

# “99B” SERIES



**“THE BEST”**

**From  
International Tapetronics Corporation/3M**



## THE "99B" SERIES AND YOU

Broadcast professionals who demand the best select the 99B series from International Tapetronics Corporation/3M. Loaded with features, the 99B series delights the most discriminating engineer, operator and listener. 99B cartridge machines embody the essence of ITC quality and reliability. If you desire both engineer and operator conveniences while providing crisp, clean and consistent sound for your listeners, your choice will invariably be the 99B series.

Central to the 99B series engineer and operator conveniences is the patented ELSA system, making the 99B cartridge machine the only one of its kind in the world. ELSA is an optional cartridge preparation

system that optimizes the audio performance of each and every cartridge. During the ELSA cycle, the cartridge is erased, the splice located and the record head automatically azimuth aligned for maximum phase response performance.

### The 99B series standard features include:

- Mono or stereo models.
- High speed cue.
- Jumper selectable cart played indication and replay inhibit features insure on-air integrity.
- Microprocessor control.
- Stop tone add and defeat, cue track erase.
- Simultaneous cue tone detection and generation.
- Multi-function test tone generator simplifies and reduces maintenance time.
- Front panel access to all controls.
- Multiple function meter selector with automatic meter switching between record and reproduce modes.
- Modular design with plug in subassemblies and P.C. cards.
- Sealed, multi-turn trimpots.

Additionally, the 99B series is covered by a bold, two year warranty. You also receive a detailed, comprehensive technical manual. All this reinforced by the finest, readily accessible technical service support group in the industry.

# ELSA MAKES THE "99B" CARTRIDGE MACHINE The Only One Of Its Kind In The World

Even cartridges from the same manufacturer are not exactly alike. A natural variance in plastics from cart to cart affects tape path, and ultimately, the audio performance of your station. ITC's solution to the problem is the ELSA system.

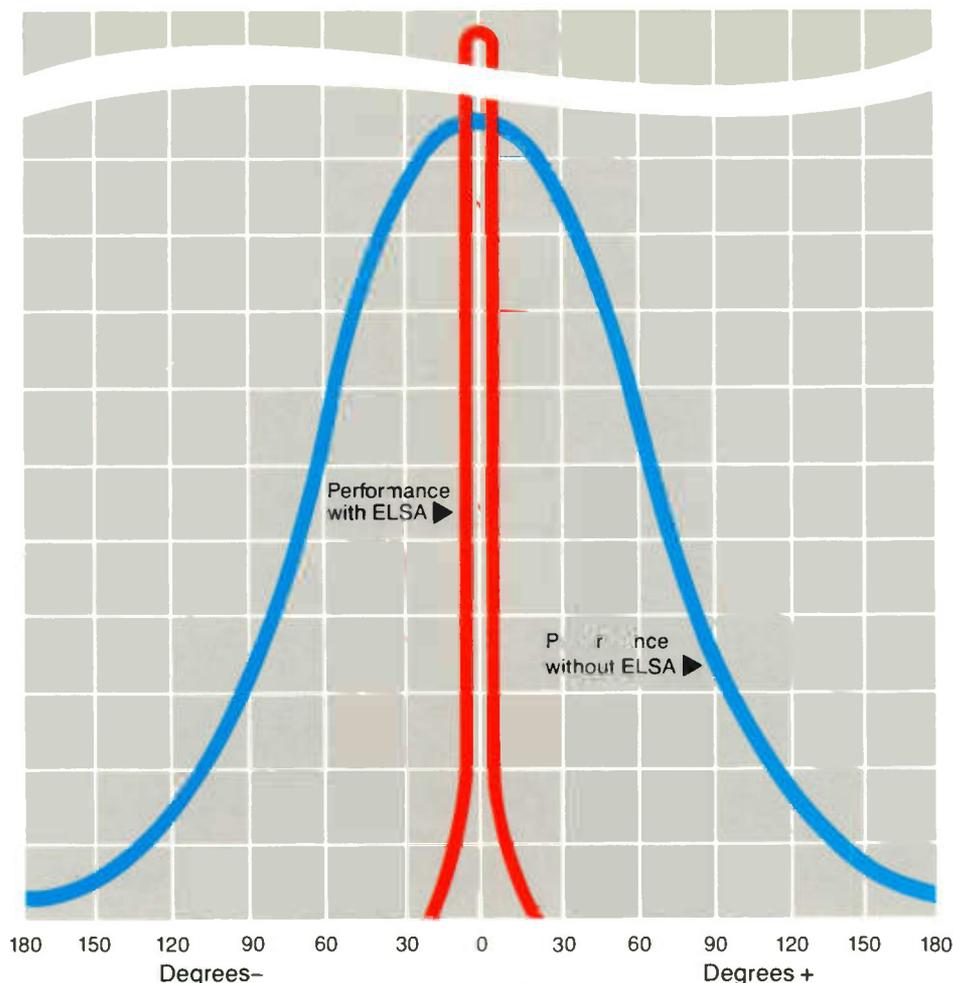
ELSA automatically phase adjusts the recording head to the tape for each and every cartridge recorded. This azimuth adjustment is accomplished by automatically recording a tone,

then evaluating and correcting for audio zero crossing errors between the two audio channels. Reference tone bursts are generated, recorded, reproduced and evaluated by a microprocessor. A small D.C. motor corrects phase errors by adjusting the record azimuth. This true phase evaluation and correction process is quick, consistent and highly reliable. This feature provides cart-to-cart

phase integrity in stereo, and insures a uniformity of either mono or stereo sound from cart-to-cart.

The ELSA system also includes bulk erasing and splice locating features. Using this system offers the operator the confidence of consistent tape cartridge preparation and the convenience of totally automatic operation.

## ELSA CORRECTS PHASING ERROR

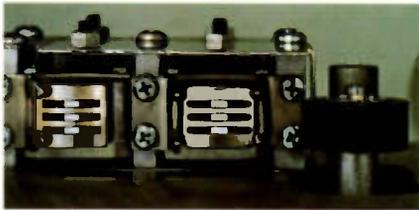


The blue line illustrates typical stereo phasing errors present in a random sample of current tape cartridges. The red line shows dramatically reduced phase error after using the automatic azimuth and tape preparation routine (ELSA).

# "99B" SERIES MECHANICAL AN

## Solid Reasons For Superior Performance

There are solid reasons, both mechanical and electronic, to support the truly superior performance of the 99B series.



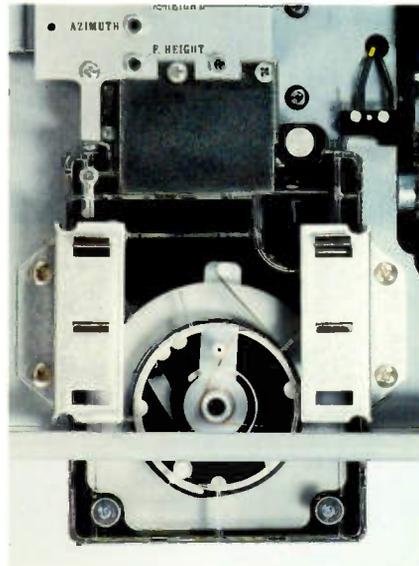
The 99B series is built on a strong foundation—the rugged deck that has become synonymous with ITC quality. ITC's deck is milled half inch thick, aluminum tool plate. It will not warp or groove like die casting, which may take years to stabilize. The deck plate is machined on computer controlled mills for absolute precision and uniformity. The deck is then anodized to harden the cartridge slide surfaces and to provide a durable, attractive finish. The heavy duty deck plate and heavy, cast aluminum housing provide exceptional rigidity in the 99B series.

## Crystal Referenced Servo Motor Reduces Wow And Flutter



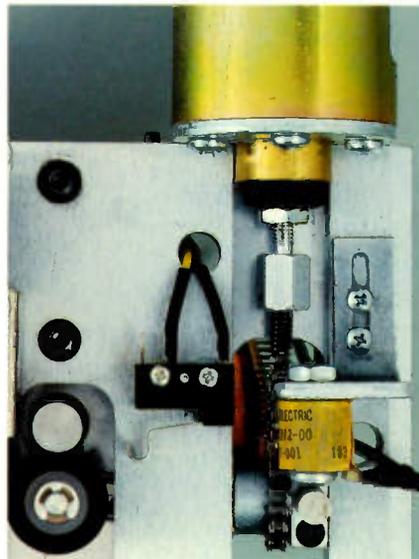
The 99B series uses a brushless DC servo capstan motor driven by a crystal referenced, phase frequency locked servo amplifier which reduces wow and flutter and provides long term stability.

## Distortion Free Cartridge Positioning System



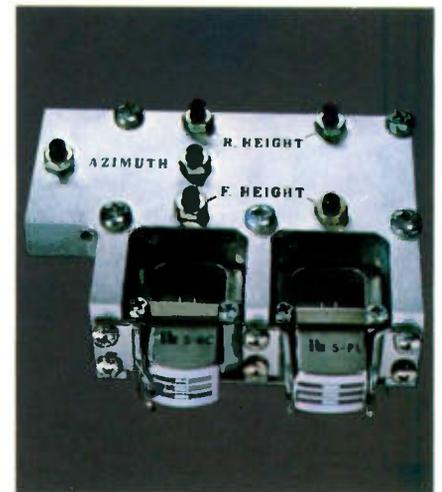
The 99B cartridge guidance system puts its pressure on the load-bearing outer rails of the cartridge. This holds the cartridge firmly in position and extremely flat, without distorting it or altering the tape path. A side pressure spring pushes the cartridge to the proper side location. This system assures precise alignment, even when cartridge insertion is hurried.

## Positive, True Positioning Solenoid Assures Quicker Release And Faster Stop Time



The positive positioning solenoid assures accurate, repeatable pressure roller pressure. Neither heat nor variations in line voltage will change pressure roller pressure thereby virtually eliminating skew induced phase errors. And, because solenoid voltage drops from 50 VDC to 18 VDC immediately after the cartridge starts, there is less magnetic field to collapse when it stops. This provides for a quicker release and a faster stop, with less than 12.7 mm (1/2 inch) of tape overshoot from the high speed cue mode.

## Patented Micro-Adjust Head Module For Precise Head Adjustment

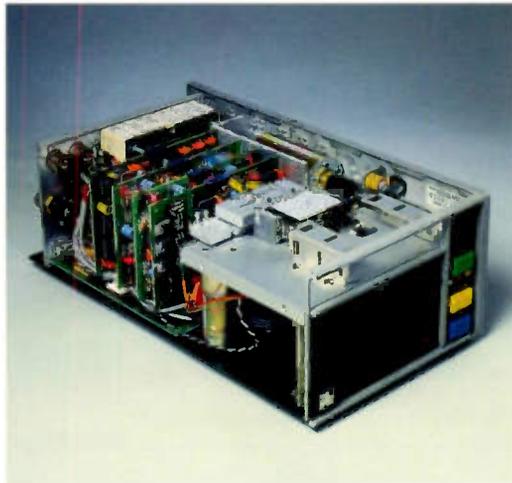


The true, center pivot head block module is designed with head rotational axis on the exact vertical and horizontal centerline of the heads. Height, zenith and azimuth adjustments are made independently of each other and have individual locks. Each adjustment pivots on a steel ball which, combined with a long azimuth arm, permits exact adjustments. The completely removable, micro-adjust head block can be preadjusted, removed for back-up storage, and reinstalled without further adjustment.

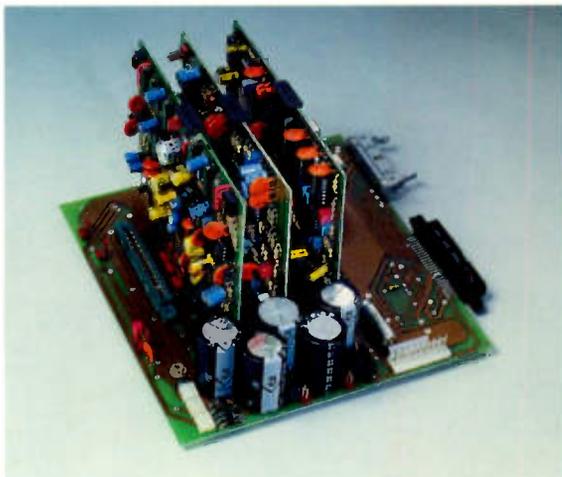
# D ELECTRONIC EXCELLENCE



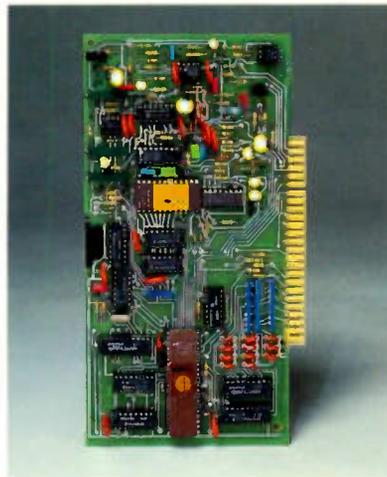
Plug in P.C. cards



Modular construction with easy to remove side panels



Mother board/daughter board construction



Microprocessor control

## Modular Construction

Modular construction, with plug in subassemblies and printed circuitry is used throughout. All PC cards plug into a mother board. Raised letters on each PC card pull identifies its function. The mother boards may be removed or replaced without soldering. Connections are all plug in.

Improved performance and reliability are achieved through the use of low noise BIFET OP amps, integrated circuit analog switches, high stability tantalum, and low leakage electrolytic capacitors. Bi-polar regulated power supplies are used for all critical amplifier circuitry. Serviceability is enhanced through the use of IC

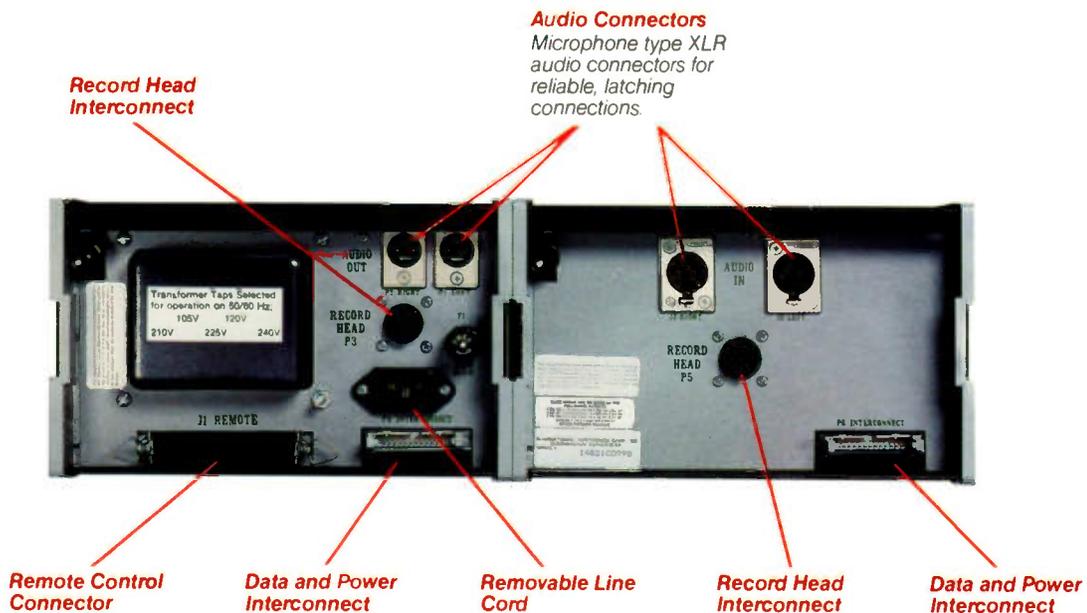
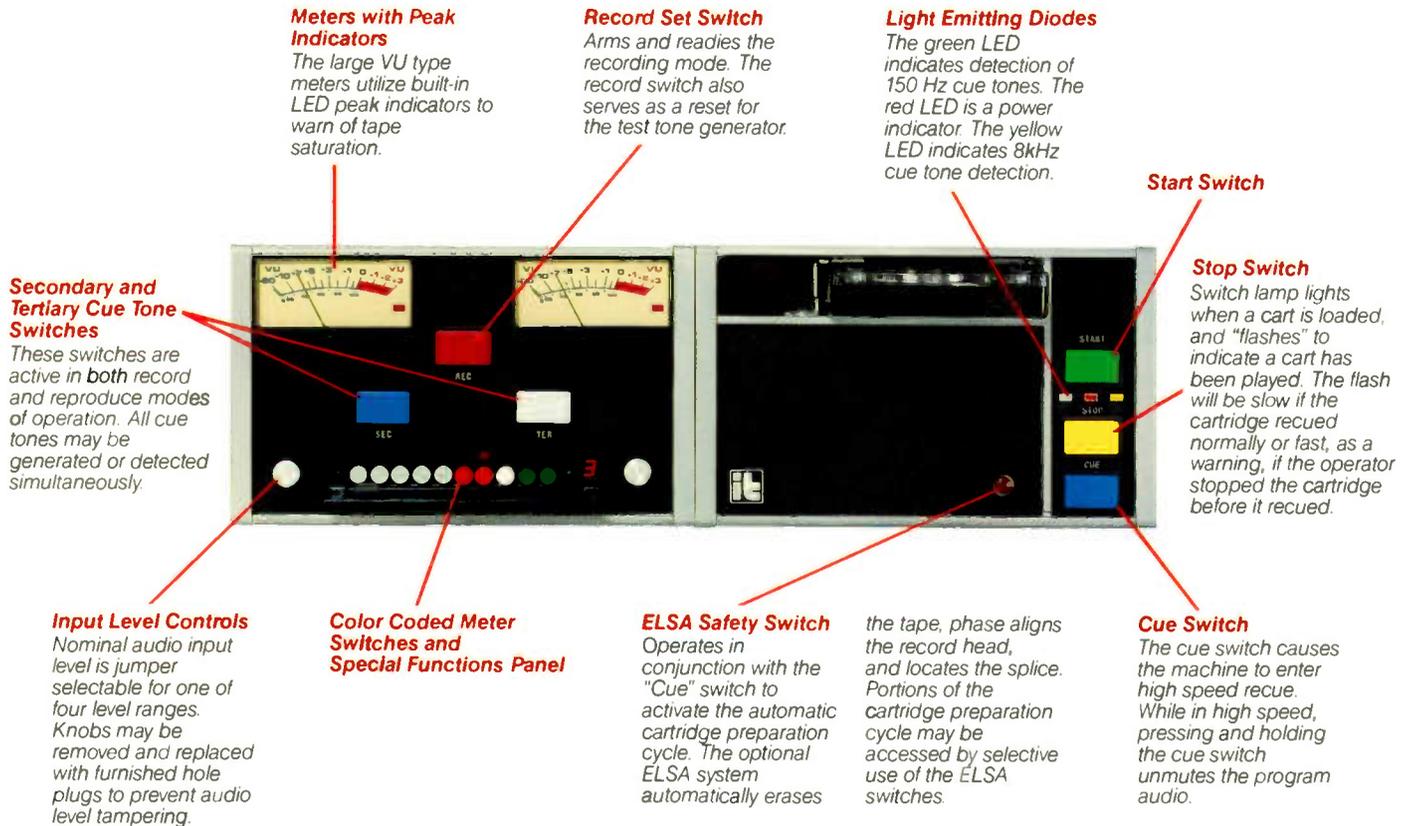
sockets, precision multi-turn pots, and plug in subassemblies. Flexibility in selection of user options is provided in the form of DIP programming jumpers.

## Microprocessor System Controls All Electronic Functions

- The record head bias frequency is derived from the microprocessor crystal referenced clock frequency.
  - A quartz crystal clock, accurate within .05%, provides the reference for all machine logic and control. The crystal clock insures extremely precise, long term frequency stability.
  - Controls logic for solenoid
- operating voltage, stepping it from 50 to 18 VDC after cartridge start-up.
- Controls the ELSA functions: the cartridge erase cycle, the automatic azimuth (phase) adjustment cycle, and the splice locator cycle.
  - Provides maintenance and error free cue detection with no need to adjust frequency or level controls. All NAB cue tone frequencies are standard.
  - Provides cue tone generation of precise frequencies, controls the crystal referenced test tone generator system and controls all record and playback logic functions.

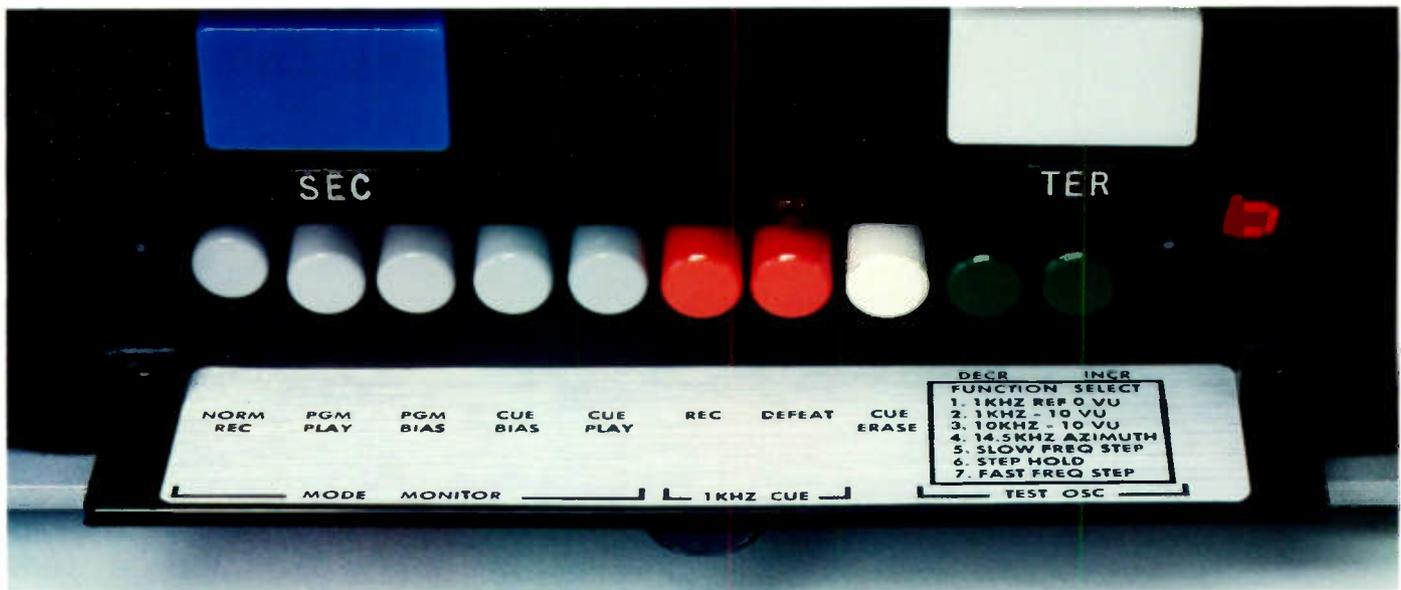
# "99B" SERIES CONNECTIONS

## RECORDING AMPLIFIER AND REPRODUCER



# AND OPERATOR CONVENIENCES

## RECORDING AMPLIFIER SPECIAL FUNCTIONS PANEL



### Easily Accessible Color Coded Switches

Convenient, color coded push buttons provide control of special machine functions. Meter monitoring selections (grey switches) include: 1. Normal Record (automatically switches to program playback when machine is not recording), 2. Program Playback, 3. Program Bias, 4. Cue Bias, 5. Cue Play. CMOS

integrated analog switches are used in meter switch circuits to eliminate mechanical switch problems and allow direct control by the microprocessor.

The 1 kHz cue record and defeat switches (red switches) permit addition and deletion of stop tones. Functions are electronically latched and

controlled, with LED confirmation of the defeat mode. A cue erase facility (white switch) allows erasure of any information recorded on the cue track without affecting program material. A microprocessor controlled test tone generator (green switches) offers seven functions and an LED displays mode identification.

# "99B" SERIES SPECIFICATIONS

## POWER:

- A. 117 VAC Or 234 VAC
- B. 50/60 Hz

## POWER CONSUMPTION:

- A. Reproducer/Recorder: 40 VA Typ.; 60 VA Max.
- B. ELSA Cycle: 760 VA Typ.; 800 VA Max.

## TAPE SPEED:

- A. 7.5 IPS (19 cm/s) Standard
- B. 22.5 IPS (57 cm/s) High Speed Cue Standard
- B. 3.75 IPS (9.5 cm/s) & 15 IPS (38 cm/s) Available Via Jumper Change

## SPEED ACCURACY:

- +/- 0.1% Maximum Deviation

## RECORD/PLAY FLUTTER:

- A. Play Max.: 0.12% DIN Wtd. @ 7.5 IPS
- B. Rec/Play Max.: 0.15% DIN Wtd. @ 7.5 IPS

## AUDIO OUTPUT CONFIGURATION:

Transformer Coupled

## AUDIO OUTPUT IMPEDANCES:

- A. 600 Ohm Load Impedance Standard (180 Ohm Source Impedance)
- B. Strappable For 150 Ohm Load Impedance

## AUDIO OUTPUT LEVEL:

- A. +25 dBm Maximum Before Clipping Into 600 Ohm Load
- B. May Be Strapped To Provide The Following Operating Ranges Without Deteriorating Signal-To-Noise Ratio:
  - 18 to -1 dBm
  - 10 to +7 dBm
  - 5 to +12 dBm
  - +1 to +18 dBm

## DISTORTION:\*

System: 0.8% Or Less THD.  
(Tape Dependent)

## NOISE:

- A.\* Signal-To-Noise: Measured With Bias/No Signal.

MONO  
58 dB  
(or better)

STEREO  
56 dB  
(or better)

- B.\* Signal-To-Noise: No Tape Running; ScotchCart® Cartridge In Place.

MONO  
58 dB  
(or better)

STEREO  
56 dB  
(or better)

- C. Squelch Noise: 70 dB or better  
(Noise Measurements are 20 Hz-20 kHz Bandlimited, Unweighted.)

## CROSSTALK (SYSTEM):\*

-50 dB Minimum Separation Between Any Two Channels.

## FREQUENCY RESPONSE:\*

Record To Playback:  
+/- 1.0 dB, 31.5 Hz - 16 kHz

## EQUALIZATION:

- A. 1975 NAB: Standard
- B. 1964 NAB: Optional
- C. CCIR: Optional

## CUE SIGNALS:

(Conforms to NAB Specification)

- A. NAB Primary Cue: 1 kHz
- B. NAB Secondary Cue: 150 Hz
- C. NAB Tertiary Cue: 8 Hz

## AUDIO INPUT SENSITIVITY:

- A. +28 dBm @ 0.5% THD (Recorder).
- B. Strappable For The Following Input Ranges (Front Panel Level Control Set At Mid-Range):
  - 20 dBm
  - 10 dBm
  - 0 dBm
  - +10 dBm

## AUDIO INPUT CONFIGURATION:

- Transformer Coupled:
- 1. 20K Ohm Bridging Standard
- 2. Strappable For 150/600 Ohms Terminating Impedance

## METERING:

- A. Taut Band Movement: VU Type "A" Scale

- B. LED Peak Indicators Adjustable To Follow Tape Saturation

## BIAS:

256 kHz, Crystal Referenced

## CARTRIDGE SIZE:

NAB A & AA

## AMBIENT OPERATING

## TEMPERATURE RANGE:

10 to 55 Degrees C. (50 to 131 Degrees F)

## MOUNTING:

- A. Table-top Standard
- B. Rack-Mount Optional With URM-0001 Rack-Mount Kit. Filler Panels Also Available.

## DIMENSIONS:

- A. Width: 21.6 cm (8.5")
- B. Depth: 39.4 cm (15.5")
- C. Height: 13.34 cm (5.25")  
Add 1 cm (.375") For Feet.

## WEIGHT (Typical)

Playback: 14.1 kg (31 lbs.)  
Recording Amplifier: 6.8 kg (15 lbs.)  
Total Max. Shipping Weight:  
Less Than 22.7 kg (50 lbs.)

## ELSA SYSTEM:

Splice Locate: Will Detect One (1) mil Splicing Tape Thickness Minimum, Square Or Diagonally Cut.

Automatic Phase Alignment: +/- 20 Degrees Or Less Difference Between Left And Right Program Channels At 10 kHz.  
Final Azimuth Mean Setting Is Cartridge Dependent And May Vary Slightly Due To Cartridge Dynamic Phase Jitter.  
(Measured Under Steady State Conditions After Start Of ELSA Sequence.)

\*Note: Items Indicated (\*) Are Specified Using A ScotchCart® Broadcast Cartridge At A Reference Level Of 1 kHz At 250 nWb/m.

International Tapetronics Corporation/3M Reserves The Right To Change Products And Specifications Without Notice.

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

More International Tapetronics Corporation/3M cartridge machines are installed in radio stations around the world each year than all other manufacturers' cartridge machines combined. Call today for more information on ITC's complete line of cartridge machines.

- 99B Cartridge Machines, "The Best"
- DELTA Cartridge Machines, "Today's Most Popular Cartridge Machines"
- OMEGA Cartridge Machines, "Affordable Performance You Can Trust"

When better performance emerges, it will come from International Tapetronics Corporation/3M, "The Leader in Reliability and Service".

### TO ORDER OR FOR MORE INFORMATION CALL TOLL FREE 800-447-0414

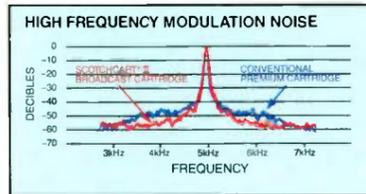
From Alaska, Hawaii or Illinois, call collect  
309-828-1381.

In Canada, call Maruno Electronics, Ltd.,  
416-255-1445.

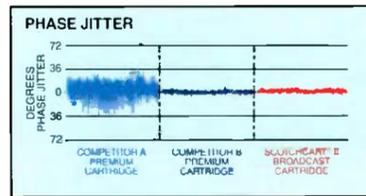
# Superior Programming Deserves Superior Sound

## LOOK AT THE FACTS:

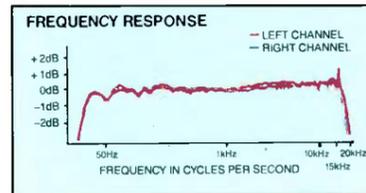
The ScotchCart® II broadcast cartridge provides uncompromising sound while offering operational convenience and control.



The Revolutionary ScotchCart® II broadcast cartridge design eliminates the excessive audio sideband noise which results from the rubbing effects of pressure pads and the mechanical irregularities of rotating hubs found in conventional cartridge designs.

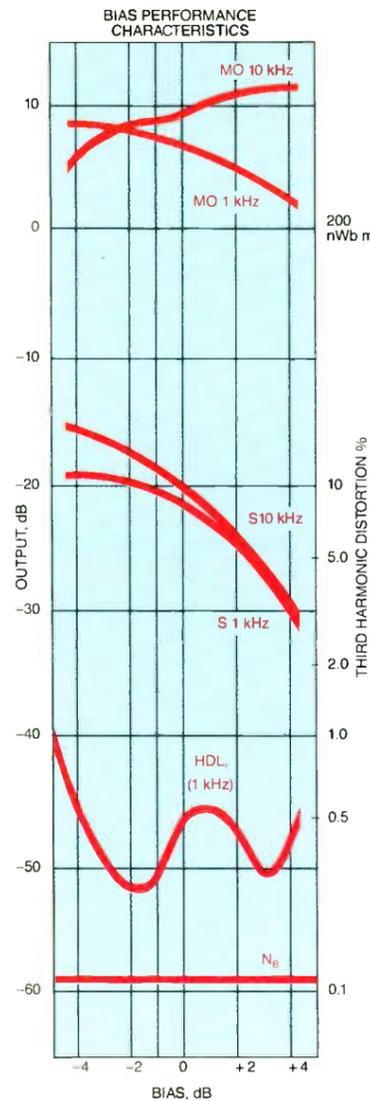


Some competitive cartridges sound muddy on the air because of excessive phase jitter. ScotchCart® II broadcast cartridges sound crisp and clean.



The new tape was conceived as an integral part of a complete cartridge system. When used with high quality equipment, such as an ITC "99B" cartridge machine, the ScotchCart® II broadcast cartridge is capable of frequency response equalling professional reel-to-reel performance.

## NEW, HIGH-OUTPUT, LOW-NOISE TAPE



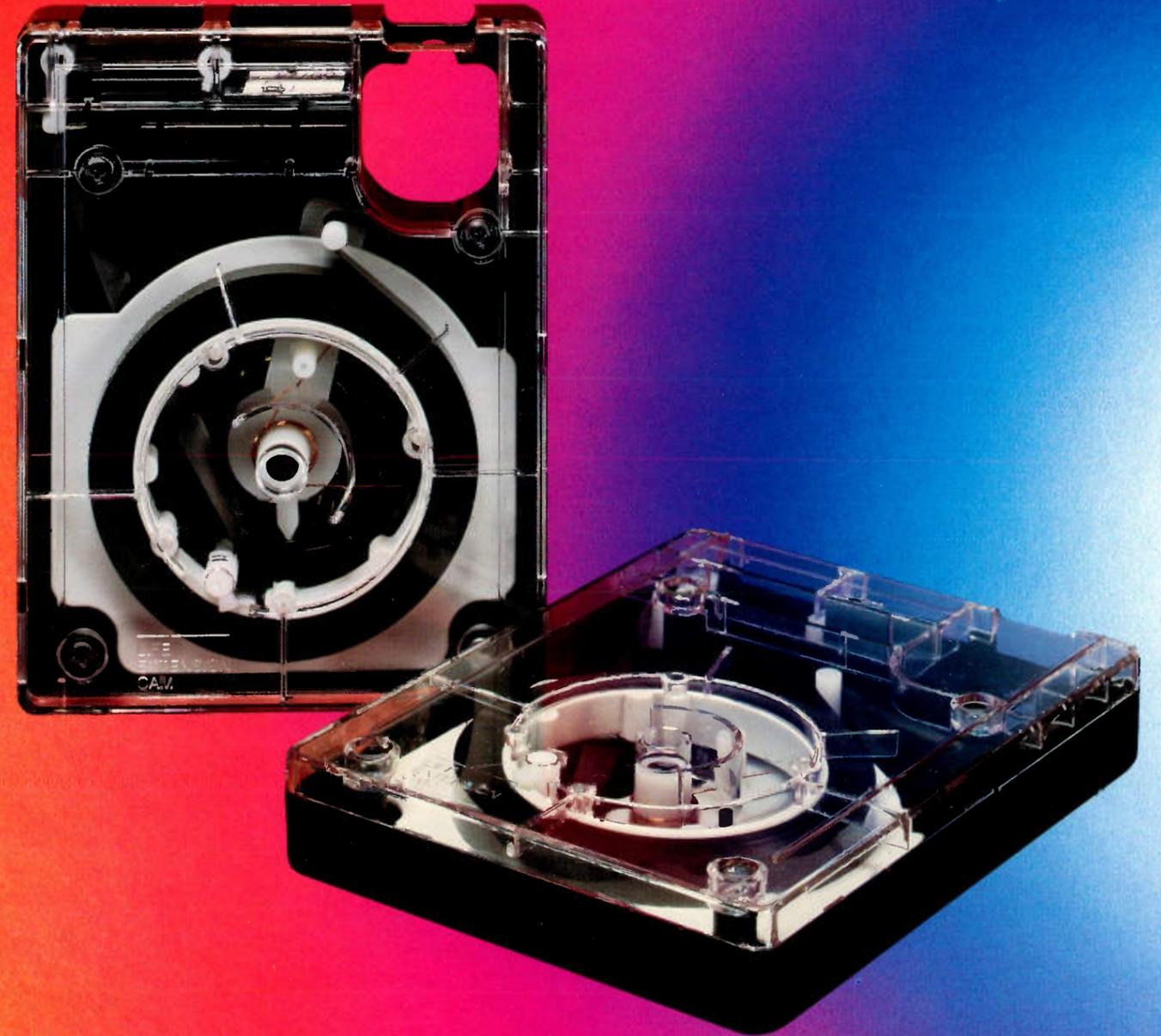
**MAXIMUM OUTPUT (MO)**  
Maximum output level at the specified frequency is a measure of the output capability of a tape. The recorder is equalized for a flat response using the appropriate reference tape. While recording 10 kHz the level of the input signal is increased until no further increase is noted in the output (short wavelength saturation). This output is then reported at different bias settings relative to reference level. While recording 1 kHz the level of the input signal is increased until 3% third harmonic distortion appears in the output. This output level is then reported at different bias settings relative to reference level.

**SENSITIVITY (S)**  
Sensitivity data provides a means to compare the output of one tape to that of another when recordings are made with the same low level input (i.e., an input at which an insignificant amount of system distortion is contributed by the tape). The record equalization is set to achieve a flat response when using the reference tape at the bias setting. A constant input level 20 dB below that required to produce reference level output from the reference tape is used.

**HARMONIC DISTORTION (HDL)**  
Third harmonic distortion is the amount of third harmonic distortion found upon playback of a reference level signal. The HDL<sub>1</sub> curve shows the change in this level of distortion as a result of different bias settings.

**TAPE NOISE (N<sub>b</sub>)**  
Biased tape noise level is a measure of a tape's residual noise. When recording with zero input signal, the output is measured through a filter having the characteristics defined by the NAB Standard Noise Weighting Curve. The level of noise is then reported at different bias settings relative to reference level.

# ScotchCart® II 3M Broadcast Cartridges



## A REAL VALUE

No broadcast cartridge in the world combines long life and performance like the new ScotchCart® II cartridge.

**To order** ScotchCart® II broadcast cartridges or request a technical manual to optimize ScotchCart® II performance, in the U.S., contact your local 3M sales office, your professional audio dealer, or call International Tapetronics Corporation/3M at 800-447-0414 or collect 309-828-1381 from Alaska or Illinois. In Canada, call Maruno Electronics, Ltd. at 416-255-9108. In other countries outside the U.S., contact your ITC cartridge machine representative.



Reel-to-Reel Performance with Cartridge Convenience

# ScotchCart® II

Revolutionary Design, Impressive Performance and Long Life

## REVOLUTIONARY DESIGN

The ScotchCart® II broadcast cartridge represents a breakthrough in technology beyond anything previously experienced in the industry. A revolutionary design eliminates pressure pads, utilizes a non-rotating hub, and now includes . . . a new, high-output, low-noise, lubricated tape for recording at high levels without performance loss. Tape and cartridge compliment each other like never before in the ScotchCart® II broadcast cartridge.

Setting an industry precedent, the ScotchCart® II broadcast cartridge utilizes a passive system of internal tape guidance, which allows your cartridge machine to do a much more precise job. This design, combined with the new tape, makes the ScotchCart® II broadcast cartridge the most reliable, stable and repeatable cartridge available.

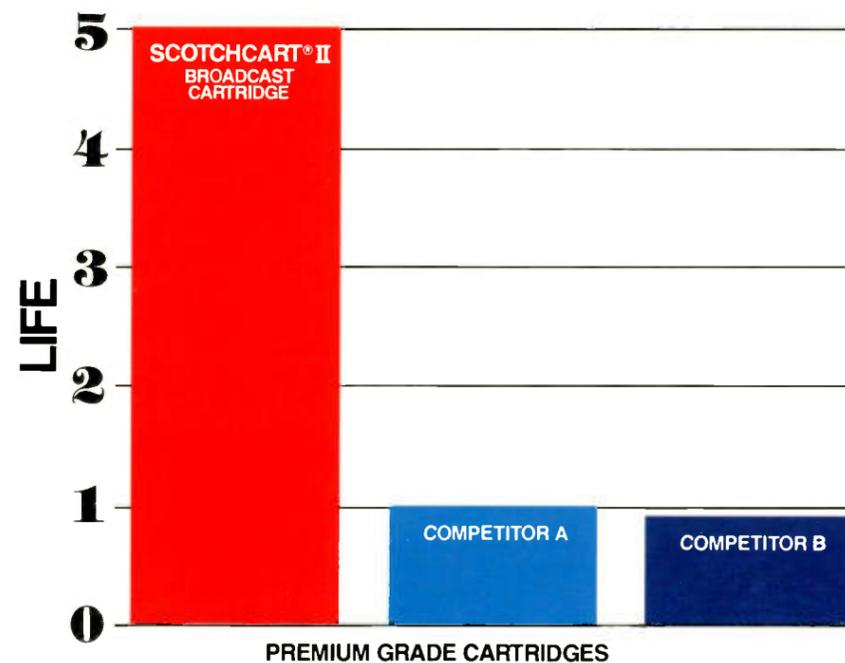
## IMPRESSIVE PERFORMANCE

To be successful in today's competitive environment, professional broadcasters need the best. The ScotchCart® II broadcast cartridge clearly outperforms conventional cartridges. The ScotchCart® II broadcast cartridge sounds crisp and clean, and eliminates the excessive modulation noise which results from the rubbing effects of pressure pads and the mechanical irregularities of rotating

hubs. When used with quality equipment, the ScotchCart® II broadcast cartridge is capable of frequency response equalling professional reel-to-reel performance.

## LONG LIFE

With five times the average life of its nearest premium grade cartridge competitor and superior audio performance, the ScotchCart® II broadcast cartridge is the best value ever.



\*Life results are based upon tests using 3.5 minute length premium grade cartridges and FIC cartridge machines. A cartridge was considered at the end of useful life when it reached a 5 dB frequency response loss at 10 kHz, .5% DIN weighted flutter, or mechanical failure. These criteria represent easily recognizable problems that should result in the cartridge being removed from service.

*NAB head penetration and centering marks to facilitate head block and cartridge guide adjustment.*

*No pressure pads to cause troublesome tape steering and wear or induce modulation noise.*

*Built-in magnetic head shield to protect heads from stray radiated hum and low frequency noise.*

*Cart cover made of polycarbonate materials to insure long lasting, break resistant wear.*

*Naturally lubricated concave guides gently position tape to allow the cartridge machine to do the critical guidance.*

*Window for visual splice identification.*

*High output, low noise, studio-grade tape is capable of impressive frequency response and higher recording levels for improved signal to noise performance.*

*Patented dynamic tension control system to insure proper tape-to-head contact, provide constant tape tension and control tape looping inside the cartridge.*

*Naturally lubricated hub material with 40% glass bead fill has broad temperature stability and resists warpage for consistent performance.*

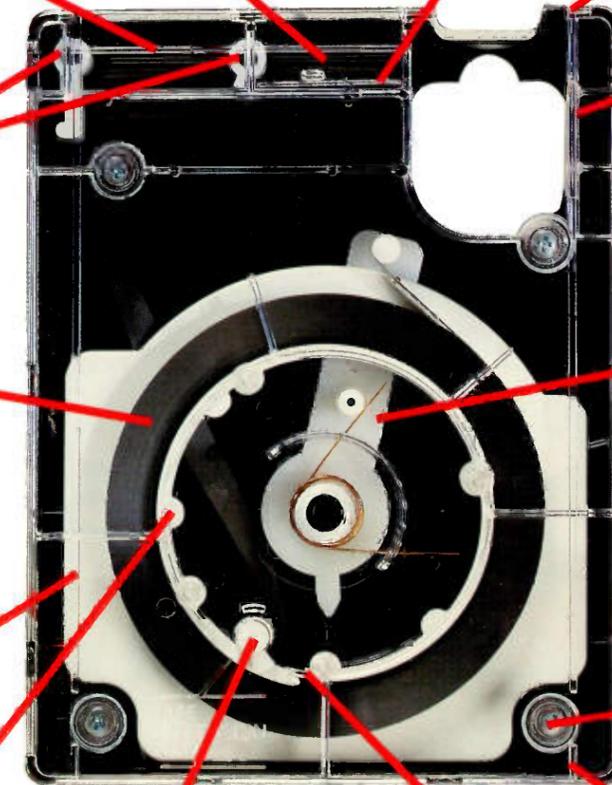
*Four screw antiwarp construction for an extremely rigid body that resists flexing.*

*Non-rotating hub to reduce wow and flutter; eliminate annoying rotating hub rattle and minimize stop cue over-shoot.*

*Adjustable cam to control tape loop for maximum life.*

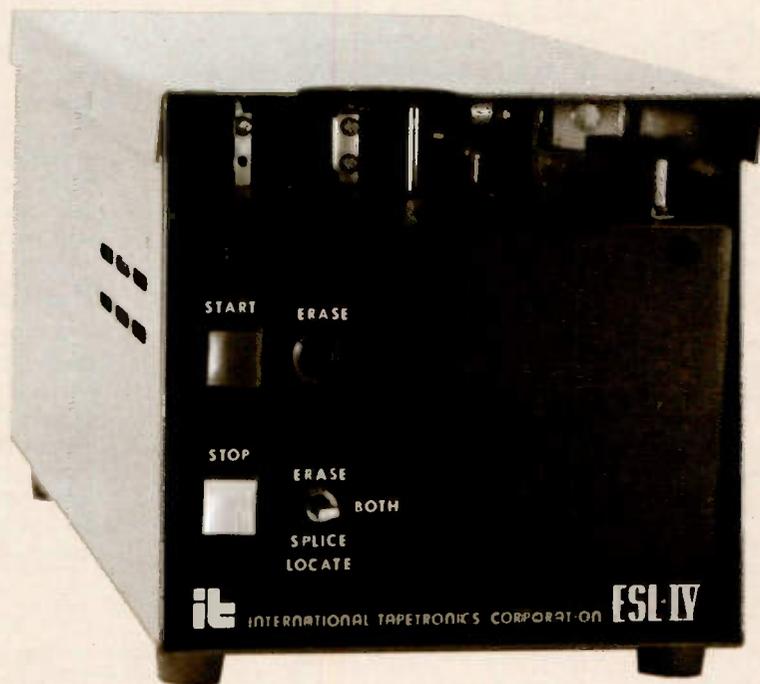
*Tape exits naturally from the hub center instead of twisting and curling up and over the pack to reduce edge stress and debris for extended tape life.*

*Interlocking tabs in cover and base to eliminate sliding when cartridges are stacked.*





**ESL-IV SERIES**  
**Cartridge Tape Eraser /**  
**Splice Locator**



# Combines cartridge erasing and splice locating in a single, automatic operation.

## For Better Sound

Clean, crisp recording — and on-air sound — requires that tapes be completely erased and the splice located and positioned just past the playback head. If the erasure is not complete there will be noise superimposed on the new recording. And if the new sound is recorded over a splice, sound quality will be poor — or sound will drop out entirely — for that period. If a high frequency cue tone is recorded on the splice, as might occur in an automated system, the tone may be garbled. For these reasons, automated stations, large stations — and all stations concerned with their sound — locate splices in conjunction with cartridge erasure.

## Manual Operation A Problem

USING A HAND-HELD BULK ERASER does not always produce a uniformly erased tape. Positioning of the eraser, length of erasing time, operator-error and other factors all affect the outcome. For example, continuous use of the eraser will cause overheating and possible failure of the eraser. And, of course, use of the bulk eraser requires both hands and the full attention of the operator. Since most operators turn the tape cartridge over during erasure, the process may take twenty or thirty seconds.

## Splice locating also tedious

TO LOCATE A SPLICE VISUALLY, the operator has to place the cartridge in a regular machine (normally running at 7½ IPS), run it, and watch for the splice to appear at the playback head position. Depending on the tape length, it takes from several seconds to several minutes for the splice to appear. Sometimes the splice will elude the operator at the first pass and the cycle must be repeated. Because the process of locating splices is tedious and time consuming many stations elect instead to tolerate the loss of quality caused by recording over them.

## The ESL does both jobs with ease

The operator simply inserts a cartridge and pushes the "Start" button. The button lights up the indicate tape movement. A diagonal cartridge guide assures accurate positioning of the cartridge even when insertion is done rapidly or carelessly. This permits rapid handling of cartridges without risk of damage. A hold-down spring locks the cartridge solidly in position.

## 3 Modes

Any of three modes can be selected: combination, erase only, or splice locate only. The COMBINATION MODE involves two, sequential cycles. The erase cycle comes first and lasts 15 seconds. During the erase cycle, a light on the control panel glows red, dimming and then going out as erasing is accomplished. The splice locating cycle follows. The length of this cycle depends on the length of the tape and the position of the splice. Upon sensing the splice, tape motion stops and the machine returns to a "ready" condition. If the machine is started again, with the same cartridge left in place, the ESL-IV will ignore the erase cycle, going directly into the splice locator cycle. A "Stop" button permits the operator to over-ride any function, turning the machine off at any point, in any cycle, in any mode. A safety feature.

In the ERASE-ONLY MODE, the internal bulk eraser erases the cartridge. At

the end of this 15 second cycle, tape motion stops. This mode is useful when the operator is more concerned with time savings than with production quality.

The SPLICE LOCATOR ONLY MODE is used where a tape has already been erased but where the splice has not been located. Or, where, for some reason, tape has multiple splices. In this mode, the machine goes directly into the splice locate cycle. When the splice is located, tape motion stops.

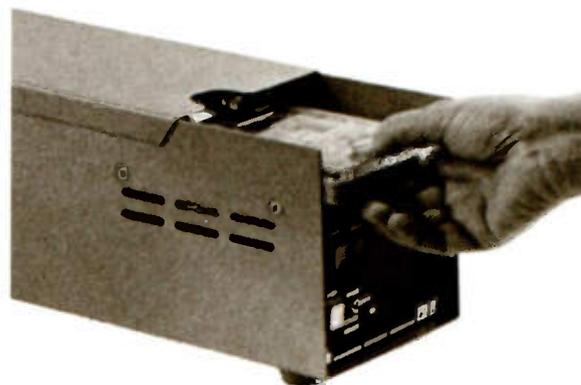
## Virtually Fool-Proof

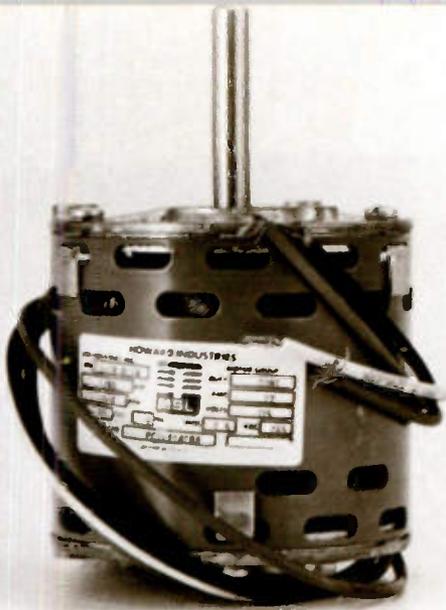
The switches on the panel are easy to see and control, speeding operation and reducing the probability of error. The machine is very quiet in operation, highly resistant to shock, external vibration, and noise. This resistance is provided for by the massive, rugged construction of the machine and by the rejection of noise by its electronics. It is compact. Visually attractive.

## Built With ITC Quality

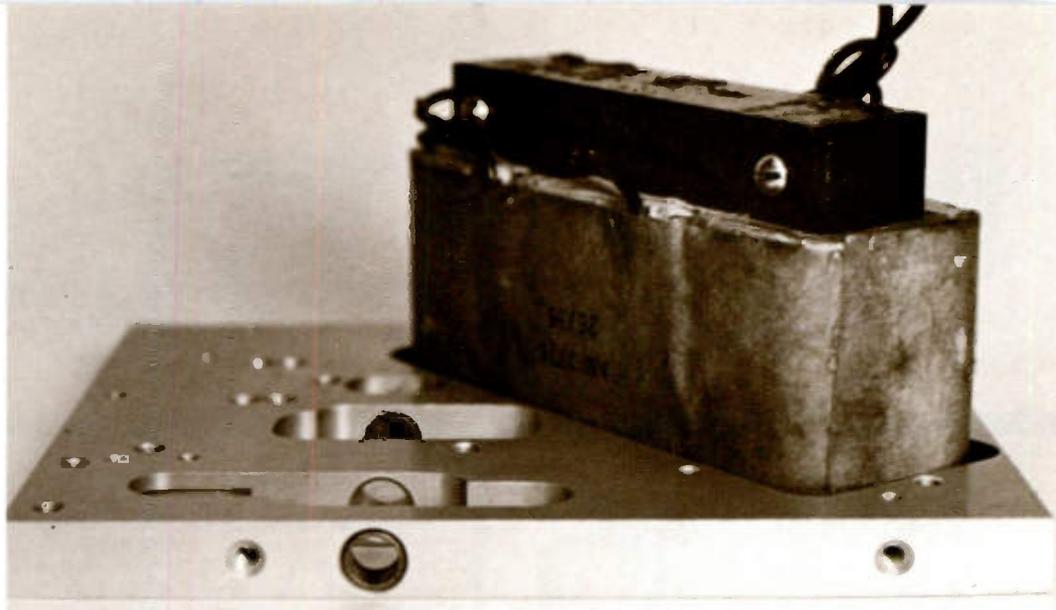
The ESL is fast, running at about four times normal playing speed, without harmful stress to the tape. It is a fine quality machine, built to the same high standards you expect from ITC cartridge machines, using parts interchangeable with these machines. This assures long life, dependable service, and ease of servicing and parts replacement.

Angled cartridge guide permits rapid placement of cartridge.





Heavy-duty AC induction motor provides for precision tape travel at speeds between 25 and 29 inches per second. Reliable, long-lived. The motor is electrically isolated from the electronics, each enabled by a separate Micro-Switch. This permits the motor to be turned off when there is no cartridge in the machine, reducing deck heat.



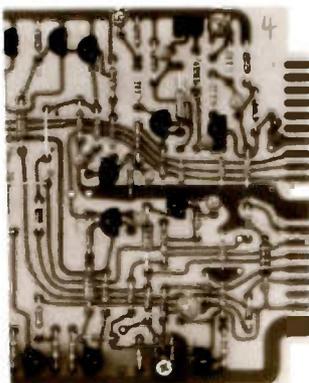
Half-inch thick, milled aluminum deck provides the massive support and stability needed to withstand shock and vibration and permit precision performance of all components.

The erase-coil is positioned horizontally on the tape deck so that the flux field is equally distributed, assuring uniform and complete erasure.

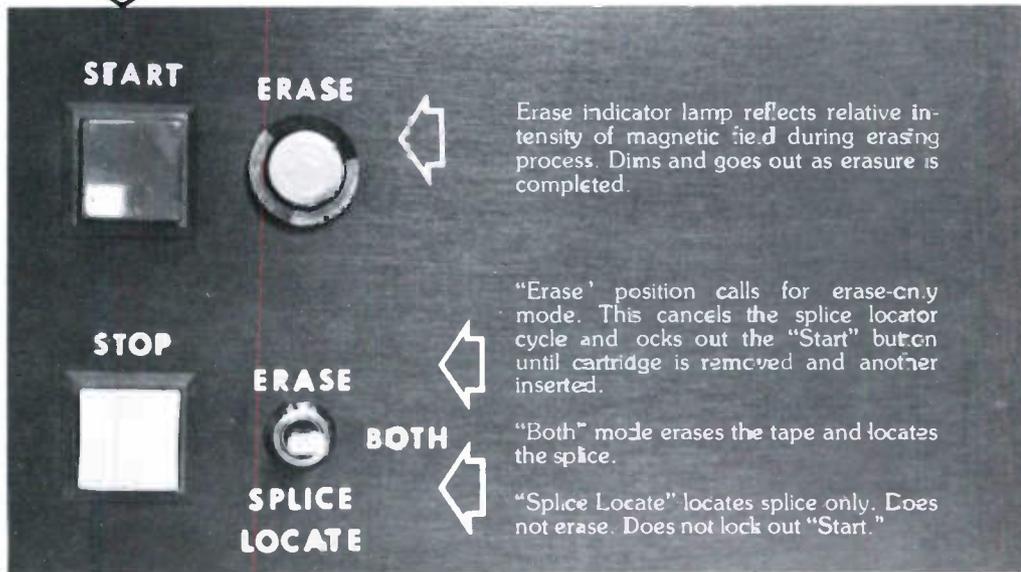
### Will Not Overheat

The design of the machine makes it almost impossible for the operator to subject the erase-coil to continuous duty, which can cause overheating and failure in manual erasers. The necessary "rest" period is provided in the combination mode by the splice locating cycle. In the erase mode, a cartridge must be removed and replaced before the machine will re-energize the coil. And, of course, in the splice finder only mode, the erase-coil is turned off. The operator, thus, cannot inadvertently damage the machine.

Electronics are totally accessible from back of machine. All high voltage electronics are on the mother board, out of reach of human hands. There are no high voltage electronics on the plug-in daughter board. The erase coil and other electronics are individually fused for safety.



Start button starts function called for by mode switch.



Erase indicator lamp reflects relative intensity of magnetic field during erasing process. Dims and goes out as erasure is completed.

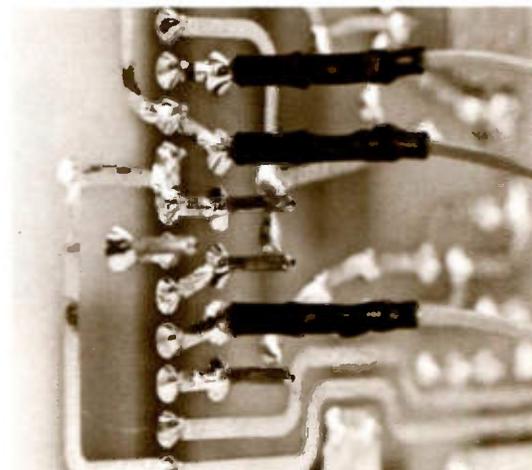
"Erase" position calls for erase-only mode. This cancels the splice locator cycle and locks out the "Start" button until cartridge is removed and another inserted.

"Both" mode erases the tape and locates the splice.

"Splice Locate" locates splice only. Does not erase. Does not lock out "Start."

"Start" and "Stop" buttons have indicator lamps. Manual "Stop" overrides all functions.

Plug-in termination of all harnesses and cables permits rapid assembly, dis-assembly and easy maintenance.





The top cover has a cut-out to facilitate insertion of the cartridge. In a stepped-back position, it provides easy access to the mechanism and allows even more rapid feeding of cartridges. It can be fully removed. The cover is tightly fitted to avoid vibration during operation.

# ESL-IV SERIES Cartridge Tape Eraser / Splice Locator

## SPECIFICATIONS



### Guaranteed

The ITC ESL-IV guarantees good sound, time savings, convenience, fool-proof operation and performance. At a very modest cost.

All this plus ITC's famous thirty-day guarantee of satisfaction and bold two-year warranty on parts and factory labor.

#### POWER:

117 volts, AC, 60 Hz, 50 watts continuous, 625 volt amperes intermittent (at peak erasure).

#### TAPE SPEED:

25-29 IPS. Direct-drive, high-speed capstan motor with permanently lubricated ball bearings.

#### SPLICE SENSITIVITY:

Senses splicing tape thickness of 1/2 mil or greater.

#### ERASE DEPTH:

45 dB\* or better 50 Hz to 15 kHz

#### TAPE CAPACITY:

NAB size AA cartridges.

#### CYCLE TIME:

For complete erase/splice location cycle:

Minimum	
any length cartridge	15 sec.
Maximum	
70 sec. cartridge	35 sec.
10 1/2 min. cartridge	180 sec.

#### AMBIENT TEMPERATURE:

55 degrees C., 131 degrees F., maximum.

#### MOUNTING:

Table top mounting.

#### DIMENSIONS:

5 3/4" wide, 15" deep, 5 1/4" high (add 3/8" for feet).

#### WEIGHT:

17 lbs.

\* As referenced to "0" level at 1 kHz (fluxivity level 160 nW/m)



**INTERNATIONAL TAPETRONICS CORPORATION**  
2425 South Main Street, Bloomington, Illinois 61701

**CALL TOLL-FREE: 800-447-0414**  
In Alaska, Hawaii or Illinois call collect: (309) 828-1381

Made under one or more of the following patents: 3,800,323; 3,801,043; 3,801,329; 3,833,935; 3,865,719; 3,932,887; 4,142,221.

# PD-II SERIES



There's no longer any need to compromise on the performance of tape cartridge equipment for the sake of low price! ITC's PD-II Series is an economy priced machine designed to deliver excellent results in those applications requiring the services of a basic cartridge machine . . . recording and playing mono tapes in the "A" size cartridge and stopping automatically on the 1 kHz cue tone. The PD-II could well be the best cartridge machine buy you'll ever make when you consider the long life expectancy, minimum maintenance, many exclusive features, and outstanding performance.

The PD-II Series includes a *combination* of important features found nowhere else in the economy priced field. One prime example is the super quiet operation. This is due to ITC's now famous and often copied air-damped solenoid with Teflon coated plunger. And the machine is *totally* automatic. There are no levers to pull, or buttons to push when inserting or withdrawing a cartridge. Just gently insert the cartridge and press the start switch. The machine does the rest automatically and quietly.

We've milled the deck from a solid block of 1/2 inch thick aluminum.

It won't warp and presents the same flat, stable surface to cartridges every time assuring correct azimuth of heads. Our heavy-duty micro adjustment head assembly is designed for accurate and easy adjustments; and once made they hold to provide consistent fidelity. The adjustable tape guides, head assembly parts, and deck are non-magnetic so that they will not adversely affect the quality of audio.

The direct-capstan, 450 RPM, hysteresis-synchronous drive motor with an electrolyzed shaft minimizes wow and flutter, improves pulling power, and eliminates need for rubber belts and separate fly wheel assembly.

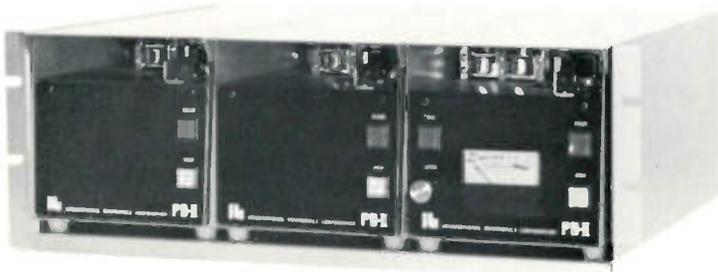
The new trim-line design allows you to place *three* units side-by-side in a 19 inch rack. Each unit is only 5-3/4 inches wide, 5-1/4 inches high, and 15 inches deep. No matter where you place the PD-II, you'll find location easier than ever before. And there is a removable top cover that facilitates easy cleaning, maintenance, and adjustment.

The printed circuit electronics include the latest silicon solid-state diodes, transistors and integrated circuits. All

switching and logic is performed by solid-state components. No relays are used. Printed circuit cards are of the plug-in variety with gold plated contacts for ease of replacement or repair. Head cables have plug-in connections at the heads to permit easy reversing of cue and program output when servicing or during head replacement; and the well-vented housing assists in providing cool operation under continuous use.

What does ITC's PD-II offer over the competition? It can probably be summed up in one word — reliability. And this is the real reason the choice of PD-II is a decision for economy. The rugged design means the machine will perform faithfully when called upon. It was designed to outlast and outperform any other economy machine we've seen. We've eliminated the cams, latches, pulleys, belts, and other numerous parts that require frequent adjustment. The machine is designed for continuous use, long life, and minimum maintenance. The PD-II is the only cartridge machine that provides the right combination of features, performance, reliability and price . . . the elements essential to *true* economy.

The PD-II Series carries a two year warranty and a 30 day money-back guarantee of satisfaction.



Available for triple rack mounting



Easy serviceability

#### MODEL DESIGNATION

PD-II Series Reproducers and Recorder/Reproducers accept the NAB "A" size cartridges.

PD-II Reproducer, Monophonic with 1 kHz primary cue tone.

PD-II Recorder/Reproducer, Monophonic with 1 kHz primary cue tone.

#### ACCESSORY

SA-0034 Rack Mounting Kit — mounts three PD-II Series in a 19 inch equipment rack.



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 Telephone: 309-828-1381

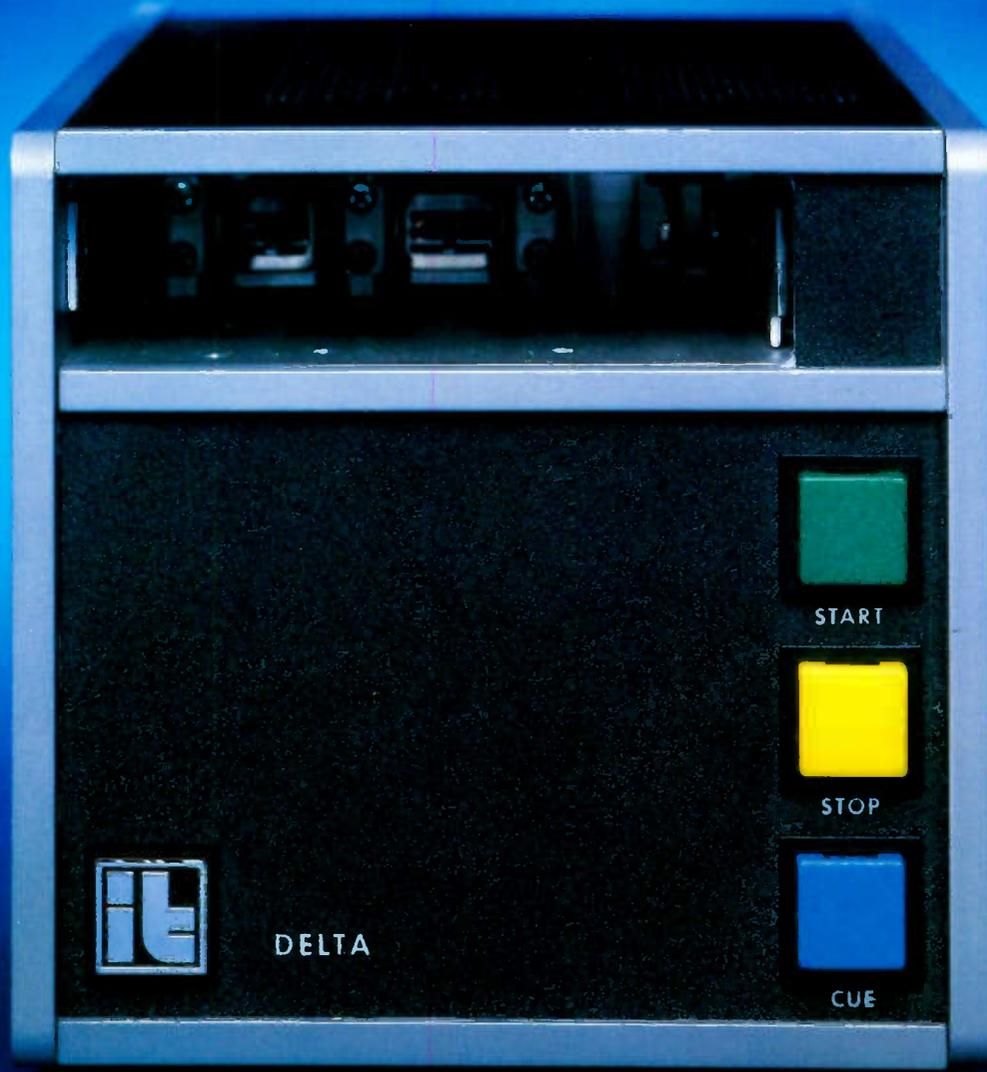
# PD-II SERIES

## REPRODUCERS AND RECORDER/REPRODUCERS

### SPECIFICATIONS

POWER:	117 volts, AC, 60 Hz, 70 watts.
TAPE SPEED:	7-1/2 inches per second. Direct-drive, hysteresis synchronous motor with electrolyzed shaft and permanently lubricated ball bearings.
TIMING ACCURACY:	±0.2% or better.
WOW AND FLUTTER:	0.2% or less, NAB weighted.
AUDIO INPUT:	-20 to 0 dBm; 600 ohms balanced.
AUDIO OUTPUT:	+15 dBm before clipping; normally +5 dBm; 600 ohms balanced.
DISTORTION:	2% or less, record to playback at 0 VU record level.
NOISE:	52 dB or better below reference of 400 Hz at 3% THD, unweighted.
CROSS TALK BETWEEN CHANNELS:	Better than 50 dB at 1 kHz.
FREQUENCY RESPONSE:	±2 dB from 50 to 12,000 Hz.
EQUALIZATION:	NAB. Adjustable to compensate for head wear.
HEAD CONFIGURATION:	NAB. Separate record and reproduce heads permit monitoring while recording.
CUE SIGNAL:	NAB primary (stop) cue, 1 kHz, automatically applied at start of recording.
METERING:	Taut-band movement with "A" scale.
BIAS OSCILLATOR:	75 kHz.
TAPE CAPACITY:	NAB size A cartridges. 2 seconds to 10-1/2 minutes with 1 mil lubricated tape at 7-1/2 IPS.
START AND STOP TIME:	0.15 second minimum. Dependent upon air damping adjustment of solenoid.
AMBIENT TEMPERATURE:	55 degrees C, 131 degrees F, maximum.
REMOTE CONTROL:	All indicator lamps and push-button switch controls.
EXTERNAL CONNECTORS:	Terminal strip.
MOUNTING:	Table top mounting. Rack mounting shelf for mounting three units side-by-side available as an option.
DIMENSIONS:	5-3/4" width, 15" depth, 5-1/4" height (add 3/8" for feet).
WEIGHT:	15 pounds.

Terms: Net 30 or 5% discount for payment prior to shipment. Leasing also available.



**TEN YEARS WORTH  
OF IMPROVEMENTS  
ARE PACKED INSIDE  
THIS MACHINE.**

**3M**

The original ITC Premium Series of tape cartridge machines was introduced in 1970. To say it caught on quickly would be an understatement.

Over the next ten years, the Premium Series became the standard of the broadcast industry throughout the world, outselling its nearest two competitors combined. Over 35,000 Premium Cart Machines were purchased, over 50,000 Premium Decks. In fact, three out of every five broadcast cart machines around the world are ITC machines.

What made the Premium Series so popular was an unmatched level of features, performance specs and reliability within the mid-price range. And those same attributes are still there, along with over ten years worth of improvements, in the Delta Series, the new generation of mid-priced ITC machines.

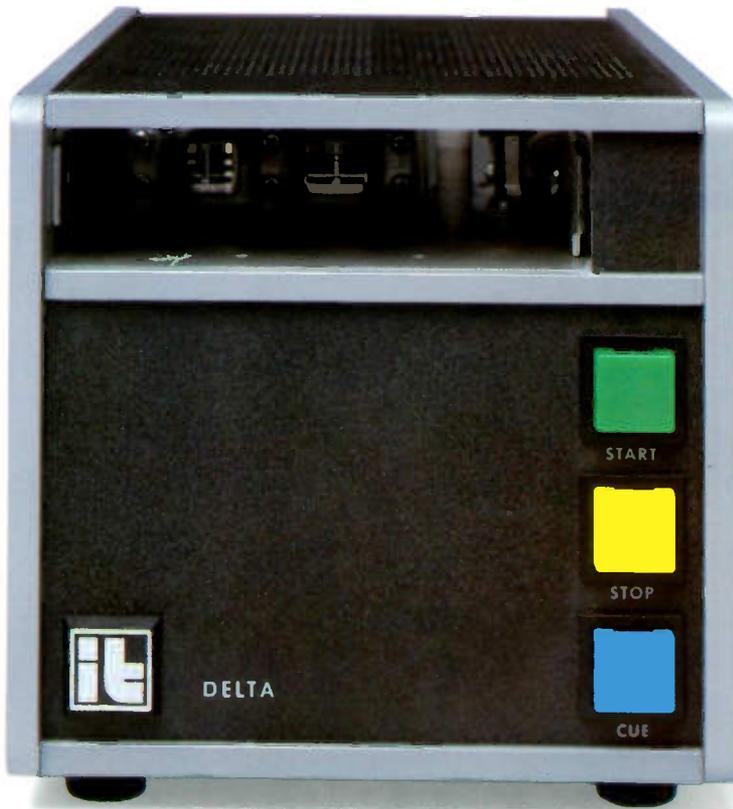
1983



1973



# Delta I Single Deck Reproducer



The Delta I was designed for use with size A or AA tape cartridges.

The unit is much smaller than previous cart machines. So three machines can now fit into a rack where two used to fit.

The Delta I is packed with improvements. High-speed recue is standard. NE5500 Series amplifiers are used, along with an exclusive ITC playback head. There's a toroidal power transformer. And a digital cue tone detector.

The half-inch tool plate aluminum deck is still there, with the air-damped solenoid design pioneered by ITC. So is the chain-and-sprocket pressure roller assembly.

And we've gone to a modular series design. That means you can add a Delta IV Recording Amplifier to any single or triple deck to make a play/record combination.



## ITC Reproduce Head

This patented head, pioneered in ITC's Series 99 results in unusually flat response and extended life.

## Precision CNC Milled, Tool Plate Aluminum Deck

The aluminum alloy deck offers the rigidity of steel with the weight advantages of aluminum. It provides a stable reference surface for motor, solenoid, and head block mounting. Unique criss-cross azimuth adjusting arms provide the fine adjustment of head azimuth, zenith and height on the true center pivot head block. Locking nuts secure position after each adjustment. Head mounting straps allow easy head replacement. And the complete head mounting block is removable for ease of service. Plug-in head cables make program and cue channel calibration and testing easy. And the metal deck is brushed and anodized for long life.



Delta I  
Rear View



### DC Brushless Servo Motor

The motor is precision manufactured for extremely low wow and flutter. Selectable speeds are 3¾, 7½ and 15 ips, with high-speed recue running at 22.5 ips.

### Delta Series Servo Motor

At the heart of any cartridge machine is its motor. Traditional designs have used hysteresis-synchronous motors with high wow and flutter, heat and radiated magnetic field. These motors were usually limited to one speed because they were referenced to the power line frequency.

In contrast, The Delta Series utilizes a unique, brushless DC servo motor, phase locked to a precision crystal reference. Among other things, this provides for extremely low wow and flutter. Wow and flutter are some of the most audible types of distortion. You can hear it even through inexpensive AM radio receivers.

One reason we can produce machines with such low wow and flutter is that our servo motor uses an averaging tachometer. Most tachometers use a toothed ring attached to the motor, rotating at the same speed with a single point detector. These tachs determine motor speed by counting the teeth on the ring. Unfortunately, this has been a rather troublesome part of conventional servo motor design, because any eccentricity in the gear circumference or tooth irregularities will cause instantaneous errors, which will, in turn, cause the electronic driver circuit to make false current adjustments, actually injecting wow and flutter into the motor.

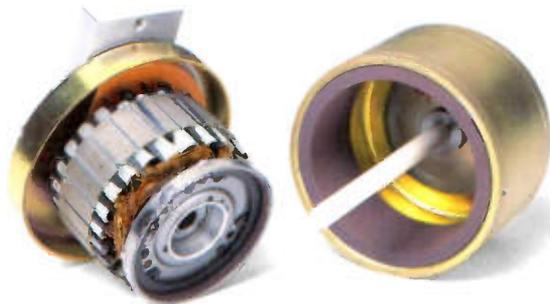
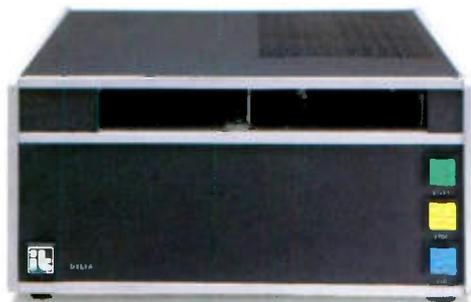
Our averaging tachometer is a unique design that automatically compensates for tachometer ring eccentricity which induces flutter. The averaging tachometer produces a stable, steady signal input to the phase-locked loop motor controller to ensure extremely accurate speed control. Included in the tachometer design is a second pickup coil, wired out of phase, which serves to reduce extraneous hum fields.

The Delta Series Servo Motor also generates far less heat—less than one watt, compared to 23 watts from conventional hysteresis-synchronous motors. This reduction of heat will significantly improve the life of the motor bearings.

Most importantly, the Delta motor is a powerful high torque motor reducing the effective cart-generated wow and flutter. Due to the power of this motor, stall protection is included to prevent motor damage.

### Delta II Wide Play Reproducer

Twice as wide as Delta I to accommodate all sized cartridges. The Delta II is also compatible with the Delta IV Recorder.



## Delta III Triple-Deck Reproducer

Like the Delta I, the Delta III is designed for use with size A or AA tape cartridges.

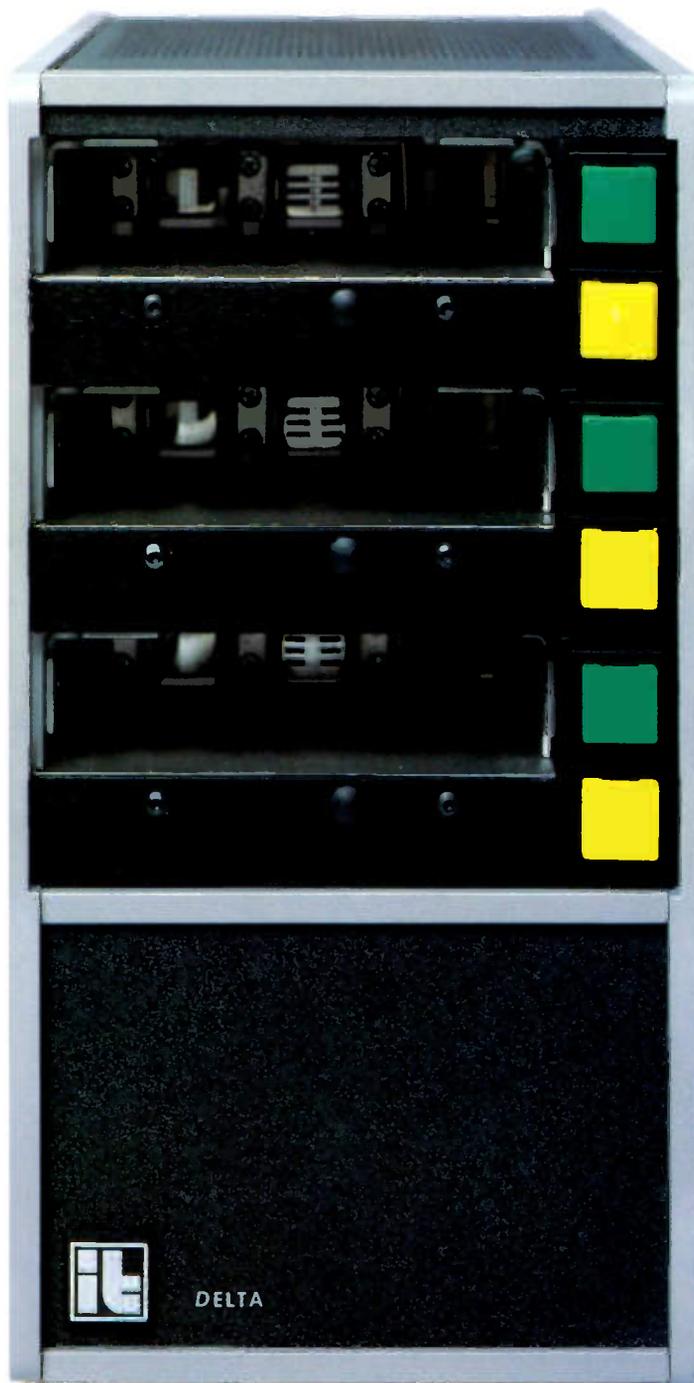
It features three independent reproduce decks. When combined with a Delta IV Recorder, the lower deck is the record deck. Each deck can be removed for service or alignment without affecting the performance

of the other decks.

Since the Delta III is the same width as the Delta I, three units, or nine decks, can now fit into a standard 19-inch equipment rack.

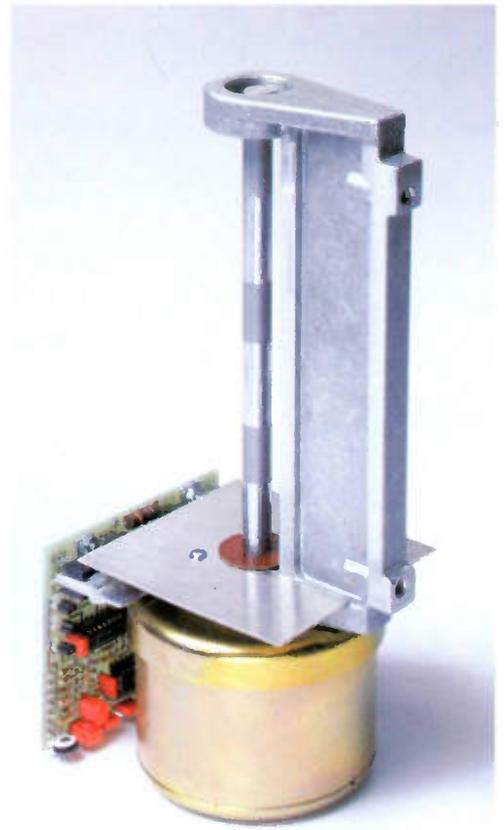
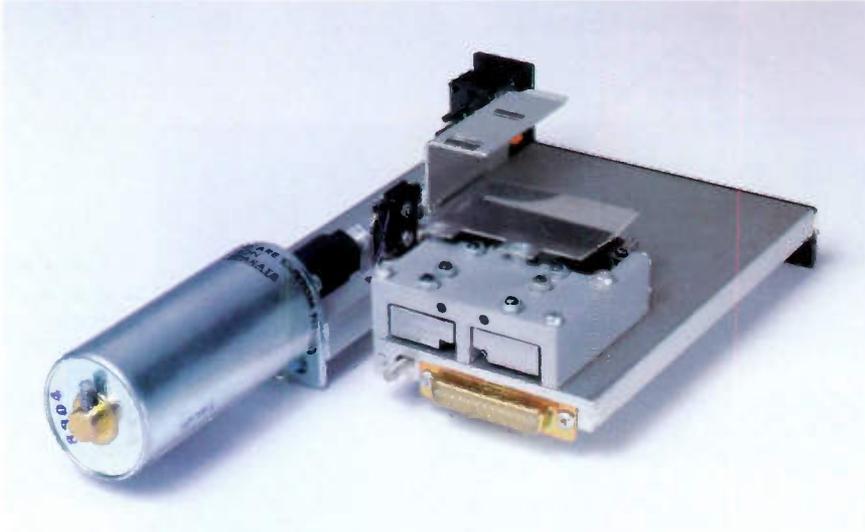
Historically, triple deck machines have suffered from many drawbacks. They are bulky,

mechanically unstable, difficult to maintain and generally lower in audio quality than single deck machines. In contrast, the Delta III has been designed as a high performance, highly reliable and easily maintainable machine at substantially less cost than three single deck Delta machines.



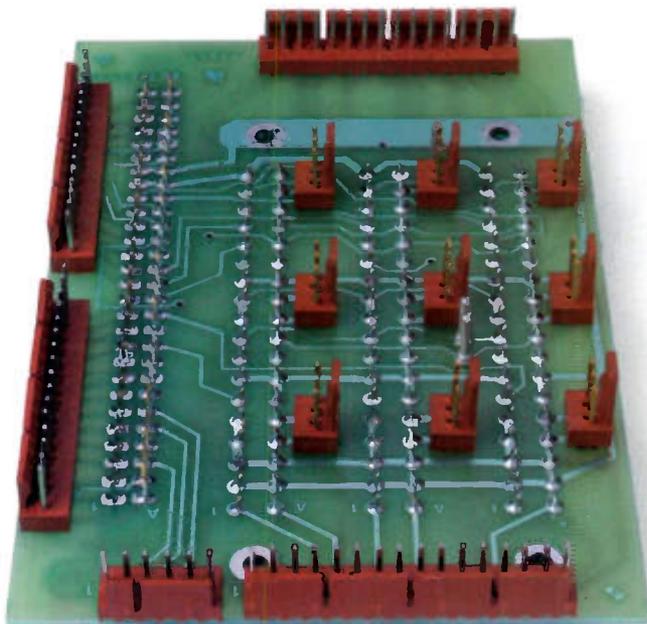
**Capstan Drive Motor Assembly**

Unlike previous triple-deck motors, this motor is set within a unique, single-piece casting that uses just two ball bearings. As a result, bearing noise and failure are greatly reduced. The 10mm, non-magnetic, stainless steel shaft is centerless ground and vapor honed to optimize the tape driving surface. All of these features help solve many problems common to triple deck motors, such as bearing misalignment, wow and flutter, and phase instability. Selectable speeds are 3¾, 7½, and 15 ips.



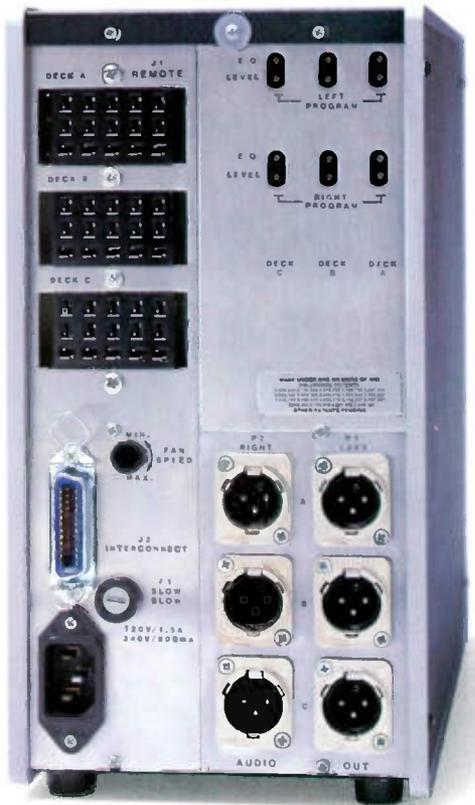
**Rear View of a Delta III Deck**

Each deck is easily removed for maintenance with the turn of one front panel screw. There is only one component connector per deck, and as part of the deck assembly, it disconnects as the deck is removed. Interchangeable decks do not leave remaining decks out of service. The precision milled tool plate deck is warp resistant.



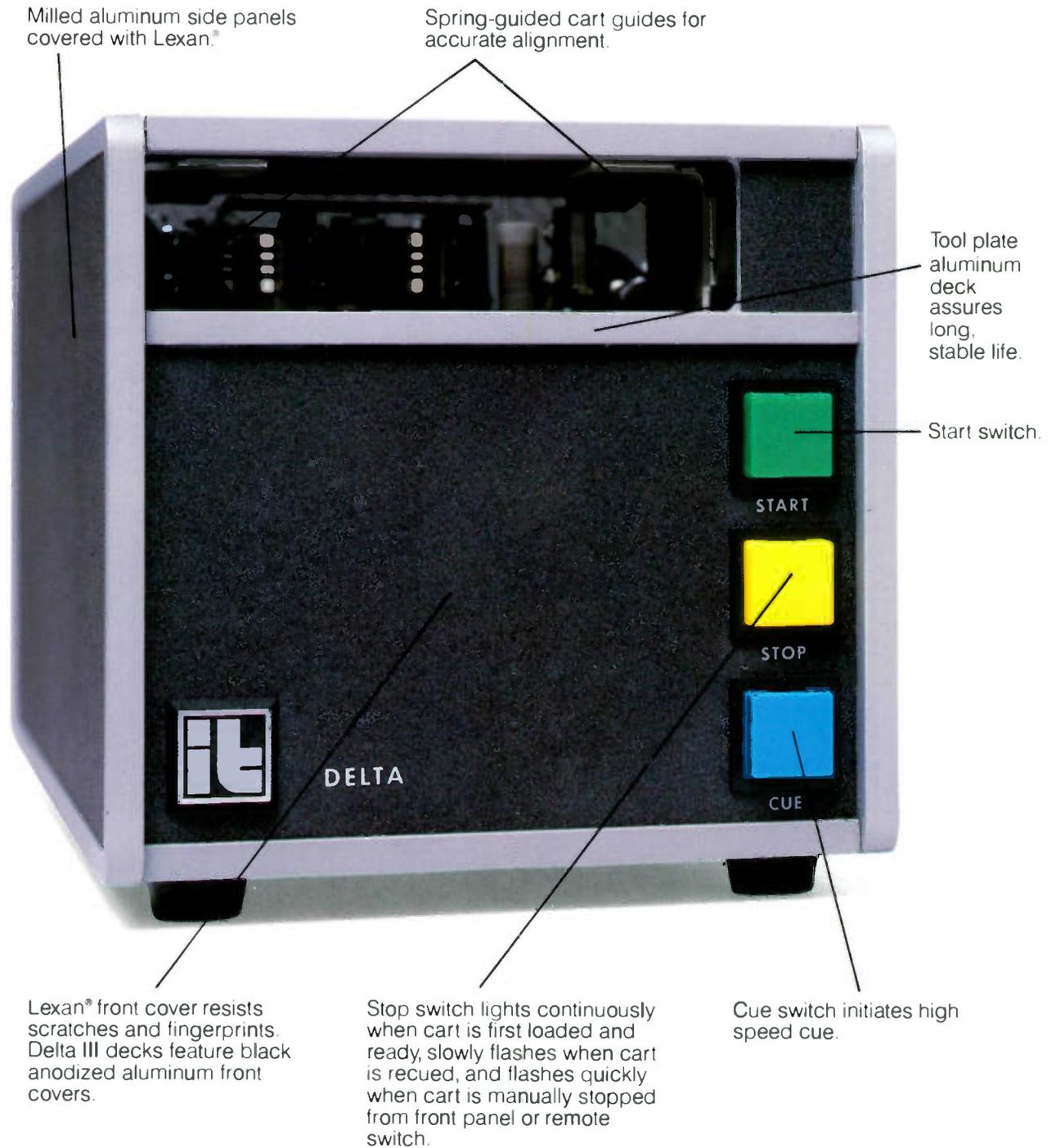
**Delta III Interconnect Board**

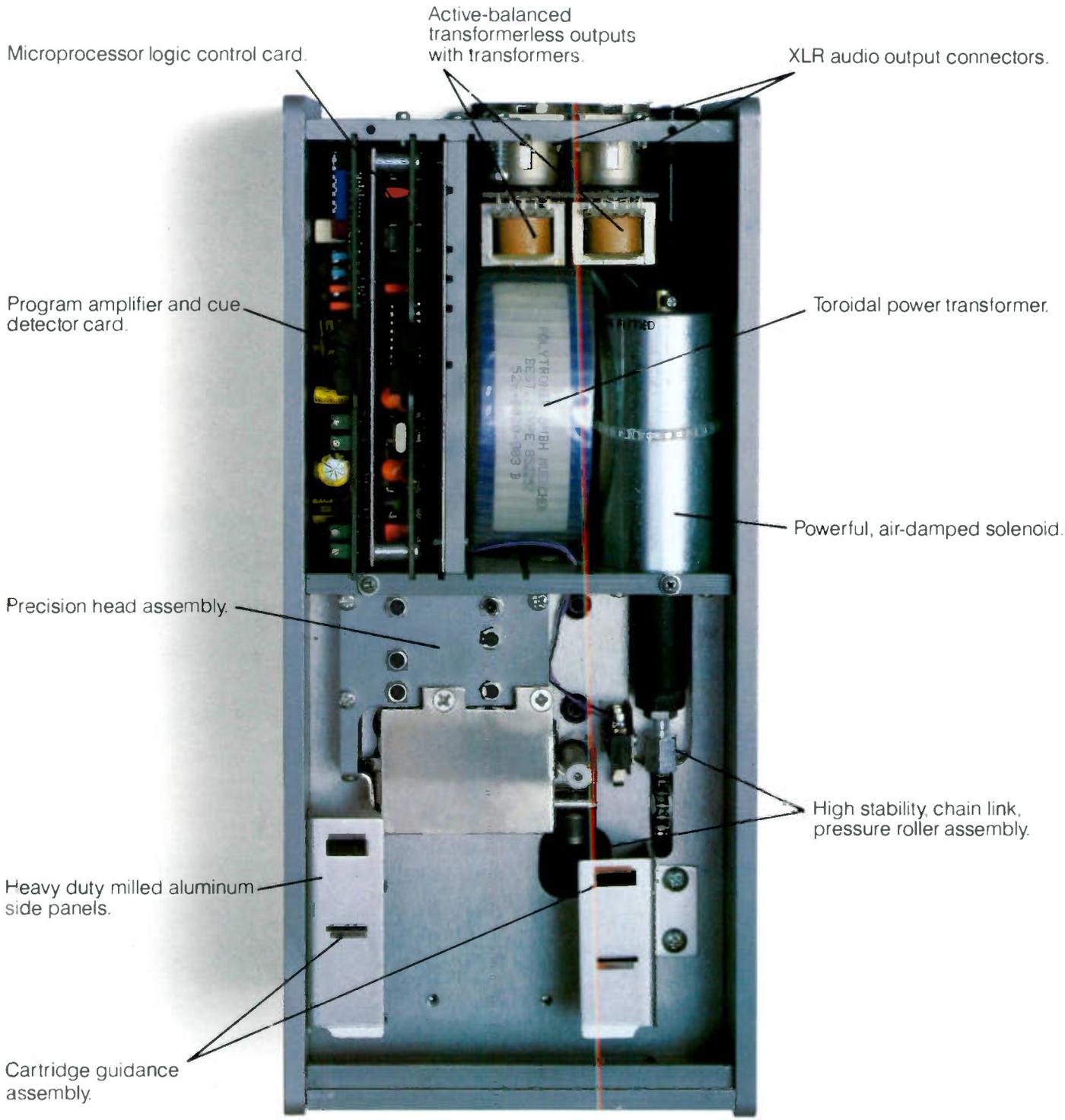
Dramatically reduces messy wiring by providing a central connection point for PC Cards and Cabling.



**Delta III Rear View**

XLR-type audio connectors are used. All remote connections are brought in through connectors with signal paths compatible with the Delta I and Delta IV.





# Delta IV Recording Amplifier

The Delta IV may be combined with any Delta Reproducer to make a fully compatible recorder/reproducer combination.

Like the rest of the Delta Series, the Delta IV is built with high quality components, such as the NE5500 Series amplifiers, electrolytic and film capacitors, and metal film resistors.

Balanced audio inputs are switchable between 600 ohms, 150 ohms or 20k ohms, and may be used with or without audio input transformers.

The Delta IV accepts audio input levels up to +18 dBm without the use of external pads. The amplifier design easily accommodates higher recording levels for improved signal-to-noise ratios. Record amplifier distortion

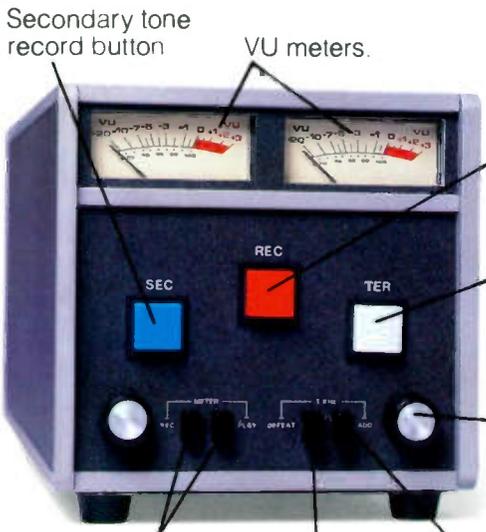
is less than 0.5% THD and I.M. distortion is significantly reduced. Group delay compensation is incorporated to eliminate phase delays caused by inductive and capacitive components, improving transient response.

Program and bias signals are mixed actively, using slew rate operational amplifiers, instead of program/bias mixing transformers.

Metering functions are calibrated independently using high quality, multi-turn potentiometers. Meters automatically display program playback output level when not in the record mode. A level internal slide switch allows the front panel meters to be used for setup adjustments of record bias, cue bias, and cue play level.

Bias amplifiers are independent adjustable for left program, right program, and cue channels. A crystal-referenced bias generator maintains a frequency of 119.3 kHz  $\pm$  0.05%. Bias ramp on and off is carefully controlled to insure pop-free recordings. The high bias frequency, plus the active mixing of program material and bias, reduce I.M. distortion.

A microprocessor controls all logic functions in the recording amplifier and interfaces with the reproducer microprocessor. Since recorder and reproducer microprocessors are identical, they may be interchanged to aid with servicing. Components include CMOS, TTL, and low power Schottky integrated circuit.



Metering switches    1 kHz defeat    1 kHz add

Record set switch lights in record mode, flashes for 1 kHz tone defeat.

Tertiary tone record button

Record level set knobs may be removed.

Audio inputs

Remote control

Interconnect cable

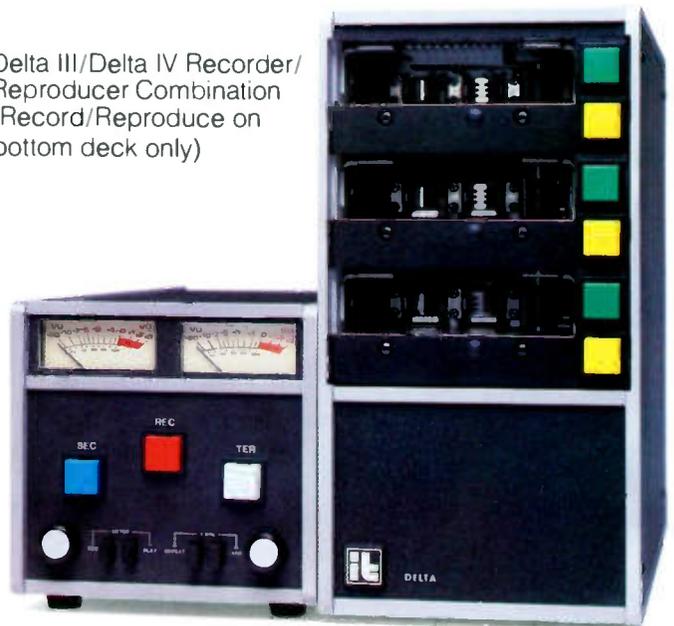


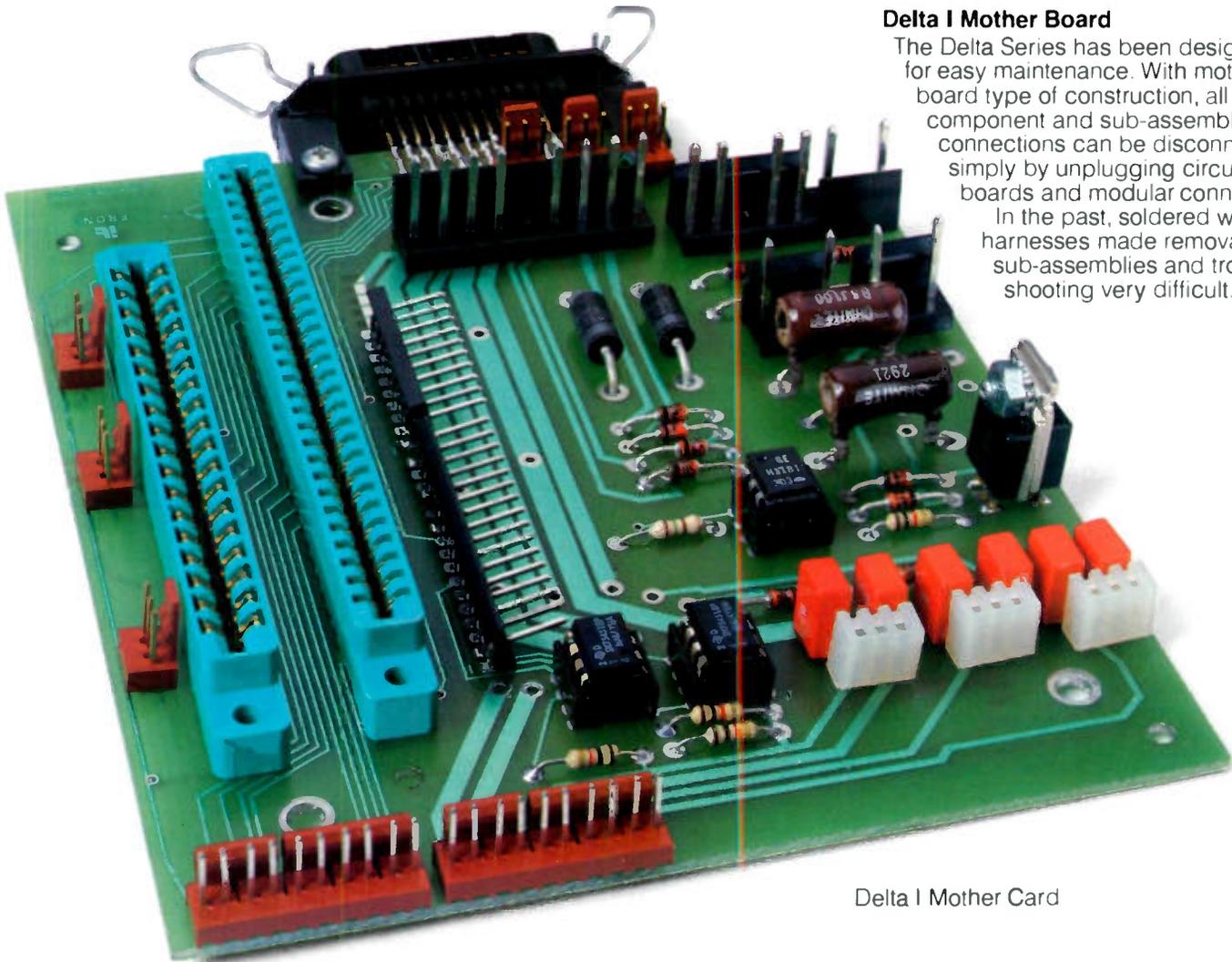
Delta IV Recording Amplifier Rear View

Delta III/Delta IV Recorder/Reproducer Combination (Record/Reproduce on bottom deck only)



Delta I/Delta IV Recorder/Reproducer Combination





### Delta I Mother Board

The Delta Series has been designed for easy maintenance. With mother board type of construction, all component and sub-assembly connections can be disconnected simply by unplugging circuit boards and modular connectors. In the past, soldered wire harnesses made removal of sub-assemblies and troubleshooting very difficult.

Delta I Mother Card



### Toroidal Power Transformer

The Delta Series incorporates a new innovation in domestically made cartridge machines, the toroidal power transformer, distinguishable by its doughnut shape. The magnetic core is made of spirally wound magnetic steel, and the primaries and secondaries are wound through the center and

around the core. This design has several advantages over conventional transformers. The first is reduced stray magnetic field. Conventional transformers suffer from significant stray field and designers have had to resort to complex shielding to cancel the stray field at the head. In a toroidal transformer, the field is confined to the core, and very little stray field is emitted—typically one-tenth of a conventional transformer stray field—minimizing the need for

bulky and expensive shielding.

Reduced heat is another advantage. A conventional transformer made to be electrically "quiet" is inefficient, and can be a significant source of heat in a machine. Toroids are far more efficient for the same electrical load. Thus, less heat is produced. This helps lengthen the life of heat sensitive components within the machine.

Generally, a toroidal transformer is considerably smaller than a conventional transformer, making smaller machines possible.

# Electronic Quality

Common, interchangeable printed circuit cards are used throughout the Delta Series to reduce your need to maintain a large parts inventory while making on-site maintenance easier and faster than ever before. The program reproduce amplifier/cue detector p.c. card is common to all Delta Reproducers, as is the reproduce logic p.c. card. And the same microprocessor

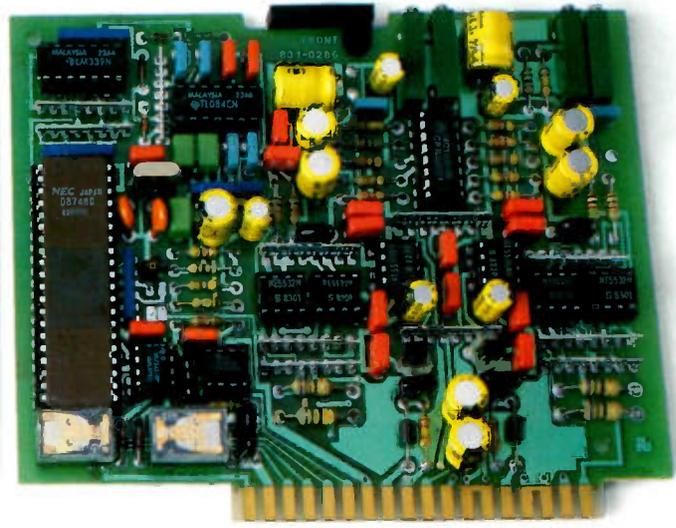
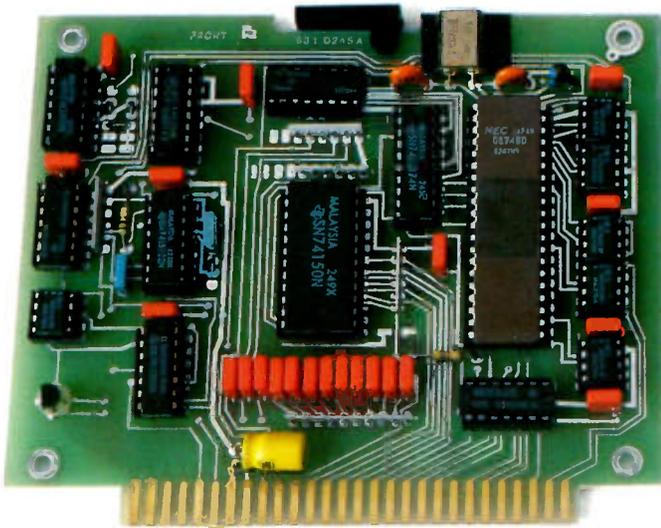
software is used for single-deck, triple-deck and record amplifier logic, reducing the need for costly backup components.

The mother board/daughter board concept is also used throughout. Most active components are located on removable printed circuit boards for ease of service. Transistors and integrated circuits are socketed for ease of service. A full set

of extender p.c. cards are available for servicing.

Machine logic is user definable for all features requiring user interface, or for custom applications.

The Delta proves that good electronic design reliability can go hand in hand. All printed circuit boards are made of G10/FR4 glass epoxy with solder-resist masking. And all components are overrated for their applications.



## Microprocessor Logic

A lot of products, these days, are made with microprocessors that serve no purpose. They're simply marketing gimmicks.

But this is not the case with the Delta Series. Microprocessors make our units more accurate, more reliable, more servicable, more compact, more efficient and more affordable. Best of all, the powerful microprocessor allows inclusion of many features not practical with conventional designs.

They're more accurate because they use digital logic, which means that component drift cannot affect machine operation.

For the same reasons, they're more reliable.

And since you can afford to replace the entire microprocessor, troubleshooting is easy. No more searching for individual components to replace, or faulty discreet circuitry.

Without unnecessary components or discreet circuitry, they're more compact and they require less power.

And they're not only less expensive to run, less expensive to service, and cheaper in terms of reliability, they're actually inexpensive to buy, feature for feature.

## Microprocessor Cue Detection

The Delta Series employs a microprocessor which handles the bulk of the cue detection responsibilities. The circuit is a unique approach to this critical area in cart machine design.

The cue channel signal from the head is amplified, equalized and band-split before being converted to square waves. The resultant four signals are routed to independent ports on the microprocessor. In a proprietary process the microprocessor compares the frequency of each of the signals simultaneously to that of a reference-crystal oscillator.

This makes possible a simple design which, compared to conventional LC or PLL circuits is more accurate, more repeatable and far less susceptible to component drift or misadjustment. In fact, no adjustment is ever required.

## Audio Quality

High performance components are the standard throughout the Delta Series. NE5500 Series operational amplifiers are used for transparent audio and exceptionally low noise. There's extensive use of electrolytic and

monolithic capacitors, as well as metal film resistors. Logic circuits are CMOS, TTL, and low power Schottky.

The electronically balanced output circuitry can be used with or without output transformers. Audio output level is continuously

variable from  $-18$  dBm to  $+18$  dBm. Amplifier distortion is typically less than 0.5% THD at 0 dBm. I.M. distortion is significantly reduced. Audio output impedance is strappable for 150 ohm or 600 ohm loads.

## User Options

The Delta Series offers many opportunities to tailor our equipment to your needs.

- Audio output transformers are standard, providing high isolation. Or you can order a transformerless audio output card to use the electronically balanced audio amplifiers.
- The audio output impedance is factory set to operate into 600 ohm loads. But it may be changed to 150 ohms by moving a strap.
- The audio output level is continuously variable from  $-18$  dBm to  $+18$  dBm, with the amplifier clipping level at  $+20$  dBm. Reproducer equalization is

factory adjusted to meet 1975 NAB standards. It can be set to 1964 NAB standards or CCIR equalization by readjustment.

- End of message tones mute the audio and initiate high-speed recue. This is factory set to occur with the secondary tone, but may be jumpered to use the tertiary tone. A new feature allows either, neither, or both tones to be used at the end of message. High-speed recue may be defeated, if so desired.
- Audio input impedance is normally factory set at 20k ohms bridging. By moving a jumper, it can be changed to 150 ohms or

600 ohms balanced terminating, or to transformerless, electronically balanced bridging input at 20k ohms.

- The audio input level range is from  $-18$  dBm to  $+18$  dBm. Two range control straps in the recording amplifier input circuitry are used to select a nominal input level of  $-6$  dBm or  $+6$  dBm.
- A repeat play lock-out feature can be engaged with a strap change. This prevents the operator from inadvertently playing the same cart twice in a row.
- And the capstan motor speed, normally  $7\frac{1}{2}$  ips, may be changed to  $3\frac{3}{4}$  ips or 15 ips with a strap change.



### Mounting the Delta Series

All units in the Delta Series may be tabletop-mounted or rack-mounted. ITC now makes a universal rack mount designed to accommodate all Delta Series machines, as well as the PD-II, the ESL-IV, and all Series 99 machines.

## Delta Series Features

### MECHANICAL

- Compact size— $\frac{1}{3}$  rack width, 12" deep (D I, II, IV)  
13" deep (D III)  
Height 5 $\frac{1}{2}$ " (D I, II, IV) 10 $\frac{1}{2}$ " (D III)
- Modular construction
- Styling similar to Series 99—neutral colors
- $\frac{1}{2}$ " deck assembly—tool plate aluminum—anodized
- New headblock—stable, compact, allows precision adjustment
- Improved cart guides
- Solenoid electronically controlled
- Capstan motor—D.C. Servo, brushless with ball bearings on magnetic, vapor-honed, stainless steel motor shafts.  
Crystal referenced—can be strapped for 3 $\frac{3}{4}$ , 7 $\frac{1}{2}$ , 15 ips
- XLR-type connectors for audio inputs and outputs
- Vinyl-clad and polycarbonate surfaces for lasting finish and ease of cleaning
- Universal rack mounting
- On D III, all three decks are removable
- Extensive use of mumetal shielding
- Long-life, high quality switches—bifurcated wiping contacts
- All front panel switches illuminated, using five-volt, long-life bulbs

### ELECTRICAL

- Toroidal power transformer
- Extended life, open face, cylindrical heads
- Common p.c. cards for D I, II and III
- Microprocessor control
- State-of-the-art audio using TLO Series and 5500 Series (5532, 34) op-amps
- Electronically balanced input/output. Can be used with or without transformers (input can be bridging)
- Hi-speed recue standard on D I and II
- Full three-cue tone operation standard
- Either 150 Hz or 8 kHz cue detectors can be strapped to initiate hi-speed cue
- Audio muting
- Non-repeat indicator with repeat play lockout
- Flashing record lamp for record set with 1 kHz cue disabled
- D IV front panel controls and indicators:
  1. Normal record (input) metering
  2. Program play (output) metering
  3. 1 kHz defeat (electronically latched)
  4. 1 kHz add (timed tone)
  5. Front panel actuation of test metering mode:
    - a. cue play/cue bias
    - b. program bias
- ICs and transistors socketed
- Solder mask on all printed circuits
- All power supplies regulated
- Full remote controls including lamps
- Detachable line cord
- Strappable level ranges
- Cart cueing standard (Cue switch mutes unless held depressed)
- D IV is universal recording amplifier for use with D I, D II, and bottom deck of D III
- Motor and control electronics (servo) are one assembly—eliminates field matching
- High frequency crystal reference bias (120 kHz)
- Auxiliary start pulse

## Delta Specifications

1. Power Specification
  - A. 105 to 132 VAC or 210 to 264 VAC
  - B. 50/60 Hz
  - C. Power Consumption
    1. Delta I—50 VA Typical; 65 VA Maximum
    2. Delta II—50 VA Typical; 65 VA Maximum
    3. Delta III—120 VA Typical; 135 VA Maximum
    4. Delta IV—5 VA Typical; 10 VA Maximum
  - D. Line Conditioning with EMI Filter
2. Tape Speed
  - A. 7 $\frac{1}{2}$  ips, (19 cm/s) standard; 3 $\frac{3}{4}$  ips (9.5 cm/s); 15 ips (38 cm/s) strappable
  - B. High speed recue—22.5 ips (57 cm/s), nominal
3. Capstan Motor
  - A. Direct drive capstan (10.0 mm diameter capstan shaft)
  - B. Brushless DC servo motor
  - C. Electrolyzed stainless steel shaft, non-magnetic
  - D. Permanently lubricated ball bearings
4. Record/Play Wow and Flutter
  - A. Record/Play maximum 0.15% DIN WTD at 7.5 ips
  - B. Play maximum 0.12% DIN WTD at 7.5 ips
 Tape cartridge length 2 $\frac{1}{2}$  minutes
5. Speed Accuracy
 

Better than  $\pm 0.2\%$
6. Audio Output Configuration and Audio Impedance
  - A. Transformer coupled  
Strappable for 150 ohm or 600 ohm (load impedance) operation (source impedance is 50 ohms or 275 ohms respectively)
  - B. Transformerless output  
(Source impedance is 75 ohms as factory supplied for 600 ohm load; only for electronically balanced output, no transformers)
7. Audio Output Level
 

+18 dBm before clip, w/XFMR, 600 ohm  
+20 dBm before clip XFMR-less, 600 ohm
8. Distortion
 

Reproduce Amplifier: 0.5% or less THD.  
System Distortion: 1.5% or less THD; 0.5% or less 2nd and 3rd harmonic distortion  
Referenced to 250 nWb/m, 1kHz on ScotchCart
9. Noise
  - A. S/N—Measured with bias/no signal; virgin "ScotchCart" tape at 7.5 ips
 

	Mono	Stereo
	58 dB	56 dB
	(or better)	(or better)
  - B. Hum & Noise—No tape running
 

	Mono	Stereo
	60 dB	58 dB
	(or better)	(or better)
  - C. Squelch Noise—70 dB or better
  - D. Reference level of measurements 250 nWb/m at 1 kHz recorded signal
10. Cross Talk
 

Measured at 1 kHz—50 dB min. separation between program channels
11. Frequency Response
  - A.  $\pm 2.0$  dB from 50 Hz —16 kHz
  - B. R/P 0 dB reference; 250 nWb/m at 1 kHz (ScotchCart tape)

12. Equalization
- 1975 NAB cartridge machine standard—adjustable for CCIR (pot. adjustment)
  - Customer option/component reloading in field 7.5 ips only—1964 NAB equalization
  - Fixed low frequency equalization; adjustable high frequency equalization
13. Head Configuration—NAB, Mono/Stereo
14. Cue Signals
- NAB primary cue 1 kHz
  - NAB secondary cue 150 Hz
  - NAB tertiary cue 8 kHz
  - Open collector sinking signal (ground switching) available upon sensing secondary or tertiary cue tones maximum volts 25V, maximum current 200 ma, saturation volts 0.7V at 200 ma
  - Cue detect open relay contacts; closure upon sensing secondary or tertiary cue tones
- Secondary and Tertiary cue detect normally open relay SPDT\*
- \*Contact ratings—1A at 25V DC, 0.5A at 100V AC (resistive). Not to be used with inductive loads
15. Logging Signals
- Not internal to machine
  - Cue audio input and cue audio output available for external use
- Cue Audio Input—Source impedance: 10K ohms or less  
Volts in: .5V ± .25V RMS @ 3.5 kHz\*
- Cue Audio Output—Load impedance: 47K ohms or greater  
Volts out: 500 mv nominal @ 1 kHz, 150 Hz, 3.5 kHz, \* 8 kHz
- \*—10 dBm referenced to 0 dBm @ 160 nWb/m
16. Audio Input Level
- 18 dBm to +18 dBm
  - 2 range control straps on record amp: —6 dBm/+6 dBm center-range
  - Front panel potentiometer range: 0 to at least +12 dB—referenced to each strap
17. Audio Input Configuration
- Input XFMR is normally supplied for 20K ohm balanced bridging
  - Strappable for 600 ohms or 150 ohms terminating
  - Electronically balanced bridging 20K ohms
18. Metering (DIV)/Function Switches
- Front panel switch selection for monitoring (left to right positions on front panel)
    - Meter Rec—monitor input level to recorder—switches automatically to "Meter Play" (monitor output level from playback) when machine is not set to record
    - Meter Play—monitor output level
    - 1 kHz Defeat—prevents the 1 kHz tone from automatically being recorded on the cue track when recording. This mode is indicated when the record set lamp flashes.
    - 1 kHz Add—Places a 1 kHz tone on the tape for a duration of 0.625 seconds when the playback is in the run mode. It is not necessary to hold the 1 kHz record button depressed for the duration of the tone.
  - Internal Meter Switch—Two position slide switch on record amp/meter board—activates only when meter rec and meter play buttons are in "out" position
    - Cue play/cue bias—slide switch in the "left" position for cue functions and record bias; Cue Play—Left Meter  
Cue Bias—Right Meter
    - Record Bias—Slide switch in the "right" position for program bias functions  
Left Program Bias—Left Meter  
Right Program Bias—Right Meter
19. Bias Amplifier  
119.3 kHz Bias Frequency, crystal referenced
20. Tape Capacity
- NAB sizes A and AA (Delta I and Delta III)
  - NAB sizes A, AA, B and C (Delta II)
21. Start Time  
Typically 100 milliseconds  
(Timing dependent upon solenoid air damp adjustment)
22. Stop Time
- Audio squelch stop time typically 2 msec—Tape stop time typically less than 100 msec
  - Tape travel varies according to:
    - Type of cartridge
    - Length of tape
23. Ambient operating temperature range  
10-50 degrees C (50 degrees to 122 degrees F)
24. Manual and Remote Controls
- All front panel indicators and controls (except program bias and cue track metering)
  - Play remotes available via play remote connector
  - Record remotes functions (except metering) available via record remote connector
25. External Connectors
- XLR audio connectors
  - Jones remote connectors
  - Interconnect between play unit and recorder to carry audio and microprocessor control lines
  - Plug-in line cord
26. Mounting
- Table top standard
  - Rack mount (optional rack mount hardware)
27. Dimensions
- | A.        | Width              | Depth | Height             |
|-----------|--------------------|-------|--------------------|
| Delta I   | 5 $\frac{5}{8}$ "  | 12"   | 5 $\frac{1}{4}$ "  |
| Delta II  | 11 $\frac{1}{8}$ " | 12"   | 5 $\frac{1}{4}$ "  |
| Delta III | 5 $\frac{5}{8}$ "  | 13"   | 10 $\frac{1}{2}$ " |
| Delta IV  | 5 $\frac{5}{8}$ "  | 12"   | 5 $\frac{1}{4}$ "  |
- \*Add  $\frac{1}{8}$ " for feet.  
All machines require 3 $\frac{1}{2}$ " additional depth at rear for interconnection.
- Single height rack assembly (for use with the Delta I, II, and IV): requires 7" vertical height
  - Double height rack assembly (for use with all machines): requires 12 $\frac{1}{4}$ " vertical height.
28. Weight (typical)
- Delta I—15 lbs, 6.75 kg
  - Delta II—20 lbs; 9.0 kg
  - Delta III—31 lbs; 13.95 kg
  - Delta IV—8 lbs; 3.6 kg
  - Total shipping weight (including connectors, instruction book, etc.) less than 50 lbs; 22.5 kg

All ITC Equipment is covered by one or more of the following patents: 3,801,043; 3,800,323; 3,809,329; 3,869,719; 3,833,925; 3,932,887; 3,942,189; 4,105,934; 4,040,114; 4,142,221; 4,221,316; 4,101,937; D248,393; 4,153,918; 4,219,167; 4,096,533; D255,793; 4,158,868; 4,978,709; 4,193,103; 4,271,440.



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2425 South Main Street  
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**3M**

## RP SERIES RECORDER/REPRODUCERS

### SPECIFICATIONS

<b>Power:</b>	117 volts, AC, 60 Hz, 77 watts. Other voltage and frequency variations are available on special order.
<b>Tape Speed:</b>	7 1/2 inches per second. Other speeds on special order. Direct drive hysteresis synchronous motor with electrolyzed shaft and instrument type permanently lubricated ball bearings.
<b>Timing Accuracy:</b>	0.1% or better.
<b>Wow and Flutter:</b>	0.2% RMS or less, unweighted.
<b>Audio Input:</b>	-20 to 0 dBm; accepts higher level by changing input pad. 600 ohms balanced. Bridging input available on special order.
<b>Audio Output:</b>	+15 dBm before clipping; normally +5 dBm; 600 ohms balanced. May be strapped for 150 ohms. (+18 dBm available on special order.)
<b>Distortion:</b>	2% or less, record to playback at 0 VU record level.
<b>Noise:</b>	55 dB or better below reference of 400 Hz at 3% THD, unweighted, monophonic. 50 dB or better below reference of 400 Hz at 3% THD, unweighted, stereophonic.
<b>Cross Talk Between Channels:</b>	Better than 50 dB at 1 kHz.
<b>Frequency Response:</b>	±2 dB from 50 to 15,000 Hz.
<b>Equalization:</b>	NAB. Adjustable to compensate for head wear. CCIR available.
<b>Head Configuration:</b>	NAB. Two tracks for monophonic, three tracks for stereophonic. Separate record and reproduce heads permit monitoring while recording.
<b>Cue Signals:</b>	NAB. Primary (stop) Cue, 1 kHz, standard; automatically applied at start of recording (may also be defeated and applied at user's discretion). Secondary cue, 150 Hz, and tertiary cue, 8 kHz, optional; may be applied during recording process or during playback. Individually adjustable oscillator for each tone. Reproducer utilizes adjustable tuned circuit detector for each tone and furnishes relay contact closure for external control.
<b>Metering:</b>	Taut-band movement with "A" scale. Internal meter switch allows selection for metering the following: Program Bias, Peak Recording Level, Normal Recording Level, Program Play, Cue Play, and Cue Bias.
<b>Bias Oscillator:</b>	Push-pull, 82 kHz; individual gates and level controls for program (separate left and right in stereophonic units) and cue.

<b>Tape Capacity:</b>	NAB size A, B, and C cartridges. 2 seconds to 31 minutes with 1 mil lubricated tape at 7 1/2 IPS.
<b>Start Time:</b>	0.1 second.
<b>Stop Time:</b>	0.1 second.
<b>Ambient Temperature:</b>	55 degrees C, 131 degrees F., maximum.
<b>Remote Control:</b>	All indicators and controls except meter switch.
<b>External Connectors:</b>	Latching type. Mating plugs furnished.
<b>Mounting:</b>	Table top mounting. Rack mounting adapters optional.
<b>Dimensions:</b>	17 1/2" width, 11" depth, 5 1/4" height (add 3/4" for feet).
<b>Weight:</b>	39 pounds.

### MODEL DESIGNATIONS

RP Series Recorder/Reproducers accept the NAB "A", "B", and "C" size cartridges and provide the complete recording and reproducing capability. RA Series Recording Amplifiers are designed for field addition to existing WP Series Reproducers.

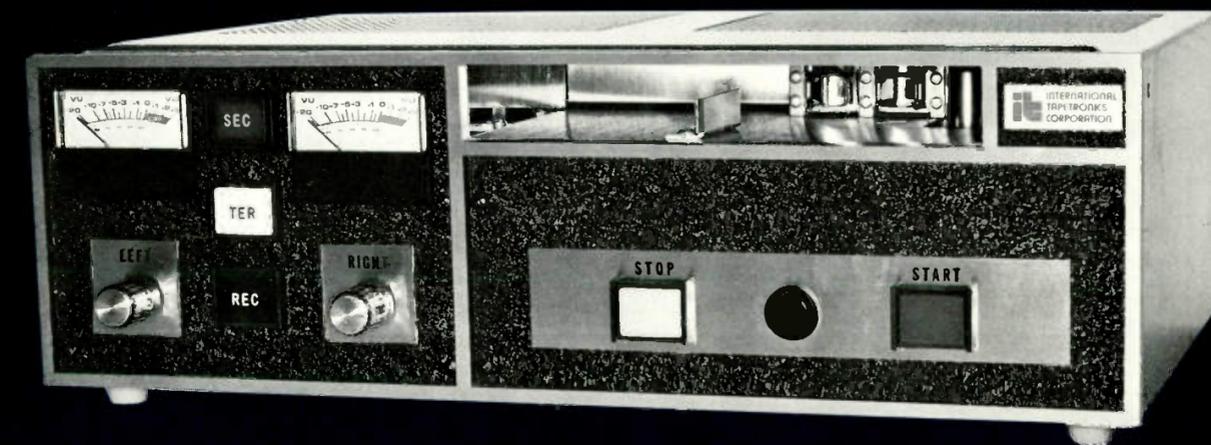
<b>RP-0001</b>	<b>RA-0001</b>	Monophonic with 1 kHz primary cue.
<b>RP-0002</b>	<b>RA-0002</b>	Stereophonic with 1 kHz primary cue.
<b>RP-0003</b>	<b>RA-0003</b>	Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.
<b>RP-0004</b>	<b>RA-0004</b>	Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.
<b>*RP-0005</b>	<b>*RA-0005</b>	Monophonic, Hi-Speed Cue with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.
<b>*RP-0006</b>	<b>*RA-0006</b>	Stereophonic, Hi-Speed Cue with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.

### ACCESSORY

<b>NR-0002</b>	Rack Mounting Kit — mounts one RP Series in 19" equipment rack.
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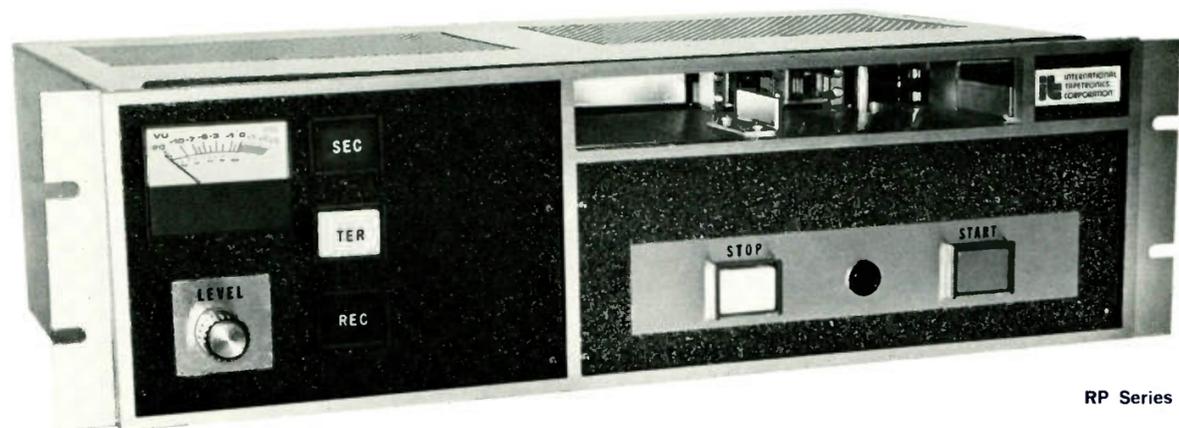
\*NAB-type tape cartridges cannot be reversed. Therefore, the only way to quickly return the tape to "starting position" is to run it forward at a faster speed than the standard 7 1/2 IPS. In the ITC system, Hi-Speed Cue runs at 30 IPS . . . four times faster than the normal speed. Hi-Speed Cue can be operated either manually or automatically. In either case, the machine runs the tape forward at 30 IPS to completion, then automatically reverts to 7 1/2 IPS ready for the next play.

# RP SERIES



**INTERNATIONAL TAPETRONICS CORPORATION**  
2425 South Main Street • Bloomington, Illinois 61701  
Telephone: 309-828-1381

Marketed exclusively in Canada by McCurdy Radio Industries Ltd., Toronto



RP Series

What are the features most needed and most desired by the people who are going to use tape cartridge equipment? ITC engineers have always approached equipment design from the standpoint of the broadcaster. From this very logical approach has come a complete line of cartridge equipment covering the spectrum of broadcasters' needs.

The RP Series Master Recorder/Reproducer is an outstanding example of ITC's design approach. We've combined our RA Series recording amplifier with our WP Series reproducer to provide a compact recorder/reproducer incorporating those features most wanted by broadcasters.

Since reproducer capabilities are described in detail in ITC's SP/WP and 3D Series brochures, we'll concentrate here on the recording amplifier features. And, by the way, all the comments we make about recording amplifiers are also applicable to the WRA Series recording amplifier used in conjunction with the 3D Series reproducers.

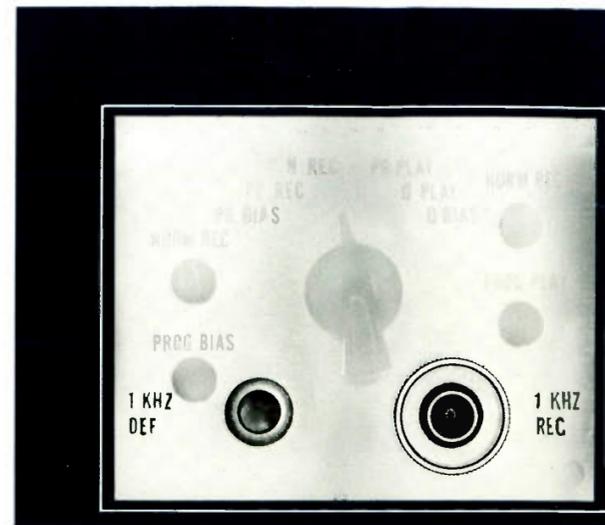
Reliability, audio quality, and operational features were foremost in the minds of ITC engineers during the design of these recording amplifiers. The electronics are totally silicon solid state from the logic circuitry right on through the oscillators and amplifiers which have been designed to assure the transient free quality of audio recordings expected by the most demanding broadcasters.

We've even taken into consideration the varying operator requirements in the design of our front panel level controls. Take your choice . . . use the slotted control recessed behind the panel or add the extender shafts and knobs, furnished with each unit, and you have the traditional control accessible to everyone.

Auxiliary cue tone oscillators (optional) are designed to permit the secondary (150 Hz) and tertiary (8 kHz) tones to be added during the recording process or during playback. You can even add the auxiliary tones to existing cartridges. The secondary tone is normally used to indicate "end of message" either as lamp illumination in live operations or as a contact closure for control of automation systems. The tertiary tone may be used for such things as control for a lamp indication at the beginning and end of a live insert, to provide logging information in an automated system, or to control slide projectors in TV.

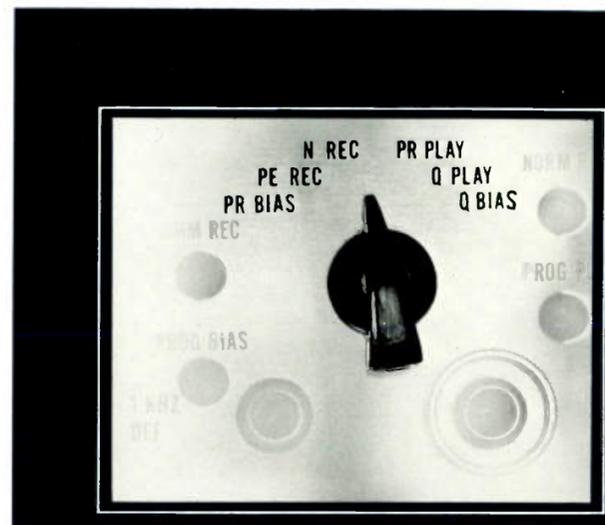
Another optional feature available on the RP Series is the high speed cue capability that permits the rapid advance of the tape (at 4 times regular speed) to the next cue tone either automatically or manually. The 150 Hz secondary cue tone is used for automatic control of the high speed cue function. However, during the recording process, ITC disables the automatic operation to facilitate the recording of multiple cuts on one cartridge.

Yes . . . we've been listening to the people who use cartridge equipment. And the RP Series Master Recorder/Reproducer is the product of this "joint effort".



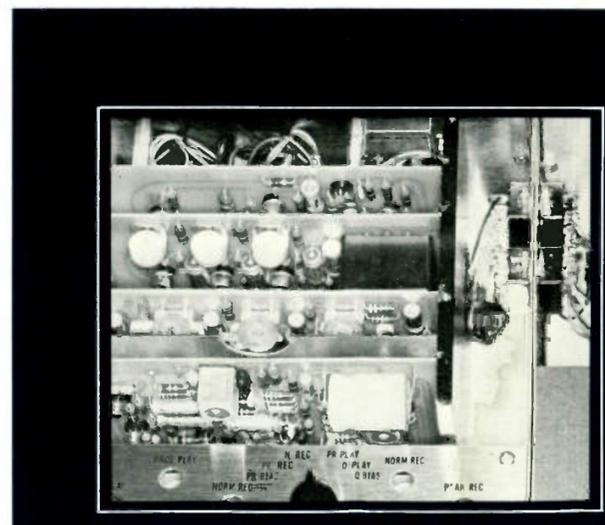
#### Cue Tone Add and Defeat Switches

The 1 kHz Cue Tone Add Switch permits the manual recording of a "stop" tone either during the recording or playback process. This facilitates recording multiple cuts on one cartridge without going through the stop, record set, start routine after each cut. Or, you can add stop tones to previously recorded material. The 1 kHz Cue Tone Defeat Switch allows you to manually inhibit the automatic recording of the 1 kHz stop tone when the machine is started in the record mode. This permits electronic editing in that the recording process may be stopped and restarted without recording a new stop tone. These controls are located behind the front panel to prevent inadvertent operation, but the slide-out housing permits easy access. Or they may be remote controlled.



#### Meter Switch

The six position meter switch may be helpful to both the operator and the maintenance engineer. The operator may wish to visually check (A-B) the input to the recording amplifier against the output of the playback unit, or he may wish to have the meters always provide a playback indication. The Peak Recording Level position provides a meter indication of program level as related to tape saturation. By preventing the meter (in the peak level position) from exceeding the "zero" (100%) indication, the operator can create virtually distortion free recordings. The program and cue bias positions permit rapid check for the operation of the bias oscillators, and the cue play position provides a visual indication that cue tones have been properly recorded and are being received at the cue tone detector.



#### Serviceability

Even the most carefully designed tape recorders sometime need servicing, but here, too, ITC has tried to make your job the ultimate in simplicity. A slide-out housing is standard, and the machine is fully operational when removed from its case. All printed circuit electronics include the latest silicon solid state diodes, transistors, and integrated circuits. Printed circuit cards are of the plug-in variety for ease of replacement or repair, and extender cards are available for added accessibility of components during repair work. In the reproducer, the relays and motor plug-in also. Sheet metal parts are constructed of magnetic stainless steel for maximum shielding and durability of finish.

# "OMEGA" SERIES Specifications

## Power:

- A. 105-133 VAC or 210-264 VAC
- B. 50/60 Hz

## Power Consumption:

- A. Mono Reproducer: 45 VA typical, 65 VA maximum
- B. Stereo Reproducer: 45 VA typical, 65 VA maximum
- C. Mono Recorder/Reproducer: 50 VA typical, 70 VA maximum

## Tape Speed:

- A. 7.5 IPS (19 cm/s) standard
- B. 7.5 IPS (57 cm/s) high speed cue standard
- C. 3.75 IPS (9.5 cm/s) strappable option

## Speed Accuracy:

Better than  $\pm 0.2\%$

## Record/Play Flutter:

- A. Play maximum: 0.12% DIN weighted @ 7.5 IPS
- B. Rec/Play maximum: 0.15% DIN weighted @ 7.5 IPS

## Audio Output Configuration:

Transformer coupled

## Audio Output Impedances:

600 ohm recommended load impedance  
(180 ohm source impedance)

## Audio Output Level:

+18 dBm before clipping into 600 ohm load

## Distortion:\*

System: 1.5% or less THD (Tape dependent)

## Noise:

- A.\* Signal-to-noise: measured with bias/no signal
- | MONO        | STEREO      | MIC-MONO R/P |
|-------------|-------------|--------------|
| 56 dB       | 54 dB       | 51 dB        |
| (or better) | (or better) | (or better)  |

B.\* Signal-to-noise: no tape running; ScotchCart® II cartridge in place

MONO	STEREO
58 dB	56 dB
(or better)	(or better)

- C. Squelch noise: 70 dB or better  
(Noise measurements are 20 Hz - 20 kHz bandlimited, unweighted)

## Crosstalk (system):\*

-50 dB minimum separation between any two channels

## Frequency Response:\*

- A. Playback:  
 $\pm 2.0$  dB, 50 Hz - 16 kHz
- B. R/P-line level input:  
 $\pm 2.0$  dB, 50 Hz - 16 kHz
- C. R/P-MIC level input:  
 $\pm 3.0$  dB, 300 Hz - 10 kHz

## Equalization:

- A. 1975 NAB: Standard
- B. 1964 NAB: Optional
- C. CCIR: Optional

## Cue Signals: (Conform to NAB specification)

- A. NAB primary cue: 1 kHz
- B. NAB secondary cue: 150 Hz

## Audio Input Sensitivity:

- A. Line input: 0 dBm nominal
- B. MIC input: -70 dBV nominal

## Audio Input Configuration:

- A. Line input-transformer coupled:
  1. 20K ohm bridging standard
  2. Strappable for 150/600 ohms terminating impedance
- B. Microphone input:
  1. Unbalanced
  2. Input impedance: 50K ohms

## Metering:

Taut band movement with VU type "A" scale

## Bias:

111.84 kHz, crystal referenced

## Cartridge Size:

NAB A & AA

## Ambient Operating Temperature Range:

50 to 122 degrees F. (10 to 50 degrees C.)

## Mounting:

- A. Table-top standard
- B. Rack-mount optional with URM-0001 rack-mount kit. Filler panels also available

## Dimensions:

- A. Width: 5 $\frac{3}{4}$ " (14.6 cm)
- B. Depth: 15" (38.1 cm)
- C. Height: 5 $\frac{1}{4}$ " (13.34 cm) Add  $\frac{3}{8}$ " (1 cm) for feet

## Weight (Typical):

All machines: 15 lbs. (6.84 kg)  
Total shipping weight: Less than 20 lbs. (9.1 kg) maximum

\*Note: Items indicated (\*) are specified using a ScotchCart® II broadcast cartridge at a reference level of 1 kHz at 250nWb/m.

International Tapetronics Corporation/3M reserves the right to change products and specifications without notice.

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

International Tapetronics Corporation/3M offers a variety of financial options designed to fit your needs. Call today for more information on ITC's complete line of audio equipment.

- 3M HCDA™ 3000 Digital Audio System, "An Achievement"
- The Performance System, 99B Recorders and DELTA Reproducers

- The Economy System, DELTA Recorders and OMEGA Reproducers
  - AUDIO SWITCHER, "The Advantage"
- When newer technology emerges, it will come from International Tapetronics Corporation/3M, "The Leader in Reliability and Service". To order or for more information call toll free 800-447-0414. From Alaska or Illinois, call collect 309-828-1381. In Canada, call Maruno Electronics, Ltd., 416-255-9108.

# Analog Cartridge Machine Systems... To Keep You Competitive Into The Future

# Performance, Reliability and Service

To be a world leader, you must offer customers products designed and built with the highest integrity. In audio tape cartridge machines and related products for professional applications, International Tapetronics Corporation/3M's dominant leadership position comes from superb audio performance, consistent product reliability and the most thorough service support team in the industry.

International Tapetronics Corporation/3M's constant response to the needs of the market has resulted in the most comprehensive offering of quality audio products in our history. From the most basic cost-effective analog tape cartridge machines to today's most sophisticated digital tape machine technology, International Tapetronics Corporation/3M offers you complete systems and individual components to meet your needs and budget requirements. The following pages highlight our analog tape cartridge equipment and related accessory product line.

## A Variety Of Applications

Although audio tape cartridge machines are best known for their use in radio and television for on-air broadcasting of music and commercial messages, they are also used in a wide variety of other applications wherever reliable systems for repeated messages are required.

Airports use cartridge machines to broadcast flight and traffic reports to travelers. Hotels use them to repeat restaurant and lounge locations. At museums, cartridge machines are used to add audio to exhibits. They are also used in sports facilities to play music between action and increase fan participation. In video and film post production houses, cartridge machines are used to add sound effects and music tracks.

When combined with an International Tapetronics Corporation/3M "FB-1" telephone answering interface, businesses use specific ITC cartridge machines in conjunction with 800, 900 or 876 prefix telephone numbers to automatically repeat information regarding products or services to customers. Schools use the FB-1

telephone answering interface with specific ITC cartridge machines to pre-record enrollment dates, course information, sports results or emergency school closures for callers. In radio and television stations dial-in weather information, sports scores, concert dates and the sale of other sponsored services offer steady monthly income.



Where there is a need for reliable message repetition, there is a need for a cartridge machine from International Tapetronics Corporation/3M.

For years radio and television broadcasters have known the tremendous advantages of the audio tape cartridge concept:

### ■ Easy Operation

Recording and playback on a reliable and easy to handle audio tape cartridge

### ■ Instant Start

Audio at the press of a button for complete control of today's fast paced programming

### ■ Automatic Cueing

Recues to the beginning of the selection or cues to the next selection without operator involvement

### ■ Re-Recording And Editing

Cartridges can be recorded again and again and edited or customized at the time of recording

### ■ Source Preservation

Compact discs, vinyl records and other source materials can be preserved as library masters

### ■ Facilitates Playing Correct Cut

Cartridge selections in the control room are easily identified

### ■ Conserves Space

Compact cartridge machine design conserves space in today's tighter installations

## "99B" SERIES Specifications

### Power:

A. 117 VAC or 234 VAC  
B. 50/60 Hz

### Power Consumption:

A. Reproducer/Recorder: 40 VA typical, 60 VA maximum  
B. ELSA cycle: 760 VA typical, 800 VA maximum

### Tape Speed:

A. 7.5 IPS (19 cm/s) standard  
B. 22.5 IPS (57 cm/s) high speed cue standard  
C. 3.75 IPS (9.5 cm/s) & 15 IPS (38 cm/s) available via jumper change

### Speed Accuracy:

± 0.1% maximum deviation

### Record/Play Flutter:

A. Play maximum: 0.12% DIN weighted @ 7.5 IPS  
B. Rec/Play maximum: 0.15% DIN weighted @ 7.5 IPS

### Audio Output Configuration:

Transformer coupled

### Audio Output Impedances:

A. 600 ohm load impedance standard (180 ohm source impedance)  
B. Straddle for 150 ohm load impedance

### Audio Output Level:

A. +25 dBm maximum before clipping into 600 ohm load  
B. May be strapped to provide the following operating ranges without deteriorating signal-to-noise ratio:  
-18 to -1 dBm  
-10 to +7 dBm  
-5 to +12 dBm  
+1 to +18 dBm

### Distortion:\*

System: 0.8% or less THD (Tape dependent)

### Noise:

A.\* Signal-to-noise: measured with bias/no signal  
MONO STEREO  
58 dB 56 dB  
(or better) (or better)

B.\* Signal-to-noise: no tape running; ScotchCart® II cartridge in place  
MONO STEREO  
58 dB 56 dB  
(or better) (or better)

C. Squelch noise: 70 dB or better  
(Noise measurements are 20 Hz - 20 kHz bandlimited, unweighted)

### Crosstalk (system):\*

-50 dB minimum separation between any two channels

### Frequency Response:\*

Record to playback:  
± 1.0 dB, 31.5 Hz - 16 kHz

### Equalization:

A. 1975 NAB: Standard  
B. 1964 NAB: Optional  
C. CCIR: Optional

### Cue Signals (Conform to NAB specification):

A. NAB primary cue: 1 kHz  
B. NAB secondary cue: 150 Hz  
C. NAB tertiary cue: 8 kHz

### Audio Input Sensitivity:

A. +28 dBm @ 0.5% THD (Recorder)  
B. Strappable for the following input ranges (front panel level control set at mid-range):  
-20 dBm  
-10 dBm  
0 dBm  
+10 dBm

## "DELTA" SERIES Specifications

### Power:

A. 105-132 VAC or 210-264 VAC  
B. 50/60 Hz

### Power Consumption:

DELTA I Reproducer: 50 VA typical, 65 VA maximum  
DELTA III Reproducer: 120 VA typical, 135 VA maximum  
DELTA IV Recorder/Reproducer: 5 VA typical, 10 VA maximum

### Tape Speed:

A. 7.5 IPS (19 cm/s) standard  
B. 3.75 IPS (9.5 cm/s) strappable option  
C. 15 IPS (38 cm/s) strappable option

### Speed Accuracy:

Better than ± 0.2%

### Record/Play Flutter:

A. Play maximum: 0.12% DIN weighted @ 7.5 IPS  
B. Rec/Play maximum: 0.15% DIN weighted @ 7.5 IPS

### Audio Output Configuration:

A. Transformer coupled standard  
B. Balanced transformerless operation available via field conversion

### Audio Output Impedances:

A. 600 ohm standard termination impedance (275 ohm source impedance)  
B. 150 ohm optional termination impedance via strap change (50 ohm source impedance)  
C. Transformerless output: 150 ohm source impedance

### Audio Output Level:

A. +18 dBm before clipping into 600 ohm load  
B. +22 dBm transformerless clip level  
C. Variable from 0 level to +18 dBm (Referenced to 1 kHz at 160 nWb/m) Continuously variable "useable" range of -18 dBm to +18 dBm

### Distortion:

System: 1.5% or less THD (Tape dependent)

### Noise:

A.\* Signal-to-noise: no tape running; ScotchCart® II cartridge in place  
MONO STEREO  
62 dB 60 dB  
(or better) (or better)

B.\* Signal-to-noise: measured with bias/no signal; input shorted; virgin cartridge

MONO STEREO  
60 dB 58 dB  
(or better) (or better)

C. Squelch noise—70 dB or better

(Noise measurements are 20 Hz - 20 kHz bandlimited, unweighted)

### Crosstalk (system):\*

-50 dB minimum separation between any two channels

### Frequency Response:\*

Record playback: ± 2.0 dB, 50 Hz - 16 kHz

### Equalization:

A. 1975 NAB: Factory standard  
B. 1964 NAB: Field convertible, via jumper  
C. CCIR: Field convertible  
Adjustments: High frequency via potentiometer

### Cue Signals (Conform to NAB specification):

A. NAB primary cue: 1 kHz  
B. NAB secondary cue: 150 Hz  
C. NAB tertiary cue: 8 kHz  
D. External cue:  
1. Cue record logging input—source impedance: 10K ohms or less volts in: 0.5V ± 25V RMS  
2. Cue reproduce audio output—load impedance: 47K ohms or greater volts out: 0.5V ± 25V RMS

### Audio Input Sensitivity:

A. Line input: 0 dBm nominal  
Input range: -18 dBm to +18 dBm  
(Strappable for -6 dBm or +6 dBm center range)

### Audio Input Configuration:

A. Transformer coupled:  
1. 20K ohm bridging standard  
2. Strappable for 150/600 ohms terminating impedance  
B. Transformerless balanced available

### Audio Input Configuration:

Transformer coupled:  
1. 20K ohm bridging standard  
2. Strappable for 150/600 ohms terminating impedance

### Metering:

A. Taut band movement: VU Type "A" scale  
B. LED peak indicators adjustable to follow tape saturation

### Blas:

256 kHz, crystal referenced

### Cartridge Size:

NAB A & AA

### Ambient Operating Temperature Range:

50 to 131 degrees F. (10 to 55 degrees C.)

### Mounting:

A. Table-top standard  
B. Rack-mount optional with URM-0001 rack-mount kit. Filler panels also available

### Dimensions:

A. Width: 8½" (21.6 cm)  
B. Depth: 15½" (39.4 cm)  
C. Height: 5¼" (13.34 cm) Add ¾" (1 cm) for feet

### Weight (Typical):

Playback: 31 lbs. (14.1 kg)  
Recording Amplifier: 15 lbs. (6.8 kg)  
Total shipping weight: Less than 50 lbs. (22.7 kg) maximum

### ELSA System:

Splice locate: will detect one (1) mil splicing tape thickness minimum, square or diagonal cut  
Automatic phase alignment: ± 20 degrees or less difference between left and right program channels at 10 kHz. Final azimuth mean setting is cartridge dependent and may vary slightly due to cartridge dynamic phase jitter.  
(Measured under steady state conditions after start of ELSA sequence)

Note: Items indicated (\*) are specified using a ScotchCart® II broadcast cartridge at a reference level of 1 kHz at 250 nWb/m.

### Metering:

A. Monitors input level to the recorder; automatically switches to playback when not recording; manually switchable for record/play/bias/cue  
B. Taut band movement with VU type "A" scale

### Blas:

119.3 kHz, crystal referenced

### Cartridge Size:

DELTA I and DELTA III Reproducers: NAB A & AA

### Ambient Operating Temperature Range:

50 to 122 degrees F. (10 to 50 degrees C.)

### Mounting:

A. Table-top standard  
B. Rack-mount optional with URM-0001 rack-mount kit. (Three units may mount side-by-side)

### Dimensions:

A. Width:  
DELTA I Reproducer: 59/16" (14.1 cm)  
DELTA III Reproducer: 59/16" (14.1 cm)  
DELTA IV Recording Amplifier: 59/16" (14.1 cm)

B. Depth:

DELTA I Reproducer: 12" (30.5 cm)  
DELTA III Reproducer: 13" (33 cm)  
DELTA IV Recording Amplifier: 12" (30.5 cm)

C. Height:

DELTA I Reproducer: 57/32" (13.3 cm)  
DELTA III Reproducer: 10 15/32" (26.6 cm)  
DELTA IV Recording Amplifier: 5 7/32" (13.3 cm)  
Add ¾" (1 cm) for feet

Note: All machines require 3½" (8.75 cm) additional depth at rear for interconnection

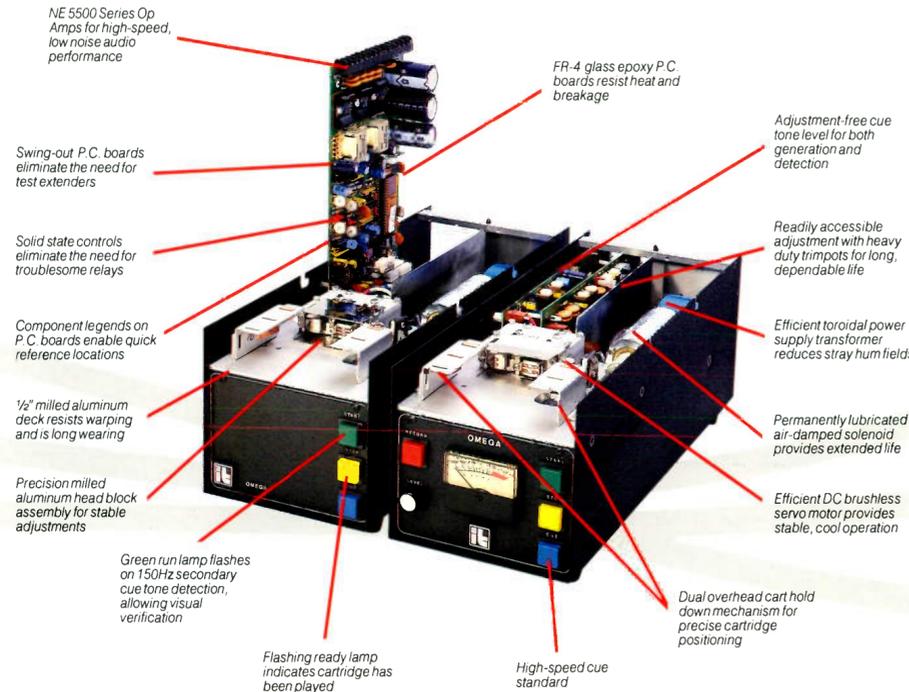
### Weight (Typical):

DELTA I Reproducer: 22 lbs. (10 kg)  
DELTA III Reproducer: 37 lbs. (16.8 kg)  
DELTA IV Recording Amplifier: 13 lbs. (5.9 kg)  
Total shipping weight: Less than 50 lbs. (22.7 kg) maximum

Note: Items indicated (\*) are specified using a ScotchCart® II broadcast cartridge at a reference level of 1 kHz at 250 nWb/m.

# "OMEGA" SERIES

Available in recorder/reproducer and reproducer versions for size A and AA cartridges. High-speed cue and 1kHz and 150Hz NAB cue tones standard.



## Other features include:

- Long life stereo heads
- 150 Hz secondary cue tone generation and detection standard. Detection mutes the audio, thereby reducing on-air noise
- Recorder has built-in microphone preamplifier
- Cart played indication and cart replay lock-out reduce possible operator errors
- Microprocessor design virtually eliminates all troublesome relays and discrete components of other designs
- Crystal referenced cue tone and bias frequencies further eliminate adjustments
- Self-wiping contacts in front panel switches for long life
- Rear panel screw connections provide convenient connection for audio and remote control circuits
- Polycarbonate front panel overlay resists dirt
- Security latching top cover, removable for maximum accessibility

# Components Of A Complete Cartridge Machine System

## DCM-1 Dynamic Cartridge Monitor

The DCM-1 Dynamic Cartridge Monitor automatically evaluates minute changes in cartridge tape speed by monitoring a special reference tone located on a previously unused portion of the cue track. When this performance diminishes to your predetermined in-house limit, your operators can remove the cartridge from service.

An easy to read color LED display indicates when a potential cartridge or machine problem may exist. The DCM-1 monitor can even be connected to a remote alarm or automatic logging device.

The Encoder/Decoder version operates automatically during the normal recording process applying a reference tone on the unused portion of the cartridge cue track. It can also encode already recorded cartridges. The Decoder only model is used for monitoring an encoded cartridge and can be connected to up to six playback decks, monitoring one cartridge at a time as playback occurs without degradation of audio quality.

The DCM-1 Dynamic Cartridge Monitor works with any ITC analog cartridge machine and with most brands of broadcast cartridges.

## ESL V Eraser/Splice Locator

The ESL V eraser/splice locator combines erasing and splice locating into one easy, automatic step ensuring consistent high quality audio reproduction from cartridge to cartridge. This eliminates the tedious task and inconsistency of manually bulk erasing cartridges and visually locating splices.

Microprocessor control assures a clean, deep erasure everytime eliminating unwanted program material and noise. High-speed splice locate (30 IPS) frees the operator from visually locating the tape splice. The operator can then perform other tasks, such as cueing tapes, pre-reading copy, locating sound effects or music while the ESL V eraser/splice locator properly prepares the cartridge for recording.



DCM-1 Dynamic Cartridge Monitor



ESL V Eraser/Splice Locator

## ESL V Specifications

### Tape Speed:

- A. Splice locate cycle: 30 IPS (76.2 cm/s)
- B. Erase cycle: 1.875 IPS (4.76cm/s)

### Erase Depth: (Using ScotchCart® II Broadcast Cartridge)

- A. -55 dB, handlimited (20 Hz-20 kHz)
- B. Typical residual coherent noise, 75 dB below 1 kHz, recorded at 250 nWb/m

**Cartridge Size:**  
NAB A & AA

### Cycle Time (Typical):

- Complete erase/splice locate cycle**
- A. Standard Configuration: 30 seconds ERASE, plus 1/4 total tape time
- B. Optimized for ScotchCart® II Broadcast Cartridge: 22 seconds ERASE, plus 1/4 total tape time

### Splice Detection Sensitivity:

Detector senses 1/2 mil or greater tape thickness change

# Component Systems To Keep You Competitive

The broadcasting industry today is involved in a major revolution...a competition like it has never faced before. The battle being waged to obtain the attention of the audience's ear has never been greater. Not only do broadcasters compete head-to-head for audience share, they must now consider a new generation of listeners accustomed to hearing higher quality sound.

To keep you competitive into the future, we recommend one of two cost-effective Component Systems: The Performance System or The Economy System. Your choice is dependent upon your needs. Only one manufacturer...International Tapetronics Corporation/3M...is able to offer systems like these which comprise all five essential components:

- Premium Grade Tape Cartridge
- Tape Cartridge Preparation
- Quality Recorder
- Quality Reproducer
- Dynamic Cartridge Monitor

Together, these five perfectly matched components constitute the systems approach needed to keep you

competitive into the future by producing consistent, high quality sound.

## Premium Grade Tape Cartridge

The ScotchCart® II broadcast cartridge should be an integral part of both The Performance System and The Economy System. It is capable of frequency response equalling professional reel-to-reel performance. A revolutionary design eliminates pressure pads and utilizes a non-rotating hub to clearly outperform conventional cartridges. With five times the life of its nearest premium grade cartridge competitor and superior audio performance, the ScotchCart® II broadcast cartridge is the best value ever.

## Tape Cartridge Preparation

To insure audio consistency from one cartridge to another, cartridge preparation is necessary. With The Performance System, cartridge preparation is built into the 99B recorder/reproducer through the patented ELSA feature. The recorder will automatically

(1) erase the tape, (2) locate the splice and (3) phase align the record head. With The Economy System, an ESL V eraser/splice locator will (1) erase the tape and (2) locate the splice.

## Quality Recorder

The recording process, more than anything else, determines the quality of audio during playback. For this reason, the 99B recorder/reproducer with ELSA was selected as the recorder for The Performance System. In The Economy System, the DELTA series recorder/reproducer offers excellent recording capabilities and many of the features of the 99B recorder.

## Quality Reproducer

The Performance System utilizes proven DELTA series reproducers designed for superb audio and today's limited space requirements. In The Economy System, OMEGA series reproducers provide excellent audio quality when used in conjunction with DELTA series recorders.

## Dynamic Cartridge Monitor

The DCM-1 Dynamic Cartridge Monitor, a recommended component of both The Performance System and The Economy System, is designed to maintain audio consistency and advertiser satisfaction. The DCM-1 Dynamic Cartridge Monitor can optimize cartridge life and performance by identifying worn out or problem cartridges before an on-air failure occurs. The DCM-1 monitor is fully automatic and requires no user intervention once installed.

Now with either The Performance System or The Economy System, you are ready to compete with the on-air sound of digital technology while enjoying the superb price/performance benefits of analog technology from International Tapetronics Corporation/3M.

Although Component Systems are recommended, all ITC analog machines are available separately, in any quantity, and in both monophonic and stereophonic versions.

## The Performance System



## The Economy System



# A Complete Line Of Analog Recorders And Reproducers

Loaded with features, the 99B series delights the most discriminating user and listener. Central to the 99B series is the patented ELSA feature found in the recorder. The ELSA cartridge preparation feature automatically erases the cartridge, locates the splice and azimuth aligns the record head for maximum phase response performance. The 99B series standard features include:

- Patented ELSA cartridge preparation
- 3 cue tone
- High-speed cue
- Microprocessor controlled logic
- Crystal referenced phase lock loop DC brushless servo motor
- Mono or stereo recorders and reproducers



**"99B" SERIES**

The DELTA series consistently meets the tough requirements of professionals who demand outstanding audio performance in a reliable, mid-priced mono or stereo cartridge machine. Standard features include:

- DELTA I single deck or space saving DELTA III triple deck reproducers
- 3 cue tones
- High-speed cue on DELTA I reproducer
- Microprocessor controlled logic
- Crystal referenced phase lock loop DC brushless servo motor
- DELTA IV recording amplifier converts a DELTA I reproducer or the bottom deck of a DELTA III reproducer into a recorder



**"DELTA" SERIES**

The OMEGA series embodies quality at an affordable price. Standard features include:

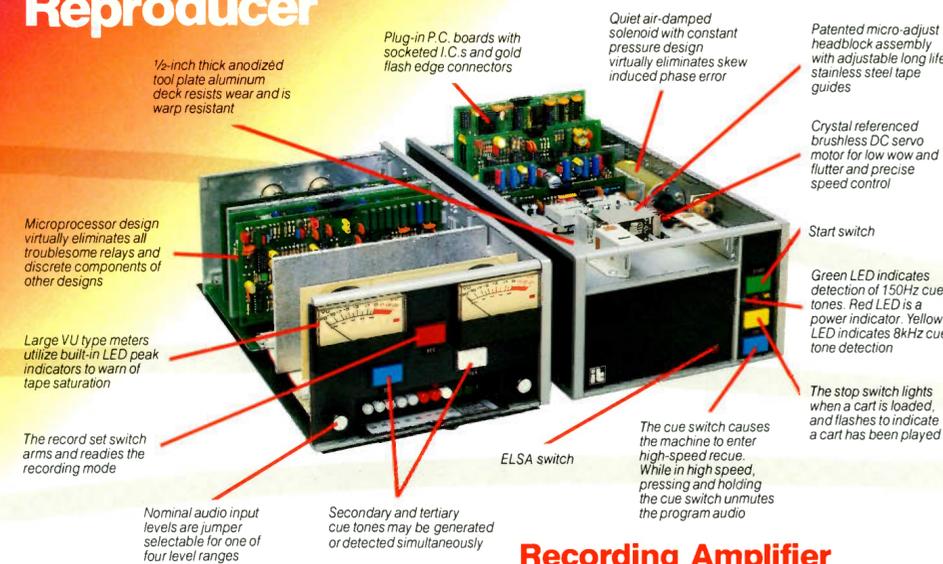
- 2 cue tones
- High-speed cue
- Microprocessor controlled logic
- Crystal referenced phase lock loop DC brushless servo motor
- Mono recorder and either mono or stereo reproducers
- Recorder with built-in microphone preamplifier



**"OMEGA" SERIES**

## "99B" SERIES Recording Amplifier And Reproducer

Available in recorder/reproducer and reproducer versions for size A and AA cartridges. Hi-speed cue and all NAB cue tones standard.



Microprocessor design virtually eliminates all troublesome relays and discrete components of other designs

Large VU type meters utilize built-in LED peak indicators to warn of tape saturation

The record set switch arms and readies the recording mode

Nominal audio input levels are jumper selectable for one of four level ranges

Secondary and tertiary cue tones may be generated or detected simultaneously

Plug-in P.C. boards with socketed I.C.'s and gold flash edge connectors

Quiet air-damped solenoid with constant pressure design virtually eliminates skew induced phase error

Patented micro-adjust headblock assembly with adjustable long life stainless steel tape guides

Crystal referenced brushless DC servo motor for low wow and flutter and precise speed control

Start switch

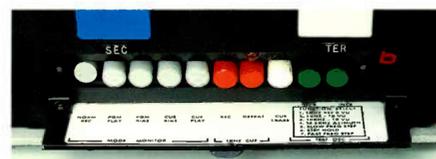
Green LED indicates detection of 150Hz cue tones. Red LED is a power indicator. Yellow LED indicates 8kHz cue tone detection

The stop switch lights when a cart is loaded, and flashes to indicate a cart has been played

ELSA switch

The cue switch causes the machine to enter high-speed cue. While in high speed, pressing and holding the cue switch unmutes the program audio

### Recording Amplifier Special Functions Panel



#### Easily Accessible Color-Coded Switches

Convenient color-coded push buttons provide control of special machine functions. The 1 kHz cue record and defeat switches (red switches) permit addition and deletion of stop tones. A cue erase facility (white switch) allows erasure of any information recorded on the cue track without affecting program material. A test tone generator (green switches) offers seven functions and an LED displays mode identification.

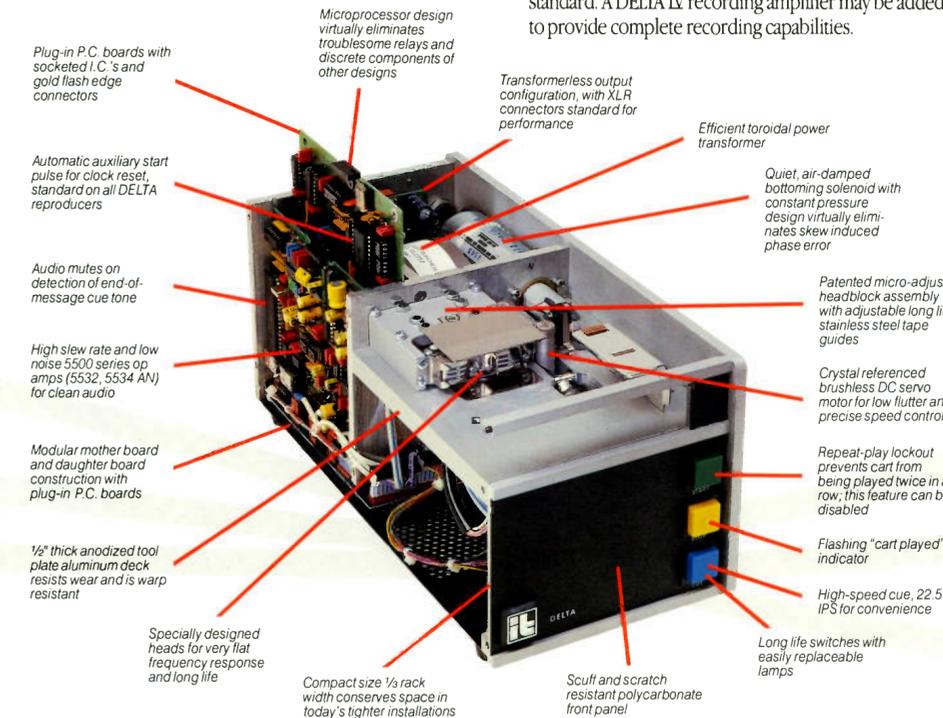
#### Other features include:

- Specially designed heads for very flat frequency response and long life
- Audio mutes on detection of end-of-message cue tone
- Multi-turn trimpots
- Full remote control through rear panel connection
- XLR audio connections

## "DELTA" SERIES

### "DELTA" I Reproducer

A stand-alone single deck reproducer, for size A and AA cartridges. High-speed cue and all NAB cue tones standard. A DELTA IV recording amplifier may be added to provide complete recording capabilities.



Plug-in P.C. boards with socketed I.C.'s and gold flash edge connectors

Automatic auxiliary start pulse for clock reset, standard on all DELTA reproducers

Audio mutes on detection of end-of-message cue tone

High slew rate and low noise 5500 series op amps (5532, 5534 AN) for clean audio

Modular mother board and daughter board construction with plug-in P.C. boards

1/2" thick anodized tool plate aluminum deck resists wear and is warp resistant

Specially designed heads for very flat frequency response and long life

Compact size 1/2 rack width conserves space in today's tighter installations

Transformerless output configuration, with XLR connectors standard for performance

Efficient toroidal power transformer

Quiet, air-damped bottoming solenoid with constant pressure design virtually eliminates skew induced phase error

Patented micro-adjust headblock assembly with adjustable long life stainless steel tape guides

Crystal referenced brushless DC servo motor for low flutter and precise speed control

Repeat-play lockout prevents cart from being played twice in a row; this feature can be disabled

Flashing "cart played" indicator

High-speed cue, 22.5 IPS for convenience

Long life switches with easily replaceable lamps

Record amplifier interconnect cables mate with rear panel connectors on DELTA I or DELTA III reproducers to provide power, logic, and head lead interconnection

### "DELTA" IV Recording Amplifier

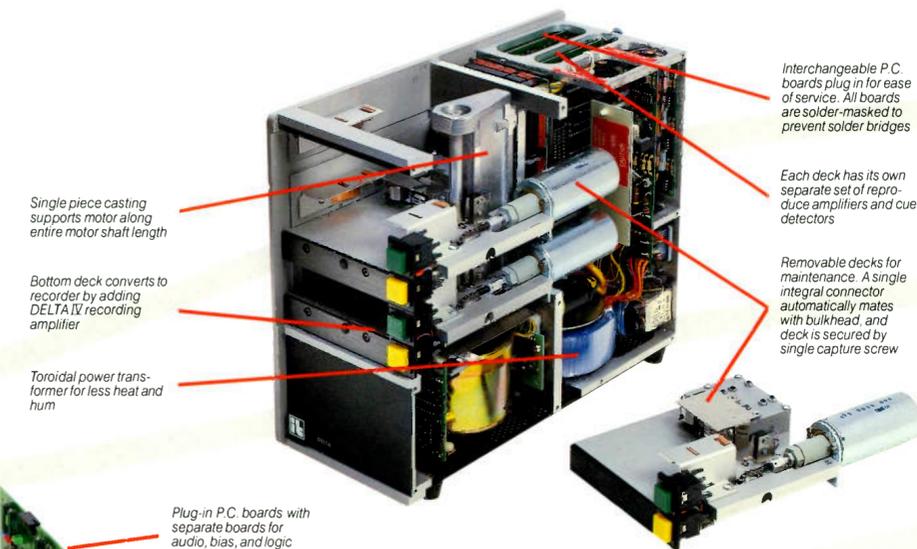
With the addition of a DELTA IV recording amplifier, a DELTA I reproducer or the bottom deck of a DELTA III reproducer can be converted to a recorder.

#### Other features include:

- Digital cue tone detection eliminating cue tone component adjustments
- Multi-turn trimpots
- Full remote control available through rear panel connection
- XLR audio input connections
- International I.E.C. type AC connector with removable cord and integral RFI filtering
- Easily removable top covers for service access. Extender P.C. boards are available
- Quiet internal variable speed fan supplements convection cooling in the DELTA III reproducer
- Dual overhead cart hold down mechanism for precise cartridge positioning

### "DELTA" III Reproducer

Three independent reproduce only decks in a space of two single decks! Narrow size allows three across rack mounting for 9 slots in a 19-inch rack! Add a DELTA IV recording amplifier, and record on the bottom deck.



Single piece casting supports motor along entire motor shaft length

Bottom deck converts to recorder by adding DELTA IV recording amplifier

Toroidal power transformer for less heat and hum

Plug-in P.C. boards with separate boards for audio, bias, and logic

Group delay compensated, low distortion recording amplifier

Precision, crystal referenced bias and cue tones for no drift and low distortion

Front panel meters with simulated VU ballistics and "A" scale. Meters automatically switch between record (input) and reproduce (output)

Record set switch

Secondary and tertiary cue tone record switches

Independent front panel input level controls. Knobs may be removed, and holes capped, to prevent level tampering

Convenient meter selection switches allow front panel selection of record, play, cue or bias indications

Front panel controls for 1kHz cue tone add and defeat

### Rack Mounting



All ITC analog cartridge machines may be table top mounted, or rack mounted in ITC's URM-0001 rack mount accessory. This unique design is expandable vertically to accommodate any current ITC designed machine.

# Product Guide

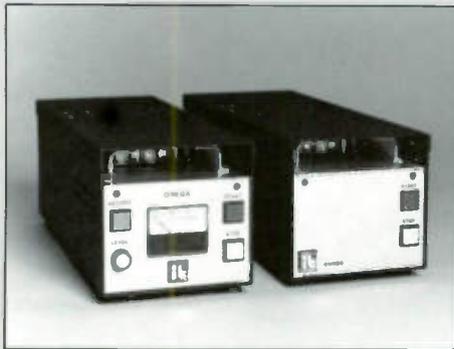
Effective June 1, 1986

**NEW**

## OMEGA Series,

"Affordable Performance You Can Trust"

OMEGA Monophonic Reproducer  
OMEGA Stereophonic Reproducer  
OMEGA Monophonic Recorder/  
Reproducer



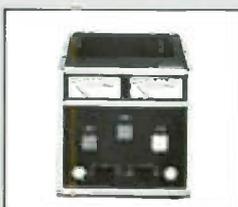
The OMEGA series embodies ITC quality at an affordable price with features to delight everyone.

- 150 Hz secondary cue tone standard on all models
- DC brushless servo motor for low wow and flutter and stable long-term speed
- Rugged modular design for easy servicing
- Microprocessor technology
- Compact size for today's tighter studio limitations
- Flashing ready lamp indicates cartridge has played
- Recorder has built-in microphone preamplifier
- Monophonic reproducer upgrades to stereophonic
- Accommodates 105-132V or 210-264V, 50/60 Hz line voltages. May be configured to operate on most worldwide equalization and record fluxivities. NAB 1975 operation standard. NAB "A" size cartridges. 1/3 rack width, rack mounting optional.

The OMEGA series offers audio quality and reliability for on-air and production room uses. When attached to an ITC "FB-1" telephone interface, the OMEGA series also becomes a cost effective machine for automatic dial-in weather, sports, and concert information. It can also be used to perform a variety of newsroom and research functions.

## DELTA Series,

"Today's Most Popular  
Cartridge Machines"



DELTA I Single Deck Reproducer, NAB "A" size cartridges, 1/3 rack width.  
DELTA III Triple Deck Reproducer, NAB "A" size cartridges, 1/3 rack width.  
DELTA IV Recording Amplifier, 1/3 rack width.

The DELTA series consistently meets the tough requirements of broadcasters and professionals who demand outstanding audio performance in a reliable, mid-priced mono or stereo cartridge machine.

- DELTA IV recording amplifier converts DELTA reproducers and bottom deck of DELTA III reproducers to recorders
- 150 Hz and 8 kHz cue tones standard on all models
- DC brushless servo motor. High-speed cue standard on DELTA I reproducers
- Microprocessor controlled logic and cue detection
- High-speed op amps for outstanding audio performance
- Modular construction for easy servicing
- Optional balanced transformerless operation
- Cart played indication and replay inhibit
- Accommodates 105-132V or 210-264V, 50/60 Hz line voltages. May be configured to operate on most worldwide equalization and record fluxivities. NAB 1975 operation is standard. Rack mounting is optional.

These features and many more make the DELTA series today's most popular cartridge machines.

*(Continued on reverse side.)*

## 99B Series, "The Best"

99B Series Monophonic Reproducer  
99B Series Stereophonic Reproducer  
99B Series Monophonic Recorder/  
Reproducer with ELSA  
99B Series Stereophonic  
Recorder/Reproducer with ELSA



Loaded with features, the 99B series delights the most discriminating engineer, operator and listener. The ELSA cartridge preparation system automatically erases the cartridge, locates the splice and azimuth aligns the record head for maximum phase response performance making the 99B series the only cartridge machine of its kind in the world.

- ELSA system
- DC brushless servo motor with high-speed cue
- Microprocessor controlled logic and cue detection
- Built-in test tone generator in recorder version
- Cart played indicator and replay inhibit
- Modular construction for easy servicing
- High speed op amps for outstanding audio performance
- Power transformer taps allow operation at most commercial line voltages found worldwide, 117/240V, 50/60Hz. Accommodates most popular cartridge equalization and record level standards. NAB 1975 operation is standard. NAB "A" size cartridges, 1/2 rack width, rack mounting available.

If you desire both engineer and operator convenience while providing crisp, clean and consistent sound for your listeners, your choice will invariably be the 99B series.

**NEW**

**ESL V**  
Eraser/Splice  
Locator



Saves time and improves on-air sound. Combines erase and splice locating into one easy step. Designed to erase today's high-output, low-noise tapes. Operates on 105-132 or 210-264 VAC, 50/60 Hz.

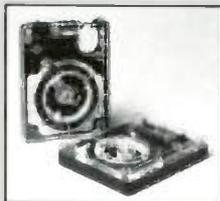
**FB-1**  
Telephone  
Answer-Only  
Interface



Connects directly to the rear panel of any ITC cartridge machine (except the DELTA series) for unattended answer-only telephone applications. Applications include, automatic dial-in weather, sports and concert information, as well as a variety of newsroom and research functions. FCC registered.

**NEW**

**ScotchCart II**  
Broadcast  
Cartridges



The ScotchCart® II broadcast cartridge represents a revolutionary development in cartridges. No pressure pads, no rotating hub and constant tension arm insure low wow and flutter, excellent frequency response and low distortion performance.

ITC reserves the right to change products and specifications without notice.

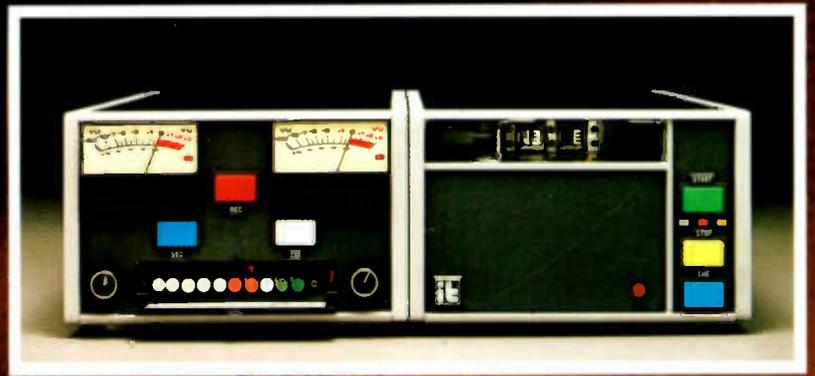
## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

More International Tapetronics Corporation/3M cartridge machines are installed in radio stations around the world each year than all other manufacturers' cartridge machines combined. All new ITC equipment carries a two year warranty on parts and factory labor.

When newer technology emerges, it will come from International Tapetronics Corporation/3M.

**TO ORDER OR FOR MORE INFORMATION, CALL  
TOLL FREE 800-447-0414.**

From Alaska and Illinois, call collect 309-828-1381.  
In Canada, call Maruno Electronics, Ltd., 416-255-9108.



Better listening  
through  
better design

The new  
99B Cartridge Machines  
from



# Computerized control, the latest solid-state electronics, and advanced mechanical features, provide reel-to-reel sound from cartridge tapes.

## Does It Sound Better?

The ultimate measure of a better audio tape machine is, "Does it sound better?" The ITC Series 99B cartridge machine does sound better, consistently. Crisper. Cleaner. There are solid reasons—both mechanical and electrical—to support this measurable improvement in performance.

We built a strong foundation—the rugged deck that has become synonymous with ITC quality. We've added a new, crystal-referenced servomotor; a positive, true positioning solenoid<sup>1</sup>; a micro-adjust head module<sup>2</sup>; and a distortion-free cartridge positioning system. These features provide tape handling precision previously found only in reel-to-reel machines. Never before in a cartridge machine. The benefits: reduced wow and flutter, improved azimuth (phase) stability, and improved long-term speed accuracy.

Couple this improved tape handling with a new, exclusive ITC head design<sup>2</sup> and you have a base for utilizing the most advanced electronics available for audio recording. The system design provides a frequency response truly flat to within  $\pm 1$  dB for every frequency from 31.5 Hz to 16 kHz. And, our heads are constructed of durable materials with an average life expectancy ten times that of common lamination-type heads.

The new machines are as advanced electronically as they are mechanically. A microprocessor controls electronic logic functions, and additionally controls cue tone generation and detection. Program electronics make use of the most advanced, low noise, bi-polar and BIFET OP amps. Head-room, transient response, and square wave performance are all improved dramatically. The new machines meet or surpass all NAB cartridge standards covering audio performance. You can readily hear the difference!

## New Operator Convenience

In addition to outstanding performance, the machines offer the operator new control and new convenience. High-speed cue is

standard, with added operational flexibility. We've retained the versatile meter selection, and stop-tone add and defeat switches. And we've improved these features by replacing human logic with microprocessor control. We've added cue track erase, and the convenience of front panel access to all these controls. VU-type meters are larger, and have built-in LED peak indicators which follow tape saturation. There's even automatic meter switching between the record and playback modes. Perhaps the most important feature is the automatic cartridge preparation system—ELSA<sup>3</sup>. It automatically bulk erases, azimuth (phase) aligns the recording head, erases again, and locates the splice, in preparation for superb quality audio tape recording.

## Simplified Maintenance

The engineer will find that ITC reliability and serviceability are even greater. Heat has been reduced dramatically. The design concept is modular, with plug-in sub-assemblies. The elimination of unnecessary adjustments, the addition of significant calibration controls, and a new microprocessor controlled multifunction test-tone generator simplify and reduce maintenance time.

## New State-of-the-Art

These are truly machines of a new generation, virtually self-controlled, and combining great new sound with unprecedented reliability and freedom from most of the maintenance chores of the past.

## Compatible With Present Generation Machines

Tape cartridges recorded on the new generation machines can be played on existing ITC machines, with a noticeable improvement in sound. For optimum results—true reel-to-reel sound quality—cartridges must be recorded and played on ITC's Series 99B cartridge equipment.

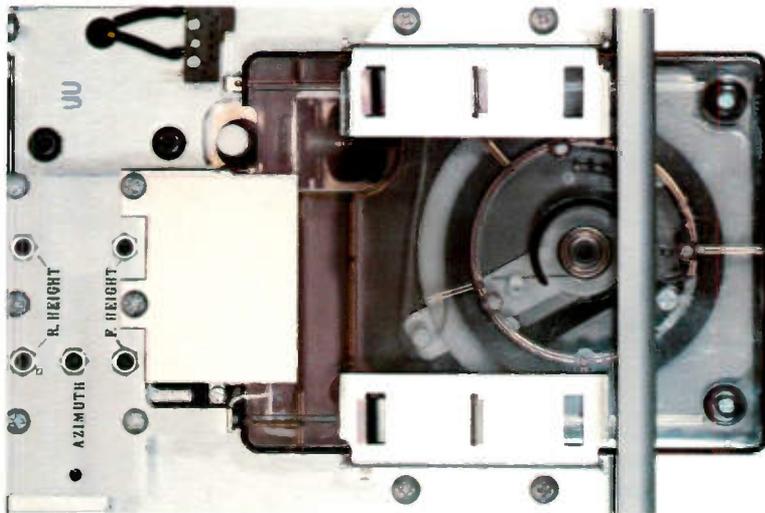
<sup>1</sup>Patent 4,158,868

<sup>2</sup>Patent 4,193,103

<sup>3</sup>Patent 4,142,221



# A new generation of electronic and mechanical excellence.



## Cartridge Positioning Mechanism

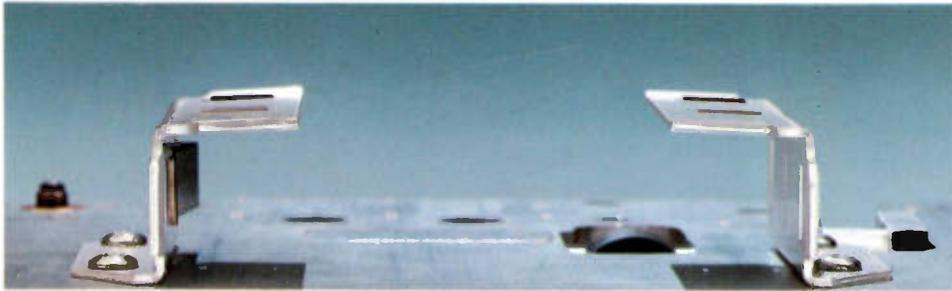
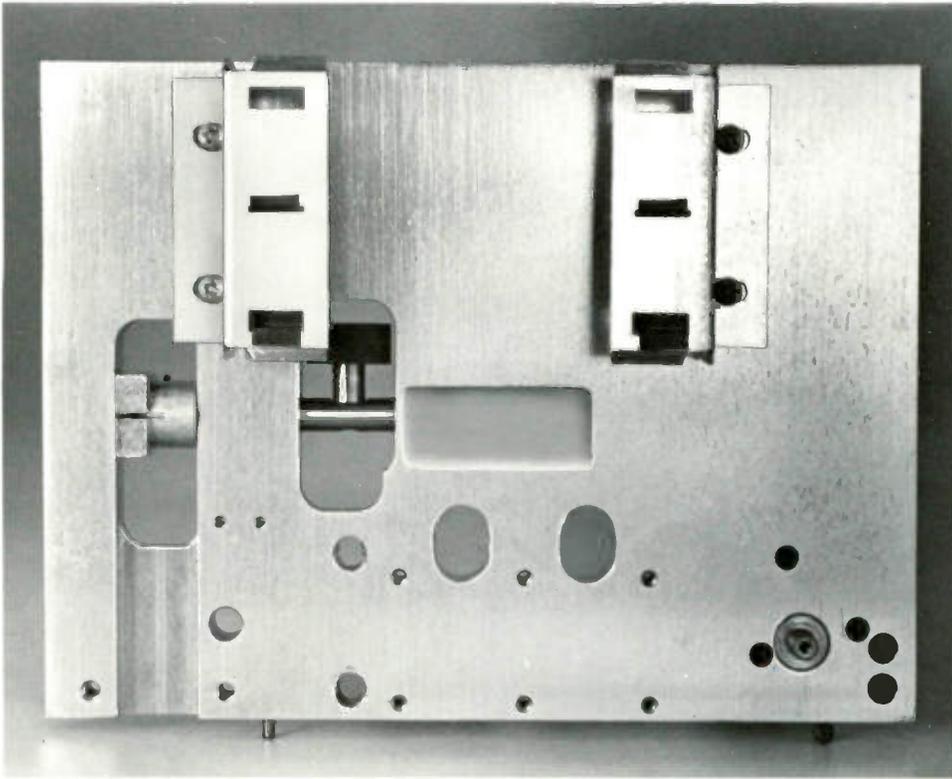
The cartridge guidance puts its pressure on the load-bearing outer rails of the cartridge. This holds the cartridge firmly in position without distorting the cartridge and altering tape travel. A side-pressure spring on the left side pushes the cartridge to the proper side location. This system assures precise, rigid alignment of tape and head, even when cartridge insertion is hurried or careless.

## Servo-Motor System

A newly designed, professional, brushless DC capstan motor, coupled with a crystal-referenced, phase frequency locked servo control system, have dramatically reduced wow and flutter and improved long-term speed stability. Flutter averages .1% or less DIN weighted (1975 NAB standard). Long term tape speed accuracy is .1%. With the simple change of a jumper, tape speed can be changed from the standard 19 cm/s (7-1/2 ips) to either 9.5 cm/s (3-3/4 ips) or 38 cm/s (15 ips), and speed can be varied (by using an external frequency source) for additional flexibility.

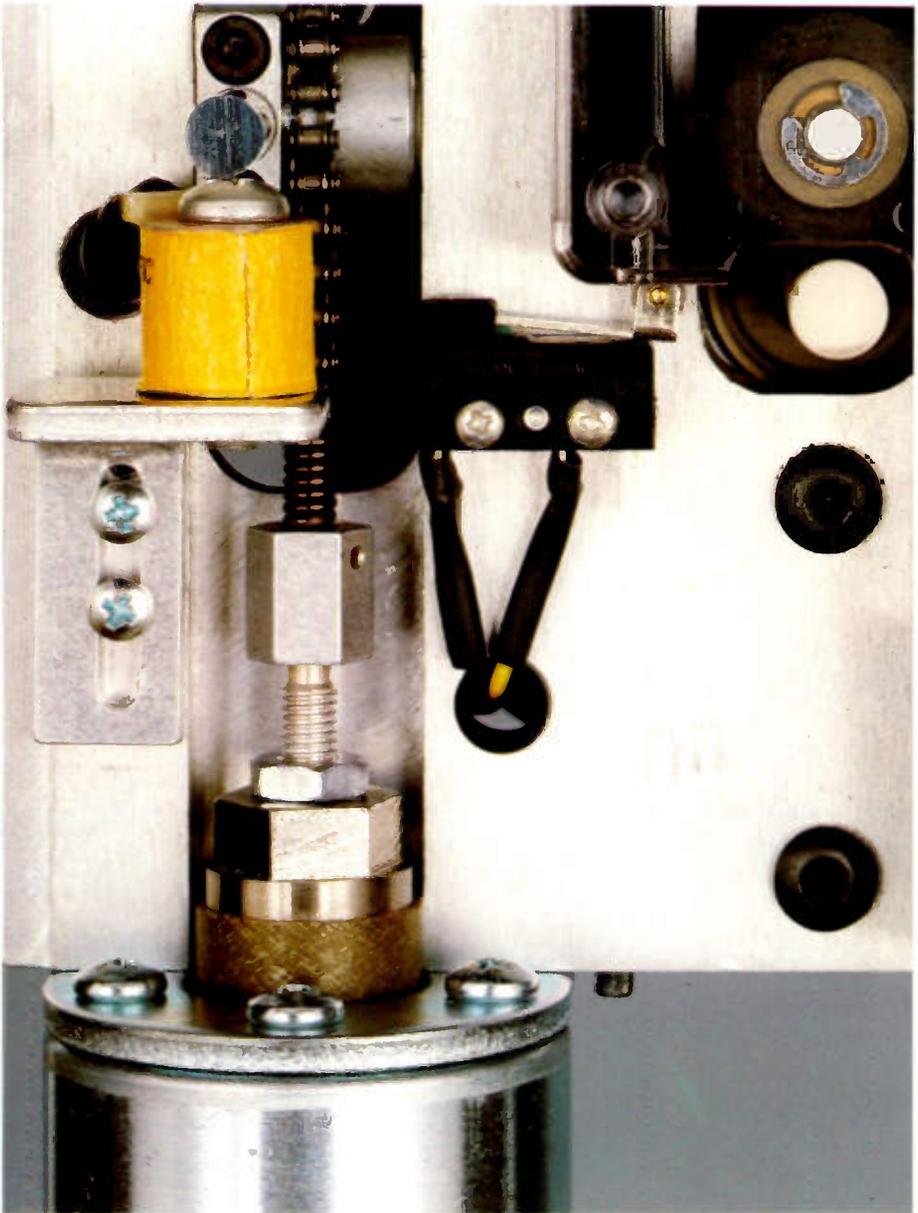
The DC servo-motor requires only 1.6 watts to drive the tape, and only requires .5 watts when idling. This results in much cooler operation—a 15 watt reduction from our old AC motors—and helps eliminate the need for a ventilated housing.





### Stable, Machined-Aluminum Deck Plate

ITC's deck is milled from half-inch thick, solid aluminum tool plate. It will not warp or groove like die castings, which may take years to stabilize. The thick plate is machined on numerically controlled mills for absolute precision and uniformity. The deck is then anodized to harden the cartridge slide surfaces and to provide an attractive, durable finish. This heavy-duty deck plate, along with the heavy, cast-aluminum housing, provides exceptional rigidity in the machine.



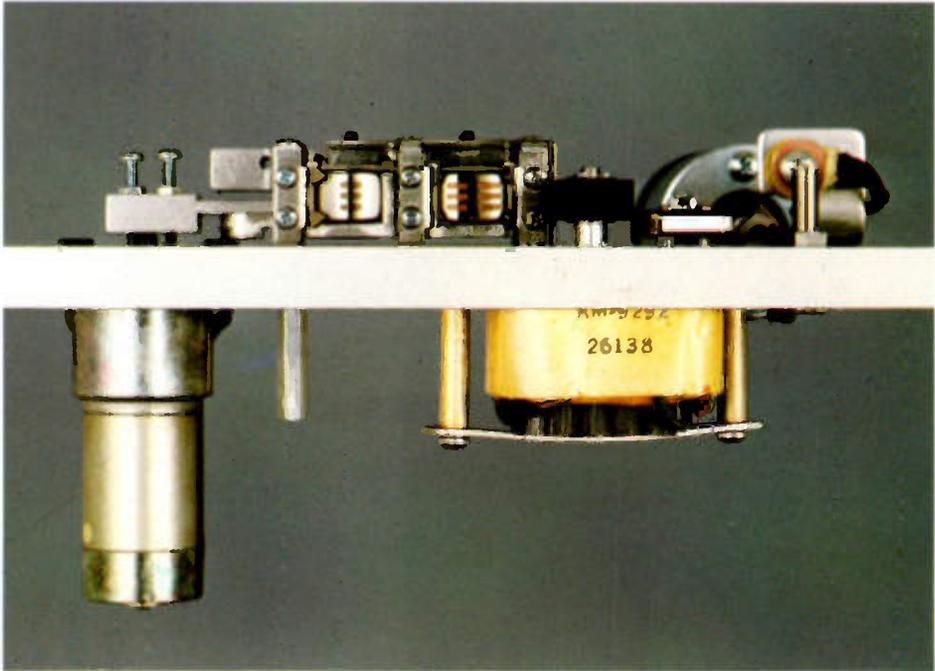
**Positive, True Positioning Solenoid**

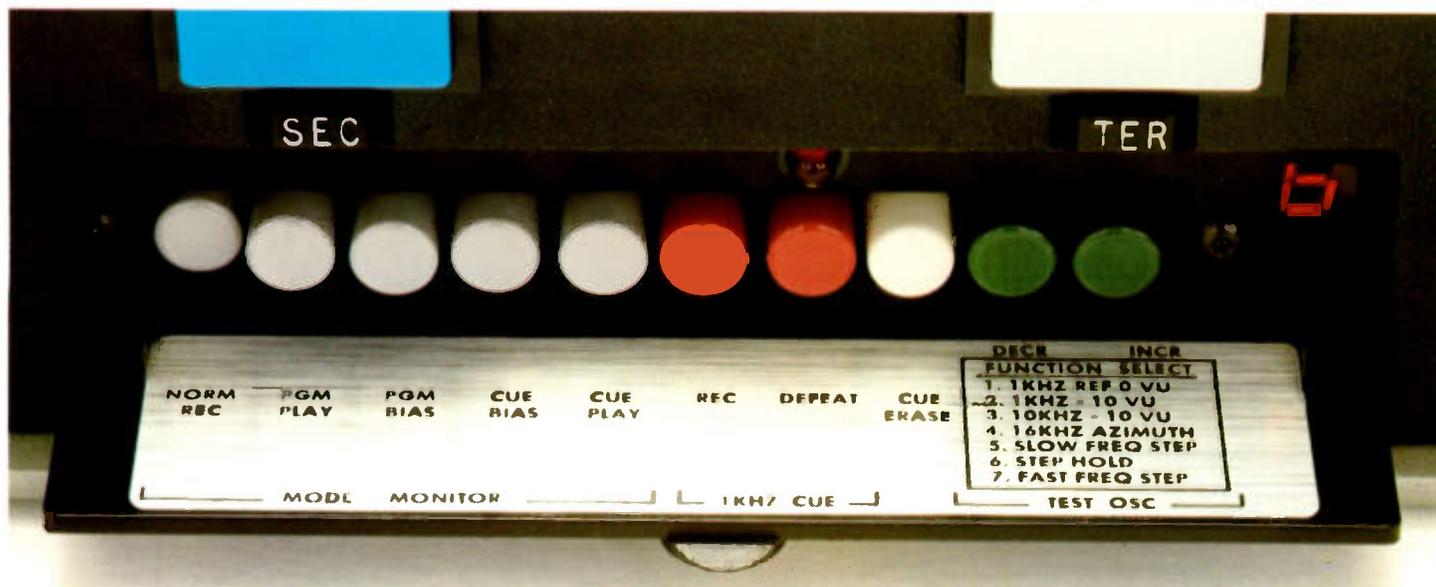
The positive positioning of the solenoid assures consistent location of the pressure roller. Neither heat nor variations in line voltage can produce changes in solenoid tension. Phase skew is reduced. And, because operating voltage drops from 50 VDC to 18 VDC immediately after the cartridge starts, there is less magnetic field to collapse when it stops. This provides for a quicker release and a faster stop, with less than 12.7 mm (1/2 inch) of tape over-shoot from the high speed cue mode. Heat has been reduced greatly over that produced by conventional solenoids.

**Cartridge Preparation System\* (Optional)**

When a cartridge is inserted, and the ELSA (erase, locate splice, azimuth) mode selected, the tape is bulk erased automatically, the recording head is azimuth (phase) aligned to compensate for variations in cartridges, and the cartridge is erased again to remove alignment tones. Then the splice is automatically located and positioned just beyond the capstan shaft. This combination function, controlled by the microprocessor, automatically adjusts the azimuth to any peculiarities of the specific cartridge inserted. A clean, splice-positioned tape is readied for recording.

\*Patent 4,142,221

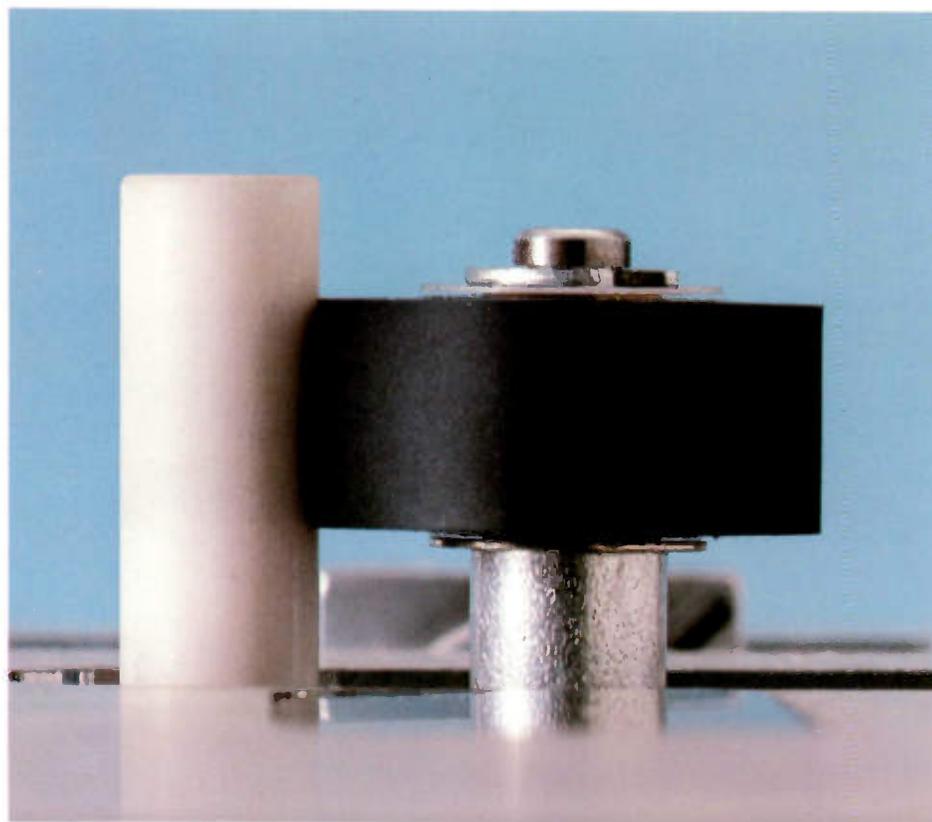




Convenient, color-coded push buttons provide control of special machine functions. Meter monitoring selections (grey) include: 1) Normal Record (automatically switches to program playback when machine is not recording). 2) Program Playback. 3) Program Bias. 4) Cue Bias. 5) Cue Play. Integrated-circuit, analog switches are used in conjunction with meter switches to eliminate dirty-contact problems.

The 1 kHz Cue Record and Defeat switches (red) permit addition and deletion of stop tones. The functions are electronically latched and controlled, with LED confirmation of the Defeat mode. A new Cue Erase facility (white) allows erasure of any information recorded on the cue track without affecting program material. A microprocessor controlled test tone generator (green) is another ITC exclusive. It offers seven functions with digital display mode identification.

### Meter and Special Function Switch Panel



### New Ceramic Capstan Shaft

The texture of the new ceramic shaft is naturally and permanently porous. It is ideal for driving tape and does not conduct heat or magnetic fields from the motor to the tape or heads.

### Improved Pressure Roller

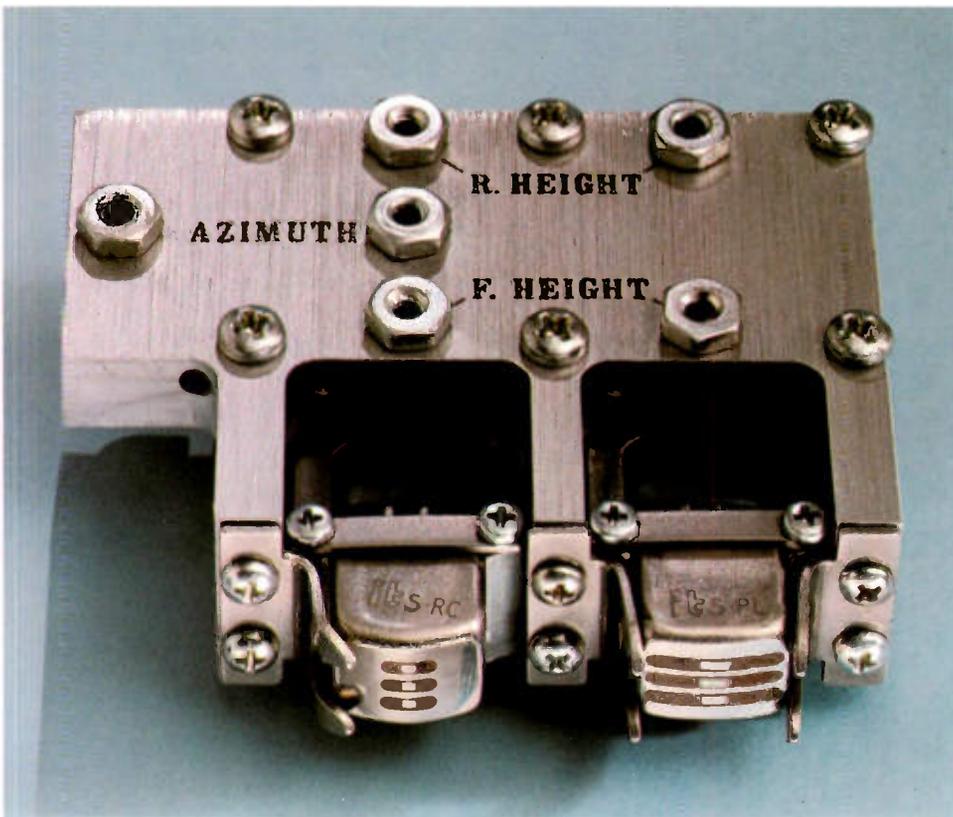
525K, an advanced, new rubber compound provides twice the pulling power of ordinary rollers and five times the life. Will not crack or dry out. Holds its durometer even under the most extreme humidity. This roller is impervious to most cleaning chemicals.



The head is designed for optimum tape wrap in a cartridge machine. A unique lamination design, combined with a cylindrical face normally associated with reel-to-reel heads, provides measurably improved frequency response:  $\pm 1$  dB from 31.5 Hz to 16 kHz. The magnetic heads are constructed of durable materials with a composite life expectancy ten times that of common lamination heads.

\*Patent 4,193,103

Exclusive, New ITC Head Design\*

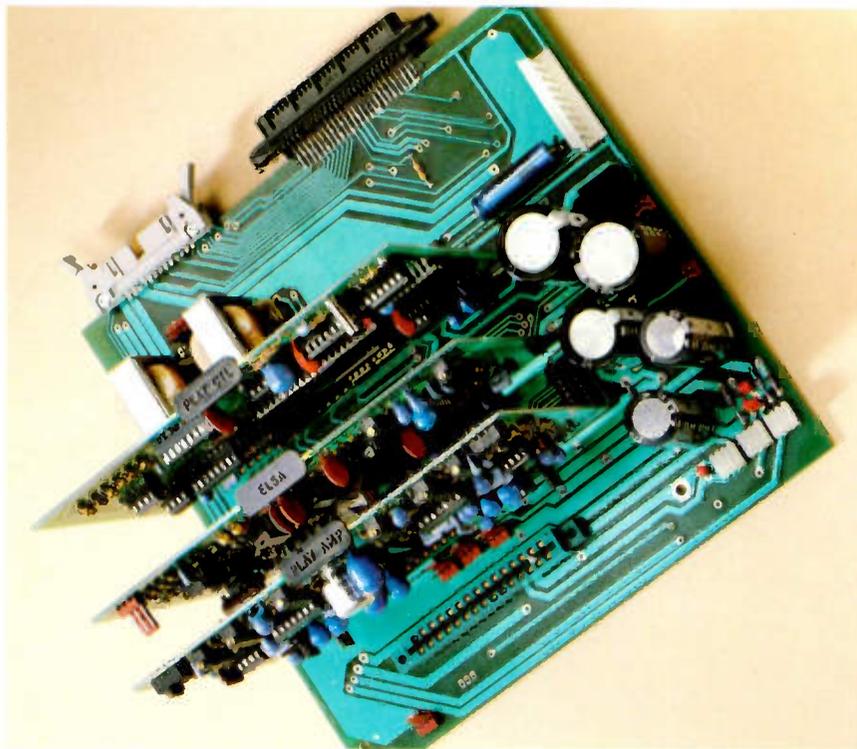
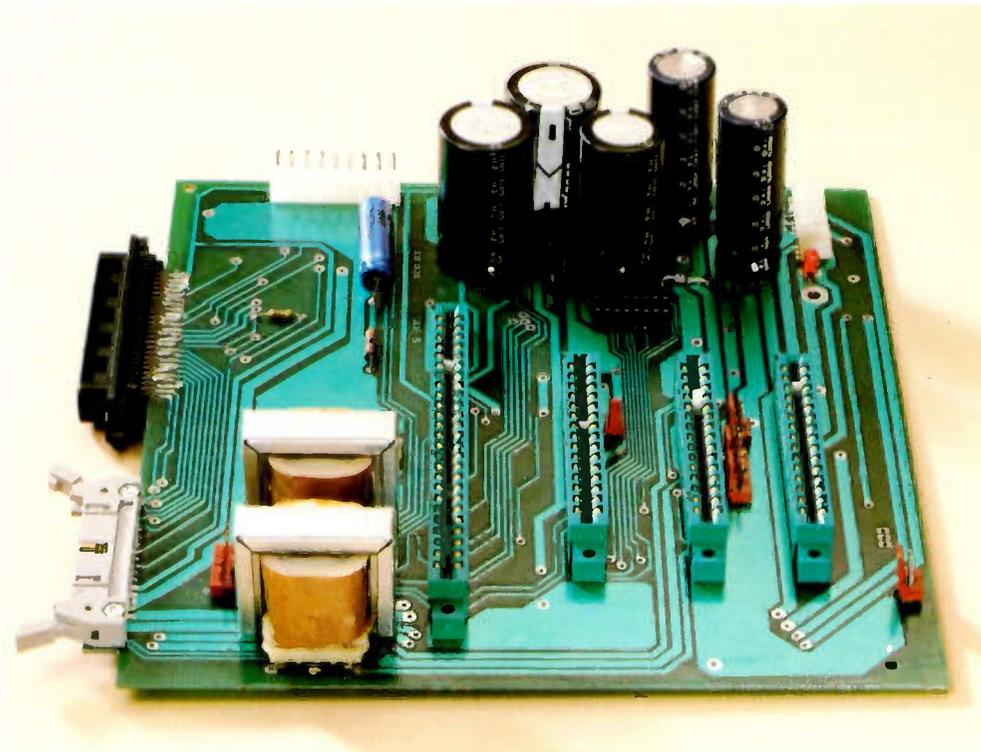


Removable Head Module\*



The true, center-pivot head module is designed with rotational axis on the exact vertical and horizontal centerline of the heads. All three adjustments—height, zenith and azimuth—are made independently and have individual locks. Therefore, locking down one adjustment does not affect the others. The adjustments are on steel-ball pivots which, combined with a longer azimuth arm, permit much finer tuning. The completely removable, micro-adjust head module can be pre-adjusted, removed for back-up storage, and re-installed without further adjustment.

\*Patent 4,158,868



Modular construction, with plug-in sub-assemblies, is used throughout. All PC cards plug into a mother board. Raised letters on the PC card pulls identify each: 1) Program Playback Amplifier and Cue Pre-amplifier. 2) Logic and Cue Detectors. 3) Servo Control. 4) ELSA functions (optional). Even the mother board can be removed or replaced without soldering. Connections are all plug-in.

Modular Construction

# Buying new tape cartridges doesn't completely solve phasing problems— Series 99B does!

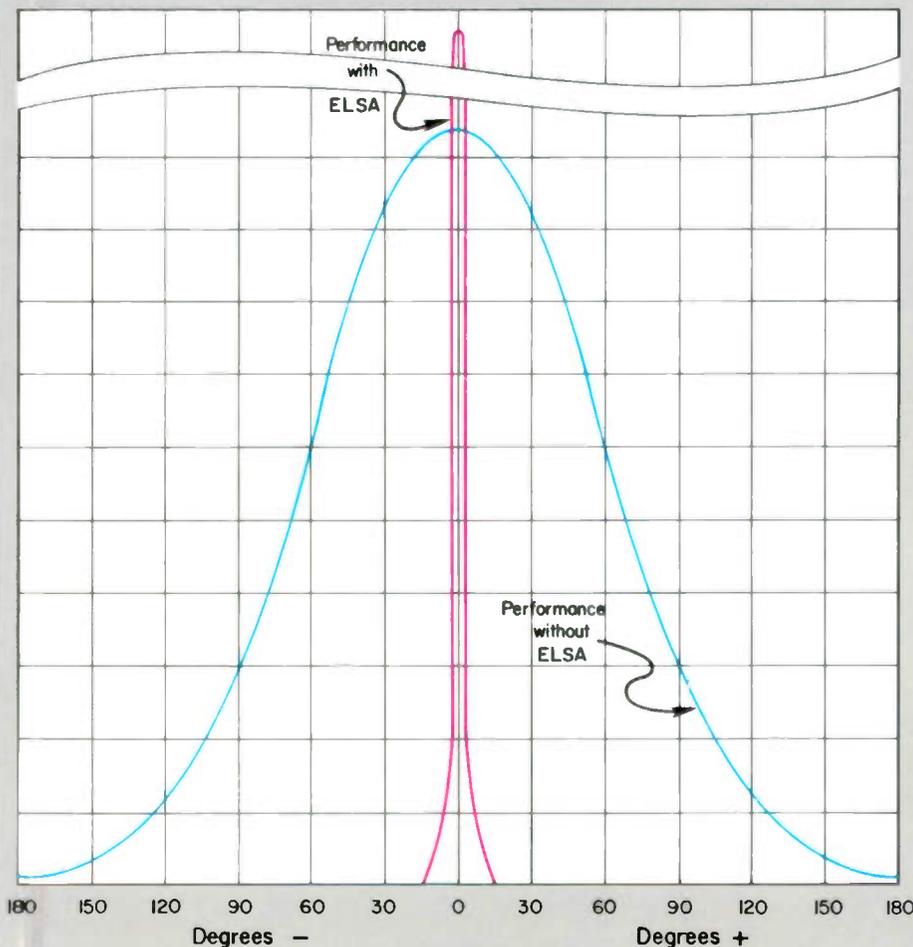
No two cartridges are exactly alike. This natural variance among cartridges affects tape path, and ultimately, the performance of the total cartridge system.

ITC's Series 99B minimizes the effects of tape tracking problems. Our development of recording head azimuth control was based on observations that the problem is actually generated in the recording process. The guidance of the tape in the cartridge is under much better control when it reaches the playback head than when it first passes the recording head.

Our solution to the problem is to properly position the recording head to the tape, regardless of tape path error. In Series 99B this (azimuth) alignment is accomplished by evaluating and correcting the zero crossing errors between two audio

channels. Reference tone bursts are generated, recorded, reproduced and evaluated by the microprocessor. As a series of tone bursts is evaluated, a D.C. motor corrects for recording head azimuth error. This true phase evaluation and correction process is quick, consistent, and highly reliable. The system will enhance high frequency response in mono, maintain cart-to-cart phase integrity in stereo, and provide a uniformity of sound from cart-to-cart in both mono and stereo.

In addition to the automatic azimuth capabilities of Series 99B, we've included bulk erasing and splice locating features. Using this system offers the operator the confidence of complete tape cartridge preparation and the convenience of its totally automatic operation.

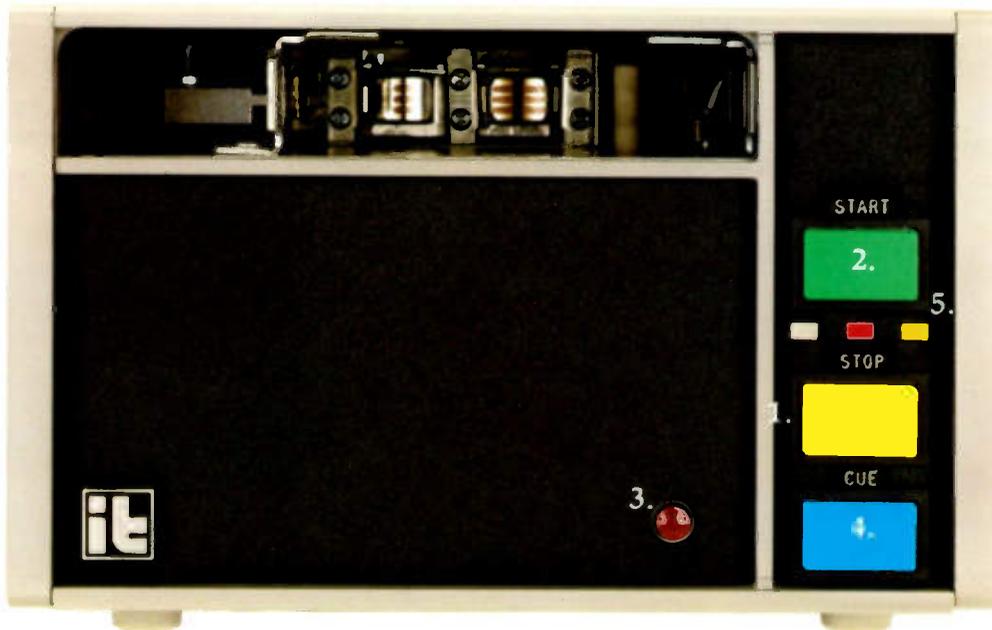


Relative  
Quantity  
of  
Randomly  
Selected  
Cartridges

## ELSA Corrects Phasing Error

This graph illustrates the stereo phasing errors present in a random sample of tape cartridges. Before each of these measurements was plotted, the results were normalized at  $\pm 0$  degrees phase shift. The red line shows the dramatically reduced phase error after the Series 99B has performed its automatic azimuth and tape preparation routine.

# Reproducer



## 1. Stop Switch

The lamp indicator in the "Stop" switch is a "ready" indication. When the cartridge is loaded properly, this lamp lights. The lamp is also an integral part in the non-repeat play function. If a cartridge is played, cued off, and not removed, the lamp will flash. With an internal jumper option, the machine can be set so that it will not start until such a cartridge has been removed and reloaded.

## 2. Start Switch

When a cartridge is loaded, and the ready lamp is on, pressing the "Start" switch will cause the machine to start to play the tape. Or, if you press "Record" on the recording amplifier, and then press "Start", the machine will begin to record. Pressing "Start" will also cause the machine to transfer from the high-speed cue mode directly into normal run speed.

## 3. ELSA Switch\*

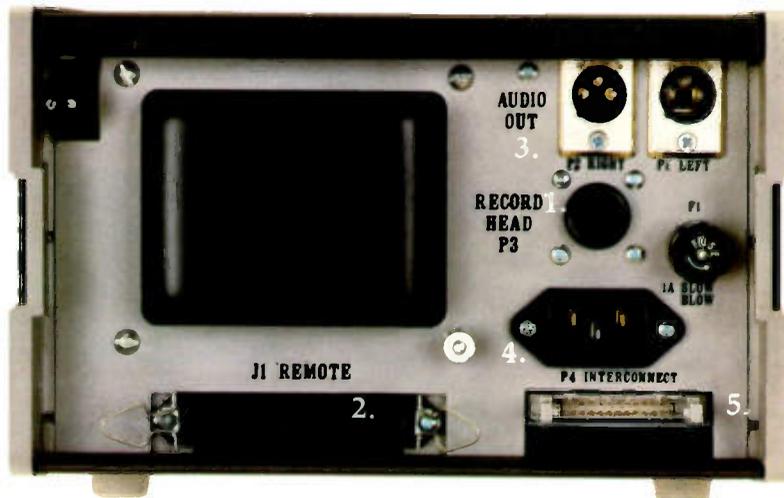
This switch works in conjunction with the "Cue" switch to activate the cartridge preparation cycle, allowing these functions to be performed automatically: erasing the tape, adjusting the azimuth (phase) of the recording head, erasing the tape again, and locating the splice. Portions of the cartridge preparation cycle may be accessed by selective use of the ELSA switches. \*Patent 4,142,221

## 4. Cue Switch

The cue switch is active in "Stop", "Start", and "Record" modes. This provides new flexibility in editing. In the high-speed mode, pressing and holding the cue switch will cause the program audio to turn on. Audio automatically turns off when the switch is released. With the change of an internal jumper, the machine offers a choice of "audio on" or "audio off" during high-speed cue.

## 5. Light Emitting Diodes

The green LED on the left indicates 150 Hz cue tone detection. The center LED, red, is a power indicator. The right LED is for the 8kHz cue sensor, and is yellow.



## 1. Heads Interconnect

Connects recording head to recording amplifier through a keyed, latching connector.

## 2. Remote Control

Provides access to remote control of both playback and recording functions through a single, latching connector.

## 3. Audio Connectors

XLR type, used for Audio input and output.

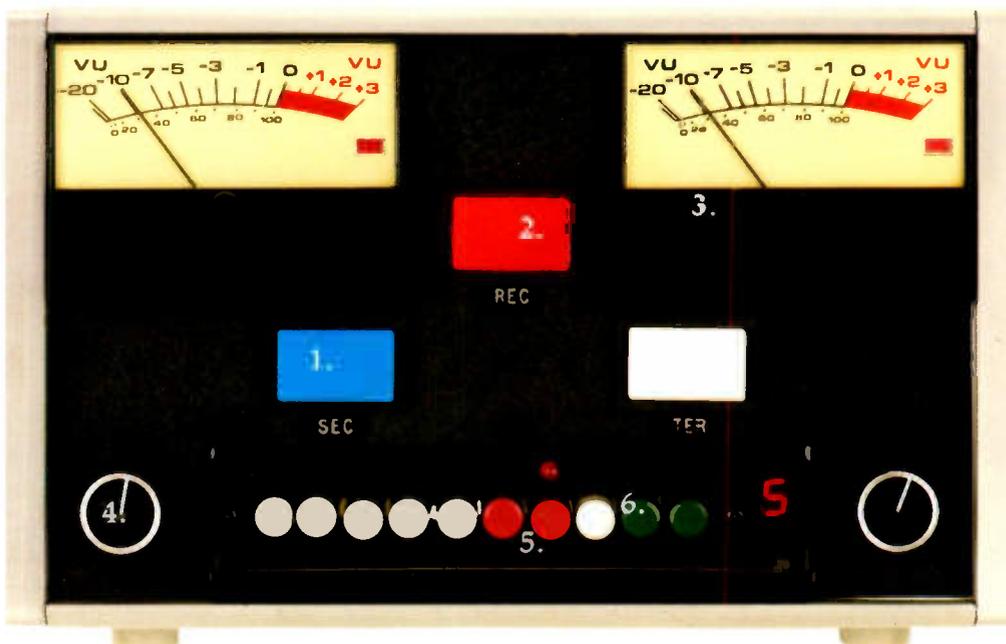
## 4. Mains Line Cord Connector

Facilitates removal of machine from service position since the cord can be disconnected either at the machine or at the power source.

## 5. Control Interconnect

Joins control functions of playback unit with recording amplifier.

# Recording Amplifier



## 1. Secondary and Tertiary Cue Tone Switches

These switches are active in both the recording and play only modes of operation. All cue tones can be detected individually or simultaneously.

## 2. Record Set Switch

When a cartridge is properly loaded, and "Record" is pressed, the switch will light to indicate the machine is in the recording mode. When "Start" is pressed, the machine will begin to record. The Record switch also serves as a reset for the test tone generator.

## 3. VU Meters with Peak Indicators

The VU type meters are larger and are driven by BIFET OP amps with flatter frequency response and faster responding circuitry. Built-in LED peak indicators give a warning of overloading at all audio frequencies.

## 4. Input Level Controls

Designed so that the knob can be removed to provide recessed, screwdriver-slot adjustment. Hole plugs are furnished to cover openings and prevent tampering.

## 5. Meter and Special Function Switch Panel

1) Normal Record (automatically switches to program playback when machine is not recording). 2) Program Playback. 3) Program Bias. 4) Cue Bias. 5) Cue Play. 6) 1 kHz Record. 7) 1 kHz Defeat (electronically latched.) 8) Cue Erase. 9) Test Tone Generator Decrement Control. 10) Test Tone Generator Increment Control.

## 6. Built-In Test Generator

Controls consist of two pushbutton switches and a seven segment readout. With the machine in a recording mode, pressing the "INC" switch will activate the system, whereby the normal program input is removed and the test tone generator is fed to the record amplifier. The following tones are produced when the readout indicates:

- 0 - Off (Readout Blank)
- 1 - 1 kHz at 0 dB Reference Level
- 2 - 1 kHz at - 10 dB

- 3 - 10 kHz at - 10 dB
- 4 - 14.5 kHz at - 10 dB (azimuth)
- 5 - DIN (1975 NAB standard) Test Frequencies\* at - 10 dB with 8 seconds length
- 6 - Hold
- 7 - DIN Test Frequencies\* at - 10 dB with 4 seconds length

\*The ITC test system generates the following frequencies: 50; 63; 125; 150; 250; 500; 1 k; 2 k; 3.4 k; 3.6 k; 4 k; 8 k; 10 k; 12.5 k; 15.5 kHz. Actual frequencies are rounded off. All frequencies within NAB tolerance with exception of 14.5 kHz—specified by 1975 NAB standards at 16 kHz.

With the built-in test tone generator operating, pressing "Record" will reset the generator to the beginning frequency in mode 5 or 7. When the "Stop" switch is depressed or a cartridge cues, the generator shuts off and reconnects external audio input. Tones from the built-in tone generator are brought out on the remote control connector for tests of external equipment.



## 1. Heads Interconnect

Connects recording head to recording amplifier through a keyed, latching connector.

## 2. Audio Connectors

XLR type, used for Audio input and output.

## 3. Control Interconnect

Joins control functions of playback unit with recording amplifier.

# Series 99B Specifications

## POWER:

117/234 volts AC, 50/60 Hz, 40 VA. Selectable taps for various line voltage conditions.

## TAPE SPEED:

7.5 IPS (19 cm/s): High speed cue standard on models at 20.25 IPS (51.4 cm/s).

## WOW & FLUTTER:

Playback: 0.12% or less DIN weighted. Record/play: 0.15% or less DIN weighted.

## SPEED ACCURACY:

0.1% maximum deviation.

## RATED OUTPUT LOAD IMPEDANCE:

600 ohms balanced. May be strapped for 150 ohms. Measured at 1 kHz in accordance with 1975 NAB standard.

## AUDIO OUTPUT CAPABILITY:

+25 dBm maximum before clipping. May be strapped to provide the following operating ranges without deteriorating the signal-to-noise ratio.

- 18 to -1 dBm
- 10 to +7 dBm
- 5 to +12 dBm
- +1 to +18 dBm

## AMPLIFIER DISTORTION:

Reproducer: 0.5% or less THD, 0.1% or less third harmonic distortion. Recorder: 0.5% or less THD, 0.1% or less third harmonic distortion. Measured in accordance with the 1975 NAB standard.

## SYSTEM DISTORTION:

0.8% or less THD, 0.5% or less third harmonic distortion. Record to playback at normal operating level.\*

## HUM & NOISE (excluding tape noise):

58 dB or better—mono  
56 dB or better—stereo  
At normal operating level.\*

## CROSS TALK BETWEEN CHANNELS:

48 dB or better at 1 kHz

## FREQUENCY RESPONSE:

±1 dB from 31.5 Hz to 16 kHz—record to playback at -14 VU recording level.\*

## EQUALIZATION:

Adjustable for CCR and 1975 NAB. May be strapped for 1964 NAB. High frequency equalization control included in recording amplifier with both high and low frequency controls in reproducer.

## HEAD CONFIGURATION:

NAB. Two tracks for monophonic, three tracks for stereophonic. Separate record and reproducer heads permit monitoring while recording.

## CUE SIGNALS:

NAB—primary (1 kHz), secondary (150 Hz) and tertiary (8 kHz) all standard. Open collector transistor switching for external control available for 150 Hz and 8 kHz in accordance with 1975 NAB standard. Optional relays available. Secondary cue, 150 Hz, and tertiary cue, 8 kHz, may be applied during recording process or during playback. 150 Hz and/or 8 kHz tones are strappable to initiate high-speed cue upon conclusion of detection of tone (playback or record/playback mode). Individual and/or simultaneous tone generation and detection are available for 1 kHz, 150 Hz and 8 kHz.

## LOGGING SIGNALS:

External input to the cue recording amplifier and external output from the cue reproducer amplifier are available for recording and reproducing logging signals at -10 VU between 3.3 kHz and 6.5 kHz. Externally applied cue tones are not for simultaneous generation or detection with 1 kHz, 150 Hz, 8 kHz or any other combination. Input and output to cue system are compatible with 1975 NAB standards.

## AUDIO INPUT IMPEDANCE:

20k ohm balanced bridging standard. 600 ohm and 150 ohm balanced terminating loads may be selected by jumper.

## AUDIO INPUT CAPABILITY:

+28 dBm @ 0.5% THD (recorder). Strappable for the following mid-range (level control knob position) sensitivity levels to facilitate front panel adjustment ease and optimize signal-to-noise.

- 20 dBm
- 10 dBm
- 0 dBm
- +10 dBm

## METERING:

Taut band movement with "A" scale. Switch selection for monitoring: Recording input (automatic switching to program playback when machine is not recording); program playback; program bias; cue bias; and cue playback. Built in LED peak indicators follow tape saturation.

## BIAS AMPLIFIER:

Crystal-referenced 256 kHz for program track, 85 kHz for cue track.

## TAPE CAPACITY: NAB size AA

## START TIME:

100 milliseconds (tape movement)  
150 milliseconds (to audio on)

## STOP TIME:

75 milliseconds (transport and electronics). Tape travel after stop signal varies according to type of cartridge used and length of tape.

## REMOTE CONTROL:

All front panel controls and indicators plus cue erase, 1 kHz record and defeat, and external cue record input and enable lines.

## AMBIENT OPERATING TEMPERATURE RANGE:

10° C to 55° C (50° F to 131° F)

## EXTERNAL CONNECTORS:

XLR audio and latching remote control. Mating connectors furnished.

## MOUNTING:

Table top mounting. Rack mount housing optional.

## DIMENSIONS: (Maximum)

Width	Depth	Height	Add for Feet
21.6 cm	39.4 cm	13.3 cm	0.9 cm
(8.5 in)	(15.5 in)	(5.25 in)	(.354 in)

Playbacks and Recording Amplifiers are the same physical size. Require 17.8 cm (7 inches) of vertical space for rack mounting.

## WEIGHT:

Playback: 14.1 kg (31 pounds)  
Recording Amplifier: 6.8 kg (15 pounds)

\*All measurements made using 3M Scotchcart tape and referenced to 1 kHz recorded at 250 nW/m, 4 dB higher than the 160 nW/m reference of the 1975 NAB Cartridge Recordings and Reproductions Standard.

Specifications subject to change without notice.

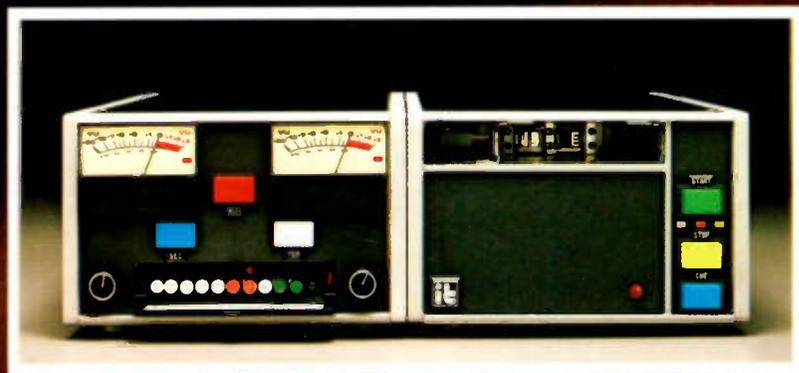
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Better listening  
through  
better design

The new  
99B Cartridge Machines  
from



# Computerized control, the latest solid-state electronics, and advanced mechanical features, provide reel-to-reel sound from cartridge tapes.

## Does It Sound Better?

The ultimate measure of a better audio tape machine is, "Does it sound better?" The ITC Series 99B cartridge machine does sound better, consistently. Crisper. Cleaner. There are solid reasons—both mechanical and electrical—to support this measurable improvement in performance.

We built a strong foundation—the rugged deck that has become synonymous with ITC quality. We've added a new, crystal-referenced servomotor; a positive, true positioning solenoid<sup>1</sup>; a micro-adjust head module<sup>2</sup>; and a distortion-free cartridge positioning system. These features provide tape handling precision previously found only in reel-to-reel machines. Never before in a cartridge machine. The benefits: reduced wow and flutter, improved azimuth (phase) stability, and improved long-term speed accuracy.

Couple this improved tape handling with a new, exclusive ITC head design<sup>2</sup> and you have a base for utilizing the most advanced electronics available for audio recording. The system design provides a frequency response truly flat to within  $\pm 1$  dB for every frequency from 31.5 Hz to 16 kHz. And, our heads are constructed of durable materials with an average life expectancy ten times that of common lamination-type heads.

The new machines are as advanced electronically as they are mechanically. A microprocessor controls electronic logic functions, and additionally controls cue tone generation and detection. Program electronics make use of the most advanced, low noise, bi-polar and BIFET OP amps. Head-room, transient response, and square wave performance are all improved dramatically. The new machines meet or surpass all NAB cartridge standards covering audio performance. You can readily hear the difference!

## New Operator Convenience

In addition to outstanding performance, the machines offer the operator new control and new convenience. High-speed cue is

standard, with added operational flexibility. We've retained the versatile meter selection, and stop-tone add and defeat switches. And we've improved these features by replacing human logic with microprocessor control. We've added cue track erase, and the convenience of front panel access to all these controls. VU-type meters are larger, and have built-in LED peak indicators which follow tape saturation. There's even automatic meter switching between the record and playback modes. Perhaps the most important feature is the automatic cartridge preparation system—ELSA<sup>3</sup>. It automatically bulk erases, azimuth (phase) aligns the recording head, erases again, and locates the splice, in preparation for superb quality audio tape recording.

## Simplified Maintenance

The engineer will find that ITC reliability and serviceability are even greater. Heat has been reduced dramatically. The design concept is modular, with plug-in sub-assemblies. The elimination of unnecessary adjustments, the addition of significant calibration controls, and a new microprocessor controlled multifunction test-tone generator simplify and reduce maintenance time.

## New State-of-the-Art

These are truly machines of a new generation, virtually self-controlled, and combining great new sound with unprecedented reliability and freedom from most of the maintenance chores of the past.

## Compatible With Present Generation Machines

Tape cartridges recorded on the new generation machines can be played on existing ITC machines, with a noticeable improvement in sound. For optimum results—true reel-to-reel sound quality—cartridges must be recorded and played on ITC's Series 99B cartridge equipment.

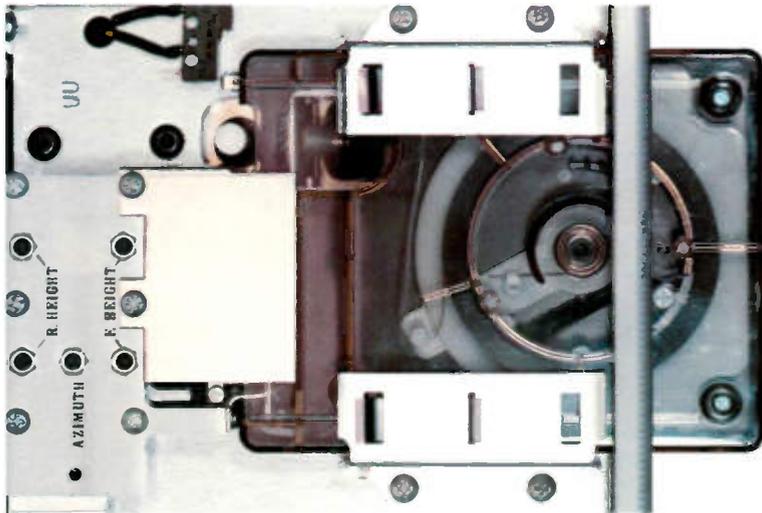


<sup>1</sup>Patent 4,158,868

<sup>2</sup>Patent 4,193,103

<sup>3</sup>Patent 4,142,221

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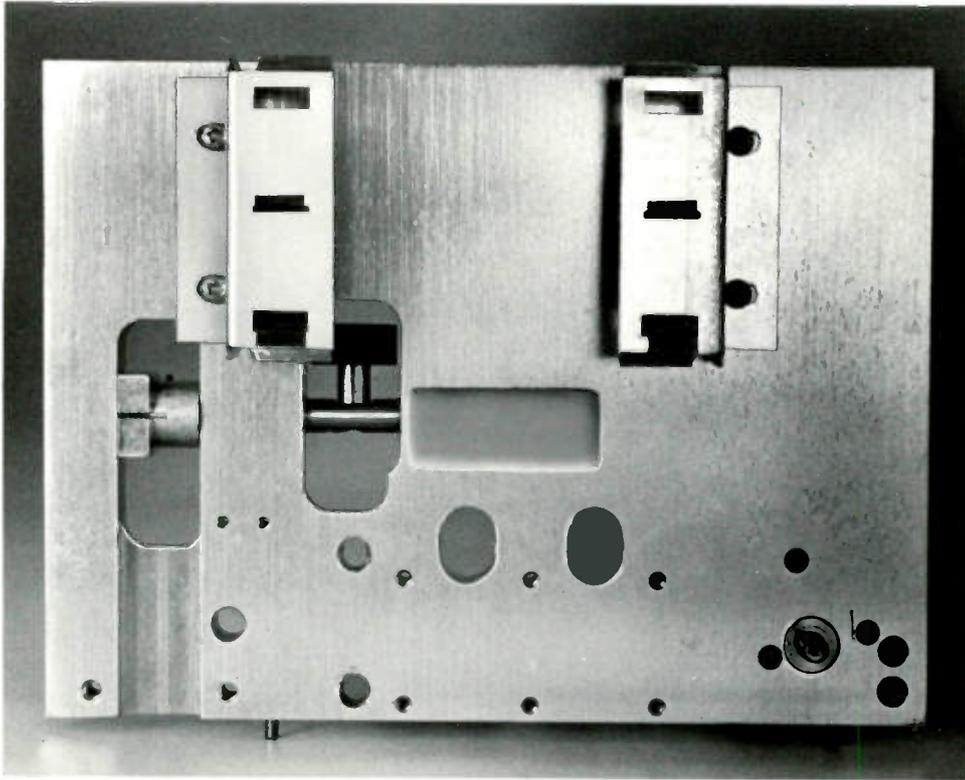
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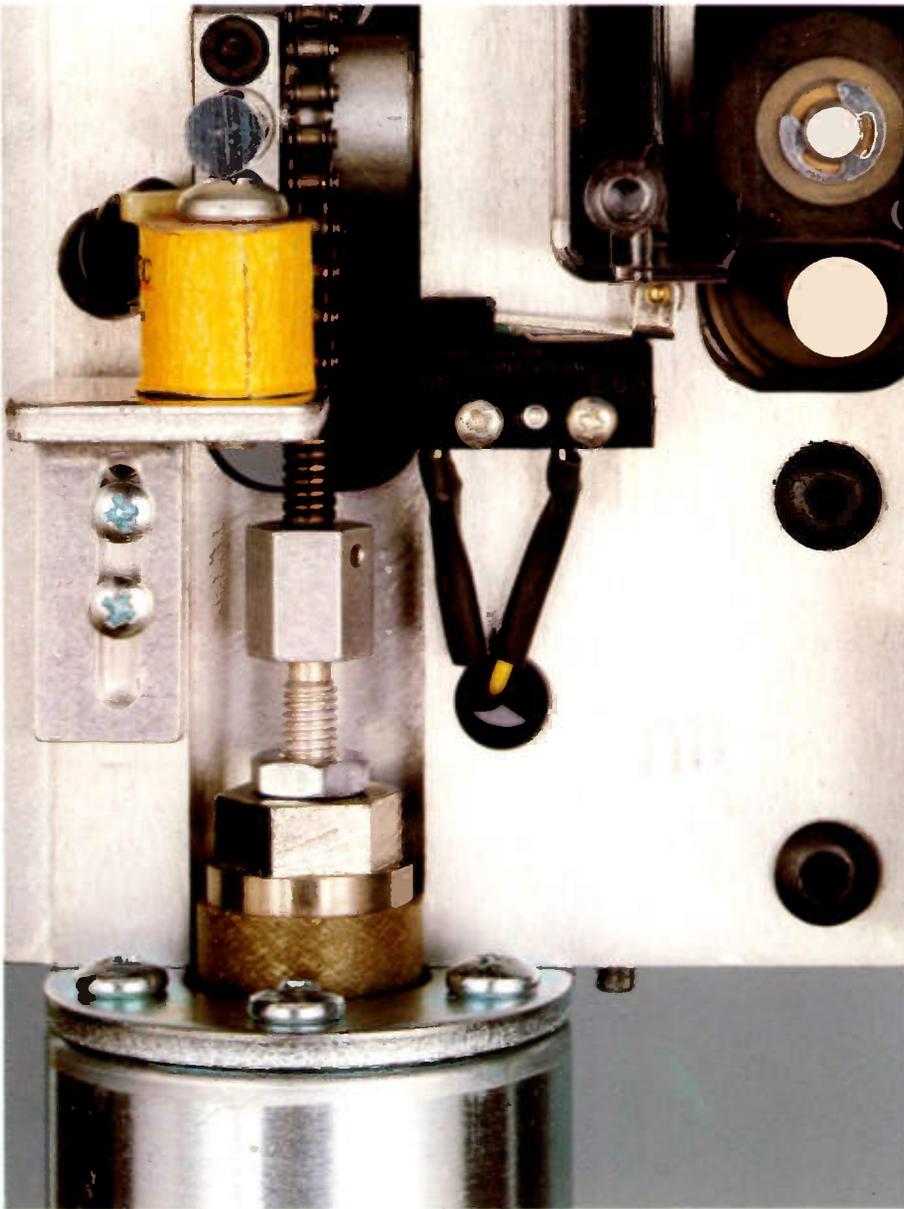
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### Stable, Machined-Aluminum Deck Plate

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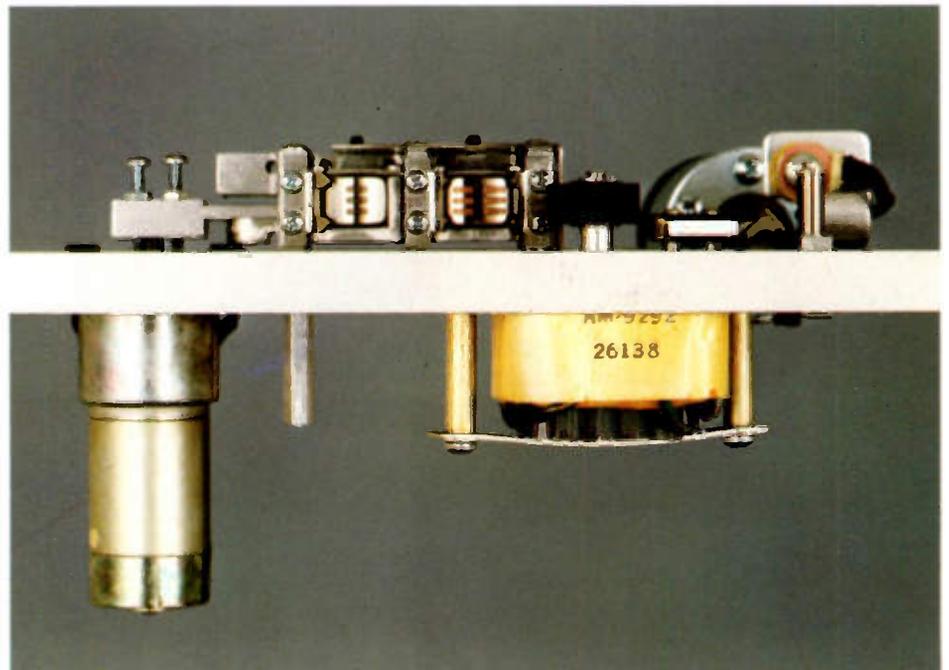
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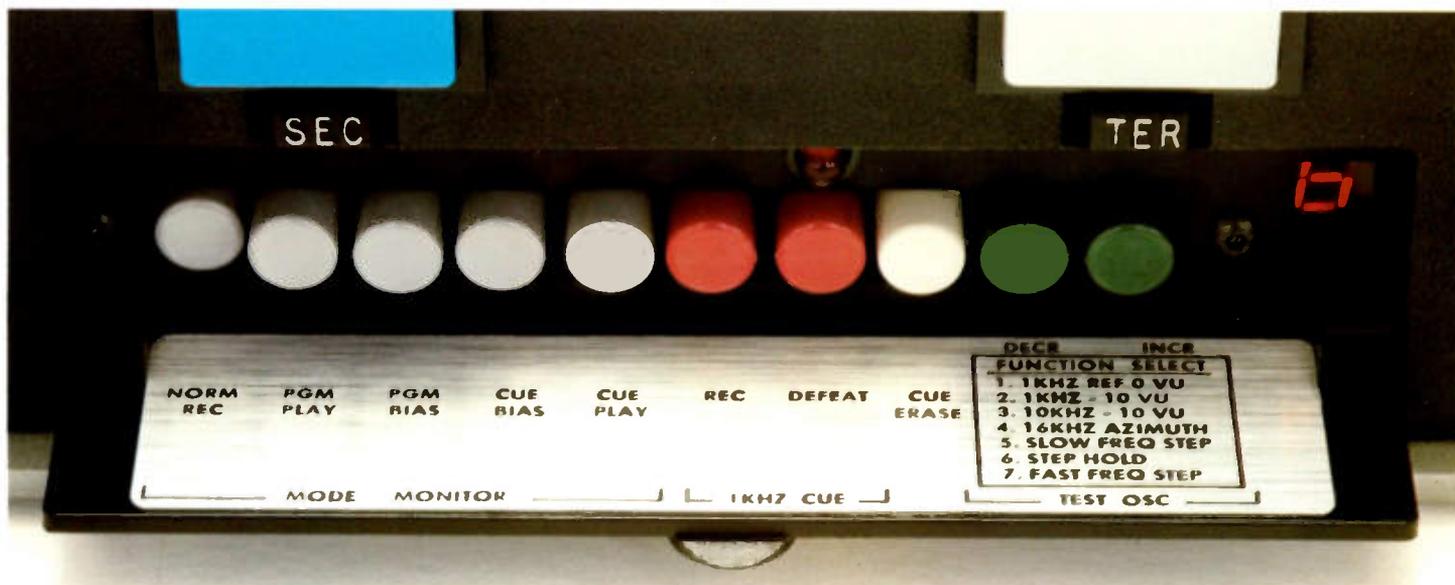
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\*Patent 4,142,221

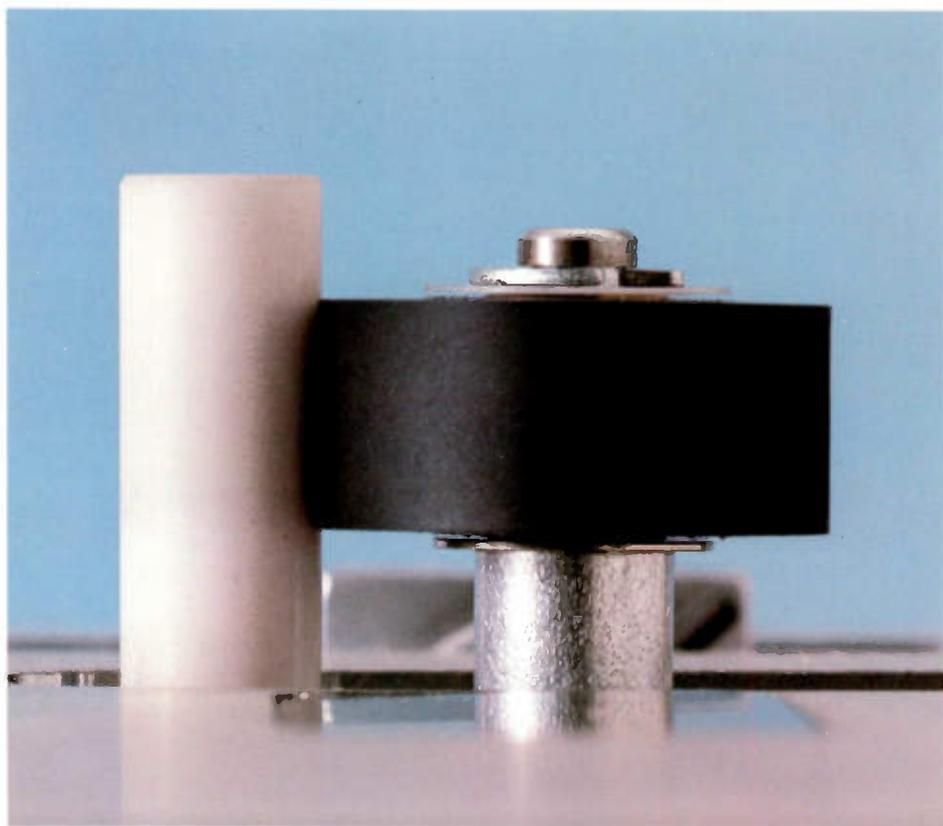




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### Meter and Special Function Switch Panel



### New Ceramic Capstan Shaft

The texture of the new ceramic shaft is naturally and permanently porous. It is ideal for driving tape and does not conduct heat or magnetic fields from the motor to the tape or heads.

### Improved Pressure Roller

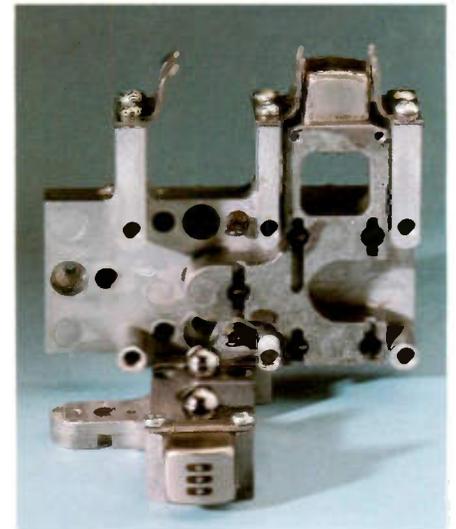
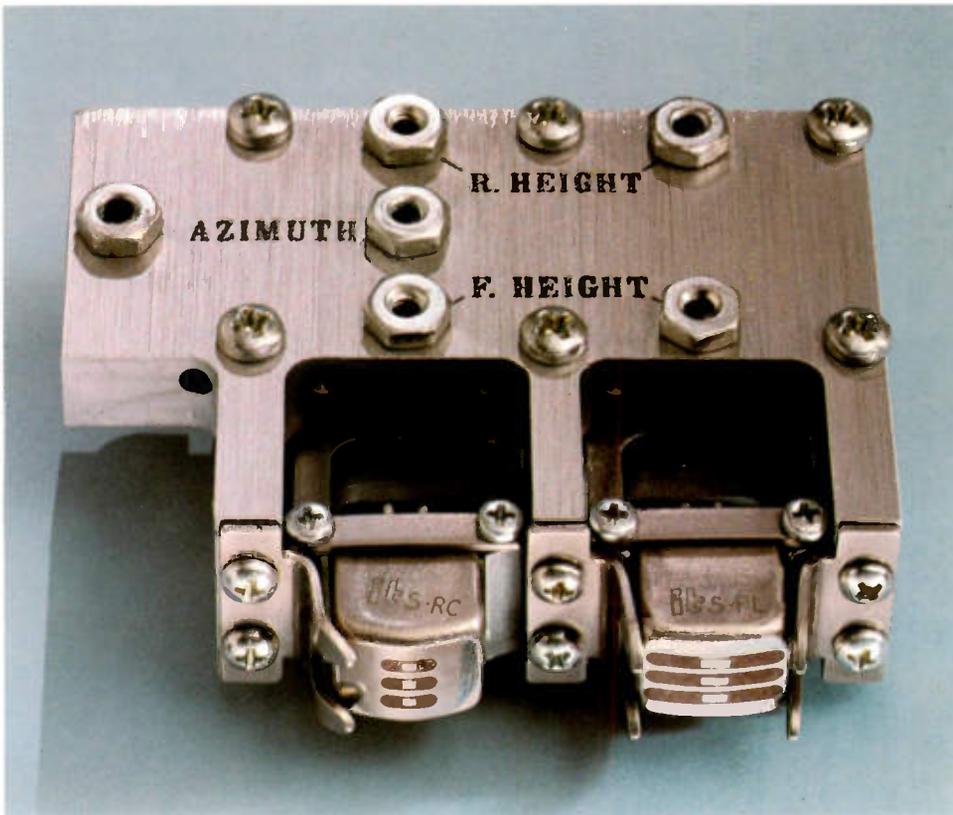
525K, an advanced, new rubber compound provides twice the pulling power of ordinary rollers and five times the life. Will not crack or dry out. Holds its durometer even under the most extreme humidity. This roller is impervious to most cleaning chemicals.



The head is designed for optimum tape wrap in a cartridge machine. A unique lamination design, combined with a cylindrical face normally associated with reel-to-reel heads, provides measurably improved frequency response:  $\pm 1$  dB from 31.5 Hz to 16 kHz. The magnetic heads are constructed of durable materials with a composite life expectancy ten times that of common lamination heads.

\*Patent 4,193,103

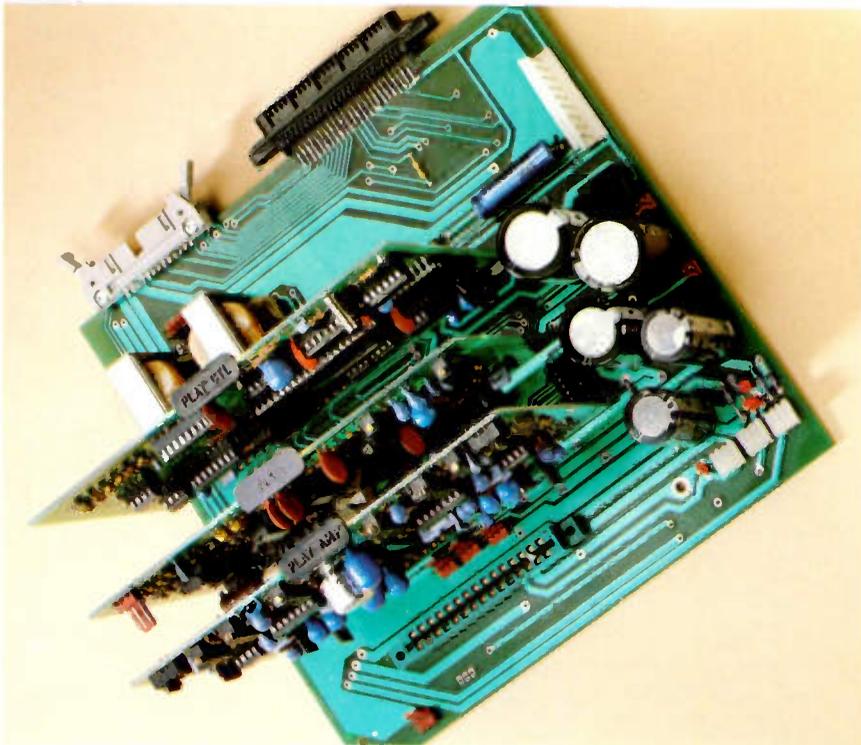
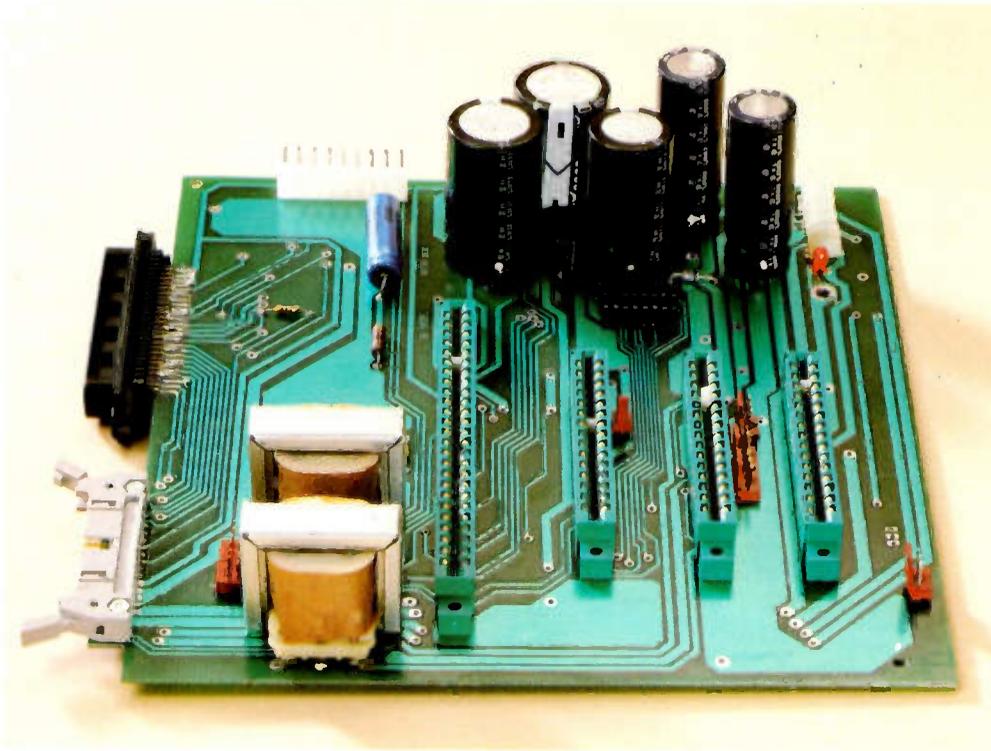
Exclusive, New ITC Head Design\*



The true, center-pivot head module is designed with rotational axis on the exact vertical and horizontal centerline of the heads. All three adjustments—height, zenith and azimuth—are made independently and have individual locks. Therefore, locking down one adjustment does not affect the others. The adjustments are on steel-ball pivots which, combined with a longer azimuth arm, permit much finer tuning. The completely removable, micro-adjust head module can be pre-adjusted, removed for back-up storage, and re-installed without further adjustment.

\*Patent 4,158,868

Removable Head Module\*



Modular construction, with plug-in sub-assemblies, is used throughout. All PC cards plug into a mother board. Raised letters on the PC card pulls identify each: 1) Program Playback Amplifier and Cue Preamp. 2) Logic and Cue Detectors. 3) Servo Control. 4) ELSA functions (optional). Even the mother board can be removed or replaced without soldering. Connections are all plug-in.

Modular Construction

# Buying new tape cartridges doesn't completely solve phasing problems— Series 99B does!

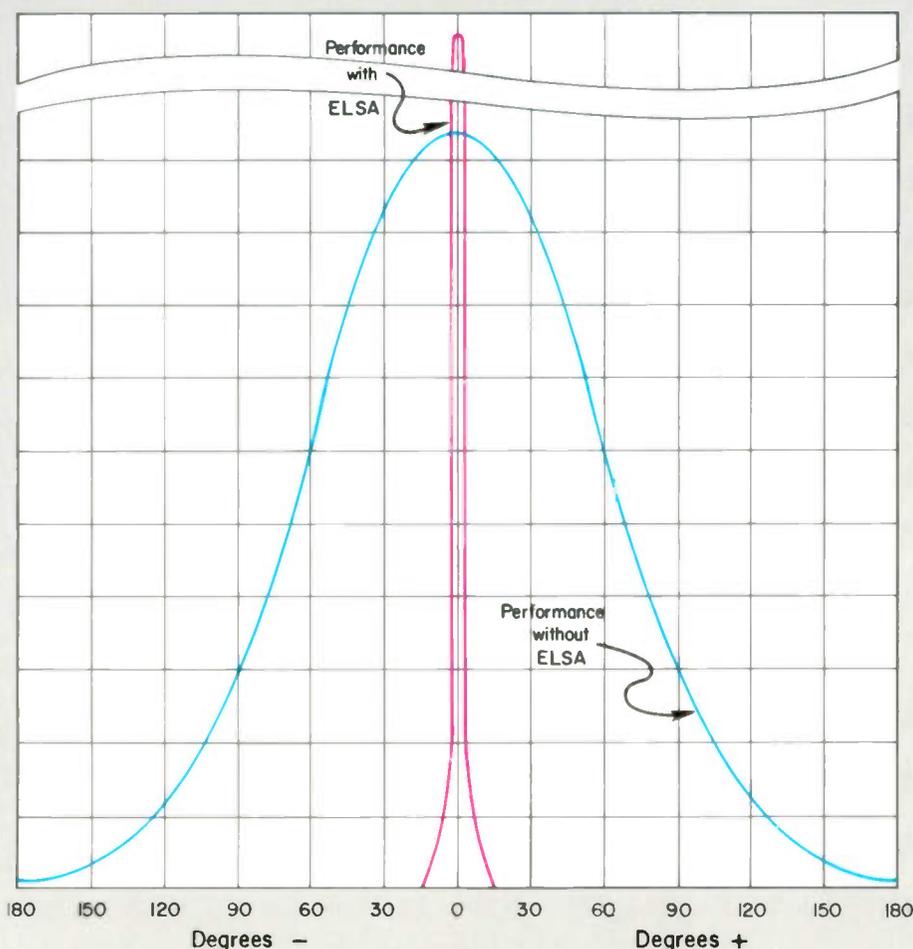
No two cartridges are exactly alike. This natural variance among cartridges affects tape path, and ultimately, the performance of the total cartridge system.

ITC's Series 99B minimizes the effects of tape tracking problems. Our development of recording head azimuth control was based on observations that the problem is actually generated in the recording process. The guidance of the tape in the cartridge is under much better control when it reaches the playback head than when it first passes the recording head.

Our solution to the problem is to properly position the recording head to the tape, regardless of tape path error. In Series 99B this (azimuth) alignment is accomplished by evaluating and correcting the zero crossing errors between two audio

channels. Reference tone bursts are generated, recorded, reproduced and evaluated by the microprocessor. As a series of tone bursts is evaluated, a D.C. motor corrects for recording head azimuth error. This true phase evaluation and correction process is quick, consistent, and highly reliable. The system will enhance high frequency response in mono, maintain cart-to-cart phase integrity in stereo, and provide a uniformity of sound from cart-to-cart in both mono and stereo.

In addition to the automatic azimuth capabilities of Series 99B, we've included bulk erasing and splice locating features. Using this system offers the operator the confidence of complete tape cartridge preparation and the convenience of its totally automatic operation.

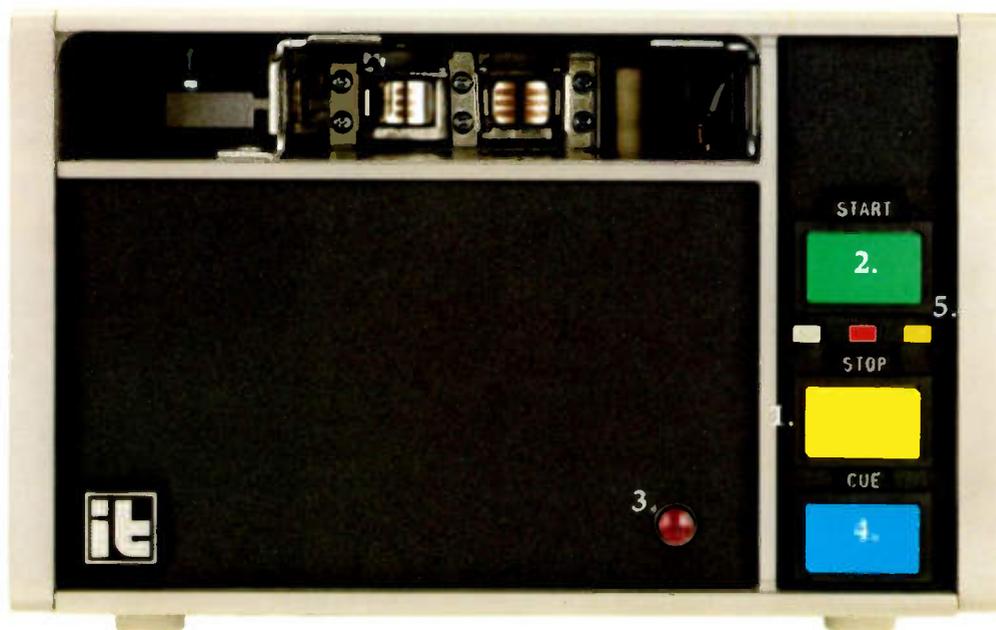


Relative  
Quantity  
of  
Randomly  
Selected  
Cartridges

## ELSA Corrects Phasing Error

This graph illustrates the stereo phasing errors present in a random sample of tape cartridges. Before each of these measurements was plotted, the results were normalized at  $\pm 0$  degrees phase shift. The red line shows the dramatically reduced phase error after the Series 99B has performed its automatic azimuth and tape preparation routine.

# Reproducer



## 1. Stop Switch

The lamp indicator in the "Stop" switch is a "ready" indication. When the cartridge is loaded properly, this lamp lights. The lamp is also an integral part in the non-repeat play function. If a cartridge is played, cued off, and not removed, the lamp will flash. With an internal jumper option, the machine can be set so that it will not start until such a cartridge has been removed and reloaded.

## 2. Start Switch

When a cartridge is loaded, and the ready lamp is on, pressing the "Start" switch will cause the machine to start to play the tape. Or, if you press "Record" on the recording amplifier, and then press "Start", the machine will begin to record. Pressing "Start" will also cause the machine to transfer from the high-speed cue mode directly into normal run speed.

## 3. ELSA Switch\*

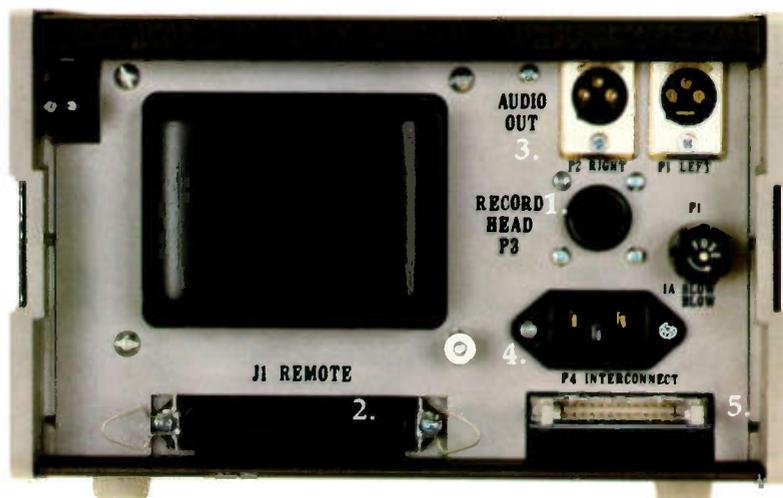
This switch works in conjunction with the "Cue" switch to activate the cartridge preparation cycle, allowing these functions to be performed automatically: erasing the tape, adjusting the azimuth (phase) of the recording head, erasing the tape again, and locating the splice. Portions of the cartridge preparation cycle may be accessed by selective use of the ELSA switches. \*Patent 4,142,221

## 4. Cue Switch

The cue switch is active in "Stop", "Start", and "Record" modes. This provides new flexibility in editing. In the high-speed mode, pressing and holding the cue switch will cause the program audio to turn on. Audio automatically turns off when the switch is released. With the change of an internal jumper, the machine offers a choice of "audio on" or "audio off" during high-speed cue.

## 5. Light Emitting Diodes

The green LED on the left indicates 150 Hz cue tone detection. The center LED, red, is a power indicator. The right LED is for the 8kHz cue sensor, and is yellow.



## 1. Heads Interconnect

Connects recording head to recording amplifier through a keyed, latching connector.

## 2. Remote Control

Provides access to remote control of both playback and recording functions through a single, latching connector.

## 3. Audio Connectors

XLR type, used for Audio input and output.

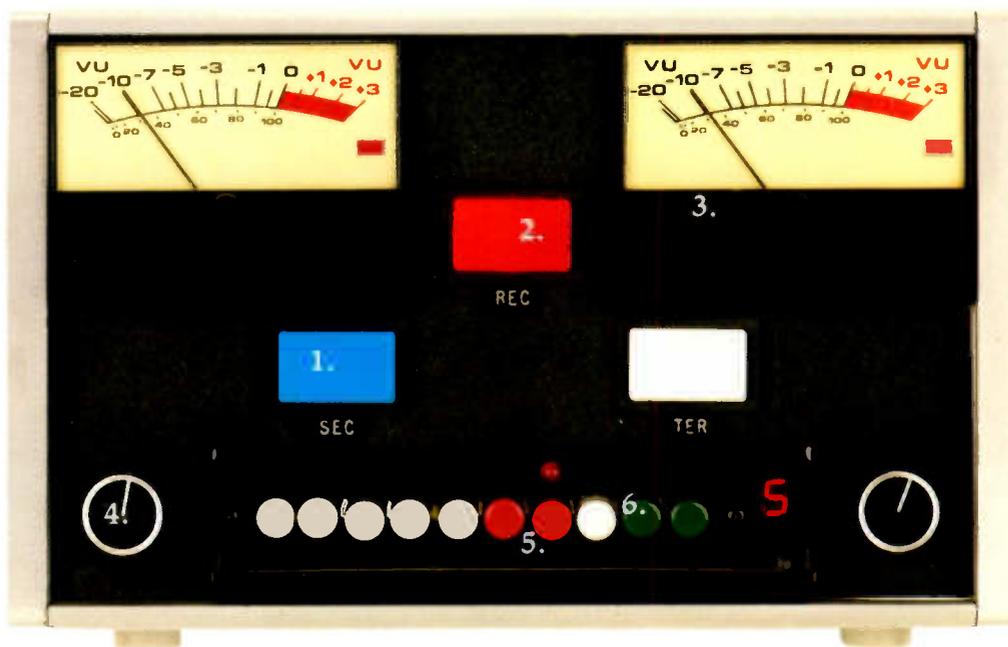
## 4. Mains Line Cord Connector

Facilitates removal of machine from service position since the cord can be disconnected either at the machine or at the power source.

## 5. Control Interconnect

Joins control functions of playback unit with recording amplifier.

# Recording Amplifier



## 1. Secondary and Tertiary Cue Tone Switches

These switches are active in both the recording and play only modes of operation. All cue tones can be detected individually or simultaneously.

## 2. Record Set Switch

When a cartridge is properly loaded, and "Record" is pressed, the switch will light to indicate the machine is in the recording mode. When "Start" is pressed, the machine will begin to record. The Record switch also serves as a reset for the test tone generator.

## 3. VU Meters with Peak Indicators

The VU type meters are larger and are driven by BIFET OP amps with flatter frequency response and faster responding circuitry. Built-in LED peak indicators give a warning of overloading at all audio frequencies.

## 4. Input Level Controls

Designed so that the knob can be removed to provide recessed, screwdriver-slot adjustment. Hole plugs are furnished to cover openings and prevent tampering.

## 5. Meter and Special Function Switch Panel

1) Normal Record (automatically switches to program playback when machine is not recording). 2) Program Playback. 3) Program Bias. 4) Cue Bias. 5) Cue Play. 6) 1 kHz Record. 7) 1 kHz Defeat (electronically latched.) 8) Cue Erase. 9) Test Tone Generator Decrement Control. 10) Test Tone Generator Increment Control.

## 6. Built-In Test Generator

Controls consist of two pushbutton switches and a seven segment readout. With the machine in a recording mode, pressing the "INC" switch will activate the system, whereby the normal program input is removed and the test tone generator is fed to the record amplifier. The following tones are produced when the readout indicates:

- 0 - Off (Readout Blank)
- 1 - 1 kHz at 0 dB Reference Level
- 2 - 1 kHz at - 10 dB

- 3 - 10 kHz at - 10 dB
- 4 - 14.5 kHz at - 10 dB (azimuth)
- 5 - DIN (1975 NAB standard) Test Frequencies\* at - 10 dB with 8 seconds length
- 6 - Hold
- 7 - DIN Test Frequencies\* at - 10 dB with 4 seconds length

\*The ITC test system generates the following frequencies: 50; 63; 125; 150; 250; 500; 1 k; 2 k; 3.4 k; 3.6 k; 4 k; 8 k; 10 k; 12.5 k; 15.5 kHz. Actual frequencies are rounded off. All frequencies within NAB tolerance with exception of 14.5 kHz—specified by 1975 NAB standards at 16 kHz.

With the built-in test tone generator operating, pressing "Record" will reset the generator to the beginning frequency in mode 5 or 7. When the "Stop" switch is depressed or a cartridge cues, the generator shuts off and reconnects external audio input. Tones from the built-in tone generator are brought out on the remote control connector for tests of external equipment.



## 1. Heads Interconnect

Connects recording head to recording amplifier through a keyed, latching connector.

## 2. Audio Connectors

XLR type, used for Audio input and output.

## 3. Control Interconnect

Joins control functions of playback unit with recording amplifier.

# Series 99B Specifications

## POWER:

117/234 volts AC, 50/60 Hz, 40 VA. Selectable taps for various line voltage conditions.

## TAPE SPEED:

7.5 IPS (19 cm/s): High speed cue standard on models at 20.25 IPS (51.4 cm/s).

## WOW & FLUTTER:

Playback: 0.12% or less DIN weighted. Record/play: 0.15% or less DIN weighted.

## SPEED ACCURACY:

0.1% maximum deviation.

## RATED OUTPUT LOAD IMPEDANCE:

600 ohms balanced. May be strapped for 150 ohms. Measured at 1 kHz in accordance with 1975 NAB standard.

## AUDIO OUTPUT CAPABILITY:

+25 dBm maximum before clipping. May be strapped to provide the following operating ranges without deteriorating the signal-to-noise ratio.

- 18 to -1 dBm
- 10 to +7 dBm
- 5 to +12 dBm
- +1 to +18 dBm

## AMPLIFIER DISTORTION:

Reproducer: 0.5% or less THD, 0.1% or less third harmonic distortion. Recorder: 0.5% or less THD, 0.1% or less third harmonic distortion. Measured in accordance with the 1975 NAB standard.

## SYSTEM DISTORTION:

0.8% or less THD, 0.5% or less third harmonic distortion. Record to playback at normal operating level.\*

## HUM & NOISE (excluding tape noise):

58 dB or better—mono  
56 dB or better—stereo  
At normal operating level.\*

## CROSS TALK BETWEEN CHANNELS:

48 dB or better at 1 kHz

## FREQUENCY RESPONSE:

±1 dB from 31.5 Hz to 16 kHz—record to playback at -14 VU recording level.\*

## EQUALIZATION:

Adjustable for CCIR and 1975 NAB. May be strapped for 1964 NAB. High frequency equalization control included in recording amplifier with both high and low frequency controls in reproducer.

## HEAD CONFIGURATION:

NAB. Two tracks for monophonic, three tracks for stereophonic. Separate record and reproducer heads permit monitoring while recording.

## CUE SIGNALS:

NAB—primary (1 kHz), secondary (150 Hz) and tertiary (8 kHz) all standard. Open collector transistor switching for external control available for 150 Hz and 8 kHz in accordance with 1975 NAB standard. Optional relays available. Secondary cue, 150 Hz, and tertiary cue, 8 kHz, may be applied during recording process or during playback. 150 Hz and/or 8 kHz tones are strappable to initiate high-speed cue upon conclusion of detection of tone (playback or record/playback mode). Individual and/or simultaneous tone generation and detection are available for 1 kHz, 150 Hz and 8 kHz.

## LOGGING SIGNALS:

External input to the cue recording amplifier and external output from the cue reproducer amplifier are available for recording and reproducing logging signals at -10 VU between 3.3 kHz and 6.5 kHz. Externally applied cue tones are not for simultaneous generation or detection with 1 kHz, 150 Hz, 8 kHz or any other combination. Input and output to cue system are compatible with 1975 NAB standards.

## AUDIO INPUT IMPEDANCE:

20k ohm balanced bridging standard. 600 ohm and 150 ohm balanced terminating loads may be selected by jumper.

## AUDIO INPUT CAPABILITY:

+28 dBm @ 0.5% THD (recorder). Strappable for the following mid-range (level control knob position) sensitivity levels to facilitate front panel adjustment ease and optimize signal-to-noise.

- 20 dBm
- 10 dBm
- 0 dBm
- +10 dBm

## METERING:

Taut band movement with "A" scale. Switch selection for monitoring; Recording input (automatic switching to program playback when machine is not recording); program playback; program bias; cue bias; and cue playback. Built in LED peak indicators follow tape saturation.

## BIAS AMPLIFIER:

Crystal-referenced 256 kHz for program track, 85 kHz for cue track.

## TAPE CAPACITY: NAB size AA

## START TIME:

100 milliseconds (tape movement)  
150 milliseconds (to audio on)

## STOP TIME:

75 milliseconds (transport and electronics). Tape travel after stop signal varies according to type of cartridge used and length of tape.

## REMOTE CONTROL:

All front panel controls and indicators plus cue erase, 1 kHz record and defeat, and external cue record input and enable lines.

## AMBIENT OPERATING TEMPERATURE RANGE:

10° C to 55° C (50° F to 131° F)

## EXTERNAL CONNECTORS:

XLR audio and latching remote control. Mating connectors furnished.

## MOUNTING:

Table top mounting. Rack mount housing optional.

## DIMENSIONS: (Maximum)

Width	Depth	Height	Add for Feet
21.6 cm	39.4 cm	13.3 cm	0.9 cm
(8.5 in)	(15.5 in)	(5.25 in)	(.354 in)

Playbacks and Recording Amplifiers are the same physical size. Require 17.8 cm (7 inches) of vertical space for rack mounting.

## WEIGHT:

Playback: 14.1 kg (31 pounds)  
Recording Amplifier: 6.8 kg (15 pounds)

\*All measurements made using 3M Scotchcart tape and referenced to 1 kHz recorded at 250 nW/m, 4 dB higher than the 160 nW/m reference of the 1975 NAB Cartridge Recordings and Reproductions Standard.

Specifications subject to change without notice.

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## SP/WP SERIES REPRODUCERS

### SPECIFICATIONS

<b>Power:</b>	117 volts AC, 60 Hz, 70 watts. Other voltage and frequency variations are available on special order.
<b>Tape Speed:</b>	7½ inches per second. Other speeds on special order. Direct drive hysteresis synchronous motor with electrolyzed shaft and instrument-type permanently lubricated ball bearings.
<b>Timing Accuracy:</b>	0.1% or better.
<b>Wow and Flutter:</b>	0.2% RMS or less, unweighted.
<b>Audio Output:</b>	+15 dBm before clipping; normally +5 dBm; 600 ohms balanced. May be strapped for 150 ohms. (+18 dBm available on special order.)
<b>Distortion:</b>	2% or less, record to playback at 0 VU record level.
<b>Noise:</b>	55 dB or better below reference of 400 Hz at 3% THD, unweighted, monophonic. 50 dB or better below reference of 400 Hz at 3% THD, unweighted, stereophonic.
<b>Cross Talk Between Channels:</b>	Better than 50 dB at 1 kHz.
<b>Frequency Response:</b>	+2 dB from 50 to 15,000 Hz.
<b>Equalization:</b>	NAB. Adjustable to compensate for head wear. CCIR available.
<b>Head Configuration:</b>	NAB. Two tracks for monophonic, three tracks for stereophonic.
<b>Cue Signals:</b>	NAB. Primary (stop) cue, 1 kHz, standard; secondary cue, 150 Hz, and tertiary cue, 8 kHz, optional. Utilizes adjustable tuned circuit detector for each tone and furnishes relay contact closure for external control.
<b>Tape Capacity:</b>	SP Series: NAB size A and B cartridges. 2 seconds to 16 minutes with 1 mil lubricated tape at 7½ IPS. WP Series: NAB size A, B, and C cartridges. 2 seconds to 31 minutes with 1 mil lubricated tape at 7½ IPS.
<b>Start Time:</b>	0.1 second.
<b>Stop Time:</b>	0.1 second.
<b>Ambient Temperature:</b>	55 degrees C, 131 degrees F., maximum.
<b>Remote Control:</b>	All controls and indicators.
<b>External Connectors:</b>	Latching type. Mating plugs furnished.
<b>Mounting:</b>	Table top mounting. Rack mounting adapters optional.

<b>Dimensions:</b>	SP Series: 8½" width, 11" depth, 5¼" height (add ¾" for feet). WP Series: 17¼" width, 11" depth, 5¼" height (add ¾" for feet).
<b>Weight:</b>	SP Series: 23 pounds. WP Series: 28 pounds.

### MODEL DESIGNATIONS

SP Series Reproducers accept the NAB "A" and "B" size cartridges. WP Series Reproducers accept the NAB "A", "B", and "C" size cartridges, and have provisions for accepting recording amplifier electronics for ready conversion to recorder/reproducer.

<b>SP-0001</b>	<b>WP-0001</b>	Monophonic with 1 kHz primary cue.
<b>SP-0002</b>	<b>WP-0002</b>	Stereophonic with 1 kHz primary cue.
<b>SP-0003</b>	<b>WP-0003</b>	Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.
<b>SP-0004</b>	<b>WP-0004</b>	Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.
<b>*SP-0005</b>	<b>*WP-0005</b>	Monophonic, Hi-Speed Cue with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.
<b>*SP-0006</b>	<b>*WP-0006</b>	Stereophonic, Hi-Speed Cue with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.

### ACCESSORIES

<b>SR-0001</b>	Rack mounting kit—mounts one SP Series in 19" equipment rack.
<b>DR-0003</b>	Rack mounting kit—mounts two SP Series side by side in 19" equipment rack.
<b>NR-0002</b>	Rack mounting kit—mounts one WP Series in 19" equipment rack.

\*NAB-type tape cartridges cannot be reversed. Therefore, the only way to quickly return the tape to "starting position" is to run it forward at a faster speed than the standard 7½ IPS. In the ITC system, Hi-Speed Cue runs at 30 IPS—four times faster than the normal speed. Hi-Speed Cue can be operated either manually or automatically. In either case, the machine runs the tape forward at 30 IPS to completion, then automatically reverts to 7½ IPS ready for the next play.

# SP/WP SERIES



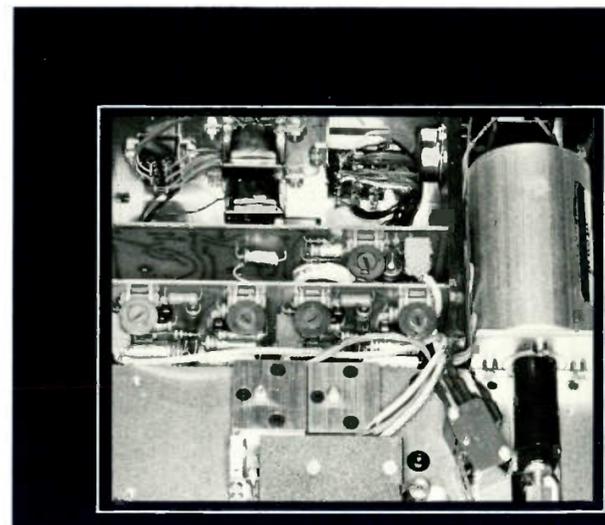
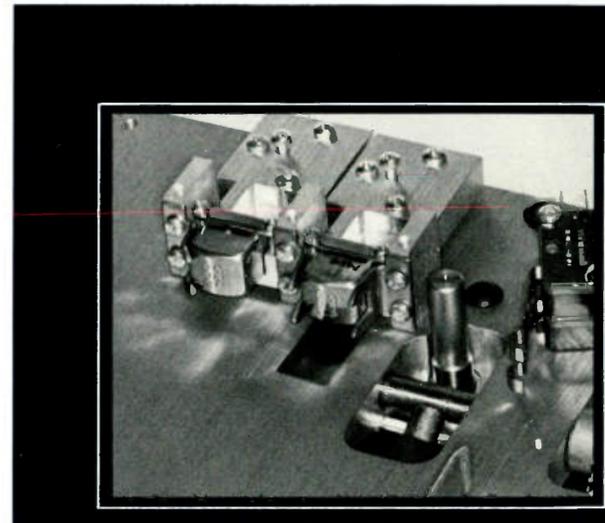
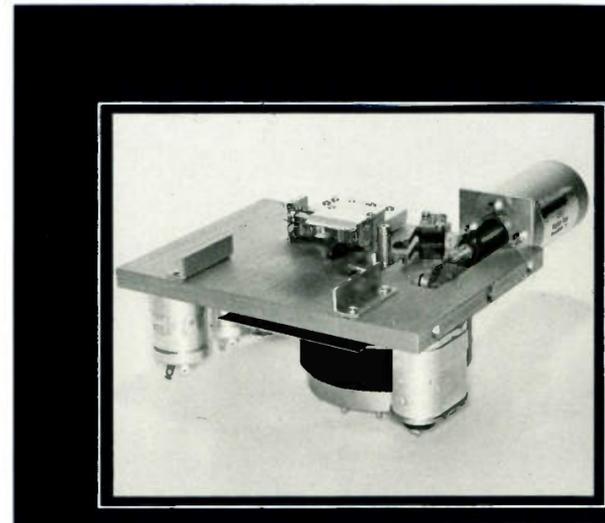
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SP Series Dual Mount

WP Series



### Tape Transport

One of the outstanding features of the tape transport area is the heavy duty, rugged, 1/2" hardened aluminum tool plate deck. There's good reason for this accent on heavy duty. The ITC deck is guaranteed flat within .005 inch TIR. It won't warp under normal use, and presents the same flat stable surface to cartridges everytime assuring correct azimuth of heads and consistent playback performance time after time. Also visible in this photograph is the powerful, air-damped solenoid, the fool-proof linkage assembly and the direct drive capstan motor mentioned previously. All in all, this thoughtfully designed tape transport assures the consistent performance and high fidelity reproduction that is the desire of all concerned broadcasters.

### Head Assembly

The head assembly is an important part of the tape transport. The entire assembly has been designed to accurately and easily achieve correct height, zenith and azimuth adjustments. Three tape guides can be adjusted independently for peak micro positioning and are made of stainless steel for long wear. Controlled by three adjustment screws, heads pivot on their center axis achieving the only true azimuth adjustment possible. Heads may be replaced quickly and easily. The tape guides, head assembly parts, and deck are non-magnetic so that they will not adversely affect the quality of audio.

### Serviceability

Equal care and consideration have been given to the design and refinement of electronic circuitry. For reliability, only the latest silicon transistors, diodes, and integrated circuits have been included in ITC's conservative design. Transistor sockets are provided where the solid state device might require replacement. The program reproduce amplifier and the cue tone detector printed circuit cards are of plug-in design and have gold plated contacts. To optimize signal to noise and facilitate servicing and testing, head cables with gold plated contacts take the signal from the head directly to the input circuit on the PC card.

"Make the machine quiet!" "Give us mechanics which will operate a million times without failure!" "Design it so that it can be easily serviced!" "Dependability is the key!"

Suggestions such as these came from broadcasters. We listened . . . and are still listening. And the result of our listening is the acceptance of ITC's SP and WP Series Cartridge Reproducers as the standards of the broadcasting industry . . . by broadcasters themselves, and by other manufacturers who have paid us the highest compliment . . . imitation.

By air damping a powerful solenoid, ITC was able to provide what can only be described as super-quiet, totally automatic mechanical operation. We added a Teflon coating to the solenoid plunger to eliminate any need for lubrication or cleaning. The result . . . quiet operation, improved performance and less maintenance.

The mechanical linkage between the solenoid and the pressure roller assembly is the simplest, most reliable yet designed. We utilize a chain and sprocket with a minimum of moving parts. The outcome is a cartridge machine which has been tested for its ability to be started and stopped in excess of a million times without failure or the need for adjustment. ITC parts are easily accessible and adjustments, when required, are as simple and easy as any we are aware of.

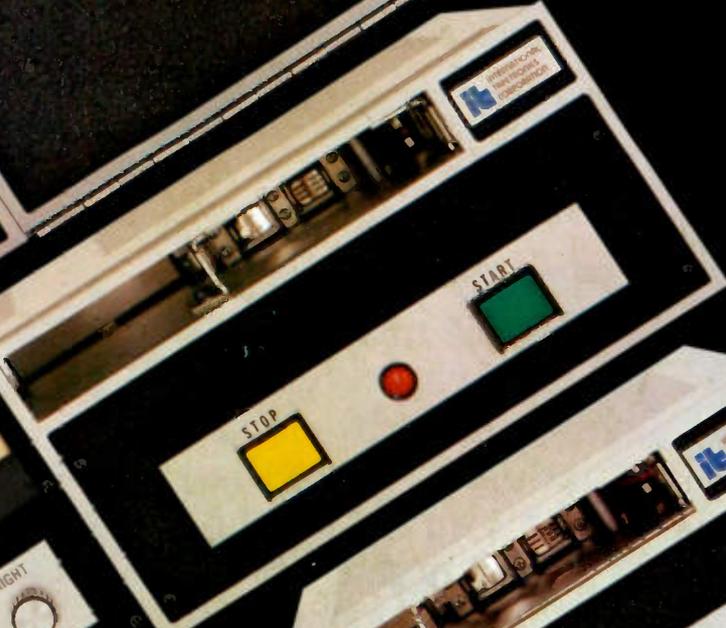
For optimum tape drive, we employ a powerful direct drive motor with permanently lubricated ball bearings. The first step toward speed stability is the use of the time-proven hysteresis-synchronous design. To minimize wow and flutter and improve pulling power, we use a capstan shaft with the largest possible diameter. And to further assist in speed consistency, the capstan is chrome plated, microscopically roughened (vapor blasted), and hardened (electrolyzed). Summary results . . . highly stable speed accuracy, minimum wow and flutter, and no lubrication.

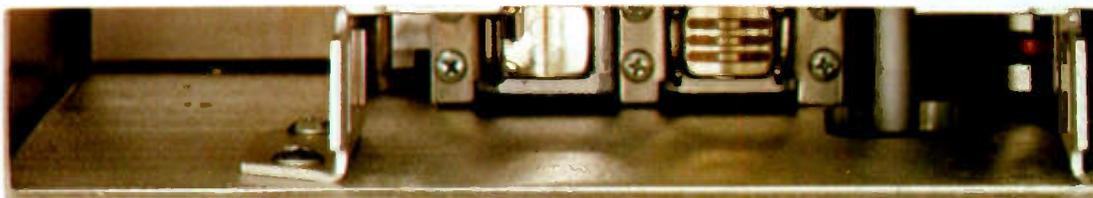
The program reproduce amplifier includes an IC electronic "squelch" circuit which turns off the audio output when the machine is idle and permits the mixing of several machines into one console input without sacrificing desirable signal to noise ratio. Detection of auxiliary cue tones (an option) is indicated by front panel indicator lamps and relay contact closures are provided to signal external equipment.

Both the compact SP and WP Series Reproducers are designed for either table-top or rack mounting (rack kits are optional). Two of the SP Series units may be mounted side by side in an equipment rack (as shown above). Slide-out housings are standard and the machines are fully operational when removed from their cases.

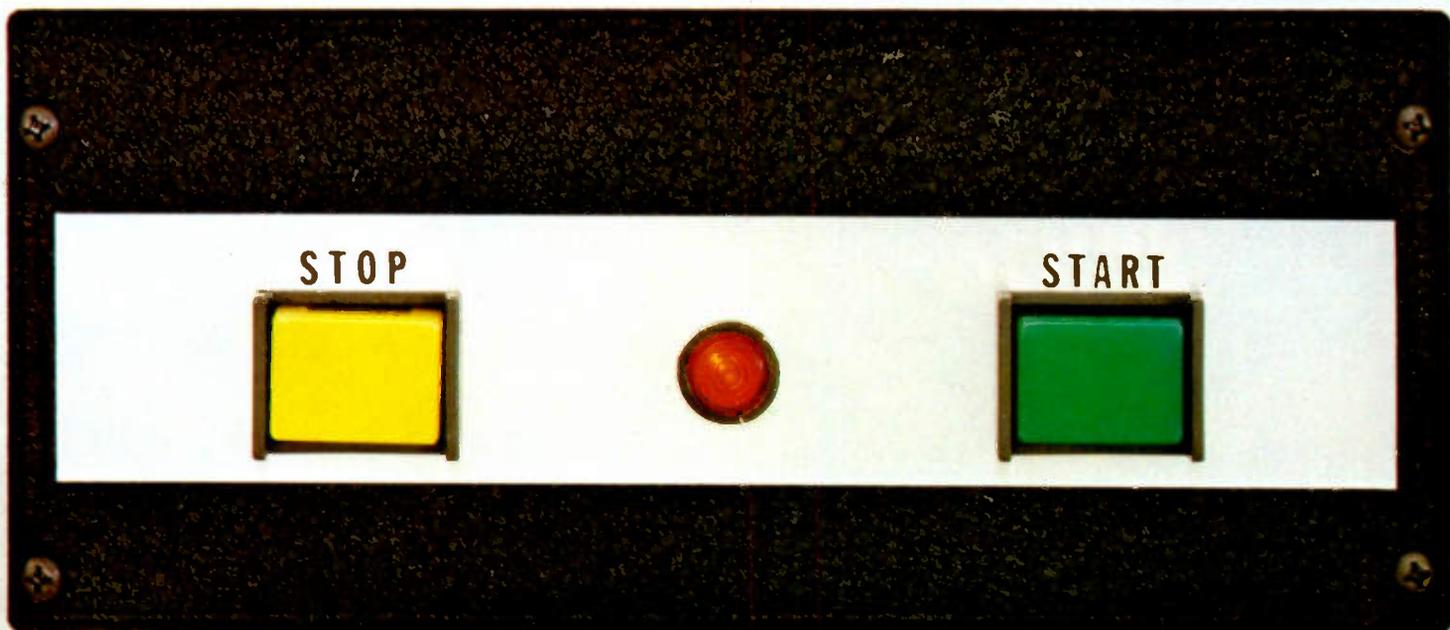
The SP and WP Series are available in monophonic or stereophonic; with single cue tone or secondary and tertiary cue tones added; and with a high speed cue feature that permits the rapid advance of the tape (at four times regular speed) to the next cue tone either automatically or manually.

# IFC





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The SP Reproducer is the most widely used cartridge machine in the broadcast industry. More than 8,000 are in use today. It is ruggedly built, totally dependable. This compact machine uses NAB "AA" and "BB" size cartridges.

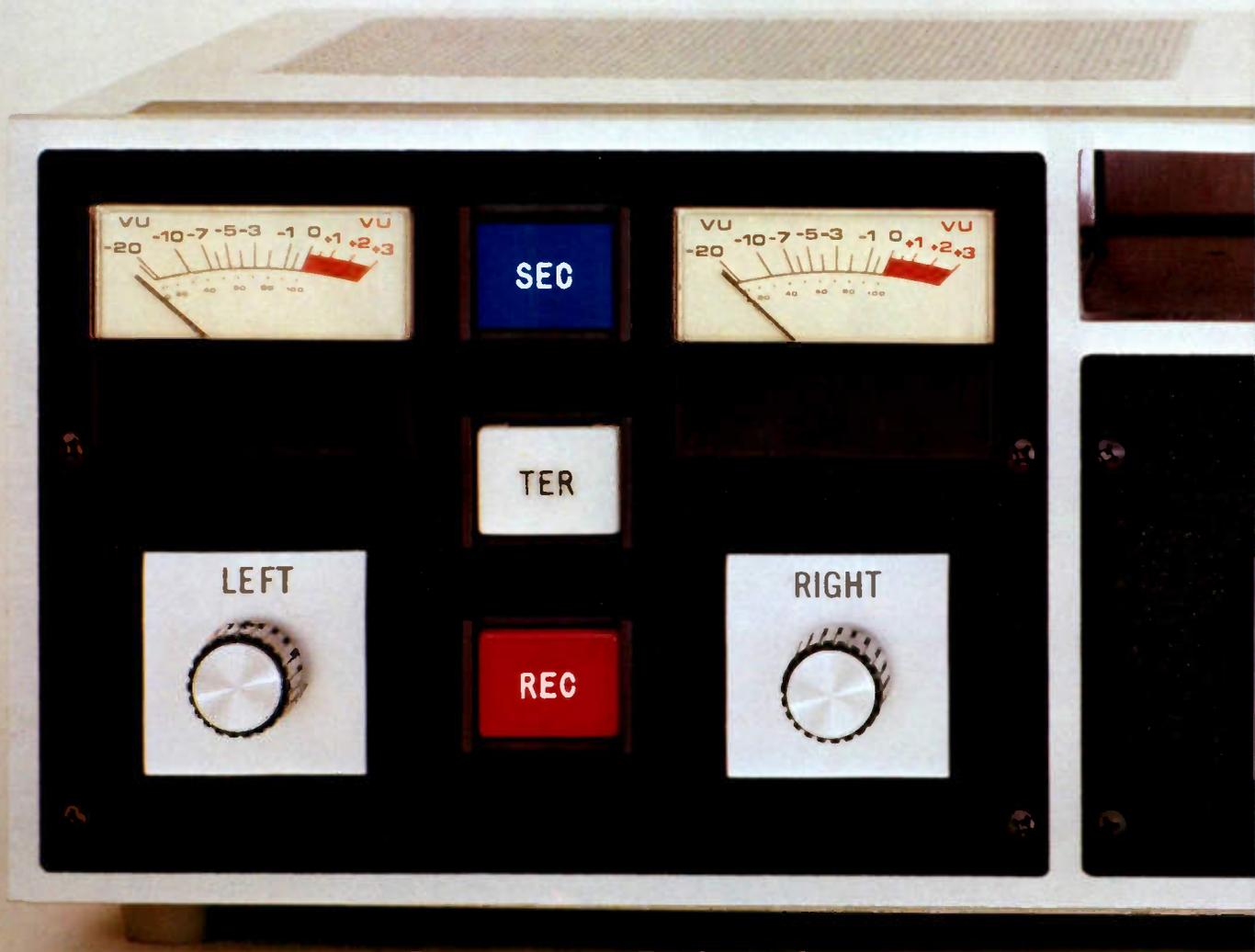
# SP/WP



WP Series Reproducers accept the NAB "AA", "BB" and "CC" size cartridges, and have provision for accepting recording amplifier electronics for ready conversion to recorder/reproducer.

For more than a decade — broadcasters have purchased more ITC machines than any other brand. The Record: Three out of five broadcast cartridge machines sold world wide are ITC machines — 60%! Over 25,000 Premium Line cartridge machines are in use today. Every year, 500 additional stations become ITC customers. The state of the art has changed dramatically in the last decade, and the Premium Line has evolved with the times. Today, Premium Line machines employ many revolutionary features, including ITC's new playback head, head module, cartridge guidance system and pressure roller. The philosophy of the Premium Line remains the same: evolution, dependability, ruggedness, simplicity and serviceability. Today, broadcasters have both new and well established reasons for choosing ITC Premium Line cartridge machines.

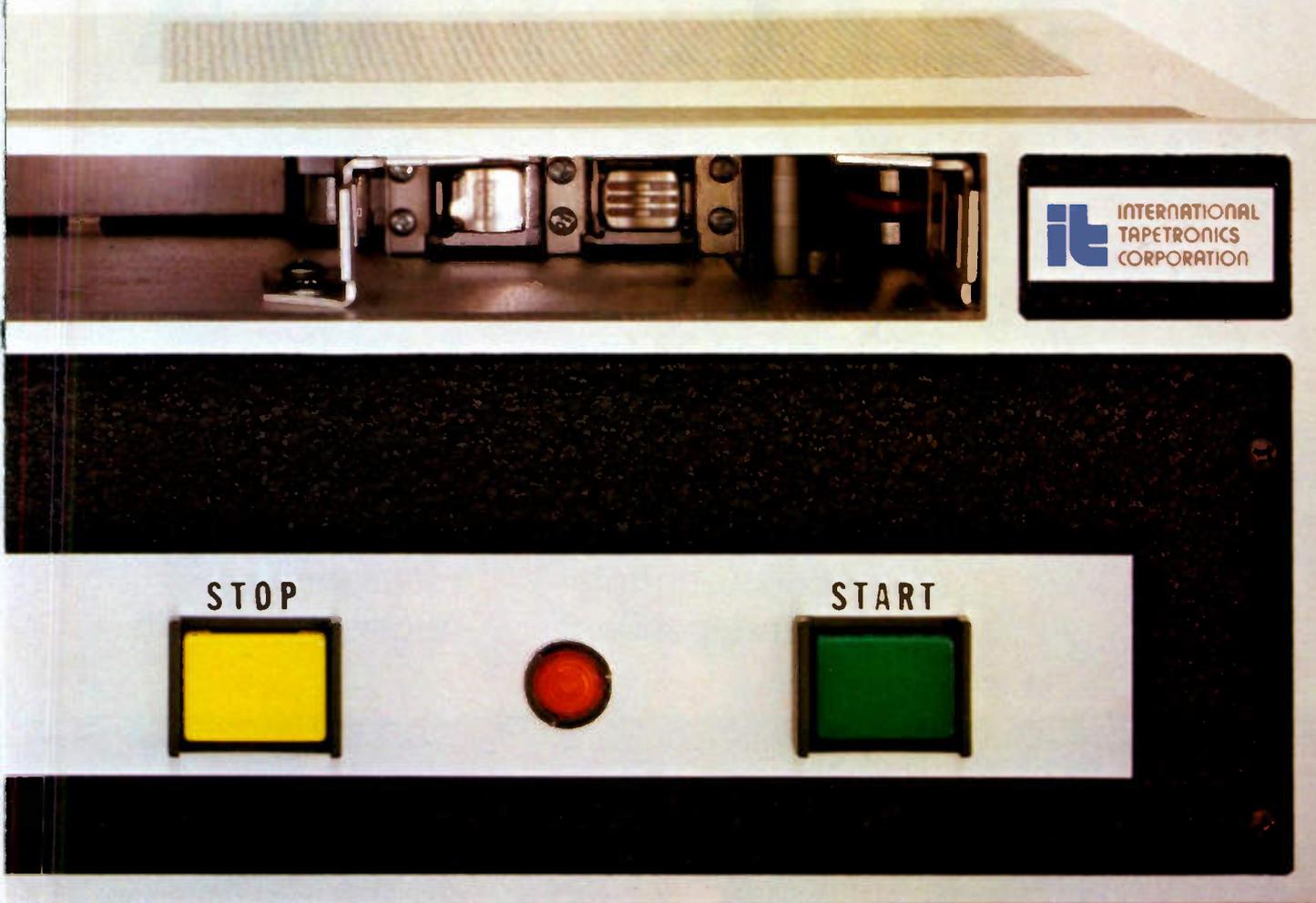
The  
ITC  
Premium  
Line takes  
another  
giant  
step  
forward



The RP Series Master Recorder-Reproducer combines the playback features of the SP/WP with the RA Series recording amplifier to provide a compact recorder/reproducer offering those features most

# RP &

wanted by broadcasters. The RPD Series provides the additional capability of program delay.



# RPD



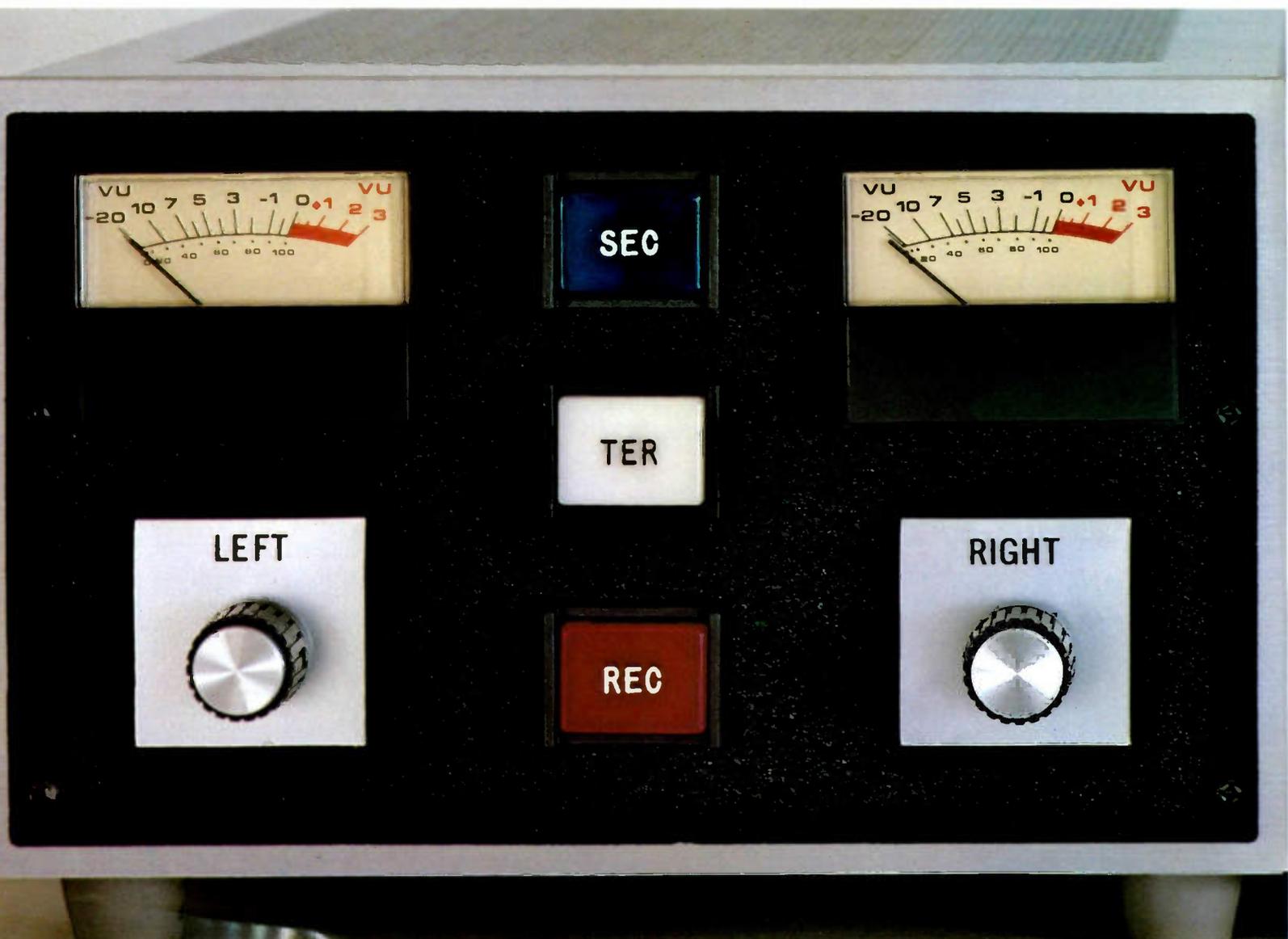
The RPD provides a third head and two separate playback systems, including amplifier, VU meter, output transformer, and output connector. This separate "Delay" system avoids loss of audio quality.

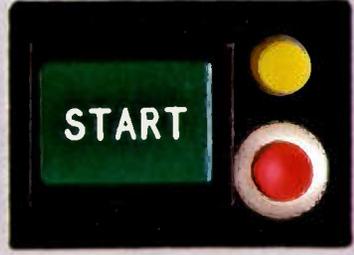
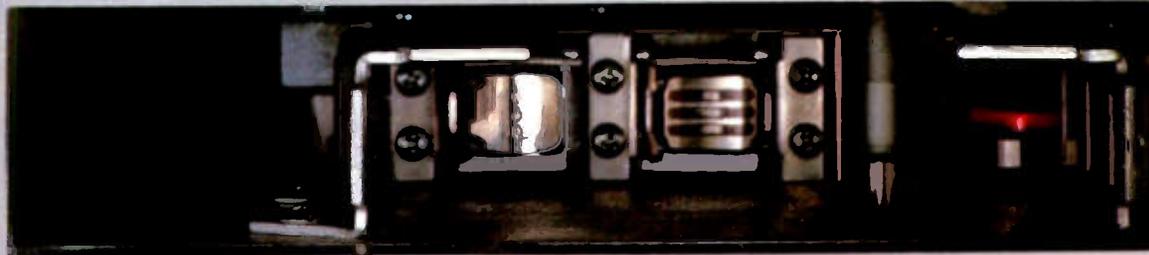
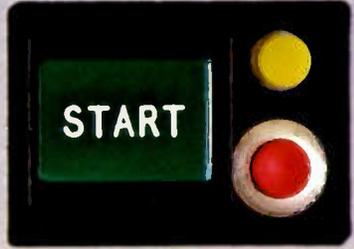
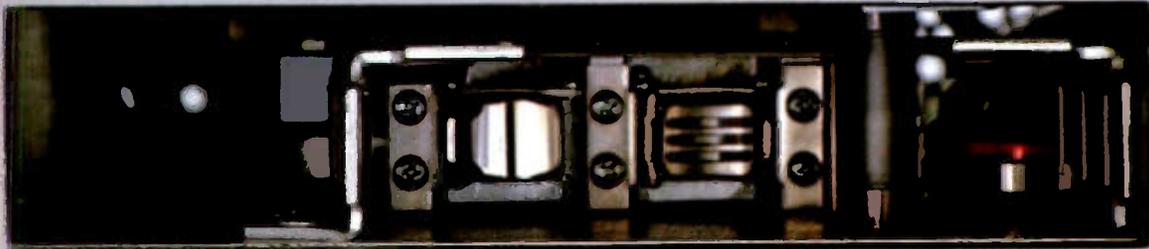
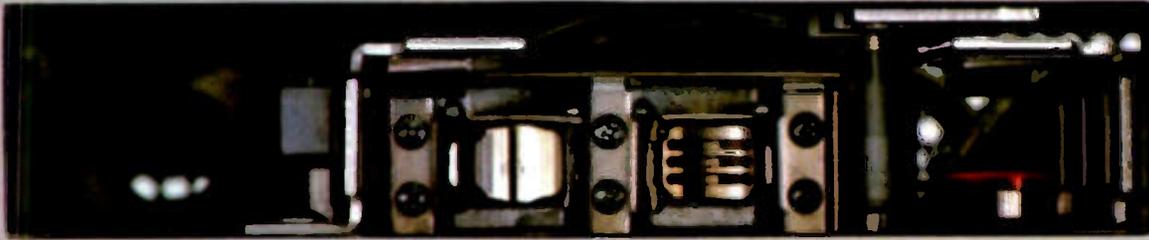
# 3D & WRA

The 3D Series provides three cartridge reproducers in the space ordinarily taken by two, and at less than the cost of three SP machines. All three decks may be operated at once, supplying independent

audio and control information.

Add the WRA Series Recording Amplifier and the bottom deck of the 3D machines functions as a complete recorder/reproducer.







#### **Synchronous Motor System**

A powerful, high-quality direct-drive capstan motor. Dynamically balanced with permanently lubricated ball bearings. Results: highly stable speed accuracy, minimum wow and flutter and no lubrication.

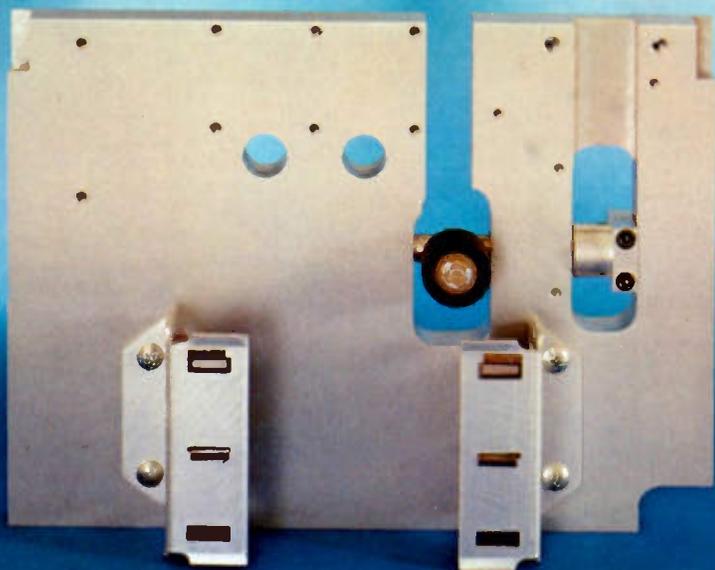


#### **Vapor-Honed Capstan Shaft**

The large-diameter shaft is formed of hardened steel, chrome plated and microscopically roughened to enhance pulling force.

# Evolutionary:

Outstanding features common to the ITC Premium line of cartridge machines.

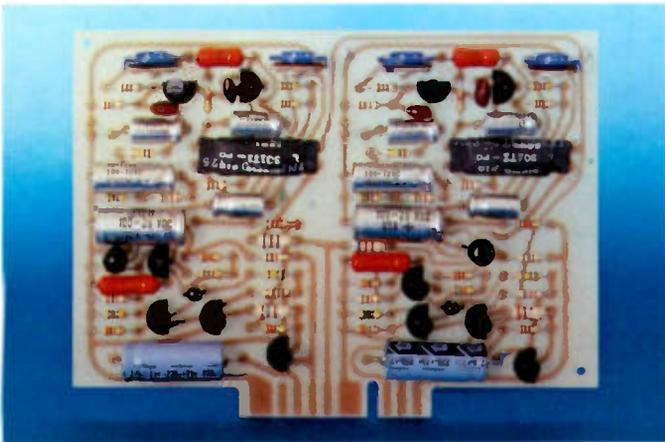
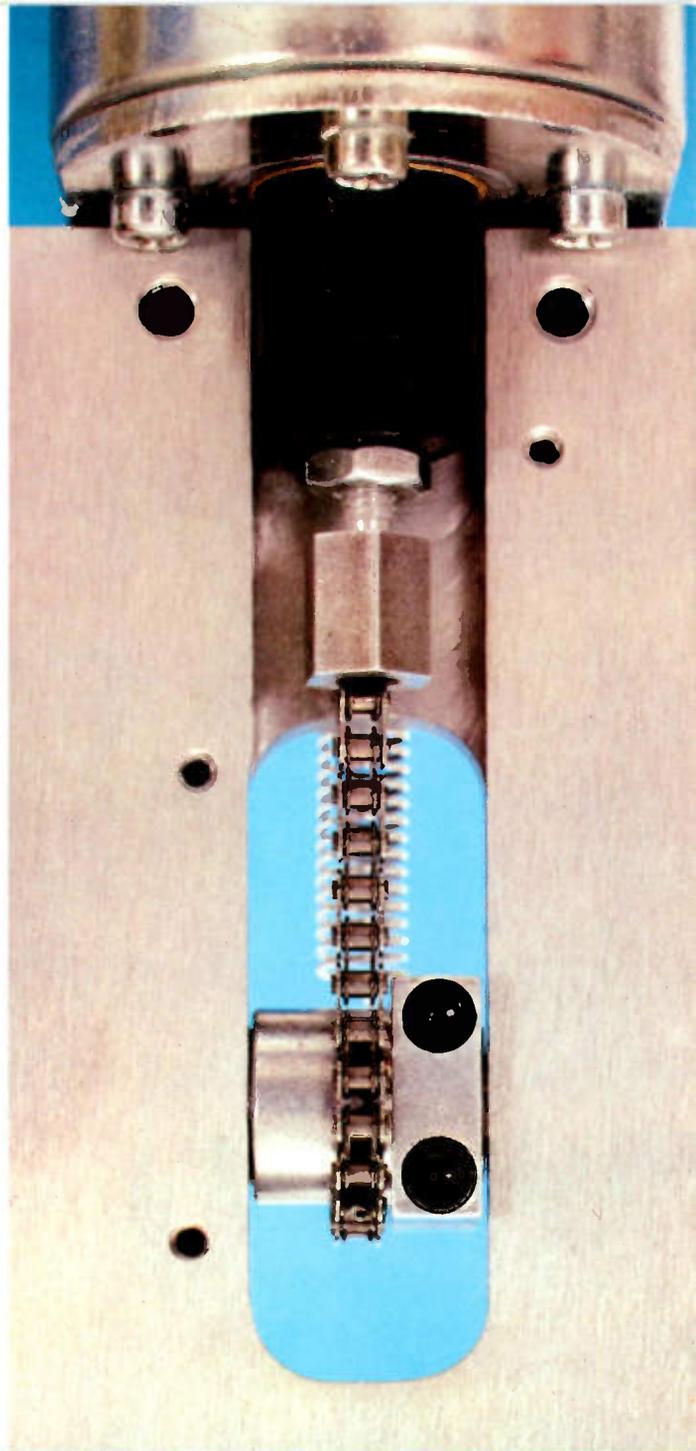


#### **Stable, Machined-Aluminum Deck**

The Premium Line deck is milled from half-inch thick, solid aluminum tool plate. Unlike die castings, which may take years to stabilize, it will not warp or groove. The thick plate is machined on numerically controlled mills for absolute precision and uniformity. The deck is then anodized to harden the cartridge slide surfaces and to provide a durable, attractive finish. This heavy-duty deck plate gives Premium machines their exceptional rigidity.

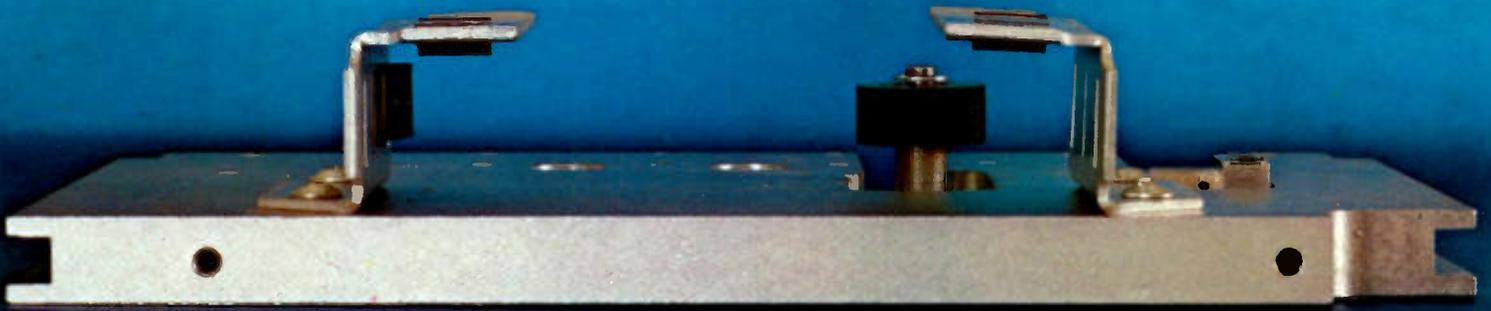
### Air-Damped Solenoid

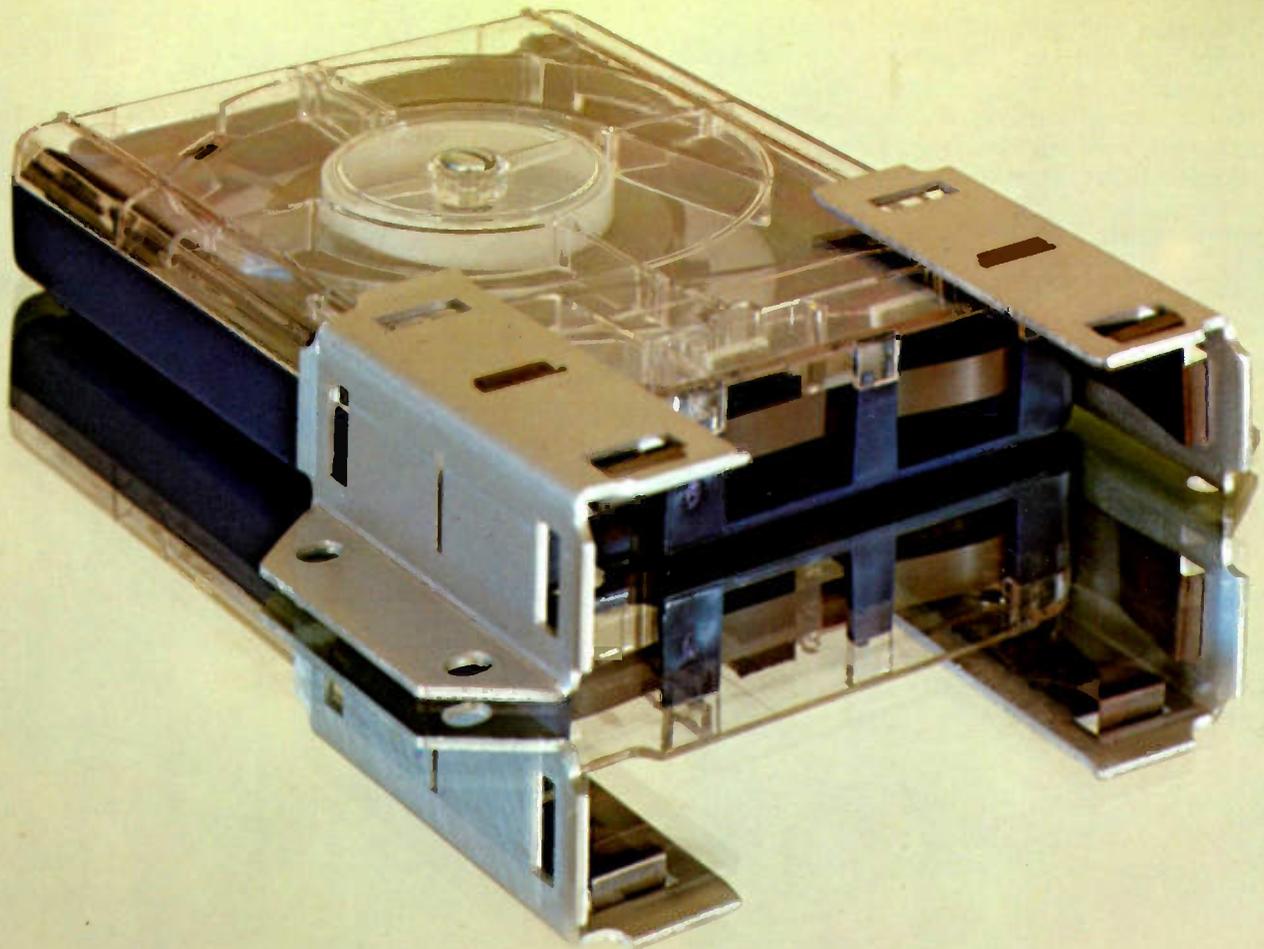
A powerful, whisper-quiet, electro-mechanical system that provides consistent positioning of the pressure roller for tape drive. The plunger is Teflon®-coated to eliminate the need for lubrication or cleaning. The mechanical linkage between solenoid and pressure roller is a chain and sprocket design — simple, with a minimum of parts.



### Improved Electronics

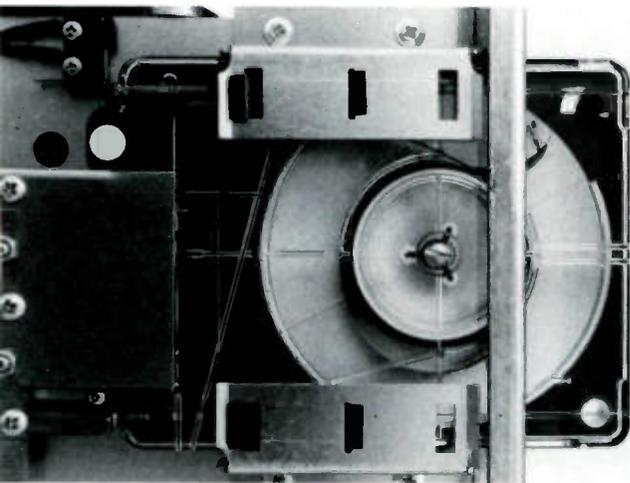
Improved electronics optimize the performance of Premium Line playbacks. The squelch circuit in the amplifier has been improved. Carbon film resistors used in audio circuits improve noise performance. The PC boards are single-sided, with improved, single-turn potentiometers. Components are spaced to permit easy repair. Plug-in PC cards are used extensively.





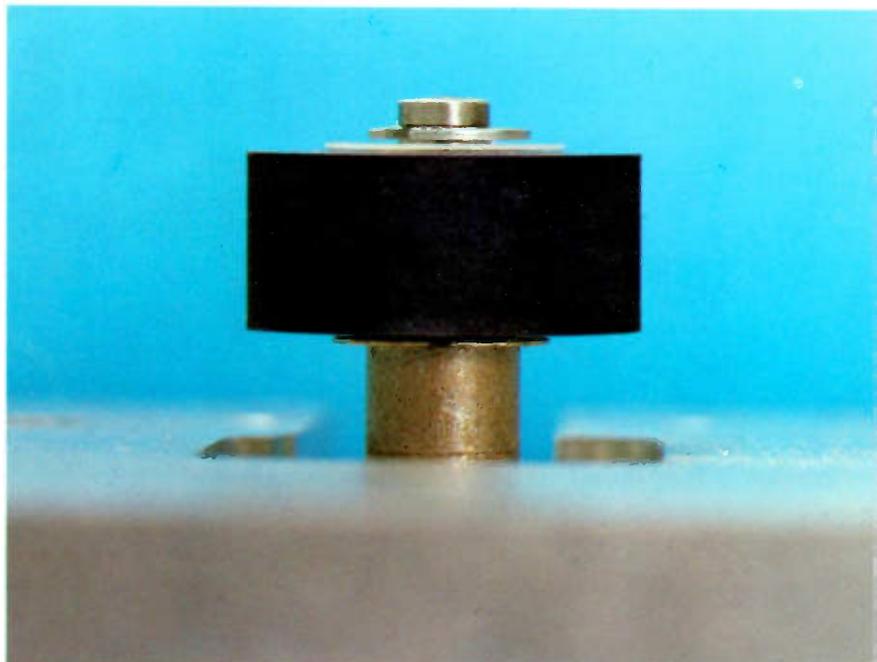
### **Cartridge Positioning Mechanism**

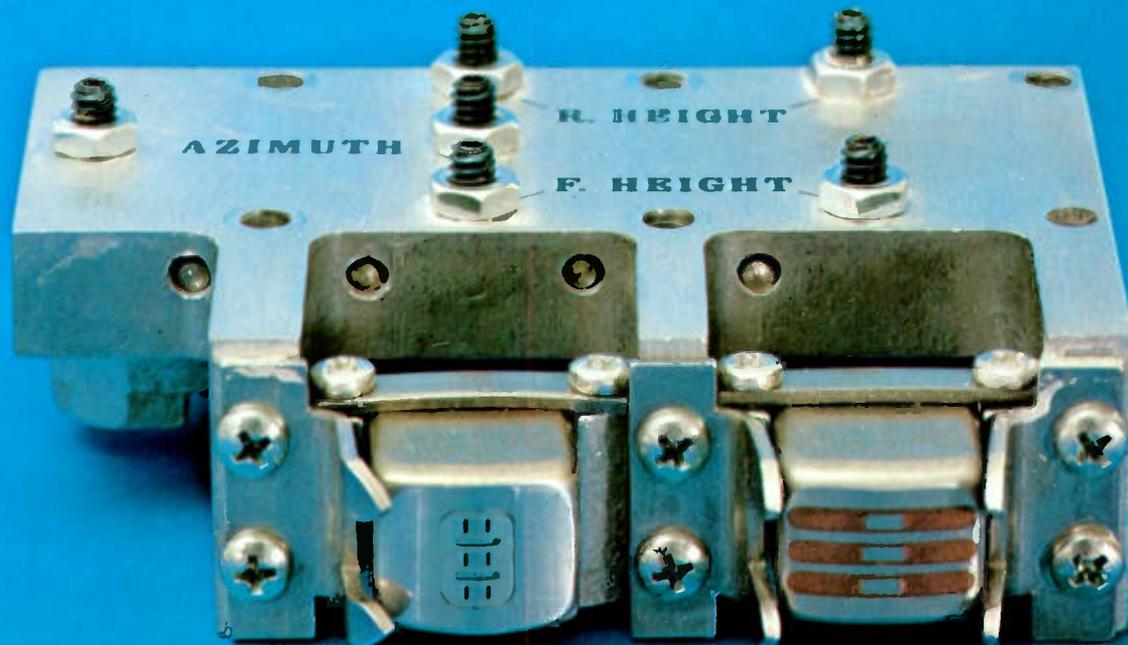
The cartridge guidance systems puts its pressure on the load-bearing outer rails of the cartridge. This holds the cartridge firmly in position without distorting the cartridge and altering tape travel. A side-pressure spring on the left side pushes the cartridge to the proper side location. The system assures precise, rigid alignment of the tape to head, even when cartridge insertion is hurried or careless. The result is accurate and repeatable azimuth alignment, essential for improved stereo phase performance.



### **Improved Pressure Roller**

The pressure roller is formed of an advanced 525K rubber compound. It provides twice the pulling power of ordinary rollers and extended life. The roller holds its durometer even under the highest humidity. It will not crack or dry out, and is impervious to commonly used cleaning chemicals.





### Removable Head Module

A true center-pivot head module, designed with rotational axis on the exact vertical and horizontal centerline of the heads. All three head adjustments — height, zenith and azimuth — are made independently and have individual locks. Locking one adjustment does not alter the others. These adjustments are on steel-ball pivots which, combined with a longer azimuth arm, permit much finer tuning.



### Unique Head Design

This exclusive, ITC-designed, long-life reproduce head is cylindrically shaped, rather than hyperbolic. Mu-Metal laminations are surrounded by epoxy filler impregnated with aluminum oxide particles for shielding and durability. The core windows are wider than conventional designs. The result is greatly improved frequency response without any low end bumps.



# Specifications

## SP, WP, RP, RPD, 3D, AND WRA SERIES CARTRIDGE EQUIPMENT

### POWER:

#### SP, WP, & RP SERIES:

117 volts, 60 Hz, 77 watts typical.

#### 3D & WRA SERIES:

117 volts, 60 Hz, 144 watts typical.

### TAPE SPEED:

7-1/2 inches per second. Direct drive hysteresis synchronous motor with electrolyzed shaft and instrument-type permanently lubricated ball bearings.

### WOW & FLUTTER:

0.2% or less, NAB weighted using a prerecorded tape with a flutter content not exceeding 0.025% NAB weighted.

### TIMING ACCURACY:

0.1% or better.

### AUDIO OUTPUT IMPEDANCE:

600 ohms balanced. May be strapped for 150 ohms.

### AUDIO OUTPUT LEVEL:

+18 dBm maximum before clipping. Normal operating range: -10 to +8 dBm. External audio pads required for lower levels to prevent deterioration of signal-to-noise ratio.

### AMPLIFIER DISTORTION:

0.5% THD or less. In accordance with 1975 NAB standard.

### SYSTEM DISTORTION:

2.0% THD or less — record to playback at 0 VU recording level.\*

### NOISE:

50 dB or better from 1 kHz at 0 VU recording level.\*

### CROSS TALK BETWEEN CHANNELS:

50 dB or better at 1 kHz.

### FREQUENCY RESPONSE:

±2 dB 315 to 15,000 Hz; +3, -2 dB 50 to 315 Hz record to playback at -10 VU recording level.\*

### EQUALIZATION:

NAB (1964 Standard). High frequency equalization controls included in reproducer and recording amplifier.

### HEAD CONFIGURATION:

NAB. Two tracks for monophonic, three tracks for stereophonic. Separate record and reproducer heads permit monitoring while recording.

### CUE SIGNALS:

NAB. Primary (stop) Cue, 1 kHz, standard; automatically applied at start of recording (may also be defeated and applied at user's discretion). Secondary Cue 150 Hz, and Tertiary Cue, 8 kHz, optional; may be applied during recording process or during playback. Individually adjustable oscillator for each tone. Reproducer utilizes adjustable tuned circuit detector for each tone and furnishes relay contact closure for external control.

### AUDIO INPUT IMPEDANCE:

600 ohm balanced terminating standard. 15K ohm balanced bridging may be selected by jumpers.

### AUDIO INPUT LEVEL:

-20 to 0 dBm; accepts higher level by changing input pad.

### METERING:

Taut-band movement with "A" scale. Internal meter switch allows selection for metering the following: Program Bias, Peak Recording Level, Normal Recording Level, Program Play, Cue Play, and Cue Bias.

### BIAS OSCILLATOR:

Push-pull, 82 kHz; individual gates and level controls for program (separate left and right in stereophonic units) and cue.

### TAPE CAPACITY:

#### SP & 3D SERIES:

NAB size AA and BB cartridges. 2 seconds to 16 minutes with 1 mil lubricated tape at 7-1/2 IPS.

#### WP & RP SERIES:

NAB size AA, BB, and CC cartridges. 2 seconds to 31 minutes with 1 mil lubricated tape at 7-1/2 IPS.

### START TIME:

100 ms with minimum solenoid air damping.

### STOP TIME:

100 ms with minimum solenoid air damping.

### AMBIENT OPERATING TEMPERATURE RANGE:

50° F. to 131° F.; 10° C to 55° C.

### REMOTE CONTROL:

All indicators and switch controls except meter switch and power indicator. Also provides cue track audio input and output for logging applications.

### EXTERNAL CONNECTORS:

Latching type. Mating connectors furnished.

### MOUNTING:

Table top mounting standard. Rack mounting adapters optional. Machines require following vertical space for rack mounting and proper ventilation:

**SP, WP, RP & WRA SERIES:** 7 inches

**3D SERIES:** 12.25 inches

DIMENSIONS:	Width	Depth	Height - Add for Feet
SP Series:	8.5 in.	11.0 in.	5.25 in. .375 in.
WP & RP Series:	17.5 in.	11.0 in.	5.25 in. .375 in.
3D Series:	8.5 in.	12.875 in.	10.5 in. .625 in.
WRA Series:	8.5 in.	11.0 in.	5.25 in. .375 in.

### WEIGHT:

SP Series:	23 pounds	3D Series	41 pounds
WP Series:	28 pounds	WRA Series	12 pounds
RP Series:	39 pounds		

\*All measurements made using Capitol Q17 tape or equivalent, and referenced to 1 kHz recorded at 160 nWb/m in accordance with 1975 NAB standard.

Specifications subject to change without notice.

# Tech Service

by those  
who know your  
equipment best



STEVE WATERS

And, we are here, with the parts and knowledge to repair or rebuild your machine.

A phone conversation between your people and ours will usually identify the problem. And, diagnosing by phone, we can often have the needed part on its way the same day.

ITC tech service helps keep Premium line machines in top operating condition, with minimum down time.

DAVE MONTGOMERY



MARK HILL



GEOFF LISTON



# Sales Service

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who know  
broadcasting best



JOHN SCHAAB

Our direct-marketing staff knows your needs and can expertly recommend the ideal equipment match.

ITC machines are protected by a 24 month warranty, featuring free parts replacement and no-charge factory labor when required.

We offer a 30 day trial order. If, after 30 days, you are dissatisfied, the machine may be returned for a full refund.



LARRY CUTCHENS



JANET DALRYMPLE



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## **it** Premium Line

### **SP Series Reproducers**

#### **SP-0001**

Monophonic with 1 kHz primary cue

#### **SP-0002**

Stereophonic with 1 kHz primary cue

#### **SP-0003**

Monophonic with 1 kHz, 150 Hz and 8 kHz cues

#### **SP-0004**

Stereophonic with 1 kHz, 150 Hz and 8 kHz cues

### **WP Series Reproducers**

#### **WP-0003**

Monophonic with 1 kHz, 150 Hz and 8 kHz cues

#### **WP-0004**

Stereophonic with 1 kHz, 150 Hz and 8 kHz cues

### **RP Series Recorder/Reproducers**

#### **RP-0001**

Monophonic with 1 kHz primary cue

#### **RP-0002**

Stereophonic with 1 kHz, primary cue

#### **RP-0003**

Monophonic with 1 kHz, 150 Hz and 8 kHz cues

#### **RP-0004**

Stereophonic with 1 kHz, 150 Hz and 8 kHz cues

### **RP Delay Series Recorder/Reproducer/Delay**

#### **RPD-0013**

Monophonic with 1 kHz primary cue, 150 Hz secondary cue, and 8 kHz tertiary cues

### **3D Series Reproducers**

#### **3D-0001**

Monophonic with 1 kHz primary cue

#### **3D-0002**

Stereophonic with 1 kHz, primary cue

#### **3D-0003**

Monophonic with 1 kHz, 150 Hz and 8 kHz cues

#### **3D-0004**

Stereophonic with 1 kHz, 150 Hz and 8 kHz cues

### **WRA Series Recording Amplifiers**

#### **WRA-0001**

Monophonic with 1 kHz primary cue

#### **WRA-0002**

Stereophonic with 1 kHz primary cue

#### **WRA-0003**

Monophonic with 1 kHz primary, 150 Hz secondary cue, and 8 kHz tertiary cues

#### **WRA-0004**

Stereophonic with 1 kHz primary, 150 Hz secondary cue, and 8 kHz tertiary cues

Two year warranty on parts and factory labor.

30 day guarantee of satisfaction.

5% discount for payment prior to shipment.

36 month leasing plan available.



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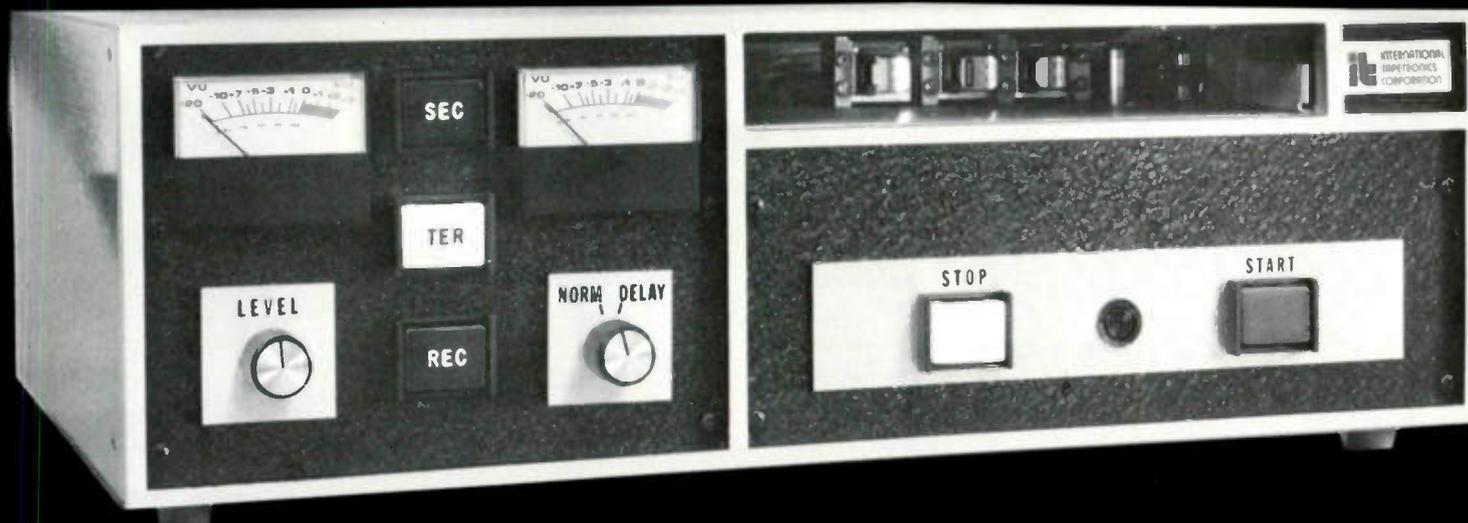
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“The industry has a  
new Benchmark:  
**The evolutionary  
ITC Premium Line!**”

John Schaab, Broadcast Salesman

# RP DELAY



Now you can get the economy of having four different operations available in one cartridge machine--continuous program delay, network delay, normal recording, and normal playback--yet maintain all the dependability, all the specifications, all the quality associated with ITC. The RP Delay provides a means of protecting your station from damaging libel suits or FCC actions, and from antagonizing your audience or advertisers. The RP Delay combines the features of ITC's RP Series Master Recorder/Reproducer with the additional capability of program delay. Use the RPD for normal cartridge recording and playback; but when the protection or convenience of a time lapse is needed, just turn the switch to "Delay".

## CONTINUOUS PROGRAM DELAY

Even in "Delay", ITC engineers have matched or surpassed NAB standards through the use of a totally separate program delay head and amplifier. No longer is a head required to alternate between record and play functions. This means that no compromises are made in the frequency response or the signal-to-noise ratio, as occurs when the function of the heads is switched.\* The extra head allows each of the three to be chosen for optimum performance in a single assignment--either recording or playback, but never both.

The third head (located on the far left) provides the delayed playback. The tape passes the erase/record head (center) and continues for the full cycle of the tape before again arriving at the delay playback head. (See the diagram on the reverse side.)

When the machine is set in "Delay", simply insert an erased "B" or "C" sized NAB cartridge (these allow the use of the third head), press "Record Set" and "Start", and the unit will operate as a continuous delay recorder/reproducer. The duration of the delay is determined by the amount of tape in the cartridge. For example, a seven second cartridge is often used to delay "live" interviews and telephone talk shows. This seven second time lapse provides an opportunity to edit words or comments that are not permissible.

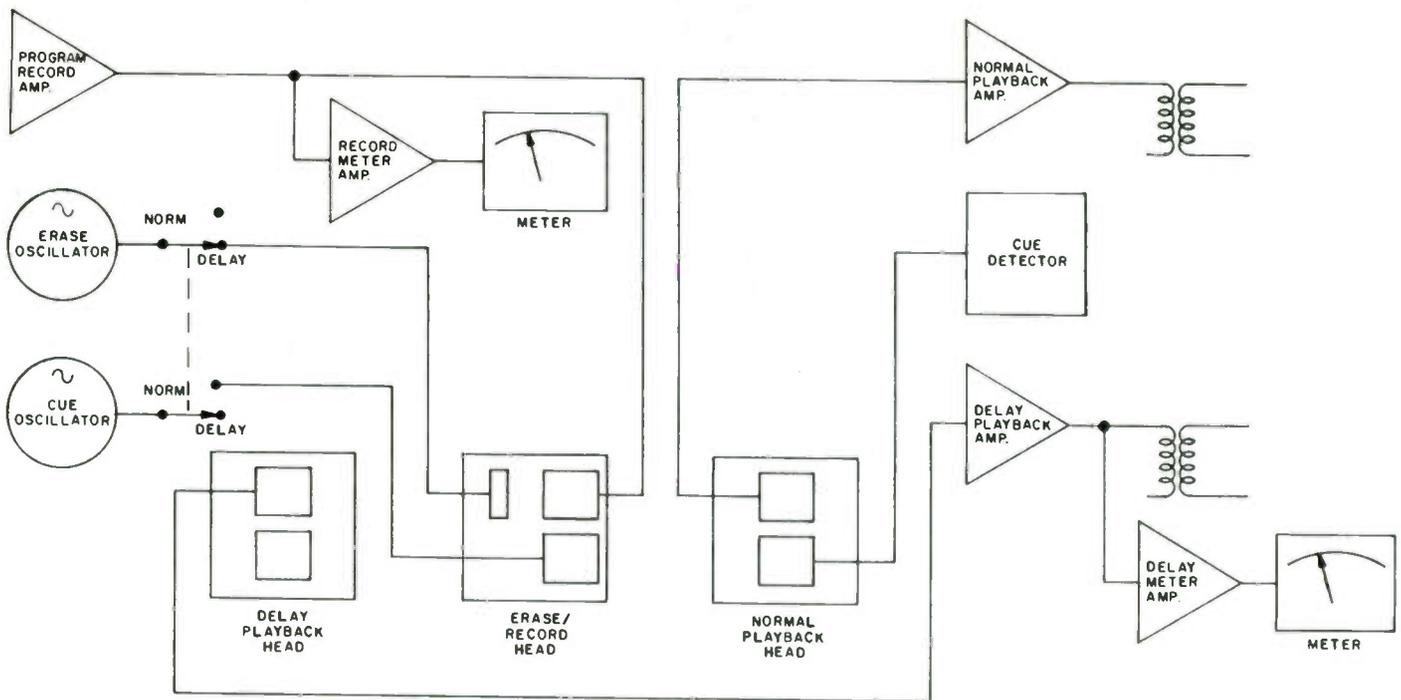
## NETWORK PROGRAM DELAY

The RP Delay is also capable of automatically recording an entire program for playback at a later time. Choose a cartridge long enough to record the entire program (5½ minutes for a 5-minute news cast), and turn the selector switch to "Delay". When a "Record/Start" command is generated by a timer in an automation system or by network cue tones, the machine will erase any program material on the tape and record new information. A previously recorded cue tone will stop the tape when it has completed one cycle, and the machine will remain idle until instructed to start playback. At the time you have specified, it will begin to play the material recorded earlier, stopping on the cue tone, ready to repeat the cycle of erase/record and playback.

## NORMAL CARTRIDGE OPERATION

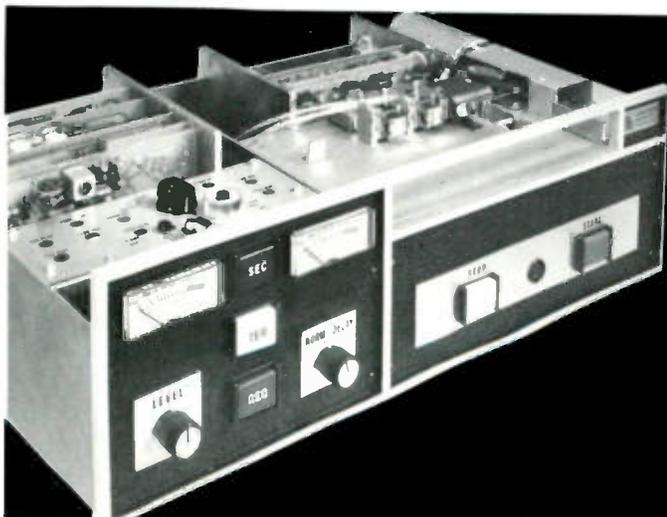
Return the selector switch to "Norm" and your unit will function as a standard cartridge recorder/reproducer. Use "A", "B", or "C" sized NAB cartridges and make recordings in the conventional way. ITC has designed this machine for optimum performance as a normal recorder/reproducer and for dependable operation in the delay application. The only difference between the RP Series and the RPD Series is the additional ability of the RPD to function as a program delay unit.

The RP Delay is a cartridge machine for all broadcasters. For the station with regularly scheduled talk programs, the machine will perform reliably day after day as a delay unit, and provide backup for normal cartridge machines. For the station that doesn't regularly air "live" talk shows, it fills the need for a standard cartridge record/playback unit, yet is ready to act as a delay machine for that unexpected situation or future program. Since the extra cost of this protection is so small compared to the possible damaging repercussions, can you afford not to check into ITC's four-in-one cartridge recorder/reproducer/delay machine?



- "Delay" Mode—Erase oscillator is activated, primary (stop) cue oscillator is inhibited.
- No Head Lead Switching--No need for compromise adjustments necessary when an amplifier is switched between two heads. Adjust each amplifier for a maximum performance with one head.
- Third Head For "Delay" Playback--Heads are chosen for optimum performance in either recording or playback applications but never both.\*
- Two VU Meters allow monitoring of input and "Delay" output simultaneously.
- Two Separate Playback Systems (head, playback amplifier, VU meter, output transformer, and output connection)--one for normal operation and one for delay. Use the external audio routings most convenient for your operation.

\*ITC uses wide gap heads in recording applications to insure good frequency response and adequate recorded field depth. High impedance, narrow gap heads are used in playback applications for optimum frequency response and signal-to-noise ratio.



#### MODEL DESIGNATION

RPD Series Delay Recorder/Reproducers accept the NAB "A", "B", or "C" sized cartridges and provide complete recording and reproducing capabilities. The units require the use of either "B" or "C" sized cartridges for continuous program delay operations.

RPD-0011 Recorder/Reproducer/Delay, Monophonic, with 1 kHz Primary Cue Tone

RPD-0013 Recorder/Reproducer/Delay, Monophonic, with 1 kHz Primary, 150 Hz Secondary, and 8 kHz Tertiary Cue Tones

RPD-0015 Recorder/Reproducer/Delay, Monophonic, Hi-Speed Cue, with 1 kHz Primary, 150 Hz Secondary, and 8 kHz Tertiary Cue Tones

#### ACCESSORY

NR-0002 Rack Mounting Kit - mounts RPD Series in 19" equipment rack.

867-0014-001 NAB "B" size cartridge with additional pressure pads for use of third head in "Delay" operation. Loaded with 7 seconds of tape.

PLEASE SEE THE RP SERIES BROCHURE FOR COMPLETE SPECIFICATIONS.



INTERNATIONAL TAPETRONICS CORPORATION  
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Marketed exclusively in Canada by McCurdy Radio Industries Ltd., Toronto



770 Recorder/Reproducer  
(Shown in optional console cabinet.)

## ITC 770 SPECIFICATIONS

### REPRODUCER

- Power:** 105 to 130 volts AC, 60 Hz, 160 watts maximum.
- Wind Time:** Less than 60 seconds for 2500 feet of tape. Less than 90 seconds for 3600 feet of tape.
- Motors:** Capstan - Direct drive DC servo control with electrolyzed shaft. Reels - Two capacitor start induction torque motors.
- Tape Speeds:** 7 1/2 and 15 ips (19 and 38 cm/sec) or 3 3/4 and 7 1/2 ips (9.5 and 19 cm/sec) Speed accuracy  $\pm 0.2\%$  or less measured with 1.5 mil (0.038 mm) tape.
- Tape Width and Tracks:** 1/4 inch (6.3 mm) tape, 1.0 mil (0.025 mm) base minimum. Full Track - mono 1/2 track - mono or stereo 1/4 track - stereo
- Reel Sizes:** NAB or EIA with a hub diameter of 1.75 inch (44.45 mm) or greater. Maximum reel flange diameter of 10.5 inches (266.7 mm). Selectable tape tension for small or large reels. Reels of dissimilar sizes, i.e. 7 inches (177.8 mm) and 10.5 inches (266.7 mm), should not be used together.
- Flutter (NAB Weighted):** 3 3/4 ips 0.10% or less 7 1/2 ips 0.07% or less 15 ips 0.05% or less
- Audio Output:** With transformer(s) . . . +24dBm before clipping into 600 ohm load, balanced. Without transformer(s) . . . +18dBm before clipping into 600 ohm load, unbalanced.
- Distortion (Amplifier):** 0.5% rms total harmonic distortion, maximum at +18dBm output level at 1 KHz with output transformer(s). +16dBm without output transformer(s).
- Signal-To-Noise Ratio:** 52dB measured from a 700 Hz tone, recorded at 185 nWb/m, with reproduce amplifier adjusted for +8dBm output, to tape recorded with bias but no signal. Measurement is unweighted noise with a band width of 20 to 20,000 Hz.
- Crosstalk:** 55dB or better with a 185nWb/m 1 kHz tone on adjacent track.
- Equalization:** NAB with high frequency adjustment for 3 3/4, 7 1/2 and 15 ips. Automatically switched with speed switch between low and high speed equalizers.

- Frequency Response:** 3 3/4 ips (+2dB -3.5dB) 25 to 35 Hz;  $\pm 2$ dB 35 to 8,000 Hz. 7 1/2 ips (+2dB -3dB) 25 to 35 Hz;  $\pm 2$ dB 35 to 15,000 Hz. 15 ips (+2dB -3.5dB) 25 to 35 Hz;  $\pm 2$ dB 35 to 18,000 Hz.
- Headphone Output:** 24 mV into 8 ohms (with AT-0002 output transformers). 58 mV into 8 ohms (without AT-0002 output transformers).
- Ambient Operating Temperature:** 40° to 130°F (5° to 55°C).
- Remote Control:** Start, Stop, Rewind, Forward, Speed Select, Foil Sense and Mode Indicators.
- Brakes:** Mechanical disc with one-way clutch. 10 1/2 inch (266.7 mm) metal reels stop time adjustable from 2 1/2 seconds to 10 seconds.
- External Connectors:** Latching type Beau Series 3300. Mating plugs furnished.
- Dimensions:** 19 inches (482.6 mm) wide, 1 1/4 inch (31.75 mm) overhang on each side with 10 1/2 inch (266.7 mm) reels. 14 inches (355.6 mm) high, 2 1/4 inches (57.15 mm) overhang on top with 10 1/2 inch (266.7 mm) reels. 7 7/8" (200.0 mm) deep, including mating plugs.
- Weight:** Unpacked - 44 pounds (19.96 kg).

### RECORDING AMPLIFIER

- Power:** (includes reproduce deck and recorder electronics) 105-130 volts, AC, 60 Hz, 165 watts maximum.
- Recorder Source Impedance:** 600 ohms
- Recorder Input Impedance:** 5000 ohms balanced (15 K ohm bridging optional).
- Input Level:** -22 dBm (0.61 volts) minimum to record at "0" reference level (185 nWb/m flux level) +8 dBm (1.96 volts) maximum.
- Distortion (Record to Play):** Using 400 Hz tone recorded at NAB standard reference level\* with reproduce amplifier adjusted for 0 dBm output, and measuring on a distortion, analyzer with a 400 Hz to 20 kHz band width.
 

15 IPS	1.2%
7.5 IPS	1.5%
3.75 IPS	2.0%

The 770 is covered by the following patents:  
4,106,934, 4,040,114, D 248,393

- Amplifier Headroom:** Maximum amplifier headroom above reference level (185 nWb/m) using frequencies of 1 kHz and 10 kHz.

Tape Speed	1 kHz	10 kHz
15 IPS	+23 dB	+23 dB
7.5 IPS	+23 dB	+19 dB
3.75 IPS	+23 dB	+12 dB

- Crosstalk:** Better than 50 dB at 1 kHz.
- Frequency Response:** 15 IPS  $\pm 2$  dB from 35 to 18,000 Hz at normal operation level. 7.5 IPS  $\pm 2$  dB from 35 to 15,000 Hz. 10 dB below normal operating level. 3.75 IPS  $\pm 2$  dB from 35 to 8,000 Hz. 15 dB below normal operating level.
- Equalization:** NAB with adjustments for high frequency control.
- Headphone Output:** 8 ohms or greater.
- Meter Amplifier Monitor:** 600 ohms (available at rear chassis).
- Remote Control:** Record set switch and record indicator lamp.
- External Connectors:** Latching and phono types. Mating plugs and sockets furnished.
- Head and Track Configuration:** Full Track Monophonic Half Track Monophonic Half Track Stereophonic (2 channel) Quarter Track Stereophonic (2 channel)
- Metering:** Taut band movement with "A" scale. Meter switch selection for metering the following: Normal line recording level, P.R.S., bias and program play. (Meter sensitivity may be calibrated for 0 to +18 dBm output level.)
- Erase Depth:** Below Noise Level.
- Mounting:** Rack mounting. (Console cabinet optional).
- Dimensions:** 19 inches wide (482.60 mm) 9 inches deep (228.60 mm) 3 1/2 inches high (88.90 mm)
- Weight:** 15 pounds (6.805 kg) unpacked.

\*185 nWb/m = 0 dBm output, using 3M type 206 tape or equivalent.

The 770 is covered by a 30 day guarantee of satisfaction and a two-year warranty on parts and factory labor. Ask about our 770 Leasing Program.

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3M

# ITC 770

## Reproducers and Recorder-Reproducers



## Rugged, reliable, easily maintained

Broadcasting can be a tough life for a machine: demanding schedules, lack of attention, a multitude of operators. No wonder the "lightweight" machines can't take it! And it's for precisely these reasons that the 770 series looks so good.

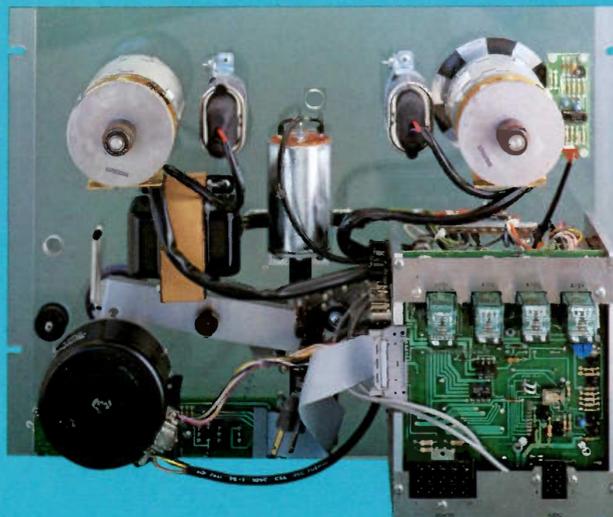
Stations specify ITC because they want the best. And reliability is what makes ITC machines best. It starts with a responsive design that pays close attention to areas affected by the fatigue and wear of professional use. Then, the machine undergoes extensive cycle testing and evaluation, to flush out potential problem areas. The 770 Series you receive is fully tested, and immediately ready to go to work.

### Tech Service Assistance

Maintenance and repair needs are simplified by the modular design of the 770, with all components in sight and at hand. Plus, if alignment assistance or trouble-shooting help is needed, our Technical Service Department offers you direct telephone consultation. Needed parts can often be shipped the very same day.

The optional console, (right) with multi-positioning transport drum, provides convenient, comfortable operation. The handsome woodgrain finish complements any studio decor.

## Simple, trouble-free mechanical design



This display model uses a see-through Plexiglas® deck to show the simplicity of the 770. It is a chief engineer's dream, clean and rugged with a minimum of moving parts. Best of all, there are no hidden springs, belts or pulleys, and no tricky adjustments to make.

The design is spaciouly roomy. Maintenance is simple: no fumbling or groping in hidden cavities. Plug-in assemblies make repair or replacement simple.

Compare the clean, uncomplicated mechanics of the 770 to other machines. It's an important reason to choose ITC.

Control switches are situated logically for clear-cut and rapid operation.

The tape path is open, clean, for easy threading. A cue lever provides manual control of tape lifters.

## Operators call it, "Untemperamental"

The 770 offers an operator flexibility, convenience, and — most importantly — absolute reliability. No matter what demands the operator makes, this machine obliges, with a cool temperament that's always welcome. It simply has no unnecessary frills to fail.

The deck is clean, uncluttered, with controls conveniently placed and sized.

The PRS (Play/Record Synchronization) system lets you record on one channel, then add audio on the other, while listening to both, in complete synchronization. Great for electronic editing.

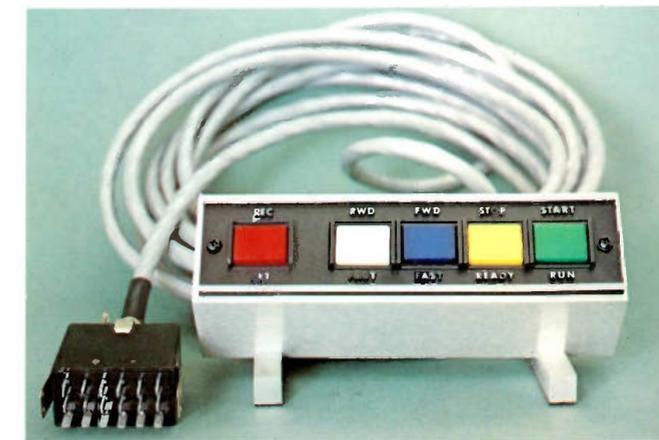
The 770 accepts 10½" and 7" or smaller reels, to fit mastering, or production work.

Recorders have full motion sensing and "START MEMORY" that protects delicate tapes and enhances production use. Motion sensing prevents the machine from entering the run mode until tape has come to a stop from fast forward or rewind. The start memory circuit stores the command until tape can safely enter play mode.

New, Long-life Playback Head with improved low-end frequency response. Insures reliable 25Hz. tone sensing.

Recessed level knobs require push-turn actuation, so preset levels will not be changed accidentally.

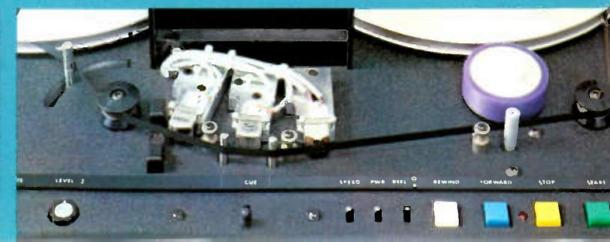
The 770 Recorder provides full facility metering — input, output, bias levels, with safety interlock to prevent accidental erasures.



Optional Remote Control.



The flip-up cover exposes tape for easy editing.



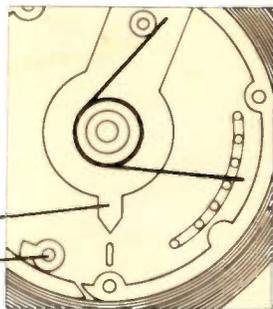
# Here's how to get the best performance from your new ScotchCart™

The ScotchCart design includes a tape tension control arm which provides and maintains tension at the tape to head point. This arm will provide constant tension when it is functioning between the operating limits. Each ScotchCart is adjusted at the factory for optimum performance. If during shipment the carts get tossed around, the tape in the cart could loosen up, creating some slack. This slack is normally picked up instantly upon tape motion. Should the tension arm remain out of its normal operating range, the adjustable cam is built right into the front of the cart so that you can compensate for the slack and get the tape back to constant tension before operating, thus saving an otherwise unusable cart.

**This Life Extension Cam** will not only take the excess slack out of the tape, but when used properly, it can extend the life of the cartridge. The way to do this is to periodically (every 300 passes or so) check the position of the tension arm and re-center it if required.

## FOUR EASY STEPS:

*(Important: For a new cart or a cart that has just been shipped, turn the Life Extension Cam fully counter-clockwise before proceeding.)*



- 1 Place ScotchCart in cartridge machine and play at normal speed.
- 2 Take a look at the arrow on the tension arm (illustration). Rotate the Life Extension Cam one click clockwise and note change in arrow position. Continue to rotate cam until the arrow on the tension control arm points as close to the marker as possible.  
Once calibrated, cover the Life Extension Cam with a circular Calibration Seal (provided on the label sheet).
- 3 Place cartridge in splice locating machine and find splice.
- 4 ScotchCart is now ready for operation with an assurance of constant tension.

### Special Instructions for erasing

Due to the effect of the Playback Head Shield, it's recommended that before you subject your cart to your normal erasing procedure, first run the front of the cart past the eraser. This will insure that cue tones will be removed.



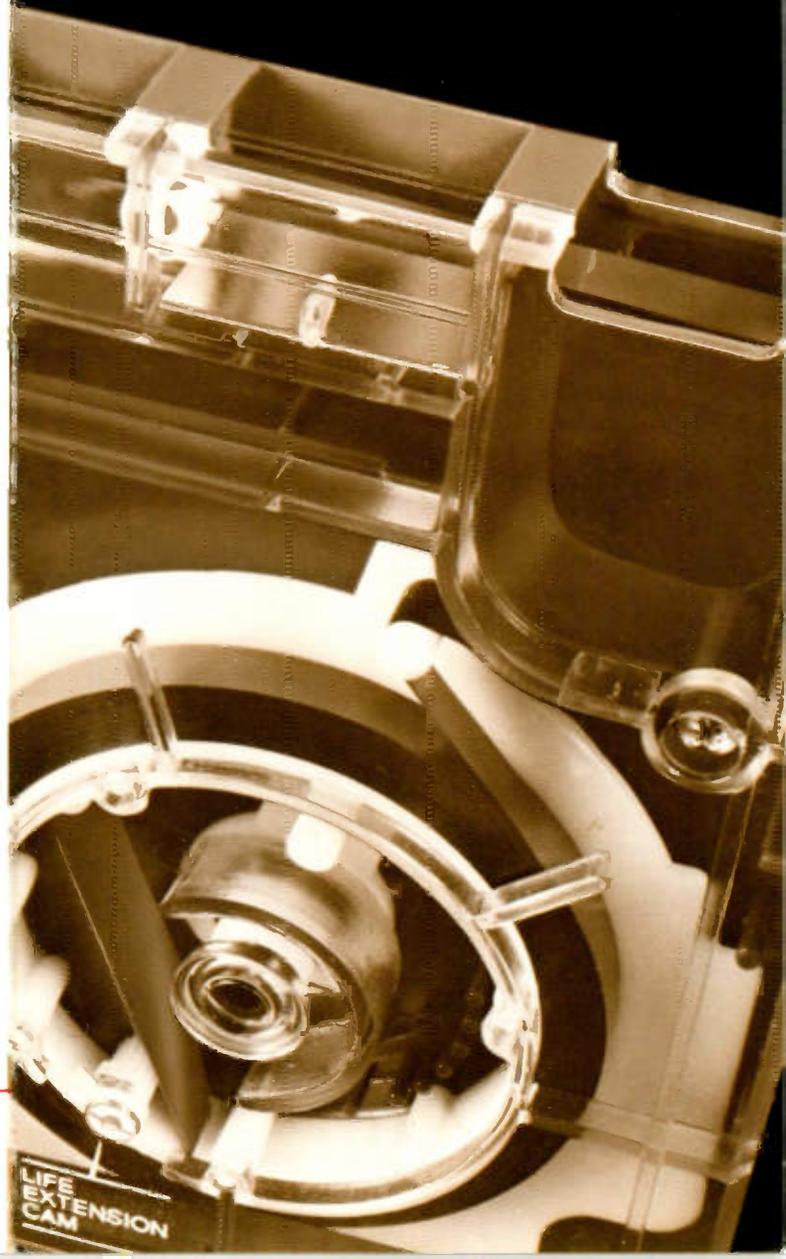
For more information call: 800-328-1684 (In Minnesota: 800-792-1072)  
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Magnetic Audio/Video  
Products Division  
223-5N 3M Center  
St. Paul, MN 55144

# 3M

# ScotchCart™ continuous loop broadcast cartridge



# ScotchCart™ : more constant tension in the RADIO BROADCAST CARTRIDGE cart means less constant tension for you!

The intent of design behind the ScotchCart continuous loop broadcast cartridge is to control tension the way a reel-to-reel transport would. What does that mean for you? Impressive performance characteristics with the added bonus of extended life.

Cartridges used today in the broadcast industry don't have controlled tension and that's the

source of an unending number of problems. ScotchCart provides constant tension where the tape meets the head. You've got a good thing at the start, and it gets even better because of the Life Extension Cam, a device which allows you to adjust the center hub diameter insuring constant tension far beyond the life you have come to expect from broadcast carts.

## It's what's inside the cart that counts.

The tape inside this cart comes to you from the world leader in magnetic tape development. 3M was a pioneer in this area, producing our first commercial roll of audio tape in 1947. What does that mean for you? Over 34 years of research and dedication to excellence... we're dedicated to develop a premium quality

lube tape to match the performance improvements afforded by the revolutionary design of the ScotchCart. Features like output characteristics which are every bit as good as our best professional audio tapes. You get quality sound, longer life, in simplest terms, a better cartridge—hands down.

### CUEING

The hub doesn't rotate so there is no stored momentum at either high or low speeds, therefore, tape motion stops immediately when the pressure roller disengages from the capstan. *Result: An accurate cue point.*

### TAPE GUIDES

Concave surfaces which center and gently guide the tape as it passes over the magnetic heads. *Results: Lower phase error, more uniform output, cart to cart consistency.*

### PLAYBACK HEAD SHIELD

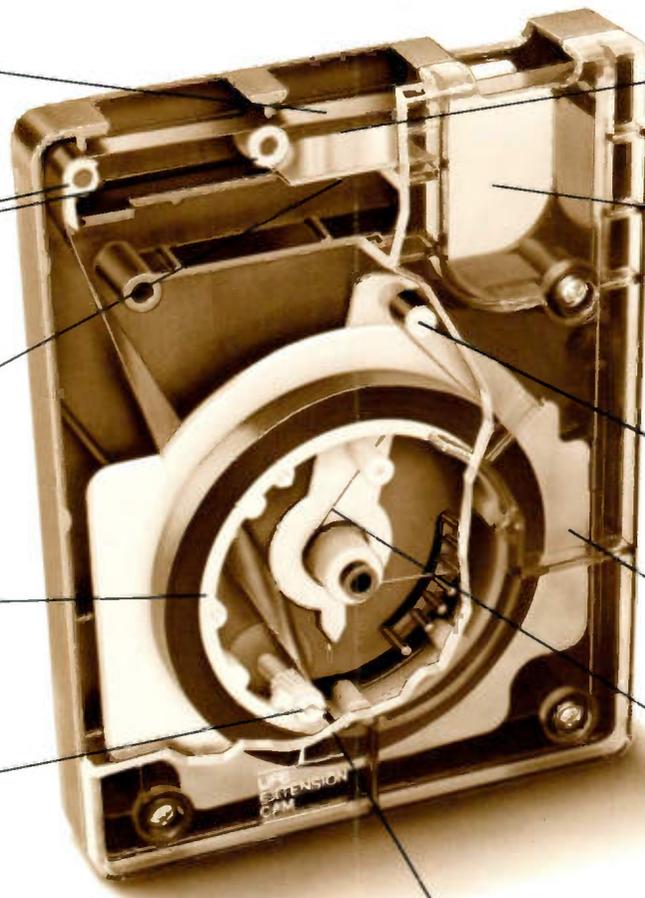
Prevents stray radiated fields from getting to playback head causing hum and high frequency noise. Due to the effect of the shield, see special instructions for erasing on back page.

### LARGER CENTER HUB

This means fewer tape layers for the same amount of play time, which means the tape won't have to slip on itself as much due to the larger circumference of the hub. *Result: Longer life for tape.*

### LIFE EXTENSION CAM

An average cart is good for 300 passes before it dies. ScotchCart runs far beyond the average due to this Life Extension Cam. *Results: No more premature cart failure.*



### NO PRESSURE PADS

We were able to take them out due to our constant tension design. Pressure pads create a frictional force that in turn creates modulation noise, tape and head wear. Pressure pads can also steer the tape, resulting in increased phase error.

### LESS FLUTTER

Flutter is influenced by tension changes, rotating platters, pressure pads, edge stress, and tape formulation. The design of ScotchCart either eliminates or minimizes these factors, causing less flutter than the contribution of the machine. *Result: Less speed variation, better sound.*

### NO SLACK LOOP

The design of ScotchCart provides for loop growth compensation. The Life Extension Cam and the tape tension arm work to absorb loop growth. *Result: Longer life for the cart.*

### LUBRICATED PLASTIC PARTS

Platter, tension arm, roller guides... all plastic parts are made out of the lubricated plastic—Acetal. *Result: Minimizes friction.*

### TAPE TENSION ARM/TENSION SPRING

Together they create the heart of the ScotchCart and give you performance like that of a reel-to-reel system. *Result: No longer necessary to optimize cart equipment for tape length.*

### NATURAL PACK EXIT

Tape comes directly out of the hub center and is pulled straight. No obstacle course for the tape to go through. Tape platter is tilted, which allows the tape to pass under the pack with a minimum amount of stress on its edge. *Result: Less debris from roughing up tape edges, extended tape life.*

## Field report:

# ITC/3M Delta series cartridge machines



By Andy Laird, chief engineer, KDAY, and broadcast audio consultant, Los Angeles, CA

If your station uses cart machines, you have heard of International Tapetronics Corporation/3M. In December 1969, ITC began shipping its Premium Line cart machines, which have become, by far, the most popular series of cart machines the company has produced.

In mid-December 1982, Chuck Kelly of ITC called me with incredible news. The Premium Line series, soon to be discontinued, would be replaced by a new series called Delta, he said. He said that he had four pre-production machines to loan us for an in-depth field evaluation. We could have them for at least a month, and should put them on the air for the jocks to beat up. We were to subject them to the hardest possible daily use to catch any possible weakness before ITC finished the final production model.

We agreed to do the tests after we found out that 12 of these machines had been constructed, that they had already been under test in several other stations since October and had been debugged.

### The Delta series

The new Delta series consists of three different tape transport configurations and a record electronics package. The Delta 1 replaces the SP.

It is a single-play deck and is narrower than the old SP, allowing three Delta 1s to be mounted side by side in one rack width. The Delta 1 handles a size A cartridge. The Delta 2 is twice as wide as a Delta 1 and accommodates all cart sizes: A, B and C. It replaces the WP. Both the Delta 1 and Delta 2 have high speed cue standard.

The 3D is replaced by the Delta 3, a 3-tray, vertically stacked machine. We did not see a Delta 3; however, I'm told that it is also one-third of a rackwidth wide and only twice as high as a Delta 1. It also has a unique servomotor design to eliminate bearing alignment problems. The Delta 4 replaces the Premium Line record electronics and can be used with any of the three transport packages to make a cart recorder.

For our test, we received four Delta 1s and the Delta 4 record electronics.

### The transport

The Delta series continues to use, as in ITC's past, an extremely strong machined, milled, tool plate aluminum deck for a basic foundation. To this deck is attached the motor, head block, cart guides, pinch roller assembly, etc. This assembly is mounted within a cast aluminum frame and front panel, and is bolted

together for easy disassembly and maintenance.

The cart positioning guides use the same basic scheme as those found in the series 99 and the SP retrofits. The cart is held down by springs in the top of the edge guides, with a spring in the left-hand guide pushing the cart snug against the right-hand guide.

The head block is similar to the series 99 with the exceptions that it is narrower and the azimuth arms are crossed. The narrowness is necessary to fit it into a machine that is only one-third of a rackwidth wide. The crossed arms allow fine high resolution azimuth adjustments. The block is removable with five screws and can be reinstalled with only minor touchups of azimuth required.

The pinch roller; mechanical assembly; and dc, air-damped, teflon-coated, plunger pull-in solenoid are designed similar to past Premium Line machines.

From this point on, the Delta series is all new, and a great improvement over the Premium Line.

The Delta series has a new capstan motor drive system, a direct drive dc servo motor system with ceramic drive shaft. Two things make this drive system different from others. First, the mechanical parts of the tach sensing system—the toothed wheel,



The Delta series cartridge machines.

magnet structure and sensing coils—are set up in a fashion that cancels out any eccentricity problems of the ring, or any problem with one particular tooth in the ring. This design greatly reduces tach flutter. Second, the motor-over-speed conditions are detected off the phase/frequency comparator, and the motor is braked by reversing the commutation sequence. This provides a quick reduction of speed after ending the high speed wind mode. (Tape speeds of 15ips, 7½ips and 3¾ips are jumper-selectable, and the fast forward wind speed is three times the selected speed. This new drive motor system is a major improvement over the Premium Line motors. Flutter is audibly reduced. Songs such as Joe Jackson's *Steppin' Out* sound much more stable.

Lower flutter greatly improves the clarity of music. Unfortunately, flutter is one of the tape cart medium's major defects. The Delta series features an improvement in flutter that is audible through all radios, AM and FM.

The power supply is built around a toroidal power transformer that reduces magnetic flux leakage compared to a traditional power transformer. This design greatly reduces the hum field around the playback head, and the reduced hum level is audible. The system runs cooler because toroids are more efficient.

#### The electronics: Playback

The playback amplifiers are designed using op amps. The NE5534AN is used for the head amplifier and for the EQ. It is followed by a level control, then a CMOS switch for muting. Each output amplifier consists of two 5532s, one for drivers and one to form a balanced

output drive to a 1:1 output transformer. A unique feature of this circuit is that, if you want to remove the output transformer, you can. Also, when an unbalanced output feed is used, rather than a balanced output, there is no 6dB drop in level. The overall headroom of the playback preamp section is 13-14dB above a 250 nanoweber reference.

I have no detailed information on the cue detector circuits at this time; however, there are no inductors, and the cue detectors work.

Both the left and right playback amplifiers and the four cue detectors are on the same card. All adjustment pots are 20-turn. The capacitors used in the audio path are polystyrene, polypropylene and one low leakage electrolytic. The card also uses 15 resistor packs or *sips*.

The new playback amplifier design has improved high note clarity and the nature of the noise is different, containing much less hum.

#### The electronics: Control

There's one other plug-in circuit board in the machine, and its function is control. Gone are all the control relays of the Premium Line. Control in the Delta is totally electronic via an 8048 microprocessor. The same logic board works in all three of the Delta machines, but only one of these boards is required in the Delta 3. The Delta 4 record electronics also has a logic control board using the same 8048 microprocessor. Both *play* and *record* logic programs are programmed at the factory into the memory of each 8048 microprocessor. Depending on whether you install it in either the *play* or *record* logic board, the microprocessor recognizes which board it's in and calls up the correct

program. The end result is that you only need to stock one microprocessor for emergencies, and each one contains all the programs needed for control logic functions in all machines.

The control logic boards are actually simple. However, with the control functions microprocessor-controlled, new control modes are provided. Included are a slow flashing of the stop button light when a cart cues itself and a fast flashing if someone stops it manually. Replay, of the same cart without removing it, can be locked



The motor assembly for the Delta series cart machines.

out. High speed recue can be selected from the end of both, or either, of the secondary and tertiary tones. The high speed cue mode can be entered directly from the stopped mode, never unmuting the output or resetting the timer clock. But muting during high speed cue can be defeated by pressing and holding the high speed cue button while in high speed mode.

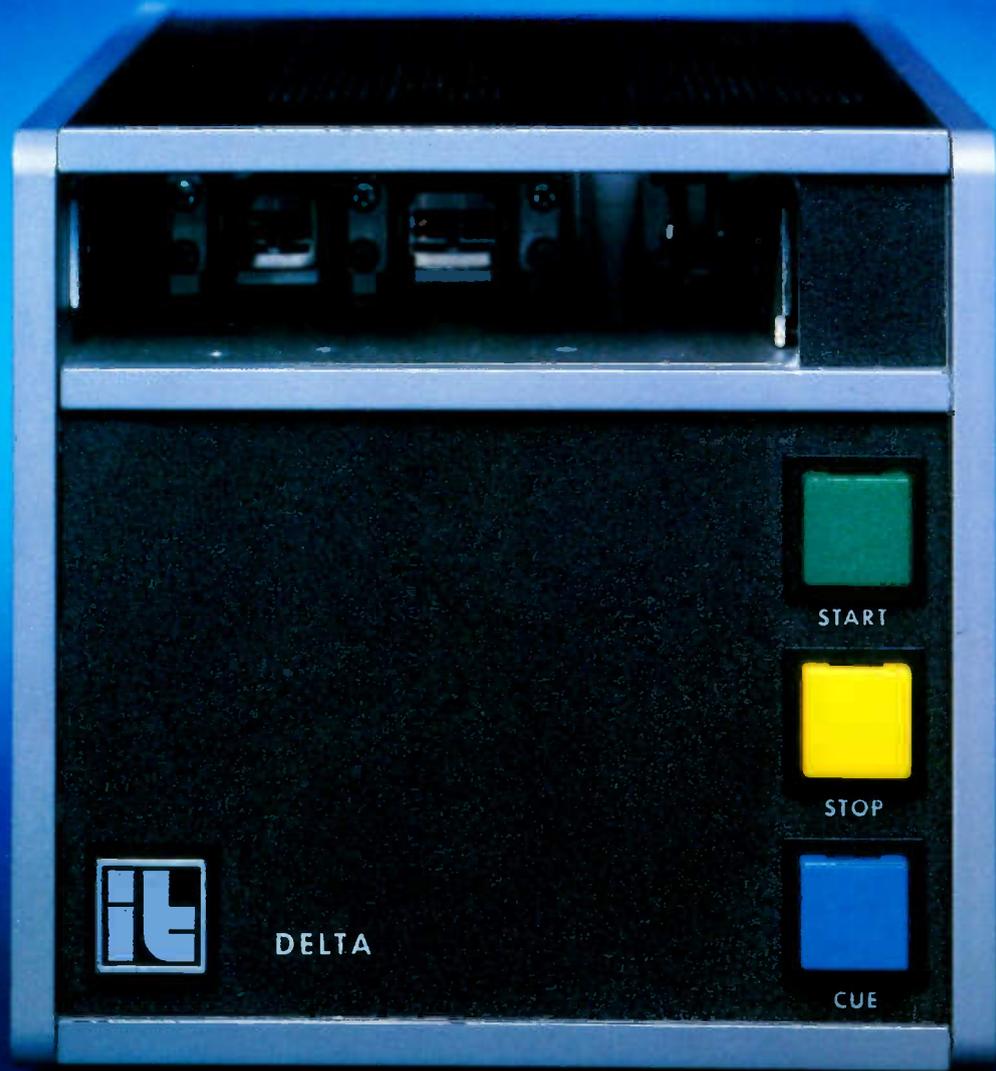
Full remote control of all record and transport functions is available with common collector ties (30V, 200mA) for each remote function indicator. The secondary and tertiary tone detectors provide a normally open floating relay closure rated at 1A. The relays, when unplugged and jumpered, convert the remote contacts to open collector circuits as previously mentioned. These relays, by the way, are the only relays in the machines. An auxiliary *start pulse* (also open collector) is provided for timer clock resets. And 5V at 240mA max is available for your use.

#### The electronics: Record

All new record electronics are used. The cue tones are all digitally generated. From the crystal reference for the recorder microprocessor, dividers are used to arrive at each of three frequencies. These are square waves which, after a switch gate, are passed through a low-pass filter to get sine wave tones with harmonics below 1%. Division of the reference frequency is also done to generate the







**TEN YEARS WORTH  
OF IMPROVEMENTS  
ARE PACKED INSIDE  
THIS MACHINE.**

**3M**

The original ITC Premium Series of tape cartridge machines was introduced in 1970. To say it caught on quickly would be an understatement.

Over the next ten years, the Premium Series became the standard of the broadcast industry throughout the world, outselling its nearest two competitors combined. Over 35,000 Premium Cart Machines were purchased, over 50,000 Premium Decks. In fact, three out of every five broadcast cart machines around the world are ITC machines.

What made the Premium Series so popular was an unmatched level of features, performance specs and reliability within the mid-price range. And those same attributes are still there, along with over ten years worth of improvements, in the Delta Series, the new generation of mid-priced ITC machines.

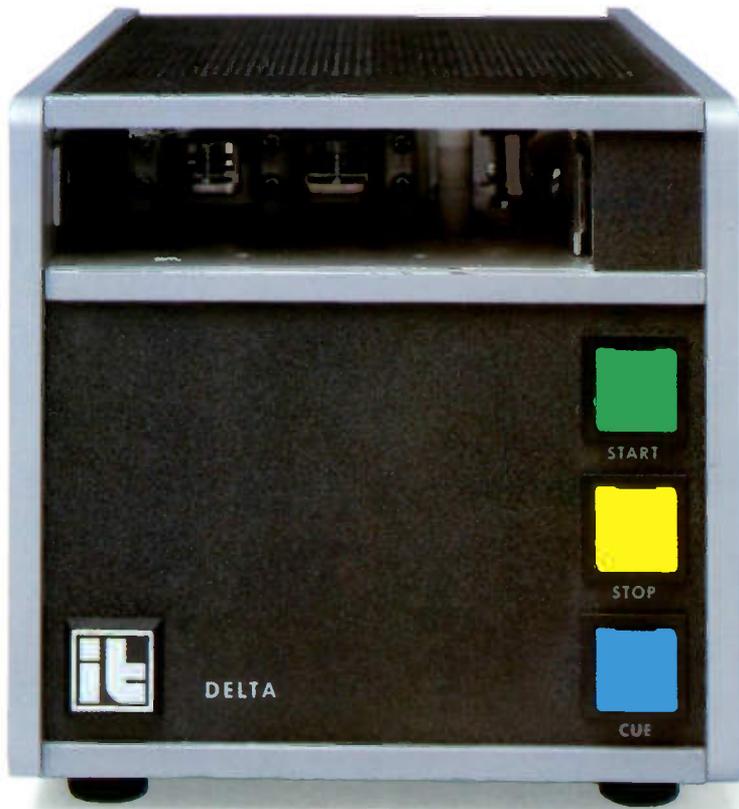
1983



1973



# Delta I Single Deck Reproducer



The Delta I was designed for use with size A or AA tape cartridges.

The unit is much smaller than previous cart machines. So three machines can now fit into a rack where two used to fit.

The Delta I is packed with improvements. High-speed recue is standard. NE5500 Series amplifiers are used, along with an exclusive ITC playback head. There's a toroidal power transformer. And a digital cue tone detector.

The half-inch tool plate aluminum deck is still there, with the air-damped solenoid design pioneered by ITC. So is the chain-and-sprocket pressure roller assembly.

And we've gone to a modular series design. That means you can add a Delta IV Recording Amplifier to any single or triple deck to make a play/record combination.

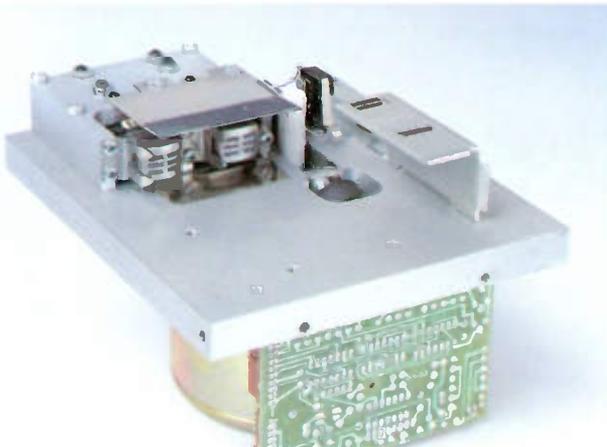


## ITC Reproduce Head

This patented head, pioneered in ITC's Series 99 results in unusually flat response and extended life.

## Precision CNC Milled, Tool Plate Aluminum Deck

The aluminum alloy deck offers the rigidity of steel with the weight advantages of aluminum. It provides a stable reference surface for motor, solenoid, and head block mounting. Unique criss-cross azimuth adjusting arms provide the fine adjustment of head azimuth, zenith and height on the true center pivot head block. Locking nuts secure position after each adjustment. Head mounting straps allow easy head replacement. And the complete head mounting block is removable for ease of service. Plug-in head cables make program and cue channel calibration and testing easy. And the metal deck is brushed and anodized for long life.



Delta I  
Rear View



### DC Brushless Servo Motor

The motor is precision manufactured for extremely low wow and flutter. Selectable speeds are 3¾, 7½ and 15 ips, with high-speed recue running at 22.5 ips.

### Delta Series Servo Motor

At the heart of any cartridge machine is its motor. Traditional designs have used hysteresis-synchronous motors with high wow and flutter, heat and radiated magnetic field. These motors were usually limited to one speed because they were referenced to the power line frequency.

In contrast, The Delta Series utilizes a unique, brushless DC servo motor, phase locked to a precision crystal reference. Among other things, this provides for extremely low wow and flutter. Wow and flutter are some of the most audible types of distortion. You can hear it even through inexpensive AM radio receivers.

One reason we can produce machines with such low wow and flutter is that our servo motor uses an averaging tachometer. Most tachometers use a toothed ring attached to the motor, rotating at the same speed with a single point detector. These tachs determine motor speed by counting the teeth on the ring. Unfortunately, this has been a rather troublesome part of conventional servo motor design, because any eccentricity in the gear circumference or tooth irregularities will cause instantaneous errors, which will, in turn, cause the electronic driver circuit to make false current adjustments, actually injecting wow and flutter into the motor.

Our averaging tachometer is a unique design that automatically compensates for tachometer ring eccentricity which induces flutter. The averaging tachometer produces a stable, steady signal input to the phase-locked loop motor controller to ensure extremely accurate speed control. Included in the tachometer design is a second pickup coil, wired out of phase, which serves to reduce extraneous hum fields.

The Delta Series Servo Motor also generates far less heat—less than one watt, compared to 23 watts from conventional hysteresis-synchronous motors. This reduction of heat will significantly improve the life of the motor bearings.

Most importantly, the Delta motor is a powerful high torque motor reducing the effective cart-generated wow and flutter. Due to the power of this motor, stall protection is included to prevent motor damage.

### Delta II Wide Play Reproducer

Twice as wide as Delta I to accommodate all sized cartridges. The Delta II is also compatible with the Delta IV Recorder.



## Delta III Triple-Deck Reproducer

Like the Delta I, the Delta III is designed for use with size A or AA tape cartridges.

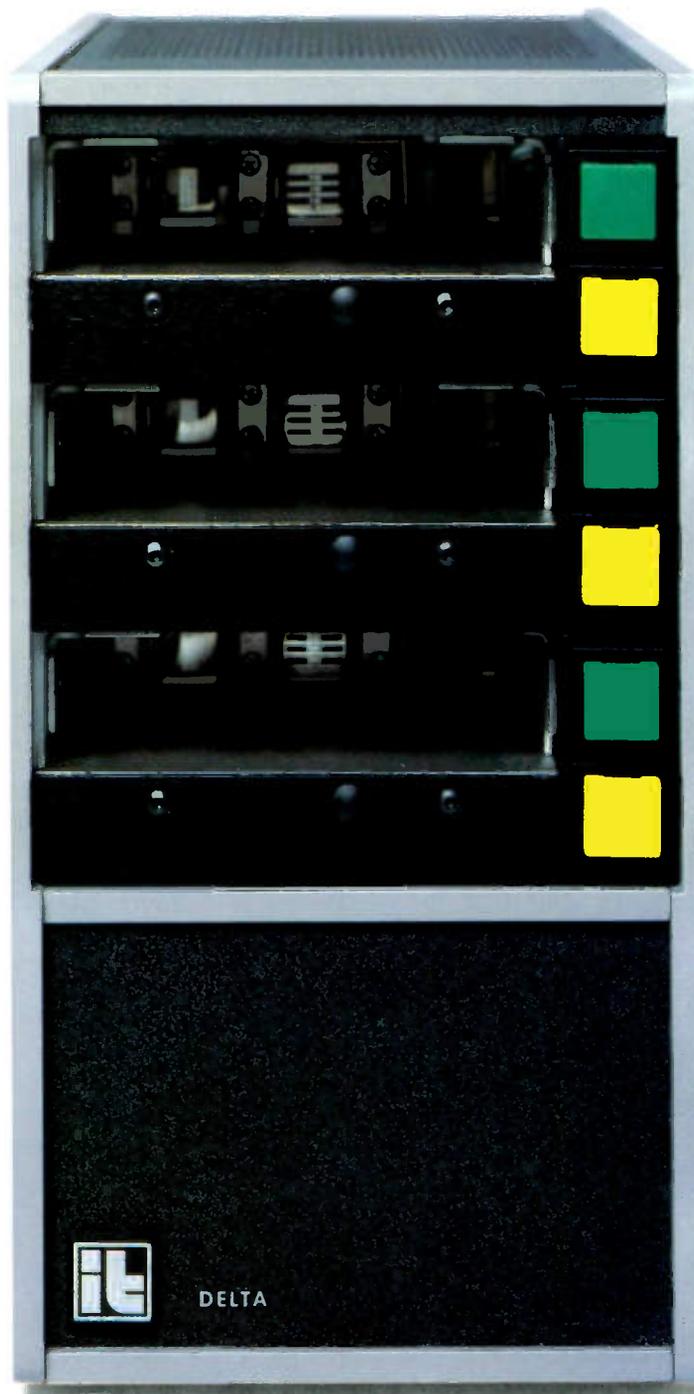
It features three independent reproduce decks. When combined with a Delta IV Recorder, the lower deck is the record deck. Each deck can be removed for service or alignment without affecting the performance

of the other decks.

Since the Delta III is the same width as the Delta I, three units, or nine decks, can now fit into a standard 19-inch equipment rack.

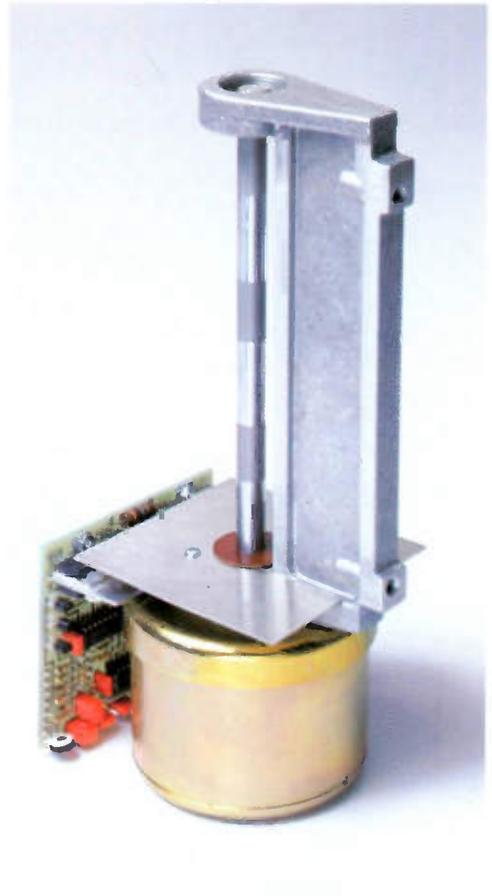
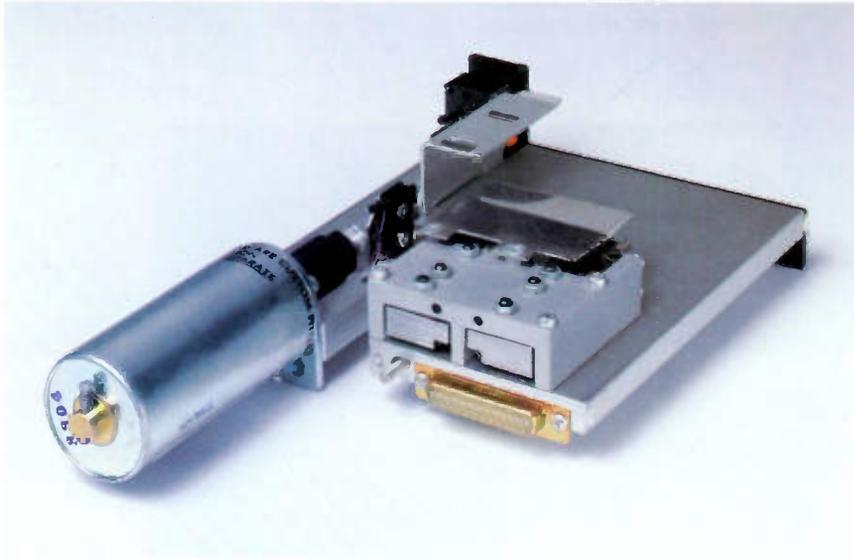
Historically, triple deck machines have suffered from many drawbacks. They are bulky,

mechanically unstable, difficult to maintain and generally lower in audio quality than single deck machines. In contrast, the Delta III has been designed as a high performance, highly reliable and easily maintainable machine at substantially less cost than three single deck Delta machines.



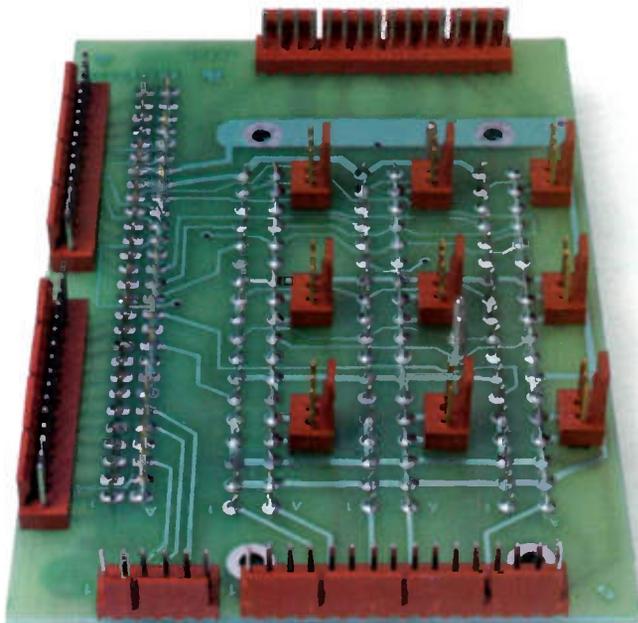
### Capstan Drive Motor Assembly

Unlike previous triple-deck motors, this motor is set within a unique, single-piece casting that uses just two ball bearings. As a result, bearing noise and failure are greatly reduced. The 10mm, non-magnetic, stainless steel shaft is centerless ground and vapor honed to optimize the tape driving surface. All of these features help solve many problems common to triple deck motors, such as bearing misalignment, wow and flutter, and phase instability. Selectable speeds are 3¾, 7½, and 15 ips.



### Rear View of a Delta III Deck

Each deck is easily removed for maintenance with the turn of one front panel screw. There is only one component connector per deck, and as part of the deck assembly, it disconnects as the deck is removed. Interchangeable decks do not leave remaining decks out of service. The precision milled tool plate deck is warp resistant.



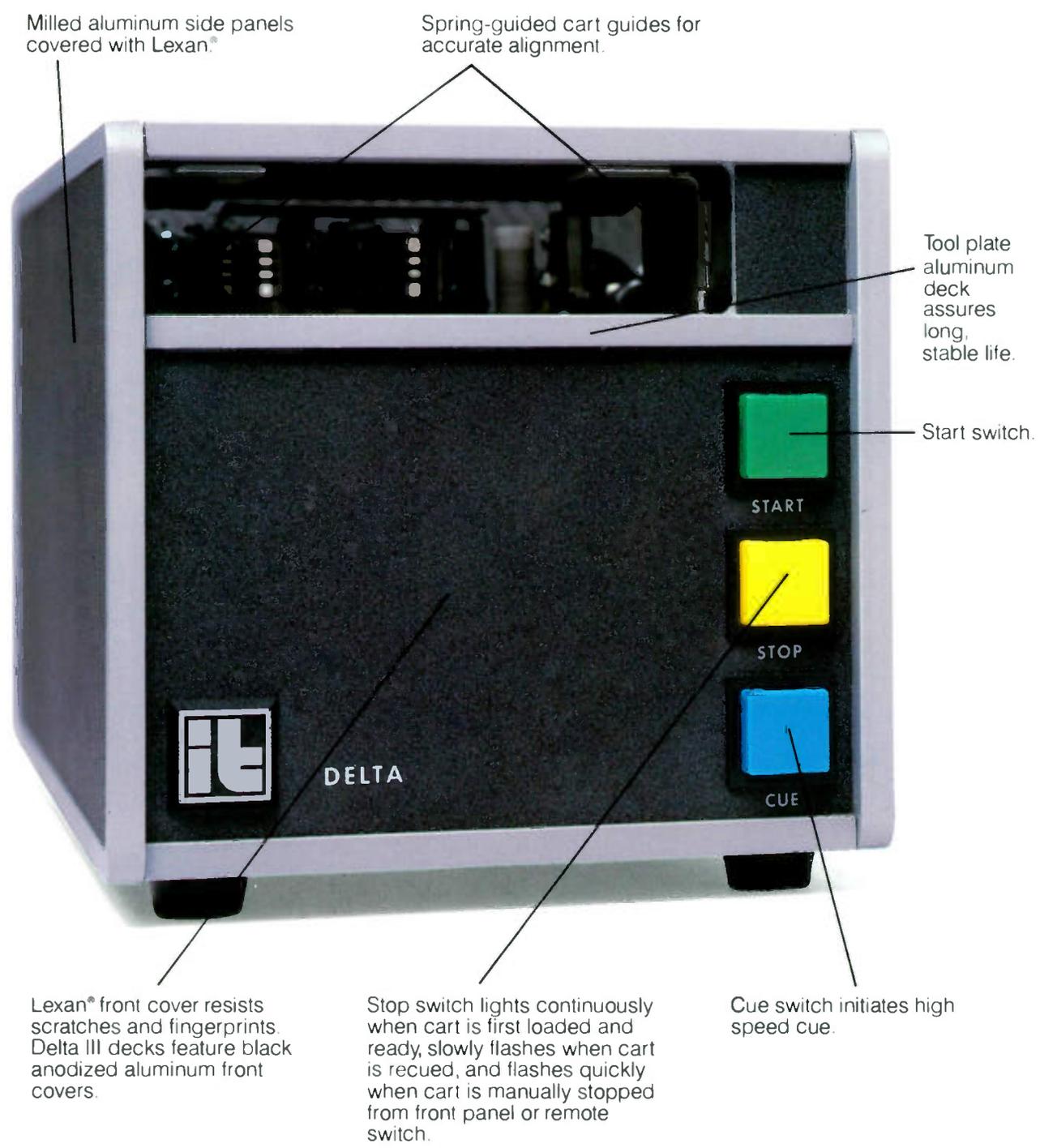
### Delta III Interconnect Board

Dramatically reduces messy wiring by providing a central connection point for PC Cards and Cabling.



### Delta III Rear View

XLR-type audio connectors are used. All remote connections are brought in through connectors with signal paths compatible with the Delta I and Delta IV.



Milled aluminum side panels covered with Lexan®

Spring-guided cart guides for accurate alignment.

Tool plate aluminum deck assures long, stable life.

Start switch.



DELTA

START

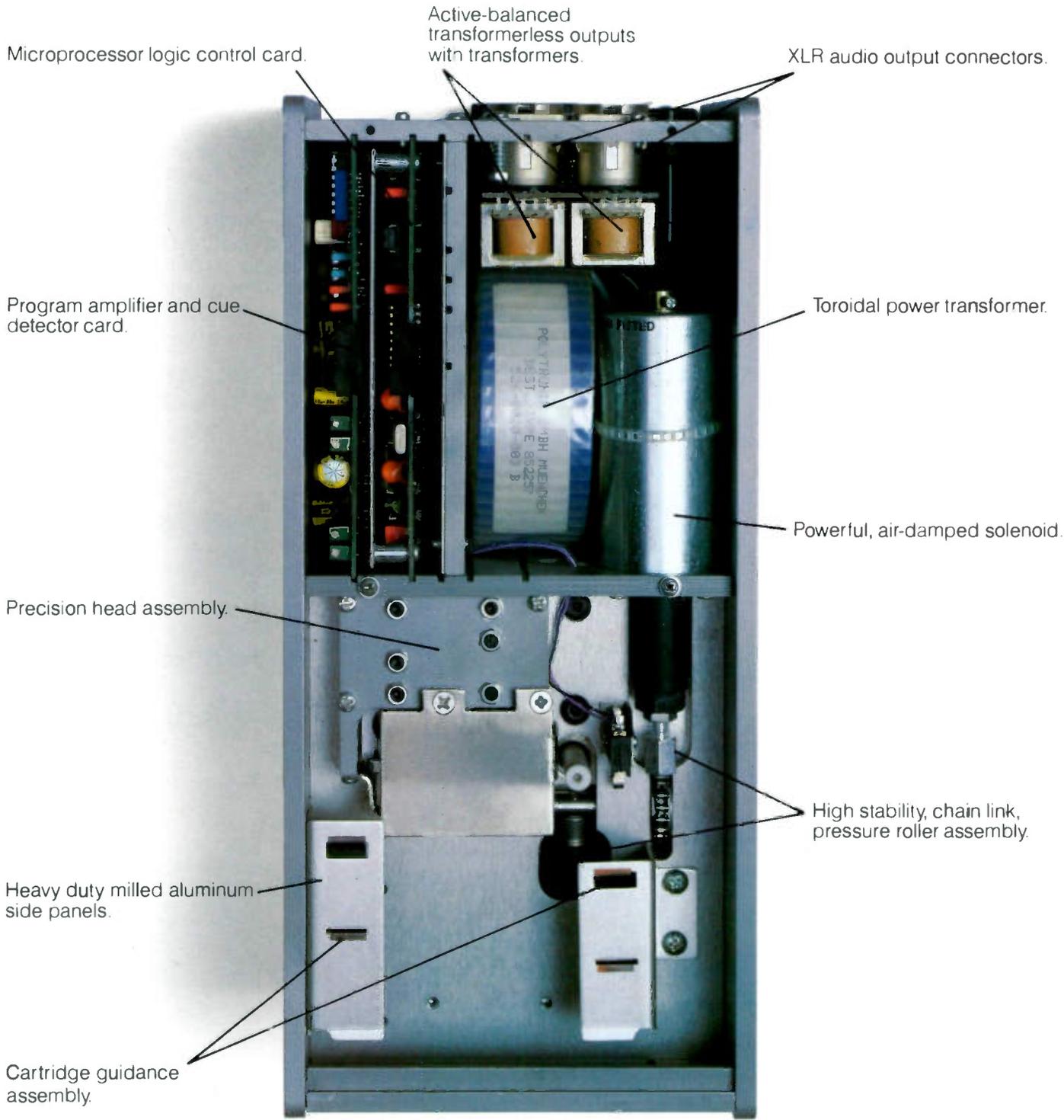
STOP

CUE

Lexan® front cover resists scratches and fingerprints. Delta III decks feature black anodized aluminum front covers.

Stop switch lights continuously when cart is first loaded and ready, slowly flashes when cart is recued, and flashes quickly when cart is manually stopped from front panel or remote switch.

Cue switch initiates high speed cue.



# Delta IV Recording Amplifier

The Delta IV may be combined with any Delta Reproducer to make a fully compatible recorder/reproducer combination.

Like the rest of the Delta Series, the Delta IV is built with high quality components, such as the NE5500 Series amplifiers, electrolytic and film capacitors, and metal film resistors.

Balanced audio inputs are switchable between 600 ohms, 150 ohms or 20k ohms, and may be used with or without audio input transformers.

The Delta IV accepts audio input levels up to +18 dBm without the use of external pads. The amplifier design easily accommodates higher recording levels for improved signal-to-noise ratios. Record amplifier distortion

is less than 0.5% THD and I.M. distortion is significantly reduced. Group delay compensation is incorporated to eliminate phase delays caused by inductive and capacitive components, improving transient response.

Program and bias signals are mixed actively, using slew rate operational amplifiers, instead of program/bias mixing transformers.

Metering functions are calibrated independently using high quality, multi-turn potentiometers. Meters automatically display program playback output level when not in the record mode. A level internal slide switch allows the front panel meters to be used for setup adjustments of record bias, cue bias, and cue play level.

Bias amplifiers are independent adjustable for left program, right program, and cue channels. A crystal-referenced bias generator maintains a frequency of 119.3 kHz  $\pm$  .05%. Bias ramp on and off is carefully controlled to insure pop-free recordings. The high bias frequency, plus the active mixing of program material and bias, reduce I.M. distortion.

A microprocessor controls all logic functions in the recording amplifier and interfaces with the reproducer microprocessor. Since recorder and reproducer microprocessors are identical, they may be interchanged to aid with servicing. Components include CMOS, TTL, and low power Schottky integrated circuit.

Secondary tone record button  
VU meters.



Record set switch lights in record mode, flashes for 1 kHz tone defeat.

Tertiary tone record button

Record level set knobs may be removed.

Metering switches 1 kHz defeat 1 kHz add

Audio inputs

Remote control

Interconnect cable



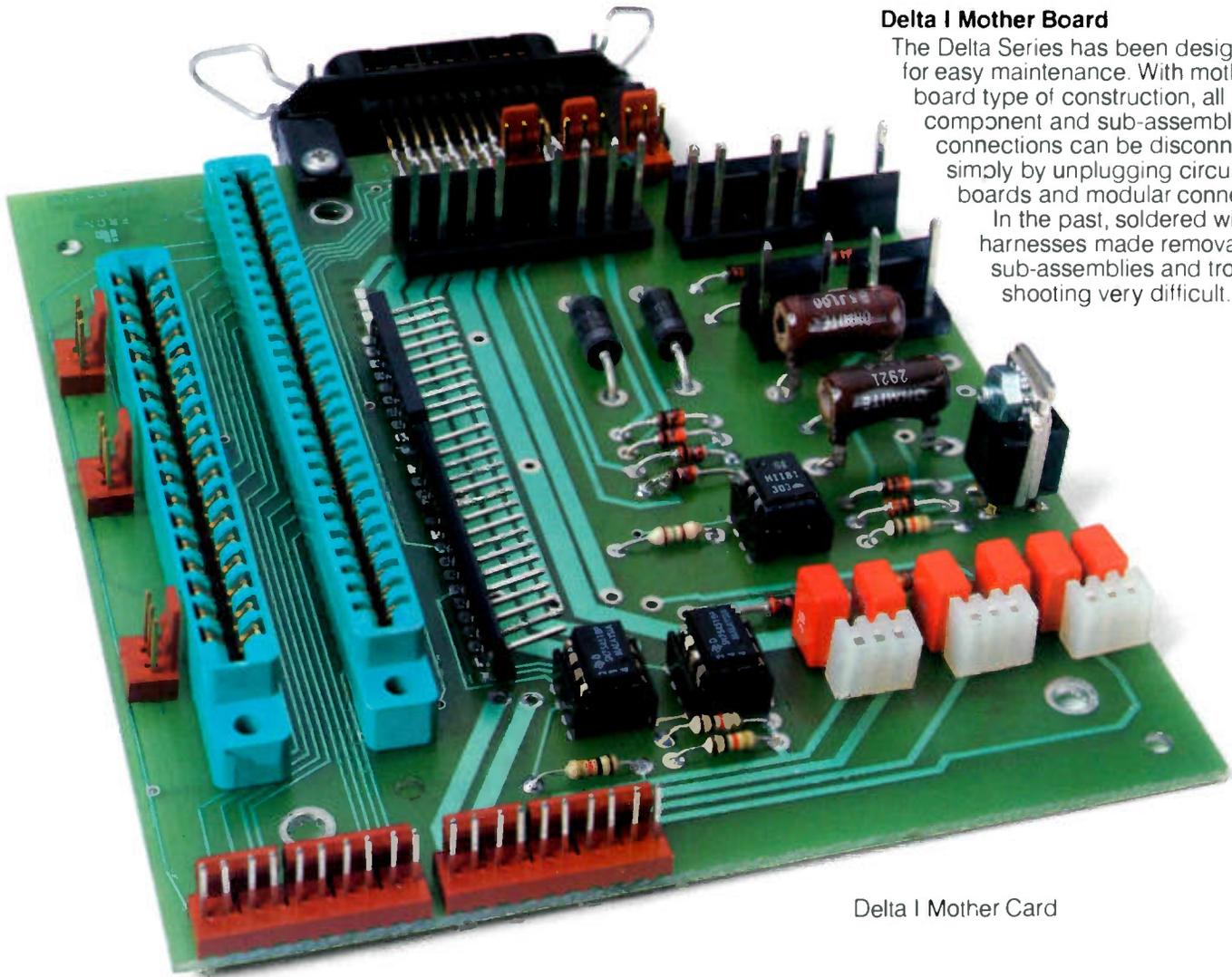
Delta IV Recording Amplifier Rear View

Delta III/Delta IV Recorder/Reproducer Combination (Record/Reproduce on bottom deck only)



Delta I/Delta IV Recorder/Reproducer Combination





### Delta I Mother Board

The Delta Series has been designed for easy maintenance. With mother board type of construction, all component and sub-assembly connections can be disconnected simply by unplugging circuit boards and modular connectors. In the past, soldered wire harnesses made removal of sub-assemblies and troubleshooting very difficult.

Delta I Mother Card



### Toroidal Power Transformer

The Delta Series incorporates a new innovation in domestically made cartridge machines, the toroidal power transformer, distinguishable by its doughnut shape. The magnetic core is made of spirally wound magnetic steel, and the primaries and secondaries are wound through the center and

around the core. This design has several advantages over conventional transformers. The first is reduced stray magnetic field. Conventional transformers suffer from significant stray field and designers have had to resort to complex shielding to cancel the stray field at the head. In a toroidal transformer, the field is confined to the core, and very little stray field is emitted—typically one-tenth of a conventional transformer stray field—minimizing the need for

bulky and expensive shielding. Reduced heat is another advantage. A conventional transformer made to be electrically “quiet” is inefficient, and can be a significant source of heat in a machine. Toroids are far more efficient for the same electrical load. Thus, less heat is produced. This helps lengthen the life of heat sensitive components within the machine. Generally, a toroidal transformer is considerably smaller than a conventional transformer, making smaller machines possible.

# Electronic Quality

Common, interchangeable printed circuit cards are used throughout the Delta Series to reduce your need to maintain a large parts inventory while making on-site maintenance easier and faster than ever before. The program reproduce amplifier/cue detector p.c. card is common to all Delta Reproducers, as is the reproduce logic p.c. card. And the same microprocessor

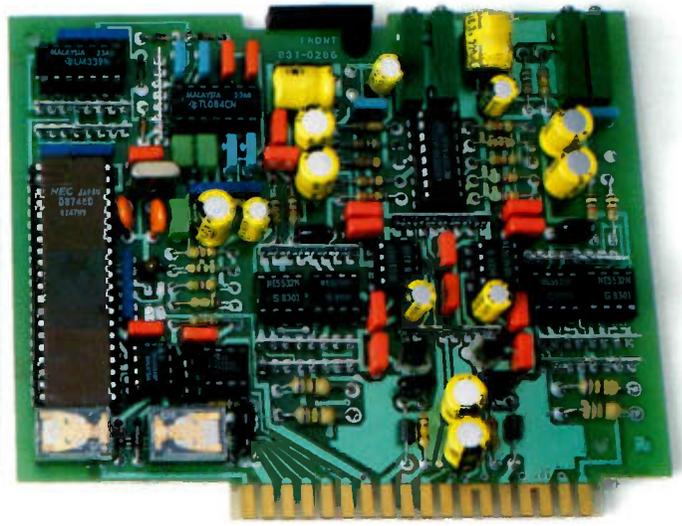
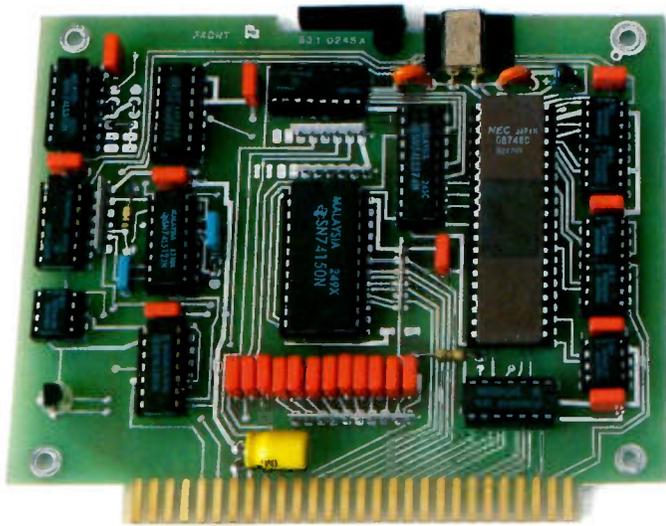
software is used for single-deck, triple-deck and record amplifier logic, reducing the need for costly backup components.

The mother board/daughter board concept is also used throughout. Most active components are located on removable printed circuit boards for ease of service. Transistors and integrated circuits are socketed for ease of service. A full set

of extender p.c. cards are available for servicing.

Machine logic is user definable for all features requiring user interface, or for custom applications.

The Delta proves that good electronic design reliability can go hand in hand. All printed circuit boards are made of G10/FR4 glass epoxy with solder-resist masking. And all components are overrated for their applications.



## Microprocessor Logic

A lot of products, these days, are made with microprocessors that serve no purpose. They're simply marketing gimmicks.

But this is not the case with the Delta Series. Microprocessors make our units more accurate, more reliable, more servicable, more compact, more efficient and more affordable. Best of all, the powerful microprocessor allows inclusion of many features not practical with conventional designs.

They're more accurate because they use digital logic, which means that component drift cannot affect machine operation.

For the same reasons, they're more reliable.

And since you can afford to replace the entire microprocessor, troubleshooting is easy. No more searching for individual components to replace, or faulty discreet circuitry.

Without unnecessary components or discreet circuitry, they're more compact and they require less power.

And they're not only less expensive to run, less expensive to service, and cheaper in terms of reliability, they're actually inexpensive to buy, feature for feature.

## Microprocessor Cue Detection

The Delta Series employs a microprocessor which handles the bulk of the cue detection responsibilities. The circuit is a unique approach to this critical area in cart machine design.

The cue channel signal from the head is amplified, equalized and band-split before being converted to square waves. The resultant four signals are routed to independent ports on the microprocessor. In a proprietary process the microprocessor compares the frequency of each of the signals simultaneously to that of a reference-crystal oscillator.

This makes possible a simple design which, compared to conventional LC or PLL circuits is more accurate, more repeatable and far less susceptible to component drift or misadjustment. In fact, no adjustment is ever required.

## Audio Quality

High performance components are the standard throughout the Delta Series. NE5500 Series operational amplifiers are used for transparent audio and exceptionally low noise. There's extensive use of electrolytic and

monolithic capacitors, as well as metal film resistors. Logic circuits are CMOS, TTL, and low power Schottky.

The electronically balanced output circuitry can be used with or without output transformers. Audio output level is continuously

variable from  $-18$  dBm to  $+18$  dBm. Amplifier distortion is typically less than 0.5% THD at 0 dBm. I.M. distortion is significantly reduced. Audio output impedance is strappable for 150 ohm or 600 ohm loads.

## User Options

The Delta Series offers many opportunities to tailor our equipment to your needs.

- Audio output transformers are standard, providing high isolation. Or you can order a transformerless audio output card to use the electronically balanced audio amplifiers.
- The audio output impedance is factory set to operate into 600 ohm loads. But it may be changed to 150 ohms by moving a strap.
- The audio output level is continuously variable from  $-18$  dBm to  $+18$  dBm, with the amplifier clipping level at  $+20$  dBm. Reproducer equalization is

factory adjusted to meet 1975 NAB standards. It can be set to 1964 NAB standards or CCIR equalization by readjustment.

- End of message tones mute the audio and initiate high-speed recue. This is factory set to occur with the secondary tone, but may be jumpered to use the tertiary tone. A new feature allows either, neither, or both tones to be used at the end of message. High-speed recue may be defeated, if so desired.
- Audio input impedance is normally factory set at 20k ohms bridging. By moving a jumper, it can be changed to 150 ohms or

600 ohms balanced terminating, or to transformerless, electronically balanced bridging input at 20k ohms.

- The audio input level range is from  $-18$  dBm to  $+18$  dBm. Two range control straps in the recording amplifier input circuitry are used to select a nominal input level of  $-6$  dBm or  $+6$  dBm.
- A repeat play lock-out feature can be engaged with a strap change. This prevents the operator from inadvertently playing the same cart twice in a row.
- And the capstan motor speed, normally  $7\frac{1}{2}$  ips, may be changed to  $3\frac{3}{4}$  ips or 15 ips with a strap change.



### Mounting the Delta Series

All units in the Delta Series may be tabletop-mounted or rack-mounted. ITC now makes a universal rack mount designed to accommodate all Delta Series machines, as well as the PD-II, the ESL-IV, and all Series 99 machines.

## Delta Series Features

### MECHANICAL

- Compact size— $\frac{1}{3}$  rack width, 12" deep (D I, II, IV)  
13" deep (D III)  
Height 5 $\frac{1}{2}$ " (D I, II, IV) 10 $\frac{1}{2}$ " (D III)
- Modular construction
- Styling similar to Series 99—neutral colors
- $\frac{1}{2}$ " deck assembly—tool plate aluminum—anodized
- New headblock—stable, compact, allows precision adjustment
- Improved cart guides
- Solenoid electronically controlled
- Capstan motor—D.C. Servo, brushless with ball bearings on magnetic, vapor-honed, stainless steel motor shafts. Crystal referenced—can be strapped for 3 $\frac{3}{4}$ , 7 $\frac{1}{2}$ , 15 ips
- XLR-type connectors for audio inputs and outputs
- Vinyl-clad and polycarbonate surfaces for lasting finish and ease of cleaning
- Universal rack mounting
- On D III, all three decks are removable
- Extensive use of mumetal shielding
- Long-life, high quality switches—bifurcated wiping contacts
- All front panel switches illuminated, using five-volt, long-life bulbs

### ELECTRICAL

- Toroidal power transformer
- Extended life, open face, cylindrical heads
- Common p.c. cards for D I, II and III
- Microprocessor control
- State-of-the-art audio using TLO Series and 5500 Series (5532, 34) op-amps
- Electronically balanced input/output. Can be used with or without transformers (input can be bridging)
- Hi-speed recue standard on D I and II
- Full three-cue tone operation standard
- Either 150 Hz or 8 kHz cue detectors can be strapped to initiate hi-speed cue
- Audio muting
- Non-repeat indicator with repeat play lockout
- Flashing record lamp for record set with 1 kHz cue disabled
- D IV front panel controls and indicators:
  1. Normal record (input) metering
  2. Program play (output) metering
  3. 1 kHz defeat (electronically latched)
  4. 1 kHz add (timed tone)
  5. Front panel actuation of test metering mode:
    - a. cue play/cue bias
    - b. program bias
- ICs and transistors socketed
- Solder mask on all printed circuits
- All power supplies regulated
- Full remote controls including lamps
- Detachable line cord
- Strappable level ranges
- Cart cueing standard (Cue switch mutes unless held depressed)
- D IV is universal recording amplifier for use with D I, D II, and bottom deck of D III
- Motor and control electronics (servo) are one assembly—eliminates field matching
- High frequency crystal reference bias (120 kHz)
- Auxiliary start pulse

## Delta Specifications

1. Power Specification
  - A. 105 to 132 VAC or 210 to 264 VAC
  - B. 50/60 Hz
  - C. Power Consumption
    1. Delta I—50 VA Typical; 65 VA Maximum
    2. Delta II—50 VA Typical; 65 VA Maximum
    3. Delta III—120 VA Typical; 135 VA Maximum
    4. Delta IV—5 VA Typical; 10 VA Maximum
  - D. Line Conditioning with EMI Filter
2. Tape Speed
  - A. 7 $\frac{1}{2}$  ips, (19 cm/s) standard; 3 $\frac{3}{4}$  ips (9.5 cm/s); 15 ips (38 cm/s) strappable
  - B. High speed recue—22.5 ips (57 cm/s), nominal
3. Capstan Motor
  - A. Direct drive capstan (10.0 mm diameter capstan shaft)
  - B. Brushless DC servo motor
  - C. Electrolyzed stainless steel shaft, non-magnetic
  - D. Permanently lubricated ball bearings
4. Record/Play Wow and Flutter
  - A. Record/Play maximum 0.15% DIN WTD at 7.5 ips
  - B. Play maximum 0.12% DIN WTD at 7.5 ips
 Tape cartridge length 2 $\frac{1}{2}$  minutes
5. Speed Accuracy
 

Better than  $\pm 0.2\%$
6. Audio Output Configuration and Audio Impedance
  - A. Transformer coupled
 

Strappable for 150 ohm or 600 ohm (load impedance) operation (source impedance is 50 ohms or 275 ohms respectively)
  - B. Transformerless output
 

(Source impedance is 75 ohms as factory supplied for 600 ohm load; only for electronically balanced output, no transformers)
7. Audio Output Level
 

+18 dBm before clip, w/XFMR, 600 ohm  
+20 dBm before clip XFMR-less, 600 ohm
8. Distortion
 

Reproduce Amplifier: 0.5% or less THD.  
System Distortion: 1.5% or less THD; 0.5% or less 2nd and 3rd harmonic distortion  
Referenced to 250 nWb/m, 1kHz on ScotchCart
9. Noise
  - A. S/N—Measured with bias/no signal; virgin "ScotchCart" tape at 7.5 ips
 

Mono	Stereo
58 dB	56 dB
(or better)	(or better)
  - B. Hum & Noise—No tape running
 

Mono	Stereo
60 dB	58 dB
(or better)	(or better)
  - C. Squelch Noise—70 dB or better
  - D. Reference level of measurements 250 nWb/m at 1 kHz recorded signal
10. Cross Talk
 

Measured at 1 kHz—50 dB min. separation between program channels
11. Frequency Response
  - A.  $\pm 2.0$  dB from 50 Hz —16 kHz
  - B. R/P 0 dB reference; 250 nWb/m at 1 kHz (ScotchCart tape)

12. Equalization
- 1975 NAB cartridge machine standard—adjustable for CCIR (pot. adjustment)
  - Customer option/component reloading in field 7.5 ips only—1964 NAB equalization
  - Fixed low frequency equalization; adjustable high frequency equalization

13. Head Configuration—NAB, Mono/Stereo

14. Cue Signals

- NAB primary cue 1 kHz
- NAB secondary cue 150 Hz
- NAB tertiary cue 8 kHz
- Open collector sinking signal (ground switching) available upon sensing secondary or tertiary cue tones maximum volts 25V, maximum current 200 ma, saturation volts 0.7V at 200 ma
- Cue detect open relay contacts; closure upon sensing secondary or tertiary cue tones

Secondary and Tertiary cue detect normally open relay SPDT\*

\*Contact ratings—1A at 25V DC, 0.5A at 100V AC (resistive). Not to be used with inductive loads

15. Logging Signals

- Not internal to machine
  - Cue audio input and cue audio output available for external use
- Cue Audio Input—Source impedance: 10K ohms or less  
Volts in: .5V ± .25V RMS @ 3.5 kHz\*
- Cue Audio Output—Load impedance: 47K ohms or greater  
Volts out: 500 mv nominal @ 1 kHz, 150 Hz, 3.5 kHz,\* 8 kHz

\*—10 dBm referenced to 0 dBm @ 160 nWb/m

16. Audio Input Level

- 18 dBm to +18 dBm
- 2 range control straps on record amp: —6 dBm/+6 dBm center-range
- Front panel potentiometer range: 0 to at least +12 dB—referenced to each strap

17. Audio Input Configuration

- Input XFMR is normally supplied for 20K ohm balanced bridging
- Strappable for 600 ohms or 150 ohms terminating
- Electrically balanced bridging 20K ohms

18. Metering (DIV)/Function Switches

- Front panel switch selection for monitoring (left to right positions on front panel)
  - Meter Rec—monitor input level to recorder—switches automatically to "Meter Play" (monitor output level from playback) when machine is not set to record
  - Meter Play—monitor output level
  - 1 kHz Defeat—prevents the 1 kHz tone from automatically being recorded on the cue track when recording. This mode is indicated when the record set lamp flashes.
  - 1 kHz Add—Places a 1 kHz tone on the tape for a duration of 0.625 seconds when the playback is in the run mode. It is not necessary to hold the 1 kHz record button depressed for the duration of the tone.

- Internal Meter Switch—Two position slide switch on record amp/meter board—activates only when meter rec and meter play buttons are in "out" position
  - Cue play/cue bias—slide switch in the "left" position for cue functions and record bias; Cue Play—Left Meter Cue Bias—Right Meter
  - Record Bias—Slide switch in the "right" position for program bias functions Left Program Bias—Left Meter Right Program Bias—Right Meter

19. Bias Amplifier

119.3 kHz Bias Frequency, crystal referenced

20. Tape Capacity

- NAB sizes A and AA (Delta I and Delta III)
- NAB sizes A, AA, B and C (Delta II)

21. Start Time

Typically 100 milliseconds  
(Timing dependent upon solenoid air damp adjustment)

22. Stop Time

- Audio squelch stop time typically 2 msec—Tape stop time typically less than 100 msec
- Tape travel varies according to:
  - Type of cartridge
  - Length of tape

23. Ambient operating temperature range

10-50 degrees C (50 degrees to 122 degrees F)

24. Manual and Remote Controls

- All front panel indicators and controls (except program bias and cue track metering)
- Play remotes available via play remote connector
- Record remote functions (except metering) available via record remote connector

25. External Connectors

- XLR audio connectors
- Jones remote connectors
- Interconnect between play unit and recorder to carry audio and microprocessor control lines
- Plug-in line cord

26. Mounting

- Table top standard
- Rack mount (optional rack mount hardware)

27. Dimensions

A.	Width	Depth	Height
Delta I	5 $\frac{5}{8}$ "	12"	5 $\frac{1}{4}$ "
Delta II	11 $\frac{1}{8}$ "	12"	5 $\frac{1}{4}$ "
Delta III	5 $\frac{5}{8}$ "	13"	10 $\frac{1}{2}$ "
Delta IV	5 $\frac{5}{8}$ "	12"	5 $\frac{1}{4}$ "

\*Add  $\frac{1}{3}$ " for feet.

All machines require 3 $\frac{1}{2}$ " additional depth at rear for interconnection.

- Single height rack assembly (for use with the Delta I, II, and IV): requires 7" vertical height
- Double height rack assembly (for use with all machines): requires 12 $\frac{1}{4}$ " vertical height.

28. Weight (typical)

- Delta I—15 lbs; 6.75 kg
- Delta II—20 lbs; 9.0 kg
- Delta III—31 lbs; 13.95 kg
- Delta IV—8 lbs; 3.6 kg
- Total shipping weight (including connectors, instruction book, etc.) less than 50 lbs; 22.5 kg

All ITC Equipment is covered by one or more of the following patents: 3,801,043; 3,800,323; 3,809,329; 3,869,719; 3,833,925; 3,932,887; 3,942,189; 4,105,934; 4,040,114; 4,142,221; 4,221,316; 4,101,937; D248,393; 4,153,918; 4,219,167; 4,096,533; D255,793; 4,158,868; 4,978,709; 4,193,103; 4,271,440.



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**3M**

# Now it's our turn.

In the past 10 years, the Premium Line from ITC has seen refinements, but no major changes. Frankly, it hasn't needed any. The Premium Line has been a dependable workhorse that's found its way into more studios than its next two competitors combined.

But we couldn't leave well enough alone. So this year, the Premium Line gives way to the Delta Series, a new generation of cartridge machines that offers you more than ten years worth of improvements.

It's mechanically better. Modular construction makes alignment and service convenient. There's a crystal-referenced servo capstan motor with a ceramic capstan shaft. High-speed recue is standard. And the Delta Three gives you three independently removable decks.

It's electronically better. There are new, high performance components, including NE5500 Series amplifiers. There's an exclusive ITC/3M playback head for smooth frequency response and improved signal-to-noise. We've added a toroidal power transformer with fully regulated and protected power supplies. And a digital cue tone detector controlled by a powerful microprocessor.

And it's physically better because it's smaller. The whole unit is only one-third rack width (5 $\frac{5}{8}$ ""). The enclosure is made of 1/4-inch milled or cast aluminum, for stability. And the panel inserts are made of Lexan®.

Of course, we left in all the good things that made the Premium Line so popular. The 1/2-inch tool plate aluminum deck. Durable, high quality switches. And a solenoid-actuated, chain-and-sprocket pressure roller assembly.

But what you'll notice are the improvements. We think they were worth the wait.

## 1983

## 1973



1/2-inch tool plate aluminum deck.

1/4-inch milled aluminum side panels.

Lexan® panel inserts.

Durable, high quality switches.

Improved cartridge guides.

Exclusive ITC/3M playback head designed for Series 99.

Ceramic capstan shaft to improve tape drive characteristics.

Standard high speed recue.

Digital cue tone detector.

Three standard cue tones: primary (1 kHz), secondary (150 Hz), tertiary (8 kHz).

Modular construction of all mechanical assemblies.

Easily replaceable components.

Toroidal power transformer for more efficiency and less radiated field.

Fully regulated and protected power supplies.

Heavy duty air-damped solenoid.

Chain-and-sprocket drive pressure roller assembly.

Crystal-referenced, DC brushless, servo capstan motor.

Interchangeable printed circuit boards used for all Delta Series Reproducers.

High performance electronics, including NE5500 amplifiers.

Amplifier gain straps to maximize signal-to-noise.

Electronically balanced output circuitry.

120 kHz bias circuitry.

Mu metal for hum field shielding.

Detachable AC mains cord.

XLR Audio Connectors.

## DELTA SPECIFICATIONS

- 1. Power**  
A. 105 to 132 VAC or 210 to 264 VAC  
B. 50/60 Hz
- 2. Record/Play Flutter**  
A. Record/Play Maximum  
0.15% DIN. WTD. at 7.5 IPS  
B. Play Maximum  
0.12% DIN. WTD. at 7.5 IPS
- 3. Audio Output Configuration**  
Transformer Coupled or Active  
Balanced (Transformerless) Output
- 4. Audio Output Level\***  
Variable from -18 to +18 dBm  
(clip level +22 dBm)\* (Continuously  
Variable, "Usable" Range  
-18 dBm to +18 dBm.
- 5. System Distortion\***  
Record/Replay System Distortion  
(including tape)—Less than 1.5%  
THD (1975 NAB Standards)
- 6. Noise\***  
Mono Stereo  
A. Hum & Noise-No  
Tape Running 52 dB 50 dB  
B. Squelch Noise 70 dB or Better
- 7. Frequency Response**  
+/- 2.0 dB from 50 Hz—16 kHz\*
- 8. Equalization**  
A. 1975 NAB Cartridge Machine  
Standard—Adjustable for CCIR  
(Potentiometer Adjustment)  
B. 1964 NAB Equalization  
(Customer Option)
- 9. Audio Input Level**  
-18 dBm to +18 dBm
- 10. Audio Input Configuration**  
A. Input Transformer Configuration—  
20K Ohm Balanced Bridging  
B. Electronically Balanced  
Configuration—Bridging 20K Ohms  
C. Source Termination Available for  
600 Ohm or 150 Ohm Balanced  
Terminating
- 11. Ambient Operating  
Temperature Range**  
10 to 50 Degrees C (50 to 122  
Degrees F)
- 12. Remote Controls**  
All Front Panel Indicators and Controls  
(Except Program Bias and Metering)
- 13. External Connectors**  
A. XLR Audio Connectors  
B. Cinch Jones Remote Connectors  
C. Interconnect Between Play and  
Recorder to Carry Audio and  
Microprocessor Control Lines  
D. Plug-In A.C. Line Cord
- 14. Mounting**  
A. Table Top  
B. Rack Mount (optional—URM-1)  
1/3 rack width filler panels also optional.
- 15. Dimensions**  
A.  

	Width	Depth	Height
Delta One	5 5/8"	12"	5 1/4"
Delta Two	11 1/8"	12"	5 1/4"
Delta Three	5 5/8"	13"	10 1/2"
Delta Four	5 5/8"	12"	5 1/4"

Add 1/3" in height for feet for all  
machines.  
All Machines Require 3 1/2" additional  
extra depth at rear for connectors.

B. Single Height Rack Assembly  
(For Use with the Delta One, Two,  
and Four). Requires 7" Vertical  
Height.

C. Double Height Rack Assembly  
(For Use with all Machines)  
Requires 12 1/4" Vertical Height.
- 16. Weight**  

	Unpacked
A. Delta One	15 lbs.
B. Delta Two	20 lbs.
C. Delta Three	31 lbs.
D. Delta Four	8 lbs.

\*Reference: 1kHz at 160 nWb/m using 3M ScotchCart.



Delta Four  
recording amplifier,  
mono or stereo



Delta One  
single deck reproducer,  
mono or stereo



Delta Three  
three deck reproducer,  
mono or stereo



Delta Two  
wide deck reproducer,  
mono or stereo

3M hears you...

In the past ten years,  
computers have gotten smarter,  
cameras have gotten simpler,  
ovens have gotten quicker,  
beer has gotten lighter,  
bodies have gotten leaner,  
athletes have gotten richer,  
hi-fi has gotten higher,  
radio has gotten stronger,  
studios have gotten smaller,  
towers have gotten taller,  
cars have gotten shorter,  
film has gotten faster,  
outerspace has gotten closer  
and blue jeans have gotten classier.

# “99B” SERIES



**“THE BEST”**

**From  
International Tapetronics Corporation/3M**



## THE "99B" SERIES AND YOU

Broadcast professionals who demand the best select the 99B series from International Tapetronics Corporation/3M. Loaded with features, the 99B series delights the most discriminating engineer, operator and listener. 99B cartridge machines embody the essence of ITC quality and reliability. If you desire both engineer and operator conveniences while providing crisp, clean and consistent sound for your listeners, your choice will invariably be the 99B series.

Central to the 99B series engineer and operator conveniences is the patented ELSA system, making the 99B cartridge machine the only one of its kind in the world. ELSA is an optional cartridge preparation

system that optimizes the audio performance of each and every cartridge. During the ELSA cycle, the cartridge is erased, the splice located and the record head automatically azimuth aligned for maximum phase response performance.

### The 99B series standard features include:

- Mono or stereo models.
- High speed cue.
- Jumper selectable cart played indication and replay inhibit features insure on-air integrity.
- Microprocessor control.
- Stop tone add and defeat, cue track erase.
- Simultaneous cue tone detection and generation.

- Multi-function test tone generator simplifies and reduces maintenance time.
- Front panel access to all controls.
- Multiple function meter selector with automatic meter switching between record and reproduce modes.
- Modular design with plug in subassemblies and P.C. cards.
- Sealed, multi-turn trimpots.

Additionally, the 99B series is covered by a bold, two year warranty. You also receive a detailed, comprehensive technical manual. All this reinforced by the finest, readily accessible technical service support group in the industry.

# ELSA MAKES THE "99B" CARTRIDGE MACHINE The Only One Of Its Kind In The World

Even cartridges from the same manufacturer are not exactly alike. A natural variance in plastics from cart to cart affects tape path, and ultimately, the audio performance of your station. ITC's solution to the problem is the ELSA system.

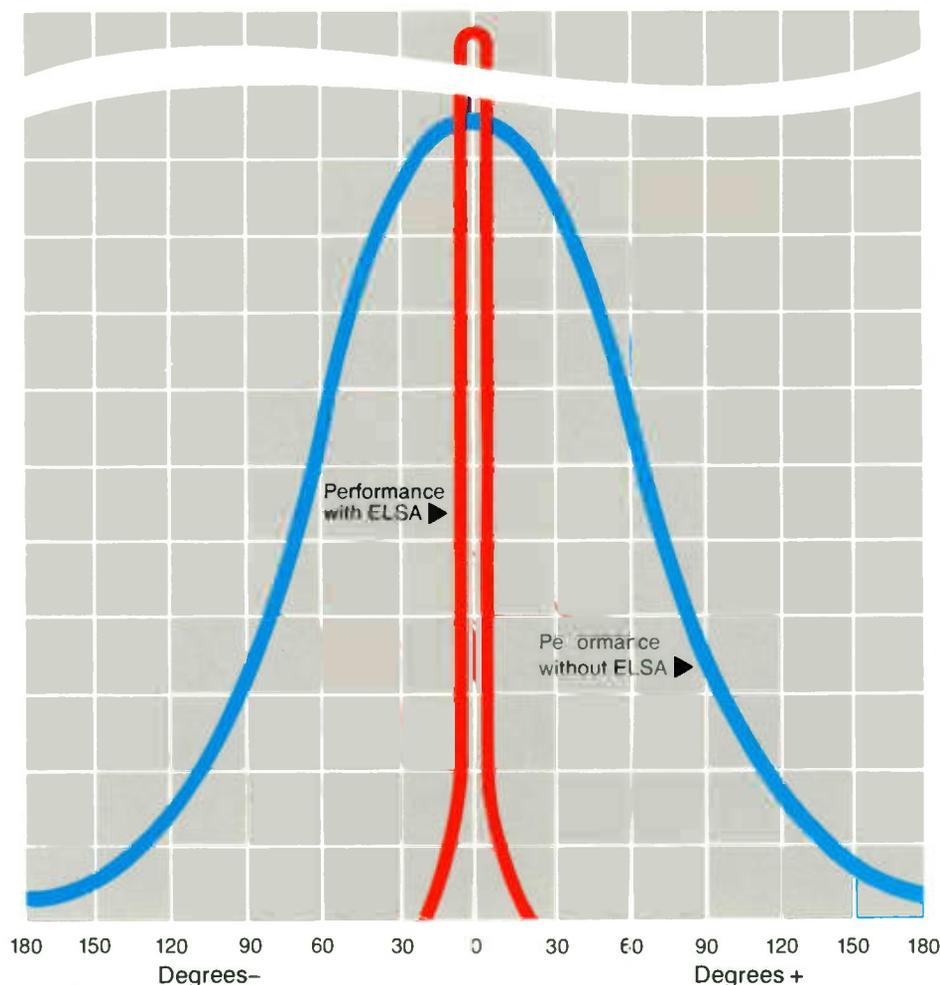
ELSA automatically phase adjusts the recording head to the tape for each and every cartridge recorded. This azimuth adjustment is accomplished by automatically recording a tone,

then evaluating and correcting for audio zero crossing errors between the two audio channels. Reference tone bursts are generated, recorded, reproduced and evaluated by a microprocessor. A small D.C. motor corrects phase errors by adjusting the record azimuth. This true phase evaluation and correction process is quick, consistent and highly reliable. This feature provides cart-to-cart

phase integrity in stereo, and insures a uniformity of either mono or stereo sound from cart-to-cart.

The ELSA system also includes bulk erasing and splice locating features. Using this system offers the operator the confidence of consistent tape cartridge preparation and the convenience of totally automatic operation.

## ELSA CORRECTS PHASING ERROR

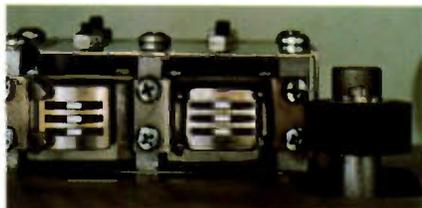


The blue line illustrates typical stereo phasing errors present in a random sample of current tape cartridges. The red line shows dramatically reduced phase error after using the automatic azimuth and tape preparation routine (ELSA).

# "99B" SERIES MECHANICAL AN

## Solid Reasons For Superior Performance

There are solid reasons, both mechanical and electronic, to support the truly superior performance of the 99B series.



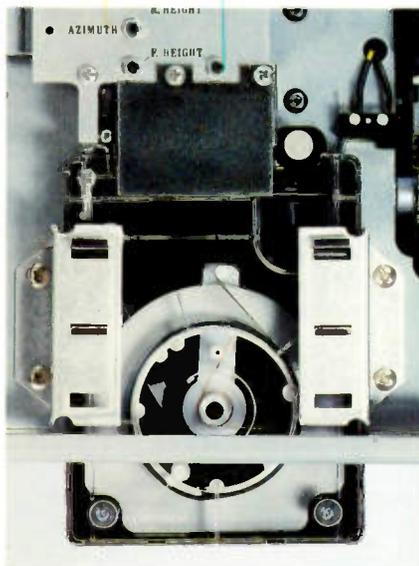
The 99B series is built on a strong foundation—the rugged deck that has become synonymous with ITC quality. ITC's deck is milled half inch thick, aluminum tool plate. It will not warp or groove like die casting, which may take years to stabilize. The deck plate is machined on computer controlled mills for absolute precision and uniformity. The deck is then anodized to harden the cartridge slide surfaces and to provide a durable, attractive finish. The heavy duty deck plate and heavy, cast aluminum housing provide exceptional rigidity in the 99B series.

## Crystal Referenced Servo Motor Reduces Wow And Flutter



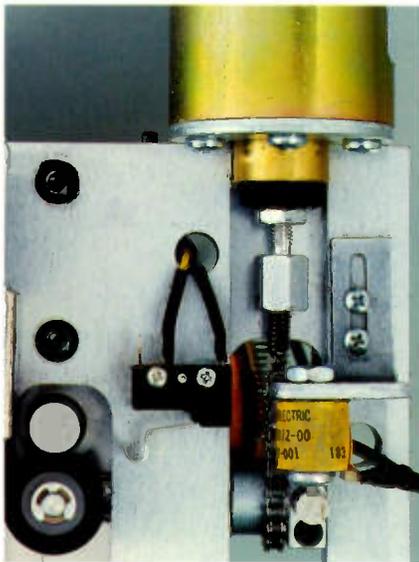
The 99B series uses a brushless DC servo capstan motor driven by a crystal referenced, phase frequency locked servo amplifier which reduces wow and flutter and provides long term stability.

## Distortion Free Cartridge Positioning System



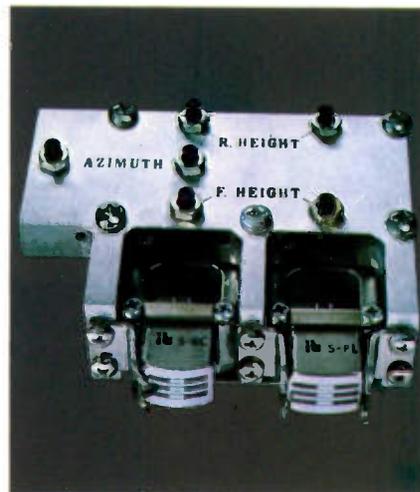
The 99B cartridge guidance system puts its pressure on the load-bearing outer rails of the cartridge. This holds the cartridge firmly in position and extremely flat, without distorting it or altering the tape path. A side pressure spring pushes the cartridge to the proper side location. This system assures precise alignment, even when cartridge insertion is hurried.

## Positive, True Positioning Solenoid Assures Quicker Release And Faster Stop Time



The positive positioning solenoid assures accurate, repeatable pressure roller pressure. Neither heat nor variations in line voltage will change pressure roller pressure thereby virtually eliminating skew induced phase errors. And, because solenoid voltage drops from 50 VDC to 18 VDC immediately after the cartridge starts, there is less magnetic field to collapse when it stops. This provides for a quicker release and a faster stop, with less than 12.7 mm (1/2 inch) of tape overshoot from the high speed cue mode.

## Patented Micro-Adjust Head Module For Precise Head Adjustment

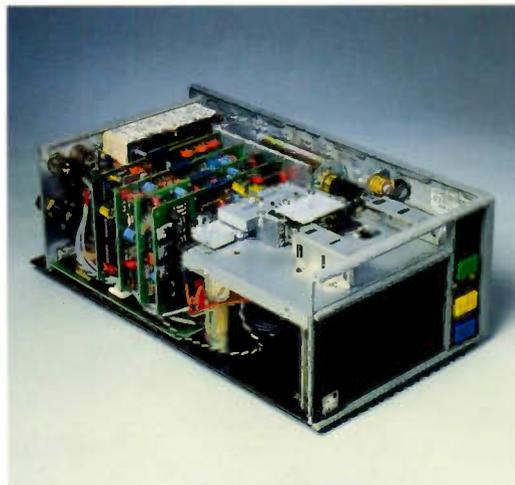


The true, center pivot head block module is designed with head rotational axis on the exact vertical and horizontal centerline of the heads. Height, zenith and azimuth adjustments are made independently of each other and have individual locks. Each adjustment pivots on a steel ball which, combined with a long azimuth arm, permits exact adjustments. The completely removable, micro-adjust head block can be preadjusted, removed, for back-up storage, and reinstalled without further adjustment.

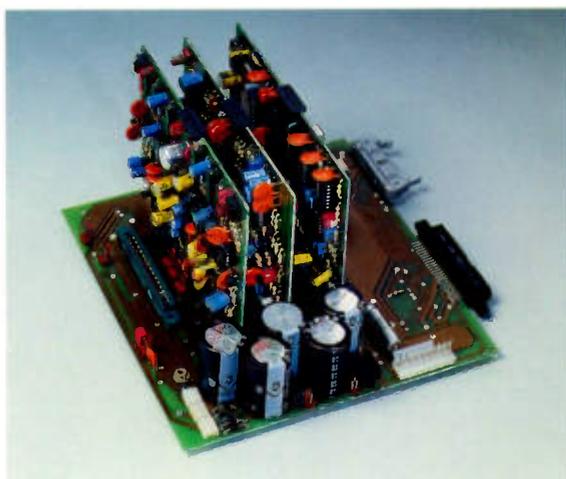
# D ELECTRONIC EXCELLENCE



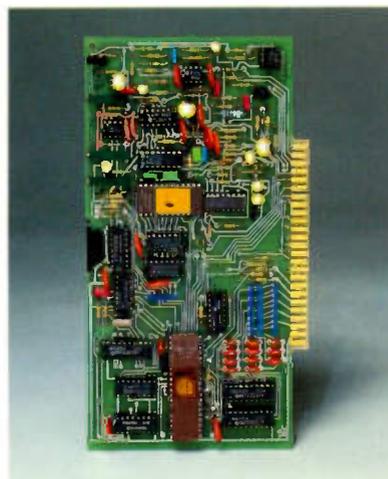
Plug in PC cards



Modular construction with easy to remove side panels



Mother board/daughter board construction



Microprocessor control

## Modular Construction

Modular construction, with plug in subassemblies and printed circuitry is used throughout. All PC cards plug into a mother board. Raised letters on each PC card pull identifies its function. The mother boards may be removed or replaced without soldering. Connections are all plug in.

Improved performance and reliability are achieved through the use of low noise BIFET OP amps, integrated circuit analog switches, high stability tantalum, and low leakage electrolytic capacitors. Bi-polar regulated power supplies are used for all critical amplifier circuitry. Serviceability is enhanced through the use of IC

sockets, precision multi-turn pots, and plug in subassemblies. Flexibility in selection of user options is provided in the form of DIP programming jumpers.

## Microprocessor System Controls All Electronic Functions

- The record head bias frequency is derived from the microprocessor crystal referenced clock frequency.
- A quartz crystal clock, accurate within .05%, provides the reference for all machine logic and control. The crystal clock insures extremely precise, long term frequency stability.
- Controls logic for solenoid
- operating voltage, stepping it from 50 to 18 VDC after cartridge start-up.
- Controls the ELSA functions: the cartridge erase cycle, the automatic azimuth (phase) adjustment cycle, and the splice locator cycle.
- Provides maintenance and error free cue detection with no need to adjust frequency or level controls. All NAB cue tone frequencies are standard.
- Provides cue tone generation of precise frequencies, controls the crystal referenced test tone generator system and controls all record and playback logic functions.

# "99B" SERIES CONNECTIONS

## RECORDING AMPLIFIER AND REPRODUCER

### Meters with Peak Indicators

The large VU type meters utilize built-in LED peak indicators to warn of tape saturation.

### Record Set Switch

Arms and readies the recording mode. The record switch also serves as a reset for the test tone generator.

### Light Emitting Diodes

The green LED indicates detection of 150 Hz cue tones. The red LED is a power indicator. The yellow LED indicates 8kHz cue tone detection.

### Start Switch

### Stop Switch

Switch lamp lights when a cart is loaded, and "flashes" to indicate a cart has been played. The flash will be slow if the cartridge recued normally or fast, as a warning, if the operator stopped the cartridge before it recued.

### Secondary and Tertiary Cue Tone Switches

These switches are active in both record and reproduce modes of operation. All cue tones may be generated or detected simultaneously.

### Input Level Controls

Nominal audio input level is jumper selectable for one of four level ranges. Knobs may be removed and replaced with furnished hole plugs to prevent audio level tampering.

### Color Coded Meter Switches and Special Functions Panel

### ELSA Safety Switch

Operates in conjunction with the "Cue" switch to activate the automatic cartridge preparation cycle. The optional ELSA system automatically erases

the tape, phase aligns the record head, and locates the splice. Portions of the cartridge preparation cycle may be accessed by selective use of the ELSA switches.

### Cue Switch

The cue switch causes the machine to enter high speed recue. While in high speed, pressing and holding the cue switch unmutes the program audio.



### Record Head Interconnect

### Audio Connectors

Microphone type XLR audio connectors for reliable, latching connections.



### Remote Control Connector

### Data and Power Interconnect

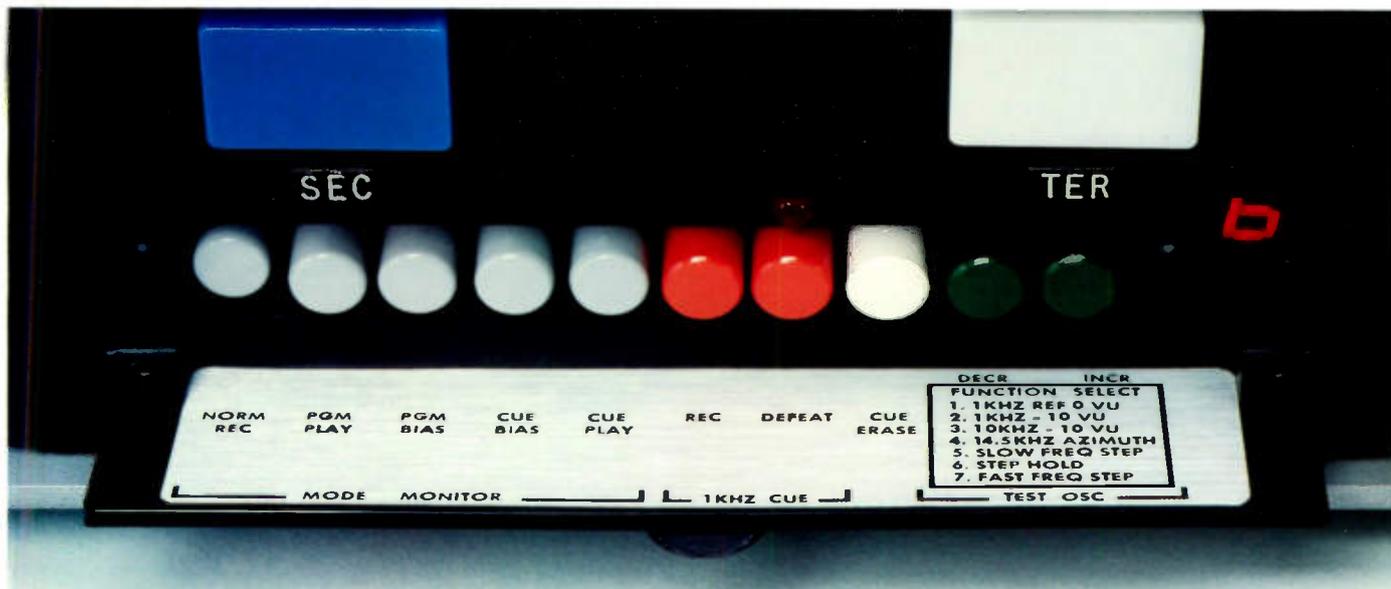
### Removable Line Cord

### Record Head Interconnect

### Data and Power Interconnect

# AND OPERATOR CONVENIENCES

## RECORDING AMPLIFIER SPECIAL FUNCTIONS PANEL



### Easily Accessible Color Coded Switches

Convenient, color coded push buttons provide control of special machine functions. Meter monitoring selections (grey switches) include: **1.** Normal Record (automatically switches to program playback when machine is not recording), **2.** Program Playback, **3.** Program Bias, **4.** Cue Bias, **5.** Cue Play. CMOS

integrated analog switches are used in meter switch circuits to eliminate mechanical switch problems and allow direct control by the microprocessor.

The 1 kHz cue record and defeat switches (red switches) permit addition and deletion of stop tones. Functions are electronically latched and

controlled, with LED confirmation of the defeat mode. A cue erase facility (white switch) allows erasure of any information recorded on the cue track without affecting program material. A microprocessor controlled test tone generator (green switches) offers seven functions and an LED displays mode identification.

# "99B" SERIES SPECIFICATIONS

## POWER:

- A. 117 VAC Or 234 VAC
- B. 50/60 Hz

## POWER CONSUMPTION:

- A. Reproducer/Recorder: 40 VA Typ.; 60 VA Max.
- B. ELSA Cycle: 760 VA Typ.; 800 VA Max.

## TAPE SPEED:

- A. 7.5 IPS (19 cm/s) Standard
- B. 22.5 IPS (57 cm/s) High Speed Cue Standard
- B. 3.75 IPS (9.5 cm/s) & 15 IPS (38 cm/s) Available Via Jumper Change

## SPEED ACCURACY:

+/- 0.1% Maximum Deviation

## RECORD/PLAY FLUTTER:

- A. Play Max.: 0.12% DIN Wtd. @ 7.5 IPS
- B. Rec/Play Max.: 0.15% DIN Wtd. @ 7.5 IPS

## AUDIO OUTPUT CONFIGURATION:

Transformer Coupled

## AUDIO OUTPUT IMPEDANCES:

- A. 600 Ohm Load Impedance Standard (180 Ohm Source Impedance)
- B. Strappable For 150 Ohm Load Impedance

## AUDIO OUTPUT LEVEL:

- A. +25 dBm Maximum Before Clipping Into 600 Ohm Load
- B. May Be Strapped To Provide The Following Operating Ranges Without Deteriorating Signal-To-Noise Ratio:
  - 18 to -1 dBm
  - 10 to +7 dBm
  - 5 to +12 dBm
  - +1 to +18 dBm

## DISTORTION:\*

System: 0.8% Or Less THD.  
(Tape Dependent)

## NOISE:

- A.\* Signal-To-Noise: Measured With Bias/No Signal.

MONO	STEREO
58 dB	56 dB
(or better)	(or better)

- B.\* Signal-To-Noise: No Tape Running; ScotchCart® Cartridge In Place.

MONO	STEREO
58 dB	56 dB
(or better)	(or better)

- C. Squelch Noise: 70 dB or better (Noise Measurements are 20 Hz-20 kHz Bandlimited, Unweighted.)

## CROSSTALK (SYSTEM):\*

-50 dB Minimum Separation Between Any Two Channels.

## FREQUENCY RESPONSE:\*

Record To Playback:  
+/- 1.0 dB, 31.5 Hz - 16 kHz

## EQUALIZATION:

- A. 1975 NAB: Standard
- B. 1964 NAB: Optional
- C. CCIR: Optional

## CUE SIGNALS:

(Conforms to NAB Specification)

- A. NAB Primary Cue: 1 kHz
- B. NAB Secondary Cue: 150 Hz
- C. NAB Tertiary Cue: 8 Hz

## AUDIO INPUT SENSITIVITY:

- A. +28 dBm @ 0.5% THD (Recorder).
- B. Strappable For The Following Input Ranges (Front Panel Level Control Set At Mid-Range):
  - 20 dBm
  - 10 dBm
  - 0 dBm
  - +10 dBm

## AUDIO INPUT CONFIGURATION:

- Transformer Coupled:
- 1. 20K Ohm Bridging Standard
- 2. Strappable For 150/600 Ohms Terminating Impedance

## METERING:

- A. Taut Band Movement: VU Type "A" Scale

- B. LED Peak Indicators Adjustable To Follow Tape Saturation

## BIAS:

256 kHz, Crystal Referenced

## CARTRIDGE SIZE:

NAB A & AA

## AMBIENT OPERATING

### TEMPERATURE RANGE:

10 to 55 Degrees C. (50 to 131 Degrees F.)

## MOUNTING:

- A. Table-top Standard
- B. Rack-Mount Optional With URM-0001 Rack-Mount Kit. Filler Panels Also Available.

## DIMENSIONS:

- A. Width: 21.6 cm (8.5")
- B. Depth: 39.4 cm (15.5")
- C. Height: 13.34 cm (5.25")  
Add 1 cm (.375") For Feet.

## WEIGHT (Typical)

Playback: 14.1 kg (31 lbs.)  
Recording Amplifier: 6.8 kg (15 lbs.)  
Total Max. Shipping Weight:  
Less Than 22.7 kg (50 lbs.)

## ELSA SYSTEM:

Splice Locate: Will Detect One (1) mil Splicing Tape Thickness Minimum, Square Or Diagonally Cut.  
Automatic Phase Alignment: +/- 20 Degrees Or Less Difference Between Left And Right Program Channels At 10 kHz.  
Final Azimuth Mean Setting Is Cartridge Dependent And May Vary Slightly Due To Cartridge Dynamic Phase Jitter. (Measured Under Steady State Conditions After Start Of ELSA Sequence.)

\*Note: Items Indicated (\*) Are Specified Using A ScotchCart® Broadcast Cartridge At A Reference Level Of 1 kHz At 250 nWb/m.

International Tapetronics Corporation/3M Reserves The Right To Change Products And Specifications Without Notice.

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

More International Tapetronics Corporation/3M cartridge machines are installed in radio stations around the world each year than all other manufacturers' cartridge machines combined. Call today for more information on ITC's complete line of cartridge machines.

- 99B Cartridge Machines, "The Best"
- DELTA Cartridge Machines, "Today's Most Popular Cartridge Machines"
- OMEGA Cartridge Machines, "Affordable Performance You Can Trust"

When better performance emerges, it will come from International Tapetronics Corporation/3M, "The Leader in Reliability and Service".

### TO ORDER OR FOR MORE INFORMATION CALL TOLL FREE 800-447-0414

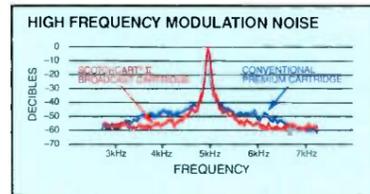
From Alaska, Hawaii or Illinois, call collect 309-828-1381.

In Canada, call Maruno Electronics, Ltd., 416-255-1445.

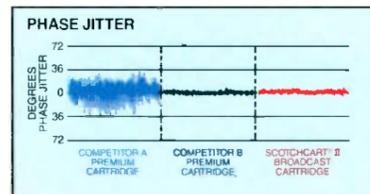
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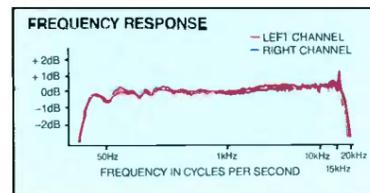
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The Revolutionary ScotchCart® II broadcast cartridge design eliminates the excessive audio sideband noise which results from the rubbing effects of pressure pads and the mechanical irregularities of rotating hubs found in conventional cartridge designs.

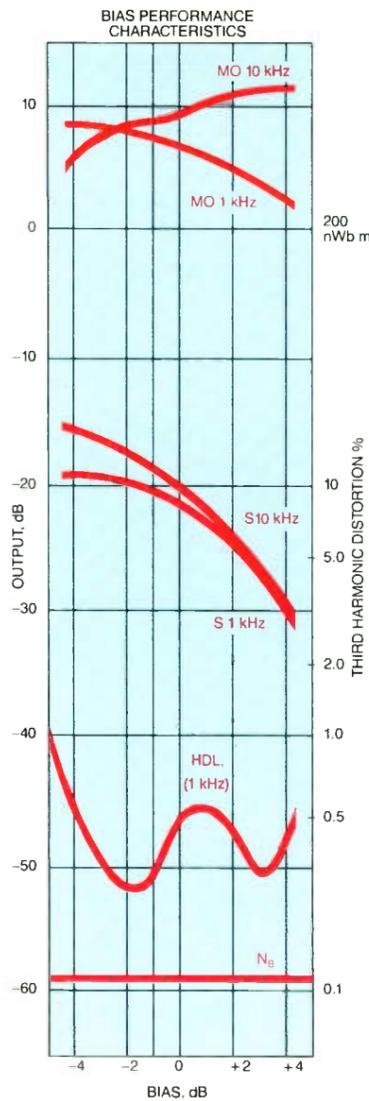


Some competitive cartridges sound muddy on the air because of excessive phase jitter. ScotchCart® II broadcast cartridges sound crisp and clean.



The new tape was conceived as an integral part of a complete cartridge system. When used with high quality equipment, such as an ITC "99B" cartridge machine, the ScotchCart® II broadcast cartridge is capable of frequency response equalling professional reel-to-reel performance.

## NEW, HIGH-OUTPUT, LOW-NOISE TAPE



**MAXIMUM OUTPUT (MO)**  
Maximum output level at the specified frequency is a measure of the output capability of a tape. The recorder is equalized for a flat response using the appropriate reference tape. While recording 10 kHz the level of the input signal is increased until no further increase is noted in the output (short wavelength saturation). This output is then reported at different bias settings relative to reference level. While recording 1 kHz the level of the input signal is increased until 3% third harmonic distortion appears in the output. This output level is then reported at different bias settings relative to reference level.

**SENSITIVITY (S)**  
Sensitivity data provides a means to compare the output of one tape to that of another when recordings are made with the same low level input (i.e., an input at which an insignificant amount of system distortion is contributed by the tape). The record equalization is set to achieve a flat response when using the reference tape at the bias setting. A constant input level 20 dB below that required to produce reference level output from the reference tape is used.

**HARMONIC DISTORTION (HDL)**  
Third harmonic distortion is the amount of third harmonic distortion found upon playback of a reference level signal. The HDL<sub>1</sub> curve shows the change in this level of distortion as a result of different bias settings.

**TAPE NOISE (N<sub>b</sub>)**  
Biased tape noise level is a measure of a tape's residual noise. When recording with zero input signal, the output is measured through a filter having the characteristics defined by the NAB Standard Noise Weighting Curve. The level of noise is then reported at different bias settings relative to reference level.

## A REAL VALUE

No broadcast cartridge in the world combines long life and performance like the new ScotchCart® II cartridge.

To order ScotchCart® II broadcast cartridges or request a technical manual to optimize ScotchCart® II performance, in the U.S., contact your local 3M sales office, your professional audio dealer, or call International Tapetronics Corporation/3M at 800-447-0414 or collect 309-828-1381 from Alaska or Illinois. In Canada, call Maruno Electronics, Ltd. at 416-255-9108. In other countries outside the U.S., contact your ITC cartridge machine representative.

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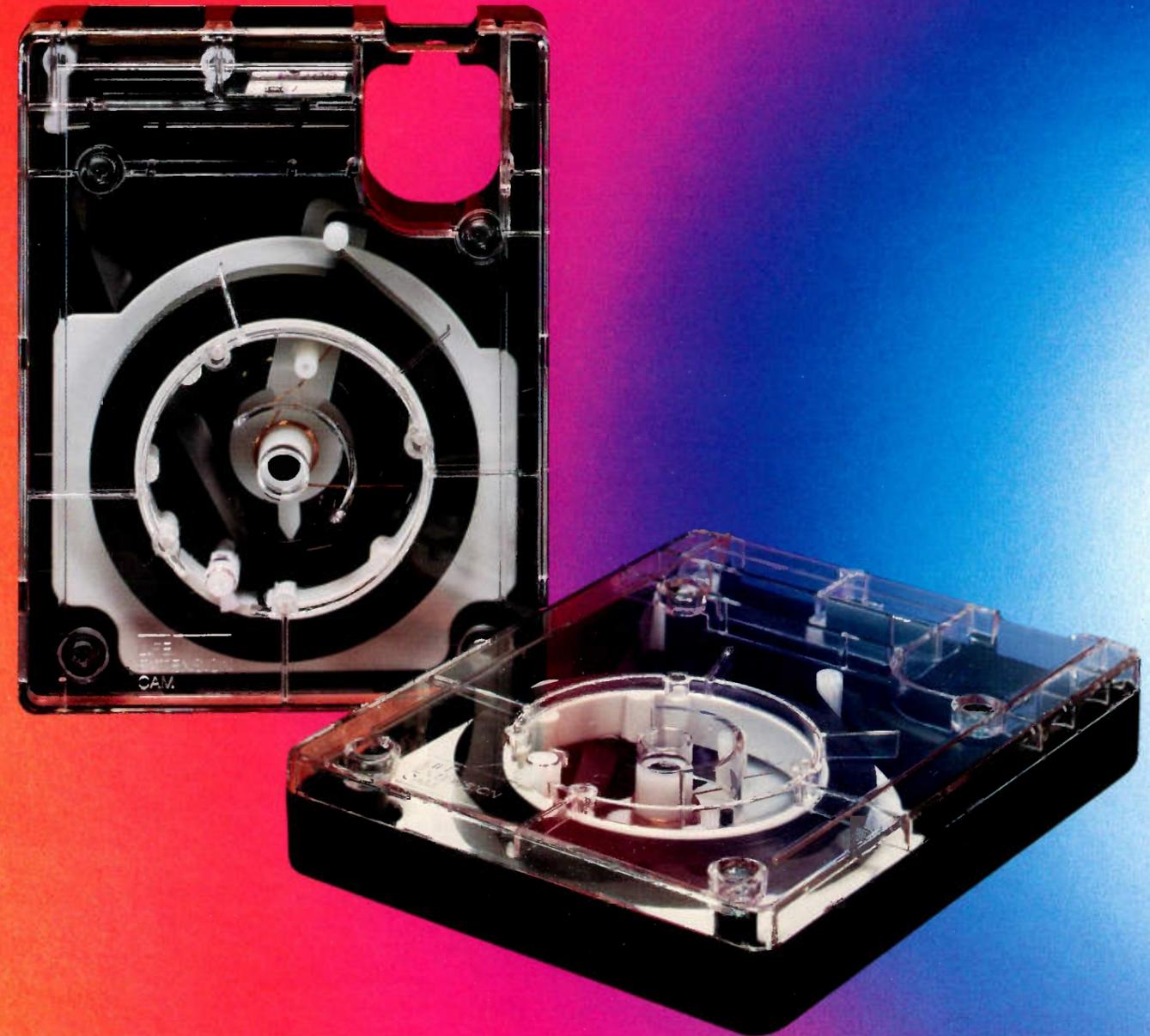
Printed in USA

International Tapetronics Corporation/3M

2425 South Main Street  
P.O. Box 241  
Bloomington, IL 61702-0241



# ScotchCart® II Broadcast Cartridges



Reel-to-Reel Performance with Cartridge Convenience

# ScotchCart® II

Revolutionary Design, Impressive Performance and Long Life

## REVOLUTIONARY DESIGN

The ScotchCart® II broadcast cartridge represents a breakthrough in technology beyond anything previously experienced in the industry. A revolutionary design eliminates pressure pads, utilizes a non-rotating hub, and now includes . . . a new, high-output, low-noise, lubricated tape for recording at high levels without performance loss. Tape and cartridge compliment each other like never before in the ScotchCart® II broadcast cartridge.

Setting an industry precedent, the ScotchCart® II broadcast cartridge utilizes a passive system of internal tape guidance, which allows your cartridge machine to do a much more precise job. This design, combined with the new tape, makes the ScotchCart® II broadcast cartridge the most reliable, stable and repeatable cartridge available.

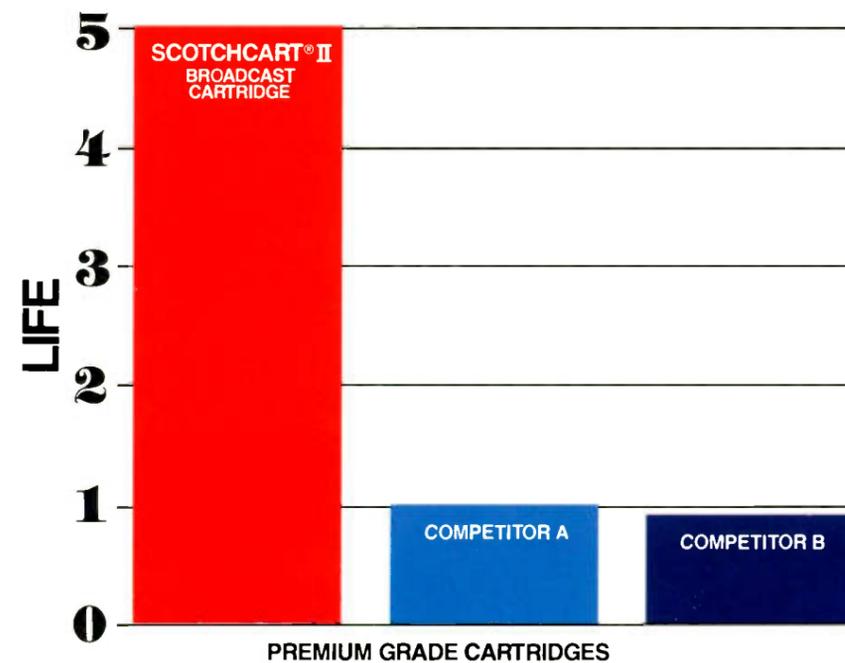
## IMPRESSIVE PERFORMANCE

To be successful in today's competitive environment, professional broadcasters need the best. The ScotchCart® II broadcast cartridge clearly outperforms conventional cartridges. The ScotchCart® II broadcast cartridge sounds crisp and clean, and eliminates the excessive modulation noise which results from the rubbing effects of pressure pads and the mechanical irregularities of rotating

hubs. When used with quality equipment, the ScotchCart® II broadcast cartridge is capable of frequency response equalling professional reel-to-reel performance.

## LONG LIFE

With five times the average life of its nearest premium grade cartridge competitor and superior audio performance, the ScotchCart® II broadcast cartridge is the best value ever.



\*Life results are based upon tests using 3.5 minute length premium grade cartridges and ITC cartridge machines. A cartridge was considered at the end of useful life when it reached a 5 dB frequency response loss at 10 kHz, .5% DIN weighted flutter, or mechanical failure. These criteria represent easily recognizable problems that should result in the cartridge being removed from service.

*NAB bead penetration and centering marks to facilitate bead block and cartridge guide adjustment.*

*No pressure pads to cause troublesome tape steering and wear or induce modulation noise.*

*Built-in magnetic bead shield to protect heads from stray radiated hum and low frequency noise.*

*Cart cover made of polycarbonate materials to insure long lasting, break resistant wear.*

*Naturally lubricated concave guides gently position tape to allow the cartridge machine to do the critical guidance.*

*Window for visual splice identification.*

*High output, low noise, studio-grade tape is capable of impressive frequency response and higher recording levels for improved signal to noise performance.*

*Patented dynamic tension control system to insure proper tape-to-head contact, provide constant tape tension and control tape looping inside the cartridge.*

*Naturally lubricated hub material with 40% glass bead fill has broad temperature stability and resists warpage for consistent performance.*

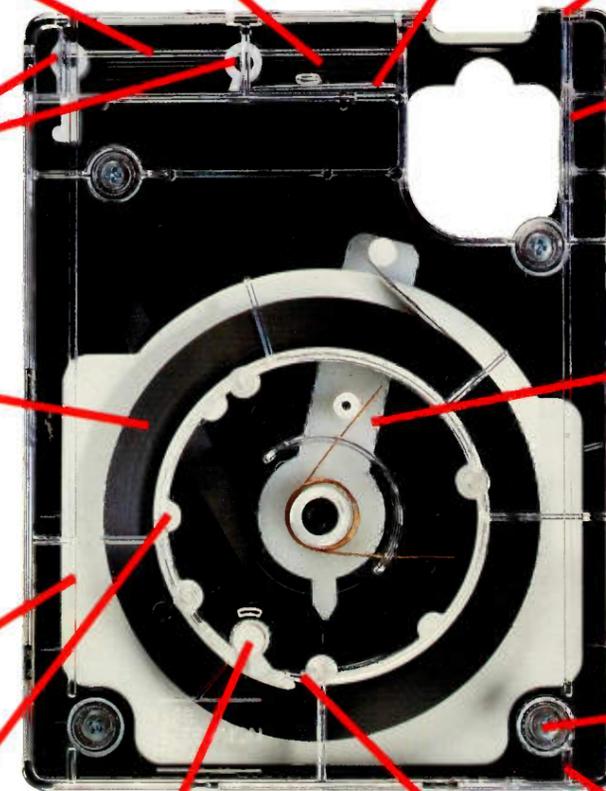
*Four screw antiwarp construction for an extremely rigid body that resists flexing.*

*Non-rotating hub to reduce wow and flutter; eliminate annoying rotating hub rattle and minimize stop cue over-shoot.*

*Adjustable cam to control tape loop for maximum life.*

*Tape exits naturally from the hub center instead of twisting and curling up and over the pack to reduce edge stress and debris for extended tape life.*

*Interlocking tabs in cover and base to eliminate sliding when cartridges are stacked.*

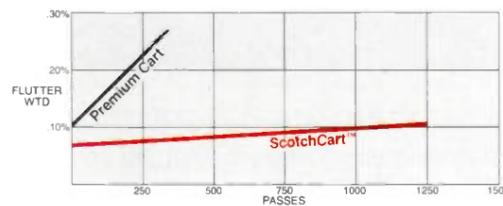


# Look at the facts:

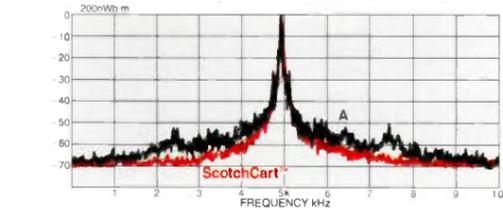
The following performance comparisons were conducted in 3M laboratories. Comparisons were made between 3½ minute premium stereo carts and the 3M ScotchCart Cartridge.



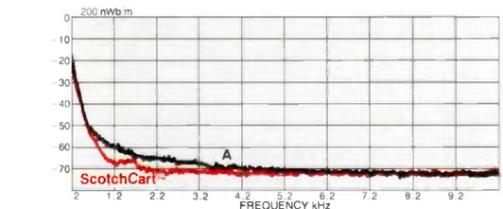
**TENSION VS. NUMBER OF PASSES**  
In this comparison, 7 oz. was established as the arbitrary failure point due to excessive tension. (Flutter and phase jitter is unacceptable on most machines at this tension.) The ratio was 6 to 1 for ScotchCart Cartridge in passes to tension excess failure over premium carts.



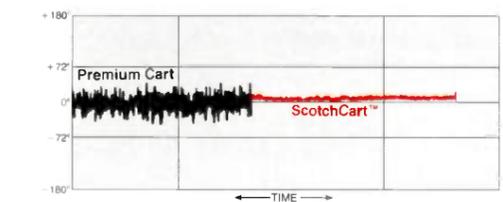
**EXCESSIVE FLUTTER VS. NUMBER OF PASSES**  
This covers another area of performance reliability. Typically, the ScotchCart Cartridge would exceed 500 passes prior to significant build-up in flutter, a better than 5 to 1 ratio over premium carts.



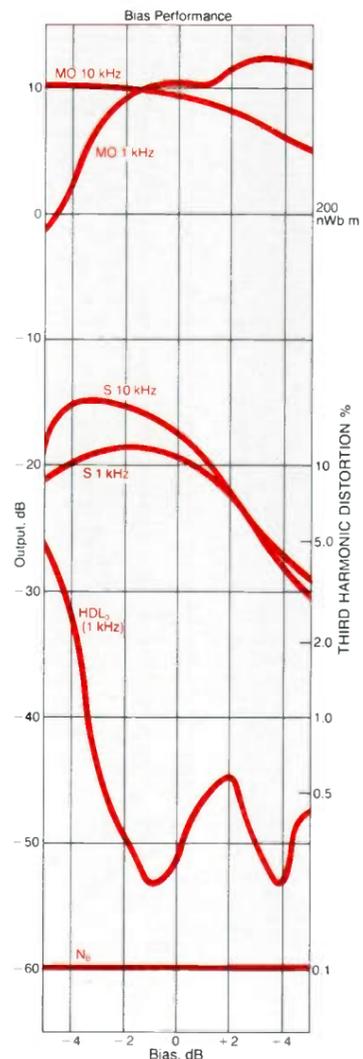
**HIGH FREQUENCY MODULATION NOISE**  
Noise generation is compared at a 5 kHz signal at 200 nWb/m.



**LOW FREQUENCY MODULATION NOISE**  
A comparison is shown of the amount of noise generated by a 40 Hz signal recorded at +3 VU.



**PHASE JITTER**  
This shows the dynamic phase stability of the 3M ScotchCart Cartridge... with the amount of phase jitter indicated, the fuzziness of the sound is readily apparent to the ear.



**MAXIMUM OUTPUT—MO**  
Maximum output level at the specified frequency is a measure of the output capability of a tape. The recorder is equalized for a flat response using the appropriate reference tape. While recording 10 kHz the level of the input signal is increased until no further increase is noted in the output (short wavelength saturation). This output is then reported at different bias settings relative to reference level. While recording 1 kHz the level of the input signal is increased until 3% third harmonic distortion appears in the output. This output level is then reported at different bias settings relative to reference level.

**SENSITIVITY—S**  
Sensitivity data provides a means to compare the output of one tape to that of another when recordings are made with the same low level input (i.e., an input at which an insignificant amount of system distortion is contributed by the tape). The record equalization is set to achieve a flat response when using the reference tape at the bias setting. A constant input level 20 dB below that required to produce reference level output from the reference tape is used.

**HARMONIC DISTORTION—HDL<sub>3</sub>**  
Third harmonic distortion is the amount of third harmonic distortion found upon playback of a reference level signal. The HDL<sub>3</sub> curve shows the change in this level of distortion as a result of different bias settings.

**TAPE NOISE—N<sub>b</sub>**  
Biased tape noise level is a measure of a tape's residual noise. When recording with zero input signal, the output is measured through a filter having the characteristics defined by the NAB Standard Noise Weighting Curve. The level of noise is then reported at different bias settings relative to reference level.

**CONCLUSIONS:** Our performance comparisons clearly position ScotchCart Broadcast Cartridge as the leader. Tests were conducted on 3½ minute carts to provide the always consistent performance advantages of ScotchCarts on music length cartridges.

Many competitive tapes scratch, shed and suffer edge deterioration after extended performance. ScotchCart doesn't. **SOUND PROOF. SOUND PERFORMANCE.**

# ScotchCart™

# 3M

## Broadcast Cartridges



# Impressive.

# ScotchCart™ Broadcast Cartridges

**Impressive. That's exactly what the ScotchCart Broadcast Cartridge is.**

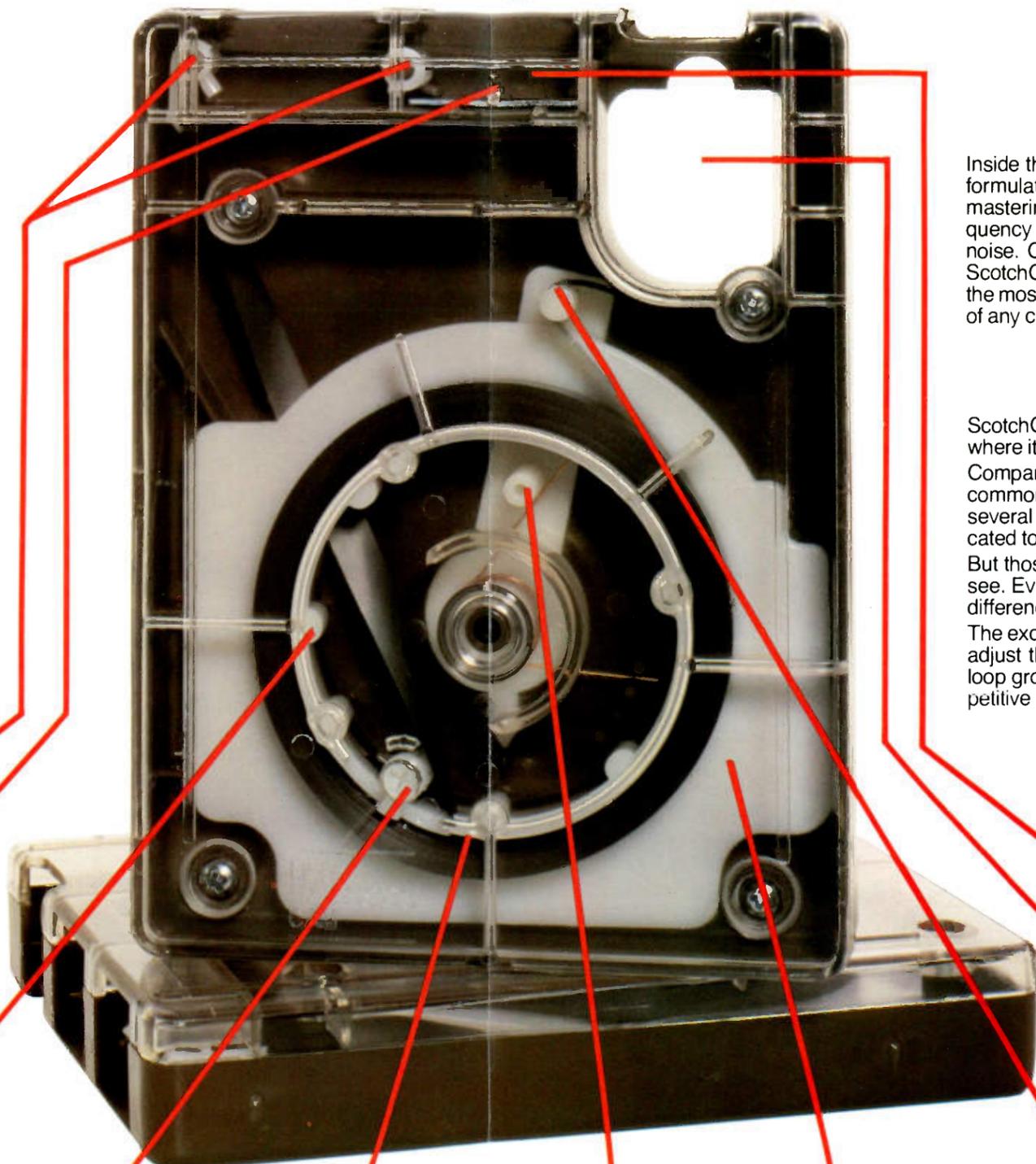
Together, the innovative design of this cart and the superior mastering tape formulation offer you performance capabilities far beyond what you have come to expect from broadcast cartridges.

Not only will you hear unbelievable reel-to-reel sound quality, but we have used the most advanced technologies to eliminate many of the most unwanted cart problems:

- Excessive tension
- Phase jitter
- Wow and flutter
- Distortion
- Pressure pad problems
- Short life
- Generally poor sound

ScotchCart Cartridge eliminates these problems

It sounds too good to be true. But it is a FACT. This new cartridge will re-establish your faith that uncompromising reel-to-reel sound can be achieved through the use of a ScotchCart Broadcast Cartridge.



**TAPE GUIDES**  
Concave surfaces which center and gently guide the tape as it passes over the magnetic heads. Results: lower phase error, more uniform output, cart to cart consistency.

**PLAYBACK HEAD SHIELD**  
Prevents stray radiated fields from getting to playback head. Result: reduces hum and low frequency noise.

**LARGER CENTER HUB**  
This means fewer tape layers for the same amount of play time. Results: better loop control and longer tape life.

**LIFE EXTENSION CAM**  
After 300 passes the average cart sounds bad, because of higher tension, phase error, and/or flutter (usually due to built-up tension). ScotchCart runs far beyond the average cart due to the Life Extension Cam which counteracts tension build-up or loop growth. Results: longer cart life.

**NATURAL PACK EXIT**  
Tape is pulled directly out of the hub center. No obstacle course for the tape to go through. Tape platter is tilted, which allows the tape to pass under the pack with a minimum amount of stress on its edge. Result: less debris, extended tape life.

**TAPE TENSION ARM/ TENSION SPRING**  
These two features are the heart of the ScotchCart and the reason for performance like that of a reel-to-reel system. This unique patented tension control system insures that a 20-second ScotchCart sounds every bit as good as a music length cart. Result: no longer necessary to optimize cart equipment for tape length.

**LUBRICATED PLASTIC PARTS**  
Platter, tension arm, wrap guides... all parts which contact the tape are made out of the lubricated plastic—Acetal. Result: minimized friction.

**NO SLACK LOOP**  
The design of ScotchCart provides for loop growth compensation. The Life Extension Cam and the tape tension arm work to absorb loop growth. Result: longer life for the cart.

**LESS FLUTTER**  
Flutter is influenced by tension changes, rotating platters and pressure pads. The design of ScotchCart either eliminates or minimizes these factors, causing less flutter than the contribution of the machine. Result: better sound.

**NO PRESSURE PADS**  
Pressure pads are not needed due to our constant tension design. Pressure pads create a frictional force that in turn creates modulation noise, tape and head wear. They can also steer the tape, resulting in increased phase error.

## MASTERING QUALITY TAPE

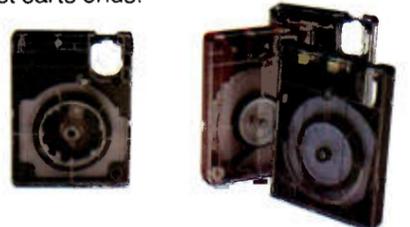
Inside the ScotchCart Cartridge is a lubricated magnetic recording tape. Newly formulated, this tape offers the same superior oxide formulation as our 226/227 mastering quality tapes. You will find improvements in head room, high frequency output, short wavelength stability and significantly reduced modulation noise. Conceived as an integral part of a complete system, the tape in every ScotchCart Cartridge will deliver the most consistent performance of any cart tape available.



## SCOTCHCART VS. COMPETITION

ScotchCart Cartridge is compatible with all NAB standard equipment, but that's where its similarities with ordinary broadcast carts ends.

Compare a ScotchCart Cartridge with any commonly accepted cart, and you will see several unique design features (as indicated to the left).



But those are just the differences you can see. Even more important are the unseen differences in performance and longevity.

The exclusive Life Extension Cam lets you adjust the center hub diameter to insure constant tension and minimize slack loop growth. Your ScotchCart will last up to 3 times as long as any other competitive cart.

## CREATED SPECIFICALLY FOR YOUR NEEDS

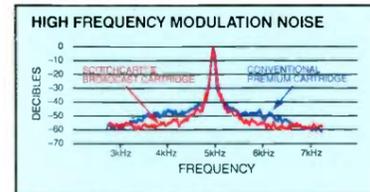
Prior to introduction, the ScotchCart was subjected to an extensive field evaluation program involving hundreds of broadcasters across the country. It was their input that finalized our designs and allowed us to offer you exactly what you've been clammering for. Reel-to-reel sound off of a reliable, top performing cartridge.

**Get reel-to-reel quality with cartridge convenience.**

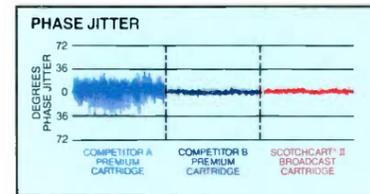
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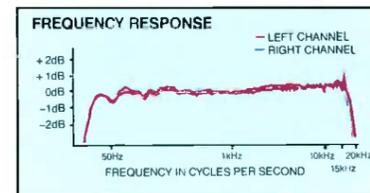
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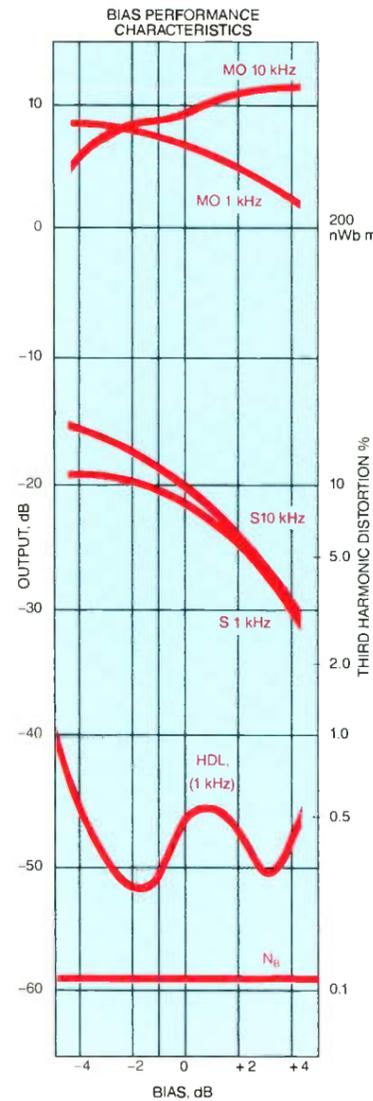


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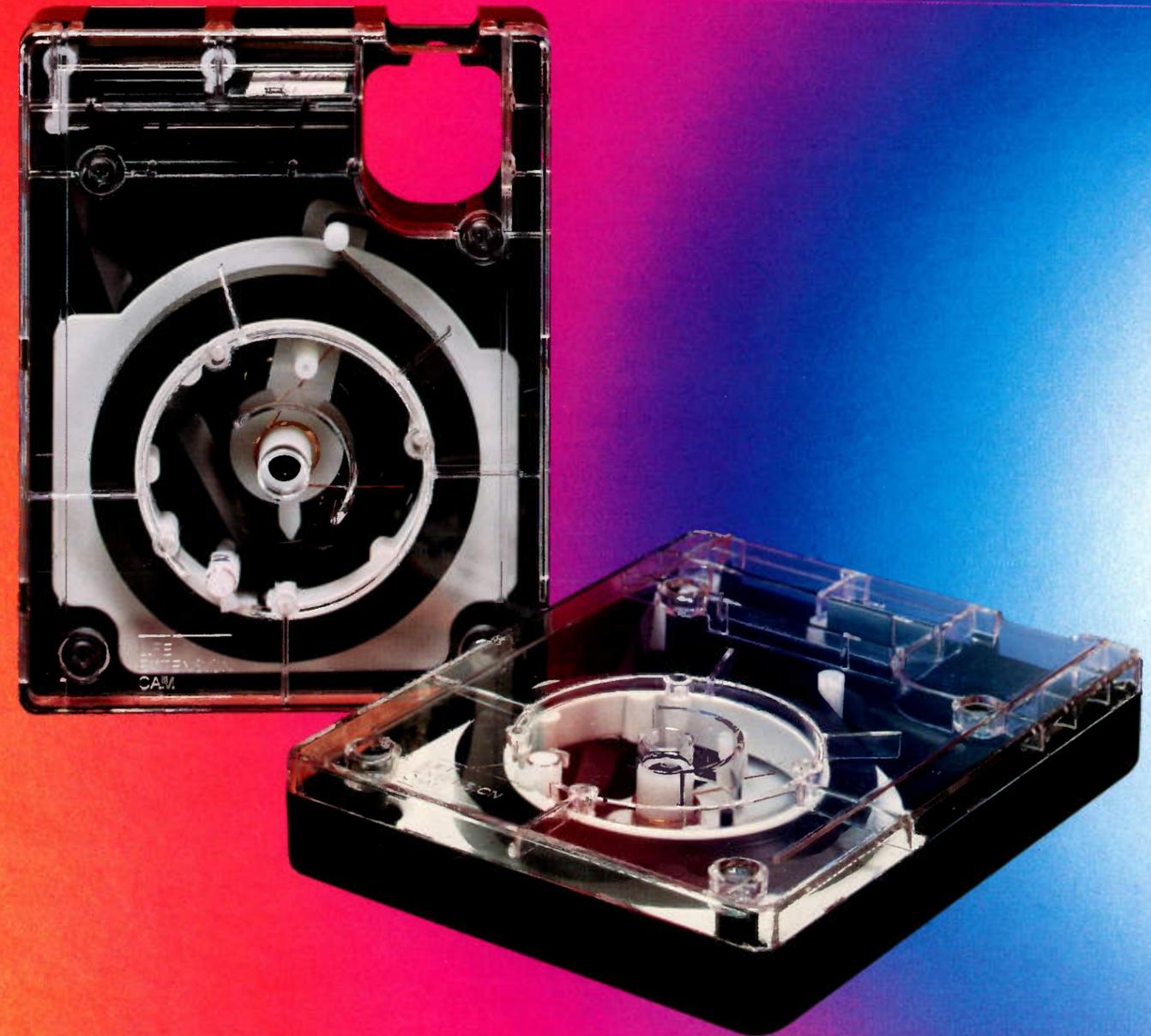
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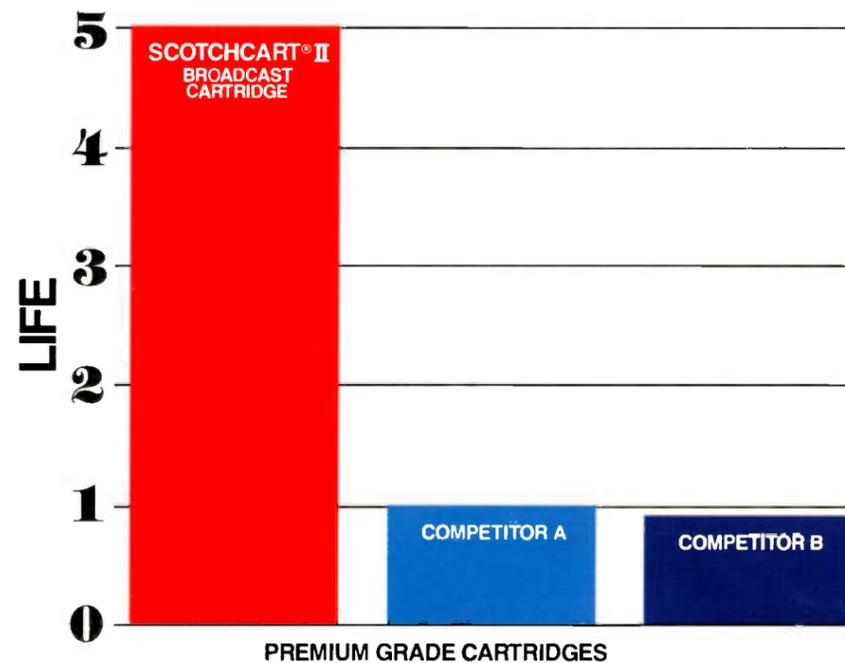
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*No pressure pads to cause troublesome tape steering and wear or induce modulation noise.*

*Built-in magnetic bead shield to protect beads from stray radiated hum and low frequency noise.*

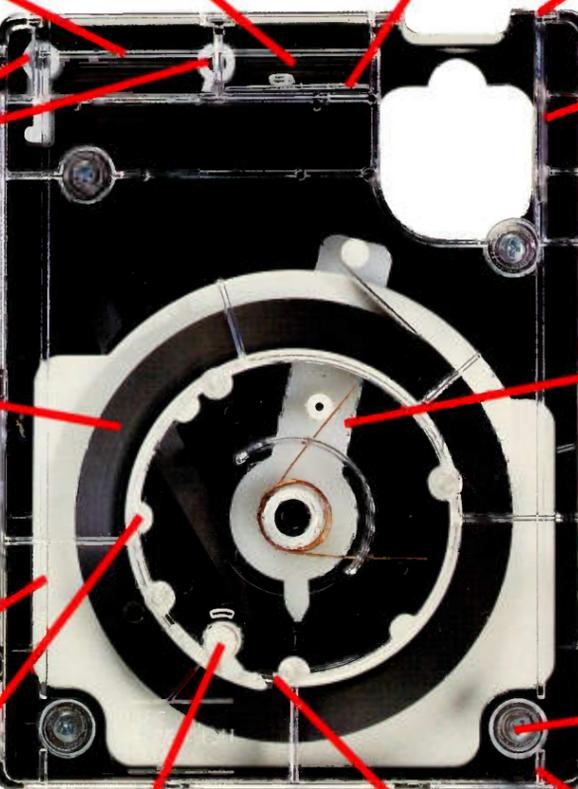
*Cart cover made of polycarbonate materials to insure long lasting, break resistant wear.*

*Naturally lubricated concave guides gently position tape to allow the cartridge machine to do the critical guidance.*

*High output, low noise, studio-grade tape is capable of impressive frequency response and higher recording levels for improved signal to noise performance.*

*Naturally lubricated hub material with 40% glass bead fill has broad temperature stability and resists warpage for consistent performance.*

*Non-rotating hub to reduce wow and flutter; eliminate annoying rotating hub rattle and minimize stop cue over-shoot.*



*Window for visual splice identification.*

*Patented dynamic tension control system to insure proper tape-to-bead contact, provide constant tape tension and control tape looping inside the cartridge.*

*Four screw antiwarp construction for an extremely rigid body that resists flexing.*

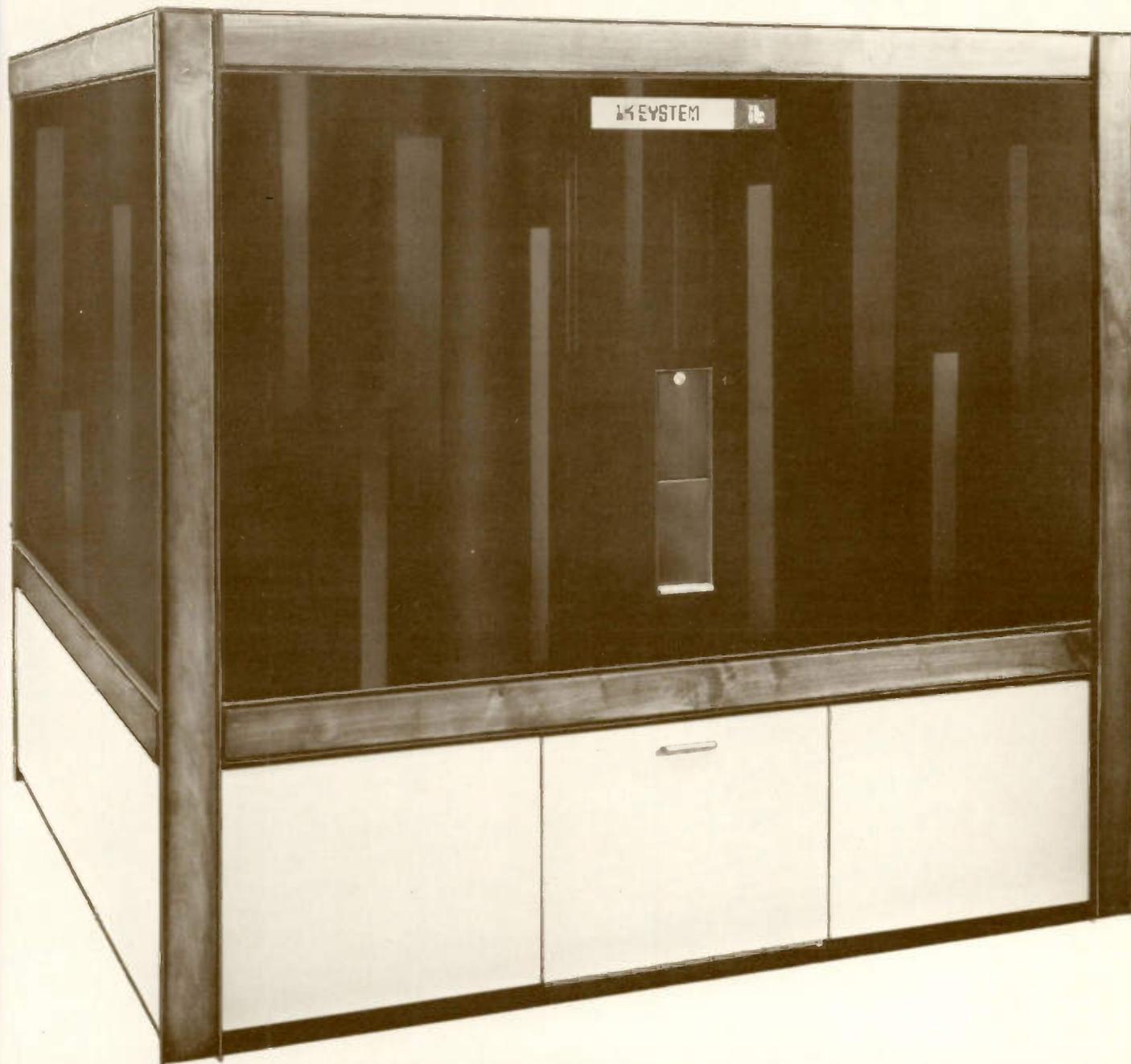
*Adjustable cam to control tape loop for maximum life.*

*Tape exits naturally from the hub center instead of twisting and curling up and over the pack to reduce edge stress and debris for extended tape life.*

*Interlocking tabs in cover and base to eliminate sliding when cartridges are stacked.*

# it 1K

## Library storage system



Traditional ITC quality • Advanced Technology • Lowest cost per tray

# 1K:

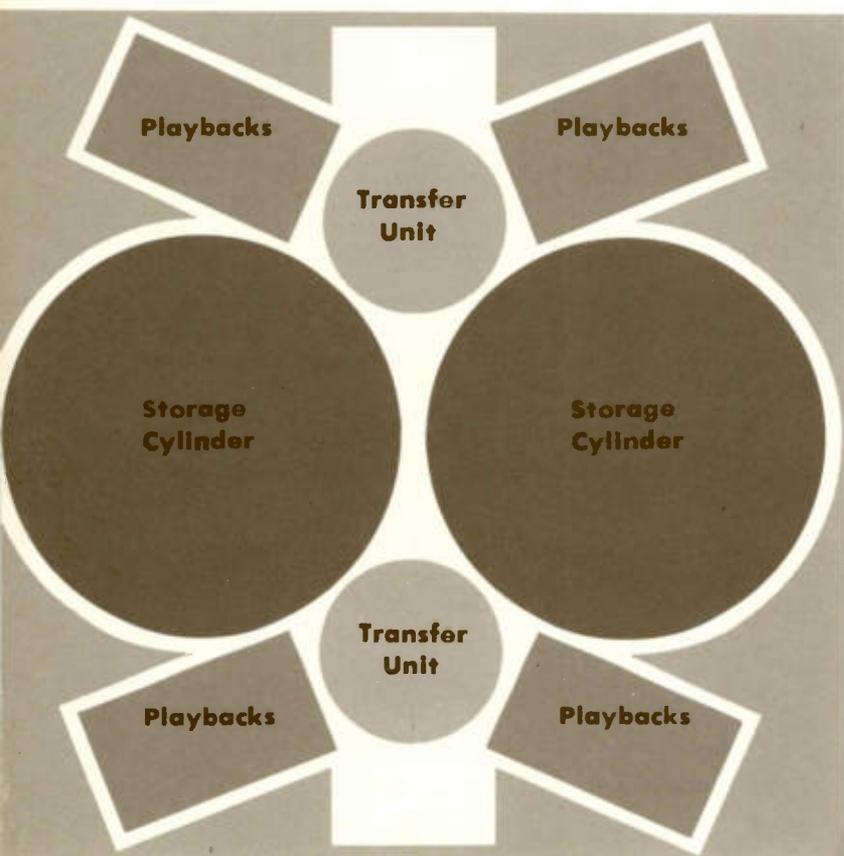
## a technological leap for audio tape cartridges

The 1K represents a milestone advance in audio tape cartridge technology. A computerized system that receives, files, moves, and plays tape cartridges automatically, the 1K:

- + Files 1024 cartridges.
- + Plays cartridges back-to-back.
- + Self-loads incoming cartridges.
- + Provides 4 simultaneous audio programs.
- + Offers reel-to-reel sound quality.
- + Is impressively cost-effective.

A 1K machine includes up to 24 internal, single-deck cartridge playbacks. The actual number of playbacks provided depends on the user's needs, and on the controller selected. Cartridges are supplied to these playbacks from twin storage cylinders, each holding 512 cartridges. Twin transfer mechanisms move the cartridges between the two cylinders and the playback machines. Additionally, the 1K can access external inputs, such as a reel-to-reel source, network, etc. An on-board computer manages all 1K functions—mechanical and electronic—interfacing with a controller of the user's choice. The 1K—a compact, 5-foot cube—can be located remotely from the controller.

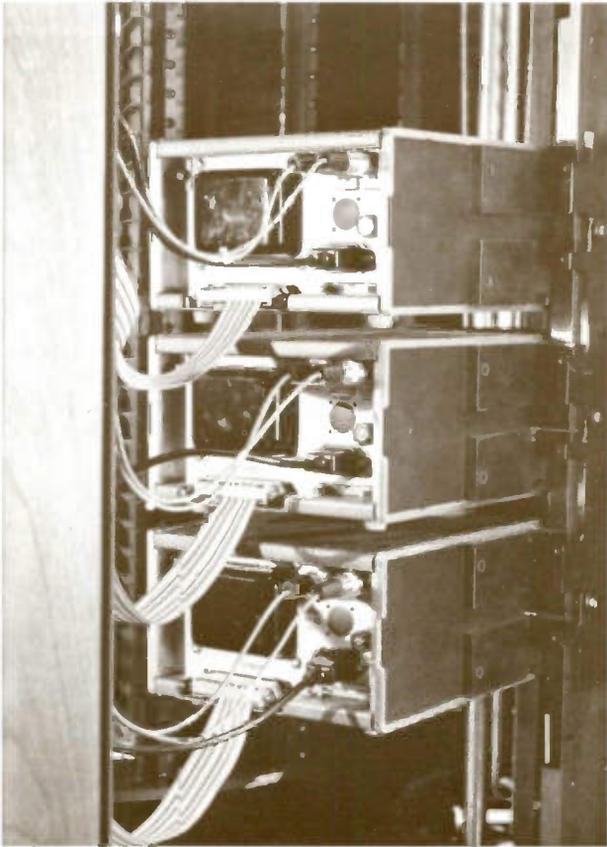
One to four external controllers can be used, each controlling from one to four audio channels. The choice of the controller is left to the owner's discretion so that the station's specific program requirements may be met in the best manner possible. The choice of the controller will probably be influenced by the type of operation (live or automated), the type of programming (MOR, AOR, Disco, Rock), and program control requirements.



PLAN VIEW: 1K SYSTEM

### **REDUNDANCY ASSURES RELIABILITY**

The 1K's redundancy—24 playbacks, 2 storage cylinders, 2 transfer mechanisms—provides reliability. All cartridges in both storage cylinders are accessible to both transfer mechanisms. And each of the two transfer mechanisms serves its own battery of playbacks . . . Up to 12 playbacks for each transfer unit. If one transfer mechanism should fail, the programming load will be distributed among the playbacks serving the operating transfer unit. This duplex design permits continuous, flawless operation of the 1K even with half the system disabled. And permits the disabled half to be repaired without interrupting service.

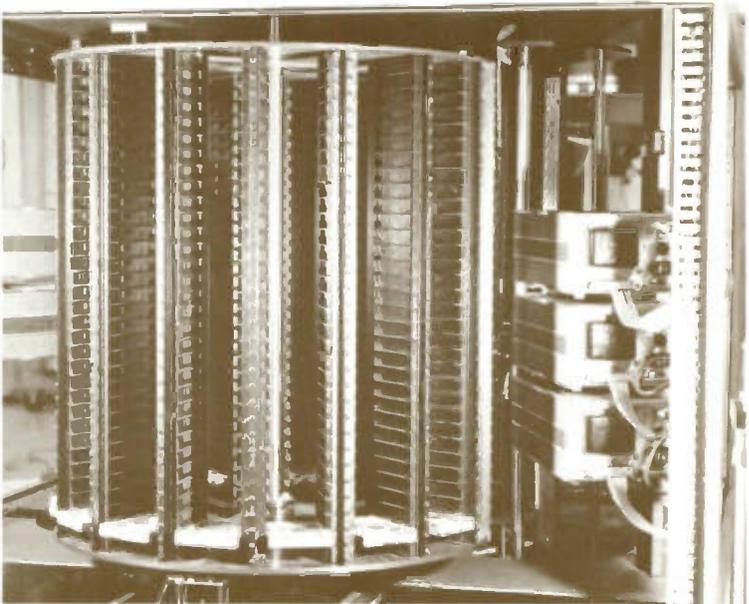


**Up to 24 playbacks can be provided, with up to 6 units in each of 4 different locations.**

## **REDUNDANCY SUPPORTS BACK-TO-BACK PLAYBACK CAPABILITY**

When provided with a current event list, all playbacks—up to 24—are loaded with “ready” cartridges, providing the operator with instant access to these cartridges in the order given. The average access time for other cartridges—stored in the 1K but not loaded and “ready” in a playback—is 5 seconds.

Electronic and mechanical features combine to provide this rapid, random access of cartridges. The 1K computer calculates the shortest distance between the stored cartridge and an available playback, and assigns the cartridge to the transfer unit that can make the move fastest. The storage cylinder, which can move clock-wise or counter-clockwise, takes the shortest turn toward the transfer mechanism, which in turn is moving toward the cartridge. All movements are simultaneous and complementary.



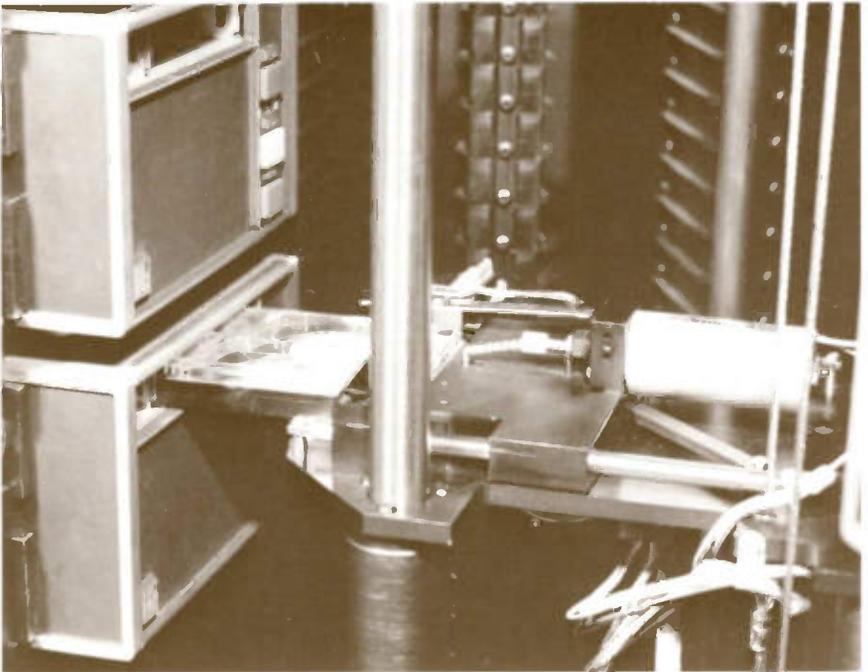
**Two storage cylinders each provide space for 512 cartridges.**



**A Read-Only Memory  
Chip contains instructional  
programs for decision-  
making.**

### **A GREAT "LIVE ASSIST" MACHINE**

Computer automated management of cartridges offers a variety of benefits. In a live-assist role, the system frees the operator for creative, detail-free air presentations. It eliminates the fatiguing chores of clock-watching, log-keeping, cueing records, and handling cartridges. There are fewer missed spots, less risk of dead-air time, fewer on-air errors. The operator has the "think time" to be spontaneous and interactive, increasing his or her impact as a live, real-time presence.



**Transfer mechanism inserting cartridge into playback.**

### **AN EXTRA PAIR OF HANDS**

The 1K, which can be located remotely, places 1024 events at the operator's fingertips. Yet, the operator need not handle these cartridges. He simply orders the events wanted, and monitors their status, as reported through the controller. He can use the total automation capability of the 1K for walk-away time, or intersperse occasional 1K use in a virtually live format. In any mode, the 1K provides the freedom from detail needed for live, creative, responsive thought and expression.

### **A VARIABLE AUTOMATION FACILITY**

The 1K can be used as part of a totally live presentation, support walk-away automation, or serve in any role in between these two extremes. This role can also vary by time of day, day of week, season, program material, or by a combination of these things.

A program director can exercise full programming control. For example, he or she might wish to "freeze" the music event list at certain times of the day and relax the reins at other times. The 1K facilitates this program management, being a closed system—often remotely placed—with cartridges accessible only through the controller. The degree of programming control is determined by the director, and by his choice of controllers.

### **SERVES FOUR AUDIO CHANNELS**

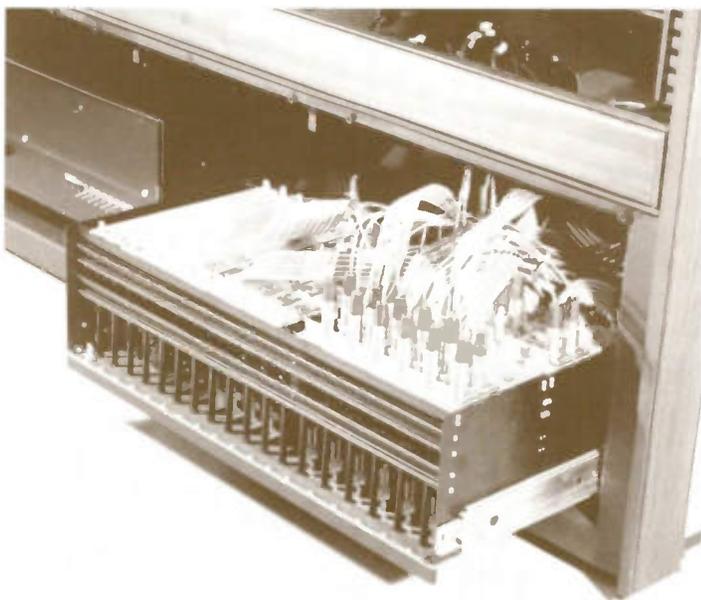
The 1K can serve up to four stereo audio channels simultaneously. For example, two channels feeding an AM station and two feeding an FM station. The use of two channels for each facility permits crossfades and overlaps between them. It also permits grouping of related events by channel. Example: "top-of-the-hour" program material. Audio overlaps can also be achieved on individual channels by proper placement of cue tones.



**Interface (for audio and remote functions) between Series 99 cartridge machines and the 1K system.**

The 1K will accept four different event lists—one for each channel—and each up to 31 long: a total of 124 events. Any of the playbacks—up to 24—can serve any of the four audio channels. By programming ahead, the operator can maximize the 1K's capability to play cartridges back-to-back. When loaded with "ready-to-play" cartridges, the 1K provides a pool of up to 24 instantly accessible events, depending on the number of playbacks in the system.

In a live operation, a spontaneous, creative air personality may want to modify his or her event list frequently: adding, deleting, re-sequencing. The 1K facilitates such change, updating it's memory with each event list correction. When a cartridge is not in a playback, and therefore must be accessed from cylinder storage, lead time averaging 5 seconds is required. Longer lead time, up to 20 seconds, may be required when a playback must be unloaded to make room for the new cartridge.



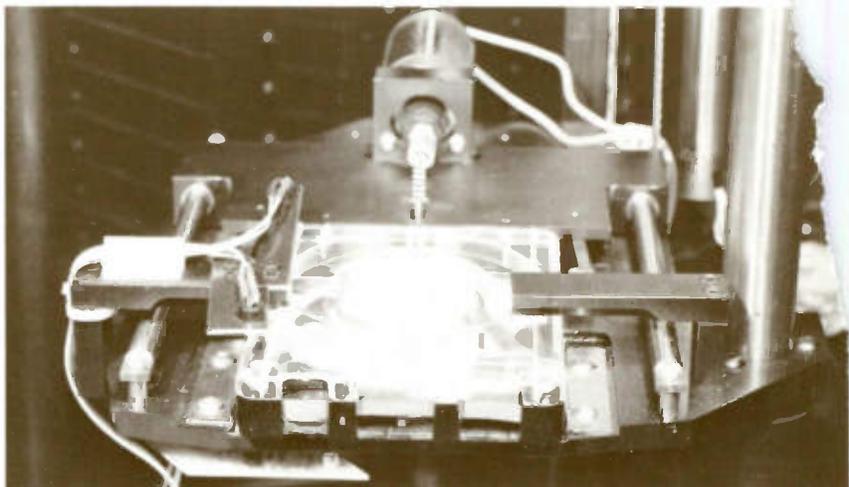
**Slide-out drawers hold electronics.**

### **A COMMUNICATIVE SYSTEM**

The 1K and the operator communicate through an external controller, with the 1K providing on-going reports on system status: cartridges "ready", cartridges running, and the presence of secondary (EOM) and tertiary cue tones. In addition, cue track audio and demodulated FSK logging information are provided for each channel. The 1K is equipped with an integral keyboard which provides direct-access for unloading cartridges from the system, for inquiry regarding available storage locations, and for verification of the presence of any particular cartridge in storage. The 1K computer also provides control of the transfer mechanisms and cylinders—and displays diagnostic information—supporting installation and maintenance.

### **A CONTINUOUSLY ANIMATED MACHINE**

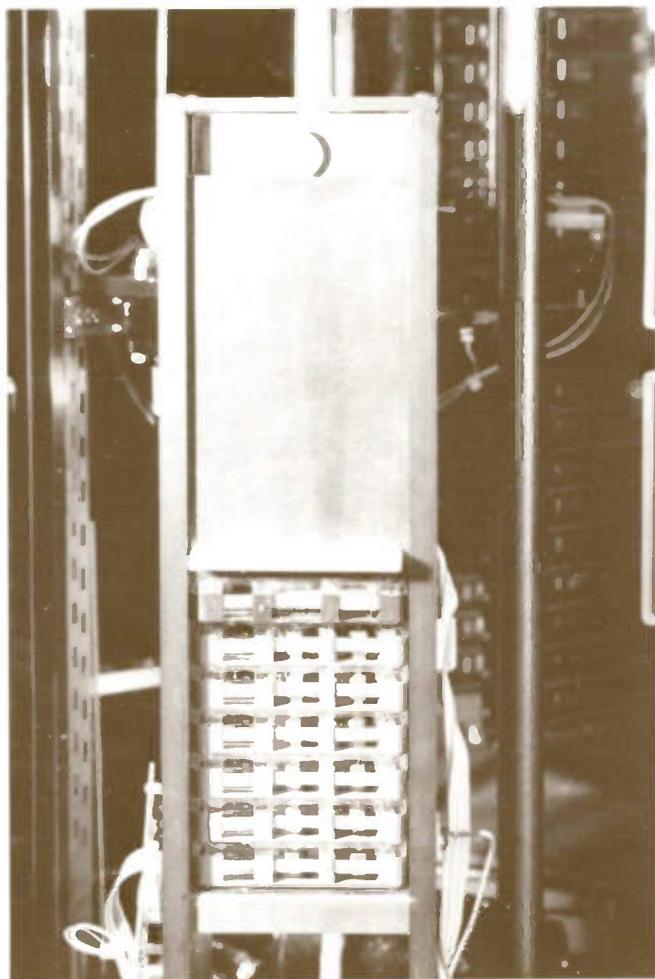
While accepting commands and reporting status, the 1K executes its basic functions: Receiving, filing, moving, and playing cartridges. The 1K's first priority is to see that all active channels have at least 3 "ready" cartridges, instantly accessible. Given this, it will see if there are new cartridges to be received into the system. If not, it will load additional playbacks with cartridges called for by the event list, using the event sequence as a priority guide. If there are no cartridges to load into playbacks, the 1K will see if there is a cartridge to unload from a playback and return to storage. As a final priority, it will unload cartridges from storage as directed by the operator or system controller and make the necessary deletions from the "available" storage list.



**The cartridge gripping mechanism of one of the transfer units.**

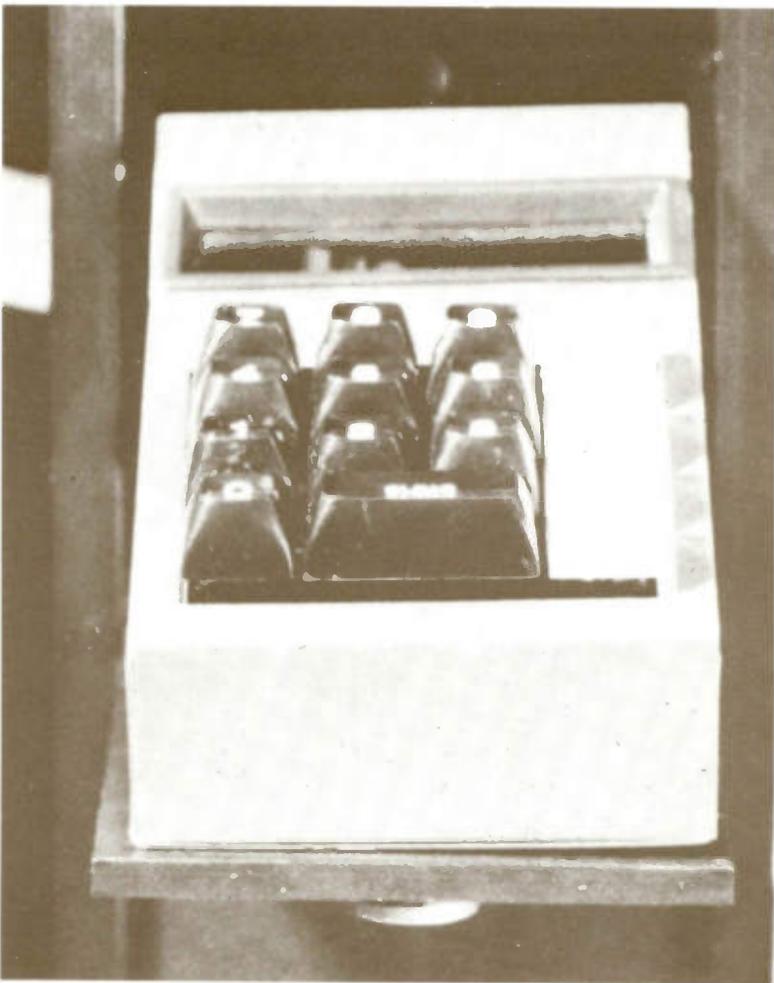
### **A CLOSED, REMOTELY CONTROLLED MACHINE**

Except for maintenance access, the 1K is a closed machine. Cartridges to be loaded into the 1K are placed in a reception compartment, holding up to 8 cartridges. The 1K accepts each new cartridge individually, reading its identification number, and verifying primary and secondary cue tones in a playback. Cartridges loaded backwards or upside down will not be accepted. And, if cue tones are not verified, the new cartridge is rejected by the 1K.



**Cartridges stacked in reception unit awaiting acceptance and filling by the machine.**

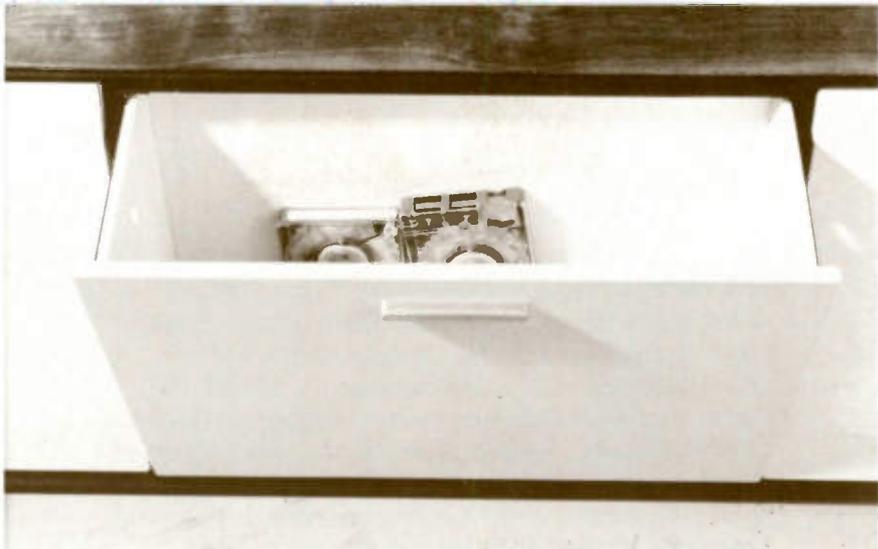
Cartridges carrying new numbers are assigned new library storage locations by the 1K. If a number is a duplicate, the same-numbered cartridge is unloaded and the new cartridge stored in its location. The 1K, of course, stores in memory all newly-entered cartridge numbers and their respective storage location numbers. On command from the controller—or the 1K's own keyboard—the 1K will unload an inactive cartridge, making the storage location and the cartridge available for new use, taking obsolete material out of circulation.



**On-board computer allows direct communication with the 1K.**



**Central processor which issues instructions and coordinates activities within the 1K.**

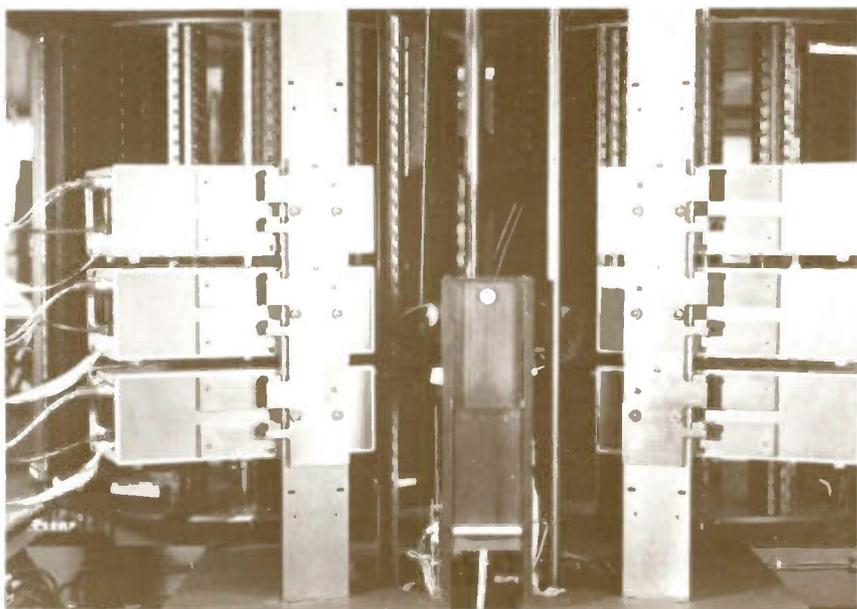


**Dump tray receives cartridges ordered out of system storage.**

### **AN INTELLIGENT MACHINE**

The 1K is both self-diagnosing and self-healing. If a playback fails, the 1K will report its number, and by-pass that playback until it is fixed. If the failure occurs during play, the cartridge will be recued in another playback and returned to storage. If failure occurs before a ready cartridge is played, a playback holding a lower-priority cartridge will be unloaded to make room for the cartridge from the disabled cart machine. The event list sequence establishes the priority for all cartridges.

If a cartridge transfer mechanism fails, the 1K will report the failure, and automatically switch the full handling chore to the other, functioning unit.

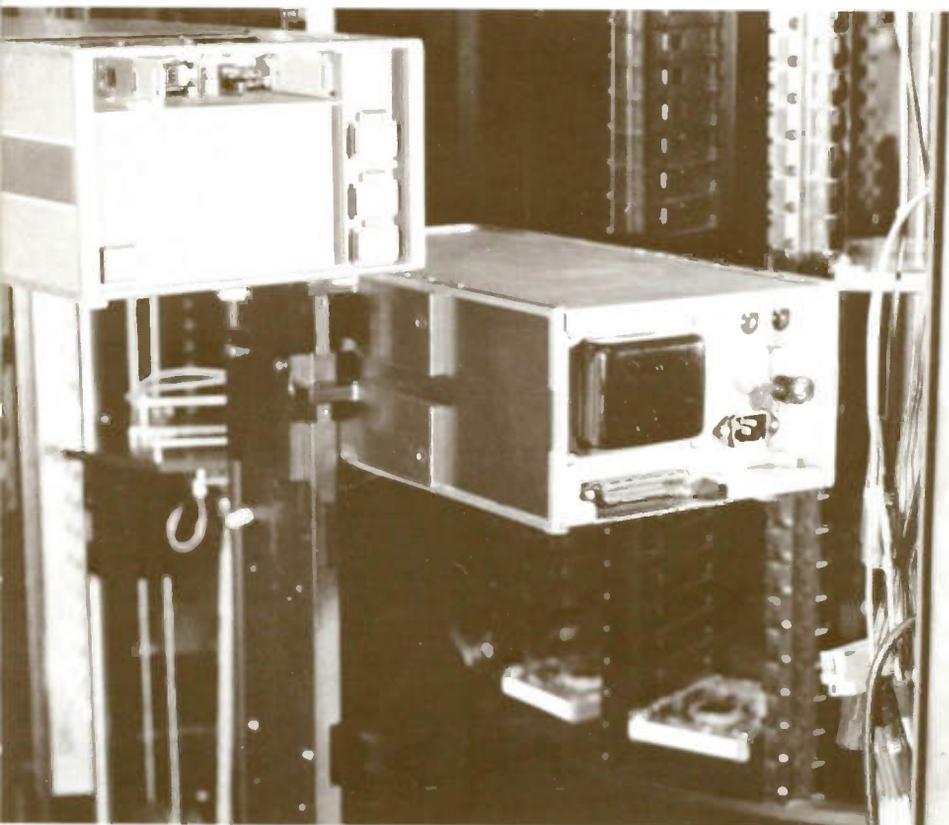


### **A SYSTEM THAT GROWS AS YOU GROW**

A 1K has a capacity of 1024 cartridges. These 1024 cartridges can be assigned any identification numbers between 0 and 8,191. Up to eight 1K's can be linked together in a super-system. Such a system, depending on the number of playbacks provided for each 1K module, would offer an impressive number of instantly accessible, back-to-back events.

### **A LANDMARK EVENT IN CARTRIDGE HISTORY**

The 1K will impact on broadcasting in two dramatic ways. First, it represents a new state-of-the-art for audio tape cartridge sound: measurably and discernably improved. When tapes are recorded and played on the new ITC Series 99 cartridge machines, audio quality is dramatically crisp and clean, with reduced wow, flutter and distortion, improved



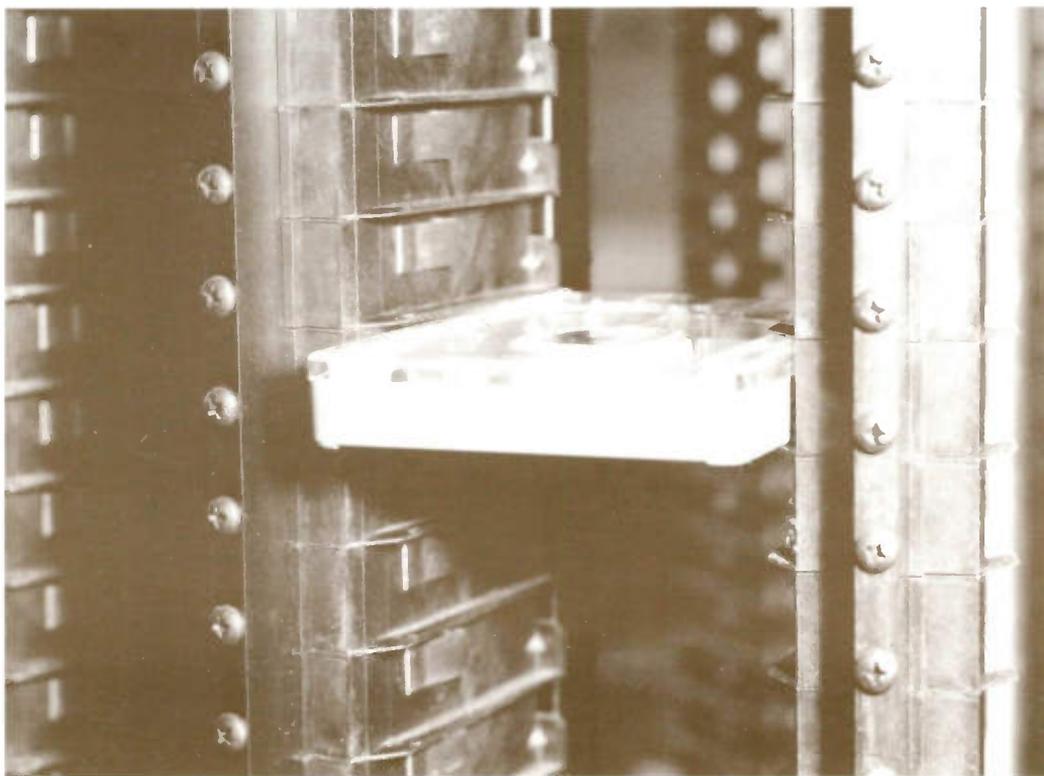
**Cartridge machines swing out on hinges for easy service access.**

azimuth (phase) stability and frequency response, and greater headroom. Music now carried on open-reel tapes or on records can be recorded and played from audio tape cartridges with open reel sound quality.

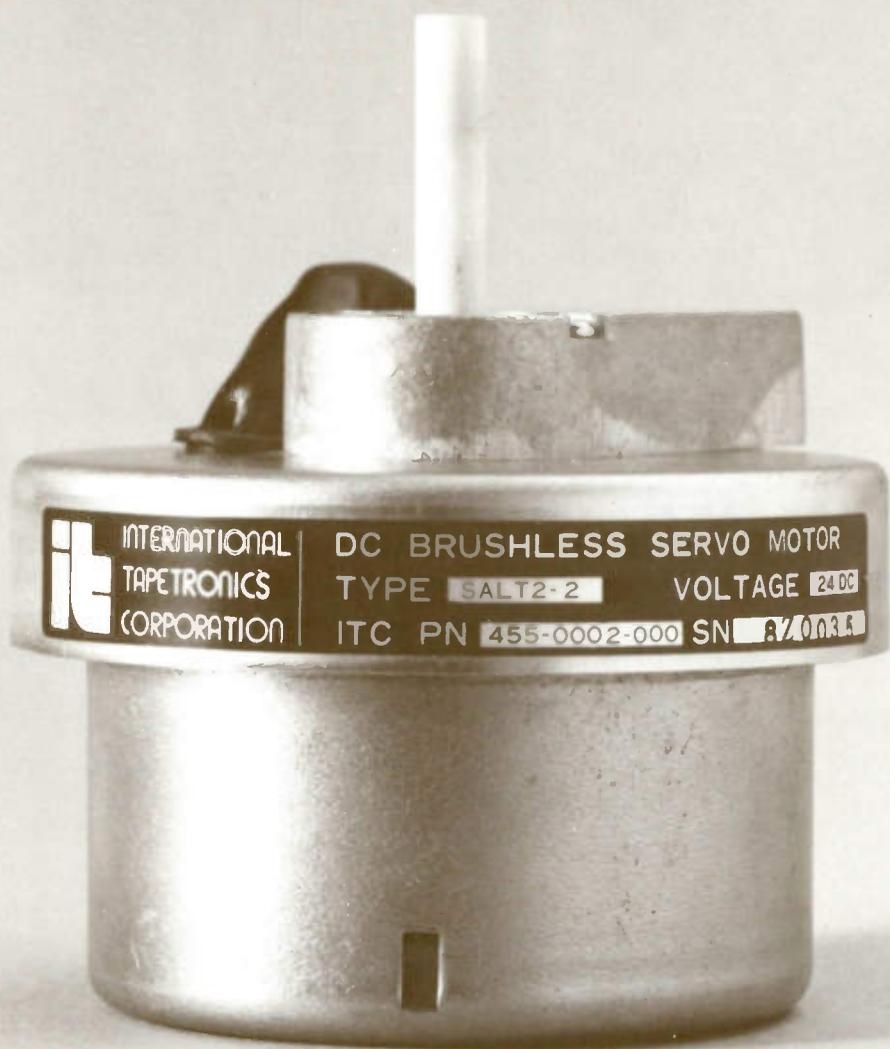
And, at the same time that ITC Series 99 cartridge machines expand the program range of tape cartridges, the 1K makes their expanded use physically feasible, remotely managing virtually unlimited numbers of events.

#### **LOWEST COST PER TRAY**

The 1K, along with its electro-mechanical sophistication and superb sound quality, offers the lowest cost per tray of any automatic cartridge system available. Contact your audio systems manufacturer for information on a 1K and controller tailored to your needs.



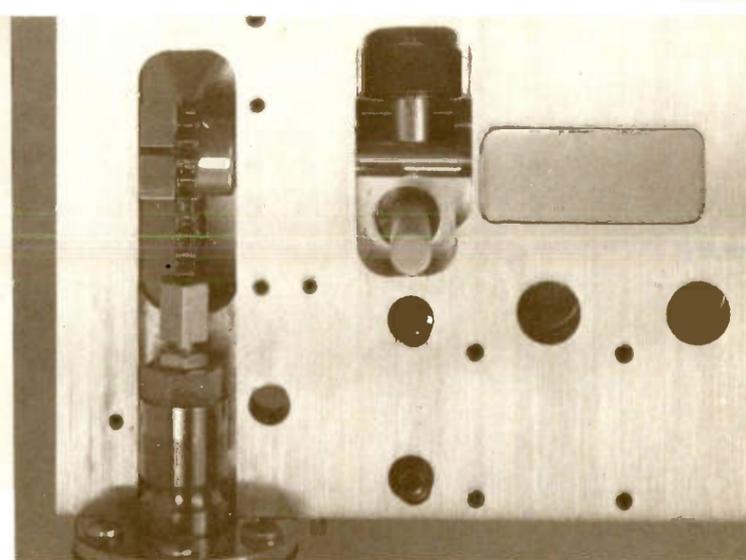
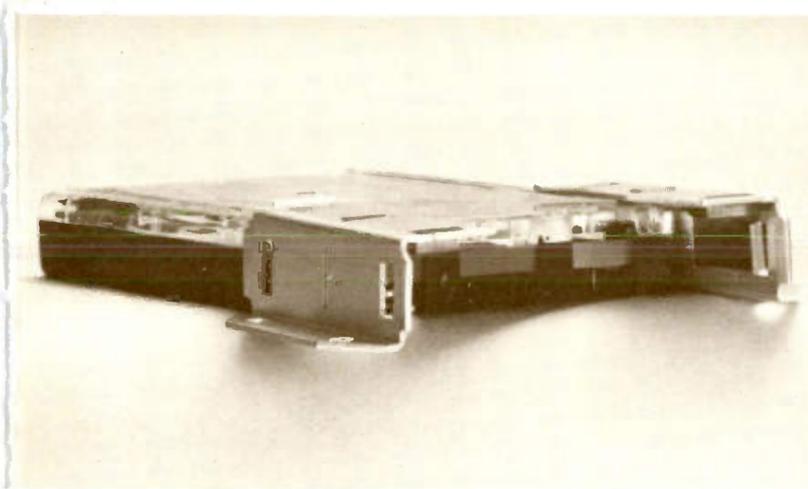
**A close-up view of storage trays.**



### **Servo-Motor System**

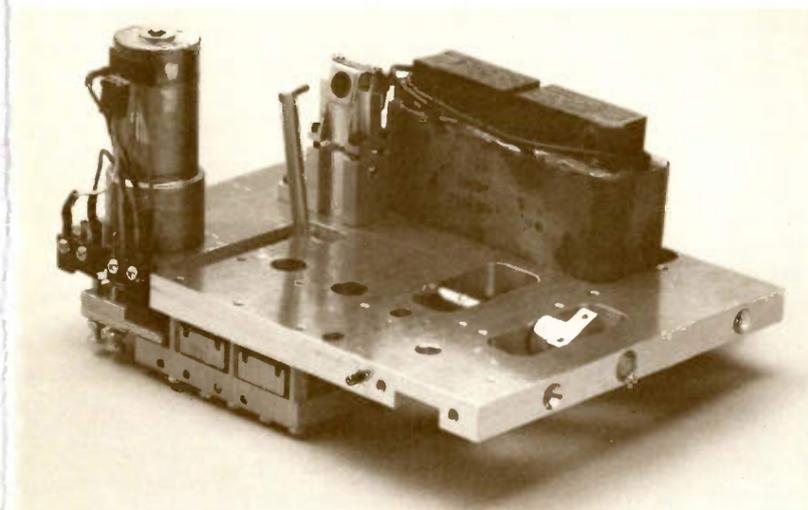
A newly designed, professional, brushless DC capstan motor, coupled with a crystal-referenced, phase frequency locked servo control system, have dramatically reduced wow and flutter and improved long-term speed stability. Flutter averages less than .07% NAB weighted (1964 standard) and .08% DIN weighted (1975 NAB standard). Long term tape speed accuracy is .1%. With the simple change of a jumper, tape speed can be changed from the standard 19 cm/s (7-1/2 ips) to either 9.5 cm/s (3-3/4 ips) or 38 cm/s (15 ips), and speed can be varied (by using an external frequency source) for additional flexibility.

The DC servo-motor requires only 1.6 watts to drive the tape, and only requires .5 watts when idling. This results in much cooler operation—a 15 watt reduction from our old AC motors—and helps eliminate the need for a ventilated housing.



### Cartridge Positioning Mechanism

The cartridge guidance puts its pressure on the load-bearing outer rails of the cartridge. This holds the cartridge firmly in position without distorting the cartridge and altering tape travel. A side-pressure spring on the left side pushes the cartridge to the proper side location. This system assures precise, rigid alignment of tape and head, even when cartridge insertion is hurried or careless.



### Cartridge Preparation System\* (Optional)

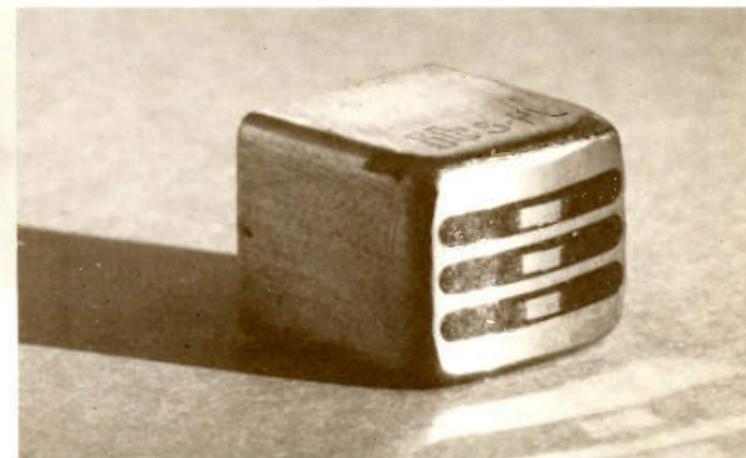
When a cartridge is inserted, and the ELSA (erase, locate splice, azimuth) mode selected, the tape is bulk erased automatically, the recording head is azimuth (phase) aligned to compensate for variations in cartridges, and the cartridge is erased again to remove alignment tones. Then the splice is automatically located and positioned just beyond the capstan shaft. This combination function, controlled by the micro processor, automatically adjusts the azimuth to any peculiarities of the specific cartridge inserted. A clean, splice-positioned tape is readied for recording.

\*Patent 4,142,221

### Mechanically Latching Solenoid\*

The positive, mechanical latch assures consistent positioning of the pressure roller. Neither heat nor variations in line voltage can produce changes in solenoid tension. Phase skew is reduced. And, because operating voltage drops from 50 VDC to 18 VDC immediately after the cartridge starts, there is less magnetic field to collapse when it stops. This provides for a quicker release and a faster stop, with less than 12.7 mm (1/2 inch) of tape over-shoot from the high-speed cue mode. Heat has been reduced from 24 watts to 6 watts, with an average temperature of approximately 43°C (110°F) after two hours of continuous running.

\*Patent 4,078,709



### Exclusive, New ITC Head Design\*

The head is designed for optimum tape travel in a cartridge machine. A unique lamination design, combined with the open face normally associated with reel-to-reel heads, provides measurably improved frequency response:  $\pm 1$  dB from 31.5 Hz to 16 kHz. Head laminations are constructed of mu-metal impregnated with aluminum oxide particles — a substantially more durable material, resulting in head life many times that of common lamination heads.

\*Patent Pending

## Series 99 Features:

### Does It Sound Better?

The ultimate measure of a better audio tape machine is, "Does it sound better?" The ITC Series 99 cartridge machine does sound better, consistently. Crisper. Cleaner. There are solid reasons—both mechanical and electrical—to support this measureable improvement in performance.

We built on a strong foundation—the rugged deck that has become synonymous with ITC quality. We've added a new, crystal-referenced servo-motor; a positive, mechanically latching solenoid<sup>1</sup>; a micro-adjust head module<sup>2</sup>; and a distortion-free cartridge positioning system. These features provide tape handling precision previously found only in reel-to-reel machines. Never before in a cartridge machine. The benefits: reduced wow and flutter, improved azimuth (phase) stability, improved long-term speed accuracy.

Couple this improved tape handling with a new, exclusive ITC head design<sup>2</sup> and you have a base for utilizing the most advanced electronics available for audio recording. The system design provides a frequency response truly flat to within  $\pm 1$  dB for every frequency from 31.5 Hz to 16 kHz. And, our heads are constructed of mu-metal impregnated with aluminum oxide particles—a material with a life expectancy ten times that of common lamination-type heads.

The new machines are as advanced electronically as they are mechanically. A micro processor controls electronic logic functions, and additionally controls cue tone generation and detection. Program electronics make use of the most advanced, low noise, bipolar and BIFET OP amps. Headroom, transient response, and square wave performance are all improved dramatically. IM distortion is substantially reduced. The new machines easily surpass all NAB cartridge standards covering audio performance. You can readily hear the difference!

### New Operator Convenience

In addition to outstanding performance, the machines offer the operator new control and new convenience. High-speed cue is standard, with added operational flexibility. We've

retained the versatile meter selection, and stop-tone add and defeat switches. And we've improved these features by replacing human logic with micro processor control. We've added cue track erase, and the convenience of front panel access to all these controls. VU-type meters are larger, and have built-in LED peak indicators which follow tape saturation. There's even automatic meter switching between the record and playback modes. Perhaps the most important feature is the automatic cartridge preparation system—ELSA<sup>3</sup>. It automatically bulk erases, azimuth (phase) aligns the recording head, erases again, and locates the splice, in preparation for superb quality audio tape recording.

### Simplified Maintenance

The engineer will find that, in the new machine, ITC reliability and serviceability are even greater. Heat has been reduced 43 percent! The design concept is modular, with plug-in sub-assemblies. The elimination of unnecessary adjustments, the addition of significant calibration controls, and a new micro processor controlled multi-function test-tone generator simplify and reduce maintenance time.

### New State-of-the-Art

These are truly machines of a new generation, virtually self-controlled, and combining great new sound with unprecedented reliability and freedom from most of the maintenance chores of the past.

### Compatible With Present Generation Machines

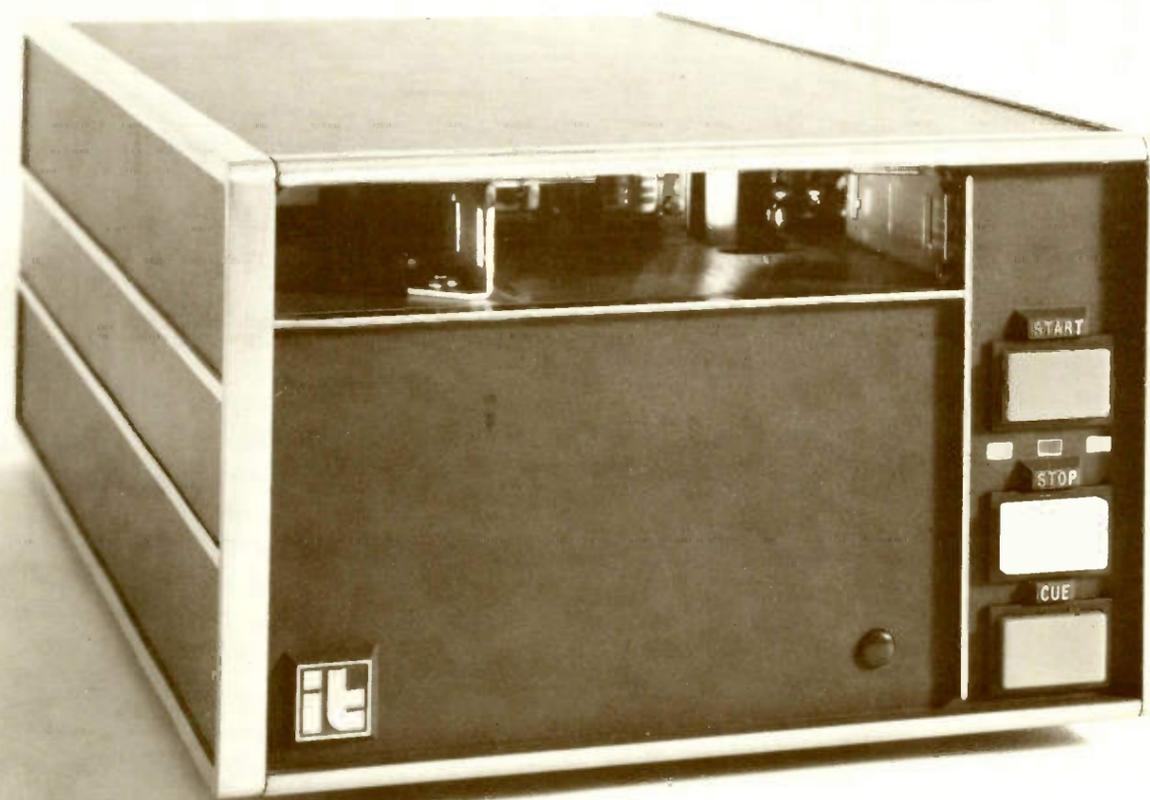
Tape cartridges recorded on the new generation machines can be played on existing ITC machines, with a noticeable improvement in sound. For optimum results—true reel-to-reel sound quality—cartridges must be recorded and played on ITC's Series 99 cartridge equipment.

<sup>1</sup>Patent 4,078,709

<sup>2</sup>Patents Pending

<sup>3</sup>Patent 4,142,221

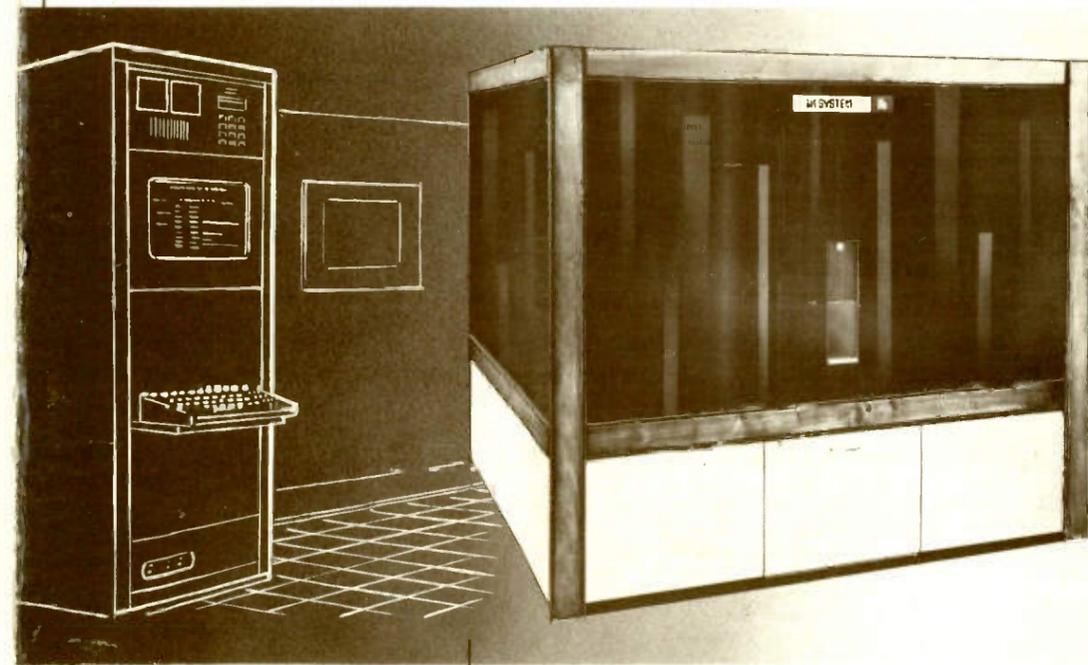
**Featuring the quality reel-to-reel sound of the new ITC Series 99 cartridge machines.**



## Contact Your Audio Systems Manufacturer

The new ITC 1K Library Storage System will be marketed and serviced as a central component in systems provided by IGM, Cetec, McCurdy, and other original equipment systems manufacturers. The 1K is engineered to be compatible with controllers of all leading automation systems. And, as the illustration below indicates, the 1K can be utilized either in Unattended Program Automation or Live Assist formats.

UNATTENDED AUTOMATION



LIVE ASSIST

For Direct Information from ITC Call  
TOLL-FREE:  
800-447-0414

In Alaska, Hawaii or Illinois  
call collect: (309) 828-1381



**INTERNATIONAL TAPETRONICS CORPORATION**  
2425 South Main Street, Bloomington, Illinois 61701

The 1K is protected by a one year warranty on parts and labor. An extended service contract is also available.

Specifications subject to change without notice.

# "OMEGA" SERIES SPECIFICATIONS

## POWER:

- A. 105-132 VAC or 210-264 VAC  
B. 50/60 Hz

## POWER CONSUMPTION:

- A. Mono Reproducer: 45 VA Typ., 65 VA Max.  
B. Stereo Reproducer: 45 VA Typ., 65 VA Max.  
C. Mono Recorder/Reproducer: 50 VA Typ., 70 VA Max.

## TAPE SPEED:

- A. 7.5 IPS (19 cm/s) Standard  
B. 3.75 IPS (9.5 cm/s) Strappable Option

## SPEED ACCURACY:

Better than +/- 0.2%

## RECORD/PLAY FLUTTER:

- A. Play Max.: 0.12% DIN Wtd. @ 7.5 IPS  
B. Rec/Play Max.: 0.15% DIN Wtd. @ 7.5 IPS

## AUDIO OUTPUT CONFIGURATION:

Transformer Coupled

## AUDIO OUTPUT IMPEDANCES:

600 Ohm Recommended Load Impedance  
(180 Ohm Source Impedance)

## AUDIO OUTPUT LEVEL:

+ 18 dBm Before Clipping Into  
600 Ohm Load

## DISTORTION:\*

System: 1.5% or less THD. (Tape dependent)

## NOISE:

A.\* Signal to Noise: Measured with bias/  
no signal.

MONO	STEREO	MIC-MONO R/P
56 dB (or better)	54 dB (or better)	51 dB (or better)

B.\* Signal to Noise: No tape running;  
ScotchCart® cartridge in place.

MONO	STEREO
58 dB (or better)	56 dB (or better)

C. Squelch Noise: 70 dB or better  
(Noise Measurements are 20 Hz-20 kHz  
Bandlimited. Unweighted.)

## CROSSTALK (SYSTEM):\*

-50 dB Minimum Separation Between  
Any Two Channels.

## FREQUENCY RESPONSE:\*

- A. Playback:  
+/- 2.0 dB, 50 Hz - 16 kHz  
B. R/P-Line Level Input:  
+/- 2.0 dB, 50 Hz - 16 kHz  
C. R/P-MIC Level Input:  
+/- 3.0 dB, 300 Hz - 10 kHz

## EQUALIZATION:

- A. 1975 NAB: Standard  
B. 1964 NAB: Optional  
C. CCIR: Optional

## CUE SIGNALS:

(Conforms to NAB Specification)

- A. NAB Primary Cue: 1 kHz  
B. NAB Secondary Cue: 150 Hz

## AUDIO INPUT SENSITIVITY:

- A. Line Input: 0 dBm nominal  
B. MIC Input: -70 dBV nominal

## AUDIO INPUT CONFIGURATION:

- A. Line Input: Transformer Coupled:  
1. 20K Ohm Bridging Standard  
2. Strappable for 150/600 Ohms  
Terminating Impedance

## B. Microphone Input:

1. Unbalanced  
2. Input Impedance: 50K Ohms

## METERING:

Taut Band Movement with "A" Scale

## BIAS:

111.84 kHz, Crystal-referenced

## CARTRIDGE SIZE:

NAB A & AA

## AMBIENT OPERATING TEMPERATURE RANGE:

10 to 50 Degrees C. (50 to 122 Degrees F.)

## MOUNTING:

- A. Table-top Standard  
B. Rack-mount Optional with URM-0001  
Rack-mount Kit. Filler Panels Also  
Available.

## DIMENSIONS:

- A. Width: 14.6 cm (5.75")  
B. Depth: 38.1 cm (15.00")  
C. Height: 13.34 cm (5.25")  
Add 1 cm (.375") for feet.

## WEIGHT (Typical)

All Machines: 6.84 kg (15 lbs.)  
Total Max. Shipping Weight: 9.1 kg (20 lbs.)

\*Note: Items indicated (\*) are specified using  
a ScotchCart® broadcast cartridge at a  
reference level of 1 kHz at 250 nWb/m.

International Tapetronics Corporation/3M  
reserves the right to change products and  
specifications without notice.

# "OMEGA" SERIES



"AFFORDABLE PERFORMANCE YOU CAN TRUST"

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

More International Tapetronics Corporation/3M  
cartridge machines are installed in radio  
stations around the world each year than all  
other manufacturers' cartridge machines  
combined. Call today for more information on  
ITC's complete line of cartridge machines.

- 99B Cartridge Machines, "The Best"
- DELTA Cartridge Machines, "Today's Most Popular Cartridge Machines"
- OMEGA Cartridge Machines, "Affordable Performance You Can Trust"

When better performance emerges, it will  
come from International Tapetronics  
Corporation/3M, "The Leader in Reliability  
and Service".

### TO ORDER OR FOR MORE INFORMATION CALL TOLL FREE 800-447-0414

From Alaska, Hawaii or Illinois, call collect  
309-828-1381.

In Canada, call Maruno Electronics, Ltd.,  
416-255-1445.



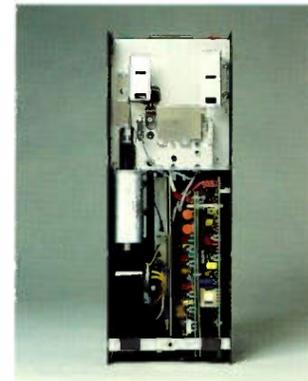
## “OMEGA” CARTRIDGE MACHINES

Design Engineered With You In Mind...



**Microprocessor technology** facilitates many operational conveniences and economical maintainability.

- Adjustment-free cue tone levels, both generation and detection.
- Crystal referenced cue tone and bias frequencies further eliminate adjustments.
- Cart played indication and cart replay lock-out reduce possible operator errors.
- Secondary cue tone detection mutes the audio thereby reducing on-air noise.
- Flashing ready lamp indicates cartridge has been played.
- Green run lamp flashes on 150 Hz secondary cue tone detection allowing visual verification.



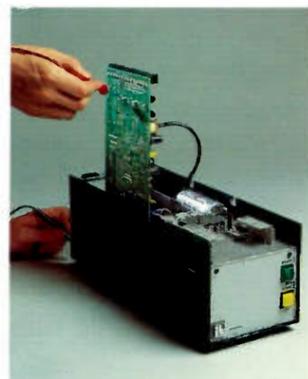
### Rugged design

- 1/2 inch milled aluminum deck resists warping and is long wearing.
- Permanently lubricated air damped solenoid provides extended life.
- Precision milled aluminum head block assembly for stable adjustments.
- Long life stereo heads.
- Dual overhead cart hold down mechanism for precise cartridge positioning.
- Self-wiping contacts in front panel switches for long life.
- Rear panel screw terminal connections provide convenient connection for audio and remote control circuits.



### Reliable components

- NE 5500 Series Op Amps for high-speed, low-noise audio performance.
- Efficient DC brushless servo motor providing stable, cool operation.
- Solid state control circuits eliminate the need for troublesome relays.
- Heavy duty trim pots for long dependable life.
- Voltage regulated power supply for stable operation of logic and audio circuits.
- Efficient toroidal power supply transformer reduces stray hum fields.
- G-10 Glass Epoxy P.C. cards resist heat and breakage.



### Quick, easy maintainability

- Swing-out P.C. cards eliminate need for test extenders.
- Component legends on P.C. cards enable quick reference locations.
- Readily accessible adjustments.
- Polycarbonate front panel overlay resists dirt.
- Securely latching top cover, removable for maximum accessibility.
- Detailed, comprehensive technical manual.

## WHAT THE “OMEGA” SERIES BRINGS TO YOU

OMEGA series cartridge machines embody traditional ITC quality at an affordable price with features to delight everyone... **including low cost stereo performance.**

The OMEGA series is yet another example of International Tapetronics Corporation/3M's commitment to providing you with rugged and reliable, high technology cartridge equipment. Whether you are using the OMEGA series in your on-air and production studios or for other important uses throughout the station, you'll have affordable performance you can trust. What's more, you can have stereo reproducers now or field upgrade from mono to stereo reproducers in the future.

The OMEGA series is covered by the same bold 2-year warranty International Tapetronics Corporation/3M offers on all its new equipment. In addition, you receive a detailed, comprehensive technical manual. All this reinforced by the

finest, readily accessible technical service support group in the industry.

### OMEGA Series Stereo Reproducers

OMEGA stereo reproducers have simple, clean electronics for clear, accurate audio reproduction. Standard features include:

- 150 Hertz secondary cue tone detection
- Long life stereo heads
- Modular design for easy servicing
- Efficient DC brushless servo motor providing stable, cool operation
- Compact design for today's tighter studio size limitations
- Flashing ready lamp indicating cartridge has been played

Match your OMEGA stereo reproducers with a high-quality stereo recorder such as the ITC “DELTA” or “99B” recorder and insure optimum playback audio quality from your OMEGA reproducers.

### OMEGA Series Mono Reproducers

OMEGA mono reproducers and mono recorders have all the features and contain the same rugged and reliable, high technology components for dependable operation as the OMEGA stereo reproducers. **Plus, the OMEGA mono reproducers are even field upgradeable to stereo!** To complete the upgrade and insure optimum playback audio quality, merely match your OMEGA stereo reproducers with a high-quality stereo recorder such as the ITC “DELTA” or “99B” recorder.

### Omega Series Mono Recorders

The OMEGA mono recorders have a selectable 1 kHz cue tone defeat and include a built-in microphone preamp. With direct microphone input and ITC's “FB-1” telephone interface device, your station can offer automatic dial-in weather information, sports scores, concert dates and perform a wide variety of newsroom and research functions.

# The AUDIO SWITCHER

## Preliminary Specifications

### Power:

- A. 90-132/180-264 VAC
- B. 47-440 Hz

### Power Consumption:

- A. MASTER CONTROL: 43W Maximum
- B. MATRIX MODULE: 22W Maximum
- C. I/O AMPLIFIER: 77W Maximum
- D. REMOTE CONTROL: 5W Maximum
- E. POWER MODULE: Dependent on system configuration

### Audio Output Configuration:

Electronically balanced output capable of grounding either side with <0.1 dB level change

### Audio Output Impedance:

50 ohms

### Maximum Output Level:

+22 dBm with <1% THD

### Audio Input Configuration:

- A. Balanced bridging transformerless
- B. Input impedance: >20K, 600 ohm selectable

### Input Level Range:

-30 dBm to +20 dBm

### Common Mode Rejection Rate:

- > 80 dB
- 74 dB at 0
- 84 dB at +10
- 94 dB at +20

### Signal-To-Noise:

>90 dB, 20Hz to 20kHz at 0 dBm

### Distortion:

<.01%, 20Hz to 20kHz at 0 dBm

### Frequency Response:

±0.1dB, 20Hz to 20kHz

### Crosstalk:

>90 dB, 1 kHz at +20 dBm

### Phase Shift:

±0.3 degrees at 20kHz (channel to channel)

### Ambient Operating Temperature:

39 to 122 degrees F. (4° to 50°C.)

### Storage Temperature Range:

-40 to +185 degrees F. (-40° to +85°C.)

### Relative Humidity Operating Range:

25% to 80% (without condensation)

### Dimensions:

- A. Width:
  - MASTER CONTROL: 19" (48.26 cm)
  - MATRIX MODULE: 19" (48.26 cm)
  - I/O AMPLIFIER: 19" (48.26 cm)
  - REMOTE CONTROL: 47/8" (12.38 cm)
  - POWER MODULE: 19" (48.26 cm)
- B. Depth:
  - MASTER CONTROL: 21" (53.34 cm) Add 2" (5.08 cm) for connectors

MATRIX MODULE: 19 3/4" (50.16 cm) Add 2"

(5.08 cm) for connectors

I/O AMPLIFIERS: 17 3/4" (45.08 cm) Add 2"

(5.08 cm) for connectors

REMOTE CONTROL: 6 5/16" (16 cm) Add 1 1/4"

(3.18 cm) for connectors

POWER MODULE: 19 3/4" (50.16 cm) Add 2"

(5.08 cm) for connectors

### C. Height:

MASTER CONTROL: 5 1/4" (13.34 cm)

MATRIX MODULE: 7" (17.75 cm)

I/O AMPLIFIER: 5 1/4" (13.34 cm)

REMOTE CONTROL: 3 15/16" (8.41 cm)

Add 1/8" (.318 cm) for feet

POWER MODULE: 5 1/4" (13.34 cm)

### Weight:

MASTER CONTROL: 25 lbs (11.36 kg)

MATRIX MODULE: 45 lbs (20.45 kg)

I/O AMPLIFIER: 24 lbs (10.9 kg)

REMOTE CONTROL: 3 lbs (1.36 kg)

POWER MODULE: 30 lbs (13.63 kg)

International Tapetronics Corporation/3M reserves the right to change products and specifications without notice.

# The Advantage

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

International Tapetronics Corporation/3M offers a variety of financial options designed to fit your needs. Call today for more information on ITC's complete line of audio equipment.

- 3M HCDA™ 3000 Digital Audio System, "An Achievement"
- The Performance System, 99B Recorders and DELTA Reproducers

- The Economy System, DELTA Recorders and OMEGA Reproducers

- AUDIO SWITCHER, "The Advantage"

When newer technology emerges, it will come from International Tapetronics Corporation/3M, "The Leader in Reliability and Service". **To order or for more information call toll free 800-447-0414.** From Alaska or Illinois, call collect 309-828-1381. In Canada, call Maruno Electronics, Ltd., 416-255-9108.

**The AUDIO SWITCHER**  
Designed for Radio Broadcasters  
From International Tapetronics Corporation/3M

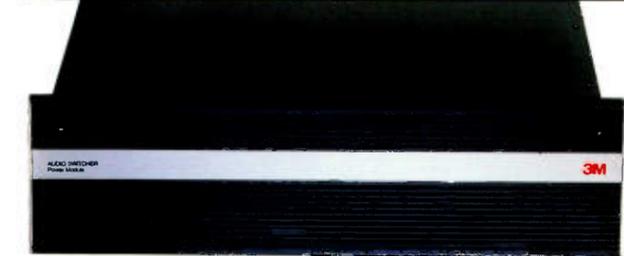
# The AUDIO SWITCHER Designed For Radio Broadcasters

The AUDIO SWITCHER from International Tape-tronics Corporation/3M is designed to replace patchbays and distribution amplifiers offering a new level of flexibility for handling today's diverse and dynamic programming requirements.

Today's broadcasters utilize an abundance of outside program sources including: satellite feeds, traffic helicopter reports, network or syndicated news feeds, promotional events from various locations, sporting events, information from weather forecasting bureaus and many others. Manually patching all of these sources into one central control unit and making them available to more than one studio at a radio station can take days and sometimes weeks of engineering time. What often results is a confusing and complicated maze of wires and patchbays.

Now all of these sources can be connected together easily and routinely through the AUDIO SWITCHER. The AUDIO SWITCHER from International Tape-tronics Corporation/3M brings a cost-effective and reliable method of audio routing to radio stations.

For decades television broadcasters have depended upon video routing systems to interconnect many sources and outputs via one central control unit. International Tape-tronics Corporation/3M has taken advantage of the proven reliability of 3M's advanced *video* switching technology and designed an audio routing switcher specifically for radio broadcasters.



## I/O Amplifier

### Input Amplifier

- Active transformerless balanced input
- 20K Ohm input impedance, 600 Ohm selectable
- Variable gain – system can accommodate inputs from  $-30$  to  $+20$  dBm to produce 0 dBm output
- Four input amplifiers per P.C. board
  - up to 16 boards per rack housing
  - modular replacement for easy servicing
  - separate voltage regulators & fusing on each P.C. board
- Proportional filtered cooling system – stays clean for long life
- Alarm sensors detect and report overheating
- Radio frequency (RF) tested
- Common Mode Rejection Ratio (CMRR) greater than 80 dB
- P.C. boards can be installed or replaced while the system is in operation
- 15-turn trimpot input gain adjustment
- Easy to positively connect wires to terminals

### Output Amplifier

- Active transformerless balanced outputs with self compensating output stage – for use in both symmetrically balanced & unbalanced circuits
- Four output amplifiers per P.C. board
  - up to 16 boards per rack housing
  - modular replacement for easy servicing
  - separate voltage regulators & fusing on each P.C. board
- Capable of supplying  $+22$  dBm in 600 Ohm load (maximum output)
- Low output impedance – for driving long lines
- Proportional filtered cooling system – stays clean for long life
- Alarm sensors detect and report overheating
- Zero group delay – system passes square waves cleanly
- P.C. boards can be installed while the system is in operation
- Easy to positively connect wires to terminals

## Power Module

- Optional redundant power supply – always on line
- "Switching Power Supply" reduces heat and susceptibility to power line irregularities
- Proportional filtered cooling system – stays clean for long life
- Alarm sensors – detect and report overheating and under/over voltage conditions
- Dual AC line – feeds may be attached to separate phases
- 120V, 60Hz; 220V, 50Hz

# The AUDIO SWITCHER From International Tapetronics Corporation/3M

## Master Control

The Master Control consists of a rack-mount housing containing the microprocessor control system for the AUDIO SWITCHER. The front panel of the Master Control features a 5-line, 40-character LCD display for alpha-numeric and graphics and four "soft key" function pushbuttons. It has a 12-key pad for easy numeric data entry.

## Matrix Module

The Matrix Module contains up to two matrix P.C. boards which are mounted within the frame on a slide-out tray for easy expandability and servicing. Each matrix P.C. board can support up to a 32 input x 32 output mono switch.

## I/O Amplifier

Audio input and output amplifiers are contained on plug-in boards with four input or output amplifiers per board. Audio level adjustments are made here to assure a consistent sound quality without additional distribution amplifiers.

## Remote Control

The Remote Control consists of a small keypad and associated LCD display which allows switching from a control room, on-air desk, or other location away from the Master Control. Each Remote Control can handle four outputs. As many as 31 Remote Controls can be used in conjunction with the Master Control.

## Power Module

The Power Module mounts in its own rack housing. Provision is made for mounting an optionally available redundant power supply in the same rack housing. Power supplies are completely connectorized for quick and easy replacement in case of power failure. The AC power inputs are separated, allowing plug-in to separate power feeds.

## Component Features

### Master Control

- A 5-line x 40-character alpha-numeric graphics LCD display
- Four "soft key" function pushbuttons – allow you to operate the switcher and lead you through programming in conjunction with the LCD display
- Built-in meters, speaker and headphone jack – facilitates monitoring inputs at main controller without additional hardware
- A 1 farad capacitor backup for internal memory and real-time clock – provides two week memory & clock protection
- Removable cartridge contains redundant memory and battery with 10-year life
- Alarm sensors monitor many system parameters and can alert operators via contact closure and on-screen announcement
- Internal real-time clock/calendar – can be used as station master reference clock or be synced to external time source
- 3M *Whisper* Writer printer & keyboard – programs Master Control unit – provides hardcopy printout of system status and log



3M *Whisper*Writer printer & keyboard

### Matrix Module

- Proven hybrid technology – for all audio circuits
- P.C. board holds 32 inputs x 32 outputs for mono and up to 2 boards per rack housing for 32 x 64 or 64 x 32 mono
- P.C. boards mount on slide-out trays – for easy serviceability
- Hybrid circuits are replaceable while the system is in operation
- Crosstalk better than 90dB
- Control handshaking verifies commands are implemented



Satellite Receiver



Traffic Helicopter



Weather Information



Location Remotes



Sports Broadcasts

## The AUDIO SWITCHER



Control Room



Production Room



Transmitter



Newsroom

## More Flexibility

The AUDIO SWITCHER is a single matrix routing device which can route virtually any source, such as a satellite feed, to one or more studios within the broadcast facility at the press of a few keyboard buttons. Other features and benefits include:

- Easier to make major, permanent format changes
- Easier to make major, temporary format changes, such as adding sporting events, remote broadcasts and on-site news coverage
- Allows placing any source on-air without major wiring changes

## Grows With You

Designed as a modular, expandable system, the AUDIO SWITCHER grows as your needs grow. A 16 input by 16 output monophonic switcher (8 x 8 stereophonic) is the smallest configuration of the AUDIO SWITCHER. As you need more inputs and/or outputs you add system modules. Expansion up to a maximum size of 256 by 256 monophonic or 128 by 128 stereophonic is possible. You can choose the size AUDIO SWITCHER from International Tapetronics Corporation/3M that is right for you today knowing the system will expand as your needs grow.

## Consider "The Advantage"

Consider the advantage the AUDIO SWITCHER can bring to your station. Consider the convenience and flexibility offered by the AUDIO SWITCHER and use it as a reliable tool for handling your diverse and dynamic programming requirements. With the AUDIO SWITCHER from International Tapetronics Corporation/3M you have "The Advantage" on your side.

# The AUDIO SWITCHER Provides "The Advantage"

for the General Manager



for the Program Director and News Director



for the Chief Engineer



- Reliability** Reduces likelihood of lost revenue.
- Flexibility** Quick and easy manipulation of format and creative changes.
- Reduced Maintenance** Lower maintenance costs.
- Audio Quality** Enhanced listener and advertiser satisfaction.
- Minimal Training** Faster productivity yielding reduced operational costs. Easy for new technical and operational staff to understand.
- Expandability** Modular design facilitates future growth needs.
- Fewer Errors** Increased efficiency and revenue potential.

- Confidence in equipment allows a high degree of creative freedom.
- No special skills required to provide instantaneous routing from any source to any destination within the station upon demand.
- Fewer studio interruptions for routine maintenance or repairs.
- Consistent sound quality.
- Shorter training time for new operators. More time available for other tasks.
- Programming changes requiring increased capabilities are quick and easy to implement.
- Fewer program interruptions can result in higher shares and cumes.

- No mechanical contacts or patchcords to fail. Reduces need for patchbays and distribution amplifiers.
- Reduces wiring requirements for special or new circuits. Most audio changes controlled by simple software commands.
- Designed for long component life and freedom from mechanical switching.
- Facilitates uniform and consistent quality from all switch signals without degradation. Reduces complaints.
- Promotes logical flow of audio. Easier to communicate functions with programming and operations staff.
- Minimizes rewiring needed to accommodate new requirements.
- Reduces late night or weekend trouble calls.

## The Advantage

### Saves Money

- Reduces lost air time due to faulty or defective patching
- Fewer labor costs for wiring and maintenance
- Reduces wire and patchbay cost
- Less console space required
- Eliminates the need for monitor speakers and meters (they are built into the Master Control)
- Compact size via hybrid technology reduces rack space requirements
- Includes a real-time clock and calendar
- Saves operator training time

### Self Documenting

The AUDIO SWITCHER includes a 3M *Whisper* Writer keyboard and printer as standard equipment. Once the switcher is in operation, it can provide a hardcopy printout of the system status and log. Now even the most complex routing problem can be solved easily and quickly by referring to the log without searching through a "rat's nest" of wiring and patch systems.

### Fail-Safe Memory Protection

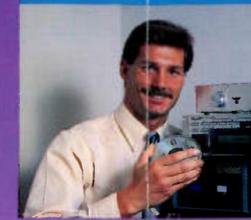
Stored data is automatically protected, even in the event of a power failure, through the use of redundant memory. The primary memory is capacitor backed-up and retains data for up to two weeks. The secondary memory is located in a removable cartridge. This cartridge includes low power RAM and onboard batteries with a 10-year life.

### Versatile Salvos

The AUDIO SWITCHER has the ability to make changes to the matrix automatically. A stored set of instructions, known as "salvos," can be initiated at such times when a known station configuration is needed. Salvos could be used when a signal routing requirement always occurs at the same time, such as regular newscasts.



General Manager



Program Director



Chief Engineer



### Built-In Security

The system is initially configured to meet a station's requirements. This includes assigning numbers to all inputs and assigning these inputs to various outputs. By entering a 4-digit code number, unauthorized modification of these assigned numbers can be prevented.

### "Wild Audio" Capability

The consistent sound quality of stereo broadcasting is virtually assured by the system's "Wild Audio" feature. Once the system has been configured for stereo, it has the "intelligence" to know when a mono source is being routed to a stereo output, and routes it to both left and right outputs. It also handles stereo source to mono outputs, mono source to mono output, and of course, stereo source to stereo output situations, automatically.

### Easy Serviceability

- The AUDIO SWITCHER was designed with serviceability in mind. Service is easy with:
  - ITC's PC board exchange program
  - Installation and operation manual and optional technical illustrations manual
  - Factory technical consultation
  - Fast shipment of parts orders
  - Factory repair service available
  - Many components can be removed or serviced while the AUDIO SWITCHER is in operation

### Other Advantages Of Using The AUDIO SWITCHER

- No time lost patching one source to another
- No internal compensation service adjustments necessary
- No "rat's nest" of complicated wiring or cables under consoles or desks
- Facilitates quick changes when inconsistent audio signals from outside sources occur
- No time spent searching for an error source in an undocumented maze of patch wiring
- No diode-effect distortion due to dirty or corroded parts
- Left and right audio channels can be reversed internally without rewiring



"We know that it's very important for us to maintain the public's trust. We want our radio personalities to be friendly, stable people whose voices the listeners learn to trust. Most of our people have been with us for quite a while. In our market, we think that's important.

### Can't Afford Downtime

It's also important that we have trustworthy technical equipment. We don't have the luxury of extra studios or extra machines. We can't afford a failure. We don't have time for much product maintenance. I guess our philosophy is, 'if it isn't broke, don't fix it!' We've got to have equipment we can count on. That's why we're so happy with the PD-II's and the

ESL-IV. ITC has created quality equipment we can afford...and can't afford to do without. We're proud of WRNJ. We intend to stay that way."

**"Our station depends on ITC's Economy Line—the PD-II's and the ESL are the only cart machines we own."**

Larry Tighe, Jr.



PD-II Recorder/Reproducer



PD-II Reproducer



ESL-IV Eraser/Splice Locator

## The ITC Economy Line

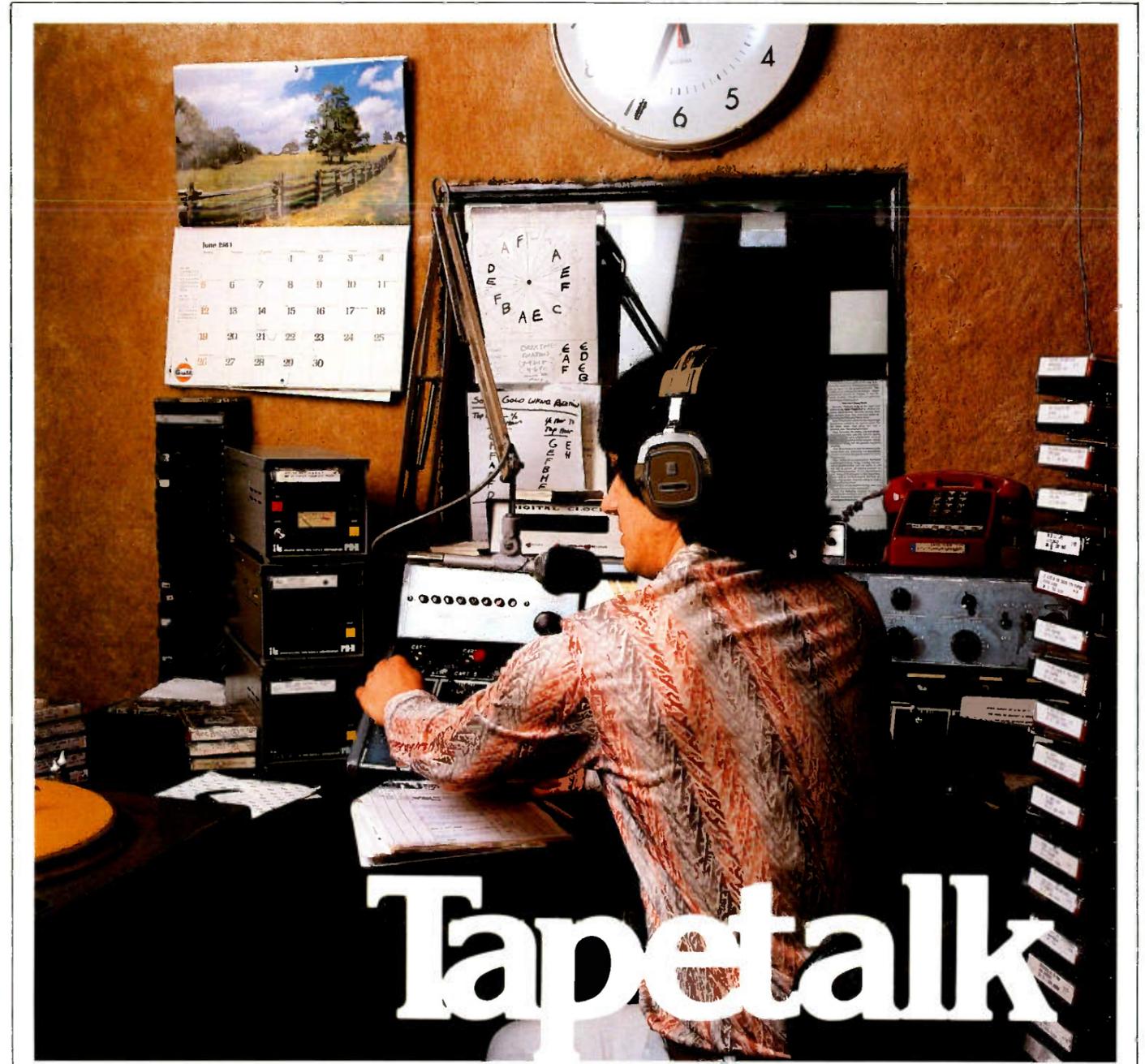
INTERNATIONAL TAPETRONICS CORPORATION



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RADIO STATION WLVE  
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# Tapetalk

Kenneth Griffin  
On Air Personality

## ITC Helps WRNJ Succeed in Hackettstown, N.J.



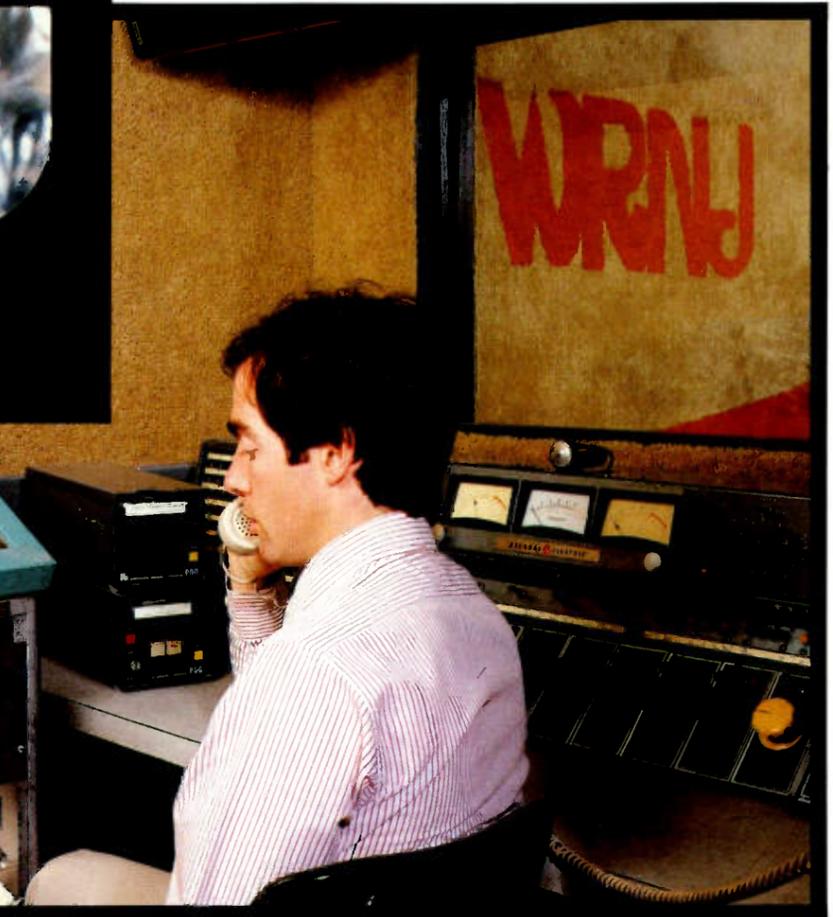
"The PD-II lets us concentrate on programming—instead of spending valuable time on equipment problems"

**Larry Tighe Jr.**  
Owner / Chief Engineer



"In news you need speed and accuracy—and ITC gives me all this plus dependability"

**Kathleen Reilly**  
News Director



"With New York and Philly stations on the same dial, we have to sound just as good"

**Norman Worth**  
Owner / General Manager

"Becoming the dominant local station in our broadcast area has involved three things: . . . pride in our community . . . pride in the sound we're putting out over the air . . . and hard work. I guess the bottom line is pride. When you care about what you do, you take the time to do it right. ITC has allowed us to use our time programming for Hackettstown instead of worrying about equipment problems. We have a real solid sense of what we're about, but

we know that our continued success will depend on performance and quality control. That's why we went with ITC . . . they understand the small-to-middle radio market. They know we have certain limitations, yet if our listeners don't like what we're giving them, they won't be our listeners for very long. "That puts the kind of pressure to perform on us that we like. It keeps us sharp and looking for new and better ways to serve

the people in the small New Jersey towns in our broadcast area . . . it keeps us looking to ITC.

### **We're Radio New Jersey**

"You can tell a lot about our programming philosophy from our call letters. We're Radio New Jersey. We're constantly taking the pulse of the people in the communities surrounding Hackettstown. We're close to New York and Philadelphia, but

we don't try to compete with the major market stations there. We don't need to. We provide a service to our listeners that they can't get from New York or Philly. "We're licensed as a daytime station. There are times when we stay on the air past sunset during emergency weather situations. Local folks really appreciate the emergency weather information. They trust us. "Although we appeal to a wide audience in our listening area, a

lot of our programming is directed at the housewife. We play mostly adult contemporary music. Our talk show format lends itself to someone with access to a phone. We ask a lot of trivia questions for prizes. Our 'Swap & Shop' show is very popular with homemakers.

### **Listening To Our Listeners**

"We're a family station. We like to do family promotions. A 'Back

to the Beach' special, where we give away ten bags of beach stuff, has gotten a very good response.

### **Involvement**

"We feel like the more we get involved with our listeners, the more they'll get involved with us. If we don't listen to them, well, they won't listen to us. A lot of our news is man-on-the-street interview style. We don't like to rely on any wire services.

# ESL-IV SERIES

cartridge  
tape eraser/  
splice locator



ITC's revolutionary ESL-IV Series eraser/splice locator combines both operations into just one easy, reliable step. It's a design breakthrough: professional equipment at a very reasonable price — and engineered to outlast and outperform any other eraser or splice locator made.

The ESL-IV Series is designed to provide consistency by eliminating poor erasures caused by human error. Completely automatic operation. Just insert a cartridge, and press the start button. No lever to pull or buttons to hold in. When the splice is located, the machine automatically releases the cartridge — fully erased!

This equipment can pay for itself in time saved and subsequent recording excellence free of thumps caused by poor erasure or dropouts due to the tape splice.

Quality benefits of the ITC ESL-IV eraser/splice locator include super-quiet operation because of our famous (and often imitated) air-damped solenoid with Teflon coated plunger. A solid, milled aluminum deck with precision tape guides, another ITC "standard," provides tape handling in the same careful manner as on standard ITC cartridge machines. Our direct-capstan motor provides smooth acceleration to about four times normal playing speed, without undue stresses on the tape.

Following ITC tradition for standard cartridge equipment, the ESL-IV provides all of the essentials for true economy: a proper combination of features, performance, reliability and price. Various patents have been applied for to cover the distinctive features designed into this eraser/splice locator.



- Automatic operation insures uniformity of erasure
- Erase indicator lamp to warn when magnetic field is present
- Angled cartridge guide for rapid insertion
- Illuminated push button switches
- Manual stop switch to override all automatic functions
- Air-damped pressure roller solenoid for quiet operation
- Complete solid state control of all functions — no relays
- Erase coil with balanced magnetic field for most effective erasure
- All plug-in assemblies for easy access and service
- Precision milled, 1/2-inch thick, aluminum deck and tape guides for stability
- Low-temperature, high-speed, ball-bearing capstan motor for safe tape handling, reliability, long life
- Adjustable erasure time to optimize erase depth
- Vernier adjustment to insure optimum sensitivity in splice locator

The ESL-IV Series carries a two-year warranty and 30-day money-back guarantee of satisfaction.

# ESL-IV series

## cartridge tape eraser/splice locator

ESL-IV Eraser/Splice Locaters accept the NAB size A cartridges and provide automatic erasure and splice location in one operation.

Model ESL-IV Eraser/Splice Locator \$495.00

### SPECIFICATIONS

- POWER:** 117 volts, AC, 60 Hz, 50 watts continuous, 625 volt amperes intermittent (at peak erasure).
- TAPE SPEED:** 25-29 IPS. Direct-drive, high-speed capstan motor with permanently lubricated ball bearings.
- SPLICE SENSITIVITY:** Senses splicing tape thickness of 1/2 mil or greater.
- ERASE DEPTH:** 45 dB or better, 50 to 15,000 Hz.
- TAPE CAPACITY:** NAB size A cartridges. 2 seconds to 10 1/2 minutes with 1 mil lubricated tape at 7 1/2 IPS.
- CYCLE TIME:** For complete erase/splice location cycle:  
 Minimum  
     any length cartridge 15 sec.  
 Maximum  
     70 sec. cartridge 35 sec.  
     10 1/2 min. cartridge 180 sec.
- AMBIENT TEMPERATURE:** 55 degrees C., 131 degrees F., maximum.
- MOUNTING:** Table top mounting.
- DIMENSIONS:** 5 3/4" wide, 15" deep, 5 1/4" high (add 3/8" for feet).
- WEIGHT:** 17 lbs.

Made under one or more of the following patents: 3,800,323; 3,801,043; 3,801,329; 3,833,935; 3,865,719; 3,932,887. Other patents pending.



**INTERNATIONAL TAPETRONICS CORPORATION**  
 2425 SOUTH MAIN ST., BLOOMINGTON, ILLINOIS 61701  
 TELEPHONE: 309-828-1381



Well-vented housing for cool operation.

Two-position cover eases cartridge insertion or removal.

Plug-in printed circuit card.

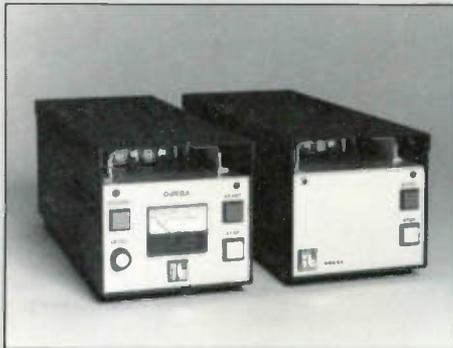
# Product Guide

**NEW**

## OMEGA Series,

"Affordable Performance You Can Trust"

OMEGA Monophonic Reproducer  
OMEGA Stereophonic Reproducer  
OMEGA Monophonic Recorder/  
Reproducer



The OMEGA series embodies ITC quality at an affordable price with features to delight everyone.

- 150 Hz secondary cue tone standard on all models
- DC brushless servo motor for low wow and flutter and stable long-term speed
- Rugged modular design for easy servicing
- Microprocessor technology
- Compact size for today's tighter studio limitations
- Flashing ready lamp indicates cartridge has played
- Recorder has built-in microphone preamplifier
- Monophonic reproducer upgrades to stereophonic
- Accommodates 105-132V or 210-264V, 50/60 Hz line voltages. May be configured to operate on most worldwide equalization and record fluxivities. NAB 1975 operation standard. NAB "A" size cartridges. 1/3 rack width, rack mounting optional.

The OMEGA series offers audio quality and reliability for on-air and production room uses. When attached to an ITC "FB-1" telephone interface, the OMEGA series also becomes a cost effective machine for automatic dial-in weather, sports, and concert information. It can also be used to perform a variety of newsroom and research functions.

## DELTA Series,

"Today's Most Popular  
Cartridge Machines"



DELTA I Single Deck Reproducer, NAB "A" size cartridges, 1/3 rack width.  
DELTA II Wide Deck Reproducer, NAB "A", "B" and "C" size cartridges, 2/3 rack width.  
DELTA III Triple Deck Reproducer, NAB "A" size cartridges, 1/3 rack width.  
DELTA IV Recording Amplifier, 1/3 rack width.

The DELTA series consistently meets the tough requirements of broadcasters and professionals who demand outstanding audio performance in a reliable, mid-priced mono or stereo cartridge machine.

- DELTA IV recording amplifier converts DELTA reproducers and bottom deck of DELTA III reproducers to recorders
- 150 Hz and 8 kHz cue tones standard on all models
- DC brushless servo motor. High-speed cue standard on DELTA I and DELTA II reproducers
- Microprocessor controlled logic and cue detection
- High-speed op amps for outstanding audio performance
- Modular construction for easy servicing
- Optional balanced transformerless operation
- Cart played indication and replay inhibit
- Accommodates 105-132V or 210-264V, 50/60 Hz line voltages. May be configured to operate on most worldwide equalization and record fluxivities. NAB 1975 operation is standard. Rack mounting is optional.

These features and many more make the DELTA series today's most popular cartridge machines.

## 99B Series, "The Best"

99B Series Monophonic Reproducer  
99B Series Stereophonic Reproducer  
99B Series Monophonic Recorder/  
Reproducer with ELSA  
99B Series Stereophonic  
Recorder/Reproducer with ELSA



Loaded with features, the 99B series delights the most discriminating engineer, operator and listener. The ELSA cartridge preparation system automatically erases the cartridge, locates the splice and azimuth aligns the record head for maximum phase response performance making the 99B series the only cartridge machine of its kind in the world.

- ELSA system
- DC brushless servo motor with high-speed cue
- Microprocessor controlled logic and cue detection
- Built-in test tone generator in recorder version
- Cart played indicator and replay inhibit
- Modular construction for easy servicing
- High speed op amps for outstanding audio performance
- Power transformer tapes allow operation at most commercial line voltages found worldwide, 117/240V, 50/60 Hz. Accommodates most popular cartridge equalization and record level standards. NAB 1975 operation is standard. NAB "A" size cartridges, 1/2 rack width, rack mounting optional.

If you desire both engineer and operator convenience while providing crisp, clean and consistent sound for your listeners, your choice will invariably be the 99B series.

**NEW**

### ESL V Eraser/Splice Locator



Saves time and improves on-air sound. Combines erase and splice locating into one easy step. Designed to erase today's high-output, low-noise tapes. Operates on 105-132 or 210-264 VAC, 50/60 Hz.

### FB-1 Telephone Answer-Only Interface



Connects directly to the rear panel of any ITC cartridge machine (except the DELTA series) for unattended answer-only telephone applications. Applications include, automatic dial-in weather, sports and concert information, as well as a variety of newsroom and research functions. FCC registered.

**NEW**

### ScotchCart II Broadcast Cartridges



The ScotchCart® II broadcast cartridge represents a revolutionary development in cartridges. No pressure pads, no rotating hub and constant tension arm insure low wow and flutter, excellent frequency response and low distortion performance.

ITC reserves the right to change products and specifications without notice.

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

More International Tapetronics Corporation/3M cartridge machines are installed in radio stations around the world each year than all other manufacturers' cartridge machines combined. All new ITC equipment carries a bold two year warranty on parts and factory labor.

When newer technology emerges, it will come from International Tapetronics Corporation/3M.

**TO ORDER OR FOR MORE INFORMATION, CALL  
TOLL FREE 800-447-0414.**

From Alaska and Illinois, call collect 309-828-1381.  
In Canada, call Maruno Electronics, Ltd., 416-255-9108.

# PD-II SERIES



There's no longer any need to compromise on the performance of tape cartridge equipment for the sake of low price! ITC's PD-II Series is an economy priced machine designed to deliver excellent results in those applications requiring the services of a basic cartridge machine . . . recording and playing mono tapes in the "A" size cartridge and stopping automatically on the 1 kHz cue tone. The PD-II could well be the best cartridge machine buy you'll ever make when you consider the long life expectancy, minimum maintenance, many exclusive features, and outstanding performance.

The PD-II Series includes a *combination* of important features found nowhere else in the economy priced field. One prime example is the super quiet operation. This is due to ITC's now famous and often copied air-damped solenoid with Teflon coated plunger. And the machine is *totally* automatic. There are no levers to pull, or buttons to push when inserting or withdrawing a cartridge. Just gently insert the cartridge and press the start switch. The machine does the rest automatically and quietly.

We've milled the deck from a solid block of 1/2 inch thick aluminum.

It won't warp and presents the same flat, stable surface to cartridges every time assuring correct azimuth of heads. Our heavy-duty micro adjustment head assembly is designed for accurate and easy adjustments; and once made they hold to provide consistent fidelity. The adjustable tape guides, head assembly parts, and deck are non-magnetic so that they will not adversely affect the quality of audio.

The direct-capstan, 450 RPM, hysteresis-synchronous drive motor with an electrolyzed shaft minimizes wow and flutter, improves pulling power, and eliminates need for rubber belts and separate fly wheel assembly.

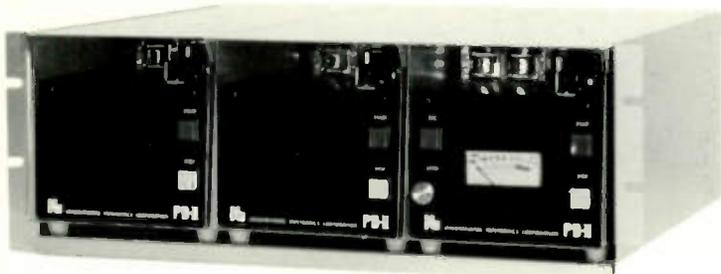
The new trim-line design allows you to place *three* units side-by-side in a 19 inch rack. Each unit is only 5-3/4 inches wide, 5-1/4 inches high, and 15 inches deep. No matter where you place the PD-II, you'll find location easier than ever before. And there is a removable top cover that facilitates easy cleaning, maintenance, and adjustment.

The printed circuit electronics include the latest silicon solid-state diodes, transistors and integrated circuits. All

switching and logic is performed by solid-state components. No relays are used. Printed circuit cards are of the plug-in variety with gold plated contacts for ease of replacement or repair. Head cables have plug-in connections at the heads to permit easy reversing of cue and program output when servicing or during head replacement; and the well-vented housing assists in providing cool operation under continuous use.

What does ITC's PD-II offer over the competition? It can probably be summed up in one word — reliability. And this is the real reason the choice of PD-II is a decision for economy. The rugged design means the machine will perform faithfully when called upon. It was designed to outlast and outperform any other economy machine we've seen. We've eliminated the cams, latches, pulleys, belts, and other numerous parts that require frequent adjustment. The machine is designed for continuous use, long life, and minimum maintenance. The PD-II is the only cartridge machine that provides the right combination of features, performance, reliability and price . . . the elements essential to *true* economy.

The PD-II Series carries a two year warranty and a 30 day money-back guarantee of satisfaction.



Available for triple rack mounting



Easy serviceability

#### MODEL DESIGNATION

PD-II Series Reproducers and Recorder/Reproducers accept the NAB "A" size cartridges.

PD-II Reproducer, Monophonic with 1 kHz primary cue tone.

PD-II Recorder/Reproducer, Monophonic with 1 kHz primary cue tone.

#### ACCESSORY

SA-0034 Rack Mounting Kit — mounts three PD-II Series in a 19 inch equipment rack.



**INTERNATIONAL TAPETRONICS CORPORATION**

2425 South Main Street • Bloomington, Illinois 61701  
Telephone: 309-828-1381

# PD-II SERIES

## REPRODUCERS AND RECORDER/REPRODUCERS

### SPECIFICATIONS

POWER:	117 volts, AC, 60 Hz, 70 watts.
TAPE SPEED:	7-1/2 inches per second. Direct-drive, hysteresis synchronous motor with electrolyzed shaft and permanently lubricated ball bearings.
TIMING ACCURACY:	±0.2% or better.
WOW AND FLUTTER:	0.2% or less, NAB weighted.
AUDIO INPUT:	-20 to 0 dBm; 600 ohms balanced.
AUDIO OUTPUT:	+15 dBm before clipping; normally +5 dBm; 600 ohms balanced.
DISTORTION:	2% or less, record to playback at 0 VU record level.
NOISE:	52 dB or better below reference of 400 Hz at 3% THD, unweighted.
CROSS TALK BETWEEN CHANNELS:	Better than 50 dB at 1 kHz.
FREQUENCY RESPONSE:	±2 dB from 50 to 12,000 Hz.
EQUALIZATION:	NAB. Adjustable to compensate for head wear.
HEAD CONFIGURATION:	NAB. Separate record and reproduce heads permit monitoring while recording.
CUE SIGNAL:	NAB primary (stop) cue, 1 kHz, automatically applied at start of recording.
METERING:	Taut-band movement with "A" scale.
BIAS OSCILLATOR:	75 kHz.
TAPE CAPACITY:	NAB size A cartridges. 2 seconds to 10-1/2 minutes with 1 mil lubricated tape at 7-1/2 IPS.
START AND STOP TIME:	0.15 second minimum. Dependent upon air damping adjustment of solenoid.
AMBIENT TEMPERATURE:	55 degrees C, 131 degrees F, maximum.
REMOTE CONTROL:	All indicator lamps and push-button switch controls.
EXTERNAL CONNECTORS:	Terminal strip.
MOUNTING:	Table top mounting. Rack mounting shelf for mounting three units side-by-side available as an option.
DIMENSIONS:	5-3/4" width, 15" depth, 5-1/4" height (add 3/8" for feet).
WEIGHT:	15 pounds.

Terms: Net 30 or 5% discount for payment prior to shipment. Leasing also available.

**THE ONE WAY TO GO**

By starting from scratch and reinventing the entire system, we don't have to compromise anything. We can truly design a system for tomorrow, without the constraints of today.

And because we're the only company that makes the tape, the cartridge and the machines, you can now handle the whole thing, from shipping to maintenance, through one source. One very well-respected source.

It's about time.

**CENTRACART™**



**CENTRACART RADIO CARTRIDGE SYSTEM**

**MACHINES:**

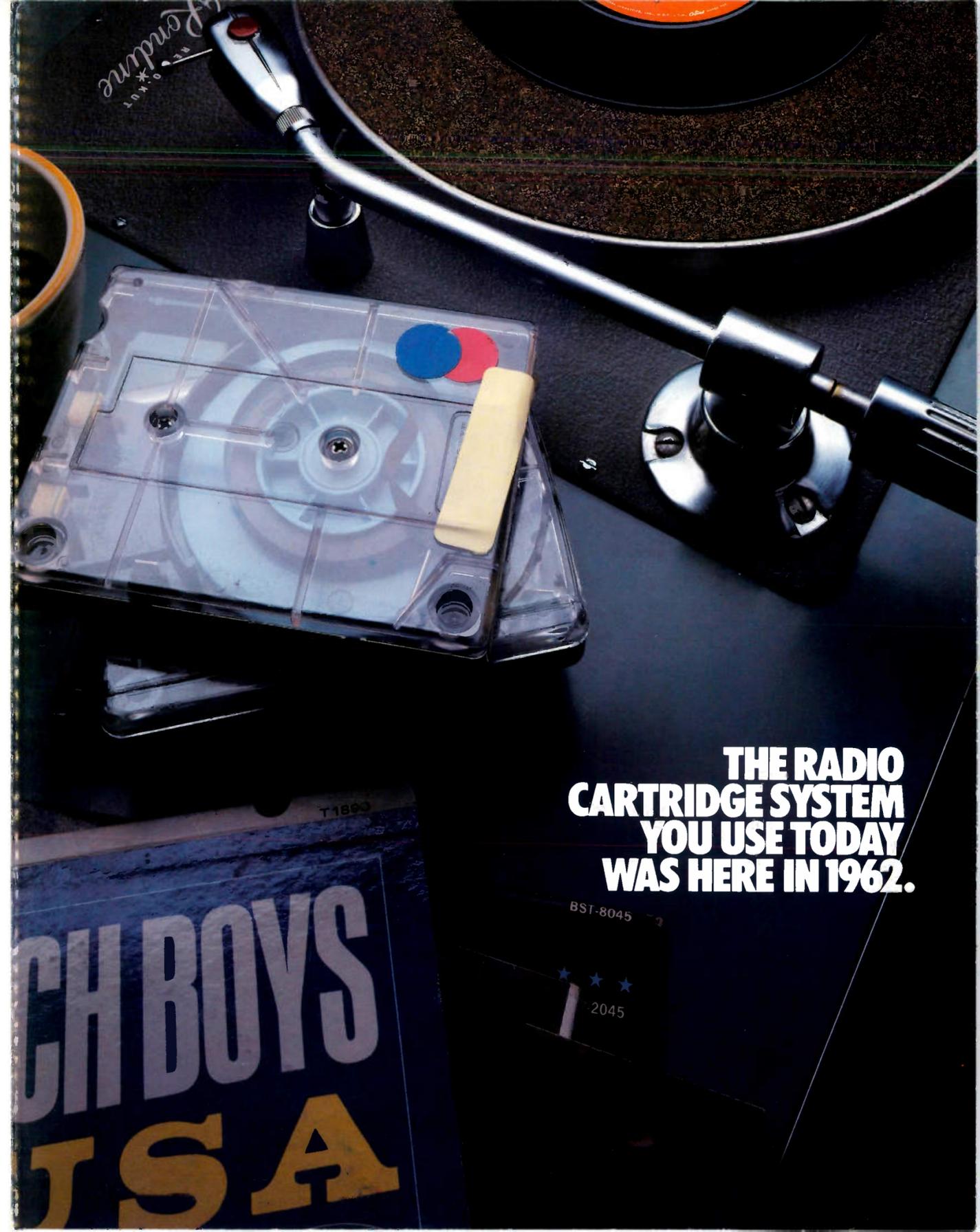
CR10 ..... Recorder/Player      CP10 ..... Player

**CARTRIDGES:**

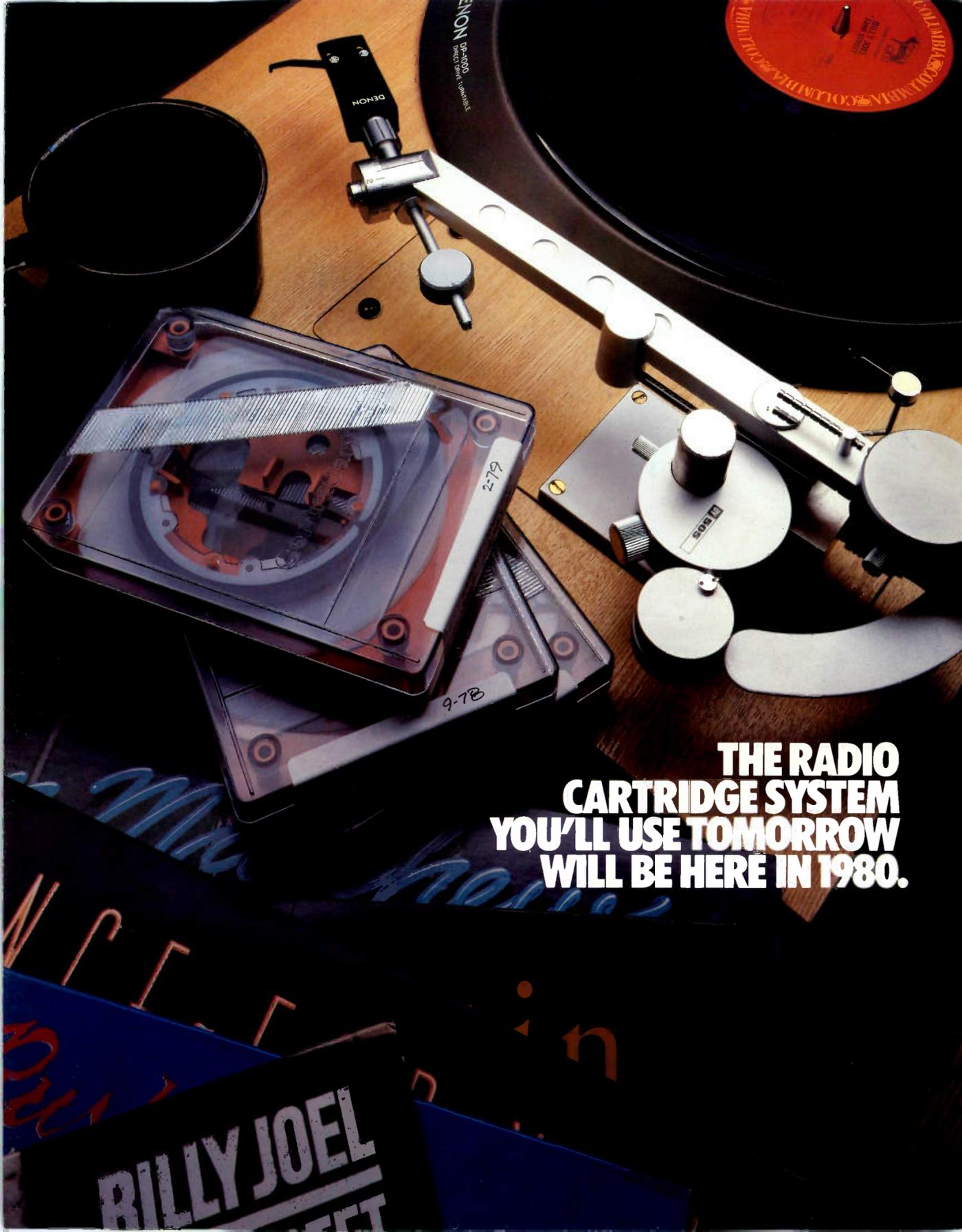
Standard Size		Large Size	
A70 .....	70 seconds	B8 .....	8 minutes
A140 .....	140 seconds	B10 .....	10 minutes
A3.5 .....	3.5 minutes	B12 .....	12 minutes
A5.5 .....	5.5 minutes	B15 .....	15 minutes
A7.5 .....	7.5 minutes		

**For additional information, call toll-free 800-328-1300.** For sales information, ask for CentraCart™ Sales. For technical information, ask for CentraCart™ Technical Service.

Magnetic Audio/Video Products Division  
 Building 223-5N  
 St. Paul, Minnesota 55101



**THE RADIO  
 CARTRIDGE SYSTEM  
 YOU USE TODAY  
 WAS HERE IN 1962.**



**THE RADIO  
CARTRIDGE SYSTEM  
YOU'LL USE TOMORROW  
WILL BE HERE IN 1980.**

## CENTRACART RADIO CARTRIDGE SYSTEM BY 3M

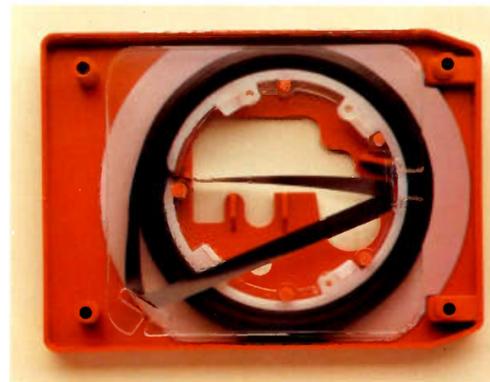
Music has changed dramatically in the last seventeen years. Not to mention commercials. But the way you play your program material has changed very little.

We took a look at what changes should be made in your cartridge system and discovered that the real problem is the cartridge itself. It simply can't handle the demands of modern radio fidelity. Especially when you consider the future of AM stereo.

However, to redesign the cartridge, we had to redesign the entire system—the tape, the cartridge and the machines. That's a pretty dramatic change. But among other things, it leaves you with the first single system supplier you ever had. And a radio cartridge system that's comparable with reel-to-reel quality.

### THE CARTRIDGE

Our revolutionary new cartridge design lets the tape feed from the inside, across the middle of the cartridge, for a more constant tape tension. The tape then feeds back onto the outside of the pack, where it's bent and flexed at its lowest tension point, for improved tape life. The result: better fidelity, more durability and virtually no moving parts.



This new cartridge will require new equipment. But we think it's clearly worth it.

- unique hub and tape path design for constant hold-back tension
- stationary hub that allows the tape to float for more precise tracking
- greatly reduced phase error because the tape remains in the same plane as the tape pack until it's been recorded and played
- less wow and flutter due to a stationary hub
- cartridges available in two sizes, from 70 seconds to 15 minutes
- compatibility with current storage systems
- no pressure pads, for reduced scrape flutter, head wear and cartridge reloading

### THE TAPE

Scotch and tape are practically synonymous. We pioneered the development of recording tape. And we've been on the leading edge of tape technology ever since. As a result, most cartridge suppliers generally use 8-track cartridge tape, formulated for optimum performance at 3¾ i.p.s. In redesigning your radio cartridge system, we formulated a tape for optimum performance at your speed—7½ i.p.s.

- special formulation for excellent high frequency response, requiring less pre-equalization
- impressive signal-to-noise ratio—an 8 dB improvement over Scotch 156 tape used in competitive cartridges

### THE MACHINES

We'll be offering two basic units: a player and a player/recorder. As you can see, we didn't just make them over. We made them better.

- simultaneous erase, record and play
- convenient slot loading
- no adjustment required to accept different cartridge sizes
- crystal-controlled
- DC servo motors for accuracy of speed and low flutter
- fast start time
- motors that run only when the tape is moving, with momentary on/off solenoids for less heat build up
- automatic fast forward—30 i.p.s.
- high-speed erase
- high-speed splice find
- first selective record/erase capabilities
- tape guidance totally controlled by equipment, as with reel-to-reel
- excellent phase and tracking stability
- automatic monitor and indicator switching
- scrape flutter filter
- LED record indicators with automatic overload capability
- adjustable LED peak indicators
- record input level controls with selectable internal presets
- ready indicator that flashes at the end of a message
- buffered logic controls
- special shielding to prevent RF pickup
- quality Jensen input and output transformers
- 20 dB of system headroom
- low profile, 5.63-inch width that allows three-unit mounting in a 19-inch panel
- all inputs, outputs and motion functions on the rear panel, with D series gold-plated connectors

# 750 Series recorder/reproducer

## MODEL DESIGNATIONS

The 750 Series open-reel recorder/reproducers are capable of handling reels up to 10 1/2 inches in diameter. All equipment is supplied ready for rack mounting. Specially designed console cabinets are available as an option.

7514 Full Track Mono, 3 3/4 — 7 1/2 IPS  
 7515 Full Track Mono, 7 1/2 — 15 IPS  
 7524 1/2 Track Mono, 3 3/4 — 7 1/2 IPS  
 7525 1/2 Track Mono, 7 1/2 — 15 IPS

7534 1/2 Track Stereo, 3 3/4 — 7 1/2 IPS  
 7535 1/2 Track Stereo, 7 1/2 — 15 IPS  
 7544 1/4 Track Stereo, 3 3/4 — 7 1/2 IPS  
 7545 1/4 Track Stereo, 7 1/2 — 15 IPS

864-0014-010 Console Cabinet with filler strip  
 833-0018 25 Hz Cue Detector

Note: Standard for 750 Series Recorder/Reproducers: Dual speed, rack mounting, 60 Hz, 117V AC operation with NAB equalization. Other models are available on special order.

## 750 SPECIFICATIONS

### Power:

105-125 volts, AC, 60 Hz, approximately 200 volt-amperes (Varies with remote controls and accessories) Other voltage and frequency variations are available on special order.

### Wind Time:

Less than 60 seconds for 2400 feet of tape  
 Less than 90 seconds for 3600 feet of tape

### Motors:

Capstan — direct-drive hysteresis synchronous with electrolyzed shaft and instrument-type permanently lubricated ball bearings

Torque — induction motors (two) with ball bearings provide 20 ounce/inches of torque.

### Timing Accuracy:

0.2% or better

### Flutter (NAB weighted):

15 IPS	.05%
7.5 IPS	.07%
3.75 IPS	1%

### Audio Output:

+ 18 dBm before clipping; 600 ohms balanced.

### Audio Input:

15 k ohm bridging or 600 ohms balanced by strappable option.

### Distortion (Record to Play):\*

Using 400 Hz tone recorded at NAB Standard Reference Level\* with reproduce amplifier adjusted for +8 dBm output, and measuring on a distortion analyzer with a 400 to 20 kHz bandwidth.

15 IPS	1.2%
7.5 IPS	1.5%
3.75 IPS	2.0%

NOTE: Measuring only third harmonic distortion on an octave band analyzer will result in a maximum distortion of 0.5%.

### Signal-to-Noise:\*

Using 400 Hz tone recorded at NAB Standard Reference Level\* with reproduce amplifier adjusted for +8 dBm output, and measuring unweighted noise.

	Full Track	Half Track
15 IPS	-58 dB	-56 dB
7.5 IPS	-54 dB	-52 dB
3.75 IPS	-50 dB	-48 dB

Using 1 kHz tone recorded at 500 nWb/m (approximately 8 dB above NAB Standard Reference Level) and measuring NAB weighted noise.

	Full Track	Half Track
15 IPS	-76 dB	-74 dB
7.5 IPS	-72 dB	-70 dB
3.75 IPS	-68 dB	-66 dB

### Crosstalk:

Better than 50 dB at 1 kHz

### Frequency Response (Overall Record and Play)\*

7.5 IPS + 2 dB from 30 to 15,000 Hz 10 dB below normal recording level.

### Equalization:

NAB with adjustment for high frequencies

### Headphone Outputs:

8 ohms or greater

### Brakes:

Mechanical differential band brakes

### Remote Control:

All operating mode indicators and controls

### External Connectors:

Latching type, mating plugs furnished

### Head and Track Configuration:

Full track monophonic  
 Half track monophonic  
 Half track stereophonic (two channel)  
 Quarter track stereophonic (two channel)

### Metering:

Taut band movement with "A" scale. Meter switch allows selection for metering the following: Normal Line Recording Level, P.R.S., Bias and Program Play. (Meter sensitivity may be calibrated for 0 to +18 dBm output level)

### Erase Depth:

Below noise level

### Ambient Operation Temperature:

55 degrees C., 131 degrees F., maximum

### Mounting:

Rack mounting. Console cabinet optional.

### Dimensions:

Reproducer Deck  
 19" wide (1 1/4" overhang on each side with 10 1/2" reels)  
 14" high (2 1/4" overhang on top with 10 1/2" reels)  
 9" deep

### Recording Amplifier

19" wide  
 9" deep  
 3 1/2" high

### Weight:

Reproducer  
 41 pounds (unpacked)  
 Recording Amplifier  
 15 pounds (unpacked)

\*Measurements made using 3M type 206 or equivalent tape.

750 Series equipment warranted two years on parts and factory labor — plus ITC 30-day money-back guarantee of satisfaction.



# 750 Series recorder/reproducer

**IT** INTERNATIONAL  
TAPETRONICS  
CORPORATION

2425 South Main Street  
 Bloomington, Illinois 61701  
 Telephone: 309-828-1381

## Professional equipment in all but price

More and more broadcasters are expressing a need for reel-to-reel record/playback equipment that is (a) thoroughly professional in performance quality and operating flexibility, (b) moderately priced, (c) rugged and reliable enough to run 24 hours a day, day after day, (d) designed to need only a minimum of maintenance. This equipment is now reality.

Meet the ITC 750 Series open reel recorder/reproducer. It's designed to withstand the stress of heavy production and editing operations, perform with the dependability demanded by broadcasting applications and still compare in cost to semi-pro or consumer-type machines. If this all seems unbelievable, read on . . . because the 750 Series offers even more.

This ITC equipment is designed for reliable performance and only the simplest maintenance. Quiet running, it's an ideal recorder/playback unit for live studio operations, and many of the 750's features are normally found only in the most expensive open-reel machines. One standout quality of the 750 Series machine — it affords an unusually high degree of operational flexibility.

Features include convenient audio monitoring during either recording or playback. Fixed tape guides for precise phase alignment. Play/Record Synchronization — PRS. "Safe" features to prevent accidental erasure of audio, and status indicators for record and monitor controls. The operator always knows what's happening with and within the 750.

**Monitor control with automatic meter switching.** These switches give you the conventional choices of record, play and bias level; and, since they con-



trol the VU meters, headphone jack, and rear chassis monitor connector, you hear what you see on the VU meters. In addition, with the record monitor switch depressed, the machine will automatically switch the monitor control to playback when the machine is in the playback mode.

**Record control.** With these switches, you can select channels to be recorded, one at a time or both at once. The record set is furnished with a strappable option which lets you enter the record mode before or after starting tape motion. This allows you to preset to the recording mode for level adjustment and to switch from play to record while tape is running.

**The PRS (Play/Record Synchronization) system** is strictly professional. You can record on one channel and then add audio on the other while listening to both channels in complete synchronization.

Imagine editing a music bed down to proper length and adding a voice announcement in sync with the music. Or consider how easily a talented

announcer might "talk to himself" by recording one voice and replying in a second voice on the other channel. These are just two possibilities offered by the flexible 750 Series PRS amplifier feature.

**The motion sensing and start memory** combination protects your tapes and provides extra operator convenience. Motion sensing prevents the machine from entering the run mode until the tape comes to a stop from fast forward or rewind. The start memory circuit stores a start command until tape can safely enter the play mode.

**The 750 Reproducer** is built in accordance with ITC tradition — simply but like a tank. The uncomplicated, durable mechanics, the 1/2 inch milled aluminum deck overlaid with stainless steel, and the heavy, micro-adjustable head assembly are a few of the ways this ruggedness has been achieved. The simple, solid mechanical construction coupled with ITC's air-damped pressure roller solenoid accounts for the super-quiet performance which makes the 750 Reproducer ideal for use in live studio operations.

The 750 Series has been designed to get the most out of the least. This simplicity has been accomplished through the use of plug-in assemblies (head, relays, circuit cards, and motors). Essentially the machine is constructed from several individual operating units — electrical and mechanical — to permit the quick servicing and extremely handy access provided by modular construction.

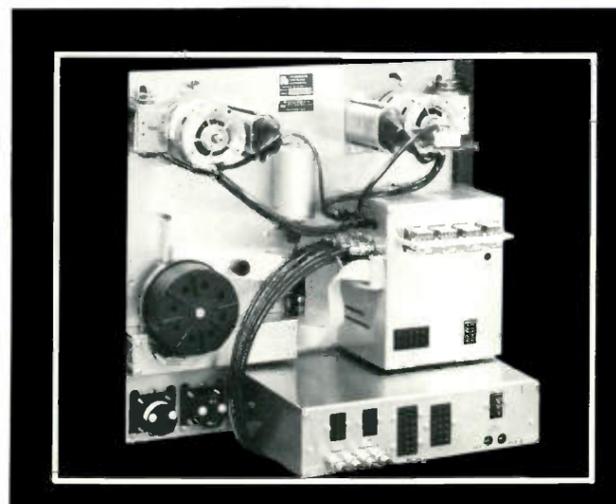
The uninvolved tape travel path makes tape threading virtually foolproof. Loading tape is a smooth and easy process on this practically designed, uncluttered deck. To maximize phase stability, the five tape guides have been secured

directly to the deck plate, assuring a fixed and accurate tape travel path. The spring-loaded flip-top cover makes the head convenient and visible for editing, cleaning, and adjusting. ITC has incorporated the elements that are key in professional applications — simplicity and ruggedness.

### Features list:

- \* Air-damped pressure roller solenoid for quiet operation
- \* Precision milled 1/2-inch thick aluminum deck overlaid with stainless steel — for stability and durability
- \* Straight-line tape threading
- \* Fixed tape travel path for phase stability
- \* Three-point micro-adjustable heads — height, zenith, true center-pivot azimuth
- \* Flip-top head cover for easy access to heads
- \* Manual tape lifter defeat with automatic release
- \* Motion sensing and start memory for operator convenience and safe tape handling
- \* Optical tape break sensor, solid state
- \* Professional +8 dBm output with 10 dB headroom
- \* All plug-in assemblies — PC boards plus mother-daughter concept
- \* Transistor and IC sockets for flexibility and serviceability
- \* Large diameter capstan and pressure roller
- \* Front panel calibration controls
- \* Limited range playback level controls
- \* Metallic tape (foil) sensor
- \* Master and dual slave bias oscillator system for optimum erase depth and channel separation in PRS

Once you've considered all the benefits — including the extra features listed above — we think you will agree that the ITC 750 Series open reel recorder/reproducer makes an ideal unit for all your production and control room requirements. We know you'll find it professional in all but price.



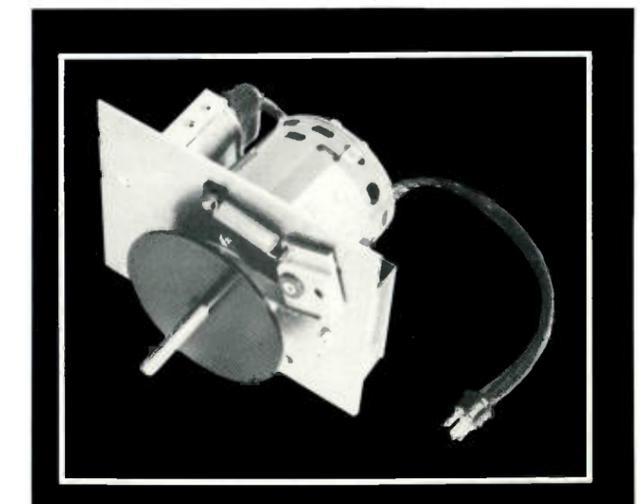
Where else could you find such simplicity in a machine that does so much? The 750 Series has a minimum of moving parts, is quickly accessible throughout.



Excellent serviceability on the 750 Series with plug-in printed circuit cards, transistor and integrated circuit sockets. All controls and calibrations accessible from front panel or through the top of the recording amplifier.



Flip-top head cover for editing accessibility. Excellent phase stability — the five tape guides are secured directly to the deck plate, assuring a fixed and accurate tape travel path for precise phase alignment.



Mechanical brakes on the 750 Series make use of brake bands rather than discs. Bands create more pressure in one direction than the other. This provides differential braking action important for smooth, safe tape handling.

## SPECIFICATIONS

### 3D Series Reproducer

<b>Power:</b>	117 volts, AC, 60 Hz, 144 watts. Other voltage and frequency variations are available on special order.
<b>Tape Speed:</b>	7½ inches per second. Other speeds on special order. Direct drive, hysteresis synchronous, common-capstan motor with electrolyzed shaft and instrument-type permanently lubricated ball bearings.
<b>Timing Accuracy:</b>	0.1% or better.
<b>Wow and Flutter:</b>	0.2% RMS or less, unweighted.
<b>Audio Output:</b>	+15 dBm before clipping; normally +5 dBm; 600 ohms balanced. May be strapped for 150 ohms. (+18 dBm available on special order.) Independent output for each deck.
<b>Distortion:</b>	2% or less, record to playback at 0 VU record level.
<b>Noise:</b>	55 dB or better below reference of 400 Hz at 3% THD, unweighted, monophonic. 50 dB or better below reference or 400 Hz at 3% THD, unweighted, stereophonic.
<b>Cross Talk Between Channels:</b>	Better than 50 dB at 1 kHz.
<b>Frequency Response:</b>	±2 dB from 50 to 15,000 Hz.
<b>Equalization:</b>	NAB. Adjustable to compensate for head wear. CCIR available.
<b>Head Configuration:</b>	NAB. Two tracks for monophonic, three tracks for stereophonic.
<b>Cue Signals:</b>	NAB. Primary (stop) Cue, 1 kHz, standard; secondary cue, 150 Hz, and tertiary cue, 8 kHz, optional. Utilizes adjustable tuned circuit detector for each tone and furnishes relay contact closure for external control.
<b>Tape Capacity:</b>	NAB size A and B cartridges. 2 seconds to 16 minutes with 1 mil lubricated tape at 7½ IPS — each deck.
<b>Start Time:</b>	0.1 second.
<b>Stop Time:</b>	0.1 second.
<b>Ambient Temperature:</b>	55 degrees C, 131 degrees F, maximum.
<b>Remote Control:</b>	All indicators and controls.
<b>External Connectors:</b>	Latching type. Mating plugs furnished.
<b>Mounting:</b>	Table top mounting. Rack mounting adapters optional.
<b>Dimensions:</b>	8½" width, 12⅞" depth, 10½" height (add ⅜" for feet).
<b>Weight:</b>	41 pounds.

### WRA Series Recording Amplifier

<b>Power:</b>	Supplied by associated three deck Reproducers through interconnect cable.
<b>Audio Input:</b>	-20 to 0 dBm; accepts higher level by changing input pad. 600 ohms balanced. Bridging input available on special order.
<b>Head Configuration:</b>	NAB. Two tracks for monophonic, three tracks for stereophonic. Separate record and reproduce heads permit monitoring while recording.
<b>Cue Signals:</b>	NAB. Primary (stop) Cue, 1 kHz, standard; automatically applied at start of recording (may also be defeated and applied at user's discretion). Secondary cue, 150 Hz, and tertiary cue, 8 kHz, optional; may be applied during recording process or during playback. Individually adjustable oscillator for each tone.
<b>Metering:</b>	Taut-band movement with "A" scale. Internal meter switch allows selection for metering the following: Program Bias, Peak Recording Level, Normal Recording Level, Program Play, Cue Play, and Cue Bias.
<b>Bias Oscillator:</b>	Push-pull, 82 kHz; individual gates and level controls for program (separate left and right in stereophonic units) and cue.
<b>Remote Control:</b>	All indicators and controls except meter switch.
<b>External Connectors:</b>	Latching type. Mating plugs furnished.
<b>Mounting:</b>	Table top mounting. Rack mounting adapters optional.
<b>Dimensions:</b>	8½" width, 11" depth, 5¼" height (add ⅜" for feet).
<b>Weight:</b>	12 pounds.
<b>Note:</b>	All other specifications are the same as those shown under 3D Series Reproducers.

### MODEL DESIGNATIONS

3D-0001	WRA-0001	Monophonic with 1 kHz primary cue.
3D-0002	WRA-0002	Stereophonic with 1 kHz primary cue.
3D-0003	WRA-0003	Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.
3D-0004	WRA-0004	Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.

### ACCESSORIES

SR-0004	Rack Mounting Kit — mounts one 3D Series in 19" equipment rack.
SA-0014	Rack Mounting Shelf Assembly — mounts two 3D Series in 19" equipment rack.
SR-0001	Rack Mounting Kit — mounts one WRA Series in 19" equipment rack.
DR-0003	Rack Mounting Kit — mounts two WRA Series in 19" equipment rack.
MP-0009	Audio Mixing Circuit, three input/single output, 600 ohm, 9.5 dB insertion loss. Two required for stereophonic applications.
AS-0001	Audio Switcher, three input/single output, balanced audio switching, 0 insertion loss. Designed for either monophonic or stereophonic applications.

# 3D SERIES



**INTERNATIONAL TAPETRONICS CORPORATION**  
2425 South Main Street • Bloomington, Illinois 61701  
Telephone: 309-828-1381

Marketed exclusively in Canada by McCurdy Radio Industries Ltd., Toronto



3D Series Dual Mount

ITC research and design originates in broadcast studios across the nation. We listen for what experienced broadcasters want and need, then we concentrate our creative energies in designing a superlative cartridge machine that will best fill those demands. We heard an unmistakable request for a trend toward greater compactness. Our answer is the 3D Series . . . three cartridge reproducers in the space ordinarily devoted to two machines, providing even greater fingertip accessibility than before, and at a price less than the cost of three single machines!

Flexibility is a key feature of the 3D Series. All decks may operate at once supplying independent audio and control information. Audio may be fed to three separate console inputs or may be mixed or switched externally as desired. The program reproduce amplifiers include an IC electronic "squelch" circuit which independently turns off the audio output when the deck is idle and permits the mixing of all 3 decks into one console input without sacrificing desirable signal to noise ratio. (Mixing pads and audio switchers are available as accessory items.)

Automated breaks can be set up easily with each deck automatically starting the next through utilization of the optional 150 Hz cue. Detection of auxiliary cue tones is indicated by front panel indicator lamps and relay contact closures are provided to signal external equipment.

By air damping the powerful solenoids, ITC was able to provide what can only be described as super-quiet, totally automatic mechanical operation. We added a Teflon coating to the solenoid plungers to eliminate any need for lubrication or cleaning.

The mechanical linkage between the solenoid and the pressure roller assembly is the simplest, most reliable yet designed. We utilize a chain and sprocket with a minimum of moving parts. The outcome is a cartridge machine which has been tested for its ability to be started and stopped in excess of a million times without failure or the need for adjustment. ITC parts are easily accessible and adjustments, when required, are as simple and easy as any we are aware of.

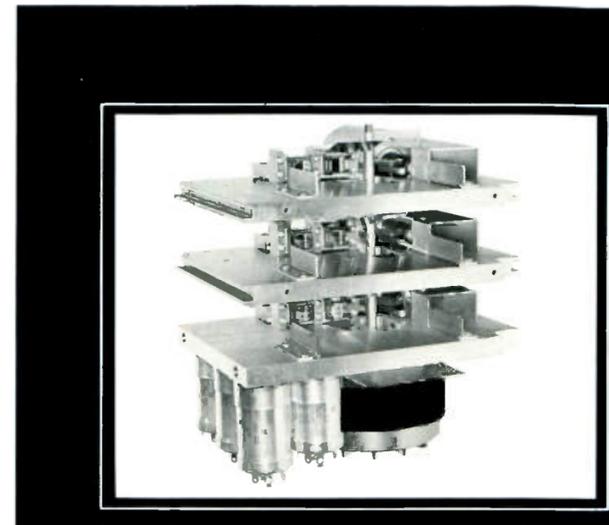


WRA Series

For optimum tape drive, we employ a powerful direct drive motor with permanently lubricated ball bearings. The first step toward speed stability is the use of the time-proven hysteresis-synchronous design. To minimize wow and flutter and improve pulling power, we use a capstan shaft with the largest possible diameter. And to further assist in speed consistency, the capstan is chrome plated, microscopically roughened (vapor blasted), and hardened (electrolyzed).

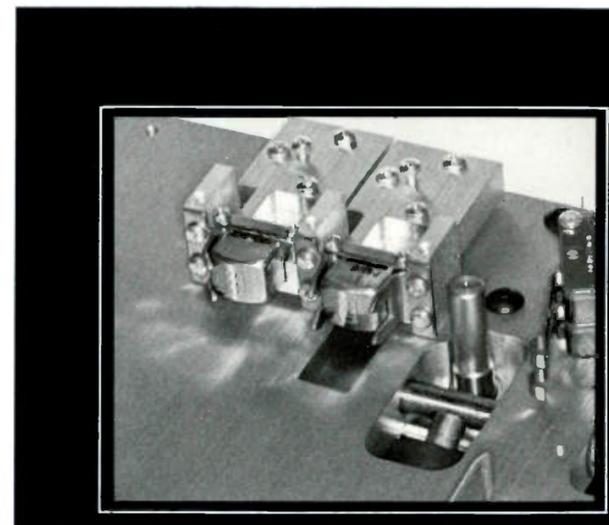
The 3D Series Reproducer is designed for either table-top or rack mounting (rack kits are optional). Two of the units may be mounted side by side in an equipment rack (as shown above). The 3D Series is available in monophonic or stereophonic; with single cue tone or secondary and tertiary cue tones added.

Add the WRA Series Recording Amplifier and the bottom deck of the 3D Series machine functions as a complete recorder/reproducer. You now have a master recorder with two playback units which operate independently just as you might use several single deck units. For detailed information on the WRA Recording Amplifier, refer to the RP Series brochure.



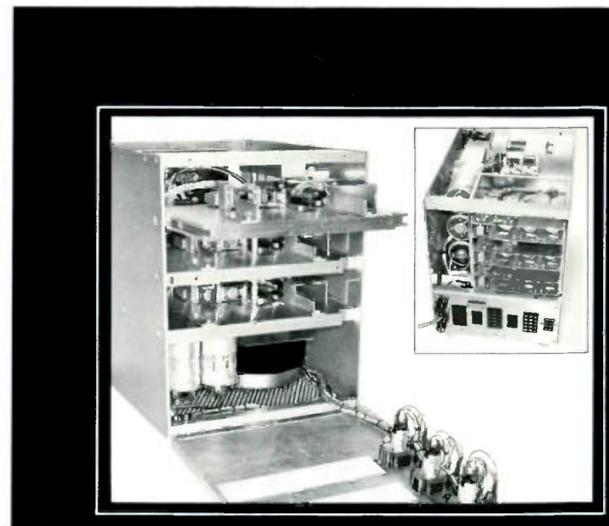
#### Tape Transport

One of the outstanding features of the tape transport area is the heavy duty, rugged,  $\frac{1}{2}$ " hardened aluminum tool plate decks. There's good reason for this accent on heavy duty. The ITC deck is guaranteed flat within .005 inch TIR. They won't warp under normal use and present the same flat stable surface to cartridges every-time assuring correct azimuth of heads and consistent playback performance time after time. Also visible in this photograph are the powerful, air-damped solenoid, the fool-proof linkage assemblies and the direct drive capstan motor mentioned previously. All in all, this thoughtfully designed tape transport assures the consistent performance and high fidelity reproduction that is the desire of all concerned broadcasters.



#### Head Assembly

The head assembly is an important part of the tape transport. The entire assembly has been designed to accurately and easily achieve correct height, zenith and azimuth adjustments. Three tape guides can be adjusted independently for peak micro positioning and are made of stainless steel for long wear. Controlled by three adjustment screws, heads pivot on their center axis achieving the only true azimuth adjustment possible. Heads may be replaced quickly and easily. The tape guides, head assembly parts, and deck are non-magnetic so that they will not adversely affect the quality of audio.



#### Serviceability

Removal of the cover grille provides accessibility to both mechanics and electronics. The top two decks readily slide from the housing, and either or both may be removed for service without affecting the remaining decks. For reliability, only the latest silicon transistors, diodes, and integrated circuits have been included in ITC's conservative design. Transistor sockets are provided where the solid state device might require replacement. The program reproduce amplifier and the cue tone detector printed circuit cards are of plug-in design and have gold plated contacts. To optimize signal to noise and facilitate servicing and testing, head cables with gold plated contacts take the signal from the head directly to the input circuit on the PC card.

# the 3D

We've got a darn good reason why the 3D is the number one multiple cart machine in the broadcast market today. It works!

It was the first 3 Deck machine on the market and is still the most dependable. Years of proven performance has made the ITC 3D the most sought after multi-deck cartridge machine in the Radio/TV market today.

And why not? The 3D was designed by broadcasters for broadcasters. Time tested in small and large markets. Designed to keep your format going twenty-four hours a day.

We guarantee it! If you are dissatisfied, return the ITC 3D unit within 30 days and we'll refund your money promptly. Who else can give you this confident ITC Guarantee?

Additionally the ITC 3D comes to you with a Bold Two (2) Year Warranty. Should your 3D experience an electrical or mechanical failure (including heads and capstan motor) within **two** years from purchase, ITC will replace the component at absolutely no charge. And we'll do it quickly—usually within 24 hours. How's that for ITC protection?

Look over our specifications and call our toll free number 800-447-0414. Ask for Larry Cutchens, Karen Ryder, or John Schaab. They will be happy to explain a purchase plan that fits your budget.

We're proud of the ITC 3D and its' proven performance. After all, we're in business to make you sound better.



INTERNATIONAL TAPETRONICS CORPORATION  
P.O. BOX 241 2425 SOUTH MAIN STREET BLOOMINGTON, ILLINOIS 61701  
800-447-0414 TOLL-FREE  
309-828-1381 COLLECT IN ALASKA, HAWAII AND ILLINOIS

## 3D Specifications

**POWER:**  
117 volts, AC, 60 Hz, 144 watts typical.

**TAPE SPEED:**  
7½ inches per second. Direct drive hysteresis synchronous motor with electrolyzed shaft and instrument-type permanently lubricated ball bearings.

**WOW & FLUTTER:**  
0.2% or less, NAB weighted.

**TIMING ACCURACY:**  
0.1% or better.

**AUDIO OUTPUT IMPEDANCE:**  
600 ohms balanced. May be strapped for 150 ohms.

**AUDIO OUTPUT LEVEL:**  
+18 dBm maximum before clipping. Normal operating range: -10 to +8 dBm. External audio pads required for lower levels to prevent deterioration of signal-to-noise ratio.

**AMPLIFIER DISTORTION:**  
0.5% THD or less. In accordance with 1975 NAB standard.

**SYSTEM DISTORTION:**  
2.0% THD or less—record to playback at 0 VU recording level.\*

**NOISE:**  
50 dB or better from 1 kHz at 0 VU recording level.\*

**CROSS TALK BETWEEN CHANNELS:**  
50 dB or better at 1 kHz.

**FREQUENCY RESPONSE:**  
±2dB 315 to 15,000 Hz; +3, -2 dB 50

to 315 Hz record to playback at -10 VU recording level.\*

**EQUALIZATION:**  
NAB. High frequency equalization controls included in reproducer and recording amplifier.

**HEAD CONFIGURATION:**  
NAB. Two tracks for monophonic, three tracks for stereophonic. Separate record and reproducer heads permit monitoring while recording.

**CUE SIGNALS:**  
NAB. Primary (stop) Cue, 1 kHz, standard; automatically applied at start of recording (may also be defeated and applied at user's discretion). Secondary Cue, 150 Hz, and Tertiary Cue, 8 kHz, optional; may be applied during recording process or during playback. Individually adjustable oscillator for each tone. Reproducer utilizes adjustable tuned circuit detector for each tone and furnishes relay contact closure for external control.

**AUDIO INPUT IMPEDANCE:**  
600 ohm balanced terminating standard. 15K ohm balanced bridging may be selected by jumpers.

**AUDIO INPUT LEVEL:**  
-20 to 0dBm; accepts higher level by changing input pad.

**METERING:**  
Taut-band movement with "A" scale. In-ternal meter switch allows selection for metering the following: Program Bias, Peak Recording Level, Normal Recording Level, Program Play, Cue Play, and Cue Bias.

**BIAS OSCILLATOR:**  
Push-pull, 82 kHz; individual gates and

level controls for program (separate left and right in stereophonic units) and cue.

**TAPE CAPACITY:**  
NAB size AA and BB cartridges. 2 seconds to 16 minutes with 1 mil lubricated tape at 7½ IPS.

**START TIME:**  
100 ms with minimum solenoid air damping.

**STOP TIME:**  
100 ms with minimum solenoid air damping.

**AMBIENT OPERATING TEMPERATURE RANGE:**  
50° F. to 131° F.

**REMOTE CONTROL:**  
All indicators and switch controls except meter switch and power indicator. Also provides cue track audio input and output for logging applications.

**EXTERNAL CONNECTORS:**  
Latching type. Mating connectors furnished.

**MOUNTING:**  
Table top mounting standard. Rack mounting adapters optional. 3D machines require 12.25 inches of vertical space for rack mounting and proper ventilation.

**DIMENSIONS:**

Width	Depth	Height-Add for Feet
8.5 in.	12.875 in.	10.5 in. 625 in.

**WEIGHT:**  
41 pounds.

\* All measurements made using Ampex type 675 tape or equivalent, and referenced to 1 kHz recorded at 160 nWb/m in accordance with 1975 NAB standard.

Prices and specifications subject to change without notice.

## 3D PRICES

(Price List, July 15, 1979)

3D Series Reproducers accept the NAB "A" ("AA") and "B" ("BB") size cartridges and have provisions for interconnecting to recording amplifier electronics for easy conversion of bottom deck to recorder/reproducer.

**3D-0001** Monophonic with 1 kHz primary cue.

**\$2200.00**

**3D-0002** Stereophonic with 1 kHz primary cue.

**\$2605.00**

**3D-0003** Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.

**\$2395.00**

**3D-0004** Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.

**\$2800.00**

**it** INTERNATIONAL TAPETRONICS CORPORATION  
2425 SOUTH MAIN STREET  
BLOOMINGTON, ILLINOIS 61701

CHIEF ENGINEER  
WHA-TV  
821 UNION AVE  
MADISON, WI 53706

BULK RATE  
U.S. POSTAGE  
PAID  
BLOOMINGTON, IL  
PERMIT NO. 31



OVER FIFTEEN THOUSAND  
DECKS IN USE  
TESTIFY TO IT'S RELIABILITY



Conserve space and money – common housing, power supply, and capstan motor for three decks.

Rugged stability guaranteed by three individually machined 1/2" thick aluminum tool-plate decks. Built to take the punishment of day to day operation.

Three premium line reproducers cost little more than the price of two single deck machines.

Decks operate independently; multi-cue tone machines may be easily adapted so each deck automatically starts the next.

Compact design – Three decks in the space normally taken by two single deck machines. (8 1/2" wide, 12-7/8" deep, 10 1/2" high).

Quick starts and quiet operation insured by ITC's air-damped solenoids.

Three decks within convenient reach of the operator. Ideal for tight formats.

Simple, reliable mechanics. Hinged front panel and slide-out decks allow easy access for adjustments.

Independent audio output and remote control capability for each deck. Great for segueing and overlap.

Add a WRA Recording Amplifier and the bottom deck of your 3D will become the finest quality Master Recorder/Reproducer available. The other two decks will continue to serve as professional reproducers.

To place a no-risk order:  
**Call Toll Free: 800-447-0414**



**Earn a 5% cash discount**

"Most companies offer either no discount or only 2% for 10 days. Send a check before we ship your 3D and we'll give you 5% off! And remember, our guarantee protects you. You can return a 3D within 30 days for a full cash refund. Look how you save:"

3D-0001 Mono, Single Cue	\$2200.00
Less 5% for payment prior to shipment	\$ 110.00
Your cash outlay	\$2090.00

*Karen Ryder*  
 Karen Ryder



**Save with a liberal trade-in allowance**

"Do you have an ITC machine to trade in? Look what you save:"

3D-0001 Mono, Single Cue	\$2200.00
Less ITC trade (example)	\$ 200.00
Sub-total	\$2000.00
Less 5% for payment prior to shipment	\$ 100.00
Total cost	\$1900.00

*Larry Cutchens*  
 Larry Cutchens



**Ask about our lease-buy-out plans**

"You can enjoy ITC equipment benefits without a large cash outlay. Look how economical it is to lease 3D machines:"

3D-0001 Mono, Single Cue	\$2200.00
Monthly lease payment	\$ 77.00

*John Schaab*  
 John Schaab

## "OMEGA" SERIES SPECIFICATIONS

### POWER:

- A. 105-132 VAC or 210-264 VAC  
B. 50/60 Hz

### POWER CONSUMPTION:

- A. Mono Reproducer: 45 VA Typ.,  
65 VA Max.  
R. Stereo Reproducer: 45 VA Typ.,  
65 VA Max.  
C. Mono Recorder/Reproducer: 50 VA Typ.,  
70 VA Max.

### TAPE SPEED:

- A. 7.5 IPS (19 cm/s) Standard  
B. 3.75 IPS (9.5 cm/s) Strappable Option

### SPEED ACCURACY:

Better than +/- 0.2%

### RECORD/PLAY FLUTTER:

- A. Play Max.: 0.12% DIN Wtd. @ 7.5 IPS  
B. Rec/Play Max.: 0.15% DIN Wtd. @ 7.5 IPS

### AUDIO OUTPUT CONFIGURATION:

Transformer Coupled

### AUDIO OUTPUT IMPEDANCES:

600 Ohm Recommended Load Impedance  
(180 Ohm Source Impedance)

### AUDIO OUTPUT LEVEL:

+ 18 dBm Before Clipping Into  
600 Ohm Load

### DISTORTION:\*

System: 1.5% or less THD. (Tape dependent)

### NOISE:

A.\* Signal to Noise: Measured with bias/  
no signal.

MONO	STEREO	MIC-MONO R/P
56 dB (or better)	54 dB (or better)	51 dB (or better)

B.\* Signal to Noise: No tape running;  
ScotchCart® cartridge in place.

MONO	STEREO
50 dB (or better)	50 dB (or better)

C. Squelch Noise: 70 dB or better  
(Noise Measurements are 20 Hz-20 kHz  
Bandlimited. Unweighted.)

### CROSSTALK (SYSTEM):\*

-50 dB Minimum Separation Between  
Any Two Channels.

### FREQUENCY RESPONSE:\*

- A. Playback:  
+/- 2.0 dB, 50 Hz - 16 kHz  
B. R/P-Line Level Input:  
+/- 2.0 dB, 50 Hz - 16 kHz  
C. R/P-MIC Level Input:  
+/- 3.0 dB, 300 Hz - 10 kHz

### EQUALIZATION:

- A. 1975 NAB: Standard  
B. 1964 NAB: Optional  
C. CCIR: Optional

### CUE SIGNALS:

(Conforms to NAB Specification)

- A. NAB Primary Cue: 1 kHz  
B. NAB Secondary Cue: 150 Hz

### AUDIO INPUT SENSITIVITY:

- A. Line Input: 0 dBm nominal  
B. MIC Input: -70 dBV nominal

### AUDIO INPUT CONFIGURATION:

- A. Line Input-Transformer Coupled:  
1. 20K Ohm Bridging Standard  
2. Strappable for 150/600 Ohms  
Terminating Impedance

### B. Microphone Input:

1. Unbalanced  
2. Input Impedance: 50K Ohms

### METERING:

Taut Band Movement with "A" Scale

### BIAS:

111.84 kHz, Crystal-referenced

### CARTRIDGE SIZE:

NAB A & AA

### AMBIENT OPERATING

### TEMPERATURE RANGE:

10 to 50 Degrees C. (50 to 122 Degrees F.)

### MOUNTING:

- A. Table-top Standard  
B. Rack-mount Optional with URM-0001  
Rack-mount Kit. Filler Panels Also  
Available.

### DIMENSIONS:

- A. Width: 14.6 cm (5.75")  
B. Depth: 38.1 cm (15.00")  
C. Height: 13.34 cm (5.25")  
Add 1 cm (.375") for feet.

### WEIGHT (Typical)

All Machines: 6.84 kg (15 lbs.)  
Total Max. Shipping Weight: 9.1 kg (20 lbs.)

\*Note: Items indicated (\*) are specified using  
a ScotchCart® broadcast cartridge at a  
reference level of 1 kHz at 250 nWb/m.

International Tapetronics Corporation/3M  
reserves the right to change products and  
specifications without notice.

# "OMEGA" SERIES



"AFFORDABLE PERFORMANCE YOU CAN TRUST"

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

More International Tapetronics Corporation/3M  
cartridge machines are installed in radio  
stations around the world each year than all  
other manufacturers' cartridge machines  
combined. Call today for more information on  
ITC's complete line of cartridge machines.

- 99B Cartridge Machines, "The Best"
- DELTA Cartridge Machines, "Today's Most  
Popular Cartridge Machines"
- OMEGA Cartridge Machines, "Affordable  
Performance You Can Trust"

When better performance emerges, it will  
come from International Tapetronics  
Corporation/3M, "The Leader in Reliability  
and Service"

### TO ORDER OR FOR MORE INFORMATION CALL TOLL FREE 800-447-0414

From Alaska, Hawaii or Illinois, call collect  
309-828-1381.

In Canada, call Maruno Electronics, Ltd.,  
416-255-1445.



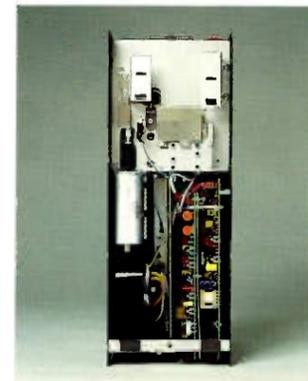
## “OMEGA” CARTRIDGE MACHINES

Design Engineered With You In Mind . . .



**Microprocessor technology** facilitates many operational conveniences and economical maintainability.

- Adjustment-free cue tone levels, both generation and detection.
- Crystal referenced cue tone and bias frequencies further eliminate adjustments.
- Cart played indication and cart replay lock-out reduce possible operator errors.
- Secondary cue tone detection mutes the audio thereby reducing on-air noise.
- Flashing ready lamp indicates cartridge has been played.
- Green run lamp flashes on 150 Hz secondary cue tone detection allowing visual verification.



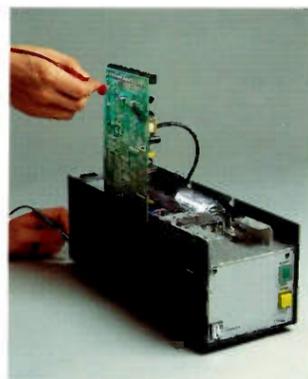
### Rugged design

- 1/2 inch milled aluminum deck resists warping and is long wearing.
- Permanently lubricated air damped solenoid provides extended life.
- Precision milled aluminum head block assembly for stable adjustments.
- Long life stereo heads.
- Dual overhead cart hold down mechanism for precise cartridge positioning.
- Self-wiping contacts in front panel switches for long life.
- Rear panel screw terminal connections provide convenient connection for audio and remote control circuits.



### Reliable components

- NE 5500 Series Op Amps for high-speed, low-noise audio performance.
- Efficient DC brushless servo motor providing stable, cool operation.
- Solid state control circuits eliminate the need for troublesome relays.
- Heavy duty trim pots for long dependable life.
- Voltage regulated power supply for stable operation of logic and audio circuits.
- Efficient toroidal power supply transformer reduces stray hum fields.
- G-10 Glass Epoxy P.C. cards resist heat and breakage.



### Quick, easy maintainability

- Swing-out P.C. cards eliminate need for test extenders.
- Component legends on P.C. cards enable quick reference locations.
- Readily accessible adjustments.
- Polycarbonate front panel overlay resists dirt.
- Securely latching top cover, removable for maximum accessibility.
- Detailed, comprehensive technical manual.

## WHAT THE “OMEGA” SERIES BRINGS TO YOU

OMEGA series cartridge machines embody traditional ITC quality at an affordable price with features to delight everyone . . . **including low cost stereo performance.**

The OMEGA series is yet another example of International Tapetronics Corporation/3M's commitment to providing you with rugged and reliable, high technology cartridge equipment. Whether you are using the OMEGA series in your on-air and production studios or for other important uses throughout the station, you'll have affordable performance you can trust. What's more, you can have stereo reproducers now or field upgrade from mono to stereo reproducers in the future.

The OMEGA series is covered by the same bold 2-year warranty International Tapetronics Corporation/3M offers on all its new equipment. In addition, you receive a detailed, comprehensive technical manual. All this reinforced by the

finest, readily accessible technical service support group in the industry.

### OMEGA Series Stereo Reproducers

OMEGA stereo reproducers have simple, clean electronics for clear, accurate audio reproduction. Standard features include:

- 150 Hertz secondary cue tone detection
- Long life stereo heads
- Modular design for easy servicing
- Efficient DC brushless servo motor providing stable, cool operation
- Compact design for today's tighter studio size limitations
- Flashing ready lamp indicating cartridge has been played

Match your OMEGA stereo reproducers with a high-quality stereo recorder such as the ITC “DELTA” or “99B” recorder and insure optimum playback audio quality from your OMEGA reproducers.

### OMEGA Series Mono Reproducers

OMEGA mono reproducers and mono recorders have all the features and contain the same rugged and reliable, high technology components for dependable operation as the OMEGA stereo reproducers. **Plus, the OMEGA mono reproducers are even field upgradeable to stereo!** To complete the upgrade and insure optimum playback audio quality, merely match your OMEGA stereo reproducers with a high-quality stereo recorder such as the ITC “DELTA” or “99B” recorder.

### Omega Series Mono Recorders

The OMEGA mono recorders have a selectable 1 kHz cue tone defeat and include a built-in microphone preamp. With direct microphone input and ITC's “FB-1” telephone interface device, your station can offer automatic dial-in weather information, sports scores, concert dates and perform a wide variety of newsroom and research functions.

## 99B Series, "The Best"

99B Series Monophonic Reproducer  
99B Series Stereophonic Reproducer  
99B Series Monophonic Recorder/  
Reproducer with ELSA  
99B Series Stereophonic  
Recorder/Reproducer with ELSA



Loaded with features, the 99B series delights the most discriminating engineer, operator and listener. The ELSA cartridge preparation system automatically erases the cartridge, locates the splice and azimuth aligns the record head for maximum phase response performance making the 99B series the only cartridge machine of its kind in the world.

- ELSA system
- DC brushless servo motor with high-speed cue
- Microprocessor controlled logic and cue detection
- Built-in test tone generator in recorder version
- Cart played indicator and replay inhibit
- Modular construction for easy servicing
- High speed op amps for outstanding audio performance
- Power transformer tapes allow operation at most commercial line voltages found worldwide, 117/240V, 50/60 Hz. Accommodates most popular cartridge equalization and record level standards. NAB 1975 operation is standard. NAB "A" size cartridges, 1/2 rack width, rack mounting optional.

If you desire both engineer and operator convenience while providing crisp, clean and consistent sound for your listeners, your choice will invariably be the 99B series.

## ESL-IV

Eraser/  
Splice  
Locator



Saves time and improves your on-air sound by combining erase and splice locating into one easy step. Operates on 117V, 60 Hz. (NOT recommended for use with certain types of cartridges).

## FB-1

Telephone  
Answer-Only  
Interface



Connects directly to the rear panel of any ITC cartridge machine (except the DELTA series) for unattended answer-only telephone applications. Applications include, automatic dial-in weather, sports and concert information, as well as a variety of newsroom and research functions. FCC registered.

## ScotchCart® Broadcast Cartridges



The ScotchCart® broadcast cartridge represents a revolutionary development in cartridges. No pressure pads, no rotating hub and constant tension arm insure low wow and flutter, excellent frequency response and low distortion performance.

ITC reserves the right to change products and specifications without notice.

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

More International Tapetronics Corporation/3M cartridge machines are installed in radio stations around the world each year than all other manufacturers' cartridge machines combined. All new ITC equipment carries a bold two year warranty on parts and factory labor.

When newer technology emerges, it will come from International Tapetronics Corporation/3M.

**TO ORDER OR FOR MORE INFORMATION, CALL  
TOLL FREE 800-447-0414.**

From Alaska and Illinois, call collect 309-828-1381.  
In Canada, call Maruno Electronics, Ltd., 416-255-9108.

# Product Guide

## **OMEGA Series,** "Affordable Performance You Can Trust"

**OMEGA Monophonic Reproducer**  
**OMEGA Stereophonic Reproducer**  
**OMEGA Monophonic Recorder/  
Reproducer**



The OMEGA series embodies ITC quality at an affordable price with features to delight everyone.

- 150 Hz secondary cue tone standard on all models
- DC brushless servo motor for low wow and flutter and stable long-term speed
- Rugged modular design for easy servicing
- Microprocessor technology
- Compact size for today's tighter studio limitations
- Flashing ready lamp indicates cartridge has played
- Recorder has built-in microphone preamplifier
- Monophonic reproducer upgrades to stereophonic
- Accommodates 105-132V or 210-264V, 50/60 Hz line voltages. May be configured to operate on most worldwide equalization and record fluxivities. NAB 1975 operation standard. NAB "A" size cartridges. 1/3 rack width, rack mounting optional.

The OMEGA series offers audio quality and reliability for on-air and production room uses. When attached to an ITC "FB-1" telephone interface, the OMEGA series also becomes a cost effective machine for automatic dial-in weather, sports, and concert information. It can also be used to perform a variety of newsroom and research functions.

## **DELTA Series,** "Today's Most Popular Cartridge Machines"



**DELTA I Single Deck Reproducer**, NAB "A" size cartridges, 1/3 rack width.  
**DELTA II Wide Deck Reproducer**, NAB "A", "B" and "C" size cartridges, 2/3 rack width.  
**DELTA III Triple Deck Reproducer**, NAB "A" size cartridges, 1/3 rack width.  
**DELTA IV Recording Amplifier**, 1/3 rack width.

The DELTA series consistently meets the tough requirements of broadcasters and professionals who demand outstanding audio performance in a reliable, mid-priced mono or stereo cartridge machine.

- DELTA IV recording amplifier converts DELTA reproducers and bottom deck of DELTA III reproducers to recorders
- 150 Hz and 8 kHz cue tones standard on all models
- DC brushless servo motor. High-speed cue standard on DELTA I and DELTA II reproducers
- Microprocessor controlled logic and cue detection
- High-speed op amps for outstanding audio performance
- Modular construction for easy servicing
- Optional balanced transformerless operation
- Cart played indication and replay inhibit
- Accommodates 105-132V or 210-264V, 50/60 Hz line voltages. May be configured to operate on most worldwide equalization and record fluxivities. NAB 1975 operation is standard. Rack mounting is optional.

These features and many more make the DELTA series today's most popular cartridge machines.

International Tapetronics Corporation/3M

# Prime Rate Lease Purchase

---

**Finance ITC equipment near the prime lending rate with ownership at the end of either a one, two or three year term.**

The interest rate for the Prime Rate Lease Purchase is near the prime lending rate in effect at the time the agreement is consummated. The current prime lending rate can be found in each day's **Wall Street Journal**.

The terms and frequency of payments of the Prime Rate Purchase can usually be tailored to conform to your budget. Depending on the amount financed; one, two or three year terms are offered and payments arranged either monthly or quarterly.

With the Prime Rate Lease Purchase, you own the equipment after making the final payment. There is no buy out at the end of the payment term. You may also be eligible to receive the investment tax credit.

## **Other Advantages of the Prime Rate Lease Purchase**

- **Frees Working Capital**

Consider the advantage of conserving working capital which could yield a better return if invested in expansion of sales, service or

other income producing areas.

- **Hedges Against Inflation**

Based on experience in the recent past, your dollar may well be cheaper tomorrow than it is today.

- **Saves Valuable Time**

Why wait to accumulate the cash? New equipment financed now goes to work immediately.

- **Eases A Tight Budget**

Do you have a rigid budget? Payments can usually be tailored to your ability to pay.

- **Provides Possible Tax Advantages**

You should consult with your tax advisor to determine to what extent you might profit by the tax advantages of the Prime Rate Lease Purchase.

Call us today for more information on the Prime Rate Lease Purchase available on ITC's complete line of cartridge machines.

99B Cartridge Machines,  
"The Best"

DELTA Cartridge Machines,  
"Today's Most Popular  
Cartridge Machines"

OMEGA Cartridge Machines,  
"Affordable Performance You  
Can Trust"

When newer technology emerges,  
it will come from International  
Tapetronics Corporation/3M, "The  
Leader in Reliability and Service."

**Call Toll Free 800-447-0414**  
or collect from Alaska or  
Illinois 309-828-1381.

International Tapetronics Corporation/3M

2425 South Main Street  
P.O. Box 241  
Bloomington, Illinois 61702-0241



# Product Guide

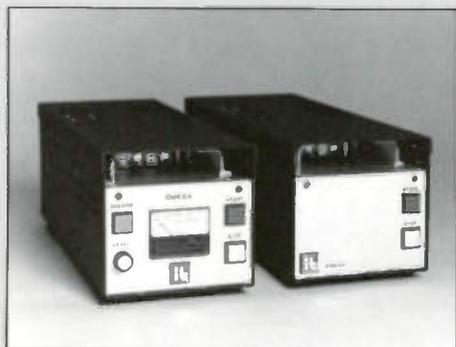
Effective June 1, 1986

**NEW**

## OMEGA Series,

"Affordable Performance You Can Trust"

OMEGA Monophonic Reproducer  
OMEGA Stereophonic Reproducer  
OMEGA Monophonic Recorder/  
Reproducer



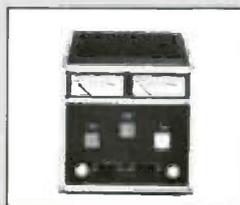
The OMEGA series embodies ITC quality at an affordable price with features to delight everyone.

- 150 Hz secondary cue tone standard on all models
- DC brushless servo motor for low wow and flutter and stable long-term speed
- Rugged modular design for easy servicing
- Microprocessor technology
- Compact size for today's tighter studio limitations
- Flashing ready lamp indicates cartridge has played
- Recorder has built-in microphone preamplifier
- Monophonic reproducer upgrades to stereophonic
- Accommodates 105-132V or 210-264V, 50/60 Hz line voltages. May be configured to operate on most worldwide equalization and record fluxivities. NAB 1975 operation standard. NAB "A" size cartridges. 1/3 rack width, rack mounting optional.

The OMEGA series offers audio quality and reliability for on-air and production room uses. When attached to an ITC "FB-1" telephone interface, the OMEGA series also becomes a cost effective machine for automatic dial-in weather, sports, and concert information. It can also be used to perform a variety of newsroom and research functions.

## DELTA Series,

"Today's Most Popular  
Cartridge Machines"



DELTA I Single Deck Reproducer, NAB "A" size cartridges, 1/3 rack width.  
DELTA III Triple Deck Reproducer, NAB "A" size cartridges, 1/3 rack width.  
DELTA IV Recording Amplifier, 1/3 rack width.

The DELTA series consistently meets the tough requirements of broadcasters and professionals who demand outstanding audio performance in a reliable, mid-priced mono or stereo cartridge machine.

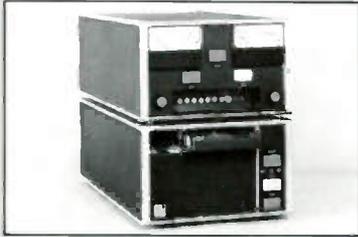
- DELTA IV recording amplifier converts DELTA reproducers and bottom deck of DELTA III reproducers to recorders
- 150 Hz and 8 kHz cue tones standard on all models
- DC brushless servo motor. High-speed cue standard on DELTA I reproducers
- Microprocessor controlled logic and cue detection
- High-speed op amps for outstanding audio performance
- Modular construction for easy servicing
- Optional balanced transformerless operation
- Cart played indication and replay inhibit
- Accommodates 105-132V or 210-264V, 50/60 Hz line voltages. May be configured to operate on most worldwide equalization and record fluxivities. NAB 1975 operation is standard. Rack mounting is optional.

These features and many more make the DELTA series today's most popular cartridge machines.

*(Continued on reverse side.)*

## 99B Series, "The Best"

99B Series Monophonic Reproducer  
99B Series Stereophonic Reproducer  
99B Series Monophonic Recorder/  
Reproducer with ELSA  
99B Series Stereophonic  
Recorder/Reproducer with ELSA



Loaded with features, the 99B series delights the most discriminating engineer, operator and listener. The ELSA cartridge preparation system automatically erases the cartridge, locates the splice and azimuth aligns the record head for maximum phase response performance making the 99B series the only cartridge machine of its kind in the world.

- ELSA system
- DC brushless servo motor with high-speed cue
- Microprocessor controlled logic and cue detection
- Built-in test tone generator in recorder version
- Cart played indicator and replay inhibit
- Modular construction for easy servicing
- High speed op amps for outstanding audio performance
- Power transformer taps allow operation at most commercial line voltages found worldwide, 117/240V, 50/60Hz. Accommodates most popular cartridge equalization and record level standards. NAB 1975 operation is standard. NAB "A" size cartridges, 1/2 rack width, rack mounting available.

If you desire both engineer and operator convenience while providing crisp, clean and consistent sound for your listeners, your choice will invariably be the 99B series.

**NEW**

### ESL V Eraser/Splice Locator



Saves time and improves on-air sound. Combines erase and splice locating into one easy step. Designed to erase today's high-output, low-noise tapes. Operates on 105-132 or 210-264 VAC, 50/60 Hz.

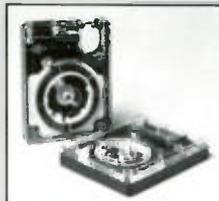
### FB-1 Telephone Answer-Only Interface



Connects directly to the rear panel of any ITC cartridge machine (except the DELTA series) for unattended answer-only telephone applications. Applications include, automatic dial-in weather, sports and concert information, as well as a variety of newsroom and research functions. FCC registered.

**NEW**

### ScotchCart II Broadcast Cartridges



The ScotchCart® II broadcast cartridge represents a revolutionary development in cartridges. No pressure pads, no rotating hub and constant tension arm insure low wow and flutter, excellent frequency response and low distortion performance.

ITC reserves the right to change products and specifications without notice.

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

More International Tapetronics Corporation/3M cartridge machines are installed in radio stations around the world each year than all other manufacturers' cartridge machines combined. All new ITC equipment carries a two year warranty on parts and factory labor.

When newer technology emerges, it will come from International Tapetronics Corporation/3M.

**TO ORDER OR FOR MORE INFORMATION, CALL  
TOLL FREE 800-447-0414.**

From Alaska and Illinois, call collect 309-828-1381.  
In Canada, call Maruno Electronics, Ltd., 416-255-9108.

# International Tapetronics Corporation/3M

# Price List

Effective July 1, 1985 In USA Only

## OMEGA Series, "Affordable Performance You Can Trust"

Table top mounting, 1/3 rack width and accepts NAB "A" size cartridges.

Includes secondary cue tone. NAB (1975) equalization. Adjustable for CCIR equalization. 105—132V or 210—264V, 50/60Hz.

OMEGA Monophonic Reproducer . . . . .	\$1050
OMEGA Stereophonic Reproducer . . . . .	\$1195
OMEGA Monophonic Recorder/Reproducer . . . . .	\$1575

## DELTA Series, "Today's Most Popular Cartridge Machines"

Table top mounting. Three cue tones standard. NAB 1975 equalization or CCIR. 105—132V or 210—264V, 50/60Hz.

DELTA I single deck reproducer with high speed cue standard. Units are 1/3 rack width and accept NAB "A" size cartridges.

Monophonic Reproducer . . . . .	\$1995
Stereophonic Reproducer . . . . .	\$2155

DELTA II single deck wide play reproducer with high speed cue standard.

Units are 2/3 rack width and accept NAB "A", "B" and "C" size cartridges.

Monophonic Reproducer . . . . .	\$2260
Stereophonic Reproducer . . . . .	\$2470

DELTA III triple deck reproducer is 1/3 rack width and accepts NAB "A" size cartridges.

Monophonic Reproducer . . . . .	\$4345
Stereophonic Reproducer . . . . .	\$4695

DELTA IV Recording Amplifier. Converts a DELTA I reproducer, DELTA II reproducer, or the bottom deck of a DELTA III reproducer into a recorder/reproducer. Includes record head.

Monophonic Recording Amplifier . . . . .	\$1225
Stereophonic Recording Amplifier . . . . .	\$1325

## "99B" Series, "The Best"

Table top mounting and 1/2 rack width. Accepts NAB "A" size cartridges.

Includes hi-speed cue and three cue tones. NAB (1975) equalization or CCIR.

ELSA (Erase, Locate Splice, Azimuth) function optional. 120V/240V with taps at 105, 120, 210, 225 and 240V, 50/60Hz.

### "99B" Series Reproducers

Monophonic Reproducer . . . . .	\$2580
Stereophonic Reproducer . . . . .	\$2795

### "99B" Series Recorder/Reproducers

Monophonic Recorder/Reproducer . . . . .	\$4425
Monophonic Recorder/Reproducer with ELSA . . . . .	\$5550
Stereophonic Recorder/Reproducer . . . . .	\$5025
Stereophonic Recorder/Reproducer with ELSA . . . . .	\$5995

## PD-II Series (Replaced by new OMEGA series and available while supplies last.)

Table top mounting, 1/3 rack width and accepts NAB "A" size cartridges. Available only in monophonic with single cue tone. NAB (1964) equalization. 117V/60Hz.

PD-II Reproducer . . . . .	\$ 925
PD-II Recorder/Reproducer . . . . .	\$1270

### ESL-IV Eraser/Splice Locator

Eraser/Splice Locator accepts NAB "A" size cartridges. Table top mounting.  
117V/60Hz. Not recommended for use with certain types of cartridges or tape.  
Call International Tapetronics Corporation/3M for more information.

\$835

### Accessories

FB-I Telephone Answer-Only Interface. Works with any ITC cartridge machine except the DELTA series	\$160
URM-0001 Universal Rack Mount	\$120
Filler Panel, 1/2 Rack Width for "99B" Series	\$ 19
Filler Panel, 1/3 Rack Width for OMEGA Series, DELTA Series and PD-II Series	\$ 16

### ScotchCart® Broadcast Cartridge

10 second length	\$ 6.04
20 second length	\$ 6.09
40 second length	\$ 6.17
70 second length	\$ 6.30
100 second length	\$ 6.46
2-1/2 minute length	\$ 6.69
3 minute length	\$ 6.80
3-1/2 minute length	\$ 6.97
4 minute length	\$ 7.14
4-1/2 minute length	\$ 7.31
5-1/2 minute length	\$ 7.65
6-1/2 minute length	\$ 8.00
7-1/2 minute length	\$ 8.32
9-1/2 minute length	\$ 9.03

NOTE: ScotchCart® Broadcast Cartridge prices shown are list prices—  
reduced prices are available for quantity orders. Call for details.  
Items available only in standard carton quantities of 10 cartridges of same length per carton.

All prices are FOB Bloomington, Illinois.

Terms are Net 30 days with established credit, or save 5% with payment prior to shipment on new equipment. An economical lease plan is also available.

All new ITC equipment carries a bold two year warranty on parts and factory labor.

International Tapetronics Corporation/3M reserves the right to change price and product specifications without notice.

**TO ORDER OR FOR MORE INFORMATION  
CALL TOLL FREE  
800-447-0414**

From Alaska or Illinois, call collect: 309-828-1381  
In Canada, call Maruno Electronics, Ltd., 416-255-1445



# The AUDIO SWITCHER Preliminary Specifications

## Power:

- A. 90-132/180-264 VAC
- B. 47-440 Hz

## Power Consumption:

- A. MASTER CONTROL: 43W Maximum
- B. MATRIX MODULE: 22W Maximum
- C. I/O AMPLIFIER: 77W Maximum
- D. REMOTE CONTROL: 5W Maximum
- E. POWER MODULE: Dependent on system configuration

## Audio Output Configuration:

Electronically balanced output capable of grounding either side with <0.1 dB level change

## Audio Output Impedance:

50 ohms

## Maximum Output Level:

+22 dBm with <1% THD

## Audio Input Configuration:

- A. Balanced bridging transformerless
- B. Input impedance: >20K, 600 ohm selectable

## Input Level Range:

-30 dBm to +20 dBm

## Common Mode Rejection Rate:

- > 80 dB
- 74 dB at 0
- 84 dB at +10
- 94 dB at +20

## Signal-To-Noise:

>90 dB, 20Hz to 20kHz at 0 dBm

## Distortion:

<.01%, 20Hz to 20kHz at 0 dBm

## Frequency Response:

±0.1dB, 20Hz to 20kHz

## Crosstalk:

>90 dB, 1 kHz at +20 dBm

## Phase Shift:

±0.3 degrees at 20kHz (channel to channel)

## Ambient Operating Temperature:

39 to 122 degrees F. (4° to 50° C.)

## Storage Temperature Range:

-40 to +185 degrees F. (-40° to +85° C.)

## Relative Humidity Operating Range:

25% to 80% (without condensation)

## Dimensions:

- A. Width:
  - MASTER CONTROL: 19" (48.26 cm)
  - MATRIX MODULE: 19" (48.26 cm)
  - I/O AMPLIFIER: 19" (48.26 cm)
  - REMOTE CONTROL: 47/8" (12.38 cm)
  - POWER MODULE: 19" (48.26 cm)
- B. Depth:
  - MASTER CONTROL: 21" (53.34 cm) Add 2" (5.08 cm) for connectors

MATRIX MODULE: 19 3/4" (50.16 cm) Add 2"

(5.08 cm) for connectors

I/O AMPLIFIERS: 17 3/4" (45.08 cm) Add 2"

(5.08 cm) for connectors

REMOTE CONTROL: 6 5/16" (16 cm) Add 1 1/4"

(3.18 cm) for connectors

POWER MODULE: 19 3/4" (50.16 cm) Add 2"

(5.08 cm) for connectors

## C. Height:

MASTER CONTROL: 5 1/4" (13.34 cm)

MATRIX MODULE: 7" (17.75 cm)

I/O AMPLIFIER: 5 1/4" (13.34 cm)

REMOTE CONTROL: 3 15/16" (8.41 cm)

Add 1/8" (.318 cm) for feet

POWER MODULE: 5 1/4" (13.34 cm)

## Weight:

MASTER CONTROL: 25 lbs (11.36 kg)

MATRIX MODULE: 45 lbs (20.45 kg)

I/O AMPLIFIER: 24 lbs (10.9 kg)

REMOTE CONTROL: 3 lbs (1.36 kg)

POWER MODULE: 30 lbs (13.63 kg)

International Tapetronics Corporation/3M reserves the right to change products and specifications without notice.

# The Advantage

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

International Tapetronics Corporation/3M offers a variety of financial options designed to fit your needs. Call today for more information on ITC's complete line of audio equipment.

- 3M HCDA™ 3000 Digital Audio System, "An Achievement"
- The Performance System, 99B Recorders and DELTA Reproducers

- The Economy System, DELTA Recorders and OMEGA Reproducers

- AUDIO SWITCHER, "The Advantage"

When newer technology emerges, it will come from International Tapetronics Corporation/3M, "The Leader in Reliability and Service". **To order or for more information call toll free 800-447-0414.** From Alaska or Illinois, call collect 309-828-1381. In Canada, call Maruno Electronics, Ltd., 416-255-9108.

**The AUDIO SWITCHER**  
Designed for Radio Broadcasters  
From International Tapetronics Corporation/3M

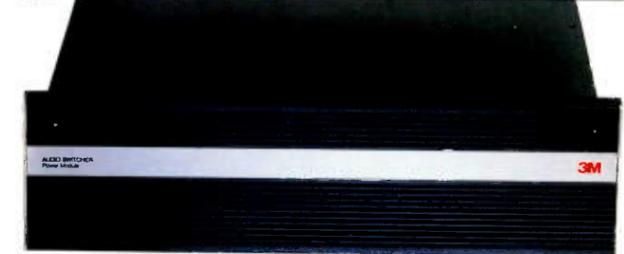
# The AUDIO SWITCHER Designed For Radio Broadcasters

The AUDIO SWITCHER from International Tape-tronics Corporation/3M is designed to replace patchbays and distribution amplifiers offering a new level of flexibility for handling today's diverse and dynamic programming requirements.

Today's broadcasters utilize an abundance of outside program sources including: satellite feeds, traffic helicopter reports, network or syndicated news feeds, promotional events from various locations, sporting events, information from weather forecasting bureaus and many others. Manually patching all of these sources into one central control unit and making them available to more than one studio at a radio station can take days and sometimes weeks of engineering time. What often results is a confusing and complicated maze of wires and patchbays.

Now all of these sources can be connected together easily and routinely through the AUDIO SWITCHER. The AUDIO SWITCHER from International Tape-tronics Corporation/3M brings a cost-effective and reliable method of audio routing to radio stations.

For decades television broadcasters have depended upon video routing systems to interconnect many sources and outputs via one central control unit. International Tape-tronics Corporation/3M has taken advantage of the proven reliability of 3M's advanced *video* switching technology and designed an audio routing switcher specifically for radio broadcasters.



## I/O Amplifier

### Input Amplifier

- Active transformerless balanced input
- 20K Ohm input impedance, 600 Ohm selectable
- Variable gain – system can accommodate inputs from  $-30$  to  $+20$  dBm to produce 0 dBm output
- Four input amplifiers per P.C. board
  - up to 16 boards per rack housing
  - modular replacement for easy servicing
  - separate voltage regulators & fusing on each P.C. board
- Proportional filtered cooling system – stays clean for long life
- Alarm sensors detect and report overheating
- Radio frequency (RF) tested
- Common Mode Rejection Ratio (CMRR) greater than 80 dB
- P.C. boards can be installed or replaced while the system is in operation
- 15-turn trimpot input gain adjustment
- Easy to positively connect wires to terminals

### Output Amplifier

- Active transformerless balanced outputs with self compensating output stage – for use in both symmetrically balanced & unbalanced circuits
- Four output amplifiers per P.C. board
  - up to 16 boards per rack housing
  - modular replacement for easy servicing
  - separate voltage regulators & fusing on each P.C. board
- Capable of supplying  $+22$  dBm in 600 Ohm load (maximum output)
- Low output impedance – for driving long lines
- Proportional filtered cooling system – stays clean for long life
- Alarm sensors detect and report overheating
- Zero group delay – system passes square waves cleanly
- P.C. boards can be installed while the system is in operation
- Easy to positively connect wires to terminals

## Power Module

- Optional redundant power supply – always on line
- "Switching Power Supply" reduces heat and susceptibility to power line irregularities
- Proportional filtered cooling system – stays clean for long life
- Alarm sensors – detect and report overheating and under/over voltage conditions
- Dual AC line – feeds may be attached to separate phases
- 120V, 60Hz; 220V, 50Hz

# The AUDIO SWITCHER Provides "The Advantage"

for the  
General Manager



**Reliability** Reduces likelihood of lost revenue.

**Flexibility** Quick and easy manipulation of format and creative changes.

**Reduced Maintenance** Lower maintenance costs.

**Audio Quality** Enhanced listener and advertiser satisfaction.

**Minimal Training** Faster productivity yielding reduced operational costs. Easy for new technical and operational staff to understand.

**Expandability** Modular design facilitates future growth needs.

**Fewer Errors** Increased efficiency and revenue potential.

for the Program  
Director and News  
Director



Confidence in equipment allows a high degree of creative freedom.

No special skills required to provide instantaneous routing from any source to any destination within the station upon demand.

Fewer studio interruptions for routine maintenance or repairs.

Consistent sound quality.

Shorter training time for new operators. More time available for other tasks.

Programming changes requiring increased capabilities are quick and easy to implement.

Fewer program interruptions can result in higher shares and cumes.

for the  
Chief Engineer



No mechanical contacts or patchcords to fail. Reduces need for patchbays and distribution amplifiers.

Reduces wiring requirements for special or new circuits. Most audio changes controlled by simple software commands.

Designed for long component life and freedom from mechanical switching.

Facilitates uniform and consistent quality from all switch signals without degradation. Reduces complaints.

Promotes logical flow of audio. Easier to communicate functions with programming and operations staff.

Minimizes rewiring needed to accommodate new requirements.

Reduces late night or weekend trouble calls.

## The Advantage

### Saves Money

- Reduces lost air time due to faulty or defective patching
- Fewer labor costs for wiring and maintenance
- Reduces wire and patchbay cost
- Less console space required
- Eliminates the need for monitor speakers and meters (they are built into the Master Control)
- Compact size via hybrid technology reduces rack space requirements
- Includes a real-time clock and calendar
- Saves operator training time

### Self Documenting

The AUDIO SWITCHER includes a 3M *Whisper* Writer keyboard and printer as standard equipment. Once the switcher is in operation, it can provide a hardcopy printout of the system status and log.

Now even the most complex routing problem can be solved easily and quickly by referring to the log without searching through a "rat's nest" of wiring and patch systems.

### Fail-Safe Memory Protection

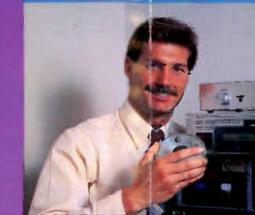
Stored data is automatically protected, even in the event of a power failure, through the use of redundant memory. The primary memory is capacitor backed-up and retains data for up to two weeks. The secondary memory is located in a removable cartridge. This cartridge includes low power RAM and onboard batteries with a 10-year life.

### Versatile Salvos

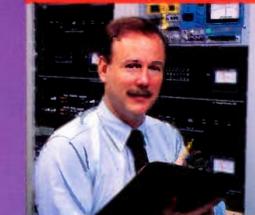
The AUDIO SWITCHER has the ability to make changes to the matrix automatically. A stored set of instructions, known as "salvos," can be initiated at such times when a known station configuration is needed. Salvos could be used when a signal routing requirement always occurs at the same time, such as regular newscasts.



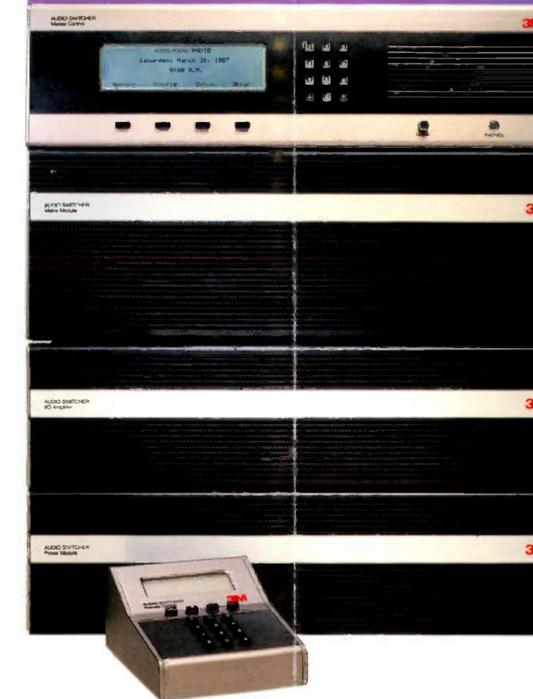
General Manager



Program Director



Chief Engineer



### Built-In Security

The system is initially configured to meet a station's requirements. This includes assigning numbers to all inputs and assigning these inputs to various outputs.

By entering a 4-digit code number, unauthorized modification of these assigned numbers can be prevented.

### "Wild Audio" Capability

The consistent sound quality of stereo broadcasting is virtually assured by the system's "Wild Audio" feature.

Once the system has been configured for stereo, it has the "intelligence" to know when a mono source is being routed to a stereo output, and routes it to both left and right outputs. It also handles stereo source to mono outputs, mono source to mono output, and of course, stereo source to stereo output situations, automatically.

### Easy Serviceability

The AUDIO SWITCHER was designed with serviceability in mind. Service is easy with:

- ITC's P.C. board exchange program
- Installation and operation manual and optional technical illustrations manual
- Factory technical consultation
- Fast shipment of parts orders
- Factory repair service available
- Many components can be removed or serviced while the AUDIO SWITCHER is in operation

### Other Advantages Of Using The AUDIO SWITCHER

- No time lost patching one source to another
- No internal compensation service adjustments necessary
- No "rat's nest" of complicated wiring or cables under consoles or desks
- Facilitates quick changes when inconsistent audio signals from outside sources occur
- No time spent searching for an error source in an undocumented maze of patch wiring
- No diode-effect distortion due to dirty or corroded parts
- Left and right audio channels can be reversed internally without rewiring

# The AUDIO SWITCHER From International Tapetronics Corporation/3M

## Master Control

The Master Control consists of a rack-mount housing containing the microprocessor control system for the AUDIO SWITCHER. The front panel of the Master Control features a 5-line, 40-character LCD display for alpha-numeric and graphics and four "soft key" function pushbuttons. It has a 12-key pad for easy numeric data entry.

## Matrix Module

The Matrix Module contains up to two matrix P.C. boards which are mounted within the frame on a slide-out tray for easy expandability and servicing. Each matrix P.C. board can support up to a 32 input x 32 output mono switch.

## I/O Amplifier

Audio input and output amplifiers are contained on plug-in boards with four input or output amplifiers per board. Audio level adjustments are made here to assure a consistent sound quality without additional distribution amplifiers.

## Remote Control

The Remote Control consists of a small keypad and associated LCD display which allows switching from a control room, on-air desk, or other location away from the Master Control. Each Remote Control can handle four outputs. As many as 31 Remote Controls can be used in conjunction with the Master Control.

## Power Module

The Power Module mounts in its own rack housing. Provision is made for mounting an optionally available redundant power supply in the same rack housing. Power supplies are completely connectorized for quick and easy replacement in case of power failure. The AC power inputs are separated, allowing plug-in to separate power feeds.

## Component Features

### Master Control

- A 5-line x 40-character alpha-numeric graphics LCD display
- Four "soft key" function pushbuttons – allow you to operate the switcher and lead you through programming in conjunction with the LCD display
- Built-in meters, speaker and headphone jack – facilitates monitoring inputs at main controller without additional hardware
- A 1 farad capacitor backup for internal memory and real-time clock – provides two week memory & clock protection
- Removable cartridge contains redundant memory and battery with 10-year life
- Alarm sensors monitor many system parameters and can alert operators via contact closure and on-screen announcement
- Internal real-time clock/calendar – can be used as station master reference clock or be synched to external time source
- 3M *Whisper* Writer printer & keyboard – programs Master Control unit – provides hardcopy printout of system status and log



3M *Whisper* Writer printer & keyboard

### Matrix Module

- Proven hybrid technology – for all audio circuits
- P.C. board holds 32 inputs x 32 outputs for mono and up to 2 boards per rack housing for 32 x 64 or 64 x 32 mono
- P.C. boards mount on slide-out trays – for easy serviceability
- Hybrid circuits are replaceable while the system is in operation
- Crosstalk better than 90dB
- Control handshaking verifies commands are implemented



Satellite Receiver



Traffic Helicopter



Weather Information



Location Remotes



Sports Broadcasts

## The AUDIO SWITCHER



Control Room



Production Room



Transmitter



Newsroom

## More Flexibility

The AUDIO SWITCHER is a single matrix routing device which can route virtually any source, such as a satellite feed, to one or more studios within the broadcast facility at the press of a few keyboard buttons. Other features and benefits include:

- Easier to make major, permanent format changes
- Easier to make major, temporary format changes, such as adding sporting events, remote broadcasts and on-site news coverage
- Allows placing any source on-air without major wiring changes

## Grows With You

Designed as a modular, expandable system, the AUDIO SWITCHER grows as your needs grow. A 16 *input* by 16 *output* monophonic switcher (8 x 8 stereophonic) is the smallest configuration of the AUDIO SWITCHER. As you need more inputs and/or outputs you add system modules. Expansion up to a maximum size of 256 by 256 monophonic or 128 by 128 stereophonic is possible. You can choose the size AUDIO SWITCHER from International Tapetronics Corporation/3M that is right for you today knowing the system will expand as your needs grow.

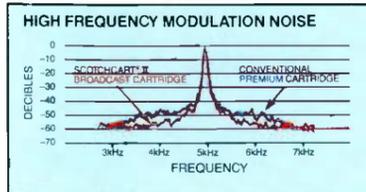
## Consider "The Advantage"

Consider the advantage the AUDIO SWITCHER can bring to your station. Consider the convenience and flexibility offered by the AUDIO SWITCHER and use it as a reliable tool for handling your diverse and dynamic programming requirements. With the AUDIO SWITCHER from International Tapetronics Corporation/3M you have "The Advantage" on your side.

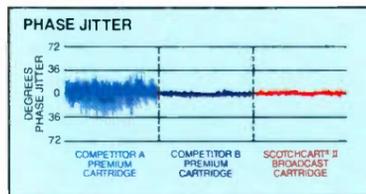
# Superior Programming Deserves Superior Sound

## LOOK AT THE FACTS:

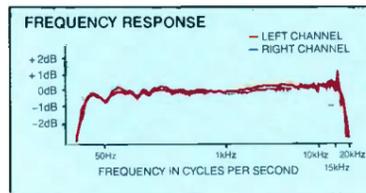
The ScotchCart® II broadcast cartridge provides uncompromising sound while offering operational convenience and control.



The Revolutionary ScotchCart® II broadcast cartridge design eliminates the excessive audio sideband noise which results from the rubbing effects of pressure pads and the mechanical irregularities of rotating hubs found in conventional cartridge designs.

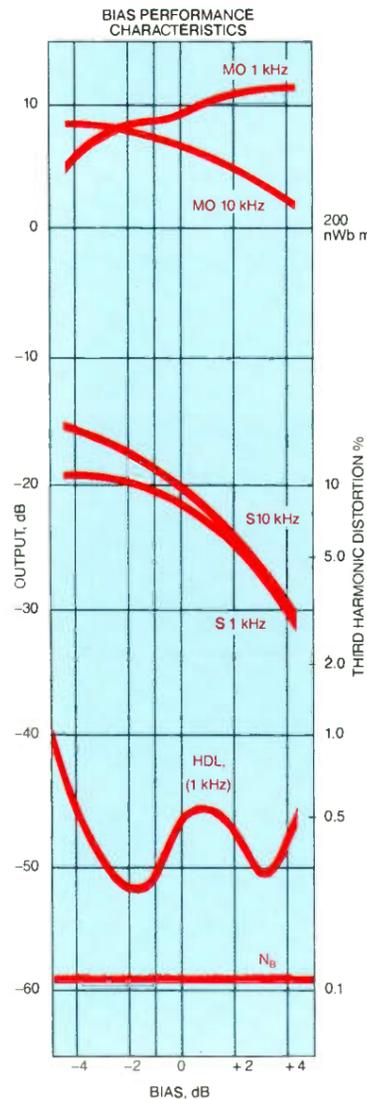


Some competitive cartridges sound muddy on the air because of excessive phase jitter. ScotchCart® II broadcast cartridges sound crisp and clean.



The new tape was conceived as an integral part of a complete cartridge system. When used with high quality equipment, such as an ITC "99B" cartridge machine, the ScotchCart® II broadcast cartridge is capable of frequency response equalling professional reel-to-reel performance.

## NEW, HIGH-OUTPUT, LOW-NOISE TAPE



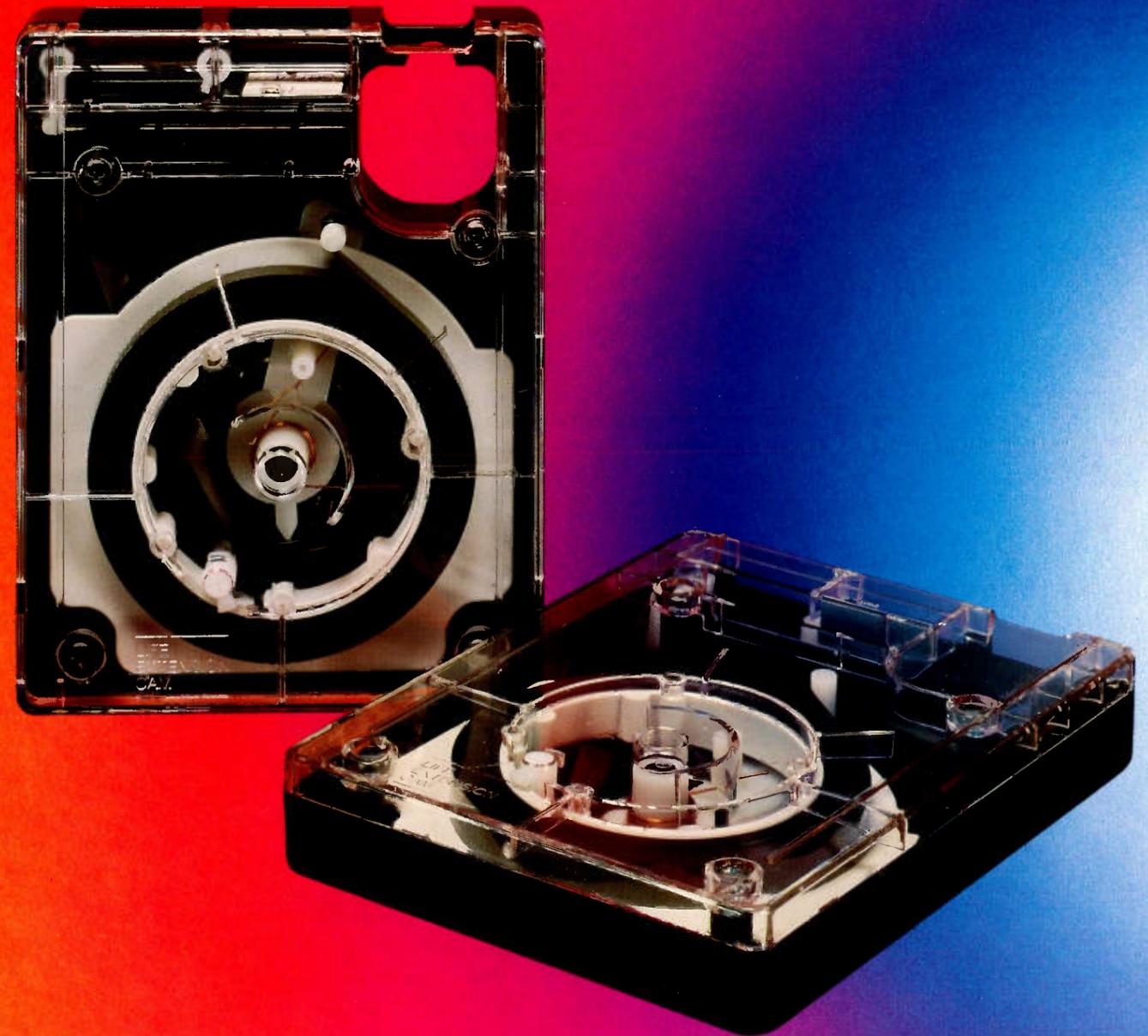
**MAXIMUM OUTPUT (MO)**  
Maximum output level at the specified frequency is a measure of the output capability of a tape. The recorder is equalized for a flat response using the appropriate reference tape. While recording 10 kHz the level of the input signal is increased until no further increase is noted in the output (short wavelength saturation). This output is then reported at different bias settings relative to reference level. While recording 1 kHz the level of the input signal is increased until 3% third harmonic distortion appears in the output. This output level is then reported at different bias settings relative to reference level.

**SENSITIVITY (S)**  
Sensitivity data provides a means to compare the output of one tape to that of another when recordings are made with the same low level input (i.e., an input at which an insignificant amount of system distortion is contributed by the tape). The record equalization is set to achieve a flat response when using the reference tape at the bias setting. A constant input level 20 dB below that required to produce reference level output from the reference tape is used.

**HARMONIC DISTORTION (HDL<sub>3</sub>)**  
Third harmonic distortion is the amount of third harmonic distortion found upon playback of a reference level signal. The HDL<sub>3</sub> curve shows the change in this level of distortion as a result of different bias settings.

**TAPE NOISE (N<sub>b</sub>)**  
Biased tape noise level is a measure of a tape's residual noise. When recording with zero input signal, the output is measured through a filter having the characteristics defined by the NAB Standard Noise Weighting Curve. The level of noise is then reported at different bias settings relative to reference level.

# ScotchCart® II Broadcast Cartridges



## A REAL VALUE

No broadcast cartridge in the world combines long life and performance like the new ScotchCart® II cartridge.

To order ScotchCart® II broadcast cartridges or request a technical manual to optimize ScotchCart® II performance, in the U.S., contact your local 3M sales office, your professional audio dealer, or call International Tapetronics Corporation/3M at 800-447-0414 or collect 309-828-1381 from Alaska or Illinois. In Canada, call Maruno Electronics, Ltd. at 416-255-9108. In other countries outside the U.S., contact your ITC cartridge machine representative.



Reel-to-Reel Performance with Cartridge Convenience

# ScotchCart® II

Revolutionary Design, Impressive Performance and Long Life

## REVOLUTIONARY DESIGN

The ScotchCart® II broadcast cartridge represents a breakthrough in technology beyond anything previously experienced in the industry. A revolutionary design eliminates pressure pads, utilizes a non-rotating hub, and now includes . . . a new, high-output, low-noise, lubricated tape for recording at high levels without performance loss. Tape and cartridge compliment each other like never before in the ScotchCart® II broadcast cartridge.

Setting an industry precedent, the ScotchCart® II broadcast cartridge utilizes a passive system of internal tape guidance, which allows your cartridge machine to do a much more precise job. This design, combined with the new tape, makes the ScotchCart® II broadcast cartridge the most reliable, stable and repeatable cartridge available.

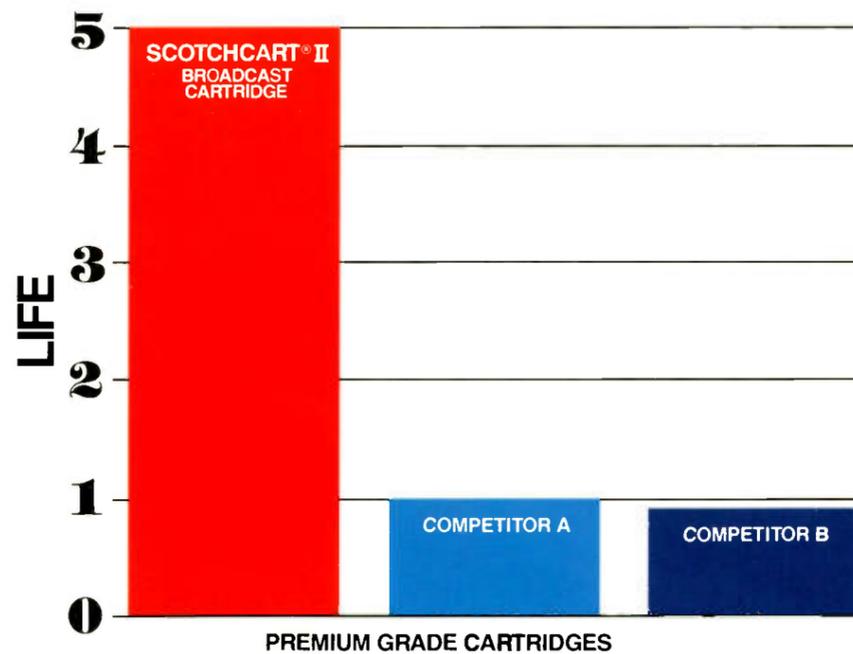
## IMPRESSIVE PERFORMANCE

To be successful in today's competitive environment, professional broadcasters need the best. The ScotchCart® II broadcast cartridge clearly outperforms conventional cartridges. The ScotchCart® II broadcast cartridge sounds crisp and clean, and eliminates the excessive modulation noise which results from the rubbing effects of pressure pads and the mechanical irregularities of rotating

hubs. When used with quality equipment, the ScotchCart® II broadcast cartridge is capable of frequency response equalling professional reel-to-reel performance.

## LONG LIFE

With five times the average life of its nearest premium grade cartridge competitor and superior audio performance, the ScotchCart® II broadcast cartridge is the best value ever.



\*Life results are based upon tests using 3.5 minute length premium grade cartridges and ITC cartridge machines. A cartridge was considered at the end of useful life when it reached a 5 dB frequency response loss at 10 kHz, .5% DIN weighted flutter, or mechanical failure. These criteria represent easily recognizable problems that should result in the cartridge being removed from service.

NAB bead penetration and centering marks to facilitate head block and cartridge guide adjustment.

No pressure pads to cause troublesome tape steering and wear or induce modulation noise.

Built-in magnetic bead shield to protect beads from stray radiated hum and low frequency noise.

Cart cover made of polycarbonate materials to insure long lasting, break resistant wear.

Naturally lubricated concave guides gently position tape to allow the cartridge machine to do the critical guidance.

Window for visual splice identification.

High output, low noise, studio-grade tape is capable of impressive frequency response and higher recording levels for improved signal to noise performance.

Patented dynamic tension control system to insure proper tape-to-head contact, provide constant tape tension and control tape looping inside the cartridge.

Naturally lubricated hub material with glass bead fill has broad temperature stability and resists warpage for consistent performance.

Four screw antiwarp construction for an extremely rigid body that resists flexing.

Non-rotating hub to reduce wow and flutter; eliminate annoying rotating hub rattle and minimize stop cue over-shoot.

Adjustable cam to control tape loop for maximum life.

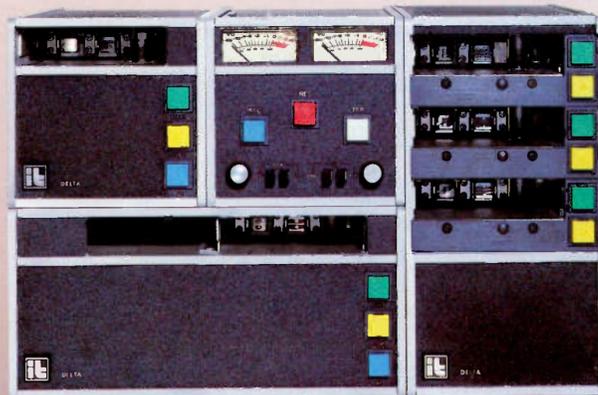
Tape exits naturally from the hub center (instead of curling up over the pack) to reduce edge stress and debris for extended tape life.

Interlocking tabs in cover and base to eliminate sliding when cartridges are stacked.



# A The DELTA Series from ITC: Popularity through proven performance.

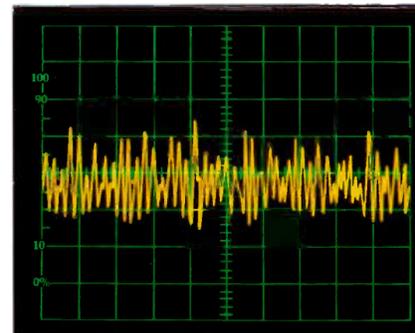
We're absolutely delighted so many broadcasters everywhere switched their loyalty to the DELTA series. These broadcasters demonstrated again what makes them marketplace leaders - concern for their listeners. They know the DELTA series



provides what today's listener is asking for - clearly superior audio quality. Since its introduction, over eighteen months ago, more DELTA cart machines have been installed in radio stations around the world than any other cart machine. And, that's music to their listeners' ears.

## A SOUND DIFFERENCE

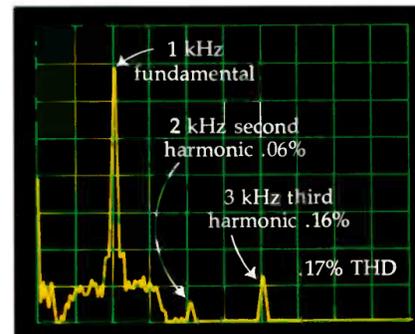
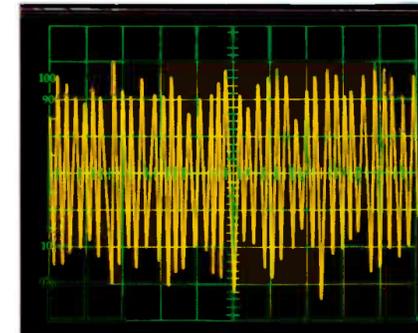
### DELTA Series



### DELTA Series

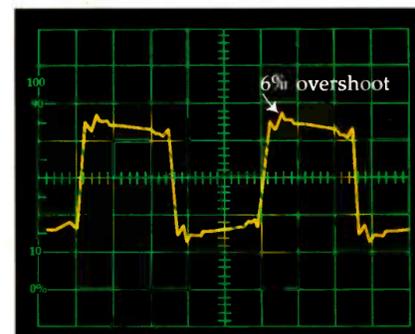
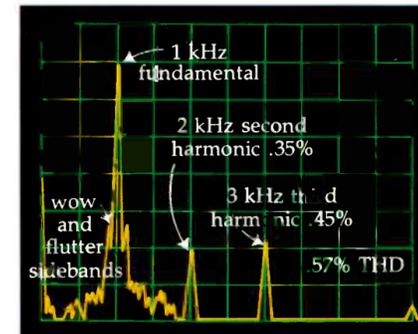
54% Less  
Wow and  
Flutter

### PREMIUM Line



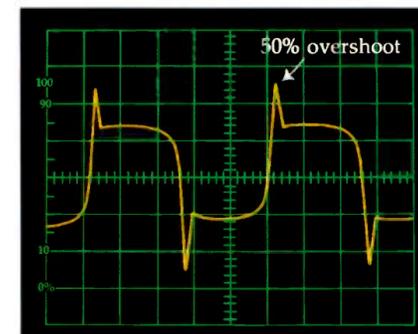
### DELTA Series

70% Less  
Total  
Harmonic  
Distortion



### DELTA Series

88% Less  
Overshoot



All measurements using ScotchCart™ broadcast cartridges and recorded at standard set-up levels for machines. DELTA series reference is 250 nWb/m, Premium line is 160 nWb/m. Wow and flutter graphs depict demodulated flutter from a standard wow and flutter meter. Overshoot is referenced to recorded 1 kHz square wave.

Call for purchase pricing or lease plan information.

Call toll-free 1-800-447-0414.

From Alaska, Hawaii or Illinois, call collect 1-309-828-1381.

International Tapetronics Corporation  
2425 South Main Street  
P.O. Box 241  
Bloomington, Illinois 61701



Q. Can you name the most popular musical group for the last year and a half?



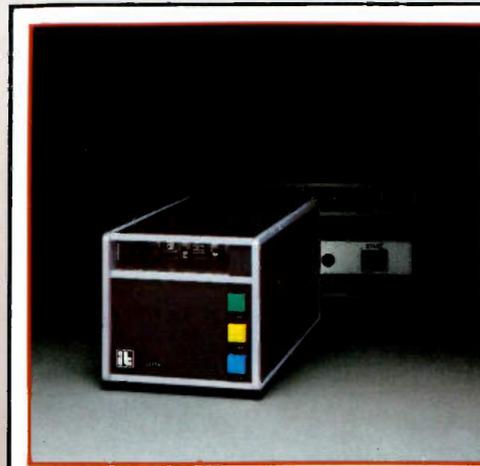
## BROADCASTER - DESIGNED FOR BROADCASTERS

Broadcasters actually began envisioning the DELTA series 15 years ago when its predecessor, the Premium line, was introduced. ITC collected your thoughts and suggestions through the years and incorporated them into this latest generation, the DELTA cart machines. You'll notice the improvement the instant you see and hear the DELTA series...

- **Improved audio quality** for greater signal to noise performance, lower wow and flutter and better high frequency definition means clear, crisp and accurate sound.
- **High speed cue and other operational features** save operator time and patience.
- **Enhanced traditional reliability** through careful design and component selection insures longer component and motor life.
- **Convenient functional replacement modules and interchangeable, plug-in P.C. boards** make for quick, simplified maintainability.
- **Compact size** makes the DELTA series perfect for today's tighter studio size limitations.

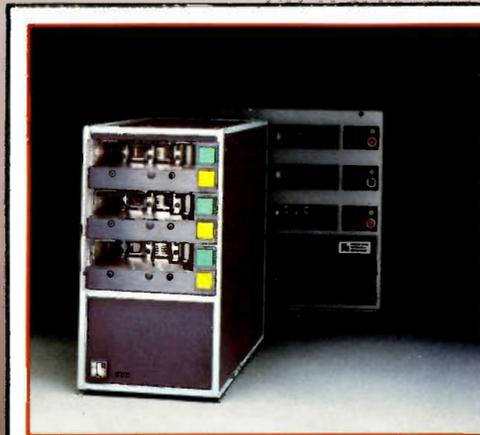
Compare the industry leading features and performance specs designed into the DELTA series with the previous industry standard, the Premium line. You'll discover, for audio performance, operational convenience, and reliability there's really no contest. Broadcasters have designed the DELTA series to be in a class by itself!

## "DELTA" SERIES VS "PREMIUM" LINE



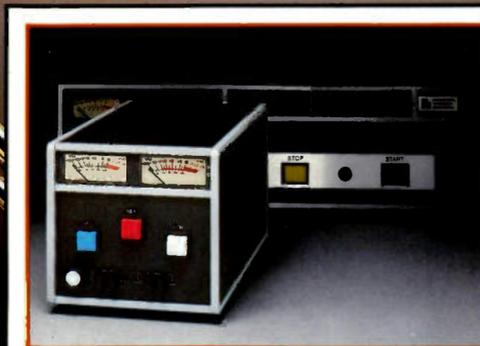
### DELTA I vs SP

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Crystal Referenced Servo Motor for low wow and flutter</li> <li>• High-Speed Cue is standard for convenience</li> <li>• NE 5500 Series Op Amps for Clean Audio</li> <li>• Digital Cue Detector for Accuracy and Reliability</li> <li>• Transformerless Balanced Output available for performance</li> <li>• Toroidal Power Supply Transformer means Less Hum and Heat</li> <li>• Converts to Recorder with the Addition of a DELTA IV Record Amp.</li> <li>• "Cart Played" Indication and Lockout are standard operator convenience features</li> <li>• XLR Type Professional Audio Connectors provide reliable connections</li> </ul> | <ul style="list-style-type: none"> <li>• Hysteresis - Synchronous Motor</li> <li>• High-Speed cue - not available</li> <li>• Discrete Transistor Amps</li> <li>• LC Cue Detector</li> <li>• Transformerless Balanced Output - not available</li> <li>• Conventional Laminated Frame Transformer</li> <li>• Not Convertible to Recorder</li> <li>• "Cart Played" Indication and Lockout - not available</li> <li>• Jones Plugs for audio connections</li> </ul> |
|---|--|



### DELTA III vs 3D

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Unique two (2) bearing D.C. Servo motor design for long life</li> <li>• All three decks slide out independently for easy in-use servicing</li> <li>• All DELTA I features, except High-Speed Cue</li> </ul> | <ul style="list-style-type: none"> <li>• Standard three (3) bearing Hysteresis Synchronous motor design</li> <li>• Bottom deck fixed with hinged front panel and multiple cable connections</li> <li>• All SP features and convertible to Recorder</li> </ul> |
|--|---|



### DELTA IV Record Amplifier vs RP Recorder

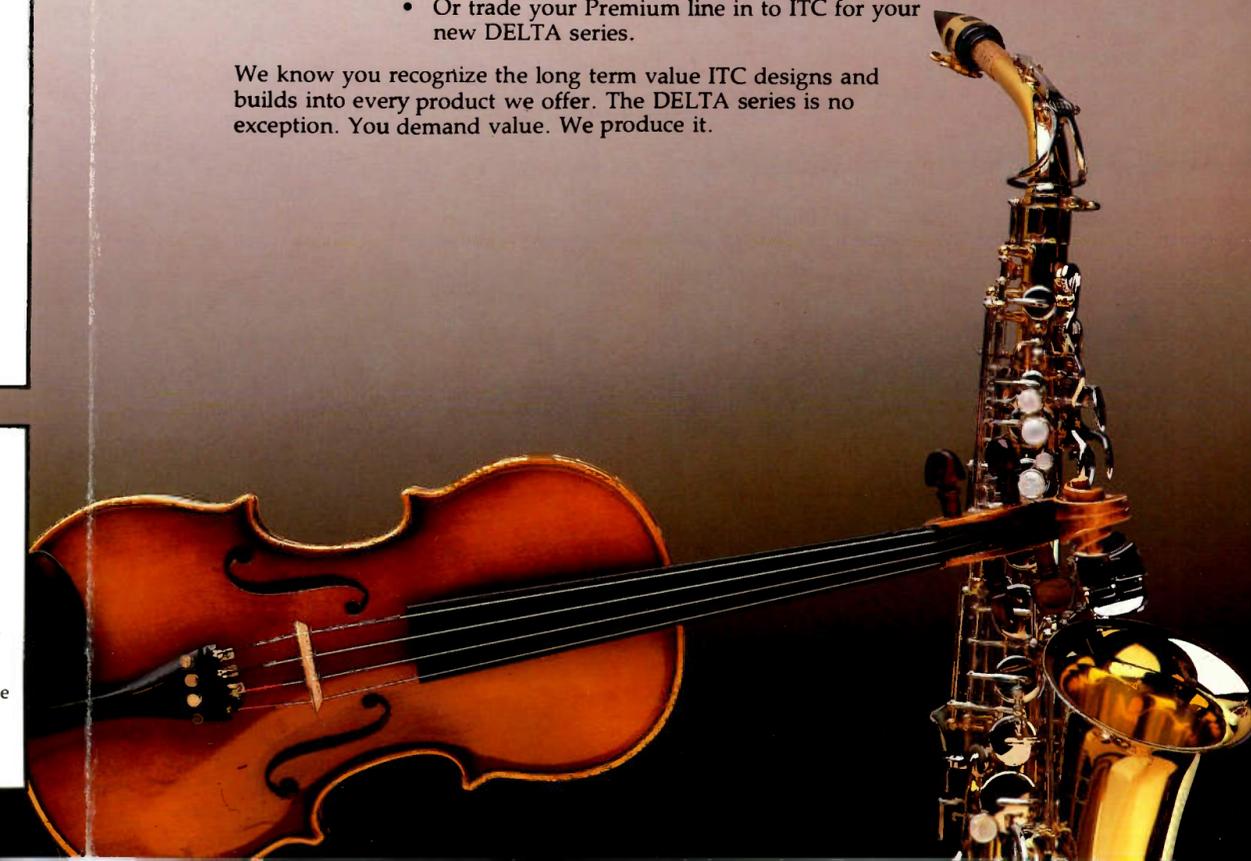
- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Versatile Transformerless Balanced Input is Selectable</li> <li>• Convenient Front Panel Selection of all metering modes</li> <li>• 119 kHz Bias Frequency for clean audio</li> <li>• Active Bias Mixing for lower intermodulation distortion</li> <li>• Accurate Crystal Referenced Cue Tone Generation</li> </ul> | <ul style="list-style-type: none"> <li>• Transformerless Balanced Input-not available</li> <li>• Front Panel Selection of all metering modes - not available</li> <li>• 70 kHz Bias Frequency</li> <li>• Active Bias Mixing-not available</li> <li>• LC Generated Cue Tones</li> </ul> |
|--|--|

## YOUR OLDER "PREMIUM" LINE MACHINES: VERSATILE AND VALUABLE

Upgrading to the DELTA series doesn't mean retiring your Premium line machines. These older machines will still perform a variety of valuable functions at your station. Here's what others have done:

- Connect a Premium line cart machine with an ITC "FB-1" Telephone Interface and you've got a fully automated pre-recorded message machine. Gives listeners easy, direct telephone access to information about weather, sports, concerts, etc. That's a service you can sell to your advertisers.
- Put your Premium line to work in the production studio or use it for playback in the production manager's office.
- Place your Premium line in the newsroom and improve the quality of your pre-recorded news segments.
- Set a Premium line playback unit in each sales office.
- Or trade your Premium line in to ITC for your new DELTA series.

We know you recognize the long term value ITC designs and builds into every product we offer. The DELTA series is no exception. You demand value. We produce it.



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# FREE

## "FB-1" TELEPHONE INTERFACE

When you order a DELTA series playback machine -see details below.

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*Limited Offer*

Ask for a FREE "FB-1" telephone interface with each DELTA series playback cart machine you order during October and November, shipped to you before January 1, 1985.

Not only do you receive the FB-1 telephone interface for free, but remember, the FB-1 telephone interface was designed to help you increase sales revenues. For a long time, ITC received requests for a telephone answering interface. Stations wanted a way to utilize their ITC cart machines to replace unreliable cassette based auto-answer telephone systems.

The FB-1 telephone interface allows you to take an ITC cart machine (the FB-1 telephone interface works with all ITC cart machines except the DELTA series) and hook it to a standard phone line for money-making information services, like weather information, sports scores, concert dates, and many other services you can sell to advertisers. When someone dials the call-in number, the FB-1 telephone interface answers the ring, starts the cart machine, which plays the message and then hangs up the line.

You can also use the FB-1 telephone interface in conjunction with a telephone to play sales demos down the phone line, or to gain out-call research data to help determine your music programming.

We think the FB-1 telephone interface can add a steady income using your older Premium line cart machines. Buy a DELTA playback cart machine today and find out for yourself by asking for your free FB-1 telephone interface. Call us toll-free at 800-447-0414, or in Alaska, Hawaii and Illinois, call collect at 309-828-1831.





# "OMEGA" SERIES SPECIFICATIONS

## POWER:

- A. 105-132 VAC or 210-264 VAC  
B. 50/60 Hz

## POWER CONSUMPTION:

- A. Mono Reproducer: 45 VA Typ.; 65 VA Max.  
B. Stereo Reproducer: 45 VA Typ.; 65 VA Max.  
C. Mono Recorder/Reproducer: 50 VA Typ.; 70 VA Max.

## TAPE SPEED:

- A. 7.5 IPS (19 cm/s) Standard  
B. 3.75 IPS (9.5 cm/s) Strappable Option

## SPEED ACCURACY:

Better than +/- 0.2%

## RECORD/PLAY FLUTTER:

- A. Play Max.: 0.12% DIN Wtd. @ 7.5 IPS  
B. Rec/Play Max.: 0.15% DIN Wtd. @ 7.5 IPS

## AUDIO OUTPUT CONFIGURATION:

Transformer Coupled

## AUDIO OUTPUT IMPEDANCES:

600 Ohm Recommended Load Impedance  
(180 Ohm Source Impedance)

## AUDIO OUTPUT LEVEL:

+ 18 dBm Before Clipping Into  
600 Ohm Load

## DISTORTION:\*

System: 1.5% or less THD. (Tape dependent)

## NOISE:

A.\* Signal to Noise: Measured with bias/  
no signal.

MONO	STEREO	MIC-MONO R/P
56 dB (or better)	54 dB (or better)	51 dB (or better)

B.\* Signal to Noise: No tape running;  
ScotchCart® cartridge in place.

MONO	STEREO
58 dB (or better)	56 dB (or better)

C. Squelch Noise: 70 dB or better  
(Noise Measurements are 20 Hz-20 kHz  
Bandlimited. Unweighted.)

## CROSSTALK (SYSTEM):\*

-50 dB Minimum Separation Between  
Any Two Channels.

## FREQUENCY RESPONSE:\*

- A. Playback:  
+/- 2.0 dB, 50 Hz - 16 kHz  
B. R/P-Line Level Input:  
+/- 2.0 dB, 50 Hz - 16 kHz  
C. R/P-MIC Level Input:  
+/- 3.0 dB, 300 Hz - 10 kHz

## EQUALIZATION:

- A. 1975 NAB: Standard  
B. 1964 NAB: Optional  
C. CCIR: Optional

## CUE SIGNALS:

(Conforms to NAB Specification)

- A. NAB Primary Cue: 1 kHz  
B. NAB Secondary Cue: 150 Hz

## AUDIO INPUT SENSITIVITY:

- A. Line Input: 0 dBm nominal  
B. MIC Input: -70 dBV nominal

## AUDIO INPUT CONFIGURATION:

- A. Line Input-Transformer Coupled:  
1. 20K Ohm Bridging Standard  
2. Strappable for 150/600 Ohms  
Terminating Impedance

## B. Microphone Input:

1. Unbalanced  
2. Input Impedance: 50K Ohms

## METERING:

Taut Band Movement with "A" Scale

## BIAS:

111.84 kHz, Crystal-referenced

## CARTRIDGE SIZE:

NAB A & AA

## AMBIENT OPERATING

## TEMPERATURE RANGE:

10 to 50 Degrees C. (50 to 122 Degrees F.)

## MOUNTING:

- A. Table-top Standard  
B. Rack-mount Optional with URM-0001  
Rack-mount Kit. Filler Panels Also  
Available.

## DIMENSIONS:

- A. Width: 14.6 cm (5.75")  
B. Depth: 38.1 cm (15.00")  
C. Height: 13.34 cm (5.25")  
Add 1 cm (.375") for feet.

## WEIGHT (Typical)

All Machines: 6.84 kg (15 lbs.)  
Total Max. Shipping Weight: 9.1 kg (20 lbs.)

\*Note: Items indicated (\*) are specified using  
a ScotchCart® broadcast cartridge at a  
reference level of 1 kHz at 250 nWb/m.

International Tapetronics Corporation/3M  
reserves the right to change products and  
specifications without notice.

# "OMEGA" SERIES



## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

More International Tapetronics Corporation/3M  
cartridge machines are installed in radio  
stations around the world each year than all  
other manufacturers' cartridge machines  
combined. Call today for more information on  
ITC's complete line of cartridge machines.

- 99B Cartridge Machines, "The Best"
- DELTA Cartridge Machines, "Today's Most  
Popular Cartridge Machines"
- OMEGA Cartridge Machines, "Affordable  
Performance You Can Trust"

When better performance emerges, it will  
come from International Tapetronics  
Corporation/3M, "The Leader in Reliability  
and Service."

### TO ORDER OR FOR MORE INFORMATION CALL TOLL FREE 800-447-0414

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"AFFORDABLE PERFORMANCE YOU CAN TRUST"

From  
International Tapetronics Corporation/3M



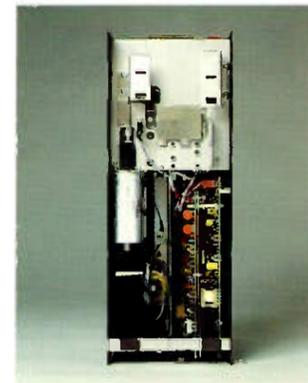
## “OMEGA” CARTRIDGE MACHINES

### Design Engineered With You In Mind...



**Microprocessor technology** facilitates many operational conveniences and economical maintainability.

- Adjustment-free cue tone levels, both generation and detection.
- Crystal referenced cue tone and bias frequencies further eliminate adjustments.
- Cart played indication and cart replay lock-out reduce possible operator errors.
- Secondary cue tone detection mutes the audio thereby reducing on-air noise.
- Flashing ready lamp indicates cartridge has been played.
- Green run lamp flashes on 150 Hz secondary cue tone detection allowing visual verification.



#### Rugged design

- 1/2 inch milled aluminum deck resists warping and is long wearing.
- Permanently lubricated air damped solenoid provides extended life.
- Precision milled aluminum head block assembly for stable adjustments.
- Long life stereo heads.
- Dual overhead cart hold down mechanism for precise cartridge positioning.
- Self-wiping contacts in front panel switches for long life.
- Rear panel screw terminal connections provide convenient connection for audio and remote control circuits.

## WHAT THE “OMEGA” SERIES BRINGS TO YOU

OMEGA series cartridge machines embody traditional ITC quality at an affordable price with features to delight everyone... **including low cost stereo performance.**

The OMEGA series is yet another example of International Tapetronics Corporation/3M's commitment to providing you with rugged and reliable, high technology cartridge equipment. Whether you are using the OMEGA series in your on-air and production studios or for other important uses throughout the station, you'll have affordable performance you can trust. What's more, you can have stereo reproducers now or field upgrade from mono to stereo reproducers in the future.

The OMEGA series is covered by the same bold 2-year warranty International Tapetronics Corporation/3M offers on all its new equipment. In addition, you receive a detailed, comprehensive technical manual. All this reinforced by the

finest, readily accessible technical service support group in the industry.

#### OMEGA Series Stereo Reproducers

OMEGA stereo reproducers have simple, clean electronics for clear, accurate audio reproduction. Standard features include:

- 150 Hertz secondary cue tone detection
- Long life stereo heads
- Modular design for easy servicing
- Efficient DC brushless servo motor providing stable, cool operation
- Compact design for today's tighter studio size limitations
- Flashing ready lamp indicating cartridge has been played

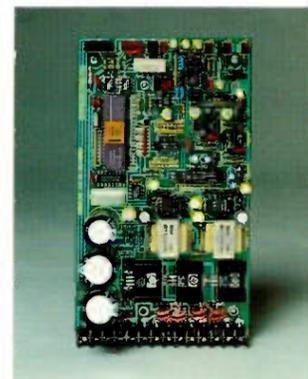
Match your OMEGA stereo reproducers with a high-quality stereo recorder such as the ITC “DELTA” or “99B” recorder and insure optimum playback audio quality from your OMEGA reproducers.

#### OMEGA Series Mono Reproducers

OMEGA mono reproducers and mono recorders have all the features and contain the same rugged and reliable, high technology components for dependable operation as the OMEGA stereo reproducers. **Plus, the OMEGA mono reproducers are even field upgradeable to stereo!** To complete the upgrade and insure optimum playback audio quality, merely match your OMEGA stereo reproducers with a high-quality stereo recorder such as the ITC “DELTA” or “99B” recorder.

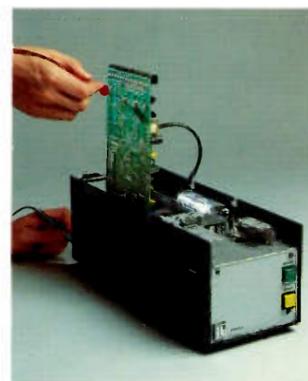
#### Omega Series Mono Recorders

The OMEGA mono recorders have a selectable 1 kHz cue tone defeat and include a built-in microphone preamp. With direct microphone input and ITC's “FB-1” telephone interface device, your station can offer automatic dial-in weather information, sports scores, concert dates and perform a wide variety of newsroom and research functions.



#### Reliable components

- NE 5500 Series Op Amps for high-speed, low-noise audio performance.
- Efficient DC brushless servo motor providing stable, cool operation.
- Solid state control circuits eliminate the need for troublesome relays.
- Heavy duty trimpots for long dependable life.
- Voltage regulated power supply for stable operation of logic and audio circuits.
- Efficient toroidal power supply transformer reduces stray hum fields.
- G-10 Glass Epoxy P.C. cards resist heat and breakage.



#### Quick, easy maintainability

- Swing-out P.C. cards eliminate need for test extenders.
- Component legends on P.C. cards enable quick reference locations.
- Readily accessible adjustments.
- Polycarbonate front panel overlay resists dirt.
- Securely latching top cover, removable for maximum accessibility.
- Detailed, comprehensive technical manual.

# FB-1

## TELEPHONE ANSWERING INTERFACE



**AUTOMATIC TELEPHONE DIAL-IN INFORMATION**

**From  
International Tapetronics Corporation/3M**

# RELIABLE AUTOMATIC TELEPHONE DIAL-IN INFORMATION SYSTEM

Provide fully automated, reliable and unattended playing of tape messages over a standard telephone line simply by connecting the FB-1 telephone answering interface to specific International Tapetronics Corporation/3M tape cartridge machines. The FB-1 telephone answering interface can also be used in conjunction with 800, 876 and 900 series telephone services.

## Money Making and Money Saving Applications

### ■ Newsrooms, TV Stations, Radio Stations

An automatic telephone dial-in information system provides listeners with information, and is a service that can produce revenue. Dial-in weather information, sports scores, concert dates, and the sale of other sponsored services offer steady monthly income. An automatic telephone dial-in information system can also be used to facilitate market research when connected to a call counter or by sampling music to radio audiences.

### ■ Government Agencies

Automatically provide agency hours, important dates, and other information via telephone for improved service while freeing up valuable personnel for more productive duties.

### ■ Educational Institutions

Free personnel from repetitive tasks by automatically providing such

information as school closings, enrollment dates, course information, and campus activities via the telephone.

### ■ Private Business

Institute a cost-effective method of automatically presenting advertising messages of all kinds.

### Fully Automated, Easy to Use

The FB-1 telephone answering interface connects a telephone line with any ITC tape cartridge machine (except the DELTA series), providing answer-only access to a recorded

tape message. The FB-1 telephone answering interface automatically connects callers to the tape cartridge machine and starts the message. When the message is over, the tape cartridge automatically recues, and is ready for another call. A call will not be answered unless a tape cartridge is in the machine; nor will it be answered if the tape cartridge is already running. It will signal busy until the message is finished playing and automatically recued.

### Easy to Install

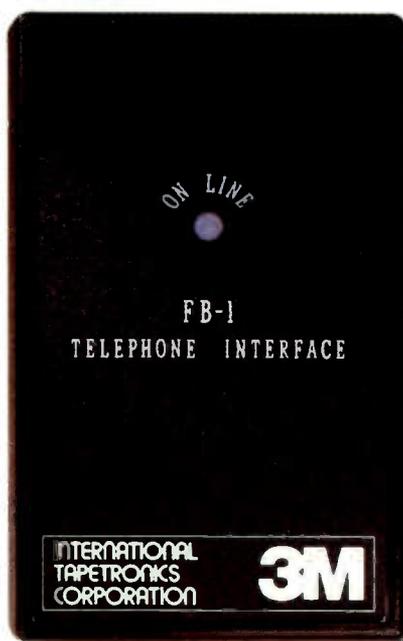
A modular plug connects the FB-1 to a telephone line, and with a few simple connections, to the tape cartridge machine.

### Handles Heavy Call Load

Multiple phone lines can be accommodated by multiple systems. Also, the use of stepping lines and multiple FB-1 systems permits handling of heavy call loads during peak demand periods.

### Extremely Reliable

Automatic telephone dial-in information systems utilizing ITC tape cartridge machines have been proven in the demanding world of broadcasting, where the need for repeatable announcements and reliability is a way of life. The FB-1 telephone answering interface is FCC approved, carries a 30-day satisfaction guarantee, and a 2-year warranty on parts and factory labor.



FB-1 Telephone Answering Interface

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

More International Tapetronics Corporation/3M tape cartridge machines are installed in radio stations around the world each year than all other manufacturers' tape cartridge machines combined. All new ITC equipment carries a two-year warranty on parts and factory labor. Call today for more information on ITC's complete line of tape cartridge machines.

- 99B Cartridge Machines, "The Best"
- DELTA Cartridge Machines, "Today's Most Popular Cartridge Machines"

- OMEGA Cartridge Machines, "Affordable Performance You Can Trust"

When newer technology emerges, it will come from International Tapetronics Corporation/3M "The Leader in Reliability and Service".

**TO ORDER OR FOR MORE INFORMATION  
CALL TOLL FREE 800-447-0414**

From Alaska or Illinois, call collect  
309-828-1381.

In Canada, call Maruno Electronics, Ltd.,  
416-255-9108.

# "ESL V" SPECIFICATIONS

## POWER:

- A. 105-132 VAC or 210-264 VAC
- B. 50/60 Hz.

## POWER CONSUMPTION:

- A. 11 VA Minimum; 650 VA Maximum @ 120V

## TAPE SPEED:

- A. Splice locate cycle: 30 IPS (76.2 cm/s)
- B. Erase cycle: 1.875 IPS (4.76 cm/s)

## ERASE DEPTH: (Using ScotchCart®II Broadcast Cartridge)

- A. -55 dB, bandlimited (20 Hz-20 kHz)
- B. Typical residual coherent noise, 75 dB below 1 kHz, recorded at 250 nWb/m

## CYCLE TIME (typical): Complete erase/splice locate cycle

- A. Standard Configuration: 30 seconds ERASE, plus 1/4 total tape time

- B. Optimized for ScotchCart®II Broadcast Cartridge: 22 seconds ERASE, plus 1/4 total tape time

## CARTRIDGE SIZE:

NAB A & AA

## SPLICE DETECTION SENSITIVITY:

Detector senses 1/2 mil. or greater tape thickness change

## AMBIENT OPERATING TEMPERATURE:

4 to 50 degrees C. (39 to 122 degrees F.)

## STORAGE TEMPERATURE RANGE:

-40 to +85 degrees C. (-40 to +185 degrees F.)

## RELATIVE HUMIDITY OPERATING RANGE:

25 to 80% without condensation

## MOUNTING:

- A. Table-top standard (w/feet)

- B. Rack-mount optional w/URM-0001 rack-mount kit (Three units may be mounted side-by-side)

## DIMENSIONS:

- A. Width: 14.6 cm (5.75")
- B. Depth: 30.5 cm (12.00")
- C. Height: 13.34 cm (5.25")  
Add 1 cm for feet

## WEIGHT:

- A. Typical: 6.12 kg (13.5 lbs.)
- B. Total maximum shipping weight: 7.94 kg (17.5 lbs.)

The ESL V eraser/splice locator, its drive system, splice finder, and erase circuitry will operate with any NAB standard A/AA size tape cartridge; however, performance may vary. The specifications referred to herein are referenced to the Scotchcart®II broadcast cartridge.

International Tapetronics Corporation/3M reserves the right to change products and specifications without notice.

# ESL V

## ERASER/SPLICE LOCATOR



## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

More International Tapetronics Corporation/3M tape cartridge machines are installed in radio stations around the world each year than all other manufacturers' tape cartridge machines combined. All new ITC equipment carries a two-year warranty on parts and factory labor. Call today for more information on ITC's complete line of tape cartridge machines.

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In Canada, call Maruno Electronics, Ltd.,  
416-255-9108.



# “ESL V” FEATURES

## DEEP, CONSISTENT CARTRIDGE ERASING AND SPLICE LOCATING IN A SINGLE, AUTOMATIC STEP

Eliminate the tedious task of manually bulk erasing cartridges and visually locating tape splices. Use the ESL V eraser/splice locator to combine erasing and splice locating into a single, automatic operation.

### Better Sound

The erase of the ESL V eraser/splice locator is deep and consistent. You can count on a clean erasure every time because the function is controlled by a microprocessor. The ESL V eraser/splice locator was designed for use with NAB A and AA size cartridges, including those loaded with today's high-output, low-noise tapes.

The tape splice is accurately positioned just past the playback head, every time. Recording over the tape splice is eliminated when you use the ESL V eraser/splice locator, thereby insuring better audio quality.

### Saves Time

A quick, automatic erase frees the

operator from manually bulk erasing the cartridge. The erase cycle time can be even further reduced 26% when using a ScotchCart® II broadcast cartridge, due to the revolutionary design of this cartridge.

High speed (30 IPS) splice locating frees the operator from visually searching for the tape splice. The operator can perform other tasks, such as pre-reading copy, cueing tapes or locating sound effects and music, while the ESL V eraser/splice locator properly prepares the cartridge for recording.

### Easy To Operate

Front panel controls are clearly marked and easy to use by even inexperienced personnel. The operator simply inserts the cartridge into the machine and selects the desired function. The machine logic takes over from there. ESL V logic will erase the cartridge using a carefully designed erase coil ramp-

down circuit. Then the cartridge tape is automatically high speed forwarded to its splice. Individual erase or splice locate functions may also be selected. The machine's top cover has been designed for easy viewing of the cartridge while these operations are taking place.

### Incredibly Reliable

Built with traditional ITC quality, the ESL V eraser/splice locator requires no electronic adjustments and is highly resistant to shock and external vibrations. The microprocessor logic is even designed to monitor the erase coil temperature to prevent overheating.

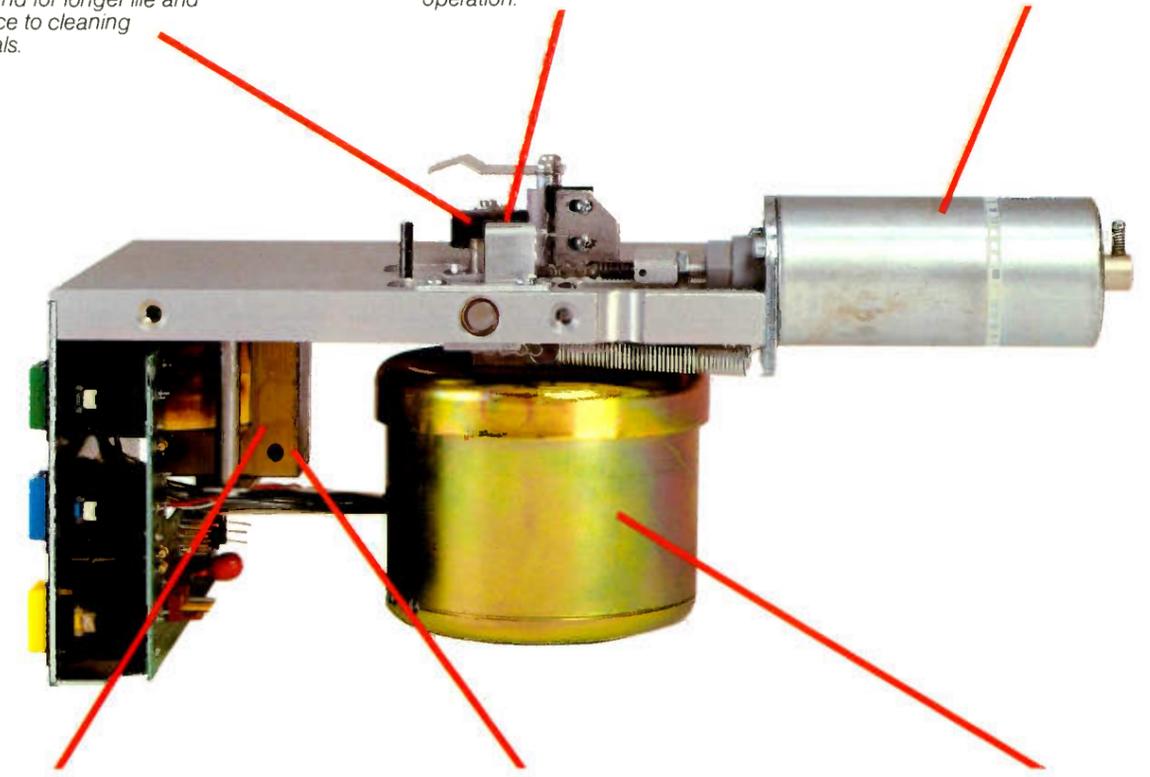
### Saves Money

The ESL V eraser/splice locator saves money by reducing production time. It also eliminates the need to re-record cartridges due to poor erasure or recording quality caused by recording over the tape splice.

*Pressure roller utilizes a sintered bronze sleeve bearing and 525-K rubber compound for longer life and resistance to cleaning chemicals.*

*Hall-effect splice sensor uses microprocessor technology for adjustment free, highly reliable operation.*

*Powerful air-damped bottoming solenoid for quick, quiet, reliable operation.*



*Powerful, specially designed erase coil provides erase depth lower than the noise floor of modern high-output, low-noise tape formulations.*

*Erase coil temperature continuously monitored by internally mounted sensor. Should elevated erase coil temperatures be sensed, the microprocessor disables the erase function until the coil returns to a safe operating temperature.*

*D.C. Servo motor with electronically controlled speed regulation for accurate and gentle tape handling.*

### Microprocessor Technology

The ESL V eraser/splice locator system functions are controlled by a microprocessor. The microprocessor provides fast, dependable operation and virtually eliminates the need for electromechanical adjustments.

### Superior Eraseability

The erase coil provides a quick, clean erase on both conventional formulation tapes and newer, high-output, low-noise tapes. The microprocessor slowly ramps down the erase field, minimizing residual

noise on the tape, and provides a consistent erase from cartridge to cartridge.

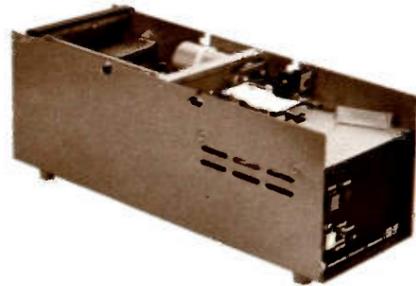
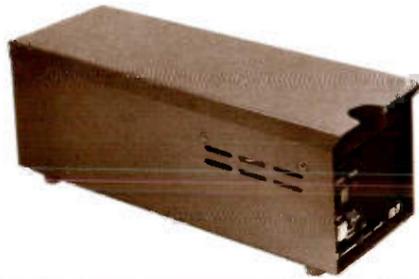
### DC Servo Motor

The ESL V eraser/splice locator uses a reliable DC Servo capstan motor, with accurate speed control provided by the microprocessor. The machine has a revolutionary splice detect mechanism, which utilizes a hall-effect sensor and patented microprocessor-driven software to provide accurate splice location. No operator adjustments are needed

under normal operation. Highly accurate and repeatable pressure roller pressure is provided by our air-damped, bottoming type solenoid.

### Easy To Service

Access for servicing is made via a removable top cover. Full access to all electrical and mechanical components is accomplished with the removal of just one screw. Assemblies are concentrated in two major modules which can be easily moved away from the chassis.



The top cover has a cut-out to facilitate insertion of the cartridge. In a stepped-back position, it provides easy access to the mechanism and allows even more rapid feeding of cartridges. It can be fully removed. The cover is tightly fitted to avoid vibration during operation.

## ESL-IV SERIES Cartridge Tape Eraser / Splice Locator

### SPECIFICATIONS

#### POWER:

117 volts, AC, 60 Hz, 50 watts continuous, 625 volt amperes intermittent (at peak erasure).

#### TAPE SPEED:

25-29 IPS. Direct-drive, high-speed capstan motor with permanently lubricated ball bearings.

#### SPLICE SENSITIVITY:

Senses splicing tape thickness of 1/2 mil or greater.

#### ERASE DEPTH:

45 dB\* or better 50 Hz to 15 kHz

#### TAPE CAPACITY:

NAB size AA cartridges.

#### CYCLE TIME:

For complete erase/splice location cycle:

Minimum	any length cartridge	15 sec.
Maximum	70 sec. cartridge	35 sec.
	10 1/2 min. cartridge	180 sec.

#### AMBIENT TEMPERATURE:

55 degrees C., 131 degrees F., maximum.

#### MOUNTING:

Table top mounting.

#### DIMENSIONS:

5 3/4" wide, 15" deep, 5 1/4" high (add 3/8" for feet).

#### WEIGHT:

17 lbs.

\* As referenced to "0" level at 1 kHz (fluxivity level 160 nW/m)

Made under one or more of the following patents: 3,800,323; 3,801,043; 3,801,329; 3,833,935; 3,865,719; 3,932,887; 4,142,221.



#### Guaranteed

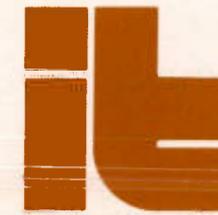
The ITC ESL-IV guarantees good sound, time savings, convenience, fool-proof operation and performance. At a very modest cost.

All this plus ITC's famous thirty-day guarantee of satisfaction and bold two-year warranty on parts and factory labor.



**INTERNATIONAL TAPETRONICS CORPORATION**  
2425 South Main Street, Bloomington, Illinois 61701

**CALL TOLL-FREE: 800-447-0414**  
In Alaska, Hawaii or Illinois call collect: (309) 828-1381



## ESL-IV SERIES Cartridge Tape Eraser / Splice Locator



## Combines cartridge erasing and splice locating in a single, automatic operation.

### For Better Sound

Clean, crisp recording — and on-air sound — requires that tapes be completely erased and the splice located and positioned just past the playback head. If the erasure is not complete there will be noise superimposed on the new recording. And if the new sound is recorded over a splice, sound quality will be poor — or sound will drop out entirely — for that period. If a high frequency cue tone is recorded on the splice, as might occur in an automated system, the tone may be garbled. For these reasons, automated stations, large stations — and all stations — concerned with their sound — locate splices in conjunction with cartridge erasure.

### Manual Operation A Problem

USING A HAND-HELD BULK ERASER does not always produce a uniformly erased tape. Positioning of the eraser, length of erasing time, operator-error and other factors all affect the outcome. For example, continuous use of the eraser will cause overheating and possible failure of the eraser. And, of course, use of the bulk eraser requires both hands and the full attention of the operator. Since most operators turn the tape cartridge over during erasure, the process may take twenty or thirty seconds.

### Splice locating also tedious

TO LOCATE A SPLICE VISUALLY, the operator has to place the cartridge in a regular machine (normally running at 7½ IPS), run it, and watch for the splice to appear at the playback head position. Depending on the tape length, it takes from several seconds to several minutes for the splice to appear. Sometimes the splice will elude the operator at the first pass and the cycle must be repeated. Because the process of locating splices is tedious and time consuming many stations elect instead to tolerate the loss of quality caused by recording over them.

### The ESL does both jobs with ease

The operator simply inserts a cartridge and pushes the "Start" button. The button lights up to indicate tape movement. A diagonal cartridge guide assures accurate positioning of the cartridge even when insertion is done rapidly or carelessly. This permits rapid handling of cartridges without risk of damage. A hold-down spring locks the cartridge solidly in position.

### 3 Modes

Any of three modes can be selected: combination, erase only, or splice locate only. The COMBINATION MODE involves two, sequential cycles. The erase cycle comes first and lasts 15 seconds. During the erase cycle, a light on the control panel glows red, dimming and then going out as erasing is accomplished. The splice locating cycle follows. The length of this cycle depends on the length of the tape and the position of the splice. Upon sensing the splice, tape motion stops and the machine returns to a "ready" condition. If the machine is started again, with the same cartridge left in place, the ESL-IV will ignore the erase cycle, going directly into the splice locator cycle. A "Stop" button permits the operator to over-ride any function, turning the machine off at any point, in any cycle, in any mode. A safety feature.

In the ERASE-ONLY MODE, the internal bulk eraser erases the cartridge.

the end of this 15 second cycle, tape motion stops. This mode is useful when the operator is more concerned with time savings than with production quality.

The SPLICE LOCATOR ONLY MODE is used where a tape has already been erased but where the splice has not been located. Or, where, for some reason, tape has multiple splices. In this mode, the machine goes directly into the splice locate cycle. When the splice is located, tape motion stops.

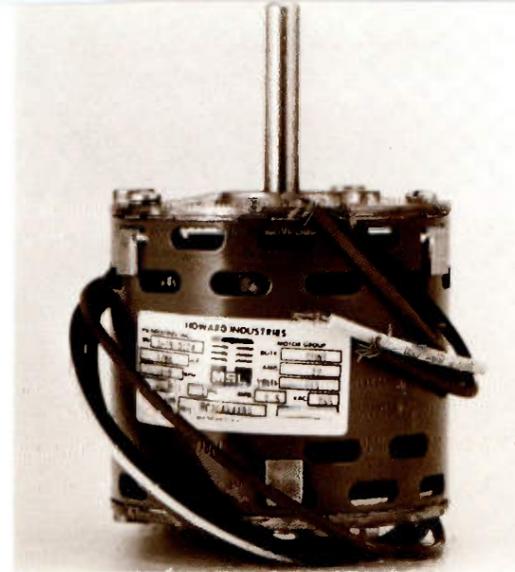
### Virtually Fool-Proof

The switches on the panel are easy to see and control, speeding operation and reducing the probability of error. The machine is very quiet in operation, highly resistant to shock, external vibration, and noise. This resistance is provided for by the massive, rugged construction of the machine and by the rejection of noise by its electronics. It is compact. Visually attractive.

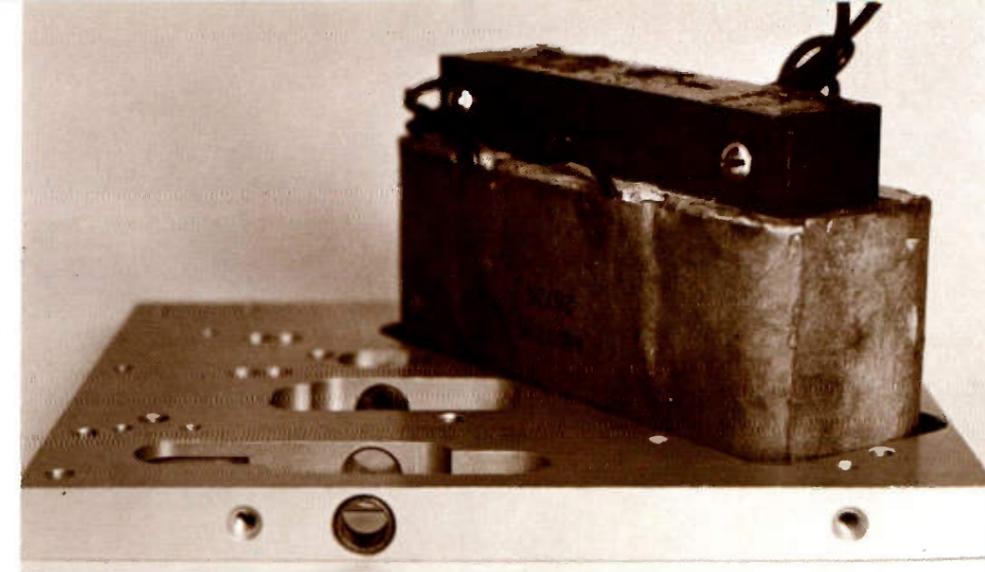
### Built With ITC Quality

The ESL is fast, running at about four times normal playing speed, without harmful stress to the tape. It is a fine quality machine, built to the same high standards you expect from ITC cartridge machines, using parts interchangeable with these machines. This assures long life, dependable service, and ease of servicing and parts replacement.

Angled cartridge guide permits rapid placement of cartridge.



Heavy-duty AC induction motor provides for precision tape travel at speeds between 25 and 29 inches per second. Reliable, long-lived. The motor is electrically isolated from the electronics, each enabled by a separate Micro-Switch. This permits the motor to be turned off when there is no cartridge in the machine, reducing deck heat.



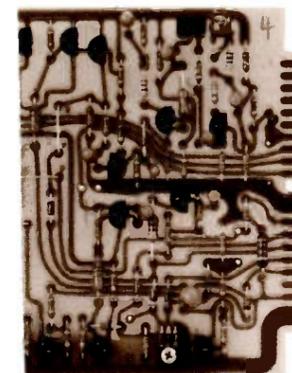
Half-inch thick, milled aluminum deck provides the massive support and stability needed to withstand shock and vibration and permit precision performance of all components.

The erase-coil is positioned horizontally on the tape deck so that the flux field is equally distributed, assuring uniform and complete erasure.

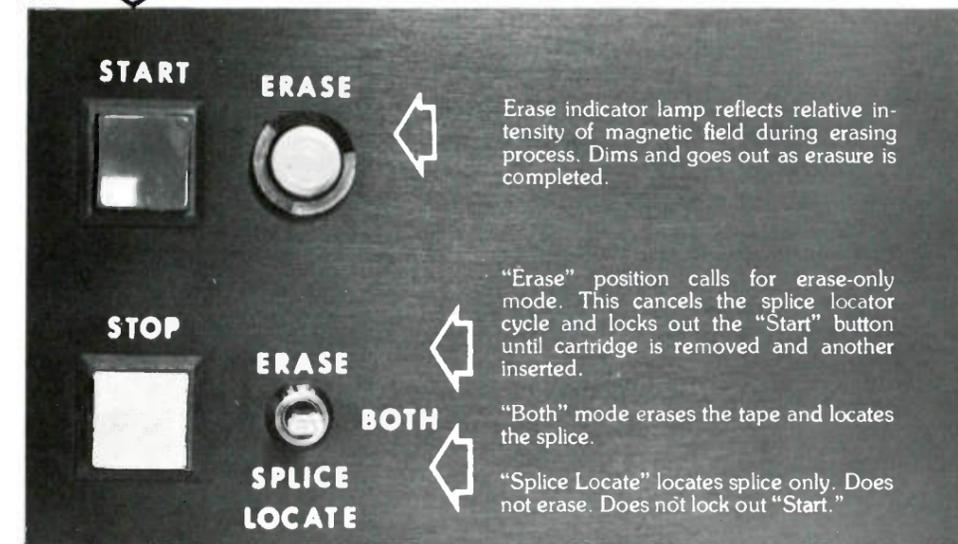
### Will Not Overheat

The design of the machine makes it almost impossible for the operator to subject the erase-coil to continuous duty, which can cause overheating and failure in manual erasers. The necessary "rest" period is provided in the combination mode by the splice locating cycle. In the erase mode, a cartridge must be removed and replaced before the machine will re-energize the coil. And, of course, in the splice finder only mode, the erase-coil is turned off. The operator, thus, cannot inadvertently damage the machine.

Electronics are totally accessible from back of machine. All high voltage electronics are on the mother board, out of reach of human hands. There are no high voltage electronics on the plug-in daughter board. The erase coil and other electronics are individually fused for safety.



"Start" button starts function called for by mode switch.



Erase indicator lamp reflects relative intensity of magnetic field during erasing process. Dims and goes out as erasure is completed.

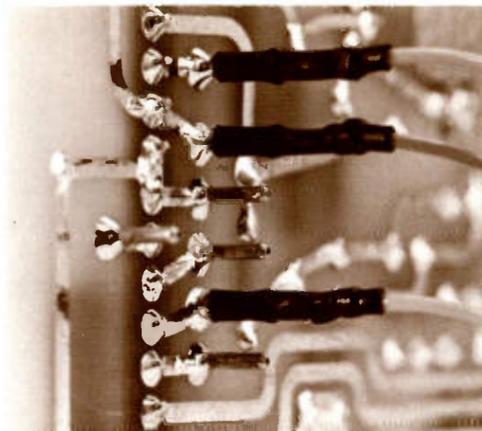
"Erase" position calls for erase-only mode. This cancels the splice locator cycle and locks out the "Start" button until cartridge is removed and another inserted.

"Both" mode erases the tape and locates the splice.

"Splice Locate" locates splice only. Does not erase. Does not lock out "Start."

"Start" and "Stop" buttons have indicator lamps. Manual "Stop" over-rides all functions.

Plug-in termination of all harnesses and cables permits rapid assembly, dis-assembly and easy maintenance.



# International Tapetronics

# Price List

Effective January 1, 1988 In USA Only

## 99B Series

### 99B Reproducers

Monophonic Reproducer .....	\$2,580
Stereophonic Reproducer .....	\$2,795

### 99B Recorder/Reproducers

Monophonic Recorder/Reproducer with ELSA .....	\$5,550
Stereophonic Recorder/Reproducer with ELSA .....	\$5,995

## DELTA Series

### DELTA I Single Deck Reproducer

Monophonic Reproducer .....	\$1,995
Stereophonic Reproducer .....	\$2,155

### DELTA III Triple Deck Reproducer

Monophonic Reproducer .....	\$4,345
Stereophonic Reproducer .....	\$4,695

### DELTA IV Recording Amplifier

Monophonic Recording Amplifier .....	\$1,225
Stereophonic Recording Amplifier .....	\$1,325

**NEW**

## OMEGA Series with High Speed Cue

OMEGA Monophonic Reproducer .....	\$1,460
OMEGA Stereophonic Reproducer .....	\$1,665
OMEGA Monophonic Recorder/Reproducer .....	\$2,195

ESL V Eraser/Splice Locator .....	\$1,095
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**NEW**

## DCM-1 Dynamic Cartridge Monitor

Decoder .....	\$385
Encoder/Decoder .....	\$550

## Accessories

FB-1 Telephone Answering Interface. Works with any ITC analog cartridge machine except the DELTA series .....	\$180
URM-0001 Universal Rack Mount .....	\$140
Filler Panel, 1/2 rack width .....	\$ 37
Filler Panel, 1/3 rack width .....	\$ 35

**ScotchCart® II Broadcast Cartridge**

Length	List Price	12.5%	25%
	10-50	60-990	1000 +
10 second	\$7.21	\$6.33	\$5.41
20	\$7.28	\$6.39	\$5.46
40	\$7.37	\$6.46	\$5.53
70	\$7.53	\$6.61	\$5.65
100	\$7.73	\$6.78	\$5.79
2-1/2 minute	\$7.79	\$7.01	\$5.99
3	\$8.13	\$7.13	\$6.09
3-1/2	\$8.34	\$7.31	\$6.25
4	\$8.53	\$7.48	\$6.40
4-1/2	\$8.74	\$7.67	\$6.55
5	\$8.96	\$7.86	\$6.72
5-1/2	\$9.14	\$8.02	\$6.85
6-1/2	\$9.59	\$8.41	\$7.19
7-1/2	\$9.95	\$8.72	\$7.46

Items available only in standard carton quantities of 10 cartridges of same length per carton.

**ScotchCart® II Broadcast Cartridge Label Sheets**

100 Sheets of 10 Labels Each ..... \$24.00

**ScotchCart® II Broadcast Cartridge Technical Manual** ..... No Charge

**NEW**

**AUDIO SWITCHER**

All inputs and outputs are mono. For stereo prices, multiply input and output requirements by two. Pricing with Remote Controls includes one Remote Control per eight mono outputs. For an exact price quote on your specific AUDIO SWITCHER requirements, contact the ITC Sales Department. Following are some selected examples:

Mono Inputs Required	Mono Outputs Required	Price Without Remote Controls	Price With Remote Controls
16	16	\$ 13,980	\$ 15,090
32	16	\$ 15,880	\$ 16,990
32	32	\$ 18,520	\$ 20,740
48	32	\$ 23,515	\$ 25,735
64	32	\$ 26,295	\$ 28,515
48	48	\$ 33,290	\$ 36,620
64	48	\$ 36,950	\$ 40,280
64	64	\$ 41,350	\$ 45,790
128	64	\$ 72,005	\$ 76,445
128	128	\$ 127,170	\$ 136,050
Additional Remote Controls			\$555 each

All prices are FOB Bloomington, Illinois

Terms are Net 30 days with established credit, or save 5% with payment prior to shipment on all new equipment except cartridges and accessories. Economical Lease Purchase or Standard Lease Plans are also available.

International Tapetronics reserves the right to change products and prices without notice.

**TO ORDER OR FOR MORE INFORMATION CALL TOLL FREE 800-447-0414**

From Alaska or Illinois, call collect: 309-828-1381

**International Tapetronics  
3M Broadcasting and Related Products Department**

2425 South Main Street  
P.O. Box 241  
Bloomington, Illinois 61702-0241



International Tapetronics

# Extended Payment Plans

Effective January 1, 1988 In USA Only

## **Choose between either a Lease Purchase or Standard Lease Plan.**

### **Lease Purchase**

- Financing at attractive rates.
- Depending on the amount financed; 12, 24, or 36 month terms are offered and payments arranged either monthly or quarterly.
- Title to equipment automatically transfers to you upon completion of final payment.

### **Standard Lease**

- 36, 48, or 60 month pay-for-use plan on total purchases exceeding \$5,000.
- Low monthly payments; lease rate includes applicable property taxes.
- Options available at end of lease:
  - A. Purchase equipment for estimated fair market value.
  - B. Renew lease at greatly reduced rate.
  - C. Return equipment, with no further obligation.
- During lease, you may convert to purchase at any time; with 50% of lease payments made applied to original selling price.

*Continued on other side*

## Other Advantages of the Extended Payment Plans

- Allows you to have the equipment you need without waiting to accumulate the cash – It positions you to acquire sophisticated, advanced technology at a low monthly payment.
- Frees Working Capital – Consider the advantage of conserving working capital which would yield a better return if invested in expansion of sales, service or other income producing areas.
- Preserves your lines of credit – Keeps cash available for short term needs.
- Eases a Tight Budget – If you have a rigid budget, payments can usually be tailored to your ability to pay.
- No security deposit is required.
- Hedges Against Inflation – Your dollar may well be cheaper tomorrow than it is today.

Call us today for more information on the Extended Payment Plans available on ITC's complete line of audio equipment.

■ The Performance System,  
99B Recorders and DELTA  
Reproducers

■ The Economy System,  
DELTA Recorders and  
OMEGA Reproducers

■ AUDIO SWITCHER,  
"The Advantage"

When newer technology emerges it will come from International Tapetronics, "The Leader in Reliability and Service."

**Call Toll Free 800-447-0414**  
or collect from Alaska or  
Illinois 309-828-1381.

# Extended Payment Plans Payment Examples

**Effective January 1, 1988 In USA Only**

## Lease Purchase

All ITC equipment is eligible for the Lease Purchase Plan; however, a total purchase amount of at least \$1,500 is necessary to qualify for the 36 month term. The following examples are calculated assuming an interest rate of 10%. Any applicable state or local taxes have not been included.

### Typical Terms

	12 months	24 months	36 months
<b>DELTA I/IV Stereo Recorder/Reproducer and 3 OMEGA Stereo Reproducers</b>			
List Price \$8,475			
Monthly Payment .....	\$ 739.87 .....	\$ 389.00 .....	\$ 271.20
Total Cash Outlay .....	8,878.44 .....	9,336.00 .....	9,763.20
<b>99B Stereo Recorder/Reproducer with ELSA and 3 DELTA I Stereo Reproducers</b>			
List Price \$12,460			
Monthly Payment .....	1,087.76 .....	571.91 .....	398.72
Total Cash Outlay .....	13,053.12 .....	13,725.84 .....	14,353.92
<b>OMEGA Mono Recorder/Reproducer and 3 OMEGA Mono Reproducers</b>			
List Price \$6,575			
Monthly Payment .....	574.00 .....	301.79 .....	210.40
Total Cash Outlay .....	6,888.00 .....	7,242.96 .....	7,574.40
<b>AUDIO SWITCHER - 32x32 with 4 Remote Controls</b>			
List Price \$20,740			
Monthly Payment .....	1,810.60 .....	951.97 .....	663.68
Total Cash Outlay .....	21,727.20 .....	22,847.28 .....	23,892.48

*Examples continued on other side*

## Standard Lease

All ITC equipment is eligible for the Standard Lease Plan; however, a total purchase amount of at least \$5,000 is necessary to qualify. The following examples include property taxes which may not be applicable in all states. Any other applicable state or local taxes have not been included.

### Typical Terms

	36 months	48 months	60 months
<b>DELTA I/IV Stereo Recorder/Reproducer and 3 OMEGA Stereo Reproducers</b>			
List Price \$8,475			
Monthly Payment	\$ 275.44	\$ 229.67	\$ 201.71
Annual Renewal Option	678.00	593.25	423.75
Purchase Option	1,525.50	1,356.00	1,186.50
<b>99B Stereo Recorder/Reproducer with ELSA and 3 DELTA I Stereo Reproducers</b>			
List Price \$12,460			
Monthly Payment	402.46	335.17	294.06
Annual Renewal Option	996.80	872.20	623.00
Purchase Option	2,242.80	1,993.60	1,744.40
<b>OMEGA Mono Recorder/Reproducer and 3 OMEGA Mono Reproducers</b>			
List Price \$6,575			
Monthly Payment	213.69	178.18	156.49
Annual Renewal Option	526.00	460.25	328.75
Purchase Option	1,183.50	1,052.00	920.50
<b>AUDIO SWITCHER - 32x32 with 4 Remote Controls</b>			
List Price \$20,740			
Monthly Payment	669.90	557.91	489.46
Annual Renewal Option	1,659.20	1,451.80	1,037.00
Purchase Option	3,733.20	3,318.40	2,903.60

To determine the monthly payment on your exact equipment needs **call toll free 800-447-0414**, or collect 309-828-1381 from Alaska or Illinois.

# The AUDIO SWITCHER Preliminary Specifications

## Power:

- A. 90-132/180-264 VAC
- B. 47-440 Hz

## Power Consumption:

- A. MASTER CONTROL: 43W Maximum
- B. MATRIX MODULE: 22W Maximum
- C. I/O AMPLIFIER: 77W Maximum
- D. REMOTE CONTROL: 5W Maximum
- E. POWER MODULE: Dependent on system configuration

## Audio Output Configuration:

Electronically balanced output capable of grounding either side with <0.1 dB level change

## Audio Output Impedance:

50 ohms

## Maximum Output Level:

+22 dBm with <1% THD

## Audio Input Configuration:

- A. Balanced bridging transformerless
- B. Input impedance: >20K, 600 ohm selectable

## Input Level Range:

-30 dBm to +20 dBm

## Common Mode Rejection Rate:

> 80 dB  
74 dB at 0  
84 dB at +10  
94 dB at +20

## Signal-To-Noise:

>90 dB, 20Hz to 20kHz at 0 dBm

## Distortion:

<.01%, 20Hz to 20kHz at 0 dBm

## Frequency Response:

±0.1dB, 20Hz to 20kHz

## Crosstalk:

>90 dB, 1 kHz at +20 dBm

## Phase Shift:

±0.3 degrees at 20kHz (channel to channel)

## Ambient Operating Temperature:

39 to 122 degrees F. (4° to 50° C.)

## Storage Temperature Range:

-40 to +185 degrees F. (-40° to +85° C.)

## Relative Humidity Operating Range:

25% to 80% (without condensation)

## Dimensions:

- A. Width:
  - MASTER CONTROL: 19" (48.26 cm)
  - MATRIX MODULE: 19" (48.26 cm)
  - I/O AMPLIFIER: 19" (48.26 cm)
  - REMOTE CONTROL: 47/8" (12.38 cm)
  - POWER MODULE: 19" (48.26 cm)
- B. Depth:
  - MASTER CONTROL: 21" (53.34 cm) Add 2" (5.08 cm) for connectors

MATRIX MODULE: 19 3/4" (50.16 cm) Add 2" (5.08 cm) for connectors  
I/O AMPLIFIERS: 17 3/4" (45.08 cm) Add 2" (5.08 cm) for connectors  
REMOTE CONTROL: 6 5/16" (16 cm) Add 1 1/4" (3.18 cm) for connectors  
POWER MODULE: 19 3/4" (50.16 cm) Add 2" (5.08 cm) for connectors

- C. Height:
  - MASTER CONTROL: 5 1/4" (13.34 cm)
  - MATRIX MODULE: 7" (17.75 cm)
  - I/O AMPLIFIER: 5 1/4" (13.34 cm)
  - REMOTE CONTROL: 3 15/16" (8.41 cm) Add 1/8" (.318 cm) for feet
  - POWER MODULE: 5 1/4" (13.34 cm)

## Weight:

MASTER CONTROL: 25 lbs (11.36 kg)  
MATRIX MODULE: 45 lbs (20.45 kg)  
I/O AMPLIFIER: 24 lbs (10.9 kg)  
REMOTE CONTROL: 3 lbs (1.36 kg)  
POWER MODULE: 30 lbs (13.63 kg)

International Tapetronics Corporation/3M reserves the right to change products and specifications without notice.

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

International Tapetronics Corporation/3M offers a variety of financial options designed to fit your needs. Call today for more information on ITC's complete line of audio equipment.

- 3M HCDA™ 3000 Digital Audio System, "An Achievement"
- The Performance System, 99B Recorders and DELTA Reproducers

- The Economy System, DELTA Recorders and OMEGA Reproducers
- AUDIO SWITCHER, "The Advantage"

When newer technology emerges, it will come from International Tapetronics Corporation/3M, "The Leader in Reliability and Service". To order or for more information call toll free 800-447-0414. From Alaska or Illinois, call collect 309-828-1381. In Canada, call Maruno Electronics, Ltd., 416-255-9108.

# The Advantage

The AUDIO SWITCHER  
Designed for Radio Broadcasters

From International Tapetronics Corporation/3M

# The AUDIO SWITCHER Designed For Radio Broadcasters

The AUDIO SWITCHER from International Tape-tronics Corporation/3M is designed to replace patchbays and distribution amplifiers offering a new level of flexibility for handling today's diverse and dynamic programming requirements.

Today's broadcasters utilize an abundance of outside program sources including: satellite feeds, traffic helicopter reports, network or syndicated news feeds, promotional events from various locations, sporting events, information from weather forecasting bureaus and many others. Manually patching all of these sources into one central control unit and making them available to more than one studio at a radio station can take days and sometimes weeks of engineering time. What often results is a confusing and complicated maze of wires and patchbays.

Now all of these sources can be connected together easily and routinely through the AUDIO SWITCHER. The AUDIO SWITCHER from International Tapetronics Corporation/3M brings a cost-effective and reliable method of audio routing to radio stations.

For decades television broadcasters have depended upon video routing systems to interconnect many sources and outputs via one central control unit. International Tapetronics Corporation/3M has taken advantage of the proven reliability of 3M's advanced *video* switching technology and designed an audio routing switcher specifically for radio broadcasters.



## I/O Amplifier

### Input Amplifier

- Active transformerless balanced input
- 20K Ohm input impedance, 600 Ohm selectable
- Variable gain – system can accommodate inputs from  $-30$  to  $+20$  dBm to produce 0 dBm output
- Four input amplifiers per P.C. board
  - up to 16 boards per rack housing
  - modular replacement for easy servicing
  - separate voltage regulators & fusing on each P.C. board
- Proportional filtered cooling system – stays clean for long life
- Alarm sensors detect and report overheating
- Radio frequency (RF) tested
- Common Mode Rejection Ratio (CMRR) greater than 80 dB
- P.C. boards can be installed or replaced while the system is in operation
- 15-turn trimpot input gain adjustment
- Easy to positively connect wires to terminals

### Output Amplifier

- Active transformerless balanced outputs with self compensating output stage – for use in both symmetrically balanced & unbalanced circuits
- Four output amplifiers per P.C. board
  - up to 16 boards per rack housing
  - modular replacement for easy servicing
  - separate voltage regulators & fusing on each P.C. board
- Capable of supplying  $+22$  dBm in 600 Ohm load (maximum output)
- Low output impedance – for driving long lines
- Proportional filtered cooling system – stays clean for long life
- Alarm sensors detect and report overheating
- Zero group delay – system passes square waves cleanly
- P.C. boards can be installed while the system is in operation
- Easy to positively connect wires to terminals

## Power Module

- Optional redundant power supply – always on line
- "Switching Power Supply" reduces heat and susceptibility to power line irregularities
- Proportional filtered cooling system – stays clean for long life
- Alarm sensors – detect and report overheating and under/over voltage conditions
- Dual AC line – feeds may be attached to separate phases
- 120V, 60Hz; 220V, 50Hz

# The AUDIO SWITCHER From International Tapetronics Corporation/3M

## Master Control

The Master Control consists of a rack-mount housing containing the microprocessor control system for the AUDIO SWITCHER. The front panel of the Master Control features a 5-line, 40-character LCD display for alpha-numeric and graphics and four "soft key" function pushbuttons. It has a 12-key pad for easy numeric data entry.

## Matrix Module

The Matrix Module contains up to two matrix P.C. boards which are mounted within the frame on a slide-out tray for easy expandability and servicing. Each matrix P.C. board can support up to a 32 input x 32 output mono switch.

## I/O Amplifier

Audio input and output amplifiers are contained on plug-in boards with four input or output amplifiers per board. Audio level adjustments are made here to assure a consistent sound quality without additional distribution amplifiers.

## Remote Control

The Remote Control consists of a small keypad and associated LCD display which allows switching from a control room, on-air desk, or other location away from the Master Control. Each Remote Control can handle four outputs. As many as 31 Remote Controls can be used in conjunction with the Master Control.

## Power Module

The Power Module mounts in its own rack housing. Provision is made for mounting an optionally available redundant power supply in the same rack housing. Power supplies are completely connectorized for quick and easy replacement in case of power failure. The AC power inputs are separated, allowing plug-in to separate power feeds.

## Component Features

### Master Control

- A 5-line x 40-character alpha-numeric graphics LCD display
- Four "soft key" function pushbuttons – allow you to operate the switcher and lead you through programming in conjunction with the LCD display
- Built-in meters, speaker and headphone jack – facilitates monitoring inputs at main controller without additional hardware
- A 1 farad capacitor backup for internal memory and real-time clock – provides two week memory & clock protection
- Removable cartridge contains redundant memory and battery with 10-year life
- Alarm sensors monitor many system parameters and can alert operators via contact closure and on-screen announcement
- Internal real-time clock/calendar – can be used as station master reference clock or be synced to external time source
- 3M *Whisper* Writer printer & keyboard – programs Master Control unit – provides hardcopy printout of system status and log



3M *Whisper* Writer printer & keyboard

### Matrix Module

- Proven hybrid technology – for all audio circuits
- P.C. board holds 32 inputs x 32 outputs for mono and up to 2 boards per rack housing for 32 x 64 or 64 x 32 mono
- P.C. boards mount on slide-out trays – for easy serviceability
- Hybrid circuits are replaceable while the system is in operation
- Crosstalk better than 90dB
- Control handshaking verifies commands are implemented



Satellite Receiver



Traffic Helicopter



Weather Information



Location Remotes



Sports Broadcasts

## The AUDIO SWITCHER



Control Room



Production Room



Transmitter



Newsroom

## More Flexibility

The AUDIO SWITCHER is a single matrix routing device which can route virtually any source, such as a satellite feed, to one or more studios within the broadcast facility at the press of a few keyboard buttons. Other features and benefits include:

- Easier to make major, permanent format changes
- Easier to make major, temporary format changes, such as adding sporting events, remote broadcasts and on-site news coverage
- Allows placing any source on-air without major wiring changes

## Grows With You

Designed as a modular, expandable system, the AUDIO SWITCHER grows as your needs grow. A 16 input by 16 output monophonic switcher (8 x 8 stereophonic) is the smallest configuration of the AUDIO SWITCHER. As you need more inputs and/or outputs you add system modules. Expansion up to a maximum size of 256 by 256 monophonic or 128 by 128 stereophonic is possible. You can choose the size AUDIO SWITCHER from International Tapetronics Corporation/3M that is right for you today knowing the system will expand as your needs grow.

## Consider "The Advantage"

Consider the advantage the AUDIO SWITCHER can bring to your station. Consider the convenience and flexibility offered by the AUDIO SWITCHER and use it as a reliable tool for handling your diverse and dynamic programming requirements. With the AUDIO SWITCHER from International Tapetronics Corporation/3M you have "The Advantage" on your side.

# The AUDIO SWITCHER Provides "The Advantage"

for the General Manager



- Reliability** Reduces likelihood of lost revenue.
- Flexibility** Quick and easy manipulation of format and creative changes.
- Reduced Maintenance** Lower maintenance costs.
- Audio Quality** Enhanced listener and advertiser satisfaction.
- Minimal Training** Faster productivity yielding reduced operational costs. Easy for new technical and operational staff to understand.
- Expandability** Modular design facilitates future growth needs.
- Fewer Errors** Increased efficiency and revenue potential.

for the Program Director and News Director



- Confidence in equipment allows a high degree of creative freedom.
- No special skills required to provide instantaneous routing from any source to any destination within the station upon demand.
- Fewer studio interruptions for routine maintenance or repairs.
- Consistent sound quality.
- Shorter training time for new operators. More time available for other tasks.
- Programming changes requiring increased capabilities are quick and easy to implement.
- Fewer program interruptions can result in higher shares and cumes.

for the Chief Engineer



- No mechanical contacts or patchcords to fail. Reduces need for patchbays and distribution amplifiers.
- Reduces wiring requirements for special or new circuits. Most audio changes controlled by simple software commands.
- Designed for long component life and freedom from mechanical switching.
- Facilitates uniform and consistent quality from all switch signals without degradation. Reduces complaints.
- Promotes logical flow of audio. Easier to communicate functions with programming and operations staff.
- Minimizes rewiring needed to accommodate new requirements.
- Reduces late night or weekend trouble calls.

## The Advantage

### Saves Money

- Reduces lost air time due to faulty or defective patching
- Fewer labor costs for wiring and maintenance
- Reduces wire and patchbay cost
- Less console space required
- Eliminates the need for monitor speakers and meters (they are built into the Master Control)
- Compact size via hybrid technology reduces rack space requirements
- Includes a real-time clock and calendar
- Saves operator training time

### Self Documenting

The AUDIO SWITCHER includes a 3M *Whisper* Writer keyboard and printer as standard equipment. Once the switcher is in operation, it can provide a hardcopy printout of the system status and log. Now even the most complex routing problem can be solved easily and quickly by referring to the log without searching through a "rat's nest" of wiring and patch systems.

### Fail-Safe Memory Protection

Stored data is automatically protected, even in the event of a power failure, through the use of redundant memory. The primary memory is capacitor backed-up and retains data for up to two weeks. The secondary memory is located in a removable cartridge. This cartridge includes low power RAM and onboard batteries with a 10-year life.

### Versatile Salvos

The AUDIO SWITCHER has the ability to make changes to the matrix automatically. A stored set of instructions, known as "salvos," can be initiated at such times when a known station configuration is needed. Salvos could be used when a signal routing requirement always occurs at the same time, such as regular newscasts.



General Manager



Program Director



Chief Engineer



### Built-In Security

The system is initially configured to meet a station's requirements. This includes assigning numbers to all inputs and assigning these inputs to various outputs. By entering a 4-digit code number, unauthorized modification of these assigned numbers can be prevented.

### "Wild Audio" Capability

The consistent sound quality of stereo broadcasting is virtually assured by the system's "Wild Audio" feature. Once the system has been configured for stereo, it has the "intelligence" to know when a mono source is being routed to a stereo output, and routes it to both left and right outputs. It also handles stereo source to mono outputs, mono source to mono output, and of course, stereo source to stereo output situations, automatically.

### Easy Serviceability

- The AUDIO SWITCHER was designed with serviceability in mind. Service is easy with:
  - ITC's P.C. board exchange program
  - Installation and operation manual and optional technical illustrations manual
  - Factory technical consultation
  - Fast shipment of parts orders
  - Factory repair service available
  - Many components can be removed or serviced while the AUDIO SWITCHER is in operation

### Other Advantages Of Using The AUDIO SWITCHER

- No time lost patching one source to another
- No internal compensation service adjustments necessary
- No "rat's nest" of complicated wiring or cables under consoles or desks
- Facilitates quick changes when inconsistent audio signals from outside sources occur
- No time spent searching for an error source in an undocumented maze of patch wiring
- No diode-effect distortion due to dirty or corroded parts
- Left and right audio channels can be reversed internally without rewiring

# DigiCenter SPECIFICATIONS

## STANDARD HARDWARE CONFIGURATION

- Rack Mounting Enclosure with 8-slot motherboard or 12-slot backplane, high MTBF linear power supply and analog power supply
- 386SX CPU, 25 MHz, 4 MB RAM
- Internal 1.44 MB 3 1/2 inch FDD
- 2 Serial and 1 Parallel Port
- 2400 bps Modem
- 32 Channel Parallel Logic I/O Board
- SCSI Control Board
- 14 Inch VGA Monitor
- Mouse, Trackball or Touchscreen Operation
- DSP-1 Digital Signal Processing Board (1, 2 or 3)
- AIO-1 Analog Audio I/O Board

## Optional Hardware

- Additional Hard Disk Drives
- Multiple Disk Drive Cabinet (4 drives)
- DIO-1 Digital Audio I/O Board
- DSP-1 Digital Signal Processing Boards

## HARDWARE/SOFTWARE INTERFACES

Serial interfaces for commercially available CD and CD ROM changers

32 Channel Parallel Logic Interface

Logic Inputs: Opto-Isolated  
Software selectable for Polarity,  
Delay and Hold Times

Logic Outputs: Software Selectable for NC or NO,  
Delay and Hold Times

## AUDIO SPECIFICATIONS

Analog Inputs: Active Balanced and Differential  
10k $\Omega$ /600 $\Omega$  Input Impedance, -15 to  
+8 dBm adjustable.<sup>1</sup>

Analog Outputs: Active Balanced and Differential  
<50 $\Omega$  Output Impedance, -10 to +8  
dBm adjustable.<sup>1</sup>

## Frequency Response:

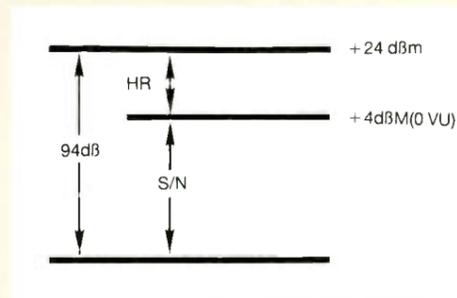
Sampling Rate	Frequency Response
48 kHz	20 Hz-22 kHz $\pm$ 0.5 dB
44.1 kHz	20 Hz-20 kHz $\pm$ 0.5 dB
32 kHz	20 Hz-15 kHz $\pm$ 0.5 dB
16 kHz	20 Hz-7.5 kHz $\pm$ 0.5 dB
8 kHz	20 Hz-3.6 kHz $\pm$ 0.5 dB

Dynamic Range: 94 dB<sup>1</sup>

Distortion:  $\leq$  0.05% THD

<sup>1</sup>Reference to 0 VU = +4 dBm,  
(+24 dBm = Full Code).

**Headroom (HR) and Signal to Noise (S/N)**  
specifications are relative to the Dynamic Range of the  
System and user's selection of 0 VU reference level per  
the following chart.



# DigiCenter

AUDIO MANAGEMENT SYSTEM



Distributed by:  
**APT**  
Audio Pro Technologies

Call for further information  
**1-800-APT-2050**  
FAX: (708) 969-0341



ITC Corporation,  
2425 South Main Street  
Bloomington, IL 61702-0241 U.S.A.  
TEL: (800) 447-0414, (309) 828-1381  
FAX: (309) 828-1386

DigiCenter™ is a Trade mark of ITC Corporation

# DigiCenter Brings you the best in digital



**ITC's DigiCenter Does it all  
and does it easy...  
The perfect broadcaster's tool.**

**D**riven by the compact disk, digital audio technology has claimed its place in radio. The result has been a rash of attempts to adapt hardware developed for the consumer market to the broadcast environment. CD players and modified DAT machines fail to perform effectively as audio management tools for radio. And now many suppliers are rushing to convert software and hardware products from the consumer PC market to broadcasting under the guise of digital audio.

ITC listened to what broadcasters had to say regarding their expectations in digital audio management systems and responded as we have done with other broadcasting products for well over two decades... with a product that will set the standard in digital audio equipment for many years to come. And, like all products we produce, we designed a system that was unique to broadcasters and dedicated to accomplishing the tasks that broadcasters need to do. Accurately, swiftly and above all, easily.

The goals we set for DigiCenter were those directed to customer needs. A system that is:

- **Performance capable** in accomplishing all digital audio broadcasting disciplines
- **Broadcaster Friendly** with a minimum of training and orientation necessary.
- **Extremely reliable**, eliminating overload and/or shut-down possibilities.
- **Flexible** to individual broadcaster's needs and capable of future expansion.
- **Protected** by ITC's satisfaction guarantee, and long established reputation for quality products and service.

DigiCenter has achieved these goals and more.



Configured as a full length AT Bus board, the DSP accepts up to four powerful digital signal processor chips, quadrupling the capabilities of the DSP boards utilized in competing systems. Two DSP circuits are available and are reserved for integral data compression permitting future selection by users as standards evolve or new concepts emerge.

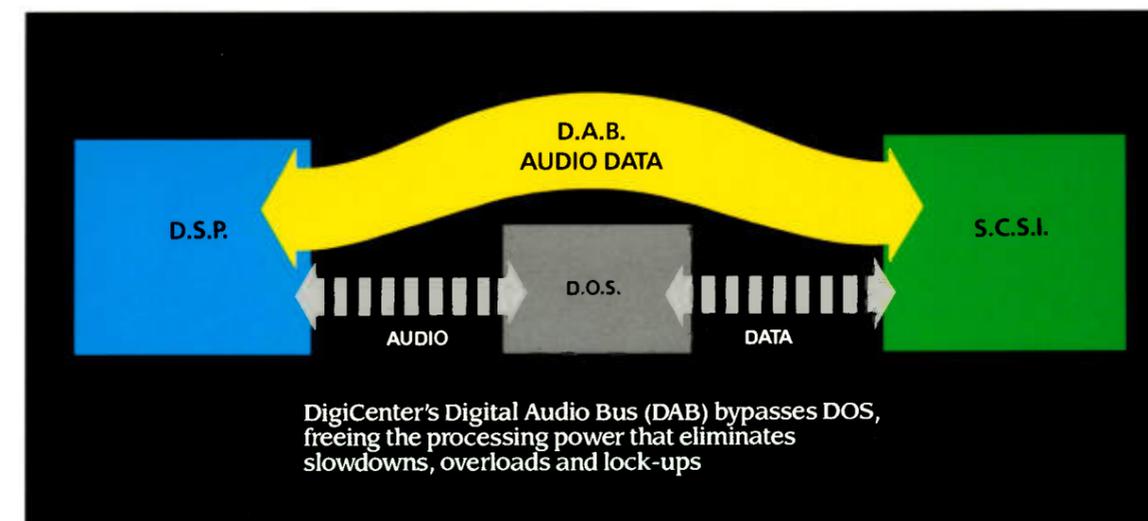
DigiCenter accommodates three DSP/AIO boards, expanding the system to a powerful input/output capability of six audio stereo channels simultaneously.

Digital input/output boards (DIO boards) can also be selected as substitute daughterboards in place of the AIO's if needed initially or at any time after purchase. By providing a mix of AIO and DIO boards, DigiCenter accommodates individual broadcaster requirements.

This added feature contributes to the value of your initial investment — meaning you can upgrade to digital easily and cost effectively.

### Digital Audio Bus (DAB)

The hardware and software ITC developed to process audio data within the DigiCenter is unique. It is what we call the DAB or Digital Audio Bus. The DAB eliminates operating system bottlenecks by allowing the flow of data to bypass DOS and go directly to the SCSI from the DSP. This capability allows the platform to handle user inputs immediately — in real time, simultaneously from remote stations. The DAB accommodates more than enough processing power to drive six uncompressed stereo audio channels with over 100GB available.



*Manufactured the only way ITC knows how... With QUALITY.*

## *audio management FOR BROADCASTERS.*

### **A Multi-User Audio Management Tool**

The goals set for DigiCenter were affirmed through careful testing and over two years of on-air station operations. The results of this experience show that DigiCenter is a viable and reliable tool, easy for broadcasters to operate and a vital contributor to increased station profitability.

- Live Assist, the Digital Cart Machine Operation
- Satellite and Program Automation
- Networked Multiple Users
- Traffic, Billing, Scheduling Interfaces
- Remote Control Hardware and Software
- Multiple Recorders and Reproducers Active Simultaneously
- User Interface Designed for Radio

### **DigiCenter is a profit generator**

Feedback from broadcast industry general managers using the DigiCenter system indicates a fast return on their investment and increased profitability by substantial margins... often within a year's time. They also report increased efficiency and productivity by their engineering staff, program managers and broadcast talent.

DigiCenter is the system of choice in all broadcast

management groups. We can offer the most in customer service because we offer the best in reliable quality products backed up with ITC's famous lifetime product satisfaction guarantee that protects your past, present and future investment. And, with our trade up policy, you don't have to trash your analog cart machines... **TRADE THEM IN** for a generous allowance against the purchase of your DigiCenter.

### **ITC makes your DigiCenter transition easy**

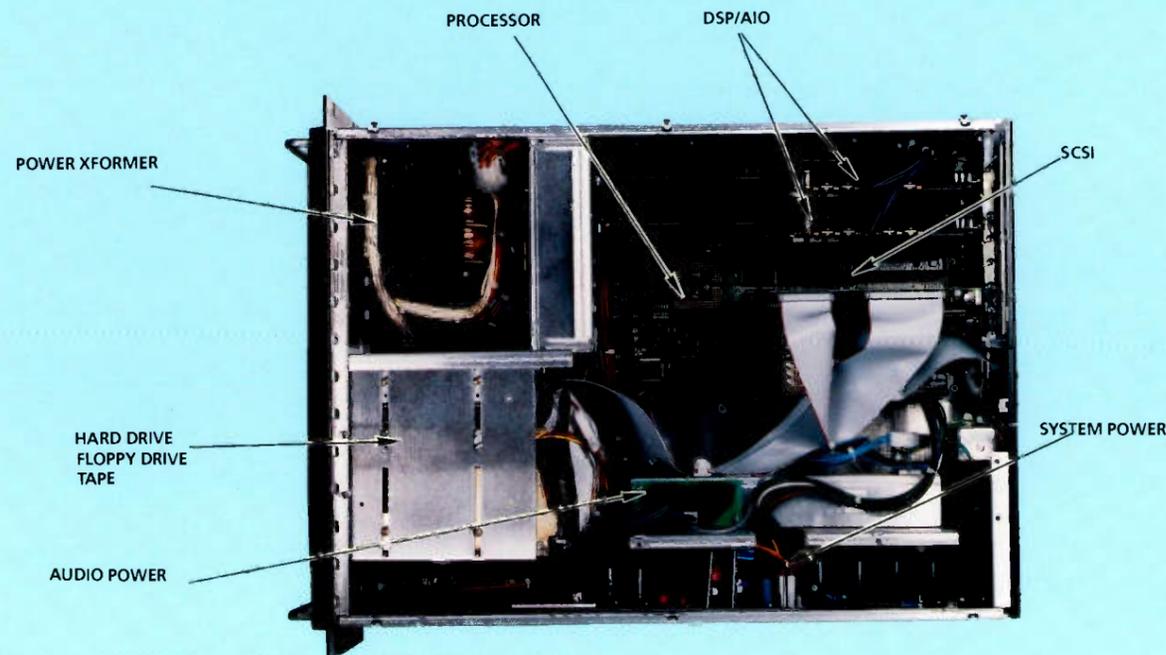
The conversion from analog tape is most often a major step for broadcasters. Hard decisions have to be made that concern broadcasting continuity, audio quality, personnel training, and program management, not to mention budgetary considerations, financing and profitability.

ITC has the solutions for these potential stumbling blocks. The DigiCenter design makes it easy to convert through its broadcaster friendly operation, accommodation for analog tape cart machine operation and total networking capability. It provides the interface that manages your audio library no matter what storage media is right for you.

**D**igiCenter system hardware includes a 19 inch metal cabinet that can be rack mounted or desk top installed, a 14" VGA monitor and integral touch screen, a mouse or track ball, and keyboard.

The heart of DigiCenter is ITC's proprietary and exclusive Digital Signal Processing board (DSP). The advanced technology utilized in this module and its associated Analog Input/Output board (AIO) permit DigiCenter to perform far more simultaneous audio processing tasks than conventional DSP boards. Less physical expansion of hardware is required to accomplish multiple outputs resulting in lower system cost per performance factor. The majority of components on both the DSP and AIO boards are surface mount devices—a technology proven to be the most reliable in modern electronic equipment manufacture.

- 100,000 hr MTBF Power Supply
- Separate Audio Power Supply
- Dual Cooling System
- FCC Tested and Approved
- Built to ITC's Strong Box Standards



# DigiCenter operations cover the complete spectrum of broadcasting management.

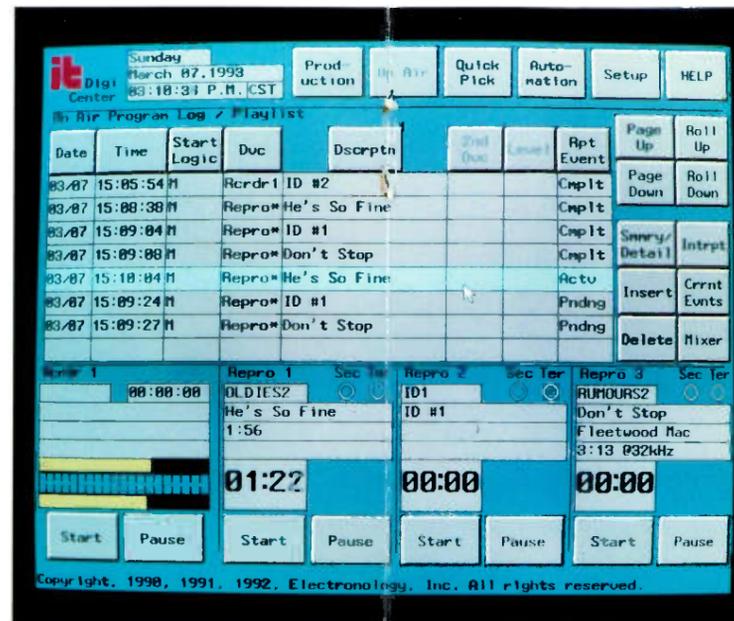
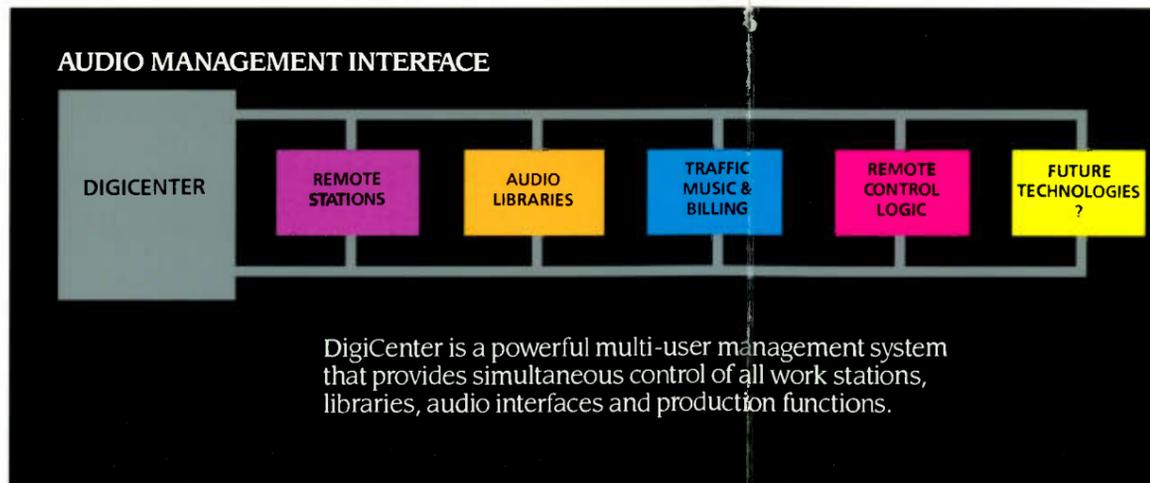
**W**ith the application of proprietary hardware and software developed by ITC, DigiCenter performs as a digital audio management system capable of replacing many present functions and equipment in a radio broadcast environment as well as providing a platform for future facilities and technological expansion.

- Very powerful with over 100GB of on line hard disk storage
- Handling real time, on-air commands instantaneously eliminating overloads or lock-ups
- A Varitime feature offering real time adjustment of spots to fit real world time slots
- Remote control logic I/O
- Simultaneous playback of multiple sampling rates
- Expandable to 6 uncompressed stereo channels
- Optional digital audio I/O
- Stereo or mono, sampling rate is selectable by cut
- ITC's Common Automation File for universal traffic and billing interface

DigiCenter capabilities include the scheduling and operation of multiple sources on-air, audio production facilities, interface to traffic scheduling and accounting systems, satellite program networks and to other commonly utilized broadcast equipment. All scheduled events are logged as successfully or unsuccessfully completed, and are optionally available for printout.

- Digital cart machine (DCM)
- Live assist capability (LAC)
- Instacart emulation (AUTOCART)
- Program logging (PROGLOG)
- Satellite automation capability (SAC)
- Program automation capability (PAC)
- Traffic, accounting, billing interface (TAB I/O)
- System networking (SYSNET)
- Remote diagnostics capability via modem (RDC)

DigiCenter performs its tasks in real time speed through its exclusive Digital Audio Bus that eliminates frustrating appearances of the hourglass icon, and prevents overloads and lock-ups of the system



**ON-AIR**  
View and modify your On-Air Schedule at any time. Delete and insert cuts. Browse through past and pending events. Send the log to a printer or file.

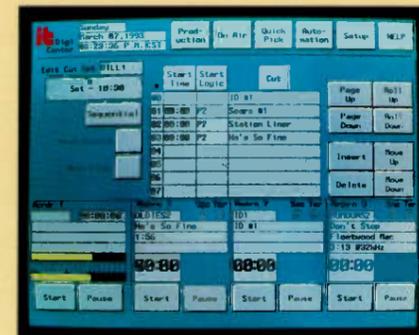
## QUICK PICK

Build your own on-hand personal selection of music, spots and stingers for Quick Picking. Point and shoot them into the On-Air Schedule.



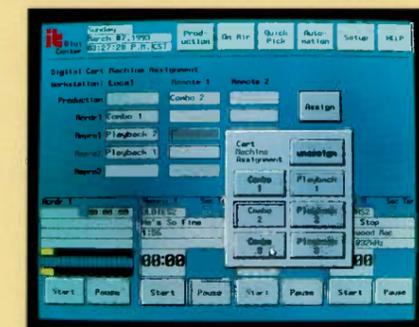
## CUT SETS

Like building a stack of carts and daisy-chaining them together via start pulses, intros, outros, cue tones or tails, auto or manual starts. Build sets of 2, 3, or your entire show and load them into the On Air Schedule with one point and shoot operation. DigiCenter does the rest.



## WORKSTATION ASSIGN

Assign your recorders and reproducers to various users as your situation warrants. Move them from Production to News to the On-Air studio with the click of a mouse or the touch of a screen.



## PRODUCTION

Record and Edit your spots, jingles and music with DigiCenter's production tools. Engage ITC's Varitime feature to adjust the spot to fit the time slot. Experience the simplistic AutoRecord feature giving you the tightest cues without depending on CD's inaccuracies. Trim head and tail, set intro and outro time marks. Add and delete cue tones with the touch of a button.

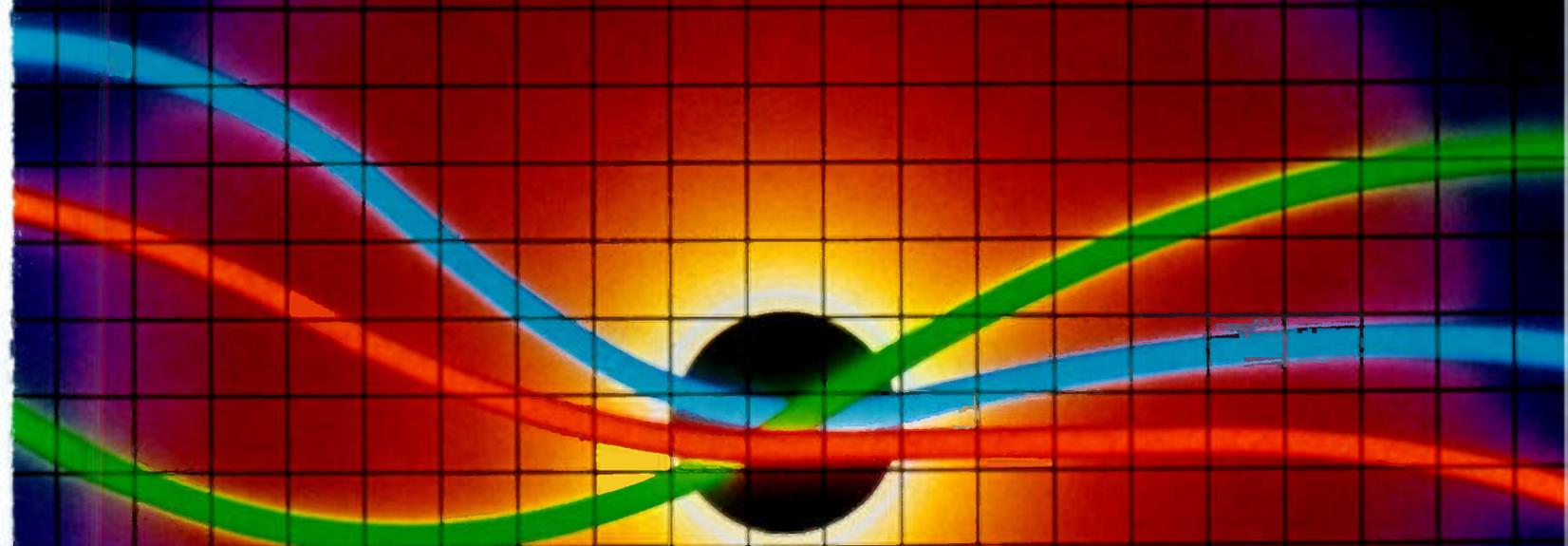


## OPTIONS AND PARAMETERS

Select the options that fit your needs. Five sampling rates and four selections of mono and stereo recording and playback for ultimate flexibility. Intermix them in playback. DigiCenter allows simultaneous playback of any recorded formats.



# **Analog Cartridge Machine Systems... To Keep You Competitive Into The Future**



**From International Tapetronics Corporation/3M**

# Performance, Reliability and Service

To be a world leader, you must offer customers products designed and built with the highest integrity. In audio tape cartridge machines and related products for professional applications, International Tapetronics Corporation/3M's dominant leadership position comes from superb audio performance, consistent product reliability and the most thorough service support team in the industry.

International Tapetronics Corporation/3M's constant response to the needs of the market has resulted in the most comprehensive offering of quality audio products in our history. From the most basic cost-effective analog tape cartridge machines to today's most sophisticated digital tape machine technology, International Tapetronics Corporation/3M offers you complete systems and individual components to meet your needs and budget requirements. The following pages highlight our analog tape cartridge equipment and related accessory product line.

## A Variety Of Applications

Although audio tape cartridge machines are best known for their use in radio and television for on-air broadcasting of music and commercial messages, they are also used in a wide variety of other applications wherever reliable systems for repeated messages are required.

Airports use cartridge machines to broadcast flight and traffic reports to travelers. Hotels use them to repeat restaurant and lounge locations. At museums, cartridge machines are used to add audio to exhibits. They are also used in sports facilities to play music between action and increase fan participation. In video and film post production houses, cartridge machines are used to add sound effects and music tracks.

When combined with an International Tapetronics Corporation/3M "FB-1" telephone answering interface, businesses use specific ITC cartridge machines in conjunction with 800, 900 or 876 prefix telephone numbers to automatically repeat information regarding products or services to customers. Schools use the FB-1

telephone answering interface with specific ITC cartridge machines to pre-record enrollment dates, course information, sports results or emergency school closures for callers. In radio and television stations dial-in weather information, sports scores, concert dates and the sale of other sponsored services offer steady monthly income.



Where there is a need for reliable message repetition, there is a need for a cartridge machine from International Tapetronics Corporation/3M.

For years radio and television broadcasters have known the tremendous advantages of the audio tape cartridge concept:

### ■ Easy Operation

Recording and playback on a reliable and easy to handle audio tape cartridge

### ■ Instant Start

Audio at the press of a button for complete control of today's fast paced programming

### ■ Automatic Cueing

Recues to the beginning of the selection or cues to the next selection without operator involvement

### ■ Re-Recording And Editing

Cartridges can be recorded again and again and edited or customized at the time of recording

### ■ Source Preservation

Compact discs, vinyl records and other source materials can be preserved as library masters

### ■ Facilitates Playing Correct Cut

Cartridge selections in the control room are easily identified

### ■ Conserves Space

Compact cartridge machine design conserves space in today's tighter installations

# Component Systems To Keep You Competitive

The broadcasting industry today is involved in a major revolution...a competition like it has never faced before. The battle being waged to obtain the attention of the audience's ear has never been greater. Not only do broadcasters compete head-to-head for audience share, they must now consider a new generation of listeners accustomed to hearing higher quality sound.

To keep you competitive into the future, we recommend one of two cost-effective Component Systems: The Performance System or The Economy System. Your choice is dependent upon your needs. Only one manufacturer...International Tapetronics Corporation/3M...is able to offer systems like these which comprise all five essential components:

- Premium Grade Tape Cartridge
- Tape Cartridge Preparation
- Quality Recorder
- Quality Reproducer
- Dynamic Cartridge Monitor

Together, these five perfectly matched components constitute the systems approach needed to keep you

competitive into the future by producing consistent, high quality sound.

## Premium Grade Tape Cartridge

The ScotchCart® II broadcast cartridge should be an integral part of both The Performance System and The Economy System. It is capable of frequency response equalling professional reel-to-reel performance. A revolutionary design eliminates pressure pads and utilizes a non-rotating hub to clearly outperform conventional cartridges. With five times the life of its nearest premium grade cartridge competitor and superior audio performance, the ScotchCart® II broadcast cartridge is the best value ever.

## Tape Cartridge Preparation

To insure audio consistency from one cartridge to another, cartridge preparation is necessary. With The Performance System, cartridge preparation is built into the 99B recorder/reproducer through the patented ELSA feature. The recorder will automatically

(1) erase the tape, (2) locate the splice and (3) phase align the record head. With The Economy System, an ESL V eraser/splice locator will (1) erase the tape and (2) locate the splice.

## Quality Recorder

The recording process, more than anything else, determines the quality of audio during playback. For this reason, the 99B recorder/reproducer with ELSA was selected as the recorder for The Performance System. In The Economy System, the DELTA series recorder/reproducer offers excellent recording capabilities and many of the features of the 99B recorder.

## Quality Reproducer

The Performance System utilizes proven DELTA series reproducers designed for superb audio and today's limited space requirements. In The Economy System, OMEGA series reproducers provide excellent audio quality when used in conjunction with DELTA series recorders.

## Dynamic Cartridge Monitor

The DCM-1 Dynamic Cartridge Monitor, a recommended component of both The Performance System and The Economy System, is designed to maintain audio consistency and advertiser satisfaction. The DCM-1 Dynamic Cartridge Monitor can optimize cartridge life and performance by identifying worn out or problem cartridges before an on-air failure occurs. The DCM-1 monitor is fully automatic and requires no user intervention once installed.

Now with either The Performance System or The Economy System, you are ready to compete with the on-air sound of digital technology while enjoying the superb price/performance benefits of analog technology from International Tapetronics Corporation/3M.

Although Component Systems are recommended, all ITC analog machines are available separately, in any quantity, and in both monophonic and stereophonic versions.

## The Performance System



## The Economy System



# A Complete Line Of Analog Recorders And Reproducers

Loaded with features, the 99B series delights the most discriminating user and listener. Central to the 99B series is the patented ELSA feature found in the recorder. The ELSA cartridge preparation feature automatically erases the cartridge, locates the splice and azimuth aligns the record head for maximum phase response performance. The 99B series standard features include:

- Patented ELSA cartridge preparation
- 3 cue tone
- High-speed cue
- Microprocessor controlled logic
- Crystal referenced phase lock loop DC brushless servo motor
- Mono or stereo recorders and reproducers

The DELTA series consistently meets the tough requirements of professionals who demand outstanding audio performance in a reliable, mid-priced mono or stereo cartridge machine. Standard features include:

- DELTA I single deck or space saving DELTA III triple deck reproducers
- 3 cue tones
- High-speed cue on DELTA I reproducer
- Microprocessor controlled logic
- Crystal referenced phase lock loop DC brushless servo motor
- DELTA IV recording amplifier converts a DELTA I reproducer or the bottom deck of a DELTA III reproducer into a recorder

The OMEGA series embodies quality at an affordable price. Standard features include:

- 2 cue tones
- High-speed cue
- Microprocessor controlled logic
- Crystal referenced phase lock loop DC brushless servo motor
- Mono recorder and either mono or stereo reproducers
- Recorder with built-in microphone preamplifier



**"99B" SERIES**



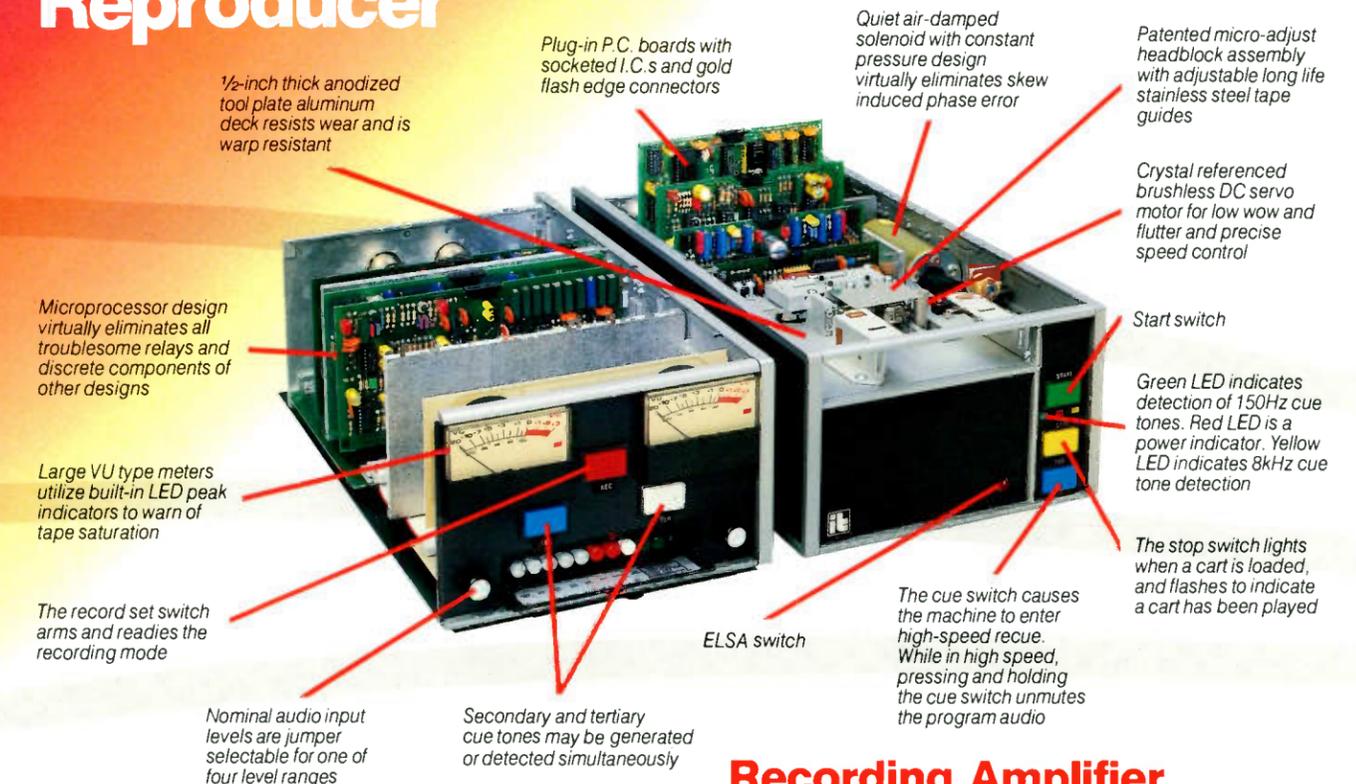
**"DELTA" SERIES**



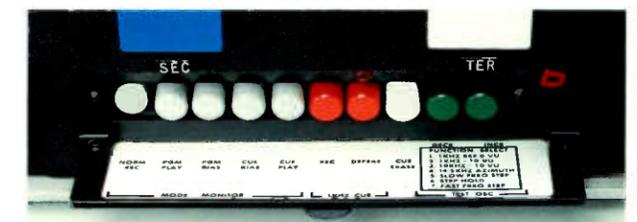
**"OMEGA" SERIES**

## "99B" SERIES Recording Amplifier And Reproducer

Available in recorder/reproducer and reproducer versions for size A and AA cartridges. Hi-speed cue and all NAB cue tones standard.



### Recording Amplifier Special Functions Panel



#### Easily Accessible Color - Coded Switches

Convenient color-coded push buttons provide control of special machine functions. The 1 kHz cue record and defeat switches (red switches) permit addition and deletion of stop tones. A cue erase facility (white switch) allows erasure of any information recorded on the cue track without affecting program material. A test tone generator (green switches) offers seven functions and an LED displays mode identification.

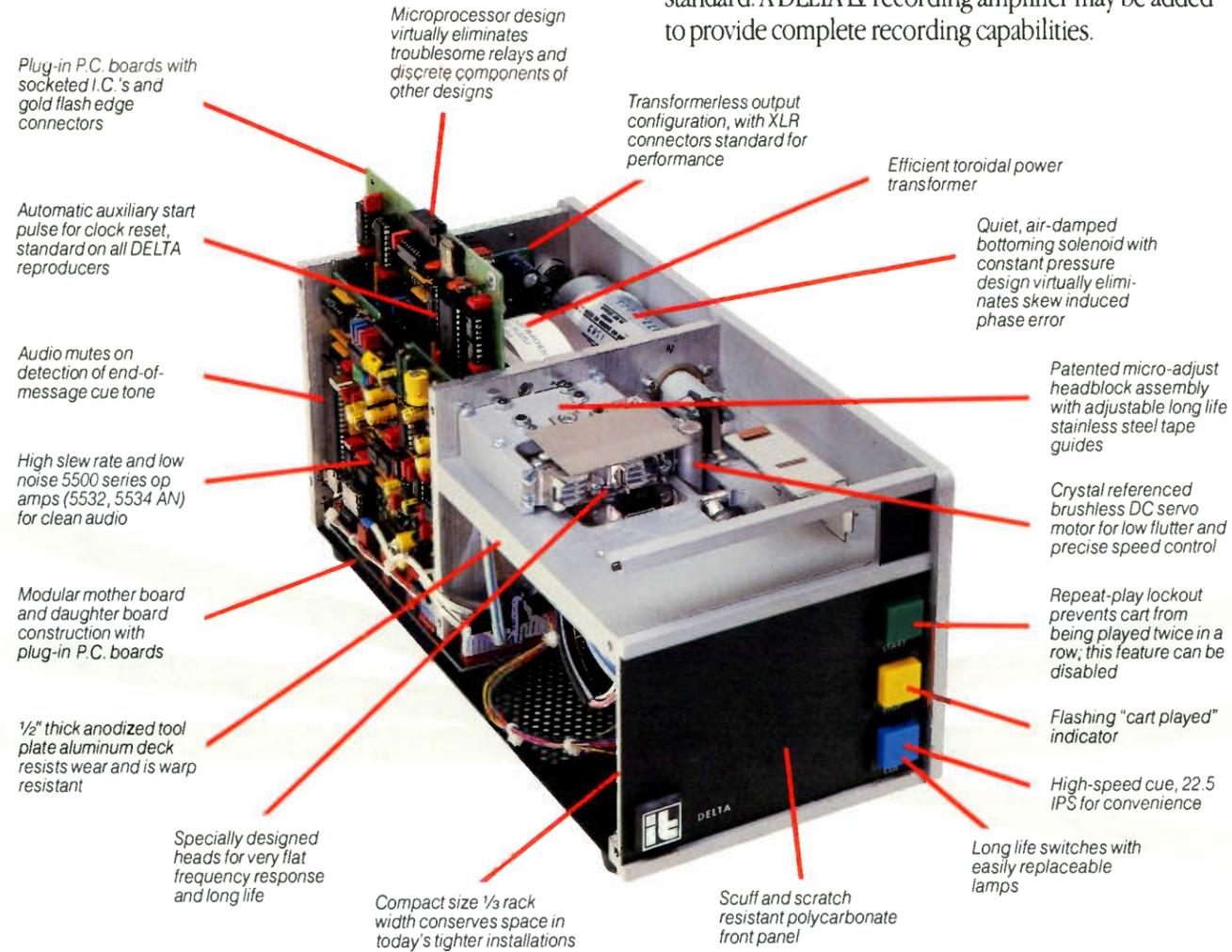
#### Other features include:

- Specially designed heads for very flat frequency response and long life
- Audio mutes on detection of end-of-message cue tone
- Multi-turn trimpots
- Full remote control through rear panel connection
- XLR audio connections

# "DELTA" SERIES

## "DELTA" I Reproducer

A stand-alone single deck reproducer, for size A and AA cartridges. High-speed cue and all NAB cue tones standard. A DELTA IV recording amplifier may be added to provide complete recording capabilities.

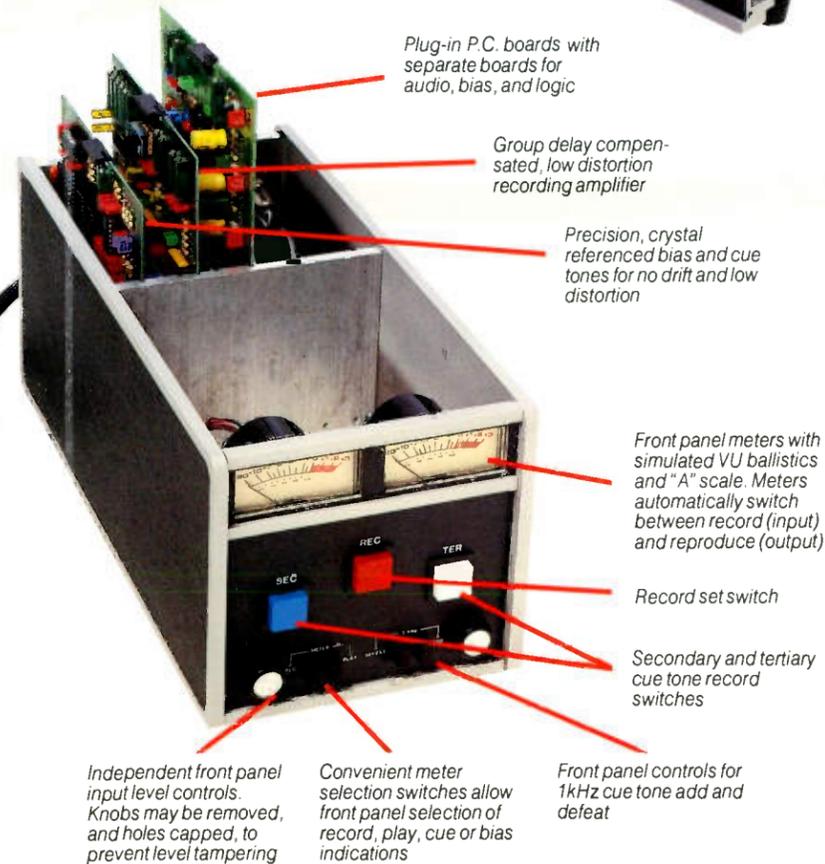


### Other features include:

- Digital cue tone detection eliminating cue tone component adjustments
- Multi-turn trimpots
- Full remote control available through rear panel connection
- XLR audio input connections
- International I.E.C. type AC connector with removable cord and integral RFI filtering
- Easily removable top covers for service access. Extender P.C. boards are available
- Quiet internal variable speed fan supplements convection cooling in the DELTA III reproducer
- Dual overhead cart hold down mechanism for precise cartridge positioning

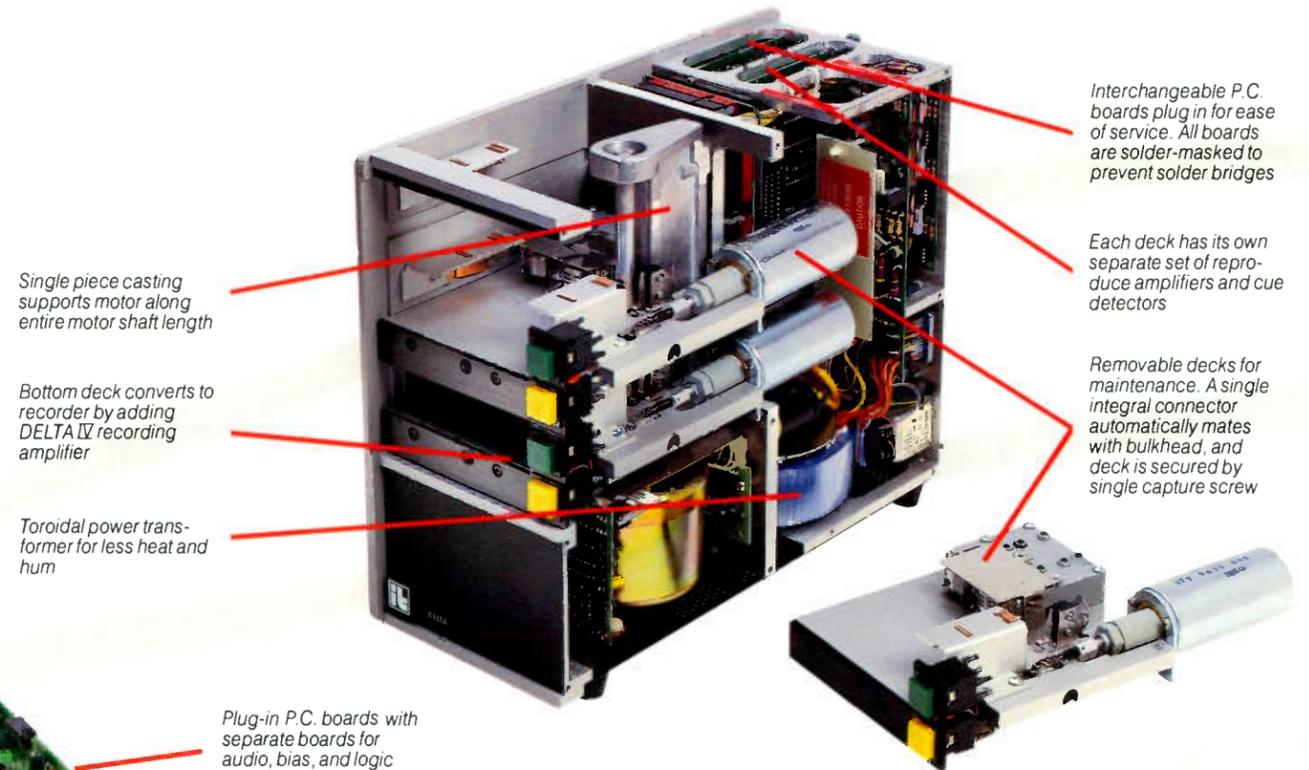
## "DELTA" IV Recording Amplifier

With the addition of a DELTA IV recording amplifier, a DELTA I reproducer or the bottom deck of a DELTA III reproducer can be converted to a recorder.



## "DELTA" III Reproducer

Three independent reproduce only decks in a space of two single decks! Narrow size allows three across rack mounting for 9 slots in a 19-inch rack! Add a DELTA IV recording amplifier, and record on the bottom deck.



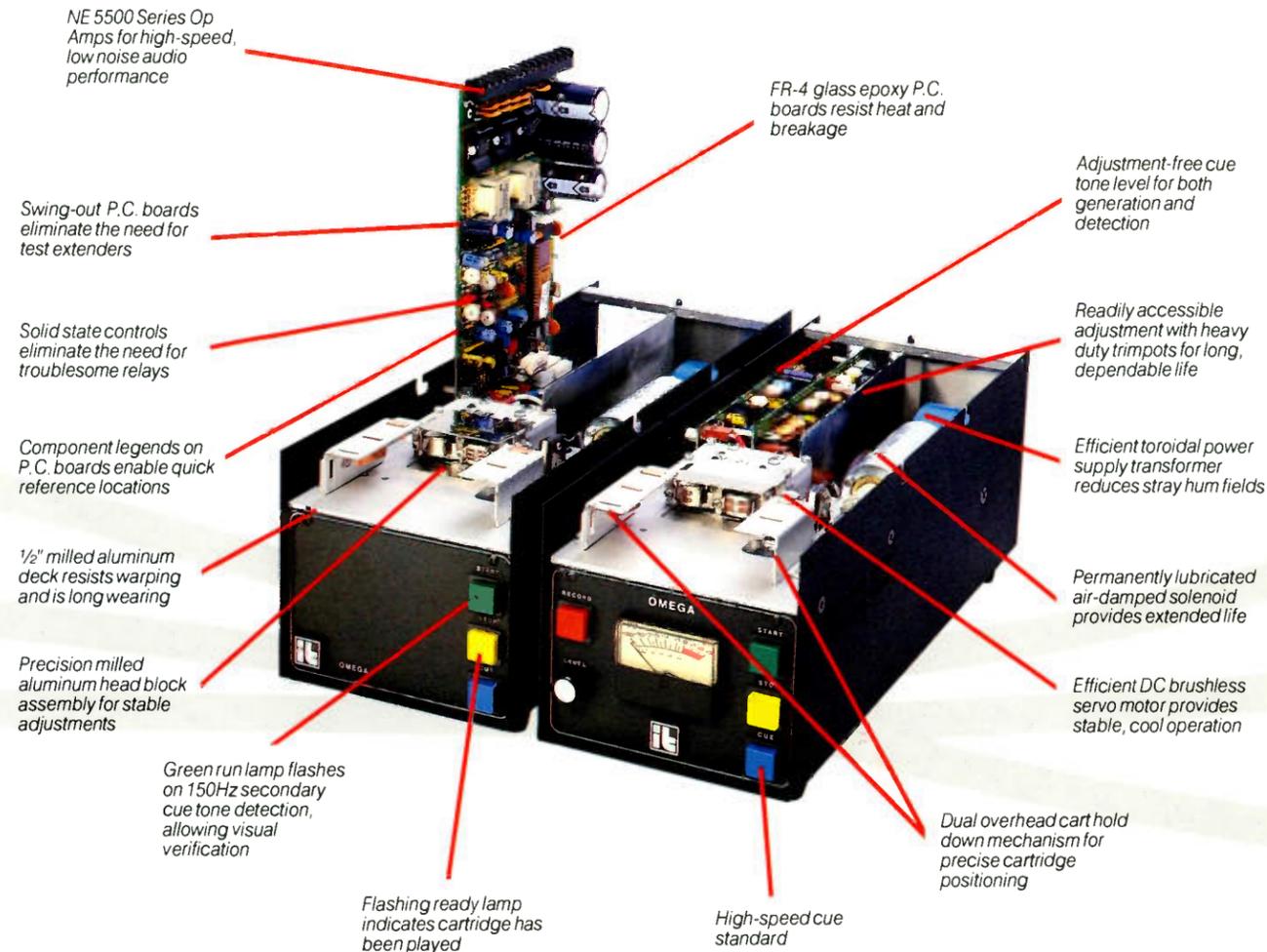
## Rack Mounting



All ITC analog cartridge machines may be table top mounted, or rack mounted in ITC's URM-0001 rack mount accessory. This unique design is expandable vertically to accommodate any current ITC designed machine.

# "OMEGA" SERIES

Available in recorder/reproducer and reproducer versions for size A and AA cartridges. High-speed cue and 1kHz and 150Hz NAB cue tones standard.



## Other features include:

- Long life stereo heads
- 150 Hz secondary cue tone generation and detection standard. Detection mutes the audio, thereby reducing on-air noise
- Recorder has built-in microphone preamplifier
- Cart played indication and cart replay lock-out reduce possible operator errors
- Microprocessor design virtually eliminates all troublesome relays and discrete components of other designs
- Crystal referenced cue tone and bias frequencies further eliminate adjustments
- Self-wiping contacts in front panel switches for long life
- Rear panel screw connections provide convenient connection for audio and remote control circuits
- Polycarbonate front panel overlay resists dirt
- Security latching top cover, removable for maximum accessibility

# Components Of A Complete Cartridge Machine System

## DCM-1 Dynamic Cartridge Monitor

The DCM-1 Dynamic Cartridge Monitor automatically evaluates minute changes in cartridge tape speed by monitoring a special reference tone located on a previously unused portion of the cue track. When this performance diminishes to your predetermined in-house limit, your operators can remove the cartridge from service.

An easy to read color LED display indicates when a potential cartridge or machine problem may exist. The DCM-1 monitor can even be connected to a remote alarm or automatic logging device.

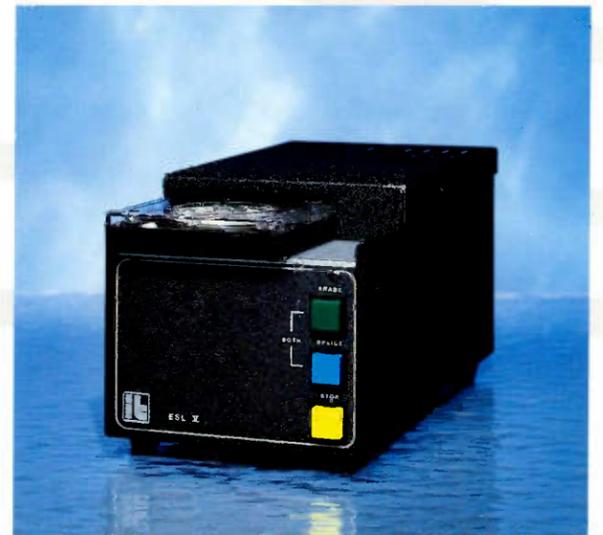
The Encoder/Decoder version operates automatically during the normal recording process applying a reference tone on the unused portion of the cartridge cue track. It can also encode already recorded cartridges.

The Decoder only model is used for monitoring an encoded cartridge and can be connected to up to six playback decks, monitoring one cartridge at a time as playback occurs without degradation of audio quality.

The DCM-1 Dynamic Cartridge Monitor works with any ITC analog cartridge machine and with most brands of broadcast cartridges.



DCM-1 Dynamic Cartridge Monitor



ESL V Eraser/Splice Locator

## ESL V Eraser/Splice Locator

The ESL V eraser/splice locator combines erasing and splice locating into one easy, automatic step ensuring consistent high quality audio reproduction from cartridge to cartridge. This eliminates the tedious task and inconsistency of manually bulk erasing cartridges and visually locating splices.

Microprocessor control assures a clean, deep erasure everytime eliminating unwanted program material and noise. High-speed splice locate (30 IPS) frees the operator from visually locating the tape splice. The operator can then perform other tasks, such as cueing tapes, pre-reading copy, locating sound effects or music while the ESL V eraser/splice locator properly prepares the cartridge for recording.

## ESL V Specifications

### Tape Speed:

- A. Splice locate cycle: 30 IPS (76.2 cm/s)
- B. Erase cycle: 1.875 IPS (4.76 cm/s)

### Erase Depth: (Using ScotchCart® II Broadcast Cartridge)

- A. -55 dB, bandlimited (20 Hz-20 kHz)
- B. Typical residual coherent noise, 75 dB below 1 kHz, recorded at 250 nWb/m

**Cartridge Size:**  
NAB A & AA

### Cycle Time (Typical):

- Complete erase/splice locate cycle**
- A. Standard Configuration: 30 seconds ERASE, plus 1/4 total tape time
- B. Optimized for ScotchCart® II Broadcast Cartridge: 22 seconds ERASE, plus 1/4 total tape time

### Splice Detection Sensitivity:

Detector senses 1/2 mil or greater tape thickness change

# "99B" SERIES Specifications

## Power:

- A. 117 VAC or 234 VAC  
B. 50/60 Hz

## Power Consumption:

- A. Reproducer/Recorder: 40 VA typical; 60 VA maximum  
B. ELSA cycle: 760 VA typical; 800 VA maximum

## Tape Speed:

- A. 7.5 IPS (19 cm/s) standard  
B. 22.5 IPS (57 cm/s) high speed cue standard  
C. 3.75 IPS (9.5 cm/s) & 15 IPS (38 cm/s) available via jumper change

## Speed Accuracy:

- ± 0.1% maximum deviation

## Record/Play Flutter:

- A. Play maximum: 0.12% DIN weighted @ 7.5 IPS  
B. Rec/Play maximum: 0.15% DIN weighted @ 7.5 IPS

## Audio Output Configuration:

Transformer coupled

## Audio Output Impedances:

- A. 600 ohm load impedance standard (180 ohm source impedance)  
B. Strappable for 150 ohm load impedance

## Audio Output Level:

- A. + 25 dBm maximum before clipping into 600 ohm load  
B. May be strapped to provide the following operating ranges without deteriorating signal-to-noise ratio:
- 18 to - 1 dBm
  - 10 to + 7 dBm
  - 5 to + 12 dBm
  - + 1 to + 18 dBm

## Distortion:\*

System: 0.8% or less THD (Tape dependent)

## Noise:

- A.\* Signal-to-noise: measured with bias/no signal
- |  | MONO        | STEREO      |
|--|-------------|-------------|
|  | 58 dB       | 56 dB       |
|  | (or better) | (or better) |
- B.\* Signal-to-noise: no tape running; ScotchCart® II cartridge in place
- |  | MONO        | STEREO      |
|--|-------------|-------------|
|  | 58 dB       | 56 dB       |
|  | (or better) | (or better) |
- C. Squelch noise: 70 dB or better  
(Noise measurements are 20 Hz - 20 kHz bandlimited, unweighted)

## Crosstalk (system):\*

- 50 dB minimum separation between any two channels

## Frequency Response:\*

Record to playback:  
± 1.0 dB, 31.5 Hz - 16 kHz

## Equalization:

- A. 1975 NAB: Standard  
B. 1964 NAB: Optional  
C. CCIR: Optional

## Cue Signals (Conform to NAB specification):

- A. NAB primary cue: 1 kHz  
B. NAB secondary cue: 150 Hz  
C. NAB tertiary cue: 8 kHz

## Audio Input Sensitivity:

- A. + 28 dBm @ 0.5% THD (Recorder)  
B. Strappable for the following input ranges (front panel level control set at mid-range):
- 20 dBm
  - 10 dBm
  - 0 dBm
  - + 10 dBm

## Audio Input Configuration:

- Transformer coupled:  
1. 20K ohm bridging standard  
2. Strappable for 150/600 ohms terminating impedance

## Metering:

- A. Taut band movement: VU Type "A" scale  
B. LED peak indicators adjustable to follow tape saturation

## Bias:

256 kHz, crystal referenced

## Cartridge Size:

NAB A & AA

## Ambient Operating Temperature Range:

50 to 131 degrees F. (10 to 55 degrees C.)

## Mounting:

- A. Table-top standard  
B. Rack-mount optional with URM-0001 rack-mount kit. Filler panels also available

## Dimensions:

- A. Width: 8 1/2" (21.6 cm)  
B. Depth: 15 1/2" (39.4 cm)  
C. Height: 5 1/4" (13.34 cm) Add 3/8" (1 cm) for feet

## Weight (Typical):

- Playback: 31 lbs. (14.1 kg)  
Recording Amplifier: 15 lbs. (6.8 kg)  
Total shipping weight: Less than 50 lbs. (22.7 kg) maximum

## ELSA System:

- Splice locate: will detect one (1) mil splicing tape thickness minimum, square or diagonal cut  
Automatic phase alignment: ± 20 degrees or less difference between left and right program channels at 10 kHz. Final azimuth mean setting is cartridge dependent and may vary slightly due to cartridge dynamic phase jitter.  
(Measured under steady state conditions after start of ELSA sequence)

Note: Items indicated (\*) are specified using a ScotchCart® II broadcast cartridge at a reference level of 1 kHz at 250 nWb/m.

# "DELTA" SERIES Specifications

## Power:

- A. 105-132 VAC or 210-264 VAC  
B. 50/60 Hz

## Power Consumption:

- DELTA I Reproducer: 50 VA typical; 65 VA maximum  
DELTA III Reproducer: 120 VA typical; 135 VA maximum  
DELTA IV Recorder/Reproducer: 5 VA typical; 10 VA maximum

## Tape Speed:

- A. 7.5 IPS (19 cm/s) standard  
B. 3.75 IPS (9.5 cm/s) strappable option  
C. 15 IPS (38 cm/s) strappable option

## Speed Accuracy:

Better than ± 0.2%

## Record/Play Flutter:

- A. Play maximum: 0.12% DIN weighted @ 7.5 IPS  
B. Rec/Play maximum: 0.15% DIN weighted @ 7.5 IPS

## Audio Output Configuration:

- A. Transformer coupled standard  
B. Balanced transformerless operation available via field conversion

## Audio Output Impedances:

- A. 600 ohm standard termination impedance (275 ohm source impedance)  
B. 150 ohm optional termination impedance via strap change (50 ohm source impedance)  
C. Transformerless output: 150 ohm source impedance

## Audio Output Level:

- A. + 18 dBm before clipping into 600 ohm load  
B. + 22 dBm transformerless clip level  
C. Variable from 0 level to + 18 dBm (Referenced to 1 kHz at 160 nWb/m) Continuously variable "useable" range of - 18 dBm to + 18 dBm

## Distortion:

System: 1.5% or less THD (Tape dependent)

## Noise:

- A.\* Signal-to-noise: no tape running; ScotchCart® II cartridge in place
- |  | MONO        | STEREO      |
|--|-------------|-------------|
|  | 62 dB       | 60 dB       |
|  | (or better) | (or better) |

- B.\* Signal-to-noise: measured with bias/no signal; input shorted; virgin cartridge
- |  | MONO        | STEREO      |
|--|-------------|-------------|
|  | 60 dB       | 58 dB       |
|  | (or better) | (or better) |

- C. Squelch noise—70 dB or better  
(Noise measurements are 20 Hz - 20 kHz bandlimited, unweighted)

## Crosstalk (system):\*

- 50 dB minimum separation between any two channels

## Frequency Response:\*

Record playback: ± 2.0 dB, 50 Hz - 16 kHz

## Equalization:

- A. 1975 NAB: Factory standard  
B. 1964 NAB: Field convertible, via jumper  
C. CCIR: Field convertible  
Adjustments: High frequency via potentiometer

## Cue Signals (Conform to NAB specification):

- A. NAB primary cue: 1 kHz  
B. NAB secondary cue: 150 Hz  
C. NAB tertiary cue: 8 kHz  
D. External cue:

1. Cue record logging Input—source impedance: 10K ohms or less volts in: 0.5V ± .25V RMS
2. Cue reproduce audio output—load impedance: 47K ohms or greater volts out: 0.5V ± .25V RMS

## Audio Input Sensitivity:

- A. Line Input: 0 dBm nominal  
Input range: - 18 dBm to + 18 dBm  
(Strappable for - 6 dBm or + 6 dBm center range)

## Audio Input Configuration:

- A. Transformer coupled:  
1. 20K ohm bridging standard  
2. Strappable for 150/600 ohms terminating impedance  
B. Transformerless balanced available

## Metering:

- A. Monitors input level to the recorder; automatically switches to playback when not recording; manually switchable for record/play/bias/cue  
B. Taut band movement with VU type "A" scale

## Bias:

119.3 kHz, crystal referenced

## Cartridge Size:

DELTA I and DELTA III Reproducers: NAB A & AA

## Ambient Operating Temperature Range:

50 to 122 degrees F. (10 to 50 degrees C.)

## Mounting:

- A. Table-top standard  
B. Rack-mount optional with URM-0001 rack-mount kit (Three units may mount side-by-side)

## Dimensions:

- A. Width:  
DELTA I Reproducer: 5 9/16" (14.1 cm)  
DELTA III Reproducer: 5 9/16" (14.1 cm)  
DELTA IV Recording Amplifier: 5 9/16" (14.1 cm)  
B. Depth:  
DELTA I Reproducer: 12" (30.5 cm)  
DELTA III Reproducer: 13" (33 cm)  
DELTA IV Recording Amplifier: 12" (30.5 cm)

## C. Height:

- DELTA I Reproducer: 5 7/32" (13.3 cm)  
DELTA III Reproducer: 10 15/32" (26.6 cm)  
DELTA IV Recording Amplifier: 5 7/32" (13.3 cm)  
Add 3/8" (1 cm) for feet

Note: All machines require 3 1/2" (8.75 cm) additional depth at rear for interconnection

## Weight (Typical):

- DELTA I Reproducer: 22 lbs. (10 kg)  
DELTA III Reproducer: 37 lbs. (16.8 kg)  
DELTA IV Recording Amplifier: 15 lbs. (5.9 kg)  
Total shipping weight: Less than 50 lbs. (22.7 kg) maximum

Note: Items indicated (\*) are specified using a ScotchCart® II broadcast cartridge at a reference level of 1 kHz at 250 nWb/m.

# "OMEGA" SERIES Specifications

## Power:

- A. 105-132 VAC or 210-264 VAC
- B. 50/60 Hz

## Power Consumption:

- A. Mono Reproducer: 45 VA typical; 65 VA maximum
- B. Stereo Reproducer: 45 VA typical; 65 VA maximum
- C. Mono Recorder/Reproducer: 50 VA typical; 70 VA maximum

## Tape Speed:

- A. 7.5 IPS (19 cm/s) standard
- B. 22.5 IPS (57 cm/s) high speed cue standard
- C. 3.75 IPS (9.5 cm/s) strappable option

## Speed Accuracy:

Better than  $\pm 0.2\%$

## Record/Play Flutter:

- A. Play maximum: 0.12% DIN weighted @ 7.5 IPS
- B. Rec/Play maximum: 0.15% DIN weighted @ 7.5 IPS

## Audio Output Configuration:

Transformer coupled

## Audio Output Impedances:

600 ohm recommended load impedance  
(180 ohm source impedance)

## Audio Output Level:

+18 dBm before clipping into 600 ohm load

## Distortion:\*

System: 1.5% or less THD (Tape dependent)

## Noise:

- A.\* Signal-to-noise: measured with bias/no signal
- MONO STEREO MIC-MONO R/P
- 56 dB 54 dB 51 dB
- (or better) (or better) (or better)

- B.\* Signal-to-noise: no tape running; ScotchCart® II cartridge in place

MONO STEREO  
58 dB 56 dB  
(or better) (or better)

- C. Squelch noise: 70 dB or better  
(Noise measurements are 20 Hz - 20 kHz  
bandlimited, unweighted)

## Crosstalk (system):\*

-50 dB minimum separation between any two channels

## Frequency Response:\*

- A. Playback:  
 $\pm 2.0$  dB, 50 Hz - 16 kHz
- B. R/P-line level input:  
 $\pm 2.0$  dB, 50 Hz - 16 kHz
- C. R/P-MIC level input:  
 $\pm 3.0$  dB, 300 Hz - 10 kHz

## Equalization:

- A. 1975 NAB: Standard
- B. 1964 NAB: Optional
- C. CCIR: Optional

## Cue Signals: (Conform to NAB specification)

- A. NAB primary cue: 1 kHz
- B. NAB secondary cue: 150 Hz

## Audio Input Sensitivity:

- A. Line input: 0 dBm nominal
- B. MIC input: -70 dBV nominal

## Audio Input Configuration:

- A. Line input-transformer coupled:
  1. 20K ohm bridging standard
  2. Strappable for 150/600 ohms terminating impedance
- B. Microphone input:
  1. Unbalanced
  2. Input impedance: 50K ohms

## Metering:

Taut band movement with VU type "A" scale

## Bias:

111.84 kHz, crystal referenced

## Cartridge Size:

NAB A & AA

## Ambient Operating Temperature Range:

50 to 122 degrees F. (10 to 50 degrees C.)

## Mounting:

- A. Table-top standard
- B. Rack-mount optional with URM-0001 rack-mount kit. Filler panels also available

## Dimensions:

- A. Width: 5 $\frac{3}{4}$ " (14.6 cm)
- B. Depth: 15" (38.1 cm)
- C. Height: 5 $\frac{1}{4}$ " (13.34 cm) Add  $\frac{3}{8}$ " (1 cm) for feet

## Weight (Typical):

All machines: 15 lbs. (6.84 kg)  
Total shipping weight: Less than 20 lbs.  
(9.1 kg) maximum

\*Note: Items indicated (\*) are specified using a ScotchCart® II broadcast cartridge at a reference level of 1 kHz at 250nWb/m.

International Tapetronics Corporation/3M reserves the right to change products and specifications without notice.

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

International Tapetronics Corporation/3M offers a variety of financial options designed to fit your needs. Call today for more information on ITC's complete line of audio equipment.

- 3M HCDA™ 3000 Digital Audio System, "An Achievement"
- The Performance System, 99B Recorders and DELTA Reproducers

- The Economy System, DELTA Recorders and OMEGA Reproducers
  - AUDIO SWITCHER, "The Advantage"
- When newer technology emerges, it will come from International Tapetronics Corporation/3M, "The Leader in Reliability and Service". To order or for more information call toll free 800-447-0414. From Alaska or Illinois, call collect 309-828-1381. In Canada, call Maruno Electronics, Ltd., 416-255-9108.

## International Tapetronics Corporation

2425 South Main Street, P.O. Box 241, Bloomington, Illinois 61701  
 TWX: 510-352-2500

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# ITC 770

## Reproducers and Recorder-Reproducers



770 Recorder/Reproducer  
 (Shown in optional console cabinet.)

### ITC 770 SPECIFICATIONS

#### REPRODUCER

- Power:** 105 to 130 volts AC, 60 Hz, 160 watts maximum.
- Wind Time:** Less than 60 seconds for 2500 feet of tape. Less than 90 seconds for 3600 feet of tape.
- Motors:** Capstan - Direct drive DC servo control with electrolyzed shaft. Reels - Two capacitor-start induction torque motors.
- Tape Speeds:** 7-1/2 and 15 ips (19 and 38 cm/sec) or 3-3/4 and 7-1/2 ips (9.5 and 19 cm/sec) Speed accuracy  $\pm 0.2\%$  or less measured with 1.5 mil (0.038 mm) tape.
- Tape Width and Tracks:** 1/4 inch (6.3 mm) tape, 1.0 mil (0.025 mm) base minimum. Full Track - mono 1/2 track - mono or stereo 1/4 track - stereo
- Reel Sizes:** NAB or EIA with a hub diameter of 1.75 inch (44.45 mm) or greater. Maximum reel flange diameter of 10.5 inches (266.7 mm). Selectable tape tension for small or large reels. Reels of dissimilar sizes, i.e. 7 inches (177.8 mm) and 10.5 inches (266.7 mm), should not be used together.
- Flutter (NAB Weighted):** 3-3/4 ips 0.10% or less 7-1/2 ips 0.07% or less 15 ips 0.05% or less
- Audio Output:** With transformer(s) . . . +24dBm before clipping into 600 ohm load, balanced. Without transformer(s) . . . +18dBm before clipping into 600 ohm load, unbalanced.
- Distortion (Amplifier):** 0.5% rms total harmonic distortion, maximum at +18dBm output level at 1 KHz with output transformer(s). +16dBm without output transformer(s).
- Signal-To-Noise Ratio:** 52dB measured from a 700 Hz tone, recorded at 185 nWb/m, with reproduce amplifier adjusted for +8dBm output, to tape recorded with bias but no signal. Measurement is unweighted noise with a bandwidth of 20 to 20,000 Hz.
- Crosstalk:** 55dB or better with a 185nWb/m 1 kHz tone on adjacent track.
- Equalization:** NAB with high frequency adjustment for 3-3/4, 7-1/2 and 15 ips. Automatically switched with speed switch between low and high speed equalizers.

- Frequency Response:** 3-3/4 ips (+2dB -3.5dB) 25 to 35 Hz;  $\pm 2$ dB 35 to 8,000 Hz. 7-1/2 ips (+2dB -3dB) 25 to 35 Hz;  $\pm 2$ dB 35 to 15,000 Hz. 15 ips (+2dB -3.5dB) 25 to 35 Hz;  $\pm 2$ dB 35 to 18,000 Hz.
- Headphone Output:** 24 mV into 8 ohms (with AT-0002 output transformers). 58 mV into 8 ohms (without AT-0002 output transformers).
- Ambient Operating Temperature:** 40° to 130°F (5° to 55°C).
- Remote Control:** Start, Stop, Rewind, Forward, Speed Select, Foil Sense and Mode Indicators.
- Brakes:** Mechanical disc with one-way clutch. 10-1/2 inch (266.7 mm) metal reels stop time adjustable from 2-1/2 seconds to 10 seconds.
- External Connectors:** Latching type Beau Series 3300. Mating plugs furnished.
- Dimensions:** 19 inches (482.6 mm) wide 1-1/4 inch (31.75 mm) overhang on each side with 10-1/2 inch (266.7 mm) reels. 14 inches (355.6 mm) high, 2-1/4 inches (57.15 mm) overhang on top with 10-1/2 inch (266.7 mm) reels. 7-7/8" (200.0 mm) deep, including mating plugs.
- Weight:** Unpacked - 44 pounds (19.96 kg).

#### RECORDING AMPLIFIER

- Power:** (includes reproduce deck and recorder electronics) 105-130 volts, AC, 60 Hz, 165 watts max.
- Recorder Source Impedance:** 600 ohms.
- Recorder Input Impedance:** 5000 ohms balanced (15 K ohm bridging optional).
- Input Level:** -22 dBm (0.61 volts) minimum to record at "0" reference level (185 nWb/m flux level) +8 dBm (1.96 volts) maximum.
- Distortion (Record to Play):** Using 400 Hz tone recorded at NAB standard reference level\* with reproduce amplifier adjusted for 0 dBm output, and measuring on a distortion analyzer with a 400 Hz to 20 kHz bandwidth.
 

15 IPS	1.2%
7.5 IPS	1.5%
3.75 IPS	2.0%

- Amplifier Headroom:** Maximum amplifier headroom above reference level (185 nWb/m) using frequencies of 1 kHz and 10 kHz.

Tape Speed	1 kHz	10 kHz
15 IPS	+23 dB	+23 dB
7.5 IPS	+23 dB	+19 dB
3.75 IPS	+23 dB	+12 dB

- Crosstalk:** Better than 50 dB at 1 kHz.
- Frequency Response:** 15 IPS  $\pm 2$  dB from 35 to 18,000 Hz at normal operation level. 7.5 IPS  $\pm 2$  dB from 35 to 15,000 Hz, 10 dB below normal operating level. 3.75 IPS  $\pm 2$  dB from 35 to 8,000 Hz, 15 dB below normal operating level.
- Equalization:** NAB with adjustments for high frequency control.
- Headphone Output:** 8 ohms or greater.
- Meter Amplifier Monitor:** 600 ohms (available at rear chassis).
- Remote Control:** Record set switch and record indicator lamp.
- External Connectors:** Latching and phono types. Mating plugs and sockets furnished.
- Head and Track Configuration:** Full Track Monophonic Half Track Monophonic Half Track Stereophonic (2 channel) Quarter Track Stereophonic (2 channel)
- Metering:** Taut-band movement with "A" scale. Meter switch selection for metering the following: Normal line recording level, P.R.S. bias and program play. (Meter sensitivity may be calibrated for 0 to +18 dBm output level.)
- Erase Depth:** Below Noise Level.
- Mounting:** Rack mounting. (Console cabinet optional.)
- Dimensions:** 19 inches wide (482.60 mm) 9 inches deep (228.60 mm) 3-1/2 inches high (88.90 mm)
- Weight:** 15 pounds (6.805 kg) unpacked.

\*185 nWb/m = 0 dBm output, using 3M type 206 tape or equivalent.

The 770 is covered by the following patents:  
 4,106,994, 4,040,114, D 248,390.



## Rugged, reliable, easily maintained

Broadcasting can be a tough life for a machine: demanding schedules, lack of attention, a multitude of operators. No wonder the "lightweight" machines can't take it! And it's for precisely these reasons that the 770 series looks so good.

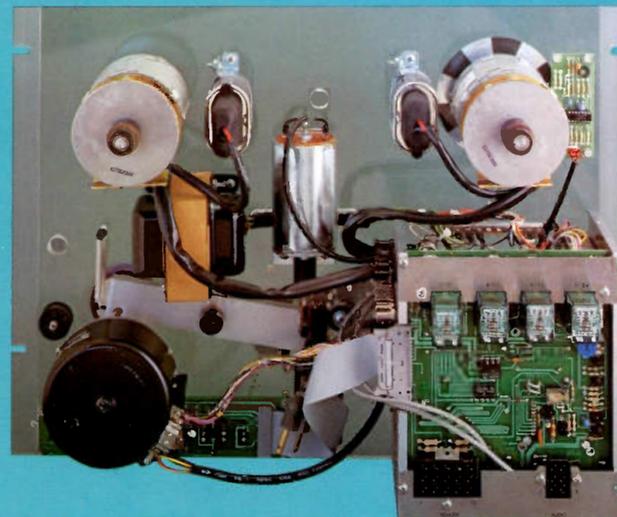
Stations specify ITC because they want the best. And reliability is what makes ITC machines best. It starts with a responsive design that pays close attention to areas affected by the fatigue and wear of professional use. Then, the machine undergoes extensive cycle testing and evaluation, to flush out potential problem areas. The 770 Series you receive is fully tested, and immediately ready to go to work.

### Tech Service Assistance

Maintenance and repair needs are simplified by the modular design of the 770, with all components in sight and at hand. Plus, if alignment assistance or trouble-shooting help is needed, our Technical Service Department offers you direct telephone consultation. Needed parts can often be shipped the very same day.

The optional console, (right) with multi-positioning transport drum, provides convenient, comfortable operation. The handsome woodgrain finish complements any studio decor.

## Simple, trouble-free mechanical design



Control switches are situated logically for clear-cut and rapid operation.

This display model uses a see-through Plexiglas® deck to show the simplicity of the 770. It is a chief engineer's dream, clean and rugged with a minimum of moving parts. Best of all, there are no hidden springs, belts or pulleys, and no tricky adjustments to make.

The design is spaciouly roomy. Maintenance is simple: no fumbling or groping in hidden cavities. Plug-in assemblies make repair or replacement simple.

Compare the clean, uncomplicated mechanics of the 770 to other machines. It's an important reason to choose ITC.

The tape path is open, clean, for easy threading. A cue lever provides manual control of tape lifters.

## Operators call it, "Untempermental"

The 770 offers an operator flexibility, convenience, and — most importantly — absolute reliability. No matter what demands the operator makes, this machine obliges, with a cool temperament that's always welcome. It simply has no unnecessary frills to fail.

The deck is clean, uncluttered, with controls conveniently placed and sized.

The PRS (Play/Record Synchronization) system lets you record on one channel, then add audio on the other, while listening to both, in complete synchronization. Great for electronic editing.

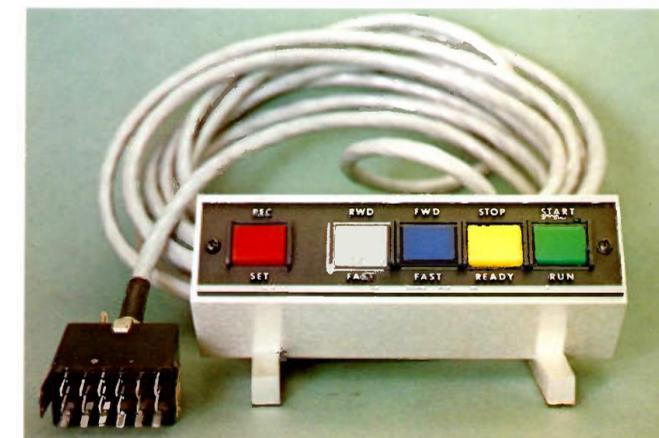
The 770 accepts 10½" and 7" or smaller reels, to fit mastering, or production work.

Recorders have full motion sensing and "START MEMORY" that protects delicate tapes and enhances production use. Motion sensing prevents the machine from entering the run mode until tape has come to a stop from fast forward or rewind. The start memory circuit stores the command until tape can safely enter play mode.

New, Long-life Playback Head with improved low-end frequency response. Insures reliable 25Hz. tone sensing.

Recessed level knobs require push-turn actuation, so preset levels will not be changed accidentally.

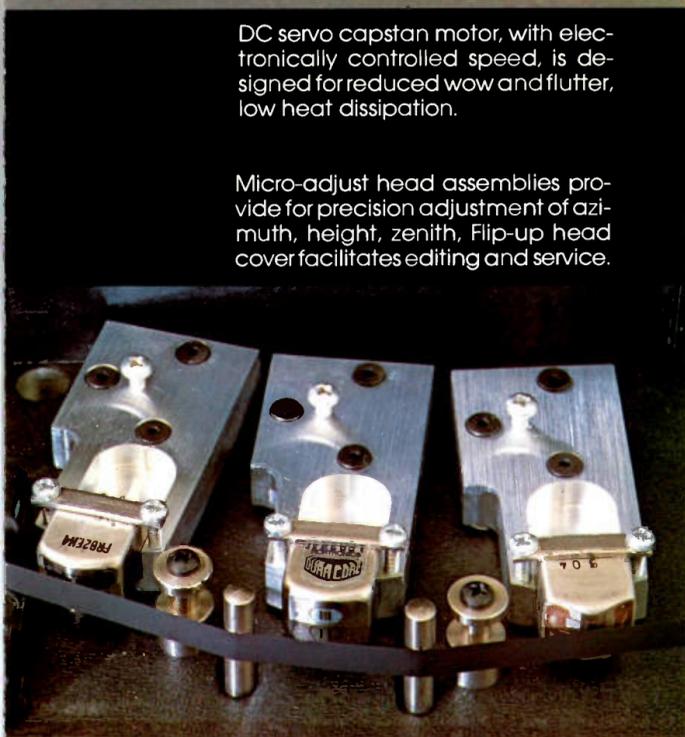
The 770 Recorder provides full facility metering — input, output, bias levels, with safety interlock to prevent accidental erasures.



Optional Remote Control.



The flip-up cover exposes tape for easy editing.

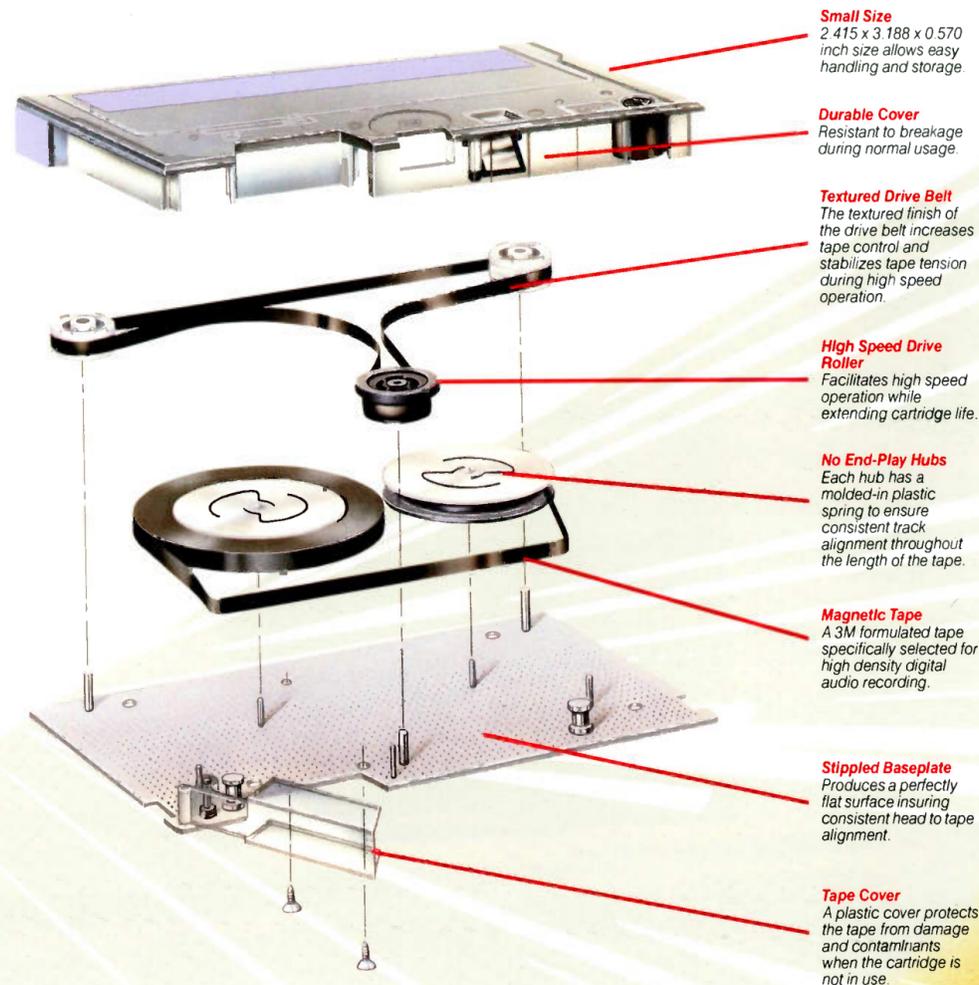


DC servo capstan motor, with electronically controlled speed, is designed for reduced wow and flutter, low heat dissipation.

Micro-adjust head assemblies provide for precision adjustment of azimuth, height, zenith. Flip-up head cover facilitates editing and service.

# The 3M HCDA™ 3000 Digital Audio Cartridge, An Achievement In Media

The 3M HCDA™ 3000 Digital Audio Cartridge is a single length tape cartridge. There is only one length to stock, meaning less unused or incorrect cartridge inventory. Each cartridge is capable of up to 20 minutes of stereo recording time and of holding up to 31 separate cuts. When recording time remains, additional cuts can be added to a cartridge without re-dubbing. The following are other advantages:



**Small Size**  
2.415 x 3.188 x 0.570  
inch size allows easy  
handling and storage.

**Durable Cover**  
Resistant to breakage  
during normal usage.

**Textured Drive Belt**  
The textured finish of  
the drive belt increases  
tape control and  
stabilizes tape tension  
during high speed  
operation.

**High Speed Drive  
Roller**  
Facilitates high speed  
operation while  
extending cartridge life.

**No End-Play Hubs**  
Each hub has a  
molded-in plastic  
spring to ensure  
consistent track  
alignment throughout  
the length of the tape.

**Magnetic Tape**  
A 3M formulated tape  
specifically selected for  
high density digital  
audio recording.

**Stippled Baseplate**  
Produces a perfectly  
flat surface insuring  
consistent head to tape  
alignment.

**Tape Cover**  
A plastic cover protects  
the tape from damage  
and contaminants  
when the cartridge is  
not in use.

## The 3M HCDA™ 3000 Digital Audio System Preliminary Specifications

### Power

- A. 90-132/180-264 VAC
- B. 47-440 Hz

### Power Consumption:

- A. TAPE DRIVE: 22W in standby, 60W in play
- B. SIGNAL PROCESSOR: 50W play, 80W record/play

### Frequency Response:

- ± 3dB, 20 Hz to 18kHz
- ± 5dB, 10 Hz to 20kHz

### Dynamic Range:

>90dB

### Harmonic Distortion:

< .03%, 20Hz to 20kHz at maximum input/output level

### Intermodulation Distortion:

< .03% for any two frequencies, 100Hz to 20kHz at maximum input/output level

### Audio Input Level:

- 18 dBm to + 18 dBm adjustable for maximum output. Transformerless balanced 20K bridging input

### Audio Output Impedance:

25 ohm termination impedance

### Audio Output Level:

+ 22 dBm, transformerless balanced output  
+ 18 dBm, before clipping into a 600 ohm load

### Flutter:

Below measurable limits

### Timing Accuracy:

Controlled by crystal oscillator

### Start Time:

150 msec.

### Stop Time:

5 msec.

### Tape Speed:

120 IPS nominal tape speed  
120 IPS fast forward/rewind tape speed

### Play Time:

20 minutes maximum

### Fast Forward/Rewind Time:

20 seconds maximum

### Channel Use:

- A. 16-bit/48K samples per second, multiplexed into one digital channel
- B. 24-bit/4K samples per second, second user channel

### Sampling Frequency:

48kHz or 44.1kHz

### Quantization:

16-bit linear per channel

### Error Correction Method:

Multi-orthogonal convolutional code (patent applied for)

### Error Concealment Method:

Digitally synthesized mute

### Track Configuration:

- 32 Tracks total
- 31 Audio tracks
- 1 Directory track

### Pre-Emphasis:

- A. None or CCITT J.17 standard
- B. None or 50/15 microseconds (compact disc type), optional

### Ambient Operating Parameters:

- A. Temperature: 40 to 113 degrees F. (- 40 to + 45 degrees C.)
- B. Relative humidity: 20% to 80%
- C. Maximum wet bulb temperature is 79 degrees F (26 degrees C.)

### Dimensions:

- A. Width:  
TAPE DRIVE: 4 1/4" (10.79 cm)  
SIGNAL PROCESSOR: 19" (48.26 cm)  
RECORD CONTROL: 4 1/4" (10.79 cm)  
EXPANDED CONTROL PANEL: 7 9/16" (19.20 cm)
- B. Depth:  
TAPE DRIVE: 16" (40.64 cm) Add 3" (7.62 cm) for connectors  
SIGNAL PROCESSOR: 14 1/2" (36.83 cm) Add 3 1/2" (8.89 cm) for connectors  
RECORD CONTROL: 16" (40.64 cm) Add 3" (7.62 cm) for connectors  
EXPANDED CONTROL PANEL: 6 5/16" (16 cm) Add 1 1/4" (3.18 cm) for connectors
- C. Height:  
TAPE DRIVE: 5 7/32" (13.25 cm) Add 1/8" (.847 cm) for feet  
SIGNAL PROCESSOR: 5 1/4" (13.34 cm) Add 1/8" (.847 cm) for feet  
EXPANDED CONTROL PANEL: 3 5/16" (8.41 cm) Add 1/8" (.318 cm) for feet

### Weight:

- TAPE DRIVE: 11 lbs. (5 kg)
- SIGNAL PROCESSOR: 18 lbs. (8.2 kg)
- RECORD CONTROL: 5 lbs. (2.3 kg)
- EXPANDED CONTROL PANEL: 4 lbs. (1.8 kg)

Specifications above are applicable at a sampling rate of 48kHz. International Tapetronics Corporation/3M reserves the right to change products and specifications without notice.

## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

International Tapetronics Corporation/3M offers a variety of financial options designed to fit your needs, as well as a new, generous trade-in policy. Call today for more information on ITC's complete line of audio equipment.

- 3M HCDA™ 3000 Digital Audio System, "An Achievement"
- The Performance System, 99B Recorders and DELTA Reproducers

- The Economy System, DELTA Recorders and OMEGA Reproducers
- AUDIO SWITCHER, "The Advantage"

When newer technology emerges, it will come from International Tapetronics Corporation/3M, "The Leader in Reliability and Service". To order or for more information call toll free 800-447-0414. From Alaska or Illinois, call collect 309-828-1381. In Canada, call Maruno Electronics, Ltd., 416-255-9108.

# An Achievement In Digital Audio

## 3M HCDA™ 3000 Digital Audio System

True, Recordable Digital Audio  
For Broadcasters

From International Tapetronics Corporation/3M

# An Achievement In Digital Audio To Set You Above The Competition

The broadcasting industry today is involved in a major revolution...a competition like it has never faced before. The battle being waged to obtain the attention of the audience's ear has never been greater. And the alternatives now available have grown in number and sophistication along with the trained, attuned ear of a new generation who are now accustomed to hearing quality sound.

Not only do broadcasters compete head-to-head for audience share, they compete with a new onslaught of entertainment now both available and affordable to a vast market of potential listeners.

In automobiles, radio stations compete against each other for attention, as well as against stereo cassette decks, and now in-dash compact disc players.

In the home, record albums, compact discs, cassette tapes and now stereo television, offering both stereo programming and music videos also compete for attention.

To not only succeed against such formidable competition in the audio battle, but to indeed excel, the industry must meet these challenges with the latest technology to provide the clearest, cleanest sound...a sound so pure, so true-to-life, that it differentiates you the broadcaster from your competition and gives you the competitive edge in your market.

Such an achievement is here today...a digital audio system capable of true, digital recording that combines the finest elements of sound engineering technology... and takes into account your requirements for reliability and ease of use. The system is from International Tapetronics Corporation/3M and is designed for broadcasters.

The system provides realistic sound with depth, clarity and crispness in even the most quiet passages with virtually no dropouts, noise, frequency response aberrations or wow and flutter.

This superior sound combined with your carefully chosen programming should lead to greater audience share, more advertising revenues and more profits. All this without sacrificing any of the advantages of the popular cartridge machine format, as this system includes:

## ■ Easy Operation

Recording and playback on a new digital audio tape cartridge

## ■ Instant Start

Audio at the press of a button for complete control of today's fast-paced programming

## ■ Automatic Cueing

Recues to the beginning of the selection or cues to the next selection without operator involvement

## ■ Re-Recording And Editing

Cartridges can be recorded again and again and edited or customized at the time of recording

## ■ Source Preservation

CD's, vinyl records and other source materials can be preserved as library masters

## ■ Facilitates Playing Correct Cut

Cartridge selections in the control room are easily identified

International Tapetronics Corporation/3M designed all of these features and more into a digital audio system capable of true, digital recording developed specifically for broadcasters...the 3M HCDA™ 3000 Digital Audio System.

# ational Controls and Functions

**EOM Record Switch**  
During the recording process, this switch records an end-of-message (cut) signal when pressed.

**EOM Record Lamp**  
Indicates an end-of-message (cut) signal is being recorded.

**AUX Record Switch**  
During recording, this switch records an auxiliary signal when pressed.

**AUX Record Lamp**  
Indicates an auxiliary signal is being recorded.

**Keypad**  
The 16-switch Keypad consists of digits 0-9, a delete key, cut key, clear key, time key, and two scrolling keys. The Keypad instructs the Tape Drive to perform various cueing and locating functions.

**Rewind/Cue Last Switch**  
Used to high-speed advance the tape in the opposite direction of the message (rewind). If pressed a second time, it allows the operator to cue back to the previous cut.

**Rewind/Cue Last Lamp**  
Indicates the machine is either in rewind, or cue-to-previous-cut condition.

**Fast Forward/Cue Next Switch**  
Used to high-speed advance the tape along a message. If pressed a second time, this switch allows an operator to cue to the next cut.

**Fast Forward/Cue Next Lamp**  
Indicates the machine is in either the fast forward or cue-to-next-cut condition.



**Expanded Control Panel**

**Display**  
This 4-line x 20-character LED display provides feedback on Keypad instructions, cut number, track information, time, signal status (EOM & AUX), error status, and overlevel conditions.

**Record Set Switch**  
Places the system in the ready-to-record condition.

**Record Set Lamp**  
Indicates the machine is ready to record or in the process of recording.

**Locate Switch**  
Used to instruct the Tape Drive to locate a specified cut.

**Locate Lamp**  
Indicates tape drive is locating a specific cut.

**Start Switch**  
Used to initiate the playback run or record run operations.

**Start (Run) Lamp**  
Indicates the machine is in the playback run or record run mode.

**Stop Switch**  
Used to stop tape movement from any function in operation and to cue the machine.

**Stop (Ready) Lamp**  
Indicates the tape is ready to start or ready for unloading after playback. When illuminated continuously, it indicates a ready-to-start condition. When this lamp is flashing, it indicates a ready-to-unload condition.

**Increment Cut Switch**  
Advances the cut display once per depression.

**Decrement Cut Switch**  
Decreases the cut display once per depression.

**Time Switch**  
Toggles the time display back and forth between counting up or counting down during playback.



**Time Display**  
This 4-digit LED shows message running time in minutes and seconds.

**Cut Number Display**  
This 2-digit LED identifies the current cut while in playback, record, ready-to-start, or standby condition. If the cut increment switch or cut decrement switch is pressed during playback, the 2-digit display will flash, indicating the next cut to be played.

**Record Control**

# The 3M HCDA™ 3000 Digital Audio System, An Achievement In Design

The 3M HCDA™ 3000 Digital Audio System is a true, 16-bit linear digital audio recording system allowing for up to 20 minutes of stereo recording per cartridge without companding. The system is capable of recording a cartridge at either a 48 kHz or 44.1 kHz sampling rate. *The sampling rate will automatically be detected during playback which allows you to mix cartridges recorded at different sampling rates without operator/intervention.*

Each cartridge contains 200 feet of tape. When operating, the tape runs from one end of the cartridge to the other, while the head (the only element which ever comes in contact with the tape) remains stationary. When the end of the tape is reached, the head moves up vertically to the next track and the tape direction is reversed. This is known as serpentine recording and it provides 6,200 feet of usable recording length, or about 20 minutes of stereo recording time on 31 of the 32 tracks available.

The remaining track is used as a Directory. The Directory facilitates placing multiple cuts on a cartridge and allows operators to locate and cue to any desired cut on the tape in only 15 seconds or less!

The 3M HCDA™ 3000 Digital Audio System is available in three configurations:

## ■ Reproducer

Includes Tape Drive and rack-mounted Signal Processor

## ■ Recorder/Reproducer

Includes Tape Drive, rack-mounted Signal Processor and Record Control

## ■ Recorder/Reproducer With Expanded Control Panel

Includes Tape Drive, rack-mounted Signal Processor and Expanded Control Panel in place of Record Control



The Signal Processor contains the primary electronics for accomplishing A/D and D/A conversion, tape encoding and decoding, and error correction. The rack-mounted Signal Processor can be located remotely from the Tape Drive. This unique approach conserves space and facilitates mounting four drive units in a single rack width.

The Expanded Control Panel is an optional unit used when maximum operational flexibility is required. This unit eliminates the need for a Record Control and also provides remote control if desired.

## An Achievement In Serviceability

The 3M HCDA™ 3000 Digital Audio System has been designed with serviceability in mind. Service is easy with:

- No need to make electro-mechanical adjustments
- ITC's P.C. board exchange program
- Installation and operation manual and optional technical illustrations manual
- Factory technical consultation
- Fast shipment of parts orders
- Factory repair service available

# The 3M HCDA™ 3000 Digital Audio System, An Achievement In Operational Convenience

# Opera

The 3M HCDA™ 3000 Digital Audio System offers uncompromisingly true-sound reproduction quality and operates very much like other ITC cartridge machines. The need for staff training is minimal because of the operational similarity.

**Standby Lamp**  
Indicates an auto-cueing operation is taking place. If either the fast forward/cue next or the rewind/cue last lamp is also illuminated, it indicates either a cue-to-next-cut or cut-to-previous-cut operation is taking place.

**Seven-Segment LED**  
Serves as a power on indicator and allows numbering of the tape drives as either 0-9 or A-J.

**EOM Detect Lamp**  
Indicates detection of the end-of-message (cut) signal on the tape.

**Fail Lamp**  
Indicates an out-of-ordinary condition has occurred.

**Read Error Lamp**  
Alerts the operator the tape is worn, errors are beyond correcting, and the cartridge should be replaced.

**Rewind/Cue Last Switch**  
Used to high-speed advance the tape in the opposite direction of the message (rewind). If pressed a second time, it allows the operator to cue back to the previous cut.

**Rewind/Cue Last Lamp**  
Indicates the machine is either in rewind, or cue-to-previous-cut condition.



**Start Switch**  
Used to initiate the playback run or record run operations.

**Start (Run) Lamp**  
Indicates the machine is in the playback run or record run mode.

**Stop Switch**  
Used to stop tape movement from any function in operation and to cue the machine.

**Stop (Ready) Lamp**  
Indicates the tape is ready to start or ready for unloading after playback. When illuminated continuously, it indicates a ready-to-start condition. When this lamp is flashing, it indicates a ready-to-unload condition.

**Fast Forward/Cue Next Switch**  
Used to high-speed advance the tape along a message. If pressed a second time, this switch allows an operator to cue to the next cut.

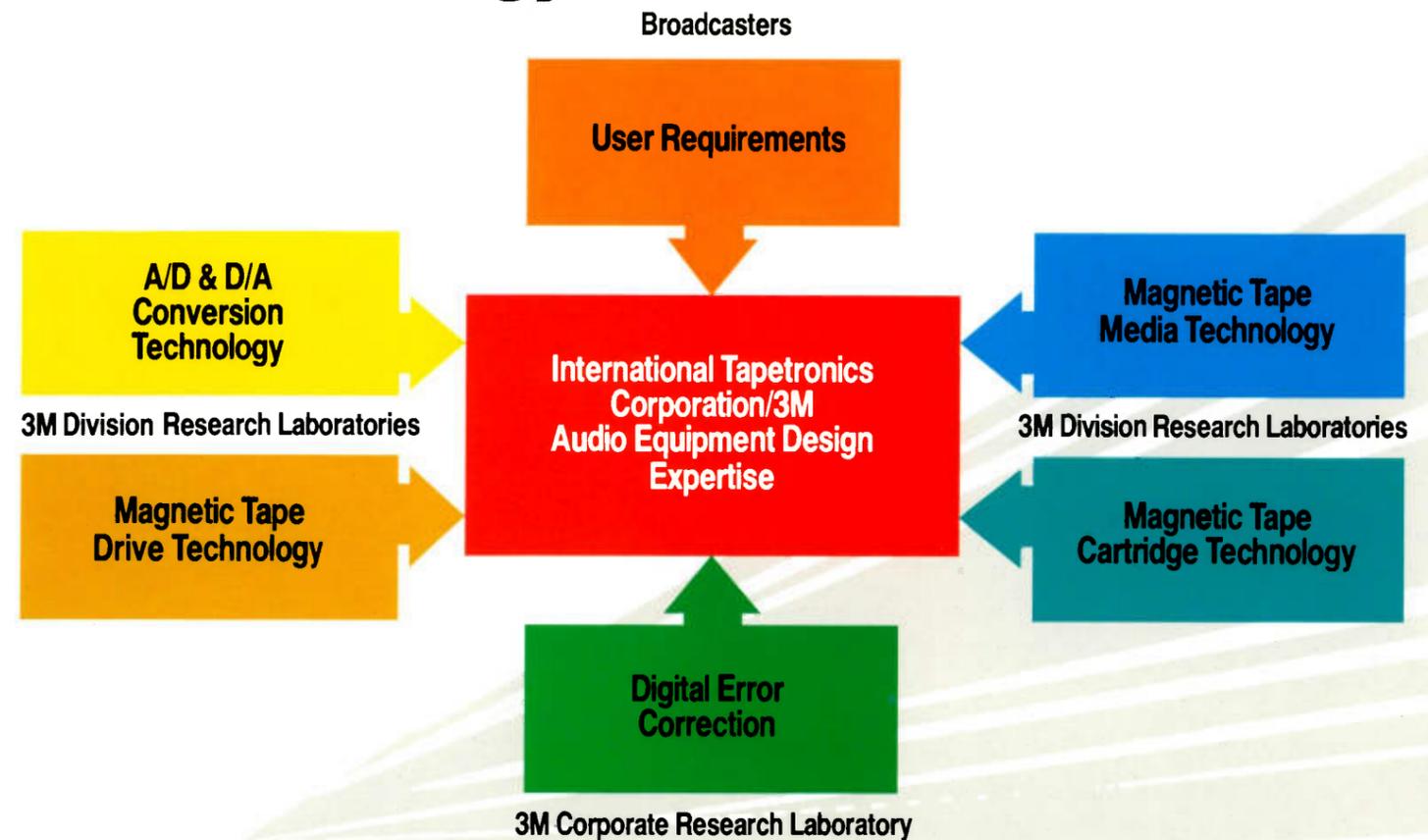
**AUX Detect Lamp**  
Indicates detection of an auxiliary signal.

**Fast Forward/Cue Next Lamp**  
Indicates the machine is in either the fast forward or cue-to-next-cut condition.

## Tape Drive

# The 3M HCDA™ 3000 Digital Audio System, An Achievement In Technology

The 3M HCDA™ 3000 Digital Audio System represents a breakthrough of the highest magnitude. It is a product of 3M's vast technological resources combined with ITC's knowledge of broadcasting and reputation for delivering uncompromising product quality.



## 3M HCDA™ 3000 Digital Audio System

ITC engineers built upon 3M's proven A/D and D/A conversion technology used within the M-81 Digital Mastering System (DMS). This 32-track digital audio recording machine is so well respected by the music recording industry that hundreds of albums each year are still produced on the DMS despite the fact 3M discontinued manufacturing it years ago.

ITC then incorporated a patent applied for error correction system designed within 3M's corporate research laboratory. This error correction system

surpasses that of compact disc players and offers state-of-the-art, third order error correction.

Both the cartridge and the drive technology designed into the 3M HCDA™ 3000 Digital Audio System are long proven through use in the computer industry. A magnetic tape, unique to the new digital audio cartridge, results from years of successful 3M magnetic tape media technology.

All of these elements along with YOUR requirements were brought together by International Tapetronics Corporation/3M to form the basis for an achievement in technology...the 3M HCDA™ 3000 Digital Audio System.

# 750 Series recorder/reproducer

## MODEL DESIGNATIONS

The 750 Series open-reel recorder/reproducers are capable of handling reels up to 10 1/2 inches in diameter. All equipment is supplied ready for rack mounting. Specially designed console cabinets are available as an option.

855-7514 Full Track Mono, 3 3/4 — 7 1/2 IPS  
 855-7515 Full Track Mono, 7 1/2 — 15 IPS  
 855-7524 1/2 Track Mono, 3 3/4 — 7 1/2 IPS  
 855-7525 1/2 Track Mono, 7 1/2 — 15 IPS

855-7534 1/2 Track Stereo, 3 3/4 — 7 1/2 IPS  
 855-7535 1/2 Track Stereo, 7 1/2 — 15 IPS  
 855-7544 1/4 Track Stereo, 3 3/4 — 7 1/2 IPS  
 855-7545 1/4 Track Stereo, 7 1/2 — 15 IPS

864 0014-010 Console Cabinet with filler strip  
 833-0018 25 Hz Cue Detector

Note: Standard for 750 Series Recorder/Reproducers. Dual speed, rack mounting, 60 Hz, 117V AC operation with NAB equalization. Other models are available on special order.

## 750 SPECIFICATIONS

### Power:

105-125 volts, AC, 60 Hz, approximately 200 volt-amperes (Varies with remote controls and accessories) Other voltage and frequency variations are available on special order.

### Wind Time:

Less than 60 seconds for 2400 feet of tape  
 Less than 90 seconds for 3600 feet of tape

### Motors:

Capstan — direct-drive hysteresis synchronous with electrolyzed shaft and instrument-type permanently lubricated ball bearings

Torque — induction motors (two) with ball bearings provide 20 ounce/inches of torque.

### Timing Accuracy:

0.2% or better

### Flutter (NAB weighted):

15 IPS	.05%
7.5 IPS	.07%
3.75 IPS	.1%

### Audio Output:

+ 18 dBm before clipping; 600 ohms balanced.

### Audio Input:

15 k ohm bridging or 600 ohms balanced by strappable option.

### Distortion (Record to Play):\*

Using 400 Hz tone recorded at NAB Standard Reference Level\* with reproduce amplifier adjusted for +8 dBm output, and measuring on a distortion analyzer with a 400 to 20 kHz bandwidth.

15 IPS	1.2%
7.5 IPS	1.5%
3.75 IPS	2.0%

NOTE: Measuring only third harmonic distortion on an octave band analyzer will result in a maximum distortion of 0.5%.

### Signal-to-Noise:\*

Using 400 Hz tone recorded at NAB Standard Reference Level\* with reproduce amplifier adjusted for +8 dBm output, and measuring unweighted noise.

	Full Track	Half Track
15 IPS	-58 dB	-56 dB
7.5 IPS	-54 dB	-52 dB
3.75 IPS	-50 dB	-48 dB

Using 1 kHz tone recorded at 500 nWb/m (approximately 8 dB above NAB Standard Reference Level) and measuring NAB weighted noise.

	Full Track	Half Track
15 IPS	-76 dB	-74 dB
7.5 IPS	-72 dB	-70 dB
3.75 IPS	-68 dB	-66 dB

### Crosstalk:

Better than 50 dB at 1 kHz

### Frequency Response (Overall Record and Play):\*

15 IPS	+2 dB from 30 to 18,000 Hz at normal recording level.
7.5 IPS	+2 dB from 30 to 15,000 Hz 10 dB below normal recording level.
3.75 IPS	+2 dB from 50 to 8,000 Hz 15 dB below normal recording level.

### Equalization:

NAB with adjustment for high frequencies

### Headphone Outputs:

8 ohms or greater

### Brakes:

Mechanical differential band brakes

### Remote Control:

All operating mode indicators and controls

### External Connectors:

Latching type, mating plugs furnished

### Head and Track Configuration:

Full track monophonic  
 Half track monophonic  
 Half track stereophonic (two channel)  
 Quarter track stereophonic (two channel)

### Metering:

Taut-band movement with "A" scale. Meter switch allows selection for metering the following: Normal Line Recording Level, P.R.S., Bias and Program Play. (Meter sensitivity may be calibrated for 0 to +18 dBm output level)

### Erase Depth:

Below noise level

### Ambient Operation Temperature:

55 degrees C., 131 degrees F., maximum

### Mounting:

Rack mounting. Console cabinet optional.

### Dimensions:

Reproducer Deck  
 19" wide (1 1/4" overhang on each side with 10 1/2" reels)  
 14" high (2 1/4" overhang on top with 10 1/2" reels)  
 9" deep

### Recording Amplifier

19" wide  
 9" deep  
 3 1/2" high

### Weight:

Reproducer  
 41 pounds (unpacked)  
 Recording Amplifier  
 15 pounds (unpacked)

\*Measurements made using 3M type 206 or equivalent tape.

750 Series equipment warranted two years on parts and factory labor — plus ITC 30-day money-back guarantee of satisfaction.



# 750 Series

recorder/reproducer

**IT** INTERNATIONAL  
 TAPETRONICS  
 CORPORATION

2425 South Main Street  
 Bloomington, Illinois 61701  
 Telephone: 309-828-1381

## Professional equipment in all but price

More and more broadcasters are expressing a need for reel-to-reel record/playback equipment that is (a) thoroughly professional in performance quality and operating flexibility, (b) moderately priced, (c) rugged and reliable enough to run 24 hours a day, day after day, (d) designed to need only a minimum of maintenance. This equipment is now reality.

Meet the ITC 750 Series open reel recorder/reproducer. It's designed to withstand the stress of heavy production and editing operations, perform with the dependability demanded by broadcasting applications and still compare in cost to semi-pro or consumer-type machines. If this all seems unbelievable, read on . . . because the 750 Series offers even more.

This ITC equipment is designed for reliable performance and only the simplest maintenance. Quiet running, it's an ideal recorder/playback unit for live studio operations, and many of the 750's features are normally found only in the most expensive open-reel machines. One standout quality of the 750 Series machine — it affords an unusually high degree of operational flexibility.

Features include convenient audio monitoring during either recording or playback. Fixed tape guides for precise phase alignment. Play/Record Synchronization — PRS. "Safe" mode to prevent accidental erasure of audio, and status indicators for record and monitor controls. The operator always knows what's happening with and within the 750.

**Monitor control with automatic meter switching.** These switches give you the conventional choices of record, play and bias level; and, since they con-



trol the VU meters, headphone jack, and rear chassis monitor connector, you hear what you see on the VU meters. In addition, with the record monitor switch depressed, the machine will automatically switch the monitor control to playback when the machine is in the playback mode.

**Record control.** With these switches, you can select channels to be recorded, one at a time or both at once. The record set is furnished with a strappable option which lets you enter the record mode before or after starting tape motion. This allows you to preset to the recording mode for level adjustment and to switch from play to record while tape is running.

**The PRS (Play/Record Synchronization) system** is strictly professional. You can record on one channel and then add audio on the other while listening to both channels in complete synchronization.

Imagine editing a music bed down to proper length and adding a voice announcement in sync with the music. Or consider how easily a talented

announcer might "talk to himself" by recording one voice and replying in a second voice on the other channel. These are just two possibilities offered by the flexible 750 Series PRS amplifier feature.

**The motion sensing and start memory** combination protects your tapes and provides extra operator convenience. Motion sensing prevents the machine from entering the run mode until the tape comes to a stop from fast forward or rewind. The start memory circuit stores a start command until tape can safely enter the play mode.

**The 750 Reproducer** is built in accordance with ITC tradition — simply but like a tank. The uncomplicated, durable mechanics, the ½ inch milled aluminum deck overlaid with stainless steel, and the heavy, micro-adjustable head assembly are a few of the ways this ruggedness has been achieved. The simple, solid mechanical construction coupled with ITC's air-damped pressure roller solenoid accounts for the super-quiet performance which makes the 750 Reproducer ideal for use in live studio operations.

The 750 Series has been designed to get the most out of the least. This simplicity has been accomplished through the use of plug-in assemblies (heads, relays, circuit cards, and motors). Essentially the machine is constructed from several individual operating units — electrical and mechanical — to permit the quick servicing and extremely handy access provided by modular construction.

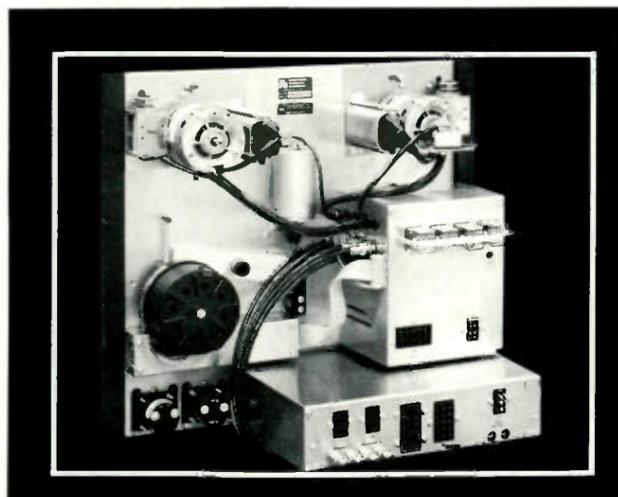
The uninvolved tape travel path makes tape threading virtually foolproof. Loading tape is a smooth and easy process on this practically designed, uncluttered deck. To maximize phase stability, the five tape guides have been secured

directly to the deck plate, assuring a fixed and accurate tape travel path. The spring-loaded flip-top cover makes the heads convenient and visible for editing, cleaning, and adjusting. ITC has incorporated the elements that are key in professional applications — simplicity and ruggedness.

### Features list:

- \* Air-damped pressure roller solenoid for quiet operation
- \* Precision milled ½-inch thick aluminum deck overlaid with stainless steel — for stability and durability
- \* Straight-line tape threading
- \* Fixed tape travel path for phase stability
- \* Three-point micro-adjustable heads — height, zenith, true center-pivot azimuth
- \* Flip-top head cover for easy access to heads
- \* Manual tape lifter defeat with automatic release
- \* Motion sensing and start memory for operator convenience and safe tape handling
- \* Optical tape break sensor, solid state
- \* Professional +8 dBm output with 10 dB headroom
- \* All plug-in assemblies — PC boards plus mother-daughter concept
- \* Transistor and IC sockets for flexibility and serviceability
- \* Large diameter capstan and pressure roller
- \* Front panel calibration controls
- \* Limited range playback level controls
- \* Metallic tape (foil) sensor
- \* Master and dual slave bias oscillator system for optimum erase depth and channel separation in PRS

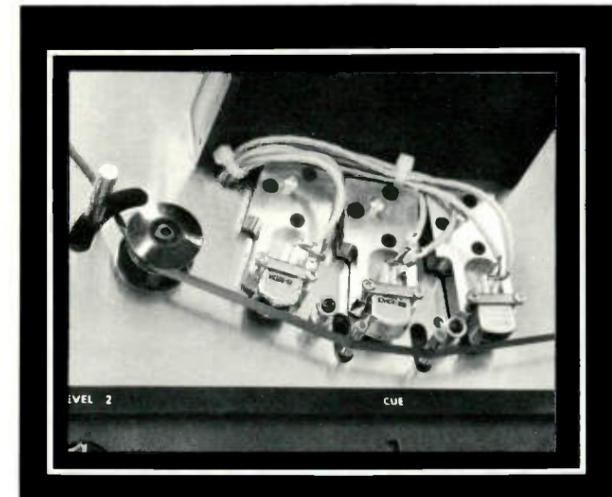
Once you've considered all the benefits — including the extra features listed above — we think you will agree that the ITC 750 Series open reel recorder/reproducer makes an ideal unit for all your production and control room requirements. We know you'll find it professional in all but price.



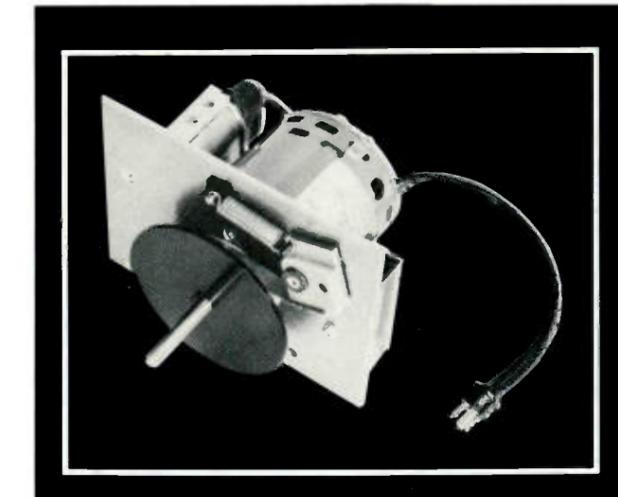
Where else could you find such simplicity in a machine that does so much? The 750 Series has a minimum of moving parts, is quickly accessible throughout.



Excellent serviceability on the 750 Series with plug-in printed circuit cards, transistor and integrated circuit sockets. All controls and calibrations accessible from front panel or through the top of the recording amplifier.



Flip-top head cover for editing accessibility. Excellent phase stability — the five tape guides are secured directly to the deck plate, assuring a fixed and accurate tape travel path for precise phase alignment.



Mechanical brakes on the 750 Series make use of brake bands rather than discs. Bands create more pressure in one direction than the other. This provides differential braking action important for smooth, safe tape handling.

## 750 SERIES REPRODUCER

Reel-To-Reel Audio Tape Reproducer. Handles ¼ inch tape and either NAB or EIA hubs with diameters greater than 1¼ inches. Maximum reel flange diameter 10½ inches. Selectable tape tension for small or large reels.

Model 7532

Reproducer, ½ Track  
Stereophonic, 7½ IPS

### ACCESSORY

AT-0001

Audio Output Transformers,  
PC Mount (Factory Installed)

## SPECIFICATIONS

### Power:

105 to 125 volts AC, 60 Hz; 150 watts maximum

### Wind Time:

Less than 60 seconds for 2400 feet of tape  
Less than 90 seconds for 3600 feet of tape

### Motors:

Capstan — direct-drive hysteresis synchronous with electrolyzed shaft and instrument-type permanently lubricated ball bearings

Torque — induction motors (two) with ball bearings provide 20 ounce/inches of torque

### Timing Accuracy:

0.2% or better

### Flutter (NAB weighted):

0.07%

### Audio Output:

+18 dBm before clipping, into 600 ohm load.  
Unbalanced (600 ohm transformers optional)

### Distortion:

0.5% maximum total RMS amplifier distortion at +8 dBm output level from 50 Hz to 15,000 Hz

### Signal-To-Noise:

-52 dB using 400 Hz tone recorded at NAB Standard Reference Level with reproduce amplifier adjusted for +8 dBm output and measuring unweighted noise

-70 dB using 1 kHz tone recorded at 500 nWb/m (approximately 8 dB above NAB Standard Reference Level) and measuring NAB weighted noise

### Crosstalk:

Better than 50 dB at 1 kHz

### Frequency Response:

±2 dB from 50 to 15,000 Hz

### Equalization:

NAB with adjustment for high frequencies

### Headphone Output:

8 ohms or greater

### Brakes:

Mechanical brakes with stainless steel bands

### Remote Control:

All operating mode indicators and controls

### External Connectors:

Latching type, mating plugs furnished

### Dimensions:

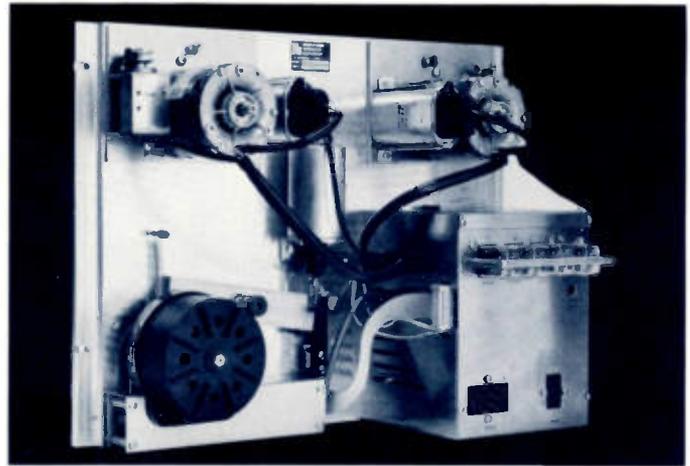
19" wide (1¼" overhang on each side with 10½" reels)

14" high (2¼" overhang on the top with 10½" reels)

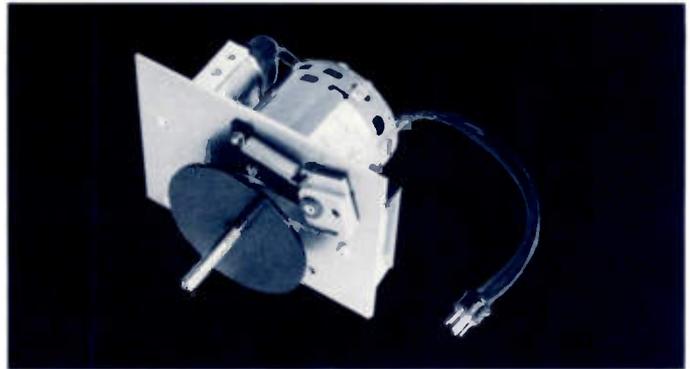
9" deep

### Weight:

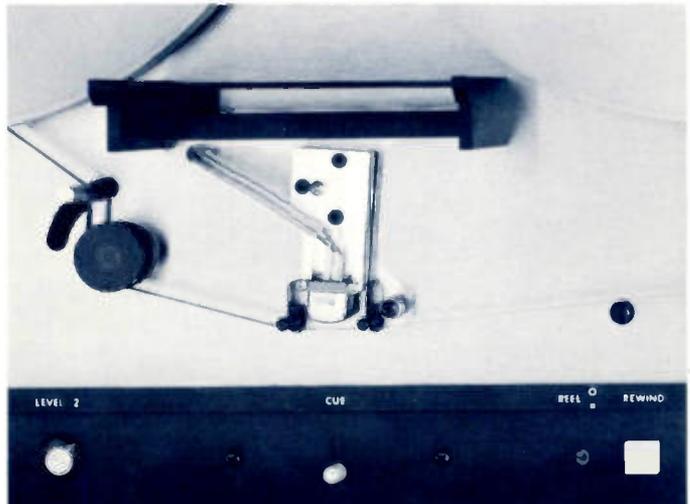
41 lbs., unpacked



The 750 Series has been designed with a minimum of moving parts. This approach makes each part quickly accessible and facilitates making accurate adjustments.



The mechanical brakes on the 750 Series are designed so that the brake bands exert more pressure in one direction than in the other. This results in a differential braking action which is important for smooth and safe tape handling.



The head is mounted in a precision milled aluminum block that is controlled by three adjustment screws. Varying one of these screws pivots the head on its center axis, allowing true azimuth adjustment. The fixed tape guides guarantee that the tape will cross the head correctly, assuring precise phase alignment and eliminating the need for additional tape wrapping members.

**IT** INTERNATIONAL TAPETRONICS CORPORATION  
2425 SOUTH MAIN STREET • BLOOMINGTON, ILLINOIS 61701  
TELEPHONE: 309-828-1381

Marketed exclusively in Canada by McCurdy Radio Industries Ltd., Toronto



# 750 SERIES

## REPRODUCER

ITC's 750 Series has been designed and built for broadcasters and is ideally suited for use in program automation systems. The overall objective was to provide a professional reel-to-reel playback unit which would be competitive in price with the "semi-professional" or "consumer" machines. In the 750, all efforts have been channeled into constructing a durable, reliable, practical machine — eliminating unused features and controls — and offering it for the lowest possible selling price. The result is an open reel unit that will withstand the stress of continuous operation and provide the dependability demanded by broadcast applications — especially by unattended automation systems.

The 750 Series is built in accordance with ITC tradition — simply but like a tank. The uncomplicated, durable mechanics, the ½ inch milled aluminum deck overlaid with stainless steel, and the heavy, micro-adjustable head assembly are a few of the ways this ruggedness has been achieved. The simple, solid mechanical construction coupled with ITC's air-damped pressure roller solenoid accounts for the super-quiet performance which makes the 750 Reproducer ideal for use in live studio operations.

The 750 Series has been designed to get the most out of the least. This simplicity has been accomplished through the use of plug-in assemblies (head, relays, circuit cards, and motors). Essentially the machine is constructed from several individual operating units — electrical and mechanical — to permit the quick servicing and extremely handy access provided by modular construction.

The uninvolved tape travel path makes tape threading virtually foolproof. Loading tape is a smooth and easy process on this practically designed, uncluttered deck. To maximize phase stability, the four tape guides have been secured directly to the deck plate, assuring a

fixed and accurate tape travel path. The spring-loaded flip-top cover makes the head convenient and visible for editing, cleaning, and adjusting.

In creating an open reel machine reliable enough for automation use, the elements that are key in professional applications have been incorporated — simplicity and ruggedness. Combine all that we've mentioned with the features on the following list, and you'll see that we are offering a reel-to-reel reproducer that is ideally suited for your broadcast applications.

### FEATURES

- Designed by ITC for Professional Applications
- Air-damped Pressure Roller Solenoid for Quiet Operation
- Precision Milled ½ Inch Thick Aluminum Deck
- Straight-line Tape Threading
- Fixed Tape Travel Path for Phase Stability
- Three-Point Micro-Adjustable Head — Height, Zenith, and True Center-Pivot Azimuth
- Flip-top Head Cover for Convenient Access to Head
- Manual Tape Lifter Defeat with Automatic Release
- Automatic Tape Protection — Pause Between Fast Modes and Play
- Optical Tape Break Sensor — Solid State
- Professional +8 dBm Output with 10 dB Headroom
- All Plug-in Assemblies
- Large Diameter Capstan and Pressure Roller
- Front Panel Calibration Controls
- Limited Range Level Controls
- Metallic Tape (Foil) Sensor
- Standard: Rack Mounting
  - NAB Reel
  - NAB Hub Adapters
  - Technical Manual
- Warranty: The 750 Series Reproducer carries a two year warranty and a 30 day money-back guarantee of satisfaction.

# "ESL V" SPECIFICATIONS

## POWER:

- A. 105-132 VAC or 210-264 VAC
- B. 50/60 Hz.

## POWER CONSUMPTION:

- A. 11 VA Minimum; 650 VA Maximum @ 120V

## TAPE SPEED:

- A. Splice locate cycle: 30 IPS (76.2 cm/s)
- B. Erase cycle: 1.875 IPS (4.76 cm/s)

## ERASE DEPTH: (Using ScotchCart®II Broadcast Cartridge)

- A. -55 dB, bandlimited (20 Hz-20 kHz)
- B. Typical residual coherent noise, 75 dB below 1 kHz, recorded at 250 nWb/m

## CYCLE TIME (typical): Complete erase/splice locate cycle

- A. Standard Configuration: 30 seconds ERASE, plus 1/4 total tape time

- B. Optimized for ScotchCart®II Broadcast Cartridge: 22 seconds ERASE, plus 1/4 total tape time

## CARTRIDGE SIZE:

NAB A & AA

## SPLICE DETECTION SENSITIVITY:

Detector senses 1/2 mil. or greater tape thickness change

## AMBIENT OPERATING TEMPERATURE:

4 to 50 degrees C. (39 to 122 degrees F.)

## STORAGE TEMPERATURE RANGE:

-40 to +85 degrees C. (-40 to +185 degrees F.)

## RELATIVE HUMIDITY OPERATING RANGE:

25 to 80% without condensation

## MOUNTING:

- A. Table-top standard (w/feet)

- B. Rack-mount optional w/URM-0001 rack-mount kit (Three units may be mounted side-by-side)

## DIMENSIONS:

- A. Width: 14.6 cm (5.75")
- B. Depth: 30.5 cm (12.00")
- C. Height: 13.34 cm (5.25")  
Add 1 cm for feet

## WEIGHT:

- A. Typical: 6.12 kg (13.5 lbs.)
- B. Total maximum shipping weight: 7.94 kg (17.5 lbs.)

The ESL V eraser/splice locator, its drive system, splice finder, and erase circuitry will operate with any NAB standard A/AA size tape cartridge; however, performance may vary. The specifications referred to herein are referenced to the Scotchcart®II broadcast cartridge.

International Tapetronics Corporation/3M reserves the right to change products and specifications without notice.

# ESL V

## ERASER/SPLICE LOCATOR



## International Tapetronics Corporation/3M "The Leader in Reliability and Service"

More International Tapetronics Corporation/3M tape cartridge machines are installed in radio stations around the world each year than all other manufacturers' tape cartridge machines combined. All new ITC equipment carries a two-year warranty on parts and factory labor. Call today for more information on ITC's complete line of tape cartridge machines.

- 99B Cartridge Machines, "The Best"
- DELTA Cartridge Machines, "Today's Most Popular Cartridge Machines"

- OMEGA Cartridge Machines, "Affordable Performance You Can Trust"

When newer technology emerges, it will come from International Tapetronics Corporation/3M, "The Leader in Reliability and Service".

### TO ORDER OR FOR MORE INFORMATION CALL TOLL FREE 800-447-0414

From Alaska or Illinois, call collect  
309-828-1381.

In Canada, call Maruno Electronics, Ltd.,  
416-255-9108.

From  
International Tapetronics Corporation/3M



# “ESL V” FEATURES

## DEEP, CONSISTENT CARTRIDGE ERASING AND SPLICE LOCATING IN A SINGLE, AUTOMATIC STEP

Eliminate the tedious task of manually bulk erasing cartridges and visually locating tape splices. Use the ESL V eraser/splice locator to combine erasing and splice locating into a single, automatic operation.

### Better Sound

The erase of the ESL V eraser/splice locator is deep and consistent. You can count on a clean erasure every time because the function is controlled by a microprocessor. The ESL V eraser/splice locator was designed for use with NAB A and AA size cartridges, including those loaded with today's high-output, low-noise tapes.

The tape splice is accurately positioned just past the playback head, every time. Recording over the tape splice is eliminated when you use the ESL V eraser/splice locator, thereby insuring better audio quality.

### Saves Time

A quick, automatic erase frees the

operator from manually bulk erasing the cartridge. The erase cycle time can be even further reduced 26% when using a ScotchCart®II broadcast cartridge, due to the revolutionary design of this cartridge.

High speed (30 IPS) splice locating frees the operator from visually searching for the tape splice. The operator can perform other tasks, such as pre-reading copy, cueing tapes or locating sound effects and music, while the ESL V eraser/splice locator properly prepares the cartridge for recording.

### Easy To Operate

Front panel controls are clearly marked and easy to use by even inexperienced personnel. The operator simply inserts the cartridge into the machine and selects the desired function. The machine logic takes over from there. ESL V logic will erase the cartridge using a carefully designed erase coil ramp-

down circuit. Then the cartridge tape is automatically high speed forwarded to its splice. Individual erase or splice locate functions may also be selected. The machine's top cover has been designed for easy viewing of the cartridge while these operations are taking place.

### Incredibly Reliable

Built with traditional ITC quality, the ESL V eraser/splice locator requires no electronic adjustments and is highly resistant to shock and external vibrations. The microprocessor logic is even designed to monitor the erase coil temperature to prevent overheating.

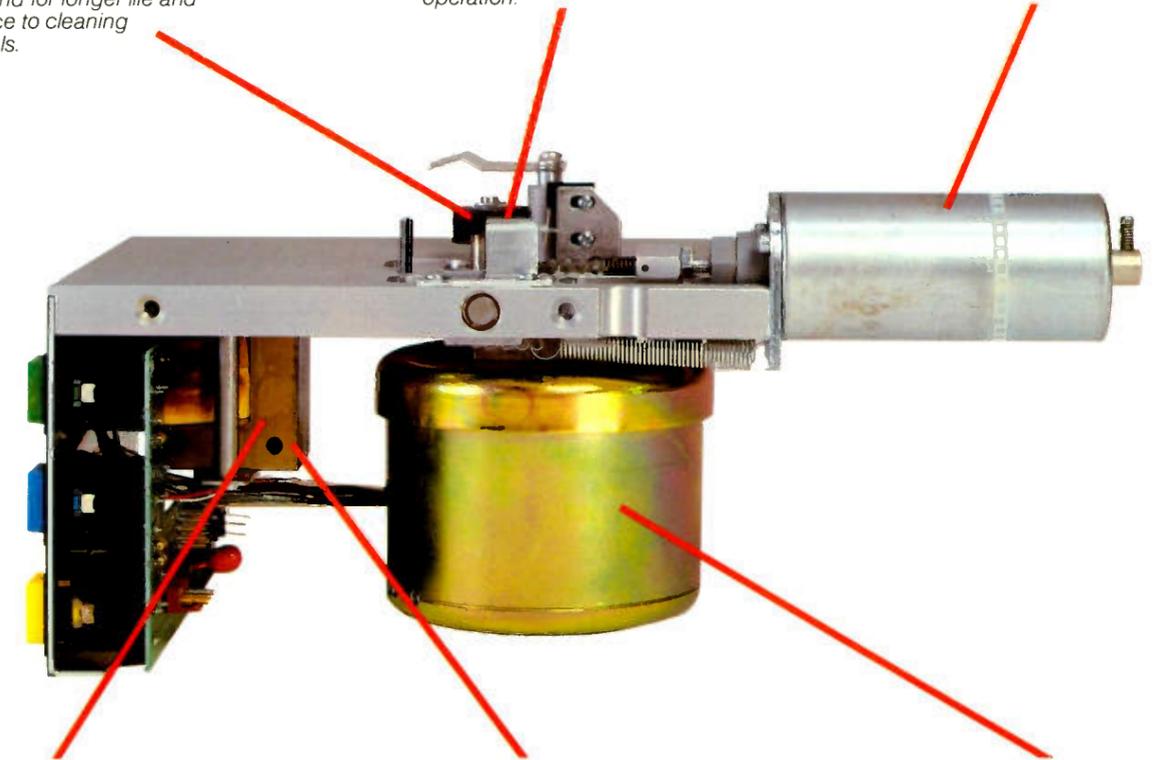
### Saves Money

The ESL V eraser/splice locator saves money by reducing production time. It also eliminates the need to re-record cartridges due to poor erasure or recording quality caused by recording over the tape splice.

*Pressure roller utilizes a sintered bronze sleeve bearing and 525-K rubber compound for longer life and resistance to cleaning chemicals.*

*Hall-effect splice sensor uses microprocessor technology for adjustment free, highly reliable operation.*

*Powerful air-damped bottoming solenoid for quick, quiet, reliable operation.*



*Powerful, specially designed erase coil provides erase depth lower than the noise floor of modern high-output, low-noise tape formulations.*

*Erase coil temperature continuously monitored by internally mounted sensor. Should elevated erase coil temperatures be sensed, the microprocessor disables the erase function until the coil returns to a safe operating temperature.*

*D.C. Servo motor with electronically controlled speed regulation for accurate and gentle tape handling.*

### Microprocessor Technology

The ESL V eraser/splice locator system functions are controlled by a microprocessor. The microprocessor provides fast, dependable operation and virtually eliminates the need for electromechanical adjustments.

### Superior Eraseability

The erase coil provides a quick, clean erase on both conventional formulation tapes and newer, high-output, low-noise tapes. The microprocessor slowly ramps down the erase field, minimizing residual

noise on the tape, and provides a consistent erase from cartridge to cartridge.

### DC Servo Motor

The ESL V eraser/splice locator uses a reliable DC Servo capstan motor, with accurate speed control provided by the microprocessor. The machine has a revolutionary splice detect mechanism, which utilizes a hall-effect sensor and patented microprocessor-driven software to provide accurate splice location. No operator adjustments are needed

under normal operation. Highly accurate and repeatable pressure roller pressure is provided by our air-damped, bottoming type solenoid.

### Easy To Service

Access for servicing is made via a removable top cover. Full access to all electrical and mechanical components is accomplished with the removal of just one screw. Assemblies are concentrated in two major modules which can be easily moved away from the chassis.

# International Tapetronics Corporation/3M

# Price List

Effective July 1, 1985 In USA Only

## OMEGA Series, "Affordable Performance You Can Trust"

Table top mounting, 1/3 rack width and accepts NAB "A" size cartridges.

Includes secondary cue tone. NAB (1975) equalization. Adjustable for CCIR equalization. 105—132V or 210—264V, 50/60Hz.

OMEGA Monophonic Reproducer . . . . .	\$1050
OMEGA Stereophonic Reproducer . . . . .	\$1195
OMEGA Monophonic Recorder/Reproducer . . . . .	\$1575

## DELTA Series, "Today's Most Popular Cartridge Machines"

Table top mounting. Three cue tones standard. NAB 1975 equalization or CCIR. 105—132V or 210—264V, 50/60Hz.

DELTA I single deck reproducer with high speed cue standard. Units are 1/3 rack width and accept NAB "A" size cartridges.

Monophonic Reproducer . . . . .	\$1995
Stereophonic Reproducer . . . . .	\$2155

DELTA II single deck wide play reproducer with high speed cue standard.

Units are 2/3 rack width and accept NAB "A", "B" and "C" size cartridges.

Monophonic Reproducer . . . . .	\$2260
Stereophonic Reproducer . . . . .	\$2470

DELTA III triple deck reproducer is 1/3 rack width and accepts NAB "A" size cartridges.

Monophonic Reproducer . . . . .	\$4345
Stereophonic Reproducer . . . . .	\$4695

DELTA IV Recording Amplifier. Converts a DELTA I reproducer, DELTA II reproducer, or the bottom deck of a DELTA III reproducer into a recorder/reproducer. Includes record head.

Monophonic Recording Amplifier . . . . .	\$1225
Stereophonic Recording Amplifier . . . . .	\$1325

## "99B" Series, "The Best"

Table top mounting and 1/2 rack width. Accepts NAB "A" size cartridges.

Includes hi-speed cue and three cue tones. NAB (1975) equalization or CCIR.

ELSA (Erase, Locate Splice, Azimuth) function optional. 120V/240V with taps at 105, 120, 210, 225 and 240V, 50/60Hz.

### "99B" Series Reproducers

Monophonic Reproducer . . . . .	\$2580
Stereophonic Reproducer . . . . .	\$2795

### "99B" Series Recorder/Reproducers

Monophonic Recorder/Reproducer . . . . .	\$4425
Monophonic Recorder/Reproducer with ELSA . . . . .	\$5550
Stereophonic Recorder/Reproducer . . . . .	\$5025
Stereophonic Recorder/Reproducer with ELSA . . . . .	\$5995

## PD-II Series (Replaced by new OMEGA series and available while supplies last.)

Table top mounting, 1/3 rack width and accepts NAB "A" size cartridges. Available only in monophonic with single cue tone. NAB (1964) equalization. 117V/60Hz.

PD-II Reproducer . . . . .	\$ 925
PD-II Recorder/Reproducer . . . . .	\$1270

### ESL-IV Eraser/Splice Locator

Eraser/Splice Locator accepts NAB "A" size cartridges. Table top mounting.  
117V/60Hz. Not recommended for use with certain types of cartridges or tape.  
Call International Tapetronics Corporation/3M for more information.

\$835

### Accessories

FB-I Telephone Answer-Only Interface. Works with any ITC cartridge machine except the DELTA series	\$160
URM-0001 Universal Rack Mount	\$120
Filler Panel, 1/2 Rack Width for "99B" Series	\$ 19
Filler Panel, 1/3 Rack Width for OMEGA Series, DELTA Series and PD-II Series	\$ 16

### ScotchCart® Broadcast Cartridge

10 second length	\$ 6.04
20 second length	\$ 6.09
40 second length	\$ 6.17
70 second length	\$ 6.30
100 second length	\$ 6.46
2-1/2 minute length	\$ 6.69
3 minute length	\$ 6.80
3-1/2 minute length	\$ 6.97
4 minute length	\$ 7.14
4-1/2 minute length	\$ 7.31
5-1/2 minute length	\$ 7.65
6-1/2 minute length	\$ 8.00
7-1/2 minute length	\$ 8.32
9-1/2 minute length	\$ 9.03

NOTE: ScotchCart® Broadcast Cartridge prices shown are list prices—  
reduced prices are available for quantity orders. Call for details.  
Items available only in standard carton quantities of 10 cartridges of same length per carton.

All prices are FOB Bloomington, Illinois.

Terms are Net 30 days with established credit, or save 5% with payment prior to shipment  
on new equipment. An economical lease plan is also available.

All new ITC equipment carries a bold two year warranty on parts and factory labor.

International Tapetronics Corporation/3M reserves the right to change price and product  
specifications without notice.

**TO ORDER OR FOR MORE INFORMATION  
CALL TOLL FREE  
800-447-0414**

From Alaska or Illinois, call collect: 309-828-1381  
In Canada, call Maruno Electronics, Ltd., 416-255-1445

International Tapetronics Corporation/3M  
2425 South Main Street  
P.O. Box 241  
Bloomington, Illinois 61702-0241



# International Tapetronics Corporation/3M

# Price List

Effective July 1, 1986 In USA Only

**NEW**

## OMEGA Series, "Affordable Performance You Can Trust"

Table top mounting, 1/3 rack width and accepts NAB "A" size cartridges. Includes secondary cue tone. NAB (1975) equalization. Adjustable for CCIR equalization. 105—132V or 210—264V, 50/60Hz.

OMEGA Monophonic Reproducer . . . . .	\$1270
OMEGA Stereophonic Reproducer . . . . .	\$1445
OMEGA Monophonic Recorder/Reproducer . . . . .	\$1910

## DELTA Series, "Today's Most Popular Cartridge Machines"

Table top mounting. Three cue tones standard. NAB 1975 equalization or CCIR. 105—132V or 210—264V, 50/60Hz.

**DELTA I** single deck reproducer with high speed cue standard. Units are 1/3 rack width and accept NAB "A" size cartridges.

Monophonic Reproducer . . . . .	\$1995
Stereophonic Reproducer . . . . .	\$2155

**DELTA III** triple deck reproducer is 1/3 rack width and accepts NAB "A" size cartridges.

Monophonic Reproducer . . . . .	\$4345
Stereophonic Reproducer . . . . .	\$4695

**DELTA IV** Recording Amplifier. Converts a DELTA I reproducer, or the bottom deck of a DELTA III reproducer into a recorder/reproducer. Includes record head.

Monophonic Recording Amplifier . . . . .	\$1225
Stereophonic Recording Amplifier . . . . .	\$1325

## "99B" Series, "The Best"

Table top mounting and 1/2 rack width. Accepts NAB "A" size cartridges. Includes hi-speed cue and three cue tones. NAB (1975) equalization or CCIR.

ELSA (Erase, Locate Splice, Azimuth) function standard on recorder/reproducer. 120V/240V with taps at 105, 120, 210, 225 and 240V, 50/60Hz.

### "99B" Series Reproducers

Monophonic Reproducer . . . . .	\$2580
Stereophonic Reproducer . . . . .	\$2795

### "99B" Series Recorder/Reproducers

Monophonic Recorder/Reproducer with ELSA . . . . .	\$5550
Stereophonic Recorder/Reproducer with ELSA . . . . .	\$5995

**NEW**

## COMPONENT SYSTEM STARTER PACKAGES

**ECONOMY SYSTEM**—Includes a DELTA I stereophonic reproducer, a DELTA IV stereophonic record amplifier and three (3) OMEGA stereophonic reproducers . . . . .

PERFORMANCE SYSTEM—Includes a 99B stereophonic recorder/reproducer with ELSA and three (3) DELTA I stereophonic reproducers . . . . .	\$ 6,955
	\$11,215

**NEW**

## ESLV Eraser/Splice Locator

Combines erase and splice locating into one quick, easy step.

Designed for today's high-output, low-noise tapes.

Accepts NAB "A" size cartridges. Table top mounting. 105-132 or 210-264 VAC, 50/60 Hz . . . . . \$1095

(Continued on reverse side.)

## Accessories

FB-1 Telephone Answer-Only Interface. Works with any ITC cartridge machine except the DELTA series .....	\$160
URM-0001 Universal Rack Mount .....	\$120
Filler Panel, 1/2 Rack Width for "99B" Series .....	\$ 19
Filler Panel, 1/3 Rack Width for OMEGA Series and DELTA Series .....	\$ 16

**NEW**

## ScotchCart® II Broadcast Cartridge

Length	List Price	12.5%	25%
	10-50	60-990	1000 +
10 second .....	\$6.87	6.01	5.15
20 .....	6.94	6.07	5.21
40 .....	7.03	6.15	5.27
70 .....	7.18	6.28	5.39
100 .....	7.36	6.44	5.52
2-1/2 minute .....	7.63	6.68	5.72
3 .....	7.75	6.78	5.81
3-1/2 .....	7.95	6.96	5.96
4 .....	8.14	7.12	6.11
4-1/2 .....	8.33	7.29	6.25
5 .....	8.54	7.47	6.41
5-1/2 .....	8.72	7.63	6.54
6-1/2 .....	9.14	8.00	6.86
7-1/2 .....	9.48	8.30	7.11

Items available only in standard carton quantities of 10 cartridges of same length per carton.

### ScotchCart® II Broadcast Cartridge Label Sheets

100 Sheets of 10 Labels Each .....

\$24.00

### ScotchCart® II Broadcast Cartridge Technical Manual

No Charge

**SAVE**

## INVENTORY CLOSE-OUT SPECIALS

Sold on an as available basis while supplies last.

	List Price	Special Price
DELTA II single deck wide play reproducer with high speed cue standard. Units are 2/3 rack width and accept NAB "A", "B" and "C" size cartridges.		
Monophonic Reproducer .....	\$2260	\$1920
Stereophonic Reproducer .....	\$2470	\$2100
Monophonic Recorder/Reproducer .....	\$3485	\$2960
Stereophonic Recorder/Reproducer .....	\$3795	\$3225
<b>"99B" Series Reproducers</b>		
Monophonic Reproducer (Transport section of a 99B recorder/reproducer with ELSA) .....	\$3235	\$2750
Stereophonic Reproducer (Transport section of a 99B recorder/reproducer with ELSA) .....	\$3390	\$2880

All prices are FOB Bloomington, Illinois.

Terms are Net 30 days with established credit, or save 5% with payment prior to shipment on new equipment. An economical lease purchase plan is also available.

All new ITC equipment carries a two-year warranty on parts and factory labor.

International Tapetronics Corporation/3M reserves the right to change price and product specifications without notice.

**TO ORDER OR FOR MORE INFORMATION  
CALL TOLL FREE 800-447-0414**

From Alaska or Illinois, call collect: 309-828-1381  
In Canada, call Maruno Electronics, Ltd., 416-255-9108

# International Tapetronics Corporation/3M

# Price List

Effective January 1, 1986 In USA Only

**NEW**

## OMEGA Series, "Affordable Performance You Can Trust"

Table top mounting, 1/3 rack width and accepts NAB "A" size cartridges.  
Includes secondary cue tone. NAB (1975) equalization. Adjustable for CCIR equalization. 105—132V or 210—264V, 50/60Hz.

OMEGA Monophonic Reproducer .....	\$1155
OMEGA Stereophonic Reproducer .....	\$1315
OMEGA Monophonic Recorder/Reproducer .....	\$1735

## DELTA Series, "Today's Most Popular Cartridge Machines"

Table top mounting. Three cue tones standard. NAB 1975 equalization or CCIR. 105—132V or 210—264V, 50/60Hz.

**DELTA I** single deck reproducer with high speed cue standard. Units are 1/3 rack width and accept NAB "A" size cartridges.

Monophonic Reproducer .....	\$1995
Stereophonic Reproducer .....	\$2155

**DELTA II** single deck wide play reproducer with high speed cue standard.

Units are 2/3 rack width and accept NAB "A", "B" and "C" size cartridges.

Monophonic Reproducer .....	\$2260
Stereophonic Reproducer .....	\$2470

**DELTA III** triple deck reproducer is 1/3 rack width and accepts NAB "A" size cartridges.

Monophonic Reproducer .....	\$4345
Stereophonic Reproducer .....	\$4695

**DELTA IV** Recording Amplifier. Converts a DELTA I reproducer, DELTA II reproducer, or the bottom deck of a DELTA III reproducer into a recorder/reproducer. Includes record head.

Monophonic Recording Amplifier .....	\$1225
Stereophonic Recording Amplifier .....	\$1325

## "99B" Series, "The Best"

Table top mounting and 1/2 rack width. Accepts NAB "A" size cartridges.

Includes hi-speed cue and three cue tones. NAB (1975) equalization or CCIR.

ELSA (Erase, Locate Splice, Azimuth) function optional. 120V/240V with taps at 105, 120, 210, 225 and 240V, 50/60Hz.

### "99B" Series Reproducers

Monophonic Reproducer .....	\$2580
Stereophonic Reproducer .....	\$2795

### "99B" Series Recorder/Reproducers

Monophonic Recorder/Reproducer .....	\$4425
Monophonic Recorder/Reproducer with ELSA .....	\$5550
Stereophonic Recorder/Reproducer .....	\$5025
Stereophonic Recorder/Reproducer with ELSA .....	\$5995

**NEW**

## ESLV Eraser/Splice Locator

Combines erase and splice locating into one quick, easy step.

Designed for today's high-output, low-noise tapes.

Accepts NAB "A" size cartridges. Table top mounting. 105-132 or 210-264 VAC, 50/60 Hz. .... \$995

**Accessories**

FB-1 Telephone Answer-Only Interface. Works with any ITC cartridge machine except the DELTA series . . . . .	\$160
URM-0001 Universal Rack Mount . . . . .	\$120
Filler Panel, 1/2 Rack Width for "99B" Series . . . . .	\$ 19
Filler Panel, 1/3 Rack Width for OMEGA Series and DELTA Series . . . . .	\$ 16

**NEW**

**ScotchCart® II Broadcast Cartridge**

Length	List Price 10-50	12.5% 60-250	19% 260-990	25% 1000 +
10 second . . . . .	\$6.89	6.03	5.58	5.17
20 . . . . .	6.94	6.07	5.62	5.21
40 . . . . .	7.03	6.15	5.69	5.27
70 . . . . .	7.18	6.28	5.82	5.39
100 . . . . .	7.36	6.44	5.96	5.52
2-1/2 minute . . . . .	7.63	6.68	6.18	5.72
3 . . . . .	7.75	6.78	6.28	5.81
3-1/2 . . . . .	7.95	6.96	6.44	5.96
4 . . . . .	8.14	7.12	6.59	6.11
4-1/2 . . . . .	8.33	7.29	6.75	6.25
5 . . . . .	8.54	7.47	6.92	6.41
5-1/2 . . . . .	8.72	7.63	7.06	6.54
6-1/2 . . . . .	9.12	7.98	7.39	6.84
7-1/2 . . . . .	9.48	8.30	7.68	7.11

Items available only in standard carton quantities of 10 cartridges of same length per carton.

All prices are FOB Bloomington, Illinois.

Terms are Net 30 days with established credit, or save 5% with payment prior to shipment on new equipment. An economical lease purchase plan is also available.

All new ITC equipment carries a bold two year warranty on parts and factory labor.

International Tapetronics Corporation/3M reserves the right to change price and product specifications without notice.

**TO ORDER OR FOR MORE INFORMATION**

**CALL TOLL FREE  
800-447-0414**

From Alaska or Illinois, call collect: 309-828-1381  
In Canada, call Maruno Electronics, Ltd., 416-255-9108



## CARTRIDGE EQUIPMENT

### Series 99

Table top mounting. Accepts NAB "A" and "B" size cartridges. Includes hi-speed cue and five cue tones with provisions for FSK logging. NAB (1975) equalization. Adjustable for CCIR equalization. ELSA (Erase, Locate Splice, Azimuth) function optional.

#### Series 99 Reproducers

<b>PM-*</b>	Monophonic, 50/60 Hz	\$ 1450.00
<b>PME-*</b>	Monophonic, 50/60 Hz, ELSA	1825.00
<b>PS-*</b>	Stereophonic, 50/60 Hz	1600.00
<b>PSE-*</b>	Stereophonic, 50/60 Hz, ELSA	1975.00

#### Series 99 Recorder/Reproducers

<b>RPM-*</b>	Monophonic, 50/60 Hz	\$ 2640.00
<b>RPME-*</b>	Monophonic, 50/60 Hz, ELSA	3015.00
<b>RPS-*</b>	Stereophonic, 50/60 Hz	3000.00
<b>RPSE-*</b>	Stereophonic, 50/60 Hz, ELSA	3375.00

\*Specify line voltage (110-240) after model identification.

#### Accessories for Series 99

<b>DR-0099</b>	Rack Mount-mounts one Series 99 Recorder/Reproducer or two Series 99 Reproducers.	\$150.00
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#### SP Series Reproducers

SP Series Reproducers accept the NAB "A" and "B" size cartridges. Table top mounting, 117v/60 Hz AC operation with NAB (1964) equalization.

<b>SP-0001</b>	Monophonic with 1 kHz primary cue.	\$ 925.00
<b>SP-0002</b>	Stereophonic with 1 kHz primary cue.	1060.00
<b>SP-0003</b>	Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	990.00
<b>SP-0004</b>	Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	1125.00

#### Accessories for SP Series

<b>SR-0001</b>	Rack Mounting Kit - mounts one SP Series in a 19" equipment rack.	\$ 30.00
<b>DR-0003</b>	Rack Mounting Kit-mounts two SP Series side by side in a 19 inch equipment rack.	25.00

#### WP Series Reproducers

WP Series Reproducers accept the NAB "A", "B", and "C" size cartridges, and have provisions for accepting recording amplifier electronics for ready conversion to recorder/reproducer. Table top mounting, 117v/60 Hz AC operation with NAB (1964) equalization.

<b>WP-0003</b>	Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	\$ 1095.00
<b>WP-0004</b>	Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	1230.00

#### Accessory for WP Series

<b>NR-0002</b>	Rack Mounting Kit-mounts one WP Series in a 19 inch equipment rack.	\$ 15.00
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#### RP Series Recorder/Reproducers

RP Series Recorder/Reproducers accept the NAB "A", "B" and "C" size cartridges and provide the complete recording and reproducing capability. Table top mounting, 117v/60 Hz AC operation with NAB (1964) equalization.

<b>RP-0001</b>	Monophonic with 1 kHz primary cue.	\$ 1660.00
<b>RP-0002</b>	Stereophonic with 1 kHz primary cue.	2000.00
<b>RP-0003</b>	Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	1745.00
<b>RP-0004</b>	Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	2085.00

#### Accessories for RP Series

<b>NR-0002</b>	Rack Mounting Kit-mounts one RP Series in a 19 inch equipment rack.	\$ 15.00
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**International Tapetronics Corporation  
Price List  
July 15, 1979\***

## 750 SERIES

**750 Series 10 1/2 Inch Recorder/Reproducers (Motion Sensing, Input & Output Transformers Standard)**

855-7514	Full Track Monophonic, 3 3/4 — 7 1/2 IPS.	\$ 2300.00
855-7515	Full Track Monophonic, 7 1/2 — 15 IPS.	2300.00
855-7524	1/2 Track Monophonic, 3 3/4 — 7 1/2 IPS.	2300.00
855-7525	1/2 Track Monophonic, 7 1/2 — 15 IPS.	2300.00
855-7534	1/2 Track Stereophonic (Two Channel), 3 3/4 — 7 1/2 IPS.	2600.00
855-7535	1/2 Track Stereophonic (Two Channel), 7 1/2 — 15 IPS.	2600.00
855-7544	1/4 Track Stereophonic (Two Channel), 3 3/4 — 7 1/2 IPS.	2825.00
855-7545	1/4 Track Stereophonic (Two Channel), 7 1/2 — 15 IPS.	2825.00

**750 Series 10 1/2 Inch Reproducers (Motion Sensing and Output Transformers Optional)**

856-7514	Full Track Monophonic, 3 3/4 — 7 1/2 IPS.	\$ 1500.00
856-7515	Full Track Monophonic, 7 1/2 — 15 IPS.	1500.00
856-7524	1/2 Track Monophonic, 3 3/4 — 7 1/2 IPS.	1500.00
856-7525	1/2 Track Monophonic, 7 1/2 — 15 IPS.	1500.00
856-7532	1/2 Track Stereophonic (Two Channel), 7 1/2 IPS.	1415.00
856-7534	1/2 Track Stereophonic (Two Channel), 3 3/4 — 7 1/2 IPS.	1515.00
856-7535	1/2 Track Stereophonic (Two Channel), 7 1/2 — 15 IPS.	1515.00
856-7544	1/4 Track Stereophonic (Two Channel), 3 3/4 — 7 1/2 IPS.	1625.00
856-7545	1/4 Track Stereophonic (Two Channel), 7 1/2 — 15 IPS.	1625.00

**Special Accessories for 750 Series Reel-To-Reel Equipment**

833-0018-200	25 Hz Detector for 750 Reproducer.	\$ 130.00
864-0016-000	Remote Control for 750 Reproducer Only.	190.00
864-0017-000	Remote Control for 750 Recorder/ Reproducer.	200.00
864-0014-010	Console Cabinet for 750 Recorder/ Reproducer.	525.00
864-0015-000	Add-on stacking kit, adds 3 1/2 inches of vertical space.	65.00
281-0014-012	1 3/4 Inches Filler Panel.	10.00
878-0045-000	Motion Sensing (Reproducer Only).	50.00
AT-0001	Audio Output Transformers (Reproducer Only-Two Transformers Included).	35.00
830-0022-001	Alignment Gauge.	25.00
831-0075-003	Reproducer Test Extender.	20.00
831-0119-003	Recorder Test Extender.	20.00

Note: Standard for all reel-to-reel equipment: rack mounting, 117v/60 Hz, AC operation. Console cabinets are available as an option.

**ITC Cartridge and Reel-to-Reel Equipment is Covered by a Thirty-Day, Money-Back Guarantee of Satisfaction and is Protected by a Two-year Warranty on Parts and Factory Labor.**



\*Prices FOB Bloomington, Illinois.  
Terms: Net 30 or 5% Discount for Payment Prior to Shipment; Leasing also available.  
Prices and specifications subject to change without notice.

**INTERNATIONAL TAPETRONICS CORPORATION**  
PO BOX 241 2425 SOUTH MAIN STREET BLOOMINGTON ILLINOIS 61701 PHONE 309-828-1381

**CALL TOLL-FREE  
800-447-0414**

Alaska, Hawaii and  
Illinois Residents Call  
Collect 309-828-1381

## CARTRIDGE EQUIPMENT

### Series 99

Table top mounting. Accepts NAB "A" and "B" size cartridges. Includes hi-speed cue and five cue tones with provisions for FSK logging. NAB (1975) equalization. Adjustable for CCIR equalization. ELSA (Erase, Locate Splice, Azimuth) function optional.

#### Series 99 Reproducers

PM-*	Monophonic, 50/60 Hz	\$ 2025.00
PS-*	Stereophonic, 50/60 Hz	\$ 2235.00

#### Series 99 Recorder/Reproducers

RPM-*	Monophonic, 50/60 Hz	\$ 3715.00
RPME-*	Monophonic, 50/60 Hz, ELSA	\$ 4215.00
RPS-*	Stereophonic, 50/60 Hz	\$ 4200.00
RPSE-*	Stereophonic, 50/60 Hz, ELSA	\$ 4700.00

\*Specify line voltage (110-240) after model identification.

#### Accessories for Series 99

DR-0099	Rack Mount - mounts one Series 99 Recorder/Reproducer or two Series 99 Reproducers.	\$ 90.00
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### SP Series Reproducers

SP Series Reproducers accept the NAB "A" and "B" size cartridges. Table top mounting, 117v/60 Hz AC operation with NAB (1964) equalization.

SP-0001	Monophonic with 1 kHz primary cue.	\$ 1125.00
SP-0002	Stereophonic with 1 kHz primary cue.	\$ 1285.00
SP-0003	Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	\$ 1200.00
SP-0004	Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	\$ 1360.00

#### Accessories for SP Series

SR-0001	Rack Mounting Kit - mounts one SP Series in a 19 inch equipment	\$ 35.00
DR-0003	Rack Mounting Kit - mounts two SP Series side by side in a 19 inch equipment rack.	\$ 28.50

### WP Series Reproducers

WP Series Reproducers accept the NAB "A", "B", and "C" size cartridges, and have provisions for accepting recording amplifier electronics for ready conversion to recorder/reproducer. Table top mounting, 117v/60 Hz AC operation with NAB (1964) equalization.

WP-0003	Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	\$ 1365.00
WP-0004	Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	\$ 1525.00

#### Accessories for WP Series

NR-0002	Rack Mounting Kit - mounts one WP Series in a 19 inch equipment rack.	\$ 15.00
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### RP Series Recorder/Reproducers

RP Series Recorder/Reproducers accept the NAB "A", "B" and "C" size cartridges and provide the complete recording and reproducing capability. Table top mounting, 117v/60 Hz AC operation with NAB (1964) equalization.

RP-0001	Monophonic with 1 kHz primary cue.	\$ 2060.00
RP-0002	Stereophonic with 1 kHz primary cue.	\$ 2455.00
RP-0003	Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	\$ 2155.00
RP-0004	Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	\$ 2550.00

#### Accessories for RP Series

NR-0002	Rack Mounting Kit - mounts one RP Series in a 19 inch equipment rack.	\$ 15.00
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**International Tapetronics Corporation**  
**Price List** **August 1, 1981\***

## 770 SERIES — NEW!

**770 Series 10½ Inch Recorder/Reproducers (Motion Sensing, Input & Output Transformers Standard)**

855-7714	Full Track Monophonic, 3¼—7½ IPS.	\$ 2730.00
855-7715	Full Track Monophonic, 7½—15 IPS.	\$ 2730.00
855-7724	½ Track Monophonic, 3¼—7½ IPS.	\$ 2730.00
855-7725	½ Track Monophonic, 7½—15 IPS.	\$ 2730.00
855-7734	½ Track Stereophonic (Two Channel), 3¼—7½ IPS.	\$ 3085.00
855-7735	½ Track Stereophonic (Two Channel), 7½—15 IPS.	\$ 3085.00
855-7744	¼ Track Stereophonic (Two Channel), 3¼—7½ IPS.	\$ 3425.00
855-7745	¼ Track Stereophonic (Two Channel), 7½—15 IPS.	\$ 3425.00

**770 Series 10½ Inch Reproducers (Motion Sensing & Output Transformers Optional)**

856-7714	Full Track Monophonic, 3¼—7½ IPS.	\$ 1650.00
856-7715	Full Track Monophonic, 7½—15 IPS.	\$ 1650.00
856-7724	½ Track Monophonic, 3¼—7½ IPS.	\$ 1650.00
856-7725	½ Track Monophonic, 7½—15 IPS.	\$ 1650.00
856-7734	½ Track Stereophonic (Two Channel), 3¼—7½ IPS.	\$ 1650.00
856-7735	½ Track Stereophonic (Two Channel), 7½—15 IPS.	\$ 1650.00
856-7744	¼ Track Stereophonic (Two Channel), 3¼—7½ IPS.	\$ 1650.00
856-7745	¼ Track Stereophonic (Two Channel), 7½—15 IPS.	\$ 1650.00

**Special Accessories for 770 Series Reel-To-Reel Equipment**

833-0018-200	25 Hz Detector for 770 Reproducer.	\$ 165.00
833-0013-370	Remote Control for 770 Reproducer Only.	\$ 260.00
833-0013-380	Remote Control for 770 Recorder/Reproducer.	\$ 275.00
864-0014-010	Console Cabinet for 770 Recorder/Reproducer.	\$ 650.00
864-0015-000	Add-On Stacking Kit, Adds 3½ Inches of Vertical Space.	\$ 75.00
281-0014-012	1¾ Inches Filler Panel.	\$ 12.50
878-0069-000	Audio Output Transformers (Reproducer Only - Two Transformers Included).	\$ 40.00
830-0022-021	Alignment Gauge.	\$ 21.00
831-0075-003	Reproducer Test Extender.	\$ 26.50
831-0119-003	Recorder Test Extender.	\$ 28.75

Note: Standard for all reel-to-reel equipment: rack mounting, 117v/60 Hz, AC operation. Console cabinets are available as an option.

ITC Cartridge and Reel-to-Reel Equipment is Covered by a Thirty-Day, Money-Back Guarantee of Satisfaction and is Protected by a Two-year Warranty on Parts and Factory Labor.



\*Prices FOB Bloomington, Illinois.  
 Terms: Net 30 or 5% Discount for Payment Prior to Shipment; Leasing also available.  
 Prices and specifications subject to change without notice.

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# International Tapetronics

# Price List

Effective April 1, 1987 In USA Only

**NEW**

**3M HCDA™ 3000 Digital Audio System**

3M HCDA™ 3000 Reproducer .....	\$ 6,750
3M HCDA™ 3000 Recorder/Reproducer with Record Control .....	\$13,500
3M HCDA™ 3000 Recorder/Reproducer with Expanded Control Panel .....	\$14,250
3M HCDA™ 3000 Expanded Control Panel .....	\$ 2,250

**3M HCDA™ 3000 Digital Audio Cartridge\***

Cartridge Quantity	Or	Equivalent Purchase	Unit Price
10-40 .....			\$30.00
50-240 .....		\$ 1,200 .....	\$24.00
250-490 .....		\$ 6,000 .....	\$22.50
500-990 .....		\$11,000 .....	\$21.45
1000-1990 .....		\$18,000 .....	\$18.00
2000 plus .....		\$33,000 .....	\$16.50

\*Either the total cartridge quantity or the total net dollar value of all items on an order, whichever yields the lowest unit price, will apply. Items available only in standard carton quantities of 10 cartridges per carton.

**99B Series**

**99B Reproducers**

Monophonic Reproducer .....	\$2,580
Stereophonic Reproducer .....	\$2,795

**99B Recorder/Reproducers**

Monophonic Recorder/Reproducer with ELSA .....	\$5,550
Stereophonic Recorder/Reproducer with ELSA .....	\$5,995

**DELTA Series**

**DELTA I Single Deck Reproducer**

Monophonic Reproducer .....	\$ 1,995
Stereophonic Reproducer .....	\$ 2,155

**DELTA III Triple Deck Reproducer**

Monophonic Reproducer .....	\$4,345
Stereophonic Reproducer .....	\$4,695

**DELTA IV Recording Amplifier**

Monophonic Recording Amplifier .....	\$1,225
Stereophonic Recording Amplifier .....	\$1,325

**NEW**

**Analog To Digital Trade-In Program**

- Any model ITC analog cartridge machine, whether in current production or not, may qualify for a trade-in allowance depending on the date originally shipped from ITC.
- Such trade-in allowance can be applied towards the net purchase price of any of the following 3M HCDA™ 3000 Digital Audio System components:
  - 3M HCDA™ 3000 Reproducer
  - 3M HCDA™ 3000 Recorder/Reproducer with Record Control
  - 3M HCDA™ 3000 Recorder/Reproducer with Expanded Control Panel
  - 3M HCDA™ 3000 Expanded Control Panel
- The trade-in allowance for an ITC analog cartridge machine is calculated as a percentage of the current or last published list price according to the following schedule:

Age		% Allowance
1-12	months	80
13-24	months	70
25-36	months	60
37-48	months	50
49-60	months	40
61-72	months	30
73-84	months	20
85-96	months	10
97 plus	months	0

- There is no limit to the number of ITC analog cartridge machines that may qualify for trade-in; however, the total allowance per transaction cannot exceed 20% of the net 3M HCDA™ 3000 Digital Audio System equipment purchase price.
- International Tapetronics reserves the right to modify or discontinue the Analog to Digital Trade-In Program without notice.

All prices are FOB Bloomington, Illinois.

Terms are Net 30 days with established credit, or save 5% with payment prior to shipment on all new equipment except cartridges and accessories.

Economical Lease Purchase or Standard Lease Plans are also available.

International Tapetronics reserves the right to change products and prices without notice.

**TO ORDER OR FOR MORE INFORMATION  
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800-447-0414**

From Alaska or Illinois, call collect: 309-828-1381  
In Canada, call Maruno Electronics, Ltd., 416-255-9108



International Tapetronics Corporation/3M

# Prime Rate Lease Purchase

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**Finance ITC equipment near the prime lending rate with ownership at the end of either a one, two or three year term.**

The interest rate for the Prime Rate Lease Purchase is near the prime lending rate in effect at the time the agreement is consummated. The current prime lending rate can be found in each day's **Wall Street Journal**.

The terms and frequency of payments of the Prime Rate Purchase can usually be tailored to conform to your budget. Depending on the amount financed; one, two or three year terms are offered and payments arranged either monthly or quarterly.

With the Prime Rate Lease Purchase, you own the equipment after making the final payment. There is no buy out at the end of the payment term. You may also be eligible to receive the investment tax credit.

## **Other Advantages of the Prime Rate Lease Purchase**

- **Frees Working Capital**

Consider the advantage of conserving working capital which could yield a better return if invested in expansion of sales, service or

other income producing areas.

- **Hedges Against Inflation**

Based on experience in the recent past, your dollar may well be cheaper tomorrow than it is today.

- **Saves Valuable Time**

Why wait to accumulate the cash? New equipment financed now goes to work immediately.

- **Eases A Tight Budget**

Do you have a rigid budget? Payments can usually be tailored to your ability to pay.

- **Provides Possible Tax Advantages**

You should consult with your tax advisor to determine to what extent you might profit by the tax advantages of the Prime Rate Lease Purchase.

Call us today for more information on the Prime Rate Lease Purchase available on ITC's complete line of cartridge machines.

99B Cartridge Machines,  
"The Best"

DELTA Cartridge Machines,  
"Today's Most Popular  
Cartridge Machines"

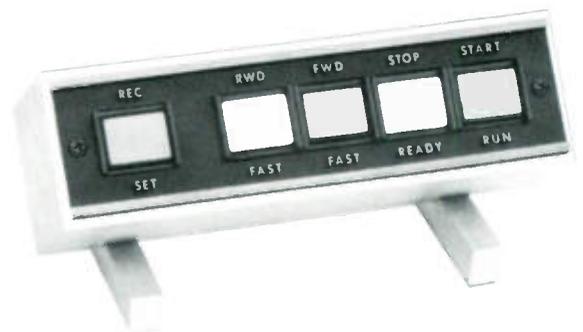
OMEGA Cartridge Machines,  
"Affordable Performance You  
Can Trust"

When newer technology emerges,  
it will come from International  
Tapetronics Corporation/3M, "The  
Leader in Reliability and Service."

**Call Toll Free 800-447-0414**  
or collect from Alaska or  
Illinois 309-828-1381.

# 850 SERIES





**855 Monophonic With Optional Remote Control**

ITC's 850 Series reel-to-reel equipment was a second generation product before it ever found its way into the marketplace. It was designed, sent into the field for rigorous testing, then re-designed in keeping with the excellent suggestions made by engineers and operators.

The result is a rugged, reliable, open reel system that embodies the features most wanted and needed by users of professional tape recording equipment. But the key word in describing ITC's 850 Series is "integrity". We can actually claim it is machined like a fine watch. Every component, every part was selected for its ability to perform faithfully under the most demanding conditions. Our engineers had quiet "in studio" operation in mind during the design phase. They even gave careful consideration to front panel layout and location of controls. Nothing was treated as unimportant. As a consequence, we offer the 850 Series with complete confidence that it will outperform, and outlast any reel machine on the market.

The 850 Series offers a wide variety of 16 different configurations capable of handling reels

up to 10½ inches in diameter. The machines are available in either one channel or two channel configurations. In the one channel models you can choose between a full track or half track monophonic format, while in the two channel models you have a choice of either a half track or quarter track stereophonic format. All machines have a two speed capability with a choice of either 3¾-7½ or 7½-15 IPS.

A prime example of the integrity built into the 850 Series is the aluminum tool and jig plate deck. This ½ inch thick deck is inherently stress relieved so that thermal changes will **not** cause the instability sometimes encountered with cast decks. The surface is guaranteed flat within .005 inch, and all holes and milled openings are held to the nearest one thousandth. A stainless steel overlay is then added to provide shielding and a handsome appearance that defies hard use and the rigors of time.

All bearing surfaces within the machine are either ball-bearing or permanently lubricated sintered bronze. There are no steel-on-steel or sheet metal bearings as found in many other machines.

ITC's traditionally rugged design is extended to the mechanical assemblies associated with the deck. For example, the main support of the pressure roller arm is made from one solid block of aluminum for strength and simplicity. It is actuated by an air-damped solenoid for quiet operation.

For optimum tape drive, we employ a powerful direct drive motor with permanently lubricated ball-bearings. The first step toward speed stability is the use of the time-proven hysteresis-synchronous design. To minimize wow and flutter and improve pulling power, we use a capstan shaft with an unusually large diameter. And to further assist in speed consistency, the capstan is chrome plated, microscopically roughened (vapor blasted), and hardened (electrolyzed). Reel motors are especially designed with a near linear torque curve to provide better control and make adjustments less critical. These motors are also equipped with permanently lubricated ball bearings.

The braking system is another example of seeking to give the operator what he wants and needs. You're all acquainted with the old technique in which the operator rocks the forward and rewind buttons back and forth to provide a smoother braking action. With the 850 Series, dynamic braking and motion sensing make this unnecessary. If the machine is in a fast mode and the stop button is pressed, the machine automatically transfers to the opposite fast mode until an optical detector senses that motion has ceased, at which time the mechanical brakes are applied.

Dynamic braking and motion sensing practically eliminate the chance of mishandling tape. Pressing any of the control switches automatically keys a sequence of logical events which must take place before the next operating mode begins. For those who prefer, however, motion sensing may be eliminated in the edit mode through a strapable option on the logic card.

The tape lifter mechanism is an integral part of the head assembly and permits either automatic or manual tape lifting. The tape lifters (which lift the tape from the heads in the normal fast modes) and the front head assembly door automatically close during the run mode. The closure is quick and quiet (due to air damping) and permits very rapid starts. Automatic tape lifting is, however, defeated in the edit mode to offer manual flexibility. Tape threading is accomplished by simply laying the tape across a front opening as opposed to intricate threading through a maze of components.

850 Series electronics are solid state with logic decisions made using TTL integrated circuitry. Because of the flexibility of TTL a "Start Memory" function has been included which enables the operator to enter the run mode from any other mode without having to first press the stop switch.

A complimentary amplifier is used at the output of the reproduce amplifier and is capable of delivering up to +24 dBm of program level into a 600 ohm load. The output level can be varied with limited range front mounted controls. Controls are either slotted and recessed behind the front panel or extender shafts and knobs are furnished for those who desire operator control. Either way a reset position has been engineered into the level control assemblies which allows easy return to a "calibrated" output level.

To save space all playback electronics are housed in the transport deck assembly; and, therefore, a separate electronics chassis is not required on reproducer only units. All 850 Series reproducers are wired to accept the optionally available 25 Hz sensor required in program automation systems. This circuit card is plug-in and offers a variety of operating modes.

Another unique feature included in ITC's design is on-off control of the take-up reel in the edit mode. With the take-up tension arm in its raised or normal running position, tape will spool onto the take-up reel as usual. If, while in the edit mode, the take-up tension arm is manually moved to its relaxed position, power to the take-up motor is interrupted and tape may then be discarded easily.



## Head Assembly

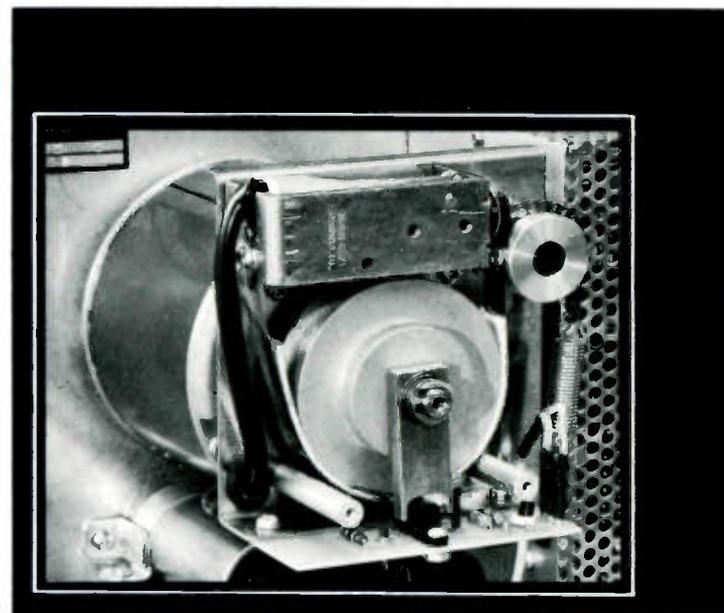
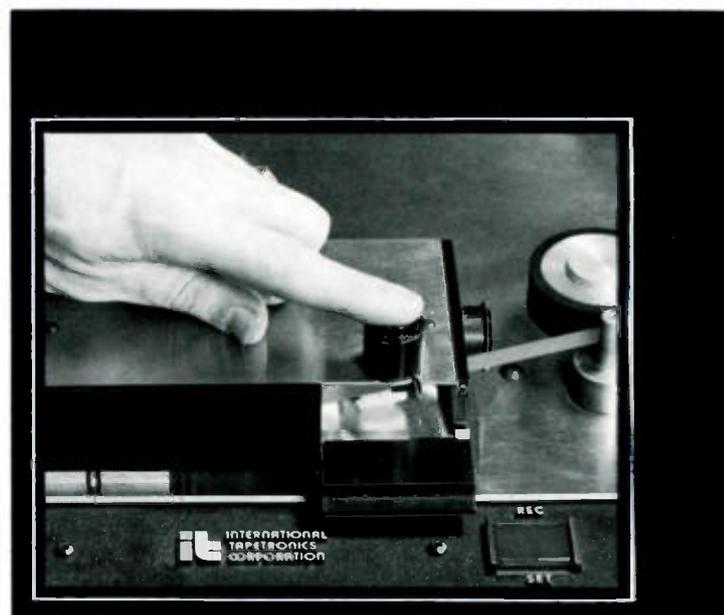
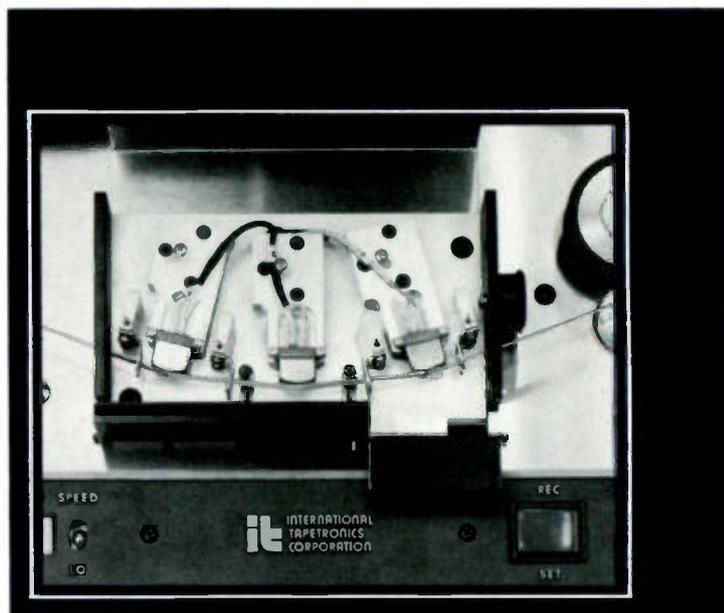
The base plate for the head assembly is machined of the same  $\frac{1}{2}$  inch thick material as the deck to provide a stable base for mounting all head assembly parts and for easy interchangeability of the entire head assembly. Heads are mounted in precision milled aluminum blocks and are controlled by three adjustment screws which pivot the heads on their center axis achieving a true azimuth adjustment. Four nonmagnetic tape guides are independently adjustable for peak micro positioning. The entire head assembly is carefully designed so that the arc of the erase, recording, and reproducing heads causes the tape to enter and depart from each head at an exact 7 degree angle. This eliminates the need for additional tape wrapping members which can cause skew detrimental to phasing, response, and signal-to-noise ratio.

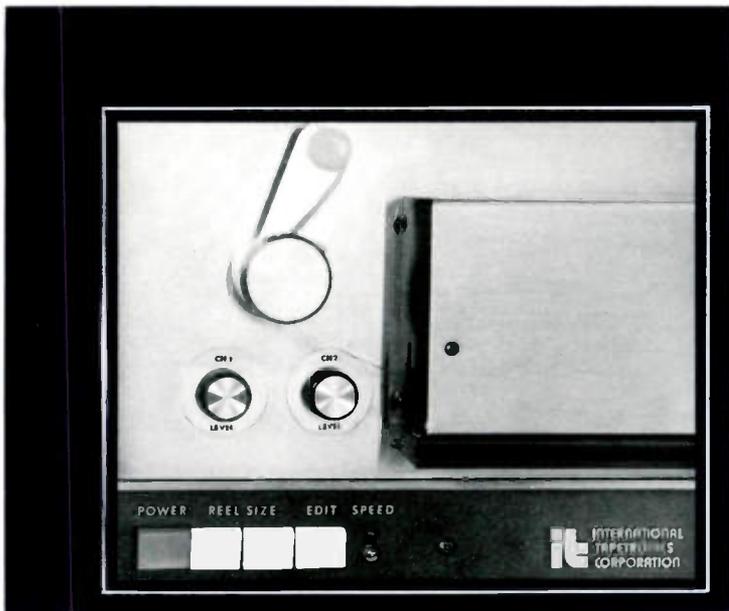
## Tape Editing

The optional ITC Micro-Mark Tape Marker (patent pending) makes editing easy and precise. Cue the tape to the critical spot, press the button and the tape is clearly and accurately marked by an easily seen line exactly at the point where the tape is cued. If you prefer the "measure tape from the edge of the head assembly" method, an especially designed disc has been mounted on the right hand side of the head assembly. Pressing the tape against this disc creates it at the point compatible with the edge of professional splicing blocks. If the operator still prefers to use the grease pencil method, ITC has added a split gate front head assembly door which permits access to the playback head for convenient tape marking without operation of tape lifters. Whichever method you prefer, editing is simple and accurate with the ITC 850 Series.

## Mechanical Brakes

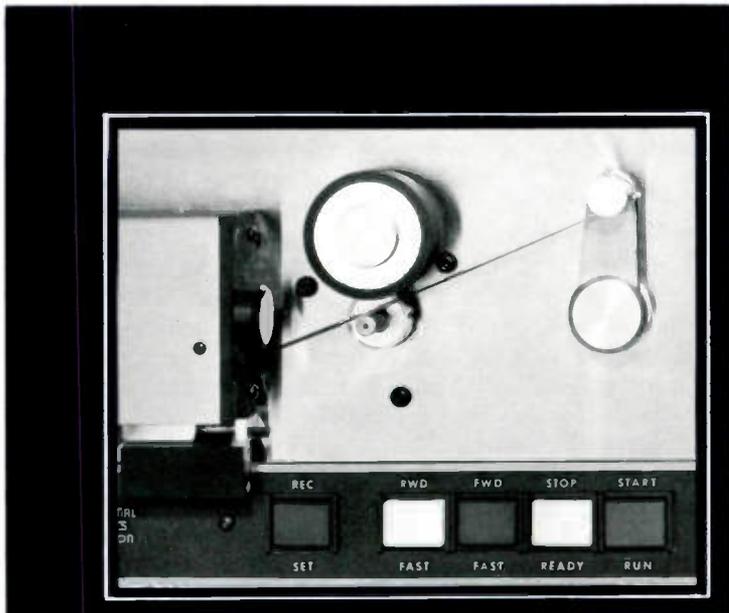
The mechanical brakes used primarily for holding action, are adjusted to provide a light braking action which results in easy tape threading, smooth editing, gentle stopping in an emergency, and extremely long life of mechanical brake assemblies. No extra editing brake solenoid is required. The mechanical brakes utilize brake bands rather than disc brakes. The brake bands create more pressure in one direction than the other thus achieving a differential braking action important to smooth and safe tape handling. Uniquely engineered into the brake assembly is a solenoid operated roller and chain linkage. Actuation of the solenoid releases mechanical brake tension totally because the rotation of the roller forces the brake band completely away from the brake drum. Therefore, there is no brake drag to cause wow and flutter.





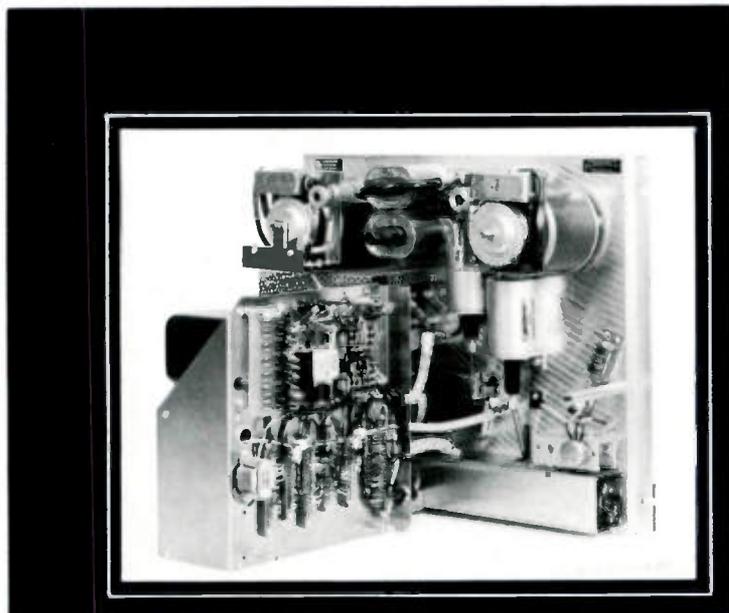
### Left Switch Bank

The bank of switches pictured here provides the 850 Series with super flexibility. Reel size switches permit smooth operation with small, large or dissimilar size reel hubs. The multi-function edit switch disables the tape lifters to permit manual gating of the tape in fast modes, defeats the squelch of the reproduce amplifiers in the fast and stop modes for location of specific material, and permits on-off control of the take-up reel for easy discarding of tape. The speed switch allows selection of either 3¾-7½ or 7½-15 IPS operation depending on the model you select.



### Right Control Bank

When you want to know the best location of front panel control switches, you ask the men and women who are going to operate the machines. That's what we did for the 850 Series, and by following their advice, we have positioned all control switches for easy access, instantaneous reaction, and smooth operation. A brief familiarization with the illuminated switches allows the operator to manipulate controls with a simple fingertip touch system without the necessity of looking for control positions. Start, stop, forward, and rewind are set apart from the record switch to coincide with the thumb and fingers of the operator's right hand . . . allowing sure, smooth operation of all modes. All functions of these switches can be remote controlled.



### Serviceability

When service is required, ITC has attempted to make the job the ultimate in simplicity. For reliability, only the latest silicon transistors, diodes, and integrated circuits have been included. Transistors and IC sockets are provided where replacement might be required. All printed circuit cards with active components are of plug-in design and have gold plated contacts. Extender cards are available for added accessibility of components during repair work. In the reproducer, the solenoids and motors plug-in also. The hinged swing-out design of the electronics chassis permits easy access to both electronic components and mechanical adjustments. Sheet metal parts are constructed of magnetic stainless steel for maximum shielding and durability of finish.



**854 Stereophonic Recording Amplifier**

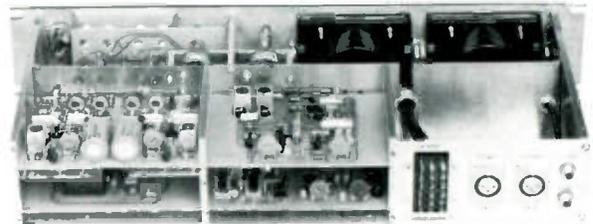
Reliability, audio quality, and operational features were foremost in the minds of ITC engineers during the design of the 850 Series recording amplifiers. Silicon solid state electronics have been designed to assure transient free recordings. We've even taken into consideration the varying operator requirements in the design of our front panel level controls. Take your choice . . . use the slotted control recessed behind the panel or add the extender shafts and knobs, furnished with each unit, and you have the traditional control accessible to everyone.

The four position Meter Mode switch allows you to visually check (A-B) the input to the recording amplifier against the output of the playback unit or you may wish to have the meters always provide a playback indication. The Peaks (PKS) Recording Level position provides a meter indication of program level as related to tape saturation. By preventing the meter (in the PKS position) from exceeding the "zero" (100%) indication, the operator can create virtually distortion free recordings. The Meter Mode switch also controls the audio provided at the Mode Monitor headphone jack — you hear what you see on the VU meter. And speaking of VU meters, ours have been made as large as possible at the request of operators.

On stereo (two channel) recording amplifiers we've provided P.R.S. (Play-Record-Synchronization). This allows the operator to record on one channel while simultaneously, and in complete synchronization, listening to the other. The output of the P.R.S. amplifier is available through either a front panel head-phone jack or a rear chassis audio connector.

Flexibility was also at the top of the design list. As an example, the unit may be placed in the record mode only when the transport is idle (in the ready mode) or only when tape is moving in

the run (play) mode or in either of these modes. The choice is made by a simple jumper installation on the logic card. The record mode is automatically cancelled if another mode is entered or, (to facilitate electronic editing) may be cancelled by placing the Meter Mode switch in the "safe" position. Even the audio input can be easily changed from 15k ohm bridging to 600 ohm balanced by yet another jumper option. We've also provided an input for a 25 Hz tone generator should you wish to record control tones for program automation. Transistor and IC sockets are provided where the solid state device might require replacement. All printed circuit cards with active components are of plug-in design and have gold plated contacts. Removing a small cover plate on the front panel provides access to all important maintenance adjustments—including bias, equalization, and all meter calibrations.



**Rear Chassis (Cover Removed)**



**Calibration Control Panel (Cover Removed)**

# 850 SERIES

## SPECIFICATIONS

**Power:**

105-125 volts, AC, 60 Hz, approximately 200 volt-amperes. (Varies with remote controls and accessories.) Other voltage and frequency variations are available on special order.

**Tape Speed (Two):**

3.75/7.5 IPS or 7.5/15 IPS. (Equalization and level of both record and playback are automatically adjusted with change of speed.)

**Wind Time:**

Approximately 60 seconds for 2400 feet of tape.

**Motors:**

Capstan—direct drive hysteresis synchronous motor with electrolyzed shaft and instrument-type permanently lubricated ball bearings.

Torque—induction motors (two) with ball bearings provide 40 ounce/inches of torque.

**Timing Accuracy:**

0.2% or better.

**Flutter (NAB weighted):**

15 IPS	.05%
7.5 IPS	.07%
3.75 IPS	.1%

**Brakes:**

Dynamic with motion sensing. Mechanical brakes applied when reels are idle.

**Tape Width:**

0.25 inch.

**Audio Input:**

15 k ohms bridging or 600 ohms balanced by strappable option.

**Audio Output:**

+24 dBm before clipping; factory adjusted for +8 dBm; 600 ohms balanced. May be strapped for 150 ohms.

**Distortion (Record to Play):\***

Using 400 Hz tone recorded at NAB Standard Reference Level\* with reproduce amplifier adjusted for +8 dBm output, and measuring on a distortion analyzer with a 400 to 20 kHz bandwidth.

15 IPS	1.2%
7.5 IPS	1.5%
3.75 IPS	2.0%

NOTE: Measuring only third harmonic distortion on an octave band analyzer will result in a maximum distortion of 0.5%.

**Noise:\***

Using 400 Hz tone recorded at NAB Standard Reference Level\* with reproduce amplifier adjusted for +8 dBm output, and measuring unweighted noise.

	Full Track	Half Track
15 IPS	-58 dB	-56 dB
7.5 IPS	-54 dB	-52 dB
3.75 IPS	-50 dB	-48 dB

Using 1 kHz tone recorded at 500 nWb/m (approximately 8 dB above NAB Standard Reference Level) and measuring NAB weighted noise.

	Full Track	Half Track
15 IPS	-76 dB	-74 dB
7.5 IPS	-72 dB	-70 dB
3.75 IPS	-68 dB	-66 dB

**Cross Talk Between Channels:**

Better than 50 dB at 1 kHz.

**Frequency Response (Overall Record and Play):\***

15 IPS	±2 dB from 30 to 18,000 Hz at normal recording level.
7.5 IPS	±2 dB from 30 to 15,000 Hz 10 dB below normal recording level.
3.75 IPS	±2 dB from 50 to 8,000 Hz 15 dB below normal recording level.

**Equalization:**

NAB or CCIR adjustable.

**Head and Track Configuration:**

Full track monophonic.  
Half track monophonic.  
Half track stereophonic (two channel).  
Quarter track stereophonic (two channel).

**Metering:**

Taut-band movement with "A" scale. Meter switch allows selection for metering the following: Peak Recording Level, Normal Line Recording Level, and Program Play. (Meter sensitivity may be calibrated for 0 to +24 dBm output level.)

**Erase Depth:**

Below noise level.

**Ambient Operating Temperature:**

55 degrees C., 131 degrees F., maximum.

**Remote Control:**

All indicators and controls except meter and edit switches.

**External Connectors:**

Latching type. Mating plugs furnished. XL Connectors used for audio.

**Mounting:**

Rack mounting. Mounting consoles optional.

**Dimensions:**

10½" reel reproducers:  
19" width, 11" overall depth (7¾" penetration into housing), 15¾" height.  
Recording Amplifiers:  
19" width, 8" depth, 3½" height.

**Weight:**

10½" reel reproducers:  
70 pounds.  
Recording Amplifiers:  
15 pounds.

\*Measurements made using 3M type 206 or equivalent tape.

## MODEL DESIGNATIONS

The 850 Series open reel reproducers are available in models capable of handling reels up to 10½ inches in diameter. Reproducers have provisions for interconnecting to recording amplifier electronics. All equipment is supplied ready for rack mounting. Specially designed console cabinets are also available as an option.

### 855 SERIES 10½ INCH RECORDER/REPRODUCER

855-0001	Full Track Mono, 7½-15 IPS
855-0002	Full Track Mono, 3¾-7½ IPS
855-0003	½ Track Mono, 7½-15 IPS
855-0004	½ Track Mono, 3¾-7½ IPS
855-0005	½ Track Stereo (two channel) 7½-15 IPS
855-0006	½ Track Stereo (two channel) 3¾-7½ IPS
855-0007	¼ Track Stereo (two channel) 7½-15 IPS
855-0008	¼ Track Stereo (two channel) 3¾-7½ IPS

### 856 SERIES 10½ INCH REPRODUCER

856-0001	Full Track Mono, 7½-15 IPS
856-0002	Full Track Mono, 3¾-7½ IPS
856-0003	½ Track Mono, 7½-15 IPS
856-0004	½ Track Mono, 3¾-7½ IPS
856-0005	½ Track Stereo (two channel) 7½-15 IPS
856-0006	½ Track Stereo (two channel) 3¾-7½ IPS
856-0007	¼ Track Stereo (two channel) 7½-15 IPS
856-0008	¼ Track Stereo (two channel) 3¾-7½ IPS

### 854 SERIES RECORDING AMPLIFIER

854-0001	Full Track Mono, 7½-15 IPS
854-0002	Full Track Mono, 3¾-7½ IPS
854-0003	½ Track Mono, 7½-15 IPS
854-0004	½ Track Mono, 3¾-7½ IPS
854-0005	½ Track Stereo (two channel) 7½-15 IPS
854-0006	½ Track Stereo (two channel) 3¾-7½ IPS
854-0007	¼ Track Stereo (two channel) 7½-15 IPS
854-0008	¼ Track Stereo (two channel) 3¾-7½ IPS

### ACCESSORIES

864-0001	Micro-Mark Tape Editing Marker
864-0002	Console Cabinet for 10½" Recorder/Reproducer
864-0006	Remote Control for Reproducer only
864-0007	Remote Control for Recorder/Reproducer
831-0054-013	25 Hz Cue Detector



INTERNATIONAL TAPETRONICS CORPORATION  
2425 South Main Street • Bloomington, Illinois 61701  
Telephone: 309-828-1381

Marketed exclusively in Canada by McCurdy Radio Industries Ltd., Toronto

## CARTRIDGE EQUIPMENT

### Series 99

Table top mounting. Accepts NAB "A" and "B" size cartridges. Includes hi-speed cue and five cue tones with provisions for FSK logging. NAB (1975) equalization. Adjustable for CCIR equalization. ELSA (Erase, Locate Splice, Azimuth) function optional.

#### Series 99 Reproducers

PM-*	Monophonic, 50/60 Hz	\$ 1755.00
PS-*	Stereophonic, 50/60 Hz	1935.00

#### Series 99 Recorder/Reproducers

RPM-*	Monophonic, 50/60 Hz	\$ 3185.00
RPME-*	Monophonic, 50/60 Hz, ELSA	3635.00
RPS-*	Stereophonic, 50/60 Hz	3620.00
RPSE-*	Stereophonic, 50/60 Hz, ELSA	4070.00

\*Specify line voltage (110-240) after model identification.

#### Accessories for Series 99

DR-0099	Rack Mount-mounts one Series 99 Recorder/Reproducer or two Series 99 Reproducers.	\$ 125.00
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### SP Series Reproducers

SP Series Reproducers accept the NAB "A" and "B" size cartridges. Table top mounting, 117v/60 Hz AC operation with NAB (1964) equalization.

SP-0001	Monophonic with 1 kHz primary cue.	\$1020.00
SP-0002	Stereophonic with 1 kHz primary cue.	1170.00
SP-0003	Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	1090.00
SP-0004	Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	1240.00

#### Accessories for SP Series

SR-0001	Rack Mounting Kit - mounts one SP Series in a 19" equipment rack.	\$ 30.00
DR-0003	Rack Mounting Kit-mounts two SP Series side by side in a 19 inch equipment rack.	25.00

### WP Series Reproducers

WP Series Reproducers accept the NAB "A", "B", and "C" size cartridges, and have provisions for accepting recording amplifier electronics for ready conversion to recorder/reproducer. Table top mounting, 117v/60 Hz AC operation with NAB (1964) equalization.

WP-0003	Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	\$ 1235.00
WP-0004	Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	1385.00

#### Accessory for WP Series

NR-0002	Rack Mounting Kit-mounts one WP Series in a 19 inch equipment rack.	\$ 15.00
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### RP Series Recorder/Reproducers

RP Series Recorder/Reproducers accept the NAB "A", "B" and "C" size cartridges and provide the complete recording and reproducing capability. Table top mounting, 117v/60 Hz AC operation with NAB (1964) equalization.

RP-0001	Monophonic with 1 kHz primary cue.	\$ 1835.00
RP-0002	Stereophonic with 1 kHz primary cue.	2205.00
RP-0003	Monophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	1925.00
RP-0004	Stereophonic with 1 kHz primary, 150 Hz secondary, and 8 kHz tertiary cues.	2295.00

#### Accessories for RP Series

NR-0002	Rack Mounting Kit-mounts one RP Series in a 19 inch equipment rack.	\$ 15.00
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**International Tapetronics Corporation  
Price List  
July 15, 1980\***

## 750 SERIES

**750 Series 10 1/2 Inch Recorder/Reproducers (Motion Sensing, Input & Output Transformers Standard)**

855-7514	Full Track Monophonic, 3 3/4 — 7 1/2 IPS.	\$ 2600.00
855-7515	Full Track Monophonic, 7 1/2 — 15 IPS.	2600.00
855-7524	1/2 Track Monophonic, 3 3/4 — 7 1/2 IPS.	2600.00
855-7525	1/2 Track Monophonic, 7 1/2 — 15 IPS.	2600.00
855-7534	1/2 Track Stereophonic (Two Channel), 3 3/4 — 7 1/2 IPS.	2935.00
855-7535	1/2 Track Stereophonic (Two Channel), 7 1/2 — 15 IPS.	2935.00
855-7544	1/4 Track Stereophonic (Two Channel), 3 3/4 — 7 1/2 IPS.	3260.00
855-7545	1/4 Track Stereophonic (Two Channel), 7 1/2 — 15 IPS.	3260.00

**750 Series 10 1/2 Inch Reproducers (Motion Sensing and Output Transformers Optional)**

856-7514	Full Track Monophonic, 3 3/4 — 7 1/2 IPS.	\$ 1725.00
856-7515	Full Track Monophonic, 7 1/2 — 15 IPS.	1725.00
856-7524	1/2 Track Monophonic, 3 3/4 — 7 1/2 IPS.	1725.00
856-7525	1/2 Track Monophonic, 7 1/2 — 15 IPS.	1725.00
856-7532	1/2 Track Stereophonic (Two Channel), 7 1/2 IPS.	1570.00
856-7534	1/2 Track Stereophonic (Two Channel), 3 3/4 — 7 1/2 IPS.	1760.00
856-7535	1/2 Track Stereophonic (Two Channel), 7 1/2 — 15 IPS.	1760.00
856-7544	1/4 Track Stereophonic (Two Channel), 3 3/4 — 7 1/2 IPS.	1875.00
856-7545	1/4 Track Stereophonic (Two Channel), 7 1/2 — 15 IPS.	1875.00

**Special Accessories for 750 Series Reel-To-Reel Equipment**

833-0018-200	25 Hz Detector for 750 Reproducer.	\$ 150.00
864-0016-000	Remote Control for 750 Reproducer Only.	210.00
864-0017-000	Remote Control for 750 Recorder/Reproducer.	220.00
864-0014-010	Console Cabinet for 750 Recorder/Reproducer.	595.00
864-0015-000	Add-on stacking kit, adds 3 1/2 inches of vertical space.	70.00
281-0014-012	1 3/4 inches Filler Panel.	10.00
878-0045-000	Motion Sensing (Reproducer Only).	50.00
AT-0001	Audio Output Transformers (Reproducer Only-Two Transformers Included).	35.00
830-0022-021	Alignment Gauge.	15.00
831-0075-003	Reproducer Test Extender.	20.00
831-0119-003	Recorder Test Extender.	25.00

Note: Standard for all reel-to-reel equipment: rack mounting, 117v/60 Hz, AC operation. Console cabinets are available as an option.

ITC Cartridge and Reel-to-Reel Equipment is Covered by a Thirty-Day, Money-Back Guarantee of Satisfaction and is Protected by a Two-year Warranty on Parts and Factory Labor.



\*Prices FOB Bloomington, Illinois.  
Terms: Net 30 or 5% Discount for Payment Prior to Shipment; Leasing also available.  
Prices and specifications subject to change without notice.

**INTERNATIONAL TAPETRONICS CORPORATION**  
PO BOX 241 2425 SOUTH MAIN STREET BLOOMINGTON ILLINOIS 61701 PHONE 309-828-1381

**CALL TOLL-FREE  
800-447-0414**

Alaska, Hawaii and  
Illinois Residents Call  
Collect 309-828-1381

# Reel-to-Reel

## Recorder/Reproducers

**770 Series 10½ Inch Recorder/Reproducers:** A professional open reel machine at an affordable price. Motion sensing and input and output transformers standard. Deck: 19" W x 7⅞" D x 14" H. Amplifier: 19" W x 9" D x 3½" H.

Full track mono: 3¾-7½ IPS, \$2865. - 7½-15 IPS, \$2865.  
 ½ track mono: 3¾-7½ IPS, \$2865. - 7½-15 IPS, \$2865.  
 ½ track stereo: 3¾-7½ IPS, \$3240. - 7½-15 IPS, \$3240.

Console cabinet optional.



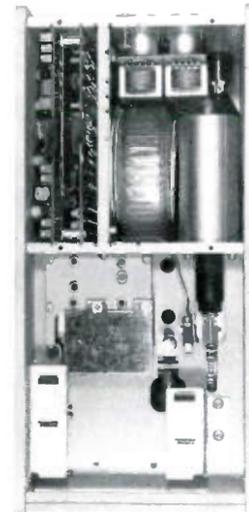
**770 Series Reproducer:** Playback version of above designed for automation systems. Output transformers standard.

Full track mono: 3¾-7½ IPS, \$1850. - 7½-15 IPS, \$1850.  
 ½ track mono: 3¾-7½ IPS, \$1850. - 7½-15 IPS, \$1850.  
 ½ track stereo: 3¾-7½ IPS, \$1850. - 7½-15 IPS, \$1850.



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IT'S TIME TO LOOK INTO  
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# Product Guide & Price List

April 10, 1983

## INTRODUCING DELTA!



## INTERNATIONAL TAPETRONICS CORPORATION

# DELTA MEANS CHANGE . . . FOR THE BETTER



**Delta One Reproducer.** High speed recue and triple cue tones standard. Accepts "A" and "AA" cartridges. 5⅝" W x 12" D x 5¼" H.

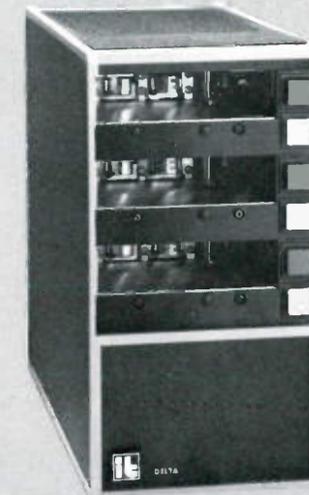
Mono: \$1715. Stereo: \$1865.

Coming Soon — The Delta Two Wide Play!



**Delta Four Recording Amplifier.** Works with Delta One (shown above), Delta Two, or Delta Three (shown below) to provide complete recording and reproducing capability. 5⅝" W x 12" D x 5¼" H.

Mono: \$1080. Stereo: \$1245.  
 (Price is for Delta Four Recording Amplifier only)



**Delta Three Reproducer.** All three decks are removable independently for servicing. Triple cue tones standard. Accepts "A" and "AA" sized cartridges. 5⅝" W x 12" D x 10½" H.

Mono: \$4210. Stereo: \$4630.



**CALL TOLL FREE  
 800-447-0414**

From Alaska, Hawaii or Illinois  
 call collect: (309) 828-1381

## Economy Line Cartridge Equipment

**PD-II Recorder/Reproducers:** ITC quality at an economy price. Records and plays mono tapes in "AA" size, stopping automatically on the 1 kHz cue tone. 5¼" W x 15" D x 5⅝" H. Table top mounting. Rack mounting for the side-by-side units available. *Mono, single cue:* \$1210.



**PD-II Reproducer:** Playback Only version of Recorder/Reproducer. *Mono, single cue:* \$880.



## Cartridge Equipment Accessories

**ESL-IV Eraser/Splice Locator:** Saves time and improves on-air sound. Accepts NAB "AA" size cartridges. Combines cartridge erasing and splice locating in a single, automatic, high speed operation. 5¼" W x 15" D x 5⅝" H. *ESL-IV:* \$795.



**FB-1 Telephone Answer Only Interface:** Works with any ITC Cartridge Machine except the Delta Series. FCC Registered. 1½" x 3½" x 5¼". \$150.



All ITC Equipment is covered by one or more of the following patents:  
3,801,043; 3,800,323; 3,809,329; 3,869,719; 3,833,925; 3,932,887;  
3,942,189; 4,105,934; 4,040,114; 4,142,221; 4,221,316; 4,101,937;  
D248,393; 4,153,918 4,219,167; 4,096,533; D255,793; 4,158,868;  
4,978,709; 4,193,103; 4,271,440

## Series 99B Cartridge Machines

**Series 99B Recorder/Reproducer:** A new generation of cartridge machines. Accepts NAB "AA" and "BB" size cartridges. Includes hi-speed cue and three cue tones. NAB (1975) equalization. Adjustable for CCIR equalization. ELSA function (Erase, Locate Splice, Azimuth) optional. Table top mounting. 8½" W x 15½" D x 5¼" H.

*Mono, 50/60 Hz:* \$4215. *Mono, 50/60 Hz, ELSA:* \$4760.  
*Stereo, 50/60 Hz:* \$4785. *Stereo, 50/60 Hz, ELSA:* \$5330.

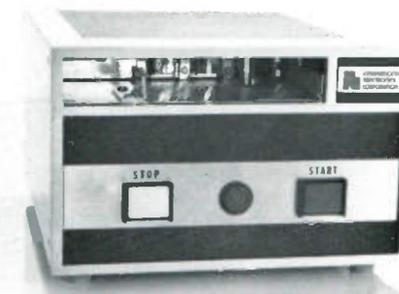


**Series 99B Reproducer:** Playback Only version of above.

*Mono, 50/60 Hz:* \$2230.  
*Stereo, 50/60 Hz:* \$2460.

Rack mounting accessories available.

## Premium Line Cartridge Equipment

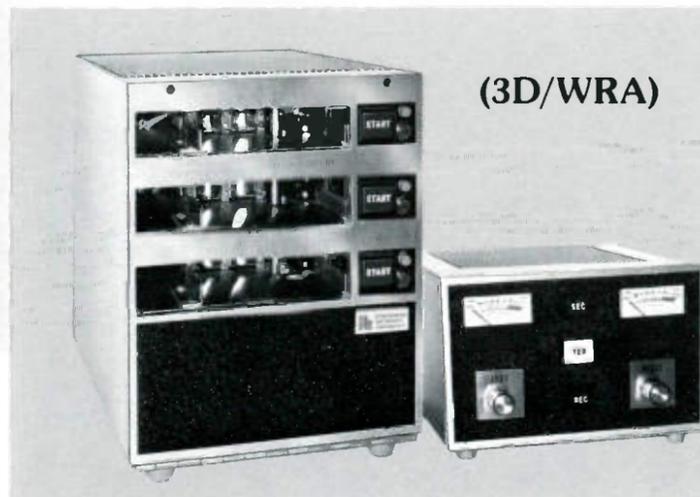


**SP Reproducers:** The most popular cartridge machine in the broadcasting industry. Accepts NAB "AA" and "BB" size cartridges. 8½" W x 11" D x 5⅝" H.

*Mono, single cue:* \$1300. *Stereo, single cue:* \$1490.  
*Mono, three cue:* \$1390. *Stereo, three cue:* \$1580.

**WP Reproducers:** All the facilities of the SP Series (pictured above) plus wide-play capability. Accepts NAB "AA", "BB", and "CC" size cartridges. Can be converted to a recorder/reproducer. 17½" W x 11" D x 5⅝" H.

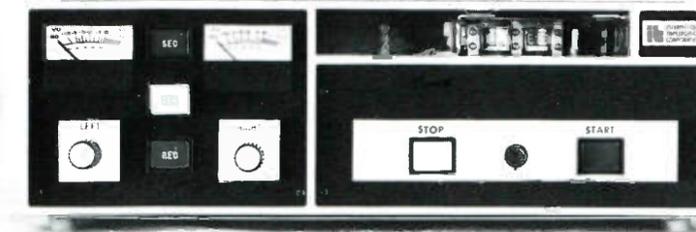
*Mono, three cue:* \$1660. *Stereo, three cue:* \$1850.



All premium line equipment designed for table top mounting. 117v/60 Hz AC operation with NAB (1964) equalization. Rack mounting kits available.

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**800-447-0414**

From Alaska, Hawaii or Illinois  
call collect: (309) 828-1381



**RP Recorder/Reproducers:** A truly professional cartridge recorder. Accepts NAB "AA", "BB", and "CC" size cartridges. Provides complete recording and reproducing capability. 17½" W x 11" D x 5⅝" H.

*Mono, single cue:* \$2390. *Stereo, single cue:* \$2840.  
*Mono, three cue:* \$2500. *Stereo, three cue:* \$2950.

**RP Recorder/Reproducer/Delay:** All the facilities of the RP Series plus program and network delay. NAB "AA", "BB" and "CC" sized cartridges may be used for network program delay. Either "BB" or "CC" sized cartridges are required for continuous program delay. Provides complete recording, reproducing and delay capabilities.

*Mono, three cue:* \$2950.

**3D Reproducers:** The original three deck cartridge machine. The Industry leader. Accepts NAB "AA" and "BB" size cartridges. 3 decks share common housing, power supply, capstan motor. 8½" W x 12⅞" D x 11⅛" H.

*Mono, single cue:* \$2910. *Stereo, single cue:* \$3480.  
*Mono, three cue:* \$3180. *Stereo, three cue:* \$3750.

**WRA Recording Amplifiers:** All the recording facilities of our famous RP Series. Designed to interconnect with 3D Reproducers to provide recording capability in the bottom deck. 8½" W x 11" D x 5⅝" H.

*Mono, single cue:* \$1160. *Stereo, single cue:* \$1425.  
*Mono, three cue:* \$1180. *Stereo, three cue:* \$1445.

Economy Line equipment designed for table top mounting. 117v/60 Hz AC operation. Rack mounting kit and test accessories available. NAB (1964) equalization.

# Economy Line Cartridge Equipment



**PD-II Recorder/Reproducer:** ITC quality at an economy price. Records and plays mono tapes in "AA" size, stopping automatically on the 1 kHz cue tone. 5 $\frac{3}{4}$ " W x 15" D x 5 $\frac{5}{8}$ " H. Table top mounting. Rack mounting for three side-by-side units available. *Mono, single cue: \$990.*

**PD-II Reproducer:** Playback Only version of above. *Mono, single cue: \$725.*

**ESL-IV Eraser/Splice Locator:** Saves time and improves on-air sound. Accepts NAB "AA" size cartridges. Combines cartridge erasing and splice locating in a single, automatic, high speed operation. 5 $\frac{3}{4}$ " W x 15" D x 5 $\frac{5}{8}$ " H. *ESL-IV: \$655.*

Economy Line equipment designed for table top mounting. 117v/60 Hz AC operation. Rack mounting kits and test accessories available. NAB (1964) equalization.



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SPECIALIST  
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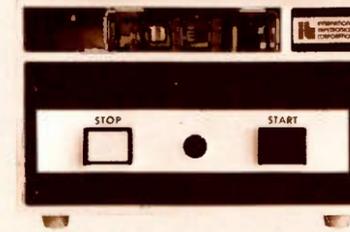
# Product Guide & Price List

(with Leasing Information)

July 15, 1980

**it** INTERNATIONAL  
TAPETRONICS  
CORPORATION

# Premium Line Cartridge Equipment



**SP Reproducers:** The most popular cartridge machine in the broadcasting industry. Accepts NAB "AA" and "BB" size cartridges. 8 $\frac{1}{2}$ " W x 11" D x 5 $\frac{5}{8}$ " H.

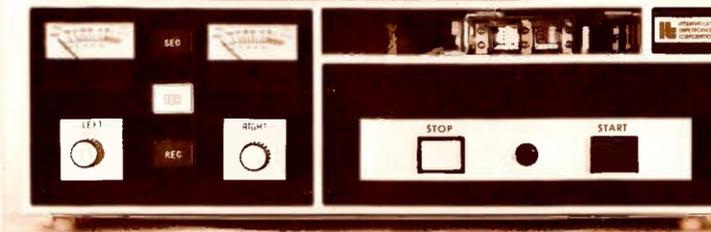
*Mono, single cue: \$1020. Stereo, single cue: \$1170.  
Mono, three cue: \$1090. Stereo, three cue: \$1240.*

**WP Reproducers:** All the facilities of the SP Series plus wide-play capability. Accepts NAB "AA", "BB", and "CC" size cartridges. Can be converted to a recorder/reproducer. 17 $\frac{1}{2}$ " W x 11" D x 5 $\frac{5}{8}$ " H.

*Mono, three cue: \$1235. Stereo, three cue: \$1385.*



All premium line equipment designed for table top mounting. 117v/60 Hz AC operation with NAB (1964) equalization. Rack mounting kits available.



**RP Recorder/Reproducers:** A truly professional cartridge recorder. Accepts NAB "AA", "BB", and "CC" size cartridges. Provides complete recording and reproducing capability. 17 $\frac{1}{2}$ " H x 11" D x 5 $\frac{5}{8}$ " H.

*Mono, single cue: \$1835. Stereo, single cue: \$2205.  
Mono, three cue: \$1925. Stereo, three cue: \$2295.*

**RP Recorder/Reproducer/Delay:** All the facilities of the RP Series plus program and network delay. NAB AA, BB and CC sized cartridges may be used for network program delay. Either BB or CC sized cartridges are required for continuous program delay. Provides complete recording, reproducing and delay capabilities.

*Mono, three cue: \$2310.*

**3D Reproducers:** The original three deck cartridge machine. The Industry leader. Accepts NAB "AA" and "BB" size cartridges. 3 decks share common housing, power supply, capstan motor. 8 $\frac{1}{2}$ " W x 12 $\frac{7}{8}$ " D x 11 $\frac{1}{8}$ " H.

*Mono, single cue: \$2390. Stereo, single cue: \$2840.  
Mono, three cue: \$2600. Stereo, three cue: \$3050.*

**WRA Recording Amplifiers:** All the recording facilities of our famous RP Series. Designed to interconnect with 3D Reproducers to provide recording capability in the bottom deck. 8 $\frac{1}{2}$ " W x 11" D x 5 $\frac{5}{8}$ " H.

*Mono, single cue: \$910. Stereo, single cue: \$1130.  
Mono, three cue: \$930. Stereo, three cue: \$1150.*

# Series 99 Cartridge Machines

**Series 99 Recorder/Reproducer:** A new generation of cartridge machines. Accepts NAB "AA" and "BB" size cartridges. Includes hi-speed cue and five cue tones, with provisions for FSK logging. NAB (1975) equalization. Adjustable for CCIR equalization. ELSA function (Erase, Locate Splice, Azimuth) optional. Table top mounting.

Mono, 50/60 Hz: \$3185. Mono, 50/60 Hz, ELSA: \$3635.  
Stereo, 50/60 Hz: \$3620. Stereo, 50/60 Hz, ELSA: \$4070.



**Series 99 Reproducer:** Playback Only version of above.

Mono, 50/60 Hz: \$1755.  
Stereo, 50/60 Hz: \$1935.

Rack mounting accessories available.

# Reel-to-Reel Recorder/Reproducers

**850 Series 10 1/2 Inch Recorder/Reproducers:** ITC's best. A heavy duty machine designed for intensive production schedules.

Full track mono: 7 1/2-15 IPS, \$3970 - 3 3/4-7 1/2 IPS, \$3970.  
1/2 track mono: 7 1/2-15 IPS, \$3970 - 3 3/4-7 1/2 IPS, \$3970.  
1/2 track stereo: 7 1/2-15 IPS, \$4750 - 3 3/4-7 1/2 IPS, \$4750.



Console cabinets, stacking kits, and cartridge machine optional.

**750 Series 10 1/2 Inch Recorder/Reproducers:** A professional open reel machine at an affordable price. Motion sensing and input and output transformers standard.

Full track mono: 3 3/4-7 1/2 IPS, \$2600 - 7 1/2-15 IPS, \$2600.  
1/2 track mono: 3 3/4-7 1/2 IPS, \$2600 - 7 1/2-15 IPS, \$2600.  
1/2 track stereo: 3 3/4-7 1/2 IPS, \$2935 - 7 1/2-15 IPS, \$2935.



**750 Series Reproducer:** Playback version of above designed for automation systems.

Full track mono: 3 3/4-7 1/2 IPS, \$1725 - 7 1/2-15 IPS, \$1725.  
1/2 track mono: 3 3/4-7 1/2 IPS, \$1725 - 7 1/2-15 IPS, \$1725.  
1/2 track stereo: 7 1/2 IPS, \$1570 - 3 3/4-7 1/2 IPS, \$1760.  
7 1/2-15 IPS, \$1760.

## THE ITC LEASING PLAN:

# AN ALTERNATIVE TO CASH!

### WHY LEASE FROM ITC?

1. Leasing produces substantial tax advantages because monthly payments are fully deductible as operating expenses.
2. Leasing is a form of protection against rising costs because payments from future income will still be based on today's prices.
3. The lease term is often longer than other types of financing . . . and monthly payments will be smaller.
4. Leasing frees working capital for more productive uses rather than putting it into frozen investments such as equipment.
5. Leasing allows you to enjoy the use of needed equipment while not disturbing your usual lines of credit.
6. Leasing conserves cash. Virtually 100% of the equipment can be financed by the lease.
7. To make leasing even more attractive, ITC extends the normal warranty to 3 years on all leased equipment. You get full protection for the live of the lease at no extra cost!

### LEASING EXAMPLES

Machine	Leasing Cost*	Outright buy
SP-0001	\$ 35.70/mth.	\$1020.00
RP-0001	\$ 64.23	\$1835.00
3D-0001	\$ 83.65	\$2390.00
850 stereo	\$166.25	\$4750.00

\*The lease is a 36 month plan which requires a security deposit equal to 3 monthly payments. Please note that ITC Leasing is not available in New York state.

### THE ITC SALES STAFF SAYS:



From left to right: John Schaab, Janet Dalrymple, Bill Parfitt and Larry Cutchens.

**"IF LEASING SOUNDS RIGHT  
TO YOU, LET'S TALK IT OVER!"**

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