



US 20140317988A1

(19) **United States**(12) **Patent Application Publication**
Battis et al.(10) **Pub. No.: US 2014/0317988 A1**(43) **Pub. Date: Oct. 30, 2014**(54) **WEAPON-MOUNTABLE NON-LETHAL
OPTICAL SECURITY DEVICE****Publication Classification**(71) Applicant: **LASER ENERGETICS, INC.**,
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Wayne Armstrong, Placitas, NM (US)(21) Appl. No.: **14/363,499**(22) PCT Filed: **Dec. 6, 2012**(86) PCT No.: **PCT/US12/68181**

§ 371 (c)(1),

(2), (4) Date: **Jun. 6, 2014****Related U.S. Application Data**(60) Provisional application No. 61/567,159, filed on Dec.
6, 2011.(51) **Int. Cl.****F41G 1/35**

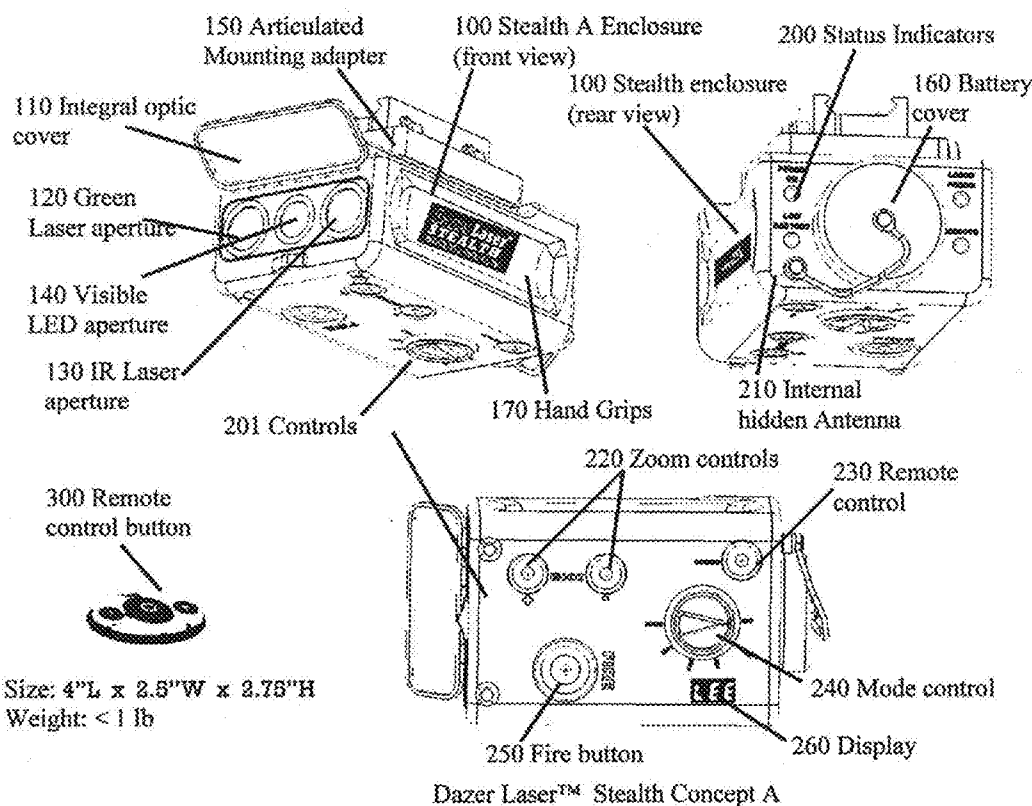
(2006.01)

(52) **U.S. Cl.**CPC **F41G 1/35** (2013.01)USPC **42/114**

(57)

ABSTRACT

Provided is weapon-mountable laser distractor having an enclosure (100) with a top surface and bottom surface connected to each other by two side surfaces, a front surface and a rear surface. The top surface includes an articulated mounting adapter (150), the bottom surface includes controls (201), the front surface includes an integral optic cover (110) and a plurality of apertures (120, 130, 140). The enclosure (100) protects and surrounds a laser device including a battery module (490) in communication with an electronic module (470). The electronic module (470) controls a plurality of light generating modules (400, 405, 410) which provide light to a plurality of optic modules (420, 425, 430). A controls module (440) or remote module (460) provides instructions to the electronic module. A display module (480) and an indicator module (450) are also provided.



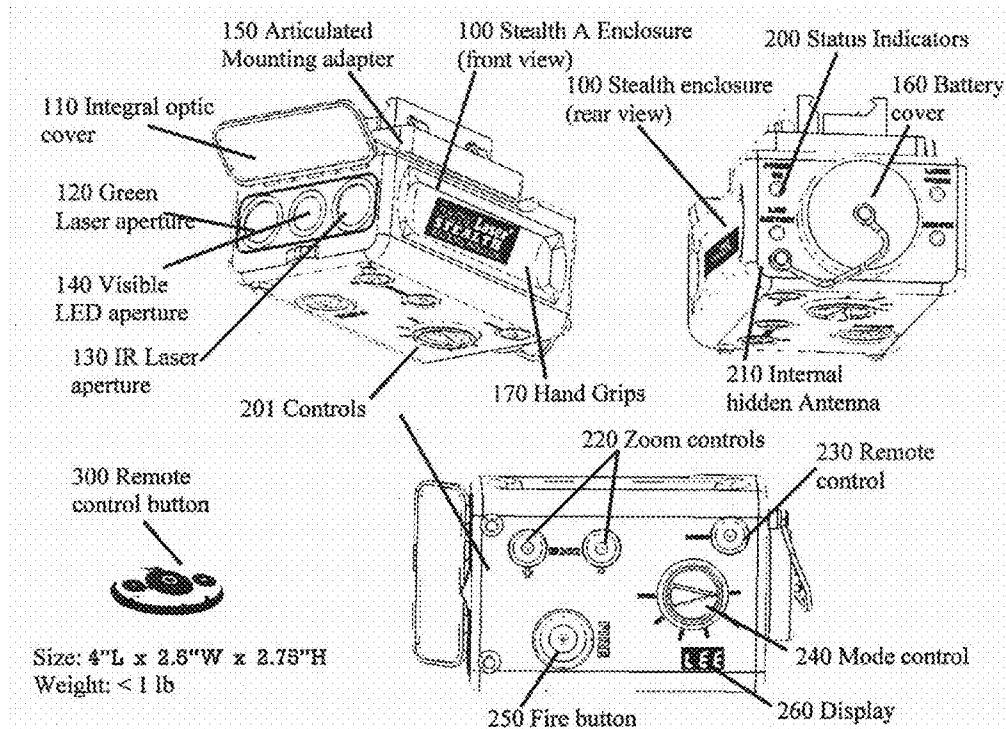


Figure 1: Dazer Laser™ Stealth Concept A

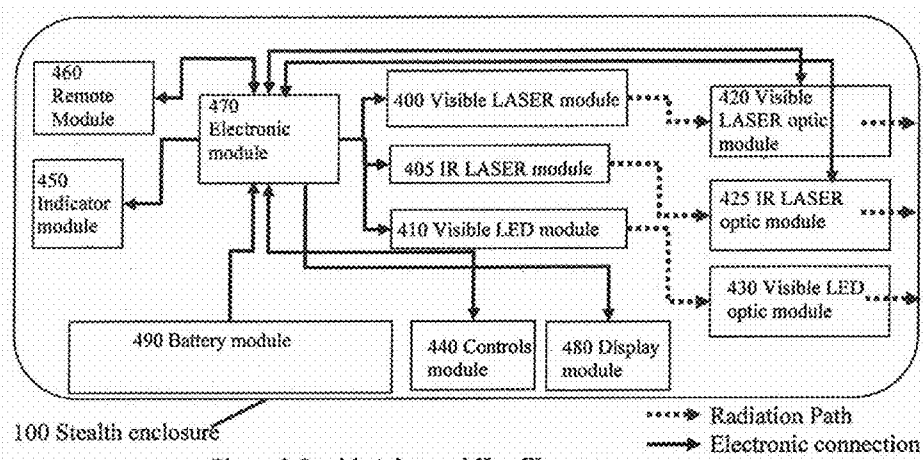


Figure 2 Stealth A Internal Key Elements

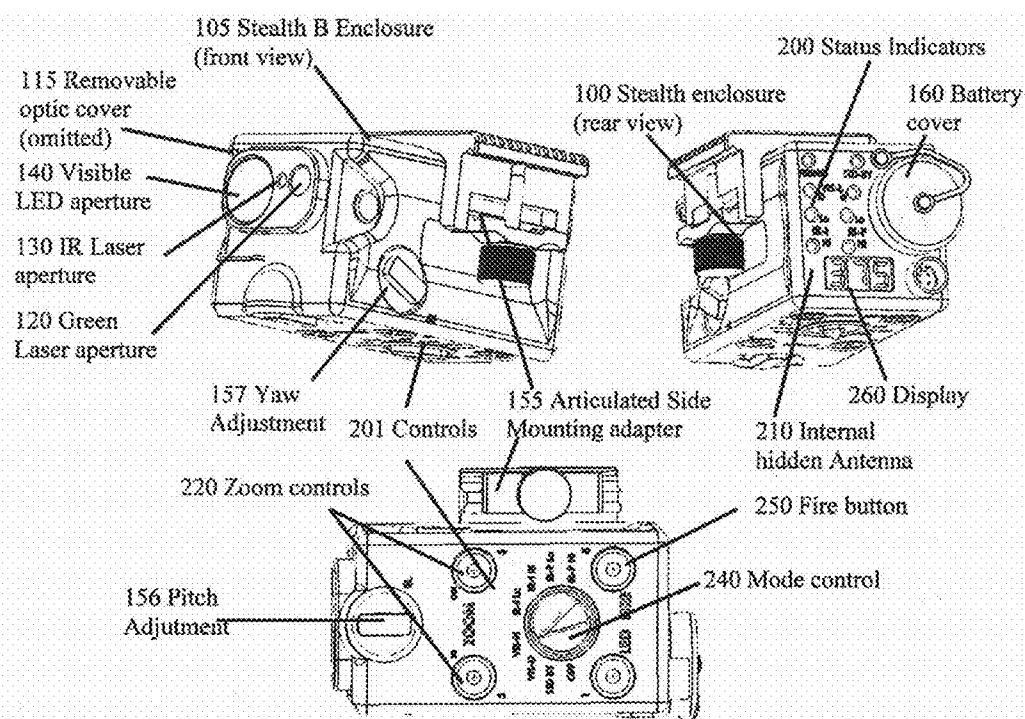
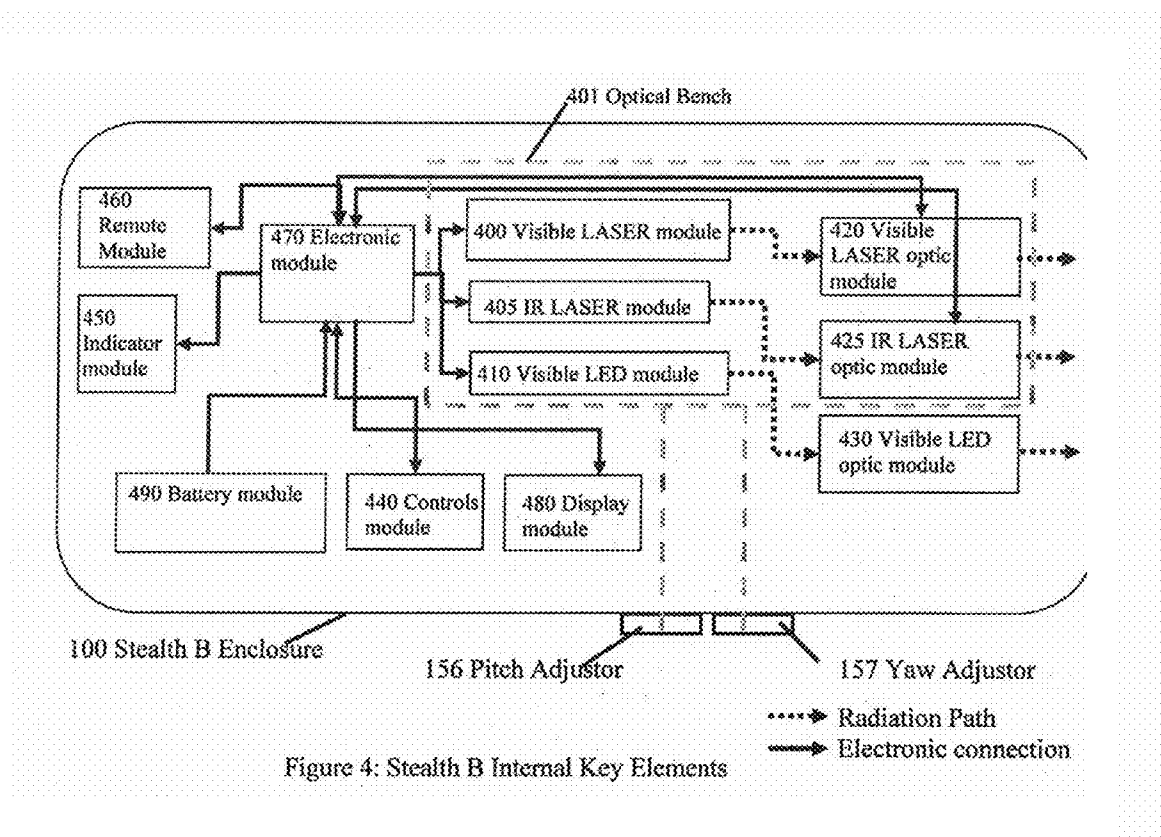
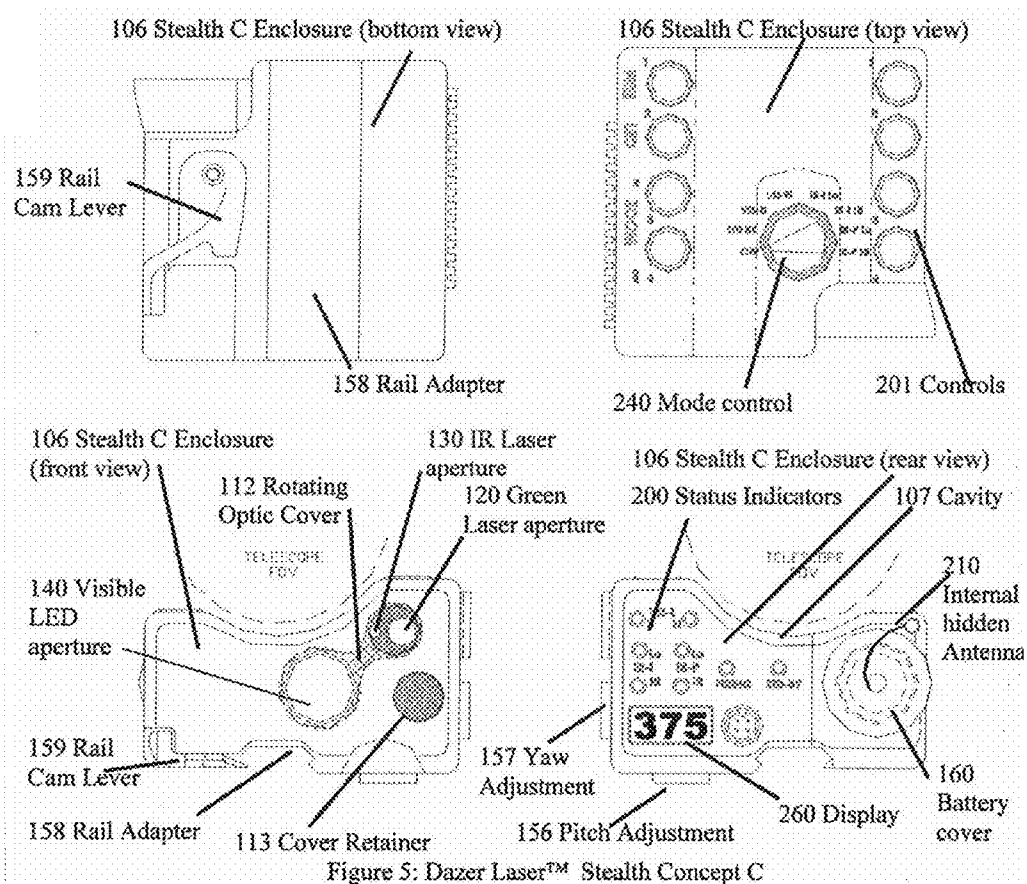


Figure 3: Dazer Laser™ Stealth Concept B





WEAPON-MOUNTABLE NON-LETHAL OPTICAL SECURITY DEVICE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is related to and claims priority from U.S. Provisional Patent Application No. 61/567,159 filed on Dec. 6, 2011, by Robert Battis, et al. titled “Dazer-Laser™ Stealth, which is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0002] This invention generally relates to a multi-function weapon-mountable non-lethal optical security device, and more particularly to a weapon-mountable optical distractor/laser device for optically illuminating, distracting or dazing a person.

BACKGROUND OF THE INVENTION

[0003] Low power white LED flash lights, fixed focus green lasers, and red small collimated beam target designation “pencil beam” lasers have been used individually mounted to weapons. In most implementations, the optical device is mounted in the 3, 6 or 9 O’clock positions on the weapon.

[0004] Optical distractors which operate by “dazing” a target are also known. Such a device is described in detail in several references, such as: provisional U.S. patent application No. 61/273,371 filed on Aug. 27, 2009, by Robert Battis, et al. titled “Dazer Laser Mean Beam Improvement” (hereinafter, “Mean Beam Application”), PCT Patent Application No. PCT/US11/38121, filed on Nov. 26, 2012 by Battis, et al., titled “Diode Pumped Solid State Green Laser” (hereinafter, “Green Laser Application”), which are included herein by reference. This laser, suitable for this application provides the features of a small, efficient, compact and all solid state diode pumped, dual frequency conversion green laser.

[0005] “Dazing” refers to the temporary, safe and reversible physiological effect that a laser beam of radiation has on a subject person’s eyes and brain after the person has received a short dose of safe laser radiation. Dazing usually results in momentary flash blindness lasting a few seconds or as long as the beam is focused on someone’s eyes, followed by a feeling of disorientation, and may also result in a mild headache and motion sickness, which may last several hours. These dazing effects are completely reversible, even after repeated darings. There are several useful articles describing the physiological background for the effects of a dazing laser on a subject person. One such online article is entitled “Temporal Resolution” and is available at <http://webvision.med.utah.edu/temporal.html>. Additional references include: “Flicker an Intermittent Stimulation”, Vision and Visual Perception, Graham, C. H., (ed), New York; John Wiley and Sons, Inc., 1965, and “Research into the Dynamic Nature of the Human Fovea: Cortex Systems with Intermittent and Modulated Light, Phase Shift in Brightness and Delay in Color Perception,” De Lange, *J Opt Soc Am* 48: 784-789 (1958). Dazing is thus a potentially useful non-lethal form of weapon for use in close quarters, for wanting or ocular interruption such as but not limited to security and crowd control.

[0006] Examples of dazing laser devices are also taught in PCT Patent Application Nos. PCT/US10/36893 and PCT/US10/36932, both to Battis, et al., also incorporated herein by

reference. Green-variable focus optical distractors and red targeting lasers are also in use.

[0007] White LED flashlights have also been mounted on weapons, and are useful, in providing illumination of a potential near target. One disadvantage of using a conventional white LED weapon-mounted flashlight is that the white light will be visible, which will give the position of the user away without triggering optical distraction of the threat target.

[0008] It is thus desirable to provide for a small, weapon-mountable device which incorporates a green variable focus optical distractor, Hi power white LED flashlight, and red targeting laser in one small integrated package that can be mounted in all weapon positions. This multi-function device not only provides new and improved optical distraction using variable range and focus and MEAN Beam technology (see Mean Beam Application) but allows the soldier to remove duplicated devices from his weapon.

SUMMARY OF THE INVENTION

[0009] An aspect of the present invention provides a non-lethal multi-range weapon-mountable optical distractor which includes dazing laser technologies in a militarized package with special unique features and multiple wavebands to enhance tactical effectiveness. In an embodiment, the DAZER LASER STEALTH™ by Laser Energetics, Inc., a maximum optical effectiveness within the ANSI safe limit from 1 meter to 1000 meters is provided. In addition, optical effectiveness may be dialed down by the user to suite an engagement scenario, for example: to provide a warning instead of maximum optical distraction.

[0010] In another aspect of the invention, the weapon-mountable laser distractor includes an enclosure with a top surface, bottom surface, the top and bottom surfaces connected to each other by two side surfaces, a front surface and a rear surface. The top surface includes an articulated mounting adapter. The bottom surface includes controls. The front surface includes an integral optic cover and a plurality of apertures. The enclosure surrounds a laser device which includes a battery module in communication with an electronic module controlling a plurality of light generating modules which provide light to a plurality of optic modules. The electronic module is also in communication with a controls module, a display module (480), and an indicator module, and optionally a remote module. In use, the electronic module drives one of the light generating modules to generate light which passes to one of the plurality of optic modules.

[0011] Additional aspects of the invention include the remote module being in communication with the electronic module by either a wireless radio frequency communication interface or by an electrical umbilical cord.

[0012] In another aspect of the invention, the light generating modules include a visible laser module, an infra-red (IR) laser module, and optionally a visible LED module. In an embodiment, the IR laser module and IR laser optic module are controlled by the electronic module to generate either a broad area coverage light beam or a pencil light beam for targeting, or, alternatively by two integrated but separate IR laser sources defined as the IR laser module with separate optical paths through the laser optic modules.

[0013] In another aspect of the invention, the visible laser module and visible laser optic module are controlled by the electronic module to generate a continuously variable diverging laser beam for the purpose of optimizing eye optical distraction at any range within system limits.

[0014] In another aspect of the invention, the visible LED module generates a white light for searching. The integral optic cover may be less than 100% opaque, to allow the user to verify when light is being generated.

[0015] In another aspect of the invention, a mask having a symbol or alphanumeric characters may be provided with the optic cover to allow the projection of a message and/or warning onto a distant surface.

[0016] Another aspect of the invention provides for pitch and yaw control. In one embodiment, a yaw adjustment and a pitch adjustment is provided as controls on the enclosure. In another embodiment, the optic modules further operate to adjustment pitch and to adjustment yaw in response to control input to the controls module, or enclosure mechanical adjusters.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Embodiments will be described with reference to the following drawing figures, in which like numerals represent like items throughout the figures, and in which:

[0018] FIG. 1 provides perspective views of an exemplary optical distractor/laser device that are useful for understanding the present invention.

[0019] FIG. 2 is a block diagram of an exemplary optical distractor/laser device that is useful for understanding the present invention.

[0020] FIG. 3 provides perspective views of an exemplary optical distractor/laser device that are useful for understanding the present invention.

[0021] FIG. 4 is a block diagram of an exemplary optical distractor/laser device that is useful for understanding the present invention.

[0022] FIG. 5 provides perspective views of an exemplary optical distractor/laser device that are useful for understanding the present invention.

DETAILED DESCRIPTION

[0023] In the following description, for purposes of explanation, specific numbers, materials and configurations are set forth in order to provide a thorough understanding of the invention. It will be apparent, however, to one having ordinary skill in the art, that the invention may be practiced without these specific details. In some instances, well-known features may be omitted or simplified so as not to obscure the present invention. Furthermore, reference in the specification to “one embodiment” or “an embodiment” means that a particular feature, structure or characteristic described in connection with the embodiment is included in at least one embodiment of the invention. The appearances of the phrase “in an embodiment” in various places in the specification are not necessarily all referring to the same embodiment.

[0024] An embodiment of the present invention, advantageously provides for a small, weapon-mountable device which incorporates a green variable focus optical distractor, Hi power white LED flashlight, and red targeting laser in one small integrated package that can be mounted in all weapon positions.

[0025] One embodiment of the invention, the DAZER LASER STEALTH™ by Laser Energetics, inc., presents is a non-lethal multi-range optical distractor which combines the DAZER LASER™ technologies as provided in the Mean Beam Application and the Green Laser Application, which are included herein by reference in their entireties, in a mili-

tarized package with special unique features and multiple wavebands to enhance tactical effectiveness. The DAZER LASER STEALTH™ is also referred to herein as the “Stealth”, “the weapon-mountable laser distractor” or simply “laser distractor”.

[0026] An embodiment of the invention includes a hand held or weapon mountable small light weight package, as depicted in FIG. 1. This laser distractor projects a laser beam of radiation (120) which optically distracts and temporarily impairs the vision of the threat. One embodiment of the package concept is illustrated in FIG. 1. The laser distractor uses Laser Energetics, Inc.’s MEAN Beam laser technology, which is explained in greater detail in the Mean Beam Application, which drives the current to the laser. In addition to a Green Laser optical distractor (120) mode the laser distractor includes other radiation modes, including, but not limited to an IR Laser Illuminator/Target Designator (130) mode and a White LED Searchlight (140) mode for area illumination. The multiple apertures are protected by a weather sealed spring loaded integral optic cover (110).

[0027] The laser distractor also includes an optical zoom feature (220), or a variable range and focus feature, which is also described in further detail in the Mean Beam Application, which allows the user to vary the radiation intensity or fluence at any desired range front 5 to 1000 meters by adjusting the radiation beam size. The beam size is adjusted by the zoom control buttons (220), and the display (260) displays the selected range.

[0028] One embodiment of the present invention provides the ability to operate the laser distractor with a remote control (300) button separately tapped to the weapon. This feature allows the laser distractor to be optically zoomed to any desired range, and to then allow radiation to be emitted from one of the apertures (120, 130, 140) as preselected by the mode control (240) switch. The display [260] shows the range setting for the laser mode selected. The remote control button may be either tethered to the laser distractor by an electrical umbilical cord or communicate with it using a wireless RF (radio frequency) link. In order to increase battery life, the remote control mode is preferably activated by the remote control (230) switch.

[0029] The laser distractor is normally activated by the fire button (250), which immediately allows radiation to be emitted from one of the optic apertures based on the control switch mode (240) selected. If the Remote control (230) is activated, the Fire button (250) is also active. Radiation at normal intensity will be emitted from the optic apertures after the Integral optic cover (110) is manually opened. This cover (110) is preferably opened by spring action by relieving the slide latch with a finger or thumb.

[0030] The cover (110) is designed to be less than 100% opaque to allow a trace amount of radiation to be visible to the user. This allows the user to verify proper operation of the selected radiation mode without exposing his position in a tactical situation. In addition to the marginal opacity of the cover, there are fiducial marks which allow the user to judge whether the laser beams are set for short, mid or long range.

[0031] In addition to the tactical radiation modes herein described, the laser distractor provides a training mode wherein the green laser optical distractor (120) aperture is reduced in power to the point where it will not dazzle an individual, but will produce sufficient radiation to allow training in optical zoom control and development of short range tactics.

[0032] An embodiment of the invention also includes an articulated mounting adapter (150) which allows the laser distractor to be connected to any weapon's standard Picatinny Rail and incorporates pitch and yaw adjustment, for the purpose of bore-sighting the laser distractor to a weapon's target aiming device. An additional feature of this mount and the design of the laser distractor package is that it may be mounted below the weapon, and to the right and left sides (3, 6 and 9 o'clock positions) with all features ergonomically accessible.

[0033] Key internal elements of the various embodiments of the laser distractor are illustrated in FIG. 2. These elements are described as follows:

[0034] 1) Visible laser module [400]: Optical Distraction Green Laser operating at 532 nm, controlled by a LEI's MEAN Beam laser technology from the microprocessor in the electronics module.

[0035] 2) IR LASER module [405]: IR Laser operating at 860 or 880 nm which is used as a source for area Illumination (flooding) or Target Designation (pointing).

[0036] 3) Visible LED module [410]: 150 to 250-lumen white LED source for short range visible area Illumination (flooding).

[0037] 4) Visible LASER optic module [420]: Focusable optic module used to project and focus the laser beam between 5-1000 meters.

[0038] 5) IR LASER Optic module [425]: Focusable optic module used to project and focus the IR laser beam from a wide beam for area flooding to a pencil beam for targeting.

[0039] 6) Visible LED optic module [430]: Fixed focus optic to project the LED light with moderate divergence for short range illumination.

[0040] 7) Controls module [440]: Electro-mechanical switch to control operating modes through the microprocessor.

[0041] 8) Indicator module [450]: A series of LED indicators controlled by the microprocessor, for example: power on, low battery, laser firing and remote enabled.

[0042] 9) Remote module [460]: Short range RF receiver and decoder to interpret the 3 signals from the remote button.

[0043] 10) Control electronics module [470]: Microprocessor based electronics that controls all aspects of the Stealth

[0044] 11) Display module [480]: Display to show laser beam range setting or focused range for selected laser mode.

[0045] 12) Battery module [490]: Formed cavity to contain multiple commercial, batteries with proper electrical connection to the electronics module.

[0046] The laser distractor package features a hermetically sealed envelope containing all the key internal elements listed above, except the battery module. This envelop is pressurized to <1 atmosphere with dry nitrogen. The battery module is sealed by a threaded end cover [160] to the prevailing atmospheric pressure.

[0047] One embodiment of the invention referred to in FIG. 1 as "Stealth Concept A" is characterized by the 12 internal features listed above and the external articulated mounting

adapter (150) which allows the Stealth to be connected to any weapon's standard Picatinny Rail. Another important embodiment, referred to in FIG. 3 as "Stealth Concept B", has the articulated mounting adapter (150) replaced with a articulated side mounting adapter (155) that is secured to the weapon's Picatinny Rail in both left and right configurations, and without pitch and yaw adjustment. The pitch adjustment (156) and yaw adjustment (157) in the embodiment of FIG. 3 are placed on the laser distractor body and control internal elements associated with the optical beam projections. "Stealth Concept B" also adds additional status indicators, shifts the location of certain elements and adds body features, all not critical to the underlying concept, but result in a unique Stealth Concept B device enclosure (105).

[0048] Moving the pitch and yaw adjustments from the articulated mounting adapter (150) to the Stealth B device enclosure (105) provides an important internal change to the "Stealth Concept A" internal elements as illustrated in FIG. 2. This change is illustrated in FIG. 4 with the addition of the optical bench (401), which controls the pointing direction or bore sighting of both the visible laser (400) and IR laser (405) with respect to the Picatinny Rail attached to the articulated side mounting adapter (155). All other internal elements of the "Stealth Concept B" are essentially the same as those of the "Stealth Concept A" embodiments.

[0049] Yet another embodiment of the invention is provided as "Stealth Concept C" and illustrated in FIG. 5. "Stealth Concept C" is a modification of "Stealth Concept B" in which the internal components and enclosure controls are shifted to allow a top surface cavity (107) to be formed. This Cavity allows the "Stealth Concept C" laser distractor to be mounted to a weapon's top Picatinny rail or 12 O'clock position without interfering with the field of view of the weapon's telescope field of view (FOV) or mounting. A "Stealth Concept C" laser distractor may alternatively be mounted to any of the other three weapon rail positions (3, 6 and 9 o'clock positions).

[0050] The "Stealth Concept C" laser distractor also features a built-in rail adapter (158) located on the bottom of the enclosure (106) and rail cam lever (159), thus eliminating the external articulated side mounting adapter (155) and articulated mounting adapter (150). The rail adapter (158) is a "Stealth Concept C" enclosure (106) molded negative form of the Picatinny Rail with one side notched to allow the rail cam lever (159) to engage the rail and lock the laser distractor to this Picatinny Rail.

[0051] In addition, the "Stealth Concept C" apertures are relocated and the aperture cover is called the rotating optic cover (112), which covers only the IR and green laser apertures and rotates about the white LED aperture. The cover retainer (113) is an enclosure molded feature to hold the cover when open. Otherwise, the "Stealth Concept C" laser distractor retains all other features of the "Stealth Concept A" and "Stealth Concept B", not specifically delineated here.

[0052] Summary Comparison of Stealth Models

[0053] The following table identifies the key differences between the embodiments of the invention identified above as "Stealth Concept" models "A", "B" and "C":

Feature	Stealth Concept A	Stealth Concept B	Stealth Concept C
Emitted wavelengths		Expanded to 4	
Modes, Electronics & Controls	Essentially the same but indicators expanded and locations of controls modified		

-continued

Feature	Stealth Concept A	Stealth Concept B	Stealth Concept C
Picatinny Rail Attachment	Top of enclosure attached to in-line top module added to main enclosure.	Top of enclosure. Requires separate bracket either offset "L" or straight bracket	Bottom of enclosure, directly mounted to enclosure. No separate brackets or modules required
Weapon attachment positions	3, 6, 9 O'clock but Stealth rotated in 3 and 9 O'clock positions	3, 6, 9 O'clock with no Stealth rotation	3, 6, 9 & 12 O'clock with Stealth rotation in the 3, 6, 9 O'clock
Pitch and Yaw Adjustment	External-top mounted module	Internal with enclosure mounted sealed adjustment knobs	Same as B
Aperture Cover	Flip cover attached	Removable cover on straps	Rotating cover
Battery Operation	2-4 Cr123A	2 CR123A	Same as B
Remote switch control		Same	
Size & Weight	4 × 2.5 × 2.75, <1 lb	4.2 × 2.9 × 2.5, <1 lb	3.5 × 3.8 × 2.3, <13 oz

[0054] Although the invention herein has been described with reference to particular embodiments, it is to be understood that these embodiments are merely illustrative of the principles and applications of the present invention. It is therefore to be understood that numerous modifications may be made to the illustrative embodiments and that other arrangements may be devised without departing from the spirit and scope of the present invention as defined by the appended claims.

1. Weapon-mountable laser distractor comprising:

an enclosure (100) comprising a top surface, bottom surface, the top and bottom surfaces connected to each other by two side surfaces, a front surface and a rear surface; the top surface comprising an articulated mounting adapter (150); the bottom surface comprising controls (201); the front surface comprising an Integral optic cover (110) and a plurality of apertures (120, 130, 140);

the enclosure (100) surrounding a laser device further comprising a battery module (490) in communication with an electronic module (470), the electronic module (470) controlling a plurality of light generating modules (400, 405, 410) which provide light to a plurality of optic modules (420, 425, 430), or shared optic module;

the electronic module (470) further in communication with a controls module (440), a display module (480), and an-indicator module (450);

wherein, in use, the electronic module (470) drives one of the plurality of light generating modules (400, 405, 410) to generate light which passes to one of the plurality of optic modules (420, 425, 430).

2. The weapon-mountable laser distractor according to claim 1, further comprising a remote module 460 in communication with the electronic module (470) for command input.

3. The weapon-mountable laser distractor according to claim 2, wherein the remote module (460) communicates with the electronic module (470) by wireless radio frequency communication.

4. The weapon-mountable laser distractor according to claim 2, wherein the remote module (460) communicates with the electronic module (470) by an electrical umbilical cord.

5. The weapon-mountable laser distractor according to claim 1, wherein the plurality of light generating modules

(400, 405) comprises a visible laser module (400) and an infra-red (IR) laser module (405).

6. The weapon-mountable laser distractor according to claim 5, wherein the IR laser module (405) and IR laser optic module (425) are controlled by the electronic-module (470) to generate either a broad area coverage light beam or a pencil light beam for targeting, or alternatively by two integrated but separate IR laser sources defined as the IR laser module (405) with separate optical paths through the laser optic modules.

7. The weapon-mountable laser distractor according to claim 5, wherein the visible laser module (400) and visible laser optic module (420) are controlled by the electronic module (470) to generate a continuously variable diverging laser beam for the purpose of optimizing eye optical distraction at any range within system limits.

8. The weapon-mountable laser distractor according to claim 1, wherein the plurality of light generating modules (400, 405, 410) comprises a visible laser module (400), an infra-red (IR) laser module (405) and a visible LED module (410).

9. The weapon-mountable laser distractor according to claim 8, wherein the visible LED module (410) generates a white light for searching.

10. The weapon-mountable laser distractor according to claim 1, wherein the optic cover (110) is less than 100% opaque.

11. The weapon-mountable laser distractor according to claim 10, wherein the optic cover (110) further comprises an alpha-numeric mask for shaping a laser beam to project a message.

12. The weapon-mountable laser distractor according to claim 10, wherein the optic cover (110) further comprises a mask comprising a symbol for shaping a laser beam to project a message.

13. The weapon-mountable laser distractor according to claim 1, wherein the enclosure (100) further comprises a pitch adjustment (156) for controlling pitch and a yaw adjustment (157) for controlling yaw.

14. The weapon-mountable laser distractor according to claim 1, wherein one or more optic modules (420, 425, 430) further operate to adjustment pitch and to adjustment yaw in response to the controls module (440) and/or pitch, adjustment (156) and yaw adjustment (157).

15. The weapon-mountable laser distractor according to claim 1, wherein the articulated mounting adapter (150) is

configured to allow mounting the distractor on a weapon at the 3, 6, 9 and 12 O'clock positions.

16. the weapon-mountable laser distractor according to claim 1, wherein the body is contoured and mechanically configured to allow it to mount to a weapon at the 12 O'clock position, without, added brackets, and without, interfering with a weapon telescope.

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