70th birthday series

The ASCII Character "Octatherp"

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ABSTRACT

Starting in the early 1960's, the term "octatherp" came into use for the ASCII character "#", and this practice continued for many years. The term in fact was coined as a practical joke on the author of this article by two colleagues. This article tells the story, and names names.

BACKGROUND

Early History

Over the years, Bell Telephone Laboratories continued to look into the possibility that the familiar rotary/pulse dial could be replaced by a better user input system, presumably involving push buttons for entry of the desired number. It was of course difficult to imagine what kind of mechanism would be economically practical, and of course before the invention of the transistor, it was unthinkable to consider anything requiring electronic circuitry at the subscribers premises (such as tone generating oscillators).

One family of approaches retained the familiar pulse train format, but had clockwork mechanisms for generating the pulse trains under pushbutton control. Especially if these included any type of "digit buffer", the mechanical complexity would have been enormous, and this approach also didn't seriously decrease the time required to send the entire number to the central office. Decrease of this time period was a major objective, since in the "common control" central offices used at the time in many metropolitan areas, a piece of common equipment that received the dialed digits was "tied up" for that entire duration. Reducing the time period these units had to serve on each call meant that a far smaller pool of these costly units could be provided to meet the calling traffic need.

An approach that promised to decrease this time was based on "tone" signaling, but did not involve electronic equipment at the telephone set. In this system, there were ten buttons, one for each digit value from 0-9. Pressing the button "plucked" a resonant reed (with a different resonant frequency, in the telephone transmission band) for each button). The reed moved in a magnetic field (from a permanent magnet) with a pickup coil (reminiscent of that on an electric guitar) such that the damped oscillation of the reed was turned (passively)

into an electrical waveform, which was then sent over the telephone line to the central office.

But this system had various practical shortcomings, and further development for actual deployment was never pursued.

Getting closer

In the late 1950s, various studies suggested that the best transmission and coding format would involve the simultaneous transmission of two tones (perhaps similar to the system then used to send address signals over long distance trunks[1]). The appearance of the transistor in this time frame gave the tantalizing prospect that such a scheme might be economically implementable in a mass-manufactured telephone set, but the viable economic model “wasn’t quite there yet”. For one thing, the favored format would have required two separate oscillators (one to generate each of the two simultaneously-transmitted frequencies for each digit code), thus intimating a minimum of two transistors. (Transistors then cost about $10.00 each, and a basic telephone set about $12.00.)

Top management established an arbitrary bar for the project: if a way could be found to generate the two frequencies with a single transistor, the project would be allowed to move forward.

Meacham’s breakthrough

In fact, shortly thereafter, Larned W. Meacham of Bell Telephone Laboratories devised an ingenious oscillator circuit with only one transistor that would in a stable way generate two frequencies simultaneously. And “tone dialing” was on its way.

The field trial

A field trial was established with model telephone sets equipped with push-button “dials” using Meacham oscillators to determine if the system was in fact feasible from a technical, operational, and user interface standpoint.

There had long been interest in the introduction of “codes” beyond those for the 10 digits that could be used as syntactical elements in protocols though which customers could control emerging new and sophisticated telephone system functions. To allow testing of this

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[1] Although the system that was adopted was rather different from that one.

concept, the code system used in the trial had 12 different tone combinations, and the dials were equipped with 12 keys. The two extra keys were marked with a five-pointed star (called "star)") and a diamond (called "diamond"). These symbols were chosen for their ease of recognition and the recognizability of their names as well.

The results of the trial were very encouraging, and, after completion of a thorough economic analysis, it was decided late in 1959 to gradually introduce this new addressing modality into the Bell Telephone System generally.[2]

But the brass had concluded that, since there was not yet any doctrine nor protocol for the use of non-numeric characters to control special features, so as not to confuse the subscribers the actual commercial tone-dialing telephone sets would only have ten keys, for the digits 0-9. (Fortunately, the coding system was kept intact, so that there remained code combinations for more characters—actually 16 in all.)

KERR GETS INTO THE ACT

Shortly after completing of my training program, I was tapped for the traditional two-year assignment at the AT&T headquarters, in this case in the data and teletypewriter engineering section of the engineering department. (This was the Bell System's central engineering staff.)

When my term came to an end, the Chief Engineer of Ohio Bell seemed to have little interest in my returning (I had a reputation as a dangerous character), and so I was offered to Bell Telephone Laboratories, who gleefully (with fingers crossed) took me in. I headed the group concerned with data communication interfaces, codes, character sets, protocols, and the like. Shortly thereafter, I was assigned to represent the Bell Telephone System on the industry standards committee that had developed the ASCII coded character set, and was heavily involved in the final development and documentation of its first "complete" version (with upper and lower case letters).

At about this time, the powers that be decided that, well, it would have been good after all to have had two non-numeric "buttons" on

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[2] This was announced on the very day I reported to the Bell Telephone Laboratories to begin an 18-month graduate-level training program in advanced telecommunications for telephone company engineers (I was with Ohio Bell Telephone Company at the time).

tone dialing telephone sets after all, and a committee was formed at Bell Laboratories to decide just how to do that. Of course, a major issue was what two graphic characters should be used to designate the buttons. As the guru of character sets, I was invited onto the committee to deal with that matter.

We established a plethora of criteria to govern our choice. One criterion on which I insisted, given what I saw as the emerging relationship between telephone sets and computers, was that the two characters themselves had to be included in the ASCII graphic character set. (Thus the five-pointed star and diamond used in the field trials would not do.)

My final conclusion was that the only two characters that met (almost) all the criteria were “*” and “#”. A shortcoming was in their names. Many people could not say or spell “asterisk”, and there was no single typographic name for “#”, it often being called either “number sign” or (in the US) “pound sign”. Nevertheless, in my final report, I recommended “*” and “#”, and that is what was adopted.

In order to win acceptance, I pandered to the rather large camp in the committee that stumped for star and diamond (based on the fact that those had been used by a few hundred trial subscribers for several months) by pointing out that we could reasonably call “*” “star” (thus disposing of the problem with pronouncing and spelling “asterisk”) and that since the center of the “#” character was really a diamond, we could in fact call the character “diamond” (which I then went on to make sure didn’t happen).

THE GRAND JOKE

Shortly after this decision was announced, I received a call from two friends, John C. Schaak and Herbert T. Uthlaut, engineers from two of the Bell Telephone companies and classmates of mine in the graduate program at Bell Laboratories (actually, in the class ahead of mine), then serving their “headquarters” tour in the technical marketing department at AT&T headquarters. They asked me to join them for lunch.

They told me that they had read with interest the part of my report in which I regretted the absence of a unique typographical name for the character ”#”, and said they had solved my problem by coining one, “octatherp”. They said that it had no etymological basis, but they had been guided by one principle. They said they were irritated that I had rejected some candidate characters they thought were good on the basis of lack of compatibility with emerging international standards

(with which the Bell System had a tradition at the time of little interest). Thus, they said, as a way of getting even, they had included in the name the diphthong “th”, which of course does not appear in German and several other languages and thus might be difficult for users of those languages to pronounce, which would serve them right.

We agreed to introduce this grand joke in a clever subliminal fashion. For example, when I would write a memorandum to the field about a new free-standing decoder for the tone-dialing codes, for use in user data entry to banking systems and the like, I would say that it responded to the codes for the digits 0-9 and the special characters “*” and “#”, and then for the latter had a footnote that read, “sometimes called *octatherp*.”

Before long, we were seeing, in non-Bell System publications, similar notes about the octatherp, sometimes accompanied by fanciful (and of course completely bogus) etymological explanations, such as, “the prefix ‘octa’ refers to the eight tips of the four strokes of the character”.

One author opined that “therp” was obtained by corruption of the German word “dorf”, meaning village. He said he was not exactly sure of the logical trail there.

In recent years the use of the term “octatherp” has largely vanished.

SO WHAT IS ITS NAME?

The name in the ASCII standard for the graphic character ”#” is “number sign”.

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