
EXPLORING HIGH TECH CAREERS

By
Scott Southworth

EXPLORING HIGH TECH CAREERS



Scott Southworth

THE ROSEN PUBLISHING GROUP, Inc.

New York

Published in 1984 by The Rosen Publishing Group, Inc.
29 East 21st Street, New York City, New York 10010

First Edition

Copyright 1984 by Scott Southworth

All rights reserved. No part of this book may be
reproduced in any form without permission in writing
from the publisher, except by a reviewer.

Library of Congress Cataloging in Publication Data

Southworth, Scott.

Exploring high tech careers.

Bibliography: p.

I. High technology industries—United States—Vocational
guidance. I. Title.

T21.S67 1984

001.64'023'73

84 4822

ISBN 0 8239 0643 4

Manufactured in the United States of America

Preface

This book is intended for those of you who will soon complete your schooling and are considering pursuing a high tech career but do not have an extensive technical background. There *are* jobs available for you.

If you have a technical degree, you may find the book helpful, but you already have the credentials you need and should concentrate on selling your background to prospective employers.

My own experiences have contributed heavily to this book. I know what it is to hunt for a high tech job without the credentials I would have desired (I have a degree in urban studies and planning and another in counseling). I understand the technical world, since I attended Massachusetts Institute of Technology. I know much about the job-hunting process. I have sought counseling on my own career decisions, and in turn I have counseled others on those matters.

Part 1 is an orientation to the whole field of high technology and high tech jobs, as well as getting started in a high tech job.

Part 2 is relevant to choosing a job category to pursue and describes major job categories in several areas.

Part 3 is relevant to job-hunting and getting a job. The final chapter is partly inspirational and partly common sense, stressing the value of a realistic, positive attitude.

The book is not meant to cover every detail of the job market in the high tech industries, nor can it provide details on the job situation in specific parts of the country. Its suggestions and recommendations cannot be regarded as inflexible rules or golden answers that solve every problem. You must apply each suggestion with common sense and in light of your own situation and background. It is up to you to make your own success.

Even though the computer industry is more recession-resistant than some other industries, it too can suffer in times of severe recession, and at such times there may be job openings only for highly trained and experienced people.

I must acknowledge the valuable suggestions and advice of a fellow writer, Ray Tsuchiyama, and my other technical writing colleagues. Additional advice and help about the writing and publishing of this book has come from my mother (who has published her own work), Don Cox, and others. As always my wife, Zelda, has been a bedrock of understanding and support.

S. Southworth
Framingham, Massachusetts

Contents

<i>Preface</i>	vii
----------------	-----

PART 1

I. <i>It's a High Tech Age</i>	3
II. <i>Advantages of a High Tech Job</i>	8
III. <i>The Entry-level Job</i>	15
IV. <i>Advancing from the Entry-level Job</i>	19

PART 2

V. <i>Which Job Is Best for You?</i>	25
VI. <i>Computer Programming</i>	33
VII. <i>Manufacturing</i>	42
VIII. <i>Drafting and Layout Design</i>	46
IX. <i>Field Service</i>	52
X. <i>Computer Operating</i>	56
XI. <i>Word Processing</i>	60
XII. <i>Technical Illustrating</i>	65
XIII. <i>Technical Writing</i>	68
XIV. <i>Engineering</i>	73

PART 3

XV. <i>Pumping Up Your Credentials</i>	81
XVI. <i>Coursework</i>	85
XVII. <i>Résumé Writing</i>	89
XVIII. <i>Job-hunting</i>	93
XIX. <i>Your Mental Outlook and Attitude</i>	103
<i>Glossary</i>	108
<i>Bibliography</i>	112

Part 1

Chapter I

It's a High Tech Age

The high tech age is upon us. Within the span of only a decade or two we have seen profound changes in technology that are now reaching more and more into our daily lives. Devices and technological approaches that we once found comfortable are rapidly becoming outmoded.

I can remember being a student at Massachusetts Institute of Technology and proudly receiving my first slide rule as a gift from my parents. I remember learning how to use it, how to keep it working smoothly, and using it in taking exams. I marveled at the cleverness of such a simple mechanical device. I thought it would be something I could keep and use for many years. At that time (around 1968) it was hard to imagine the impact of computers on the consumer.

Yet the first appearance of computers in the general marketplace was only a few years away. The slide rule would be replaced by the hand-held electronic calculator, which in turn would rapidly decrease in size while offering greatly increased computer power. I long ago abandoned my slide rule and now have a thin pocket-sized calculator with 60 functions.

Calculators are of course commonplace. Computer terminals are appearing everywhere—in retail stores, in offices, and in our homes. Microprocessors are being put into products such as cars and clock radios. Computer video games are the latest recreational craze. The personal home computer is becoming cheaper and cheaper, and soon every grade-school kid may be considered a computer illiterate if he or she has not had some exposure to the computer.

In some ways this is scary and confusing, requiring new adjustments and attitudes in our daily lives. It is also exciting and challenging, as great computing power becomes more available and we must find the best way to use it. The high tech age enters the workplace, requiring a new job skill for many jobs—that of familiarity with and ability to use the computer.

The Technical Ethos

There is clearly a technical viewpoint that is associated with the computer industry and the computer world. The character of the technical world is often seen as dry, nonhumanistic, and narrowly technical. The recreations and pleasures that technical people pursue seem also to flow from their technical interests, including such things as video games, science fiction, and fantasy games. Technical people may be seen as introverted and untalkative, unsociable, and dull.

That is a stereotype, and like many stereotypes it has a grain of truth in it. It doesn't apply in most cases, although in many companies you can be sure to find a few individuals who conform to it.

It is reasonable to talk about a particular ethos or viewpoint that technical people often have. However, some people feel that to work in the computer industry they have to fulfill this stereotype, and they do not.

The technical viewpoint does tend to be dry, precise, detailed, and focused on the problem at hand. In a way, though, that is characteristic of any kind of engineering. It is a kind of problem-solving approach; it need not carry over into one's personality and daily life. Also, many jobs in high tech companies don't focus on such intensive engineering.

The trend is toward a lessening of the technical ethos. The narrow technical stereotype applies less and less to people in the computer industry. Computers have moved out of the scientific laboratory or specialized business usage and into general availability. As more people use computers, the computers must become less technical and require less specialized knowledge to use.

Friendlier Computers and Easier Programming

When I was learning programming in high school and college computers were not easily accessible to the average student. They required a special attitude and special coursework. The programmer had to adapt to the computer and to its demands and needs, and his own needs often took second place.

At that time programs had to be submitted for batch processing. It was tedious to develop and debug programs, since you had to wait a couple of days to get your results back. Often all you got back was your original deck of cards and a bunch of error messages. The programming had to be very precise, and minor mistakes could kill the whole run. I remember some of the programmers looking through long printouts of their coding, trying to track down some little error. They may have typed in a "0" (the number zero) instead of an upper-case "O" (the

letter), or vice versa, and the only difference between the two was a slight difference in shape.

Nowadays the computers are more accommodating, and programs can be written in what is called an interactive mode. They are said to be more friendly, and, in truth, they are. You can write the program on a terminal, run it in a time-sharing mode, and get your results back quickly. You can repeat the process to refine and debug the program. Error messages tend to be more helpful, less jargonistic, and more easily understood. The computers are more forgiving of small errors such as inserting an extra blank space into a sentence. Some computers even tell you line by line as you type in your programming instructions whether you have made any mistakes.

Computers Everywhere in Our Lives

In the future, computers and microprocessors will be everywhere. You can already see clock radios that can be programmed to repeat the alarm at certain intervals, or to wake the husband with one music station and then wake the wife with another music station. Microprocessors will soon be put into any appliance that has a conceivable use for them. The dishwasher, the clothes washer, the toaster oven, the blender, all can use the intelligence provided by the computer.

Speaking computers will become more common, including computers that can carry on simple conversations and follow simple orders. It may soon be possible to sit in your living room and talk to a computer, commanding it to turn lights on and off, turn on the TV, or start dinner.

Computer terminals should become freely available. Access to data banks, news reports, and the computing power of the large computers should be available from a terminal in the home and over ordinary phone lines. How soon some of these services become available will depend on the cost, but the technology has already been developed.

The basic cost of computer hardware has been decreasing, mostly because of development of the integrated circuit, which is contained in a chip. As technology advances, circuitry in the chip can be made smaller and smaller and more circuitry (and computing power) can be placed in each chip. Even when more power is packed into each chip, the cost of making the chip does not increase proportionately. As a particular chip becomes popular, it can be mass-produced and the cost becomes quite small. Simple microprocessors (the chip only, without any accessories) can cost less than fifteen dollars.

Our children will grow up in a dramatically different environment. They will become used to having available calculating power that would

astonish the slide rule-using engineers of a previous age. Terminals will be familiar objects that even grade-school children will be comfortable using, and they will become available in all kinds of job settings, such as supermarkets and other retail stores. Counter sales personnel will be able to make instant credit checks or inventory checks. Stores and companies that cannot do such things will seem backward and clumsy in their operations.

These advances will not all happen immediately, and there seems to be resistance to having so many computers around, particularly by people who are not used to using them.

The Jobs of the Future

Yet the good jobs of the future will be there for those who are willing to try computers and become familiar with them. The jobs will be available in the high tech industries themselves, as well as throughout society. Many people are using computers, and terminals are appearing everywhere. In many offices and companies the persons who can dig into the computer instructions and procedures and master the commands they need to know are becoming very valuable and well paid.

In many cases these people are not technically sophisticated, but from almost any background—those with high school diplomas or with English majors or other nontechnical backgrounds. They have decided not to be intimidated by computers and have taken advantage of the more accessible computers to make themselves valuable. They find themselves suddenly becoming “technical” people (though they do not really feel any different), proud of their skills, and with a vastly improved situation in job status, wages, and opportunities.

I emphasize that vast numbers of people have moved into computing and high tech jobs who do not have the technical background of an engineering degree or computer programming coursework. They may have taken a couple of technical courses at night school or have learned on a computer in their office.

What they have done is not so different from what has occurred throughout this century with each technological advance. The bicycle mechanic looked at the odd contraption called an automobile. He began to repair some autos, learned as he went along, and gradually found himself in a thriving new business. With each new technological product, vast numbers of people who may have been intimidated at first but were willing to learn entered new fields. They helped to construct whole new industries.

The computer industry is similar. It is still a relatively young indus-

try being built up both by the technical experts and by those who are willing to learn. The industry is growing fast. Making the computer accessible to the average person opens vast new markets, requiring armies of people to design and build the computers, to operate them, to write new software, to sell them, and to train people to use them.

If personnel interviewers in a computer industry waited to fill a job with a person having the ideal training and background instead of hiring a good person who had some background but not quite what was wanted, we would still be marveling at the five-function twenty-five-dollar calculator. The computer industry needs far more technical people than are available. The industry is in fact built upon people who did not have the "right" technical background.

Many more people are needed than just highly trained engineers. Computer industries need people in training, sales, personnel, public relations, technical writing, teaching, field service, illustration, and on and on. Those people do not need to know how to design an arithmetic logic unit or how to write a relocatable assembler. They need some technical understanding, but they do not need five years of schooling as an engineer.

The other point is that the computer industry needs people from a broad background. The personnel offices and the corporate headquarters may not always realize that, but it is true.

The computer companies cannot operate from the old narrow, highly technical viewpoint, when it was assumed that any company that bought a computer would have to train or hire highly technical people to run it. The industry is enriched by people who have varied backgrounds and come from other kinds of educational and job experience.

The computer industry *needs* that kind of people, people who can enrich the design of computers to make them more attractive and easier to use, people who can find new artistic uses for computers, people who can relate easily to the average person and understand what that person needs and wants in a computer.

The computer companies that ignore these concerns will find themselves stagnating and falling behind.

So-called nontechnical people have a great role to play in ensuring a more humanized computer industry. Their perspective can make a great difference in what happens in the future.

Chapter II

Advantages of a High Tech Job

A high tech job can be both rewarding and exciting. The high tech companies are continually introducing new products. Even if not working on a high tech research project directly, you may still find yourself with an "in" on the latest developments in computers. You may find out about new developments before the general public does and have a better understanding of what they mean.

These companies are growing and expanding. They continually need new personnel and compete for the people who are available. Salaries and wages can only be driven up by such a situation. The financial rewards in the form of direct wages, benefits, and opportunities for advancement are great. People moving into the high tech field are often surprised by the generous salaries that are considered the norm. New and entry-level workers often make the mistake of not being aggressive enough about the salary that they request.

The high tech industry offers good opportunities for job advancement. Working conditions are good, and arrangements such as flexible working hours or working at home are often available. Professional contract workers can work as much or little as they like and give themselves lengthy vacations while still commanding an excellent hourly wage. Although some of the people in the industry are narrow, technical types, there are also great numbers of interesting, intelligent people with broad interests.

One of the main things I have noticed about working in the high tech area is a good outlook on life. Even in the midst of a recession, people generally have a positive and hopeful attitude, strengthened by a better financial position and job security than the rest of the population. Of course, no industry can provide a guarantee of no layoffs and unending growth, but the computer industry has done well in those areas.

The Strength of the Computer Industry

The point is that the high tech industry is healthy and strong. As I have indicated, computers are becoming more and more available, and the market is expanding. The new products and the great expansion of computers into our daily lives means that there is greater and greater demand, not only for small personal computers and terminals but also for the large computers. Very often large computers provide the computing power for individual terminals by direct connection or over phone lines. The greater availability of computing power means that companies in all kinds of situations rely on it more and more; having computing power available becomes a new standard of doing business.

The fact is that computers can save companies great amounts of money. Dull, repetitious, and tedious clerical tasks can be handled by the computer. Labor, even clerical labor, is quite expensive for any company. The computer can do the tasks accurately and faster. The small businessman can see other benefits, such as obtaining kinds of information that he would have considered too difficult or expensive to obtain before. He can obtain precise weekly business reports of how his company is doing and widely varied accounting and financial analyses.

Anyone who has done a weekly payroll for a small company realizes what a difficult job it can be when done by hand, especially under a deadline. The computer can handle such a function quickly and efficiently.

The advance of computers tends to put many clerical personnel out of work. On the other hand, new jobs are created as people are needed to operate and program the computer and maintain it (without even considering designing and manufacturing it).

Businessmen offer prefer to make a capital investment in a computer (because of tax advantages and budgeting advantages) rather than maintain a large staff. Managers are also often under pressure to keep labor costs down, and computers can help reach this goal.

Because the computer can lessen business expenses and its capital cost can therefore be paid back quickly, there is a basic high demand for computers. Businessmen also have the money to spend (if the investment looks good); often more so than research institutes and universities (once the main users of computers).

Even if a small company has a computer, better, cheaper, faster, and more efficient computers are always coming along. The businessman with a computer must always consider whether to invest in a new

computer, partly for greater efficiency and partly because he knows that his competitors are also obtaining greater and greater computing power.

Computers are becoming more efficient. The designs are being improved, and new manufacturing processes allow more circuitry to be packed into the same area on a chip. The process is continuing and we should expect it to continue for at least the next ten years. Thus we can see the underlying strength of the computer industry.

The enormous demand translates into growth and expansion in the industry. We have all heard of the phenomenal growth rates of some computer companies—as much as 25 or 50 percent per year and even higher. Such growth rates can continue year after year and, depending on the company, may not be much affected by the forces of recession.

All this demand and growth of course translates into a continuing demand for new personnel. The growth is not only in manufacturing but also in the areas of administration, support services, design, training, and field service. It insures a steady supply of job openings, both at the entry level and at higher levels. The high demand for good personnel keeps wages and benefits at a high level and is to the benefit of the worker, ensuring him or her opportunities for salary advancement and career advancement.

Salaries, Wages, and Benefits

Salaries and wages are higher in the computer industries than in most others. Entry-level jobs for programmers and technical writers are often in the range of \$14,000 to \$20,000. Beginning engineers can earn as much as \$25,000.

Wages for hourly paid workers such as assemblers can still be around \$15,000 to \$20,000 or higher for experienced workers or with overtime work.

Experienced engineers and programmers or managers can earn much higher salaries—approaching \$50,000 a year.

These wages are often shocking to people working in such areas as teaching, counseling, social work, and government. Even university professors who hold PhD's are disturbed to find that people with bachelor's degrees in the high tech industries are earning as much as they do.

Benefits in the high tech field can be generous. They can include such things as health, dental, disability, and life insurance, all partially or fully paid for by the company. Stock options are often available. Vaca-

tion policy can vary widely, but in most companies employees receive at least two weeks per year.

Companies keep an eye on each other to see what is being offered in benefits, which can add up to a substantial amount of money. A basic figure often used is 30 percent of base salary.

If you want more vacation time, you might consider working as a contract employee. The contract worker works for a specified period of time (such as three months) and has the opportunity to take lengthy vacations between periods of work. He or she usually receives a higher hourly wage but no benefits. Certain people like this flexibility and time off and do not care about the benefits.

Recession and Inflation

High tech companies are not completely resistant to the effects of recession. They are sometimes forced to lay people off, but more often the effect of recession is a decrease in growth rather than a company's actually losing money.

Some companies are heavily tied into government contracts, and layoffs occur when a contract runs out and a new one has not yet been obtained. Paradoxical situations can occur, as when one division of such a company lays off personnel while another division has just obtained a new contract and is hiring new personnel.

Many companies can avoid large layoffs, with the effect being more of a slowdown, especially in new or ambitious projects. One company caused a hullabaloo by shutting down a manufacturing plant for a week during the Christmas holidays. Employees were requested to take their vacations at that time; otherwise they would not have been paid for that week. It is interesting that in other industries this has been common practice for years.

In other high tech companies, ambitious projects may be cut back in scope or abandoned altogether. In such a case, some of the personnel hired specifically for the project may be laid off, but the number is quite small when compared to the large layoffs of, for instance, the automobile companies.

In most cases the average worker feels the recession in less severe ways. In companies that pay tuition for courses that employees want to take, the employee may have to offer better justification for such a course or delay taking it. Pay raises may be delayed or less generous. The worker may have more work to do, because the company is limiting new hiring.

Inflation is another economic evil that affects high tech companies as well as other companies. In inflationary periods, demand for products is usually high, and such periods are boom times for the computer industries. Demands for personnel are especially high, and that demand tends to keep salaries high.

While high tech companies do not necessarily offer cost-of-living raises, raises are given for merit and performance. In inflationary periods, raises tend to be higher. There is no guarantee that a person's salary will rise faster than inflation, but in many cases it does keep up with or even ahead of inflation. Of course, in some unionized situations in which the worker receives cost-of-living increments, the wages do keep up with inflation.

Advancing in a Computer Career

The opportunities in the high tech industries can be many. The best goal is to establish yourself in a job and gain one or two years' experience. Then other opportunities within the same company or within the industry will open up. Departments that are expanding rapidly need supervisors and managers, who often come from within the department.

Some companies offer large-scale programs in sales and programming to train personnel within the company for better positions.

Again, once you have established basic credentials of work in the computer industry, you can apply for higher-level jobs in your company or for jobs in other parts of the country. Most metropolitan areas have some high tech industries, and so do some rural areas such as southern New Hampshire.

Working Conditions

The working environment is usually good. Companies often have well-equipped offices in modern buildings in suburban or rural areas away from the congestion of downtown areas. This is especially true in Massachusetts, where the high tech belt surrounding Boston has been built up in small towns or the wooded and agricultural countryside. The hectic congested commute along crowded expressways is thus avoided. Many Boston-area high tech commuters use lightly traveled roads through a pleasant New England countryside. (To be honest, however, some have to travel the now heavily congested Route 128.)

Most professional workers have their own office, often with a computer or word processing terminal in the office itself. In other cases