

The Ankle Bracelet Is History: An Informal Review of the Birth and Death of a Monitoring Technology

By Robert S. Gable¹

The 1961 film, *Westside Story*, retells the tale of an ill-fated romance between young lovers from opposing social groups. In a series of ironic twists, the protagonist is killed by a rival gang member. The acclaimed film stayed-on as reruns in movie theaters for years, and it was a favorite of Ralph Kirkland Schwitzgebel,² then a graduate student at Harvard. He described his inspiration for an electronic communication system as follows:

“I would take dates to the movie because it had a romantic effect on them. (I wasn’t very creative about what to do with dates back then.) By the third time I saw the movie, I had a good understanding of the plot. During the movie, the hero’s girlfriend tries to get to him in time to warn him of the danger of a gang fight, but she is too late. I wondered how we could have helped him. I thought, if only we could have sent him a signal. If only we knew where he was, we could have saved his life. Then I had an idea. If he wore a transmitter we would contact him and prevent his death” (Gable, 1989).

The following week, Schwitzgebel met an electrical engineer, William Sprech Hurd, at a cocktail party. This began a cordial and productive relationship until Schwitzgebel moved to California in 1975. An office was established in a vacated corner storefront in Cambridge, MA, where at-risk youth, parolees, psychiatric patients, and student research volunteers participated in various behaviorally-oriented research projects between 1960

and 1975.³ The original location monitoring system included a combination of surplus missile tracking equipment, portable transceivers, battery packs, and stationary radio-frequency relay stations.

The portable equipment was quite cumbersome. The monitored individual carried a 27 MHz AM transmitter and a separately housed timer/encoder unit which provided a 600 Hz and an 800 Hz audio signal to the portable transmitter. The time/encoder measured approximately 9x15x2.5 cm (3-1/2x6x1 in); the transmitter measured approximately 7.5x10x2.5 (3x4-1/2x1 in). The total weight of both was about 1kg (2 lbs). A 1.4 kg (3 lbs) battery pack was also required.



Jack L. Love, Albuquerque, NM, November, 29, 2006. Photo by Robert Gable.

If the transmitter of a wearer was within a prescribed urban area, it would activate a stationary relay station every 30 seconds. The signal was transmitted to the antenna (mounted on the steeple of the Old Cambridge Baptist Church), then relayed to the base station. The size of the monitored area depended upon the number of relay stations and the transmission characteristics of the environment. The monitored area usually

covered about five square blocks near the participant’s place of residence. A patent was granted on the system in 1969 (Schwitzgebel and Hurd, 1969).

One study (Schwitzgebel, 1969) summarized the results from sixteen participants who ranged from an offender with over 100 arrests and eight years of imprisonment to a young business person with no arrests. The results indicated that the participants either adjusted to the monitoring system within the first few days or rejected it as too intrusive and embarrassing.

Reports of this experiment (e.g., *New York Times*, 1969), typically brought negative reactions. For example, Schwitzgebel sent a manuscript to the well-known government publication, *Federal Probation*, and was surprised when the manuscript was returned with a letter from the editor, reading in part:

I get the impression from your article that we are going to make automatons out of our parolees and that the parole officer of the future will be an expert in telemetry, sitting at his large computer, receiving calls day and night, and telling his parolees what to do in all situations and circumstances.... Perhaps we should also be thinking about using electronic devices to rear our children. Since they do not have built-in consciences to tell them right from wrong, all they would have to do is to push the “mother” button and she would take over the responsibility for decision-making.” (Evjen, 1966).

Schwitzgebel’s twin brother, Robert, who had participated in the Harvard research project (Schwitzgebel, *et al.*, 1964), moved to UCLA and later to Claremont Graduate University in California where he initiated smaller monitoring projects with young adult

¹ Jack Love, David Hunter, Glen Rothbart, and Ricardo Rivera generously provided historical information during interviews with the author in 2006–2007. Any factual errors are the responsibility of the author, and he welcomes corrections.

² Family name, “Schwitzgebel,” shortened to “Gable” in 1983.

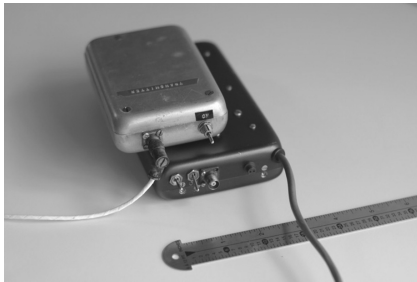
³ See Schwitzgebel (1965) for a general description. Film rights to tape-recorded interviews were sold to Universal Pictures (Fielder, 1961).

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offenders. He and a graduate engineering student, Richard Bird, built a transceiver which was configured as a belt, and was capable of two-way tactile signaling (Schwitzgebel, 1969). The system employed a low-powered FCC-licensed radio station that covered less than a mile. Later research involved telemetering physiological responses such as heart rate and galvanic skin responses of offenders in natural social settings (Schwitzgebel and Bird, 1970).

The attempt to monitor offenders became moribund for approximately a decade until resuscitated by an Arizona state district judge, Jack L. Love. In 1977, Judge Love's fertile mind was looking for a technological solution to the problem of an over-crowded correctional system and prisoners attempting to escape from prison.⁴ He noticed



Portable transmitter with timer/encode, 1968. Photo by Monica Howarth Towan.

an article in the local newspaper, describing a device implanted under the skin of livestock that could transmit information about an animal's temperature. He also recalled visiting a library where a bell would ring if a person went through a screening device with a book that had not been checked-out. Most notably, however, he had tucked away in his files a series of Spiderman cartoons that appeared in the *Albuquerque Journal* from August 8–10, 1977. In these cartoons the villain attaches an

“oversized I.D. bracelet” on Spiderman that allows the villain to locate, by radar, Spiderman's location at any time.

By 1982, Judge Love was convinced that some combination of transmitter bracelet and a nearby card-reading device could be used to verify that a probationer was at a designated location. His attempt

reception was more favorable. A month later, Love received reluctant permission from the state's highest court to use the device. Three low-risk, employed probationers were put on monitored curfew for evenings and weekends during the next three months. During the actual hours of monitoring, the procedure was found to

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to sell the idea to several computer companies was unsuccessful, but a sales representative at Honeywell Information Systems, Michael T. Goss, liked the idea. Goss, a former Navy officer and a policeman, decided to leave Honeywell, which was in the process of getting out of the computer business. (His exit may have been hastened when Honeywell reportedly failed to give Goss a large sales commission to which he believed he was entitled.) Goss's entrepreneurial spirit and talent were energized by Judge Love's concept and he was able to raise \$100,000 of investor money to establish National Incarceration Monitor and Control Services, Inc. (NIMCOS). (Judge Love was not one of the investors.)

The goal of NIMCOS was to manufacture devices and provide monitoring services. An ankle transmitter about the size of a pack of cigarettes was constructed capable of sending a radio signal approximately 100 meters. A stationary receiving unit in the offender's residence was linked by telephone line to one of the county's computers. Failure to get a signal from the residential unit indicated the possibility that the probationer had left the area.

In March 1983, Judge Love held a news conference showing the transmitter attached to his ankle, and he promised to wear the device over the weekend to test how it worked (Cassidy 1983). Reaction to Love's announcement was mixed. Locally there was some resistance because the judge had not gotten his colleagues' permission to enter into a contract with NIMCOS. Nationally, the

be effective, although behavioral problems occurred at other times when monitoring was not in use. One unexpected, but not necessarily undesirable, consequence was the stigma associated with wearing the device. Criminal associates of the first offender, a heroin user, did not want to be around him because they feared that the device was capable of transmitting conversations.

The Albuquerque experiment was short-lived. By July 1983, Michael Goss's fledgling company had run out of money, and his “GOSSlink” system shut down. An application for a grant from a New Mexico state corrections program, called “Innovations in Probation,” was rejected in August. However, Walt Niederberger, a professor of criminology at the University of Albuquerque, continued research with a grant of approximately \$5,000 from the National Institute of Justice⁵

Mr. Goss then went to venture capitalists who didn't want to invest in such a high-risk adventure; however, one individual referred Goss to a manufacturing company, Boulder Industries. Boulder produced radio-frequency identification tags. The timing could not have been better.

Boulder Industries was going through dark times. Their primary product was an “Electronic Dairy ID System” sold to

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⁴ Details reported here are based on an interview of Jack Love by Robert Gable in Albuquerque, NM, November 29, 2006. Subsequently, Judge Love generously provided newspaper and magazine documentation of his account.

⁵ Grant No. 83-0708-J-JARS.

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large dairy farms that allowed individual cows to be identified in a manner that permitted them to have a unique diet at the feeder. However, sales were not sufficient to sustain the company. Boulder had milked dry the dairy marketplace, and was actively seeking other possibilities for selling identification tags, primarily to pharmaceutical companies. Both Goss and Boulder were experiencing severe economic stress.

Fortunately, Boulder's president, David Hunter, who had been a Peace Corp volunteer and a real estate investor, was a risk-taker. According to Hunter,⁶ he asked an assistant to make a market appraisal of the *GOSSlink*. The assistant came back with a very gloomy report: Probation and parole departments thought that electronic monitoring was

alarm company and a radio station—an ideal combination of businesses for the nascent technology of offender monitoring. An opportunity presented itself which involved an individual on probation for a serious driving offense. Moody persuaded Judge Allison DeFoor of Monroe County, FL, to allow this probationer to try an “In-House Arrest Program” using newly designed monitoring equipment.

Moody's invention consisted of a radio transmitter housed in a 13x6 cm (5x2.5 in), 85 gram (3 ounce) grey plastic case shaped as a half-cylinder. It could be worn on the wrist or the ankle. This transmitter, termed the “Supervisor,” sent regular signals to a suitcase-sized home monitoring unit which linked by phone to a receiver/computer (labeled “QuickAlert!”) at the monitoring center. The monitoring center's receiver/computer had a built-in typewriter terminal

until 1986 when CSI chose Digital Office Systems, Inc. (DOSI) of Riviera Beach, FL, as its new equipment supplier. CSI also made arrangements with DOSI to serve as the exclusive marketing agent for its equipment.

When DOSI installed its own house arrest system—separately marketed as *D-tain*—in the state court-operated probation department in Charleston, WV, a dispute between CSI and DOSI surfaced (*Offender Monitoring*, 1988). Subsequently, an out-of-court settlement with DOSI regarding financial and marketing issues resulted in CSI entering into an agreement with the microsystems division of Marconi Electronic Devices, Ltd., of Swindon (UK). Marconi manufactured and marketed a new generation of CSI's In-House Arrest system until 1992.⁷ By 1990, DOSI had disappeared from the monitoring marketplace.

In the meantime, Moody's Controlled Activities Corporation (CONTRAC) continued to modify and place a sufficient number of monitoring units that it came to the attention of BI, which had a policy of buying worthy competitors. In December 1988, CONTRAC was bought by BI.

In 1998, two companies began marketing GPS devices. Advanced Business Systems introduced “ABS Com Trak,” informally referred to as “The Bag,” a black nylon case containing a GPS receiver, cellular phone, computer, and battery. That year Pro Tech Monitoring introduced their “SMART™” system, containing similar components, in a metal and plastic box, known informally as “The Box.” Thus began the increasingly popular use of GPS systems which accounted for about half of all monitoring units in 2014.

NIMCOS, BI, CONTRAC, CSI, DOSI, ABS, and Pro Tech were not the only early innovators. Just three months after Judge Love's news conference, Trac Control Systems (later Computrac Systems) was

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too new, too much work, threatened their jobs, and shouldn't be done by a private company. When Hunter read this report, he thought to himself, “Wow! Here's a real business opportunity.” About three months later he loaned \$250,000 to NIMCOS. Initially, Control Data Corporation, a large computer and financial services firm in Minneapolis, MN, marketed NIMCOS equipment, but discontinued within two years. Boulder Industries (later BI, Inc) began a series of aggressive acquisitions of smaller monitoring companies and personnel (including Mr. Goss who was hired as sales manager). Today, BI, as a subsidiary of the GEO Group, is one of the largest service providers in the United States.

While Mr. Goss was looking for funding and negotiating with BI, a young inventor in Florida, Thomas Moody, became aware of the Albuquerque experiment. Thomas Moody and his father owned a burglar

and a thermal rolled-paper printer. The receiver/computer was reportedly capable of “handling one thousand alarm transmitter packages simultaneously” (Controlled Activities Corp., 1984, p. 3).

In April, 1984, Judge DeFoor transferred the small pilot program to Edward A. Garrison, Administrative Judge of the Palm Beach County Court. Judge Garrison placed 12 probationers on electronic monitoring under the supervision of the County Sheriffs Department and of Pride Integrated Services, Inc., a non-profit probation service agency.

Thomas Moody's newly established Controlled Activities Corporation (CONTRAC) provided monitoring equipment for the In-House Arrest program, and the central monitoring station was placed at Pride in West Palm Beach. The program director at Pride was Glen Rothbart, who formed a separate company, Corrections Services, Inc. (CSI), for the purpose of writing software for the In-House Arrest program (Henderson, 1988). CSI acted as a distributor of CONTRAC equipment

⁶ Telephone interview with David Hunter by Robert Gable, December 19, 2006.

⁷ In 1992 CSI filed suit against Marconi alleging that the battery pack in their Hawk II home monitoring units were known by Marconi executives to have a latent defect causing the packs to catch on fire. (CSI, 1992). More than \$2 million was in dispute. After the lawsuit was settled in 1993, CSI went through a series of reorganizations. In 2009, CSI ceased operation.

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incorporated in Salt Lake City, UT. A unique part of their “ComTrac One” surveillance system was a compact and lightweight transmitter that hung around the neck. The epoxy case of the transmitter was described as “waterproof, shock-proof, and tamperproof” (Computrac Systems, 1985, p. 2). What was not described, however, was the short battery life of the transmitter (a common challenge even today) or how batteries might be replaced. In 1988, the company ceased operation, and was reorganized in order to go into the gold production business (The New Anaconda Company, 2000).

Another early and unique monitoring arrangement was developed by VoxTron Systems, Inc. of New Braunfels, TX, in 1983. A “Provotron phone” installed at a probationer’s home was used to verify the individual’s identity by voice verification. Key words or phrases spoken by the probationer were matched to voice-print data stored at a monitoring center. If necessary, a supervising officer could require the probationer to perform a dexterity test using the telephone keypad in order to determine possible alcohol or drug use. Calls were made at random from the monitoring center to the probationer’s home. In 1989, VoxTron went out of business.

A similar voice verification was introduced in 1987 by the Vorec Corporation in Tarrytown, NY. A unique aspect of the Vorec system was the placement of a voice analysis circuit board of its own design in a case connected to the offender’s telephone. Thus it was able to avoid the problems of loss of information over telephone networks such as AT&T or Sprint. Vorec discontinued marketing in 1995.

A vigorous business competitor in the early days of monitoring was Digital Products Corporation of Ft. Lauderdale (later, of Pompano Beach, FL). The company had been developing various digital electronic devices for military and civilian communications. In 1985, it introduced a unique monitoring system, *On-Guard*, which included an identification module in the form of a wristlet that required no batteries. A “Robot Caller” automatically dialed the offender’s residence to verify

his or her presence. When the wristlet was inserted into a “verifier unit,” the appropriate “electronic handshake” was completed (Hitek Community Control, 1989). The company also marketed an anklet and, later, an alcohol detection unit. In 1994 it stopped manufacturing its own equipment, and in April 1997, the company was forced into Chapter 11 bankruptcy protection.

Another offender monitoring system was devised by Ralph Kirkland Gable in 1984, and sponsored by the Life Science Research Group, Inc. in Thousand Oaks, CA. The project used microprocessor bulletin board software installed on community-based terminals as a means of linking adult social sponsors with low-risk monitored probationers. However, the effort was not able to sustain itself as viable enterprise, and closed its office in 1987.

Creative endeavors often disappear for reasons unknown. Perhaps the inventors lack adequate capital, judicial backing, engineering skill, salesmanship, or

beaches, in hotels, etc. and did not require a telephone.

“I did not continue to develop the system’s technology (along with my good friend Dominic Skaperdas, an electrical engineer now retired from the university) because I was a full time faculty, and with my research, publishing, teaching, and consulting, frankly just could not afford to put in the time into it. I had opportunities to sell the company at the time the monitoring technology was still viable and probably should have done so.” (McMahon, 2007).

Any serious study of the history of monitoring must recognize the *Journal of Offender Monitoring* as a primary source of information. It was founded as a newsletter (*Offender Monitoring*) in October 1987. The journal deals not only with social and ethical issues, but also contains product news, equipment manufacturer surveys, and advertisements. The founder was Marc Renzema, now retired Professor of Criminal Justice at Kutztown University

Times change. And, obviously, so does the equipment employed for offender supervision.

simply have other competing demands and interests. For example, a short-lived service provider was Cost-Effective Monitoring System, Inc., in Champaign, IL. In 1995 it marketed a tiny ankle transmitter, approximately 2.5 cm (1 in) square, that could be activated by a signal by a corrections officer in a patrol car. The founder, Prof. Walter W. McMahon at the University of Illinois, Urbana, described his efforts this way:

“Yes, I did develop and patent [in 1986] an early electronic monitoring System and still have the Cost Effective Monitoring Company that I established. It was a drive-by system, where the monitoring officer in his or her car could check on the whereabouts of the detainee if within about 6 blocks. It was far less expensive than systems that depended on telephone interface. My monitoring bracelet could be used anywhere, on

in Pennsylvania, who maintained until 2009 the most complete bibliography of monitoring-related publications that existed (Renzema, 2009).

In the years since Judge Love’s modest experiment, electronic monitoring has become, for better or worse, an established aspect of the criminal justice system in the United States. Although accurate estimates of the number of devices being worn at any given time are very difficult to calculate, one estimate placed the figure at 160,000 in 2014 (Kilgore, 2015). In addition, approximately 50,000 alcohol detection units were presumably being used.

Times change. And, obviously, so does the equipment employed for offender supervision. The monitoring bracelet is rapidly falling into obsolescence. Smartphones with GPS, image recognition, and finger-

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printing capacity are replacing anklets. A tamper-proof tether, paired with the smartphone, can be attached to the wrist for security purposes. Kiosks are also giving way to smartphones as a means of offender check-ins and blood alcohol assessment. And similarly, land-line modems for home curfew are disappearing.

Numerous location-based smartphone applications provide new opportunities to verify offender behavior in a broad range of natural social settings. In addition, smartphones provide a convenient way for a corrections officer to push relevant information to the offender. Of course, the promises of any supervision technology must always be tempered by the realities of system vulnerability and officer case load.

From a rehabilitation perspective, probably the most significant change involves the opportunity to use positive incentives. Smartphone technology allows officers to intervene in real time during an offender's decision-making process. At the beginning of a rehabilitation process, frequency and timeliness of communication is often critical. Medium to low-risk offenders tend to respond well to positive incentives. For example, an officer can give a positive incentive to an individual who shows improved behavior, such as prompt attendance at a drug treatment class. Incentives already used by community supervision programs include reduced monitoring fees,

approved special activity, "good time" credit, free bus passes, food coupons, day trips, clothing, letters of recognition, free haircuts, gift cards, and movie passes.

It is probably a bit premature to pronounce ankle monitors dead, but surely they are "on their last legs." Smartphone technology presents an opportunity for offender supervision programs to shift some resources from *control by punishment to persuasion by incentive*.

References

- Controlled Activities Corporation (1984, June). COMTRAC Supervisor Technical Highlights. (product brochure). Key Largo, FL.
- Cassidy, J. (1983, March 18). District judge tests electronic monitor. *Albuquerque Journal*, 103, A-1, A-3.
- Computrac Systems, Inc. (1985). Introducing ComTrac One. (product brochure). Salt Lake City, UT.
- CSI (1992). Corrections Services, Inc., Ft. Lauderdale, FL. Letter "Dear Hawk II Customers," August 26, 1992, p. 1.
- Evjen, V. H. (1966, November 16). Letter to R. Schwitzgebel from Victor H. Evjen, Assistant Chief of Probation, Administrative Office of the U.S. Courts, Washington, D.C.
- Fielder, R. (1961, November). *Street corner*. Draft Screenplay, #00636. Produced by George Golitzen, written by Simon Wincelberg. Universal City, CA: Universal-International Pictures.
- Gable, R. K. (1989, September 30). Archived personal letter from R. K. Gable, Thousand Oaks, CA., to Russ Immarigeon (author and book editor).
- Henderson, C. (1988, September). House arrest. *New Miami Magazine*, 1, 42-46.
- Hitek Community Control Corp. (1989, p. 11). *On Guard System*. Instruction booklet by Hitek, a subsidiary of Digital Products Corp.
- Kilgore, J. (2015). *Electronic monitoring is not the answer*. Urbana-Champaign, IL: Independent Media Center, p. 8 (citing George Drake, President of Correct Tech, LLC, Boulder, CO)
- McMahon, W. W. (2007, January 26). Email correspondence from Walter W. McMahon to Robert Gable.
- New York Times* (1969, September 7). Psychologist tests electronic monitoring to control Parolees, 85; also (1969, November 15) Tiny radio monitors prisoner behavior, 53.
- Offender Monitoring* (1988, April/May). Product and trade news, vol. 1, issue 4, 11.
- Renzema, M. (1987). Editorial: Monitoring for better or worse. *Offender Monitoring*, 1, 1.
- Renzema, M. (2009). *Renzema's Resources on the Electronic Monitoring of Offenders*. <http://renzema.net>.
- Schwitzgebel, R. (1969, April). A belt from big brother. *Psychology Today*, 2, 45-47, 65.
- Schwitzgebel, R., & Bird, R. M. (1970). Sociotechnical design factors in remote instrumentation with humans in natural environments. *Behavior Research Methods and Instrumentation*, 2, 99-105.
- Schwitzgebel, R. K. (1965). *Streetcorner research: An experimental approach to the juvenile delinquent*. Cambridge, MA: Harvard University Press.
- Schwitzgebel, R. K. (1969). Development of an electronic rehabilitation system for parolees. *Law and Computer Technology*, 2, 9-12.
- Schwitzgebel, R. K., & Hurd, W. S. (1969, November 11). Behavioral Supervision with Wrist Carried Transceiver. U. S. Patent Office, No. 3,478,344.
- Schwitzgebel, R. K., Schwitzgebel, R. L., Pahnke, W. N., & Hurd, W. S. (1964). A program of research in behavioral electronics. *Behavioral Science*, 9, 233-238.
- The New Anaconda Company (2000). *U.S. Securities and Exchange Commission*, form 10/A-1, February 14, 2000, p. 3. (originally incorporated as Trac Control Systems, Inc, June 13, 1983, Salt Lake City, UT; name changed to Computrac System, Inc, January 16, 1984).



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