

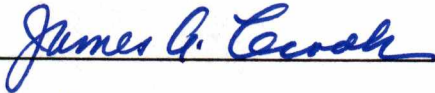
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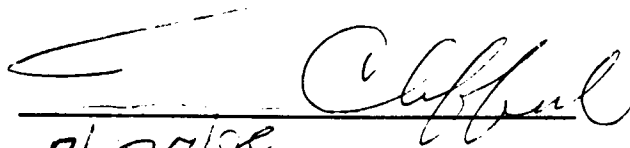
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Production Technology in Transition
at Tennessee Newspapers:
A Survey and Two Case Studies

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Terrie Clifford

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ABSTRACT

By the late 1980s, the computer technology that made it possible to replace human type setters with computer generated typesetting commands evolved into printing technology capable of producing a newspaper on a desktop in fifteen minutes.

During this period many Tennessee newspapers paired personal computers with laser printers to compose editorial and advertising copy, generate headlines and artwork, lay out pages electronically, and ultimately produce the entire publication to the plate-making stage.

This study explored the use of personal computers and laser printers by Tennessee newspapers. It sought to determine how Tennessee newspapers responded to change and how they assessed the rewards and challenges of adapting personal computers and laser printers for newspaper applications. These questions were investigated during the first half of 1989. Data were collected on 69 member newspapers of the Tennessee Press Association through a mail questionnaire. The questionnaire asked 27 questions about staff size, computer equipment and application, respondent background, employee training and perceived impact of computer use. Responses were supported by in-depth case studies of The Greeneville Sun, a daily newspaper, and the Clinton Courier-News, a weekly. The questionnaire respondents were divided into staff sizes as well as into

"full use" and "limited use" groups. Papers using personal computers to produce advertising and editorial copy as well as page layout and typesetting made up the "full use" group. Papers using personal computers for more limited uses such as bookkeeping and graphics comprised the "limited use" group.

The results indicated that 72% of the respondents were using personal computers and laser printers for newspaper production. The new technology required less initial investment than the traditional newspaper production technology and was cheaper and easier to use.

Newspaper managers who made the transition from traditional typesetting equipment and production processes to off-the-shelf personal computers and laser printers indicated that the short learning cycle, improved employee morale, and time and cost savings were often accompanied by poor technological and informational support, employee resistance to change, and the frustration of adapting personal computer technology, which was originally developed for business communications, to newspaper applications.

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CHAPTER I

PRINTING METHODS FROM GUTENBERG TO LASER BEAMS

In order to understand the impact of personal computers and laser printers on newspapers, an understanding of the evolution of the computer and typesetting is necessary.

The development of printing from movable metal type is credited to Johann Gutenberg of Mainz, Germany (Turnbull & Baird, 1980, p. 12). Prior to Gutenberg's invention in the 1400s, printing was accomplished using wooden blocks with carved images. The raised images of the blocks were coated with ink and pressed on paper.

Gutenberg's movable type, made from brass molds, provided several improvements to the wooden blocks which preceded it. With his invention, characters could be arranged in any order, reused as needed, and produced in quantity easily and accurately. Gutenberg's system also provided a method of holding type in place for printing as well as an ink which produced legible impressions from type to paper (Turnbull & Baird, 1980, p. 12).

The first major change in Gutenberg's method came in the second decade of the 1800s with the substitution of a cylinder for the press platen. The revolving cylinder picked up sheets of paper, held them tight around its circumference and carried them over a moving bed. The press cylinder and bed were steam powered, which made faster press

delivery possible. This development was improved upon with the invention of the rotary press. The rotary press operated by one cylinder holding inked type as sheets of paper were held by a second cylinder, pressed against the type and released (Turnbull & Baird, 1980, p. 12).

Eventually the rotary press incorporated the innovation of curved plates which made it possible to print on both sides of a continuous roll of paper at high speeds. This method evolved into web-fed rotary presses, the rotary press method most widely used by newspapers at the time of this study.

Hot Type

Although the development of presses progressed, most type was set by hand until about 1890, when Ottmar Mergenthaler invented the Linotype machine. Mergenthaler, a German immigrant to America, ushered in the era of hot type with his development of a method of casting lines of type by injecting molten type metal into brass molds.

With Mergenthaler's method, the operator worked at a typewriter-like keyboard. As the operator activated keys, the molds, one for each character, fell into line with expandable space bands between words. Then casting with the molten metal was done, after which a mechanism returned the mats to storage. Each line was new type, as contrasted to hand-set type that was used over and over (Turnbull & Baird,

1980, p. 12). Linecasters saw many improvements over the years, but one of the most significant was the introduction of the teletypesetter.

The teletypesetter was a device that activated the linecasting machine by means of a perforated tape running through it (Davis, 1973). The six-level tape was punched in the newspaper shop or transmitted over telephone lines from distant locations. Teletypesetters eventually forged one of the first links between typesetting and computers as newspaper publishers realized computers could be used to read teletypesetting tape and automate production.

Offset printing represents another important innovation in the history of computers and phototypesetting. Offset had its roots in lithography, a printing invention, circa 1796, credited to Alois Senefelder, a German musician (Turnbull & Baird, 1980, pp. 17 and 18). Somehow, Senefelder discovered that he could produce an image on paper by writing on a stone with a grease pencil. Senefelder's lithography developed into the offset printing method. Offset varied only in equipment from Senefelder's original discovery. Light-sensitive aluminum plates were exposed to a photographic negative. The image was etched onto the metal; the etched surfaces attracted grease and repelled water. The plates were placed on the press, covered first with water and then with grease-based ink. The water flowed around the etched surface, and the ink was

confined to the etched areas. The aluminum plate was then rolled against a rubber pad to pick up the ink and press it on paper.

Although a few papers experimented with offset methods in the 1950s, this process did not become widely popular for newspaper production until about 1961, when the development of larger and faster rotary presses made it more attractive to large daily newspapers (Davis, 1973).

Cold Type

The printing industry turned to photography to produce the range of cold type demanded by offset. The word "cold" distinguishes it from the "hot" metal of the linecasting machine (Davis, 1973). The first photographic typesetting machines were modeled after the hot metal linecasting machines which preceded them, except that film negatives replaced brass matrices. They were followed by later models which incorporated electronic circuitry and optical-mechanical devices to produce type images on paper (Davis, 1973). The second generation of phototypesetting machines was faster and produced a larger range of typefaces.

According to Davis (1973), it was the newspaper industry that saved cold type from failing in its developing years. The early photocomposition machines did not impress the rest of the publishing industry. The adaptation of cold type to newspaper production processes in the mid-1950s,

however, gave manufacturers the kind of markets needed to continue to develop their equipment and technology.

Computers

One of the first applications of computers to newspaper production was engineered thirty-five years ago by the business manager of the Philadelphia Inquirer. In 1954, before the first commercial computer mainframe was built, David Podvey devised a method to monitor production using an IBM punch card system. Podvey's innovation reduced a task that once took hours to a matter of minutes (Martin, 1986). With the new IBM system, the Inquirer's accounting system went from green eyeshade methods to getting its revenue reports quickly and easily from the cards that were already punched for insert information.

The first use of computers in the typesetting process was to justify and hyphenate lines of type (Davis, 1973). The first computer typesetting system was the directory tape processor for setting telephone books. According to Davis, The Oklahoma City Times (circulation 123,007 in 1963) in 1963 became the first newspaper to completely computer generate its news copy.

Newspapers began to stretch the capabilities of computers in the mid-1960s to perform functions such as measuring story lengths and regulating the copy flow from the newsroom to the composing room. A few years later,

computer technology was applied to display advertising makeup. In the early 1970s, the advent of the optical character reader and the video display terminal provided the means of transporting the advertiser's copy and reporter's story directly from the source to the typesetting machines (Davis, 1973).

Optical character readers scanned copy and converted it to magnetic or perforated tape or electronic signals which were used to drive composing machines. Video display terminals provided for the electronic writing, editing and storing of newspaper copy (Turnbull & Baird, 1980, pp. 116-117).

By the early 1970s, the linotype machines had given way to cathode ray tube (CRT) typesetters. The development of CRT typesetters marked the beginning of electronic phototypesetting. By the early 1980s, cold type methods were expanding to include photographic typesetting, which stored actual images of each type character, and digital typesetting.

Phototypesetting uses three components: an image library of all the type characters, a light source, and a light sensitive material, such as photographic paper or film. CRT typesetters use cathode ray tube to create scan lines that are transferred to photographic paper or film (Davis & Barry, 1988, pp. 10-12).

Digital typography is the application of computers to typesetting. It has been defined as the use of computers for the design, preparation and presentation of documents, in which the graphic elements are organized, positioned and created under digital control (Rubinstein, 1988). Digital information is expressed in the binary digit form of 0 and 1. Many computers operate on the basis of this two digit code (Turnbull & Baird, 1980, pp. 116-117).

According to Davis and Barry (1988), digital typesetting machines were used by most professional typesetters in the late 1980s. Publishers using them, however, paid a high price for the high resolution they offered. In 1988, with the hardware and software to support them, digital typesetters cost anywhere from \$30,000 to \$100,000.

Laser driven typesetters, such as the Linotronic 300, were developed in the early 1980s. The laser devices, considered faster and more versatile than the CRT typesetters, were capable of resolutions of 1200 dots per inch (Davis & Barry, 1988, pp. 10-12).

In 1984, the Canon Corporation and Hewlett Packard developed the first table-top laser jet printer. It was a noiseless non-impact printer which produced type with a 300 dpi resolution, considered at the time to be near typeset quality (Hollis, 1987).

One year later, Apple Computer Incorporated paired a laser printer with a personal computer. According to Apple officials, their innovation was designed to revolutionize business communication. Perhaps, inadvertently, they also ushered in the era of desktop publishing for newspapers.

Desktop Publishing

The personal computer used to drive a typesetter or more commonly a laser printer is responsible for the latest wave of publishing technology--desktop publishing. Desktop publishing has been credited with transforming both large and small newspapers in several measurable ways. It has changed the design or "look" of many publications, updating national newspapers with computer graphics and raising the standards of what is acceptable and possible in many smaller publications.

Desktop publishing has been defined as a marriage of the microcomputer and the publishing industry.

Desktop publishing is the old business of setting type, making pages and printing the output, approached from a different direction. PC based desktop publishing takes its standards in both resolution of output and quality of typographical precision from its traditional print and publishing industry. Conversely, the print and publishing industry must surely apply itself to

the ease of use and cost factors that lend strength to the desktop case (Wilson-Davies, 1987, p. 13).

Desktop publishing has also been defined as digital typography for personal computer users (Rubinstein, 1988, p. 5). However, Gregg K. Jones, vice-president of The Greeneville (Tennessee) Sun, offered a practical definition of the new technology for newspaper publishers. Jones said that desktop publishing "does not mean mainstream publishing per se. It means . . . utilizing low-cost equipment to serve our publication needs" (The pandemonium/panacea, 1988).

Desktop publishing, which deals primarily with digital technology, provided a way to reduce the cost of producing typeset materials because it made the text-entry and formatting system independent of the typesetting device. A general purpose personal computer, such as the Macintosh or IBM, could control much of the typesetting process. In 1988, many newspapers implementing desktop publishing used Macintosh, IBM or IBM-compatible computers with Apple or Hewlett Packard laser printers to output final copy (Davis & Barry, 1988, pp. 10-12).

The new technology used relatively inexpensive and easy-to-operate personal computers with software designed for text composition and for page makeup and graphics manipulation. A laser printer provided the finished copy

on plain paper. In comparison, digital typesetters required the use of special paper to output copy. The cost of one sheet of typesetter paper in 1988 was approximately eleven cents per sheet (Rubinstein, 1988, p. 6).

One way in which desktop publishing differed from conventional composition and typesetting methods was the method by which information was transmitted to the typesetter (Truitt, 1987). On front-end systems, commands or formats were used to tell the typesetter how to set spacing and which typefaces to use, among other things. With the hyphenation and justification commands of typesetters, the way lines would break when typeset was displayed on the computer screen, but specific typefaces could not be seen (Truitt, 1987).

In comparison, many desktop publishing systems employed WYSIWYG, or "What You See Is What You Get," page composition software. WYSIWYG meant that the text appeared on the screen in the typeface and in the size specified so that the user could preview the page prior to typesetting (Truitt, March 1987).

After the text and graphics were created on the personal computer, they could be integrated on the computer screen with page layout software and sent to the laser printer. In 1987, Apple's LaserWriter and Hewlett Packard's Laser Jet appeared to be the laser printers used most often

by newspapers, although more than a dozen others were on the market (Truitt, March 1987).

The laser printer was driven by a computer which determined which typeface was used. The computer calculated the spacing, how each letter looked and other factors. Once that was done, the laser was activated. Its beam was directed by mirrors to a rotating photoconductive drum. The drum became electrostatically charged and attracted toner particles that arranged and adhered to the drum in a pattern determined by the computer. The drum then imprinted the image on regular paper (Truitt, March 1987).

CHAPTER II

AN OVERVIEW OF THE PROBLEM

By the late 1980s, the marriage of the computer and printing technology was nearly thirty-years-old and the newspaper industry was in the midst of challenging times. According to trade magazine accounts, circulation at many newspapers was flat in 1988 and 1989, and advertising revenues were not growing as quickly as in previous years (Radolf, 1989).

If some of the larger chain-owned newspaper operations were forced to tighten their belts during this period, the smaller circulation and non-daily papers were pressed to reduce operating costs and increase advertising revenues. The economic conditions faced by newspaper publishers during the late 1980s cannot be discounted as a significant reason personal computers enjoyed a heyday in the newspaper industry.

The evolution of personal computer technology during this period must also be considered. The computer used by Podvey to monitor production via punchcards would have been considered huge, noisy, expensive and slow by the computer standards of the 1980s. In the thirty years since Podvey's punchcards, computer cost, energy consumption and size for comparable performance declined by a factor of 10,000 (Martin, 1986).

Newspapers that once favored single-purpose, front-end computer systems or large mainframes were beginning to embrace the mass-produced personal computers capable of operating any number of functions, including spreadsheets, databases, writing, editing and page layout programs.

According to John Iobst, manager of computer applications for the American Press Association, the personal computers presented practical, economical replacements for the aging VDT systems at many newspapers (Presstime, 1988). Iobst's colleague, George Gashau, director of research for the American Newspaper Publishers Association, had predicted in 1987 that the use of personal computers in newspapers would continue to grow (Truitt, May 1987).

In 1989, the movement toward personal computers for newspaper operations was seen as an important trend for newspapers by the American Society of Newspaper Editors (ASNE). The use of personal computers dominated the 1989 issue of the ASNE annual technology report for newspaper editors.

In Technology and the Future: A Guide for Newspaper Editors, Joel R. Kramer (1989) predicted: "Within the next few years, mass-market terminals will predominate in most newsrooms. That's a major change from the reliance on specialized terminals just a few years ago."

According to Kramer (1989), several factors contributed to the popularity of mass-produced personal computers for

newspaper operations. The economies of scale made them cheaper than their specialized counterparts. They were capable of running a number of programs in comparison with the single purpose terminals used by many newspapers. The personal computers were more standardized, making it easier to combine pieces from different vendors, reducing dependence on a single vendor. By the end of the 1980s, the personal computers and the programs to run them had caught up with the demanding requirements of newsrooms.

In assessing the potential PCs held for newspapers, Kramer also cited some disadvantages of the stand-alone systems. Because newsroom needs were not shared by the masses of personal computer users, the "efficient short-cuts" available in customized newsroom systems were often unavailable on the off-the-shelf personal computers. The lack of standardization of personal computer software, in some cases, made it difficult and frustrating to switch among functions, such as copy fitting and content editing. The frequent enhancements and new product introductions typical of the mass market meant pressure on newspapers to invest in replacements and upgrades more frequently than was the case with more stable customized systems (Kramer, 1989).

Disadvantages notwithstanding, the publishers of many small newspapers were quick to implement the new technology. Gregg K. Jones, vice-president of the Greeneville

(Tennessee) Sun, termed personal computers the "fourth-wave publishing technology" (The pandemonium/panacea, July 1988).

Jones assessed the potential of microcomputer technology for newspaper applications at the June 1988 convention of the American Newspaper Publishers Association. "Personal computer technology currently exists which will enhance our growth, decrease our production complexity and save us many thousands of dollars in the process," Jones said (The pandemonium/panacea, July 1988).

Personal computer use was so widespread in 1989 that the National Newspaper Association (NNA), at the request of its membership, created a taskforce to set minimum standards for desktop publishing equipment for newspaper publishing (Publisher's Auxiliary, April 1989).

At the time of this study, little information on the number of newspapers using personal computers existed in the literature. In 1989, Iobst said he was not aware of any research indicating specifically how many newspapers were using personal computers. William Childress, an executive with the West Virginia Press Association who was chosen to head the NNA's desktop publishing taskforce, said in 1989 that the number of newspapers using desktop publishing was "spotty and scattered among some state press associations. Childress is also the author of The 15-Minute Newspaper, a guide to desktop publishing for newspapers.

Although the information reported in the literature indicating the scope of desktop publishing in the newspaper industry in the late 1980s is sketchy, information from trade publications of both the newspaper and computer industries presented a general picture of personal computer use by newspapers.

In 1987, The Seybold Report on Publishing Systems assessed the use of personal computers in the newspaper industry and concluded "that PCs are the central fact for everyone involved in newspaper systems" (Truitt, May 1987).

Also in 1987, several industry experts estimated that as many as three-fourths of all daily and non-daily newspapers in the United States and Canada were using at least one personal computer somewhere in their operations (Truitt, 1987).

In 1986, Future Computing, a Dallas market research firm which compiles statistics on computer usage concluded from a survey of 120,000 households that 21 percent of those working in the publishing industry--including newspapers, magazines and books--used computers on the job. In addition, another 14 percent predicted they would be using a personal computer at work within a year. Future Computing estimated 242,000 personal computers were currently in use in the publishing industry in 1987 (Truitt, May 1987).

The popularity of personal computers is reflected in unit sales which have soared in the 1980s. In 1986,

International Business Machines (IBM), which had the largest share of the market, sold more than 3 million personal computers. Apple Computer, Incorporated claimed to be selling 50,000 units monthly during that same time period (Truitt, May 1987).

Reliability, versatility and economy were some of the factors which fueled the personal computer "boom" at newspapers in the late 1980s. Mainframe computer systems had been known to "crash" from time to time, incapacitating every work station connected to it. Stand-alone personal computers, because they operated independently of each other, could be unplugged from a network and replaced without any ill effects to other units in a system.

A review of the literature indicates that personal computers were substantially cheaper per workstation than a mainframe system. A personal computer in the mid-1980s usually cost a few thousand dollars at most, while a complete mainframe based system averaged out to \$10,000 per terminal (Truitt, May 1987).

A flood of personal computer software with text, editing, graphics and composing packages was another factor which made personal computers attractive to newspaper publishers.

By 1988, personal computer based editorial systems had become fairly common in medium- and small-circulation newspapers. At the Shelbyville (Tennessee) Times-Gazette,

the staff essentially put the paper out using eight personal computers while its mainframe computer was malfunctioning. Like many small newspapers, the Times-Gazette dropped the front-end system in favor of a PC-based one. The reason, according to Publisher Franklin Yates: "PCs work; we just couldn't keep a mainframe working" (Newsrooms warm, July 1988).

As with most new technology, personal computers were not without their drawbacks. The literature indicates that newspapers using personal computers reported problems with equipment compatibility, lingering glitches in networks and standardization of software (Garneau, 1986; Truitt, May 1987).

Desktop Publishing in Practice

The literature indicates that although large daily newspapers, such as the Dallas Morning News and The New York Times, began installing large networks of personal computers in the late 1980s, smaller newspapers were more innovative in applying desktop publishing to newspaper production (Small papers, 1987).

Industry experts estimated that several hundred small newspapers were using microcomputers and laser printers to computer typeset their publications in 1987. "In the newspaper business, desktop publishing is making inroads at small dailies and weeklies. Executives of those newspapers

say the systems reduce publishing expenses" (Presstime, July 1988). According to the literature, the low cost of the equipment necessary for implementing and operating a desktop publishing system was a factor often cited by newspapers abandoning traditional production and pre-press methods for the new desktop technology. An example of these cost savings and benefits realized by one South Dakota weekly in 1987 (Hollis, 1988) appears as an appendix.

Other benefits of implementing desktop publishing have been reported in the areas of design, creative control, time and cost savings (Hollis, 1987; McMillan, 1988).

Although the number and type of newspapers using desktop publishing in the late 1980s was not widely reported, the publishing trade magazines of that period were full of accounts of newspapers breaking that ground.

"By using a \$5,000 laser printer, some newspapers have replaced \$30,000 typesetting machines. The printers also require less servicing, they contend, so maintenance costs are reduced. Savings also accrue from the use of the cheaper paper and the elimination of costly development chemicals" (Truitt, March 1987, p. 22).

"One newspaper, a 2,000-circulation weekly, estimated that it had been spending \$350 per month for phototypesetting paper and another \$50-\$100 for processing chemicals before purchasing its desktop publishing system.

The newspaper now budgets \$50 per month for composing materials" (Truitt, March 1987).

"Speed and costs savings are the primary advantages for us," says Joseph A. Tinkelman, co-publisher and general manager of the Potomac Almanac, which is distributed to 30,000 households in Potomac, Maryland. Tinkelman says he and co-publisher considered purchasing a traditional front-end system that would have cost them about \$12,000. Instead they settled on a desktop system with 14 Macintoshes, two hard disks, two LaserWriters and software for about half that amount. In addition, the newspaper no longer pays \$50,000 a year to have it typeset by an outside firm" (Truitt, March 1987, p. 22).

Newspaper publishers, who had become desktop publishers, praised the new technology in these trade magazine accounts. In addition to the relatively modest purchase price, the desktop publishers praised the new compact systems for the money they saved in the costs of supplies and labor. Those applying desktop publishing to newspaper production expressed surprise at how easy the systems were to learn and operate. In many cases, the publishers reported that the systems were used to put out a newspaper a day or two after being installed (Truitt, 1987).

Typical of the trade press reports from the desktop publishing front was this 1987 account from the Bluefield (West Virginia) Daily Telegraph, where cathode ray tube

phototypesetters were being nudged into history by plain-paper laser printers.

The approximately 28,000 circulation daily has switched to four Apple Computer, Inc. LaserWriter Plus printers for all editorial and classified typesetting.

While type set on plain paper by most laser printers is less sharp than that from phototypesetters, the difference when printed on newsprint is unnoticeable, according to Herb Smith, whose company installed the Telegraph's system.

Smith, president of Electric Knowledge, Inc., the Charlottesville, Virginia-based division of Worrell Enterprises, Inc., said "dramatic" cost savings have driven more than 20 Worrell papers to switch to LaserWriters "as fast as we can."

He said one newspaper realized a savings of \$30,000 a year by replacing CRT typesetters with LaserWriters.

Tom Colley, Telegraph executive editor, said the system works "extremely well," setting classified and editorial text and headlines for the paper's 24-36 page editions. Compugraphic typesetters have been retained for setting ad copy.

Eliminating processing which took up to 15 minutes has been "critically important" according to Colley. The LaserWriter's output time of about a minute has proven a significant advantage "particularly on deadline," he said, allowing news to be prepared faster for pasteup. Colley said the type was "excellent, very crisp, very clean." However, long headlines set horizontally sometimes show "fadings" which is remedied by breaking up the headline and re-setting it on paper positioned vertically.

Labor savings were significant too, Colley said. LaserWriters, located in the newsroom, eliminate the need for cartridges to be unloaded manually from typesetters and loaded into processors.

Type produced by the LaserWriter has a resolution of 300 dots per inch, shows ragged edges when viewed under a magnifying glass, but with the dot gain on newsprint, "you can't tell the difference," Smith said (Garneau, 1987, p. 42).

The use of personal computers and laser printers for production has been credited with lowering the cost entry barriers of small newspaper publishing in the late 1980s,

according to Joann Buckley of the National Newspaper Association and Greeneville (Tennessee) Sun publisher Jones.

In fact, Jones warned publishers that the low cost technology could inspire new competitors to enter the marketplace. "It doesn't frighten me so much to lose a lot of money, but it does frighten me to think that somebody is going to be able to come into the same market that I [am in] and be able to charge a lot less for the same services because their entry level costs are not going to be nearly as great as mine" (Newspaper needs, July 1988).

Non-daily newspapers have reported some other benefits of replacing traditional typesetting with personal computers. Some of these are the improved speed of entering, editing and producing editorial copy, display and classified advertising. One non-daily newspaper in South Dakota reported that the personal computer system produced the paper five hours earlier every week (Hollis, 1987).

An increase in editorial control has also been cited as a benefit of applying desktop publishing to newspapers. Some papers pioneering desktop publishing have reported the ability to move their deadlines back and incorporate late-breaking news that formerly had to wait for the next deadline (Hollis, 1987).

A trade industry survey conducted in 1988 indicated that Tennessee newspapers were using personal computers,

primarily IBMs and Macintoshes, for a variety of editorial, production and business applications (McMillan, 1988).

Several papers reported using the new technology for specific circulation information for advertisers, to produce advertising, for billing, page layout, and newswriting and editing.

One daily newspaper reported making significant changes in the production of the paper, including switching from traditional typesetting to a computer-driven laser writer to produce the content of the paper in one month's time (McMillan, 1988).

The savings achieved by the newspaper were reported in the areas of materials including paper and chemicals, and maintenance including "expensive" service contracts on equipment.

The newspaper also reported a significant time savings in the area of copy production. The newspaper also cited a considerable improvement in the quality of the product (McMillan, 1988). The same newspaper also reported a short training period and described the transition from traditional typesetting to desktop publishing as "easy" (McMillan, 1988).

The literature indicates that not all the new desktop publishers praised the new technology. Users found fault with the reduced size of the keyboard keys compared with other computer terminals. Some complained that it was

necessary to have a computer consultant assemble and install a network of Macintoshes, necessary for a multi-user system.

Although many publishers seemed to be pleased with the 300 dots-per-inch resolution offered by the laser printers, typesetters and professional typographers disputed whether the laser printers yield quality approaches that of conventional phototypesetters resolution of 1,200 or more dots per inch (Truitt, March 1987).

Many newspapers implementing desktop publishing reported being frustrated by the page-size limitations of software programs which produced only tabloid-sized pages. The segments then had to be aligned together and pasted into place to produce broadsheet sections.

Comparing Desktop Publishing With Electronic Copy Processing

At the time of this study, desktop publishing was an emerging technology. Predictably, the literature yields few studies concerning the technology that many papers were just beginning to implement.

The application of desktop publishing to newspaper operations is similar to the introduction of electronic copy processing systems in the early 1970s. Electronic copy processing systems were designed to improve the speed and efficiency of the newspaper production system. Desktop publishing has been adapted to newspapers for much the same

purpose, though its uses, at least at non-daily papers, seem to exceed those of electronic copy processing systems.

In 1974, one of the promises of electronic copy processing systems for newspapers was similar to that now being realized at many non-dailies through desktop publishing--complete control by the editor of the final appearance of the newspaper (Davis, 1973).

Davis (1973) found that respondents seemed satisfied with their change from hot-type to electronic copy processing. The benefits reported by the respondents included an improvement in productivity and fewer mechanical and typographical errors.

Among the disadvantages to the technology reported by Davis include equipment unreliability, a difficulty in correcting malfunctioning computer programs and problems with labor.

Davis found that many production workers feared losing their jobs to the new technology and deliberately slowed their work process. Other workers resisted retraining (Davis, 1973). Davis also measured the scope of the new technology by the specific purchases and intentions to purchase Optical Character Reading Equipment and Video Display Terminals.

Stulce (1976) found that the introduction of electronic copy generating and editing machines increased production

and reduced typographical and grammatical errors in wire stories and locally written copy.

Sutphin (1973) noted that electronic editing systems produced neater and more error-free copy, as well as speeding up the editing process. Doebler (1974) found that VDTs provided easier manipulation of copy and later deadlines for more extensive creative work.

Garrison (1982) found that editors using electronic editing systems reported a reduction in the number of errors in published copy. The same editors reported an initial reduction in the quality of their product, during the adjustment period, followed with no change once they became accustomed to the system. Editors were divided as to whether their editing speed was increased by the new technology (Garrison, 1982).

The potentials and problems presented by electronic copy processing systems provide a good comparison for some of the same issues faced by newspapers implementing desktop publishing. The purposes of this study were not only to document the scope and type of Tennessee newspapers using personal computers, but to provide papers already involved in, or considering a transition to, desktop publishing with useful feedback.

Managing the New Technology

Carter and Cullen (1983) observed in 1983 that the newspaper industry appeared to be visibly immersed in the information technology revolution. The changes brought about by introducing computers to newspaper processes from newsgathering to automating production were swift and far-reaching. The impact of those changes, according to Carter and Cullen, "produced a controversy that has matched the pace of the technological advancements" (p. 5).

The question of ultimate costs in terms of human displacement has become a major concern to the newspaper industry. Questions about the relation of computers to job satisfaction are important because if technology results in greater job dissatisfaction and increased stress it could mean increased absenteeism and turnover and less productivity (Shipman, 1986).

Although newspaper publishers have realized the computer's promise of doing the job faster, cheaper and better, for many workers, computerization has become threatening and destructive (Carter & Cullen, 1983, p. 5).

Zuboff (1988) found that pulp mill workers used to decades of physical work monitoring the paper-making process had difficulty adapting to the computerization of their jobs (p. 63). "For workers the new computer mediated relationship to work often felt like being yanked away from a world that could be known because it could be sensed" (p.

63). One retrained mill employee said computerization distanced him from his job.

With computerization I am further away from my job than ever before. I used to listen to the sounds the boiler makes and know just how it was running. I could look at the fire in the furnace and tell by its color how it was burning. I knew what kinds of adjustments were needed by the shades of color I saw. A lot of the men also said that there were smells that told you different things about how it was running. I feel uncomfortable being away from these sights and smells. Now I only have numbers to go by. I am scared of that boiler and I feel that I should be closer to it in order to control it (p. 63).

The fears described by the mill worker are typical of some employees' negative reactions to new technology. Shipman (1986) found that job dissatisfaction from technological introduction resulted in stress for some workers. In general, problems included fear of obsolescence, fear of loss of control of the job, fear of unemployment and fear resulting from possible health problems related to computer introduction, particularly the video display terminal (Shipman, 1986).

However, accounts of employees' negative experience encountering new technology are counterbalanced by Fowler's

(1985) studies showing workers may perceive greater control over their job and be more satisfied after computerization.

An examination of the literature on how computers might affect job satisfaction for newsroom employees shows job satisfaction is a combination of factors: the method of introduction of the technology, the types of positions in which computers are used, and the nature of the environment into which computers are introduced (Shipman, 1986).

CHAPTER III

METHODOLOGY

A review of the literature indicated that personal computers and laser printers have evolved into affordable technology with the potential to transform newspapers.

Unlike many of the printing technologies that preceded it, the personal computer and laser printer combined into a flexible tool adaptable to many functions required for newspaper publishing. The applications of this technology range from the production of a few computer graphics for the front page to the pagination and electronic production of the newspaper. The process of change as it presents solutions for old problems also creates new dilemmas. Preliminary research stimulated questions to be explored in this thesis. The problems to be investigated included:

- (1) How pervasive was the use of personal computers for newspaper production in Tennessee?
- (2) What changes did Tennessee papers realize through the use of personal computers and laser printers?
- (3) What are the rewards and challenges of adapting personal computers and laser printers for newspaper applications?

The study was limited to Tennessee newspapers involved in "full-use" of personal computers. For the purposes of this study, the term "full-use" will be defined as those papers using personal computers and laser printers to

generate advertising and editorial copy and/or electronically paginate their product. The study was limited to the use of personal computers and laser printers for newspaper production. It did not include in-depth information on other newspaper applications of personal computers and laser printers such as graphics, databases, spreadsheets or computer communications.

Research Design

In order to explore the questions that arose concerning the application of personal computers by Tennessee newspapers, an appropriate research design was needed. Because information was desired concerning both the scope and process of personal computer applications by Tennessee newspapers, a mail questionnaire and two case studies were chosen as appropriate tools. This chapter begins with a discussion of the design. The other sections include a discussion of the census, the questionnaire, mailing techniques, tabulation methods and the details of the case studies.

Choosing the Design

The research problem lent itself to the survey method due to the need to collect information from a group of papers of various staff sizes and production demands. The survey design was chosen for its facility in gathering

opinions and facts (such as the type of personal computer purchased by newspapers). It was decided to mail the questionnaires to the survey census because a mail survey allowed the researcher to reach many newspapers quickly and economically.

Selecting the Sample

The literature indicated that the use of personal computers and laser printers was first innovated by rural newspapers with limited staffs. Information on how the applications of personal computers differ with newspaper staff size was desired.

The newspapers' addresses were drawn from the 1989 mailing list of the Tennessee Press Association. The list included 133 usable newspaper addresses. The questionnaires were mailed to the decision maker indicated by the mailing list, usually the publisher. A message at the top of the questionnaire requested that it be completed by the person at the newspaper who worked most closely with personal computers. This request was repeated in the cover letter.

Designing the Questionnaire

The final two-page questionnaire included 27 questions divided into five general areas including: staff size, computer equipment and application, respondent information, training, and perceived impact of computer use. The cover

letter advised the respondent that the response would be kept anonymous. The name of the paper requested in question one was for the researcher's information in tracking survey results only.

The second question was designed to classify the paper according to staff size. Preliminary research indicated that the impact of personal computers and laser printers might be relevant to the staff size, so the decision was made to distinguish the respondents this way instead of categorizing them according to newspaper circulation which is more common in newspaper research. However, a list of the respondent papers including their staff sizes and corresponding circulation figures appears in the appendix.

Question three was designed to distinguish newspapers using personal computers from those that were not and eliminate those who were not, early in the research process. The results of question three were cross-tabulated with question five to determine the number of newspapers planning a personal purchase within the following three-year period.

Questions four through six were designed to determine what types of personal computer hardware and software were popular with Tennessee newspapers. Although both of these elements were still evolving at the time of the study, it was decided that the results of these questions could be valuable for comparison. The literature indicated that the ultimate method of producing copy determined the degree to

which newspapers were applying personal computers and laser printers. The greatest impact of the new technology seemed to occur in operations applying it to its fullest degree--production in conjunction with laser printers.

Many papers replaced their phototypesetters and processors with laser printers. Where it was possible to electronically compose a story, ad, or page on a personal computer, the laser printer made it possible to produce the copy in camera-ready form immediately. Question seven was designed to determine how many Tennessee newspapers were using laser printers to output copy.

Question eight was designed to provide a picture of the respondent. It was hoped that this question would present a limited demographic of the individual at the responding newspaper most closely associated with its computer use.

Question nine was designed to reveal the scope of personal computer use at the responding paper. Unfortunately as discussed in the results chapter, this question did not yield useful information.

Questions ten through thirteen were designed to probe the personal computer training process at the responding newspapers. The research indicated that this form of technology differed from its predecessors in its shorter learning curve and the instant learning gratification it provided for the trainee. These questions were designed to

measure the amount of training time necessary before the trainee could perform basic tasks on the computer.

The research indicated that the implementation of previous printing technology, particularly the advent of cold type, had a significant personal effect on the employees who worked with it. There are many accounts of the fear among newspaper employees when the new technology was introduced. These emotions were sometimes manifested in hostile actions on the part of the fearful employees, such as the work slowdowns in newspaper "backshops" as reported by Davis (1973).

Questions fourteen and fifteen were designed to measure the respondent's perception of how the use of personal computers affected employees' attitudes about their jobs.

Questions sixteen was designed to provide information on training costs. Unfortunately, the researcher overestimated the respondents' willingness to provide specific financial information.

Question seventeen was designed to determine whether or not the respondent was using personal computers and laser printers. It was hoped that the responses concerning the previous production method would provide information on the degree of production transition accomplished by the newspaper.

It was hoped that the results of questions eighteen through twenty-seven would be useful to newspapers either

involved in, or considering a transition to, personal computers and laser printers. These nine questions were designed to provide specific information on the impact of personal computers and laser printers on the costs of supplies, labor and maintenance as well as the initial equipment purchase.

Specifically, questions twenty-six and twenty-seven were designed to present a practical picture of the everyday use of new technology. The questions were open-ended to allow the respondents to supply the desired information according to their priorities. Although this design encouraged the presentation of extremes in the challenges and rewards experienced by the respondents, it was hoped that when the results were examined as a unified voice, a realistic picture might emerge.

Mailing Techniques

The questionnaire was evaluated in a pilot test conducted by distributing it to Don Campbell, advertising manager of the Tennessee Press Association and Joe Markman, graphics editor of The Knoxville Journal. Campbell's input was valuable because of his extensive experience in working with Tennessee newspapers. Markman helped to determine the clarity and relevance of the questions. The suggestions of both were incorporated into the final questionnaire, which was mailed on March 7, 1989.

The survey was accomplished by a cover letter that briefly discussed the aim of the survey and asked that the survey be returned to the researcher within one week.

Also included in the package was a pre-paid return envelope with the address of the College of Communications at the University of Tennessee, Knoxville. A second mailing was dispatched on March 29, 1989 to papers that had not responded. The second mailing contained another copy of the questionnaire, a second cover letter, and another pre-paid self-addressed envelope. The cover letter was similar to the first and acted as a gentle reminder of the aim of the survey and the potential importance of the addressee's response. (See the appendix for a copy of both cover letters.)

The survey was closed May 5, 1989, nine weeks after the first mailing went out. The return was usable questionnaires from 69 newspapers or 52 percent of the census.

The Case Studies

The purpose of this study was to examine the process of applying personal computers and laser printers to Tennessee newspapers in addition to determining the scope of that application. It was decided that the breadth of the study should be supported with an in-depth report of the transition process involved in replacing traditional

typesetting equipment with personal computers and laser printers.

The case study as a research strategy has been defined by Yin (1984) as an "empirical inquiry that investigates a contemporary phenomenon within its real-life context, when the boundaries within phenomenon and context are not clearly evident and in which multiple sources of evidence are used" (p. 23).

The case study strategy has been used in many communications studies. It is particularly useful when "how" or "why" questions are being posed, such as how and why the decision was made to replace traditional typesetting equipment with personal computers and laser printers at some Tennessee newspapers.

The case study research strategy has been used successfully to illustrate organizational and management studies (Yin, 1984, p. 23). It was chosen as a research method for its ability to describe a process when the investigator has little control over events and when the focus is on a contemporary phenomenon.

Because the technology was so recent at the time of this study, the process of applying personal computers and laser printers to newspaper functions was still evolving while the data were being gathered. The two case studies presented here depend on the perceptions of the managers who implemented the transition at the two papers. The case

study was found to be the most suitable research strategy for reporting the events that shaped their perceptions.

The two papers chosen for the case studies--The Greeneville Sun and The Clinton Courier-News--are owned by the same company and operated by the John M. Jones family of Greeneville. In addition to the Greeneville and Clinton papers, the Jones family owns seven other Tennessee newspapers, including The News-Herald in Lenoir City, The Rogersville Review, The Newport Plain Talk, The Sweetwater Advocate, The Athens Tri-City Business Journal, and The Running Journal. The broadcasting outlets held by the Jones family include six radio stations in Tennessee. The Greeneville Sun, an afternoon paper with a circulation of 14,572, is published Monday through Friday evenings and Saturday mornings. The Clinton Courier-News is a weekly published on Wednesday with a circulation of 7,371. The two provide an interesting comparison of how one company implemented the same new technology in two different operations.

The method of gathering primary data for the case studies was personal interviews with the management staff of both newspapers. For The Greeneville Sun, the interviews were conducted with Co-publisher Gregg K. Jones, Assistant General Manager Ken Hood and Systems Manager Dawn Gibson. The interviews with Hood and Gibson were conducted in person

at The Greeneville Sun in March of 1989. Jones was interviewed by telephone in March and April of 1989.

For the Clinton Courier-News case study, Publisher David McCoy and Editor Karen Wright were interviewed. Personal interviews were conducted at The Clinton Courier-News offices in Clinton in March of 1989. Subsequent interviews were conducted with Wright over the telephone.

The Greeneville Sun was chosen because it is a daily paper using the Macintosh-laser printer system and because the system had been in place there for almost two years at the time of the study. The Clinton Courier-News was chosen chiefly because of the scope of its conversion from traditional typesetting methods to personal computers and laser printers for production. The 7,371 circulation newspaper was found to be one of the few newspapers in the state to produce the newspaper to the plate-making stage using the Macintosh personal computer and laser printer at the time of the study.

Additional information was taken from a document Jones wrote in response to a Tennessee Press Association survey concerning newspaper computer use in April of 1988. A number of newspaper documents were obtained from McCoy and Wright, including an example of a computer page layout style sheet, issues of The Courier-News before and after the transition and a copy of the marketing bulletin produced on

the personal computer for the newspaper's advertisers. Some of these documents are reproduced in the appendix.

The purpose of the case study was to examine some of the questions in the survey in greater depth. For that reason the survey questionnaire which appears in the appendix was used as a protocol for the case study. It was also decided that the in-depth information gathered in the case study should provide a comparison with the briefer, more broad-based information provided by the survey.

CHAPTER IV

RESULTS OF THE SURVEY

The responses to the mail survey varied in quality. Some respondents went into great detail in answering each question; others failed to answer all the applicable questions. For this reason the figures given for each response are in relationship to the number of respondents who answered the question and not the total number of respondents.

It was expected that the amount of information provided by the respondents would vary and it did. However, even the briefest of answers were useful and added to the depth of this report. For the most part the responses were gratifyingly complete. Only two of the 71 surveys returned were unusable, one because most of it was incomplete and the other because the conscientious respondent returned it twice.

Respondent Information

In order to better understand the responses, some information about the respondents should be considered. In this case, the respondents present an interesting mix. Although the survey was mailed to the publisher, the message at the top of the questionnaire asked that it be completed by the "person who works most closely with personal

computers" at the newspaper. Several suggestions were offered as to whom that individual might have been such as "the production manager, the composition manager, the editor or the publisher."

The results of question eight indicated that the majority of the respondents described their job titles as Publisher (25), followed by Editor (17), and General Manager (10). The remaining respondents are scattered among several job titles; they include Secretary (2), Typesetter (2), Computer Operations Manager (2), News Systems Manager (2), Vice-president (2), Executive Editor (2), Assistant News Director Graphics (1), Business Writer (1), Advertising Manager (1), Production Director (1) and Bookkeeper (1). All respondents replied to this portion of question eight, for a total of 69 responses. Of the 58 responses to part b. of question eight, the job tenure of the respondents broke down as follows: 1-5 years (25), 6-10 years (16), 11-20 years (19), and 20 or more years (8). Of 69 responses to part c. of question eight, male respondents outnumbered females (55) to (14). The age groups of these respondents included (6) in the 26-30 years old age bracket, (27) in the 31-40 years-old age bracket, (24) in the 41-50 years-old age bracket, and (13) in the over-50 years-old age bracket. Of the 62 responses to part d. of question 8, (13) had high school educations, (41) had some college or college degrees, and (8) had done some post-graduate work. Of the 69

responses to part e. of question eight, (45) said they had no computer experience compared with (24) with computer experience. So few respondents in this group described the amount of their experience that part f. of question eight became unusable.

Because it was decided that anonymity on the part of the respondents might increase the response rate, question one was designed for the researcher's information only.

Question two was designed to separate the respondents into staff sizes. The results of question two indicate the number of responses of each of these staff sizes: Group A (1-5) provided 9 responses; Group B (6-10) provided 21 responses; Group C (11-20) provided 13 responses; Group D (21-30) provided 8 responses; Group E (31-50) provided 5 responses; and Group F (over 50) provided 13 responses.

Personal Computer Use

This study was undertaken to investigate the uses of personal computers and laser printers by Tennessee newspapers. Question three was designed to separate respondents not using this equipment (8) from those who were using personal computers (61). Of the eight respondents not using personal computers, three had purchased them; four planned to purchase them within three years; one was uncertain whether a purchase was planned; and one did not plan to purchase personal computers within three years.

Types of Personal Computers

Question four was designed to tell the researcher if the respondents knew what types of computers were considered personal computers as well as provide information on the types of personal computers most popular with Tennessee newspapers. In considering these results some shortcomings of this question should be noted. A few respondents listed Compugraphic and Mycro-Tek as personal computers. At the time of this study, these two companies were beginning to provide personal computer systems, though they had long been a source of proprietary systems. It was impossible from the responses to determine which type of computer the respondent referred to.

The question called for the types of personal computers used and not a specific number. As a result, many papers did not list how many of each type they owned. Still, by counting the type of computer listed by the paper as one, it was possible for the researcher to make some determinations. Apple computers (42) appear to be the most popular with respondent papers, followed by a wide range of PCs, mostly IBM clones, which comprised the "other" category (18). Tandy computers were the next in popularity (17), followed by IBM personal computers (14).

Functions of Personal Computers

The results of question six indicate the most popular uses of personal computers by Tennessee newspapers. Although many respondents provided information on the software used to perform each function, that information was determined by the researcher to be irrelevant because of the ever-changing blizzard of software available at the time of the study. Question six was used to divide the respondents further. Papers using personal computers to produce advertising and editorial text as well as page layout and typesetting make up the "full-use" group. Papers using personal computers for more limited uses such as graphics and bookkeeping comprise the "limited use" group. For the results of question six, the two categories were tabulated together.

After reviewing the survey results, it was determined that the responses of the "full-use" group differed enough from that of the "limited use" group to justify excluding the "limited use" group from the remainder of the survey results. Many respondents in the "limited use" category indicated their papers were in transition, having recently purchased personal computers. As a result, the respondents could not fully complete the survey. Other members of the "limited use" group indicated that they used the computers solely for bookkeeping purposes or graphics; for that reason, many of the survey questions did not apply to them.

Of the respondents in the larger staff groups, this was interpreted to mean that the use of personal computers was limited to departments or individuals and not used paper-wide. The staff sizes of the "limited use" respondents include (2) in Group B, (4) in Group C, (1) in Group D, and (6) in Group F.

Many of the respondents used personal computers for a combination of functions, such as page layout, graphics and bookkeeping. The results of this question were tabulated by counting the number of respondents listing each function, whether or not the function was part of a combination. Out of 45 responses, 44 cited business related functions, such as bookkeeping, payroll and circulation; (41) listed typesetting; (29) cited page layout and ad composition equally; and (20) cited graphics. It should be noted, however, that many respondents who did not list graphics in question six later circled graphics in question 25 as a computer generated change in the paper's appearance.

Output Devices

Question seven concerned the copy output device used by the respondents. Six of the seven respondents in Group A said laser printers were used to output their copy; one indicated that the paper's copy was output to a "computer-printer." Of 14 respondents in Group B, 10 output copy to laser printers; one output copy to a typesetter; and three

used a combination of the two. Of 12 respondents in Group C, 10 output copy to a laser printer, and two used a combination of laser printer and typesetter. Of five respondents in Group E, all (5) output copy to a laser printer. The six respondents in Group F were evenly divided among two methods; three of them used laser printers and three used a combination of both.

Number of Employees Working With Personal Computers

Question nine failed to determine how many workers at the responding papers did most of their work on personal computers. The flaw in this question was that it relied on the unspecific determination of staff size in question two.

Very generally speaking, the papers in groups A, B, and C appeared to have larger numbers of their staffs working on personal computers as compared with Groups D, E, and F. The results of this question were determined for Groups A-E by dividing the number of employees indicated by the respondents into the high number at the end of the appropriate staff size. For example, if a Group A respondent indicated that four employees did most of their work on personal computers, four was divided into five to determine a percentage. Of five Group A respondents, two indicated 100 percent of the staff did most of their work on personal computers followed by one with 60 percent of the staff, and two with 40 percent of the staff reported as

doing most of their work on personal computers. Of 13 Group B respondents, two reported that 70 percent of the staff did most of their work on personal computers, followed by one with 60 percent, one with 50 percent, five with 40 percent, two with 30 percent, and two with 1 percent. Of 12 Group C respondents, one respondent indicated 100 percent of their staff did most of their work on personal computers, followed by two with 45 percent of the staff, two with 35 percent of the staff, two with 30 percent of the staff, three with 25 percent of the staff, one with 20 percent of the staff, and one with 15 percent of the staff doing most of their work on personal computers. Of six Group D respondents, one indicated 60 percent of the staff did most of their work on personal computers, followed by one with 53 percent, two with 37 percent, one with 33 percent, and one with 13 percent of the staff doing most of their work on personal computers. Of five Group E respondents, one indicated 40 percent of the staff did most of their work on personal computers, followed by one with 38 percent, one with 14 percent, one with 12 percent, and one with 6 percent. Of six Group F respondents, one indicated 24 percent of the staff did most of their work on personal computers, followed by two with 20 percent, one with 18 percent, one with 16 percent, and one with 12 percent.

Training

Questions ten and eleven are concerned with the source and time required for training the staff to operate personal computers. For question ten, Group A, three respondents indicated the employees were self-taught, two respondents indicated their employees learned through a combination of being self-taught and dealer-trained, and two respondents indicated their staffs were self-taught, dealer-trained and staff-trained.

Three respondents in Group B failed to answer this question. Of eleven responses, four indicated the staff was self-taught, four respondents indicated that the staff was dealer-trained, one respondent indicated the staff was class-trained, two respondents reported the staff was self-taught, dealer-trained and staff trained.

Of nine responses in Group C, five respondents indicated their staff were self-taught, two respondents indicated the staff had been staff-trained, one respondent indicated the staff had been dealer-trained and staff-trained, one respondent indicated the staff had been self-taught, class-trained and staff-trained.

Of six respondents in Group D, two indicated a combination of self-taught, class-taught and dealer-trained, one respondent indicated the staff was self-taught and dealer-trained, and one respondent indicated the staff has been class-trained. Of five respondents in Group E, two

respondents indicated the staff had been self-taught, one respondent indicated the staff had been dealer-trained, one respondent indicated a combination of self-training and class-training, and one respondent indicated a combination of self-training and dealer-training. Of six respondents in Group F, the majority (4) indicated their staffs had been self-taught, and two respondents indicated the staff had been dealer-trained.

Concerning question eleven, of five respondents in Group A, one indicated that the average time required for staff training was one week, three respondents indicated two to three weeks, and one respondent indicated average training as over ten weeks.

Of fourteen respondents in Group B, five indicated two to three weeks as the average staff training time, four indicated one week as the average staff training time, and one indicated over ten weeks. Of nine respondents in Group C, four indicated the average staff training time as one week, two respondents indicated over ten weeks, two indicated five weeks as the average staff training time, and one indicated two to three weeks as an average. Of the seven respondents in Group D, three indicated the average staff training time was two to three weeks, two indicated the average staff training time was four weeks, two indicated the average staff training time was four weeks, one respondent indicated one week as the average staff

training time, and one respondent cited over ten weeks for training time. Of the five respondents in Group E, three indicated the average staff training time as four weeks, one indicated the average staff training time as one week, and reported six weeks as the average staff training time. Of the six respondents in Group F, four reported two to three weeks as the average staff training time, and two reported one week as the average staff training time. One respondent in Group C added this observation to question eleven, "One day to begin, a lifetime to learn."

Question twelve probed for possible training problems in the course of either learning to operate the computer or teaching the staff to do so. Question thirteen asked about the specific problems encountered, suggesting some possibilities, such as fear of computers, lack of time, complicated manuals, etc. In most of the staff size groups, the majority of respondents indicated they had not run into any training problems; Groups C and F were exceptions, however. Respondents in Group C were evenly divided on this question with six experiencing training problems and six who did not. Although most respondents in Group F (4) indicated they did not have training problems, three respondents said they did. The other staff size groups broke down as follows: Group A, five who had no training problems and two who did; Group B, ten without training problems and four with training problems; Group D, six who experienced no

training problems and two who did; and Group E, no training problems.

In his reply to question twelve, one Group F respondent admitted he had experienced training problems. However, he seemed to sum up the pioneering spirit of many Tennessee publishers who produce their papers with personal computers. "Certainly," he said, "but none that couldn't be overcome."

Training problems reported by respondents ran the gamut from fearful employees to a lack of training support from the dealers where the computers were purchased. Of the two respondents to question thirteen in Group A, one cited employee fear and uncooperation, problems with manuals, lack of time, and lack of dealer support as training problems. One cited employee fear exclusively as the problem. Two respondents in Group B cited computer manuals as their training problem, one cited lack of dealer support, and one cited both computer manuals and a time shortage as causing training problems. Group C respondents were scattered on the source of their training problems. Two cited lack of dealer support, one cited computer manuals, one cited computer manuals, employee fear and lack of training time, one cited computer manuals and lack of training time, and one cited computer manuals, employee fear, lack of training time and lack of dealer support. The two Group D respondents to question thirteen cited employee fear, and computer manuals as causing training problems as well as a

lack of training time and lack of dealer support. Of three Group F respondents, one respondent cited lack of time as the problem, one cited computer manuals, and one cited both.

The respondents who cited computer manuals as training problems often described them as "complicated" or "incomplete." One Group C respondent complained that most personal computer training materials, like the system they describe, are not designed for newspapers. "Most training sources seem inadequate, need industry-specific, system-specific training courses."

Another Group C respondent described his dissatisfaction with the computer dealer this way: "The salesman painted too rosy a picture of the machines and then when we needed him he was gone. Also, he knew very little about operation, just selling. We phased in Macintosh as we phased out Compugraphic."

Many of the respondent newspapers using personal computers and laser printers for production took a similar sink-or-swim approach. One Group C respondent lamented: "Very difficult to train and get the paper out on time."

Another Group C respondent, a publisher, seemed to have encountered training trouble on all fronts. "System was upgraded too often," he wrote. "Documentation was poor, hardware was troublesome, support was lacking." The respondent added that he was describing the computer system that preceded the Apple computers the paper was using at the

time. "No problems with the Apple," he said, "but the one before that was a bear."

Apparently, not all the computer training experiences were horror stories. One Group B respondent wrote that the paper discontinued Compugraphic typesetting and converted to Macintoshes and laser printers in one week. "We called for more training after one week, but we were able to get the paper out, a 20-page broadsheet edition the first week without overtime."

Worker Attitude

Questions fourteen and fifteen were designed to measure staff reaction to working with personal computers. In hindsight, these questions could probably have been condensed into one. The results of the two questions were fairly uniform through all the staff sizes. The majority of the respondents indicated that they had observed a positive change in the way the employees who worked with computers felt about their jobs.

Respondents in Groups E and F reported that they had all seen a positive change in employees' attitudes toward work after personal computers were introduced. A minimum of 80 percent of the respondents in Groups A, C, and D reported positive changes. In most cases, the remaining 20 percent said that they had not observed a change. Three of the respondents in Group B who had reported observing a change

in the way employees felt about their jobs after working with computers indicated that the employees seemed to be experiencing a mixture of positive and negative feelings. They did not elaborate further.

Many of the respondents shied away from question sixteen concerning the cost of computer training for their staffs. Less than half responded and many wrote that what training they had was included in the purchase price of the computer equipment. Estimates of computer training per employee, by respondents who provided them, ranged from several under \$100 to one reported \$1,000 figure. The question did not ask how many employees were trained at \$1,000 per head or less than \$100 per head. It is possible that one employee received the purchased training and then taught the rest of the staff. Without more information, this question made it difficult to compute the cost of outside training for a staff.

Previous Methods for Page Layout and Pre-Press Production

Question seventeen sought to determine how many Tennessee newspapers were using personal computers for page layout and pre-press production. It was also designed to determine how far papers now using personal computers and laser printers for production had come in terms of their previous method of doing those jobs.

Most of the respondents in all the staff size groups indicated that they had previously produced copy on phototypesetters and pasted up manually with scissors and hot wax. Two indicated "punchtape" later pasted up by hand. Their replies were interpreted to mean that they had changed to personal computers and laser printers from an older method of typesetting. It could not be determined from their replies whether the information on the "punchtape" was used to drive converted Linotype machines or more modern phototypesetters.

Money and Time Savings

Questions eighteen through twenty-one were designed to measure whether money and time had been saved by switching production methods to personal computers and, if so, in what specific areas.

Groups A, E, and F responded unanimously in the affirmative to question eighteen. Of fourteen Group B respondents, one indicated the change had not saved money. Of eleven Group C respondents, nine indicated money savings while two did not. Group D yielded seven responses; one indicated the switch to personal computers had not saved money.

Of the respondent groups detailing money savings in question nineteen, most indicated some combination of supplies, equipment maintenance and reduced labor as the

specific savings areas. Of the six Group A respondents, two indicated that using personal computers had saved them money in chemicals, maintenance and labor, one in paper, one in chemicals and paper, and one in chemicals and labor.

Of twelve Group B respondents, three indicated they had saved money in chemicals, maintenance and paper, two indicated they had saved money in chemicals and paper, and one each had saved money in chemicals and maintenance, chemicals, maintenance and paper, chemicals, maintenance and labor, chemicals and labor, and two indicated they had saved money in the shorter training period of personal computers.

Of eleven respondents in Group C, two respondents indicated they had saved money by switching to personal computers through the low initial investment of the personal computer system. One cited the shorter training period of personal computers, five respondents said they had saved money in chemicals, paper and labor, one cited chemicals, paper, and maintenance, and one added training to that group.

Of six respondents in Group D, four indicated they had saved money on chemicals, paper and equipment maintenance, and two added labor savings to that group. The four respondents in Group E divided equally among savings in chemicals, paper and maintenance (2) and adding labor to that group. Group F respondents (7) indicated they had saved money in the switch in the areas of chemicals,

equipment and paper (2); chemicals, equipment, paper and labor (2); chemicals and maintenance (2); chemicals and paper (1). One Group B respondent wrote, "saved us a lot of money, plain paper instead of photo paper; quicker production means less overtime; reduced maintenance has been a major consideration; chemicals replaced with toner cartridges."

Another Group B respondent wrote, "The cost savings have been amazing in all of the areas named above. We have saved thousands of dollars in the first six months alone."

Two respondents went into greater detail about their cost savings using personal computers. A Group C respondent said switching from a Varityper to a Macintosh and a laser printer enabled him to eliminate one full-time production person and save \$500 per month in typesetting supplies.

Another Group C respondent explained cost savings this way: "One 8-by-11 sheet of Compugraphic paper costs 99 cents; one 8-by-11 sheet of bond paper costs about 11 cents; there are no chemicals, no sensitive silver paper to be fogged or ruined by mistakes when light accidentally is let into the machine."

Most respondents in every group with the exception of Group F indicated that switching to personal computers had saved time. Group A respondents answered question twenty in a unanimous affirmative, and in almost every other staff size group only one respondent dissented. Group F

respondents, however, were evenly divided on this question; three indicated time had been saved and three indicated it had not.

Of the 31 respondents in all groups who described how time had been saved by switching to personal computers, labor was a common theme (25); the next most mentioned area was the elimination of processing time (7); the ability of the new equipment to store and call up copy (5); the ability to make quick copy changes (4); and being able to move ad and news copy deadlines back (3).

A Group F respondent wrote that the staff was able to get the paper out in about one-half the time after switching to personal computers. A Group D respondent said that the use of personal computers cut production time by 21%. Another respondent in that group said that time had been saved because "typesetters were not forced to walk from machine to machine to obtain the finished product."

Three Group C respondents went into great detail in answering question twenty-one. "Formerly we composed on floppy discs and then ran the discs through a Compugraphic Trendsetter. We had two of these machines and eight Compugraphic 350 MDTs, plus a processor and a Compugraphic 7200. Now the type goes directly to the laser printer by wire. Two laser printers take care of all our eight word processors and ad-builders. 8-by-11 sheets are more easily handled and stored than the long takes of Compugraphic. The

Compugraphic service contract became almost unbearable."

The second Group C respondent wrote: "More machines allow for less reliance on composing room for production of news or ad copy; ad department can prepare their own. No waiting to chemically process copy. Easier correction process for errors. Easier access/information retrieval. More machine control in diversity of type, graphics and graphic effects."

The third Group C respondent said: "Simplicity of operation that I did not believe. Anyone can trip the copy and prepare it for pasteup."

A Group E publisher said that the change to personal computers had saved him time and given him more control over the product. "We have time to prepare each page as we desire, rather than rush to get each page finished." A Group D publisher simply wrote: "You'd have to know old hot metal methods to understand."

Effect on Staff Size

The responses to question twenty-two concerning whether the staff size was affected by the switch to personal computers were diverse enough to warrant reporting them in the staff-size groups.

Of six Group A respondents, four indicated staff size had been affected, and two indicated it had not. Of fourteen Group B respondents, eight said their staff size had been affected, and six indicated that it had not. Of

twelve Group C respondents, eight said their staff size had been affected, and four indicated it had not. Of six Group D respondents, two indicated their staff size had been affected, and four indicated it had not. Of five Group E respondents all but one (4) said their staff size had been affected. All of the six respondents in Group F indicated their staff size had not been affected by using personal computers.

The majority of respondents to question twenty-three indicated that their staff size had been reduced due to personal computers. All of the respondents in Groups C and D indicated that their staff size had been reduced. The remaining respondents broke down as follows: Group A, three indicated a decrease in staff size, one indicated an increase; Group B, seven indicated a decrease, one indicated an increase; Group E, three indicated a decrease, one indicated an increase.

It should be noted that in Groups A and B the addition or subtraction of one staff member would have a greater impact than in Groups C through E. It should also be noted that the staff reductions reported by the respondents were not large scale layoffs. Judging from the reported age groups of the respondents, many had been through the conversion from hot-type to cold-metal, which generated labor reduction on a larger scale. The older respondents may have been more sensitive to this issue.

One Group F respondent wrote: "We were able to change some of the roles our staffers played--laid off no staff."

Of the respondents who indicated that their staff size was not affected by the use of personal computers, many reported that the new equipment had made their employees more versatile, productive and efficient. Many of these respondents wrote that they were putting out more pages with the same size staff after switching from traditional production methods.

Many of the respondents wrote that the reduction in staff size consisted of elimination of a part-time employee. Others reduced full-time employees to part-time status as was the case of a Group C respondent: "Change has saved approximately 25 man-hours per week. Some full-time have been reduced to part-time. Reporters are now typesetters allowing a bigger news hole."

Of the respondents who indicated that their staff size had been increased, three reported that the staff size increase was in response to a greater volume of work that the new equipment was able to generate. Their comments were similar to that of this Group E respondent. "We actually have more employees but the size and frequency of our production has also grown." Or this Group F respondent: "More growth and more workers."

Product Appearance

The majority of the respondents indicated that the use of personal computers and laser printers had affected the appearance of their papers. Respondents in Groups A, B, E, and F responded to question twenty-four unanimously in the affirmative. Respondents in Groups C and D also had few dissenters. One of three respondents in Group C indicated the use of personal computers did not change the appearance of the paper, and one of five respondents in Group E said computers had not changed the paper's appearance.

For the respondents reporting a change in the newspaper's appearance, most chose a combination of elements that had been changed through personal computers. The results of question twenty-five indicate the most frequently reported areas of change, whether listed alone or in combination, were the use of graphics (36), a new design (32), fewer copy errors (23), and a better overall appearance (7). These results were tabulated by counting the number of times each of the elements were listed by the respondents who answered question twenty-five.

Questions twenty-six and twenty-seven were designed to allow the respondent papers to report the most outstanding advantages and disadvantages of using personal computers in their operations. For both questions, the respondents' replies were coded according to the elements most frequently mentioned by all the respondents. For question twenty-six,

these elements include accuracy, appearance, money saved, time saved, and control.

The responses indicating accuracy, appearance, money and time savings were stated plainly by the respondents. The control category was developed after reading several responses such as "We are no longer dependent on unreliable typesetting equipment."

There did not appear to be enough diversity between the staff size groups in the responses to question twenty-six to warrant reporting the results of each of the groups. It is worth noting, however, that the elements of appearance and control were not mentioned as frequently by the respondents with staff sizes from 1-20 compared with their counterparts in the 21-over 50 groups.

Time savings was the most positive aspect most frequently (33) mentioned by the 46 respondents who answered this question. Money savings was the next most frequently mentioned aspect (23), followed by appearance (18). The elements of employee morale and control tied for most frequent mentions (10). The least frequently mentioned positive element was accuracy (10).

The time savings element as reported by the respondent papers covered many areas of newspaper operations. Several respondents wrote that the initial training was easy and took less time than the previous production method. Other comments centered on time savings in maintenance and

pasteup. A few respondents reported time savings great enough to move their advertising and editorial copy deadlines back by a few hours, or in one case one whole day.

Concerning appearance, many respondents said their product looked "cleaner, more consistent" with the use of personal computers and laser writers for production. One respondent cited more creativity, variety and flexibility with the typographic and art elements possible with personal computers and laser printers. Another respondent said the most positive aspects of using personal computers were "speed and a feeling of more confidence of new jobs."

One of the respondents went into great detail in describing the positive aspects of using personal computers and laser printers:

Easier ad layouts; easier information retrieval; easier copy correction and reformatting to new column widths; systematized storage of recurring graphic elements; better inter-departmental exchange of copy; greater graphic and typographic diversity; portability of machines allows for portability and substitution of machinery in case of breakdowns.

Responses citing employee morale as the most positive aspect of using personal computers were similar to this one: "Typesetting for ads and newsletters is FUN and we have

several 'Mac addicts' in the shop competing for time at the keyboard."

Another respondent wrote that the most positive aspect was the employee pride generated by their ability to operate the computers: "There is a feeling that we are part of the 20th century now."

Fewer respondents answered question twenty-seven in comparison with number twenty-six. It is not known whether these respondents had no negative aspects to report or were simply tired of filling out the survey. However, of the 38 respondents in question twenty-seven, 15 wrote "none" as a response.

The other responses to open-ended question concerning the most negative aspect of the use of personal computers fell into the categories of computer crashes, equipment problems, adapting computers for newspapers, dealer support and "other."

The results of question twenty-seven are similar to those of question twenty-six in that the respondent groups did not differ significantly enough from each other in their choice of answers to warrant reporting them by staff size. Of the 27 respondents to this question, the highest number reported negative aspects that defied individual responses and were listed under the category of "other." Two respondents cited employees' fear of, or resistance to,

personal computers. As one respondent wrote: "Employees not thrilled with change."

Two other responses concerned the quality of the product compared with the previous method of production as explained by this respondent: "The only negative aspects are (a) quality is not there yet and (b) the printer does not output large enough sheet size yet."

Another respondent complained that the personal computers were not fast enough or powerful enough for newspaper use.

Overall computerization is a godsend to this industry, compared to technologies even ten years ago. It has not, however, answered all publishing problems to the degree that software developers claim. Examples: Pagemaker is too slow for paginating our whole paper, so we build ads with it and lay pages out by hand, just as we did before Macintosh was installed. Scanning photographs is still a slow and somewhat expensive process, and an inferior option compared to chemical photo and PMT processing.

Networking can create malfunctions of almost nightmarish proportions, especially if software is inferior. Another consequence of computerization is that electronically stored information is jeopardized by mechanical and software failure. It is possible to

lose a year's worth of work through the failure of a \$10 floppy disk.

Other comments which fell under the category of "other" negative aspects of using personal computers included the expense of upgrading equipment and software, time lost in training and in personally maintaining the equipment, and the increased use of supplies.

The next most frequently reported negative aspects in question twenty-seven were computer "crashes" and equipment problems. When computers "crash," they become inoperable and often "take" the information stored within them. As one respondent lamented: "We have lost a complete classified program which took six months to replace."

The most common sentiment expressed in the comments about crashes was helplessness. One respondent complained that the "crashes" led to down time and overtime. Another respondent wrote that "crashes" were a real problem because the personal computer system was tough to back up with another system.

The next most frequently expressed negative aspect was dealer support, or the lack thereof. Seven respondents indicated this as an area of dissatisfaction. A rural respondent reported: "Lack of people in rural areas with expertise to teach and troubleshoot. Firms which sell computers are, in my experience, hesitant to back up the claims of the salesmen." Another respondent wrote: "Lack

of good training from dealer and manuals" and "service response time has been a problem when working with some local dealers. Because of the technology of personal computers, we sometimes feel helpless when problems arise."

Two respondents said that personal computers, laser printers and software have not been adapted very well for newspaper use. As one respondent wrote: "We are adapting a system developed for doing newsletters. Our dealer doesn't know anything about newspaper applications or newspapers."

Other responses to question twenty-seven concerned learning limitations, such as "we still don't feel trained yet" and "not knowing the full capability of this equipment."

Some responses about negative aspects had a more positive tone. "We don't have enough computers for everyone who needs one or wants one."

CHAPTER V

ANALYSIS OF THE MAIL SURVEY

The most obvious conclusion to be drawn from the survey is that most of the respondent newspapers were involved to some degree with desktop publishing. The majority of the 69 respondents (50 or 72%) replaced the traditional form of typesetting with computers and laser printers. From survey accounts, it appears their transitions were immediate ones, with publishers unplugging phototypesetters one day and wheeling in the new technology the next.

According to respondent reports, this technology has distinguished itself from its predecessors with a shorter training period, lower initial investment, and efficiency and economy of operation. Also, unlike its predecessors, components of the new technology could be purchased off the shelf at a computer store.

Traditionally, the introduction of new technology has brought the newspaper industry problems and opportunities. The results of the mail survey indicate that the introduction of personal computers and laser printers was no exception. As the respondents shifted technologies within their operations, they seemed to be shouting with exhilaration at the same time they were screaming with frustration. The time and money savings elements of desktop publishing seemed tempered by the hurdles of tailoring to

newspapers technology which was originally developed for business communications.

The survey results present an interesting picture of the individuals managing the technology transition at Tennessee newspapers. The picture that emerged was that of college-educated publishers, most of them males between 30 and 50 years old, obtaining some of the first computer experience of their lives in figuring out how to produce their products with it.

Training

The survey results indicated that the training process required about three weeks. Although respondents seemed pleased with the relatively short training period, they expressed dissatisfaction with the training materials. Many remarked that the manuals were unclear or inappropriate for newspaper applications. With few exceptions, it appeared that the respondents trained themselves and their employees with live ammunition. The survey results indicated that employers and employees taught themselves the basic skills necessary to produce their newspaper with the new equipment under the threat of the publication's next deadline. Given the lack of much time to practice, it is surprising that there were not more respondent complaints concerning training.

The survey results indicated that the training process was most likely accomplished by the trainee working through the manuals or under the guidance of another staff member with only slightly more experience. This peer training seemed to have a sort of peer pressure on staff members to learn the computer. Though many of the respondents indicated that their staffs had been dealer-trained, their comments indicated the instruction often consisted of a day's worth of hands-on experience supplied by a salesman. Whether self-trained or dealer-trained, many respondents indicated that due to time limitations, their employees had only acquired enough skills to get the paper out. In some cases, the results appeared to be that the employees did not feel fully trained and the management did not feel that the full potential of the equipment was being realized.

Worker Attitude

The survey results painted an interesting, if limited, picture of the employees' attitude toward the new technology. Respondents indicated that, unlike its predecessors, the new technology positively affected the way that employees using the equipment felt about their jobs. According to respondent reports, the use of personal computers and laser printers did not mean the displacement of workers. Perhaps these workers, free of the threat of being replaced by the new technology, could embrace it.

The positive picture of employee attitudes presented in the survey report may be a case of whistling past the graveyard in some respects. In the same breath in which employee enthusiasm was reported came the revelation that employees' roles had been changed by the new equipment. The survey results indicated that the introduction of the new equipment changed the roles of employees, especially at newspapers with staff sizes under 50. One respondent reported that reporters had been turned into typesetters, another that production people who had previously produced pieces of ads were now producing complete ads and expected to inject creative input. The respondents' assessment of the role changes was positive. They said the new technology made their staffs more versatile, productive and efficient. However, it is unclear whether the role changes, over time, might adversely affect the employees. The technology is too young to provide many answers on how employee roles will be changed by it. Managers should be aware that although employees seem comfortable with the new equipment they may feel overwhelmed with their new responsibilities.

Money and Time Savings

Money and time savings were consistently reported by the respondents. Savings in the areas of the initial investment, supplies and maintenance were the most dramatic, especially when compared to the previous production

technology. The potential for saving money with the new technology was a common theme in the trade magazine accounts of the impact of desktop publishing for newspapers. The newness of this technology made it difficult to present a fair financial comparison with the phototypesetters and processors previously used by the respondents. It remains to be seen how personal computers will perform over time in maintaining their initial cost savings lead.

Equipment Comparisons

The types of computers purchased by the respondents as well as the combinations of equipment reported by many of the respondents indicate that many publishers seemed to be making the transition to the new technology by trial and error. The large proprietary computer systems and huge phototypesetters that preceded personal computers and laser printers often came with training and maintenance programs. Their purchases were significant capital expenditures requiring a great deal of thought and justification. They were often purchased and maintained through system vendors who installed them. The fourth wave of affordable, off-the-shelf printing technology, in contrast, demands more of the newspaper publishers who purchase it. Like wonderful presents for Christmas morning, these new systems must be assembled by someone on Christmas Eve.

The burden of keeping current with the technology of personal computers and laser printers rests with the purchaser. Information about new hardware and software, troubleshooting and efficient operation are only available through newspaper or computer industry trade magazines or word of mouth. The price of efficiently managing the off-the-shelf technology seemed to be a large chunk of management time in this respect.

Advantages and Disadvantages

Given the scope of change personal computers and laser printers presented to many respondents, it is interesting that so few reported the disadvantages of the new equipment. The problems reported seemed to center on equipment limitation or failure and dealer support. Many respondents reported disillusionment with equipment that did not meet their expectations. When detailed, the most common disappointments seemed to center on the lack of production speed and page-size limitations of some systems.

Perhaps because they were accustomed to the vendor support that traditionally accompanied large computer and phototypesetter purchases, the respondents seemed surprised to find themselves alone with personal computers and laser printers. The survey report indicated lack of dealer support was a common frustration. At the time of the study, the manufacturers of both personal computers and laser

printers offered warranties with their equipment. It is unclear from the brief information provided in the survey what kind of arrangements were made, if any, between the respondents and the computer dealers.

Overall, the respondents seemed to have a high irritation tolerance for the new technology. Many of the respondents who agonized over computer crashes or equipment incompatibility were generous with the praise for the system's capabilities. Many of the respondents attributed increased efficiency and staff creativity to personal computers and laser printers. They seemed willing to weather training challenges, equipment problems and dealer unresponsiveness in exchange for the potential of the new technology to save them money and time as well as enable them to produce a cleaner, more competitive product.

CHAPTER VI

THE CASE STUDIES

Introduction

The Greeneville Sun and the Clinton Courier-News are owned by the same company and operated by the John M. Jones family of Greeneville. In addition to the Greeneville and Clinton papers, the Jones family owns seven other Tennessee newspapers, including The News Herald in Lenoir City, The Rogersville Review, The Newport Plain Talk, The Sweetwater Advocate, The Athens Daily Post Athenian and The Herald-News in Dayton. The company also publishes the Tri-City Business Journal and The Running Journal. The family also owns six radio stations in Tennessee.

It is the goal of the company eventually to use the Macintosh-laser printer system for production at all of the papers, according to Gregg K. Jones, co-publisher of The Greeneville Sun. Because the papers vary in size as well as in their present method of production, the degree to which they will use the new technology will vary.

The Greeneville Sun, an afternoon paper with a circulation of 14,752, is published Monday through Friday evenings and Saturday morning. The Clinton Courier-News is a weekly published on Wednesday with a circulation of 7,371. The two provide an interesting comparison of how one company

implemented the same new technology in two different operations.

In telephone interviews conducted in March and April of 1989, Gregg Jones explained why the decision was made to switch from typesetting with a Compugraphic system to typesetting with a Macintosh-laser printer system. Jones said part of the reason the family did so was the availability of the mainstream computer equipment and software that could be tailored to specific newspaper needs. The fast learning cycle of the Macintosh personal computers made them front-runners for the new system chosen for the transition, he said.

Desktop publishing technology became available commercially in 1984 and hit its stride in 1985, the year the Joneses decided its cheap technology and short user-learning cycle would benefit the production process at The Sun.

"We made the decision to use Macintoshes in December of 1985, had all of them installed in March of 1986. We had all the Compugraphic equipment out of the building by February 1987," Jones said.

"We looked at display advertising from the start as a way to start with microcomputers. We've had personal computers for years, but we only did minor things with them. Until the Macintosh, we never considered getting involved with them in such a wholesale way. The introduction of the

Macintosh interface and mainstream software that can be adapted for our specific needs opened the door for us."

The declining value of the traditional typesetting, pre-press production equipment used by the Jones' papers and the increasing competition of the media marketplace also fueled Jones' decision to take advantage of the new technology. "The whole idea is to identify how technology has changed and apply it to our needs. If new technology exists to do things better and save us money, it's much better from an operations standpoint. If there are still people using the equipment and they can use my equipment, it pushes me to take action. Our world is increasingly competitive; it is growing exponentially in its competitiveness. There's new technology out there which allows the man on the street the tools to do the job. With them he can get a paper out with the highest technology and the best quality--and we had better be ahead of him."

In addition to staying ahead of the other guy, Jones said the potential cost savings of the new system coupled with the high quality of the product it produced convinced the Jones family to implement the new technology.

"There are three factors which weigh into this: the quality factor--does it look good? Also, is it cost effective to do so? Cost plays an enormous role in this business because of the shallow profit margins. It is important that we maintain profit, quality and efficiency."

Ergonomic factors were weighed along with economic factors in making the decision, Jones said. For that reason, the editorial staff at The Sun entered news copy on the Mycro-Tek front-end system. News copy was processed through the laser printer then pasted up in a traditional manner. However, The Sun had switched its advertising composition and production process entirely to the Macintosh-laser printer equipment.

"The third consideration is the working environment. This profession depends on the industry and creativity of individuals. Their moods affect our product. You can really get people down if you throw change at them without involving them in the transition," Jones said.

The use of the Macintosh-laser printer system at The Sun was more limited than at the Clinton Courier-News, where all editorial, advertising and special section copy was created and produced on the desktop publishing system, Jones said.

"At The Greeneville Sun, we are working with Mycro-Tek front-end hardware and software. I want to change to personal computers because there's an enormous amount of software on the market that provides tremendous opportunities for our editorial staff and for us as a newspaper. But they like the Mycro-Tek system; they're used to working on it. If I made the change now, I'd be making

it harder for them to do their jobs. The biggest value of the Mycro-Tek is that our staff knows it," Jones said.

Jones also pointed out that the two papers differed in the equipment used for word-processing and typesetting prior to introduction of the Macintosh-laser printer system. The Sun had been using the Mycro-Tek front-end system which is networked, while the Courier-News had been using stand-alone personal computers.

The Clinton Courier-News Case Study

The Clinton Courier-News was founded in 1887. The newspaper's production process has passed through the technological transitions of hot-type and cold-type and phototypesetting methods.

Preparation for the Transition

Publisher David McCoy and Editor Karen Wright came to the Clinton Courier-News in January of 1988. In September of the same year, they supervised the transition of the paper's production process from the Compugraphic typesetting system to Macintosh personal computers for data entry and laser printers for typesetting.

The decision to make the switch was made by the management of the Jones family papers. Some of the elements of that decision are described earlier in this chapter by Gregg K. Jones. Wright said she believed the decision to

update the production process with computers and laser printers was based on two factors: "Costs and technology. It was a combination of the two factors. We were using a Compugraphic front-end system with a typesetter. The system was several generations old. It used the silver process and it got to the point where the company was just not willing to pay for updates and mechanical problems. The costs of maintaining the old system just kept going up, up, up, and we were also limited in technology with the old system. We had our hands tied in terms of what we could do and how quickly we could do it," Wright said.

The nine Macintosh computers were installed at the Clinton paper in July of 1988 with a September deadline from the parent company for making the production transition. Both Wright and McCoy said that although the components of the personal computer system arrived in July, there was no time for training prior to the September switchover deadline.

The Courier is typical of many small papers in that the staff members must perform a wide range of functions to get the paper out. Because all available hands were needed to run the paper, carving out a chunk of time for computer training was impossible, according to Wright. "One of the problems small papers face is how to learn the whole process and still put the paper out every week. We couldn't take

the whole staff to the computer shop on an afternoon and learn how to turn those suckers on."

When the deadline for switching production to the Macintosh-laser printer system arrived, McCoy said, he was told to unplug the typesetter. The task of actually implementing the transition fell to Wright, who had taught herself how to use an earlier Macintosh model at home.

"I sat down the night we got it and categorized my embroidery thread. I was working in public relations for the community playhouse at the time and I had several thousand names on 3-by-5 cards from which I created a database. So much of the Apple stuff is consistent across generations. It's been so similar that the early experience gave me the skills I came to the job with. I still haven't had time to go through the manuals. We'll be 15% to 20% more efficient when I can go through the manuals, but that basic knowledge allowed me to puzzle much of it out."

Wright and McCoy decided they wanted the newspaper produced on the Macintosh and LaserWriter system to resemble the previous papers produced on the Compugraphic system.

"We wanted it to look as close to the product (paper) produced by the previous system as possible. We didn't want the Mac (version) to jar the reader," Wright said.

To accomplish that goal, Wright and McCoy systematically went through the Courier and attempted to reproduce the typefaces, spacing, style and design of the

body copy, headline, cutline, byline styles for a similar "look" using the Macintosh and laser printer.

Using past papers as a guide, Wright built templates and a style palette to guide reporters who would be composing stories into modular units. Wright installed the templates and style palettes, designed to be used as page layout blueprints, on all the Macintosh terminals. After entering their original copy into the Macintosh terminal using the Microsoft Word word-processing program, reporters formatted their stories using the Pagemaker page layout program and the style palettes. The result, according to Wright and McCoy, was a story and its accompanying headline, byline and photo caption produced in a modular unit by the reporter.

The Transition

It could be said of the Clinton Courier-News that the production transition from the Compugraphic to the Macintosh laser printer system was accomplished in one week. "On the last Wednesday in September, we unplugged the old system. On the first Wednesday in October, we put the paper out on the Macintosh," McCoy said. "We literally started from nothing in a week. Now we don't have a Compugraphic plugged in in the building."

Although the transition period could be considered brief, it was not an easy one, according to Wright. She

said she and some staff members worked 37 consecutive hours to produce the first computer-generated paper. "We worked from Tuesday at 7 a.m. until the following Wednesday until nearly midnight on that first issue," Wright said.

The first post-Macintosh paper was almost solely produced by Wright. Because she was the only staff member who knew the Macintosh system, all copy was given to her to enter into the system and format the page layout, Wright said.

However difficult the first post-Macintosh paper was to produce, McCoy and Wright said they were pleased with the result. The copy was more error-free than in the past and appeared neater and straighter on the page. The elements of each story and each page were more consistent and in their proper places. McCoy and Wright reported being especially pleased with how similar the first computer-produced paper was to the typesetter-produced papers which preceded it.

Although the physical transition from producing the Clinton Courier-News on the typesetter to producing it on the Macintosh-laser printer system was accomplished in one week, getting the bugs out took considerably longer and was complicated by the fact that only Wright knew enough about the process to get the paper to the plate-making stage. "The first week we were perfect. The second week we blew it," Wright said. "We tried to save a step and blew the leading. We somehow ended up using 25% more space. At the

time, we couldn't figure why we couldn't get more news in the paper. Of course, we had used auto leading instead of choosing the leading in Pagemaker. I was in tears several times those first few weeks. It was tremendously frustrating. When I was solo, it was also tremendously exhilarating. I spent a lot more time in the office those first eight weeks. Now I'm back to a normal schedule," Wright said.

Training

One of the hallmarks of the Macintosh personal computers is the short learning cycle. Although formal training is offered by computer dealerships, computer users organizations and schools, many users learn the system through the self-guided tutorials. These animated lessons are designed to teach a beginner basic skills in about one hour.

Many of the skills required to enter and format copy for newspaper use are beyond those basics. The staff at the Clinton Courier-News was able to learn enough from Wright to assist her in producing a camera-ready newspaper product. Since there was no time for formal training, in the weeks following the first Macintosh produced paper, Wright said she brought each staff member up to speed on the new system one at a time, using live copy which had to appear in the

next edition of the paper. "I'd just tell them to bring me what they were working on," Wright said.

A reporter or staff member needed two hour-long training sessions with Wright, supplemented with a week's work alone before he or she could enter and format copy on the Macintosh system, Wright said. "I would say they were trained on the new system if they could take a story all the way from composing to laying it out on the page. For a small paper that's critical. They must know their way around Microsoft Word and Pagemaker and know something about design."

It is reasonable to assume that the amount of time required for an individual to go from computer illiteracy to computer competency varies with the individual and the task at hand. Wright said the learning cycle of the new system varied among employees of various ages and levels of computer and work experience. "We have a high school intern who worked with us half-days. It took her two weeks to become competent in Microsoft, writing with someone else doing the formatting. It took two more weeks to get her proficient in Pagemaker. She has considerable other job responsibilities also, so we consider that she was up to speed in three or four days," Wright said.

Both Wright and McCoy commented that "young people take to it like ducks to water." Horace V. Wells, Jr., 82, the publisher emeritus, became an exception to that observation.

Wells owned the paper from 1933 until 1988, and wrote for the paper much of that time as well as supervising its production through the processes of hot-metal and cold-type. Wright and McCoy said that Wells had taken to the new word-processing and production method "beautifully." Wells typed his weekly column into his personal computer where it is formatted by Wright. According to Wright, the octogenarian was so impressed by the system that he bought a similar one for his personal use, which he is using to write a book.

A Comparison of the Production Process Using the Compugraphic and the Macintosh-Laser Printer System

A comparison of the production process using the Compugraphic and the Macintosh-laser printer systems show specific areas of time savings.* The addition of a laser printer in the newsroom meant that reporters and editors could see a printed copy of their work immediately. Prior to that, reporters and editors entered news copy into four personal computers. The computers were stand alone units that were not networked. The news staff saved their work on computer disks that were forwarded to editors for correction and then to typesetters to be set for the paper. Because the paper used one typesetter and processor which was located in the production room, reporters and editors were

*Figures detailing comparisons between the production methods on the Compugraphic and Macintosh systems at the Clinton Courier-News appear in the Appendix.

often at the mercy of a typesetter in the backshop when they wanted a hard copy of their work. "We all had to go to the back to see the copy printed out. If you needed something in a hurry, you sat and waited. It was awful," Wright said.

Before the Macintosh-laser printer system was installed, it took the whole staff most of each Wednesday to get the paper out, according to Wright. "On production days everyone had to drop everything they were doing to get the paper out. There wasn't enough space back there to do anything. We all used scissors and glue to piece the paper together. Sometimes the old system would go down and we stood around until it was back up. Now the paper is laid out as it is written. Reporters may lay out a story for two columns and I know it should be three, but that's easy to change. The copy is processed as a unit. The Macs make all of us more versatile. It lets reporters work on the scope of the paper, which is very important on a small paper like ours where everyone has to do everything."

Wright and McCoy decided to teach the staff to produce their news copy in modular units to streamline the production process. "The whole point in desktop publishing is to get rid of typesetters and the backshop," Wright said. As a result, the production process at the Courier shifted to the reporters and editors for composition. After entering their copy into the Macintosh using the Microsoft Word program, reporters formatted it using the style palette

and templates Wright installed. The process consisted of choosing the appropriate style from the palette for body copy, headlines, bylines, cutlines and quoteboxes.

The style palette contained the proper configuration in terms of indents, type size, and fonts for all the types of copy comprising the Clinton paper. For example, a photo credit was set up in all caps, 6-point type and flush right. That configuration could be chosen under the title "photo credit" from the computer menu through the style palette like most users select fonts. This computerized process allowed the paper to be laid out almost as it was written, a critical short-cut for a small paper, according to Wright.

"To enter their copy into the Compugraphic, reporters had to know the typesetting codes for specific fonts and type sizes because that system was designed for typesetters, not reporters. The results were that the copy was crooked, headlines, cutlines and bylines were pieced. No story was a single unit. It was a composite of elements that were produced separately. They are still many separate elements, but they are processed together. Now it comes out in one piece that's straight and square and really looks better," Wright said.

"Before, every element of a story was a separate piece printed out by the Compugraphic, often by several different people. Typesetters typed press releases, reporters typed stories and turned in headlines and cutlines on all these

tiny pieces of paper. No one had any idea if they would fit. It was normal to have six or seven different elements for one story from six or seven different places. With the Mac, it comes out in one piece and it's already straight. For example, the obituary page has a flag, a headline, some art and a cutline. It used to take one person one and one-half hours to compose it. Now it takes about 15 minutes. With many separate elements on a humid day sometimes they wouldn't wax right and would fall right off the page. Now the obituaries are done in modular units with a hole left for the pictures which are processed traditionally and pasted down," Wright said.

Copy errors were corrected easily and more quickly with the Macintosh-laser writer system, Wright said. "With the old system, if an error had to be corrected, the typesetter had to re-typeset at least one paragraph in which it appeared and then trim it out and reset it on the page. You had to worry about pieces being misplaced or covering something else up or falling off the page before it could be shot. With the Macintosh system, corrections are not a battle."

Although composing stories in modular units on the Macintosh-laser printer system saves production and correction time, the new process requires more preparation time for formatting, Wright said. "We spend some time in preparation on the front-end that we didn't spend before,

though we spend less time altogether and the finished product looks better," Wright said.

Overall, the time savings with the new system was considerable. Wright estimated that the Macintosh-laser printer system reduced the time required to get the paper out in half.

"We built a 28-page paper yesterday in three and one-half hours with three fewer people than we used to need with the old system. We gained one more day and in a weekly operation that's a lot. We never had a production department; we had typesetters. We composed the paper and laid it out on the page. We still do that, but the machines help us do it straighter. We had two people who worked with us part-time on production, but they left and we are not replacing them."

The production time saved by the new system allowed the staff to gather news longer, Wright said. "We're more alive--able to do things later in our production cycle. We're trying to deliver fresher news in the paper. There are five papers in this county, and it's important for us to remain competitive. Our goal is local news--as many names and faces as we can get in the paper. The Macs help us meet that goal because we can add things later in the cycle. We are more likely to do a better job because it's easier to make last minute additions and corrections. That used to be

cumbersome and unsatisfactory on the old system. When we do it on the Macs, it's timely and it's perfect," Wright said.

Product Appearance

Both Wright and McCoy emphasized the important role the appearance of the Clinton Courier-News plays in keeping the paper competitive. McCoy said he is planning a redesign of the paper, a project which would not have been possible using the previous typesetting equipment. "The new generation demands a more modern look," McCoy said. "They are responding to the big influence USA Today has had on newspapers. We're trying to be competitive. We now have a cleaner look. We look sharper and being able to redesign will put us back in the running with a sharper image."

Part of the sharper image the paper enjoyed through the new system was due to a "clean-up" of some inconsistent copy elements.

"We did a clean-up instead of a redesign and blamed it on the computer," Wright said. "It standardized all our standing heads and bylines. It brought very disparate elements that had not worked together--together," Wright said.

In addition to reducing the number of copy errors in the paper, the increased computer memory and database capability of the new equipment improved accuracy, Wright

said. She pointed to the paper's popular community birthday greetings feature as an example.

Prior to the installation of the Macintosh system, the list of birthday greetings for each edition was not cross-referenced with the obituary notices featured in another section. As a result, the paper's staff was occasionally embarrassed when a corpse received a published birthday greeting. Now the information for both features is cross-referenced.

The Macintosh-laser printer system has also cleaned up the Courier's classified advertising section. Because of the volume of ads which run regularly, McCoy and Wright were hesitant to attempt to transfer the classifieds file from the previous system to the Mac. "In classified, we held off and held off because we just knew it wouldn't work," McCoy said. "We didn't know how to dump it, and no one could tell us," Wright said.

On the previous system, the classified copy was processed in batches with other copy of the same column width. The result was that the classified copy was often placed under the wrong category in the paste-up phase, McCoy said. "It was scary to see ads produced the old way on the page. They were so inconsistent looking. The new system has made us look better and straighter. We certainly look better when we don't have a house for sale under the cars for sale categories."

McCoy said he was impressed with the positive impact of the new system on display ads. He said he was initially afraid that the computer-generated text would clash with the traditional clip-art the Courier uses for ad make-up. He said he was relieved to see how well the two elements work together through the Macintosh-laser printer system. Sales staff creativity was boosted by the Macintosh graphics capability, the results of which have drawn good reviews from the paper's clients. "The advertisers say the ads look cleaner. It used to be a real challenge to get a good looking ad in the paper; now it's not. We can be more creative--you can let your imagination run wild," McCoy said.

McCoy said the new system helped him to develop a unique way to communicate with the newspaper's current and potential advertisers. "For a communication business, we do a poor job of communicating with our customers," McCoy said. To resolve that problem, he produced a small monthly newsletter on the Macintosh and laser printer which is distributed to current and potential advertisers. He credited the new production process with making the newsletter possible.

Product appearance is also a critical aspect of the printing operation owned by the Clinton Courier-News. McCoy estimated that the print shop handled 60-90 jobs a month of various sizes. The printing operation is similar to the

Courier's classified ad business in that much of the business is repeat and update orders. Although the potential time and cost savings of switching the print operation from the previous system to the Macintosh-laser printer system was appealing, McCoy said the printers were concerned with the quality of the image produced by the laser printer. "You're always apprehensive. I was worried about the typesetters grasping the new system. One problem the printers thought they would have was resolution using the Macintosh equipment," McCoy said.

A comparison test of the resolution offered by the typesetting equipment and Macintosh-laser printer systems was conducted by printing the same copy on both systems. Although there was just a "hint of a blur" on the copy produced on the Macintosh-laser printer system, the printers were satisfied with its capabilities. McCoy said, "Clarity counts with print; clients demand superior resolution. The printers were real pleased."

Cost Comparison

As stated earlier in this chapter, cost was one of the main reasons the Clinton Courier-News converted its production process to the Macintosh-laser printer system. Neither McCoy nor Wright could provide exact figures concerning the expenses of using the previous typesetting system. However, McCoy described the price of the previous

system equipment as "out of this world" and "kept going up." Wright and McCoy said that the Macintosh-laser printer system clearly outshone the previous system in the costs of equipment maintenance and operation. The previous phototypesetter required expensive photo-sensitive paper and chemicals to process copy, McCoy said. "We bought chemicals for the processor and typesetter by the case." The disposition of the chemicals used by the previous system was regulated by the Environmental Protection Agency.

Because of the highly technical nature of the Compugraphic system, most maintenance had to be attended to by a company serviceman. McCoy and Wright reported that they saw entirely too much of the serviceman in the nine months before the Macintosh-laser printer installation. "We suffered," McCoy said. "We did have a guy here who could keep us on line by improvisation until we got help, but we had to nursemaid the system weekly."

When a technician was needed, he was dispatched from Atlanta, McCoy said. His hourly wage applied to the travel time from Georgia to Tennessee in addition to the travel expenses paid him by the Courier. The cost of the technician's visit was in addition to the \$1,500 maintenance contract paid on the equipment by the Courier.

Because the Macintosh-laser printer system had been in place less than a year at the time of the study, an accurate comparison of its maintenance requirements with that of the

previous system was not possible. Wright said she advised newspapers considering the purchase of a Macintosh-laser printer system to investigate maintenance options. "Service with us is a little screwy. The company got rid of the service maintenance contracts because they originally had such good luck with the equipment. I would encourage newspapers who are considering purchasing this type of system to feel comfortable with their vendor, because when you need a service person you need them right now. I think with the Macintosh system the maintenance works out better because you need them (service people) less. The printing aspect is great because the laser printers are virtually maintenance free. Also because the Macs and the laser printers are all independent of each other, if one goes down you can just move to another machine. But if the typesetter system goes down, you're sunk," Wright said.

Although they have not required much maintenance, both Wright and McCoy cited some disadvantages of the Macintosh-laser printer system. One of the problems Wright cited was a lack of technical support regarding newspaper applications of the equipment. "There is virtually no info for newspapers and that was a shock to our system," Wright said.

When a large amount of copy is being processed, Wright said she experienced "glitches" in the Pagemaker page-layout system. The "glitches" appeared in the form of system errors which froze all computer functions when they

occurred. When the "glitch" appeared, the machine had to be turned off and re-started, erasing its immediate memory. Whatever work not saved to the computer memory preceding the system error was lost and must be re-done. "In a week's cycle, I bet I got 10-20 system errors," Wright said. "The vendor couldn't find the problem; the software manufacturer couldn't solve it either."

McCoy summed up the advantages of the Macintosh-laser printer system. "In terms of what we produce the quality difference is immeasurable."

At the time of this study, the Clinton Courier-News was one of the few papers in Tennessee to produce the paper to the platemaking stage on the Macintosh-LaserWriter system. "Small papers still using galleys probably find it hard to see that producing the whole paper on the Mac is a timesaver overall," Wright said. "I think there's some resistance because of routine. To them it's still easier to pick up the scissors and paste and we still do that for spot fixes."

The Greeneville Sun Case Study

Information about the change from traditional typesetting methods to personal computers at The Greeneville Sun was gathered primarily through personal interviews with three members of the management staff of The Greeneville Sun. Those interviewed included Co-publisher Gregg K. Jones, Assistant General Manager Ken Hood, and Systems

Manager Dawn Gibson. The interviews with Hood and Gibson were conducted in person at The Greeneville Sun in March of 1989. Jones was interviewed by telephone in March and April of 1989.

At the time of the study, the Macintosh-laser printer system had been in place for almost two years. The use of personal computers and laser printers at The Sun provides an interesting comparison with that of the Clinton Courier-News.

Although both papers were owned by the same company, they differed in staff size, frequency of publication, management styles and how they used the technology.

The Sun was published Monday through Friday evenings and Saturday mornings. Its ABC circulation was listed as 14,445 as of March 31, 1988. The paper averaged 26 pages per issue and employed a full-time staff of approximately 70 full-time and 12 part-time people.

The Sun was founded in 1881 and is owned by the Jones family chain. It began publishing as a daily in the 1940s. The Greeneville Sun has a history of applying new technology to its operation. Hood described its tradition of technological foresight as a "knack the Jones have for peering into the future." According to Hood, The Sun purchased its first computer in the 1950s. "We started being aware of computers and what they could do for newspapers in the 1950s. The first computer we bought then

had eight bytes of memory." Hood said changing the production process from the Compugraphic typesetter to the personal computers and laser printers was consistent with the paper's quest to produce a better quality product faster and cheaper. Hood recalled the advent of the Linotype at the Greeneville paper. "We started out with one typeface. With the Linotype we got seven lines of type per minute. When we went to offset we got 15 per minute. The first Compugraphic typesetter gave us 30 lines per minute and we thought we were in heaven. A later Compugraphic gave us four typefaces and 50 lines per minute. I don't know how many lines per minute the laser writer gives us. One laser writer has kept us with the straight matter (editorial copy). And one has kept up with the classified. I guess the two laser writers keep up with the Compugraphic output." Hood observed that the price of computer technology declined between 1978 and 1988. He recalled that in 1979 The Sun paid \$20,000 for a 20-megabyte hard disk. "In about 1979 you paid \$1,000 for each megabyte of storage. Now you can get 20 megabytes for about \$500," Hood said.

Beginning in the mid-1980s, much of the personal computer hardware and software used by small newspapers could be purchased from a computer store shelf. According to Hood, until the late 1970s, newspapers interested in computer applications had to purchase the equipment from a system vendor, such as Mycro-Tek. "We weren't able to go

into a store and buy a hard drive because there weren't any computer stores."

Preparation for the Transition

Jones spoke several times of "managing the transition." Unlike the Courier, which switched composition and production of advertising and editorial copy and some graphics from the Compugraphic to the Macintosh-laser printer system, The Sun made less sweeping changes. Only the output device was changed so that the Mycro-Tek front-end system which had sent copy to the Compugraphic dumped copy to the laser printer.

The composition and production of display advertising was converted totally over to the Macintosh-laser printer system, however. The Sun management attempted to prepare the staff for the equipment changes by involving them in the transition. In addition to soliciting staff input concerning typeface changes, The Sun management gave its employees a chance to get their feet wet on the new equipment by placing a Macintosh personal computer in the newspaper's library for the staff to "play with." Many Sun staffers took advantage of the opportunity to get acquainted with the new equipment.

Dawn Gibson was the assistant composing manager when she started "playing with the Mac." At the time her job consisted primarily of marking type--that is, preparing ads

submitted by sales people to be typeset. She had done that job for three years, and had been employed by The Sun for eleven years. As part of her high school education, Gibson studied commercial art. She did not pursue that interest in college, choosing instead to continue working for The Sun.

When the Macintosh-laser printer system arrived, Gibson said she was less than impressed. "I used to hate computers," she recalled. Two factors drive Gibson to spend a large amount of her spare time with the new Macintosh-laser printer system. She had a lot of after-hours time free to learn it and she had been told that her job marking type would be eliminated once the transition to the new system was made on January 1, 1987.

Gibson said she spent many hours after work in late 1986 discovering the mysteries of the Macintosh. "I learned while I drew on it. It was instant gratification. I'd sit down at seven o'clock at night, and the next thing I knew it was midnight. I got to the point where I could do a few ads and by the time the Compugraphic was unplugged I felt secure. By January of 1987, I was doing all the ads."

Gibson had become so proficient with the new equipment by January of 1989 that she was promoted to computer systems manager. She is the company's in-house trainer and manages the installation and basic maintenance of Macintosh equipment at the nine papers. She has also served as a computer troubleshooter for the papers' major advertisers in

addition to her daily duties producing advertising and graphics for The Sun. By training herself on the Mac, with some help from the manuals, but mostly through trial and error, Gibson progressed from not knowing how to turn on the computer to repairing basic system malfunctions.

She even became adept at some mechanical functions normally relegated to computer maintenance people, such as dismantling the computer and physically rotating its hard disk.

Making the Transition

In examining the use of personal computers and laser printers at The Sun, it is helpful to consider the timeline for their installation.

In the fall of 1986, The Greeneville Sun began using Apple Macintosh Pluses and an Apple LaserWriter Plus to produce its display advertising. Primarily utilizing the Pagemaker 1.2 software, the composing room was transformed into a graphic arts production center. Staff members who had been setting type, laying out ads or performing any single task found themselves producing ads from start to finish. "Using this new system to produce advertising whetted our appetites and we eagerly pursued the completion of the transition throughout newspaper production," Jones said.

In early January of 1987, working with Mycro-Tek, Hood interfaced the Mycro-Tek front-end system to output on the laser printer. By the end of January of 1987, The Sun had stopped using all the phototypesetting equipment for generating editorial matter. By February 1, The Sun had switched the classified advertising production from the Compugraphic typesetter to Apple LaserWriter, making the paper entirely laser printer produced.

In early February of 1987, all equipment of the previous system was moved out of the composing room and advertised for sale. "Removing our old 'security blanket' was an important psychological step for the staff and was achieved without complications," Jones said.

Training

As with the Courier, training on the new system, with the exception of some self-motivated employees such as Gibson, was undertaken after the new system was in place. Because the editorial production process was changed only in regard to the production method, little re-training was needed in that department, Jones said. "There has been little effect on the editorial system since we programmed in our old formats and our staffers use almost exactly the same key strokes as they did when we were using the other typesetting equipment."

Involving the staff in the decision-making process concerning fonts and type apparently paid off in terms of employee enthusiasm during the transition, he said.

"Because more people have been involved in changing from traditional typesetting equipment to the laser writer equipment, more of our people understand the typesetting codes for the LaserWriter, and more people can run copy, set heads and perform any number of other functions. We feel that functional composing depth is at an all-time high," Jones said.

Hood said he had a history of teaching himself computer skills, and the only formal training Gibson received was in the form of a course in informational graphics in April of 1989, almost two years after The Sun's production transition was made. With more initiative than specific system knowledge, The Sun staff was able to get the new system on-line with little outside help, according to Hood. "The dealer who sold it to us came up and helped us set up the network. After that we just read the manuals and figured everything out. The Apple manuals are really good, but there's almost too much to read. None of us ever had any computer courses. We found that the hands-on method of training works real well. Of course, you get some folks that are real adept and others wondering what certain keys are for ten years down the road. Less than a month after purchasing the Mac, we had it up producing ads--of course,

it took longer than that to get real creative with it," Hood said.

Gibson estimated that the training and installation of the Macintosh-laser printer system averaged three days at the Jones' papers. She attributed the short training period to the "user friendliness and easily understood support materials" of the Macintosh equipment.

"With the Macintosh, you can teach yourself. The Compugraphic manual didn't even have an index," Gibson said.

Gibson said she developed training exercises for training staffers to produce ads on the new system. Gibson showed them how to make borders, print and measure ad copy and measure space for the cut and paste artwork which is later hand-pasted in place. As an example of the short learning cycle of the new system, Gibson pointed to her assistant. The assistant came to The Sun's advertisement department with no prior computer experience. After two days of training, he was able to produce a basic ad. After a week of training, he was capable of more creative and complicated ads, Gibson said.

Because Gibson was originally trained to produce ads on the Compugraphic, she was able to provide comparisons between the two systems. She recalled that a Compugraphic company trainer came to The Sun to teach production employees about the system. She estimated that it took her about two weeks to learn basic typesetting skills on the

previous system and about ninety days to really feel comfortable with the phototypesetting machine. She described her introduction to the other system as "stressful." "I was always worried about screwing up that expensive film. You always had to worry about a jam taking place inside the machine. With the Compugraphic, you couldn't actually see what you were typing. The display only showed you the commands and codes. You couldn't see what the font or style actually looked like," Gibson said. In comparison, the laser printer alerts the operator to a paper jam with a signal on the computer screen and a signal on the printer. A paper jam is easily fixed and clearly visible once the machine is turned off and the lid lifted.

Training problems that have resulted from the introduction of the new system are more psychological than technical, Gibson said. "We're talking about one person in 100, but we have had problems. We have suspected people of sabotaging the system by trashing files because they didn't want to work with the computer. I have also had people get hostile about it and say they haven't had enough training, yet their supervisors would tell me they felt that the employee had sufficient training. You have to have the 'want to.'"

Gibson said the occasional case of "computer-phobia" she has encountered can usually be overcome with the "gee-whiz" factor. She explained the "gee-whiz" factor as the

feeling trainees experienced when they successfully composed and printed something on the computer. "Some people are scared and hesitant, but none of us would go back. If you can read a recipe and cook, you can do this. The size and noise of those big old typesetters was very intimidating to me. These are little computers."

A Comparison of the Production Process Using the Compugraphic and the Macintosh-Laser Printer System

Because the composition and production of the editorial copy differs from the composition of advertising copy at The Sun, the two operations will be discussed separately.* With the Compugraphic system, editorial copy was entered into the Mycro-Tek front-end terminal by a reporter. The copy could then be called up by an editor on a terminal within the system and corrected or shortened and given a headline.

The copy was then dumped to the typesetter where it was coded for fonts, typesize and indents. The Compugraphic then output the copy to a processor which washed, dried, and fixed the copy. The copy was then hand trimmed and waxed and pasted up on the page by production personnel. The copy was proofread on the page. If corrections were needed, the process began all over again on a smaller scale before the

*Figure 4, describing the processing of editorial and advertising copy on the Compugraphic system, and Figure 5, describing the same process with the production of editorial and advertising copy on the Macintosh-laser printer system, appear in the Appendix.

pages went to camera to be shot into negatives and later made into press plates. The corrections were pasted over the original copy. Hood estimated the Compugraphic production process took approximately three hours per page, excluding corrections. Making corrections on the Compugraphic system was time consuming and wasteful, Gibson said. Corrections on one column of copy required paper of six column width and less than a paragraph of copy took as long to process as several paragraphs or a story, Gibson said.

At the time of the study editorial copy was generated on the Mycro-Tek system much the same as it always was, according to Jones. The significant change in the production process was that the copy was immediately available from the laser printer. The speed of the laser printer allowed the reporter or editor to see the copy seconds after it was entered into the system, Jones said. The copy was then proofed before it was hand-pasted on the page. Corrections, if needed, were made with a few keystrokes and the corrected story was printed again, hand trimmed and hand-pasted on the page. The personal computer and laser printer system did not significantly change how the editorial matter was assembled at The Sun, according to Gibson. However, the laser printer provided a means by which stories could be pasted up as whole elements instead of in column strips. The speed and resolution of the laser

printer also provided camera-ready copy, eliminating the processing and re-processing steps necessary with the Compugraphic, according to Gibson and Jones.

The method of producing advertisements on the Macintosh and the laser printer compared with the Compugraphic differed more drastically.

Gibson said the ads were formerly processed by a four-person assembly line. In addition to the salesperson who designed the ad, the ad was scheduled by one person, marked up for typesetting by another, typeset by still another, and finally pasted up by yet another. After the copy was typeset, it traveled through the typesetter to the processor where it was washed, fixed and dried. The copy was then hand-trimmed, waxed and pasted on the page where it was proofed.

In comparison, producing advertisements on the personal computer and laser printer system began with the rough layout by the salesperson. A production person then transferred the layout to the computer screen. This was accomplished by entering text and choosing the appropriate border, background shading, font and typesize. Although computerized clip art was available, The Sun had not purchased any at the time of the study. Instead, space for traditional clip art was measured by the computer's built-in rulers and left blank in the ad. The ad, finished except for the artwork if there was any, was printed out on the

laser printer, camera-ready. If art was called for, it was cut, waxed and pasted in place. The ad was then proofed and, if needed, corrected, hand-trimmed, waxed and pasted on the page.

Gibson said the Macintosh personal computer and laser printer production process saved time in three ways. because the Macintosh and Mycro-Tek systems used respectively for data entry allowed the operators to see what they were typing, that step of the process was sped up. The laser-printer produced typeset copy faster than the Compugraphic and the processing step was eliminated.

Gibson estimated that at least twenty minutes was saved on each batch of advertising copy that was produced on the laser printer. The new system allowed one person to process the whole ad from scheduling to paste-up, unlike the previous system which consisted of four production stations. The consolidation of the process saved time and confusion, Gibson said.

Hood said the change instilled a "bit more pride" in the advertising production people. "Before, an ad was a piecemeal thing done in three stages. I also think they like the quietness; the processor made more noise." Hood estimated that using the laser printer to typeset editorial and advertising copy saved The Sun about an hour of production time per page. "We picked up speed because we don't have to wash, fix and dry in the processor," he said.

Producing editorial copy on the laser printer saved time "because you only have to do it once," according to Jones. He said the laser printing process improved the critical time around deadlines. Using the laser printer sped up the production process and improved the accuracy of the pasted-up copy, he said. "Getting it right the first time saves correction costs and keeps customers happier," Jones said.

Hood, Gibson, and Jones agreed that the paper "looked" better since the transition. Gibson said the ads were cleaner and straighter since the transition, and advertisers asked for more complicated ads. Both the readers and the advertisers noticed how much better the ads looked since the transition, Hood said. "The ads look about 500% better. The Mac has graphic capabilities that did away with things like mitering corners. They can also store ads for recall so we can make changes on them. Now we have a method to put ads on the page without having to worry about them falling off," he said.

To produce editorial copy on the laser printer, the fonts and point sizes of copy had to be matched as closely as possible to those of the Compugraphic, Jones said. Although an exact match could not be made for the transition, no negative comments were heard from readers or advertisers, he said. "The 300 dot-per-inch resolution of the LaserWriters has caused no noticeable quality problems

in our newspaper. Since we use the Aldus Pagemaker program, the round surfaces of large type are curved and not jagged. However, extremely large type could not stand careful scrutiny," he said.

The time savings and improved appearance of the paper has resulted in cost savings in an indirect way, Jones said. "We are able to produce copy faster than ever in editorial and, to a lesser degree, in advertising. Our quality has shot up, particularly in advertising. This translates to dollar savings regardless of how you look at it."

Two other positive changes resulted from the transition from the Compugraphic to the laser printer. Moving the Compugraphic out of the composing room added floor space and decreased the noise level there, Hood said. Using laser printers with Mycro-Tek front-end system made the Mycro-Tek system more useful as a word processing system since letters and memos can be printed on the LaserWriter, Jones said. Hood said the Macintosh-laser printer production process had made The Sun staff more efficient. "There are fewer people doing more work. We have moved people around, but the staff hasn't gotten any smaller. We brought in the Macintoshes during a time of staff transition; we had folks quitting or retiring that we didn't replace. We didn't lay anyone off. In the 39 years since I've been here, we've never had to lay anyone off because we didn't have any work for them."

Cost Comparison

The chief reason the Joneses decided on the Macintosh-laser printer system was to save money. The management was also concerned with maintaining a high quality product and a high level of productivity from the staff, Jones said. For those reasons, they chose to convert the Mycro-Tek front-end system so that it was compatible with the laser printer. The alternative was to replace the Mycro-Tek system with Macintosh personal computer terminals.

Jones said he considers the Macintosh hardware cheaper to operate but the initial equipment expensive. The Sun spent \$3,500 for an interface to combine the two systems, he said. The cost was recouped in two months. At the time of the study, The Sun planned to purchase several personal computers, IBM clones, to replace the Mycro-Teks. The new personal computers would probably be used for information storage, Jones said. "I've been able to convince Mycro-Tek to make software available to use on personal computers. From a newspaper standpoint, the Mycro-Tek software is superior to Microsoft Word because Word is a mainstream word processing program not specifically designed for newspapers," Jones said. "We don't have to go to the Macintosh for data entry. We're using a Compugraphic on-line interface outputting to an Apple LaserWriter."

In his response to the Tennessee Press Association Survey on Computer Use, Jones said the production on the

laser printer achieved savings from several areas including, but not limited to: "Using bond paper instead of typesetting paper, using toner cartridges instead of typesetting chemicals, not running water all day in a typesetting paper processor, much less expensive service contracts on equipment."

The greatest cost differences between the new system and its predecessor were the purchase price of the equipment and the maintenance required, according to Jones. The Compugraphic and processor used by The Sun cost approximately \$80,000, with additional costs for fonts, Hood said. Service contracts on the two machines ran about \$17,000 annually, he said. The Sun paid \$4,500 for the LaserWriter Plus, which used plain paper instead of film. An additional service contract for the LaserWriter costs \$400 annually.

Jones said that the Compugraphic wasted a lot of typesetting paper because of its six column format. "We waste a lot of bond paper too with the LaserWriter, but it's a whole lot cheaper to do so."

Although it may be cheaper paper, Jones said he has found that reams of paper disappear quite easily with the laser printer, so paper waste was monitored. In an attempt to reduce waste, both sides of the same sheet of paper is used when possible, he said.

Hood and Jones estimated the monthly cost of running the Compugraphic at about \$1,300. The estimate included the phototypesetting paper, chemicals and electricity. The Compugraphic required special wiring for installation and used a lot of electricity, Jones said. In comparison, the LaserWriter plugs into a 110-wall outlet and uses less electricity.

Additional paper savings have been realized through using wide paper in the LaserWriter at all times, Jones said. The wide paper resulted in less waste than in switching between different sizes of typesetting paper rolls when wider measure was needed.

At the time of the study, The Sun used three Apple LaserWriters, two for producing display advertising networked into five Apple Macintosh terminals, and one used for editorial copy. This arrangement ensured that the two departments could process copy independently. With the Compugraphic, editorial and advertising copy were often processed independently and had to be sorted, Gibson said.

A spare LaserWriter served as a back-up and the system has never been down, something that could not have been said about the previous production method, according to Gibson.

"The Compugraphic tore up a lot. Two or three times a year we had to wait for company maintenance. Usually we had a back-up. You could be down two or three days with one and hope and pray that the other one didn't go down."

The Compugraphic maintenance contracts did not guarantee quick service, Jones said. "They didn't always put you first--sometimes they did," he said.

The toner cartridge required for the Macintosh costs approximately \$100 new and \$57 to refill. The Sun has used both. Jones estimated that the editorial department gets about 4,000 copies from a toner cartridge; the manufacturer said to expect 3,000. At the time of the study, the staff was beginning to monitor the number of copies produced per cartridge used in ad production.

Advantages and Disadvantages

Jones characterized the transition as "relatively easy due to the novelty of the new system and its remarkable ability to produce the finished product in a smooth consistent manner."

With some exceptions, for The Sun, many of the advantages of changing the production method from the Compugraphic to the Macintosh-laser printer systems were qualitative rather than quantitative. As reported by The Sun management, the advantages of the new system included a more positive employee attitude, more creativity, and better utilization of staff talent. "You just can't measure the value of them," Hood said. The amount of available knowledge is endless with the Mac. With Compugraphic, there

was only so much you could do. They did what they were designed to do and that was it," he said.

Gibson said the new system changed how she felt about her job. "I was bored stiff marking type. With this there's always a new program to learn. It's only as limited as the person sitting in front of it. With the Compugraphic, doing a map for the paper was unheard of. It took too long to produce it well. You rarely saw reverses and shadings in the ads because it was a more difficult process," she said.

One of the disadvantages of the new system was the erratic technical support from the Apple dealer. "When they sell you a product, they promise you the world, but the technical support is really just sales advice. Also, if you want to be updated you have to read about it yourself because the sales people won't tell you about the updates."

Jones cited the management of changing employees roles as a challenging aspect of making the transition. "The largest single problem that we encountered was in changing roles, specifically, making sure that staff members who found themselves sitting in front of a Macintosh terminal did not perceive that they had been demoted to a position of less status than they had previously held."

At The Sun, one of the production employees perceived that he was being demoted when he was asked to produce ads on the Macintosh computer, Hood said.

"Managing the changing roles is the biggest single challenge in applying new technology," Jones said. For example, in what we used to call our composing room, people were used to doing one element of an ad instead of four or five. They had to get used to one person doing one job. We had people who have been in mechanical jobs suddenly in creative jobs. They were patient with us and we were patient with them as this new technology changed all of our lives."

He also advised publishers considering making the transition from more traditional production and pre-press methods to laser-driven production technology to know the needs of their operations. "Make sure you know what you want to accomplish before you begin. Like pagination--for smaller papers, it's still not economically feasible to do the kinds of things that the majors are doing."

CHAPTER VII

ANALYSIS OF THE CASE STUDIES

The production process transition at both The Clinton Courier-News and The Greeneville Sun was made from typesetters and processors to laser printers. The methods of implementing the transition as well as the use of the available technology differed at the two papers.

At both papers one person became a self-taught expert and an in-house trainer. The training accomplished by both these "experts" was, for the most part, one-on-one with other employees. The training process at both papers with the Macintosh-laser printer was, for the most part, "hands-on" learning by doing. Although the learning curve of this new technology appears to be short, both in-house trainers reported that most employees know only the basic skills necessary to get the paper out.

The approach to training at the two papers differed. At The Sun, the transition process appeared to have been more structured, the training more deliberate than that of the Courier. Perhaps because the management of The Sun, the flagship paper of the Jones' chain, had more experience with using new technology. Another factor that must be considered in this regard with the Courier is the relatively short amount of time Wright and McCoy had been in place when the production process was changed. The smaller staff size

of the Courier also affected training time. It was clear from Wright's and McCoy's accounts that the entire staff was needed to put the paper out and no time could be allotted for training prior to the transition.

It was interesting, given these training limitations, that the transition at the Courier was more far-reaching in terms of the process than The Sun. The Courier used the Macintosh-laser printer technology to produce the paper to the plate-making stage, which is one step further than The Sun had gone. Both papers eliminated the costly, time consuming steps of traditional phototypesetting and processing. The Courier also eliminated some paste-up by formatting stories into modular units. The Sun was limited by its current technology because its Mycro-Tek front-end was not designed for even basic pagination. Because no such front-end system was in place at the Courier, its transition was a much greater technological leap, from personal typewriters to personal typesetters.

Both papers achieved much the same results from the new technology. The Sun and the Courier both reported saving money in the areas of paper, chemicals, utilities, maintenance and initial equipment costs. Both reported time and labor savings with the new process. The time and labor savings were realized to a greater degree by the Courier, where the limitations of the small staff drove management to fine-tune the production process.

The managers at both papers reported that their product "looked better" after the transition. They also said the new process was responsible for a later news cycle and better accuracy. These changes may have had more impact at the Courier, where production technology lagged behind The Sun prior to the transition.

Perhaps the most striking difference in the technology transition at both papers was how the managers perceived the challenges of the change.

At the Courier, Wright and McCoy seemed more concerned with the physical changes in the production process and the appearance of the paper. At The Sun, Jones reported being more concerned with how the technological changes affected his staff. In fact, he cited staff reaction as one of the reasons for leaving the Mycro-Tek system in place.

At the time of the study, the Macintosh-laser printer technology had been in place almost two years longer at The Sun than at the Courier. Perhaps the interim provided the Greeneville paper's managers a better perspective for monitoring the human costs of implementing new technology. Because of the short time the new technology had been in place at the Courier, Wright and McCoy might have found it necessary to keep their attention trained on getting the bugs out of the new process.

CHAPTER VIII

CONCLUSIONS AND RECOMMENDATIONS

The results of the mail survey and information from the case studies lead to some general conclusions about the use of personal computers and laser printers at Tennessee newspapers in 1989. The study indicated that 72% of the participants had replaced traditional forms of newspaper production with personal computers and laser printers. In addition to using laser printers to output editorial copy, these papers used personal computer technology to layout pages, create and produce display advertising, keep their books and store classified advertising information.

Most of the study participants successfully installed or supervised the installation of personal computers and laser printers without prior computer training or experience. By their own accounts, most of them were quickly able to realize the promises of personal computers and laser printers including low initial equipment investment, significant savings on production supplies and maintenance, a short training period and increased efficiency of operation.

Many did not experience significant problems in ushering their staffs through the transition from traditional typesetting to personal computers and laser printers. Others wrestled with poor dealer and technical

support, unclear training materials, system failures, and systems and software inappropriate for the newspaper tasks they were applied to. Reports of the study participants as well as information in the literature lead to the following recommendations.

Recommendations for Newspapers

Newspapers considering the purchase of a personal computer system should bear several factors in mind. Important considerations include the initial purchase, installation, training, maintenance and upgrades of personal computer systems.

Inexperienced purchasers should not overestimate their ability to decide the appropriate components of a personal computer system without guidance. Some of the mass-produced personal computer systems do not include installation, training and maintenance. At the time of the study, information on how to purchase a personal computer system was readily available in the trade press of both the newspaper and the personal computer industries. Newspaper trade organizations, such as the National Newspaper Association and the American Newspaper Press Association, offered workshops and publications concerning personal computers and laser printers to their members and affiliates. These organizations along with the trade publications had also compiled information on system vendors

who assembled newspaper-specific personal computer systems for sale. This option offered newspapers a single source for the purchase, installation and, in some cases, the maintenance of personal computer equipment.

Most of the participants reported that their staffs were able to informally learn enough computer skills within a month to produce the newspaper. However, newspaper managers should consider how and when the staff will be trained before the new equipment is purchased. Training materials included with the computer purchase should also be evaluated by the purchaser before a commitment is made to the new system. At the time of the study, several sources of personal computer training in addition to computer dealers were available. The cost and effectiveness of any outside training should be carefully considered.

Although few of the participants reported maintenance problems, some reported difficulty in finding maintenance support when it was needed. At the time of the study, many computer companies offered service contracts on their equipment. Newspaper managers considering personal computer purchases should investigate the experiences of other purchasers who chose this option.

As personal computer technology continues to evolve, innovations improving its cost and efficiency appear almost on a daily basis. The burden of keeping abreast of these innovations rests with the purchaser. Information about

system upgrades and new software was available at the time of this study in newspaper and computer industry trade publications and local users groups. Newspaper managers should resign themselves to a continual education process regarding this technology or designate the information monitoring task to an interested and competent employee.

To ensure a successful transition, managers must anticipate how employees' roles might be changed. Although the participants indicated that the new technology had a positive impact on the attitudes of the newspaper employees using it, the emotional aspects of change cannot be discounted. The fastest, most cost-effective machines in the world can be foiled by reluctant users. Newspaper managers must consider the impact the new equipment will have on those who will use it. The new technology requires different skills than those needed to operate the previous production equipment. The skills required by the new technology should also be considered when employees are hired.

Shipman's (1986) advice for managers introducing computerization to the newspaper workplace is valuable. He advised soliciting employee participation in the developmental stages because it tended to reduce resistance to change. Careful planning for a technological transition, coupled with communication with employees about changes the new system may bring about for them, was also advised. If

the transition means changing worker roles, Shipman advised ensuring that the employee's skills and the skills required will be a good match.

Recommendations for Further Study

At the time of the study, the technology being investigated was barely five years old. The newspaper application of the technology was younger still. Many of the questions posed by this study concerning costs, uses of the hardware and software, technology's impact on employees and on the newspaper product can be more fully answered as time goes by. Many of the respondents were in the process of a technology transition at the time of this study. As the use of the technology becomes more widespread, research will be needed on its impact.

Case studies focusing exclusively on the elements of effective employee training could improve teaching materials. A content analysis of newspapers before and after the transition to personal computers might yield useful information on whether the appearance, accuracy and editorial content is affected by the new technology.

At the time of this study, many of the newspaper managers charged with supervising the production transition had no computer experience. At the same time, students in many journalism programs were incorporating computer skills

into their studies of newspaper management, editing and design.

Presumably, these acquired computer skills will affect the decisions today's students will make as newspaper managers concerning the purchase and implementation of new technology. A survey or case study might be useful in comparing the experiences of computer literate managers to computer-learning participants in this study.

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APPENDIX

DEFINITION OF TERMS

Due to the technical nature of a portion of the material presented and to assist reader understanding, the meanings of a number of terms are given.

Baud--The rate at which electronic transmissions take place, usually between computers, generally representing bits per second.

Bit map--A computerized dot-by-dot description of a printed page, with each dot represented by a (0) (off) or 1 (on).

Camera-ready--Finished material that is ready to be reproduced or printed.

Cold type--Type produced electronically or photographically, as opposed to hot type.

Commands--Formatting instructions in a document that determine how the text will print; interactive instructions such as search-and-replace, cut-and-paste or delete.

Composition--Laying out and marking up pages.

Computer typesetting--The process of using computers to create typeset material.

CRT--Cathode Ray Tube, as in a television or computer display.

Desktop publishing--The use of personal computers, page layout software, page printers and/or typesetters to produce printed materials.

Digitize--To transform an image into a dot pattern so that it can print on a dot matrix or laser printer.

Digitized type--Type stored in a computer in dot patterns rather than as strokes.

Dots per inch (dpi)--The resolution of a CRT screen or laser or dot matrix printer; 600 dpi, for example, yields a much finer resolution than does 72 dpi.

Driver--A program that controls a printer; short for printer driver.

File--A document stored in a computer, either in its memory where it can be edited or in a storage unit such as a floppy disk or a hard disk.

File server--A computer device that stores computer files to which servers on a network have equal access.

Font--A group of type of one style and size.

Front-end--The editing and formatting device that works with a typesetting machine.

Galley--A continuous column of typeset text not made up into pages; a copy of a galley supplied to a proofreader or to the author of an article or book for proofreading and last minute changes.

Half-tone--Representation of gray scale by the use of dot patterns. Usually the darker the tone, the denser the dot patterns.

Hard-disk--A high capacity storage medium for computers. Unlike floppy disks, hard disks are usually fixed in place.

Hot type--Metal type in mechanical typesetting machines.

Impact printer--A printer that strikes the surface of the paper, usually with an inked ribbon between the paper and the actual striker. A dot matrix printer or daisywheel printer, as opposed to a laser printer or ink-jet printer.

Laser printer--A printer that works on the same principle as a photocopying machine. It uses a laser beam to etch page images onto a photoelectric drum.

Line art--Art with no continuous tones.

Mainframe--A large computer serving scores or even hundreds of users simultaneously. The large computers made by IBM, Borroughs, and Data Electric are mainframes. Although a mainframe is usually considered more powerful than a minicomputer, the distinction between the low-end mainframe and the high-end minicomputer has become blurred.

Makeup--The construction of a page.

Mouse--A device which allows the user to perform actions on a computer screen by pointing an arrow and clicking a button.

Output--As a noun, informally, information printed or plotted on paper or other flat medium; as a verb, to send information from a computer to the printed page.

Output device--Usually a printer, typesetting machine or plotter.

Page layout software--A computer program to lay out pages, to be printed later as they appear on the screen.

Phototypesetter--A typesetter that produces images directly on photographic film.

Pitch--The number of letters per inch a printer produces.

Pixel--Picture element; in a CRT, one of the phosphor elements coating the inside of the picture tube that, when struck by an electron beam, glows. One page printed by a laser printer or dot matrix printer, one of the dots that constitute the visible part of the image.

Port--A channel through which data leaves or enters a computer.

PostScript--A de facto standard page description language from Adobe Systems, Incorporated.

RAM--Random Access Memory--Memory whose contents can be altered that vanishes when you turn off the computer's power.

Resolution--Absolute or relative density of pixels on a CRT screen or dots on a page; usually expressed as pixels per inch for a screen and dots per inch for a page.

Scanner--A device that digitizes images it picks up with some light-gathering device.

Typesetter--A machine that produces typeset output, usually on photographic paper; a person who sets type.

VDT--Video Display Terminal (Davis & Barry, 1988, pp. 5-7).

Terrie A. Clifford
812 Gratz St. #2
Knoxville, Tn. 37917
(615) 637-8809

March 3, 1989

Karen Wright
The Clinton Courier-News
P O Box 270
Clinton, Tennessee
37116-0270

Dear Karen:

As I mentioned in our phone conversation last week, I am very interested in using the Clinton Courier-News as one of two newspapers for a case study on the impact of desktop publishing on Tennessee newspapers.

Specifically, I am interested in how the transition was made from more traditional typesetting and pre-production techniques, as well as employee training, costs, time and labor savings. I am also interested in whether using desktop publishing has changed the look of your paper.

I would like to come to the Courier on Thursday, March 23, to talk with you and David McCoy. I would expect that the whole process will take four to six hours and I would like to spend some of that time looking at your system. Any documentation you have concerning the transition would be very helpful.

Please go ahead and fill out the enclosed survey. I am sending one to every paper in Tennessee and I will be happy to share the results with you. The survey will provide me with some basic knowledge about your paper that I can build on in the case study.

I hope participating in the case study will be as beneficial to your operation as I anticipate it being for my thesis. Please let me know right away if March 23 won't work. If you have any questions about this study please call me or my thesis advisor, Dr. Paul Ashdown at 974-5155.

Sincerely,

Terrie Clifford

Terrie A. Clifford
812 Gratz St. #2
Knoxville, Tn. 37917
(615) 637-8809

March 3, 1989

Mr. Gregg K. Jones
The Greeneville Sun
P O Box 1630
Greeneville, Tennessee
37744

Dear Gregg:

As I mentioned in our phone conversation last week, I am very interested in using The Greeneville Sun as one of two newspapers for a case study on the impact of desktop publishing on Tennessee newspapers.

Specifically, I am interested in how the transition was made from more traditional typesetting and pre-production techniques, as well as employee training, costs, time and labor savings. I am also interested in whether using desktop publishing has changed the look of your paper.

I would like to come to the Sun on Thursday, March 16 to talk with you and Dawn Gibson. I would expect that the whole process will take four to six hours and I would like to spend some of that time looking at your system. Any documentation you have concerning the transition would be very helpful.

Please go ahead and fill out the enclosed survey. I am sending one to every paper in Tennessee and I will be happy to share the results with you. The survey will provide me with some basic knowledge about your paper that I can build on in the case study.

I hope participating in the case study will be as beneficial to your operation as I anticipate it being for my thesis. Please let me know right away if March 23 won't work. If you have any questions about this study please call me or my thesis advisor, Dr. Paul Ashdown at 974-5155.

Sincerely,

Terrie Clifford

PRODUCTION COSTS

FILM		LASER	
3 rolls 3" a week at \$8.68	\$26.04	Paper at \$6.95 per ream	
3 rolls 6" a week at \$16.34	\$49.02	Use 10 reams per month	\$69.50
1 roll headline	\$10.50	Toner \$100 1% a month	\$125.00
Film per week	\$85.56		
Film per month	\$342.24		
Chemistry per month	\$23.00		
Total per month	\$365.24	Total per month	\$194.50
Yearly total	\$4,382.88	Yearly total (new toner)	\$2,334
		If using refills yearly total	\$1,509

REFILLS VS. NEW TONER CARTRIDGES

Refills produce same or more copies at 1/2 the price!
 Refills require LITTLE or NO BREAK-IN, while new may require 200 or more copies before becoming dark enough!

EQUIPMENT

FILM		LASERS	
2 Unisettors (used)	\$20,000	2 laser printers (new)	\$10,000
Processor	\$3,000		
Spare parts kit	\$700	Telephone toll-free service number	
Headliner	\$1,000		

ADVANTAGES & DISADVANTAGES

FILM	LASERS
Must process & dry	Copy is dry when it exits
Comes out in 1 long strip	Comes out in columns (modular)
Cut to column widths	More cutting required
No bleed through	Waxer adjustment more critical
Copy will last longer	Type may rub off sooner
Limited fonts & sizes	33 fonts ranging from 1-pt.-200-pt.
Service calls in shop	Could easily transport for service

STAFF SIZE AND CIRCULATION OF
RESPONDENT NEWSPAPERS

Production Papers

Group A

Staff Size 1-5

The Cannon Courier	3,380
The Chester County Times	3,590
The Cumberland Times	1,206
Expositor	
The Grainger County News	2,678
The Moore County News	1,411
The Polk County News	2,977

Group B

Staff Size 6-10

The Tiptonvale Banner	3,013
Brownsville S.G.	4,461
The Herald Gazette	3,860
The Weakley County Press	6,038
Westview	4,124
The Dresden Enterprise	5,167
Your Community Shopper	3,461
The Carroll County News	3,660
The Macon County Times	6,160
The Bartlett Express	2,867
The Tri-City Register	3,409
The Bledsonian Banner	2,416
The Independent Appeal	6,459

Group C

Staff Size 11-20

The South Pittsburg Hustler	3,426
The Millington Star	3,185
The Bolivar Bulletin-Times	5,593
West Side Story	4,703
Independent Democrat Laker	2,046
Jefferson City Standard	5,452
The Claiborne Progress	6,281
The Clinton Courier-News	7,407
The LaFollette Press	7,321
The Savannah Courier	8,545
The Erwin Record	4,872
The Monroe County Advocate	3,834

Group D

Staff Size 21-30

Cleveland Banner	16,237
The Pulaski Citizen	6,819
The Newport Plain Talk	9,339
The Union City Daily Messenger	8,348
The Herald-News	4,581

Group E

Staff Size 31-50

The Crossville Chronicle	4,538
The Shelbyville Times-Gazette	8,023
The Southern Standard	5,452
The Review Appeal	9,904

Group F

Staff Size Over 50

The Nashville Banner	64,475
The Greeneville Sun	15,004
The Jackson Sun	36,258
The Commercial Appeal	218,572
The Cookeville Herald-Citizen	9,569
The Lebanon Democrat	8,942

NON-PRODUCTION PAPERS

Group A

Staff Size 1-5

None

Group B

Staff Size 6-10

The News-Democrat	3,596
The Collierville Independent	2,203
The Milan Mirror Exchange	5,550
The Rutherford Courier	3,997

Group C

Staff Size 11-20

None

Group D

Staff Size 21-30

Winchester Herald-Chronicle	8,098
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Group E

Staff Size 31-50

The Mountain Press	7,433
The Paris Post-Intelligencer	7,778

Group F

Staff Size Over 50

The Leaf-Chronicle	18,676
The Bristol Herald-Courier	42,362
The Chattanooga News-Free Press	65,967
The Knoxville Journal	42,900
The Knoxville News-Sentinel	99,069
The Tennessean	258,443

PAPERS WITHOUT COMPUTERS

Group A

Staff Size 1-5

The Hickman County Times	5,217
The Pickett Press	1,532

Group B

Staff Size 6-10

The Livingston Enterprise	5,059
The Somerville Review	2,017
The Scott County News	6,630
The Wayne County News	6,353

Group C

Staff Size 11-20

The Robertson County Times	8,695
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Group D

Staff Size 21-30

The Daily News	2,137
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Group E

Staff Size 31-50

None

Group F

Staff Size Over 50

The Citizen Tribune	21,261
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Source: Circulation figures were taken from the 1989 Tennessee Newspaper Directory, published by the Tennessee Press Association.

Copy Flow in the Macintosh System

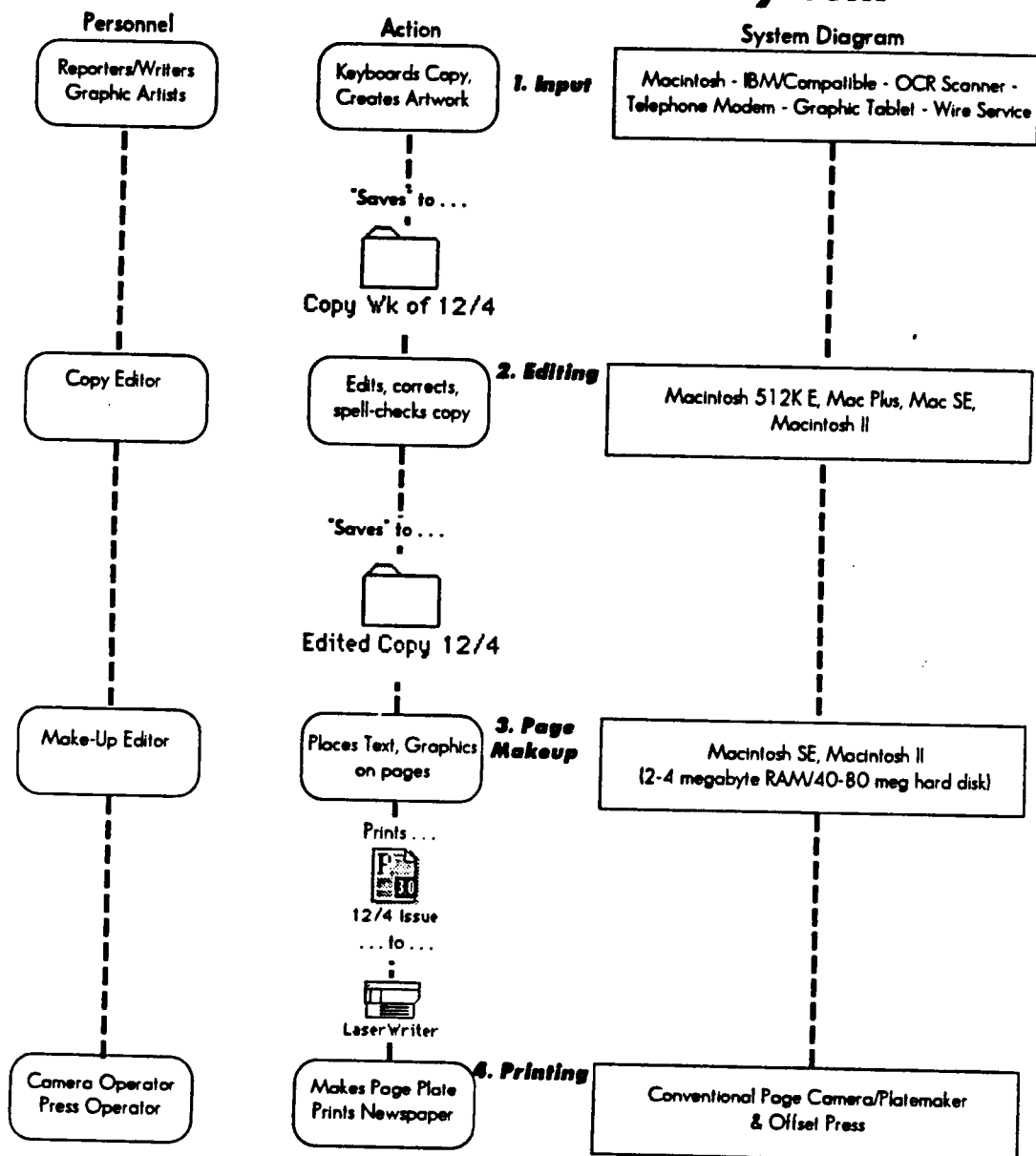


Figure 1. Copy Flow in the Macintosh System.

Source: Bill Childress (1988), The 15-Minute Newspaper.

Body copy, typed by reporters and editors on typewriters, is given to typesetters to be typeset by Compugraphic system.



Headlines, cutlines, quote boxes, ad copy and bylines composed by news-editorial staff, each item on individual pieces of paper, is given to typesetters to be typeset on Compugraphic system.



After proofreaders approve the copy, typesetter keyboard all copy into Compugraphic system using appropriate codes for column widths, type fonts, and type sizes. Copy is typeset and processed in batches according to column sizes regardless of copy type.



Copy is output from Compugraphic to processor, cut into strips, and pasted on the page.



Proofreaders comb copy again. Corrections are made by typesetters in batches similar to entry step. Corrected copy is re-processed and pasted over original copy errors.



Copy is now camera-ready.

Figure 2. Clinton Courier-News Copy Flow in Compugraphic System.

Reporters write stories on Macintosh terminals using Microsoft Word word processing program. Reporters also write and format headlines, cutlines and bylines with the Pagemaker page-layout software. Reporters choose the appropriate format to produce story as a unit incorporating headlines, bylines, cutlines and quoteboxxes using the style palette and page-layout templates.



The story "units" composed by reporters are output by the laser writer in the newsroom. The copy is now available for editing. The editor makes necessary changes in composition, spelling and grammar and prints the finished "units" out again if necessary.



Finished units are waxed, trimmed and pasted up on the page.



Pages are now camera ready.

Figure 3. Clinton Courier-News Copy Flow in the Macintosh and Laser Printer System.

Editorial

Copy is keyboarded into Mycro-Tek front-end system, and reviewed by editors through network on the system.



Copy is given to typesetters to code for typesizes, fonts, and indents on the Compugraphic typesetter.



Typeset copy is loaded into a processor to be washed, fixed and dried.



Copy is cut into columns, waxed and pasted up into pages.



Copy is proofed on the page. Corrections are re-set on the Compugraphic machine and fed through the processor again. Corrections are pasted over the original copy.

Advertising

Rough ad layout designed by salesperson is given to composing. Ad was scheduled by one production person.



Ad copy is marked up for typesetting by another production person.



Ad copy is typeset by a different production person, coding the ad for fonts, typesize and indents.



Ad copy goes from Compugraphic system to processor, to be washed, fixed and dried.



Copy is hand-trimmed, waxed and pasted in place. Ad border is fashioned out of tape and hand-mitered around the art work which has been cut, waxed and pasted in place. Ads are proofed on the page. Corrections are re-set on the Compugraphic and run through processor. Corrections are pasted over the original copy in small strips.

Figure 4. The Greeneville Sun Copy Flow in the Compugraphic System.

Editorial Copy

Copy is keyboarded into Mycro-Tek front-end system,
and reviewed by editors through network system.



Copy is printed out on laser printer.



Copy is proofed. Corrections are made through the
Mycro-Tek system and printed again on laser printer.



Copy is hand-trimmed, waxed and pasted on the page.
Copy is now camera-ready.

Advertising Copy

Ad is scheduled and produced by one production person.
The border, background, copy and some simple art elements
are produced by the Macintosh.



The ad is printed by the laser writer. Outside art
elements, such as clip-art, are added here.



Ad is proofed. Corrections are made on the Macintosh
and ad is reprinted on the LaserWriter. After final
approval, the ad is hand-trimmed, waxed and pasted on the
page. The ad is now camera-ready.

Figure 5. The Greeneville Sun Copy Flow in the Macintosh
and Laser Printer System.

Style sheet definitions

News / run-of-the paper styles

As we see it head

defaults to body copy

can also be used for small kickers with larger headlines

For use in lifestyles or life here, change face to Palatino

(like Inside Nashville - Sportsview - Norris fishing) with a space and an em dash after the words

b1 copy

defaults to more b1 copy

body copy

defaults to more body copy

BYLINE

can also be used for name line under 1 col. pictures; automatically boldface and centered.

news 18 head

defaults to body copy

small fillers and crime shorts

obits heads for one-column layout

news 24 head

defaults to body copy

larger fillers and small news stories

obits heads for two-column layout

news kicker

defaults to caption

the little headline above photos

Normal

defaults to more normal

Computer Use Survey

This survey is designed to measure the impact of personal computers such as Macintoshes, IBM's, and LaserWriters are having on Tennessee newspapers. Please have the person at your newspaper who works the most closely with personal computers complete this survey. That person may be the production manager, the composition manager, the assistant publisher, the editor or the publisher.

1. Name of your newspaper _____
2. Size of the staff at your newspaper:
a. 1-5 b. 6-10 c. 11-20 d. 21-30 e. 31-50 f. over 50
3. Do you use personal computers anywhere in your operation? (please include personal computers linked by a network in your reply).
a. Yes b. No.
4. If yes, please fill in the types of computers used. Example: Apple Macintosh SE. and model:
Type _____
Type _____
Type _____
Type _____
Type _____
Type _____
5. If no, does your newspaper plan to purchase a personal computer (s) within the next three years?
a. yes b. no

6. If you are using personal computers at your newspaper now, please list the functions you are using them to perform as well as the software used for each function.

Software	Function
Ex: Full Impact	Bookkeeping
Ex: Pagemaker	Page Layout

7. What device is used in your operation to output copy?
a. laser printer b. typesetter c. other _____
8. a. What is your job title? _____
b. How long have you worked for this newspaper? _____
c. Age _____ Sex _____
d. What was the highest grade you completed in school? _____
e. Had you worked with computers prior to your present job? a. yes b. no
9. Approximately how many other employees at your newspaper do most of their work on the computers (do not include those working on VDTs.) _____
10. How were those employees who do most of their work on the computers trained?
a. self-taught b. dealer-trained c. class-trained d. other (please elaborate on other) _____
11. Please estimate the average amount of time it took, for those who use the computers regularly, to learn how to do so. a. one week b. two-three weeks c. four weeks d. five weeks e. six weeks f. more than six weeks.
12. Did you or any other staff members experience problems in learning how to operate the computers? a. yes b. no
13. If yes, can you elaborate on the specific problem? (for example: the manual was too complicated, there was not enough time for sufficient training, employees were hesitant or fearful of the computers, etc.) _____
14. From what you have heard, has the use of computers changed the way people who work with them feel about their jobs? a. yes b. no
15. If yes, has the change (in the employees' view) been : a. positive b. negative
16. If your newspaper paid for computer training for the employees, what was the approximate cost of that training per employee? _____
17. If you are using personal computers for layout and pre-press production, what method did you previously use to do this job? _____
18. If you have switched from traditional typesetting techniques and production methods to personal computers, has the switch saved money? a. yes b. no
19. If yes, can you briefly describe the areas in which money has been saved? (example: supplies such as chemicals, maintenance costs, reduced labor costs, etc.) _____
20. If you have switched from traditional typesetting techniques and production methods to personal computers, has the switch saved time? a. yes b. no

21. If yes, please describe briefly_____

22. If you have switched from traditional typesetting techniques and production methods to personal computers, has the switch affected the number of workers you employ?

a. yes b. no

23. If yes, has the change resulted in: a. more workers b. fewer workers

24. If you have switched from traditional typesetting methods and techniques to personal computers has the switch changed the way the paper looks? a. yes b. no

25. If yes, please circle the appropriate changes as you perceive them:

a. fewer typographical errors b. new design c. use of computer graphics d. other

(please elaborate on other)_____

26. Overall, what have been some of the most positive aspects of using personal computers in your operation?_____

27. Overall, what have been the most negative aspects of using personal computers in your operation?_____

Thank you for your time. Please don't forget to stuff this survey into the self-addressed stamped envelope I have provided and mail it by March 15, 1989. Are you interested in receiving the results from this survey? a. yes b. no

VITA

Terrie Clifford was born in Rochester, New York, on June 22, 1955. She attended elementary school and high school in Rochester and was graduated from John Marshall High School in 1973.

From 1973 until 1975, she worked as an advertising clerk at the Rochester Democrat and Chronicle and the Times Union. In 1976 she entered the University of Oklahoma at Norman where she received a Bachelor of Science degree in broadcasting in 1983.

From 1981 to 1983 she worked as a reporter for the Daily Oklahoman in Oklahoma City. In 1983 she accepted a position as an assignment editor for the Oklahoma City ABC television affiliate, KOCO-TV.

In 1984 she became the assignment editor for the Raleigh, North Carolina, ABC television affiliate, WRAL-TV.

She entered the Graduate School of the University of Tennessee in August of 1987. In August of 1989 she received the Master of Science degree with a major in communications from the University of Tennessee, Knoxville College of Communications. Her program emphasis was communications management with a concentration in journalism.