

# Sound Recording and Reinforcing at The Monterey Jazz Festival

Details of the installation and operation of what is probably the largest outdoor stereophonic sound reinforcement and recording system used to date—along with some valuable pointers to anyone who may have occasion to duplicate the results, even on a much smaller scale.

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**S**PEARHEADED by the well-known D. J., Jimmy Lyons, a group of enthusiastic townspeople in the historic capital of Spanish California, Monterey, decided that the West Coast should also have its Jazz Festival. Three memorable days, October 4, 5, and 6, are just concluded.

Two lieutenants (musicians and "hi-fi" enthusiasts) from the U. S. Navy Post-Graduate School at Monterey, Ed St. Ville and Dick Avritt, counseled the local committee that since sound was what the people would pay their money for it had better be good. Upon their promise to contact Ampex for help, they were appointed to the committee.

Our first contact with the Festival came last July when they asked Ampex if we would assist the Festival organization acoustically. Since Monterey is a very pleasant place to be at any time, we agreed.

From a preliminary verbal descrip-

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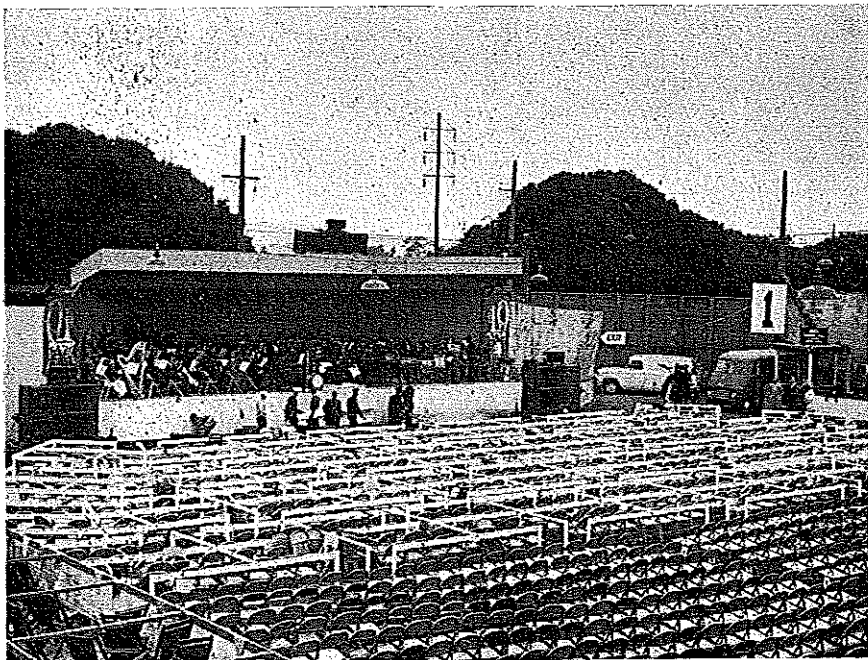
tion of the location chosen for the event, Harold Lindsay of Ampex, who operates a sound reinforcement (not "P.A.") business on weekends, Walter Selsted, Director of Research at Ampex, and the writer shuddered at the implied problems. The spot chosen was the outdoor horse-show arena at the County Fair Grounds. It was found to be directly in the approach path of the Monterey Airport, out of which operate numerous naval aircraft and commercial airliners. The approach to the airport is from the sea, and the takeoff is toward the sea, since a range of low hills prevents operation in the opposite direction.

A visit later in July to the site chosen reduced our shudders somewhat. The board fence along one side wasn't as high as first believed and the bleachers on the other side would probably be filled with people. However, if the stage were placed at the far end of the arena, as originally planned, there would be a decided backwall "slap" from the build-

ings at the near end. It was also planned to place folding chairs for the audience in the arena. The arena, itself, was high in the center and sloped downward in all directions for drainage. Numerous horse shows had been held; but they planned to grow rye grass before the Festival (and did!).

It was the celebration of but a few moments following some hand clapping for illustration, plus not a little diplomacy, to convince the committee members to follow a logical plan in the seating and staging. The stage would be placed directly in front of the buildings which were causing the bad echo, and facing the open end of the arena where a number of live oak trees acted as a fair "rear wall" sound absorber. It was agreed to re-contour the arena by bulldozing the high center toward the rear. The resulting slope had a three-foot elevation to the back, about six inches at midfield and nearly flat for the fore portion. Seating for about six thousand persons was contemplated.

The stage budget was \$1500—and it had to seat everything from a three-man combo to a seventy-five piece symphony orchestra. The first recommendation, considering the budget limitations, was to build a platform suitably high so that all could see plus a hard flat rear wall and two hard side walls at 45 deg.—all eight feet high. No ceiling was then contemplated. The walls would both help project the sound and reflect it back to the musicians who must hear themselves and each other if they are to give a good performance. As time progressed, and advance ticket sales came in better than anticipated, the budget for constructing the stage was increased. The stage finally ended up being fifty-four feet across the front, 22 feet along the eight-foot back wall, twenty-four feet deep, and with 45 deg. side walls extending two-thirds of the way forward. The front riser was five feet above grade and eight feet deep. Two more risers of the same depth, were provided, each six inches above the one



Relative positions of stage, audience, sound control center, and recording booth.

in the front. A hard ceiling was added. It sloped upward at 20 deg. from the rear wall, and was carried on a fifty-five foot transverse steel "I" beam eight feet back of the front edge of the stage. The overhead was cantilevered out to the front edge of the stage. A valance board across the front obscured the stage lighting.

Since the seating area was large (approximately three hundred feet long by one hundred fifty feet wide), and because of the present wide interest in stereo, it was decided initially to do the sound reinforcing job in three-channel stereo. The microphones used at the center of the stage would feed only the speaker system placed at the center, and the microphones on each side of the stage would feed only the speaker system on the corresponding sides. No electrical mixing between channels would be done. The only mixing would be the normal acoustic mixing reaching the microphones, and the acoustic mixing from the wide-angle speaker systems. This would also provide the necessary electrical signal for the three-track stereophonic recording of the entire Festival. It is believed that this is the first and largest such open air stereo sound reinforcing system to be used in this country. The results were gratifying.

The physical placement of the microphones and their corresponding speakers was a matter of acoustic judgement and involved many factors: the physical size and disposition of the stage with respect to the total audience; the arrangement of the audience; the sizes of the performing groups (three-piece, four-piece, fifteen to twenty-five piece, and seventy-five piece; with vocalists,

Truck sound control center and adjacent recording booth with the author at the recorder.



instrumental soloists and piano soloists). Moreover, the stage was designed to reinforce the direct sound for the box holders in the front third of the audience space, thus making sound reinforcing unnecessary in this area. Another criterion was that the sound should be natural and not sound reinforced. The highest compliment that could be paid would be to have the audience unaware of the existence of the sound system as such. Furthermore, and unlike a studio recording session, there were to be no rehearsals other than minor rearranging of microphones during the show, a very stringent, but obviously necessary, requirement.

#### Setting Up

The sound crew consisted of Harold Lindsay to handle mixing, myself to handle mike placement and acoustics in general, ably assisted by John Deans, of Ampex' Engineering Department, with Bob Baker, experienced recordist, and Gordon Longfellow, accomplished

entertainer and recordist from the public relations section of Ampex. The crew loaded up a small moving van, a panel truck, and two station wagons with \$35,000 worth of gear, thirty miles of half-inch recording tape and all the other necessities. They traveled the one hundred miles to Monterey before the first session, towing two large theatre speaker systems on trailer wheels, plus a third such system knocked down and packed inside.

It required most of two full days to install the system and check it out. The lineup of the equipment used is as follows:

#### Microphones:

Altec 21B for general pickup (three)  
Altec 21D for floor stand accent (four)  
Telefunken Stereo Model SM-2 "Crossed-mike stereo pickup comparison" (one)  
—(supplied through courtesy of Steve Temmer, Gotham Audio Sales Co. Inc., New York City).

#### Preamp Mixers:

Raytheon RPC-40 four-position broadcast mixer (two, for right and left channels)—(uses 6J7 input tube, a.c. heater.)  
Altec four-position broadcast mixer consisting of: four A425B Preamplifiers, one A426B Line Amplifier, and one P505B Power Supply (one, for center channel).

#### Power Amplifiers:

Altec 256C, 75 watts (push-pull through-out; uses 807's with fixed bias for output).

#### Right and Left

#### Speaker Systems:

Altec "Voice of the Theatre" systems consisting of a pair of H210 units stacked one on the other, (uses four 15-in. horn-loaded drivers) for "woofers," and four 288 drivers on a 1004 cellular horn for a "tweeter." Crossover at 400 cps.

#### Center Speaker:

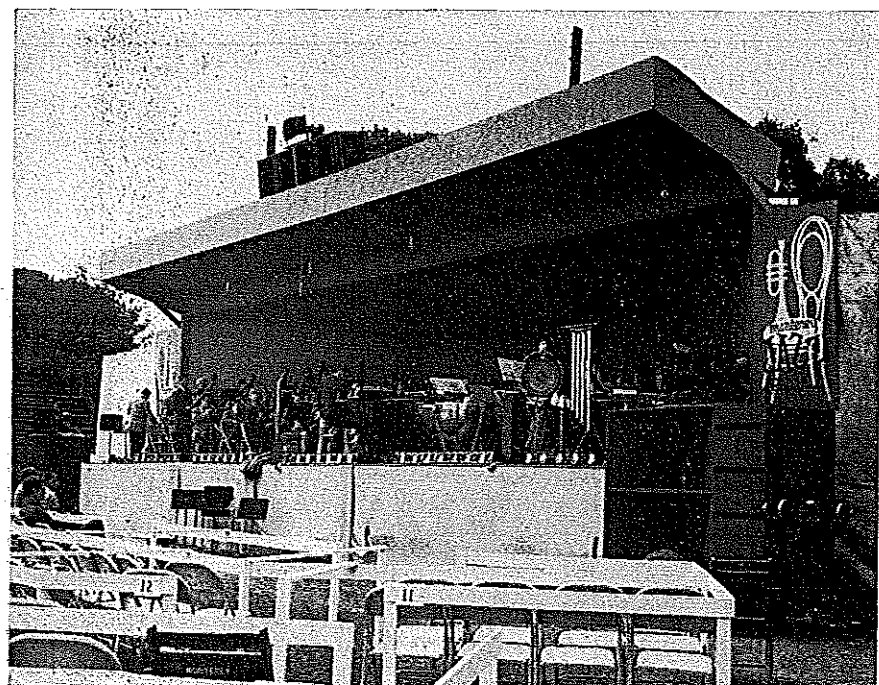
Fidelity Sound 5512, consisting of four Altec 515 (15-in.) theatre drivers (as in the other units) each horn loaded, for "woofer"; and two Altec 288 drivers on a 1005 cellular horn for "tweeter"; 500-cps crossover.

#### Speaker Equalizers:

Special; to equalize the three speaker systems for acoustically flat response to 12,000 cps, down 4 db at 15,000.

#### Recorders:

Ampex 300-3, three-channel stereo, using



Stage, showing relative positions of microphones and speaker systems.

1/2-in. tape at 15 ips, with the new Ampex Master Equalization which yields 7 db. better S/N ratio than previous equalization methods. (Two recorders used, for master and protection master.)

Ampex 300, full track, 1/4-in. tape at 15 ips, fed from center channel only.

Arriving on the scene, the two trailer-speakers were disposed at either end of the stage and on the ground. This placed the high-frequency units about nine feet above the ground. The knocked-down speaker system was hoisted up the back of the stage and mounted on a special platform constructed at the front edge of the swaying cantilevered stage overhead. During this latter maneuver, one of the local committee stepped off the runway and put his foot through the tarpaper roof dislodging one of the 4' x 8' plywood boards from the ceiling of the stage. It sailed majestically down, narrowly missing one of the star performers who was then practicing on the stage. The foot dangled grotesquely for a moment and was then withdrawn. No further mishaps occurred throughout the show.

Because of the several kinds of groups which were to perform, we decided to provide ourselves with a microphone lay-

out that would be capable of handling almost any foreseeable eventuality.

### Microphone Placement

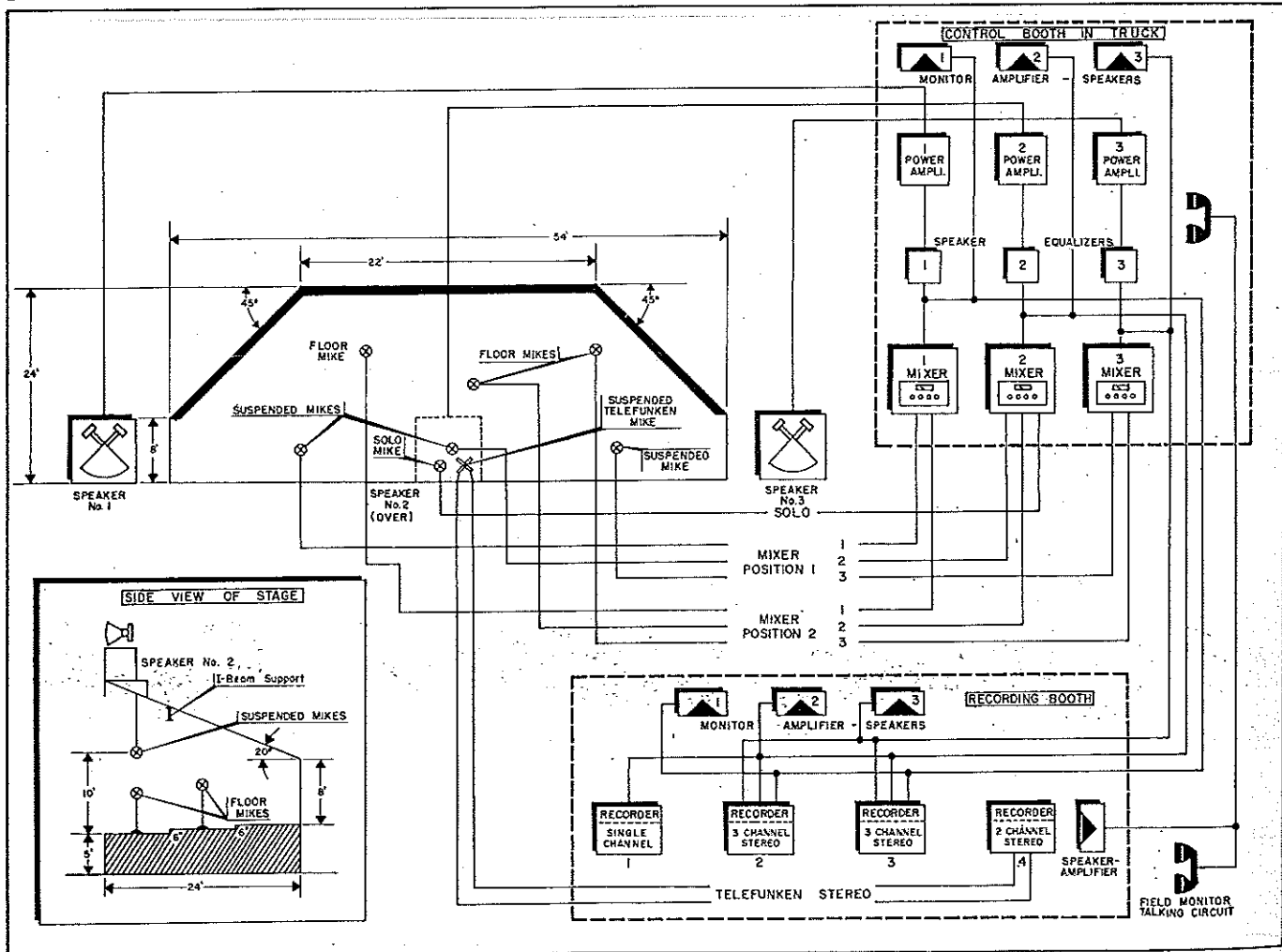
Most small groups are accustomed to working with close-mike technique, although it became apparent that virtually none had any previous experience with a stereophonic mike setup—outdoors! This was painful at times. Large groups require different miking of course. Therefore we suspended three microphones from the overhead about three feet back from the valance by driving staples into the joists supporting the ceiling skin. One mike was hung at stage center and the other two were suspended in a lateral line ten feet each side of the center. All were suspended ten feet above the front riser. This might at first glance seem to be rather close together for a fifty-four foot stage, but in analyzing the seating arrangements normally employed by the various groups of performers, this appeared best. And except for one or two instances, it worked most satisfactorily.

In addition to these three general pickup mikes, an announcer's mike was provided on a floor stand at center stage

front. Three other floor-stand mikes were also provided with their cables disappearing through the top riser at stage center and ten feet either side of center. The cables on all four of the mike stands were tethered at ten feet to prevent their being moved too far into an adjacent pickup area which would destroy the stereophonic illusion. (But we didn't figure on Dizzy Gillespie!)

The center overhead mike, the announcer's mike, and the center stand mike were fed to one mixer. This output fed the speaker system on the roof center. The right suspended mike, and the right stand mike fed the righthand mixer and the lefthand pair fed the left mixer.

The outputs of the three individual mixers were fed through special equalizers designed to compensate for the normal roll-off of the speaker systems. The design of these equalizers was based on warble tone acoustic response measurements made several days prior to the installation. They yielded an essentially flat acoustic response to 12,000 cps at a distance of ten feet in front of each speaker system. The response was down four db at 15,000 cps, a point of aca-



Block diagram of complete system: Three-channel stereo sound reinforcing and three-channel stereo recording, together with two-channel and single-channel recorders for special applications. Dimensions of stage and mike positions are shown.

demio interest only, as the absorption of the air reduces high-frequency response materially over the distances and under the conditions encountered here.

The equalizer outputs were fed to the three individual power amplifiers, of 75 watts for each channel, and their outputs fed directly to the three speaker systems.

The three-channel inputs to the stereo recorders were bridged at the output of the three mixers ahead of the speaker equalizers. The single-channel recorder, which was used to prepare tapes for the Armed Forces Radio Service for overseas broadcast, was fed from the center channel.

The output of the Telefunken double channel stereo mike was fed directly to a two-track Ampex Model 601-2 recorder. The mike was suspended at stage center eleven feet above the stage and at the very front edge. The associated compensating networks were employed as described in a recent article on the subject.<sup>1</sup> The tapes from this separate system are to be analyzed later in comparison with the resultant two-track processed tapes made from the three-track masters, which should yield some interesting conclusions.

In addition to the \$35,000 worth of equipment used (\$25,000 of which represented the sound-reinforcing system owned by Harold Lindsay—"Harold's Patio Hi-Fi Set," as someone has dubbed it), some other statistics may be of interest. Three thousand feet of cable were used—shielded mike cable, speaker cable, and so on. Nearly twenty of the thirty miles of 1/2-inch tape were used. These three-track masters are available to the various recording companies having contracts with the artists who appeared.

Among the outstanding performances were those by Louis Armstrong, Velma Middleton, Burt Bales, Lizzie Miles, Ernestine Anderson, Modern Jazz Quartet, Cal Tjader, Dizzy Gillespie Quintet, Dave Brubeck Quartet, Gregory Millar and the Monterey Jazz Festival Symphony of seventy-five instruments, and Harry James' Band, as well as numerous others.

Two demonstrations of the sound system itself were made: one planned and one impromptu. Greg Millar and the symphony orchestra recorded the opening two minutes of "Petrushka" during rehearsal. This was to be their opening selection. At the performance, we cued up the tape appropriately, and started the tape playback over the speaker system on Mr. Millar's down-beat. The members of the orchestra pantomined their part of the activity, and after a few bars they all stood up, stretched, shook hands and otherwise quit playing

—except that the sound went on. The audience expressed its delight at the deception, as the sound was good enough to be live.

The impromptu demonstration came just as the last auditors were clearing the gates—homeward bound following the evening performance of "Satchmo" Armstrong. We played a few minutes of his performance over the speaker system. A goodly number of people filed back into the arena, looked at the stage, then stayed to sit and listen. The presence was uncanny. All of the sibilance was there. The blacked-out stage had ghosts! A couple of the clean-up girls started swinging and dancing on the sidelines to the amusement of those present. Then the police chief heard about it and made us turn off the system as he wished the field cleared for the night.

### The Headaches

Outside of the usual problems of assembling the equipment, installing it, and tearing it down, there were a few others. The principle objective was to reinforce the sound in an unobtrusive manner, as was stated. The naturalness of the sound was due to two factors: a uniform acoustic response from the speakers, and running them at a reasonable level. One of the crew, equipped with a field telephone, served as listener three-quarters of the way back in the audience. There he could judge balance and phone in for more piano or what not. The unobtrusive level was found to be sufficiently below feedback, so that this did not become a factor . . . except once.

Usually we were able to have the performers sit on the middle and rear risers. But Harry James sat up well forward—on the bottom riser as well—before we could rearrange him. Consequently, we pulled the suspended mikes forward toward the front edge of the stage by means of black strings we had previously, and thoughtfully, run up over the forward edge of the roof for just such an eventuality. We couldn't at first find the ringing we encountered, as we had also used this approximate arrangement with the symphony orchestra which more than adequately filled the stage. We soon discovered that it was coming from the center suspended mike. It looked like an acoustical freak of reflection off the back and side walls. We pulled the mike up another foot and it cleared the problem. Moral: watch out for reflected foci of sound from various surfaces. Here it was the back and side walls, together, all equidistant from the mike.

Dizzy Gillespie, we believe, didn't "dig" the stereo idea. He moved the stand mikes every which way thus intermixing the three channels. One of the

crew went up on the stage between two numbers and attempted to unscramble the situation. Dizzy looked puzzled, scratched his head, then shook it, and rearranged the mikes into a mixup again. In desperation we cut off all of the accent (stand) mikes, and he then unknowingly sounded terrific on the three he couldn't reach.

Regardless of the preliminary instructions we gave the performers, many of them would almost swallow the 21D announce mike. The result was a "p"-popping problem perpetrated p-terrifically. Next time an old clunker of an un-pea-popping variety will be used here for certain.

No matter how carefully the stage management endeavored to arrange to have intermissions fall during the arrival and departure times of the commercial airliners, we never seemed to be able to coordinate the situation. One night the low-lying fog required an I. L. S. approach, and one plane thundered overhead on four distinct passes (very distinct) before bedding down. The admiral of the local Naval installation cooperated by chasing his planes off to the side or grounding them during performances.

While Dave Brubeck was performing, a low-flying roar drowned him out completely for a few moments. Without missing a beat, this artist intermixed a few bars of "Wild Blue Yonder" in his theme to the utter delight of the audience. One of the committee stated that if ever these recordings were released, it would be a grand identification to inscribe on each jacket, "Not the genuine Monterey Jazz Festival performance without the stereo airplane sound." Another poor soul, a paid admission, asked how we were going to remove the airplane noise from the tape. He thought we could. We asked him to send along any ideas he had since we were stumped.

The *San Francisco Chronicle* had this to say:

" . . . The sound system, provided by Ampex Company, was superb and even those unfortunates who were seated in the rear of the arena had a better chance to hear the music than many much closer and at indoor functions in San Francisco . . ."

When the final "take" was tallied, it appeared that the Festival was in the black by enough for the Committee, who gave us excellent cooperation, to change the name from the "Monterey Jazz Festival" to the "First Annual Monterey Jazz Festival." We undertook this program at no cost to the Festival in the combined interests of community civic duty, experiment, and to give a demonstration of the fact that good results can be achieved in sound, if one knows what he is about and is willing to put forth the necessary effort to achieve good quality in sound.

<sup>1</sup> G. Bore and S. Temmer, "M-S Stereo-phony and Compatability." *AUDIO*, April, 1958.