

# Keeping an ear out for trouble

Hearing trouble in the sounds made by electronic switches is almost impossible unless you are powerfully motivated like Bill Acker of Mountain Bell. He's blind and his skills help test precutover ESS offices

**HELEN HARDIN**  
Contributing Editor

LISTENING FOR trouble in the sounds made by electromechanical switches is a skill common to many telephony veterans. But, nearly silent electronic switches have made hearing trouble a rare art. Mountain States Telephone & Telegraph Co.'s Bill Acker, powerfully motivated by his blindness to develop his listening skills, uses them to test the telco's electronic switching system (ESS) before cutover.

Acker, who joined the company in 1979 and now works as a special facilities representative, became fascinated in his youth with the clicks he heard coming through the telephone handset when he dialed.

He pursued his interest. First, he learned about switching, which is related to what he does today. "If I dialed a PBX (private branch exchange), I found it went through a crossbar tandem," he said. "One day I realized that a series of clicks, as a call was completed, was the same as the dial pulses, the same as the dialing I did. This thing was actually dialing what I dialed! It now seems so obvious, but back then, it was quite a discovery for me."

Becoming a special facilities representative didn't happen right away; Acker started work at the telco as a TSPS (traffic service position system) operator. "They wanted me just to handle CAMA (centralized automatic message accounting) calls," Acker said, but, eventually, he was assigned to handle the entire board. "I was able to handle all the calls by using a light probe, and having somebody next to me read the Nixie tubes and write the tickets," Acker said.

Bent on putting his unusually sharp listening skills to work, he transferred to his present job, which, he said, is "tailor-made for the kind of things I do. I've been learning about the system and finding things that are wrong for 10

years. Now, I'm able to report those troubles and, occasionally, even fix them. I go around and test all the new electronic offices that are cut over.

"Most digital switching machines are nearly silent," Acker said, "but ESS machines are anything but silent. Although the part of the machine that 'thinks' is electronic, switching still uses the reed switches, which are as mechanical as ever."

The ESS machines produce the sounds Acker listens for to determine where trouble is, what it is, and what action is called for.

Jack Gooch, Mountain Bell's assistant manager-network, and Acker's supervisor, commented, "In the old step, you dialed '1,' and heard 'tch...tch...tch.' In the ESS machine, you don't quite hear that, but you hear things going on. And you don't hear levels. Frequency of 100 HZ [Hertz]—you hear that buzzing or humming sound. Some people can tell within a few Hertz or cycles."

"I need more than one tone," Acker said. "I need two or three tones. Then, I can tell."

This sounds difficult to sighted human beings, who haven't taken the trouble to listen, but Gooch noted, "Anyone working regularly with the machines can hear the sounds."

While Acker tests and verifies switching using the ESS machine, he plays the role of a customer who might dial in and be unable to complete a call. Since this may involve checking codes, Gooch pointed out, "The machine is not going to go in there and check those codes. The ESS machine looks at circuit packs and circuit boards and intricate wiring, but we're looking at it from the viewpoint of a customer."

"I dial through the network, as a customer would," Acker explained. "I

find the trouble the customer would encounter, but I do it first—before cutover—so the customer isn't inconvenienced.

"Talk about saving time! Getting somebody, any person, in there to the office takes time! What I do saves so much time; not only can we fix it before cutover, but after, too, when a customer calls for repairs. Actually, what we do is pre-cut people, do it now, before they encounter a problem."

More than checking whether the equipment is going to work when the customer dials, Acker checks on the information which has been fed into the ESS machine. "There's no question about ESS capability; it's doing what it's been told to do," he said.

Looking at it another way, Gooch added, "We don't have the computer testing the office; the office is testing itself. The ESS machine is a computer—in a sense—and yet it's not. There's a memory in the machine that says, 'I'm going to test everything in here.' Bill comes along, and looks at all the codes we put in. Sure enough, they're all typed in. No problems. Bill's a trouble-shooter, pretending he's a customer.

"He has this multi-million dollar switching machine and he plays around in there, to test the machine before our customer can dial, and say, for instance, 'I can't call Saudi Arabia.' Bill has probably already found the problem.

## Fixing a vacant code

Here's an example of a problem that Acker detects. "If I dial a code" he said, "in Aurora, it's the 269 code they've put in to get to Pueblo and on to Canon City—and the sound I hear is a vacant code recording right there in Aurora, I would figure that Canon City is a work-

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ing NXX. Okay, 275. It does work. I would type TAG-OFFC-0000000275000, and send that message to the ESS machine.

"It would tell me the address from the office code. It would also tell me the address from the rate and route pattern, but the address I'd be concerned about is the address of the office code. I'd find out what is in that address. The addresses have seven digits, so I would dump CSS [the portion of the memory that stands for call store secure], then type ADR—the address I want—and the seven digits of the address, and DEC because I want that information in decimals.

"When that information comes out, it will be the number of the rate and route pattern to which 269 has to go. Choosing the Canon City code guarantees it will be the right rate and route pattern in case they've been split off for revenue purposes. Having done that, I tell the

Having done that, I tell the machine I want to make a change. This will be RC [recent change], and the kind of change, and a three- or six-digit translator—DIG TRAN. Then a new line.

"Let's say I have found the rate and route pattern is 17. Then, I tell the machine where I want to put which three-digit translator, which is the rate center '0' [this is the major or three-digit translator everybody uses]. Then, code 269. I bring that up to the top of the screen and send it. When I go back to the code, it works—it goes all the way to Canon City! That vacant code is one problem I can fix."

When the ESS is checking codes, Acker, in effect, tells the switch to print out a list of all the codes in it. The ESS responds and, in fact, does a bit more than asked. "It dumps the translator," Acker said.

Acker noted that the computer provides information in a large batch, and pointed out that a clerk must analyze it. That may take considerable time, a period during which Acker may be able to tell by the sound what the trouble is, and fix it.

Gooch offered an example of how Acker can uncover human error: "If the person originally putting the codes into the machine overlooked that instruction, the code isn't in the machine, and the machine doesn't know the difference. Bill hears that vacant code recording; it's not necessary to wait until someone reads a printout, consults a practice books and learns what to do.

"The computer can record only information typed into it. That machine is always testing itself, every 15 nanoseconds." Gooch said.

Acker offered another example of us-

ing his listening skills to troubleshoot: "If you put in the code for the telephone number for office identification, the machine forgets the program index of 1. It's the office identification code: NESS, the prefix, followed by the prefix again to make a seven-digit number. So, if you dial 623-9623 from other than a 623 office, you'll get a high tone. I always look for this problem (forgetting the program index of 1). I dial in from outside the office. If I hear silence instead of that high tone, I know something's not right.

"To fix it, you have to go into the machine's actual data, and make a correction there. Once the correction is made," Acker said, "you get that high tone. There again is a sound. When you don't hear that tone, no switching, nothing, it is open. The trunk just sits there in the bypass state, and does nothing. I know something is wrong, so I go in and correct it."

"Yes," summarized Gooch, "The ESS can dump lots of information real quick, but then you have to read it—pages of stuff. A sighted person who would have to sit down and read it."

Because of his skills developed by listening and learning, Acker has found himself involved this year in the early stages of the biggest cutover Mountain Bell made in the Denver area.

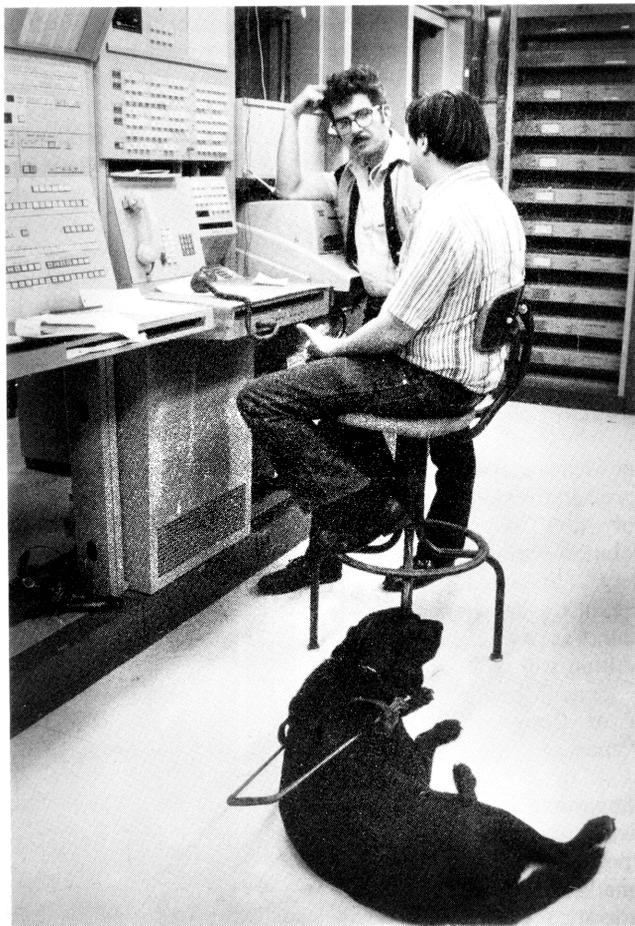
He referred to the No. 1 ESS cutover, which was accomplished in January, with pride: "I know that it'll work. I tested it, and in some cases, I fixed trouble I found. In know it's going to fly."

The January cutover was the first phase of the \$9.1 million ESS program. A second phase of ESS additions scheduled for mid-year cutover in east Denver will serve 40,000 phones, for a total of 45,500 customers served by the new ESS machines.

Acker's role in testing the machines has been varied. If it's necessary to find a phone with a certain prefix, he does it. In his memory are all the new national codes, which he can supply if someone needs to know, for example, that the code for Surinam is 597, is 7 for the Soviet Union, and 94 for Sri Lanka.

When changes were being made in the outpulsing procedure, it was necessary to change the outpulsing codes. It was Acker's job to check them to see if they were in. If he got a vacant code recording for any one of them when he dialed, he knew something was wrong, and tracked it down.

Dialing and listening have paid off in quick assessment of equipment problems, and Acker's 10 years of experience in telephony enables him to fix many of the troubles quickly. □



*CONFERRING at console are: Stan Minarsky, central office technician (standing) and Bill Acker, special facilities representative, Mountain Bell. At Acker's feet lies Kyle, his guide and the department pet.*