

McLean County Museum of History

International Tapetronics Corporation/3M Collection

Processed by
Brandon Henry
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Collection Information

VOLUME OF COLLECTION:	One Box
COLLECTION DATES:	1975 to 1990, primarily 1980's
RESTRICTIONS:	N/A
REPRODUCTION RIGHTS:	Permission to reproduce or publish material in this collection must be obtained in writing from the McLean County Museum of History
ALTERNATIVE FORMATS:	None
OTHER FINDING AIDS:	N/A
LOCATION:	Archives
NOTES:	N/A

Historical Overview

Formed in 1969 in Bloomington, Illinois the International Tapetronics Corporation (ITC) tasked itself with the: design, production, and resale of professional grade audio equipment, for use within the field of radio and television. While perhaps antiquated by the time of the digital era, the products produced by ITC were revolutionary for their time period, launching the broadcasting industry into new heights. ITC's dedication to creating a sustainable and profitable market within this field of business was rewarded with a plethora of reoccurring customers. Finding success both domestically and within foreign markets, ITC served a wide variety of broadcasting stations, including: WJBC, WBNQ, WIHN, WRBA, WGLT, and networks ABC, CBS, NBC, CBS, and BBC. Within the United States it would be difficult to locate a major broadcasting network that wasn't utilizing ITC equipment in their studios. England, Germany, Switzerland, France, Italy and even Japan were similar in their extensive use of ITC equipment.

Internally, ITC was a powerhouse of a corporation, employing around 150 employees in the 1970's and 1980's across three buildings in Bloomington, Illinois. One building acted as a main office, another for research and development and the last served as an industrial station; the final stop, where ideas came to life, birthed to the tune of ringing steel. Their influence as an organization was prominent enough locally to warrant several requests by nearby colleges (Illinois Wesleyan College and Illinois State University). Ranging from tours to guest lecturing, the knowledge that was garnered at ITC was much too valuable for engineering students to pass up. But just as sharing knowledge with outside entities was important; communication internally was paramount as well. Having a wide breadth of employees in different fields of expertise would present difficulties in communication; the "*IT Recorder*" sought to combat this. This multi-volume newsletter was published monthly, and acted as a liaison for various departments within ITC. Multiple persons within the corporation would publish articles related to projects, layoffs, open positions, etc.

Formerly known as the Minnesota Mining and Manufacturing Company, 3M originally began as a mining corporation in 1902. However, it actively adapted to the various shifts in technology presented throughout the 1900's. By the 1970's it was heavily invested in the production and research of magnetic tape recorders for studio sound recording. ITC came to the attention of the growing 3M Company, seeing ITC's masterful use and development of audio equipment. On January 1st, 1982, 3M offered to become the holding company of ITC. This offer was agreed upon and the legacy of ITC founds itself becoming a cornerstone of the foundation which the 3M Corporation rests upon today.

Scope

The ITC collection includes a wide variety of documents from 1975 to 1990 including: patents for various manufactured products, internal correspondence, correspondence to ISU and IWU, curriculum lists for electrical engineering, translated scholarly articles concerning magnetic tape recorders, a manual for the DELTA machine, various program sheets for the goals and development of ITC, sales and inventory sheets, member lists, electrical engineering publishing's, and a short history of ITC along with written works about ITC.

Box and Folder Inventory

Box 1:

Folder 1: Business Plans I

- 1.1 “What is Strategy?,” handout which consists of information on corporate strategies for maximizing profit margin gains, along with how to properly manage a corporate body, and their various goals, consists of a diagram and a handout published by the company, date unknown, 6pp.
- 1.2 “Procedure for Preparation of Action Plans,” handout which consists of information on how to create and organize “action plans,” programs that are developed through internal and external review of the company for the purpose of outlining strategies which are to be applied to lacking areas, included are: diagrams, action plan forms, formatting information, review sheets for action teams, and information pertaining to the topic, date unknown, 11pp.
- 1.3 “Example of Action Plan,” handout published by the American Management Association, which offers a small worksheet for developing action plans, along with including an action plan which covers the development of a direct bid sales organization, includes: worksheets, example sheets, and hand drawn diagrams on the subject, date unknown, 20pp.
- 1.4 “ITC/3M Long Range Planning Session,” handout marked, “Planning for Growth,” which details how to formulate budget plans around predicted business growth, and how to engage in strategic long range planning, the handout is dated February 23rd, 1983, 8pp.
- 1.5 “ITC/3M Long Range Planning Session,” handout which details different plans for corporation strategies related to radio, video, cable and industrial sound communication distribution, along with the company’s overall goal, the handout is dated February 24th, 1983, 6pp.
- 1.6 “Statement of Philosophy,” for the Dayton Hudson Corporation which outlines their purpose as a corporation, and their various philosophies on different sectors of their business including: real estate, management and ethics, possibly used as an example sheet for the International Tapetronics Corporation, date unknown, 8pp.
- 1.7 “Five Year Plan: 1983—1987,” document published by the International Tapetronics Corporation, which outlines their various strategies for the upcoming years in an index format, the headers of the sections are as follows: The Planning Process, Mission, Strategic Guideline/Issues, Internal Business Analysis, External Analysis, Programs/Action Plans, Forecasts and Financial Analysis, Resource Planning, Resource Planning Cont’d, Plan Implementation and Control and Organization Chart/Policies, the document is dated September, 3rd, 1982, 3pp.
- 1.8 “The Planning Process,” handout which outlines the usage and importance of planning within any industry, gives a step by step tutorial on planning within a corporate body and the applications of each step, the date of the handout is unknown, 9pp.

- 1.9 Mission statement of the International Tapetronics Corporation which outlines their focus on marketing needs and their wish to establish a superior growth pattern in sales volume and profit, the document is dated September 3rd, 1982, 3pp.
- 1.10 Statement of strategy by the International Tapetronics Corporation which outlines where they will allocate their budget to, what staff they will hire, how they will handle large acquisitions, and their proposed plan for marketing, the document is dated September 3rd, 1982, 10pp.
- 1.11 Internal business analysis by the Internal Tapetronics Corporation which outlines: Market performance, financial and operating performance, organization/management values and style, current strategic game plan, key result areas, and strengths and weaknesses of the organization, the document is dated September 3rd, 1982, 8pp.
- 1.12 External Analysis by the International Tapetronics Corporation which outlines: Competitors (along with their strengths and weaknesses), environmental trends and developments, and environmental opportunities/problems, the document is dated September 3rd, 1982, 29pp.

Folder 2: Business Plans II

- 2.1 Programs packet by the International Tapetronics Corporation which breaks down every proposed strategy into action plans which then outline how each task is to be performed, who is to complete each task and cost-benefit analysis of each proposed task, the packet is dated September 3rd, 1982, 15pp.
- 2.2 "Forecasts and Financial Analysis," packet which includes program analysis of products sold along with various diagrams which depict product growth, and manpower growth, utilized mainly for projecting sales growth, the document is dated September 3rd, 1982, 11pp.
- 2.3 "Resource Planning," packet which outlines a plan for each major resource department within the corporation, mostly includes budgetary allocation information along with growth and development plans for various departments, the document is dated September 3rd, 1982, 22pp.
- 2.4 "Plan Implementation and Control," packet which is meant to outline control procedures, review processes and other post-action plan documents, however the document maintains that this portion is incomplete, the document is dated September 3rd, 1928, 2pp.
- 2.5 Organizational charts and diagrams for the International Tapetronics Corporation which outline each department within the corporation and their various requirements, budget, management style, etc, the dates of the documents are unknown, 19pp.
- 2.6 "International Tapetronics Corporation: Employee Handbook," packet offered to employees upon completion of the hiring process, within it outlines: the Corporate Creed, a short welcoming message, a history of the company, the products it produces, what customers it attends to, classifications of employees, benefits, and policies, the packet is dated April 5th, 1981, 21pp.

- 2.7 Cover page of the International Tapetronics Corporations five year plan from 1983 to 1987, lists various individuals involved in the corporation including: John P. Jenkins, Larry Cutchens, Cecil Henocq, Gregg Paul, Vic Fink, Karen Ryder and Sue Durree, the document is dated September 14th, 1982.
- 2.8 Document labeled, "Organizational Structure Comments," which outlines various criticisms of the organizational structure charts mentioned in document 2.5, the document is dated September 3rd, 1982.

Folder 3: Technical Manual "Delta"

- 3.1 "Delta: Technical Manual," manual for the operation of the DELTA family of audio tape cartridge machines produced by the International Tapetronics Corporation, published by the International Tapetronics Corporation, 1985, 63pp.

Folder 4: Patents

- 4.1 Patent papers from the United States office of Patents and Trademarks, which patents the "Magnetic Transducer Head," an invention created by John C. Fesler and Hudson M. Bell both employed by the International Tapetronics Corporation , the documents consist of two packets one labeled: 4193103, and 4221316, dated October 2nd, 1978, 62pp.

Folder 5: Video-Tape VHS

- 5.1 "Video Tape for VHS Format," article translated from Japanese which outlines the composition for a new video tape for VHS formats developed at the Wireless Research Lab in Japan, within the article the chemistry behind the production of the tape is explained, in addition, various tests are presented showing the capabilities of the newly developed tape, June 1982, 18pp.

Folder 6: 75 Years of Magnetic Recording

- 6.1 "75 Years of Magnetic Recording" by Basil Lane, *Wireless World*, March 1975, pp. 102-105.
- 6.2 "75 Years of Magnetic Recording-The Dark Years" by Basil Lane, *Wireless World*, April 1975, pp. 161-164.
- 6.3 "75 Years of Magnetic Recording-From Steel to Plastic" by Basil Lane, *Wireless World*, May 1975, pp. 221-225. (2 copies)
- 6.4 "75 Years of Magnetic Recording- The Boom Years, 1946 to..." by Basil Lane, *Wireless World*, June 1975, pp. 283-286.
- 6.5 Memorandum to: John Fesler, Sharon Gibson, Sharon Graves, Betty Kessinger, Dick Loercher, Dick Lund, Ray Mackey, Helen Monkman, Karen Ryder, Bruce Whitehouse, Bob Wilson from Bill Shadid which makes reference to the composition and compilation of a short history on the International Tapetronics Corporation, November 6th, 1984.
- 6.6 Photocopy of correspondence to Mr. Basil Lane, Assistant Editor for *Wireless World Magazine* at Heywards Heath, Sussex, Great Britain from John C, Fesler Electrical Engineer at the International Tapetronics Corporation, regarding his interest in an article

that Lane wrote on German machines strikingly similar to the ones ITC produces, September 5th, 1979, 2pp.

- 6.7 Photocopy of correspondence to Mr. Fred L. Bailey at 306 Garfield Drive, Bloomington, Illinois from John C. Fesler, electrical engineer for ITC thanking him for salvaging the Bailey/Jenkins prototype cartridge machine, as he plans on using it for reference for an up-coming paper, September 5th, 1979.
- 6.8 "A Short History of the International Tapetronics Corporation," by Bill Shadid, academic paper, date unknown, 4pp.

Folder 7: Qualities of Recording & Video

- 7.1 "Relationship of Surface Roughness to Properties of Video Tape," by Sataru Osagawa, Hideaki Komoda, Hajime Hagiwara, Tadashi Kawamata, *National Technical Report Volume 28, No. 3*, June 1982, 19pp. (Translated from Japanese).
- 7.2 "Durability of Magnetic Recording Tape for Mass Memory System," by Hiroaki Hiratsuka, Hiroaki Hanafusa, Kouzaburo Nakamura and Shigefumi Hosokawa, *Review of the Electrical Communication Laboratories, Volume 28, No. 5-6*, June 1980, pp. 449-460. (Translated from Japanese).

Folder 8: Archaeology of Tape Cartridge

- 8.1 "Archaeology of the Broadcast Tape Cartridge" typescript by David T. Macfarland, Ph.D, April 17th, 1979, 33pp.

Folder 9: Made in Illinois

- 9.1 "Made in Illinois: A Story of Illinois Manufacturing" by Rolf Achilles, *Illinois Manufacturing Association*, October 1993, includes papers by John C. Fesler and other engineers which outlines the modern use of tape fed information machines, along with a plethora of other devices, 37pp.

Folder 10: Packing Lists

- 10.1 Shipping/Packing list to WIUM-TV, CONVOCOM at 1501 Bradley Avenue, Peoria, Illinois from the International Tapetronics Corporation, for a variety of radio broadcasting equipment, dated April 13th, 1988.
- 10.2 Shipping/Packing list to WIUM-TV, CONVOCOM at 1501 Bradley Avenue, Peoria, Illinois from the International Tapetronics Corporation, for a variety a DELTA instruction manual, dated March, 28th, 1988.
- 10.3 Document which outlines the service policy for products from the International Tapetronics Corporation, dated March 31st, 1988.

Folder 11: Talks to Students

- 11.1 Correspondence to Mr. Dave Rupert and Mr. Jerry Jones at the TCC department at Illinois State University from John C. Fester electrical engineer for ITC regarding a meeting to be held on February 28th, 1991, the fax is dated February 27th, 1991.
- 11.2 Correspondence to Dr. Larry Fryd at the Technology Department at ISU from John C. Fester electrical engineer for ITC regarding a meeting to be held at the Media Center on the 28th, the fax is dated February 27th, 1991.

- 11.3 Correspondence to Charlie Bates from John C. Fester electrical engineer for ITC regarding a lecture at the ISU Technology Center, the correspondence is dated February 28th, 1991.
- 11.4 Correspondence to John Fesler at International Tapetronics Corporation 2425 South Main Street, Bloomington, Illinois from Larry Fryda of the Industrial Technology Department at ISU regarding the students in IT 391 looking forward to his presentation, the letter is dated February 18th, 1991.
- 11.5 Correspondence to Paul Steece from Steve Waters regarding a tour of the manufacturing facilities at ITC during a presentation for a class of Illinois Wesleyan University, the letter is dated January 3rd, 1990. (three letters are included within this series)
- 11.6 Correspondence to John Fesler, Janet Schroeder and Jim Woodworth of ITC from Karen Ryder of ITC regarding a tour for the American Marketing Association of ISU, the letter is dated January 27th, 1989.
- 11.7 Memo to John C. Fesler electrical engineer at ITC from Paul Steece regarding the information he plans on presenting to an ISU marketing class, the memo is dated January 31st, 1989.
- 11.8 "Manufacturing Services for your Product," brochure which includes information about the products created by ITC along with information about different staff positions and a chart which features pictures of workers, the brochure's date is unknown, 4pp.
- 11.9 Correspondence to Paul Steece from S.H. Waters regarding being contacted by Dr. H. L. Detweiller of Illinois Wesleyan University who requested the engineering staff at ITC do a presentation for the University's engineering class, the letter is dated January 4th, 1989, 2pp.
- 11.10 Correspondence to Paul Steece from John C. Fesler regarding a repeat tour/lecture for the physics department at IWU, correspondence is dated December 28th, 1989, 2pp.
- 11.11 Correspondence to Paul Steece from Steve Waters requesting a tour of the ITC plant by a group of freshman from IWU, the letter is dated January 8th, 1988, 2pp.
- 11.12 Letter to John C. Fesler at the International Tapetronics Corporation, 2425 South Main Street, Bloomington, Illinois, from Dr. Wayne Anderson, president of Illinois Wesleyan University, Bloomington, Illinois thanking him for lecturing at the Physics Department on multiple occasions, the letter is dated January 19th, 1988.
- 11.13 Correspondence to Dr. Wayne Anderson, president of Illinois Wesleyan University, Bloomington, Illinois from John C. Fesler, Process Engineer Specialist at ITC, 2425 South Main Street, Bloomington, Illinois thanking him for allowing him to guest lecturer at IWU, the letter is dated December 17th, 1987. (Two copies)
- 11.14 Photocopy of a handwritten memo to Paul Steece from John C. Fesler Process Engineer Specialist at ITC, 2425 South Main Street, Bloomington, Illinois regarding information about ITC historical archives, the memo is dated January 31st, 1989.
- 11.15 Correspondence to Charlie Bates from John C. Fesler regarding an invite by Lee Dumser a student at IWU, to John Fesler requesting a lecture by him on the topic of: Management in Project Development, the letter is dated February 4th, 1991, 2pp. (Three copies of this document are included).
- 11.16 "Proposed Presentation Topics-Introduction too Engineering," packet by John C. Fesler used during his time as a guest lecturer at IWU, the packet contains information on how to "create" and "fill" a market need along with the process of product evolution, the

packet contains a wide variety of diagrams to assist in the presentation, the date of the packet is unknown, 5pp.

Folder 12: Measurements of Recording Surfaces

- 12.1 “Interferometric Measurements of the Surface Profile of Moving Samples” by Richard W. Peterson, Glen M. Robinson, Robert A. Carlsen, Craig D. Englund, Patrick J. Moran, and Wayne M. Wirth, *Applied Optics, Volume 23, No. 10*, dated May 15th, 1984, pp. 1464-1466.
- 12.2 “Applications of Interferometric Measurements of Surface Topography of Moving Magnetic Recording Materials,” by Glen M. Robinson, Patrick J. Moran, Richard W. Peterson, Craig D. Englund, *IEEE Transaction on Magnetics, Volume 20, No. 5*, dated 1984, pages unknown.
- 12.3 “Three Dimensional Surface Metrology of Magnetic Recording Materials Through Direct Phase Detecting Microscopic Interferometry,” by D.M. Perry, P.J. Morgan and G.M. Robinson, *IEEE Transaction on Magnetics, Volume 55, No. 4*, dated April, 1985, pp. 145-150.

Folder 13: Plant Investigation-Applicable Patents

- 13.1 Document labeled, “Format for Plant Investigation,” which outlines the process and different categories for plant investigation, albeit briefly, the document is dated August 1990, 5pp.
- 13.2 Photocopy of United States Patent number: 4,695,003 for the: self adjusting endless loop tape cartridge invented by Alfred H. Moris, includes abstract information along with diagrams, the patent is dated September 22nd, 1987.
- 13.3 Photocopy of United States Patent number: 4,293,882 for the: endless loop tape magazine, and a recording and/or playback machine utilizing the magazine invented by Alfred H. Moris, includes abstract information along with diagrams, the patent is dated October 6th, 1981.
- 13.4 Photocopy of United States Patent number: 4,367,850 for the: endless loop tape cartridge invented by Alfred H. Moris, includes abstract information along with diagrams, the patent is dated January 11th, 1983.
- 13.5 Photocopy of a receipt for a Canadian patent copy of the U.S. patent 4,695,003 amounting to \$192.38, paid by John C. Fesler and collected by Smart & Biggar, the note is dated March 8th, 1990, 2pp.
- 13.6 Correspondence to Charlie Bates, John Mill, Andy Rector, Jim Riggs, and Al Taylor from John C. Fesler regarding his phone call with Al Taylor on March 28th, 1990, it explains the necessity of certain patents lifetimes in both domestic markets and foreign markets be maintained for extended periods of time, the letter is dated March 30th, 1990, 7pp.
- 13.7 Patent review document for patents: 4,293,882; 4,367,850; and 4,695, 003 in Japan, Canada and the UK, the document is dated May 7th, 1990, 2pp.
- 13.8 Correspondence to Charlie Bates and Paul Steece from John C. Fesler regarding the patent status on the: ScotchCart II, Centra Cart and Application of these to the B and D Flight Recorder Project, the letter is dated December 12th 1989.
- 13.9 Correspondence to Charlie Bates from William B. Barte representing Ing. Barzano and Zanardo, Via Piemonte, Italy regarding 3M’s assignation of all rights, titles and interests

of owned patents in Italy to IWC in Bloomington Illinois, the letter is dated February 6th, 1990.

- 13.10 Correspondence to Charlie Bates from William B. Barte representing Ruschke & Partner at 8000 Munchen, Pienenauerstrasse 2, Federal Republic of Germany regarding 3M's assignation of all rights, titles and interests of owned patents in Germany to IWC in Bloomington Illinois, the letter is dated February 6th, 1990.
- 13.11 Correspondence to Charlie Bates from William B. Barte representing S.A. Fedit – Loriot, 38 Avenue Hoche, 75008 Paris, France regarding 3M's assignation of all rights, titles and interests of owned patents in France to IWC in Bloomington Illinois, the letter is dated February 6th, 1990.
- 13.12 Correspondence to Charlie Bates from William B. Barte representing Spruson and Ferguson Sydney, N.S.W. 2001, Australia regarding 3M's assignation of all rights, titles and interests of owned patents in Australia to IWC in Bloomington Illinois, the letter is dated February 6th, 1990.
- 13.13 Correspondence to Charlie Bates from William B. Barte representing Asamura Patent Office, Tokyo, Japan regarding 3M's assignation of all rights, titles and interests of owned patents in Japan to IWC in Bloomington Illinois, the letter is dated February 6th, 1990.
- 13.14 Correspondence to Charlie Bates from William B. Barte representing Smart and Biggar, Ottawa, Canada regarding 3M's assignation of all rights, titles and interests of owned patents in Canada to IWC in Bloomington Illinois, the letter is dated February 6th, 1990.
- 13.15 Correspondence to Charlie Bates from William B. Barte representing LeeInternational Patent and Law Office, Seoul, Korea regarding 3M's assignation of all rights, titles and interests of owned patents in Korea to IWC in Bloomington Illinois, the letter is dated February 6th, 1990.
- 13.16 Correspondence to Charlie Bates from William B. Barte representing Langner Parry, Munich, Federal Republic of Germany regarding 3M's assignation of all rights, titles and interests of owned patents in Germany to IWC in Bloomington Illinois, the letter is dated February 6th, 1990.
- 13.17 Correspondence to Charlie Bates from William B. Barte representing E. Blum and Co., Zurick, Switzerland regarding 3M's assignation of all rights, titles and interests of owned patents in Switzerland to IWC in Bloomington Illinois, the letter is dated February 6th, 1990.
- 13.18 Correspondence to Charlie Bates from William B. Barte representing Lloyd Wise, Tregear and Co., London, England regarding 3M's assignation of all rights, titles and interests of owned patents in the United Kingdom to IWC in Bloomington Illinois, the letter is dated February 6th, 1990.
- 13.19 Various diagrams, specification sheets, inventory lists, and quotes for prices for manufactured equipment created by ITC. This information has been bundled together by a white plastic paperclip.

Folder 14: Educating Engineers- Curriculum of MIT and Bradley University

- 14.1 Photocopy of a page from Bradley University's Undergraduate Catalog for 1981-1982 covering courses available for the Physics Major, included are classes for each individual year along with their corresponding page number.

- 14.2 Photocopy of a page from Bradley University's Undergraduate Catalog for 1981-1982 covering courses available for the Electrical Engineering Major, included are classes for each individual year along with their corresponding page number.
- 14.3 Photocopy of a page from Bradley University's Undergraduate Catalog for 1981-1982 covering courses available for the Electrical Engineering Technology Major, included are classes for each individual year along with their corresponding page number.
- 14.4 Photocopy of a page from M.I.T.'s Undergraduate Catalog for 1882 covering courses available for the Electrical Engineering Major, included are classes for each individual year along with their corresponding page number.
- 14.5 Line graph which indicates the number of graduate degrees awarded in electrical engineering from 1926-1974, the date is unknown.

Folder 15: Manufacturing Specifications and Quality Control

- 15.1 "Variation Research: Debugging the Manufacturing Process," by Paula Noaker, *Tooling & Production*, June 1987, pp.53-56.
- 15.2 Photocopies of electrical specifications and diagrams outlining the composition of magnetic head analogs manufactured by the International Tapetronics Corporation, dated August 20th, 1984, 13pp.

Folder 16: ITC/3M Recorder-Employee Newsletter of International Tapetronics Corporation

- 16.1 "*IT Recorder: For the Employees of international Tapetronics Corporation/3M*," newsletter by Jack Hanks, *Volume 2, No.1*, January 13th, 1984, pp.1-4, covers different departments projects along with news pertinent to employees regarding ITC/3M.
- 16.2 "*IT Recorder: For the Employees of international Tapetronics Corporation/3M*," newsletter by Jack Hanks, *Volume 3, No.8*, November 22nd, 1985, pp.1-8, covers different departments projects along with news pertinent to employees regarding ITC/3M.

Folder 17: Standards for Recordings (National Association of Broadcasters)

- 17.1 "Recordings & Reproductions," packet published by the Engineering Department of the National Association of Broadcasters, includes various reference sheets to measure cartridge tape devices frequency of broadcasting along with providing acceptable standards which should be adhered to, the packet is dated 1976, 18pp.

Folder 18: Journal of Audio Engineering Society

- 18.1 "Journal of the Audio Engineering Society: Audio/Acoustics/Applications," *Volume 31, No. 9*, September 1983, pp.673-694.

Folder 19: Archeology of the Broadcast Tape Cartridge

- 19.1 Handwritten note from Don Newberry to an unknown recipient asking for any sort of assistance on a paper.
- 19.2 "Archeology of the Broadcast Tape Cartridge," by David T. MacFarland, Ph.D of Kansas State University, the date of the document is unknown, 34pp.