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(54) Distributed launcher network for active radar missiles.

(57) A distributed launcher network (10) is modular in design, employing components which are easily added or subtracted as required by the size and number of the geographical areas to be covered. It employs one or more target sensors (12a-c) which collect target position information and feed it into a target data net (14). The target data net (14) integrates the target position information from the target sensors (12a-c) to form a summary of multiple target activity. One or more fire control centers (16a-b) are plugged into the target data net (14) receiving target position information. The fire control centers (16a-b) issue launch control orders to one or more airborne vehicles (20-a-e) through launchers (18a-e) assigned to their control. After launch, the fire control centers (16a-b) transmit updated target position information to the airborne vehicles (20a-e) under the control.

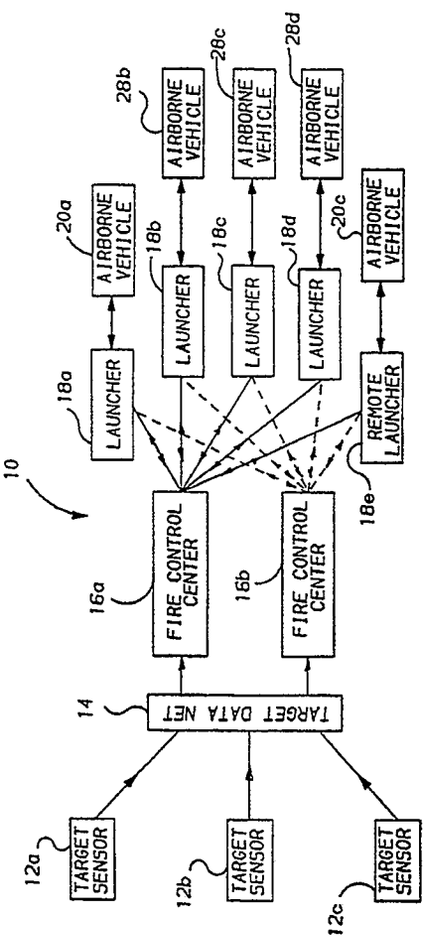

FIG-1

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DISTRIBUTED LAUNCHER NETWORK

BACKGROUND OF THE INVENTION

1. Technical Field

The present invention relates to missile systems and more specifically to a distributed launcher network.

2. Discussion

Traditional weapon systems include a sensor, a communications system, a weapon, a central processing unit, and a fire control computer. For example, a simple weapon system might include the eyes of an observer as a sensor, the pointing finger of the observer as a communications system, a rifle as a weapon, and the operator's brain as a central processing unit and fire control computer. A complex weapon system might include a radar system as a sensor, a set of radio frequency transceivers as a communication system, a missile as the weapon, and a central processing unit and fire control computer as themselves. No matter how complex, traditional weapon systems are located and operated independently of each other, aside from a mutual sharing of sensor information.

In today's multi-threat environment, traditional weapon systems are archaic. Technical developments in weaponry have reduced the time within which to receive and analyze information. When traditional weapon systems are employed, a central command authority has difficulty controlling each weapon system. Because the components of the traditional systems are located together, these systems are easily destroyed. Furthermore, a fixed number of traditional weapon systems can only cover a limited geographical area.

SUMMARY OF THE INVENTION

In accordance with the teachings of the present invention, a distributed launcher network is provided. The network is modular in design, employing components which are easily added or subtracted as required by the size and number of geographical areas to be covered. It employs one or more target sensors which collect target position information and feed it into a target data net. The target data net integrates the target position information from each target sensor to form a summary of multiple target activity. One or more fire control centers are plugged into the target data net for receiving target position information. Each fire control center issues launch and control orders to one or more airborne vehicles through launchers assigned to its control. In the preferred embodiment, the airborne vehicle is the Advanced Medium Range Air-to-Air Missile (AMRAAM), an air-to-air missile used in a surface-to-air mode. After launch, the fire control centers transmit updated target position information to the airborne vehicles under their control.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the following drawing in which :

FIG. 1 is a schematic diagram showing the basic components of the distributed launcher network.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to FIG. 1 the distributed launcher network 10 is constructed in a modular fashion. To the left side of the diagram, one or more target sensors 12a-c obtain target position information. Although three target sensors are shown for clarity, target sensors can be added or subtracted depending upon the size of the geographical area to be surveyed. One form of target sensor envisioned by this invention is a three-dimensional radar system. The target sensors 12a-c are advantageously placed in optimal surveillance locations, away from other network components, and are operated independently of each other.

Target position information from the target sensors 12a-c is fed into a target data net 14. The target data net 14 combines the target position information from each target sensor 12 to form an integrated picture of target activity. Although only one target data net is shown for clarity, more target data nets can be added depending on the number of geographical areas to be surveyed.

The integrated target position information is available for use by the fire control centers 16a-b. Only two fire control centers 16a-b are shown ; however, in keeping with the modular nature of the system, fire control centers may be added or subtracted as required by the tactical situation. The fire control centers 16a-b are assigned a specific geographical area of responsibility. Fire control center operators monitor their areas of responsibility and send launch and control orders to their assigned launchers 18a-e.

The location of the launchers 18a-e is recorded on a grid system. A common reference, from which angular course direction is measured, is also noted on the grid system. The launchers 18a-e are programmed to receive control orders referenced to their own position on the grid system. Therefore, target position information is converted into launcher coordinates

before being used to generate a launch message. The launchers 18a-e and airborne vehicles 20a-e receive launch and control orders via a secure communications link. After launch, the airborne vehicles 20a-e continue to receive updated targeting information via the secure communications link.

In the preferred embodiment, the airborne vehicles 20a-e are the Advanced Medium Range Air-to-Air Missile (AMRAAM). This missile is adaptable for use in other environments besides air-to-air. In the preferred embodiment of the distributed launcher network 10, it is being deployed as a surface-to-air missile. Other embodiments envision use of the missile in a combination of environments. Any launching platform capable of communicating with the fire control centers 16a-b can become part of the distributed launcher network 10.

The present invention has several advantages over the prior art which are readily apparent to one skilled in the art. The invention gives battlefield commanders the flexibility of placing the target sensors 12a-c in optimal surveillance locations and the launchers 18a-e in optimal locations for defending tactical positions. The number of launchers 18a-e and target sensors 12a-c is variable and launcher assignments can be changed from one fire control center 16 to another. The dashed and solid lines between the fire control centers 16a-b and the launchers 20a-e reflect this interchangeability. Thus, the relative size and fire power of the network 10 is discretionary and permits continual adjustment as tactical conditions vary.

The distributed launcher network 10 is less vulnerable to destruction than traditional weapon systems. Locating the launchers 18a-e remotely from the target sensors 12a-e makes them far less vulnerable to destruction by a weapon which is attracted by the presence of an emitting target sensor. Due to the distributed nature of the network 10 the launchers 12a-e are much less likely to be spotted by aerial reconnaissance ; there is much less heavy equipment assembled in the same location. Because it is less vulnerable to destruction, it provides a greater defense of a given area than a traditional weapon system.

Finally, the distributed launcher network 10 has other advantages. It has better freedom of movement than a traditional weapon system. Instead of shutting down the entire launcher battery and loosing all capability during tactical movement different modules may be unplugged and moved independently leaving the rest of the system operational. The invention also provides better coordination of fire power. Multiple simultaneous launches airborne vehicles to defend against enemy wave raids is possible. Each launcher has a full 360° azimuth capability.

Although the invention has been described with particular reference to certain preferred embodiments thereof, variations and modifications can be effected within the spirit and scope of the following claims.

Claims

1. An apparatus for controlling at least one airborne vehicle, said apparatus comprising :
   (a) at least one control means for controlling the launch and flight of at least one of said airborne vehicles ; and
   (b) at least one launcher communicating with the control means but spaced therefrom a sufficient distance such that distruction of the control means would not destroy the launcher.

2. The apparatus of Claim 1, further comprising :
   (c) at least one target position sensor communicating with said control means but spaced therefrom a sufficient distance such that destruction of the target position sensor would not destroy the launcher.

3. The apparatus of Claim 2, further comprising :
   (d) at least one integrating means for combining the target position information from each target position sensor for use by said control means, said integrating means being spaced therefrom a sufficient distance such that destruction of the target position sensor would not destroy the integrating means.

4. The apparatus of Claim 3, wherein said control means comprises at least one fire control center.

5. The apparatus of Claim 3, wherein said integrating means comprises at least one tactical data net.

6. The apparatus of Claim 3, which is modular in construction and includes a plurality of target position sensors, integrating means, control means, and launchers.

7. The apparatus of Claim 3, wherein said airborne vehicle is a missile.

8. The apparatus of Claim 3, wherein said launchers are geographically distributed, being spread out to maximize area coverage.

9. The apparatus of Claim 3, wherein said launchers have a 360° azimuth capability.

10. The apparatus of Claim 3, wherein said launchers include a guidance means for transmitting updated target position information to said airborne vehicles.

11. The apparatus of Claim 3, wherein said control means includes means for communicating with each of said launchers, said communications means being capable of receiving launcher and airborne vehicle status information and issuing control orders to said launcher and airborne vehicle.

12. The apparatus of Claim 3, wherein said target position sensors are geographically distributed, being spread out to maximize surveillance area.

13. The apparatus of Claim 3, wherein said target position sensors are capable of generating three-dimensional target position information.

14. An apparatus for controlling at least one airborne vehicle said apparatus comprising :
(a) at least one control means for controlling the launch of at least one of said airborne vehicles ;
(b) at least one launcher, said launchers being geographically distributed to maximize area coverage, said launchers having a 360° azimuth capability, and said launchers including a guidance means for transmitting updated target position information to said airborne vehicle after launch ;
(c) at least one target position sensor ; said target position sensors being geographically distributed, being spread out to maximize surveillance area, said target position sensors being capable of generating three-dimensional target position information ; and
(d) integrating means for combining the target position information from the target position sensors for use by said control means.

15. The apparatus of Claim 14 which is modular in construction and includes a plurality of target position sensors, integrating means, control means, and launchers.

16. A method for controlling at least one airborne vehicle, said airborne vehicle being a part of a distributed launcher network comprising at least one target sensor, at least one launcher, and at least one controlling means for controlling the launch and flight of said airborne vehicle, said controlling means having a communications means for communicating with said launcher and said airborne vehicle, said method comprising :
(a) receiving target position information from at least one target sensor ;
(b) combining target position information into a summary of multi-target activity for use by at least one of said controlling means ;
(c) sending updated position information and launch and control orders using said communications means to at least one of said launchers and airborne vehicles ; and
(d) sending updated position information using said communications means to said airborne vehicle after launch.

17. The method of Claim 16 wherein said airborne vehicle is a missile.

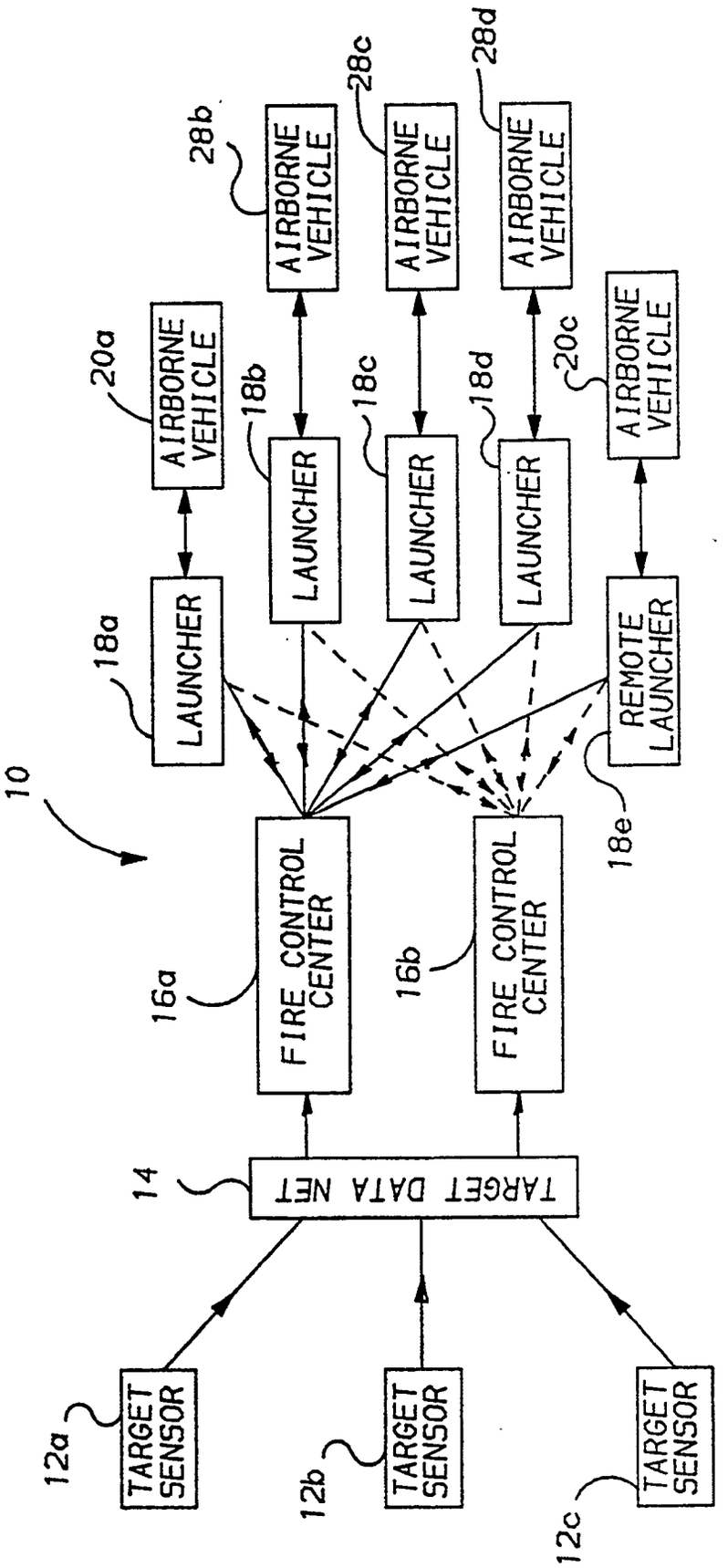
10
12a
TARGET SENSOR
12b
TARGET SENSOR
12c
TARGET SENSOR
14
TARGET DATA NET
16a
FIRE CONTROL CENTER
16b
FIRE CONTROL CENTER
18a
LAUNCHER
18b
LAUNCHER
18c
LAUNCHER
18d
LAUNCHER
18e
REMOTE LAUNCHER
20a
AIRBORNE VEHICLE
20c
AIRBORNE VEHICLE
28b
AIRBORNE VEHICLE
28c
AIRBORNE VEHICLE
28d
AIRBORNE VEHICLE

FIG-1