

LES PAUL ON TAPE RECORDING

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Les Paul jokes that a lot of people don't know that he plays guitar. "They think I am one," he says with delight. As father of the solid body electric guitar, thousands of guitarists in the world covet Gibson's famed Les Paul guitars. But few realize the other contributions Les Paul has made to recording.

As an inventor, Les Paul, now 77, is credited with creating sound-on-sound, overdubbing, the electronic echo effect and multitrack tape recording. He made the first eight-track recorder in the late 1940s by stacking eight Ampex tape machines and synchronizing them. RW's Frank Beacham interviewed Les Paul at Fat Tuesday's in New York City prior to a recent performance.

RW: *Do you think of yourself primarily as a musician or an inventor?* **Paul:** A musician. The only reason I invented is I needed something as a performer that I couldn't buy. If something was missing, I invented it.

RW: *Is it true that you invented the electric guitar because the conventional acoustic guitar wasn't loud enough?* **Paul:** In 1928 I'm playing in this little joint...a car hop in the country...and the people were complaining that I wasn't loud enough. I was singing through a telephone hooked to a car radio, but you couldn't hear the guitar. So I just took a phonograph needle, jammed it in the top of the guitar, and it made it louder. And then I took the other half of the telephone, held that underneath and...oh my goodness.

RW: *You jammed the needle where in the guitar?*

Paul: Right at the bridge, but the feedback came up with it too, so I had to keep moving my father's radio farther away.

RW: *How did you conceive the idea for multitrack recording?*

Paul: That idea came about in the 1920s...long before tape recorders...with my mother's piano roll. You have to align a piano roll so it will play the right notes. I saw that the piano keys go down when there is a hole in the paper. I thought if I punch a hole somewhere else in that paper a key's gonna go down....and it did. There's a space on the roll with nothing on it. Now when the real roll came on...say it was Fats Waller playing something on the piano...there were a lot of places for me to play along with him. So I'd punch in extra holes and out would come extra notes. So I could make him play fifths, I could make him play thirds and I was having a field day with this thing.

RW: *Sounds like the first multitrack recorder also was digital?* **Paul:** Yeah, and it was better than on a phonograph record which I got to next. And the reason being, is that as I slowed the piano roll down, the pitch didn't change, there was no change in the velocity at all. Now I didn't know digital or analog from a hole in the head, but I knew that when I put my finger on the record and slowed it down, the woman turned into a man, the record started to slow down, and the pitch went down. But on the piano when you slowed it down, the whole remained the same.

RW: *The story is that your mother was indirectly responsible for some of your breakthroughs in recording technology.* **Paul:** My mom came down to Chicago and she said 'I listened to you last night on the radio and you were good.' I said, 'Mom, I've been playing here at the theater with the Andrews Sisters, you must have been listening to somebody else.' And she said, 'Well if everybody sounds like you and your own mother can't tell you from another electric guitar player, then you'd better do something about it.' I thought about it and finally I went to the Andrews Sisters' manager and said 'I'm leaving. I'm going home and lock myself in the garage and I'm gonna create a sound that my mother is gonna be able to distinguish from anybody else out there in this whole world.'

RW: *And is that where "sound-on-sound" came from?*

Paul: That's where sound-on-sound developed from. I'd already been fooling with it, but I had to do a lot more than just sound-on-sound. I had to make different sounds on sounds to create the synthesis.

RW: *How did you do sound-on-sound on a tape recorder?*

Paul: It happened when I got my very first tape machine. Mary (Mary Ford, his longtime wife and performing partner) was hanging up the laundry in the back yard and I'm looking at the tape machine. She asks, 'What are you thinking up now?', I said, 'Oh, I have an idea here and it's crazy. We don't need the studio anymore. It can all be done with this tape machine.' By now Mary's got her clothes pins and gone. She's not even listening to me any more...and I'm saying to myself, 'Hey, there's no reason in the world why I can't do my multitracking right here, sound on sound. If I can lay one generation down and another generation down.'

RW: *Can you explain further?*

Paul: There's a resonance point to everything. Tape has a resonance. Let's say that the tape is at 50 hertz and it has a two dB head hump. If you go down another generation you now have a 4 dB head hump. If you go down another generation you now have a 8 dB head hump, then 16 dB and there goes the square root and all of a sudden you say, 'I'm gonna have one hell of a problem.' But I went 37 generations and it sounded like one generation. The trick is to do the least important parts first and do the most important parts last. If I'm playing my guitar and it's not important I might record that part first. But if it's my bass part or Mary's lead vocal or it's my lead guitar, I put those on last.

RW: *So you set a list of priorities and record them one part at a time ?*

Paul: That's right but you have to learn to think backwards. You cannot piece something together. Because now it's sound-on-sound and it means that when you start recording you play to the end. Let's say you are twenty dubs in and make a mistake. You go back twenty dubs and start all over again. So you don't make a mistake.

PART II

Les Paul, legendary guitarist and inventor, is credited with some of audio's major innovations, including the solid body electric guitar, multitrack tape recording, sound-on-sound, over-dubbing and the electronic echo effect. He was also eyewitness to the events that led to the manufacture of the first commercial tape recorder in America, the Ampex Model 200. During Frank Beacham's interview, Les Paul tells the story of how the 1943 AEG Model K-4 Magnetophon tape recorder from Germany was transformed into the first truly modern 1/4-inch high-fidelity tape machine. The inventor/guitarist recounted the following story to Mr. Beacham and members of the audience before a recent performance at Fat Tuesday's in New York City.

I'll tell you the story of how the tape recorder came to America. I was working with Bing Crosby on the Kraft Music Hall in California and Bing says to me: "You know, I could do like you do. You have all wire recording equipment) at record your stuff in your garage. I studio and do everything. I can't course. I'd rather do it right at the



wish there was a way I your (transcription & home and you can have to go down to the play on the golf club house if I could."

It just so happened that Judy Garland and I were doing a broadcast on Sundays in New York City. We had to fly from California to New York, and it took 19 hours. We were playing at 53rd and Broadway and a little old man came up to me, this

was about 1945 or 46,

and he said his name was Dick Jack Mullin (left) and his radio show producer, Murdo Ranger and he had a tape recording McKensie looking over Ampex Model 200 audio tape machine. He said he picked it up when recorder and Magnetophon. we invaded Luxembourg in the big push to end the war (World War II).

This was big news to me. Colonel Ranger said he walked into a radio station and saw this tape machine and grabbed it. It was too big to carry or ship back, so he dismantled it and brought it back to the States piece by piece. Colonel Ranger took this tape machine, it was called a Magnetophon, to Orange, N.J., and put it back together. Then he made a copy of it that he called the Rangertone.

Meanwhile, I go to Bing Crosby and tell him there's a man that nailed me at 53rd and Broadway with a tape machine. I said "That's your guy. You can put that machine right on the golf course and you can record your show from there. Just get your trio to play behind you and there you go." So Bing says find the guy and bring him out here.

I called Colonel Ranger, brought him out to California, and he demonstrated the recorder at KNX, which is CBS out in Hollywood. Bing said "I'll take 50 of them." But Ranger said he could only make one a year. This guy just wasn't a good businessman. Bing says "I want someone who can make 50 of them and I need them now."

Well, there was another guy named Jack Mullin who also had one of the German recorders in his garage but he hadn't put it together yet. Finally, Mullin put his together and took it over to Ampex. The people at Ampex took a look and said let's go with it. But first, they said, they had to have some money...so they went to Bing for the cash. He said, "how much do you want?" They said \$50,000. Bing wrote out a check for fifty grand with no interest. He said "I don't want any part of the Ampex company. I don't want anything to do with you guys other than have you deliver me those machines."

And so it was that I worked on the very first broadcast with tape (Bing Crosby Philco Radio Time, . 1947). If one of the reels on that machine broke it could have killed five people in the room...it was going so fast. The tape that the Germans were using was made of paper. It was like fly paper. The Germans would just scratch some iron dust on it. Later 3M provided the first version of "Scotch" recording tape to replace that German paper stock.

So that's how the tape machine got to America. It just floated up on our shores and Ampex made a fortune from it.

Let me say one more thing about tape, since I was there from the beginning. Anybody out there who thinks they've got something stored away on tape had better think twice because we don't know how long tape is going to last. It's almost like a (heart) bypass, unless someone stays around long enough to tell us we won't know how long it's going to work.

Editor's Note: The EQ for Jack Mullin's re-designed circuitry of the 1943 Magnetophon became the basis for the NAB curve. The first pair of Ampex Model 200 tape recorders—serial numbers 1 and 2—were delivered to Jack Mullin at the Bing Crosby show in Hollywood in April, 1948 to replace Mullin's original Magnetophons, which were being used to record the Crosby radio show.