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LOOKING GLASS, INC. VOLUME II. ADVANCED PRODUCTS DIVISION. OPER--ETC(U)
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Operational Manual
Volume II

Michael M. Lombardo

Looking Glass, Inc. Advanced Products Division

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Looking Glass is a simulation of a glass manufacturing corporation. There are twenty positions, ranging across three divisions and four levels (plant manager, director, vice-president and president). The divisions face different environments, ranging from volatile to stable. Looking Glass is typical--the organizational type, structure and environments are common. All problems contained in the simulation are based on actual events.

This volume contains all memos relating to the Advanced Products Division.

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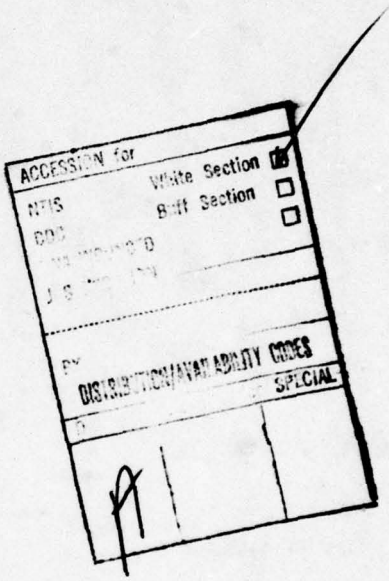
20. and also includes organization-wide corporate memos, and all memos to the President.



LOOKING GLASS, INC.

ADVANCED PRODUCTS DIVISION

MICHAEL M. LOMBARDO

OPERATIONAL MANUAL VOLUME II

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This research was sponsored by the Organizational Effectiveness Research Program, Office of Naval Research (Code 452), under contract No. N00014-76-C-0870; NR 170-825; and by the Center for Creative Leadership.

The Center for Creative Leadership is a nonprofit, educational institution founded by the Smith Richardson Foundation. The Center's primary goal is to translate the knowledge of the behavioral sciences into useful applications for leaders. Toward this goal, the Center conducts and reviews relevant research and uses these findings in a variety of programs.

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DESCRIPTION OF VOLUMES

Looking Glass is a simulation of a glass manufacturing corporation. There are twenty positions, ranging across three divisions and four levels (plant manager, director, vice-president and president). The divisions face different environments, ranging from volatile to stable. Looking Glass is, in a word, typical--the organizational type, structure and environments are common. All problems contained in the simulation are based on actual events.

Volume I of the simulation materials is divided into four sections. Section I describes the development of Looking Glass. Included are the chronology of what occurred from original idea to final pretest run and a summary of assumptions and biases related to constructing a realistic management simulation. The next section discusses research issues such as the experimental modes built into the design, possible manipulations, limitations of the simulation, measurement strategies, and preliminary hypotheses. The third section outlines training uses of the simulation, including one detailed example of a training program. The final section explains the nuts and bolts of running the simulation. This section and the appendices that follow enables users to refer to staffing and administrative necessities.

Volumes II through IV contain the simulation materials. Volume II contains all memos relating to the Advanced Products Division, and also includes organization-wide corporate memos, and all memos to the President. Volume III contains all memos relating to the Commercial Glass Division, and Volume IV, all memos concerning the Industrial Glass Division.

Subsequent volumes will contain standardized responses to information requested by participants (Volume V) and a complete listing and analysis of all problems participants face (Volume VI).

NOTICE

The material contained herein relates to a simulation of managerial performance developed by the Center for Creative Leadership pursuant to a contract with the Office of Naval Research. The context of the simulation is a fictitious corporation in the American glass industry. Any points of similarity between the simulation and an existing glass company are purely coincidental.

The simulation is an intensive exercise, and users are cautioned that a risk to participants exists. The Center for Creative Leadership assumes no responsibility whatsoever for any injury that may result from the use of the simulation by any other organization or individual.

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VOLUME II

ADVANCED PRODUCTS DIVISION

I. To All Roles From Corporate

CORP-1 to CORP-3

List of Abbreviations

HISTORY OF LOOKING GLASS

Looking Glass, Inc., was founded fifty years ago by A. J. Looking. Begun as a manufacturer of light bulb casings, Looking Glass has expanded into a major corporation with $200 million in sales and over 4,000 employees.

The Commercial Glass Division produces light bulb casings, tubes for fluorescent lights, and a variety of flat glass products.

The Industrial Glass Division produces automotive glass, specialty glass (for airplanes and assorted industrial uses), and glass piping and glass piping insulation (for use in industrial settings).

The Advanced Products Division uses glass in such high technology products as capacitors, integrated circuits, and optical fibers (for use in telecommunications).

All Looking Glass products are sold to manufacturers who make finished products from these components or to independent distributors.

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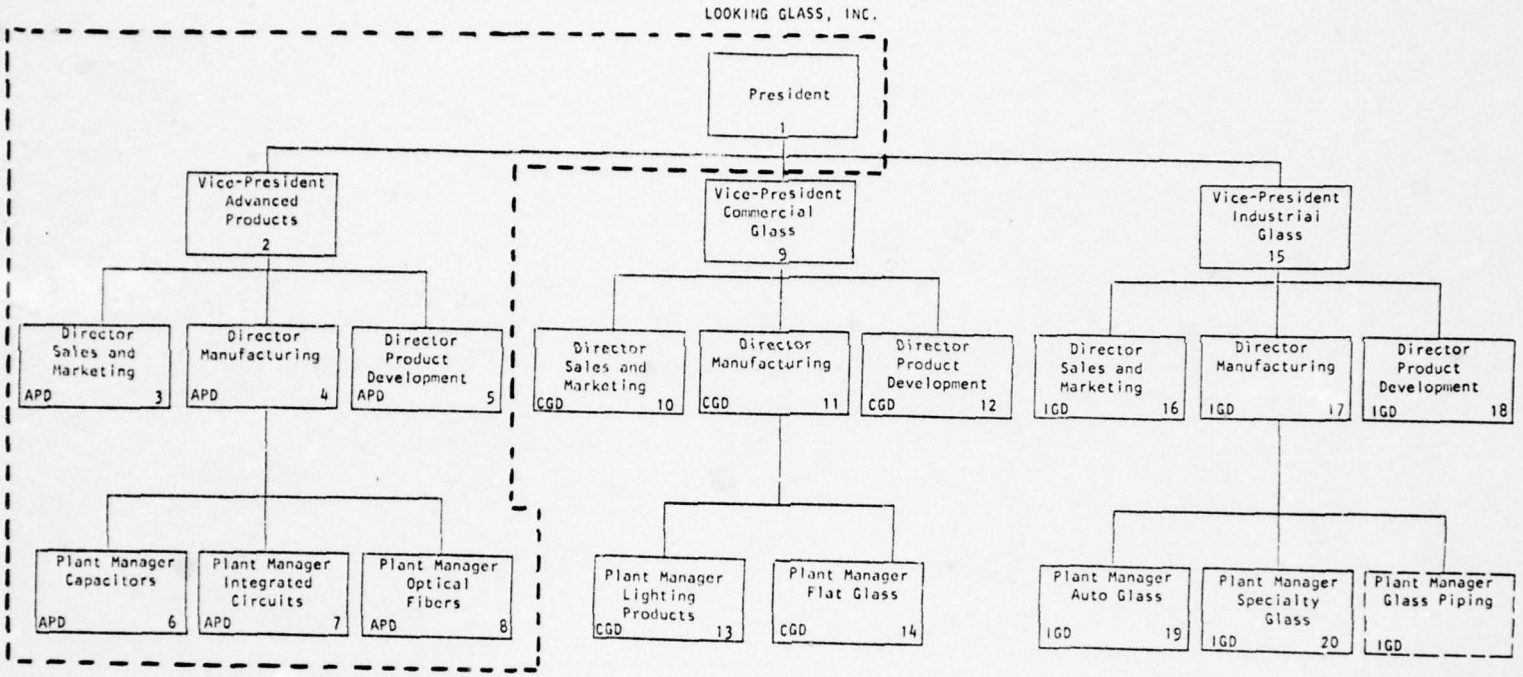

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LOOKING GLASS, INC.

POSITION ABBREVIATIONS

ABBREVIATION	TITLE AND DIVISION
ADVANCED PRODUCTS DIVISION	
VP, APD	Vice-President
DIR-MFG, APD	Director of Manufacturing
DIR-S&M, APD	Director of Sales and Marketing
DIR-PD, APD	Director of Product Development
PM-CAPACITORS	Plant Manager, Capacitors
PM-INT CIRCUITS	Plant Manager, Integrated Circuits
PM-OPT FIBERS	Plant Manager, Optical Fibers
COMMERCIAL GLASS DIVISION	
VP, CGD	Vice-President
DIR-MFG, CGD	Director of Manufacturing
DIR-S&M, CGD	Director of Sales and Marketing
DIR-PD, CGD	Director of Product Development
PM-FLAT	Plant Manager, Flat Glass
PM-LIGHTING	Plant Manager, Lighting Products
INDUSTRIAL GLASS DIVISION	
VP, IGD	Vice-President
DIR-MFG, IGD	Director of Manufacturing
DIR-S&M, IGD	Director of Sales and Marketing
DIR-PD, IGD	Director of Product Development
PM-AUTO	Plant Manager, Auto Glass
PM-SPECIALTY	Plant Manager, Specialty Glass

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LOOKING GLASS
Corporate Offices

To: All Executives of Looking Glass, Inc.

From: Corporate Controller

Re: Corporate Profits (In Thousands)

Copies to:

	NET SALES		NET PROFITS	
	LATEST YEAR	PREVIOUS YEAR	LATEST YEAR	PREVIOUS YEAR
Commercial	$72,000	$67,867	$3,300	$3,106
Advanced	39,400	35,100	3,600	2,700
Industrial	87,000	73,600	4,600	3,018
TOTAL	$198,400	$176,567	$11,500	$8,824

NET INCOME AS A % OF SALES

	LATEST YEAR	PREVIOUS YEAR
Commercial	4.6%	4.6%
Advanced	9.1%	7.7%
Industrial	5.3%	4.1%
TOTAL	5.8%	5.0%

CURRENT FINANCIAL RATIOS

	Commercial	Advanced	Industrial
Debt to Equity	37.6	58.2	32.6
Return on Equity	10.4	12.1	7.8
Return on Assets	5.6	7.5	5.4
Receivables Turnover	7.1	7.0	8.5
Cost of Goods Sold As a % of Sales	74.8%	70.9%	73.9%
R & D As a % of Sales	1.8%	5.1%	5.3%
Operating Profit Margin As a % of Sales	12.1%	18.3%	13.9%

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DEFINITIONS OF FINANCIAL RATIOS

DEBT/EQUITY RATIO: The proportion of capital supplied by creditors.

RETURN/EQUITY RATIO: Percentage return (net income) on stockholder's investment.

RETURN ON ASSETS: Net income divided by total assets. Percentage return on the book value of the resources of the firm.

RECEIVABLES TURNOVER: Measure of how quickly customers pay their accounts and of current credit policies. Net Sales divided by Accounts Receivable.

COST OF GOODS SOLD AS A % OF SALES: Measure of how efficiently goods are manufactured and sold.

R & D AS A % OF SALES: Investment in research on future products.

OPERATING PROFIT MARGIN: $\frac{\text{Net Income}}{\text{Net Sales}}$ before taxes and interest are paid.

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VOLUME II

ADVANCED PRODUCTS DIVISION

II. To the President

A. From APD

APD- 1
APD-17
APD-30
APD-90

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CGD- 28
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CORP-71

LOOKING GLASS
Advanced Products Division

To: President

From: Director of Product Development, APD

Re: Press Releases

Copies to:

VP, APD
DIR-S&M, APD

Here is a summary of the information we are using in our press releases. Please check for accuracy.

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LOOKING GLASS

Advanced Products Division

To:

From:

Re:

Copies to:

About 1/4 of the glass made by the Advanced Products Division is produced by the sheet process. A simple iron bar is introduced into the molten glass, adheres to it, and draws a continuous sheet of glass across a series of rollers. The glass is cooled by long ovens (called lehrs) where the temperature is gradually reduced under carefully controlled conditions.

The remaining 3/4 of APD's glass is produced by the newer and much more efficient float glass process. Molten glass is poured onto a bed of molten tin. The glass solidifies at a higher temperature than the tin and can be fed off for further cooling. Because no rollers touch the molten glass, the surface remains clear and undisturbed.

Descriptions of the technologies involved in making integrated circuits, capacitors, and optical fibers follow.

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INTEGRATED CIRCUITS

Technology

1) Engineer drafts circuit 200 to 500 times larger than final product (hundreds or thousands of circuits may go into the device).

2) Artwork is transferred to a sheet of red plastic mylar, called a rubylith.

3) Rubylith reduced photographically and imprinted on a light sensitive "glass mask."

4) Pattern is engraved onto a silicon wafer.

5) Components are connected.

Materials

1) Light-sensitive (photosensitive) glass produces a photographic negative when exposed to light.

sand + soda ash
lithium carbonate
potash
+ aluminum hydroxide
+ zinc oxide

+ cullet
arsenic
antimony
+ silver nitrate
+ (nucleating agent)

+ barium oxide (ultraviolet sensitizer)

heated to 1400°C. (2552°F.)

Expose under ultraviolet light and develop with heat. Image is permanent; exposed parts more soluble in hydrofluoric acid.

2) Silicon: Heat light-grade quartzite rock with charcoal in an electric furnace until white hot - CO_2 escapes, silicon remains. Cooled. Ground into powder. Mated

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To:

From:

Re:

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with methyl chloride, mixed with water, distilled.
Can then be combined with wide range of materials.

Today's integrated circuits are computer chips about 1/20th of an inch square. On one integrated circuit there are as many as 15,000 circuits, costing about 50 cents per chip. They consume practically no energy; their basic raw material is silicon; 25 applications of them have been introduced.

Integrated circuits at one time were just circuitry; now they're a computer on a chip, a knot of circuits that combines memory, programming, micro-processing capability, and software programs all on one chip. In the last 10 years cost per circuit has decreased several thousandfold while their complexity has doubled each year. Integrated circuits are very reliable; they employ no moving parts, and the smaller they get the more reliable they become. They're so cheap that customers can use chips that don't exactly match their needs.

To overcome the problem that the range of functions chips can perform is limited, the answer was to build a standard chip with stored programs and memory so that a customer could have a choice of uses. Put a chip in one gear and it would be a pocket calculator. Put it in another and it would play video ping pong.

Manufacturing Process

Chip manufacture is done in speckless conditions. The initial stage is to melt silicon and extract a tiny seed crystal which is drawn out to make something about the same diameter and shape as a stick of salami. The salami is then sliced into wafers, and on each wafer about 400 chips are printed like photographs using miniature glass mats that have been reduced from large-scale drawings of the chip's intended pattern. The pattern is etched and impurities added, then more layers are put on by further processes. A device called a laser zapper is used to make corrections on the mask itself, but with a complex chip there may only be 40 usable chips out of the 400 on the wafer.

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LOOKING GLASS

Advanced Products Division

To:

From:

Re:

Copies to:

CAPACITOR TECHNOLOGY

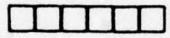
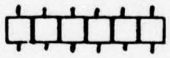
Glass Capacitors

Low volume, cost 10-12 cents each;

Used in computers and peripheral equipment, mini-computers, electronic ignitions, space satellites (telecommunications);

Not as highly mechanized as ceramics.

Approximate production steps:

1. Aluminum put on glass chip. 
2. Connecting wires added. 
3. Chip is encased in glass.
4. Capacitors cut from chip.
5. Individual test.
6. Sealed by heat.
7. Tested again.
8. Wires dipped in solder.
9. Stamped with code numbers.
10. Final inspection.

Competitors use substitute materials, e.g., enamel.

Ceramic Capacitors

High volume, cost 1.5 to 2 cents each;

New market;

Used where less precision and quality is required (television, radios);

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LOOKING GLASS
Advanced Products Division

To:

From:

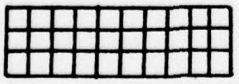
Re:

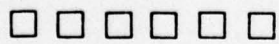
Copies to:

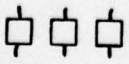
Highly automated.

Approximate productions steps:

1. Suspension (paste) is made, using rare material (e.g., paladium); looks like big jars of poster paint.
2. Paste is spread on cardboard conveyor, dried, and rolled off; creates a freezer-paper-like substance.
3. Circuit pattern is silkscreened onto rolls; rolls are cut into squares (about 6" x 6").
4. Squares are stacked; thickness depends on specifications.
5. Plates are heated, melding layers together (24 hours).
6. Melded plates are cut into capacitors.
7. Wires are attached, inspected.
8. Identification code stamped on.
9. Final stacking, inspection.

3- 

6- 

7- 

Competitors use different processes, same materials.

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LOOKING GLASS

Advanced Products Division

To:

From:

Re:

Copies to:

General Notes:

1. Make several types of axial ( ) and radial ( ) capacitors.
2. Make about 100 million a year.
3. Two assembly lines - one has most current machinery, is highly automated, more efficient.
4. Radiation area in ceramics - paste is x-ray inspected as it is spread on conveyer.
5. Fumes in glass, when aluminum is melded to glass.
6. Uses only a few small furnaces, no pollution problems.

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To:

From:

Re:

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OPTICAL FIBERS

Optical fibers are a means of impressing information on a light beam and transmitting that light beam over distance with low decibel loss. Light is an excellent medium for communication because the waves are extremely short, making it possible to put more waves at higher frequencies and increasing the amount of information the channels can carry. Light waves also have more usable frequencies. For example, a microwave system can transmit 100 million bits of information per second. Before the invention of the laser (which is called coherent light because its waves are all of one wave length), too much light was lost in transit to make fiber optics practical. A recent development is an optic fiber in which light loss is drastically reduced. The fiber is produced by systematically sweating out impurities from optical glass with a high silicon content. The resultant fiber is encased in an equally pure glass cladding. The cladding has a lower index of refraction so that straight light waves are deflected back into the core. Over the years the breakthroughs have been so spectacular that light loss has been reduced from 100 decibels per kilometer to 4 decibels. Anything below 20 decibels is competitive with conventional methods of transmissions. This development has put fiber optics into a growing specialized business. They are used in such instruments as flexible light image probes for exploring body cavities and the interior of machines; in photographic image dissectors; and in light transmission systems for data processing, photocopying, displays, and instrument panels.

There are two basic systems. The first system is called single mode, which operates only on light from a laser. This system has the largest communication capacity and is expected to be most suitable for long distances. The second system, called multimode, can operate on ordinary light and light waves moving in many directions. It is slightly lower in information-carrying capacity. The multimode is simpler to put together and has more immediate use in intercity communication networks. Multimode systems use semiconductor light-emitting diodes (light sources which have been developed by several electronics companies). These diodes can be modulated to carry communications on the same electric current that produces the light image. What this means is that multimode systems, in contrast to laser systems, require no exterior means of impressing signals on its beam. They can receive signals directly.

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LOOKING GLASS

Advanced Products Division

To:

From:

Re:

Copies to:

It is estimated that in the future we'll have a nationwide system of broad-band fiber optics. It will transmit not only telephone messages but also conventional television programs as well. Television stations will quit broadcasting over the air as optical fiber systems become available. Over the next 20 years there is expected to be a worldwide investment of $750 billion in telecommunications; fiber optics are likely to capture a major part of that investment.

Their advantages are that glass fibers can be made stronger than steel yet lighter than cotton. They are thin as human hair, flexible, and transparent. They have 10,000 times the capacity of copper wire and can be produced relatively cheaply (around 10 cents a foot, which is cheaper than copper cable or other metal conductors). Eventually, glass fiber cables will replace the heavier and bulkier conventional cables. They can be placed in present underground conduits, require much less space, and should require far less maintenance. They only need about a quarter of the number of repeaters that a coaxial cable requires to amplify signals as they fade. Glass is a stronger insulator. Once a light beam gets into a jacketed fiber it is not disturbed by any stray electromagnetic disturbances, lightning, or cross talk. It is unaffected by temperature since it retains rather than conducts heat, and is relatively immune to moisture. Right now, multimode systems are in the lead because of ease of production. Eventually, laser systems will take over.

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LOOKING GLASS

Advanced Products Division

To: President

From: Vice-President, APD

Re: Government Forms

Copies to:

Isn't there some kind of lobbying effort or something we can do about some of these government forms? On each, we report many of the same details that we report to other regulatory bodies. Each requires the same information but in a different form. Beyond that, the blasted regulations are written in such structured prose our staff can't even understand them.

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LOOKING GLASS
Advanced Products Division

To: President

From: Director of Sales and Marketing, APD

Re: Integrated Circuit Markets

Copies to:

In response to your request about integrated circuit markets, they're almost impossible to figure. Our sales, like our competitors', go up and down like a yo-yo. Since the technology is constantly changing, any integrated circuit we put out is obsolete in two years. Prices are always declining and margins eroding due to fierce competition.

As we talked about before, the way to succeed in this market is through customer service since all competitors tend to have similar products.

In brief, the integrated circuit market hasn't looked good for us for some time. There is heavy competition from Japan; the market is fiercely competitive because the patent system works so loosely, there is plain stealing of products; extensive cross-licensing; and a muddy area in between. A new integrated circuit product can have a dozen imitators almost as soon as it is launched. This is what happened to our VI-20 project of two years ago. It wasn't worth our while to sue because the product would have been obsolete by the time we collected. Of course, there's a bright side, too. The loose patent system encourages innovation in electronics, and it takes a lot less capital to innovate here than in Manufacturing. Our recent estimates indicate it takes about four dollars in manufacturing costs for every dollar of R & D in fiber optics. It takes only one dollar in manufacturing costs for every dollar of R & D in integrated circuits.

I could ramble on, but the bottom line is this--last year our cost of goods sold was an astounding 97 percent of sales. The other two products in the division--capacitors and fiber optics--ran at a reasonable 65 percent.

This past quarter's results look encouraging, however. Sales picked up slightly, particularly from the military, our primary customer.

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LOOKING GLASS
Advanced Products Division

To: President

From: Vice-President, APD

Re: Net Income for Last Quarter

Copies to:

DIR-MFG, APD
DIR-S&M, APD
DIR-PD, APD
PM-CAPACITORS
PM-INT CIRCUITS
PM-OPT FIBERS

Attached are the comparative sales figures for the last quarter.

This was our best quarter ever. Our cost savings moves in integrated circuits (primarily the laying off of the 3rd shift) paid off. The slight dropoff in income for the capacitors plant seems attributable to raw materials problems and to a need to increase prices somewhat. The optical fibers market continues to grow.

Looking to the future, we anticipate $5.6 million in profits for the division this year.

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NET INCOME FOR LAST QUARTER

COMPARATIVE SALES (In Thousands)

LAST QUARTER

	Net Sales	Net Income	Income as a Percent of Sales
Capacitors	$1,994	$220	11.0%
Integrated Circuits	1,785	(200)	-11.2%
Optical Fibers	6,317	1,441	22.8%
Division	$10,096	$1,461	14.5%

PREVIOUS QUARTER

	Net Sales	Net Income	Income as a Percent of Sales
Capacitors	$2,100	$275	13.1%
Integrated Circuits	1,700	(750)	-44.1%
Optical Fibers	6,050	1,375	22.7%
Division	$9,850	$900	9.1%

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LOOKING GLASS
Commercial Glass Division

To: President

From: Vice-President, CGD

Re: National Construction Suit

Copies to:

DIR-S&M, CGD

I've tried to keep this out of your hair, but it's escalated to the point where you need to be informed and some decisions must be made. Briefly, this is what has happened:

- Two years ago a large, heavy reflective glass panel feil from the upper story of a high rise apartment building. Fortunately no one was hurt, but the panel fell through the roof of a building below causing extensive damage to the structure and bursting the sprinkler system pipes.

- The apartment owner's insurance company investigated and found a.) that winds had created a vacuum that caused the panel to fall, b.) that National had installed the window improperly, which contributed to its fall, and c.) that the glass panel (made by us) had a slight imperfection that caused it to crack and contributed to the fall.

- The insurance company is willing to pay the $300,000 in damages but not the additional $300,000 the building owner wants for lost business. The insurance company wants to recover its loss from National because they installed the window improperly. National claims the window was poorly installed because of the flaw in the glass but that the installation was adequate had the glass not actually cracked. So they are threatening to sue us. We have countered that the imperfection was not serious and would not have caused a problem had the panel been installed properly. Further, National has the responsibility for inspecting materials before installation.

- National is a major customer of ours. This whole thing is getting nasty.

- National filed against us several weeks ago, and the case will come up soon.

Here are the options I've investigated:

1) Go to court. Legal and I have reviewed the case thoroughly. Their position is to go to court. Under the Uniform Building Standards Act we are not liable in this case. If we do go to court, however, we risk a lot of bad publicity and the loss of National as a customer.

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LOOKING GLASS
Commercial Glass Division

To:

From:

Re:

Copies to:

2) Settle. I've been negotiating with National, and they'd probably settle with us for about 50%, approximately $300,000, if the building owner recovers the full amount. If we settle, we run the risk of others trying to get us to "buy back their business." Similar incidents have happened in the past and we've been lucky until now.

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LOOKING GLASS
Commercial Glass Division

To: Listed Below

From: Director of Manufacturing, CGD

Re: Internal Task Force on Plant Managers Performance

Copies to:

PM-LIGHTING
PM-CAPACITORS
PM-AUTO

PRESIDENT
DIR-MFG, APD
DIR-MFG, IGD

Corporate has long been concerned about how to measure plant manager performance. At the last corporate planning meeting, the issue was raised again. It was decided to form a corporate-wide task force to investigate: 1) what a plant manager does, and 2) how to evaluate plant manager performance.

It was a general feeling that the place to start was with the plant managers themselves. The President authorized the formation of a task force consisting of a plant manager from each of the divisions. Appointed to this task force are:

Plant Manager, Lighting Products (chair)
Plant Manager, Capacitors
Plant Manager, Auto Glass

The chairperson is responsible for getting this task force started and for reporting its progress to me. I'd like for you to get together sometime during your visit today to lay out a plan of attack. Through the Plant Manager, Lighting Products, let me know basically what you need to do to answer the questions:

1) What resources will be required?
2) How long you think it will take?

For your information, a copy of our current appraisal form is attached.

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LOOKING GLASS

CORPORATE OFFICES

NAME OF EMPLOYEE_____ DATE_____

JOB TITLE_____

IMPORTANT--Be sure you consider only one characteristic at a time, regardless of how good or poor he/she may be in the others. It is essential that every question be answered; if more space is needed to answer any item, please write on plain paper and attach to this form. Your overall rating on each factor should be shown by code symbol in the box to the right. Mark "O" for Outstanding; "E" for Excellent; "SP" for Satisfactory Plus; "S" for Satisfactory; "SM" for Satisfactory Minus; "U" for Unsatisfactory.

A. QUALITY OF WORK — Insert Rating Code ☐
Comments:

B. QUANTITY OF WORK — Insert Rating Code ☐
Comments:

C. ABILITY TO PLAN AND UNDERSTAND WORK — Insert Rating Code ☐
Comments:

D. ABILITY TO GET ALONG WITH OTHERS — Insert Rating Code ☐
Comments:

E. OVERALL PERFORMANCE RATING (ALL FACTORS) — Insert Rating Code ☐
Comments:

If performance of any of above is below expectations, what should be done to bring about improvements?

PREPARED BY_____ DATE_____

REVIEWED AND
APPROVED BY_____ DATE_____
(Your immediate supervisor)

RECORD OF INTERVIEW:
This report was discussed with the employee on_____
(Date)

Signed_____
(Employee)

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CGD-64B

LOOKING GLASS
Commercial Glass Division

To: President

From: Vice-President, CGD

Re: Net Sales/Income Statement

Copies to:

DIR-MFG, CGD
DIR-S&M, CGD
DIR-PD, CGD
PM-FLAT
PM-LIGHTING

LAST QUARTER
(In Thousands)

	Net Sales	Net Income	Income (% Sales)
Lighting Products	$9,251	$399.6	4.3%
Flat Glass	8,752	425.3	4.9%
DIVISION	$18,003	$824.9	4.6%

PREVIOUS QUARTER
(In Thousands)

	Net Sales	Net Income	Income (% Sales)
Lighting Products	$9,150	$393.5	4.3%
Flat Glass	8,581	437.6	5.1%
DIVISION	$17,731	$831.1	4.7%

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LOOKING GLASS
Industrial Glass Division

To: President

From: Vice-President, IGD

Re: New Market--Auto Glass

Copies to:

I've just returned from my trip abroad during which I met with two foreign auto manufacturers (one in Japan and one in West Germany). If you remember from our previous conversations, both have solid sales in the U.S. (totaling 9% of auto sales with projections upward to 15% in the next three years). These companies are in the advanced stages of planning manufacturing sites in the U.S. on the West Coast.

I was able to get a strong commitment from the German firm to us as the sole supplier of windows and windshields, as they feel we have the highest quality control among our competitors. The Japanese firm was interested in us, but questioned whether we had the capacity to handle their orders. They would like, as soon as possible, more concrete data from us indicating how soon we could generate that additional capacity.

Both prospects look most appealing. As you know, our Auto Glass contracts have historically been most profitable. In the past fiscal year we had a net income of $3.5 million from a net sales of $57.8 million. Income should go up this year, as we continue to work out the bugs of our relatively new float glass process.

Time is of the essence on this one. Could I meet with you today to discuss the issue?

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LOOKING GLASS
Industrial Glass Division

To: President

From: Vice-President, IGD

Re: Net Income for Last Quarter

Copies to:

DIR-MFG, IGD
DIR-S&M, IGD
DIR-PD, IGD
PM-AUTO
PM-SPECIALTY

LAST QUARTER
(In Thousands)

	Net Sales	Net Income	Income (% Sales)
Auto Glass	$15,875	$2,245	14%
Specialty Glass	3,804	(274)	-7%
Glass Piping	5,100	258	5%
DIVISION	$24,779	$2,229	9%

PREVIOUS QUARTER
(In Thousands)

	Net Sales	Net Income	Income (% Sales)
Auto Glass	$14,450	$1,156	8%
Specialty Glass	3,511	62	2%
Glass Piping	3,800	88	2%
DIVISION	$21,761	$1,306	6%

This has been a quarter of solid growth in Auto Glass. Both Specialty and Piping have shown a marked drop in income.

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LOOKING GLASS
Corporate Offices

To: President

From: Corporate Personnel

Re: Job Description

Copies to:

You are the President of Looking Glass, Inc. Your general responsibilities include overall management of the three Looking Glass divisions. Although you do not involve yourself in day-to-day management decisions, you're involved in all major problems, whether they be financial, political, new plant location, hiring and firing of Looking Glass executives, or the addition or subtraction of product lines, plants, etc. The three Vice-Presidents report directly to you. You report to the Chairman of the Board of Looking Glass, Inc.

You preside over the Management Committee, which consists of the three division vice-presidents and yourself. This Committee decides all matters of corporate policy and makes all decisions affecting more than one division.

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LOOKING GLASS
Corporate Offices

To: President

From: Corporate Personnel

Re:

Copies to:

PRESIDENT

Time in position: 5 years

Salary & bonus: $156,500

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LOOKING GLASS
Corporate Offices

To: President

From: Chairman of the Board

Re: Boards of Directors

Copies to:

What is your decision on joining the Boards of Directors of Canfield Semi-Conductor and E.X. Computer Services? As both of us are aware, these are clients of long-standing, and it goes without saying that I would like for you to join if you feel you have the time.

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LOOKING GLASS
Corporate Offices

To: President

From: Chairman of the Board

Re: Voluntary Price Controls

Copies to:

The government's call for voluntary price controls in our industry creates a dilemma for Looking Glass as well as its competitors. The Board trusts your judgment in this matter, recognizing the delicate balance between the economy in general and Looking's financial viability. By balancing cost increases across product lines, we should come out with an average increase figure acceptable to our stockholders and to the government. Please be prepared to outline your decisions at the board meeting next month.

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LOOKING GLASS
Corporate Offices

To: President

From: Corporate Controller

Re: Consolidated Balance Sheet

Copies to:

VP, APD
VP, CGD
VP, IGD

LOOKING GLASS

CONSOLIDATED BALANCE SHEET

(In Thousands)

ASSETS	LATEST YEAR	PREVIOUS YEAR
CASH	$16,402	$14,762
RECEIVABLES	29,910	26,919
INVENTORIES	16,501	17,370
PLANT & EQUIPMENT	86,835	75,544
OTHER ASSETS	43,320	39,076
TOTAL ASSETS	$192,968	$173,671
LIABILITIES		
CURRENT LIABILITIES	$18,332	$19,104
LONG-TERM LIABILITIES	57,890	48,101
CAPITAL STOCK	26,051	26,051
RETAINED EARNINGS	90,695	80,415
TOTAL LIABILITIES	$192,968	$173,671

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LOOKING GLASS

Office of the President

To: President

From: Secretary

Re: Retirement Party

Copies to:

The yearly retirement party for all those with more than 15 years of service with the plant is next Wednesday. You will be expected to make a brief presentation, not to exceed five minutes.

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LOOKING GLASS

Office of the President

To: President

From: Secretary

Re: Quarterly Anniversary Dinner

Copies to:

Just a reminder that the quarterly anniversary dinner to hand out the 10-year pins is this Thursday. You will be expected to make a 15-minute speech.

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LOOKING GLASS

Office of the President

To: President

From: Secretary

Re: Reminder

Copies to:

The membership director of the Kiwanis called back this morning. Have you made a decision whether or not to join this organization?

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LOOKING GLASS

Office of the President

To: President

From: Secretary

Re: IGD Sales Award Dinner

Copies to:

As you requested, I've made some arrangements for tomorrow night's quarterly Sales Award Dinner. The Vice-President of IGD has been asked to give the keynote address, as IGD is being featured at this dinner.

You have been asked to kick off the evening with a general review of sales for the past quarter.

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LOOKING GLASS
Corporate Offices

To: Vice-President, APD

From: Corporate Personnel

Re:

Copies to:

PRESIDENT

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VICE-PRESIDENT, APD

Time in position: 2 years

Salary & bonus: $122,600

LOOKING GLASS
Corporate Offices

To: President

From: Manufacturing and Engineering

Re: New Capacitor Plant Location Data

Copies to:

VP, APD
DIR-MFG, APD

LOCATION

	Portland, Oregon	Corpus Christi, Texas
Cost (In Thousands)		
Land	$221	$183
Building	2,400	1,900
Machinery & equipment	8,000	8,000
Storage facilities	442	332
Other	332	290
Total Estimated Cost (standard melters)	$11,395	$10,705
Number of lines	3	3
Increase over current production	120%	120%

ESTIMATE OF OTHER FACTORS

	Portland, Oregon	Corpus Christi, Texas
Pollution control costs	High	Moderate
Freight (raw materials)	High	Low
Closeness to market	High	Moderate
Freight (finished goods)	Low	Moderate

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LOOKING GLASS
Corporate Offices

To:

From:

Re:

Copies to:

HISTORICAL DATA ON DIVISION PLANTS

	Pollution Control Costs	Freight (Raw Materials)	Closeness to Market	Freight (Finished Goods)
Optical Fibers 1 (multi-mode)	High	High	High	Low
Optical Fibers 2 (laser)	High	High	High	Low
Capacitors	Low	Low	Moderate	High
Integrated Circuits	Low	High	Moderate	Moderate

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LOOKING GLASS
Corporate Offices

To: President

From: Public Relations

Re: Press Releases

Copies to:

VP, CGD
DIR-MFG, CGD
DIR-S&M, CGD
DIR-PD, CGD
PM-FLAT
PM-LIGHTING

Attached are the press releases describing Flat Glass and Lighting Products. Please look them over and suggest any changes you'd like.

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FLAT GLASS

The Flat Glass plant at Looking Glass produces a variety of flat glass products for construction, furniture, and related industries. These products are of two basic types:

Trade glass (used in windows, display cases, sliding doors, picture and show windows, etc.)

Environmental glass (insulating, heat reflecting, and related glass products, valued for their energy efficiency and architectural beauty)

Flat glass can be made by three different processes, all of which begin by mixing precise amounts of sand, soda ash, limestone, salt, cullet, and any special materials. The ingredients are combined in a furnace where they are heated to over 2700°F.

About 1/4 of Looking's flat glass is produced by the sheet process. A simple iron bar is introduced into the molten glass, adheres to it, and draws a continuous sheet of glass across a series of rollers. The glass is cooled by long ovens (called lehrs) where the temperature is gradually reduced under carefully controlled conditions. The continuous sheet is then cut, packaged, and shipped to customers.

The remaining 3/4 of Looking's flat glass is produced by the newer and much more efficient float glass process. Molten glass is poured onto a bed of molten tin. The glass solidifies at a higher temperature than the tin and can be fed off for further cooling. Because no rollers touch the molten glass, the surface remains clear and undisturbed. The glass is then cut, packed, and shipped.

Simple adjustments allow glass made by either sheet or float processes to vary in width and thickness. Addition of chemicals to the raw ingredients, lengthened cooling periods, or various coatings applied to the glass after forming can affect its strength, light and heat transmittance qualities, and color. The use of patterned rollers can produce decorated glass of various kinds.

Finished glass is sold to distributors, furniture and cabinet makers, window and door producers, and construction firms. Looking's environmental glass products are featured in many new office buildings where their heat reflecting qualities make them energy efficient and attractive.

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LIGHTING PRODUCTS

The Commercial Glass Division of Looking Glass produces light bulb casings and tubes for fluorescent lights. These are sold to fabricators of light bulbs and fluorescent lighting who manufacture finished products for consumers, lamp makers, and a variety of other users. The oldest and most established plant in Looking Glass, Lighting Products continues to be the backbone of the company.

Produced in hundreds of different sizes and shapes, both fluorescent tubes and incandescent envelopes are made from lime glass. About 90% of the world's glass is lime glass, a mixture of sand, soda ash, limestone, and other materials heated to 2640°F. Additional chemicals can be added to create colored glass.

For bulbs, molten glass is put into a mold and inflated like a balloon (a process called blowing). Tubing is made by drawing a stream of glass over a jet of air. This keeps the center hollow. In both processes, the shaped glass is cooled gradually (annealed) in specially designed oven (lehrs).

Lighting products are sold exclusively to manufacturers who turn the envelopes and tubes into working bulbs and fluorescent lights. Looking Glass is and has been a major supplier of lighting products for large manufacturers such as Sylvester, Major Electric, and Eastern Lights.

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LOOKING GLASS
Corporate Offices

To: President

From: Public Relations

Re: Commercial Glass Division Description

Copies to:

VP, CGD
DIR-MFG, CGD
DIR-S&M, CGD
DIR-PD, CGD
PM-FLAT
PM-LIGHTING

Attached is a blurb about CGD for use in the visitors' brochure. Please return it within two weeks if you see needed changes.

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LOOKING GLASS, INC.

COMMERCIAL GLASS DIVISION

The Commercial Glass Division, a primary producer of flat glass and lighting products, is the oldest part of Looking Glass. Over the past 50 years, this division has become a well established leader in its field, supplying the few major producers with a high volume of quality materials. Though affected by GNP, sales have held relatively stable even in hard economic times.

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LOOKING GLASS
Corporate Offices

To: President

From: Corporate Personnel

Re: Affirmative Action Distributions - Commercial Glass Division

Copies to:

VP, CGD
DIR-MFG, CGD
DIR-S&M, CGD
DIR-PD, CGD
PM-FLAT
PM-LIGHTING

% OF FULL-TIME EMPLOYEES BY JOB CLASSIFICATION

	MANAGEMENT	PROFESSIONAL	HOURLY
MALE	94%	92%	75%
FEMALE	6%	8%	25%
WHITE	96%	98%	85%
MINORITY	4%	2%	15%

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LOOKING GLASS
Corporate Offices

To: President

From: Director of Public Relations

Re: Press Releases

Copies to:

VP, IGD
DIR-MFG, IGD
DIR-S&M, IGD
DIR-PD, IGD
PM-AUTO
PM-SPECIALTY

Attached are the press releases describing Auto Glass, Specialty Glass, and Glass Piping. Do you have any suggestions for changes?

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AUTO GLASS

Products: Looking Glass has, for the past 45 years, been a major producer of car and truck windows and windshields. Those 45 years have seen major improvements in safety and convenience characteristics. Looking Glass has developed a thin, penetration resistant windshield, one that shatters into fine fragments which adhere to the windshield on impact. These improvements have resulted in a substantial decrease in head injuries for front-seat occupants involved in accidents. Radio antennas, often subject to vandalism, can now be embedded in the windshield through the use of two layers of glass. Auto windows have also been improved through the development of tinted glass, which substantially reduces glare from the sun.

Manufacturing Process: The basic component is lime glass, which consists of silicone dioxide (74%), sodium oxide (14%), calcium oxide (9%), and other minor ingredients (3%). To produce one ton of lime glass the following raw materials are required: sand (1400 lbs.), soda ash (450 lbs.), limestone (350 lbs.), and other ingredients, including broken glass (cullet) (180 lbs.). The ingredients are combined in a furnace in which they melt under an intense heat of approximately 3000°F.

While glass can be made using several different processes, auto glass at Looking Glass is made by the "float" technique. This is a recently developed way of forming glass which is much more efficient and creates glass with greater strength. The float process begins with the molten (liquid) glass in the furnace. Molten glass flows onto a bed of molten tin in an area with a controlled atmosphere of nitrogen gas, thereby creating a very smooth glass surface. The glass solidifies at a higher temperature than the tin and is drawn off for further cooling. Because no rollers touch the molten glass, the surface remains clear and undisturbed. The glass is then cut and either packed and shipped (if fabrication is done elsewhere) or sent on for a final finishing process, in which the glass might be chemically treated, bent, and/or cut into the precise shape required.

Simple adjustments allow glass made by the float technique to vary in width and thickness. Addition of chemicals to the raw ingredients, lengthened cooling periods, or various coatings applied to the glass after forming can affect its strength, light and heat transmittance qualities, and color.

Customers: Auto Glass products are sold to major automobile and truck manufacturers in one of two forms: (1) blanks--the flat glass plates which are sent to the auto manufacturer which then fabricates the flat glass into usable window panes, or (2) finished windows and windshields ready to be installed in the vehicle.

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SPECIALTY GLASS

Products: The Industrial Glass Division also produces glass products which require unusual thermal, mechanical, and optical properties. These include oven windows (for both conventional and microwave), aircraft windows and windshields (for military, private, and commercial aircraft), and spacecraft windows. Each of these types of glass must meet unusual and severe demands on their strength. Looking Glass has played an integral role in the U.S. space program by providing spacecraft windows since the early 1960's. Looking Glass projects in this area have placed it in the vanguard of glass technology.

Manufacturing Process: In this plant each product involves a separate production process. For example, spacecraft windows are made from a special glass called aluminosilicate. To make this type of glass, aluminum oxide is added to a high silica glass under extreme heat. What results is a glass that is most resistant to heat, that reflects light, and that resists electricity. Making such glass is expensive because the raw materials are rare, and the production process elaborate.

The making of aircraft windows involves quite a different process. Basic borosilicate glass is coated with several layers of tin oxide. This creates a glass which conducts electricity well. The better the conductor the glass becomes, the more easily it defrosts.

Oven windows are designed to be highly heat resistant. The production begins with borosilicate glass. The finishing process involves coating the glass with magnesium fluoride and zinc sulphide.

Customers: The products of Specialty Glass are shipped to major industrial manufacturers (such as aircraft manufacturers) ready to be installed. All fabrication is conducted in the plant, requiring considerable effort to meet exact specifications of the customer. The Specialty Glass plant prides itself on a track record of meeting even the most stringent specifications of customers.

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GLASS PIPING

Products: This plant makes both piping and piping insulation used in industrial settings. The piping is used in chemical plants, dairies, and wineries to transfer liquids which may be corrosive, or require a constant environment, for which glass piping is uniquely suited. Other products made in this plant are used for insulating piping and for general industrial piping insulation. In the transfer of many liquids, it is critical that the temperature not vary widely; glass insulation can maintain this constant environment. This product line began in earnest about 15 years ago and has shown continuing steady growth.

Manufacturing Process: The manufacture of glass piping begins with molten borosilicate glass. A stream of molten glass is drawn rapidly over and around a cylinder, which emits a continuous stream of air, creating a hollow glass stream. The glass is then chemically strengthened by placing it in a hot bath of molten salt; this makes the glass up to ten times stronger. The hot salt bath tightens up the chemical composition of the glass surface so that it better resists pressures. Borosilicate glass resists heat, corrosion, and thermal shock.

Glass piping insulation is made from foam or cellular glass. A disguised form of glass, cellular glass looks bubbly and flexible; actually it is remarkably strong and rigid. Cellular glass is made by grinding up borosilicate glass and mixing it with a chemical foaming agent in a furnace, which acts as yeast in bread dough. When the mixture is heated and the ground glass melts, the foaming agent puffs up. The glass expands because of the air bubbles, cools, and hardens. It is almost as light as cork, is noncombustible, and is not affected by humidity.

Customers: The glass piping products are sold exclusively to original equipment manufacturers who incorporate the tubing into liquid processing machinery. The insulation materials are also sold to these manufacturers. The division also directly markets the insulation products to major industrial contractors who install glass piping.

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PLANT LOCATIONS

Auto Glass:	Findlay, Ohio (city of 40,000; 40 miles south of Toledo)
Specialty Glass:	Towson, Maryland (suburb of Baltimore)
Glass Piping:	Lynchburg, Virginia (city of 60,000; 90 miles east of Richmond)

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LOOKING GLASS
Corporate Offices

To: President

From: Director of Public Relations

Re: Industrial Glass Division Description

Copies to:

VP, IGD
DIR-MFG, IGD
DIR-PD, IGD
DIR-S&M, IGD
PM-AUTO
PM-SPECIALTY

The corporate communications group has prepared this summary of your division. Any problems with it?

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LOOKING GLASS, INC.

INDUSTRIAL GLASS DIVISION

The Industrial Glass Division is a producer of a wide range of industrial products. While the division has been and remains a leader in supplying auto glass, it has, in recent years, profitably expanded the technology of glassmaking to meet new and exciting challenges, including the development of glass able to withstand the pressures of space travel. While the Division's profit picture fell slightly during and immediately after the recession three years ago, it quickly returned to new heights.

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LOOKING GLASS
Corporate Offices

To: President

From: Corporate Personnel

Re: Industrial Glass Division's Annual Salary Information for Previous Year

C O N F I D E N T I A L

Copies to:
VP, IGD

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VICE-PRESIDENT

Time in position: 4 years

Salary & bonus: $117,600

DIRECTOR OF MANUFACTURING

Time in position: 4 years

Salary: $73,500

DIRECTOR OF PRODUCT DEVELOPMENT

Time in position: 9 years

Salary: $77,200

DIRECTOR OF SALES AND MARKETING

Time in position: 1 year

Salary: $67,900

PLANT MANAGER, AUTO GLASS

Time in position: 2 years

Salary: $59,200

PLANT MANAGER, SPECIALTY GLASS

Time in position: 5 years

Salary: $51,600

PLANT MANAGER, GLASS PIPING

Temporarily vacant

Salary range: $45-55,000

LOOKING GLASS
Corporate Offices

To: Vice-President, IGD

From: Corporate Personnel

Re: Unions

Copies to:

PRESIDENT

The following statistics deserve your attention. They relate to our attempts to keep plants nonunion. In the past two months hourly employees in the Auto Glass and Specialty Glass plants voted on the question of whether or not to unionize. The results are:

	% YES	
	This month	Two years ago
Auto Glass	39%	15%
Specialty Glass	27%	23%

Clearly the employees at Auto Glass are inclining toward joining a union. This is a large, highly visible plant. Some work needs to be done to figure out what is going wrong at Auto Glass. Some possible factors are:

1. The plant is too large (763 hourly employees) making the workers feel their best interests are not being kept in mind.

2. The section of Ohio the plant is located in is strongly prounion.

3. The efficiencies caused by the introduction of the float process have forced a number of layoffs.

To repeat, these data deserve our attention.

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LOOKING GLASS
Corporate Offices

To: Vice-President, IGD

From: Corporate Personnel

Re: Hourly Pay Rates

Copies to:

PRESIDENT
DIR-MFG, IGD

I recently got hold of some industry data on wages for hourly employees:

	Five Years From Now	This Year	Five Years Ago
Flat Glass Industry	$8.86*	$6.06	$4.26
Industrial Glass Division	$7.82*	$5.93	$5.03

*Projection based on current formulas in use.

Quite frankly, these figures shocked me. We've always prided ourselves on paying well. However, it seems that the cost-cutting of the past several years has placed us a bit below average.

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LOOKING GLASS
Corporate Offices

To: President

From: Corporate Personnel

Re: Affirmative Action Distributions: Industrial Glass Division

Copies to:

VP, IGD
DIR-S&M, IGD
DIR-PD, IGD
DIR-MFG, IGD
PM-AUTO
PM-SPECIALTY

% OF FULL-TIME EMPLOYEES
BY SEX, RACE, AND JOB TYPE

	MANAGEMENT	PROFESSIONAL	HOURLY
MALE	96%	90%	69%
FEMALE	4%	10%	31%
WHITE	95%	99%	89%
MINORITY	5%	1%	11%

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LOOKING GLASS
Corporate Offices

To: Vice-President, IGD

From: Corporate Personnel

Re: Staff Replacement

Copies to:

PRESIDENT

The opening of the Plant Manager position at Glass Piping is an opportunity for you to use our services in identifying high-potential managers within Looking Glass, managers who could ably fill the open position. Please let us know if we can be of any assistance.

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VOLUME II

ADVANCED PRODUCTS DIVISION

III. Across Division Memos

A. To APD From the President

PRES- 1 to PRES- 4
PRES- 9
PRES-14
PRES- 6 to PRES- 8
PRES-10 to PRES-13
PRES-15 to PRES-18

B. To APD From CGD

CGD-63 to CGD-65

C. To APD From IGD

IGD-8

LOOKING GLASS

Office of the President

To: All Executives of Looking Glass

From: President

Re: State of the Corporation Address

Copies to:

I will make a State of the Corporation address to all executives at 3:00 today, to be followed by a question and answer period.

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LOOKING GLASS

Office of the President

To: Those Listed

From: President

Re: Coordinated Sales Program

Copies to:

DIR-S&M, APD
DIR-S&M, CGD
DIR-S&M, IGD
VP, APD
VP, CGD
VP, IGD

The last meeting of the Management Committee addressed the increasing complexity of Looking Glass sales operations. It was the feeling of the Committee that the Sales and Marketing directors should get together to:

- identify common problems;
- coordinate solutions to these problems;
- plan for future problems.

The Committee took no position on specific actions, and no such decisions are contemplated at this level. It is up to you to decide what, if anything, should be done. Please keep my office informed.

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LOOKING GLASS

Office of the President

To: Those Listed

From: President

Re: Security

Copies to:

VP, APD
VP, CGD
VP, IGD

We've been stung in the past by other glass manufacturers pirating our executives and key technical people. Because we pay relatively high salaries and otherwise take care of our own, we've been more fortunate than some other companies. Still, our competitive edge depends on our ability to maintain confidentiality on our key processes.

Some companies require their executives and technical people to sign an agreement of confidentiality as well as on not taking a job with a competitor. I'd like to get your ideas on this or other strategies that might be effective at Looking Glass.

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LOOKING GLASS

Office of the President

To: Those Listed

From: President

Re: Low Expansion Furnace Linings

Copies to:

VP, APD
VP, CGD
VP, IGD

I've discussed this with each of you, and each of you thinks the others should do it. New England Furnace Company wants 200 tons of low expansion cellular glass for furnace linings, and we are going to give it to them. I don't care which plant produces it--you decide among yourselves and let me know. A summary of the specifications is attached.

We can't expect to make anything on this, and we might even go into the red some. But if we do a good job, we stand to gain substantial future orders from them.

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CELLULAR GLASS FOR FURNACE LININGS

(SUMMARY)

TECHNOLOGY:

To make cellular glass furnace linings, borosilicate glass is ground and mixed with a foaming agent. Borosilicate glass is made as follows:

Sand + Soda Ash + Boric Acid + Cullet + Arsenic +

Antimony heated to 1625°C (2957°F)

DELIVERY DATES:

50 tons:	6 weeks from today
100 tons:	8 weeks from today
50 tons:	10 weeks from today

DELIVERY LOCATION:

Willimantic, Connecticut

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LOOKING GLASS

Office of the President

To: Those Listed

From: President

Re: Looking Foundation

Copies to:

VP, APD
VP, CGD
VP, IGD

Our proposal to form a foundation has been approved by the Board of Directors. Funding will depend upon the specific purpose for which the foundation exists. Let's meet soon to discuss that purpose.

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LOOKING GLASS
Office of the President

To: Those Listed

From: President

Re: Purchase

Copies to:

VP, APD
VP, CGD
VP, IGD

Over the past year, we have discussed terms with Cascade to purchase their operations in Battle Creek, Michigan, for $42 million. The facility would maintain its present product mix of lime glass bottles, decorative bottles, and high quality lead crystal decanters and goblets.

Meet with me at 2:00 to discuss how we should allocate our resources. We obviously cannot follow through on all proposed investment opportunities, so should we choose this one or others? I think it's time to make a decision. We've discussed this long enough.

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LOOKING GLASS

Office of the President

To: Those Listed

From: President

Re: Market Slump

Copies to:

VP, APD
DIR-MFG, APD
DIR-S&M, APD
DIR-PD, APD
PM-CAPACITORS
PM-INT CIRCUITS
PM-OPT FIBERS

I was disturbed by a recent report in the Wall Street Journal on a potential slump in the computer and telecommunications industries. Should this come about, we need some contingency plans.

Please give me any information you have on the accuracy of this report. How well does it jibe with our forecasts?

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LOOKING GLASS

Office of the President

To: Those Listed

From: President

Re: EEOC Lawsuit

Copies to:

DIR-S&M, APD
DIR-PD, APD

According to my contacts in Washington, we can expect to be in a lawsuit with the EEOC within three months, unless the percentage of women and minorities in your departments goes up drastically. Let's meet to formulate a plan for avoiding this lawsuit.

Below is a summary of an article from the Wall Street Journal:

1) 35% spending increase for EEOC, including 53% more for enforcement and compliance;

2) Cases resolved are expected to go up 40% this year.

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LOOKING GLASS

Office of the President

To: Vice-President, APD

From: President

Re: Capacitor Delivery

Copies to:

I've received three complaints recently from presidents of independent capacitor dealers that they are not receiving deliveries on time. Since on-time deliveries are critical in such a highly competitive line, if something isn't done, we'll lose their business.

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LOOKING GLASS

Office of the President

To: Vice-President, APD

From: President

Re: Land Investment

Copies to:

Please prepare a briefing on our land investment needs of the next few years. I am particularly interested in potential land investments for future optical fiber and capacitor plant sites.

If we plan to expand our plant facilities, I think we should see about procuring real estate now, rather than later.

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LOOKING GLASS

Office of the President

To: Vice-President, APD

From: President

Re: Glasspack Industries Contract

Copies to:

DIR-MFG, APD

I just received a call from the president of Glasspack Industries. He is furious because we have not yet produced the special glass they have had on order for several months. As I recall, none of our plants wanted to produce this glass. Perhaps I haven't made myself clear. I don't care who produces it; I don't care what reasons each plant may have for not producing it. I want that contract obligation met. Please inform me of your decision. Pertinent specifications are attached.

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Micro Sheets:	High silica compound cut in sheets 5/1000 of an inch thick for laboratory slides
Process:	Drawn sheet
Number:	1.2 million
Estimated Profit Margin:	7.7%
Time to Produce:	4 days

Exact specifications are available from Glasspack. The plant manager involved should contact the Purchasing Department there.

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LOOKING GLASS

Office of the President

To: Director of Product Development, APD

From: President

Re: Solar Energy

Copies to:

Although there's no rush, I wish you would prepare a briefing on the latest in solar energy. As you know, our energy problems have multiplied greatly over the last few years, and I am in the process of searching for alternative forms of energy.

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LOOKING GLASS

Office of the President

To: Director of Sales and Marketing, APD

From: President

Re: National Sales Meeting

Copies to:

Our national sales meeting is in three months. Please brief me on your plans.

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LOOKING GLASS

Office of the President

To: Vice-President, APD

From: President

Re: Capacitor Plant Locations

Copies to:

DIR-MFG, APD

Let's meet to discuss the location of our proposed new capacitor factory. It seems to me that whichever location we choose, there is a trade-off involved. One location apparently has lower pollution requirements; the other apparently has a better market location.

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LOOKING GLASS

Office of the President

To: Director of Product Development, APD

From: President

Re: Staff Development

Copies to:

How are your staff development efforts going? I feel badly, in a way, bringing it up. For many years this is where we dumped our poorest performers, and we've got nobody to blame but ourselves. Although you didn't create this problem, you certainly inherited it and I sympathize.

I'd like to talk with you specifically about two issues - continued skill-building efforts for project integrators between Marketing and Manufacturing, and technological updating for your research staff.

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LOOKING GLASS

Office of the President

To: Vice-President, APD

From: President

Re: A Problem

Copies to:

As we've discussed before, our Integrated Circuits plant is and has been a loser. I'd like to meet with you at 11:00 for your recommendation on whether or not to sell it.

As you know, we have a firm offer of $5 million from Silicon, Inc., and have agreed to give them a yes or no by 2:00 p.m.

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LOOKING GLASS

Office of the President

To: Vice-President, APD

From: President

Re: Financial Education

Copies to:

I think we've agreed that we have a significant lack of financial education in the organization. Would you be willing, or is there a subordinate you would recommend, to run a series of seminars in this area?

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LOOKING GLASS

Commercial Glass Division

To: Director of Product Development, CGD

From: Research Documentation Specialist

Re: Library

Copies to:

DIR-PD, APD

Our file room is completely full. The accumulation of technical reports and books has reached the point where things are lying around in piles on top of file cabinets. We desperately need to reorganize this material and find additional space. Advanced Products has a library, complete with work rooms and systematic cataloging. We need a similar facility. As it is, our people have to go deep into the bowels of the building, plough around in this small, crowded room to find what they need, and then go back to their offices or try to find an empty room to read in.

Any chance of getting authorization to create this kind of documentation center we need?

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LOOKING GLASS

Commercial Glass Division

To: Listed Below

From: Director of Manufacturing, CGD

Re: Internal Task Force on Plant Managers Performance

Copies to:

PM-LIGHTING
PM-CAPACITORS
PM-AUTO

PRESIDENT
DIR-MFG, APD
DIR-MFG, IGD

Corporate has long been concerned about how to measure plant manager performance. At the last corporate planning meeting, the issue was raised again. It was decided to form a corporate-wide task force to investigate: 1) what a plant manager does, and 2) how to evaluate plant manager performance.

It was a general feeling that the place to start was with the plant managers themselves. The President authorized the formation of a task force consisting of a plant manager from each of the divisions. Appointed to this task force are:

Plant Manager, Lighting Products (chair)
Plant Manager, Capacitors
Plant Manager, Auto Glass

The chairperson is responsible for getting this task force started and for reporting its progress to me. I'd like for you to get together sometime during your visit today to lay out a plan of attack. Through the Plant Manager, Lighting Products, let me know basically what you need to do to answer the questions:

1) What resources will be required?
2) How long you think it will take?

For your information, a copy of our current appraisal form is attached.

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LOOKING GLASS

CORPORATE OFFICES

NAME OF EMPLOYEE _____ DATE _____

JOB TITLE _____

IMPORTANT--Be sure you consider only one characteristic at a time, regardless of how good or poor he/she may be in the others. It is essential that every question be answered; if more space is needed to answer any item, please write on plain paper and attach to this form. Your overall rating on each factor should be shown by code symbol in the box to the right. Mark "O" for Outstanding; "E" for Excellent; "SP" for Satisfactory Plus; "S" for Satisfactory; "SM" for Satisfactory Minus; "U" for Unsatisfactory.

A. QUALITY OF WORK — Insert Rating Code ☐
Comments:

B. QUANTITY OF WORK — Insert Rating Code ☐
Comments:

C. ABILITY TO PLAN AND UNDERSTAND WORK — Insert Rating Code ☐
Comments:

D. ABILITY TO GET ALONG WITH OTHERS — Insert Rating Code ☐
Comments:

E. OVERALL PERFORMANCE RATING (ALL FACTORS) — Insert Rating Code ☐
Comments:

If performance of any of above is below expectations, what should be done to bring about improvements?

PREPARED BY _____ DATE _____

REVIEWED AND
APPROVED BY _____ DATE _____
(Your immediate supervisor)

RECORD OF INTERVIEW:
This report was discussed with the employee on _____
(Date)

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Signed _____
(Employee)

LOOKING GLASS

Commercial Glass Division

To: Those Listed

From: Plant Manager, Flat Glass

Re: Internal Task Force on Heat and People

Copies to:

VP, CGD
PM-SPECIALTY
PM-OPT FIBERS
PM-INT CIRCUITS

As we are all aware, the furnaces in our plants produce enormous heat (the working area around them averages 95°). Each of us has had problems with heat prostration, etc., among our people. In spite of the best ventilation systems we can devise, it's always going to be hot. We don't have a general policy regarding the rights of the people who work around these furnaces; each plant seems to handle the problem differently, some allowing unlimited breaks while others just play it by ear.

I have been asked by the Vice-President of the Commercial Glass Division to chair a task force to develop some policy guidelines. Task force members, including myself, are:

Plant Manager, Flat Glass (chairperson)
Plant Manager, Specialty Glass
Plant Manager, Optical Fibers
Plant Manager, Integrated Circuits

Jobs around the furnaces are tough, high turn-over positions. We should develop some notions about breaks, special dispensation, water, or other possible means for reducing the unpleasantness of the work.

Can we get together later today to start working on the problem? At a minimum, we should lay out what we need to do to develop a policy. Attached are some figures that should get us started.

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G-5
G-2

CGD-65A
(APD-105)

FURNACE HEAT

TURNOVER

Overall hourly turnover: 12.3%

Turnover of furnace workers: 40.1%

TRAINING REQUIRED FOR NEW FURNACE WORKERS

16 hours classroom

24 hours on-line

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LOOKING GLASS

Industrial Glass Division

To: Vice-President, IGD

From: Director of Sales and Marketing, IGD

Re: Cost-Cutting

Copies to:

DIR-S&M, APD

Two of my district sales managers have just called me, irate over new belt-tightening policies supposedly being implemented corporate-wide. They had both spoken with a district sales manager from the Commercial Glass Division, who apparently told them that the President was dissatisfied with the increasing overhead associated with sales and marketing, and was instituting such cost-cutting rules as:

- No first-class air travel;
- Rigorous review of travel vouchers;
- Exclusion of special customer discounts.

Needless to say, this all caught me by surprise. Could you fill us in on the details of this cost-cutting, like when and why it is taking place, what other sales practices will be affected, etc.?

At a time when sales in Industrial Glass are increasing nicely (46% in two years) this is going to be a policy change difficult to explain, much less defend, to the troops.

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VOLUME II

ADVANCED PRODUCTS DIVISION

IV. To APD From Corporate

CORP- 8 to CORP-32
CORP-72 to CORP-73

LOOKING GLASS
Corporate Offices

To: President

From: Corporate Controller

Re: Consolidated Balance Sheet

Copies to:

VP, APD
VP, CGD
VP, IGD

LOOKING GLASS

CONSOLIDATED BALANCE SHEET

(In Thousands)

ASSETS	LATEST YEAR	PREVIOUS YEAR
CASH	$16,402	$14,762
RECEIVABLES	29,910	26,919
INVENTORIES	16,501	17,370
PLANT & EQUIPMENT	86,835	75,544
OTHER ASSETS	43,320	39,076
TOTAL ASSETS	$192,968	$173,671
LIABILITIES		
CURRENT LIABILITIES	$18,332	$19,104
LONG-TERM LIABILITIES	57,890	48,101
CAPITAL STOCK	26,051	26,051
RETAINED EARNINGS	90,695	80,415
TOTAL LIABILITIES	$192,968	$173,671

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LOOKING GLASS
Corporate Offices

To: Director of Product Development, APD

From: Director of Public Relations

Re: Press Releases

Copies to:

Here is a summary of the information we are using in our press releases. Please check for accuracy. As we agreed, you will forward subsections of these to the appropriate executives.

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LOOKING GLASS

Corporate Offices

To:

From:

Re:

Copies to:

About 1/4 of the glass made by the Advanced Products Division is produced by the sheet process. A simple iron bar is introduced into the molten glass, adheres to it, and draws a continuous sheet of glass across a series of rollers. The glass is cooled by long ovens (called lehrs) where the temperature is gradually reduced under carefully controlled conditions.

The remaining 3/4 of APD's glass is produced by the newer and much more efficient float glass process. Molten glass is poured onto a bed of molten tin. The glass solidifies at a higher temperature than the tin and can be fed off for further cooling. Because no rollers touch the molten glass, the surface remains clear and undisturbed.

Descriptions of the technologies involved in making integrated circuits, capacitors, and optical fibers follow.

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AD-A063 057 CENTER FOR CREATIVE LEADERSHIP GREENSBORO NC F/G 5/1
LOOKING GLASS, INC. VOLUME II. ADVANCED PRODUCTS DIVISION. OPER--ETC(U)
OCT 78 M M LOMBARDO N00014-76-C-0870
UNCLASSIFIED NL

2 OF 4
ADA
063057

LOOKING GLASS
Corporate Offices

To:

From:

Re:

Copies to:

INTEGRATED CIRCUITS

Technology

1) Engineer drafts circuit 200 to 500 times larger than final product (hundreds or thousands of circuits may go into the device).

2) Artwork is transferred to a sheet of red plastic mylar, called a rubylith.

3) Rubylith reduced photographically and imprinted on a light sensitive "glass mask."

4) Pattern is engraved onto a silicon wafer.

5) Components are connected.

Materials

1) Light-sensitive (photosensitive) glass produces a photographic negative when exposed to light.

sand + soda ash
lithium carbonate
potash
+ aluminum hydroxide
+ zinc oxide

+ cullet
arsenic
antimony
+ silver nitrate
+ (nucleating agent)

+ barium oxide (ultraviolet sensitizer)

heated to 1400°C. (2552°F.)

Expose under ultraviolet light and develop with heat. Image is permanent; exposed parts more soluble in hydrofluoric acid.

2) Silicon: Heat light-grade quartzite rock with charcoal in an electric furnace until white hot - CO_2 escapes, silicon remains. Cooled. Ground into powder. Mated

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To:

From:

Re:

Copies to:

with methyl chloride, mixed with water, distilled.
Can then be combined with wide range of materials.

Today's integrated circuits are computer chips about 1/20th of an inch square. On one integrated circuit there are as many as 15,000 circuits, costing about 50 cents per chip. They consume practically no energy; their basic raw material is silicon; 25 applications of them have been introduced.

Integrated circuits at one time were just circuitry; now they're a computer on a chip, a knot of circuits that combines memory, programming, micro-processing capability, and software programs all on one chip. In the last 10 years cost per circuit has decreased several thousandfold while their complexity has doubled each year. Integrated circuits are very reliable; they employ no moving parts, and the smaller they get the more reliable they become. They're so cheap that customers can use chips that don't exactly match their needs.

To overcome the problem that the range of functions chips can perform is limited, the answer was to build a standard chip with stored programs and memory so that a customer could have a choice of uses. Put a chip in one gear and it would be a pocket calculator. Put it in another and it would play video ping pong.

Manufacturing Process

Chip manufacture is done in speckless conditions. The initial stage is to melt silicon and extract a tiny seed crystal which is drawn out to make something about the same diameter and shape as a stick of salami. The salami is then sliced into wafers, and on each wafer about 400 chips are printed like photographs using miniature glass mats that have been reduced from large-scale drawings of the chip's intended pattern. The pattern is etched and impurities added, then more layers are put on by further processes. A device called a laser zapper is used to make corrections on the mask itself, but with a complex chip there may only be 40 usable chips out of the 400 on the wafer.

Unfortunately, sometimes design aims conflict with each other. To make a chip work fast (critical in computers), it must be smaller so that the electrons have less far to travel - but then power density goes up and the chip overheats. Some ways of over-

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To:

From:

Re:

Copies to:

coming this are micropackaging up to 100 chips on one substrate with the chips joined together by plastic film. The aim is to get the signals synchronized in different parts of the system, also using liquid cooling of the chips and various kinds of switching devices. One of the new developments to get chips more densely integrated is electron beam lithography. The wavelength of the electron beam is much smaller than that of light. Another tool for making chips is the ion implanter. Magnets bend microscopic impurities in the right direction. One implanter in use right now can in half an hour process 50 wafers, each with between 150 and 1,000 chips. This step used to take many hours.

Another innovation is the charge coupled device. On these chips wells are set up in the silicon in which a charge is stored and can be moved from one well to another. This is equivalent to moving information through the silicon. One application of this is to take photographs in the dark, because the camera senses electrons instead of photons. This is often used for cameras in missiles and in computer memories. Another application of CCDs is in a technology called surface acoustic waves in which elastic waves are converted to electric energy and back again. This was used on the Jupiter/Saturn space flight to reject signals from neighboring radio channels. It reduces interference.

Another innovation is called bubble memory. This is a thin film of magnetic material in which the north and south poles are reversed relative to the surrounding material. Bubbles are the first type of computer memory with a capacity for not just storing data but also for rearranging it.

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LOOKING GLASS
Corporate Offices

To:

From:

Re:

Copies to:

CAPACITOR TECHNOLOGY

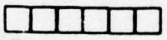
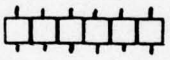
Glass Capacitors

Low volume, cost 10-12 cents each;

Used in computers and peripheral equipment, mini-computers, electronic ignitions, space satellites (telecommunications);

Not as highly mechanized as ceramics.

Approximate production steps:

1. Aluminum put on glass chip. 
2. Connecting wires added. 
3. Chip is encased in glass.
4. Capacitors cut from chip.
5. Individual test.
6. Sealed by heat.
7. Tested again.
8. Wires dipped in solder.
9. Stamped with code numbers.
10. Final inspection.

Competitors use substitute materials, e.g., enamel.

Ceramic Capacitors

High volume, cost 1.5 to 2 cents each;

New market;

Used where less precision and quality is required (television, radios);

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LOOKING GLASS
Corporate Offices

To:

From:

Re:

Copies to:

Highly automated.

Approximate productions steps:

1. Suspension (paste) is made, using rare material (e.g., paladium); looks like big jars of poster paint.

2. Paste is spread on cardboard conveyor, dried, and rolled off; creates a freezer-paper-like substance.

3. Circuit pattern is silkscreened onto rolls; rolls are cut into squares (about 6" x 6").

4. Squares are stacked; thickness depends on specifications.

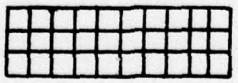
5. Plates are heated, melding layers together (24 hours).

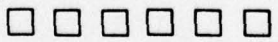
6. Melded plates are cut into capacitors.

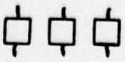
7. Wires are attached, inspected.

8. Identification code stamped on.

9. Final stacking, inspection.

3- 

6- 

7- 

Competitors use different processes, same materials.

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LOOKING GLASS

Corporate Offices

To:

From:

Re:

Copies to:

General Notes:

1. Make several types of axial ( ) and radial ( ) capacitors.
2. Make about 100 million a year.
3. Two assembly lines - one has most current machinery, is highly automated, more efficient.
4. Radiation area in ceramics - paste is x-ray inspected as it is spread on conveyer.
5. Fumes in glass, when aluminum is melded to glass.
6. Uses only a few small furnaces, no pollution problems.

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LOOKING GLASS
Corporate Offices

To:

From:

Re:

Copies to:

OPTICAL FIBERS

Optical fibers are a means of impressing information on a light beam and transmitting that light beam over distance with low decibel loss. Light is an excellent medium for communication because the waves are extremely short, making it possible to put more waves at higher frequencies and increasing the amount of information the channels can carry. Light waves also have more usable frequencies. For example, a microwave system can transmit 100 million bits of information per second. Before the invention of the laser (which is called coherent light because its waves are all of one wave length), too much light was lost in transit to make fiber optics practical. A recent development is an optic fiber in which light loss is drastically reduced. The fiber is produced by systematically sweating out impurities from optical glass with a high silicon content. The resultant fiber is encased in an equally pure glass cladding. The cladding has a lower index of refraction so that straight light waves are deflected back into the core. Over the years the breakthroughs have been so spectacular that light loss has been reduced from 100 decibels per kilometer to 4 decibels. Anything below 20 decibels is competitive with conventional methods of transmissions. This development has put fiber optics into a growing specialized business. They are used in such instruments as flexible light image probes for exploring body cavities and the interior of machines; in photographic image dissectors; and in light transmission systems for data processing, photocopying, displays, and instrument panels.

There are two basic systems. The first system is called single mode, which operates only on light from a laser. This system has the largest communication capacity and is expected to be most suitable for long distances. The second system, called multimode, can operate on ordinary light and light waves moving in many directions. It is slightly lower in information-carrying capacity. The multimode is simpler to put together and has more immediate use in intercity communication networks. Multimode systems use semiconductor light-emitting diodes (light sources which have been developed by several electronics companies). These diodes can be modulated to carry communications on the same electric current that produces the light image. What this means is that multimode systems, in contrast to laser systems, require no exterior means of impressing signals on its beam. They can receive signals directly.

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LOOKING GLASS
Corporate Offices

To:

From:

Re:

Copies to:

It is estimated that in the future we'll have a nationwide system of broad-band fiber optics. It will transmit not only telephone messages but also conventional television programs as well. Television stations will quit broadcasting over the air as optical fiber systems become available. Over the next 20 years there is expected to be a worldwide investment of $750 billion in telecommunications; fiber optics are likely to capture a major part of that investment.

Their advantages are that glass fibers can be made stronger than steel yet lighter than cotton. They are thin as human hair, flexible, and transparent. They have 10,000 times the capacity of copper wire and can be produced relatively cheaply (around 10 cents a foot, which is cheaper than copper cable or other metal conductors). Eventually, glass fiber cables will replace the heavier and bulkier conventional cables. They can be placed in present underground conduits, require much less space, and should require far less maintenance. They only need about a quarter of the number of repeaters that a coaxial cable requires to amplify signals as they fade. Glass is a stronger insulator. Once a light beam gets into a jacketed fiber it is not disturbed by any stray electromagnetic disturbances, lightning, or cross talk. It is unaffected by temperature since it retains rather than conducts heat, and is relatively immune to moisture. Right now, multimode systems are in the lead because of ease of production. Eventually, laser systems will take over.

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LOOKING GLASS
Corporate Offices

To: Vice-President, APD

From: Director of Public Relations

Re: Advanced Products Division Plants

Copies to:

DIR-MFG, APD
DIR-S&M, APD
DIR-PD, APD
PM-CAPACITORS
PM-INT CIRCUITS
PM-OPT FIBERS

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PLANTS

OPTICAL FIBERS:

Location: Buffalo, New York

Operation: 21 shifts

Employees: 280

Union status: Nonunion

Age of plant: 4 years

	Primary Products	Melting Furnace Age
Lines 1	Communications products	2 years
2	Communications products	3 years
3	Special batches	2 years
4	Special batches	3 months

INTEGRATED CIRCUITS:

Location: Santa Clara, California

Operation: 14 shifts

Employees: 272 presently; full capacity--350

Union status: Nonunion

Age of plant: 3 years

	Primary Products	Melting Furnace Age
Lines 1	Chips	3 years
2	Chips	3 years
3	Military orders	1 year
4	Special batches	1 year

LOOKING GLASS
Corporate Offices

To:

From:

Re:

Copies to:

PLANTS (cont'd)

CAPACITORS:

Location: Augusta, Georgia

Operation: 21 shifts

Employees: 220

Union status: Nonunion

Age of plant: 7 years

	Primary Products	Melting Furnace Age
Lines 1	Glass capacitors	6 years
2	Ceramic capacitors	6 years
3	Ceramic capacitors	4 years

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LOOKING GLASS
Corporate Offices

To: Listed Below

From: Corporate Personnel

Re: Job Descriptions

Copies to:

VP, APD
DIR-MFG, APD
DIR-PD, APD
DIR-S&M, APD
PM-CAPACITORS
PM-INT CIRCUITS
PM-OPT FIBERS

Here, for your information, are the job descriptions of all executives of the Advanced Products Division.

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VICE-PRESIDENT, APD

JOB DESCRIPTION

You are the Vice-President of the Advanced Products Division of Looking Glass, Inc. You have overall responsibility for all manufacturing, sales and marketing, and product development activities within your division. You and the President have the final word on matters of hiring and firing, new products, plants, and research developments. Although you do not concern yourself with the day-to-day activities of the directors who report to you, you have operational responsibility for all financial, legal, and government matters which affect your department.

You are a member of the Management Committee, which consists of the President, the other division vice-presidents, and yourself. This Committee decides all matters of corporate policy and makes all decisions affecting more than one division.

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DIRECTOR OF MANUFACTURING, APD

JOB DESCRIPTION

You are the Director of Manufacturing of the Advanced Products Division of Looking Glass, Inc. Although you do not intervene in the day-to-day activities of the three plant managers who report directly to you, you do go over with them on a regular basis their production summaries, problems, and ideas. You have final responsibility for all financial, legal, governmental, and employment matters within the manufacturing part of the division.

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DIRECTOR OF SALES AND MARKETING, APD

JOB DESCRIPTION

You are the Director of Sales and Marketing of the Advanced Products Division of Looking Glass, Inc. You have general responsibility for all sales and marketing efforts for optical fibers, capacitors, and integrated circuitry; as such, you work closely with the Director of Manufacturing in marketing what is produced. You're also in charge of all advertising and personnel matters, as well as financial, legal, and governmental matters within your part of the division.

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DIRECTOR OF PRODUCT DEVELOPMENT, APD

JOB DESCRIPTION

You are the Director of Product Development of the Advanced Products Division of Looking Glass, Inc. As such, you are not only responsible for developing new products and improving existing products, but also for research and production problems referred to you by the Director of Manufacturing, and for analyses of issues critical to the organization, such as pollution control and energy requirements. You are responsible for all personnel matters within your part of the division, such as hiring and firing, affirmative action policies, etc. You have the final say on financial, legal, and governmental matters within the Product Development area.

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PLANT MANAGER, OPTICAL FIBERS

JOB DESCRIPTION

You are the Plant Manager of the Optical Fibers Plant of the Advanced Products Division of Looking Glass, Inc. You are responsible for all production, personnel, and quality control matters within your plant. Although you run the day-to-day operations yourself, you report regularly to and consult with the Director of Manufacturing about all aspects of your plant's management.

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PLANT MANAGER, CAPACITORS

JOB DESCRIPTION

You are the Plant Manager of the Capacitors Plant of the Advanced Products Division of Looking Glass, Inc. You are responsible for all production, personnel, and quality control matters within your plant. Although you run the day-to-day operations yourself, you report regularly to and consult with the Director of Manufacturing about all aspects of your plant's management.

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PLANT MANAGER, INTEGRATED CIRCUITS

JOB DESCRIPTION

You are the Plant Manager of the Integrated Circuits Plant of the Advanced Products Division of Looking Glass, Inc. You are responsible for all production, personnel, and quality control matters within your plant. Although you run the day-to-day operations yourself, you report regularly to and consult with the Director of Manufacturing about all aspects of your plant's management.

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LOOKING GLASS
Corporate Offices

To: Vice-President, APD

From: Corporate Personnel

Re:

Copies to:

PRESIDENT

VICE-PRESIDENT, APD

Time in position: 2 years

Salary & bonus: $122,600

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LOOKING GLASS
Corporate Offices

To: Director of Manufacturing, APD

From: Corporate Personnel

Re:

Copies to:

VP, APD

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DIRECTOR OF MANUFACTURING, APD

Time in position: 4 years

Salary: $83,900

LOOKING GLASS
Corporate Offices

To: Director of Sales and Marketing, APD

From: Corporate Personnel

Re:

Copies to:

VP, APD

DIRECTOR OF SALES AND MARKETING, APD

Time in position: 1 year

Salary: $78,100

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LOOKING GLASS
Corporate Offices

To: Director of Product Development, APD

From: Corporate Personnel

Re:

Copies to:

VP, APD

DIRECTOR OF PRODUCT DEVELOPMENT, APD

Time in position: 3 years

Salary: $65,300

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LOOKING GLASS
Corporate Offices

To: Plant Manager, Optical Fibers

From: Corporate Personnel

Re:

Copies to:

VP, APD
DIR-MFG, APD

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PLANT MANAGER, OPTICAL FIBERS

Time in position: 3 years

Salary: $64,800

LOOKING GLASS
Corporate Offices

To: Plant Manager, Capacitors

From: Corporate Personnel

Re:

Copies to:

VP, APD
DIR-MFG, APD

PLANT MANAGER, CAPACITORS

Time in position: 6 years

Salary: $63,800

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LOOKING GLASS
Corporate Offices

To: Plant Manager, Integrated Circuits

From: Corporate Personnel

Re:

Copies to:

VP, APD
DIR-MFG, APD

PLANT MANAGER, INTEGRATED CIRCUITS

Time in position: 3 years

Salary: $48,700

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LOOKING GLASS
Corporate Offices

To: Those Listed

From: Corporate Personnel

Re: Plant Structure

Copies to:

VP, APD
DIR-MFG, APD
DIR-S&M, APD
DIR-PD, APD
PM-CAPACITORS
PM-INT CIRCUITS
PM-OPT FIBERS

Attached is an organization chart of personnel in each of the plants of the Advanced Products Division.

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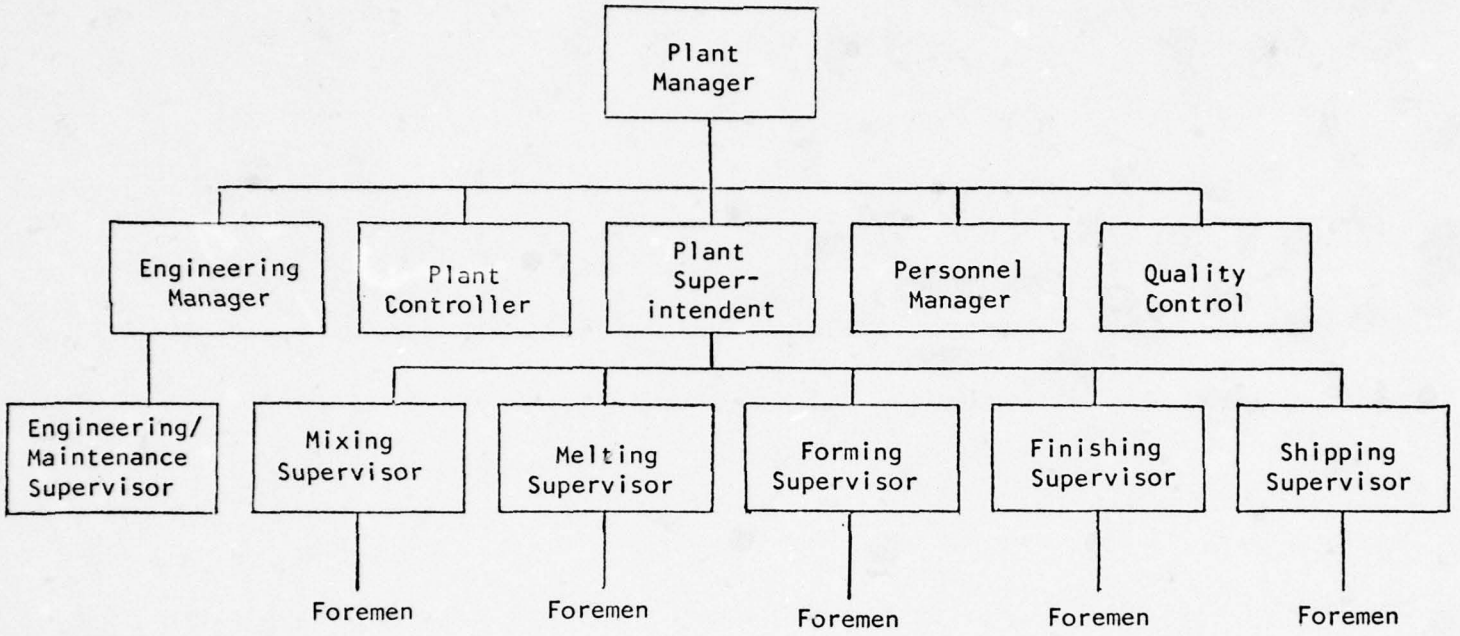
ORGANIZATIONAL CHART - APD PLANTS



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LOOKING GLASS
Corporate Offices

To: Vice-President, APD

From: Corporate Personnel

Re: Advanced Product Division Employees

Copies to:

DIR-MFG, APD
DIR-S&M, APD
DIR-PD, APD
PM-CAPACITORS
PM-INT CIRCUITS
PM-OPT FIBERS

Sales and Marketing	33
Product Development	20
Manufacturing	
Plant Management	36
Optical Fibers	280
Capacitors	220
Integrated Circuits	272
Corporate	
Executives	4
Other	12
TOTAL	877

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LOOKING GLASS

Corporate Offices

To: Director of Product Development, APD

From: Director, Corporate Personnel

Re: Affirmative Action Goals

Copies to:

My recommendation for a model to reach affirmative action goals is as follows:

1. Specify the management ladder (the hierarchy of management positions).

2. Include the current management mix--the number of men, women, and minority-group members in each level of management throughout the company.

3. Specify hiring mix--number of persons from each population group to be hired into each of the management levels each year.

4. Specify promotion policies--probability for each population group at each management level of being promoted, demoted, staying at the same level, or leaving the company during each year in question.

The way the present system works, we're playing a head count game with EEOC. Our officials and managers category, for example, includes everyone from the president to the hostess of our dining room.

No matter what EEOC wants now, later is what they'll have to settle for. It takes much longer than five or ten years to move up into top positions and with 60 percent white males on the payroll (92 percent in top management), they're not going to just vanish, thereby making room for women and minorities.

I suggest we show EEOC computer runs of projections assuming historical promotion rates, equal promotion rates, and hiring only women/minorities.

According to preliminary runs, historic promotion rates are discriminatory; equal promotion rates would take until about the year 2015 to achieve anything approaching parity; and hiring only policies, which might be reverse discrimination, would take until 2004.

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LOOKING GLASS

Corporate Offices

To: Vice-President, APD

From: Director of Training, Corporate Personnel

Re: OD Help

Copies to:

After considering your request, I feel the best bet is to go through the university. Which of your staff do you plan to pick for university courses?

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LOOKING GLASS
Corporate Offices

To: Director of Product Development, APD

From: Director of Training, Corporate Personnel

Re: OD Help

Copies to:

After considering your request, I feel the best bet is to go through the university. Which of your staff do you plan to pick for university courses?

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LOOKING GLASS
Corporate Offices

To: Director of Sales and Marketing, APD

From: Director of Training, Corporate Personnel

Re: OD Help

Copies to:

After considering your request, I feel the best bet is to go through the university. Which of your staff do you plan to pick for university courses?

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LOOKING GLASS
Corporate Offices

To: Vice-President, APD

From: Corporate Controller

Re: Financial Data

Copies to:

DIR-MFG, APD
DIR-S&M, APD
DIR-PD, APD

Attached are the divisional income statement, financial ratios, assets and liabilities, sales and cost of goods manufactured summaries.

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LOOKING GLASS
ADVANCED PRODUCTS DIVISION

INCOME STATEMENT
(In Thousands)

	DIVISION		CAPACITORS		INTEGRATED CIRCUITS		OPTICAL FIBERS	
	Latest Year	Previous Year	Latest Year	Previous Year	Latest Year	Previous Year	Latest Year	Previous Year
NET SALES	$39,400	$35,100	$8,400	$8,100	$6,800	$8,300	$24,200	$18,700
COST OF GOODS SOLD	27,800	25,300	5,500	5,400	6,600	6,700	15,700	13,200
SALES, G & A	2,400	2,200	600	600	1,000	1,000	800	600
R & D	2,000	1,800	400*	400*	800*	700*	800*	700*
ASSIGNED TAXES & INTEREST	3,600	3,100	800	700	1,400	1,100	1,400	1,300
NET INCOME FROM PRIMARY OPERATIONS	$3,600	$2,700	$1,100	$1,000	($3,000)	($1,200)	$5,500	$2,900
* ASSIGNED TO PLANTS								
MARKET RANK			8	8	26	15	1	1
MARKET SHARE (%)			4.2	4.1	1.2	2.4	31.1	25.8

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LOOKING GLASS
ADVANCED PRODUCTS DIVISION

CURRENT FINANCIAL RATIOS

	DIVISION	CAPACITORS	INTEGRATED CIRCUITS	OPTICAL FIBERS
DEBT TO EQUITY	58.2			
RETURN ON EQUITY	12.1			
RETURN ON ASSETS	7.5	7.9	-30.0	22.9
RECEIVABLES TURNOVER	7.0	6.9	3.9	11.1
COST OF GOODS SOLD AS % OF SALES	70.9%	65.3%	97.0%	65.1%
R & D AS % OF SALES	5.1%	4.8%	11.8%	3.3%
OPERATING PROFIT MARGIN AS % OF SALES	18.3%	20.2%	-14.7%	26.9%

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LOOKING GLASS

ADVANCED PRODUCTS DIVISION

SELECTED BALANCE SHEET ACCOUNTS

LATEST YEAR

(In Thousands)

CASH	$ 2,930
RECEIVABLES	5,630
INVENTORIES	3,010
PLANT AND EQUIPMENT	26,400
OTHER ASSETS	10,030
CURRENT LIABILITIES	3,400

ASSETS ASSIGNED TO PLANTS

(In Millions)

OPTICAL FIBERS	$24.0
CAPACITORS	$14.0
INTEGRATED CIRCUITS	$10.0

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LOOKING GLASS

ADVANCED PRODUCTS DIVISION

SALES

(In Thousands)

LAST QUARTER

FORECAST	ACTUAL	VARIANCE
$9,850	$10,096	+2%

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LOOKING GLASS

ADVANCED PRODUCTS DIVISION

COST OF GOODS MANUFACTURED

(In Thousands)

LAST QUARTER

BUDGET	ACTUAL	VARIANCE
$6,958	$7,197	+3%

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LOOKING GLASS
Corporate Offices

To: Those Listed

From: Corporate Controller

Re: Financial Data

Copies to:

PM-CAPACITORS
PM-INT CIRCUITS
PM-OPT FIBERS

Attached are the divisional income statement and current financial ratios.

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LOOKING GLASS
ADVANCED PRODUCTS DIVISION

INCOME STATEMENT
(In Thousands)

	DIVISION		CAPACITORS		INTEGRATED CIRCUITS		OPTICAL FIBERS	
	Latest Year	Previous Year	Latest Year	Previous Year	Latest Year	Previous Year	Latest Year	Previous Year
NET SALES	$39,400	$35,100	$8,400	$8,100	$6,800	$8,300	$24,200	$18,700
COST OF GOODS SOLD	27,800	25,300	5,500	5,400	6,600	6,700	15,700	13,200
SALES, G & A	2,400	2,200	600	600	1,000	1,000	800	600
R & D	2,000	1,800	400*	400*	800*	700*	800*	700*
ASSIGNED TAXES & INTEREST	3,600	3,100	800	700	1,400	1,100	1,400	1,300
NET INCOME FROM PRIMARY OPERATIONS	$3,600	$2,700	$1,100	$1,000	($3,000)	($1,200)	$5,500	$2,900
* ASSIGNED TO PLANTS								
MARKET RANK			8	8	26	15	1	1
MARKET SHARE (%)			4.2	4.1	1.2	2.4	31.1	25.8

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LOOKING GLASS
ADVANCED PRODUCTS DIVISION

CURRENT FINANCIAL RATIOS

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DEBT TO EQUITY	58.2			
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LOOKING GLASS
Corporate Offices

To: Director of Manufacturing, APD

From: Office Services

Re: Invoicing

Copies to:

The new invoices had the following problems:

- The pages stuck. Sometimes we got 2 or 3 extra copies.
- The boxes denoting capacitors, optical fibers and integrated circuits were so close together that the wrong boxes were sometimes checked.

These problems have been corrected. The new forms arrive today.

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LOOKING GLASS
Corporate Offices

To: Vice-President, APD

From: Corporate Controller

Re: Tax Credits

Copies to:

Please set up a time when we can meet. I'd like to propose a method whereby we can take greater advantage of tax credits. Please speak with your staff about their ideas on this matter.

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LOOKING GLASS
Corporate Offices

To: Director of Manufacturing, APD

From: Manufacturing and Engineering

Re: Percentages of Energy Use in the New Optical Fibers Plant

Copies to:

	Natural Gas	Propane	Electric
Current	62%	4%	34%
Switchover Capability (existing capacity)	50%	8%	42%

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LOOKING GLASS
Corporate Offices

To: President

From: Manufacturing and Engineering

Re: New Capacitor Plant Location Data

Copies to:

VP, APD
DIR-MFG, APD

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LOCATION

	Portland, Oregon	Corpus Christi, Texas
Cost (In Thousands)		
Land	$221	$183
Building	2,400	1,900
Machinery & equipment	8,000	8,000
Storage facilities	442	332
Other	332	290
Total Estimated Cost (standard melters)	$11,395	$10,705
Number of lines	3	3
Increase over current production	120%	120%

ESTIMATE OF OTHER FACTORS

	Portland, Oregon	Corpus Christi, Texas
Pollution control costs	High	Moderate
Freight (raw materials)	High	Low
Closeness to market	High	Moderate
Freight (finished goods)	Low	Moderate

LOOKING GLASS
Corporate Offices

To:

From:

Re:

Copies to:

HISTORICAL DATA ON DIVISION PLANTS

	Pollution Control Costs	Freight (Raw Materials)	Closeness to Market	Freight (Finished Goods)
Optical Fibers 1 (multimode)	High	High	High	Low
Optical Fibers 2 (laser)	High	High	High	Low
Capacitors	Low	Low	Moderate	High
Integrated Circuits	Low	High	Moderate	Moderate

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LOOKING GLASS
Corporate Offices

To: Director of Sales and Marketing, APD

From: Legal

Re: EEOC Lawsuit

Copies to:

Just a note about the EEOC problem before I go on vacation. In this case, as in any other hiring case, differential employment practices are determined relative to the population of possible employees. For us, it means the number of people in a given area who hold a certain degree or certain qualifications or those who are interested in employment of a given type. In short, we must hire on the basis of merit or qualification, not according to some arbitrary quota system. The Justice Department, in its analysis of Title VII of the Civil Rights Act of 1964, said there's no provision, either in Title VII or in any part of the bill, that requires or authorizes any federal agency (including EEOC) or federal court to require preferential treatment for any individual or any group for the purpose of achieving racial balance.

I and my staff unanimously feel that both our hiring practices and our performance appraisal system will stand up to the scrutiny of any court. Personally, I wish the EEOC would sue us. I'd love to get them in court.

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LOOKING GLASS
Corporate Offices

To: Director of Manufacturing, APD

From: Legal

Re: Patent Infringement Suit

Copies to:

I would estimate our chances of winning our patent infringement suit on our optical fiber process at about 70 percent. Although this seems unbelievable since National clearly infringed upon our patents, strange things have happened in recent years. To encourage the free flow of technology many organizations have been forced to give up what were hereto trade secrets to competitors.

Regardless, it will be at least two years before we know anything.

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LOOKING GLASS
Corporate Offices

To: Director of Sales and Marketing, APD

From: Corporate Personnel

Re: Staff and Budget (Current Year)

Copies to:

BUDGET: $1.4 million

STAFF:

Sales		27
Regional Directors		4
Sales Personnel		
Region I	(Northeast)	8
Region II	(South)	2
Region III	(Midwest)	3
Region IV	(West)	5
Administrative & Clerical		5
Marketing		6
Senior Market Analyst		1
Market Research & Forecasting		2
Research Assistants & Clerical		3

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LOOKING GLASS
Corporate Offices

To: Director of Product Development, APD

From: Corporate Personnel

Re: Staff and Budget (Current Year)

Copies to:

BUDGET: $2.0 million

STAFF: 20

Senior Research Scientists	2
Research Scientists	4
Project Managers	3
Technical Specialists	6
Documentation Specialist	1
Clerical	4

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VOLUME II

ADVANCED PRODUCTS DIVISION

V. To/From Roles Within APD

APD-1 to APD-116

LOOKING GLASS

Advanced Products Division

To: President

From: Director of Product Development, APD

Re: Press Releases

Copies to:

VP, APD
DIR-S&M, APD

Here is a summary of the information we are using in our press releases. Please check for accuracy.

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LOOKING GLASS

Advanced Products Division

To:

From:

Re:

Copies to:

About 1/4 of the glass made by the Advanced Products Division is produced by the sheet process. A simple iron bar is introduced into the molten glass, adheres to it, and draws a continuous sheet of glass across a series of rollers. The glass is cooled by long ovens (called lehrs) where the temperature is gradually reduced under carefully controlled conditions.

The remaining 3/4 of APD's glass is produced by the newer and much more efficient float glass process. Molten glass is poured onto a bed of molten tin. The glass solidifies at a higher temperature than the tin and can be fed off for further cooling. Because no rollers touch the molten glass, the surface remains clear and undisturbed.

Descriptions of the technologies involved in making integrated circuits, capacitors, and optical fibers follow.

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LOOKING GLASS

Advanced Products Division

To:

From:

Re:

Copies to:

INTEGRATED CIRCUITS

Technology

1) Engineer drafts circuit 200 to 500 times larger than final product (hundreds or thousands of circuits may go into the device).

2) Artwork is transferred to a sheet of red plastic mylar, called a rubylith.

3) Rubylith reduced photographically and imprinted on a light sensitive "glass mask."

4) Pattern is engraved onto a silicon wafer.

5) Components are connected.

Materials

1) Light-sensitive (photosensitive) glass produces a photographic negative when exposed to light.

sand + soda ash
lithium carbonate
potash
+ aluminum hydroxide
+ zinc oxide

+ cullet
arsenic
antimony
+ silver nitrate
+ (nucleating agent)

+ barium oxide (ultraviolet sensitizer)

heated to 1400°C. (2552°F.)

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with methyl chloride, mixed with water, distilled.
Can then be combined with wide range of materials.

Today's integrated circuits are computer chips about 1/20th of an inch square. On one integrated circuit there are as many as 15,000 circuits, costing about 50 cents per chip. They consume practically no energy; their basic raw material is silicon; 25 applications of them have been introduced.

Integrated circuits at one time were just circuitry; now they're a computer on a chip, a knot of circuits that combines memory, programming, micro-processing capability, and software programs all on one chip. In the last 10 years cost per circuit has decreased several thousandfold while their complexity has doubled each year. Integrated circuits are very reliable; they employ no moving parts, and the smaller they get the more reliable they become. They're so cheap that customers can use chips that don't exactly match their needs.

To overcome the problem that the range of functions chips can perform is limited, the answer was to build a standard chip with stored programs and memory so that a customer could have a choice of uses. Put a chip in one gear and it would be a pocket calculator. Put it in another and it would play video ping pong.

Manufacturing Process

Chip manufacture is done in speckless conditions. The initial stage is to melt silicon and extract a tiny seed crystal which is drawn out to make something about the same diameter and shape as a stick of salami. The salami is then sliced into wafers, and on each wafer about 400 chips are printed like photographs using miniature glass mats that have been reduced from large-scale drawings of the chip's intended pattern. The pattern is etched and impurities added, then more layers are put on by further processes. A device called a laser zapper is used to make corrections on the mask itself, but with a complex chip there may only be 40 usable chips out of the 400 on the wafer.

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LOOKING GLASS

Advanced Products Division

To:

From:

Re:

Copies to:

CAPACITOR TECHNOLOGY

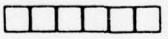
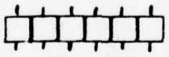
Glass Capacitors

Low volume, cost 10-12 cents each;

Used in computers and peripheral equipment, mini-computers, electronic ignitions, space satellites (telecommunications);

Not as highly mechanized as ceramics.

Approximate production steps:

1. Aluminum put on glass chip. 
2. Connecting wires added. 
3. Chip is encased in glass.
4. Capacitors cut from chip.
5. Individual test.
6. Sealed by heat.
7. Tested again.
8. Wires dipped in solder.
9. Stamped with code numbers.
10. Final inspection.

Competitors use substitute materials, e.g., enamel.

Ceramic Capacitors

High volume, cost 1.5 to 2 cents each;

New market;

Used where less precision and quality is required (television, radios);

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Highly automated.

Approximate productions steps:

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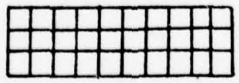
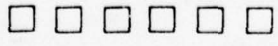
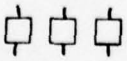
3- 

6- 

7- 

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OPTICAL FIBERS

Optical fibers are a means of impressing information on a light beam and transmitting that light beam over distance with low decibel loss. Light is an excellent medium for communication because the waves are extremely short, making it possible to put more waves at higher frequencies and increasing the amount of information the channels can carry. Light waves also have more usable frequencies. For example, a microwave system can transmit 100 million bits of information per second. Before the invention of the laser (which is called coherent light because its waves are all of one wave length), too much light was lost in transit to make fiber optics practical. A recent development is an optic fiber in which light loss is drastically reduced. The fiber is produced by systematically sweating out impurities from optical glass with a high silicon content. The resultant fiber is encased in an equally pure glass cladding. The cladding has a lower index of refraction so that straight light waves are deflected back into the core. Over the years the breakthroughs have been so spectacular that light loss has been reduced from 100 decibels per kilometer to 4 decibels. Anything below 20 decibels is competitive with conventional methods of transmissions. This development has put fiber optics into a growing specialized business. They are used in such instruments as flexible light image probes for exploring body cavities and the interior of machines; in photographic image dissectors; and in light transmission systems for data processing, photocopying, displays, and instrument panels.

There are two basic systems. The first system is called single mode, which operates only on light from a laser. This system has the largest communication capacity and is expected to be most suitable for long distances. The second system, called multimode, can operate on ordinary light and light waves moving in many directions. It is slightly lower in information-carrying capacity. The multimode is simpler to put together and has more immediate use in intercity communication networks. Multimode systems use semiconductor light-emitting diodes (light sources which have been developed by several electronics companies). These diodes can be modulated to carry communications on the same electric current that produces the light image. What this means is that multimode systems, in contrast to laser systems, require no exterior means of impressing signals on its beam. They can receive signals directly.

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Their advantages are that glass fibers can be made stronger than steel yet lighter than cotton. They are thin as human hair, flexible, and transparent. They have 10,000 times the capacity of copper wire and can be produced relatively cheaply (around 10 cents a foot, which is cheaper than copper cable or other metal conductors). Eventually, glass fiber cables will replace the heavier and bulkier conventional cables. They can be placed in present underground conduits, require much less space, and should require far less maintenance. They only need about a quarter of the number of repeaters that a coaxial cable requires to amplify signals as they fade. Glass is a stronger insulator. Once a light beam gets into a jacketed fiber it is not disturbed by any stray electromagnetic disturbances, lightning, or cross talk. It is unaffected by temperature since it retains rather than conducts heat, and is relatively immune to moisture. Right now, multimode systems are in the lead because of ease of production. Eventually, laser systems will take over.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Capacitors

From: Director of Product Development, APD

Re: Press Releases

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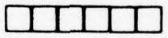
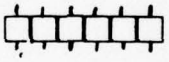
1. Aluminum put on glass chip. 
2. Connecting wires added. 
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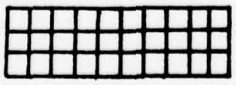
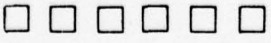
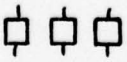
3- 

6- 

7- 

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INTEGRATED CIRCUITS

Technology

1) Engineer drafts circuit 200 to 500 times larger than final product (hundreds or thousands of circuits may go into the device).

2) Artwork is transferred to a sheet of red plastic mylar, called a rubylith.

3) Rubylith reduced photographically and imprinted on a light sensitive "glass mask."

4) Pattern is engraved onto a silicon wafer.

5) Components are connected.

Materials

1) Light-sensitive (photosensitive) glass produces a photographic negative when exposed to light.

sand + soda ash
lithium carbonate
potash

+ cullet
arsenic
antimony

+ barium oxide (ultraviolet sensitizer)

heated to 1400°C. (2552°F.)

+ aluminum hydroxide
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Expose under ultraviolet light and develop with heat. Image is permanent; exposed parts more soluble in hydrofluoric acid.

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To overcome the problem that the range of functions chips can perform is limited, the answer was to build a standard chip with stored programs and memory so that a customer could have a choice of uses. Put a chip in one gear and it would be a pocket calculator. Put it in another and it would play video ping pong.

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Unfortunately, sometimes design aims conflict with each other. To make a chip work fast (critical in computers), it must be smaller so that the electrons have less far to travel - but then power density goes up and the chip overheats. Some ways of over-

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coming this are micropackaging up to 100 chips on one substrate with the chips joined together by plastic film. The aim is to get the signals synchronized in different parts of the system, also using liquid cooling of the chips and various kinds of switching devices. One of the new developments to get chips more densely integrated is electron beam lithography. The wavelength of the electron beam is much smaller than that of light. Another tool for making chips is the ion implanter. Magnets bend microscopic impurities in the right direction. One implanter in use right now can in half an hour process 50 wafers, each with between 150 and 1,000 chips. This step used to take many hours.

Another innovation is the charge coupled device. On these chips wells are set up in the silicon in which a charge is stored and can be moved from one well to another. This is equivalent to moving information through the silicon. One application of this is to take photographs in the dark, because the camera senses electrons instead of photons. This is often used for cameras in missiles and in computer memories. Another application of CCDs is in a technology called surface acoustic waves in which elastic waves are converted to electric energy and back again. This was used on the Jupiter/Saturn space flight to reject signals from neighboring radio channels. It reduces interference.

Another innovation is called bubble memory. This is a thin film of magnetic material in which the north and south poles are reversed relative to the surrounding material. Bubbles are the first type of computer memory with a capacity for not just storing data but also for rearranging it.

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CAPACITOR TECHNOLOGY

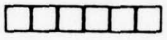
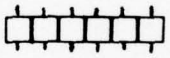
Glass Capacitors

Low volume, cost 10-12 cents each;

Used in computers and peripheral equipment, mini-computers, electronic ignitions, space satellites (telecommunications);

Not as highly mechanized as ceramics.

Approximate production steps:

1. Aluminum put on glass chip. 
2. Connecting wires added. 
3. Chip is encased in glass.
4. Capacitors cut from chip.
5. Individual test.
6. Sealed by heat.
7. Tested again.
8. Wires dipped in solder.
9. Stamped with code numbers.
10. Final inspection.

Competitors use substitute materials, e.g., enamel.

Ceramic Capacitors

High volume, cost 1.5 to 2 cents each;

New market;

Used where less precision and quality is required (television, radios);

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LOOKING GLASS

Advanced Products Division

To:

From:

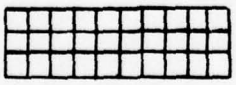
Re:

Copies to:

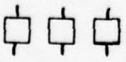
Highly automated.

Approximate productions steps:

1. Suspension (paste) is made, using rare material (e.g., paladium); looks like big jars of poster paint.
2. Paste is spread on cardboard conveyor, dried, and rolled off; creates a freezer-paper-like substance.
3. Circuit pattern is silkscreened onto rolls; rolls are cut into squares (about 6" x 6").
4. Squares are stacked; thickness depends on specifications.
5. Plates are heated, melding layers together (24 hours).
6. Melded plates are cut into capacitors.
7. Wires are attached, inspected.
8. Identification code stamped on.
9. Final stacking, inspection.

3- 

6-

7- 

Competitors use different processes, same materials.

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LOOKING GLASS

Advanced Products Division

To:

From:

Re:

Copies to:

General Notes:

1. Make several types of axial ( ) and radial ( ) capacitors.
2. Make about 100 million a year.
3. Two assembly lines - one has most current machinery, is highly automated, more efficient.
4. Radiation area in ceramics - paste is x-ray inspected as it is spread on conveyer.
5. Fumes in glass, when aluminum is melded to glass.
6. Uses only a few small furnaces, no pollution problems.

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To:

From:

Re:

Copies to:

OPTICAL FIBERS

Optical fibers are a means of impressing information on a light beam and transmitting that light beam over distance with low decibel loss. Light is an excellent medium for communication because the waves are extremely short, making it possible to put more waves at higher frequencies and increasing the amount of information the channels can carry. Light waves also have more usable frequencies. For example, a microwave system can transmit 100 million bits of information per second. Before the invention of the laser (which is called coherent light because its waves are all of one wave length), too much light was lost in transit to make fiber optics practical. A recent development is an optic fiber in which light loss is drastically reduced. The fiber is produced by systematically sweating out impurities from optical glass with a high silicon content. The resultant fiber is encased in an equally pure glass cladding. The cladding has a lower index of refraction so that straight light waves are deflected back into the core. Over the years the breakthroughs have been so spectacular that light loss has been reduced from 100 decibels per kilometer to 4 decibels. Anything below 20 decibels is competitive with conventional methods of transmissions. This development has put fiber optics into a growing specialized business. They are used in such instruments as flexible light image probes for exploring body cavities and the interior of machines; in photographic image dissectors; and in light transmission systems for data processing, photocopying, displays, and instrument panels.

There are two basic systems. The first system is called single mode, which operates only on light from a laser. This system has the largest communication capacity and is expected to be most suitable for long distances. The second system, called multimode, can operate on ordinary light and light waves moving in many directions. It is slightly lower in information-carrying capacity. The multimode is simpler to put together and has more immediate use in intercity communication networks. Multimode systems use semiconductor light-emitting diodes (light sources which have been developed by several electronics companies). These diodes can be modulated to carry communications on the same electric current that produces the light image. What this means is that multimode systems, in contrast to laser systems, require no exterior means of impressing signals on its beam. They can receive signals directly.

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LOOKING GLASS

Advanced Products Division

To: Vice-President, APD

From: Secretary

Re:

Copies to:

Just a reminder that the quarterly anniversary dinner to hand out the ten-year pins is next Thursday. You will be expected to make a 15-minute speech.

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Plant Manager, Integrated Circuits

Re: Sales

Copies to:

The sales of our V1-21 chips have picked up. However, the latest figures I've gotten from Marketing tell me that our total market share is still dropping. What's going on?

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: Marketing Research Director, Sales and Marketing, APD

Re: Summary of Recent Harvard Business Review Article

Copies to:

1. Three exposures to an ad is enough. Psychologically, fourth, fifth, and sixth exposures are repeats of the third exposure effect.

2. People who are repeatedly exposed to the same ad feel that their intelligence is insulted and often have adverse reactions to the products advertised.

3. When reach approaches 90 percent of the target audience, nearly everyone sees the ad at least once. However, 10 percent of the audience sees the ad more than 10 times.

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Director of Product Development, APD

Re: Analysis of Energy Forms

Copies to:

In response to your request, some glass manufacturers are conserving energy by using more efficient ovens during the melting process. Since natural gas is a diminishing resource, as is oil, many companies are changing to electric. For example, National is changing to all-electric ovens and furnaces which can operate at three times the efficiency of standard ones. They can now change over 70 percent of their operations to oil, electric, or propane. For some processes, like fire polishing, only gas can be used.

Oil has recently tripled in price; liquified natural gas has gone up even more. Certain glass products, such as lead glass, tableware, and borosilicate glasses, require electric heating for quality reasons. Gas is the preferred fuel when only capital is considered because all you need to burn it is an air source, two valves to a T, and a nozzle. Oil requires more complicated burners and storage. Coal costs are even more, and electric heat requires the most of all. When heat recovery is added, capital cost begins to mount for coal, oil and gas. When air pollution control equipment is required, the capital picture changes significantly in favor of electric.

Pure carbon dioxide is given off from electrically-melted glass. Carbon dioxide profit calculates to $7.50 per ton of glass produced. Future power plants fired with natural gas or oil are definitely out. The government is pushing utilities to use coal. Hydroelectric power is important in some areas, but it supplies only 5 percent of the U.S. total, and there aren't many sites left. Nuclear power supplies 8 percent; this should increase, but it won't reach the 30 percent once projected. Coal looks like the most likely source to produce electricity. It's cheaper to have coal burned in a power plant. Let that plant deal with the air pollution and melt electrically with no air pollution at all. Then, of course, we're at the mercy of a public utility. Industrial consumers have had service interrupted in both winter and summer months recently, and that trend is likely to continue.

Cost to produce a ton of glass by electric heat or oil heat is exactly the same, $21.00 a ton. When you bring in the carbon dioxide profit of $7.50 per ton of glass, the advantage is clearly with electric melting.

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Vice-President, APD

Re: Standard Costs

Copies to:

Although we know its limitations, we've historically used standard costs as a good estimate of actual costs. The latest figures I have say capacitors, 1.6 cents; integrated circuits, 45 cents; optical fiber cable, 10 cents a foot. I don't believe this is adequate any longer.

You and I should meet to agree on a new measure which more accurately reflects our actual costs.

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Plant Manager, Capacitors

Re: Aluminum Price Freeze

Copies to:

We're caught in the same bind as we were five years ago, the last time the price of aluminum was frozen. Since manufacturers can sell it overseas at a higher price, we're having to buy much more aluminum from foreign suppliers. We're paying almost 10 cents a pound more because we can't meet our aluminum needs within the United States.

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Optical Fibers

From: Director of Manufacturing, APD

Re: Information Report

Copies to:

Your temporary employment figures and raw materials costs are up. Is there an explanation?

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Director of Sales and Marketing, APD

Re: Transfer Price

Copies to:

VP, APD
PM-CAPACITORS

Our transfer price battle with Commercial Glass goes on. At the moment we're selling glass capacitors at somewhere between 10 to 12 cents per item, depending on the type of capacitor and the customer.

Commercial's argument is that they're only making a 2% profit, but I wonder if they're full costing on their overhead to make their profit margin artifically low. They're requesting a 7% increase in price, from a little over 1 cent to 1.1 cents per blank.

Also, they're saying that they can get 15% more profit by cutting us and making environmental glass (insulating, heat reflecting and heat absorbing). That's fine for them, but to get blanks on the open market will cost us 1.8 to 2.0 cents per blank, and that will price us right out of our markets. This one factor could cut our market share 30%.

I'll remind them again that the glass we use from them is simply a casing. As such, it represents only a fraction (15-25%) of our production costs.

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Director of Sales and Marketing, APD

Re: Price Cutting

Copies to:

What I told you the other day has been verified now. That dealer in Oklahoma is cutting our price. Instead of selling optical fiber cable at fifteen cents a foot, he's selling it at fourteen.

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: Director of Manufacturing, APD

Re: Capacitor Supply

Copies to:

Our independent dealers for capacitors are complaining about inadequate supply. The plant manager of capacitors gave the usual reasons. The plant is running at anywhere from 85 to 115 percent of capacity due to sales promotions, too many optional products, and screwy forecasts.

Anyway, our independent dealers are being squeezed because we always supply our house accounts first. Although a certain amount of this is inevitable, I think we'd better meet with the plant manager to see if we can work something out so it won't happen in the future.

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: Director of Manufacturing, APD

Re: Marketing Research

Copies to:

Thought you'd be interested in some of the findings in a recent report I read:

1. The average marketing research effort is less than 3½% of the product's development cost;

2. Of the advanced technology products that fail, 40% were due to marketing problems in American firms;

3. Eight main reasons were cited for a new product failure. Six of these eight were directly attributed to inadequate marketing;

4. In an Arthur D. Little study, seven of the nine major barriers to technological innovation in the U.S. economy dealt with marketing;

5. Another study showed that successful innovators had a much better understanding of a user's needs and pay much more attention to marketing.

Possible food for thought?

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LOOKING GLASS

Advanced Products Division

To: Vice-President, APD

From: Director of Product Development, APD

Re: Arsenic Release

Copies to:

Some of our research staff are concerned about possible arsenic release in our integrated circuit manufacturing process. Although I've tried to calm them down, they're threatening to go to the government about it. At this time, I have no idea whether their claims are valid or not.

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LOOKING GLASS

Advanced Products Division

To: President

From: Vice-President, APD

Re: Government Forms

Copies to:

Isn't there some kind of lobbying effort or something we can do about some of these government forms? On each, we report many of the same details that we report to other regulatory bodies. Each requires the same information but in a different form. Beyond that, the blasted regulations are written in such structured prose our staff can't even understand them.

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Vice-President, APD

Re: Census of Manufacturers Data

Copies to:

DIR-PD, APD
DIR-S&M, APD

I just got the figures on what was spent last year on the Census of Manufacturers data for the federal government. I was sickened. We spent 200 man hours.

There's got to be something we can do about this. Not only is much of what they want junk, but it's costing us a lot of money. Anyone got any ideas?

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AD-A063 057 CENTER FOR CREATIVE LEADERSHIP GREENSBORO NC F/G 5/1
LOOKING GLASS, INC. VOLUME II. ADVANCED PRODUCTS DIVISION. OPER--ETC(U)
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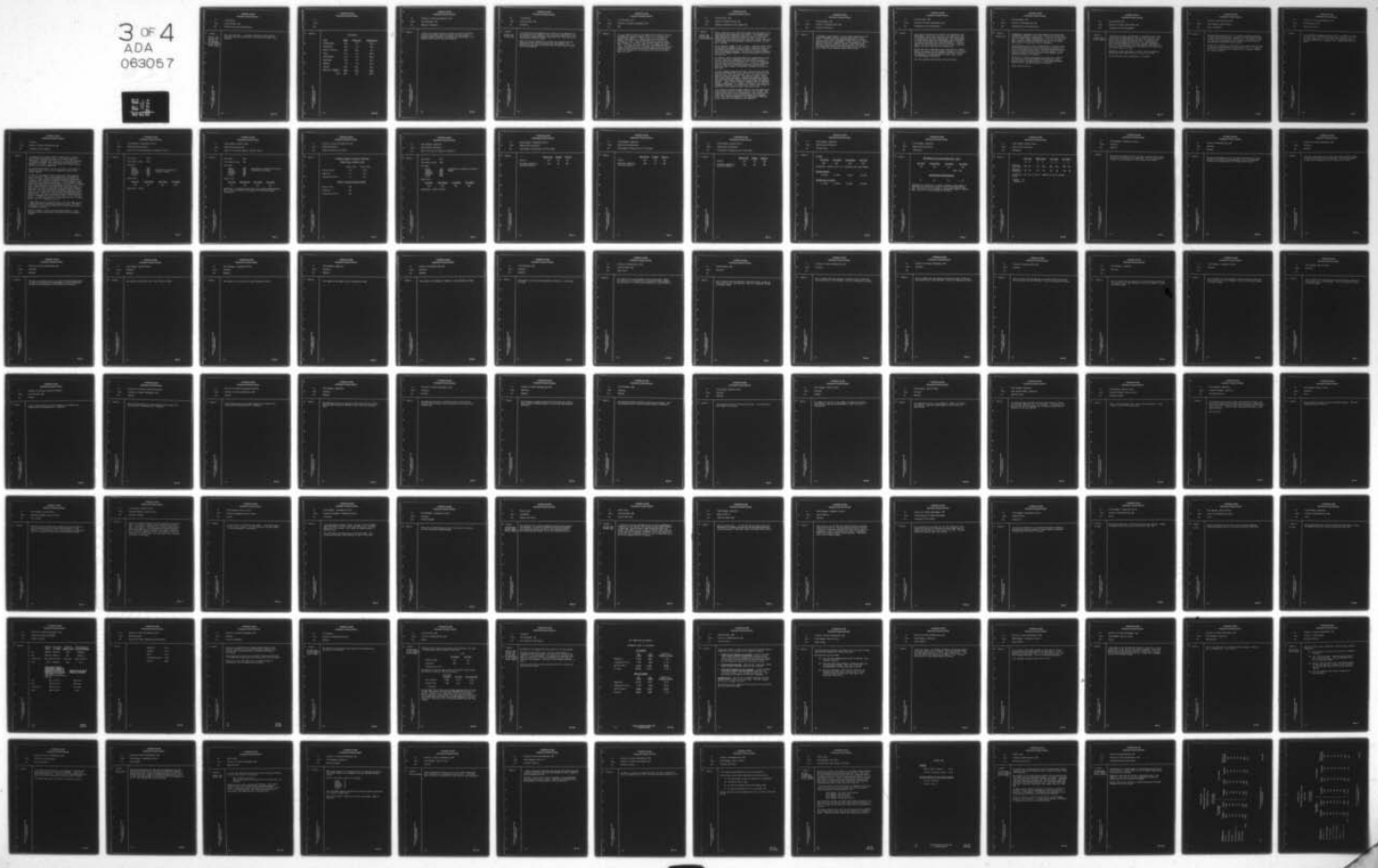

LOOKING GLASS
Advanced Products Division

To: Listed Below

From: Vice-President, APD

Re: Affirmative Action Balance Sheets

Copies to:

DIR-MFG, APD
DIR-S&M, APD
DIR-PD, APD
PM-CAPACITORS
PM-INT CIRCUITS
PM-OPT FIBERS

It's that time again. I need your affirmative action balance sheets for the year--same format as last year (last year's data attached).

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LOOKING GLASS
Advanced Products Division

To:

From:

Re:

Copies to:

EEOC REPORT

% of	Women	Minorities	Nonminorities
Professionals	28.0	3.0	69.0
Technicians	22.0	2.0	76.0
Office & Clerical	82.8	10.5	6.7
Sales	10.0	5.4	84.6
Craftspersons	12.0	6.0	82.0
Operations	16.0	7.9	76.1
Laborers	1.2	7.0	91.8
Service	62.6	18.4	19.0
Officials & Managers	22.0	3.8	74.2
Total	32.0	8.2	59.8

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LOOKING GLASS
Advanced Products Division

To: Director of Sales and Marketing, APD

From: Vice-President, APD

Re: Capacitor Promotions

Copies to:

I would like to meet with you to discuss your plans to promote our glass and ceramic capacitor products in their primary markets--consumer (basically electronic data processing), telecommunications, and military and aerospace.

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LOOKING GLASS
Advanced Products Division

To: Listed Below

From: Vice-President, APD

Re: Emergency

Copies to:

DIR-PD, APD
DIR-MFG, APD

I've just received an emergency call from one of our Manufacturing and Engineering staff members at our new optical fibers plant. We have failed to pass preliminary inspection of our facilities by the Environmental Protection Agency.

Would you two meet immediately to discuss the situation and then inform me of your plan for meeting these requirements? The Manufacturing and Engineering person said he would leave a message with the switchboard.

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LOOKING GLASS

Advanced Products Division

To: Vice-President, APD

From: Director of Product Development, APD

Re: EPA

Copies to:

I've just spent two hours on the phone with an official from the Environmental Protection Agency. They're still pushing us on antipollution measures. I told the guy, as I've told him a hundred times before, that removing the first 80 percent of pollutants is easy. With the last 20 percent, the cost curve goes straight up. He didn't seem willing to budge, and neither did I. It seems to me that we're just fire fighting on this issue. The problem we face is the same that almost all industrial companies face--to meet the pollution standards would drive the cost of our products out of the market and us out of business. What can we do?

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LOOKING GLASS

Advanced Products Division

To: Vice-President, APD

From: Director of Manufacturing, APD

Re: Japanese Integrated Circuit Competitors

Copies to:

DIR-PD, APD
DIR-S&M, APD
PM-INT CIRCUITS

There is beginning to be significant competition from Japan in the semiconductor and integrated circuit market. The Japanese have a major government-directed and financed R & D effort which has already doubled their production since last year. As yet, the Japanese have only about 2 percent of the United States' integrated circuit market while we have about 13 percent of theirs, but the gap is closing.

We're finding it tougher to sell in Japan. Japan has higher tariffs on semiconductor components than we do, and occasionally they complain about our quality. My beef, though, is with our limited access to Japanese technology. We have cross-licensing agreements with several Japanese companies, but the dribble back to us so far has been zero.

For example, Japan's government-backed VLSI program (which stands for very large scale integration) has the potential to put a million circuits on one integrated circuit chip--information on that will not be available to us at all. In the U.S., patentable work that comes out of government-sponsored research centers enters the public domain, but apparently Japanese law differs on that point.

In brief, Japanese companies have been licensed for all the semiconductor technology that exists, and they're not telling us what they're doing. There has been some talk in the industry about boycotting Japanese technology. One computer company I know of plans no more major purchases of Japanese semiconductors because this particular company supports the United States' semiconductor industry. I don't think a boycott of Japanese goods is possible, however. Almost every U.S. company, including us, uses some kind of Japanese component. As we well know, products that provide an edge easily find a market no matter what their origin.

I am starting to compile evidence, however, that the Japanese are price dumping--selling for lower prices here than at home. This brings up two issues for our consideration. One, should we consider cancelling our cross-licensing agreement with Japanese firms? Two, should we complain to the International Trade Commission about the price dumping of the Japanese?

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LOOKING GLASS

Advanced Products Division

To: Vice-President, APD

From: Director of Manufacturing, APD

Re: Project Coordinators

Copies to:

In response to your request, no, the project coordinators from Product Development have not improved appreciably in their skills. I don't think they understand the basics of project organization and matrix management. Often, they get in the way more than they help. Some of the guys in Manufacturing and Engineering who are working on the new optical fiber plant have complained bitterly to me about wasting their time due to poorly organized and sometimes superfluous meetings.

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LOOKING GLASS

Advanced Products Division

To: Vice-President, APD

From: Director of Product Development, APD

Re: Integrated Circuit Developments

Copies to:

Just a note to bring you up to date on two potentially major developments. One of our researchers is a camera buff, and in his spare time he's been fooling around with applications of charge coupled devices to photography. What he developed is a new kind of camera that takes photographs in the dark (the camera senses electrons instead of photons). There are cameras like this which are used in missiles and in computer memory, but what we have here is something new.

Another one of our researchers, who's been working in bubble memory, has come up with the damndest telephone I've ever seen. He swears the thing can take messages, send memos to people, file documents, try numbers again if they're busy, and do everything except bring coffee.

Let's get together and talk about the possibilities.

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LOOKING GLASS

Advanced Products Division

To: Vice-President, APD

From: Director of Manufacturing, APD

Re: Integrated Circuit Manufacturing

Copies to:

DIR-PD, APD

Although our integrated circuit chip manufacturing process has significantly improved in efficiency, we have run into one problem which seems almost insurmountable. If you want a chip to work fast, as do the computer manufacturers we sell to, you need to make it smaller so that the electrons have less far to travel. Unfortunately, in doing this, the chip overheats.

Some of the ways we've tried to overcome this in the past are by micropackaging chips and joining them together by plastic film to try to synchronize the signals. We've also experimented with liquid cooling and various kinds of switching devices. In the long run, though, we're going to have to have another kind of technology to handle this problem.

The Director of Product Development has briefed me on some of the work being done with electron beam lithography, charge coupled devices, and bubble memory. I barely understand what these are, but I do know that the chip overheats.

Anyway, what can we do?

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LOOKING GLASS
Advanced Products Division

To: Vice-President, APD

From: Director of Product Development, APD

Re: Integrated Circuit Developments

Copies to:

DIR-MFG, APD
PM-INT CIRCUITS

I believe we've made a breakthrough in integrated circuit technology which will decrease our cost per circuit tenfold. This one will have 150,000 transitors per chip for about the same cost we are now producing them (50 cents). Experimentally, we've had good success with this chip. Another advantage is that it can be manufactured on the same machine that designs it. Some of my staff say that within a few years we'll be able to put a million circuits on a chip.

The beauty of this, of course, is that it costs not much more whether you have 15,000 circuits on a chip or a million.

We can have this chip in production in six months.

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Plant Manager, Optical Fibers

Re: Loss of Engineers

Copies to:

National has hired away two of our foremost experienced engineers in optical fiber applications. Apparently the 50 percent increase in salary was more than they could turn down. Even after our lawsuit for their infringement on our patents, they seem intent on continuing the practice of stealing talent.

As you know, I believe the hiring away of our talent over the years is what has enabled them to directly compete with us. Although we can't stop them from hiring our people, we can, perhaps, improve our security measures.

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: Vice-President, APD

Re: Capacitor Delivery

Copies to:

I've received two complaints about lateness in capacitor delivery. In one instance, the capacitor shipment was four days late! In the other, three days. In both cases, the lateness resulted in delivery problems on our customers' end. Please check into this matter.

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LOOKING GLASS

Advanced Products Division

To: President

From: Director of Sales and Marketing, APD

Re: Integrated Circuit Markets

Copies to:

In response to your request about integrated circuit markets, they're almost impossible to figure. Our sales, like our competitors', go up and down like a yo-yo. Since the technology is constantly changing, any integrated circuit we put out is obsolete in two years. Prices are always declining and margins eroding due to fierce competition.

As we talked about before, the way to succeed in this market is through customer service since all competitors tend to have similar products.

In brief, the integrated circuit market hasn't looked good for us for some time. There is heavy competition from Japan; the market is fiercely competitive because the patent system works so loosely, there is plain stealing of products; extensive cross-licensing; and a muddy area in between. A new integrated circuit product can have a dozen imitators almost as soon as it is launched. This is what happened to our V1-20 project of two years ago. It wasn't worth our while to sue because the product would have been obsolete by the time we collected. Of course, there's a bright side, too. The loose patent system encourages innovation in electronics, and it takes a lot less capital to innovate here than in Manufacturing. Our recent estimates indicate it takes about four dollars in manufacturing costs for every dollar of R & D in fiber optics. It takes only one dollar in manufacturing costs for every dollar of R & D in integrated circuits.

I could ramble on, but the bottom line is this--last year our cost of goods sold was an astounding 97 percent of sales. The other two products in the division--capacitors and fiber optics--ran at a reasonable 65 percent.

This past quarter's results look encouraging, however. Sales picked up slightly, particularly from the military, our primary customer.

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Integrated Circuits

From: Administrative Assistant

Re: Daily % of Practical Capacity, Integrated Circuits

Copies to:

Last month: 101%

This month to date: 102%

Last week:

Monday	103%
Tuesday	100%
Wednesday	108%
Thursday	102%
Friday	99%

Explanation of production variance: Normal

Reject rate:

Last Year	Three Months	Last Month	This Month
30%	30%	29%	32%

Explanation: Normal

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Optical Fibers

From: Administrative Assistant

Re: Daily % of Practical Capacity, Optical Fibers

Copies to:

Last month: 102%

This month to date: 94%

Last week:

Monday	88%
Tuesday	90%
Wednesday	96%
Thursday	87%
Friday	88%

Explanation of production variance:
Raw materials shortage

Reject rate:

Last Year	Three Months	Last Month	This Month
9%	8%	10%	14%

Explanation: Tolerances on the glass fiber are more often unacceptable. The laser used for this purpose is affected by voltage fluctuations.

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LOOKING GLASS
Advanced Products Division

To: Director of Sales and Marketing, APD

From: Marketing Research

Re: Advertising Data (this month)

Copies to:

Frequency (Number of Times an Individual Reads, Sees, or Hears an Ad)

	Hardest 50%	Easiest 50%
Optical Fibers	5.0	20.0
Capacitors	5.1	20.1
Integrated Circuits	5.1	20.1

Percent of Target Audience Reached

Optical Fibers	86%
Capacitors	91%
Integrated Circuits	84%

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Capacitors

From: Administrative Assistant

Re: Daily % of Practical Capacity, Capacitors

Copies to:

Last month: 101%

This month to date: 104%

Last week:

Monday	98%	Explanation of production variance:
Tuesday	102%	Normal
Wednesday	104%	
Thursday	108%	
Friday	100%	

Reject rate:

Last Year	Three Months	Last Month	This Month
34%	38%	43%	43%

Explanation: Normal variance

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Integrated Circuits

From: Administrative Assistant

Re: Percentages of Energy Use as of This Month

Copies to:

	Natural Gas	Propane	Electric
Current	91%	0%	9%
Switchover Capability (existing capacity)	67%	0%	33%

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Capacitors

From: Administrative Assistant

Re: Percentages of Energy Use as of This Month

Copies to:

	Natural Gas	Propane	Electric
Current	84%	0%	16%
Switchover Capability (existing capacity)	68%	0%	32%

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Optical Fibers

From: Administrative Assistant

Re: Percentages of Energy Use as of This Month

Copies to:

	Natural Gas	Propane	Electric
Current	77%	8%	15%
Switchover Capability (existing capacity)	45%	15%	40%

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Capacitors

From: Administrative Assistant

Re: Delivery Data

Copies to:

On Time

This Month	Last Month	Three Months	Last Year
88%	90%	94%	94%

Explanation: Reject rate is up: production can't meet demand.

Average Lateness

2.2 days	1.9 days	.8 days	1.0 days

Average Days in Transit

3.1 days	2.9 days	3.0 days	3.0 days

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Capacitors

From: Administrative Assistant

Re: Information

Copies to:

RAW MATERIALS UTILIZATION (BASE YEAR - 1975)

Last Year	Three Months	Last Month	This Month
118	130	132	140

BASE = 100

INFLATION RATE (RAW MATERIALS)

4.1	4.2	4.3	4.2

The amount of raw materials it takes to produce a given number of capacitors has risen from a factor of 118 to 140 during the last year. The cause of this increase in raw materials usage is unknown. Very little of it can be explained by inflation.

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Optical Fibers

From: Administrative Assistant

Re: Employment

Copies to:

	LAST YEAR		THREE MONTHS		LAST MONTH		THIS MONTH	
	A*	B*	A	B	A	B	A	B
Employees (Full-time)	255	255	279	280	280	280	280	280
Employees (Temporary)	80	82	84	84	84	90	98	90

Explanation: Full-time is normal. Temporary up due to unknown causes.

* Actual = A
Budgeted = B

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Integrated Circuits

From: Secretary

Re: Reminder

Copies to:

The yearly retirement party for all those with more than 15 years service with the plant is this Wednesday. You will be expected to make a brief presentation, not to exceed five minutes.

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LOOKING GLASS
Advanced Products Division

To: Director of Manufacturing, APD

From: Secretary

Re: Reminder

Copies to:

The yearly retirement party for all those with more than 15 years service with the plant is next Wednesday. You will be expected to make a brief presentation, not to exceed five minutes.

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LOOKING GLASS

Advanced Products Division

To: Director of Product Development, APD

From: Secretary

Re: Reminder

Copies to:

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: Secretary

Re: Reminder

Copies to:

The yearly retirement party for all those with more than 15 years service with the plant is next Wednesday. You will be expected to make a brief presentation, not to exceed five minutes.

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LOOKiNG GLASS

Advanced Products Division

To: Plant Manager, Optical Fibers

From: Secretary

Re: Reminder

Copies to:

Your speech to the Rotary Club is next Friday at 12:00.

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Integrated Circuits

From: Secretary

Re: Reminder

Copies to:

Your speech to the Lions Club is next Thursday at 12:00.

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Capacitors

From: Secretary

Re: Reminder

Copies to:

Your speech to the Kiwanis Club is tomorrow at 12:00.

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LOOKING GLASS
Advanced Products Division

To: Director of Manufacturing, APD

From: Secretary

Re: Reminder

Copies to:

Your speech to the Chamber of Commerce is next Thursday at 12:00.

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LOOKING GLASS

Advanced Products Division

To: Vice-President, APD

From: Secretary

Re: Reminder

Copies to:

Your speech to the Future Businesspeople of America is next Friday at 12:00.

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LOOKING GLASS
Advanced Products Division

To: Director of Manufacturing, APD

From: Vice-President, APD

Re: Plant Visits

Copies to:

It's time for our semi-irregular visits to the plants. Would you please set up a schedule with the respective plant managers for our visits? I'll clear up my schedule so I can go with you.

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LOOKING GLASS

Advanced Products Division

To: Vice-President, APD

From: Secretary

Re:

Copies to:

Just a reminder that the quarterly anniversary dinner to hand out the ten-year pins is next Thursday. You will be expected to make a 15-minute speech.

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: Secretary

Re:

Copies to:

Just a reminder that the quarterly anniversary dinner to hand out the ten-year pins is next Thursday. You will be expected to attend.

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LOOKING GLASS

Advanced Products Division

To: Director of Product Development, APD

From: Secretary

Re:

Copies to:

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Secretary

Re:

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Capacitors

From: Secretary

Re:

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Integrated Circuits

From: Secretary

Re:

Copies to:

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Optical Fibers

From: Secretary

Re:

Copies to:

Just a reminder that the quarterly anniversary dinner to hand out the ten-year pins is next Thursday. You will be expected to make a 15-minute speech.

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LOOKING GLASS
Advanced Products Division

To: Director of Training, Corporate Personnel

From: Vice-President, APD

Re: OD Help

Copies to:

Just a follow-up note to see what progress you've made on the organizational development help I requested.

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LOOKING GLASS

Advanced Products Division

To: Director of Training, Corporate Personnel

From: Director of Product Development, APD

Re: OD Help

Copies to:

Just a follow-up note to see what progress you've made on the organizational development help I requested.

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LOOKING GLASS

Advanced Products Division

To: Director of Training, Corporate Personnel

From: Director of Sales and Marketing, APD

Re: OD Help

Copies to:

Just a follow-up note to see what progress you've made on the organizational development help I requested.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Capacitors

From: Secretary

Re: Reminder

Copies to:

The membership director of the Lions Club called back this morning. Have you made the decision whether or not to join this organization?

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LOOKING GLASS

Advanced Products Division

To: Director of Product Development, APD

From: Secretary

Re: Reminder

Copies to:

The membership director of the Rotary Club called back this morning. Have you made a decision whether or not to join this organization?

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: Secretary

Re: Reminder

Copies to:

The President of Computers Unlimited called back this morning. Have you made a decision whether or not to join their Board of Directors?

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LOOKING GLASS

Advanced Products Division

To: Vice-President, APD

From: Secretary

Re: Reminder

Copies to:

The President of Bond Telephone called back this morning. Have you decided whether or not to join their Board of Directors?

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Optical Fibers

From: Secretary

Re: Reminder

Copies to:

Are you going to chair the United Fund drive? I've received two calls about it this week.

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Optical Fibers

From: Secretary

Re: Reminder

Copies to:

The membership director of the Chamber of Commerce called back this morning. Have you decided whether or not to join this organization?

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Optical Fibers

From: Secretary

Re: Reminder

Copies to:

The membership director of the Chamber of Commerce called back this morning. Have you decided whether or not to join this organization?

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Capacitors

From: Plant Superintendent, Capacitors

Re: Radiation Leaks

Copies to:

I'm concerned about possible radiation leaks around the conveyer belt when the capacitors are x-ray inspected. I'm bringing in a crew to check this out tonight, and I'm going to quietly have all employees in the area examined.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Optical Fibers

From: Personnel Manager, Optical Fibers

Re: Personnel Problem

Copies to:

Jimbo is off on another drunk. We've tried suspensions; I think it may be time for final termination.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Capacitors

From: Personnel Manager, Capacitors

Re: Personnel Policies

Copies to:

Our personnel policies don't seem to be working any longer. Our grievance procedures and different penalties, such as suspensions, don't seem to be having any effect on our absentee rate or drunkenness on the job. I think we need a more positive format, a more positive policy.

Got any ideas?

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Optical Fibers

From: Secretary

Re: Visit

Copies to:

Some customers are going to be here from Argo tomorrow. They want to meet with you at 1:00 p.m.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Optical Fibers

From: Engineering Manager, Optical Fibers

Re: M & E Request

Copies to:

Manufacturing and Engineering has asked to send three people to us to work on projects to increase line efficiency. In my opinion, we don't need them, and since we'd have to pay for their salaries, we should turn the Director of Manufacturing down.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Optical Fibers

From: Personnel Manager, Optical Fibers

Re: Personnel Problem

Copies to:

Two of our foremen (persons--a man and a woman) are having an affair. Ordinarily I wouldn't care; they're of age and all that. The problem is that about once a month they are out of work on the same day. Their absences are always legitimate; both of them have enough accumulated sick leave to take care of it and their production is fine. The problem is that it's become such a running joke on the floor that I don't think we can ignore it any longer.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Optical Fibers

From: Engineering Manager, Optical Fibers

Re: Copier

Copies to:

I can't seem to fix the copier any longer. I think we're going to have to get a new one. All the secretaries are angry about it, and our paperwork is way behind.

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Integrated Circuits

From: Engineering Manager, Integrated Circuits

Re: A Problem

Copies to:

I may wring Quality Control's neck! The guy is so intransigent about everything I do that I can't even talk to him. It seems everything I do is wrong. You'd better do something before I break his head.

The issue seems to be the quality of the V1-21 chips. He's already getting 30% of them rejected, so what is his gripe?

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Integrated Circuits

From: Secretary

Re: Customer Request

Copies to:

Three of our customers want to know if you can get ten tickets for the university's homecoming game.

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LOOKING GLASS

Advanced Products Division

To: Those Listed

From: Switchboard

Re: Contact with Plants

Copies to:

PM-CAPACITORS
PM-OPT FIBERS
PM-INT CIRCUITS

The switchboard is collecting messages from your plants during your absence. Any specific questions you have about ongoing plant operations may be directed to the telephone operator. Any information which comes in will then be passed on to you.

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LOOKING GLASS

Advanced Products Division

To: Those Listed

From: Vice-President, APD

Re: Optical Fiber Bid

Copies to:

DIR-S&M, APD
DIR-MFG, APD

I received a call this afternoon to see if we are interested in bidding on the new optical fiber project on which Bond Telephone is embarking. We would have to begin production within six months, which means, of course, that our optical fiber plant has to pass pollution standards. Although I'd like very much for us to get this bid, we should only do it if we're assured that we'll be in full production within six months.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Capacitors

From: Quality Control

Re: Capacitor Reject Rate

Copies to:

Normal variance, hell! I'll tell you why our reject rate is up. The dummies in Packaging and Delivery are dropping the blasted trays of capacitors! They don't seem to care what they're doing.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Integrated Circuits

From: Quality Control

Re: Shipping

Copies to:

Just a note to let you know that the V1-21 chips are meeting standards beautifully. The only problem we've had is really a funny one. Both the V1-20 and V1-21 chips are so similar in appearance (as well as structure) that some of the people in shipping are having trouble telling them apart. That hasn't been a major problem, though.

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LOOKING GLASS
Advanced Products Division

To: Director of Product Development, APD

From: Product Research, Product Development

Re: Integrated Circuit Market

Copies to:

Our projections of the market for the new integrated circuit process are that we will increase our market share about 1%, increase profits 42%, that our costs will rise 4%. In other words, this project looks like a winner.

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LOOKING GLASS
Advanced Products Division

To: Plant Manager, Integrated Circuits

From: Quality Control

Re: Inspection

Copies to:

Our routine inspection of our production processes revealed no releases which pose any present or future danger to employees. Everything got a clean bill of health.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Integrated Circuits

From: Director of Manufacturing, APD

Re: Visit

Copies to:

VP, APD

The Vice-President and I will be visiting you next Thursday. Please be prepared to brief us on your activities at that time.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Optical Fibers

From: Director of Manufacturing, APD

Re: Visit

Copies to:

VP, APD

The Vice-President and I will be visiting you next Wednesday.
Please be prepared to brief us on your activities at that time.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Capacitors

From: Director of Manufacturing, APD

Re: Visit

Copies to:

VP, APD

The Vice-President and I will be visiting you next Friday. Please be prepared to brief us on your activities at that time.

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LOOKING GLASS

Advanced Products Division

To: Director of Product Development, APD

From: Research, Product Development

Re: Energy Estimates

Copies to:

	START-UP COSTS	EFFICIENCY OF OVENS	POLLUTION CONTROL COSTS	EFFECTIVENESS OF POLLUTION CONTROL
Oil	Moderate	Moderate	High	Moderate
Gas	Moderate	Moderate	Low	Moderate
Electricity	Very High	Very High	Very High	Nearly Perfect
Coal	High	Moderate	High	Low

	TOTAL COST OF ENERGY REQUIREMENTS (INCLUDING ACQUISITION, START-UP & OPERATING COSTS) FOR NEXT FIVE YEARS (including melting unit and pollution control)	FEASIBILITY OF USE OF ENERGY IN YEAR 2000
Oil	$22.1 million	Near zero
Gas	$18.9 million	Near zero
Electricity	$38.0 million	Very high
Coal	$20.0 million	High

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Y-1
Y-2

APD-85
(IGD-88)

LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: Market Research

Re: Forecasts of Major Industries (next quarter)

Copies to:

Automotive	+4.1%
Computer	-5.2%
Steel	+2.1%
Telecommunications	-3.8%
Housing	+0.8%

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LOOKING GLASS

Advanced Products Division

To: Director of Product Development, APD

From: Research

Re: Pollution Standards

Copies to:

Until we are prepared to use ultimate energy sources (solar, nuclear), the only way we can meet pollution standards is by electric ovens using electrostatic precipators for most of our melting.

Even though the start-up costs are almost double, we spend very little overtime on pollution control plus we get CO_2 as a product.

Projecting to the year 2000, there's no question about it. Electricity is by far the most cost effective.

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Y-1
Y-2

APD-87
(IGD-88)

LOOKING GLASS
Advanced Products Division

To: Listed Below

From: Director of Manufacturing, APD

Re: Meeting

Copies to:

PM-CAPACITORS
PM-INT CIRCUITS
PM-OPT FIBERS

Our meeting to discuss your plant operations and problems will be at 2 p.m. in my office.

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LOOKING GLASS
Advanced Products Division

To: Vice-President, APD

From: Director of Manufacturing, APD

Re: Unions

Copies to:

PM-CAPACITORS
PM-INT CIRCUITS
PM-OPT FIBERS

Although we don't need to worry about unions presently, the trend is disconcerting from this month's union vote:

	% YES	
	This Month	Last Year
Optical Fibers	31%	8%
Capacitors	29%	18%
Integrated Circuits	-	-

The problem is that our wage structure has fallen slightly below the national average for the glass industry.

	Five Years From Now	This Year	Five Years Ago
Glass Industry	8.86*	6.06	4.26
Looking Glass	7.82*	5.93	5.03

*projected

We paid about $10.6 million to our hourly employees this past year in wages and benefits (an additional $200,000 would bring us to parity). However, if our projections are close, we would be $1.6 million shy of parity within five years with our present work force of 800 and $1.4 million shy with the employees in our two new plants. Obviously, this is what makes workers feel they need a union.

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LOOKING GLASS
Advanced Products Division

To: President

From: Vice-President, APD

Re: Net Income for Last Quarter

Copies to:

DIR-MFG, APD
DIR-S&M, APD
DIR-PD, APD
PM-CAPACITORS
PM-INT CIRCUITS
PM-OPT FIBERS

Attached are the comparative sales figures for the last quarter.

This was our best quarter ever. Our cost savings moves in integrated circuits (primarily the laying off of the 3rd shift) paid off. The slight dropoff in income for the capacitors plant seems attributable to raw materials problems and to a need to increase prices somewhat. The optical fibers market continues to grow.

Looking to the future, we anticipate $5.6 million in profits for the division this year.

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NET INCOME FOR LAST QUARTER

COMPARATIVE SALES (In Thousands)

LAST QUARTER

	Net Sales	Net Income	Income as a Percent of Sales
Capacitors	$1,994	$220	11.0%
Integrated Circuits	1,785	(200)	-11.2%
Optical Fibers	6,317	1,441	22.8%
Division	$10,096	$1,461	14.5%

PREVIOUS QUARTER

	Net Sales	Net Income	Income as a Percent of Sales
Capacitors	$2,100	$275	13.1%
Integrated Circuits	1,700	(750)	-44.1%
Optical Fibers	6,050	1,375	22.7%
Division	$9,850	$900	9.1%

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LOOKING GLASS
Advanced Products Division

To: Vice-President, APD

From: Director of Manufacturing, APD

Re: Price Increase

Copies to:

As per your request, I have tried to outline the primary factors supporting a price increase for all capacitor products.

1. Actual and anticipated cost increases. Costs of raw materials, energy, salaries, maintenance, shipping, and our reject rates have all increased and will continue to do so. We anticipate a minimum of 8% and a maximum of 10% overall cost of production increase over the next 12 months.

2. Previous price increases. Over the last three years, annual price increases have kept pace with cost increases.

3. Anticipated competitive price increases. Since our competitors face virtually the same economic conditions, we anticipate dramatic price increases on their part. This would make an increase by us look quite reasonable.

Recommendations: Raise prices on ceramic capacitors from the present 2.5 to 3 cents to 3 to 3.6 cents. This 20% increase will net out at about 14% profit.

Raise prices on glass capacitors from 10-12 cents to 12-14 cents. We'll net about 7% on these.

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LOOKING GLASS
Advanced Products Division

To: Director of Sales and Marketing, APD

From: Plant Manager, Optical Fibers

Re: Sales Problem

Copies to:

I've been getting complaints that some of the sales reps are doing lousy follow-up jobs on our military contracts.

The complaints are as follows:

(1) Navy off-shore communications reports bi-monthly visits instead of monthly.

(2) They also report being unable to locate the sales rep on maintenance problems. They cite a two- and a three-day delay in finding out whom to contact.

(3) One of the Pentagon liaison officers told me a rep confided to him that once a contract was in force, he had no reason to follow up, since there is no extra pay for servicing.

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: Plant Manager, Capacitors

Re: Sales Problem

Copies to:

I have just sent a rush shipment to NASA at considerable expense to my plant ($500 in extra freight). The sales rep who filled the order never turned it in--or at least we never got it. The order was placed four months ago and NASA is livid. The purchasing officer talked about breach of contract.

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: Plant Manager, Integrated Circuits

Re: Sales Problem

Copies to:

As if we don't have enough problems, we have had four orders cancelled within the past week for the same reason. All were ordered over a month ago as part of a continuing contract. We never received the orders. All are in the Northeast Region.

I lost $23,000 in business due to this foul up.

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LOOKING GLASS

Advanced Products Division

To: Director of Product Development, APD

From: Plant Manager, Optical Fibers

Re: Screen

Copies to:

I think part of our raw materials problem is caused by a sifting screen which is too fine for the coarser chemicals. The mixing people have told me they have much more residue than a year ago. Can you check around corporate and see if anyone has a recommendation for a different screen?

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LOOKING GLASS

Advanced Products Division

To: Director of Product Development, APD

From: Plant Manager, Capacitors

Re: Raw Materials

Copies to:

We're losing 20% of our raw materials due to wastage. There's a ton of residue a day. Can you help?

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: District I Sales Manager

Re: Personnel Problem

Copies to:

District IV
Sales Manager

The sales staff is near insurrection. Here are their specific complaints:

(1) No motivation to follow up on contracts--no monetary incentive.

(2) Poor invoicing system. Invoices come from them to me to you to the plant. They are frequently lost and we always get blamed.

(3) Having to make too many calls. The average number of calls per week has increased from 20 to 37 over the last two years while staff size has remained constant.

(4) Military paperwork takes them an average of 12 hours per week.

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: District IV Sales Manager

Re: Loss of Personnel

Copies to:

I had lunch with the District I Sales Manager in Chicago, and while commiserating, he told me his problems. I agree with memo APD-97 completely. I have lost four salespeople (all with three or more years experience) during the past six months.

The reasons they gave are the same as the ones he listed.

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: Plant Manager, Integrated Circuits

Re: Losing Money

Copies to:

PM-SPECIALTY

We are losing money on the sheet glass we manufacture for the Industrial Glass Division. The glass we provide for spacecraft and microwave ovens is high silica and the price of silica is up 20% over last year. They paid $40,000 last month and our cost of goods sold was $38,000. The 5% margin left isn't covering our G & A. They're going to have to go outside.

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LOOKING GLASS

Advanced Products Division

To: Those Listed

From: Director of Product Development, APD

Re: Research Staff

Copies to:

DIR-PD, CGD
DIR-PD, IGD

It's no secret that staff are trying to switch from your division to mine. The reasons I've heard are:

- APD is where the action is;
- APD has the highest profit margin--let's go where we'll be rewarded.

Needless to say, this is causing hard feelings. We're being called pirates; you're being accused of damaging people's careers. Surely we can work out something to stop this. We're all in this thing together; these rumors are hurting us all individually and Looking Glass as an organization.

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LOOKING GLASS
Advanced Products Division

To: Director of Sales and Marketing, APD

From: Plant Manager, Capacitors

Re: Delivery Problem

Copies to:

When orders come to us in bunches we have to reschedule deliveries. The freight people try to cooperate, but they only have so many trucks.

Here are last week's orders as an example:

Monday	14
Tuesday	0
Wednesday	3
Thursday	22
Friday	1

This overloads shipping, overworks our production people, and costs us in special freight fees.

This has only been a problem for the past three weeks. What is going on?

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LOOKING GLASS

Advanced Products Division

To: Director of Sales and Marketing, APD

From: Plant Manager, Optical Fibers

Re: Invoices

Copies to:

PM-INT CIRCUITS

I don't know what's causing it, but I got 4 orders today which were intended for the Integrated Circuits plant. I've called them in, so that's no problem, but there must be some explanation.

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LOOKING GLASS
Advanced Products Division

To: Director of Sales and Marketing, APD

From: Sales Manager, District IV

Re: Sylvester Electric

Copies to:

I finally cornered a Sylvester executive and she couldn't give me a single reason other than delivery problems for their complaints about Integrated Circuits.

My guess is that they're trying to squeeze us into concessions when contract time rolls around. They know our market position has eroded and I believe they're trying to hustle us.

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LOOKING GLASS
Advanced Products Division

To: Director of Sales and Marketing, APD

From: Director of Product Development, APD

Re: Sylvester Electric

Copies to:

Sylvester is grousing to Commercial about the quality and service of our integrated circuit line. Why don't they ever complain to us?

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Plant Manager, Optical Fibers

Re: Internal Task Force

Copies to:

I am attaching memo CGD-65A & B for your information.

As you know, my plant has always had the following policy:

1) unlimited breaks as long as production is acceptable;

2) free drinks twice a day;

3) net shirts provided to those who request them;

4) no special dispensation--it's just another job.

Do you have any further recommendations for me to take to the task force?

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APD-105
(CGD-65A&B)

LOOKING GLASS

Commercial Glass Division

To: Those Listed

From: Plant Manager, Flat Glass

Re: Internal Task Force on Heat and People

Copies to:

VP, CGD
PM-SPECIALTY
PM-OPT FIBERS
PM-INT CIRCUITS

As we are all aware, the furnaces in our plants produce enormous heat (the working area around them averages 95°). Each of us has had problems with heat prostration, etc., among our people. In spite of the best ventilation systems we can devise, it's always going to be hot. We don't have a general policy regarding the rights of the people who work around these furnaces; each plant seems to handle the problem differently, some allowing unlimited breaks while others just play it by ear.

I have been asked by the Vice-President of Commercial Glass Division to chair a task force to develop some policy guidelines. Task force members, including myself, are:

Plant Manager, Flat Glass (chairperson)
Plant Manager, Specialty Glass
Plant Manager, Optical Fibers
Plant Manager, Integrated Circuits.

Jobs around the furnaces are tough, high turnover positions. We should develop some notions about breaks, special dispensation, water, or other possible means for reducing the unpleasantness of the work.

Can we get together later today to start working on the problem? At a minimum, we should lay out what we need to do to develop a policy. Attached are some figures that should get us started.

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G-5
G-2

CGD-65A
(APD-105)

FURNACE HEAT

TURNOVER

Overall hourly turnover: 12.3%

Turnover of furnace workers: 40.1%

TRAINING REQUIRED FOR NEW FURNACE WORKERS

16 hours classroom

24 hours on-line

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LOOKING GLASS

Advanced Products Division

To: Those Listed

From: Director of Manufacturing, APD

Re: Melting Furnace Life

Copies to:

PM-CAPACITORS
PM-INT CIRCUITS
PM-OPT FIBERS

Two months ago a cross-divisional task force consisting of representatives from IGD and CGD was formed to examine melting furnace life expectancy.

The average life of large melting furnaces (such as those in the Flat Glass and Lighting Products plants) is 7.6 years. Replacing a worn furnace has historically involved four phases: cool down, tear down, rebuilding, and start up. The figures we could find established the following minimum times: cool down, seven days; tear down, seven days; rebuilding, three weeks; start up, seven days.

The whole process involves a minimum of 6 weeks to a maximum of 15 weeks. Using current technology and current prices, the total cost is $3,000,000. Incorporating new technologies, such as the new electric melters, will add $1.5-2.0 million.

Since our division is too new to have any of our own figures, we have to rely on theirs. I'm passing this along as *information*. I'm unaware that we have any furnace problems.

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Director of Sales and Marketing, APD

Re: Attached Quarterly Sales Report

Copies to:

PM-CAPACITORS
PM-OPT FIBERS
PM-INT CIRCUITS

Integrated circuit sales appear to have bottomed out and are on the rise again. Military sales are up 14% despite some invoicing and delivery problems.

Capacitors sales were off 5% due to forecasting error. The downturn in sales to military and independents (15% and 7%, respectively) is due to delivery problems.

Optical fibers sales continue to exceed expectations with Bond Telephone up 10% this quarter.

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LOOKING GLASS

ADVANCED PRODUCTS DIVISION

INTEGRATED CIRCUITS

SALES REPORT
(In Thousands)

	SAME QUARTER LAST YEAR		LAST QUARTER			
Customer List	Forecast	Actual	Forecast	Actual	Variance	Percent of Total Sales
Military	$867	$502	$527	$601	+14%	34%
BA Electronics	204	184	136	138	+2%	8%
Sylvester	204	180	136	145	+7%	8%
Semiconductors, Inc.	153	140	102	100	-2%	6%
Independents	459	467	340	334	-2%	18%
Miscellaneous	663	602	459	467	+2%	26%
TOTAL	$2550	$2075	$1700	$1785	+5%	100%

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LOOKING GLASS

ADVANCED PRODUCTS DIVISION

CAPACITORS

SALES REPORT
(In Thousands)

	SAME QUARTER LAST YEAR		LAST QUARTER			
Customer List	Forecast	Actual	Forecast	Actual	Variance	Percent of Total Sales
Military	$358	$365	$378	$322	-15%	16%
Lackey Aerospace	362	364	378	400	+6%	20%
RT Television	180	182	189	178	-6%	9%
Zephyr Television	164	163	168	160	-5%	8%
Bentley Aerospace	160	162	168	169	0%	8%
Computron	162	161	168	158	-6%	8%
Independent & Misc.	622	628	651	607	-7%	31%
TOTAL	$2008	$2025	$2100	$1994	-5%	100%

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LOOKING GLASS

ADVANCED PRODUCTS DIVISION

OPTICAL FIBERS

SALES REPORT
(In Thousands)

Customer List		SAME QUARTER LAST YEAR Forecast	SAME QUARTER LAST YEAR Actual	LAST QUARTER Forecast	LAST QUARTER Actual	LAST QUARTER Variance	Percent of Total Sales
Bond Telephone		$917	$1330	$1755	$1930	+10%	30%
Military		1055	871	1210	1300	+7%	21%
Rex Telephone		367	390	484	486	0%	8%
Computron		367	358	423	430	+2%	7%
Independents		1146	982	1270	1191	-6%	19%
Miscellaneous		733	744	908	980	+8%	15%
	TOTAL	$4585	$4675	$6050	$6317	+4%	100%

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LOOKING GLASS
Advanced Products Division

To: Director of Manufacturing, APD

From: Plant Manager, Integrated Circuits

Re: Cost of Goods Manufactured

Copies to:

We experienced no production problems this quarter. Running a skeleton crew on the third shift (to keep the melting units at the proper temperature) kept us ready to produce each morning.

Laying off the third shift enabled us to sell our accumulated inventory and cut labor costs. Third shift workers on lines 1 and 2 will return to work next week.

COST OF GOODS MANUFACTURED
(In Thousands)

INTEGRATED CIRCUITS

LAST QUARTER

	Budget	Actual	Variance	% of Mfg. Costs
Direct Raw Materials	$495	$512	+3%	31%
Direct Labor	578	570	+1%	34%
Variable Overhead (utilities and benefits)	280	266	-5%	16%
Fixed Overhead (depreciation, taxes, rent, allocated overhead)	297	305	+3%	19%
Total	$1650	$1653	0%	100%

	Standard	Current
Finished Goods Inventory Level	30 days	28 days

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Plant Manager, Capacitors

Re: Cost of Goods Manufactured

Copies to:

Our raw materials problems resulted in an unacceptable variance this quarter (19%). Wastage and a high reject rate resulted in using more materials per unit produced than is standard. I am giving this problem my full attention.

COST OF GOODS MANUFACTURED
(In Thousands)

CAPACITORS

LAST QUARTER

	Budget	Actual	Variance	% of Mfg. Costs
Direct Raw Materials	$411	$489	+19%	34%
Direct Labor	480	475	-1%	33%
Variable Overhead (utilities and benefits)	247	240	-3%	17%
Fixed Overhead (depreciation, taxes, rent, allocated overhead)	232	236	+2%	16%
Total	$1370	$1440	+5%	100%

	Standard	Current
Finished Goods Inventory Level	30 days	34 days

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LOOKING GLASS
Advanced Products Division

To: Director of Manufacturing, APD

From: Plant Manager, Optical Fibers

Re: Cost of Goods Manufactured

Copies to:

Variances for this quarter are acceptable but annoying, particularly for raw materials and labor. I am looking into these variances thoroughly.

COST OF GOODS MANUFACTURED
(In Thousands)

OPTICAL FIBERS

LAST QUARTER

	Budget	Actual	Variance	% of Mfg. Costs
Direct Raw Materials	$1575	$1683	+7%	41%
Direct Labor	866	913	+5%	22%
Variable Overhead (utilities and benefits)	630	640	+2%	16%
Fixed Overhead (depreciation, taxes, rent, allocated overhead)	867	868	0%	21%
Total	$3938	$4104	+4%	100%

	Standard	Current
Finished Goods Inventory Level	30 days	21 days

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LOOKING GLASS
Advanced Products Division

To: Director of Manufacturing, APD

From: Plant Manager, Integrated Circuits

Re: Soda Ash Crisis

Copies to:

PM-CAPACITORS
PM-OPT FIBERS

We're in trouble. I'm attaching a memo I just saw (IGD-57) explaining our problem. We only have a 10-day supply; Capacitors has 11 and Optical Fibers, 6. Commercial gets their soda ash from Cyborg so maybe we can work up a deal with them.

If not, we'll have to pay dearly. I called two independent suppliers. They quoted me $36.50 and $36.35 a ton. This is $3.02 to $3.17 more than we're now paying.

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APD-111
(IGD-57)

LOOKING GLASS

Industrial Glass Division

To: Plant Manager, Auto Glass

From: Plant Controller, Auto Glass

Re: Soda Ash Crisis

Copies to:

We have a crisis on our hands! The rep at Mountain Minerals, Inc., our supplier of soda ash, just called to tell me they won't be able to process any more soda ash for the next four weeks, because somebody dynamited all their mining equipment last night. Because it is so specialized, it's highly unlikely they will be able to get it replaced before four weeks, if then. We currently have a 6-day supply (at 150 tons per day).

The only viable option seems to be to borrow from the other divisions. I'm sure the Commercial Glass Division has surplus. By the way, it would be best for us to get the soda ash delivered by train. Our storage silos hold only a 3-day supply.

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B-1
B-4

IGD-57
(APD-111)

LOOKING GLASS
Advanced Products Division

To: Director of Sales and Marketing, APD

From: Market Research

Re: Competitive Moves

Copies to:

Our final report will be to you in a month, but I thought you'd like to see some of our early conclusions:

1) High entry costs associated with optical fibers technology make it unlikely that any new major competitors will emerge in the foreseeable future. Our patents will further discourage competitors trying to invent around us. This product line looks solid for at least five years. Price increases of 10-12% (except with major customers) should not injure our market position.

2) Capacitors products will remain stable. The handful of major consumers and suppliers are already well balanced and the market is likely to continue its slow, steady growth. However, unless prices are kept low, and quality high, our market share will plummet in this fiercely competitive market. Price increases of more than 6-8% should be discouraged.

3) Integrated circuits are so volatile that the only way to stay ahead is through innovative product development. PD has a new process that looks like a sure winner. They can be in production in six months. This new chip must be marketed aggressively now. Price increases, other than real cost increases, should be discouraged. The chips must be produced at a lower cost per circuit to keep price increases at less than 4%.

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LOOKING GLASS

Advanced Products Division

To: Vice-President, APD

From: Director of Sales and Marketing, APD

Re: Forecasts

Copies to:

DIR-MFG, APD

Here's what we've come up with:

Optical fiber markets should increase dramatically for the next three years (12-15%) then level off at about 9%. We are beginning to get too dependent on Bond Telephone (30%) and the military (21%) for sales. If either cuts us at the end of the year, we're in trouble.

Capacitor markets may be narrowing on us. Most of the staff feels we should emphasize the lower quality ceramic capacitors and stay away from the more exotic glass capacitors. Our recommendation is to push big in the TV/radio markets and ease off on computer and military contracts (presently about 60% of our sales). Even so, we anticipate 8-10% growth.

Although military sales have picked up again, our integrated circuits marketing must emphasize industrial customers to avoid last year's fiasco with the V1-20 project. The new chip Product Development is touting should sell well if we can disassociate it from customer memories of V1-20.

We could increase sales by as much as 40% if this new chip performs as well as predicted.

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Plant Manager, Capacitors

Re: $100,000 Misunderstanding

Copies to:

DIR-S&M, APD

Delivery and invoicing problems accounted for almost $100,000 in lost sales last quarter.

Summary:

1) Two contracts were cancelled for excessive delay ($40,000).

2) Four shipments were too late for the proper reporting period due to failure to receive invoices on time ($35,000).

3) $25,000 were returned for reasons such as breakage, or wrong product delivered. Most of this seems related to trying to fill as many as 22 orders in one day. Breakage and error are inevitable.

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LOOKING GLASS

Advanced Products Division

To: Director of Manufacturing, APD

From: Plant Manager, Optical Fibers

Re: Bond Telephone

Copies to:

My contact at Bond told me confidentially that they will demand a 10% price cut at the end of the year or they'll slash their order in half and buy the rest from National. Since they purchased $1.93 million last quarter, we'd better come up with a counterproposal fast.

National can offer them maybe 14¢ per foot (against our 15¢), but they can't match our quality, and Bond knows it.

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LOOKING GLASS

Advanced Products Division

To: Plant Manager, Integrated Circuits

From: Director of Sales and Marketing, APD

Re: Bentley Aerospace

Copies to:

To keep the Bentley contract, I have agreed to an unlimited free maintenance contract for the next six months. I have assigned one person from Manufacturing and Engineering to trouble shoot problems with the V1-21 chips.

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