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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF STANISLAUS

THE PEOPLE OF THE STATE OF CALIFORNIA, Plaintiff, vs. SCOTT LEE PETERSON, Defendant.	Case No. 1056770 NOTICE OF MOTION AND MOTION IN LIMINE TO EXCLUDE GPS TRACKING EVIDENCE (Evidence Code § 402) DATE: October 20, 2003 TIME: 8:30 a.m. PLACE: Dept 2

mod 10-7-03 pd

TO: STANISLAUS COUNTY DISTRICT ATTORNEY; and

TO: CLERK OF THE ABOVE-ENTITLED COURT:

PLEASE TAKE NOTICE that on October 20, 2003 at the hour of 8:30 a.m., or as soon thereafter as counsel can be heard, Scott Lee Peterson ("Mr. Peterson"), through counsel, Mark J. Geragos and Kirk McAllister, will move this Court for an order excluding any and all GPS tracking evidence.

The motion is made on the ground that the Prosecution cannot satisfy the *Kelly-Frye* test.

The motion is based on this notice of motion, the memorandum of points and authorities served and filed herewith, the exhibits attached hereto, on the record on file in this action, and on such oral and documentary evidence as may be presented at the hearing on the motion.

Dated: October 6, 2003

Respectfully submitted,

GERAGOS & GERAGOS

By: _____

MARK J. GERAGOS
Attorney for Defendant
SCOTT LEE PETERSON

MEMORANDUM OF POINTS AND AUTHORITIES

INTRODUCTION

At the preliminary hearing, the prosecution intends on introducing evidence of data retrieved from Orion brand Global Positioning System (hereinafter GPS) tracking devices installed into vehicles driven by Scott Peterson. The tracked vehicles include Scott Peterson's vehicles, vehicles borrowed from family members, and several rental cars and trucks. The tracking period is from approximately January 3, 2003 through April 22, 2003[1].

The evidence derived from GPS raises foundational issues under the *Kelly-Frye* test. The issue of the admissibility of GPS based evidence under the *Kelly-Frye* test is one of first impression. An exhaustive search of state and federal case law has led us to the conclusion that published decisions are lacking on the issue of whether GPS based evidence can satisfy the *Kelly-Frye* test. The prosecution as the proponent of the GPS based evidence has the burden of establishing the admissibility of such evidence. The prosecution, however, cannot meet its burden in the case at hand not only because GPS technology has not gained general acceptance of its validity in the scientific community but because the procedures necessary for proper operation of the tracking devices were not actually followed in the instant case as evidenced by the letter by Michael Peach, the technical support supervisor for the manufacturer of the tracking devices (Orion Electronics Limited) used in the instant case. *See* Discovery Bate Stamp # 24001-24002 (Attached hereto as Exhibit A).

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[1]The tracking periods vary depending on the vehicle being tracked; however, the tracking time period for all the tracked vehicles fall within the period of January 3, 2003 through April 22, 2003.

I.

THE PROSECUTION HAS THE BURDEN OF SATISFYING THE THREE PRONG KELLY-FRYE TEST PRIOR TO ADMISSION OF ANY GLOBAL POSITIONING SYSTEM (GPS) EVIDENCE.

A. Kelly-Frye Test

In *People v. Kelly* (1976) 17 Cal.3d 24, the California Supreme Court adopted the test established by the District of Columbia Circuit Court in *Frye v. United States* (D.C. Cir. 1923) 293 F. 1013 for admitting evidence derived from new scientific methodology. The *Kelly-Frye* test is an "evidence-screening device that targets highly sophisticated scientific evidence that to the average juror would not be comprehensible in process but also irresistibly convincing in result." *People v. Pizarro* (Ct. App. 2003) 110 Cal.App.4th 530, 554-555. In *Kelly*, the California Supreme Court, in encouraging judicial caution in the acceptance of evidence developed by new scientific techniques emphasized that the *Frye* test was "deliberately intended to interpose a substantial obstacle to the unrestrained admission of evidence based upon new scientific principles" because "lay jurors tend to give considerable weight to 'scientific' evidence when presented by 'experts' with impressive credentials." *Kelly, supra,* 17 Cal.3d at 30-31.

The *Kelly-Frye* test requires proponents of evidence derived from new scientific methodology to establish the following three prongs. The first prong requires the proponent of the evidence to establish the reliability of the method, usually by expert testimony. *Kelly, supra,* 17 Cal.3d at 30; *Frye, supra,* 293 F. at 1014. To satisfy the reliability test, the scientific method must be "sufficiently established to have gained general acceptance in the particular field in which it belongs." *Frye, supra,* 293 F. at 1014. The purpose of this prong of the *Kelly-Frye* test is to assure that "those most qualified to assess the general validity of a scientific method will have the determinative voice" in deciding the reliability of the new scientific methodology rather than a trial judge. *Kelly, supra,* 17 Cal.3d at 30. (Citing *United States v. Addison* (D.C. Cir. 1974) 498 F.2d 741, 743-744.) The existence of the first prong may be determined by prior

case law. *Pizarro. supra,* 110 Cal.App.4th at 556. Once a trial court has admitted evidence derived from new scientific technology and that decision is affirmed by a published appellate decision, "the precedent so established *may* control subsequent trials, at least until new evidence is presented reflecting a change in the attitude of the scientific community." *Kelly, supra,* 17 Cal.3d at 32; *People v. Venegas* (1998) 18 Cal.4th 47, 54.

The second prong of the *Kelly-Frye* test requires that the witness furnishing testimony about the reliability of the scientific methodology "be properly qualified as an expert to give an opinion on the subject." *Kelly, supra,* 17 Cal.3d at 30.

The third prong requires the proponent to demonstrate that correct scientific procedures were used in the particular case. *Id.* This prong is a case-specific inquiry. *Venegas, supra,* 18 Cal.4th at 78. The third prong of the *Kelly-Fye* test assumes that the new scientific methodology has met the general acceptance requirement. *Id.* Hence, the remaining issue is whether the procedures utilized in the case at hand complied with the technique generally accepted as valid by the scientific community. *Id.* Expert testimony from a member of the scientific community is not necessary for establishing such compliance with the accepted technique. *Id.* "It does, however, require that the testifying expert understand the technique and its underlying theory, and be thoroughly familiar with the procedures that were in fact used in the case at bar to implement the technique." *Id.*

B. The Burden is on the Proponent of the New Scientific Technology, the Prosecution in the Instant Case, to Satisfy the Three Prongs of the *Kelly-Frye* Test.

The party offering evidence derived from new scientific methodology has the burden of proving its admissibility by a preponderance of the evidence under the *Kelly-Frye* test. *People v. Ashmus* (1991) 54 Cal.3d 932, 970.

The prosecution as the proponent of the GPS evidence must satisfy each and every prong of the *Kelly-Frye* test not only because GPS is a fairly new technology but because

this issue has never been decided. In fact, there are no cases about the admissibility of evidence derived from GPS in the face of the *Kelly-Frye* test.[2/] In addition to many inherent deficiencies with the GPS system, the government has in the past reduced and continues to reduce at times the accuracy of civilian GPS signals by degrading the signals with random errors. *See,* Alan Zeichick, *GPS Explained: How the Global Positioning System Lets You Know Where You Stand,* Red Herring, Jan. 30, 2001, 80-81.

II.

THE COURT SHOULD EXCLUDE THE GPS BASED EVIDENCE BECAUSE THE PROSECUTION CANNOT SATISFY THE KELLY-FRYE TEST.

In the *Kelley-Frye* analysis, the trial judge is the "gatekeeper", allowing evidence that is reliable and trustworthy to reach the jurors. *Pizarro, supra,* 110 Cal.App.4th at 555. The determination under the first prong of the *Kelly-Frye* test of whether a new scientific methodology has gained general acceptance by the scientific community is a determination under California Evidence Code section 405[3/] requiring the court to make the final determination regarding the existence of the preliminary fact that the scientific methodology has been generally accepted by the scientific community. *Id.* at 556. Similarly, the determination under the third prong of the *Kelly-Frye* test of whether the generally accepted procedures were actually followed in the case before the court is a determination under section 405 requiring that the court make the final determination regarding the existence of the preliminary fact that proper scientific procedures were followed. Most importantly, the determination by the court under either prong is final and not a question of whether there is evidence sufficient to permit a jury to decide the

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[2]Some courts have discussed GPS evidence in the context of Fourth Amendment search and seizure issues.

[3]Section 405 provides in pertinent part as follows:

> The court shall determine the existence or nonexistence of the preliminary fact and shall admit or exclude the proffered evidence as required by the rule of law under which the question arises.

question. *Id.* at 538. Because of the immense power of scientific evidence, the *Kelly-Frye* test goes to admissibility rather than the weight of the evidence. *Id.* at 555. (Citation omitted.)

In the case at hand, the Court has the opportunity to make good law and precedent case law on an issue of first impression. Consequently, the Court should exclude the results of the tracking devices used in the instant case for the reasons discussed below.

A. The Prosecution Cannot Satisfy the First Prong of the *Kelly-Frye* Test because GPS Technology has not Gained General Scientific Acceptance.

The GPS technology has not been generally accepted by the scientific community for several reasons. GPS has inherent inaccuracies. Furthermore, the government, at times unknown to the public and users of GPS based technology, will intentionally reduce the accuracy of GPS. Furthermore, there is no case law establishing that GPS technology has gained general acceptance.

1. <u>About Tracking Devices and GPS Technology</u>

The tracking devices installed in the cars and the trucks driven by Scott Peterson in the instant case rely on the GPS system to receive data about the movements of a vehicle including address, longitude, latitude, date, and time. These tracking devices not only receive but also record and store data. Officers assigned to the instant case retrieved data stored in the tracking devices by calling the cellular phones attached to tracking devices and relaying the data to a base computer maintained at the Modesto Police Department. (*See* Discovery, Bate Stamp # 4051).

The GPS system used by the tracking devices consists of three parts: receivers, satellites and ground-control systems. A vehicle tracking device is a GPS receiver. A GPS receiver determines its location by listening to transmissions from four satellites which orbit the earth in the same path. The GPS system consists of a minimum of 24 satellites in orbit around the earth. These satellites circle the earth in six different paths,

with four satellites in each path. Each satellite transmits a powerful radio wave that contains a unique data-navigation message. The message provides the time of day and identity of the transmitting satellite. Every few minutes, each satellite transmits the ephemeris of the satellite constellation, in other words, the position and orbital velocity of each satellite in the GPS system. The GPS satellites are operated and controlled by Master Control Station at Falcon Air Force Base, Colorado and a worldwide network of five signal monitor stations and three uplink ground antennas. Correction to individual satellite atomic clocks or orbital parameters are relayed from the Master Control Station to the satellites via the ground antennas. A GPS receiver, like the tracking device used in the instant case, determines which satellite should be over the horizon based on its own stored copy of the constellation ephemeris. Once the receiver acquires a signal, it decodes the message. The receiver computes the time the message spent in transit from the satellite to the receiver by comparing the time the satellite sent the message to the time the receiver acquired it base on the receiver's internal clock. By determining the time the message spent in transit, the receiver computes its distance from the satellite and hence its location. The GPS receiver needs signals from four satellites to compute its location because computing the exact position by using time delays is an equation with four unknowns: latitude, longitude, altitude, and time. The accuracy of the GPS tracking devices is approximate. *See generally, DOD/DOT Task Force on Global Positioning System (GPS), Increased Civil Participation*, http:/www.fas.org/spp/military/program/nav/tf-rpt.htm, Dec. 21, 1993; *GPS Explained: How the Global Positioning System Lets You Know Where You Stand*, *supra*, at 80-81.

GPS technology is a fairly new technology. The system was first launched in 1978 when the first 11 experimental satellites were placed in orbit. These 11 satellites are no longer in use and were replaced by a group of 24 satellites in 1993. *See Id.*

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2. The GPS Technolgy and Devices Relying on GPS have Inherent Inaccuracies.

The following are factors effecting the accuracy of the results of tracking devices:

- Government reducing accuracy of GPS for reasons including national security. *See, GPS Explained: How the Global Positioning System Lets You Know Where You Stand, supra,* at 80.
- Clarity of the signal.
- The infrequency of data sampling. This is generally a sign of poor placement of the antenna of the tracking device.
- Requesting data from the device at a time when the device lacks access to current signal because the system will rely on old data by putting a current time stamp on it. *See* Exhibit A.
- The satellite signal, prior to reaching the tracking devices, bouncing off of another object or body, including a building or a hill.
- Poor placement of the tracking device and antenna, generally for the purposes of covertness. This can reduce the accuracy by one degree of longitude or latitude. *See* Exhibit A. One degree of latitude is approximately 69 miles and one degree of longitude can be over 60 miles.
- Radio interference with signals. *See* Exhibit A.
- GPS receivers failing to update all decimal places of the longitude while crossing a line of latitude or longitude. If this happens when a fix is being taken, then the fix can be exactly one degree of longitude or latitude off which as mentioned above can vary between 60 to 69 miles. *See* Exhibit A.
- GPS receivers making a poor satellite choice. *See* Exhibit A. As Michael Peach, the technical supervisor for Orion Electronics Limited stated in his July 9th letter to the Modesto Police Department,

> "the GPS receiver will 'lock on' to satellites, which give it the least amount of error when it calculates its position. This

> error is primarily dependant on the geometry or angle of the satellite in the sky. Satellites too close together will result in calculation errors (error in this case not meaning 'right or wrong' but meaning not as accurate or precise as it could be) as will satellites too far apart, or those about to disappear over the horizon."

See Exhibit A.

Michael Peach of Orion Electronics Limited detected most of the above mentioned problems and inaccuracies related to GPS and tracking devices in the case at hand. The tracking device problems experienced by the Modesto Police Department as manifested in the letter by Michael Peach of Orion Electronics Limited can serve as a case study of inherent inaccuracies of tracking devices relying on GPS!

B. Proper Scientific Procedures Were Not Followed in the Case at Hand.

The Letter from Michael Peach of Orion Electronics Limited speaks volumes about the improper procedures which were used in the instant case. Even assuming *arguendo* that GPS technology has gained general scientific acceptance, it is evident that scientifically accepted procedures were not followed in the case at bar.

Michael Peach, following a review of several tracks provided by the Modesto Police Department, concluded in his letter that some of the "strange occurrences" with the GPS data "could have been related to GPS antenna placement and/or interference." He further added that:

> Due to the covertness of this device, it often cannot be put in an optimal position to see the GPS satellites. Depending on the antenna location in the vehicle and the surrounding topology and building density, it may be very hard for the receiver to get signals 100% of the time. *See* Exhibit A.

He further stated as follows with regards to a "strange occurrence" on unit model

ST604-2 S/N VH6838/01:

> In this case, I suspect that it held on too long to a satellite, **perhaps due to antenna placement**, which just went over the horizon, and the resulting calculation got 'pulled' over by the GPS receiver's averaging program (designed to reject transient spikes). Exhibit A (Emphasis added).

In addition to Michael Peach's assessment of poor antenna placement by the Modesto police, the infrequency of the sampling of data on the tracking logs is another indication of poor antenna placement by the Modesto Police. Many of the readings on the tracking logs are hours apart. Such infrequency of reading indicates that the tracking devices could not get signals from the satellites for stretches lasting several hours. One of the disadvantages of surreptitious placement of tracking devices is poor placement in non-optimal positions. Faced with a choice, the Modesto Police Department traded accuracy for covertness.

CONCLUSION

For all the foregoing reasons, the Court should exclude the vehicle tracking evidence based on GPS or in the alternative require the prosecution to meet its burden under *Kelley-Frye* in a hearing.

Dated: October 6, 2003

Respectfully submitted,

GERAGOS & GERAGOS

By: _____

MARK J. GERAGOS
Attorney for Defendant
SCOTT LEE PETERSON

EXHIBIT A

22799

ORION ELECTRONICS LIMITED

July 9, 2003

Modesto PD
600 10th street
Modesto, CA
95354

Attn: Rudy Skultety

After reviewing several tracks that you have emailed Orion we confirm that the GPS data is typical of that taken from a vehicle with a hidden GPS antenna. Unfortunately, that creates some concerns regarding some strange occurrences with the GPS data on some selected tracks. The statements below are Orion's opinion on this GPS data. We feel that some of these occurrences could have been related to GPS antenna placement and/or interference. On the other hand, we believe that the general form of the data is such that you may be confident that the vehicle was in the general areas indicated.

I will also email you back the 4 bitmaps of the GPS data identifying the descriptions below.

Bitmap 1 Track Name: Dakota 03Jan28-0834saveSkultety.sdt Unit Info: Model ST604-2 S/N VH6836/01
Bitmap 3 Track Name: S-10 03Jan09 0850.sdt Unit Info: Model ST604-2 S/N VH6838/01

This is a manifestation of a problem that is occasionally seen, and is worse in over-the air downloads. When crossing a line of latitude or longitude, the GPS receiver occasionally does not update all decimal places of the longitude. If the timing is such that this happens when a fix is taken, one fix can be exactly one degree off. For the most part our units are designed to ignore this data, but sometimes the bad data gets recorded. Normally the software automatically corrects the problem. However, in order to speed up the download over-the-air, the whole parts of degrees are only sent when a major change occurs. Therefore some records which follow will also be wrong, until the compression engine resets (upon a change in latitude, longitude, for example, it crosses back), or when the time changes increments such that the minute value changes. As the "direct" download is not compressed, this type of error would not be seen. This type of thing can also happen due to poor GPS antenna placement, although this may not be exactly one degree. Due to the covertness of this device the GPS antenna often cannot be put in an optimal position for the GPS satellites to see 100% of the time. The records, which have been thrown off, are one degree of latitude or longitude from where it should be.

Bitmap 2 Track Name: rover 03jan26-1418skultety.sdt Unit Info: Model ST602-3 S/N AH7478/02

This may be related to a problem with the data which the U.S. census bureau receives from the County of Modesto. To compile the TIGER data (Topologically Integrated Geographic Encoding and Referencing which is used for the basis of our maps) the census bureau takes planning data from many different sources in many different formats. It then converts them into one common format and combines the information. Depending what datum, projection, and coordinate system being used, problems can arise when all the country's data is rationalized. Modesto County seems to have a problem where the data towards the center of the county gets skewed up and to the left from where it really should be. The error in the data increases the further away you get from their chosen datum. Towards the western edge of the county, the error is much less. If you look carefully around the edges of the county you will find roads which don't line up when they cross the county line.

Bitmap 4 Track Name: s-10 03Jan09 1520Skultety.sdt Unit Info: Model ST604-2 S/N VH6838/01

This is an example either of the GPS receiver making a poor satellite choice, or of some form of radio (radar?) interference. Normally, the GPS receiver will "lock on" to satellites, which give it the least amount of error when it calculates its position. This error is primarily dependant on the geometry or angle of the satellite in the sky.

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ORION ELECTRONICS LIMITED

Satellites too close together will result in calculation errors (error in this case not meaning "right or wrong" but meaning not as accurate or precise as it could be), as will satellites too far apart, or those about to disappear over the horizon. Some forms of inadvertent "jamming" or interference can mimic this problem. In this case, I suspect that it held on too long to a satellite, perhaps due to the antenna placement, which just went over the horizon, and the resulting calculation got 'pulled' over by the GPS receiver's averaging program (designed to reject transient spikes). Once a better choice of satellites was available, it acquired another one and started to correct itself.
Due to the covertness of this device, it often cannot be put in an optimal position to see the GPS satellites. Depending on the antenna location in the vehicle and the surrounding topology and building density, it may be very hard for the receiver to get signals 100% of the time.

Regards,

Michael Peach
Technical Support Supervisor
Orion Electronics Limited

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