TAPE CARTRIDGE MACHINE HISTORY
Jack Mullen, US Signal Corps, was stationed in England and working at night and monitored German radio in early AM and puzzled by excellent audio quality.
- Mullen was moved to France to examine everything electronic captured from the Germans.
- Found German Magnetaphons (tape recorders) but the audio quality was poor.
Mullen was dispatched to Frankfurt to look for source of radio interference
Made a side trip to Radio Frankfurt, got a Magnetaphon demo and was bowled over by the excellent audio quality
Photographed the IM’s and schematics and discovered the secret ingredient: High Frequency AC Bias
1945

- Mullen “liberated” **two** Magnetaphons
- Shipped transports (piece by piece) along with 50 reels of tape to his home in San Francisco
- 30 IPS
Mullen built his own electronics and added pre-emphasis to improve the frequency response

Road Show to L.A.
Jack Mullin (left) showed his modified Magnetaphons to Murdo McKenzie, Bing Crosby's technical producer - and also to Alexander M. Poniatoff (Initials AMP–)
Bing Crosby hired Mullen to record and edit his radio show.

More machines were required for editing.

Mullen’s Magnetaphons were replicated and became the AMPex Model 200.
Presenting the new

Ampex Magnetic Tape Recorder

The great new unit that put the Crosby show on tape
Revolutionized the broadcasting and recording industries.

Reel-to-Reel machines well suited for long, discrete programs of 40’s – the half-hour and hour long radio shows.
A new type of music is sweeping the nation

Rock-and-Roll (räk'n roll') n. first s used (1951) by Alan Freed, Cleveland disc jockey, taken from the song "My Baby Rocks Me with a Steady Roll"
New type of radio emerged – “Top 40”

Combo operators were very busy playing fast-paced, short, recorded segments.

They could hardly keep up, and you might say, “There was a whole lot of shaking going on”
Moullic Specialties building Background Music Machines using endless-loop tape cartridges invented by George Eash at Cuisino.
1950’s

50th Anniversary
Broadcast Tape Cart Machine

Moulic Background Music Machine
WJBC Manager, Verne Nolte bought one
Nolte wonders if it can be adapted to record and play commercials & jingles
Nolte consults with Engineers Fred L. “Ted” Bailey John P. “Jack” Jenkins
Bailey & Jenkins came up with the concept and built three prototypes at WJBC transmitter site
Viking decks with belt-drive motors

7 ½ IPS Speed for professional audio quality

Gear motors (rotary solenoids) for full-swing Pressure Roller Control (slow)

1 KHz “cue tone” (because Bailey happened to have some 1 KHz oscillators on hand)
Machines went into use at WJBC

Shown at Illinois Broadcasters Convention in October, 1958

Automatic Tape Control was created – No Manufacturing & No Marketing Capability
Bailey & Jenkins take concept to Gates Radio Company

Parker Gates revealed Gates ST-101 – expected to revolutionize broadcasting

Return to B-N somewhat dejected

Prototypes go to WIZZ in Streator, IL.

Machines shown to Collins salesman
January, 1959 – John Haerle, Collins Sales Manager, called for appointment

Flew to Bloomington from Cedar Rapids, got a demonstration, and signed a marketing agreement over lunch

Plans set for introduction at 1959 NAB
Moullic Specialties assembled machines with Viking decks and a Big Linear Solenoid - full-swing pressure roller

ATC built modular, tube electronics

Collins Radio built cases – no ventilation

Machines & Cases arrived in Chicago
Machines overheat & diode problem discovered the day before NAB opened

Crew worked all night replacing diodes

1959 NAB Convention opened at the Conrad Hilton Hotel in Chicago

The Collins/ATC “P” Series Cartridge Machine were the hit of the show
- Generated more than $100,000 in sales to 45 radio stations.
- ATC was faced with a small problem – How to Fill the Orders!
- Claim to “first cart machine” is disputed, but it seems safe to say that ATC had the first commercially available cart machine.
Simultaneously Ross Beville, of WWDC was working on the Spotmaster

Shown at D.C. area audio/hi-fi show in fall of 1958
Beville was unaware of ATC machine until 1959 NAB Convention

Broadcast Electronics chartered in June, 1959 to manufacture and market Spotmaster.
• Beefed up Viking Deck with Belt-Drive Motor
• 850 Hz cue tone - changed to 1 KHz after approximately 50 units
• Slightly different head configuration
• Manual Lever to bring pressure roller into the cartridge & smaller solenoid to engage tape
Transistor Playback & Tube Recorder
First production model sold to WQSN in Charleston, South Carolina
Austin Knox, engineer & Jack Neff, sales
Mackinzie 5CPB Program Repeater (1959) – Record on Reel-to-Reel, wind into magazine, splice, paint reflective stripe at beginning.

Gates ST-101 (1959) - used 13-inch wide tape belt, 101 cuts, 90 second maximum length, 8 KHz upper audio limit.

Schafer Spotter (1959) modified reel-to-reel machine with photo sensors to count 99 windows in tape to cue proper cut.
RCA Magnetic Disc Recorder (1959) used disks (size of a 45 RPM record) with spiral grooves. Ran at 33 1/3 RPM and could be cued manually or automatically in a changer.

Ampex AG-100 Cue-Matic (1965) used 11 3/4” circular magnetic mats “for announcements and other program material by radio stations”

This may have been the first floppy disk
Early Competing Cartridge Machines:

- ATC/Collins “P & PB Series”
- ATC PC & Criterion
1960’s

Early Competing Cartridge Machines:

- Spotmaster
- Collins 642
Early Competing Cartridge Machines:

- Gates
- Moulic, MaCarta, Sono-Mag
Early Competing Cartridge Machines:

- RCA (Ampro)
1960’s

50th Anniversary
Broadcast Tape Cart Machine

Early Competing Cartridge Machines:

- Sparta - Bill Overhouser
1960’s

Early Competing Cartridge Machines:

- Tapecaster – Paul Shore
WLS started all cart with the format change from Prairie Farmer in the late 50's. They were using P-series ATC hardware and the Cart Machine was a prime motivator for ABC because it minimized the Musicians Union Record Turner. Fred Zellner was the chief at KQV Pittsburg and later at WLS and was the prime instigator of the cart revolution. (check the ABC archives for dates)

WCFL had some early RCA machines (with the big button in the middle) that came with the RCA build-out in the early 60's. I started there on November 1, 1965 and my first function was to edit "Turn Turn Turn" by the Turtles and put it on a cart. Within 60 days George Stephenson had installed ATC machines and from then on everything was on cart.

Many markets were suspicious of carts when P series were the only choice and committed only spots to cart, but the later direct drive ATC's made it a lot safer to commit music to cart.

In Chicago, WLS and Zellner provided the impetus to go cart for the rest of the market. Zellner had gone on to New York by the time I got to Chicago.

It's a wonder I can remember this stuff. Actually, the memories are very vivid.

Jim
Meanwhile, back in Bloomington-Normal

Moulic Specialties built the first 2,100 P Series Machines for Collins/ATC

ATC came up with the PB Series with a cast aluminum deck and different solenoid linkage assembly – Built by TRW and sold by Collins
Moulic starts selling their own cart machines under the MaCarta logo.

Collins and ATC split

Collins introduces their 642A Cart Machines
Starts manufacturing and marketing their products on the third floor of the Castle Theater building above the WJBC Studios.

Introduces the PC Series – essentially the PB Series with a secondary cue tone

Launches the ATC 55 that plays 55 cartridges in sequence

Introduces a line of Program Automation Systems
50th Anniversary
Broadcast Tape Cart Machine

[Image of a broadcast tape cart machine with a woman operating it]

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MOULIC - EARLY 60’S

- Changed name to Sono-Mag Corp
- Introduced the Carousel 24-Cart sequential player (later to become a bi-directional and random access machine.)
- Offers a line of program automation systems.
1964 ATC’s Jack Jenkins started working with Preston Weaver at Beau Motors on a direct-drive, inside-out (rotor on outside) motor – Jenkins insisted on 450 RPM for maximum tape contact

1965 ATC introduced the Criterion Series using the direct-drive motor, stereo, transistorized electronics, and the PB/PC cast deck and solenoid linkage (a bit complex)
1966 Automatic Tape Control was sold to the Gates Radio Div. of Harris Corporation. Harris seemed to be primarily interested in program automation.
Time for a little cart machine maintenance

ATC’s Dave Wolfenden creates the Hippy Dippy Test Tape
LATE 60'S

- 1969 Harris announced that ATC would be moved to Quincy, Illinois
- Franklin, Jenkins, Rector, and Wilson left to start International Tapetronics Corporation (ITC)
ITC introduced the Premium Line of Cart Machines – the SP, RP, and 3D Series
New, simplified solenoid linkage assembly – great success
450 RPM, Direct-Drive Motors – Proven
Used pressure roller with nylon bearing – bad news

ITC got permission to use Collins pressure roller tooling Minnesota Rubber Co
Merle Wilson built a special tool to replace pressure roller shaft. Success!
ITC used a direct sales approach – very successful
Plough Broadcasting becomes first major customer
LATE 60’S

- ITC started selling 220 Volt, 50 Hz machines in Great Britain and the motors started over heating
- ITC starts looking for a new motor supplier
- ITC introduced the Encore Series – a near disaster
Carl Martin, design engineer, broke away from ITC and starts Audi-Cord Corporation.

Martin was probably the only full-time employee of all four B-N cart machine manufacturers.

Audi-Cord introduced a new line of less expensive machines with 600 RPM motor.
1979 ITC introduced the Series 99, a micro-processor based machine with auto azimuth alignment, built-in tape eraser, servo-motor control,
Pacific Recorders & Engineering (PRE) introduced the Tom Cat cart machines with an innovative mono/stereo compatible head design – an impressive machine.

January 1, 1982 ITC is sold to 3M Company.

3M introduced a new line of Scotch Carts.
LATE 70’S – EARLY 80’S

- Beau Motors introduced the Beau Cart
- Fidelipac introduced the Dynamax machines
- 3M/ITC launched the Delta Series
Mid 80’s – Digital Audio starts to appear
1990 3M sells ITC to Canadian investors
1991 Carl Martin sells Audi-Cord to Andy Rector
1999 Essentially the end of the Cartridge Era
40 years after the 1959 introduction
That’s a quick History of the Broadcast Tape Cartridge Machine

Thanks for your time and interest!
CREDITS

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