

The present invention relates to a device for aiding target acquisition by an operator in an armament system.

5 An armament system consists in a known manner of a unit for detecting and locating targets, such as a radar, and of fire units able to fire towards targets thus located.

10 The present invention relates more particularly to a short-range armament system in which the fire operations are carried out manually by an operator, this assuming that before any fire operation, the operator acquires the target in his viewfinder, and is therefore called upon to look in the direction of the target. To
15 this end, it might be thought a priori that the operator's own means of perception would suffice; in fact, such a method would be ineffective, in particular in the presence of fast targets flying at low altitude and being unmasked at a late stage (for example because of the interposition of natural obstacles such as trees
20 or hills).

A more effective solution consists of a transmission of information from the detection and location system, which moreover acquires the target, to the operator, so as to indicate to the latter, with a view to
25 bringing forward his reaction, particularly the nature of the target, its origin, its approach speed; however the problem then resides in the selection of the communication interface between the detection and location system and the operator. Currently, this is done in the form of
30 an alert, generally given by radio or telephone. However, this method turns out to be very constraining for the operator who, because of the speed of certain targets and the implementation delays of this method, often has very little time to react.

35 In this regard, it is known through the French Patent FR-A-2,078,693, in respect of a target already acquired by an operator, to transmit to the latter vocal fire-correction orders formulated from the information furnished about the target by a detection and location

system. Such an installation consequently suffers from the disadvantages indicated above.

Moreover, the Patent US 2,069,208 describes an arrangement for enhancing the binaural effect in a system which enables the direction of a target to be appraised by listening to the true noises which it emits.

The subject of the present invention is another method of alert which is both less constraining for the operator from a physiological point of view, and more effective operationally.

According to the invention, there is provided a device for aiding target acquisition by an operator, in an armament system comprising a system for detecting and locating targets supplying target-location information, such as defined in the claims.

Other subjects and characteristics of the present invention will emerge more clearly on reading the following description of an embodiment, made in relation to the attached drawings in which:

- Figure 1 is a basic diagram of a device for aiding target acquisition according to the invention;
- Figure 2 is a schematic diagram of a stereophonic signal synthesiser used in a device for aiding target acquisition according to the invention.

The device 1 for aiding target acquisition by an operator in an armament system produces an interface between the detection and location system 2 of the armament system and n operators equipped with stereophonic headphones such as 3_n (just one of which has been represented for greater clarity). This device comprises, associated with each of the n headphones 3_n , a processor 4_n , termed the headphone processor, able to carry out the synthesis of stereophonic signals, under the control of signals received from a calculator 5 with which it communicates.

This calculator 5 itself receives from the detection and location system 2, in respect of each of the targets detected by this system (assumed multitarget) the nature (N), the direction (D_1), the range (d) and the

approach speed (V) of the target.

5 On the basis of this information, known as the target-location information, the calculator 5 formulates information for controlling synthesis of stereophonic sound signals which, when retransmitted to the earphones of the headphones with which the n operators are provided, gives them the subjective sensation of an attack direction corresponding to the true direction in which that of the targets allocated to them lies, in relation
10 to them.

To this end, the direction information is converted by the calculator 5 into phase (ϕ) information, the range information into intensity (I) information, and the speed (V) information into frequency (f) information.

15 Before its conversion into phase information, the target-direction information (D_1) is combined with the direction in which the operator is looking information (D_2), so as to obtain the stereophonic direction of the target in relation to the operator, bearing in mind the inclination of his head.
20

This direction in which the operator is looking information (D_2) can be supplied by a gyrometer platform, or also, bearing in mind the all relative accuracy which is required, by a magnetic system regulated by the local declination; it is then transmitted from the headphone processor 4 to the calculator 5. Once they have been
25 formulated by the calculator 5, the information for controlling synthesis of stereophonic signals is stored in n registers 6_n , for multiplexed transmission to the n processors 4_n .
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As shown in Figure 2, each headphone processor contains, recorded in the read-only memory 7, the binary signals corresponding to the various target natures.

35 The appropriate memory, selected by virtue of the nature-of-target information (N) is read at a rate corresponding to the frequency formulated by the calculator 5, and the signal obtained, after digital/analog conversion in a converter 8 is applied to the input of two stereophonic amplifiers 9 and 10 which furnish the

gains and the phase shifts corresponding to the intensity and phase information transmitted by the calculator 5. The operator thus hears a sound signal which gives him the subjective impression of the direction and of the approaching of the target and informs him about its nature.

The information for controlling synthesis of stereophonic signals is updated by the calculator 5 as a function of the movements of the operator's head, and of the extrapolated motion of the target. The subjective direction of the noise thus always corresponds to the actual direction of the target.

The operator is thus in a position to very rapidly turn to the direction of the target allocated to him and to acquire it.



CLAIMS

1. Device for aiding target acquisition by an operator in an armament system comprising a system (2) for detecting and locating targets supplying target-
5 location information (N , D_1 , d , ϕ), particularly the true direction, the range and the approach speed of a target, and means (1) for furnishing audible signals to the operator, characterised in that the said means (1) comprise:
10 - means (4n) for synthesising stereophonic sound signals intended for the operator, the said synthesis means synthesising, on the basis of control information received by the said means (4n), sound signals similar to those which the operator would hear if an analogous
15 target were in his auditory field in a direction corresponding to the true direction of the target, in such a manner as to give the operator the subjective sensation of an attack direction corresponding to the true direction of the target in relation to the operator; and
20 - means (5) for converting the target-location information received by the said detection and location system (2) into control information supplied to the said synthesis means (4n) and defining the phase, the intensity and the frequency of the said sound signals to be synthesised.
25
2. Device according to Claim 1, in which the target-location information comprises the direction (D_1) of this target, characterised in that this direction is combined, prior to conversion, with the direction (D_2) in which the
30 operator is looking.
3. Device according to one of Claims 1 and 2, in which the target-location information comprises the direction, the range and the approach speed of the target, characterised in that the conversion means (5)
35 comprise a calculator which converts the direction (D), range (d) and approach speed (V) information into phase (ϕ), intensity (I) and frequency (f) information respectively.
4. Device according to one of Claims 1 to 3,



characterised in that the means (4n) for synthesising stereophonic sound signals comprise a read-only memory (7) containing binary signals corresponding to a given target, at the output of which there is placed a digital analog converter (8) whose output is itself applied to two stereophonic amplifiers (9, 10).

5. Device according to Claim 4, characterised in that various types of binary signals are stored in the read-only memory (7), corresponding to various types of targets between which a selection is made by virtue of a supplementary nature-of-target item of information (N) supplied by the detection and location system.