

Exploding The Phone

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First Prize

Ma Bell's Unusual Customers



by Max Hauser

There are in this country some thousands of people who, for hobby or business, use the technology of solidstate electronics to avoid payment of lawful charges for telephone service, or to perform mischievous feats beyond the capability of normal subscribers. I have heard it estimated that between one thousand and ten thousand of these "Phone Phreaks" live in the San Francisco Bay area alone. They are therefore a significant phenomenon: not only do they account for a material loss of revenue to telephone utilities, but the periodic publicity they receive evokes widespread public interest. I plan here to outline some of their activities, and to say a little about what the "phone company," the monopoly comprised mainly of American Telephone and Telegraph, is doing to thwart them.

The technology of fraud by wire is neither eleborate nor expensive, which helps explain its popularity. Nor, perhaps contrary to general belief, does it depend on "secret" or "suppressed" information; much of it can be found in a good public library. In particular, the most powerful technique for abusing the telephone system is an inevitable consequence of the longdistance signalling system presently used by AT&T.

In the late 1940's a decision was made to transmit all call routing information over the same circuits as subscriber speech, using control signals in the audio spectrum. This permitted the Direct Distance Dialing capability now familiar in the United States, without major modification of long-distance transmission systems. This structure now appears more costly than was intended, for it permits the (unscrupulous) subscriber to interfere with the long-distance signalling equipment by imitating the audio control signals, and so redirecting or extending calls without paying normal rates. Further, the knowledgeable Phone Phreak is able to do many things impossible to ordinary subscribers, and some difficult even for telephone operators.

One instrument used for this type of toll fraud is the much-publicized "Blue Box." The name is archaic and its origin debatable, but it is universally applied. This box, rarely blue in practice, produces exactly (or in cheap versions, approximately) the audio tones sent by domestic long-distance switching machines. To use the Blue Box, a Phone Phreak will typically dial a long-distance number which is either toll-free (such as the "800" area code) or inexpensive to call (a nearby community). This establishes his connection with the long-distance network. Then, before allowing the called party to answer, the Phreak will send a tone (2600 cycles/second) which interrupts the call and renders the long-distance circuit sensitive to further commands. The number originally dialed is now ignored, and the Phone Phreak is free to specify, with signals from the Blue Box, a new destination for the call. Meanwhile the billing equipment acts as though the original call were still in progress, and the Phreak will ultimately be charged either a token amount or nothing at all.

This use of the Blue Box, while expensive to the phone company, is perhaps its least spectacular application. Since the Box can duplicate most functions of a long-distance operator, it finds many less obvious uses. International calls can be dialed directly by the use of "country codes," similar to domestic area codes but not available to subscribers in most parts of the U.S. Since the overseas network is highly automated, and equipment exists to translate between American and foreign telephone signalling protocols, much can be done by the Phone Phreak without ever speaking to a human operator (who might suspect fraud). I have



heard of Phreaks manipulating European telephone equipment extensively from the comfort of their California homes; the "Captain Crunch" of Phreaking fame was arrested and convicted for placing calls to a phone-in radio broadcast in Australia. The user of the Box can specify, for instance, whether his call to France is to be routed via satellite or underseas cable; it is even a simple matter for a Phreak to place a call *around the world* to reach a phone in the next room.

Another capability of the Blue Box user is "tandem stacking." Longdistance calls are sent over circuits, called tandems, which behave as standardized links between switching machines at the source and destination of the calls. By using the proper codes, the Phreak can link several tandems endto-end, creating a chosen geographical path for his call. For example, a call may be routed from San Francisco to San Jose via Boston, Seattle and Miami. I am told that this is frequently done to provide a path with "clean" circuits of good audio fidelity. Also, it makes "tracing" of the call difficult or impossible.

An incident which occurred in Southern California several years ago illustrates some of the power of the Blue Box for mischief, in the hands of experienced Phreaks. Two students, beset with boredom on a beach in Santa Barbara, resolved to put their Blue Boxes to interesting use. With two pay telephones at the beachfront, they managed to disable all but one of the long-distance tandems linking Santa Barbara with the rest of the country. These tandems were "stacked" in a call from one of the pay phones, which kept them engaged and unavailable for normal traffic. The telephone company's automatic equipment then caused all long-distance calls bound for Santa Barbara to use the remaining tandem, and the Phreaks had arranged for it to terminate in the second phone booth.

With this setup, they carried off a daring and effective hoax. The two, who were adept with voice imitations, took turns answering incoming calls and in grave tones informing the callers that they had reached a National Guard emergency center and that there had been a nuclear "accident." They claimed that it was not possible to complete any calls to the Santa Barbara area, and asked the callers to clear the line for emergency traffic.

The first few calls were from the East coast, where it was already nighttime. The callers, most of whom were trying



to reach U.C.S.B. students, were naturally upset by the news and subsequently called local law-enforcement authorities and the FBI for confirmation. These agencies tried to contact Santa Barbara, and received the same story. After two hours the Phreaks were getting a constant stream of urgent inquiries from police, news agencies and concerned relatives. Shortly after they stopped abruptly and restored normal service. The incident caused headlines in the Los Angeles Times the next morning, and a concerted effort to find the perpetrators; they were not caught.

While such capabilities make the Blue Box probably the most powerful device for telephone fraud, it is by no means the only one. Two other illegal instruments have found widespread use; they are the "Red Box" and "Black Box." Both perform simpler functions than the Blue Box, and presumably are simpler to make. The Red Box produces tone bursts that mimick those generated by a modern coin telephone when money is inserted. A Red Box is, as I understand, a pocket-sized unit (again, not necessarily red) with keys corresponding to "nickel," "dime" and "quarter." When an operator asks the caller to insert coins, the Box is held to the mouthpiece and keys pressed for the desired amount. The operator (or automatic equipment, in some cases) interprets the tones as confirming that coins were inserted, and completes the call. The "Black Box" is a relatively simple unit) it was described in Ramparts magazine some years ago. Unlike the others, it does not enable its user to place calls but rather to accept calls with no charge to the caller. Recently the Oakland Tribune reported an arrest for the use of this device.

None of these devices involves functions that are difficult to synthesize with modern solid-state electronics, and surprisingly, the information necessary to use them is easily available both in the public domain and in official nonrestricted telephone company literature. Since about 1971 there has been much publicity of Phone Phreak activities, stemming in large measure from a long and sensational article in Esquire magazine that year. Some of the perpetrators have been elevated almost to folk-hero status. Thus the illegal hobby is, not surprisingly, widespread. In reaction, laws have appeared making it a Federal crime to "conspire to defraud a communications utility." Moreover, in California it is a misdemeanor to publish "plans or instructions for making or assembling an instrument, apparatus or device with knowledge or reason to believe it is intended to be used to avoid any lawful telephone or telegraph charge." This law was instrumental in the demise of





the Telephone Electronics Line (TEL), a periodical from Southern California that was advertised in popular technical magazines a few years ago.

Another periodical, the Youth International Party Line (YIPL) newsletter, appeared in 1972 as an organ of Abbie Hoffman's Youth International Party. It was indicative of the interest in Phone Phreaking among the political counterculture. YIPL, later renamed TAP (for Technological American Party), was a journal of dubious legality, generously profane, and filled with short-sighted malicious suggestions. Between advocating unrestrained mischief and sabotage, to AT&T and to large institutions in general, it published plans for various Boxes with many details for their use. It illustrated other techniques for cheating the telphone company, such as credit card fraud and coin-telephone tampering, which did not require special equipment. Presumably the newsletter attracted legal action from the utilities affected, but to my knowledge it was never halted and may still be publishing. The issues that I have seen were dated 1972-74 and quoted a circulation of about a thousand.

The telephone utilities have not sat idly through this growing abuse. Besides lobbying for the stiff laws noted earlier, they have taken steps to detect and prevent the use of Blue Boxes and related paraphernalia.

One powerful tool is "Traffic Pattern Analysis." A given subscriber area, perhaps a portion of a city, will show a consistent daily schedule of telephone traffic over a long period of time. For example, the use of "800" prefix numbers, popular with Phone Phreaks, will have a characteristic geographical distribution. If this suddenly shifts, toll fraud may be suspected and a closer monitoring of traffic patterns will be made to pinpoint the unusual activity. If in fact a single subscriber, or small group of subscribers, shows an unusually heavy use of "800" numbers, then a pen recorder may be placed on the lines. This does not monitor conversations, so does not require legal sanction, but looks for the 2600-cycle tone essential to Blue Box use and records numbers dialed. If the tone is detected repeatedly, the company will take steps to record calls and eventually prosecute. Recordings of Blue Box signals, and of calls completed without normal billing, are often evidence enough for a conviction. (Judges, at first amused by the "cleverness" of such fraud, seem no longer to consider it novel enough to warrant leniency.)

Toward a long-term solution, AT&T has begun fundamental modification of its routing structure that will in time eliminate Blue Boxing altogether. The Common-Channel Interregister Signalling system, or CCIS, is designed to do what many critics claim should have been done at the beginning - to send all long-distance signalling information over isolated circuits, not accessible to the subscriber. With control removed from the audio path, there will be no way to interfere with the normal transaction of calls. The system has been installed in several midwestern cities, and is quite effective.

Of course, since the domestic telephone system is gargantuan, a complete change-over to the new system will take years. When it is completed, Phone Phreaking in the current sense will be a thing of the past. Until then it is very much a popular, if underground, branch of amateur electronics that attracts much the same kind of mind as Ham radio, or more recently home computing. For the time being it will continue to make news.



Max Hauser, a senior in Electrical Engineering at U.C. Berkeley, is the President of Eta Kappa Nu, the Electrical Engineering

Honor Society. A member of Tau Beta Pi, he has written numerous technical articles on the applications of solid--state electronics and is also an active member of the Electrical Engineering student-faculty committee. He enjoys bicycling, performing arts, and working with audio equipment. Upon graduation, Max plans to pursue a career in solid-state electronics.