

tor definition lines 83. Overlay retaining straps 85 are affixed to the edges of the display board to permit target overlays to be firmly retained against the display board. Such overlays may be semi-transparent and imprinted with a facsimile of the target, scoring circles, maps of gunnery target areas and the like. The display indicator LED's will then backlight the overlay with the impact location or miss sector.

The impact sensing and display system provided herein is intended to be highly versatile and readily useable in a wide variety of ballistic impact and general wave disturbance location and display applications beyond the pistol range, rifle range, and land or sea rocket or artillery ranges. It is intended that such additional applications as the skilled practitioner in the use of this system may adopt are within the spirit and scope of the invention provided herein. It is also understood that the preceding descriptions and drawings of the preferred embodiment include numerical values by way of example only, and that these values are not intended to limit the scope of the invention. Other numerical values may also be used and still remain within the scope of the invention.

I claim:

1. A method for determining and remotely indicating the location of a source of energy in a defined area comprising:

- sensing the arrival of energy at a minimum of three energy sensors;
- determining a first time difference between the sensing of energy at two sensors;
- determining a second time difference between the sensing of energy at two sensors, at least one of which is other than either of the two sensors used to determine said first time difference;
- remotely indicating the location of the energy source by a matrix of indicators selectively activated according to said first and second time differences and positioned substantially at the intersections of two families of hyperbolic curves; the foci of the first family of hyperbolic curves corresponding to the locations of the sensors which determined said first time difference; and the foci of the second family of hyperbolic curves corresponding to the locations of the sensors which determined said second time difference.

2. A method as described in claim 1 including remotely indicating the relative azimuth of the energy source by an array of indicators selectively activated according to said first and second time differences when the location of the energy source is beyond the limits of indication of said matrix of indicators.

3. A system for determining and remotely indicating the impact location of a projectile in a defined target area, responsive to the primary shock wave created by impact of the projectile upon the target or supersonic passage of the projectile through the target plane, comprised of:

- first, second, third, and fourth acoustic sensors located in sequence around the target area, generating signals in response to the arrival of the primary shock wave;

first logic means receiving signals from said sensors and generating a first time difference signal between receipt of a signal from either said first or

fourth sensor and receipt of a signal from either said second or third sensor;

second logic means receiving signals from said sensors and generating a second time difference signal between receipt of a signal from either said first or second sensor and receipt of a signal from either said third or fourth sensor;

a clock signal generator;

first counter receiving signals from said first logic means and said clock signal generator, and counting clock cycles during said first time difference signal period;

second counter receiving signals from said second logic means and said clock signal generator, and counting clock cycles during said second time difference signal period;

first indicator driver receiving a count from said first counter and selectively activating a plurality of indicator drive buses;

second indicator driver receiving a count from said second counter and selectively activating a plurality of indicator drive buses;

a plurality of indicators, each of which is coupled to a single first indicator driver bus and a single second indicator driver bus and is responsive to simultaneous activation of the two buses to which the indicator is coupled.

4. The system described in claim 3 including means to adjust the frequency of said clock signal generator as required for various shock wave propagation velocities and sensor spacings.

5. The system described in claim 4 including positioning said plurality of indicators in a planar array and aligning said indicators along hyperbolic lines in both axes of the array, the foci of said hyperbolic lines corresponding to the relative locations of the sensors surrounding the target area.

6. The system described in claim 5 including means to terminate counting by said first counter upon reaching a specified count, and means to terminate counting by said second counter upon reaching a specified count.

7. The system described in claim 6 including logic means interposed between said first counter and said said first indicator driver, and logic means interposed between said second counter and said second indicator driver such that the outermost indicators of said array of indicators indicates the relative azimuth of target area impacts or passage beyond the limit of location indication of the array.

8. The system described in claim 5 including means to amplify, filter, threshold detect and latch signals from each of the sensors prior to such signals reaching said first and second logic means.

9. The system described in claim 5 including an indicator panel within which said indicators are mounted, and means to attach graphic works, including scoring areas, target area maps, and the like, to the indicator panel such that said indicators indicate the point of impact on the graphic works.

10. The system described in claim 8 including means to automatically reset said first and second counters prior to starting a countup sequence and means to automatically reset said latches at a predetermined time after the shock wave has passed all sensors.

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