TECHNOLOGY

Pushbutton Warfare Now

Remote-controlled airplanes, tanks, jeeps and landing craft now being tested in military maneuvers point to the possibility of pushbutton warfare with less danger to human lives.

➤ PUSHBUTTON WARS fought by unmanned, remote-controlled tanks, jeeps, airplanes and landing craft have been taken from the future and made present possibilities.

Already military maneuvers, "war games," have been fought in part by advanced and, until now, secret equipment. Mock battles have been held "very successfully," and new equipment has been subjected to rigorous tests "without endangering the lives of human operators," military officials and defense contractors told SCIENCE SERVICE.

Television-equipped forward reconnaissance jeeps are able to penetrate enemy lines, scan defenses and send information back to commanders many miles away. The "drivers" of the unmanned jeeps are located within the safety of their own lines.

One recent development is a Marine Corps amphibious landing vehicle controlled from a helicopter hovering overhead.

Officials of Lear, Inc., Grand Rapids, Mich., who devised the electromechanical control linkages that convert radio signals into the "muscle work needed for steering, braking and throttle operation," said the development not only puts troop and equipment landings into the pushbutton warfare field, but also saves lives during tests of new equipment.

Low-flying helicopters have controlled new LVT (Landing Vehicle, Tracked) models through pounding surf and tricky currents at Monterey and Camp Pendleton, Calif., without risking the lives of human test drivers, a Lear official said.

The same vehicles, carrying supplies or reconnaissance television cameras, could be operated by "drivers" on ships several miles away, out of range of shore weapons, one Lear official said.

"This equipment can be operated from a range of at least up to 50 miles and depends only on the strength of the transmitted radio control signal.

"There is no reason why Army tanks equipped with almost the same remote control equipment and TV eyes could not fight pitched battles far from the control centers," he said.

The newest remote control equipment is "almost identical in principle and very similar in its mechanics" to that controlling "drone" anti-aircraft target planes.

The major differences are in considerations of weight, space, and the force required for operating the controls. Engineers also had to develop satisfactory waterproofing for the Marine Corps landing vehicle equipment.

The Army recently announced a line of remote controlled target aircraft, at least one of which is being tested as a camera-carrying "spy" for use over enemy territory.

Science News Letter, May 31, 1958

BLACK-HEADED RHODE ISLAND RED—This 21-day-old chick survived an operation in which it received a transplant of embryonic head tissue from a different breed of chicken. Mira Pavlovic, who performed the transplant, is observing the chick.

BIOLOGY

Embryo Chick Survives Head Transplanting

➤ A chick that lost its head but received a new one in its place is helping scientists discover the secrets of tissue and cell differentiation.

Six chicks from among 100 Rhode Island Red embryos have survived an operation in which they received head tissue from another breed of chicken and hatched. One chick with a transplanted head lived 70 days, believed to be a world record, Yale University has reported.

The transplants were made by Mira Pavlovic, a Yugoslav biologist and research associate at Yale University. They were made within 33 to 40 hours after incubation, before the chick embryo's circulation system was established. This proves, according to some scientists, that early in embryonic development the tissues of different hosts are compatible—one head took the place of a second one.

In addition, tissue differentiation, the formation of head, the various internal organs, skin and bones from look-alike embryonic tissue, appears to take place after the circulatory system is developed.

The current experiment, Miss Pavlovic said, may lead to similar transplants in mammals.

So far, she has not been able to find any difference in the behavior of chicks with transplanted heads and those with their own heads. Two chicks that lived for 70 and 55 days were both smaller than unoperated ones.

In the extremely delicate operation, a square opening is made in the egg shell. A pair of special watchmaker's forceps is used to cut through the middle of the embryonic mesencephalon or midbrain. The detached tissue is then removed with a suction pipette and placed on the prepared embryo of another chick that has been similarly "decapitated." The window in the shell is then covered and the egg placed in an incubator.

The region of the head that is transplanted includes the developing eyes and ears, the forebrain, half the midbrain, and the upper beak of the chicken.

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