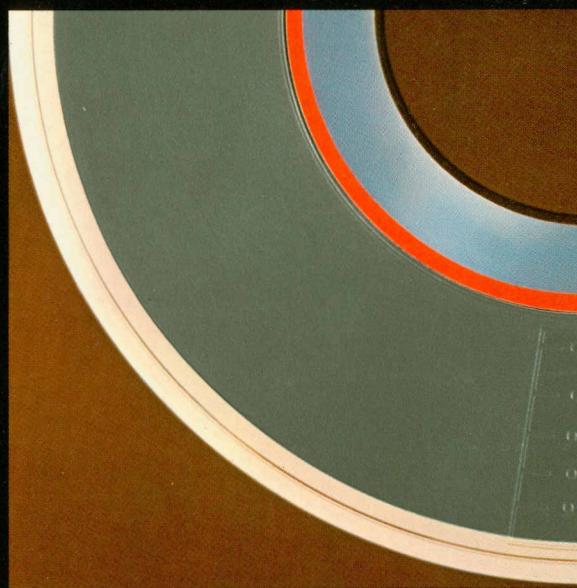
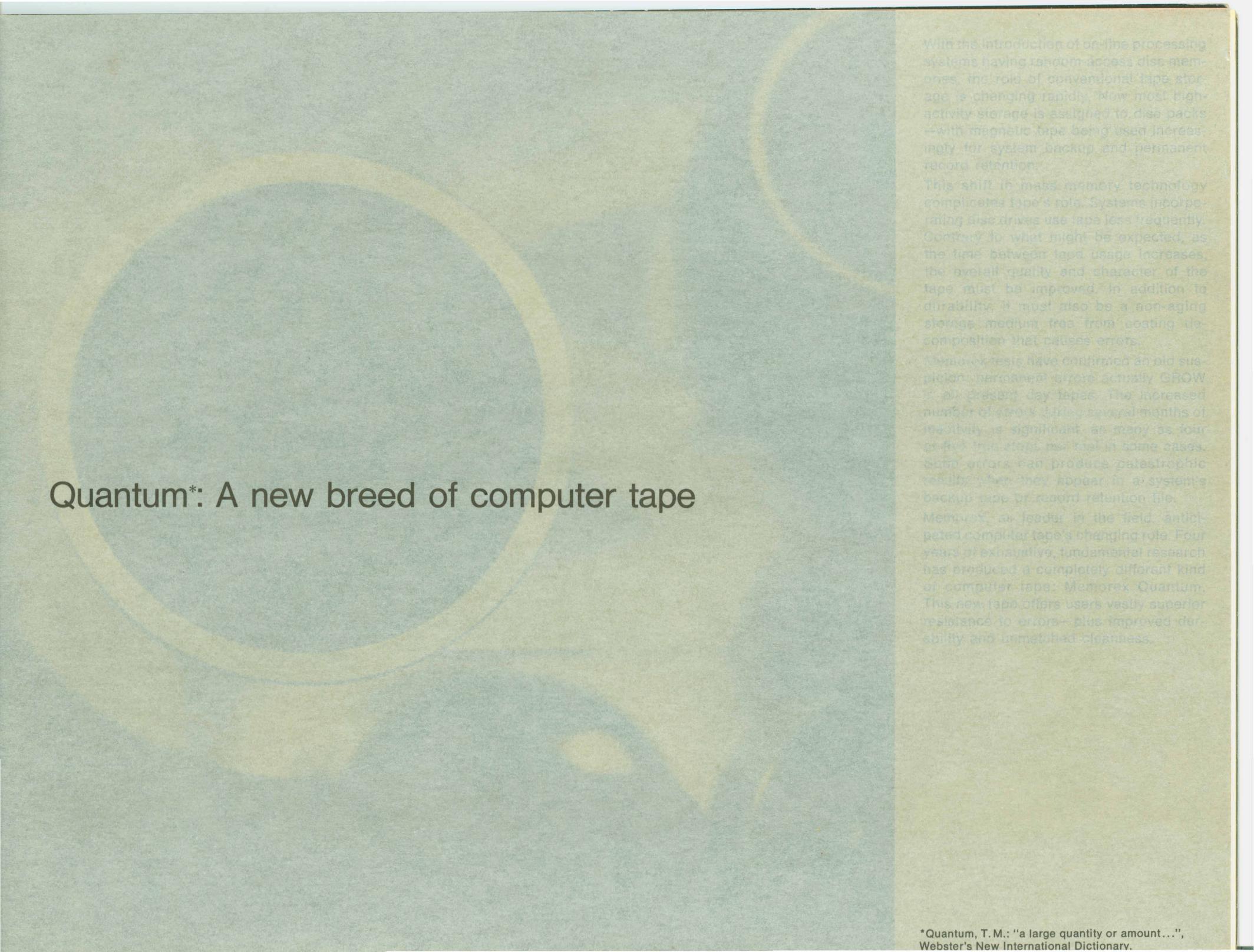


MEMOREX

QUANTUM QUANTUM QUANTUM





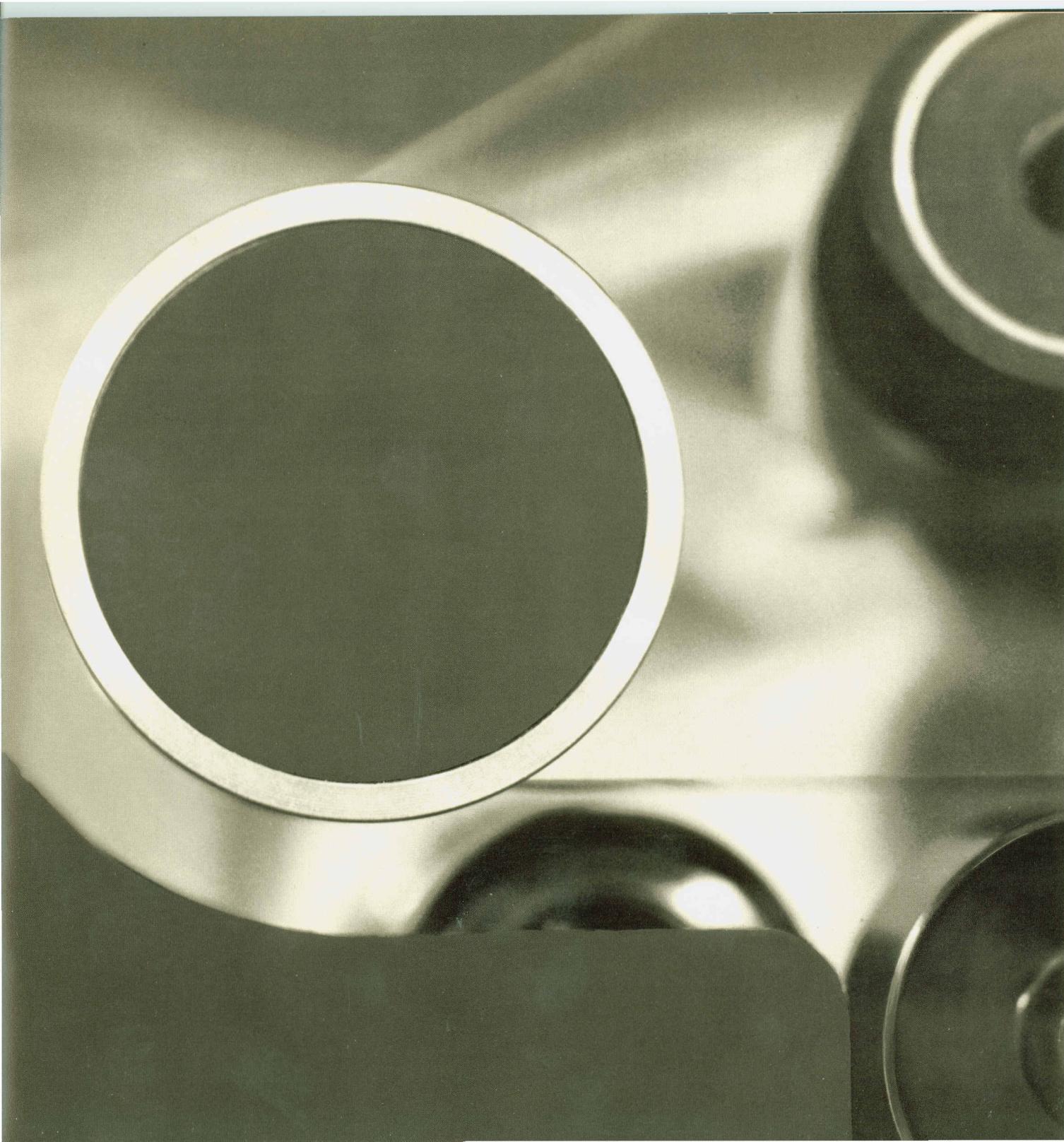
Quantum*: A new breed of computer tape

With the introduction of on-line processing systems having random-access disc memories, the role of conventional tape storage is changing rapidly. Now most high-activity storage is assigned to disc packs—with magnetic tape being used increasingly for system backup and permanent record retention.

This shift in mass memory technology complicates tape's role. Systems incorporating disc drives use tape less frequently. Contrary to what might be expected, as the time between tape usage increases, the overall quality and character of the tape must be improved. In addition to durability, it must also be a non-aging storage medium free from coating decomposition that causes errors.

Memorex tests have confirmed an old suspicion: permanent storage actually GROWS in all present-day tapes. The increased number of errors during several months of inactivity is significant: as many as four errors per track, and, in some cases, such errors can produce catastrophic results when they appear in a system's backup tape or record retention file.

Memorex, a leader in the field, anticipated computer tape's changing role. Four years of exhaustive, fundamental research has produced a completely different kind of computer tape: Memorex Quantum. This new tape offers users vastly superior resistance to errors—plus improved durability and unmatched cleanliness.

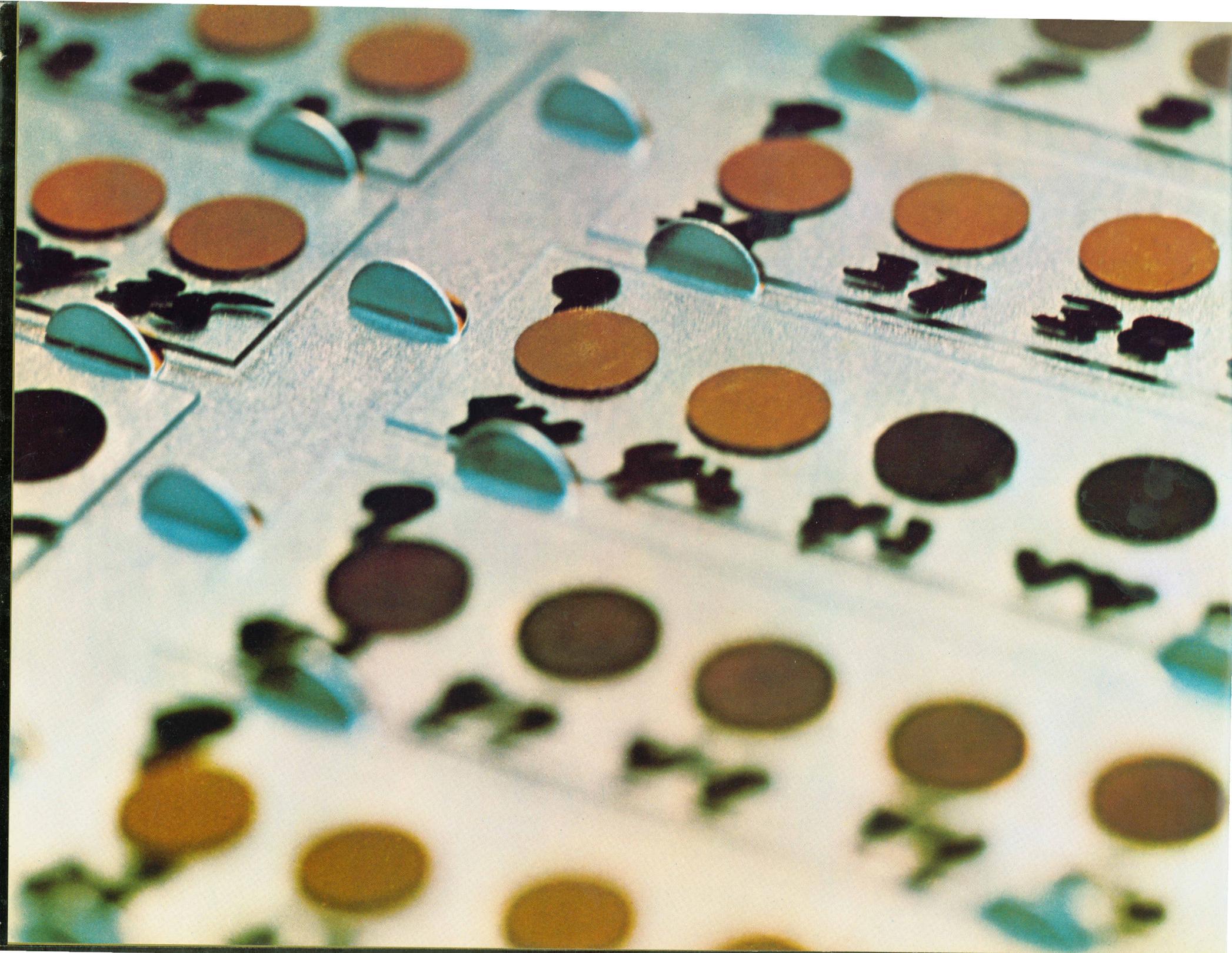


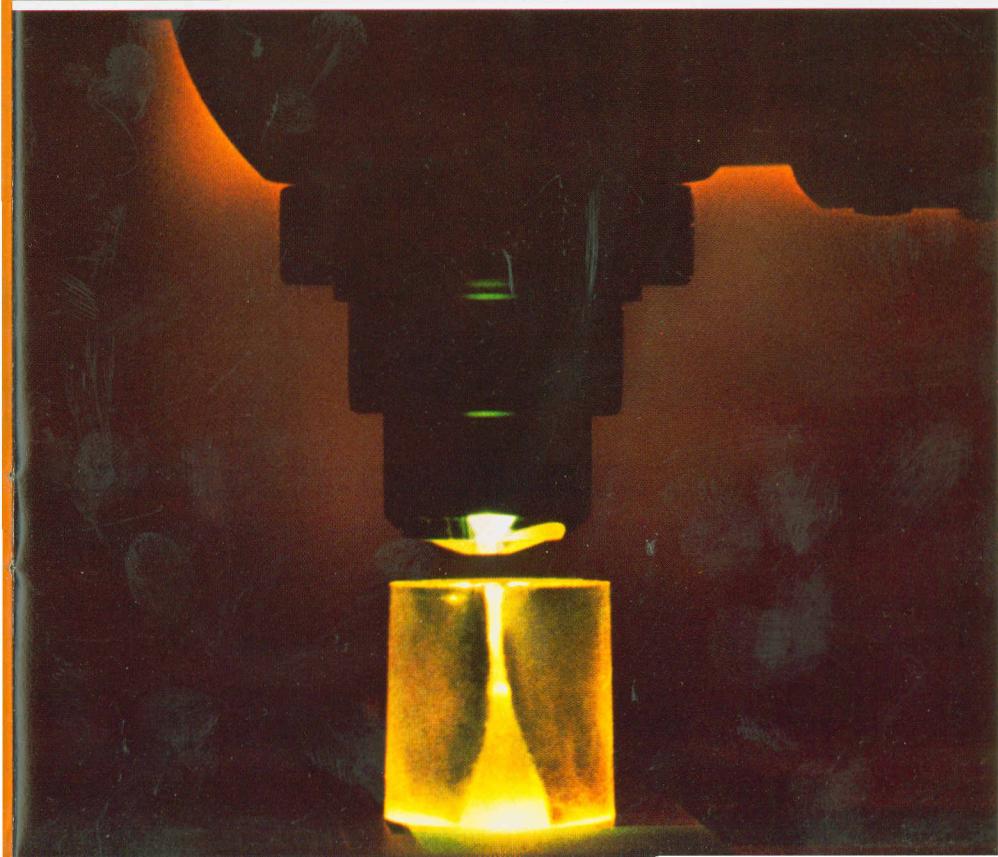
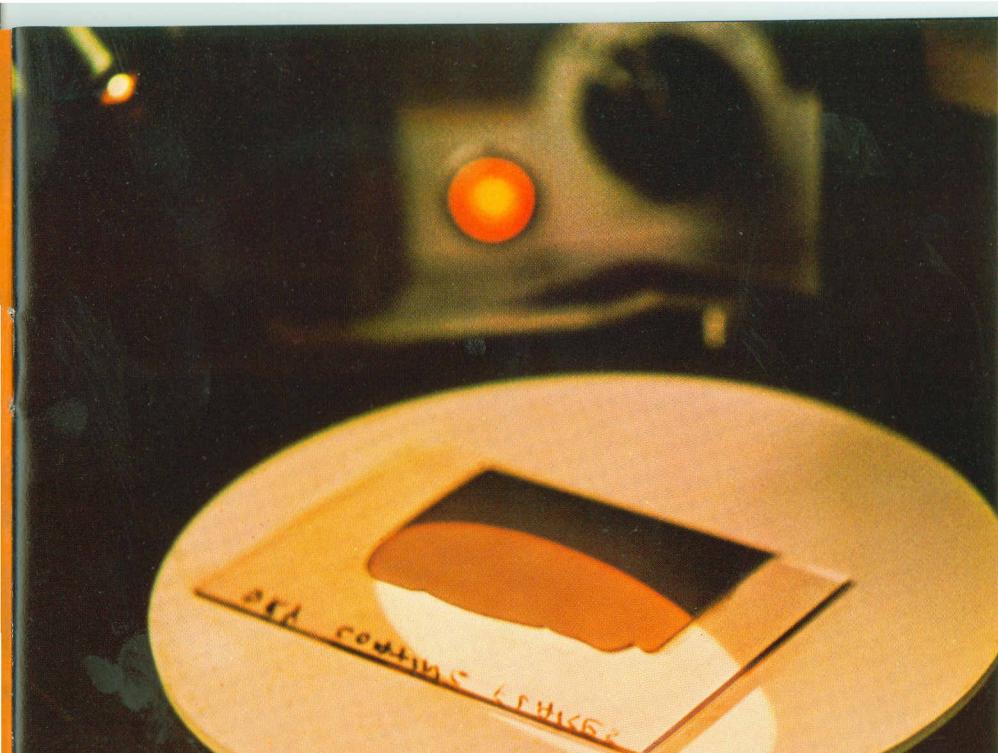
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Memorex tests have confirmed an old suspicion: permanent errors actually GROW in all present day tapes. The increased number of errors during several months of inactivity is significant, as many as four or five true stops per reel in some cases. Such errors can produce catastrophic results when they appear in a system's backup tape or record retention file.

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TAPE SELF-DESTRUCTION

Inactive computer tape, recorded or blank, undergoes tremendous mechanical stress on the shelf. Internal layer-to-layer pressures commonly reach 4,000 psi. Even slight environmental changes cause this pressure-burdened tape to expand, contract and shift. If chemical breakdown occurs simultaneously in the tape's coating, the net effect is tape self-destruction. Flaked off coating, particularly from tape edges where strain is the greatest, can collect into bunches during subsequent operation. Transient-producing foreign matter, wound into the tape pack on initial passes, can become permanently embedded. When such a decomposing tape is put back into active service, NEW permanent and temporary errors appear.

MEMOREX CHEMISTRY COMBATS BREAKDOWN

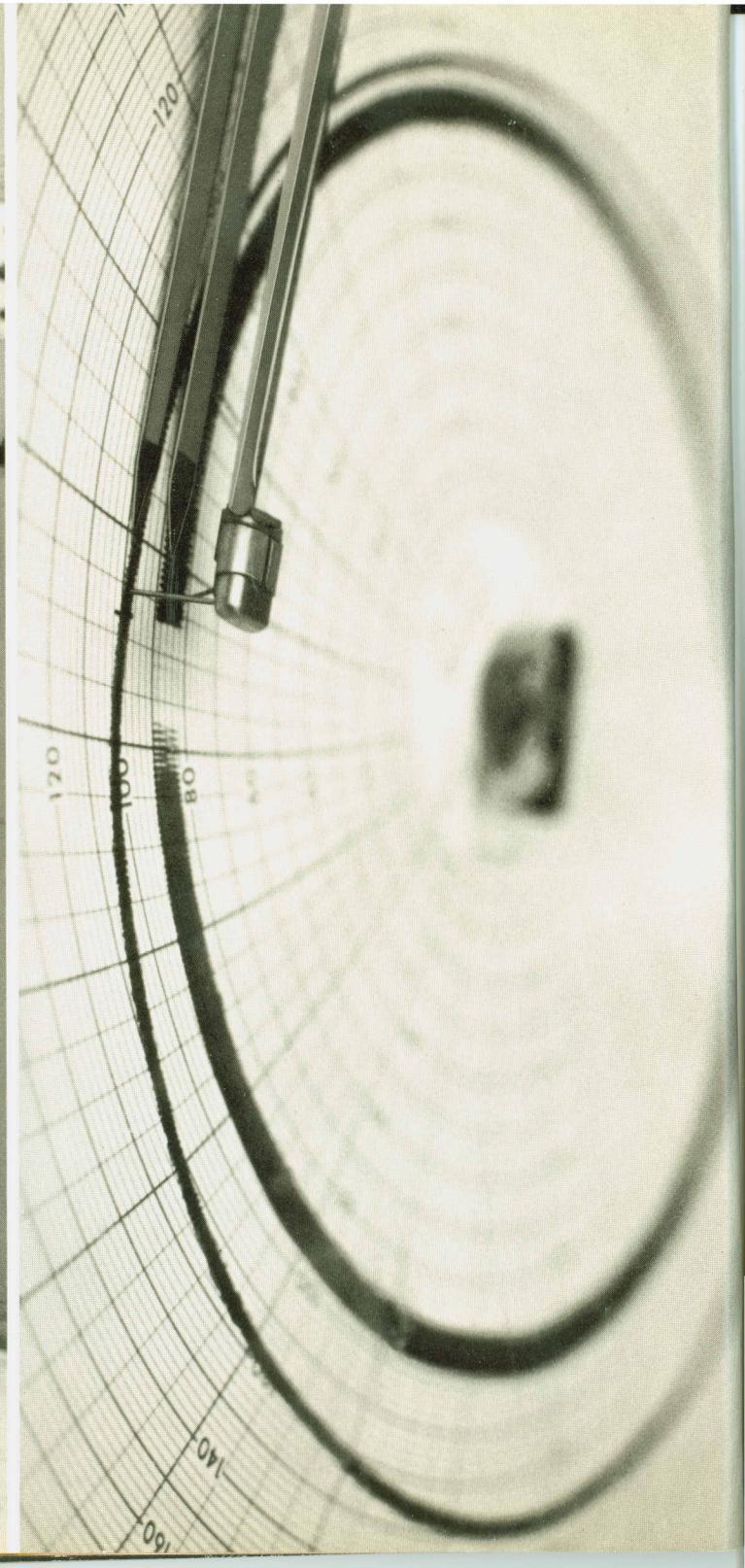
Since mechanical and thermal stress is unavoidable in tape storage, Memorex researchers have developed an entirely new, stress-resistant coating formulation. This breakthrough in polymer chemistry gives Quantum tape unusual chemical stability and mechanical strength. Its unique polymer system, without resorting to stabilizing additives used in other tapes, resists thermal, oxidative and hydrolytic decomposition — even under extreme environmental conditions. New formulation chemistry binds coating components into an enduringly tough, yet flexible, surface.

Actual shelf tests and accelerated aging tests at Memorex have proven the error-retardant quality of the new Quantum formulation. After ten months shelf storage, newly developed Quantum tape has only 4 to 5 transient errors — and on the average, less than 1 permanent error per reel. In accelerated aging tests, Quantum is 15 to 16 times more resistant to temporary errors, 2 to 3 times more resistant to permanent errors, than the two leading competitive brands. For detailed results of this series of tests, see the next page.

Opposite Page: Small, circular samples, cut from over 104 experimental tapes preceding Quantum, were filed in drawers like this one during their exhaustive physical analysis.

Upper Right: A "smear" of experimental coating formulation is examined by microphotography.

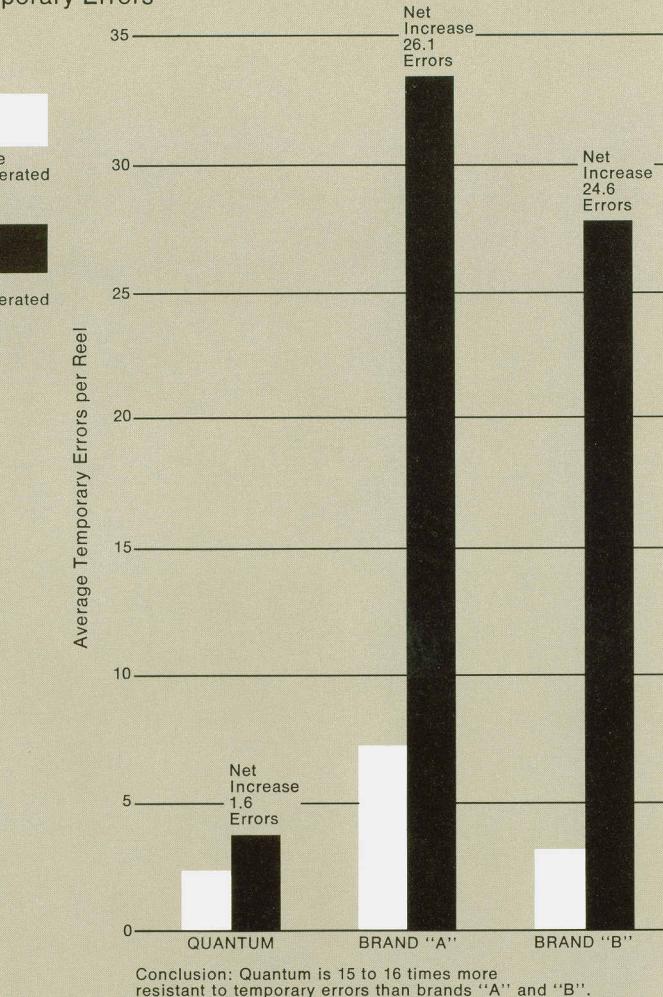
Lower Right: Precise optical techniques were used to determine coating thickness characteristics of experimental tapes in the Quantum development program.



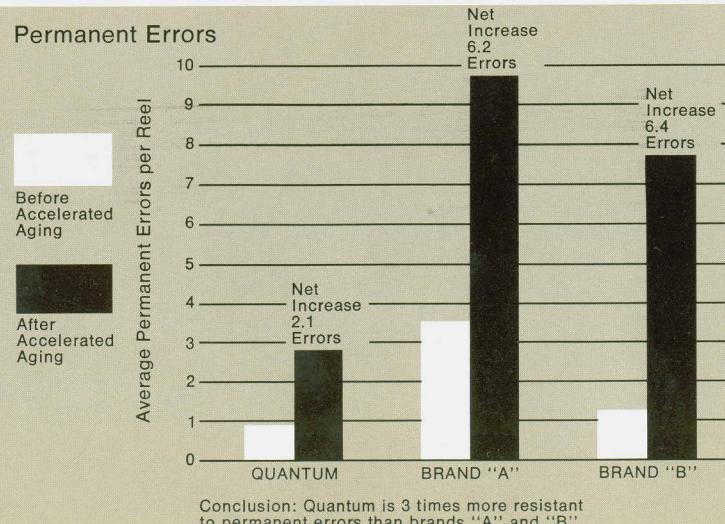


ACCELERATED AGING TEST

Temporary Errors



Permanent Errors

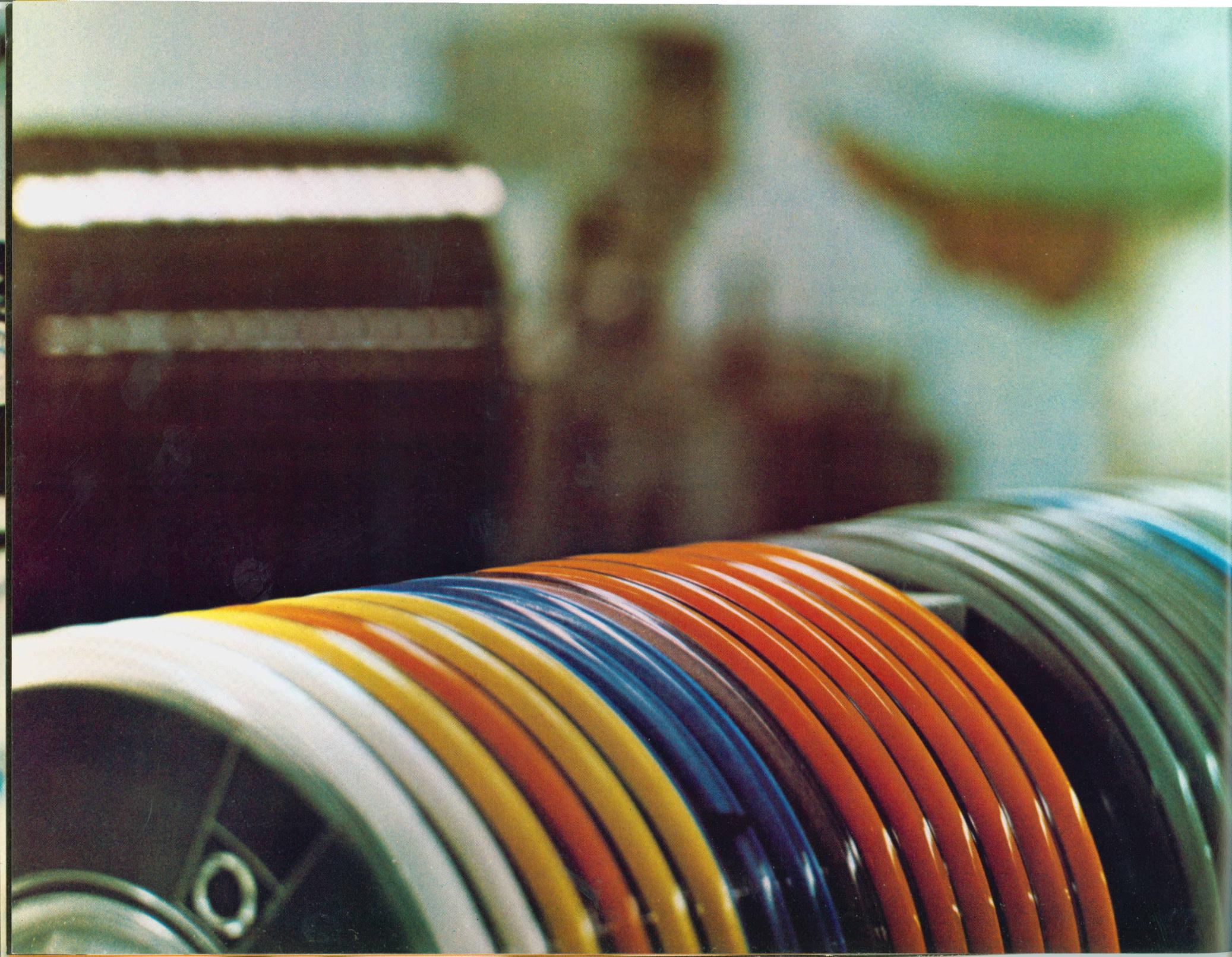


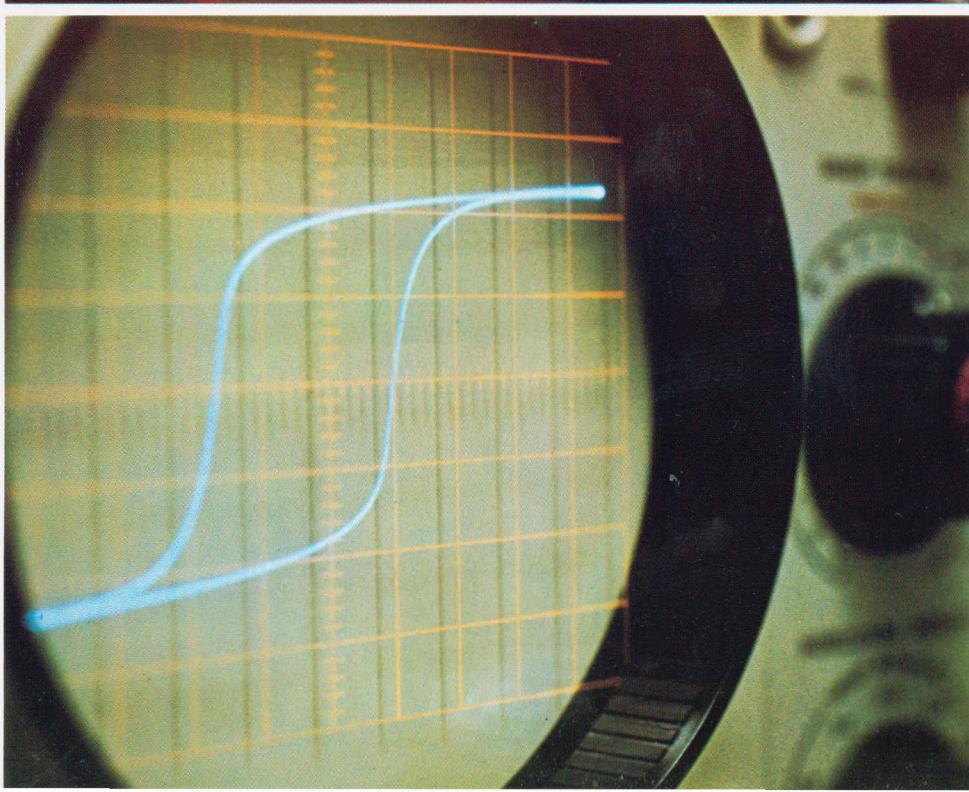
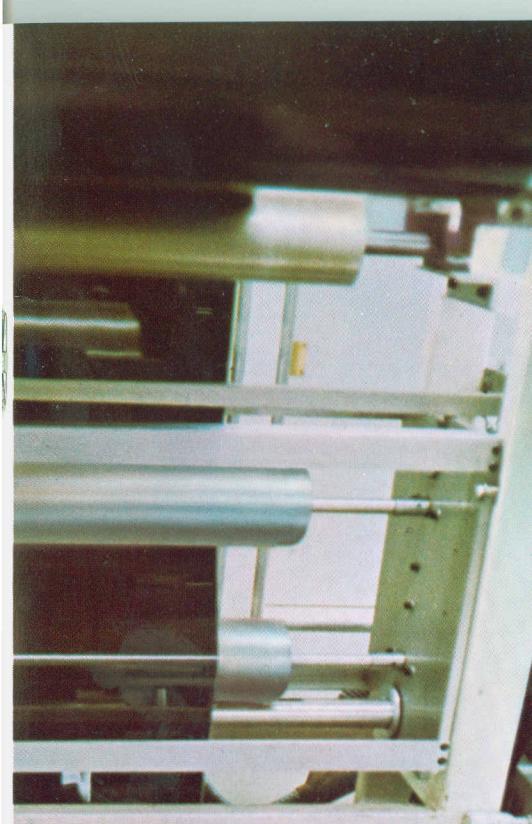
ACCELERATED AGING TESTS

Because extreme environmental cycling simulates long-term storage (as well as duplicating shipping conditions), Memorex has run a series of accelerated aging tests. In these tests, reels of Quantum tape and the two leading competitive tapes were tested end-to-end and sealed in an environmental torture chamber. Temperatures were cycled as high as 135° F, humidity as high as 90% — thus speeding up tape self-destructive effects. At the end of accelerated aging, all reels were tested end-to-end a second time. All tapes, except Quantum, showed a considerable increase in transient errors — indicating Quantum's degree of comparative resistance to decomposition. All tapes, except Quantum, showed a two to three times increase in permanent errors.

Opposite Page: Array of environmental test chambers and control equipment used in the continuing series of Quantum accelerated aging and environmental tests.

Left: Laboratory durability and drop-out tester. This special tape drive is used to "run" and examine samples of Quantum and competitive tape, both before and after environmental cycling.





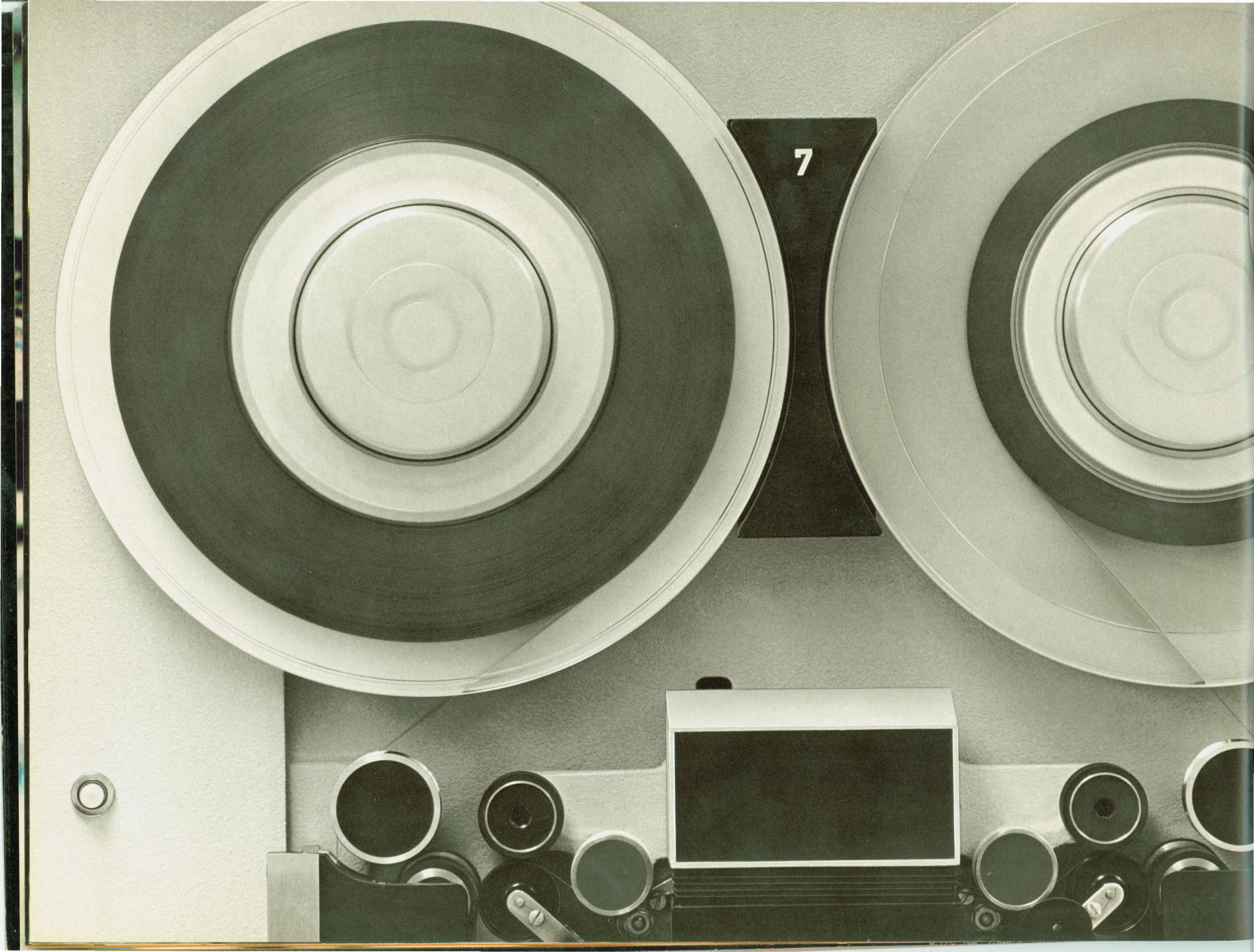
QUANTUM: MANUFACTURED IN THE
WORLD'S MOST SOPHISTICATED
FACILITY

Opposite Page: Portion of the Memorex cleanroom, where environment is maintained to pharmaceutical standards—and contamination control is practiced to the most exacting criteria in the industry.

Left: Web of Quantum tape being wound immediately after Memorex's proprietary coating and curing process.

Upper Right: Half-inch computer tape leaves Memorex' microscopically-adjusted slitting machinery, where tape width is controlled to tolerances within $\pm .002$ inch.

Lower Right: Cleanroom oscilloscope traces tape hysteresis loop as part of the continual magnetic monitoring of tape being produced.

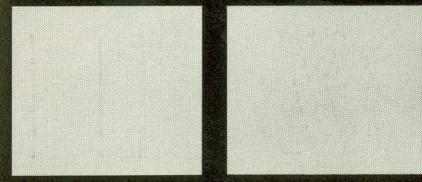


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Tape self-generated debris

The Test: Fresh, unused reels of Quantum and the two leading competitive tapes were environmentally cycled for six days to accelerate tape self-destructive effects. A six-inch sample of each test tape was then shuttled over a normal tape drive head and cleaner for 250,000 passes. At the end of the shuttle, all debris worn from each sample was carefully "lifted" for evaluation. As evident below, there was virtually NO shed with Quantum—indicating the magnitude of Quantum's durability, inherent cleanliness and stability.

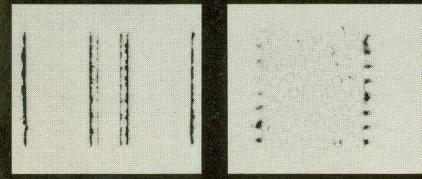
QUANTUM



Head Lift

Cleaner Lift

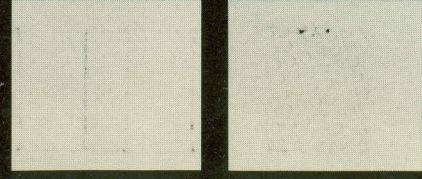
BRAND A



Head Lift

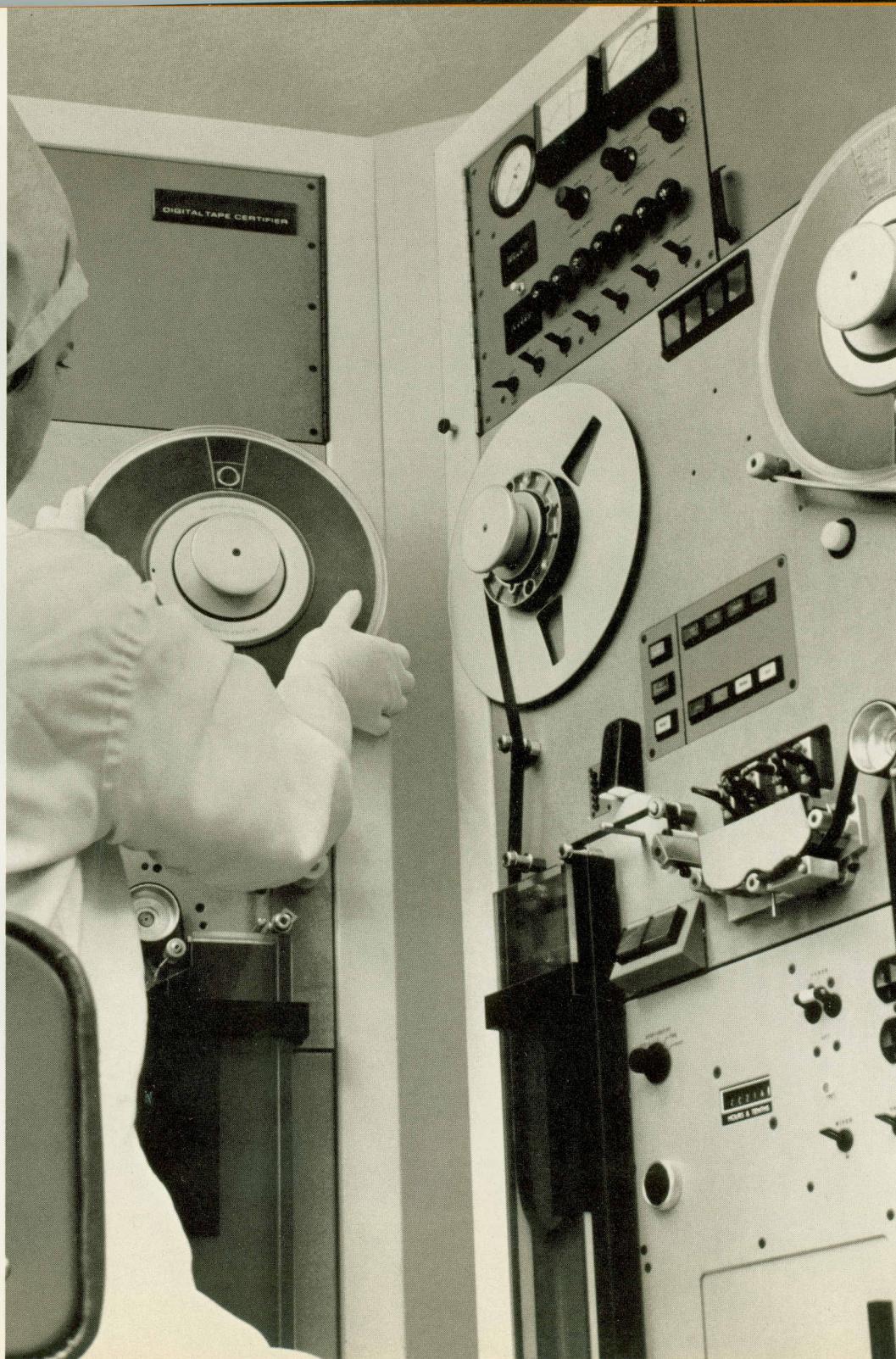
Cleaner Lift

BRAND B



Head Lift

Cleaner Lift



MEANINGFUL 100% CERTIFICATION

Quantum tapes, individually certified 100% error-free when they leave the factory, start cleaner because of their vastly more stable formulation. They stay that way through the rigors of shipping and pre-use storage—still free of permanent errors weeks, months or even years later when you put them on your computer.

EXCLUSIVE 5 YEAR WARRANTY

Memorex was the FIRST company to offer computer tape users a 3-year warranty. With its quantum leap forward in tape stability, it is now able to extend this warranty to an even longer period. New Quantum tape is warranted for a full five years—providing the long-lasting certification tape requires in the new era.

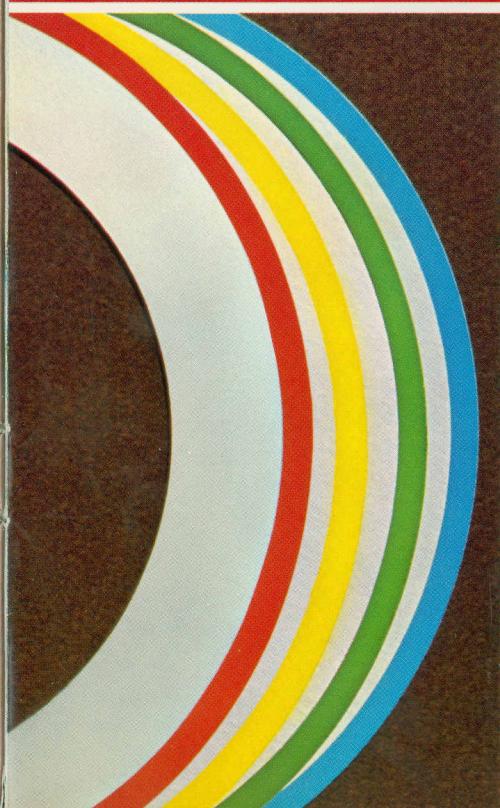
REDUCED TRANSIENT ERROR

Once in service, Quantum tape's radical new coating formulation drastically reduces transient errors and increases tape life. Its tough, impervious surface produces low dropout-producing shed, first pass or 250,000th, as evident in the comparison photos at the left. Low-shed also reduces drive maintenance and time needed to shuttle away temporary errors. Exclusive use of Quantum on your transports eliminates frequent cleaning required with most other tapes.

Opposite Page: Quantum tape runs cleaner and longer on any make of tape drive.

Left: Special Memorex-designed certifiers test each reel of Quantum tape end-to-end.





TENSAFLEX®: SMOOTHER, STRONGER BASE MATERIAL

Premium quality tape begins with a premium quality base film. Quantum tape uses the toughest, smoothest, most uniform polyester available: Tensaflex, custom-made to Memorex specifications. This film is continually source-tested to insure that every batch meets demanding standards. Before being coated with the special Quantum formulation, it is tested a second time, and run through a special solvent/ultrasonic process to enhance Memorex's "start clean" manufacturing process. In daily operation, Tensaflex provides: high, 9-pound tensile strength; extreme resistance to base film scratches; a low coefficient of friction.

LOW ABRASION

The special combination of processing and chemical components used in the new Quantum tape formulation result in low tape abrasive characteristics. In normal day-to-day operation, Quantum tape is gentle on heads, particularly fine tolerance heads utilized in all high-density drives.

COLOR-CODED REELS FOR CONVENIENT FILING

Sturdy, solid-flange Quantum reels are supplied with convenient stick-on identification rings in nine colors. These wide rings, colored around 360°, easily identify the contents of each file at a glance.

EXCLUSIVE MEMOREX CUBE PACK

The exclusive Memorex "cube pack" saves 20% more storage space than any other tape packaging. Its unique inner packing preserves Quantum tape's "start clean" condition until the moment you put it on your computer.

Certified Quantum reels are first sealed in light-weight canisters in the same clean room where tape is made. Canisters are then stacked in fives and encapsulated in Memorex's exclusive plastic film bubble—which improves tape thermal protection and eliminates nearly all cardboard containers that bring contaminants into your computer room. Quantum outer cartons are easy-to-handle, twelve-inch cubes. They contain 10 reels each and have a "zip-top" sealing tape that ends annoying, dirty carton-slitting.

Opposite Page: Quantum tape is supplied on sturdy, stress-resistant plastic reels; each reel is packaged in its own, all-plastic canister with safety lock.

Upper Left: The exclusive, space-saving Quantum Cube Pack is 20% smaller than any other 10-reel carton.

Lower Left: Self-adhesive Quantum identification bands are available in nine colors.

Lower Right: Quantum tape passes its 9-pound tensile strength test with absolutely no oxide shed.

**QUANTUM:
TECHNICAL DATA**

Dimensions

Coating thickness:
400 microinches
Average total thickness:
1.85 mils
Width: 498 ± 2 mils
"E" Value:
 $\frac{1}{8}$ inch min.

Magnetic Properties

Coercive force:
265 oersteds
Residual flux:
1.3 maxwell/ $\frac{1}{2}$ inch

Performance

Average pulse output:
at 800 bpi
 $\pm 10\%$
at 1600 bpi/3200 fci
 $\pm 10\%$
Dynamic skew:
less than 2 microseconds
Permanent errors per reel:
0

Physical Properties

Coating surface roughness,
centerline average:
5 microinches
Layer-to-layer adhesion:
none
Curvature:
0.125 inch max./36 inches
Cupping:
0.01 inch max./0.25 inch
Yield force:
9 pounds min.
Creeposity:
0.5% max.
Compatibility:
Not an inhibitor

Recommended Environment

Operating range:
40° F to 90° F
20% RH to 80% RH
(Maximum wet bulb of
78° F)

Storage range:
40° F to 90° F
20% RH to 80% RH
(Maximum wet bulb of
80° F)

Unrecorded tapes may be
stored at:
120° F
(Maximum wet bulb of
80° F)

**Test Conditions/
Magnetic Properties**

All intrinsic values are measured
using a cyclic magnetizing force
having an amplitude of 1500
oersteds. Quantum performance
is measured by recording across
the full width of the tape.

Average pulse output is given
relative to that of Reference Tapes
conforming with accepted industry
standards. An error is defined as
a reduction in output to less than
50 percent of average for 800 bpi
(35 percent for 1600 bpi/3200 fci) or
a noise pulse (dc saturation condi-
tion) greater than 10 percent of
average pulse output.

Dynamic skew, defined as the vari-
ation in time existing between two
outside-track read signals during
the writing process, is measured on
an IBM 729 Model VI tape transport.

Test Conditions/Physical Properties

Coating surface roughness is
measured using a profilometer with
a 0.1 mil diameter stylus loaded
with 0.1 gram, and the centerline
average calculated in accordance
with ASA B 46. 1-1962.

Other physical properties are
measured in accordance with IBM
specifications.

MEMOREX

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MEMOREX