reviewed several of the anomalies of the case, including the mysterious Fiat, which the article called "Princess Diana's grassy knoll (the site of Kennedy's alleged second assassin), an aspect of her death that, until the driver is found, cannot be explained."

The *Independent* noted that, although "every newspaper and news organization" has adopted the Franco-British cover story, pinning responsibility on Paul, "people who read serious newspapers and watch serious television programs still have their doubts. . . . Their suspicions reflect another sentiment, that behind much of what happens at the top of our society lies the hand of dark, mysterious forces. We are fed a constant diet of films and novels suggesting that MI5, MI6, the CIA and other sinister groups, are capable of anything. . . . This is what leads many people to suspect something similar occurred with Diana."

The *Independent* reported that "Diana feared she would be killed. She once, apparently, confided in friends that the security services would dispose of her because she was a 'loose cannon.'. . . 'One day I'm going to go up in a helicopter and it'll just blow up. MI5 will do away with me.' "

The *Independent* story was also the first to appear in a major British daily newspaper that seriously raised the possibility that the British royal family was behind her murder.

Highly professional 'sure kill'

In our Oct. 10 issue, *EIR* provided a brief outline of the growing use of anti-personnel lasers in irregular warfare, by *21st Century Science & Technology* magazine staff scientist Charles Stevens. Stevens cited a 1993 report by the International Committee of the Red Cross, which warned of the danger of a proliferation of "dazers" and other highly mobile blinding lasers, and identified the British and French intelligence services as two of the agencies that have done the most work on developing and deploying such space-age weaponry. Both countries have balked at any restrictions on the use of such weapons, and have used them in the Balkans, Africa, and in the Persian Gulf.

In this *Feature,* Stevens provides a more in-depth review of how such a blinding laser could have been used in an attack against the Mercedes, seconds before the fatal crash.

In recent weeks, LaRouche has emphasized that the murder of Princess Diana had to have necessarily been the work of a professional team of assassins, committed to either securing a "sure kill," or postponing the attempt for another occasion. Once one begins to review even the fragmentary evidence that has come to light, from the standpoint of an assassination designed by an irregular warfare professional with access to unlimited resources, inside information on the princess's travels, and assurances of cooperation from the relevant French and British authorities to secure a cover-up, a far different picture emerges than the patently phony "drunk driver" story still being peddled by the French police to the shrinking ranks of the gullible.

A driver could be blinded with a laser

by Charles B. Stevens

The question has been raised in the death of Princess Diana, whether a laser beam originating from a lead car could have blinded or incapacitated the driver of Diana's car. The answer is a definite yes.

For the act to be feasible, the following four conditions must be met: 1) the laser and its power conditioning unit must fit within an automobile; 2) the energy source for the laser must fit within an automobile; 3) the laser must deliver suffi-

FAA warned of laser danger to pilots

In October 1994, the Federal Aviation Administration (FAA) issued a press release, announcing that the Society of Automotive Engineers, the industrial safety group for mobile transportation on land, sea, air, and space, had formed a research committee to come up with safety standards for the use of outdoor lasers, following two dangerous incidents involving the accidental blinding of airplane pilots.

The first incident noted by the FAA, occurred in late 1993 at the Las Vegas Airport, as a Southwest Airlines commercial flight was taking off. A 12 W argon laser on the roof of the Las Vegas Rio Hotel accidentally was viewed by both the pilot and co-pilot, resulting in the first officer being completely blinded for 5-10 seconds, and suffering reduced vision for the next ten minutes. In a similar incident in June 1994, a flight engineer on a C-130 military cargo plane flying over Biloxi, Mississippi, was exposed to two 15 W beams from a laser at the Palace Casino. The flight engineer was totally blinded for more than one minute, although the contact with the laser occurred at a distance of 3.5 miles and an altitude of 700 feet.

It is also widely suspected that a mid-air crash of two stunt planes at the Ramstein Air Show in Germany in August 1988 was caused by a mobile laser device having incapacitated one or more of the pilots during a tricky multi-plane formation maneuver.

TABLE 1

Eye exposure limits

Continuous in W/cm^2 (exposure time=1 sec)

Wavelength (microns)	Light source	Occupational MPE	Battlefield MPE (50% probability)
White, 0.4-0.8	Sun, Xenon flash lamp	1.0	
0.22-0.32 (UV)	KrF laser	0.02	
0.488, 0.515 (blue/green)	Argon laser	1×10^{-5}	5×10^{-3}
0.633 (red)	He-Ne laser	1×10^{-5}	5×10^{-3} to 10×10^{-3}
10.6 (LWIR)	CO_2 laser	1.0	

Pulsed systems in J/cm^2			(exposure time=10^{-8} sec/10^{-3} sec)	
Wavelength (microns)	**Light source**	**Pulse length**	**Occupational MPE**	**Battlefield MPE (50% probability)**
White, 0.4-0.8	Sun, Xenon flash lamp	10^{-3} sec	1.0	
0.488, 0.515 (blue/green)	Argon laser	10^{-3} sec	0.15×10^{-3}	
0.633 (red)	He-Ne laser	10^{-3} sec	0.5×10^{-3}	0.8×10^{-3}
0.694 (red)	Ruby laser	10^{-8} sec	0.1×10^{-6}	20×10^{-6} to 50×10^{-6}
		10^{-3} sec	1×10^{-6}	1×10^{-3} to 2×10^{-3}
1.06 (near IR)	Nd:YAG laser	10^{-8} sec	300×10^{-6}	600×10^{-6}
		10^{-3} sec	5×10^{-3}	10×10^{-3}
10.6 (LWIR)	CO_2 laser	10^{-3} sec	0.3	

Source: Chemical Rubber Co., *Handbook of Lasers,* 1971.

cient power to blind or incapacitate a person from a range of at least 50 meters; and 4) the laser must be able to be aimed and pointed where needed.

We begin by reviewing the sensitivity of the human eye to light. First, consider the spectrum over which the eye is sensitive. The eye and brain can detect light (i.e., see) over the so-called visible range of wavelengths, between about 0.35 millimeters (violet light) and 0.75 mm (red light). The greatest sensitivity is in the middle of this range (green light), with the sensitivity trailing off to zero at the endpoints. While these are the wavelengths that can be seen, a broader band of radiation is transmitted through the ocular media and absorbed by the retina. This band extends from about 0.35 mm to 1.3 mm (near infrared). In darkened conditions, there exists the "attention reflex," which means that someone can be made to look in the direction of a flash of visible light. A second, stronger pulse can then more effectively incapacitate. The eye magnifies incoming light by about 100,000 times, which means that a low-energy laser, that would have no effect on other body tissue, can easily cause pain and other effects on the retina. In addition, it should be noted that all radiation, from X-rays to radio waves, whether it ever reaches the retina, impinges on the cornea of the eye (the transparent coating over the exterior surface of the eyeball, including over the pupil).

Now, consider the effect on the eye of the intensity of the radiation which strikes it. But, first, let us review what we mean by the intensity of radiation. Sunlight is classified as "continuous wave" radiation, because its power output, i.e., the Sun, is always "on." The strength of its output, or its intensity, is the power it delivers to a unit of area (watts/cm^2). By contrast, many lasers and other optical devices generate pulses of radiation. The strength of the output beam from these devices is typically expressed as energy per unit area (joules/cm^2), or fluence, rather than the power per unit area (watts/cm^2), or intensity, used for continuous-wave devices. Since energy equals power × time, the power of a pulse of radiation is simply the energy of the pulse divided by the pulse length. Note also, that the power or energy within a beam is simply its intensity or fluence, respectively, multiplied by the area of the illuminated spot it produces.

Maximum exposure levels

The "eye safe" exposure limits for pulsed light are somewhat different than the limits for continuous light. **Table 1** lists two different maximum permissible exposure levels and an exposure level that causes observable eye damage 50% of the time (the damage is statistical in nature due to variability in viewing geometries, the tissues involved from one test subject to the next, and so on). When eye tissue (cornea or retina) is damaged, it is the result of a burn—"sunburn" in the case of ultraviolet (UV), and thermal burns in the case of visible and infrared (IR) radiation. The severity of the burn or lesion is dependent on the intensity and duration of the exposure. (The data in Table 1 are taken from the 1971 edition of the *Handbook of Lasers,* and so might be

TABLE 2

Commercially available Nd:YAG lasers

Beam diameters are roughly 5 mm (0.2 inch)

Full-angle beam divergences are roughly 5 microradians

	High power	Medium power	Low power
Energy/pulse, J	3.0	0.5-1.0	0.1
Pulse width, msec	1-100	0.01-100	0.01-100
Pulse rate, Hz	10-50	10-100	5-100
Average laser power, watts	150	100	10
Input voltage, volts AC	220	220	110
Input power, watts	7,500	1,500	500
Power supply size, l″×w″×h″	42×30×12	30×30×12	30×12×12
Laser head size, l″×w″×h″	48×6×6	36×6×4	12×6×2
Cooling water required?	Yes	No	No
Approximate cost	$100,000	$60,000	$20,000

Source: *Handbook of Lasers.*

somewhat out of date. But, since the data on eye damage (detectable lesions) are most useful for this analysis, and since they are based on experiments with rabbits and primates, it is doubtful the data have significantly changed over the years.)

To get a sense of the magnitudes involved, note that the visible light emitted by the Sun has an intensity (power per unit area) at the Earth's surface of about 0.13 watts/cm^2. This would be approximately the intensity on the cornea and retina if one looked directly at the Sun. As the table makes clear, a laser pulse of 0.01 microsecond (10^{-8} sec) at an intensity of 0.001 joules/cm^2 (or $1{,}000 \times 10^{-6}$ joules/cm^2, which is about twice as large as the largest comparable value in Table 1; note that the power of the pulse is 105 watts/cm^2) at virtually any wavelength between ultraviolet and near-infrared, would severely burn the retina (and perhaps the cornea) and cause blindness until the retinal lesion healed.

One laser that fits the bill

It is now appropriate in our analysis to pick a laser device that would meet the demands for blinding a driver under conditions similar to those in which Princess Diana was killed. Since we stated at the outset that it would be advantageous to an assailant if the laser beam were invisible to the human eye (making an attack impossible to observe or detect), we are restricted to choosing among ultraviolet and infrared lasers. Of these laser types, an obvious selection is the Nd:YAG laser at 1.06 mm. These are very mature lasers and readily available at relatively high intensities. A summary of the characteristics of these lasers is given in **Table 2.**

Note the following characteristics of the medium-power Nd:YAG lasers: 1) they can easily fit within the back seat of a car or a car trunk; 2) they are air-cooled; and 3) they can be powered for a short time with a couple of car batteries (12 volts × 300 amperes = 3,600 watts). So, we have established that a medium-power Nd:YAG laser beam can be produced from within a car. But how can the laser beam be aimed and pointed?

A system of mirrors, such as in a periscope, can be used to route the laser light where needed; for example, from the back seat of a car through the rear window or a hole in the trunk. A movable mirror or lens in this "optical train" can be used to point or scan the laser beam. If the laser beam is directed at a target 50 meters (164 feet) away, the diameter of the beam grows from 5 mm to about 50 m × 5 millirad, or 25 cm (10 inches), which is an area about the size of a man's head.

To ensure the laser can be aimed and pointed to illuminate the head of the driver of a high-speed car with high confidence, the laser beam can be widened to two or three times the size of the drivers head. Better still, if the laser beam is formed into a rectangular shape about 50 cm long (the approximate height of a windshield) and 1 cm wide, it can then be scanned across the windshield of the targetted car, making the task of illuminating the car's driver a relatively easy one. To shape the output beam, the beam from the laser device must be widened a factor of 25 to about 13 cm (5 inches) in diameter and then formed into a rectangle and focussed. A series of lenses and mirrors can easily do this. The exit window for the beam must also be large enough to accommodate a 13 cm-wide beam. Since pulses can be generated at 100 hertz, the rectangular laser spot can be moved 1 cm every 0.01 sec, or 100 cm/sec (3.3 ft/sec) without failing to illuminate any part of the target car's windshield. In practice, the scan rate might be slower than this; consequently, the eyes of the targetted driver might receive multiple laser pulses as the beam scans over them. A real-time near-infrared camera can be used to observe the scan and help aim the laser.

Only one feasibility criterion remains to be analyzed in our quest to determine if a laser can be used to incapacitate the driver of an automobile: The intensity of the laser beam at the target must be higher than the level needed to damage the human eye. The beam intensity is found by simply dividing the pulse energy of the laser by the area of its spot. The area of a 50 cm × 1 cm spot is 50 cm^2, so, the average intensity of a 1 joule laser pulse with this spot size is 0.02 joules/cm^2. This is over 20 times the intensity needed to burn the human eye using a 0.01 msec pulse.

And, as Table 2 shows, lasers with this pulse width are readily available.

All of the feasibility criteria posed at the outset of this analysis are now met; we therefore conclude that yes, it is feasible to incapacitate the driver of a moving car using a laser in a lead car. The cost to construct such a system is on the order of $100,000.