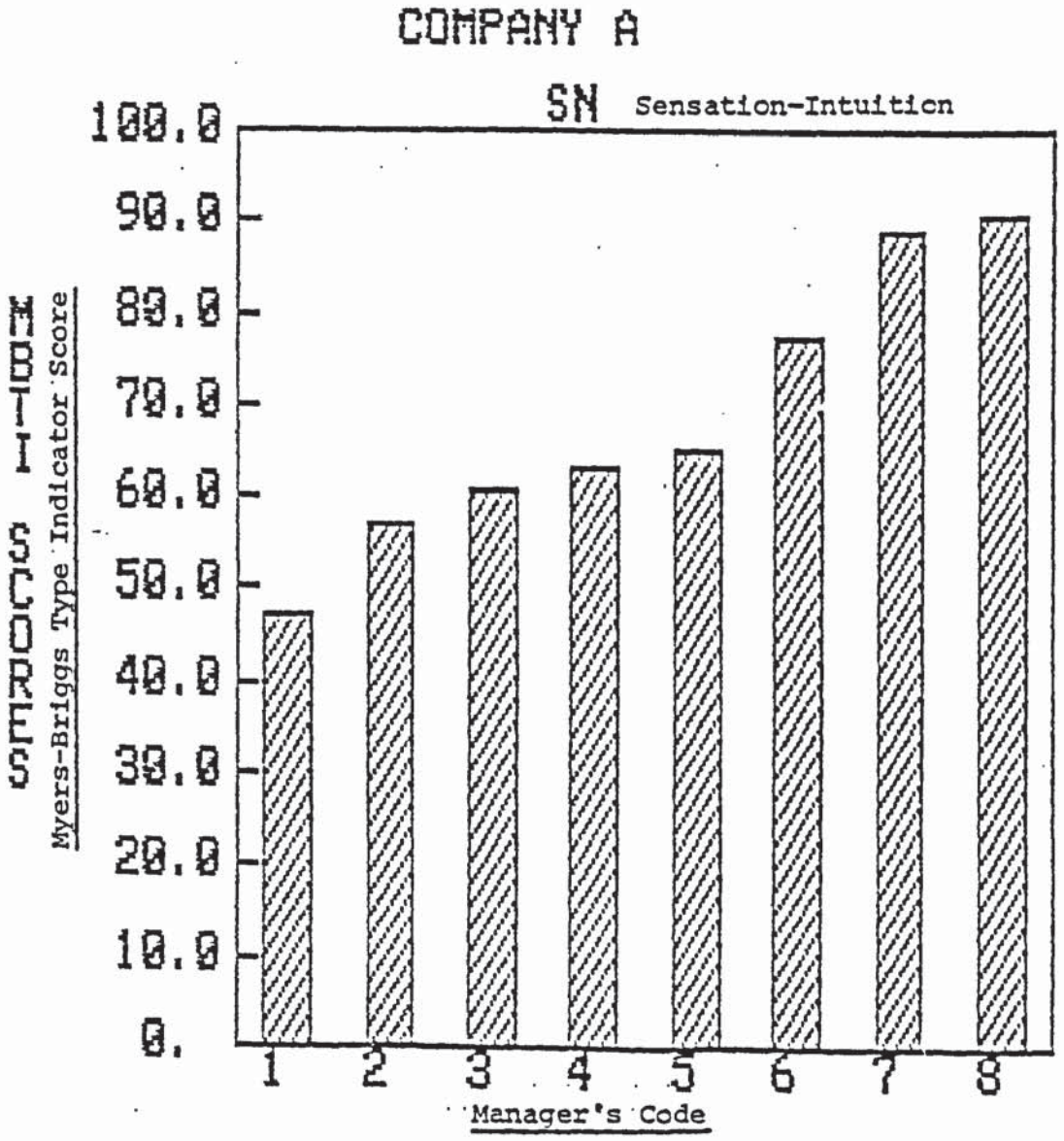


Fig. K.16

Sensation-Intuition Scale Scores For Managers

In Company B

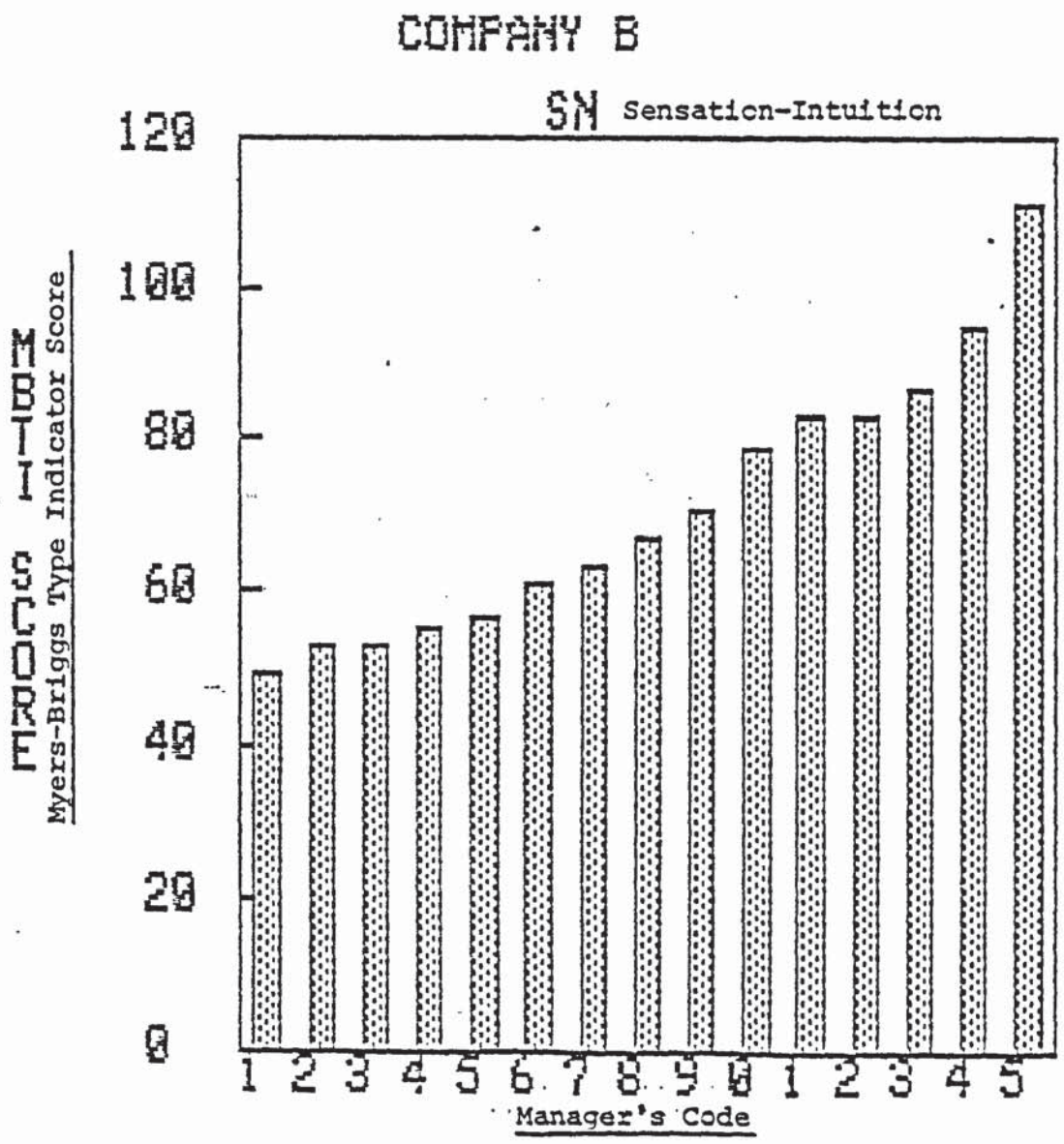


Fig. K.17

Sensation-Intuition Scale Scores For Managers

In Company F

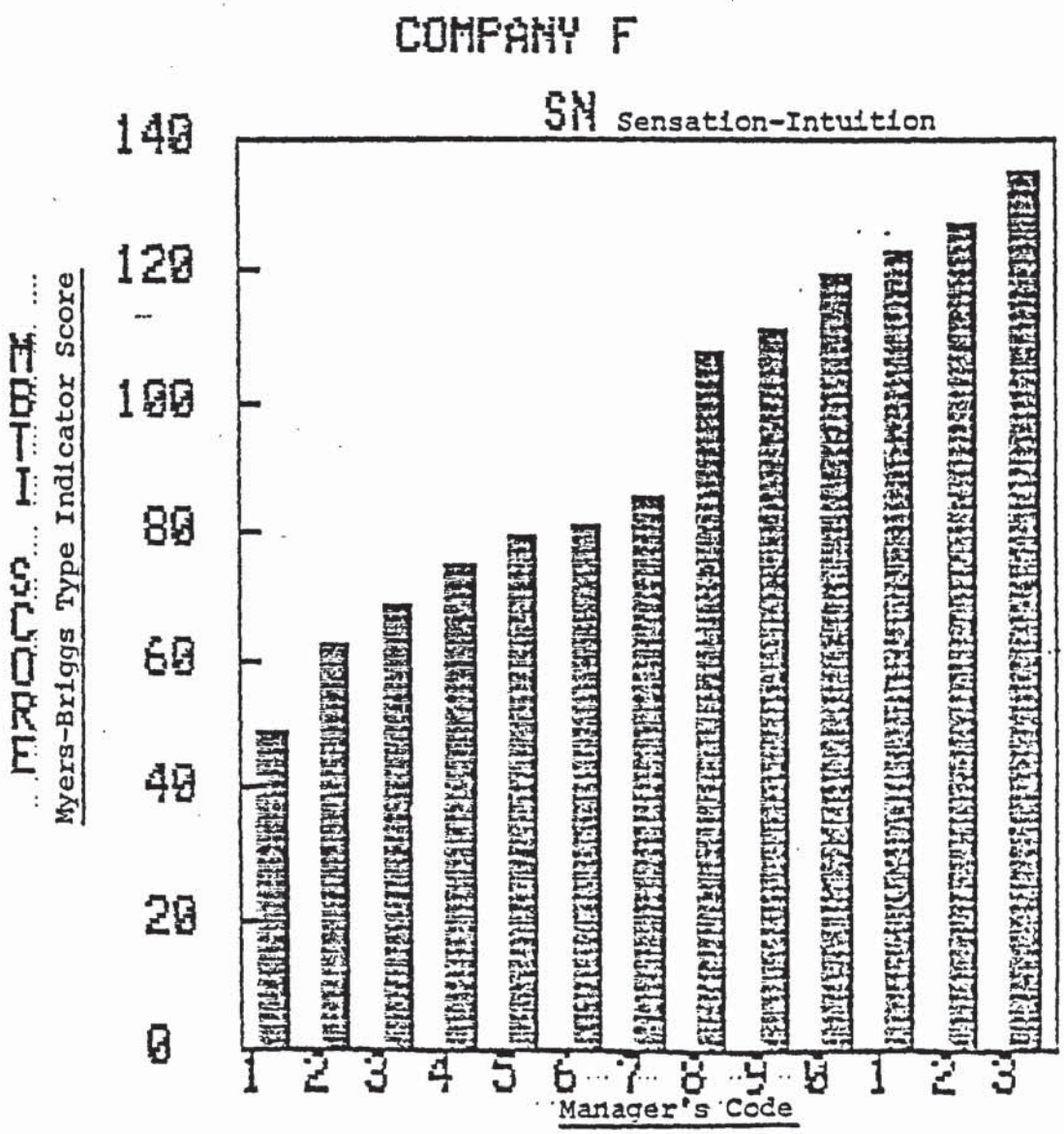


Fig. K.18

Thinking-Feeling Scale Score For Managers In Company A

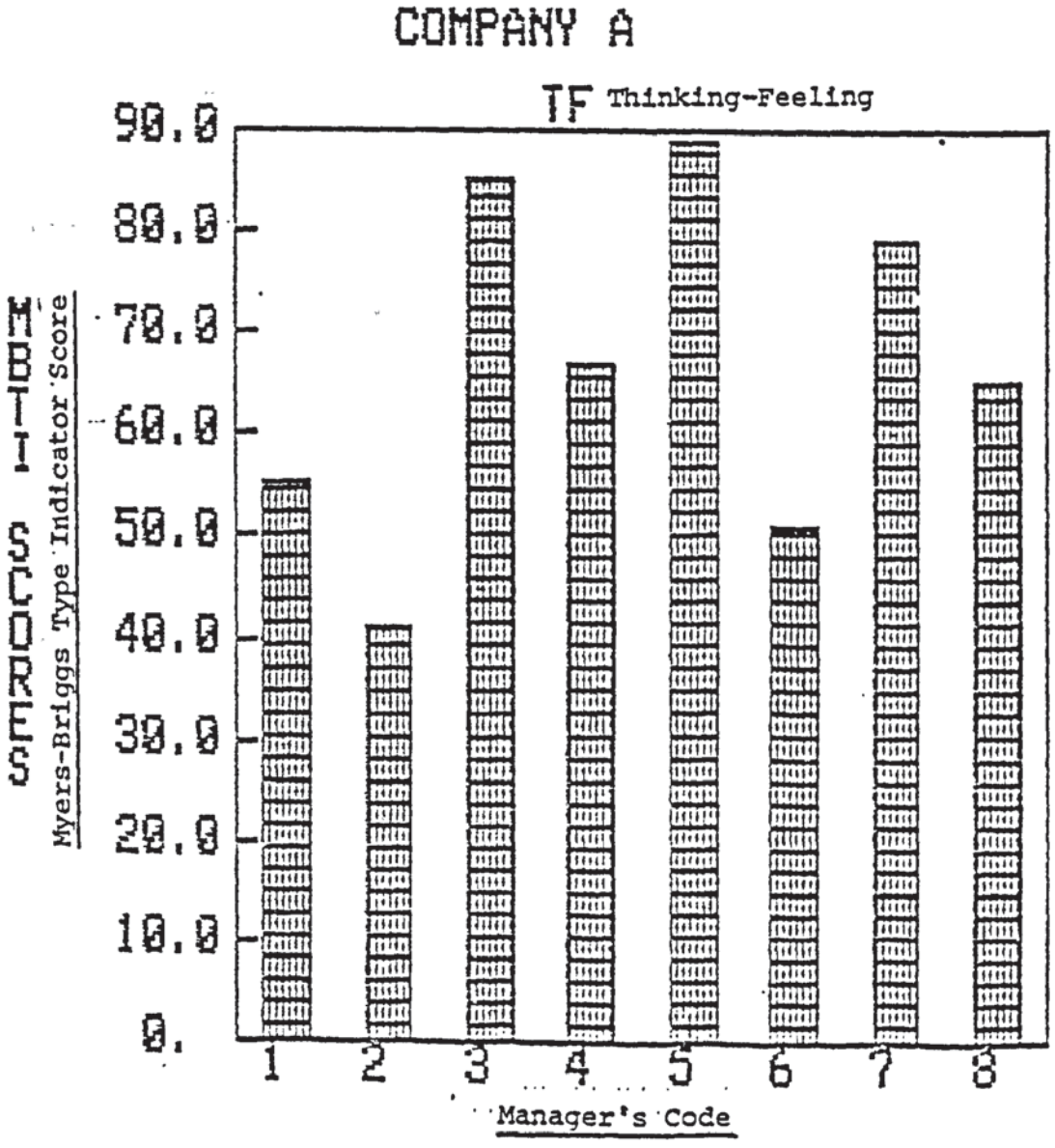


Fig. K.19

Thinking-Feeling Scale Scores For Managers In Company B

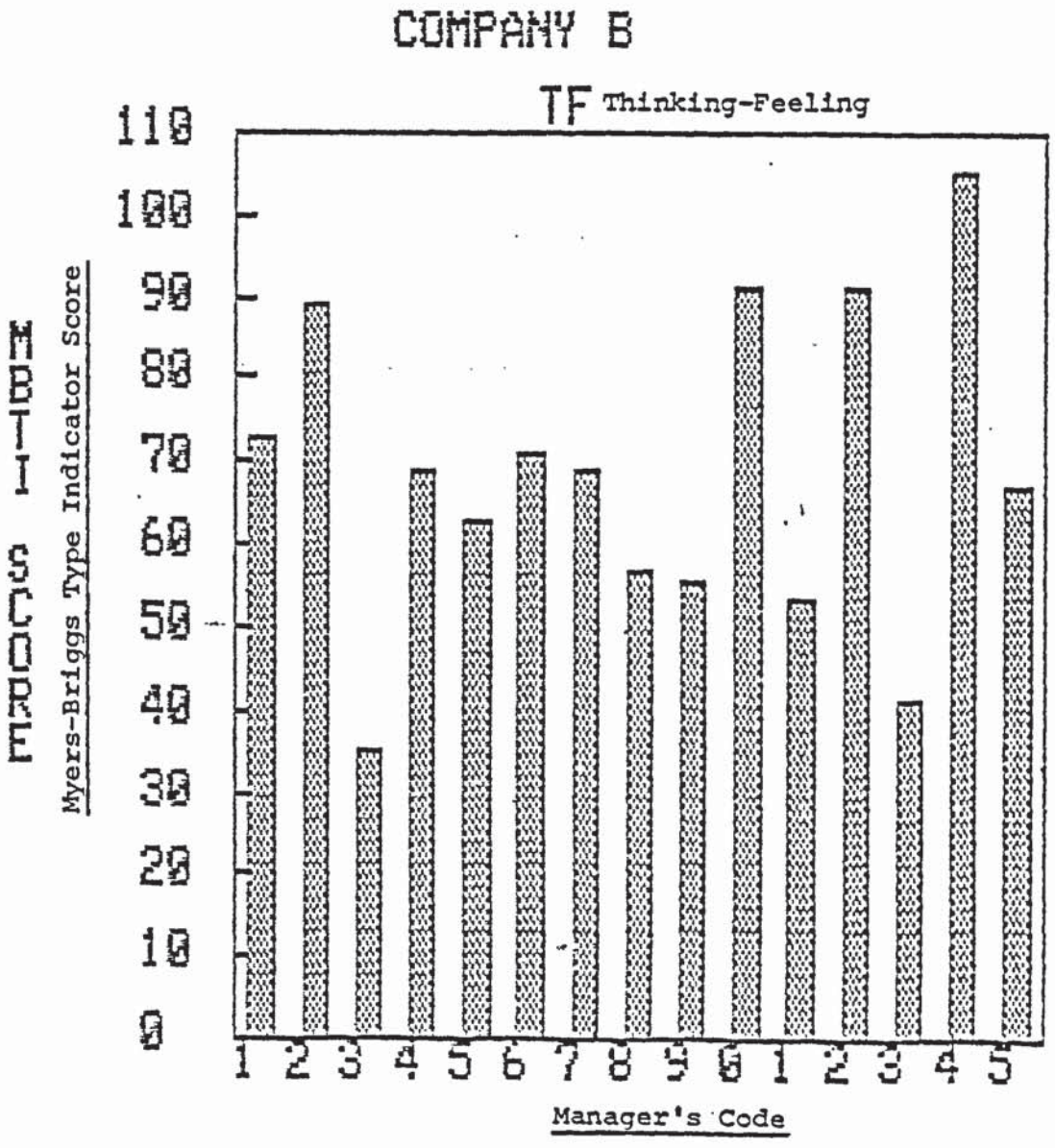


Fig. K.20

Thinking-Feeling Scale Scores For Managers

In Company F

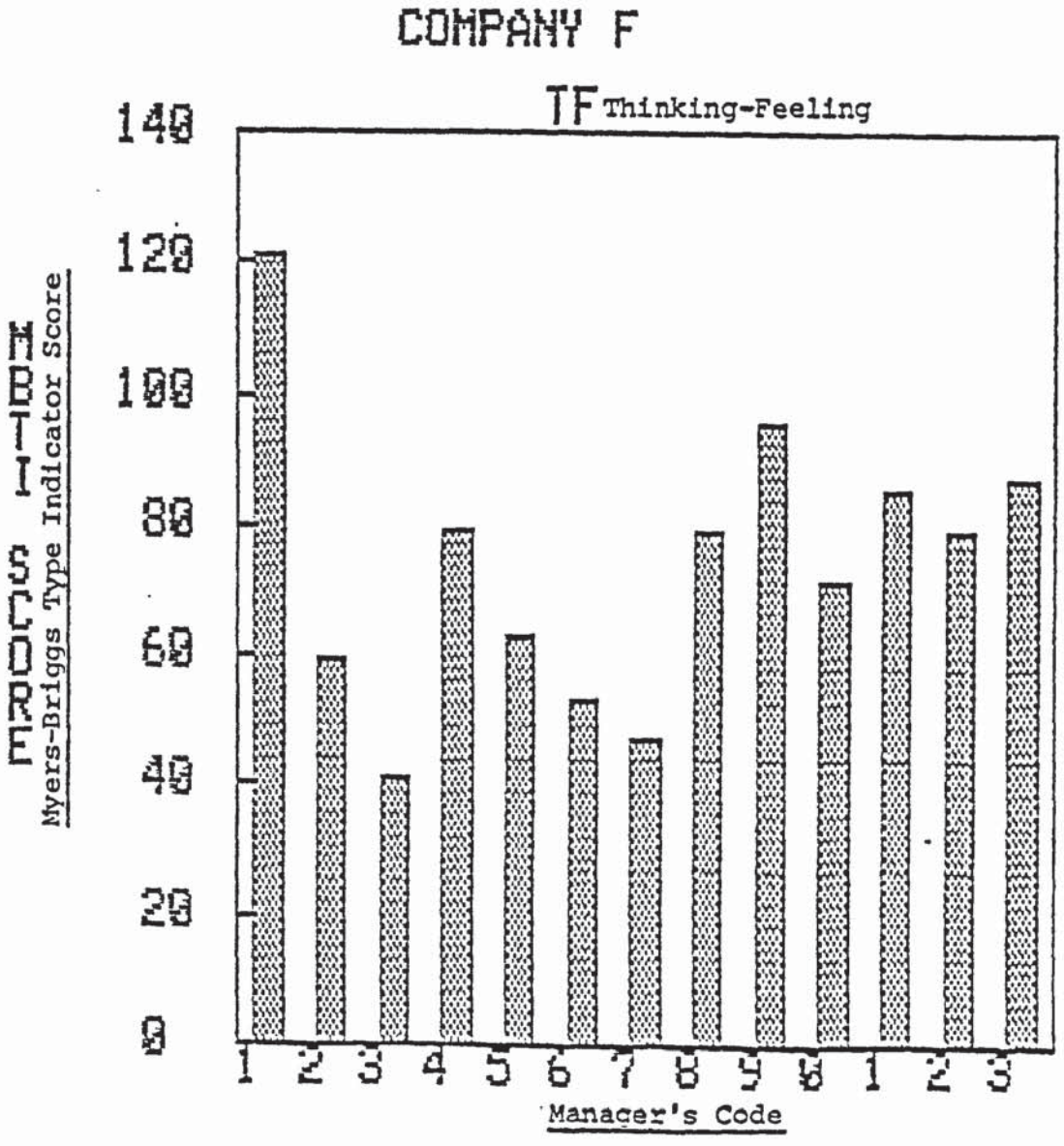


Fig. K.21

Judgement-Perception Scale Score For Managers In Company A

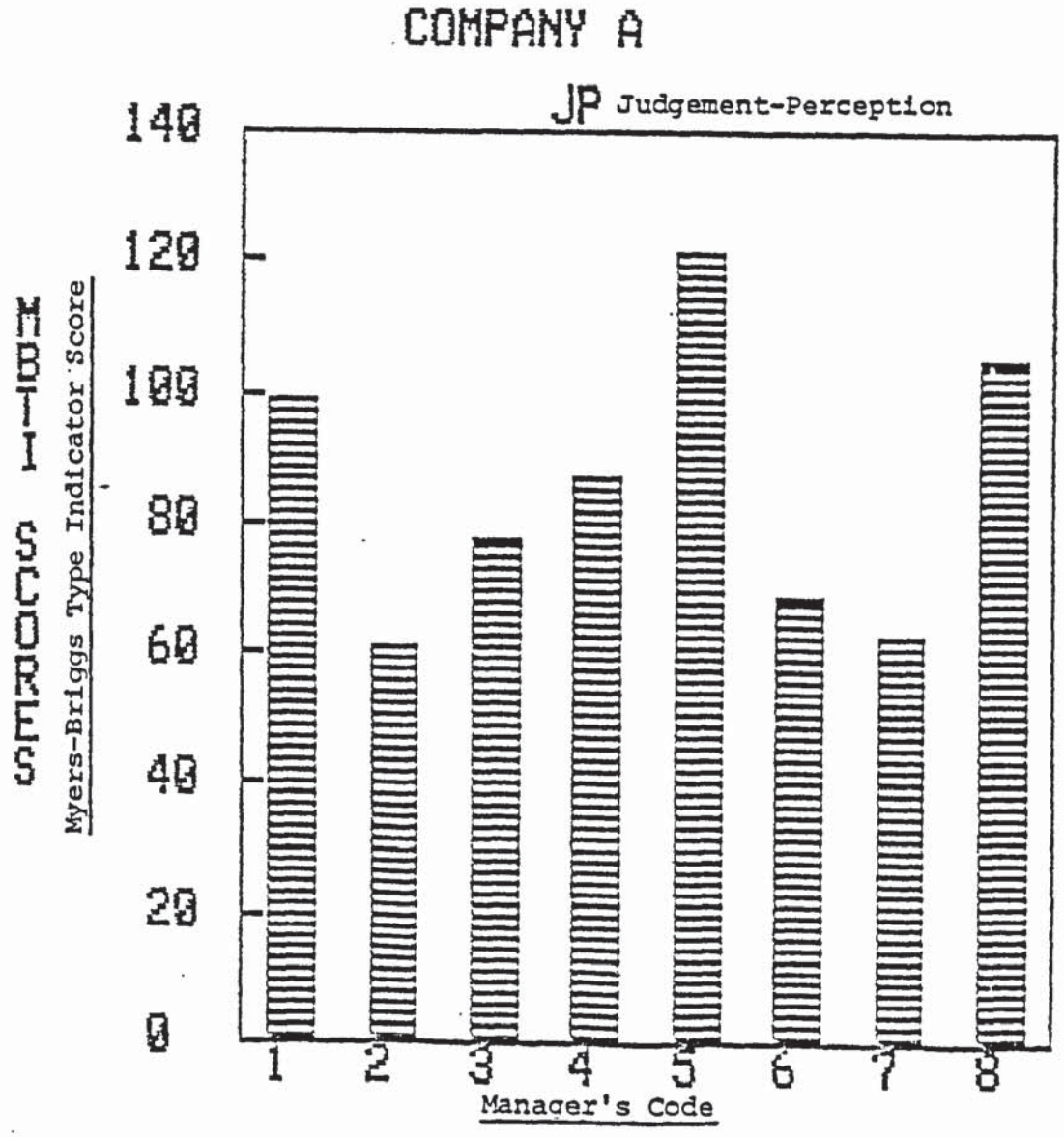


Fig. K.22

Judgement-Perception Scale Score For Managers In Company B

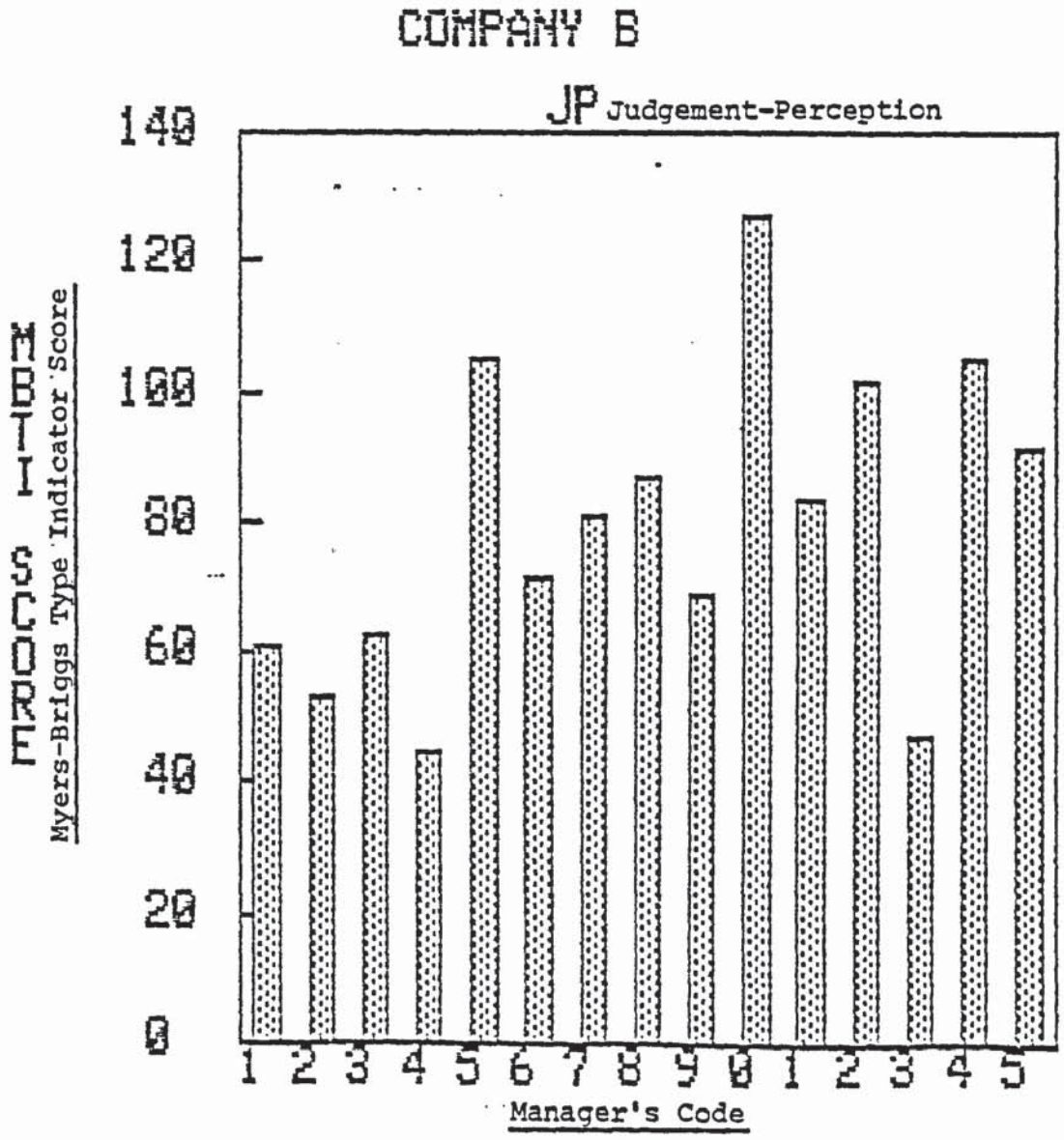


Fig. K.23

Judgement-Perception Scale Scores For Managers

In Company F

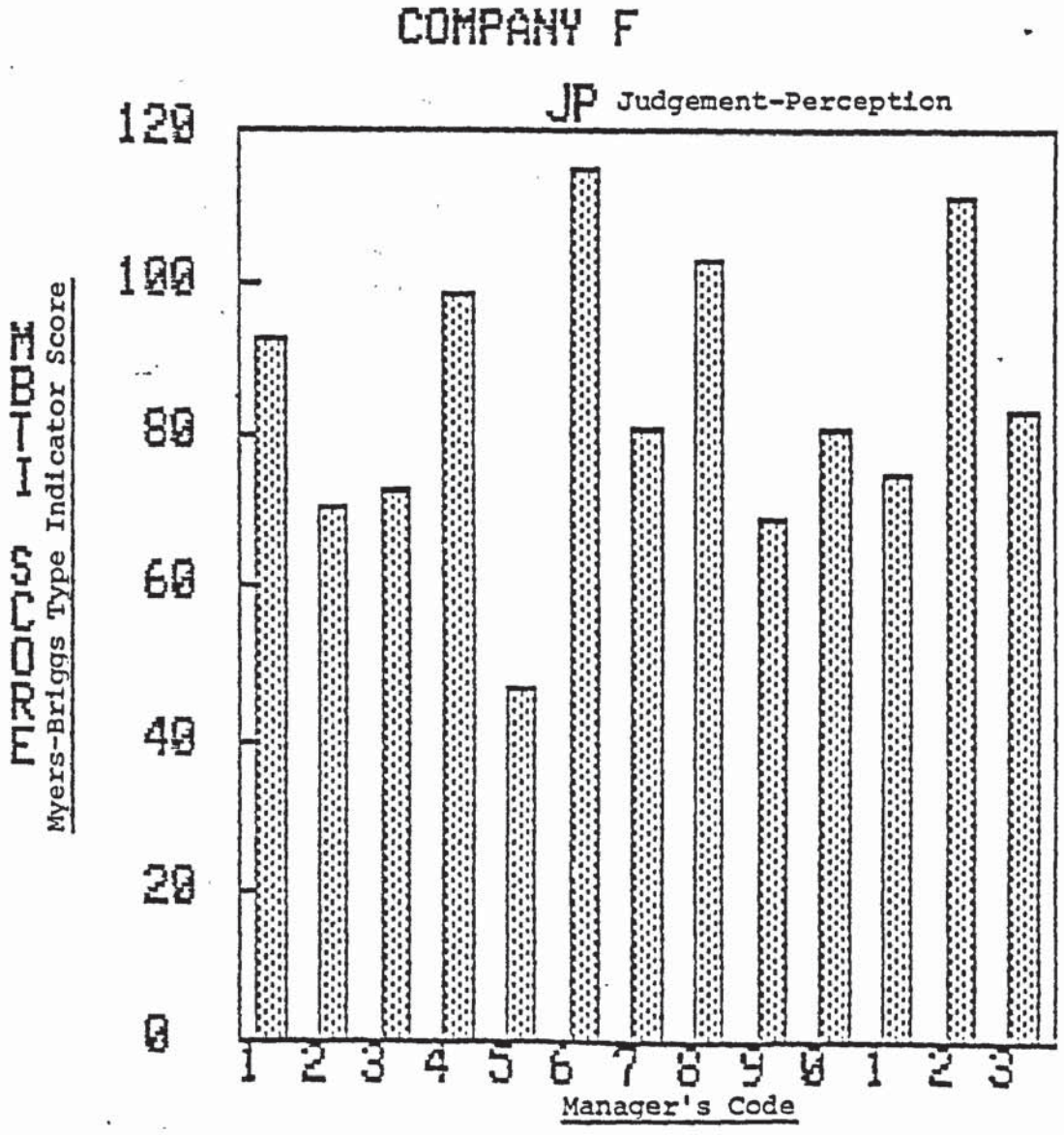


Fig. K.24

Extroversion-Introversion Scale Scores For Managers

In Company A

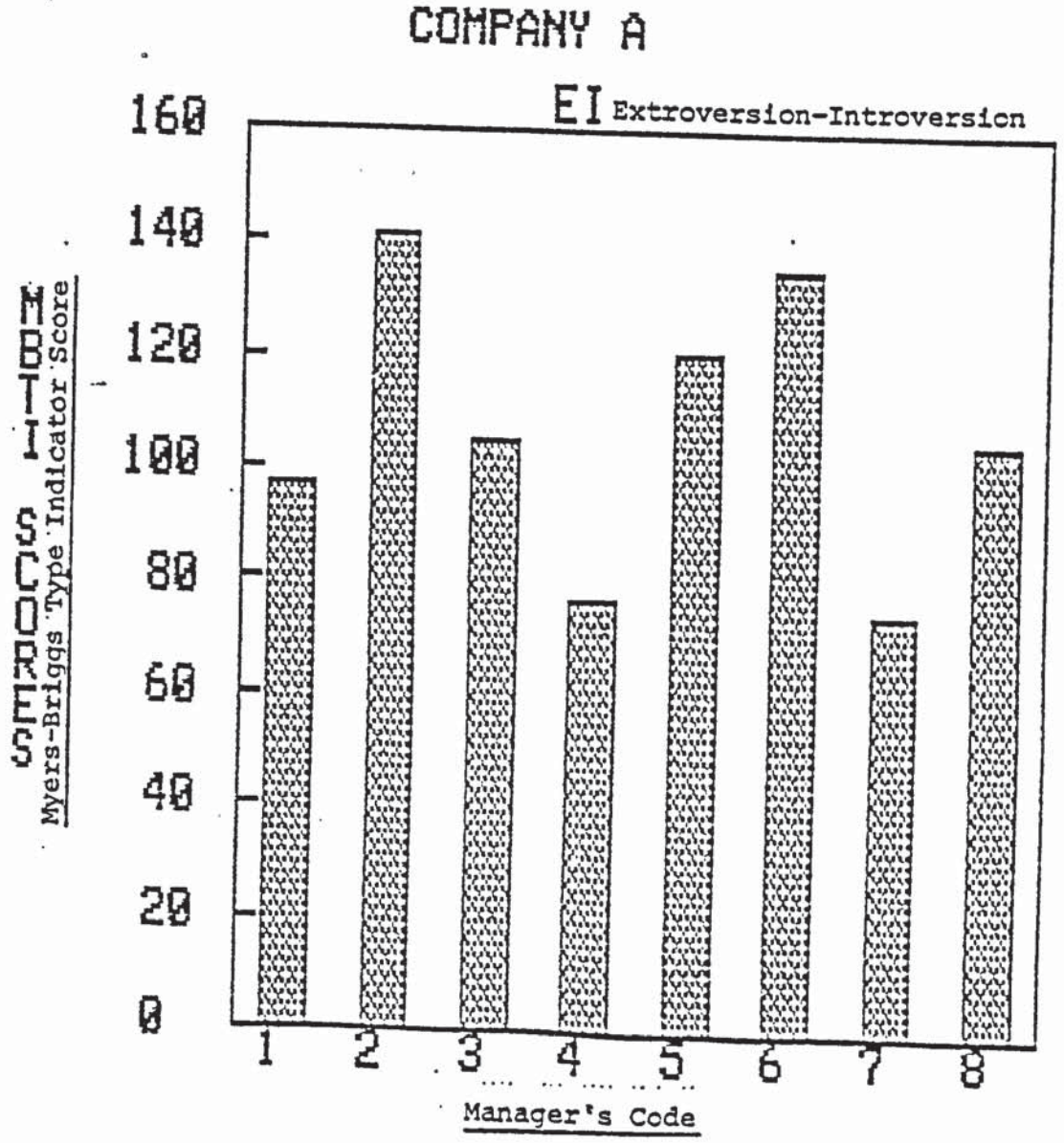


Fig. K.25

Extroversion-Introversion Scale Scores For Managers In Company B

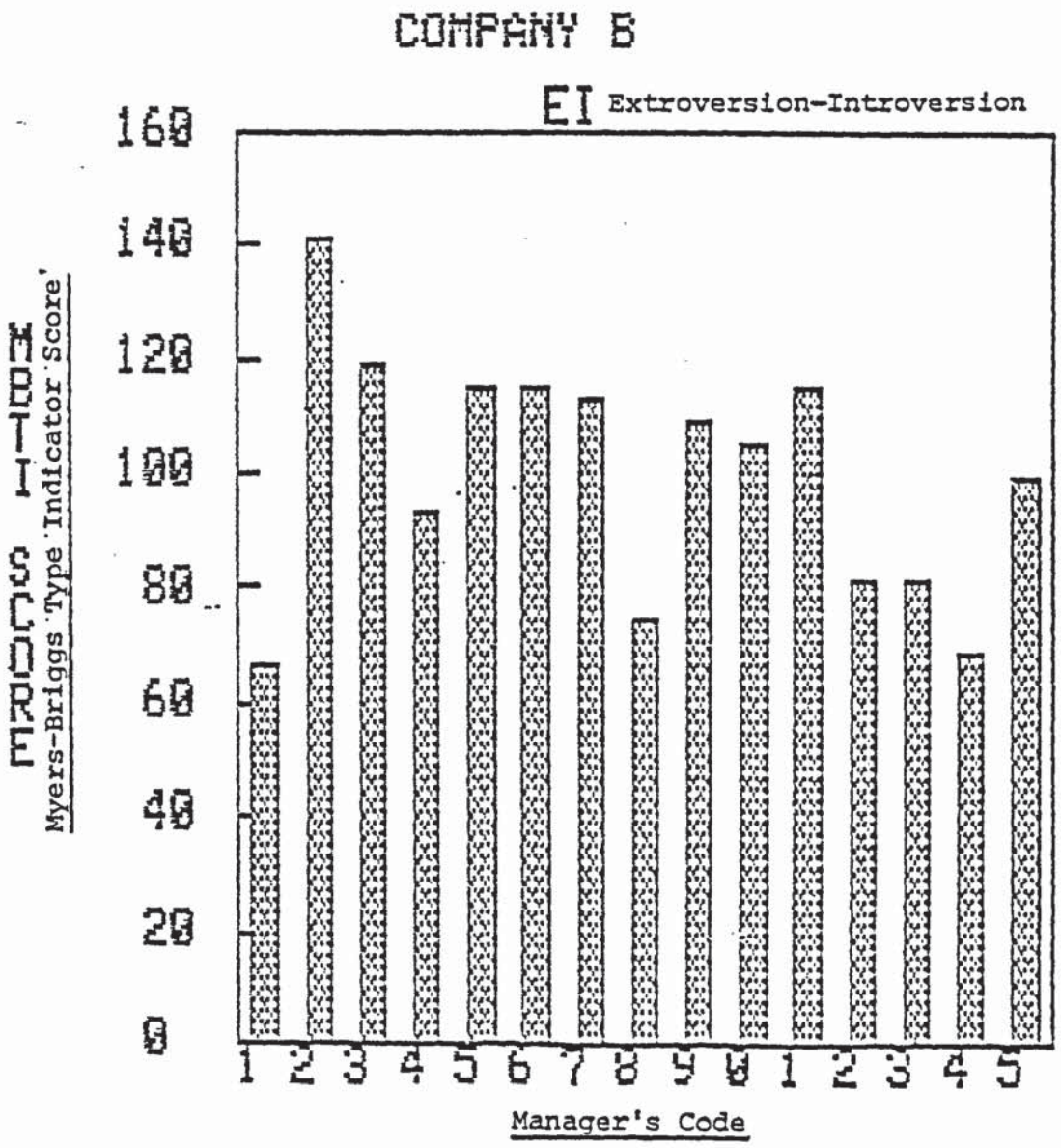


Fig. K.26

Extroversion-Introversion Scale Scores For Managers

In Company F

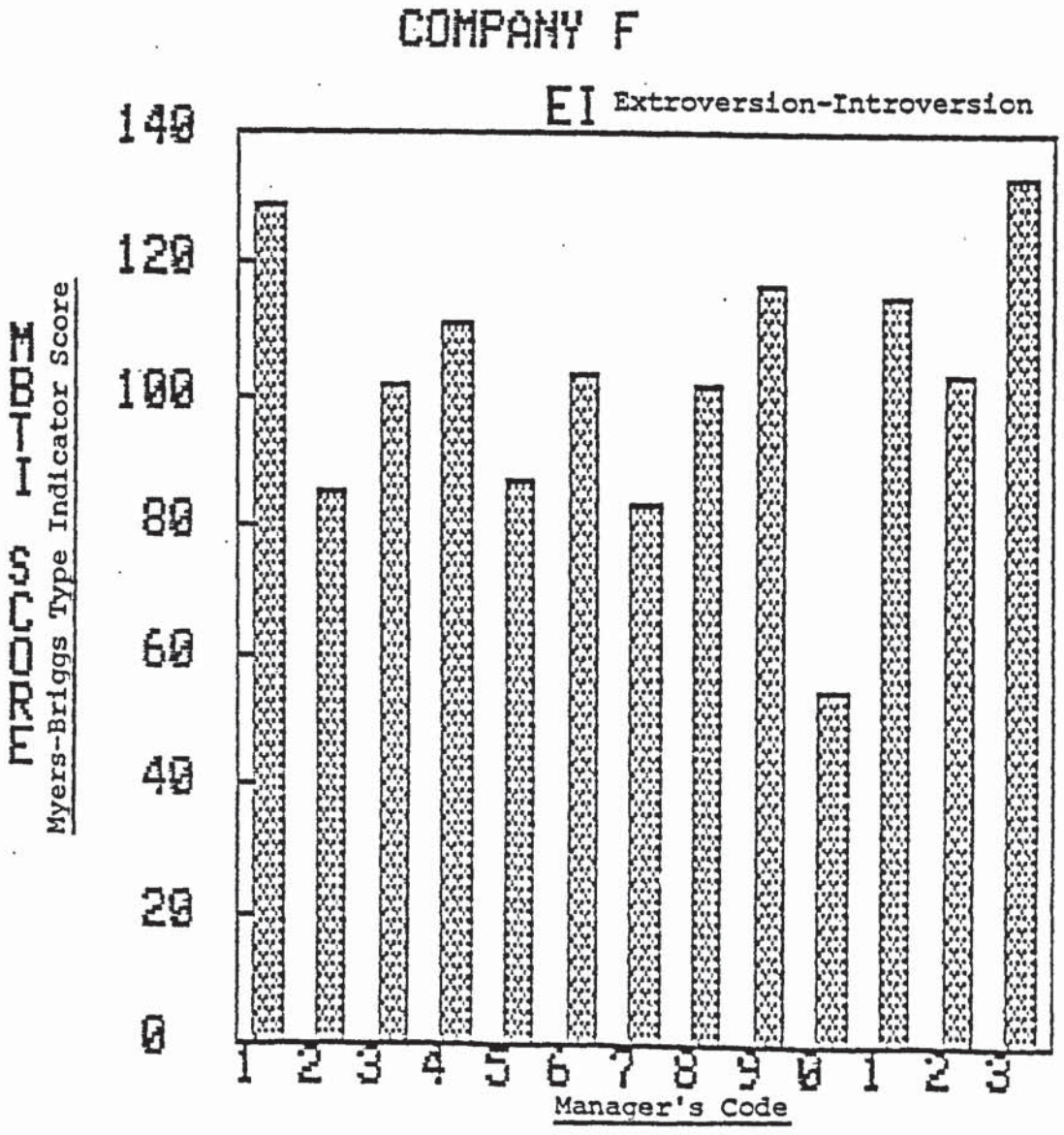


Fig. K.27

Anxiety Scores For Managers In Company A (3D)

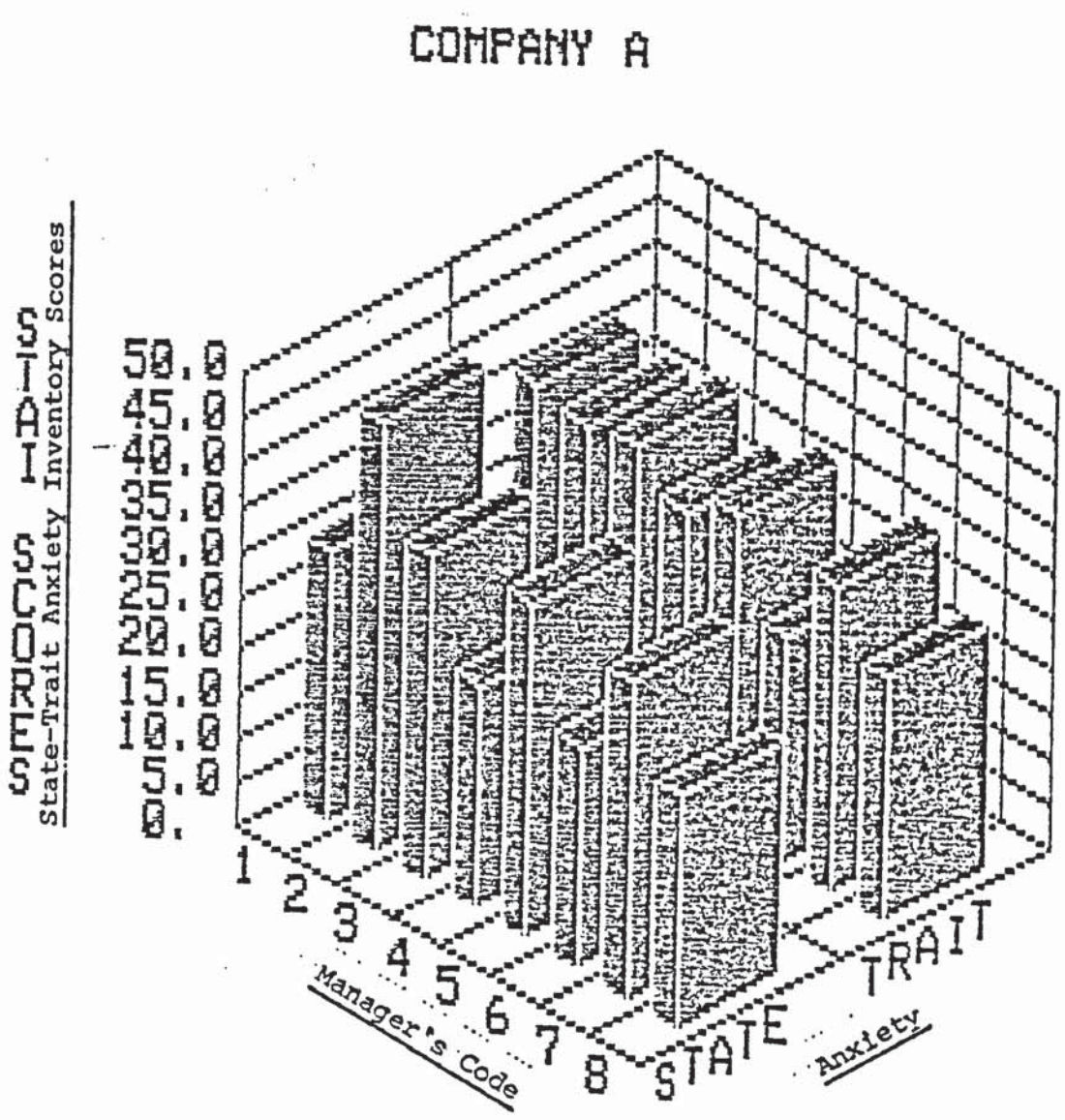


Fig. K.28

Anxiety Scores For Managers In Company B (3D)

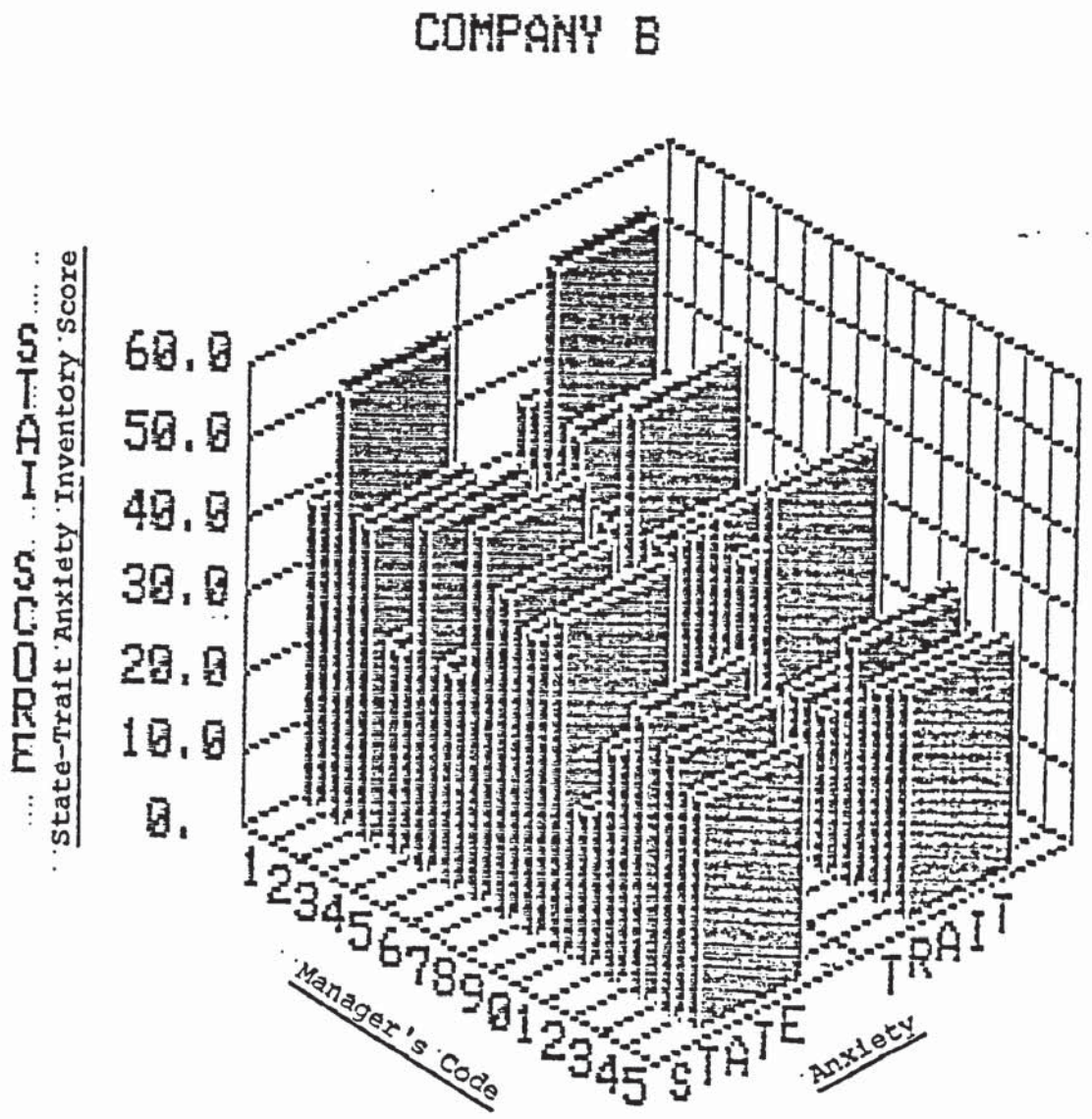


Fig. K.29

Anxiety Scores For Managers In Company F (3D)

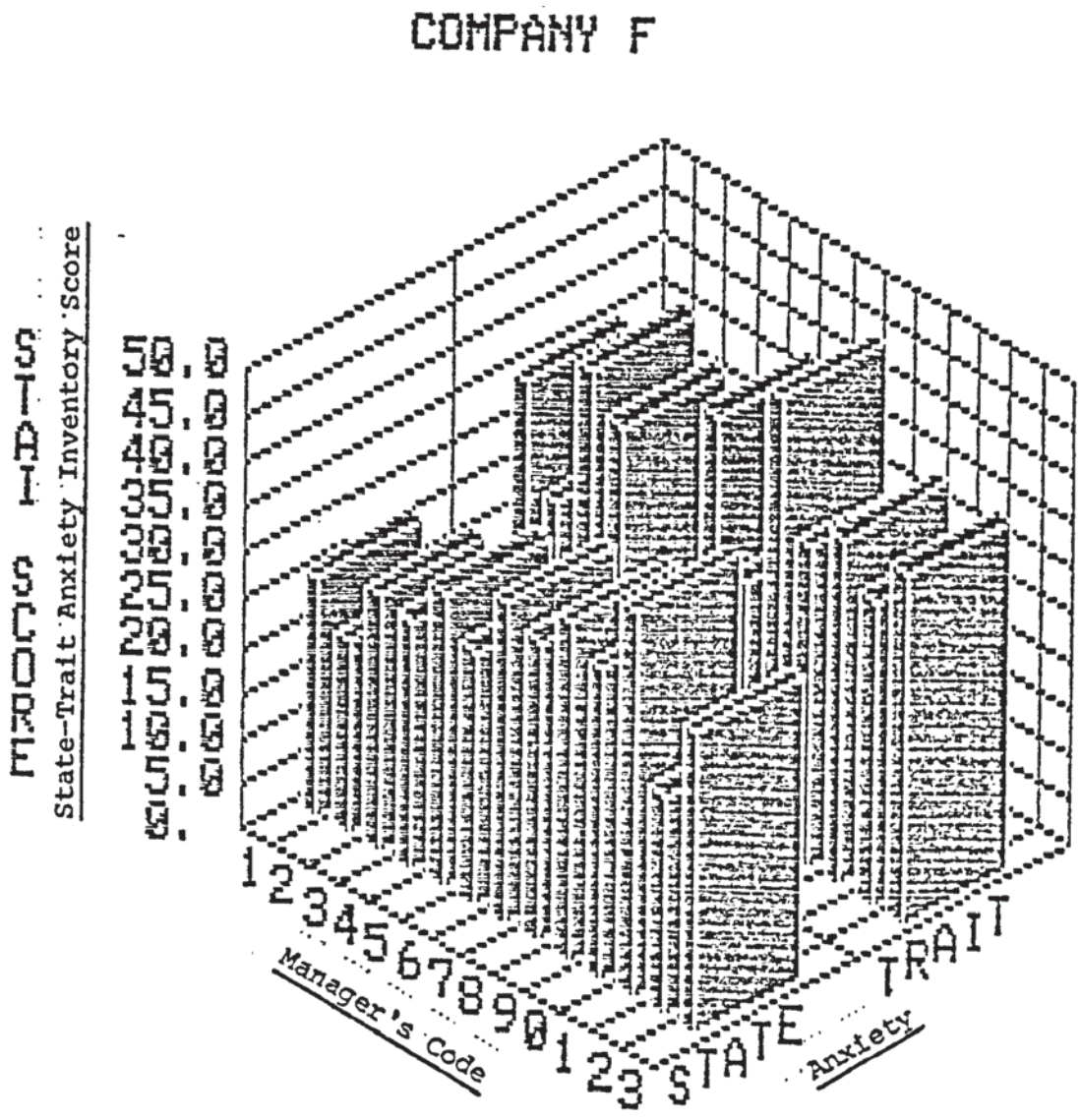


Fig. K.30

Anxiety Scores For Managers In Company A

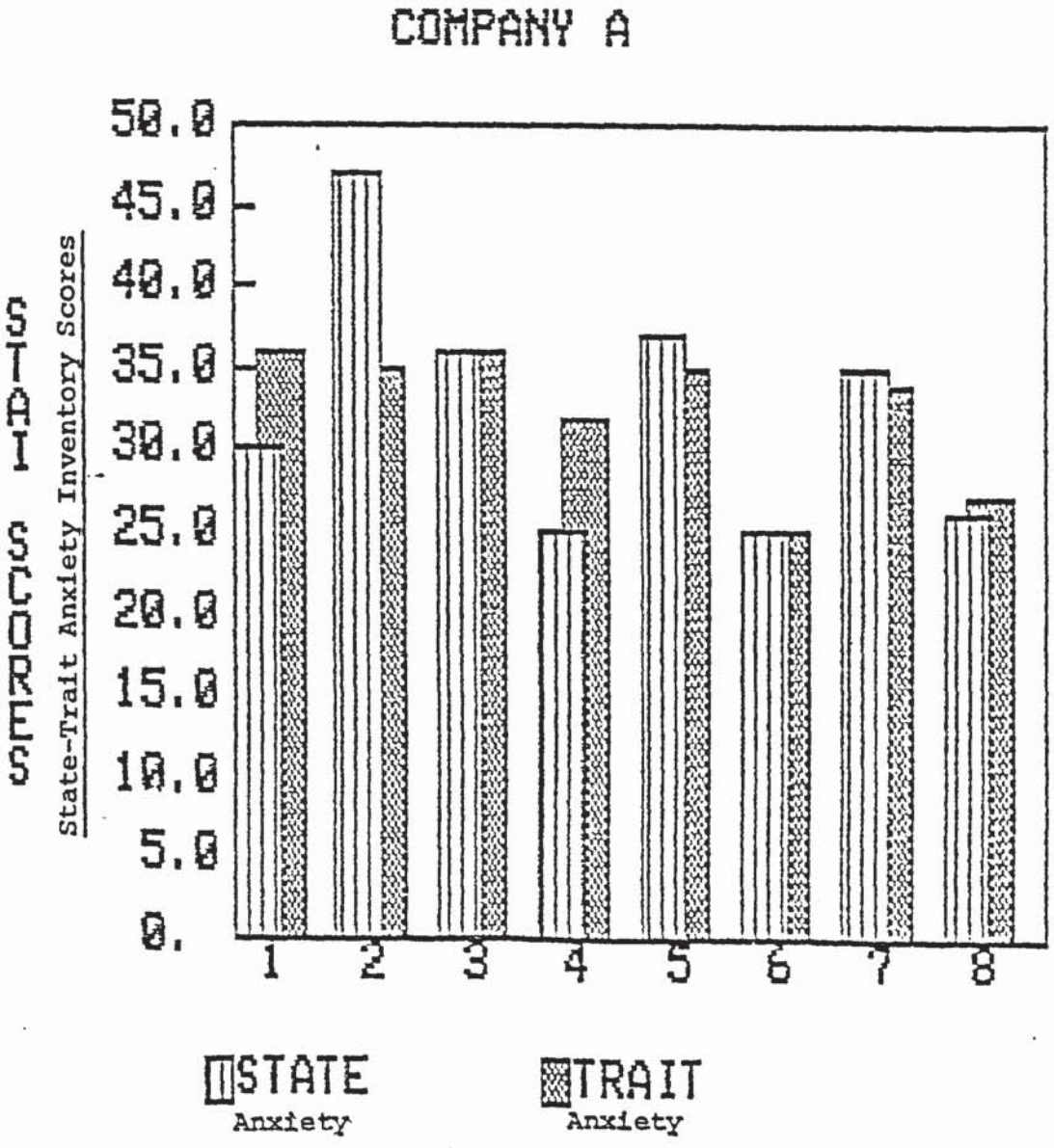


Fig. K.31

Anxiety Scores For Managers In Company B

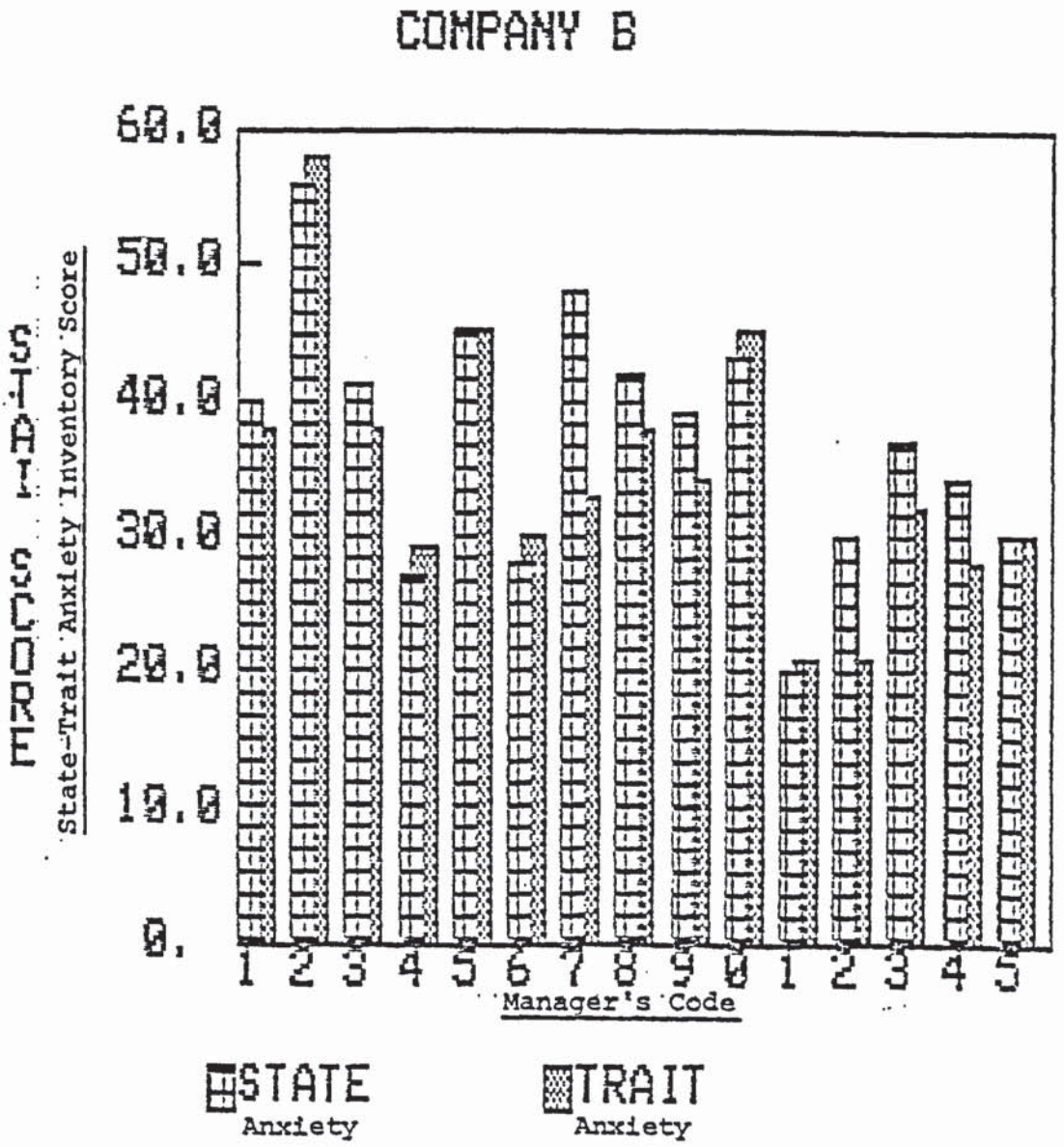


Fig. K.32

Anxiety Scores For Managers In Company F

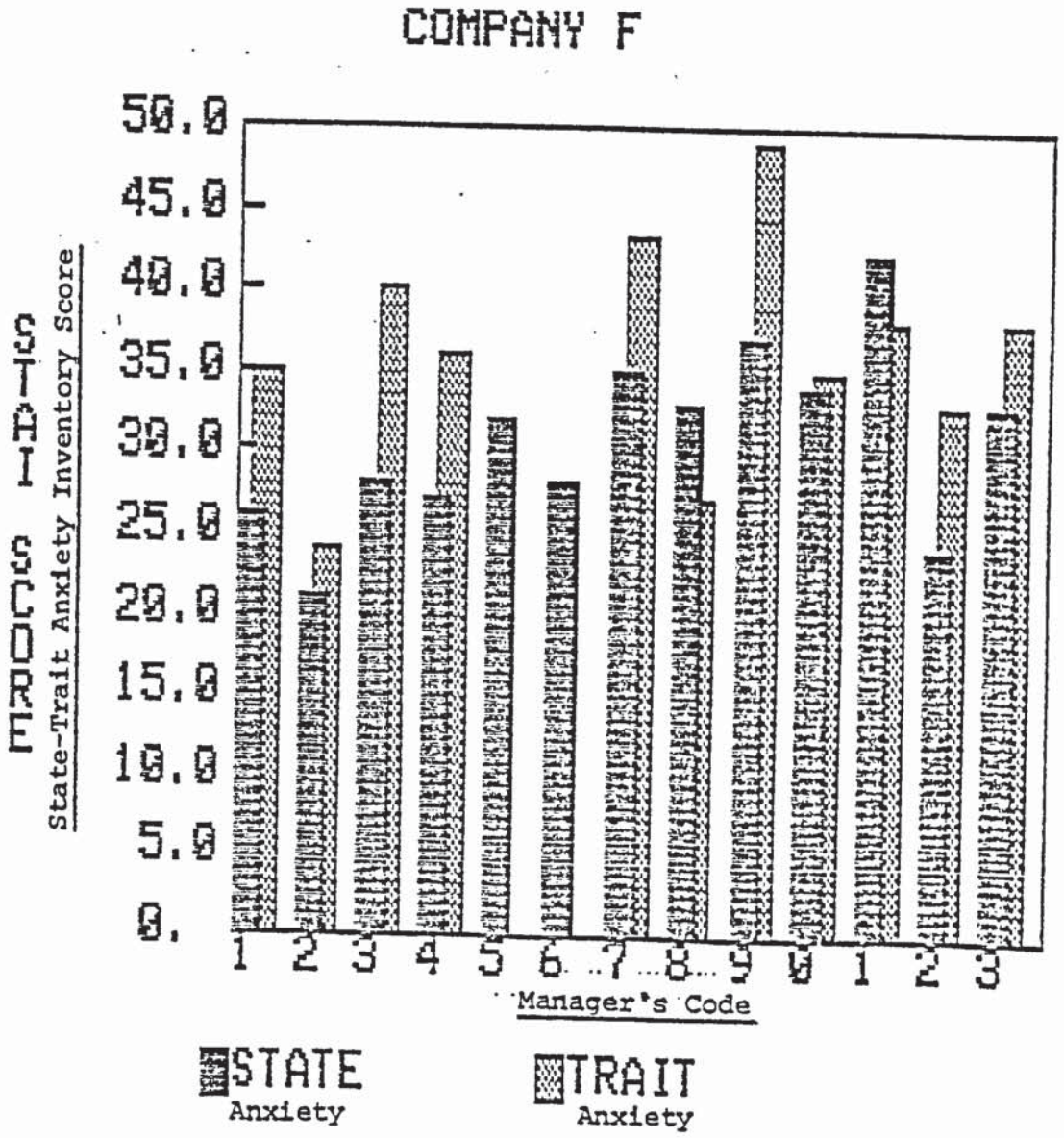


Fig. K.33

State Anxiety Scores For Managers In Company A

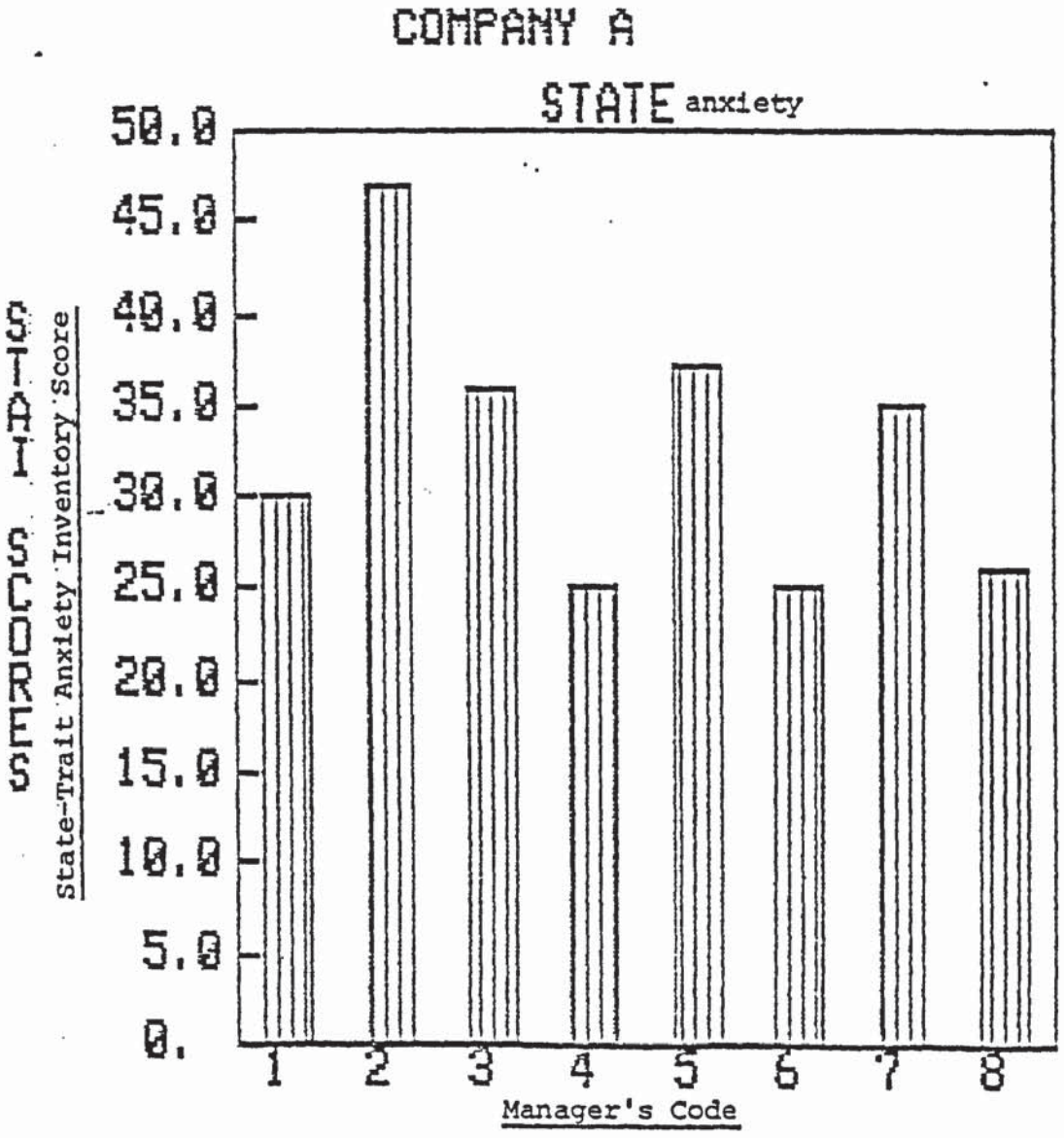


Fig. K.34

State Anxiety Scores For Managers In Company B

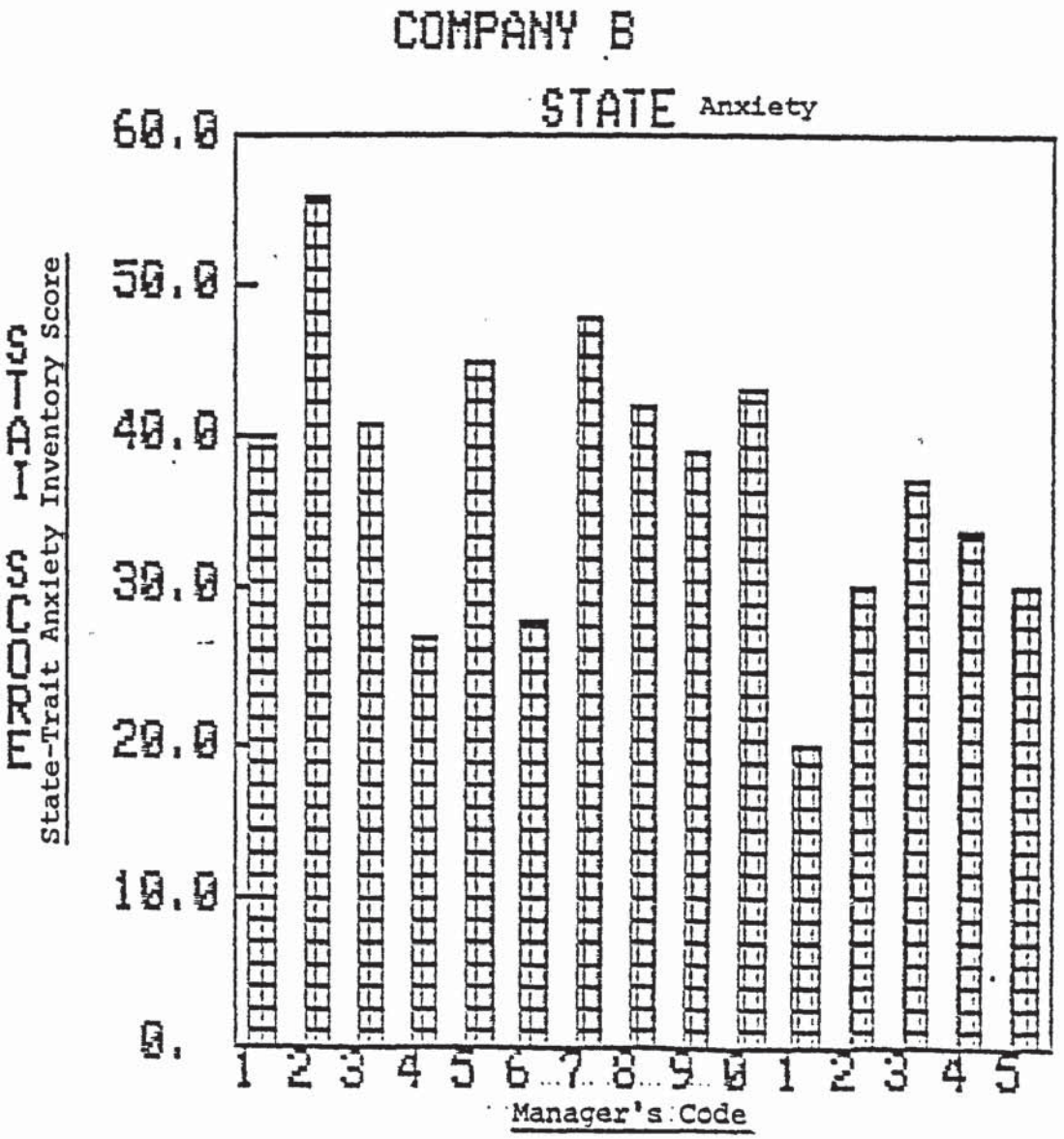


Fig. K.35

State Anxiety Scores For Managers In Company F

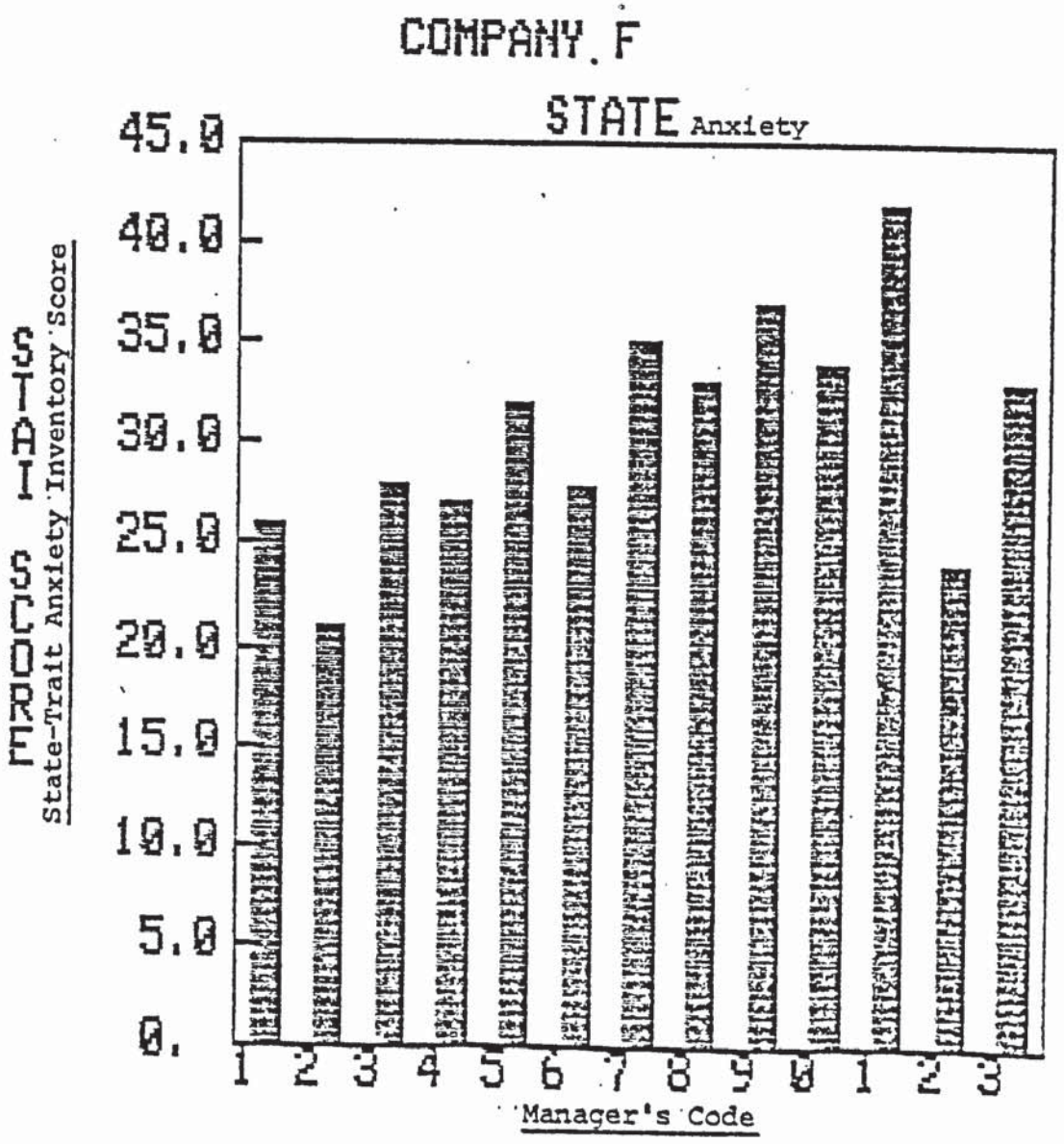


Fig. K.36

Trait Anxiety Scores For Managers In Company A

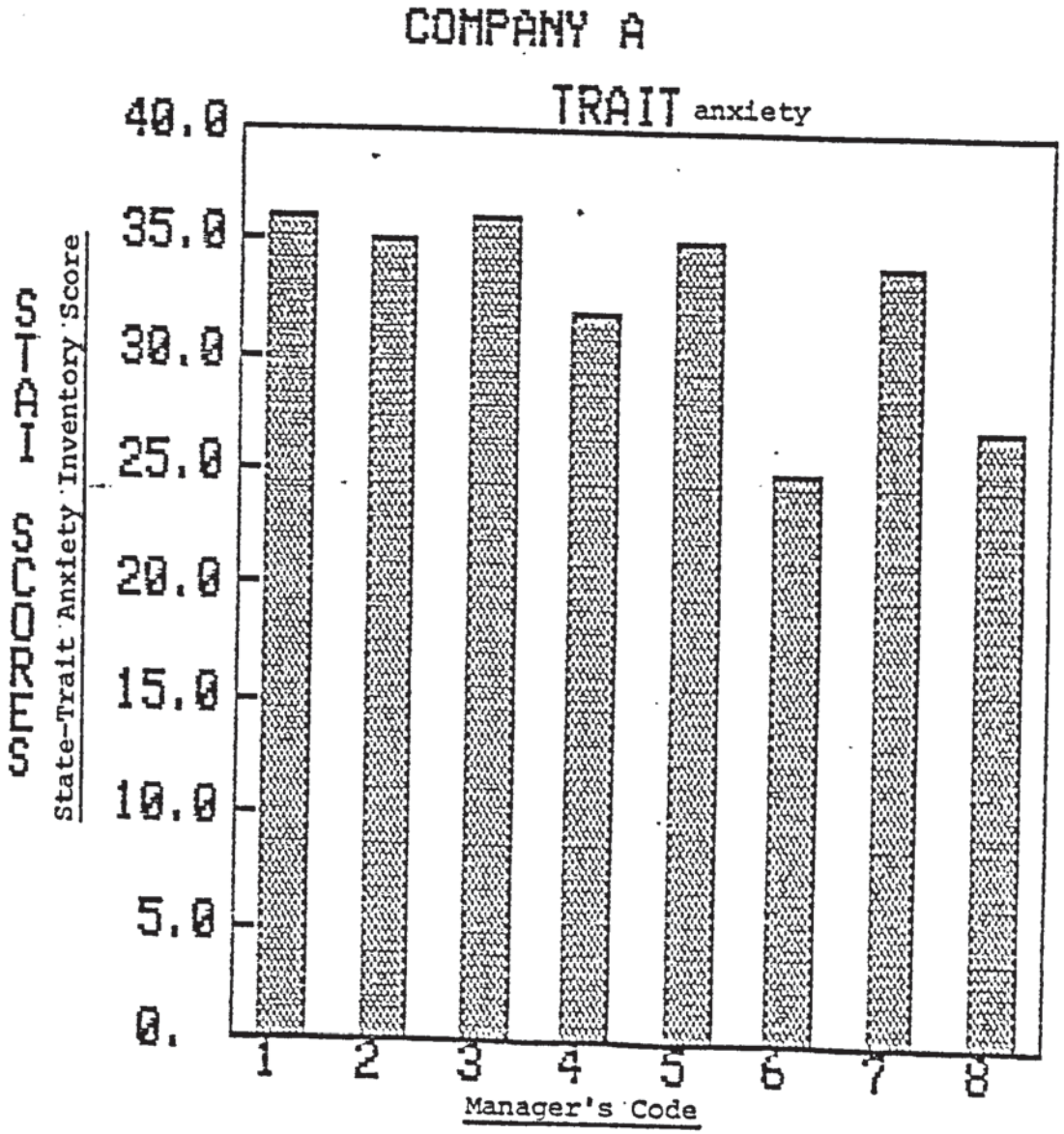


Fig. K.37

Trait Anxiety Scores For Managers In Company B

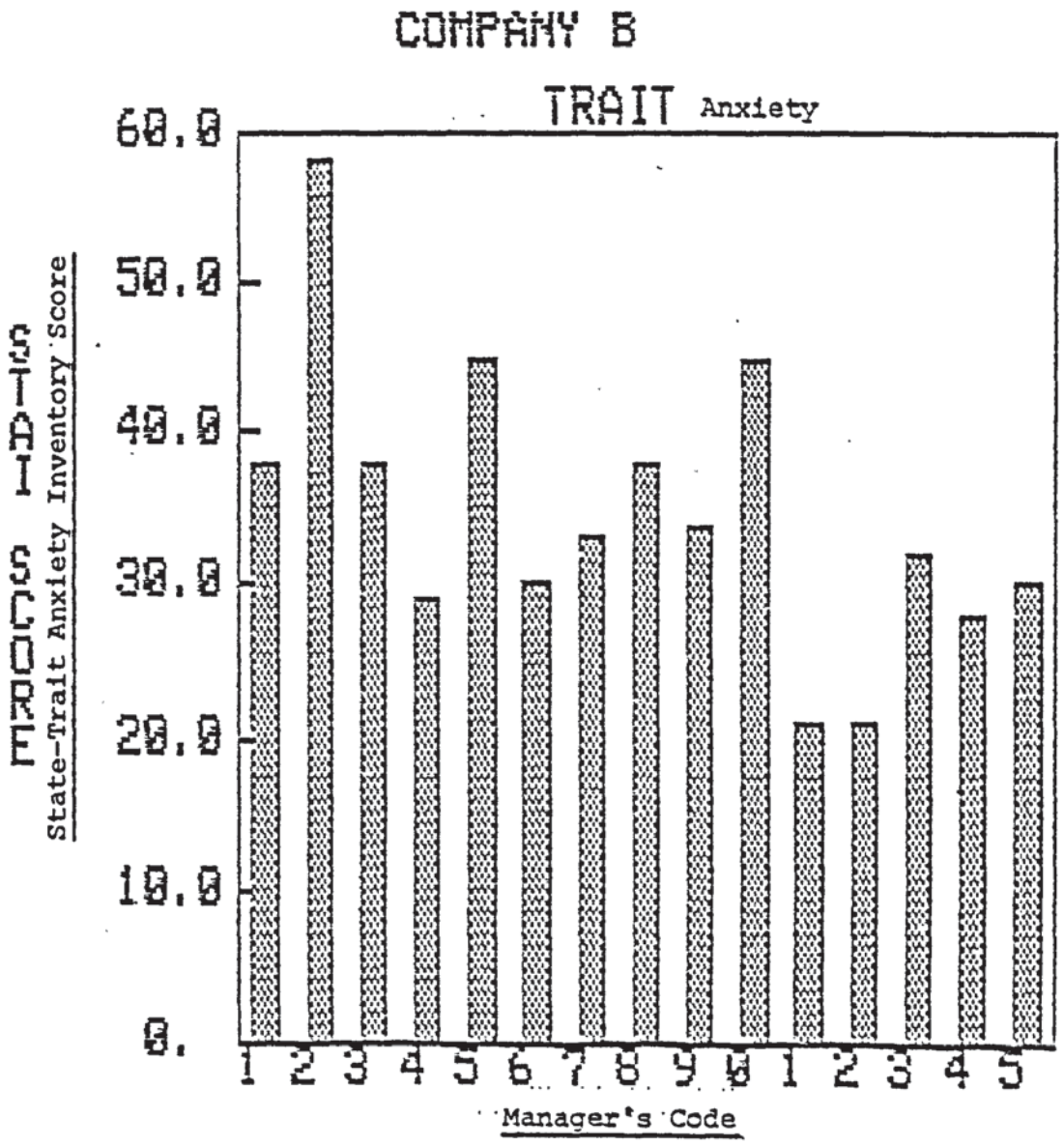


Fig. K.38

Trait Anxiety Scores For Managers In Company F

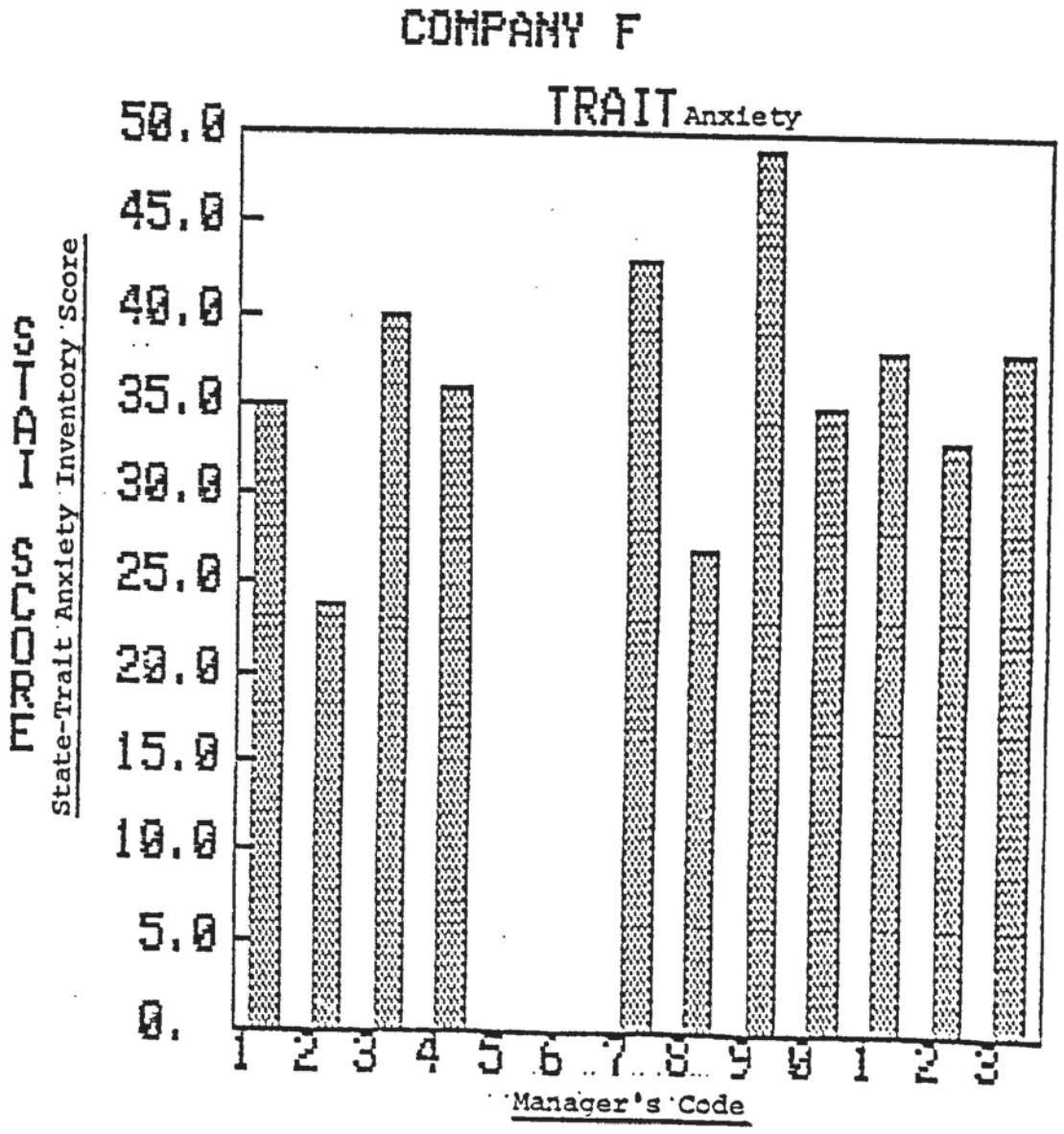
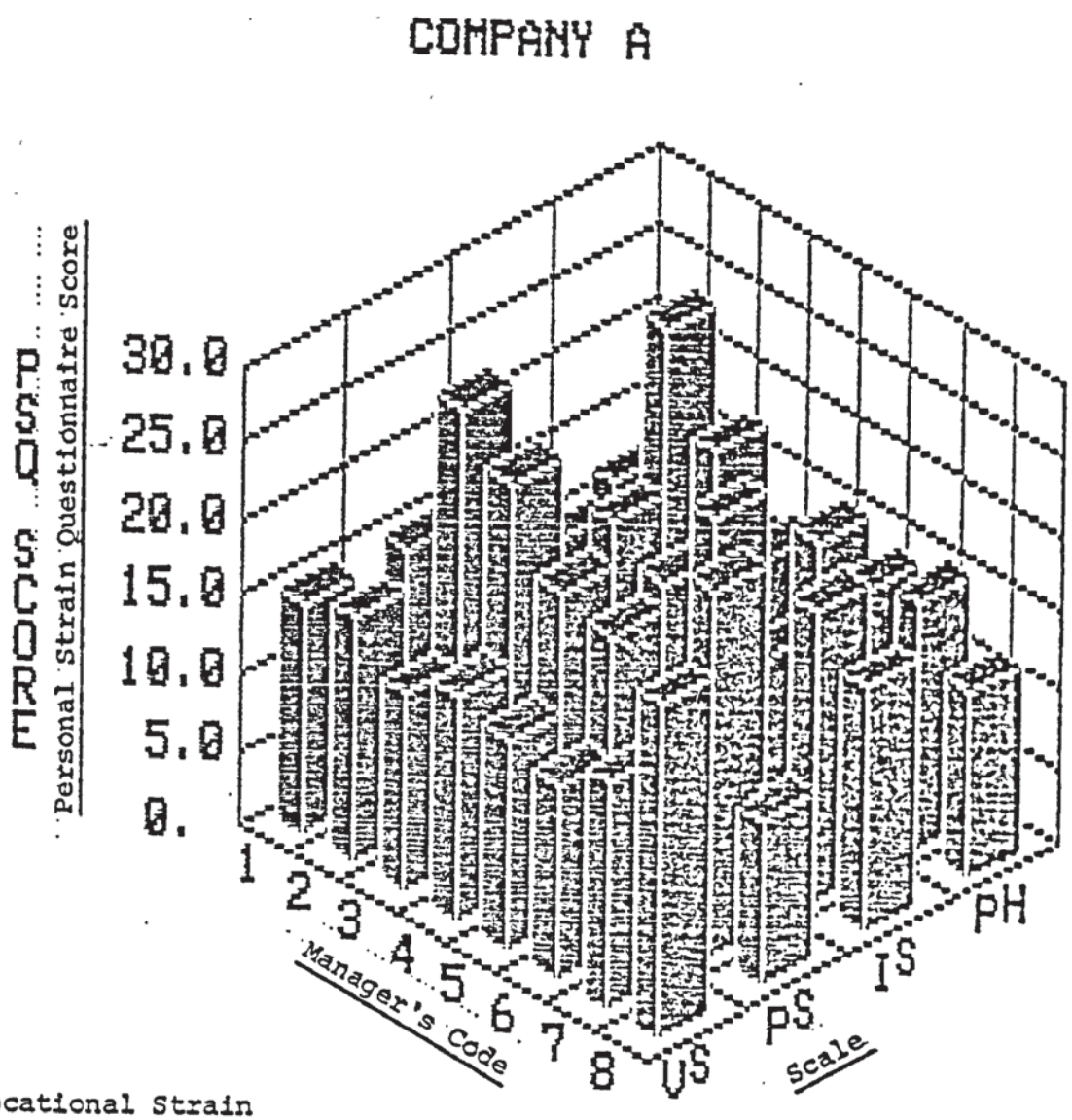


Fig. K.39

Strain Scores For Managers In Company A (3D)

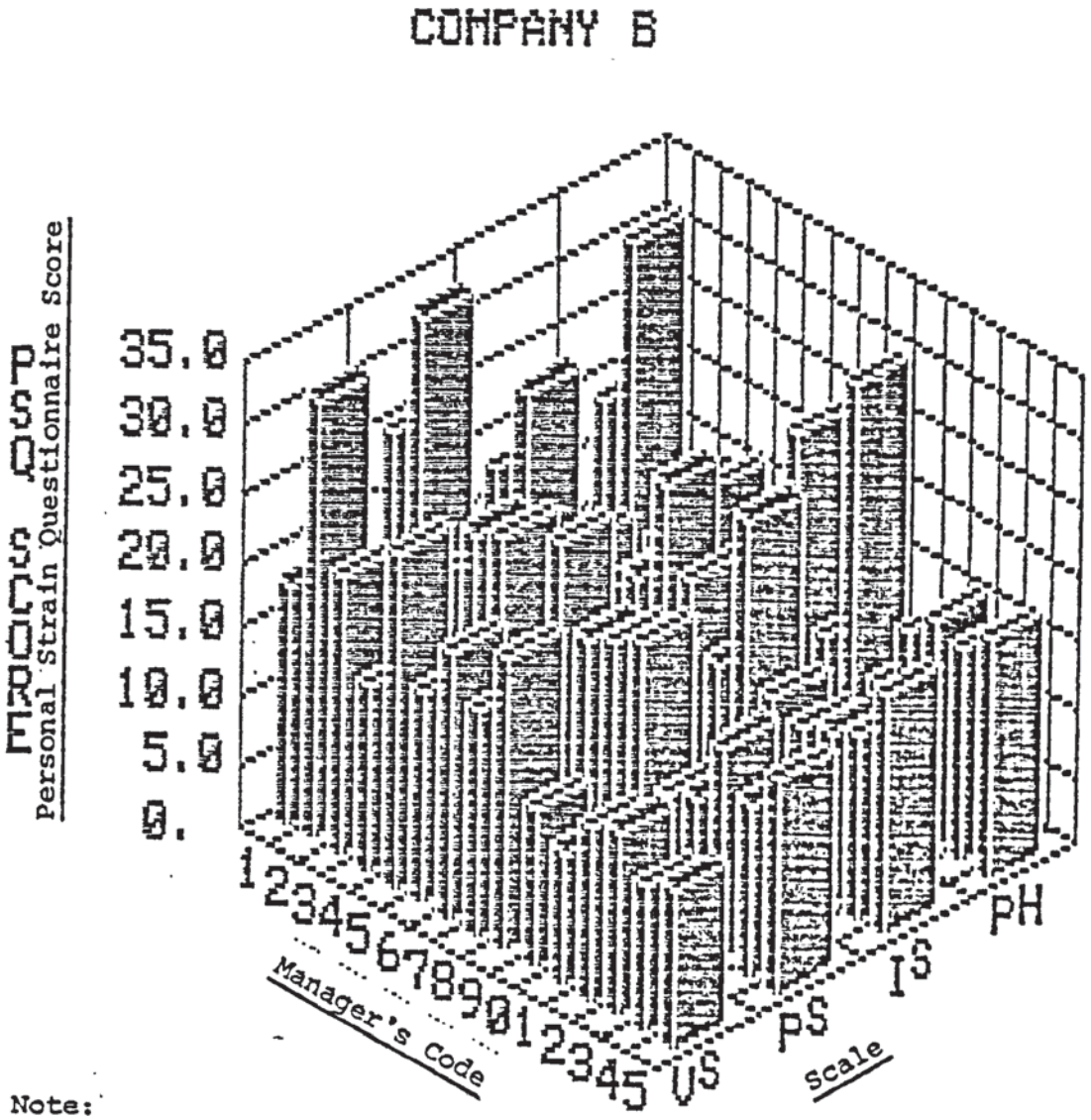


Note:

VS - Vocational Strain
PS - Psychological Strain
IS - Interpersonal Strain
PH - Physical Strain

Fig. K.40

Strain Scores For Managers In Company B (3D)

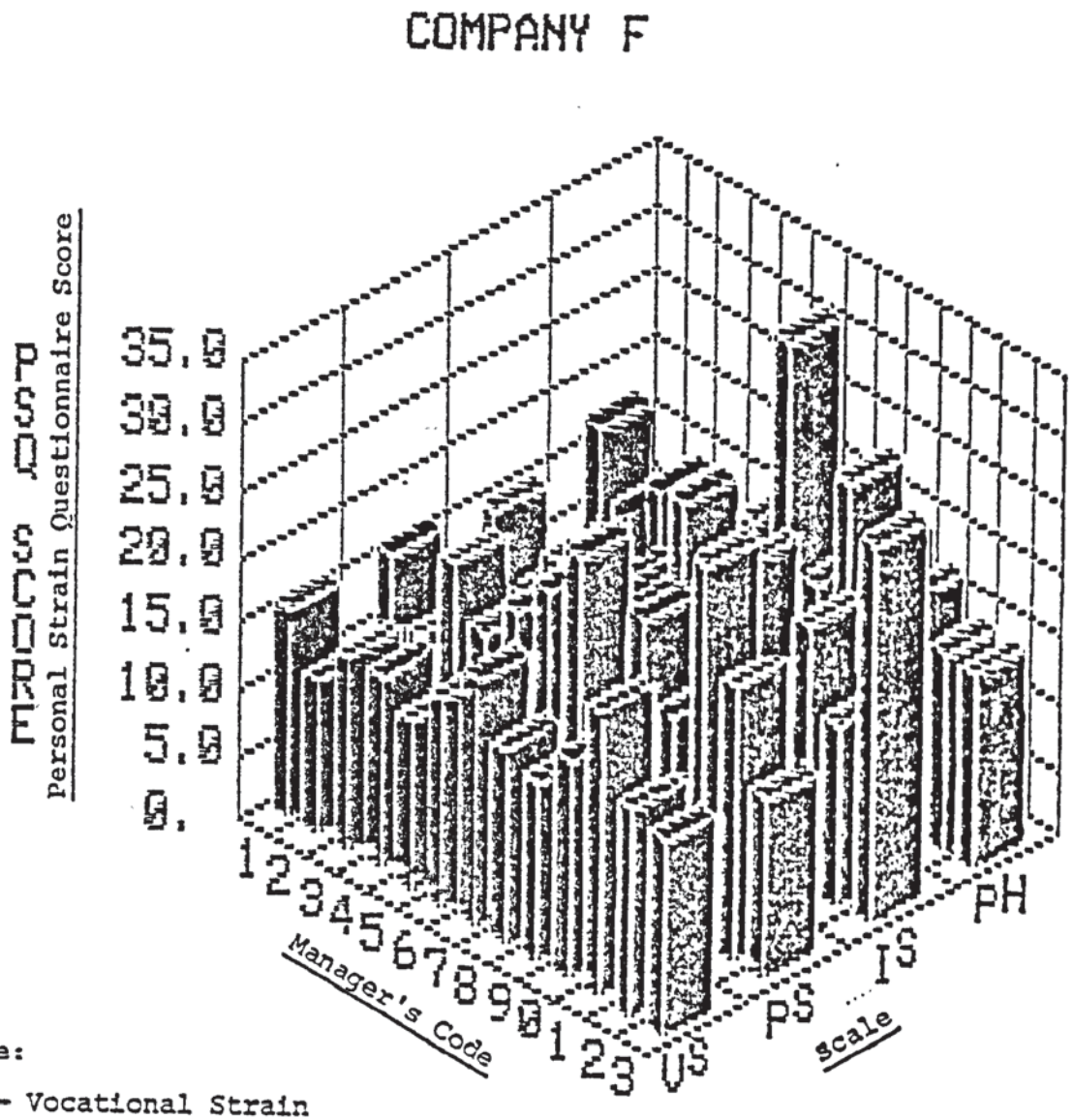


Note:

VS - Vocational Strain
PS - Psychological Strain
IS - Interpersonal Strain
PH - Physical Strain

Fig. K.41

Strain Scores For Managers In Company F (3D)



Note:

VS - Vocational Strain
PS - Psychological Strain
IS - Interpersonal Strain
PH - Physical Strain

Fig. K.42

Strain Scores For Managers In Company A

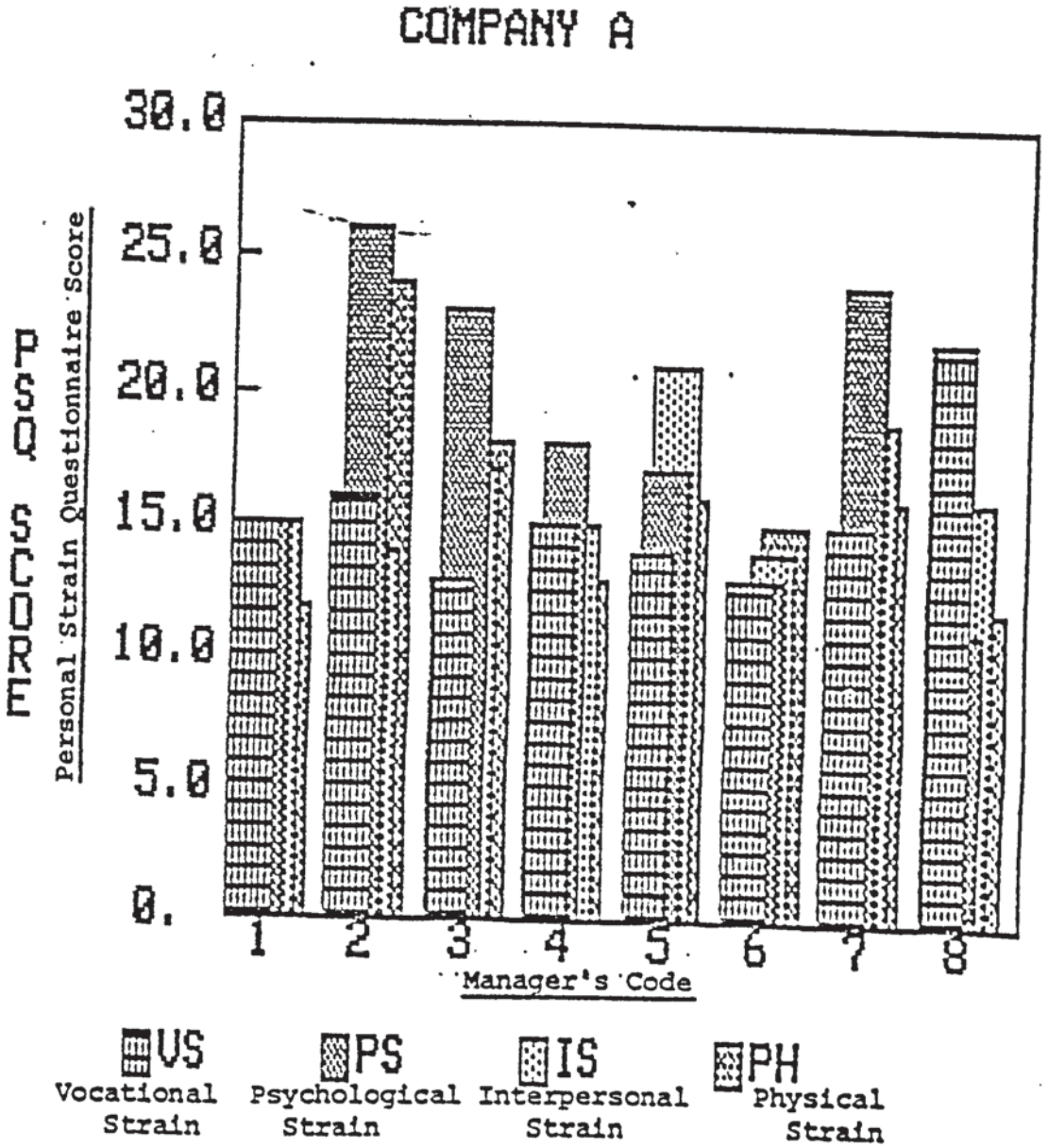


Fig. K.43

Strain Scores For Managers In Company B

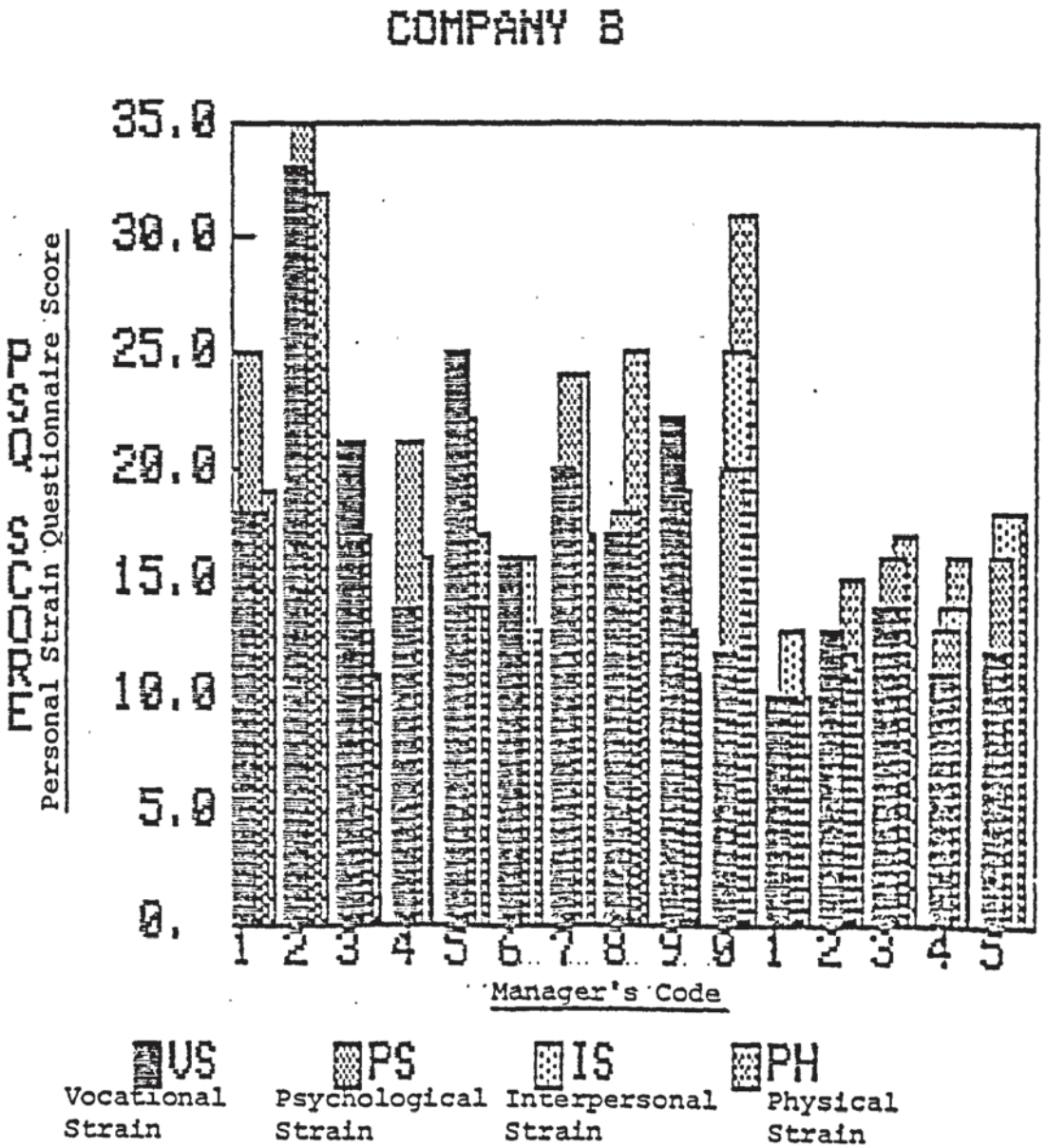


Fig. K.44

Strain Scores For Managers In Company F

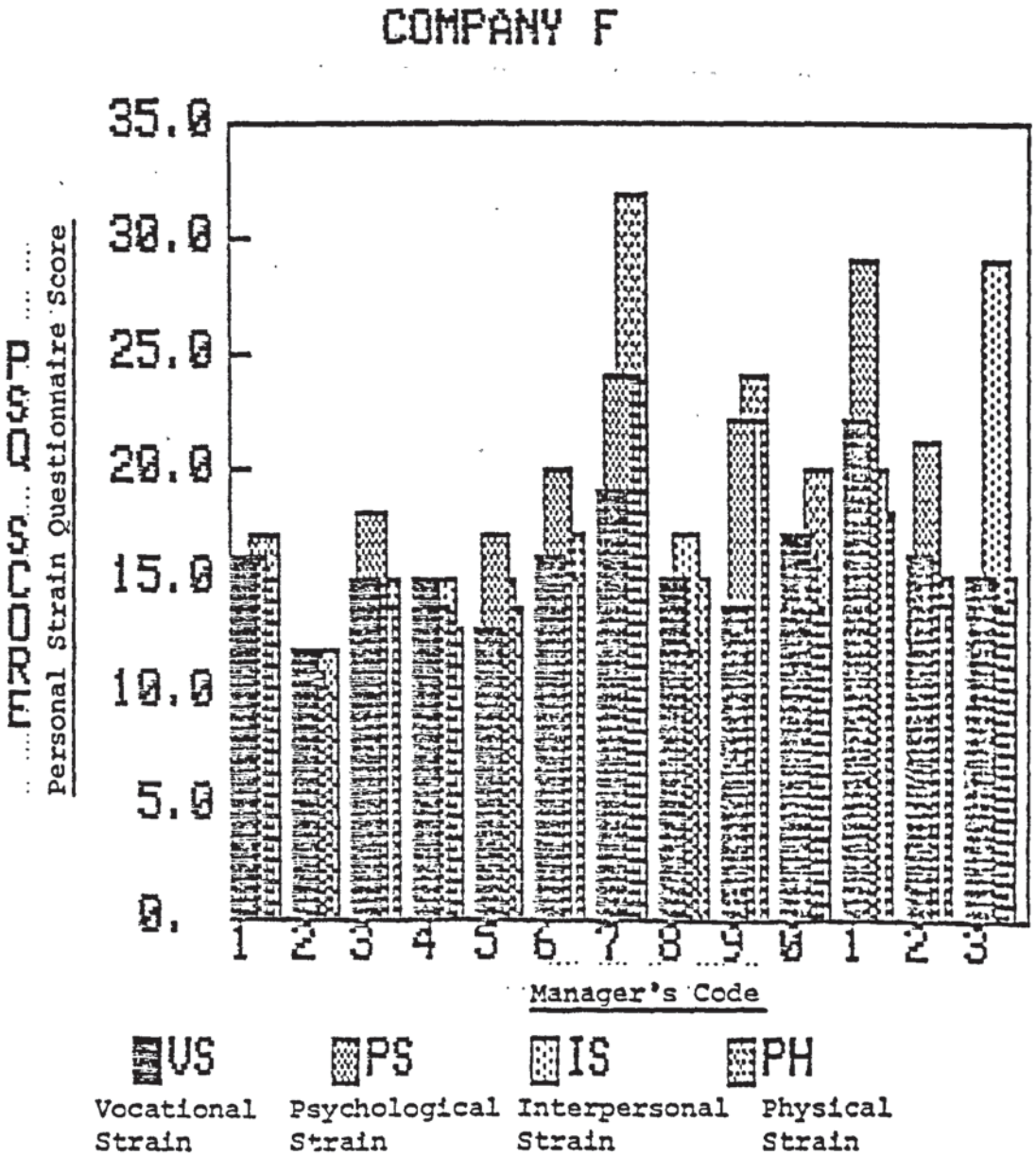


Fig. K.45

Vocational Strain Scores For Managers In Company A

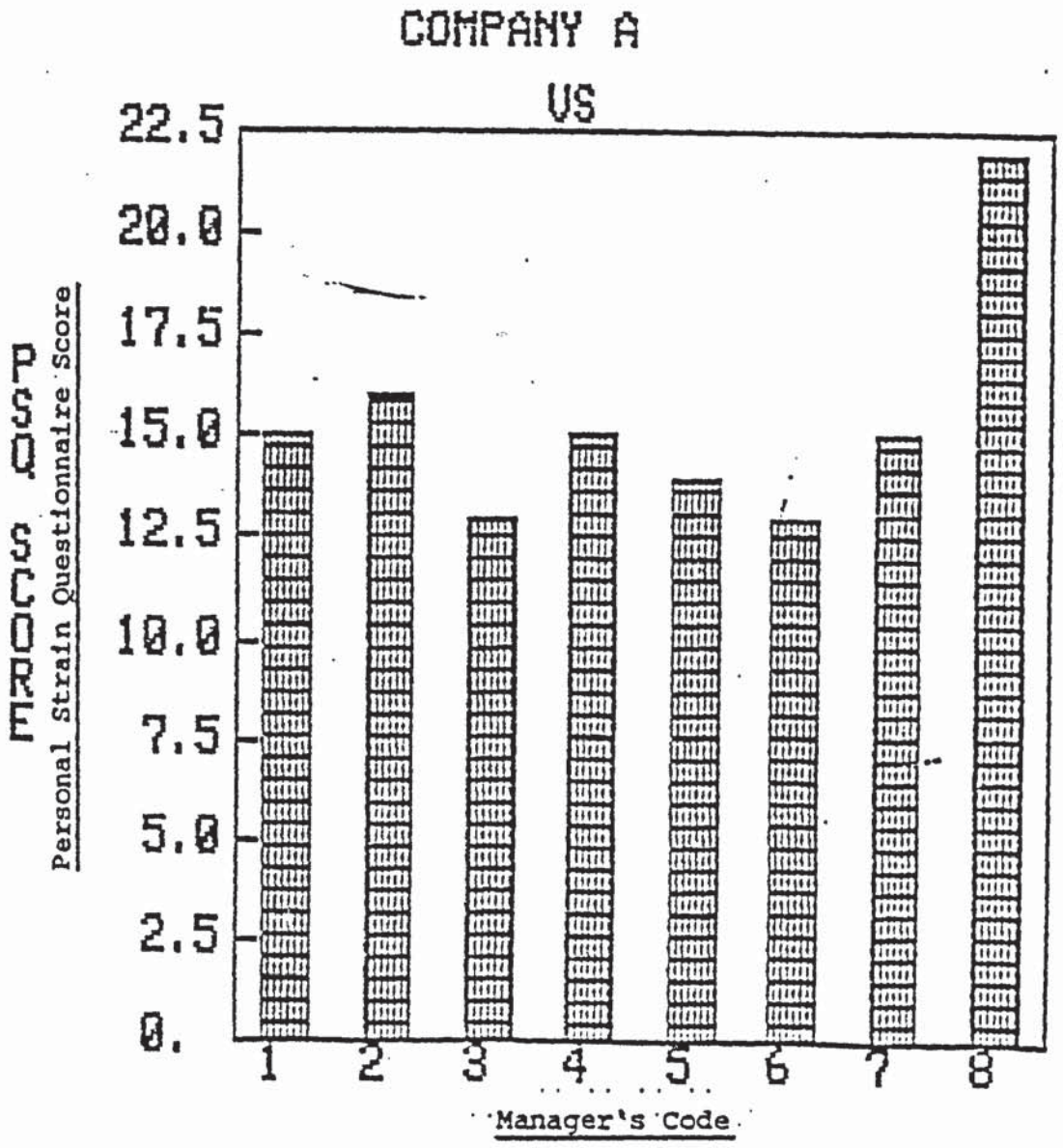


Fig. K.46

Vocational Strain Scores For Managers In Company B

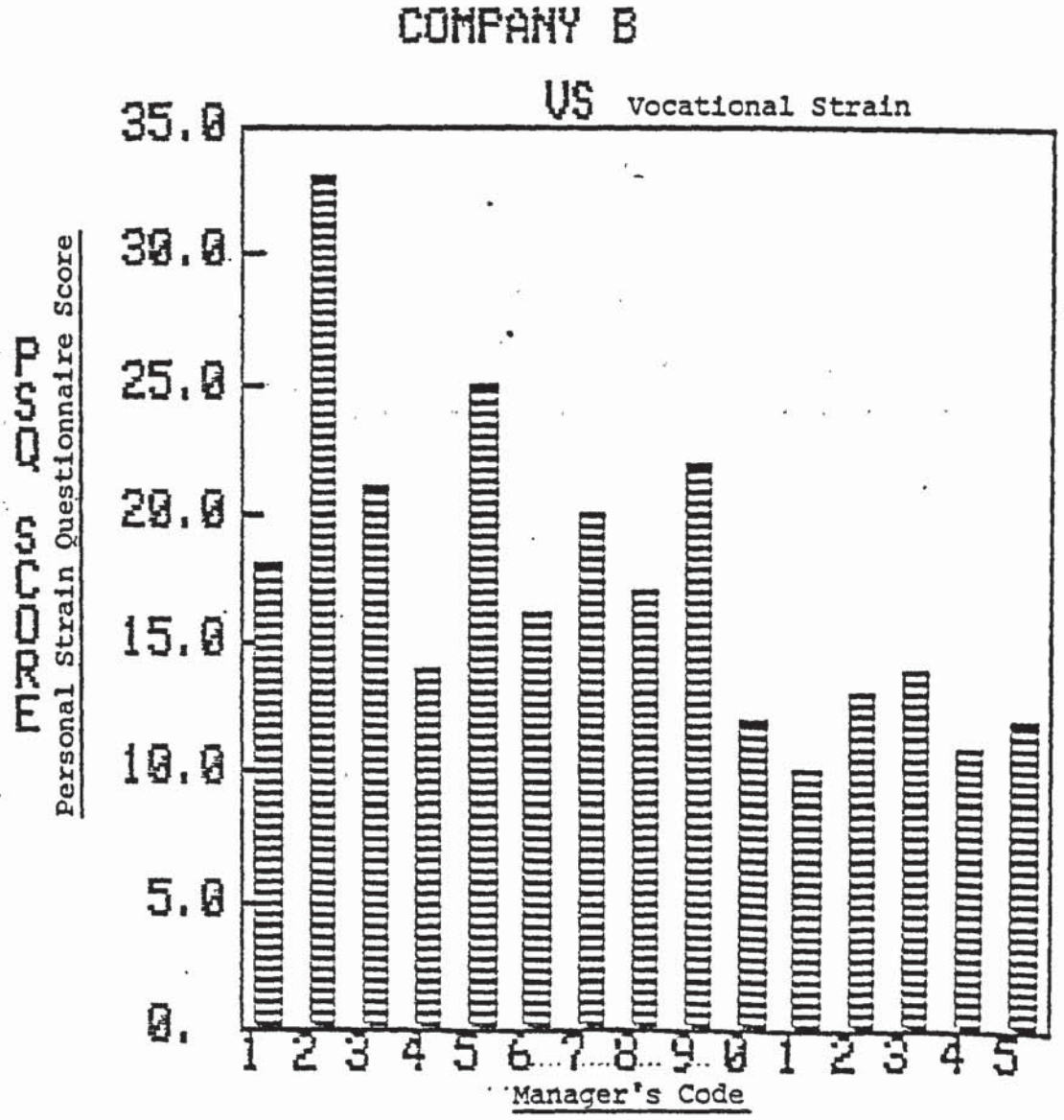


Fig. K.47

Vocational Strain Scores For Managers In Company F

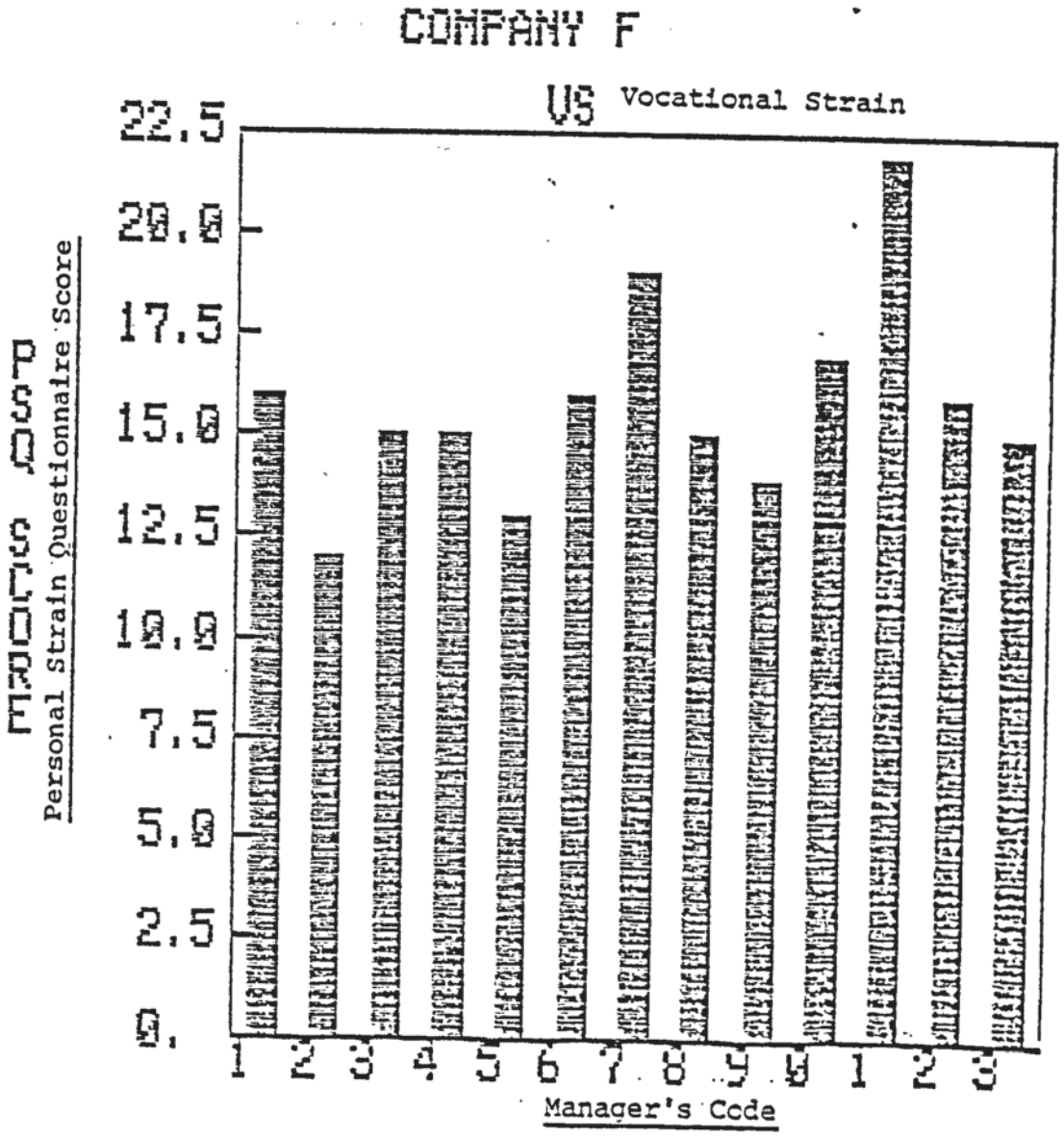


Fig. K.48

Psychological Strain Scores For Managers In Company A

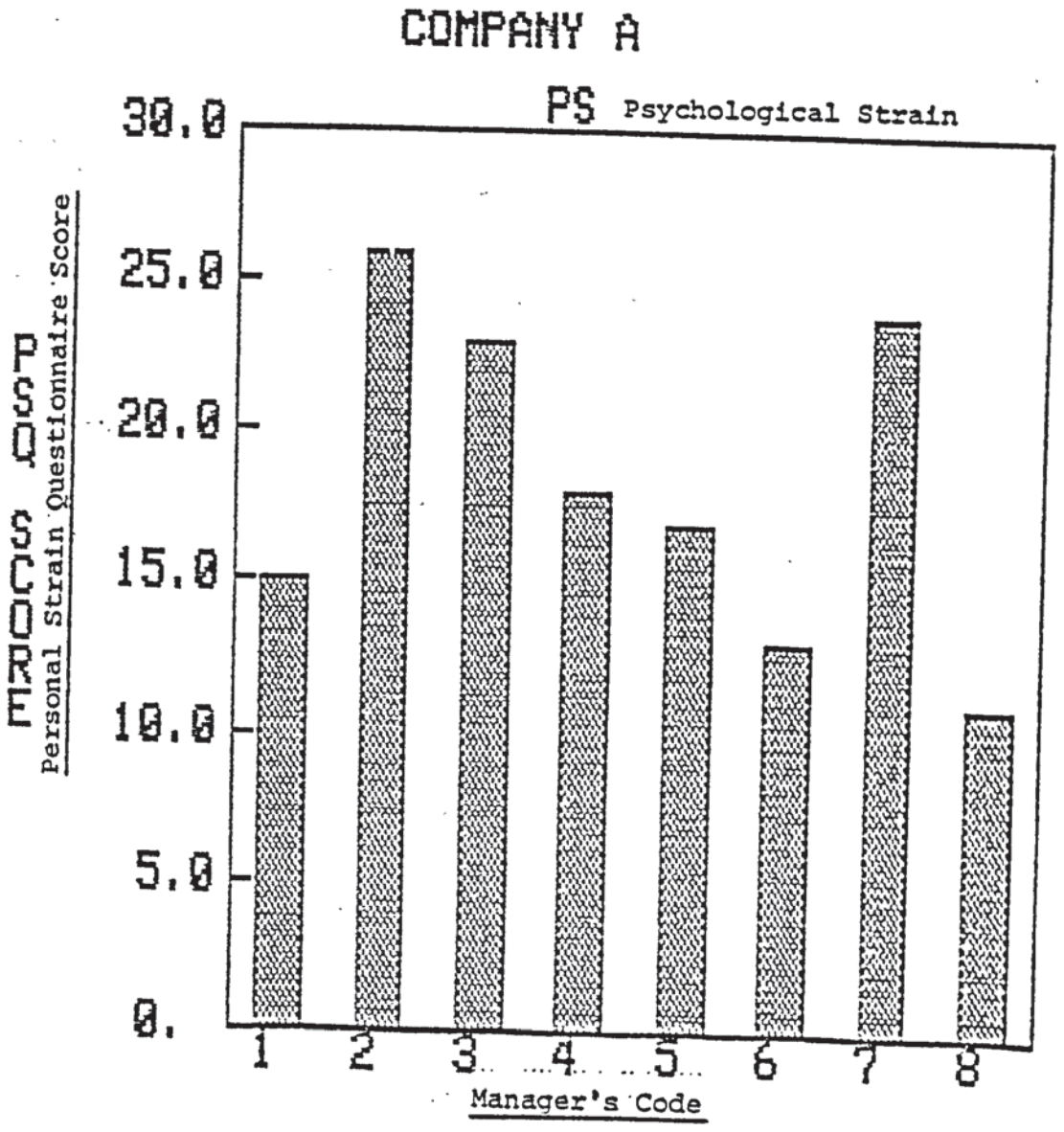


Fig. K.49

Psychological Strain Scores For Managers In Company B

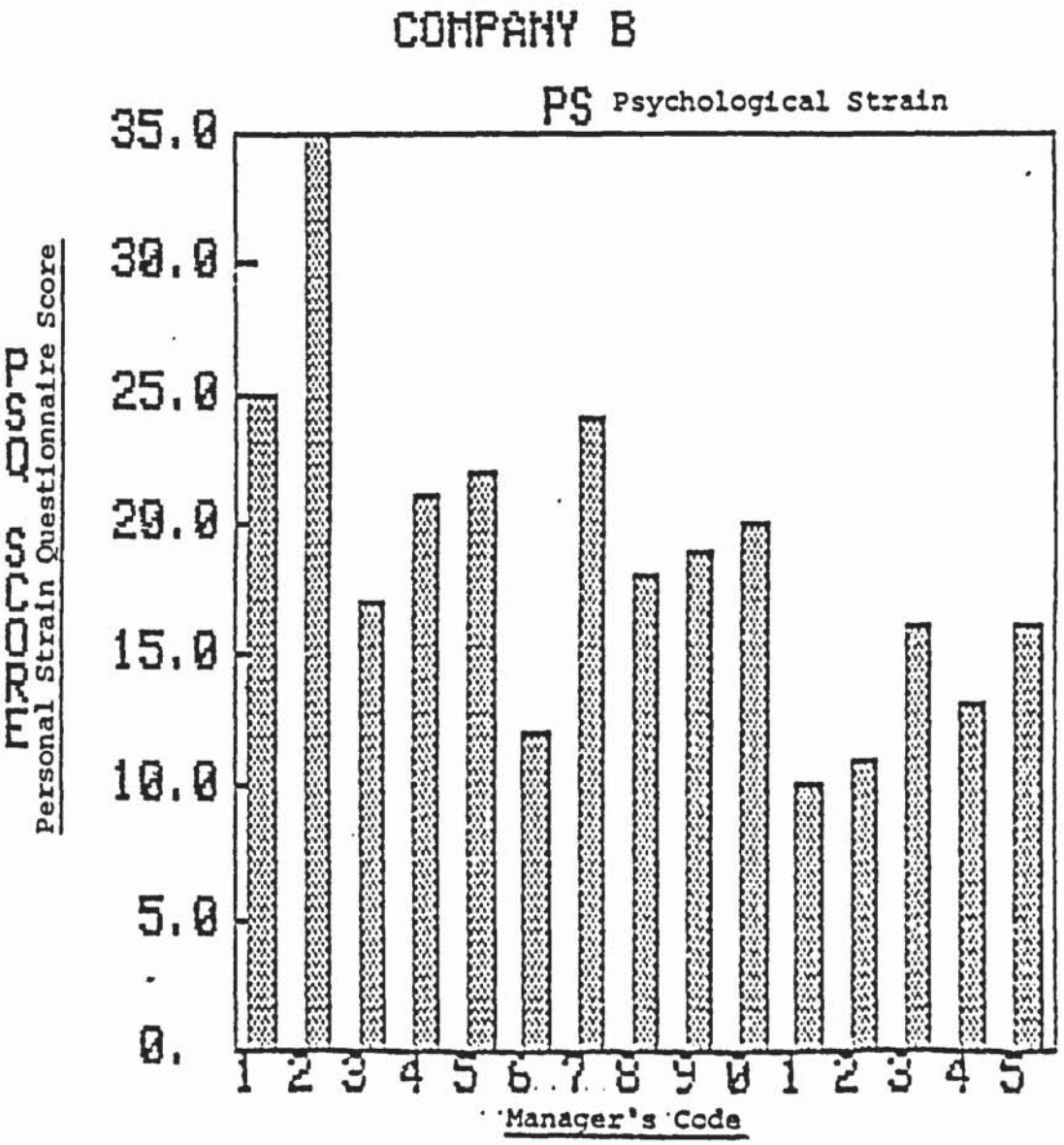


Fig. K.50

Psychological Strain Scores For Managers In Company F

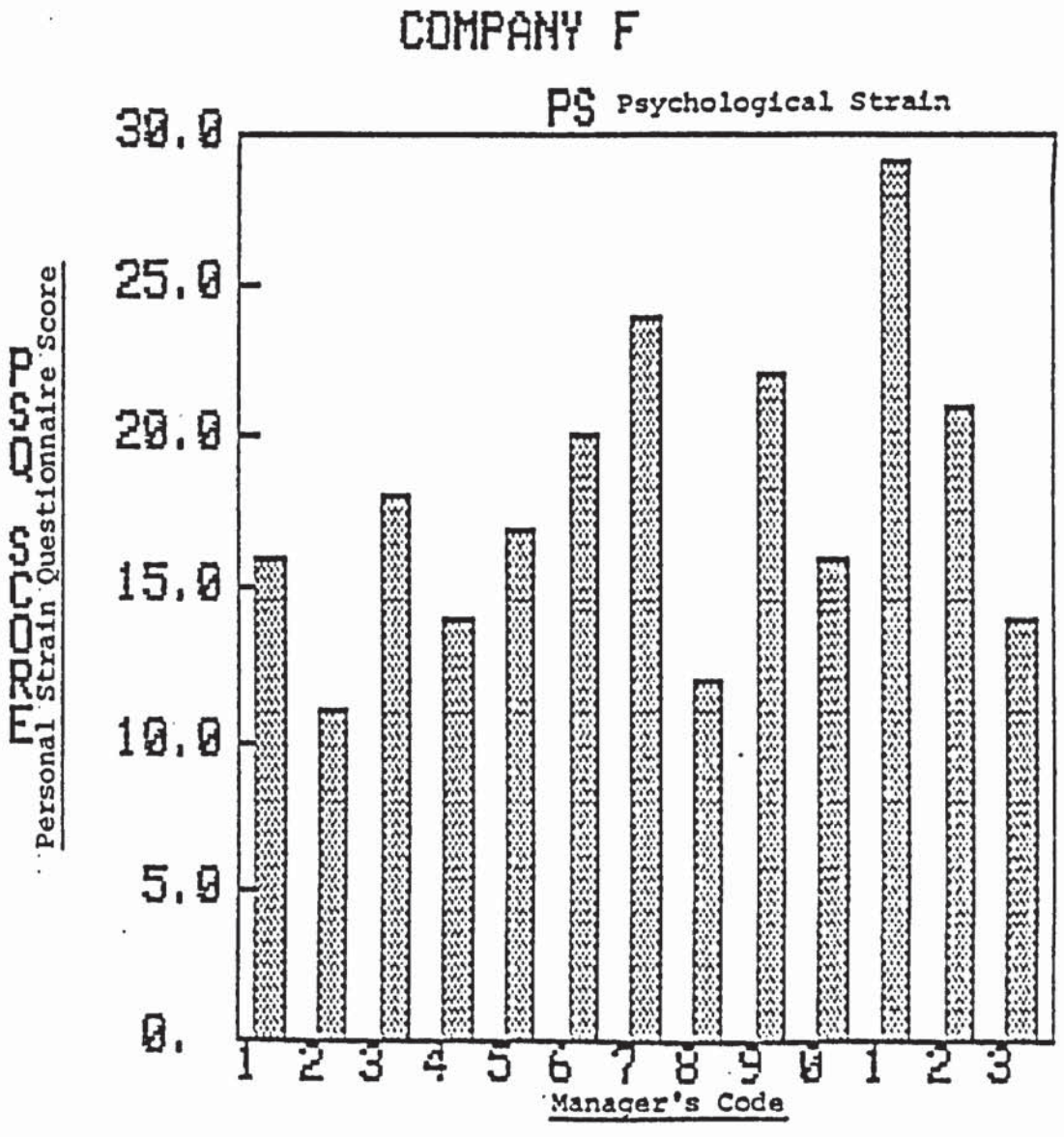


Fig. K.51

Interpersonal Strain Scores For Managers In Company A

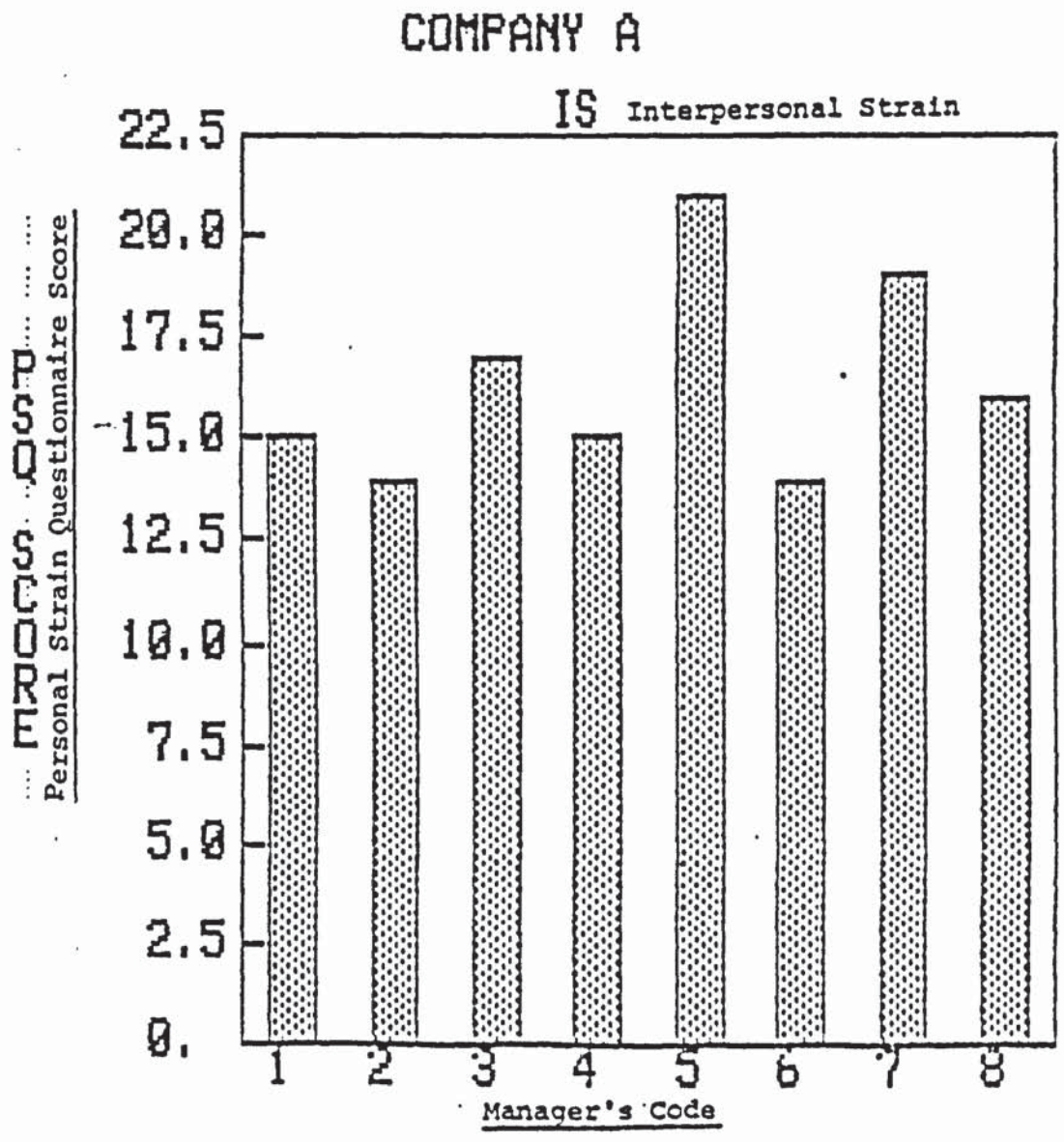


Fig.K.52

Interpersonal Strain Scores For Managers In Company B

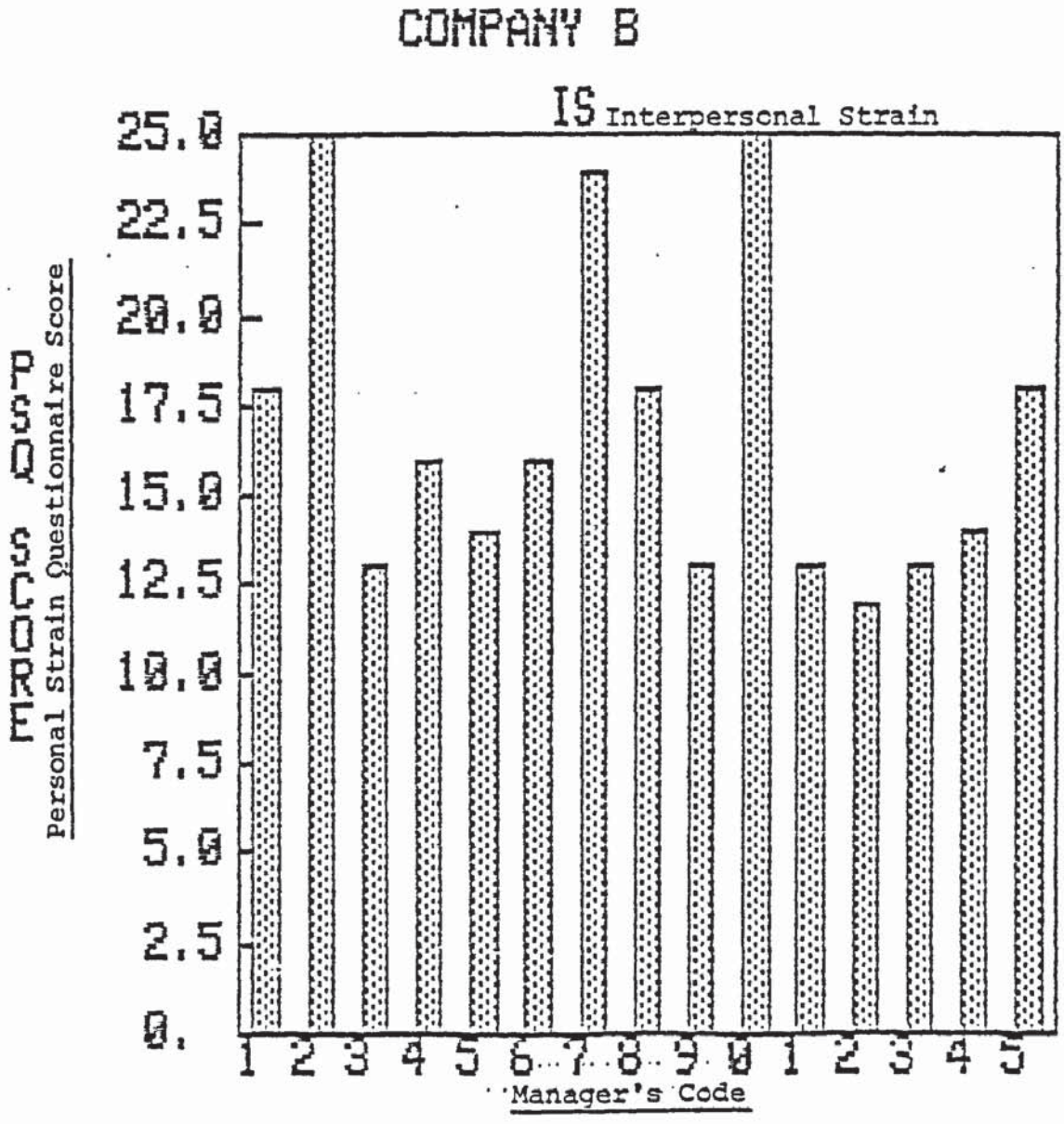


Fig. K.53

Interpersonal Strain Scores For Managers In Company F

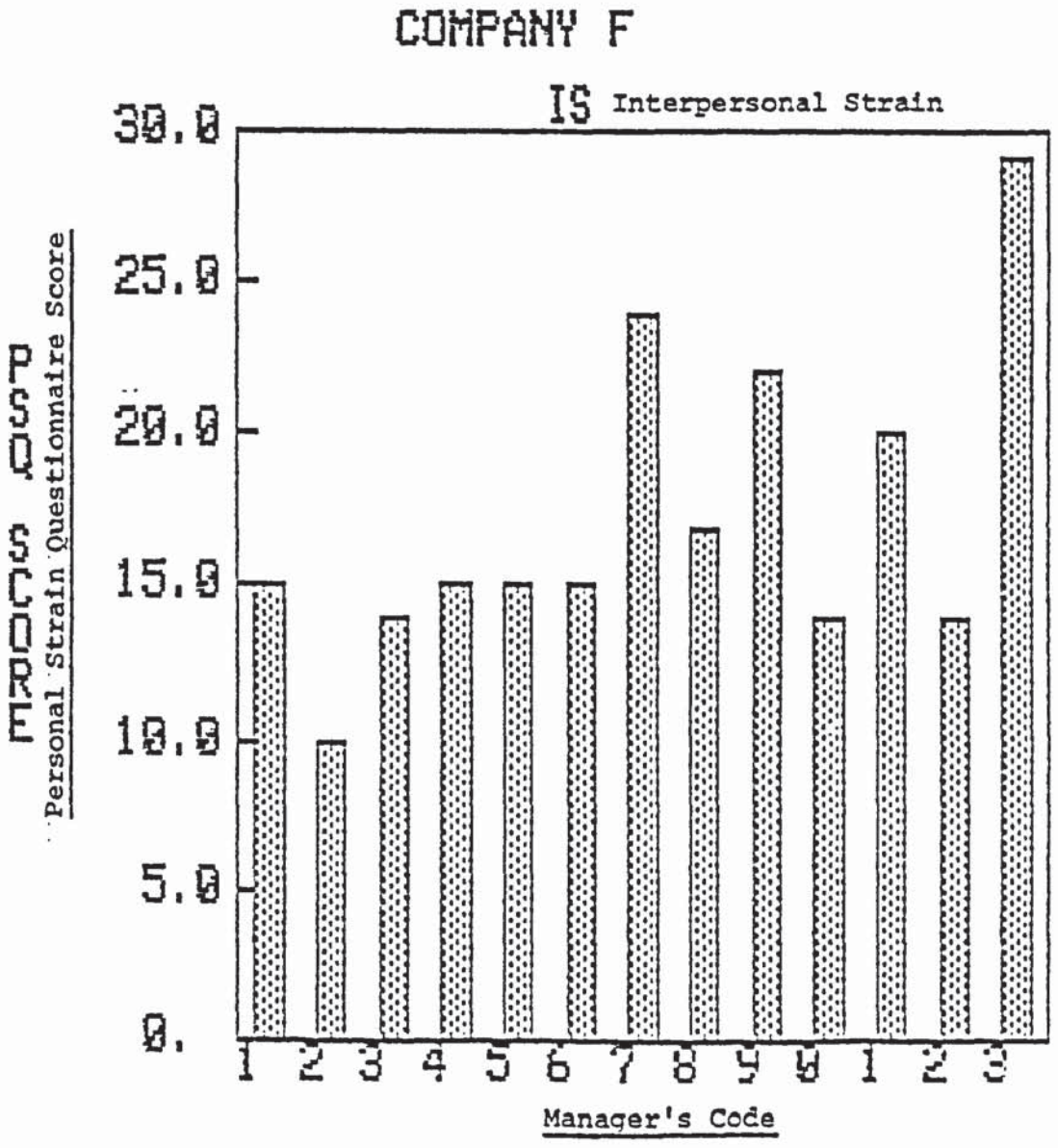


Fig. K.54

Physical Strain Scores For Managers In Company A

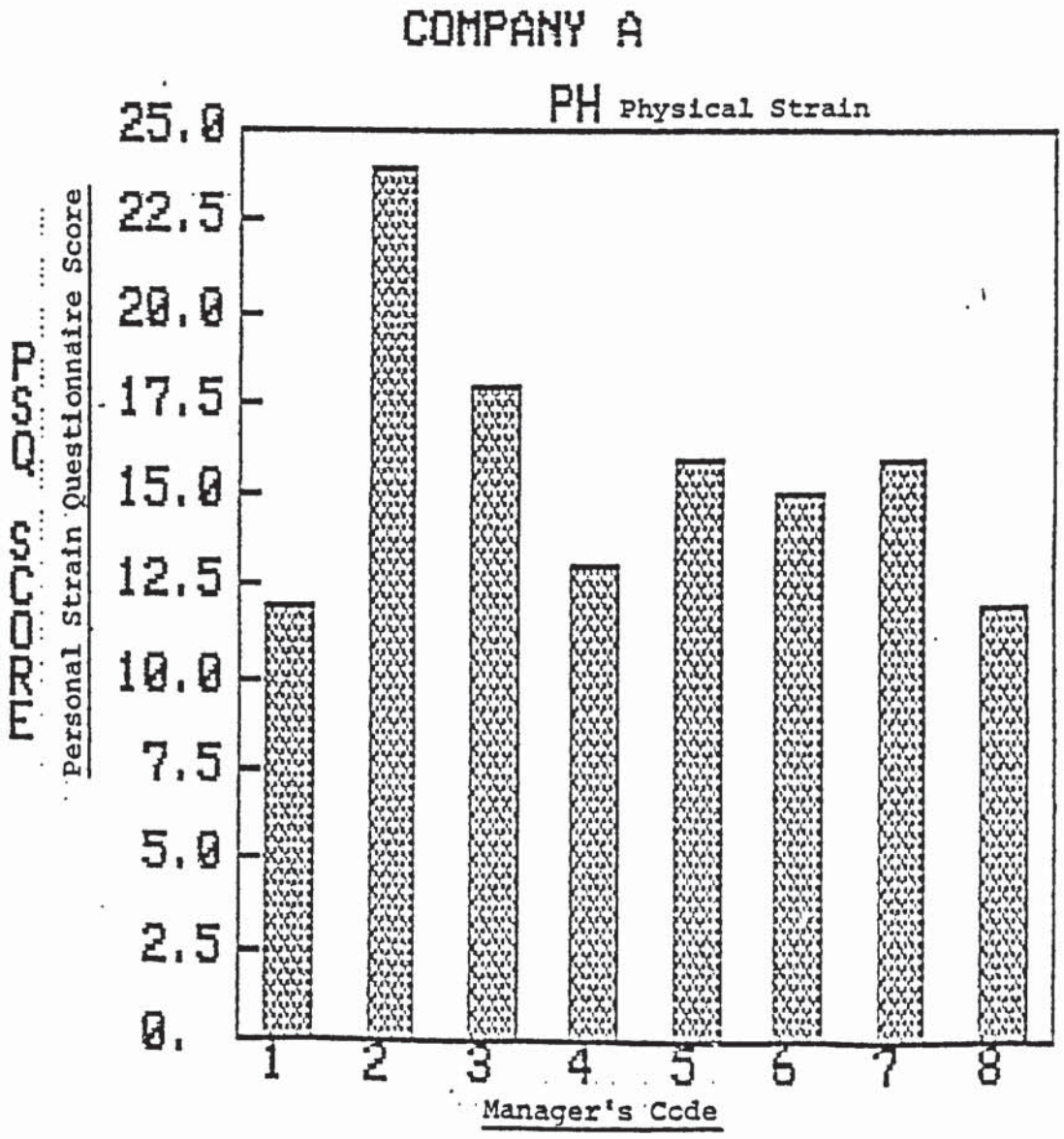


Fig. K.55

Physical Strain Scores For Managers In Company B

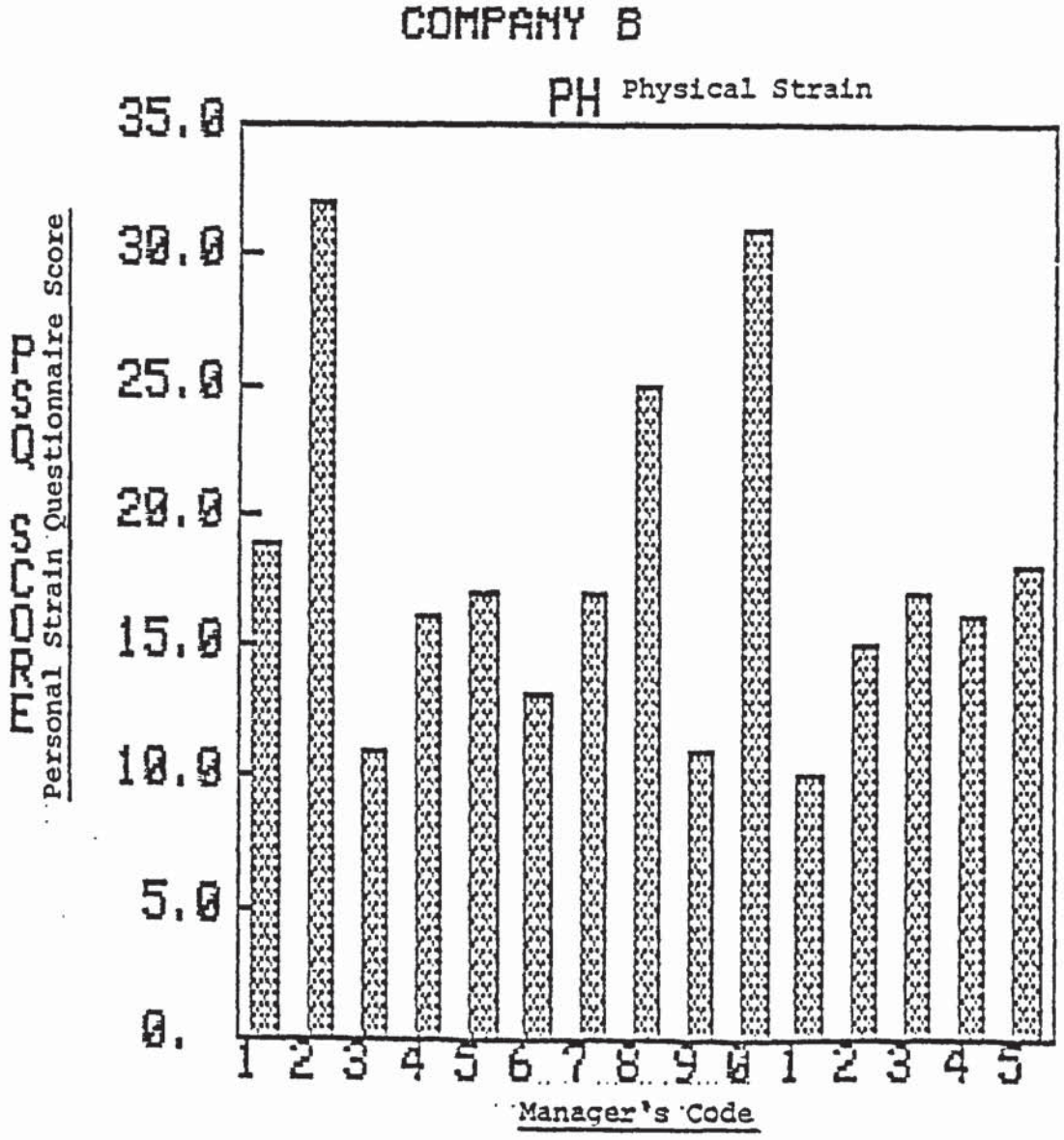


Fig.K.56

Physical Strain Scores For Managers In Company F

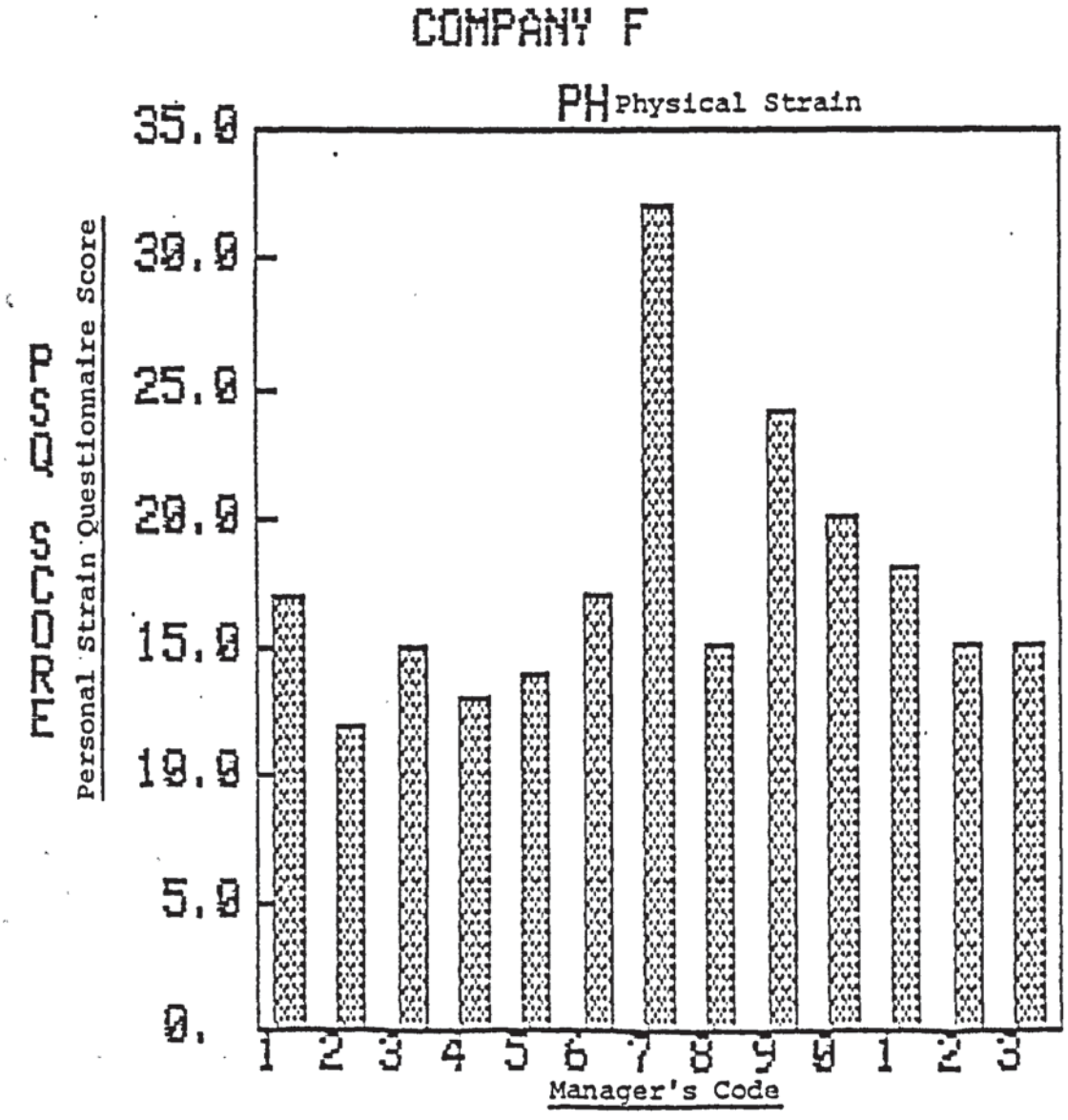


Fig. K.57

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