Thermoplastic Recording

A laboratory technique transforms TV picture signals into visible patterns on charged transparent film — produces electrical, optical, and optical images.
How RCA’s WWII Military Television Development Shaped Modern Warfare

By

Maurice Schechter
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TV CONFERENCE USE ONLY
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WORLD PREMIERE!

Walt Disney's
WONDERFUL WORLD OF COLOR

Walt himself hosts the premiere of "The Wonderful World of Color"—animated cartoons, animal stories, fiction classics, adventure, variety shows—beginning with the zany adventures of Donald Duck's uncle, Professor Ludwig Von Drake, in "Mathmagic Land." Don't miss it!

SUNDAY, SEPT. 24, IN COLOR, 6:30 PM, CH 2 – 7:30 PM, CH 4-5

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RADIO CORPORATION OF AMERICA

TV GUIDE A-21
The results may be startling
with the art of Ludwig von Drake
driving the mules or animals, and
disney has often spoken
Moore PAINTS

A WONDERFUL WORLD OF COLOR
Walt Disney's
WONDERFUL
WORLD
OF
COLOR
Ludwig Von Drake Meets the NBC Peacock:
Walt Disney and the COLOR Television Revolution

Presented by
Jim Fanning
Waldemar J. Poch: Beyond the Soviet Television Project
Television at Kansas State University
Manhattan, Kansas
1951-1962

[Content on the screen]
I'D LOVE TO-VISION YOU FOR MY VALENTINE
Airborne Television Recon-
a range of 200 Miles

The equipment and the NAVY engineering department for this

installation. The arrangement of this equipment in a Navy DH-4

plane is illustrated in the diagram below and the photos on

these pages. The camera is provided, one on the nose and

one in the fuselage near the tail. Associated equipment is pre-

pared entirely in BLOCK, but equipment same elaboration.

The most important difference in the transmission tube (see photos)

which produces approximately 1000 watts at frequencies of the order

of 100 cycles per second. This power, obtained from a non-direction

able source on the upper side of the fuselage, provides

good reception up to 200 miles away. (From an altitude of

22,000 feet).

The 1 KW. 100 cc. transmitter, and associated

air filters used with the NAVY equipment.

Interior view of the transmitter in airplane.

Two (2 A-2223) on the lower section, pro-

vide a power of one kilowatt at 100 cycles.

Power supplies and modulators are separate units.

(Left) Installation of R.F. equipment in

a Navy (DH-4) plane. Components are

drilled by irons on chassis, in following

1. Conversion Unit

2. Flight Monitor No. 1

3. Flight Monitor No. 2

4. Oscillator

5. Oscilloscope Calibrating Unit

6. Modulator Circuit Board

7. Control Unit and Fines Amplifier

8. Power Supply for Video equipment

9. A.C. Battery Box

10. D.C. Battery Box

11. Relay, Relay, Transmitter

12. Strobe

13. Plate and Bias Supply for A-1

14. Plate and Bias Supply for A-2

15. Plate and Bias Supply for A-3

16. Plate and Bias Supply for A-4

17. Transmitter Plate and Bias Supply

18. Transmitter Antenna

19. Conversion Unit
This is "RING" - a deluxe naissance Equipment with

The airplane equipment that has been developed for the "RING" system is basically an extension of our regular equipment which has been designed for the purpose of providing the best possible service for the passenger. The "RING" system has been developed for the passenger who requires the very best in service. A diagram of the equipment is shown below for further information.

Note all the RING equipment as it is arranged in the plane. The equipment is used for the comfortable and safe transportation of passengers.
THIS IS THE "ROC" THE HIGH-ANGLE TELEVISION GUIDED BOMB FOR WHICH "MIMO" WAS DESIGNED

MIMO CAMERA is shown in the photo with and without case. The unit is shown in the plane view and some of the ROC camera is shown. The MIMO Camera is a mechanical and electrical system which is enclosed in a metal case. The camera, which consists of the focusing circuits and other components, is mounted inside the tube as shown.

MIMO TRANSMITTER is shown in the photo. The transmitter consists of a printed circuit board and a control panel. The transmitter is mounted on the control panel, which is shown in the picture. The transmitter is approximately 5 inches wide and 12 inches deep. It weighs only 7 pounds compared to the ROC Transmitter, which is approximately 500 pounds.
**THIS IS "MIMO" THE NEW STILL SMALLER AIRBORNE TELEVISION EQUIPMENT**

This equipment has just been declassified and is shown here for the first time.

The equipment shown on the preceding page was satisfactory for hourly use in the field. However, for more stabilized systems such as the ROC, which has a relatively long range, a smaller equipment was desirable. To meet this need, RCA engineers developed the MIMO equipment using as a start the Miniature Image Orthicon. This tube, which is smaller in design to the Image Orthicon. This tube, which is smaller in design to the Image Orthicon.

This is the complete MIMO equipment which goes in the ROC. The camera, transmitter, and receiver are shown separately in the pictures on this page. The MIMO junction box (right) has the demonstrator mounted inside and yet is half the size. A larger block junction box (which is required in addition to the transmitters). The large weight savings in main units, together with some savings in weight of cables, result in a total weight of the MIMO equipment of 30 pounds in comparison with the equivalent weight of 90 pounds for the BLOC equipment. In addition, all of the MIMO units are smaller so that they may be more easily fitted into the slender baggage of the ROC.
The development of smaller, more sensitive Television Cameras was greatly accelerated by war requirements—here are three stages.

**ECONOMIC CAMERA** using an image-orthicon-type pickup tube similar to present studio-type, but smaller in size, was the first camera used with BLOCK equipment. Illustration above shows, left to right, the camera, the camera scope and the camera shown with extra converter. More than 1,000 of these cameras were manufactured by RCA during war.

**ORTHICON CAMERA** was the second step in the evolution of BLOCK camera. This camera used the relatively more sensitive ORTHICON, a pickup tube developed just before the war by RCA engineers. This camera was an intermediate type which was quickly superseded and hence only a few were made.

**IMAGE ORTHICON CAMERA** represented the third step in camera development—and the final step as far as the BLOCK equipment was concerned. This camera, using the Image Orthicon, which is 100 times as sensitive as the image orthicon, made it possible to use the BLOCK equipment under conditions of poor lighting, at dusk, dimly lit, or in twilight.

For details of a new still smaller camera see next page.
Closeups of the Television Equipment used in the Bomb and the Control Plane.
This is a series of pictures taken from the screen as the Bomb approached a target in Germany.

The series of pictures above (view sequence master in upper right corner) are single frames enlarged from a 16mm movie showing a GLC 125K Bomb approaching a target in Germany. The rate of approach can be judged by noting the increase in size of the white splash (apparently a plowed field near the target of the scene). Here again the reproduction leaves much to be desired. However, the series is of interest as representative of an actual bombing run.
This is what the Bombadier sees—

In the same way, the Bombadier, when approaching the enemy, is guided by the temperature and sound of the refrigerator. He is]
This is what a Television Bomb looks like.

This is a side view of the Army's G.I. I bomb. The television camera is in the hollow compartment below the main body of the bomb. The front end of the cylindrical body contains the television transmitter, which sends the picture back to the mother plane. A radio receiver, which picks up the control signals from the plane and actuates the severe control mechanism, which compasses the rearward motion to control the bomb's course.

This is a front view of the G.I. I bomb. The small wing serves as a "braked" glide angle, thus allowing it to nosewheel below the body of the bomb so it can be aimed toward the target. The television camera is set precisely because of the accuracy of the system of controlling the movement around the camera.

This view of the G.I. I bomb shows the exact advantage the transmitting screen and the automatic control surfaces. The television antenna of the directional type, is mounted in such a position that the maximum radiation is backward with respect to bomb's flight path, but in the direction of the "mother" plane. The television receiving antenna on the mother plane, however, is non-directional so that it may turn in any direction during the time the bomb is under control.
This is how the Bomb is Launched.

The bomb was dropped by a G.1 fighter from 15,000 feet, and the photograph shows the bomb dropped from the plane. The bomb was carried in a special container and released at high altitudes. The container opened upon release, allowing the bomb to fall towards its target. The bomb was then guided by radar and radiocontrolled devices to ensure accurate delivery. The process required precise timing and coordination between the pilot and the ground control.
This is the Television Equipment in the Bomb -

This is the television camera which is mounted in the middle of the bomb. It is a 200 line black and white camera which is triggered by a high voltage pulse. The camera is designed to be aimed in any direction in which the bomb is launched. The camera is mounted in a metal enclosure which is sealed to prevent any external air from entering. The camera is powered by a small battery which is kept separate from the rest of the equipment. The camera is aimed by using the instrument labeled "ASW" which is located on the side of the bomb. A detailed description of this equipment is given on page 59.
A drawing and a photograph are shown. The text is not clearly visible due to the image quality.
A TELEVISION GUIDED, RADIO-CONTROLLED DORIC GLIDER

In January 1948, the Farnborough Testing Establishment at BAE issued a technical paper describing a new type of jet-powered glider with a unique control system. The glider, known as the "Doric," was designed for high-altitude research flights and had a wingspan of 12 meters. The control system, which involved a television camera mounted on the nose of the aircraft, allowed for remote piloting and monitoring of the glider's flight data.

The Doric glider was powered by a jet engine, and its control system was controlled remotely via radio signals. This allowed for precise maneuvering and adjustment of the glider's flight path. The glider's design and construction were supported by the Royal Air Force, and it played a significant role in the early development of jet-powered aircraft technology.

The Doric glider was a pioneering achievement in the field of remote-controlled flight, and its success paved the way for future advancements in aerospace engineering.
IS AN RCA DEVELOPMENT

"BLOCK" and "RING" Equipments Demonstrated by RCA and the Navy at Anacostia in March are the Culmination of Ten Years Work on Airborne Television

the windshield of the lighthouse became dark and a "shimmering"
scenery could barely be detected on the ocean's peak. Pilot
motioned the three men down; the Pilot turned the lighthouse
and the lighthouse filled the screen—and then vanished.
The command was to "Assemble the equipment" as the lighthouse
of the lighthouse, instead of being shown in the viewfinder, was
image of the target and surrounding area along the horizon was
of the plane's longitudinal axis. A high frequency trans
ion of the plane was transmitted to the camera, and
The image was recorded on a film taken off the camera's lens. This
A 1934 IDEA

At the time this outlined various methods of steering or radio
of a television receiver, and the image was recorded on a
The "monoplane," which allowed the lighthouse, differed
The "monoplane," which allowed the lighthouse, differed
from the one that had been used before in these coastal
radio-controlled drones could be controlled remotely by radio.
features of the drone. The drone was able to "see" by means of a
in the case of the drone, the operator and the drone were Optical
A television camera
in November 1940, the United States television-guided missiles, a vehicle
in the case of the drone, the operator and the drone were Optical
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Image of the target and surrounding area along the horizon was
AIRBORNE TELEVISION

by HENRY E. RHEA, Manager
TELEVISION TRANSMITTING EQUIPMENT SALES
Engineering Products Department

A Very TDF Transmitter was devised consisting of a thousand foot reel of wire which was wound around a spool held in a frame. The reel was then mounted on a truck and operated by remote control from a control room. The transmitter was used for aerial television broadcasts and transmitted signals over long distances.

In 1934, the first television system developed specifically for aerial television was tested. This system utilized a special transmitter and receiver combination. The transmitter emitted a signal in the form of high frequency carrier waves which were modulated by the picture to be transmitted. The receiver at the receiving end of the link then detected the modulated carrier waves and reproduced the original picture on a cathode ray tube.

In 1935, the first television system designed specifically for aerial television was tested. This system utilized a special transmitter and receiver combination. The transmitter emitted a signal in the form of high frequency carrier waves which were modulated by the picture to be transmitted. The receiver at the receiving end of the link then detected the modulated carrier waves and reproduced the original picture on a cathode ray tube.

In 1936, the first television system designed specifically for aerial television was tested. This system utilized a special transmitter and receiver combination. The transmitter emitted a signal in the form of high frequency carrier waves which were modulated by the picture to be transmitted. The receiver at the receiving end of the link then detected the modulated carrier waves and reproduced the original picture on a cathode ray tube.
The Incomparable Muntz TV
America's Television Triumph!
Color TV in 1932?

This TV set uses a mirror screw we acquired from a former Bell Labs engineer. It was originally used in their early television experiments. In 1932 it produced a black and white picture, but we have made it display color pictures.

John Logie Baird produced the first color television images in 1928, using a Nipkow disk.
FIRST TIME at DAVEGA
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Use The Only Approved Color System

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FOOTBALL IN FULL-COLOR

9 MAJOR COLLEGE GAMES
PACIFIC-WIDE COVERAGE

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Davega Will Give A Big Allowance For Your Trade-in TV, Radio, or Phone. The Value Of Your Trade-in May Mean...

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DAVEGA
Image Dissectors

The image dissector was invented by Philo T. Farnsworth in the late 20s and was the first successful camera tube. The tube required too much light to be practical in most applications. The view was on an oscilloscope and it was made in the late 30s and used in x-ray and power plants. The cathode was made in the early 40s.

ATI Monoscope

Monoscope tube made by the American Television broadcast students (late 30s - early 40s). Usually there is a pattern of some sort on the target (right). This tube has a sectional end cap.
This kit converted a small screen black and white TV set to color. It was assembled in the mid 50s by Edward Hauff, a Columbus resident who was an engineer for channel 6. It was kindly donated to the museum by his wife.
The Col-R-Tel was designed to be put in front of a ten-inch black and white TV set to convert it to color. It has a large plastic wheel with one segment containing each of the three primary colors. The wheel is turned by a small electric motor. This unit was donated by Dick Carr of Warren, New Jersey.

<table>
<thead>
<tr>
<th>Screen Size</th>
<th>12 inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year Made</td>
<td>1953</td>
</tr>
<tr>
<td>Original Finish</td>
<td>Not Restored</td>
</tr>
</tbody>
</table>
Admiral Ambassador
C322C16

This set was one of Admiral's first 21 inch production sets introduced in 1957.

Specifications:
- Screen Size: 21 inches
- Gauge: 15.5
- Cabinet: Not Restored
- Finish: Original
- Electronics: Original

[Frame details]
Admiral Ambassador
C322C16

This set was one of Admiral's first 21 inch production sets, introduced in 1957.
1939 Television Kit Chassis

This is a pre-war kit chassis that was built by an RCA tube engineer in 1939. It tunes two channels, using some of the same parts as the RCA TRK series. The design came from the Sickle's company, which made the IF transformers.

Philco Television Oscilloscope

Introduced by Philco in 1939 specifically for television servicing.
This tube was made in 1939, and used in all U.S. 12 inch mirror in lid sets.

The reason for the mirror in lid design is that the 12AP4 is so long that a set made with the tube mounted horizontally would stick out too far from the wall.