

"I AM CARTRIVISION"

The All-American VTR

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In the battles over consumer home video, as transatlantic grudges were fought among established electronics and communications giants like Sony, JVC, RCA, CBS, Philips and Motorola, a curious player slipped in to claim one of the more distinctive footnotes in VTR history: Cartridge Television, Inc., whose Cartrivision cassette player became in 1972 the first consumer video player-recorder to market to offer pre-recorded feature programming for home viewing—in color. What's more, Cartrivision also came equipped with programmable television recording and even an optional camera for home movies. By utilizing skip-field recording and coaxial reel-over-reel cassette designs, the company was further able to put out reasonably compact media capable of holding up to two hours of programming. Though one might argue none of its technical achievements were entirely its own design, Cartrivision remains a fascinating example of a left-field operation with some interesting engineering decisions getting an unexpected leg up on some of its most heated contenders through prescient, if ultimately unsuccessfully realized, business reasoning. In the

following essay, I will consider the unique history of Cartrivision and lift up the chassis to explore the technology inside.

CARTRIDGE TELEVISION, INC.

The Genesis of Cartrivision

Cartridge Television, Inc. (CTV) was created by entrepreneur Frank Stanton, who led what *Fast Forward* author James Lardner describes as “a group of New Yorkers whose major business credential was having had the great good sense, in the early 1950s, to import the Volkswagen Beetle to the United States” (81). As such, they were outsiders in a field already fraught with by international competition between established players like RCA, Sony, Ampex and CBS. But Stanton managed a success bid for big money from Avco, described by the *Wall Street Journal* as “a diversified manufacturing and financial-services concern”—a “defense contractor” in multiple other descriptions—when they purchased an interest in the firm mid-1969 (“Avco Buys Interest in Firm”).

One year later a picture of Frank Stanton appears in the *New York Times* under the headline “Electronics Show Tunes In to TV Tape,” in which Cartrivision is described as attracting large crowds at its first public demonstration amid the 1970 New York Consumer Electronics Show. The specs are a just shy of how things ultimately shaped up: CTV's highest price estimate for their combination television-player, \$900, falls short of the \$1,300-\$1,895 for which it would eventually retail, and the television set also measures 19” diagonally rather than the final 25”. Fifty pre-recorded titles from United Artists and Avco Embassy

Pictures are announced (Smith 59). May 1971, CTV became the first cartridge system producer to make a public stock offering. Despite anticipated players coming from Motorola, Philips and Sony, it was predicted as a “hot” stock, “suggesting that demand exceeds supply” (Skala 14).

To meet estimated demand for its pre-recorded programming, CTV and Avco opened a tape duplication facility inside a 145,000 square foot warehouse employing 250 technicians in San Jose, California (“AVCO Cartridge TV Unit Begins Working”). By April 1972, units were shipping out to its television manufacturer licensees for final assembly. The *Chicago Tribune* announced the “Age of TV Cassette Recorder and Player” June 17, 1972, the same week the first Cartrivision units rolled out at eighteen local Sears stores (Douglas A21). Printed and video advertising materials announced a multipurpose device: one that allowed the user to bring Hollywood to his or her living room, time-shift television broadcast by recording on to blank cassettes, and use the optional \$250 camera attachment to create home movies; or, with a further optional 20' extension camera cord, establish a home surveillance system. Various local advertisements price the system from \$1,350 to \$1,895.

SPECS

Technical Details and Operation

Cartrivision only appeared on the market in combination with 25” color TVs created by Admiral, Teledyne Packard Bell, Emerson-Dumont and Sears (“Cartridge TV: Cartrivision Finally Ships Units”). Promised standalone units

never hit shelves before the company's sudden demise late-1973, though many that had been manufactured did make it into the hands of enthusiasts—who refer to them as “fishtanks”—after CTV liquidated its inventory. Subsequently, it is the unique video recording and playback technology that will be given consideration.

Head assembly

The Cartrivision unit contains a 10” rotary assembly with three electromagnetic heads spaced approximately 120° apart. The motor drives it at a fast speed of about 1200 rpm while the tape is pulled across at approximately 3.8” per second. Attached to each of the heads are amplifiers which strengthen the signal before it passes to the commutator at the center of the motor. This theoretically reduces the noise generated by the commutator, which passes the video signals sensed by the heads to external circuitry, thereby reducing signal-to-noise ratio. Like many systems since Toshiba's 1959 demonstration, Cartrivision utilized a helican scan method.

Among the strangest features of the Cartrivision design, as noted by many enthusiasts, is that the circuit board is contained within the rotating head itself. Therefore, virtually the entirety of the machines circuitry is spinning at a furious pace during playback.

Skip-field playback

As acknowledged in the patent application, Cartrivision's interlaced skip-field recording/playback technique is based upon Nobutoshi Kihara's own first employed in Sony's CV-2000, a 1/2” reel-to-reel tape system introduced mid-1965. In this method, only one of two odd/even fields of video is represented and

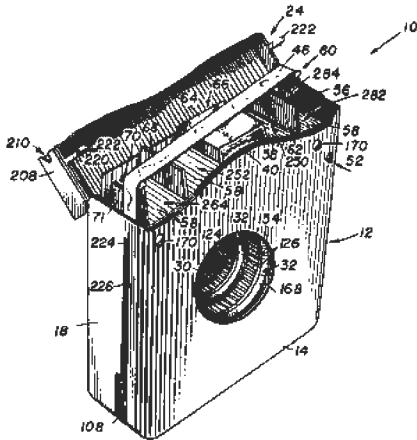
reproduced twice, making for a slightly hazy picture. The result is conservation of bandwidth and subsequently tape space and reproduction speed, whereas it had been believed the loss in quality would be commensurate with the “inexactness” of the television and video medium (Lardner 67-68). However, instead of repeating each partial field twice, the Cartrivision system does so three times: of the sixty alternately even and odd fields, every third field, even or odd, is reproduced three times. Cartrivision engineers applied for their own patent for a two-loop servo system utilizing a composite video signal's vertical sync signal to control the motor drive and reduce “jitter.”

Nevertheless, the picture quality did not escape notice. Lardner quotes David Lachenbruch of *Television Digest*: “It was a jumpy picture. If you looked at it carefully, you could see it jumping, but most people were so impressed that they got a picture at all they didn't notice” (84). This was not the case for discerning cinephile Anthony Reveaux. In the fall 1973 issue of *Film Quarterly*, Reveaux describes the image as “coarser and inferior to broadcast programming seen on the same set,” estimating that the Cartrivision cassette of *Johnny Guitar* looked “barely one-fourth as good” as a West German TV broadcast of the same film (43), implying a greater perceived lapse in quality than the already discouraging mathematic reality.

The cartridge

Cartrivision's medium consists of 1/2” iron oxide tape enclosed in cartridges of two sizes. The larger size, 7 3/16 x 6 5/8 x 1.5”, contained enough tape for 114 minutes of playing time, whereas the smaller, at 5 x 6 5/8 x 1.5”, ran

30 minutes. Externally, tapes came in two formats, red or black, the previous being pre-recorded feature programming available as rentals only and the latter purchase-only general interest programming or blank stock.



Like many cassettes, Cartrivision had been designed for durability and ease-of use. It contains many features of VHS cassettes, the eventual standard-bearer of consumer home video. Two reels are housed inside the encasing, on which one end is a pivotal closure opened for

engagement during playback or closed for protection during storage. A latch engaged inside the player releases the closure. Similarly, a brake unit engages the flanges of the tape reels when not in use for playback or recording. The reverse side of the cassette contains a tape indicator arm to indicate the amount of media remaining for playback or recording.

Distinctive from other cassette formats is Cartrivision's coaxial reel-over-reel design, which was implemented for compactness. The reels are unattached to the cartridge housing or each other and quickly engage with the drive spindles of tape transport inside the player, which move at slightly different times to facilitate the reel-over-reel design. Once the cartridge is inserted by the user, it is accepted into a "bucket" within the system, where tape arms stretch a length of tape 180° around the head assembly.

Also unique is one of the most curious methods of intellectual property

enforcement ever devised: the inability to rewind red label rental cassettes. Stanton conceptualized video cassette rental in much the same way theatrical print rental works—not “selling”, but “lending” (a principle not entirely dissimilar to present video streaming, in which consumers prefer access over ownership). He further understood that Japan was on the cutting-edge of hardware technology, and that if America were unable to compete, it should find a way around: “The point I took was that America's lead was in the software. American software dominates the world. So whatever hardware system we all got together on here, the logic was inevitable that the Japanese would have to adopt to us.” (qtd Lardner 87). Therefore, Hollywood's global entertainment domination was to renew American technological market supremacy—if only they weren't so caught up on the idea that the same technology would simultaneously undermine their own market for theatrical feature film releasing. Nevertheless, Stanton made many visits to theater owners (“Equipment & Engineering: Talking Up Cartrivision to Theater Owners”), describing how offering Cartrivision rentals in their lobby could provide an additional revenue stream, while Programming Vice President Samuel E. Gelfman continued to ink deals with distributors (Schoenfeld 5). The ultimate concession was the device's controversial inability to rewind via a locking device built into the red cassettes. Once returned, cassettes would be inserted into special devices designed with the sole purpose of rewinding the red tapes; an internal counter further ensured precision audits.

Unit operation

The Cartrivision interface consists of the tape holder and ten operating

switches: a TV/CTV switch for television or tape; a function knob controlling play and rewind; a three-position switch for turning on the optional camera for either recorder or CCTV monitoring; a sleep switch; a timer knob for setting up to eight hours of delay for record time; a small tune knob for adjusting head position; an equal size “fine tune” knob for adjusting tape pull; a fast forward button which needed to be held while turning the function knob to rewind in order to skip ahead; a record button which needed to be held while turning the function knob to play to instigate recording; and finally a stop button.

With the function knob in natural standby mode, cartridges were loaded horizontally. To rewind or play, one simply turned the function knob in the appropriate position. As mentioned, basic rewinding or recording was done by pressing the appropriate button in concert with either rewind or play on the function knob. To delay recording, before initiating the record procedure, the timer knob needed to be set for the proper delay, which could be done in increments of 5 minutes, 15 minutes or one hour up to eight hours. When the tape ran out of space, the entire unit would automatically shut off.

SPLIT FIELD

The Landscape of Home Video Recorders

Sony's CV-2000, 1965, with its skip-field recording, is an obvious precedent for Cartrivision, yet that device was considered unweildy for home use due to its reel-to-reel operation, and it also lacked color. Both were shortcomings were satisfied by the company with the development of 3/4" U-matic, which

entered development in 1969 and became the first widespread video cassette to hit the market in 1971. In the meantime, Dr. Peter Carl Goldmark, inventor of the LP vinyl record, began to work his magic on the EVR, or Electronic Video Recording, at CBS. Not video in the common sense, it actually consisted of two-track 8.75mm black and white film on which one side contained an actual image and the other typically would feature chrominance information. Unfortunately for Goldmark, the process of creating masters and duplicates proved too complicated to be cost effective (Lardner 78).

In the press Cartrivision competed for column inches with several other anticipated, but mostly failed consumer video formats including Ampex Instavideo, a 1/2" iron oxide tape system that officially went bust in mid-1973, and RCA's MagTape SelectaVision, a 3/4" tape, thinner than U-matic, which was in development from 1970 to 1974 (Lardner 88). This return to magnetic tape followed a brief sojourn with SelectaVision HoloTape, a forerunner to the laser disc technology developed by MCA—which, under the title Disco-Vision, was

Wednesday, May 5, 1971 **VARIETY** VIDEO CASSETTES 11

Key Specs On Video Cassette Systems

Compiled by TELETRONICS

COMPANY	CBS	SONY	AMPEX	AVCO	PHILIPS	FELDEC
Name	EVR	Videocassette	Instavideo	Cartrivision	VCR	Videodisc
Medium	8.75mm silver halide film	1/4" chromium oxide videotape	1/2" iron oxide video tape	1/4" iron oxide video tape	1/4" chromium dioxide video tape	Thin plastic disc
Intro Date	Early 1971	End 1971	End 1971	1st Quarter 1971	1972	Late 1972
Equip. Size	21" x 14 1/2" x 8 1/2" 30 lbs.	19" x 18" x 8" 45 lbs.	11" x 15" x 4 1/2" 15 lbs.	Licensed TV mfgs. will build into TV sets (Admiral, Emerson)	23" x 13" x 4" 14 lbs.	Not finalized
Equip. Price	Industrial \$795	Color player \$800 Player/record. \$1,100	B&W plybck \$800 B&W record \$900 Color plybck \$900 Color record \$1,000 B&W camera \$400	color player/recorder built into 19" TV—\$900-\$1,000 player/recorder adaptor (requiring installation) \$200-\$300	Color player/record. \$500-\$600	B&W \$120 B&W w/auto change \$350 Color w/auto change \$325
Cartridge Size	Round single reel 7" diam., 2/8" thick	2 reel system 2.75" x 5.5" x 1.25" (90 mins.)	Round single reel 4.6" diam., 7/10" thick	2 reel system 7 3/16 x 6 5/8 x 1.5" (114 mins.) 5" x 6 5/8" x 1.5" (30 mins.)	2 reel system 3.8" x 6" x 1.4"	Magazine 6" sq. x 1/4" with paper thin discs
Cartridge Playing Times	Color—25 min. B&W—39 min.	16, 30 & 60 mins.	30 min. @ 7.5 ips 60 min. @ 3.75 ips	30 & 114 mins.	60 mins.	Magazine holds up to 2 hrs. of 5-min. discs
Material Cost	25 min.—color \$18.50 in lots of 2000 including transfer & duplication	30 min. \$17.50 60 min. \$30,000 + transfer cost	30 min. \$13.00 + transfer cost	30-60 min. prerecorded programs will retail for \$10-\$20	60 min. \$20-\$25 + transfer cost	Discs with programming will be in present price range of LP records.
Rewind Time	1 minute	less than 3 mins. for 60 mins.	1 minute for 30 mins.	3 mins. for 60 mins.	6 mins. for 60 mins.	Not applicable

NOTE: THE ABOVE INFORMATION AND SPECIFICATIONS ARE AS ANNOUNCED BY THE COMPANIES TO DATE AND ARE SUBJECT TO CHANGE

already eagerly anticipated by the waning days of Cartrivision (Reveaux 45) before finally hitting the market in 1978.

“YOUR PASSPORT TO ENTERTAINMENT”

Cartrivision Programming

Undoubtedly the distinguishing feature of Cartrivision's launch was the breadth of pre-recorded titles available for rental at \$3 a piece. Cartrivision launched with a catalog of 850 selections including 207 feature-length films from eight suppliers: Columbia Pictures, United Artists Corp., American International Pictures, Avco Embassy Pictures, Lion International Films, Russ Meyer Productions, Sovfoto Films and Grove Press. The remaining 643 titles comprise general interest materials such as instructional, cultural, sports, music and miscellaneous entertainment programming (“Cartridge TV: Cartrivision Film Library Offers Pick of 850 at \$3”).

Of the feature selections, the Cartrivision lineup is startlingly full of quality titles ranging from Hollywood classics like *On the Waterfront*, *Casablanca* and *Stagecoach* to significant independent and arthouse films like Jack Nicholson's directorial debut *Drive, He Said*, John Cassavetes' *Shadows and Husbands*, works by Erich Rohmer and Mikhail Kalatozov and *I Am Curious (Yellow)* and *(Blue)*. In fact, one may be harder pressed to pick out the clunkers from the cinephile-friendly lineup. The sole exception is the “documentary” category, which consists entirely of sporting events like Super Bowl IV, the Mexico City Olympics and, for good measure, Pierre Dominique Gaisseau's *The Sky Above*,

the Mud Below, winner of the first Academy Award for Best Documentary Feature.

For the diversity and higher-brow nature of its content, Avco Cartrivision V.P. of programming and production Samuel E. Gelfman may deserve credit. In a 1970 *Variety* article, Gelfman described the assumed one-year window prior to the release of the system as time to develop a “new art form” with the hopes that a new generation—a “radical underground”—will realize the possibilities of the system. He also singles out burgeoning college-level cinema studies courses as a potential area of great interest alongside special markets for art films (Schoenfeld 5). To this apparently unrealized vision of Cartrivision as an original artistic medium one may cite a mid-1972 announcement that Cartrivision would make its facilities available for independent producers to transfer 35- and 16mm—and eventually smaller gauges—to the cartridge format (“Indie Filmmakers” 9). One assumes little came of this. (Shortly after Cartrivision's demise, Gelfman seems to have found his calling as an independent producer on films including Monte Hellman's *Cockfighter* and Jonathan Demme's *Caged Heat*. His name ceases to appear in the trades after 1985.)

UNBINDING

The Demise of Cartrivision

In his October 1973 column for *Popular Science*, C.P. Gilmore was quick to identify certain writing on the wall and offer a terse assessment of the Cartrivision's future:

CARTRIVISION—end of the line? In the year and a half since it was put on sale ... the Cartrivision home video recorder-playback machine has never lived up to expectations. So last March, the company decided to try what industry observers called a 'do or die' promotion in California. Together with Sears and Teledyne Packard-Bell, the company launched a hard-sell program and budgeted up to \$5 million for an all-out advertising campaign. (46)

Though the plan led to an increase in sales, the company was losing money too quickly to sustain itself. It filed for Chapter 11 bankruptcy and halted production. While continuing to sell cartridges and maintaining its rental network, CTV scrambled to raise the \$7-to-\$10 million in capital needed to stay in business (Gilmore 46) (Lardner 87).

A popularly cited explanation for the device's failure is Sears' sales people's inability to market the device at ground level. A 1973 ad for Cartrivision explains the system is “the easiest videotape system anywhere to operate. A child can be taught to turn the set on by pushing a button.” In summarizing peoples' response, Lardner quotes Groucho Marx in *Duck Soup*: “A four-year-old child could understand this . . . Run out and find me a four-year-old child” (83). Sears' sales team had difficulty selling a combination player-television to the many consumers who had only just recently purchased standalone television sets. Furthermore, cabinet-encased television sets were going out of fashion at the time.

There was also the strange, “inexplicable” situation of thousands of tapes

suddenly decomposing around the country. A massive recall was instated to prevent faulty product from damaging the heads. Consumers were suddenly left without media for their new players, an effect that no doubt aggravated consumer confidence in a market already full of various competing formats (Lardner 85).

The “do or die” move Gilmore describes was immediately considered successful—sales people were trained, and a massive publicity push drove hardware sales and film rentals alike, the latter being pushed to an average of near three a week per owner. And yet it was ultimately too little too late: as stocks plummeted in the wake of other disasters, Avco withdrew its support. Cartrivision ended up as a \$48 million write-off for the company, and Cartridge Television, Inc. shut its doors.

TOTAL REWIND

Cartrivision in Retrospect

By 1974, CTV's San Jose facility had about 8,000 disassembled players for the taking. It wasn't long before word reached Steve Wozniak, then a 24-year-old Berkeley dropout and HP engineer moonlighting as a hacker and phone phreak while developing technology that would spearhead the personal computing revolution. Intrigued by the possibility of getting his hands on \$1,000 machinery for pittance, Wozniak and his friends made several trips to the facilities where they picked up player-recorder units for \$60 a piece. In his 2006 autobiography *iWoz*, he describes walking amid the factory seeing hundreds of unenclosed units, components exposed, and being intrigued by its unorthodox

spinning circuit board. “This became a huge part of my life almost right away,” he writes. “I studied the kinds of circuits [Cartrivision] used, how it worked, went through all the manuals. I tried to figure out how they processed color, how color got recorded onto tape, how the power supply worked. This was all information that came in really handy when we did the color Apple Computers” (138-39). And so, to Cartrivision's CV of historical footnotes, one may also credit its influence on one of the key features of the Apple II, the first home computer to display color graphics.



Separately, Cartrivision's achievements may seem inconsequential, yet collectively, they are rather stunning for the sheer quantity of areas in which the company men and engineers displayed uncommon prescience. As Stanton explained to Lardner, “We had color, we had liftoff, we had roll 'em...” Cartridge Rental Network president Lawrence Hilford remarks, “It was not dissimilar to today's hardware. You dropped the cassette in a slot, pushed a button, and it played” (81). Stanton and his colleagues also displayed a unique business model

in respect to Cartrivision's software and title distribution that has only recently been vindicated by licensing efforts of video game consoles and its premise of dominating the hardware market through gains and revenue streams from the software market; mail order DVD services such as Netflix; and the unrealized concept of making home viewing content available at theatrical venues, something done in close concert with distributors at venues Landmark Sunshine and Film Forum.

Unfortunately, the acumen displayed in leveraging programming was not enough to drive hardware with an ill-informed sales team at ground level. Furthermore, the technical concession made to software licensing—the inability to rewind—likely also discouraged potential buyers. Technologies to fix jitteriness and meet market demand with standalone players went unrealized before CTV was able to restructure.

Though Cartrivision may ultimately be relegated to a footnote of historical first, it remains a fascinating example of an unlikely American entry to the early skirmishes of the VCR wars and continuing delight to hobbyists.

ANNOTATED BIBLIOGRAPHY

"Avco Buys Interest in Firm." *Wall Street Journal* (1923 - Current file): 35. Jun 03

1969. ProQuest Historical Newspapers: The Wall Street Journal (1889-1995). Web. 28 Nov. 2012.

A very short article: "Avco Corp., a diversified manufacturing and financial-services concern, said it acquired an interest in Cartridge Television Inc., New York, the companies will study the feasibility of a television tape cartridge recorder for the home."

"AVCO Cartridge TV Unit Begins Working." *Back Stage* (Archive: 1960-2000)

Sep 04 1970: 3-. Entertainment Industry Magazine Archive. Web. 11 Oct. 2012.

This article is noteworthy mostly for disclosing information about the size of CTV's staff and facilities. Otherwise, it rehashes many of the same numbers and details from other articles around this time.

Cartridge Rental Systems, Inc. *Cartridge Rental Library*. n.d. Print.

This 17-page catalog of feature-length films was accessed via Luke Perry's Cartrivision site. It separates titles by genre: comedy, western, drama, foreign, war, adult, crime, young audience, documentary (i.e., sports), adventure, stage adaptation and science fiction. Each title is followed by a list of stars and a brief synopsis. The sole exception is *Killer's Kiss*, described as "Directed by Stanley Kubrick" in lieu of stars—the only filmmaker mentioned, despite titles available being surprisingly heavy on auteurist filmmakers like John Ford, François Truffaut, Federico Fellini, Roman Polanski, John Cassavetes and so on. It does not include non-feature titles other than a few sporting events.

Cartridge Television, Inc. "Cartridge and Tape Stretch Placement System for

Video Reproducer and/or Recorder." Patent 3,665,114. 23 May 1972.

"A tape transport apparatus of the type having a rotary head assembly and adapted for use with a tape cartridge."

Cartridge Television, Inc. "Interlacing System for Skip-Field Magnetic Recording

and Reproducing." Patent 3,718,755. 27 Feb 1973.

"A skip-field magnetic recording and reproducing system records each video field in one oblique track on a magnetic tape by means of rotary magnetic heads, only one of which records, while all of the heads play back to supply the skipped fields."

Cartridge Television, Inc. "Rotary Head Assembly for Tape Transport with Amplifier Carried by the Rotor." Patent 3,673,349. 27 Jun 1972.

"An assembly for mounting a number of magnetic heads on a rotor for rotation about a central axis and for electrically connecting the heads to a commutator on the rotor wherein the heads are secured to the rotor adjacent to its outer periphery for scanning a flexible, magnetic tape disposed adjacent to and along a portion of the arcuate path of travel of the heads."

Cartridge Television, Inc. "Servo System for Video Recorder." Patent 3,662,099. 9 May 1972.

"A video recorder has multiple rotating heads, the speed and phase of rotation of which must be accurately synchronized with the transmitted video signal or with a prerecorded control signal. This is accomplished by means of a servo which utilizes two fixedly positioned pick-up devices adjacent to the rotating heads for detecting the passing of certain fixed points on a disk carrying the heads."

Cartridge Television, Inc. "Tape Cartridge." Patent 3,672,603. 27 Jun 1972.

"An improved tape cartridge for use with a tape transport of the type having a rotary head assembly."

Cartridge Television, Inc. "Vertical Synchronization Time Base Error Corrector."

Patent 3,777,054. 4 Dec 1973.

"The invention discloses a means and method of eliminating jitter, during playback, in video reproducing and/or recording apparatus utilizing the skip field system."

"Cartridge TV: Cartrivision Film Library Offers Pick of 850 at \$3." *Billboard*

(Archive: 1963-2000) Jul 17 1971: 21-. Entertainment Industry Magazine

Archive. Web. 18 Oct. 2012.

This brief piece heralds the outline of Cartrivisions rentals and sales catalog, detailing both the red-label rental cassettes and the black-label sales-only tapes.

"Cartidge TV: Cartrivision Finally Ships Units." *Billboard* (Archive: 1963-2000) Apr 01 1972: 31,31, 33. Entertainment Industry Magazine Archive. Web. 18 Oct. 2012.

This brief article describes the initial Cartrivision units rolling off the assembly line "at the rate of more than 300 sets a day." It mentions players will begin selling at Sears Chicago stores in June, 1972. The initial production run is described as 25,000 with CTV, Inc., given a further option to purchase an additional 175,000 from the Avco Precision Products manufacturing facility.

"Cartrivision Delivers." *Back Stage* (Archive: 1960-2000) Oct 06 1972: 12-. Entertainment Industry Magazine Archive. Web. 18 Oct. 2012.

This article makes bold pronouncements about the future of Cartrivision cassette by predicting widespread standardization and eventual use of Cartrivision by television stations as a broadcast format: "Five different brands of home video tape systems designed to accept and play the same standardized, compatible video tape cartridges are now being delivered to more than 500 major stores in 20 cities," it begins. "The company also announced that by October 15 it will have blanketed the entire continental United States with retail outlets where owners of Cartrivision tape units produced by any manufacturer can purchase blank or pre-recorded video tape cartridges."

Diehl, Richard N. "LabGuy's World: Cartrivision ~ The First ALL American Home VCR." LabGuy's World: The History of Video Tape Recorders Before Betamax and VHS. LabGuy's World, 9 Jan. 2005. Web. Oct. 2012.

Richard Diehl, aka "LabGuy", is a video enthusiast with an exhaustive knowledge of extinct analog video technology. The site is insanely comprehensive complete with dozens, if not hundreds, of photos from Diehl's personal collection. One cannot help but wish to take a peek inside his garage. His Cartrivision section is useful mostly for the photos it contains. The text itself, enthusiastically encribed, seems to have been sourced from Lardner's account and some additional hands-on time with the unit. He also cites Luke Perry's site (below) for more.

Douglas, Anne. "Age of TV Cassette Recorder and Player." *Chicago Tribune*

(1963-Current file): 1. Jun 17 1972. ProQuest Historical Newspapers:

Chicago Tribune (1849-1989). Web. 18 Oct. 2012.

This piece briefly describes the rollout of Cartrivision units in the Chicago area.

"Equipment & Engineering: Talking Up Cartrivision to Theater Owners."

Broadcasting (Archive: 1957-1993) Nov 01 1971: 38-9. Entertainment

Industry Magazine Archive. Web. 18 Oct. 2012.

This piece touches on a pitch CTV CEO Frank Stanton made before the National Association of Theater Owners. Presciently, his proposal was one considered novel even in a contemporary context: lease Cartrivision cassettes to theaters at \$1.50 each and allow them to charge \$3.00-per for patron rentals. "Customers attending a John Wayne feature at your theater may want a few more John Waynes to look at for the following night," he explained. This may not only have been a shrewd recognition of a potential business partnership, but also a preemptive olive branch to an industry that may have felt threatened by Cartrivision's arrival (no matter the pitiful resolution).

Gilmore, C.P. "Look and Listen." *Popular Science* Oct. 1973: 46. Print.

Gilmore gloats over the system's demise.

Greenberg, Joshua. *From Betamax to Blockbuster: Video Stores and the*

Invention of Movies on Video. Cambridge: MIT Press, 2008. Print.

Greenberg's book acknowledges Cartrivision as "the first attempt to sell videocassettes already recorded with movies," predating Betamax by more than three years. Its information is culled in part from an interview with Cartrivision employee Peter Keane, who had previously worked for Sony and was instrumental in obtaining Hollywood's cooperation in programming. Cartrivision is primarily discussed in the context of being a forerunner to Betamax, but Greenberg provides a neat summation of its troubled business history.

"Indie Filmmakers Can Convert to Cartrivision Tape." *Back Stage* (Archive: 1960-

2000) July 14 1972: 9. Entertainment Industry Magazine Archive. Web. 18

Oct. 2012.

This brief article announces that independent producers may send 16mm and 35mm materials to Cartridge Television, Inc.'s San Jose headquarters for conversion to Cartrivision format. It explains the “finest professional equipment available” will be used adhering to NTSC standards while claiming, once converted, a one-hour program may be duplicated in two minutes. No mention of price or turnaround time is made.

Lardner, James. *Fast Forward*. New York: W.W. Norton. 1987. Print.

Lardner's book is primarily an account of events surrounding the 1984 *Sony Corp. of America v. Universal City Studios, Inc.* U.S. Supreme Court case—aka, “the Betamax case.” Nevertheless, it provides a relatively detailed and perceptive account of the history of professional and consumer video without shying from technical innovations. In the course of my research, it's eight-page treatment of Cartrivision is the most comprehensive I could discover in print. At that, it's account is noteworthy for not focusing solely on the copyright concerns addressed by its non-rewindable feature but also including some business, technical and other contextual information.

“Out of Nowhere Came AVCO's CARTRIVISION.” *Billboard* (Archive: 1963-2000)

26 Sep 1970: C9. Entertainment Industry Magazine Archive. Web. 18 Oct.

2012.

This piece esteems the “casual nonchalance” with which Frank Stanton announces the Cartrivision Cartridge TV system, suddenly “[making] it a serious contender in the Cartridge TV race.” An advertising-style photograph portrays a man using the Cartrivision camera to record his attractive wife and lovely daughter playing chess as the image of the wife is simultaneously broadcast on the Cartrivision television behind them. It announces the combination player/19” unit with a mid-1971 release date and \$895 price tag. Admiral Corp., Chicago, is named as a company that will provide electronic components. It also announces the camera addition at \$200 and future standalone players for a projected \$400 to \$500. Finally, it describes the following prices: \$9.98 for 15-minute, \$12.98 for 30-minute, \$16.98 for 60-minute and \$24.98 for 120-minute. Rentals are named at \$3.

Perry, Luke. The Cartrivision Site – A unique way of looking at things. n.d. Web.

Oct. 2012.

Luke Perry's website is the ultimate hobbyist tribute to Cartrivision. It contains a historical overview, basic hardware and operation information, movie clips of a working unit, footage and remenicensens from engineer Peter Berg and his colleagues, along with pictures, advertising, documentation and other ephemera. Though much information can ultimately be found elsewhere, it is absolutely the best one-stop overview and clearly a labor of love.

Radcliffe, J. O. E. "Tape CARtridge: Cartrivision seen Home Eye-Opener

Programs." *Billboard* (Archive: 1963-2000) Jul 04 1970: 28-. Entertainment Industry Magazine Archive. Web. 11 Oct. 2012.

This pieces cruxes upon an interview with programming V.P. Sam Gelfman. His comments are along the same lines of Schoenfeld piece (cited below), albeit somewhat less colorful. However this piece does establish that United Artists was the first content provider to sign on for Cartrivision.

Reveaux, Anthony. "New Technologies for the Demystification of Cinema." *Film*

Quarterly: 27.1 (1973): 42-51. JSTOR. Web. 11 Oct. 2012.

Reveaux's piece, from a quite unabashedly discerning-cinephile-oriented position, provides perhaps the most serious, sustained analysis of Cartrivision's system. His piece, which seeks to ultimately contemplate how consumer home video technologies will advance cinema studies, primarily contrasts Cartrivision, which Reveaux actually views and mostly despises, with a gushing analysis of the theoretical capabilities of MCA's Disco-Vision videodisc system, which receives much higher marks primarily for its higher resolution, ability to freeze-frame and offer multiple discreet audio tracks. Finally, he concludes by describing how home video technology will usher in a new era of visual consciousness to be usurped by children weened on three-dimensional holographic imagery, whom he earnestly hopes will still take time to revisit "the old 'flatties.'"

Schoenfeld, Hern. "NATO Convention: AVCO'S GELFMAN: ALL ROADS OPEN."

Variety (Archive: 1905-2000) Nov 04 1970: 5-. Entertainment Industry Magazine Archive. Web. 18 Oct. 2012.

This piece is notable primarily for Gelfman's bold pronouncements about the future of Cartrivision as the future of art and western culture, which are quoted above.

Skala, Martin. "Demand Appears High for First Video-Tape Offering." *The Christian Science Monitor* (1908-Current file): 14. May 01 1971. ProQuest Historical Newspapers: The Christian Science Monitor (1908-1999). Web. 18 Oct. 2012.

This provides an overview of CTV's IPO and a generous forecast of the company's financial future.

Smith, Gene. "Electronics show Tunes in to TV Tape." *New York Times* (1923-Current file): 59. Jun 30 1970. ProQuest Historical Newspapers: The New York Times (1851-2009) with Index (1851-1993). Web. 18 Oct. 2012.

Cartrivision is the star of this article, which covers the New York Electronics show. The article also briefly mentions the unseemly robbery of the Hitachi Sales Corporation's exhibition.

"Television On A Disk." *Time* 100.12 (1972): 100. Academic Search Complete. Web. 18 Oct. 2012.

This article describes the price of Cartrivision as \$1,350 relative to U-matic's \$1,395. This price is used as a frame of reference for the anticipated low cost of the article's real focus: N.V. Philips' Gloeilampenfabrieken, a 12" laser disc player that was to retail for \$400 to \$500.

"VIDEO CASSETTES: Key Specs on Video Cassette Systems." *Variety* (Archive: 1905-2000) May 05 1971: 31-. Entertainment Industry Magazine Archive. Web. 18 Oct. 2012.

This informative chart offers fairly technical specifications on different companies' video technologies: CBS's EVR, Sony's Videocassette, Ampex Instavideo, Avco Cartrivision, Philips VCR and Teldec's Videodisc.