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(54) **Practice target.**

(57) A target towed by an aircraft is used for practice in shooting objects in flight, such as helicopters. However, this method of training is not sufficiently realistic. The invention offers a better method of practice by utilizing a remote-controlled model aircraft which registers passing projectiles and which, under predetermined conditions, emits an indication in the form of a signal to a ground station or an indication in the form of a light signal from the model aircraft.

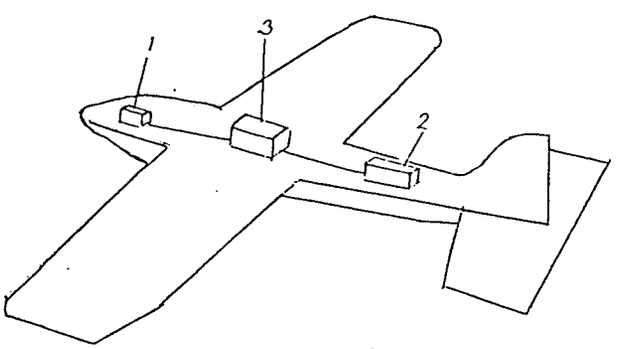

Fig 1.

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Practice target

During the war in Vietnam approximately 80% of helicopters shot down were hit by small-bore fire. The soldiers had had no special training in anti-aircraft shooting before going into action.

In view of the greatly increasing number of attack and transport helicopters in all fighting services it is now desirable to train soldiers in anti-aircraft defence.

Sausage-shaped practice targets towed by aircraft are currently used but these targets are unable to simulate realistic flight behaviour, evasive tactics, etc. These targets can be provided with a hit indicator (in reality a device measuring the miss distance), which records the number of shots within various zones from the indicator.

This means that the troups being trained can only subsequently obtain the result and cannot then relate their success or failure to any particular procedure.

Since the object of training in anti-aircraft defence is not to determine how closely the target was missed, but to hit the target, it is thus more important to indicate whether the target was hit or not, i.e. success or failure.

It is also important from the training point of view that the troups are motivated and that they obtain an immediate response to their efforts.

The present invention, designated the Ripan system, solves the above problems.

Conditions stipulated for the development work:

1) Easy to use.

2) Inexpensive in relation to current equipment.

3) Realistic as to speed and manoeuverability.

4) Immediate response.

5) Only two alternatives: destroyed/not destroyed.

6) Variable degree of difficulty, i.e.

a) variable target size

b) variable number of hits to achieve destruction.

Conditions 1-3 led to the choice of radio-controlled miniature aircraft as a preferred carrier for sensing and indicating members with signal-processor between. Condition 4 is fulfilled by means of pyrotechnical visual indication, flash, fitted on the aircraft. An electric flash or radio-transmission to a "display" on the ground is also feasible.

The important limitation of condition 5 enables fulfilment of condition 6. The target size can be varied by giving the sensor unit a variable sensitivity threshold. In the present case a microphone is selected which senses the pressure surge from a projectile passing at supersonic speed. The amplitude of this pressure surge is proportional to the distance and different thresholds can therefore be selected for this. The miniature aircraft may thus constitute a "virtual" target differing in size from one time to another. The target is "virtual" since the visible target the soldier aims at is always the miniature aircraft.

A buffer for the number of registrations is also included in the signal processor, thus enabling the number of hits for achieving destruction to be varied. Varying degrees of difficulty are thus possible.

The present invention is revealed in the following description, claims and two sheets of drawings, in which

Fig.1 shows a miniature aircraft equipped in accordance with the invention and

Fig.2 shows a block diagram for the connection of the measuring and recording equipment according to the invention.

According to a preferred embodiment "Ripan" comprises the following main components:

The sensor/sensing member is a microphone 1 which picks up signals from projectiles moving at supersonic speed. This also means that the Doppler effect limits the speed range to above 400 km/h.

For the present purpose, i.e. training forces to combat slow-flying aircraft, this is of minor significance. The ammunition from most manual firearms (with the exception of pistol ammunition) is propelled at supersonic speed.

However, the sensor 1 may be electromagnetic in order to avoid this limitation.

The signal processor is a unit 2 in which the sensitivity threshold for the microphone and the number of recorded "hits" required for destruction are set.

When the pre-set number of recorded "hits" has been reached, the processor 2 emits a signal which trips an indication.

The indicator unit 3 may consist of a number of pyrotechnical cartridges giving a powerful reddish flash to ensure good visibility.

The cartridges are disposed of after use, and are replaced by new ones.

The miniature aircraft is radio-controlled and can be guided from the ground both with respect to direction and speed. The plane needs no special start ramp, but is thrown into the air by the "pilot's" assistant.

In the following a preferred embodiment of the measuring and recording equipment comprising the main components 1-3 will be described in more detail with reference to Figure 2.

The equipment consists of five units:

Measuring microphone 4 with built-in adjustable damping unit for the setting of different calibers, signal-processor 5, decoder and detonator

unit 6 which can be programmed for various types of weapons and choices of training programmes, pyro-unit 7 and accumulator unit 8.

The signal-processor, decoder/detonator unit and battery unit are combined to form a hit indicator.

The measuring microphone and pyro-unit are connected to the hit indicator by cabling provided with a contact device.

The hit indicator is based on the principle that a pressure wave (supersonic bang) is generated around a projectile travelling at supersonic speed. The amplitude of the pressure wave decreases as the distance from the passing projectile increases.

The pressure wave is picked up by a measuring microphone and its signal is transmitted to the signal processor.

The in-coming signal is detected and processed in the signal-processor. The analog signal is then converted to digital form. (8 bits parallel.) The digital information is then transmitted to the decoder/detonator.

The digital information, which is proportional to the amplitude from the supersonic bang, is converted in the decoder to a new digital form corresponding to 15 distance zones around the microphone. A pre-set zone is then selected and passed on to a programmable counter which counts the number of detected hits within the selected zone. The counter is adjustable between 1 and 15. When the correct number of hits is reached a firing pulse will be generated to a pyrotechnical charge.

The pyro-unit consists at present of 10 pyrotechnical charges. These are triggered electrically. Selection is performed and the requisite firing pulse generated in the detonator which forms an integral part with the decoder.

All units are supplied with current in any suitable manner, such as from a separate battery unit.

CLAIMS

1. A practice target, particularly for manual firearms, which target is preferably movable over an area such as the surface of a stretch of water or land, characterised in that it comprises a sensing member (1), an indicating member (3) and a signal-processing unit (2) therebetween, said sensing member (1) reacting to passing projectiles.

2. A practice target according to claim 1, characterised in that the sensing member (1) can be adjusted directly or indirectly via the signal-processing unit (2), for projectiles at a predetermined distance from the practice target.

3. A practice target according to claim 2, characterised in that when a predetermined number of projectiles within the predetermined distance is reached, the sensing member (1) and/or the signal-processing unit (2) emits a tripping indication to the indicating member (3).

4. A practice target according to one or more of the preceding claims, characterised in that the signal-processing unit (2) and/or the sensing member (1) can be pre-set for predetermined types of projectiles.

5. A practice target according to one or more of the preceding claims, characterised in that the sensing member (1) is accoustic or electromagnetic, or a combination of both.

6. A practice target according to one or more of the preceding claims, characterised in that a signal emitted by the signal-processing unit (2) can trip a visual indication or an indication transmitted by radio.

7. A practice target according to one or more of the preceding claims, characterised in that the visual indication is either pyrotechnical or electrical, or a combination of both.

8. A practice target according to one or more of the preceding claims, characterised in that the sensing member (1), indicating member (3) and signal-processing unit (2) are arranged in a remote-controlled craft such as a model aircraft.

9. A practice target according to one or more of the preceding claims, characterised in that a signal-processing unit (5), a decoder and detonator unit (6) and a battery unit (8) are combined to form a hit indicator.

10. A practice target according to claim 9, characterised in that a measuring microphone (4) and a pyro-unit (7) are connected to said hit indicator by cabling provided with a contact device.

Fig 1

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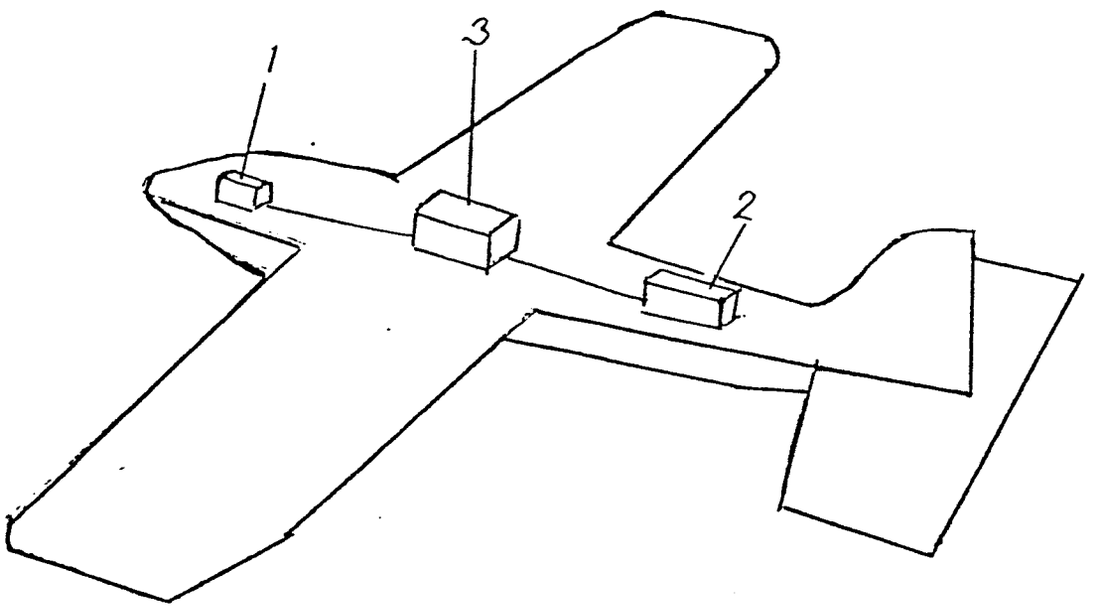

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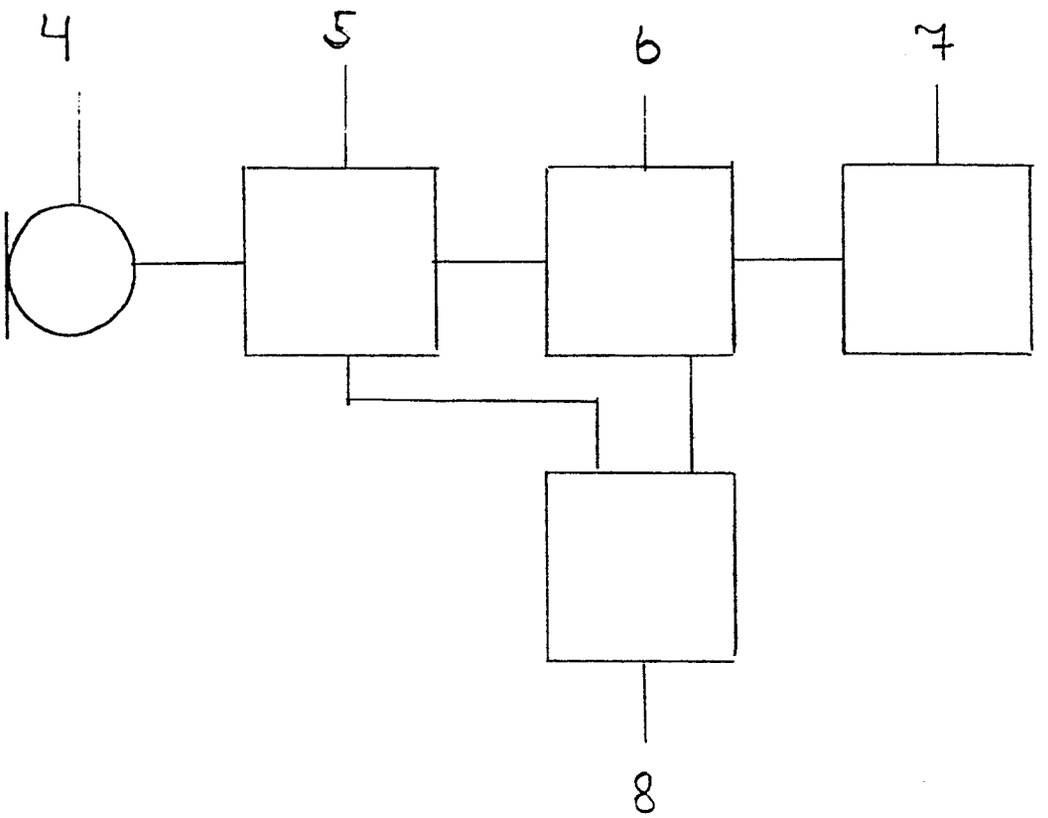
Fig 2



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EUROPEAN SEARCH REPORT

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Application number

EP 85850282.6

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	DE - A1 - 1 703 447 (AKTIEBOLAGET FLYGMAAL AIR TARGET LTD.) * Totality * --	1,2,5, 8	F 41 J 9/08 F 41 J 5/06
Y	SOLDAT UND TECHNIK, 1/1979, page 49, UMSCHAU-VERLAG, FFM. * Dornier "Mini-Drohne" * --	1,2,5, 8	
Y	FR - A1 - 2 365 773 (UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND) * Page 1, line 26 - page 3, line 25; page 8, line 38 - page 9, line 16; fig. 1,2 * --	1,2,4, 5,6,8	
Y	SOLDAT UND TECHNIK, 1/1980, page 46 * Klein-Drohne B 172 * --	1,2,4, 5,6,8	TECHNICAL FIELDS SEARCHED (Int. Cl.4) F 41 J 5/00 F 41 J 9/00
A	DE - A1 - 1 578 241 (FISFELD KURT, DIPL.-ING.) * Totality * --	2,4	
A	SOLDAT UND TECHNIK, 12/1980, pages 701-703 * "Miss-Distance Indicator", page 701; fig. 3,4 * ----	2,4	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	26-02-1986	KALANDRA

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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