The DYNAMAX CTR10 incorporates the same rugged, reliable tape transport Fidelipac developed for its top-of-the-line CTR100 Series. A unique 4-point cartridge hold-down system assures repeatable cartridge positioning. And the geometrically correct head assembly makes head alignment easy and precise.

The DYNAMAX CTR100 Series Cartridge Machines

The CTR100 Series offers features no other tape cartridge machines provide. The CTR100 is the machine by which all others must be judged.

Among the outstanding features the CTR100 offers are our exclusive CARTSCAN System, which allows the operator to intermix cartridges recorded in various audio formats. The system also provides an auxiliary output to activate equipment such as a Dolby® encoder or decoder.

Vary Speed allows the operator to continuously vary the motor speed, yet maintain cue tone tracking.

A real time digital tape counter displays total elapsed time, regardless of tape speed.

Literature detailing all the features and specifications of this, the most outstanding of all tape cartridge machines, is available from your Fidelipac Distributor. Or you may obtain a CTR100 brochure by contacting us directly.

DYNAMAX®
BROADCAST PRODUCTS BY FIDELIPAC®

Fidelipac Corporation
P.O. Box 808
Moorestown, NJ 08057 U.S.A.
609-235-3900
TELEX: 710-897-0254
Toll Free 800-HOT TAPE

Specifications may be subject to change without prior notification by Fidelipac Corp.

DYNAMAX®

DYNAMAX CTR10 Series
DYNAMAX ESD10 Eraser/Splice Detector

The DYNAMAX CTR10 Series

Here is the first step in the evolution of the revolutionary DYNAMAX CTR100 Series of Tape Cartridge Machines introduced by Fidelipac in 1984.

The DYNAMAX CTR10 Series of cartridge players and recorders features all of the mechanical advances introduced in the DYNAMAX CTR100 Series, and all but the most esoteric electronic features, as well. The desirability and merit of these advances have been proven in broadcast studios across the nation.

With the advent of the DYNAMAX CTR10 Series, studios will be able to replace older equipment, in a most cost effective way, and meet the critical demands of engineers, programmers and listeners. And do it because the advanced features of the DYNAMAX CTR10 are all standard, not extra cost options.

The CTR10 Series includes both Mono and Stereo units, with secondary (150Hz) and tertiary (8kHz) cue tones. There is also a Fast Forward mode, which can be used manually or controlled automatically by the secondary cue tone.

The head nest arrangement of the CTR10 allows geometrically correct azimuth adjustment—independent of height and zenith. And like the CTR100, the new CTR10 incorporates a unique audio switcher and a mixer. Features never before found at such a low price.

A benefit of the audio switcher is that it allows you to run a number of cartridge machines into a single console input with no increase in noise or loss of quality.

Unique cartridge hold-down system.
The DYNAMAX hold-down system consists of four rubber "tires", which hold the edges of the cartridge. This method provides firm support for the cartridge and eliminates the possibility of deforming the cartridge, which can occur when center-mounted hold-down springs are used.

Fast Forward.
Fast Forward can be activated manually from any other mode. Or it may be initiated automatically by either the leading or trailing edge of the 150Hz cue tone. Audio is usually muted during Fast Forward operation. However, audio can be unmuted by holding in the Fast Forward button.

Cart played indicator.
A flashing stop lamp indicates that the cartridge in the machine has already been played and re-cued. It also flashes if the cart has been stopped manually. Provision has also been made, within the CTR10, for the installation of a jumper which will prevent a cart from being replayed accidentally.

Metering functions.
Metering on the new CTR10 units is complete. Two automatic audio modes selectively display audio input or output. Program bias, cue tone levels and cue bias are readily available at the touch of a switch.

Cleaning Switch.
Cleaning the pressure roller is easy. And can even be accomplished when the machines are stacked, and top access is not feasible. The cleaning switch activates the pressure roller without the need to insert a cartridge. Operation without a cartridge in place also facilitates set up, diagnostics and measurement.

The following features are standard on the DYNAMAX CTR10 Series:

Operational
- Fast forward
- Secondary and tertiary cue tones
- Audio switcher and mixer
- Flashing cart played indicator
- Strappable repeat play disable
- 150 Hz control of audio muting
- Selectable high speed recue
- All front panel switches illuminated
- Ultra-long life front panel indicators
- Front panel 1 kHz defeat with dedicated indicator
- Versatile, switch-selectable audio/test metering
- Bar graph LED VU meters

Mechanical
- Compact size: ⅓ rack width
- ½ inch anodized aluminum deck plate
- Removable head nest with precision reference surfaces
- Geometrically correct azimuth adjustment, independent of height and zenith
- Reliable four point cartridge hold-down system
- Low voltage air damped solenoid
- Self aligning ball bearing pressure roller
- Micro-adjustable tape guides
- Convenient pressure roller cleaning switch
- Long-life premium quality switches with bifurcated wiping contacts
- Polycarbonate legend overlay panels for durability and ease of cleaning
- Detachable line cord

Electrical
- State-of-the-art audio performance
- Transformerless audio inputs and outputs
- High performance heads for flat low frequency response and long life
- Active bias and signal mixing
- True constant current recording
- Fully regulated DC power supplies
- Complete remote control
- Component designations silkscreened on all circuit boards

DYNAMAX CTR10 Specifications:

1. **Power**
   A. 117 VAC ± 10%
   B. 60 Hz
   C. Other voltages and frequencies on request
   D. 70 VA maximum
2. **Tape Speed**
   A. 7.5 ips (19 cm/s)
   B. High speed recue at 22.5 ips (57 cm/s)
3. **Capstan Motor Drive System**
   A. Direct drive capstan
   B. AC hysteresis synchronous motor
   C. Electrolyzed stainless-steel non-magnetic capstan
   D. Permanently lubricated ball-bearings
4. **Wow and Flutter**
   0.12% DIN WTD maximum at 7.5 ips
5. **Speed Accuracy**
   Better than ± 0.2%
6. **Audio Output and Source Impedance**
   Differentially balanced, source impedance 440Ω; RF bypassed
7. **Audio Output Level**
   +20 dBm into 600Ω before clipping
8. **Distortion**
   A. Reproduce amplifier: 0.1% or less THD max at +18 dB above 250 nWb/m
   B. System distortion (tape limited): 1.0% or less THD; 0.5% or less 2nd or 3rd harmonic, 1 kHz at 250 nWb/m
9. **Noise**
   A. S/N measured with bias/no signal at 7.5 ips
   Mono – 57 dB (or better)
   Stereo–55 dB (or better)
   B. Hum and Noise—no tape running
   Mono–60 dB (or better)
   Stereo–58 dB (or better)
   C. Squelch noise–70 dB (or better)
   D. Noise measured over a 20-20 kHz bandwidth reference 250 nWb/m at 1 kHz
10. **Crosstalk**
    50 dB minimum separation between program channels at 1 kHz
11. **Frequency Response**
    ±2 dB from 50 Hz-16 kHz
12. **Equalization**
    A. 1975 NAB EQ standard
    B. IEC EQ on request (pot adjustment)
    C. Field strappable for 1964 NAB EQ
    D. Adjustable low and high frequency playback EQ
    E. Adjustable high frequency record EQ
13. **Head Configuration**
    NAB, mono/stereo
14. **Cue Signals**
    A. NAB primary cue 1 kHz
    B. NAB secondary cue 150 Hz with front panel indicator
    C. NAB tertiary cue 8 kHz with front panel indicator
    D. Normally open relay contacts available for secondary and tertiary cue detection
15. **Logging Signals**
    A. Not internal to machine
    B. Cue audio input, cue audio output and cue bias available via remote control connector
    C. Output level 0.5V nominal from a logging signal of 35 nWb/m tape fluxivity
    D. Logging output impedance 1kΩ
    E. Cue audio input 0.5V nominal
    F. Input impedance 47kΩ
16. **Audio Input Level**
    A. –17 dBm minimum
    B. +20 dBm maximum
17. **Audio Input Configuration**
    Differentially balanced bridging 10kΩ
18. **Metering**
    A. Audio metering, switch selectable
       1. Auto 1—monitors record input level when machine is in RECORD mode, automatically switches to output level at all other times
       2. Auto 2—monitors record input level when machine is in RECORD and STOP (ready) mode, automatically switches to output level at all other times
    B. Test Metering
       1. Bias—left program bias displayed on left meter; right program bias displayed on right meter
       2. Cue—Cue bias displayed on left meter; cue audio displayed on right meter
19. **Bias Oscillator**
    120 kHz
20. **Tape Capacity**
    NAB sizes A and AA
21. **Start Time**
    100 ms typical (dependant upon solenoid air damping adjustment)
22. **Stop Time**
    100 ms typical (dependant on type and length of cartridge)
23. **Ambient Operating Temperature**
    10-50° C (50° to 122° F)
24. **Remote Control Signals**
    A. All front panel switches and indicators (except input level controls and VU meters)
    B. Cue track input, output, and bias control
    C. Automation Ready, Audio Switcher Interlock
25. **External Connectors**
    A. Audio—9 pin "D"
    B. Remote Control—50 pin "D"
    C. Plug-in line cord with IEC type connector
    D. All mating connectors supplied
26. **Mounting**
    A. Table top
    B. Rack mount (requires optional mounting hardware)
27. **Dimensions**
    A. 5.625"H × 6"W × 16"D
    (14.29cm × 15.24cm × 40.64 cm)
    B. Rack mount requires only 3 rack units
    (5.25"/13.34cm)
28. **Shipping Information**
    A. Weight—32 pounds (14.5 kg)
    B. Volume—1.4 cubic feet (.04 cubic meters)

The DYNAMAX ESD10

Reliable splice detection and deep cart erasure, for flawless sound reproduction.

The high levels of sound quality which engineers and programmers strive for is often compromised before broadcast material is transferred to tape cartridges. It happens in the process of erasing the cartridges.

The DYNAMAX ESD10 will consistently—measurably—outperform any other eraser/splice locater on the market. It will, in fact, provide erasures that are virtually as clean as those achieved by the best belt driven erasers.

Hand held and desk top erasers can be effective. But, that effectiveness is severely limited by the skill and care of the operator, and the attention paid to properly erasing the cartridge.

Our engineering staff simply does not believe that the erase function belongs in a cartridge machine. In fact, this configuration compromises both the erasure and machine performance.

Erase depth of 75 dB assured.
The DYNAMAX ESD10 borrows from, and improves upon, the technology used in high quality reel-to-reel recorders, and achieves an erase depth of 75 dB, or more. The result is a significant improvement in the signal-to-noise ratio, and on-air sound beyond anything you might have thought possible.

Dual Erase Heads.
The DYNAMAX ESD10 design uses dual, high-quality erase heads, not a coil located below the deck. Huge coils exert forces opposing movement of the tape. And these stresses measurably shorten the life of the cartridge. Coils also draw huge amounts of power and generate excessive heat. All of that is eliminated by our dual erase head configuration.

Reliable, automatic splice detection.
When program material is recorded over a splice, a severe dropout can occur. Cue track material is also disrupted and that causes false cueing, and/or logging errors.

Splice location, therefore, is very important. But, it is also a time consuming operation when performed manually, an operation busy studios can ill-afford.

Til now, even automatic splice detection machines have had drawbacks. They were often unreliable and required constant adjustment.

Sensitivity adjustments eliminated.
The DYNAMAX ESD10 uses a patented splice find system—a system developed for the DYNAMAX CTR100 Series Recorders—and as a result, the ESD10 requires no sensitivity adjustments whatsoever.

The DYNAMAX ESD10 is, quite simply, the most reliable splice detector ever built. It is available in an attractive desk mount cabinet, or may be rack mounted, alone, or in combination with DYNAMAX cartridge machines.

DYNAMAX ESD10 Specifications:

Power
A. 117VAC ±10%/234 VAC ±10%
B. 50/60 Hz.
C. 50 Watts maximum

Tape Speed
A. 27.5 IPS nominal

Splice Density
A. Detects splicing tape of ½ mil or greater thickness

Erase Depth
A. 75 dB or better, below tape saturation at 1 kHz using Master Cart II

Tape Capacity
A. NAB size A and AA Cartridges

Ambient Temperature
A. 10-50° C (50° to 122° F)

Mounting
A. Tabletop
B. Rackmount (Requires optional mounting hardware)

Dimensions
A. 5.625" H × 6" W × 16" D
(14.29 cm × 15.24 cm × 40.64 cm)
B. Rackmount requires only three rack units
(5.25"/13.34 cm)

Weight
A. 17 lbs. (7.7 kg.)

Fidelipac CTR-100

By Mike Callaghan

When upgrading a radio facility, selecting the type of cart machines to be used in the plant is a major decision. A mistake can result in years of unhappiness, excessive maintenance costs and exasperation to the air staff. In fact, there are few mistakes a radio engineer can make that are more grievous than selecting the wrong cart machines. So much depends on them. For this reason, at our station, we required that the machines we tested and found unacceptable could be returned.

A variety of machines were evaluated. Some of them were rejected for technical reasons. Some machines were hard to repair, and some were voted down because they were hard for our staff to operate. After the tests were finished, we selected the new Fidelipac CTR-100 Dynamax series.

Front panel

The CTR-100 is attractive, featuring a gray case with a black-out front panel using backlighted legends and multicolored push-button controls. Front-panel annunciators show the status of the *Cartscan* system, audio muting, secondary and tertiary tones, and capstan servo. (For more information on the Cartscan system, see the accompanying sidebar.) All the indicators use long-life incandescent lamps, and are easily changed.

Internal switches select four different display modes for the VU meters:

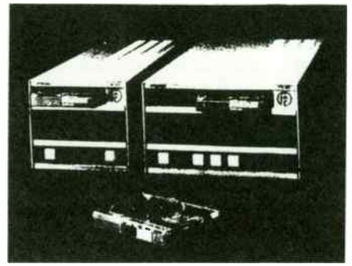
- playback levels;
- record levels;
- input levels when the machine is in record mode, and playback levels at other times; and
- input levels when the machine is in the record or stop mode, and playback levels at other times.

The machine also has a real time counter showing elapsed time in minutes and seconds. The timer is locked to the servo motor, and is accurate even during high-speed recue. When the stop tone defeat is used, the timer reset is inhibited, so the timer always shows correct elapsed time between cue tones on the cart.

High-speed recue can be defeated, initiated manually, or started by the beginning or the end of the 150Hz secondary cue. Audio is usually muted during fast forward, but may be unmuted with the fast-forward button.

The *audio switcher interlock* inhibits double audio output if two or more machines share a single console input. The feature permits only the audio from the last machine started to go on the air. The front-panel audio annunciator shows which machine is active.

Callaghan is chief engineer for KIIS-FM, Los Angeles.



Transport

The deckplate is constructed of heavy aluminum and provides a unique way of holding the cart in place. As a cart is inserted, four canted rubber rollers grasp the top edges of the cart and pull it against the right guide, where it is securely held. This process effectively reduces the problem of carts not being properly inserted.

Performance at a glance

- *Cartscan system allows automatic activation of optional features*
- *Three user-selectable tape speeds*
- *Wow and flutter 0.12% DIN weighted at 7.5ips*
- *Frequency response ±2dB 50Hz to 16kHz*
- *Signal-to-noise ratio −53dB stereo, −55dB monaural*
- *Stereo crosstalk 50dB minimum at 1kHz*
- *Distortion 1.0% THD maximum at 1kHz*

Pushing a cart into this machine gives you a feeling of confidence; the cart is firmly guided into proper playing position, and seats firmly against the head block. It will go in the same way regardless of how many times it is inserted.

On some machines, the cart guide screws are also used to stop the cart as it slides into the transport. The heads of these screws can eventually wear the plastic face of the cart and the resulting dents can upset the repeatability of the insertion. The CTR-100 has a smooth-faced head block to stop the cart. No abrasion takes place, and cart-seating and location are consistent.

The head block is a solid 3-piece casting and allows independent fine adjustment of height, azimuth and zenith for both playback and record heads. The block can be removed and replaced without upsetting the head alignments. The tape guides are glass-filled epoxy, and their height is adjusted with self-locking vernier setscrews.

The solenoid is driven by a constant current source. The voltage across the solenoid is sampled for the splice-find feature. As the splice passes between the pressure roller and the capstan, the components are pushed apart, producing a change in the solenoid voltage. This change is amplified and used to stop the machine. It is a simple system and requires no mechanical additions.

Electronics

The record and playback electronics use state-of-the-art op-amps. The deck produces +20dBm into 600Ω without clipping with differentially balanced ICs. The tone-detector circuit provides open collector outputs. Relay contacts are available as an option. If the variable playback speed feature is used, the tone sensors will continue to properly track over the ±30% speed window.

The secondary cue tone feature may be strapped for operation in a number of modes:

- the beginning or the end of the tone will put the deck into fast forward;
- the beginning or the end of the tone will mute the audio; or
- on the recorder, the beginning or end of the tone may be used to *freeze* the tape timer.

The electronics motherboard supports three high-density cards for the playback unit and five cards for the recorder. This architecture eliminates the need for a wiring harness. The cards are mounted in a shielded housing to reduce hum. The access cover can be removed without using tools.

Audio is coupled through 9-pin D-connectors, which fasten directly to the appropriate circuit cards through back panel cutouts. Screws secure the cables to the circuit cards. You must unscrew and remove these connectors to lift out the record and playback cards.

Playback-equalization adjustments are provided for both low and high frequencies. Two different sets of playback-level controls can be selected by one of the Cartscan sensors. This feature allows the use of both normal and elevated level carts. In the recorder, this sensor can also select the appropriate set of record EQ and bias adjustments.

Remote control connections are made through a 50-pin D-connector, and all but seven of the pins are used. All front-panel buttons and annunciators are available on this connector.

Capstan drive

The 3-phase dc capstan motor has a hardened stainless shaft and is servo-driven with Hall effect devices. Jumper wires inside the machine set the tape speed to 3.75, 7.5 or 15ips. If the need arises, the motor can also be sync-locked to an external reference and varied ±30% from the selected speed.

The variable cue-tone sensors are also tuned by the capstan-motor circuits. As the motor speed varies, so does the center frequency of the detectors. This design eliminates cuing problems when secondary tones go past the play head during fast forward.

If certain carts are to be played *up-tempo*, then the AUX output of the Cartscan system can be used to boost the tape speed on only those carts by switching in an external oscillator.

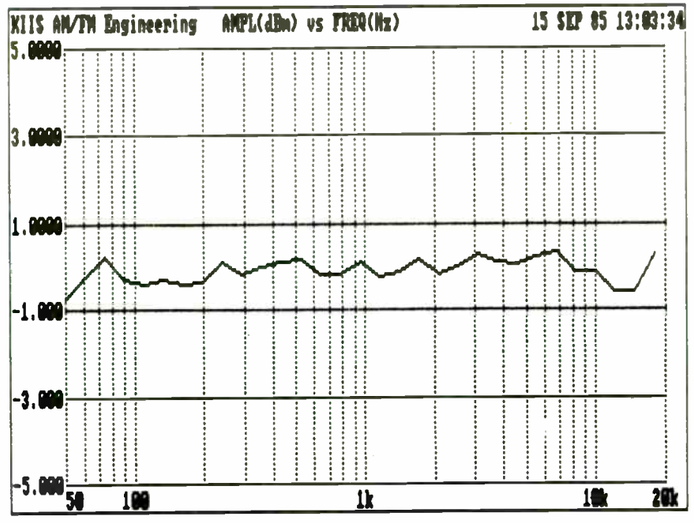


Figure 1. The record/playback frequency response of the CTR-100. The vertical axis is scaled in decibels; the horizontal axis in frequency.

The machine uses a servo reference frequency of 9,600Hz. Therefore, the deck may be locked to a video machine or other synchronizer. If the motor and reference become unlocked, a front-panel lamp indicates servo error.

Maintenance

Keeping these machines running is simple and easy. The built-in tone oscillator produces 12 different tones at 0VU and −10VU. The tones can be used for most of the EQ and bias adjustments.

The circuit boards are equipped with lever-type pulling handles for removal. The printed circuits are well labeled and extender boards are available. The IC's are all socket-mounted. Current, state-of-the-art devices are used in the audio circuitry, and the control logic uses CMOS technology. No microprocessor is used.

The manual is complete and easy to use. Large schematics are provided, in addition to circuit descriptions and a full set of assembly drawings.

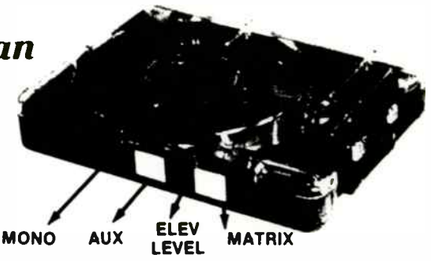
Performance

In terms of performance, the machines consistently meet their published specifications. The results of a series of frequency response and harmonic distortion tests are shown in Figures 1 and 2. All of the tests were conducted at 160nWb/m levels. We use this level because it provides extra headroom. The tests were conducted on a record/play machine from one of the newsrooms. The machine had been in use for about six months when the tests were made.

The CTR-100s have been readily accepted and appreciated by our air staff. The Cartscan system has been invaluable in airing mono newscasts and carts that need special encoding. The air staff doesn't have to designate special machines for news, traffic and weather. They can play any cart in any available machine. They accept the cart machines as a dependable piece of equipment, with no more and no fewer problems than they would expect from a reel machine, or any other hard-working piece of gear.

As a basic cart machine, the CTR-100 fulfills all the expectations I had for it. It's mechanically rugged, and the electronics are straightforward. The head assembly looks similar to what I would expect to find in a reel-to-reel unit. The machine is easy to service and the added features, such as Cartscan, make it that much more desirable.

The Cartscan system



The Cartscan feature allows the machine to automatically select several optional modes of operation. If any of the four options (mono, aux, elevated level or matrix) are needed, the special cart label must be used. The desired function is indicated by a reflective area in the appropriate position. If the infared light is reflected from the label, that function is selected within the machine. The advantage of this feature is that the machine will automatically select the proper operating conditions even when different cartridges are used.

The Cartscan system uses four infrared source/sensors mounted in the right cart guide. These sensors detect the presence or absence of four reflective areas on a sticker located on the side of the cart being used.

If the cart (see above) is equipped with these stickers, the sensors operate the appropriate circuitry in the machine to complete one of four functions:

- Mono: *In this mode the left channel will play back through both outputs in a playback deck, and the left and right inputs will be summed onto the left channel in a record machine.*
- Matrix: *If the machine is in stereo, this mode switches from discrete left and right audio channels to the* matrix system *where L+R goes on the upper track and L−R goes on the center track.*
- Elev Level: *This mode switches the machine from one set of internal bias, EQ and level settings to a second set. This feature enables the machine to use two different types of tape emulsions. This function is useful when making the transition from one type of tape or cart to another*
- Aux: *This sensor drives an open collector output that appears on the remote control connector. The feature can be used to enable external devices used with certain carts, such as dbx or Dolby decoders.*

An invert *switch is located inside the machine for each function. The feature allows the use of the different functions without requiring reflective stickers. Deleting the sticker in this mode turns the function on; putting the sticker on the cart turns it off. This feature would be useful, for example, in playing an entire cart library that has been dubbed in the matrix mode.*

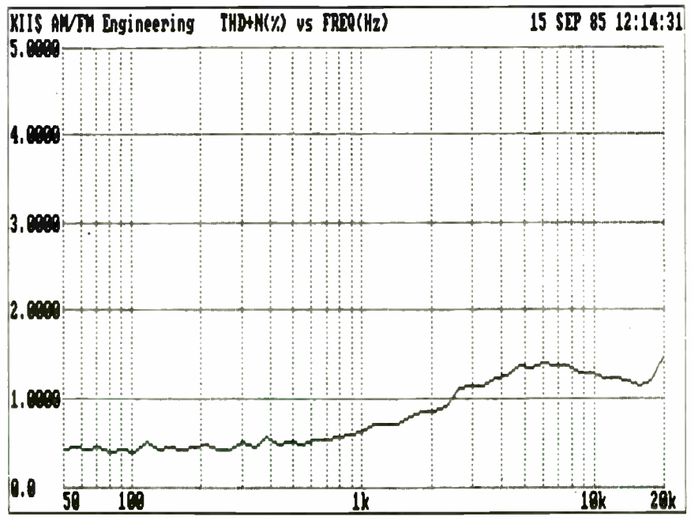


Figure 2. Total harmonic distortion plus noise from 50Hz to 20kHz. The vertical axis represents percent and the horizontal axis represents frequency.

Editor's note: The field report is an exclusive **BE** feature for broadcasters. Each report is prepared by the staff of a broadcast station, production facility or consulting firm.

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