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The Ampex ATR-124

As we enter what appears to be the digital decade of the 80s, Ampex is making a major commitment to at least one more generation of analog professional audio tape recorders.

IT SEEMS AS THOUGH everyone is introducing—or at least, announcing—the arrival of a digital tape recorder. Well, almost everyone. Lately, Ampex has been conspicuous for its total silence on the matter of digital recording. The recent ADD-1 (see our November 1979 issue) acknowledged what everyone suspected all along: Ampex—just like everyone else—was indeed getting involved in digital technology. And now, with a DDL in their product line, could a DTR be far behind?

At the recent convention of the Audio Engineering Society, Ampex finally broke the silence, by unveiling its new ATR-124 tape recorder. And, it's analog!

Ampex seems to have carefully evaluated the status of digital technology today, and concluded, "Not yet." Although others will surely disagree (as we'll see next month), the company proposes one more generation of analog machines. Of course, the new generation takes full advantage of the ubiquitous micro-processor, but the recorded format remains, for the moment, analog.

The usual specs are of course impressive, even if wow and flutter is still measurable, and signal-to-noise is not quite up to digital standards. However, the system electronics have been designed with enough latitude to accommodate future advances in tape formulations. And these will surely narrow—although perhaps not close—the S/N gap. (As an aside, there doesn't seem to be a professional application for the new metal particle tapes, since their advantages are most apparent at the very-short recorded wavelengths found on cassettes.)

Perhaps the most-noteworthy departure from earlier Ampex designs is found within the ATR-124's series of control systems. These are divided into separate sections: a channel-status module, a transport controller, an equalization selection panel, and a multi-point search-to-cue system.

CHANNEL STATUS MODULE

A 29-by-7 matrix provides control over the condition of each track. The usual modes (Ready, Safe, Input, Sync, Repro) are switched by first touching the appropriate mode switch, at either end of the matrix, and then touching one or more of the channel switches. An additional Mute mode is also available.

There is also a Group mode, in which one or more channels may be assigned to one of four groups. Now, if Input and Group 1 are touched, all channels assigned to Group 1 will go into the Input mode.

MEMORIES

A Setup Memory allows four monitor conditions to be stored in Memories A, B, C and D. The Monitor Memory allows a different monitor condition to be selected for each transport mode. As an example, the following monitoring conditions could be programmed into the system: While recording, the system will monitor only those channels presently being recorded; during playback, all channels will be monitored; at stop, all channels assigned to record will switch to input; during fast forward or rewind, all channels except the time code track will be muted.

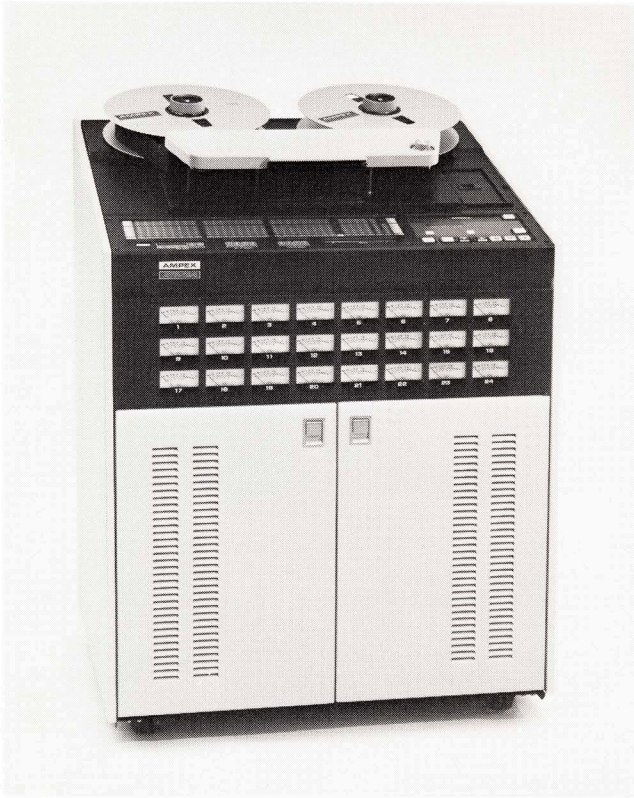


Figure 1. The ATR-124: Ampex's latest-generation analog multi-track tape recorder.

Depending on the synchronizer being used to read time code, it may be necessary to read the code continuously—or intermittently—during fast-wind modes. Usually, the tape lifter is under the control of the synchronizer, and may be permanently defeated when continuous time-code readings are required. Ampex feels that the air film that is produced between tape and heads during either fast-wind mode is sufficient to prevent head wear, although obviously, an audio-muting function is necessary to prevent demolishing the studio monitors.

Presumably, the mute mode could also be controlled from an external point—perhaps via the Group matrix—so that preselected channels could be switched on-and-off during mixdown, as is common on many automated consoles.

TRANSFER MODE

The Transfer mode prevents accidental erasure of previously-stored monitor conditions, and also allows the contents of any memory to be placed in one of the other memories as well. For example, to call up the contents of Memory A, simply depress A. To enter a new condition into Memory A, depress Transfer, A. To write condition A into Memory B, depress A, Transfer, B. This latter sequence can be helpful if a fairly-complex monitor condition needs some minor modifications from time to time. Instead of attempting a point-by-point duplication, simply transfer A into B (A remains as-is). Now, the monitor mods can be made to B.

TAPE SPEED

In addition to three-speed operation (7½, 15, 30 in./sec.) a crystal-controlled frequency synthesizer permits speed change over a 50-to-200 per cent range. Thus, the transport speed may be varied from 3¾-to-60 in./sec. Changes may be made as percentages of normal speed, or, in musical quarter-tone increments, over a range of ± one octave.

AUXILIARY CHANNELS

Some European tape recorders provide separate sync outputs, and, in a somewhat-similar fashion, the ATR-124's optional Aux channels provide a separate set of electronics which may monitor Input, Sync, Repro or Mute. Unlike the main outputs, all Aux channels switch modes simultaneously. Perhaps the major advantage here is to allow tape monitoring during punch-ins, by monitoring the Aux channels in the Repro mode (in the control room). Meanwhile, the studio musicians listen on the normal channels. At the punch-in, the sync monitor goes to Input, so the musicians hear themselves during the insert, in the usual manner.

MULTI-POINT SEARCH-TO-CUE

Of course, it would be difficult—if not impossible—for the engineer to do punch-ins while monitoring tape output, due to the delay between the sync/record and playback heads. Therefore, the just-described feature will no doubt require the use of the Multi-point Search-to-Cue module. This module can store up to 100 cue points in memory.

During rehearsal, the engineer monitors the normal channel, and—using the module's keyboard—cue numbers are assigned to several points on the tape, identified as; Cue Point, Record Start, Record End, and Search-Play. For example, assume the following times have been entered—3:27, 3:38, 3:50, 4:02. The system will start the tape at (Cue Point) 3:27, go into record (Record Start) at 3:38, drop out of record (Record End) at 3:50 and at 4:02 (Search-Play) will rewind back to 3:27 and repeat the cycle. Once cues are programmed, the engineer may switch to tape monitoring, as described above.

In the Auto Pre-roll mode, only Record-Start and -End points need be entered, and the machine will automatically cycle between pre-selected cue points before and after the recorded section. These points are set via a thumbwheel switch, between 0 and 99 seconds.



Figure 2. A roll-around pedestal containing the channel function and multi-point search-to-cue modules.

In the Rehearse mode, the system will simulate a punch-in/-out sequence, without actually going into record. If any of the cues need to be adjusted, they may be changed by frames or seconds. If any cue point is changed in error, the previous setting may be returned, simply by depressing an X/Y Transfer key, similar to the one found on most calculators.

EQUALIZATION SELECTION PANEL

Each audio channel has four complete record/playback networks, and these may be pre-set for various tape speeds, recording standards, tape formulations, fluxivities, etc. Thus, the machine may be pre-aligned for say, 7½ in./sec./NAB/3M tape, 15 in./sec./CCIR/Agfa, 30 in./sec./AES/BASF and 15 in./sec./CCIR/Ampex, at "X" fluxivity.

TESTING

Accessible from the front of the machine is an input/output bus, which may be switched to any audio channel. This allows easy access for alignment procedures, without tying up the console itself. It would seem to be a relatively trivial task to design some sort of automated testing system that could perform spot-checks on each audio channel, and perhaps even make corrective adjustments when necessary.

LOOKING AHEAD

Once a "super-mix" has been prepared, it would certainly be disastrous if all the cues were lost every night when the power was turned off. To prevent such calamities, a battery-backup for the memory will hold all cues for about three months, or until the session is over, whichever comes first. However, this won't be of much help when it becomes necessary to take the tape across town, or across the world, to another studio.

Figure 3. The Channel Status Module. A matrix of touch-sensitive membrane switches permits high-density packing of control functions. At the bottom of the panels are switch groupings for tape speed and VSO, plus set-up and monitor memories. The touch-sensitive shuttle bar may be used to rock tape back-and-forth. Position of the operator's finger along the bar determines tape speed in either direction.

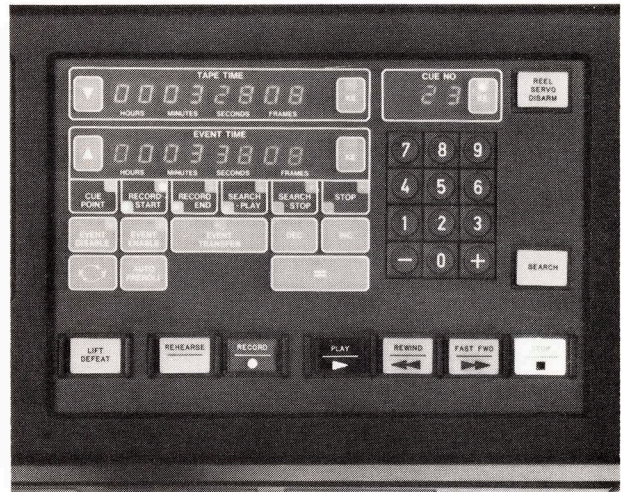
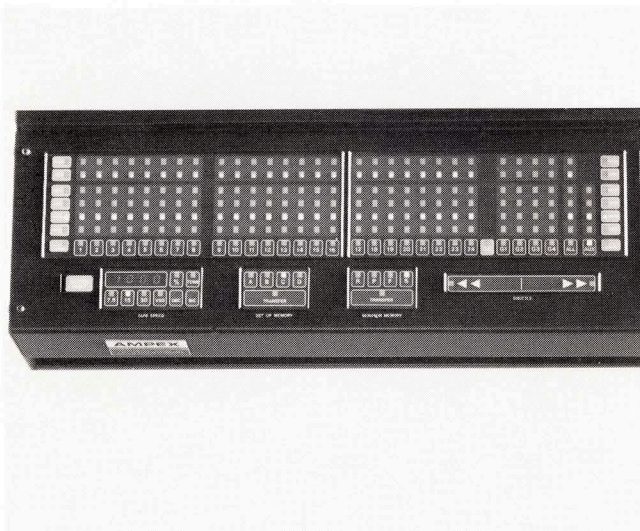


Figure 4. The Multi-point Search-to-cue module.

By touching one of three KE (keyboard) switches, the keyboard may be used to enter tape time, event time or cue number.

The six buttons immediately below the event time readout allow the operator to program the system for a variety of production chores.

Split-screen illumination of the tape transport switches indicates the actual mode of the transport, as well as the last command received. Thus, during deceleration from fast forward-to-stop, half of each button would be lit, indicating the machine has been commanded to stop, but is still in motion. As soon as the tape comes to a complete halt, both segments of the stop button are lit, and the fast-forward light is extinguished.

Again, it would seem to be within the realm of possibility to design some sort of memory-reading system, that would permit all 100 cues to be stored on a floppy disk—or perhaps, at the head of the master tape itself. That way, the cues could accompany the tape wherever it goes, freeing the machine memory for new tasks.

IN-STUDIO PERFORMANCE

It's still too early to report on the ATR-124's performance under actual recording studio conditions. But by now, Ampex's position in the pro marketplace has been well-established, and there's every reason to expect that the ATR-124 will match—and probably surpass—the performance of earlier models. With an electronics system based on the legendary ATR-100 Series, the system with no doubt attract the interest of studio-owners who wish to stay with analog audio for at least one more generation (of machines, that is—not of owners).

There's a certain amount of "leap-frogging" within the studio-to-home listener signal path, as various elements become the weakest link. Multi-track digital recording certainly removes tape from the weak-link category, but it doesn't do anything for lousy pressings or degraded f.m. broadcasts (see our recent editorials for more on this).

On the one hand, digital tape recorder technology is no doubt going to be a part of every studio's future. On the other hand, prices, proven reliability, and standards still stand in the way of an overnight swing to digital.

The question is no longer "If", but "When?". Everyone has an opinion, from sooner to later. The Ampex ATR-124 represents but one of those opinions. But—all things considered—it's a pretty strong opinion. ■