

What a piece of worke is a man!

how Noble in Reason?

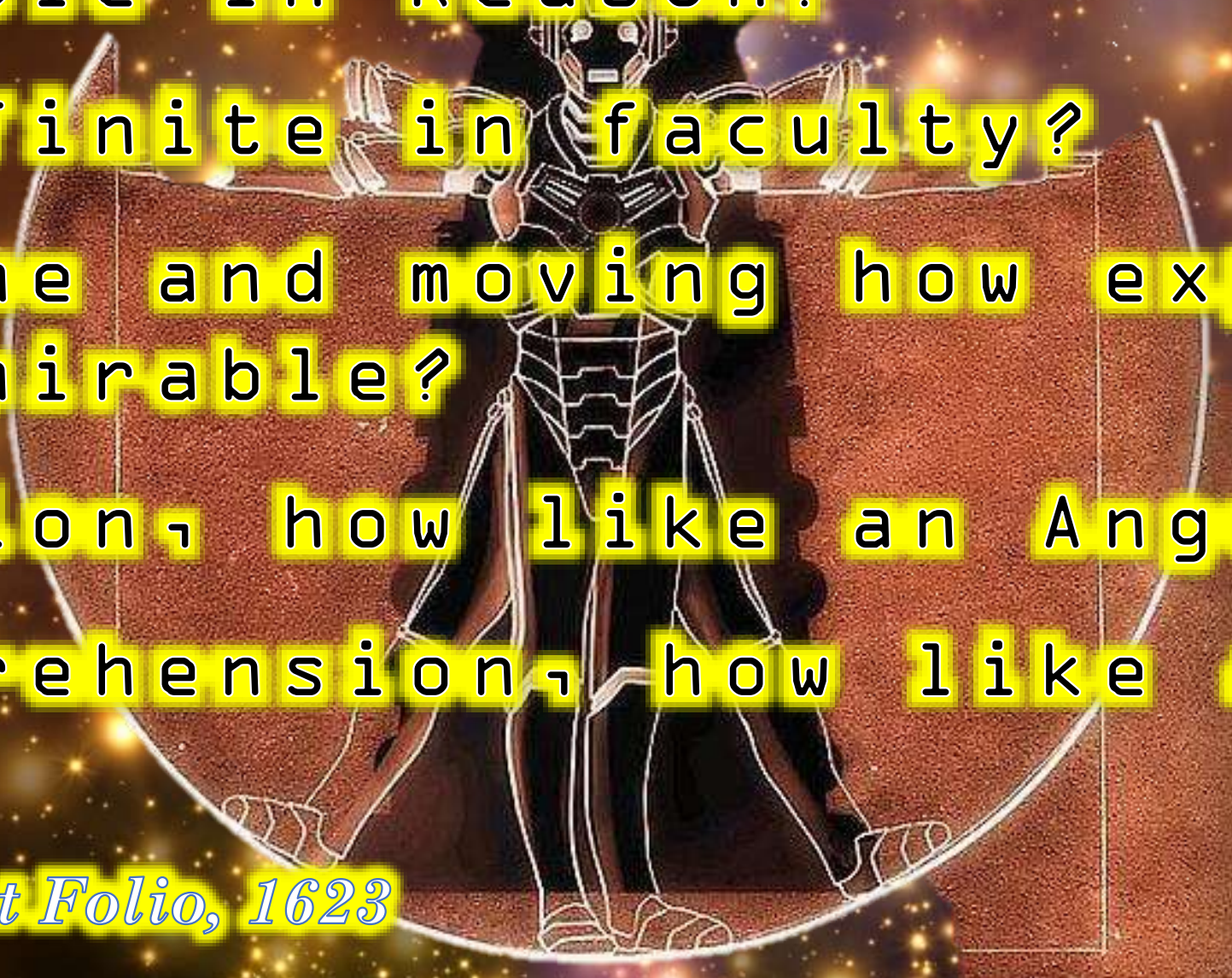
how infinite in faculty?

in forme and moving how expresse
and admirable?

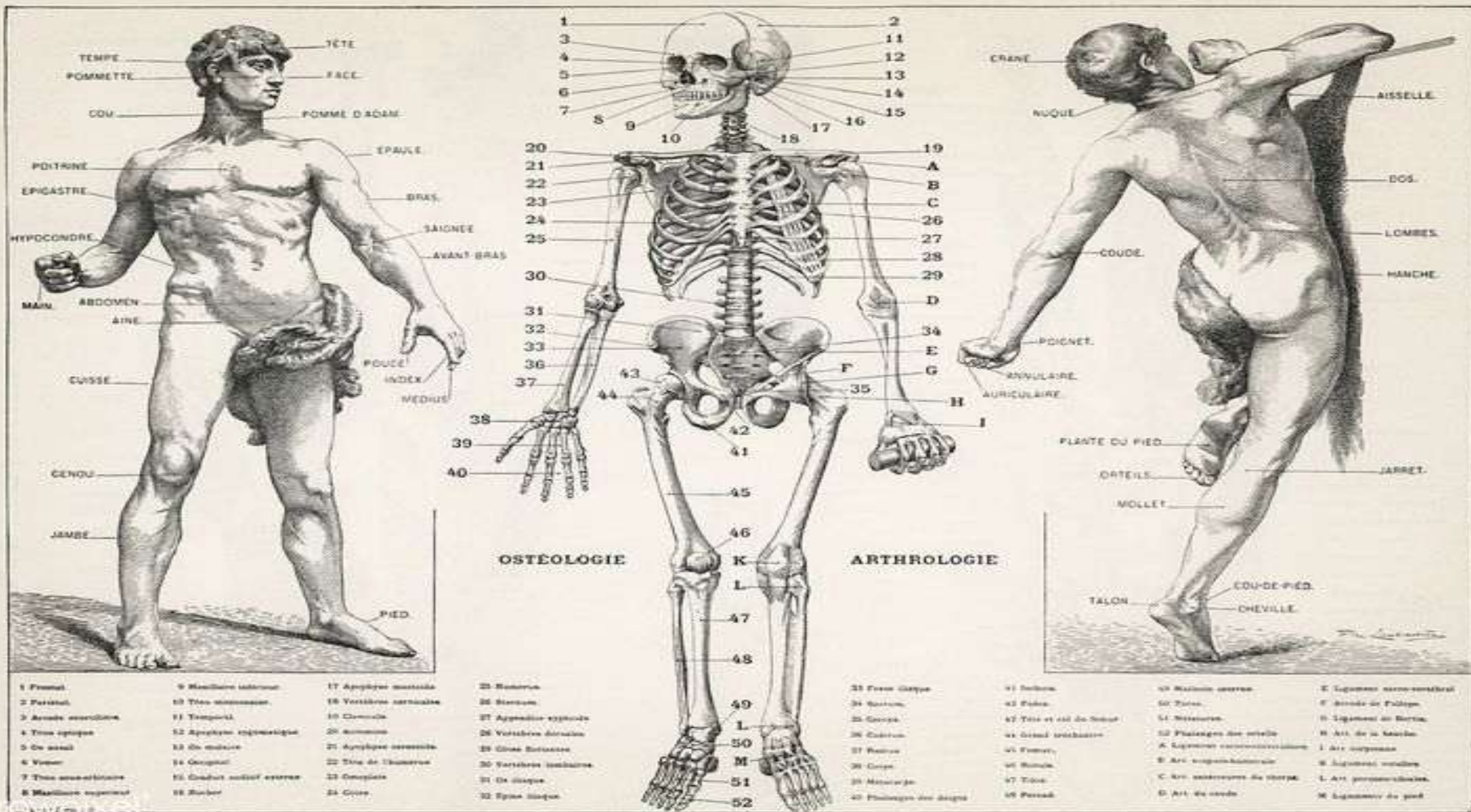
in Action, how like an Angel?

in apprehension, how like a God?

Hamlet, First Folio, 1623



HOMME



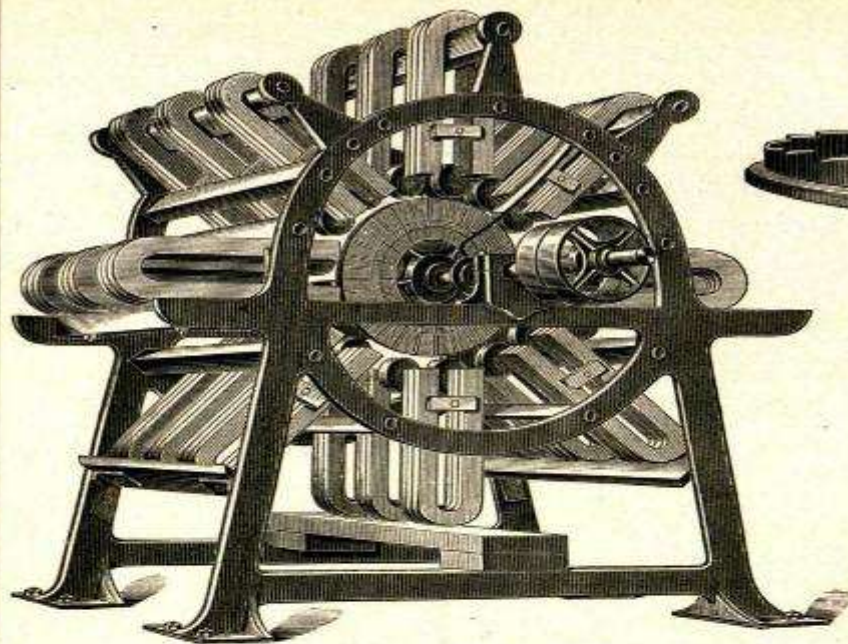


Fig. 1. Alliance-Maschine von Nollet.

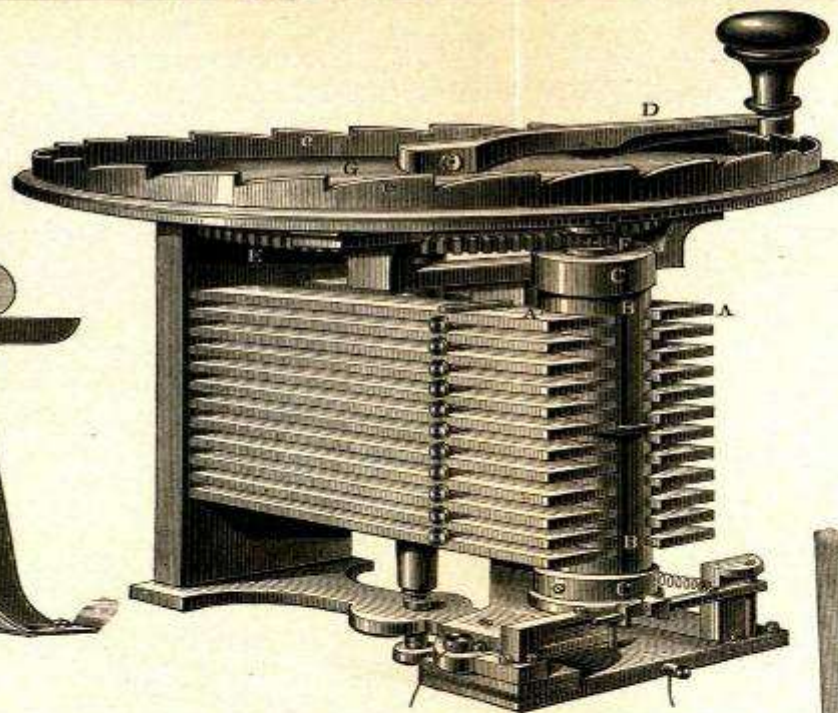


Fig. 3. Magnetelektrische Maschine (Cylinderinduktor) von Siemens u. Halske.

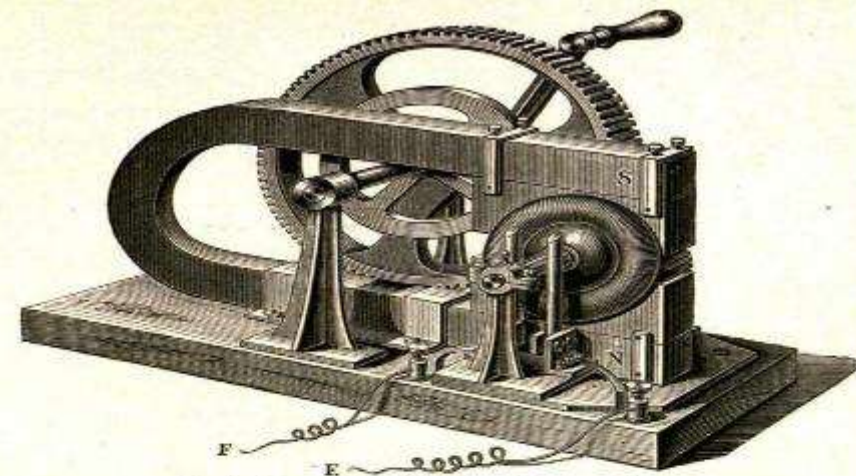


Fig. 5. Magnetelektrische Maschine von Gramme.

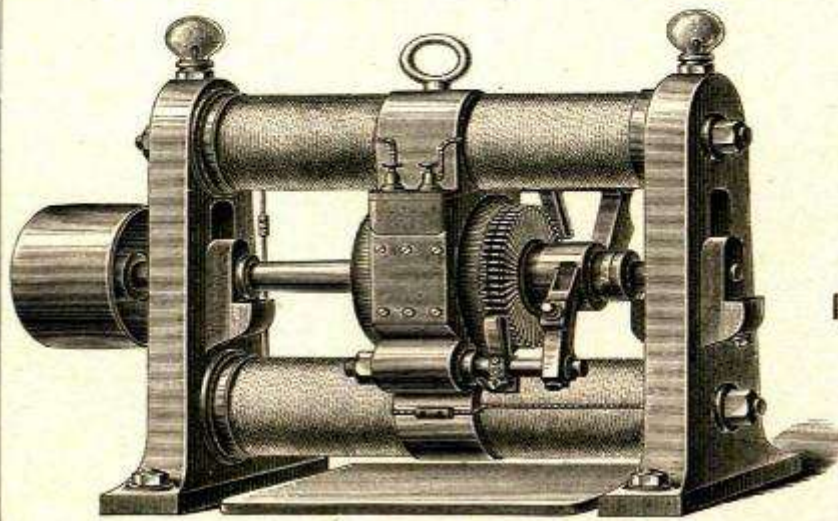


Fig. 7. Dynamoelektrische Maschine von Gramme.

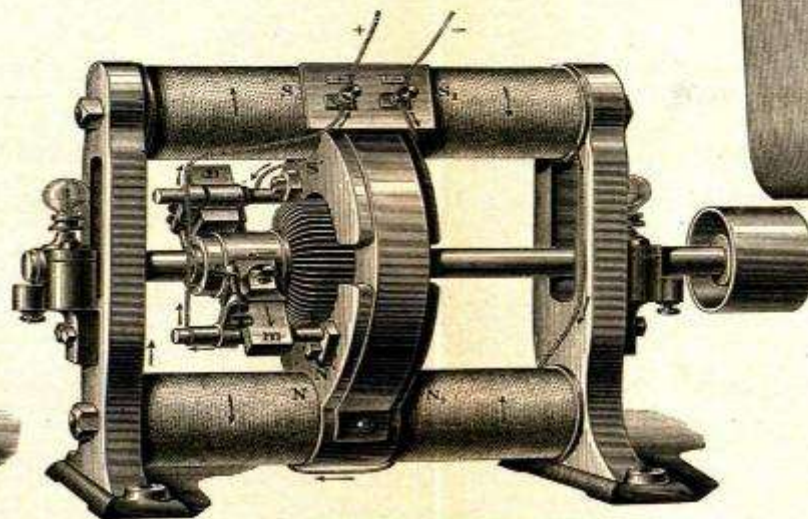


Fig. 8. Schuckerts dynamoelektrische Maschine.

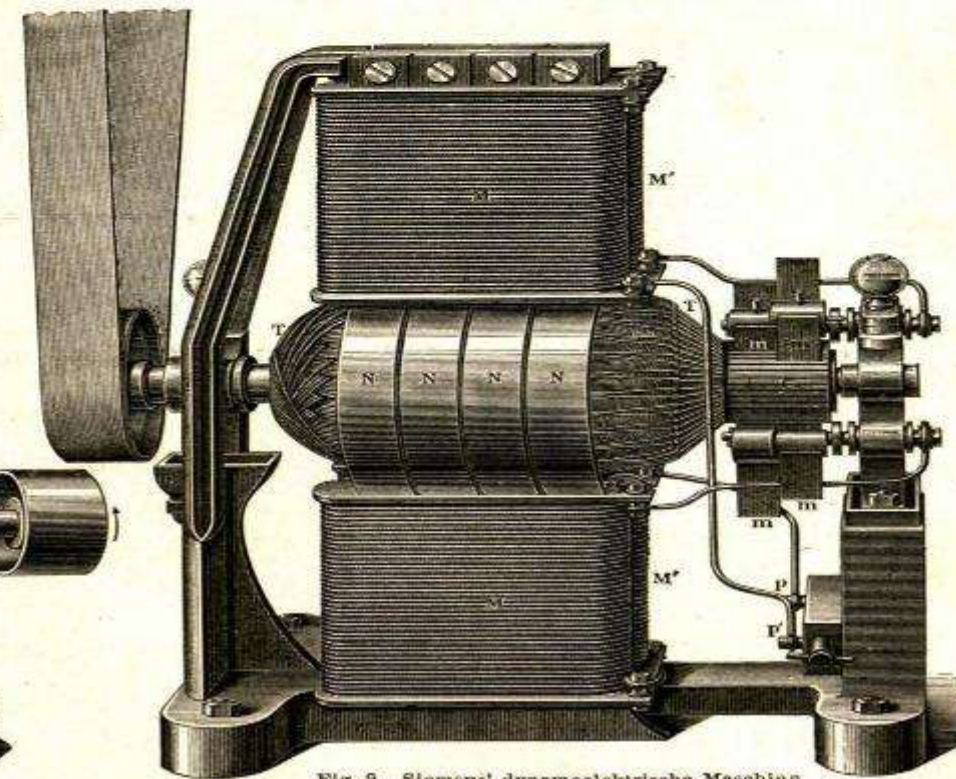


Fig. 9. Siemens' dynamoelektrische Maschine mit Trommelinduktor.



Robota

"corvée"

"serf labour"

Czech Figurative

"drudgery"

"hard work"

Bulgarian, Russian, Serbian, Slovak, Polish, Macedonian,
Ukrainian, archaic Czech

"work"

"labour"

The Robota

The time a corvée (serf) was obliged to work for the lord.
Half of each year.

From the old Bulgarian rabota "servitude"
"work" in modern Bulgarian and Russian



“R.U.R.”

**“Rosumovi Univerzální Roboti”
“(Rossum’s Universal Robots)”**

Karel Čapek

KAREL ČAPEK



ROBOTS



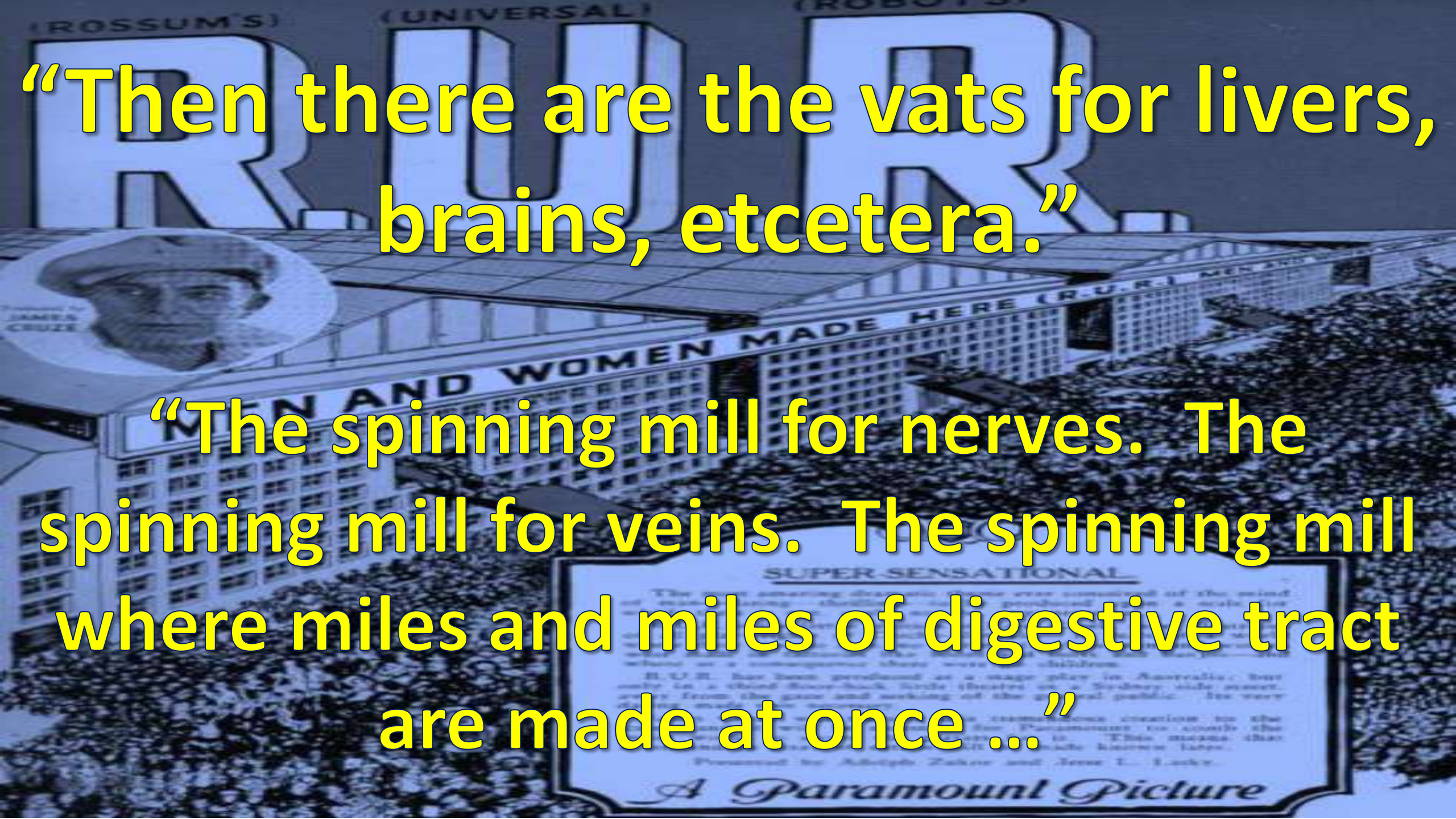
UNIVERSAL



ROSSUM'S

DRAMA

1920



“Then there are the vats for livers, brains, etcetera.”

“The spinning mill for nerves. The spinning mill for veins. The spinning mill where miles and miles of digestive tract are made at once ...”

SUPER-SENSATIONAL
The most amazing drama ever conceived of the mind
and the most powerful of the senses... a masterpiece
of the imagination... a masterpiece of the imagination...
when at a moment there were children.
R.U.R. has been produced as a stage play in Australia, but
only in a third floor back stage theatre in a Sydney side street,
away from the gaze and seeking of the general public. Its very
existence is a masterpiece of the imagination... a masterpiece of the imagination...
This means that
it is a masterpiece of the imagination... a masterpiece of the imagination...
Presented by Adolph Zukor and Jesse L. Lasky.
A Paramount Picture

1928-1929



1928-1929





70
R. U. R.
A PLAY
BY
KAREL ČAPEK

HUMPHREY MILFORD
OXFORD UNIVERSITY PRESS

R. U. R.
(ROSSUM'S UNIVERSAL ROBOTS)

A Fantastic Melodrama

BY
KAREL CAPEK

TRANSLATED BY
PAUL SELVER



THE THEATRE GUILD VERSION,
WITH FOUR ILLUSTRATIONS
FROM PHOTOGRAPHS OF THE
THEATRE GUILD PRODUCTION

GARDEN CITY NEW YORK
DOUBLEDAY, PAGE & COMPANY
1923



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INTO FOREIGN LANGUAGES, INCLUDING THE SCANDINAVIAN
PRINTED IN THE UNITED STATES
AT
THE COUNTRY LIFE PRESS, GARDEN CITY, N. Y.
First Edition

FRIDAY, February 11

3.0 THE HUMBLE AND FASHIONABLE MUSSEL. Marcel Boulestin will demonstrate the making of Moules Marinière and Moules Poulette

3.10 NEWS FILM : British Movie-
tonews

3.20 *R.U.R.* (Rossum's Universal Robots). The play by Karel Capek with Harvey Braban, William Lyon Brown, Cherry Cottrell, Desmond Davis, Annie Esmond, Judith Gick, Stephen Jack, Gordon McLeod, Larry Silverstone. Costumes designed by Mary Allan. Production by Jan Bussell

3.55-4.0 PRE-VIEW. Highlights of next week. Presentation by Jasmine Bligh

9.0 THE HUMBLE AND FASHIONABLE MUSSEL (Details as 3.0)

9.10 NEWS FILM : Gaumont-British News

9.20 *R.U.R.* (Details as 3.20)

9.55-10.0 PRE-VIEW. Highlights of next week (Details as 3.55)

1938



THE VOICE OF BRITAIN

1941

Radio Times, founded in 1923, is the first and largest of its kind in the world.

PRICE TWO PENCE

RADIO TIMES

JOURNAL OF THE BRITISH BROADCASTING CORPORATION

INCORPORATING WORLD SERVICE

'Navy Blue'

There is, it is said, little that the Navy has done for the last century of the globe provided by the gear of the Royal Navy. 'Navy Blue', a new serial starting next Saturday, tells the story of one such ship and the adventures and trials of an adventurous young man who has sailed for Great Britain.

ALSO

'R.R.R.'

Radio Times, founded in 1923, is the first and largest of its kind in the world.

'English Star'

Radio Times, founded in 1923, is the first and largest of its kind in the world.

'White Rajah'

Radio Times, founded in 1923, is the first and largest of its kind in the world.

'The Jungle'

Radio Times, founded in 1923, is the first and largest of its kind in the world.

'Sunday Morning'

Radio Times, founded in 1923, is the first and largest of its kind in the world.

'The Song of Britain'

Radio Times, founded in 1923, is the first and largest of its kind in the world.

'Saturday - Music Hall'

Radio Times, founded in 1923, is the first and largest of its kind in the world.



PROGRAMME FOR
September 21 - 27

1941
SEPTEMBER 21

Home Service SUNDAY

203.5 m. 1474 kcs. 591.1 m. 767 kcs. 449.1 m. 668 kcs. 49.34 m. 608 Mcs.

7.0 a.m. Time, Big Ben: NEWS
and summary of today's programmes
for the Forces

7.15 a.m. LEBNARD

and his Orchestra

with

Ross Levain, Tiny Powell, Jimmy

Harrison, Peter Valenz

Telugu

My Vietnamese sweetheart, Budapest

The wedding of the painted girl

Beethoven

Taken (Canada).....Conley

Melancholy serenade.....Warren

Wedding in the Highlands.....Rising

Wine, women and song.....Stanton

Remember.....Morgan

In an old-fashioned town.....Narrow

Boys' business.....Chorvick

Tango romantic.....Manilla

Nigger in the woodpile.....Ewing

Music flight.....Barclay

Samson.....Geddes

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8.30 a.m. SUNDAY MORNING
SERVICE

Order of Service:

Ye holy angels bright (R.H. 517; A.

and M. 346; S.P. 501; C.H. 29)

Lord's Prayer

Collect for Family

Kyrle-Brown (Hymnal in D)

Collect

Epistle (II Corinthians 4, vv. 1-6)

Light's abode, solemn hymn (R.H.

451; A. and M. 232; S.P. 199)

Gospel (St. Matthew 9, vv. 9-13)

Nicene Creed (Hymnal)

Address by the Rev. Walter P. P.

Time

For all the saints who from their

labours rest (R.H. 641; A. and

M. 437; S.P. 202; C.H. 220)

Prayer for the Church

Discipline for the home, ending

this great Sacrament service (R.H.

576; S.P. 280)

Proper

Blessing

Organist, Arnold Richardson

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'R.U.R.'



'Young Rouson' invented a
robot with the minimum
amount of equipment.
He rejected man and made
the Robot. . . . Mechanically
they are more perfect than
we are, they have an en-
ormously developed intelli-
gence, but they have no
soul.' Karl Capak's play,
Rossum's Universal Robots,
about a scientific dream
world on a lonely island,
a world inhabited by a few
human beings and thousands
of automata, and the terrible
outcome of this attempt to
replace nature with the per-
fect machine, will be broad-
cast this afternoon at 3.30.

10.30 a.m. MUSIC WHILE YOU
WORK

played by

William Rice and the St. Anne's
Orchestra

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1.0 Time, Greenwich: NEWS

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ST. PAUL'S CATHEDRAL.—Wren's masterpiece dominating the London
skyscape. A programme about the great cathedral, the man who built it
and its place in the life of London, written by Lewis MacNiece, will be
broadcast tonight at 10.10.

10.30 a.m. MUSIC WHILE YOU
WORK

played by

William Rice and the St. Anne's
Orchestra

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B B C 1948

WEARY ARMY CAN HEAR ENEMY TALKING

By Daily-Nat Industrial

Gunnery Courses

"When we had passed the marker we received a supply of lifeboats and food materials, either as parcels or packages. Our duty was to read the data."

"I went in one ship which was a type two submarine, and the other was a type three submarine."

General Sir Frederick Phillips, Air-Marshal, Command, is in London last night that the 3rd Squadron of the next year over. "A suggestion to say we must have something of those of our day will be blasted next morning. The reason the flying-club has been in it."

"Keep constantly alert and
ready for action. Never ride or
be alone. Do not drop off or

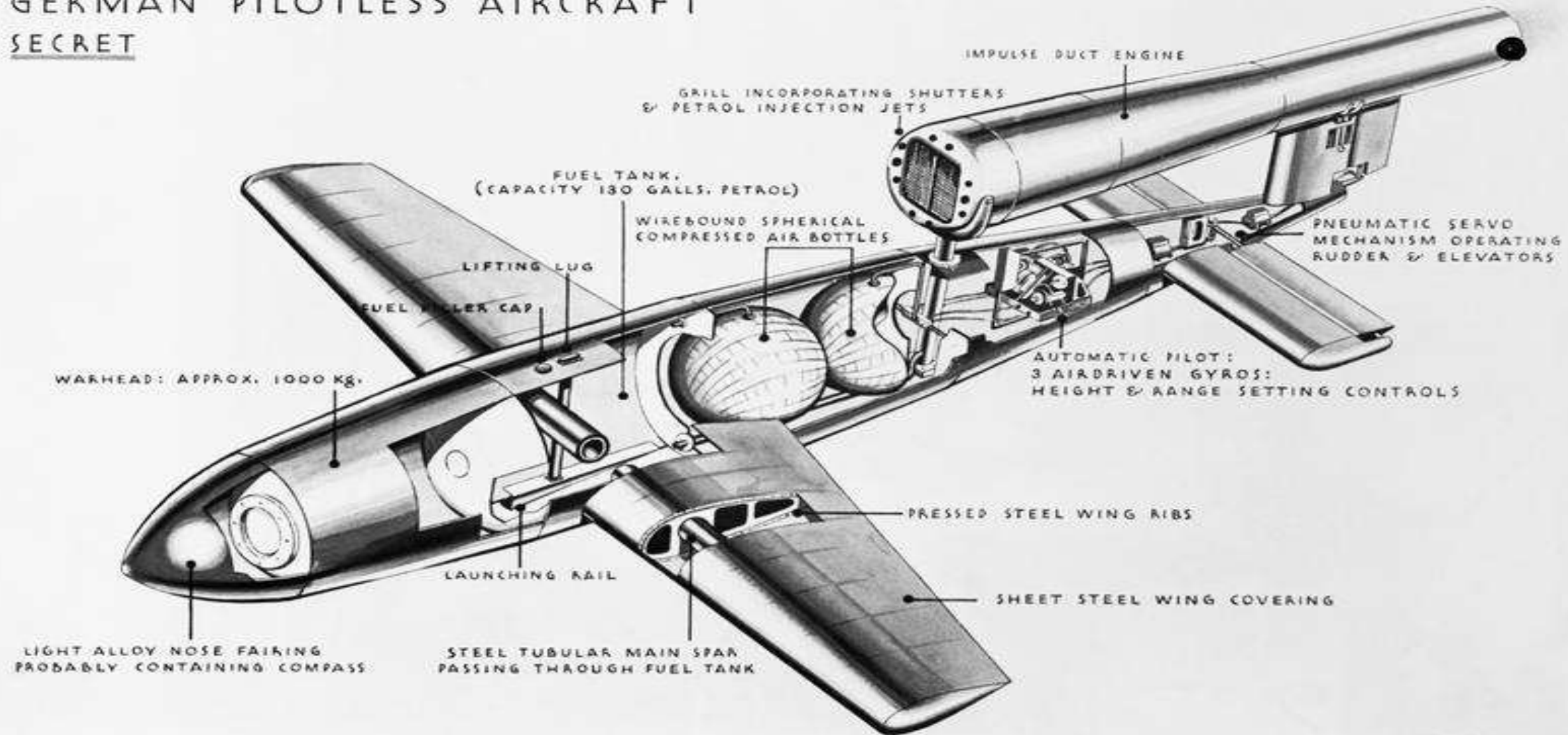
He said: "Of course the fact is that we would be perfect

Government ought to be more
bold.

enormous number of variations."

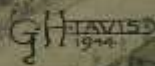
First Launch Against Britain, June 1944 (After D-Day)

GERMAN PILOTLESS AIRCRAFT SECRET



406 THE ILLUSTRATED LONDON NEWS—Dec. 7, 1944

DRAWN BY BOB SORCEAD. ARTIST: G. H. HAYES, SHOW DETAILS OBTAINED FROM A CAPTURED FLYING DUTCHMAN

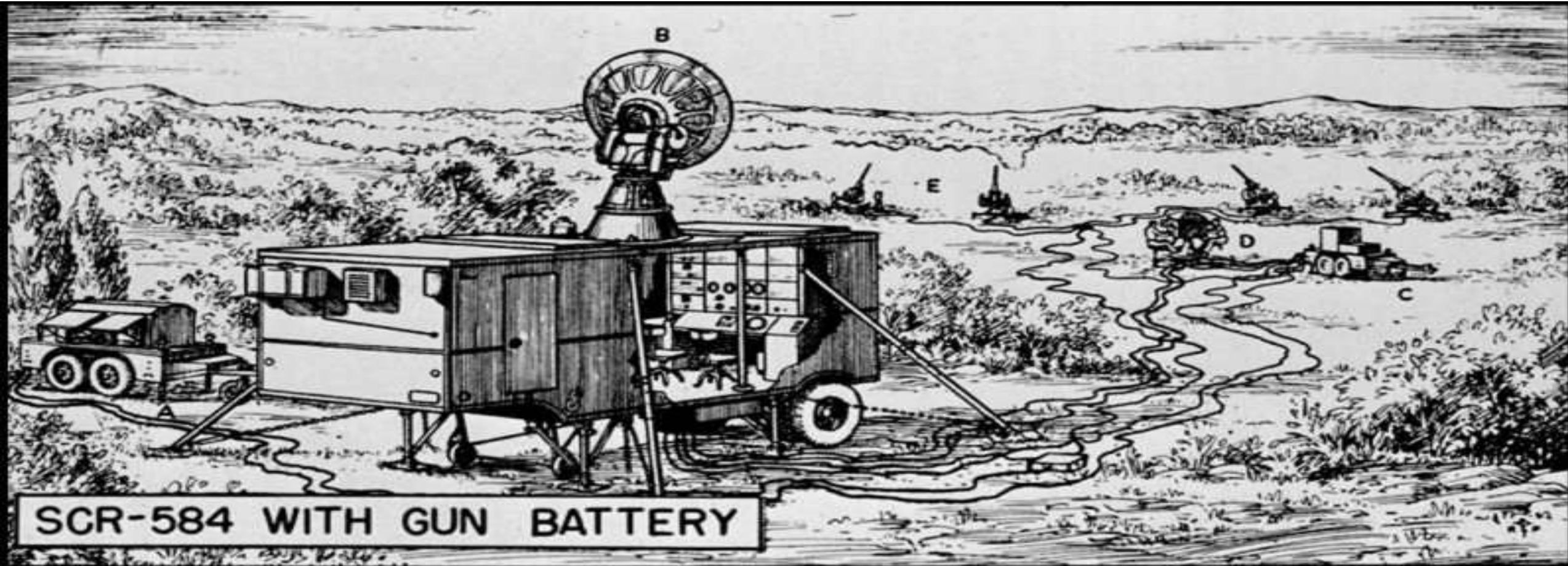


The German spring herb is a small, a crude little automatic machine, designed for quantity production and ease of manufacture and construction. It is made entirely of mild steel. The propellant unit consists of a tube past which is hung, once at the rear, but slanted at the front by a grille consisting of a series of parallel bars. The tube is closed at the rear by a launching ramp, an anvil-like gas holder is introduced into the compression chamber of the propellant tube from an outside source and ignited by a sparking plug. This heats up the gases in the tube to about 2000° C. and the bomb is ejected at a velocity of 1000 ft. per second. The gas pressure in the tube is about 1000 lb. per sq. in. The operation of this machine is explained in the following diagram.

Our drawings and the gross irregularity in their occurrence at a rate of 40 times a second, should recall to the recollection of a motor-cyclic angina. Before being satisfactorily explained, the timing of the waves has been ascribed to the contraction of the papillary muscles. This idea is based on the fact that the waves are driven by compressed air, which contracts a device resembling the muscles in the manner of a shock-wave in motion of two brass pistons. The height of waves is also set before the beginning, and this is controlled by an analog of the second or a third system in an ultrasonic, while the form of the oscillations is determined by the reflection of the waves. In the case of a sinusoidal wave, a sharp elastic oscillation is caused by an electric

trouner, measuring off a predetermined distance. When this diverter has been retracted, the bomb is pushed into its final dive. This is accomplished by two small detonators exploding and releasing two flaps (called "spotters") under the tail planes, and thus bring the tail and putting the nose down. The diverter is then released by the "spotters" or is released internally locked by the release of a spring ratchet and the rubber air-strap in the elevator servo-motor are severed by the operation of a "diminutive guillotine," as seen in our drawings. This dive throws the fuel on the impact and the bomb is then free to fall. This is a very simple and effective system, not intentional and which probably saved a good many lives.

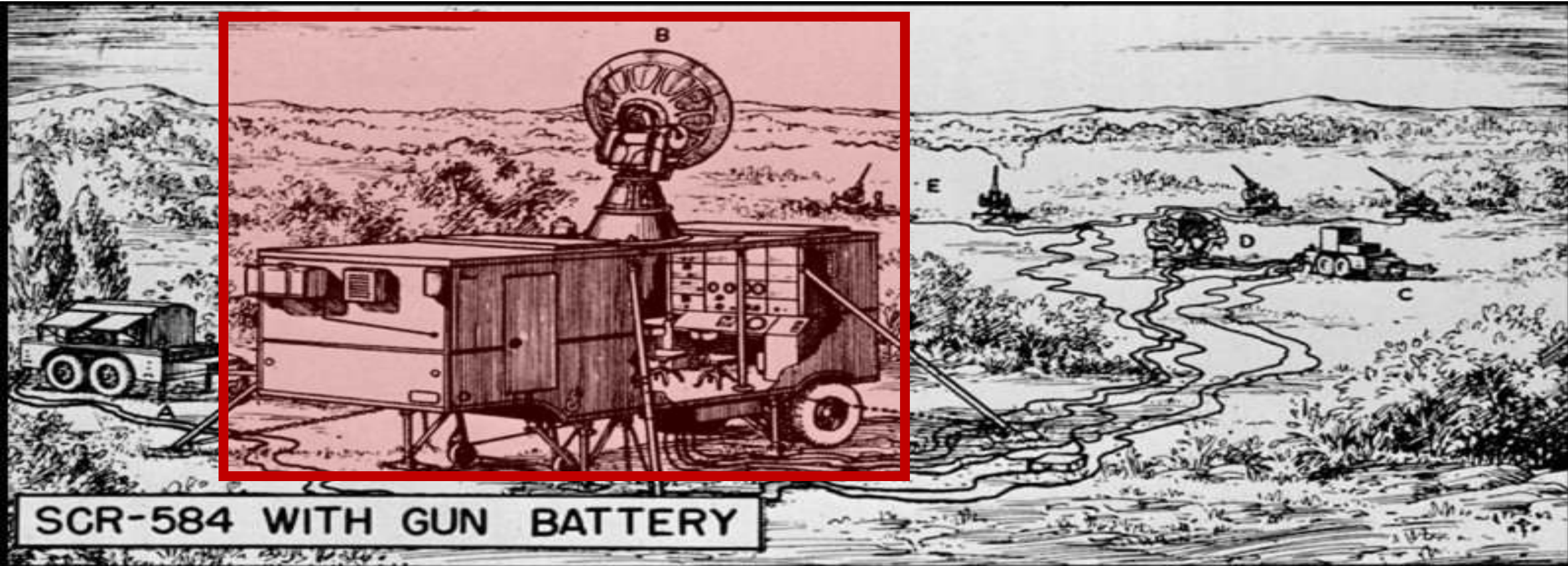
giving warning to the public when the engine stopped. It has often been asked if the flying bomb can turn on lights, and in certain cases it has been found that a clock has been fitted which, at a predetermined time, causes the lighting of a flare. The ground forces of the American Army have a number of popular questions as to whether flying bombs carried radio equipment. Only about three in 100 bombs have been so equipped. The electrical counter switching on a fog transmitter which sent out a continuous signal. Turning on in this signal, it is believed, is used to receive the signal and to plot the path of the enemy's attack. It could also take a compass reading and so plot the path of the vehicle and the termination of its flight.



SCR-584 OPERATING WITH GUN BATTERY

- A. POWER GENERATOR M7
- B. RADIO SET SCR-584
- C. DIRECTOR M9
- D. TRACKER FOR DIRECTOR M9
- E. BATTERY 90mm.

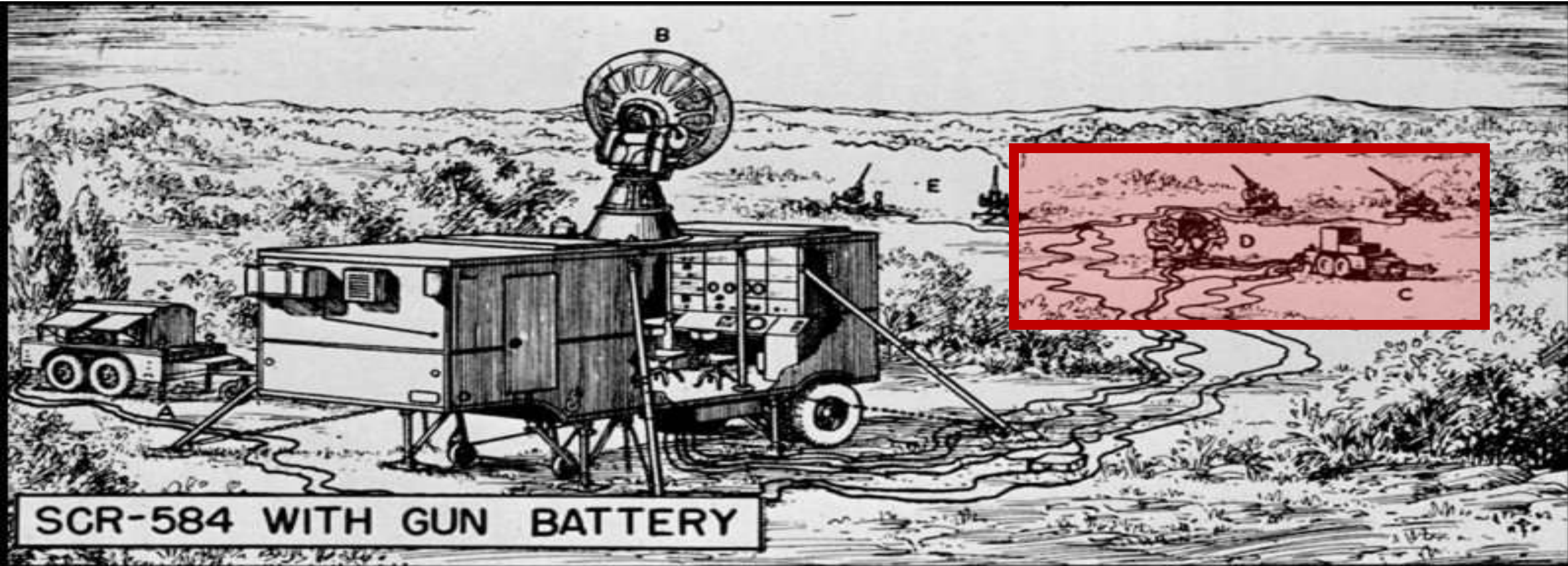
COMPUTER CONTROLLED AUTOMATED ANTI-AIRCRAFT SYSTEM - 1944



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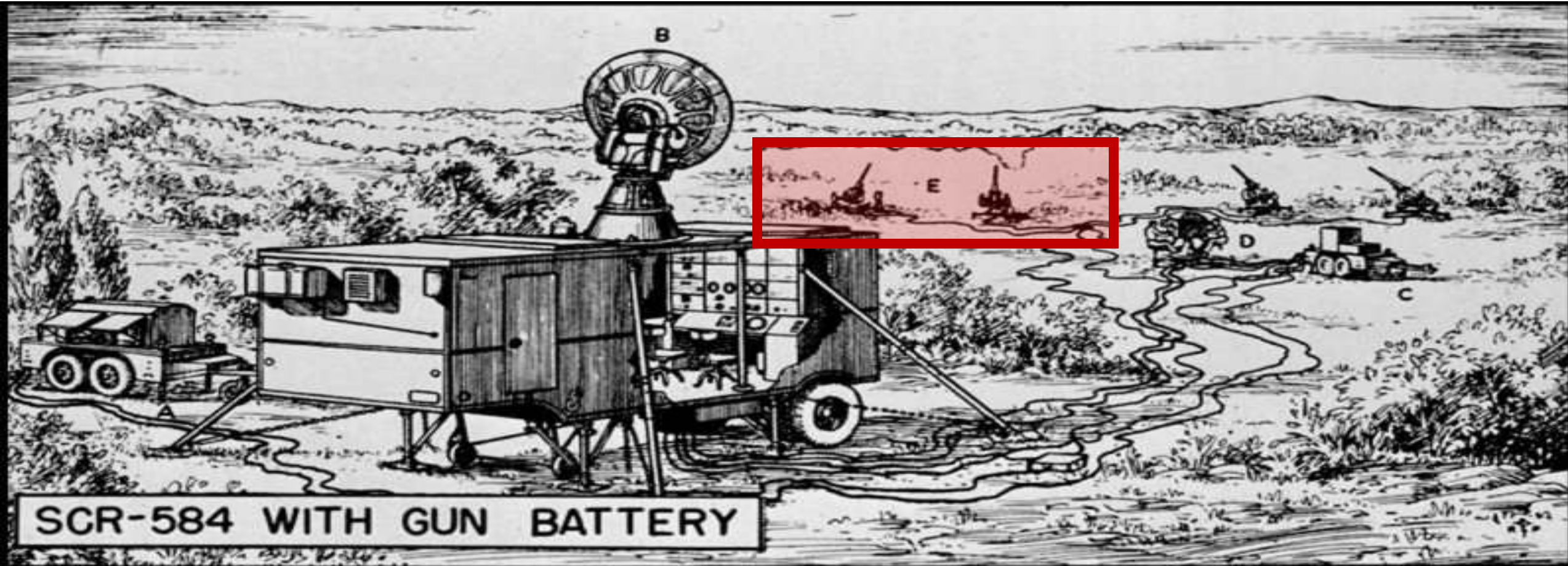
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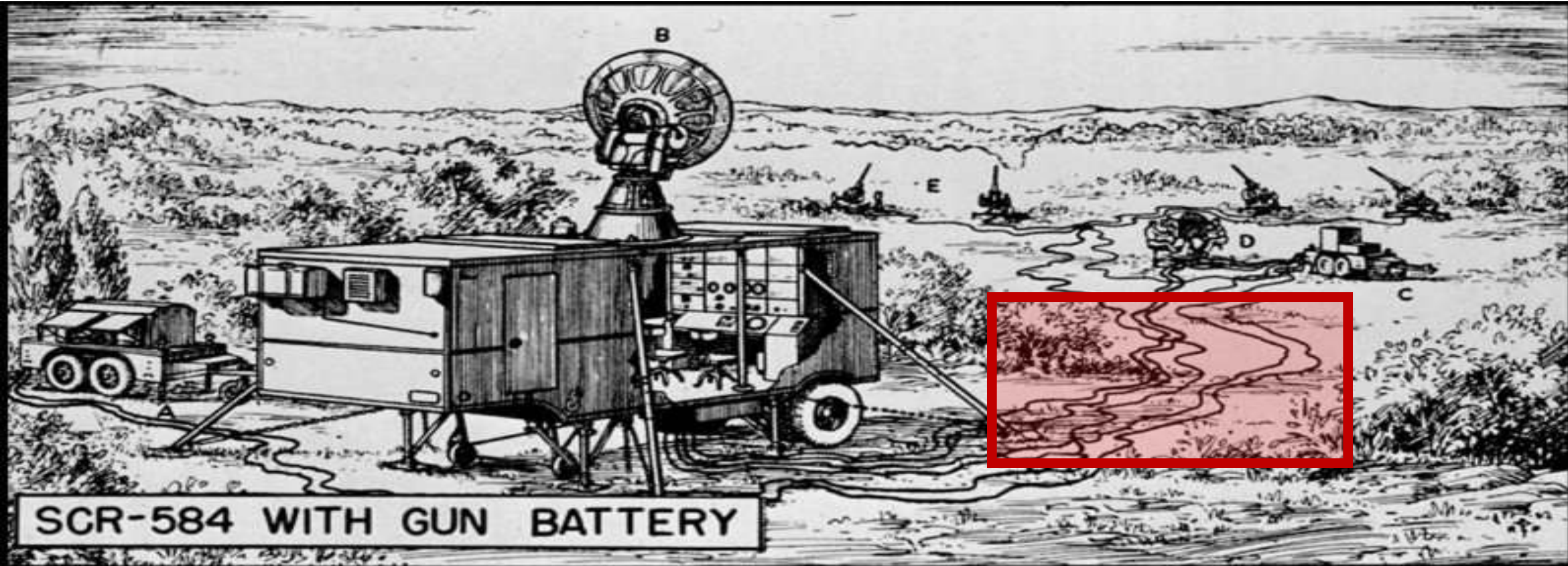
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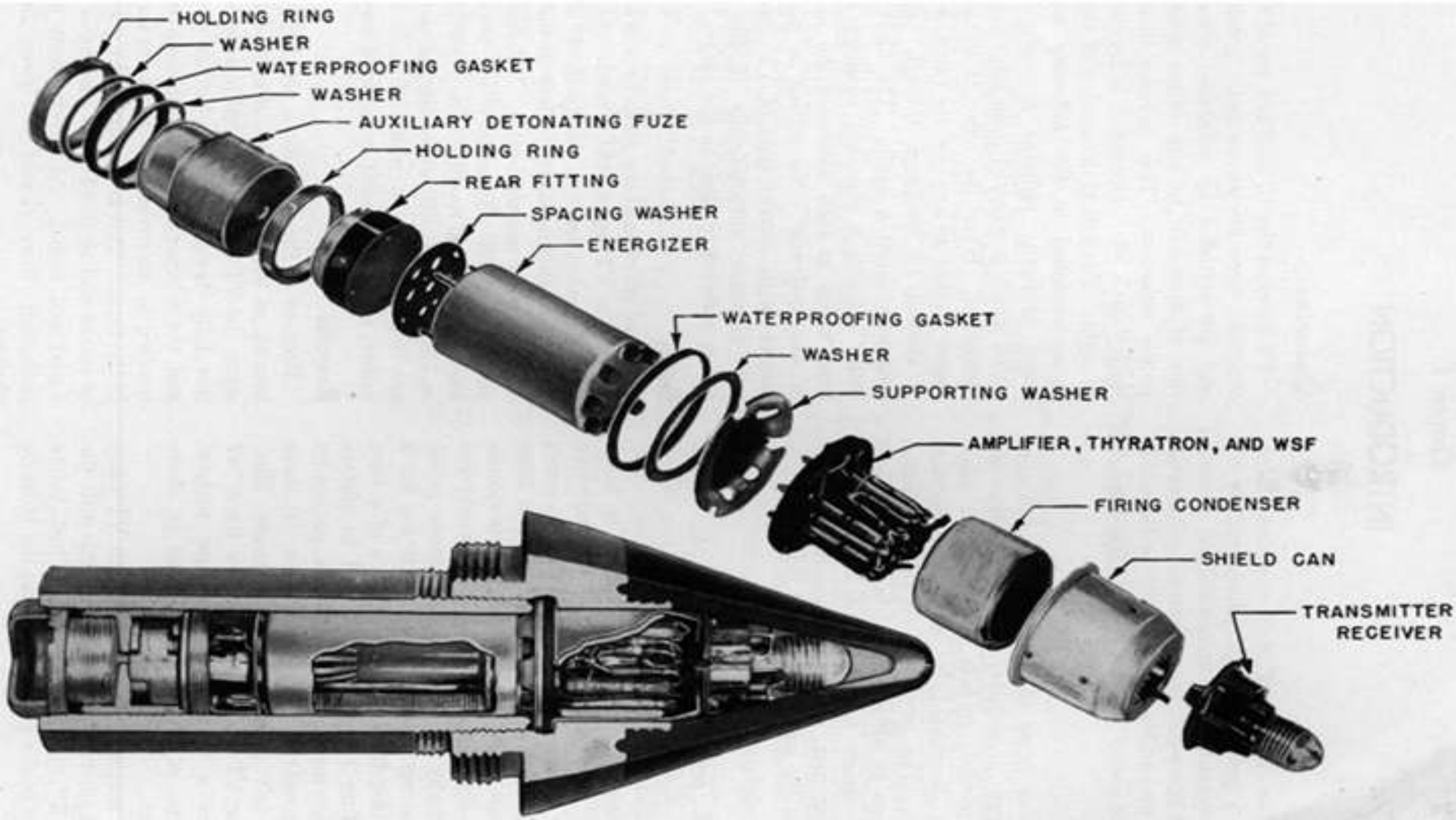
COMPUTER CONTROLLED AUTOMATED ANTI-AIRCRAFT SYSTEM - 1944



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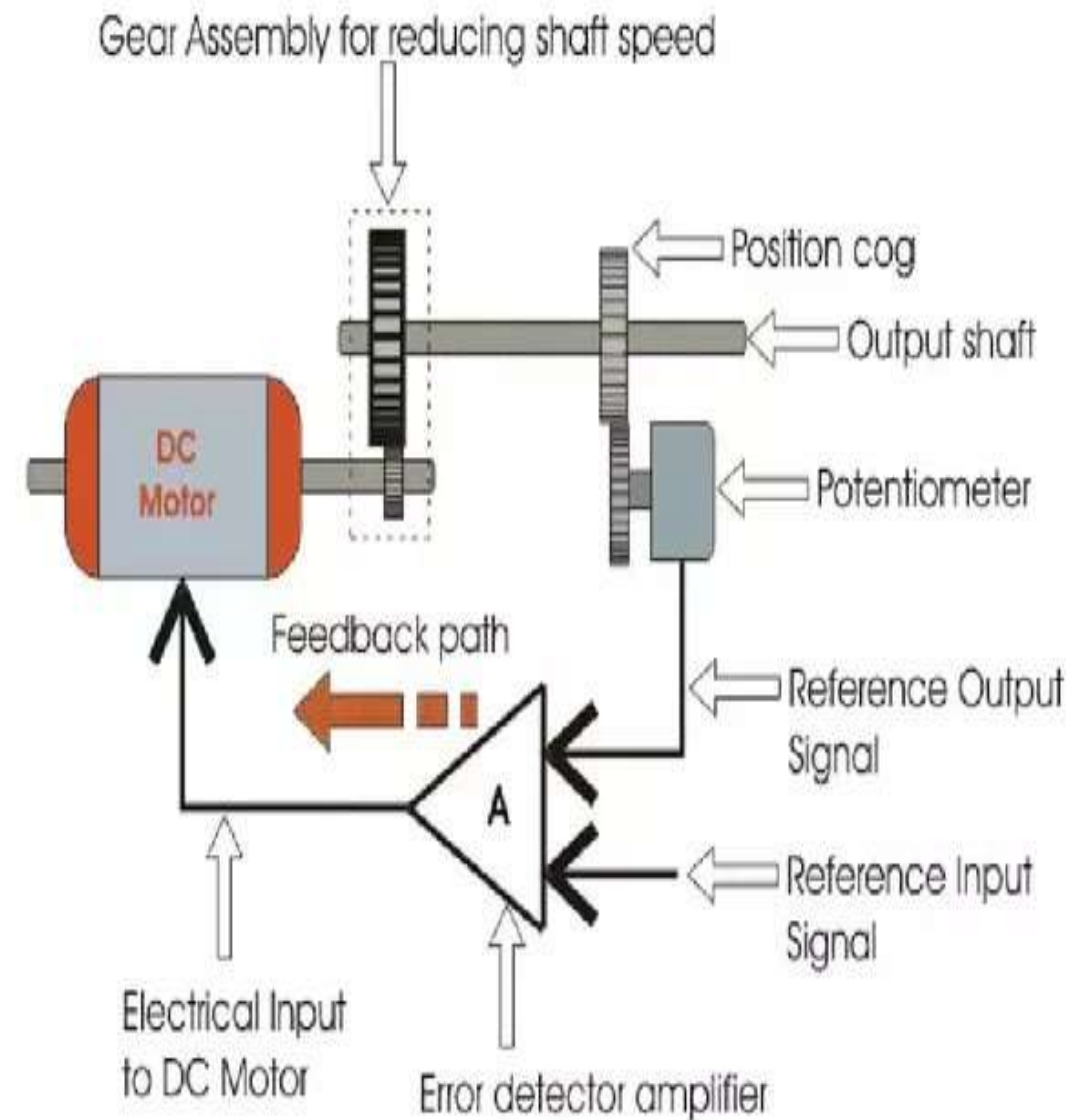
- A. POWER GENERATOR M7
- B. RADIO SET SCR-584
- C. DIRECTOR M9
- D. TRACKER FOR DIRECTOR M9
- E. BATTERY 90mm.

COMPUTER CONTROLLED AUTOMATED ANTI-AIRCRAFT SYSTEM - 1944



ELSIE

(Searchlight Control Radar No 2 Mk VI)
Entered Service 1942

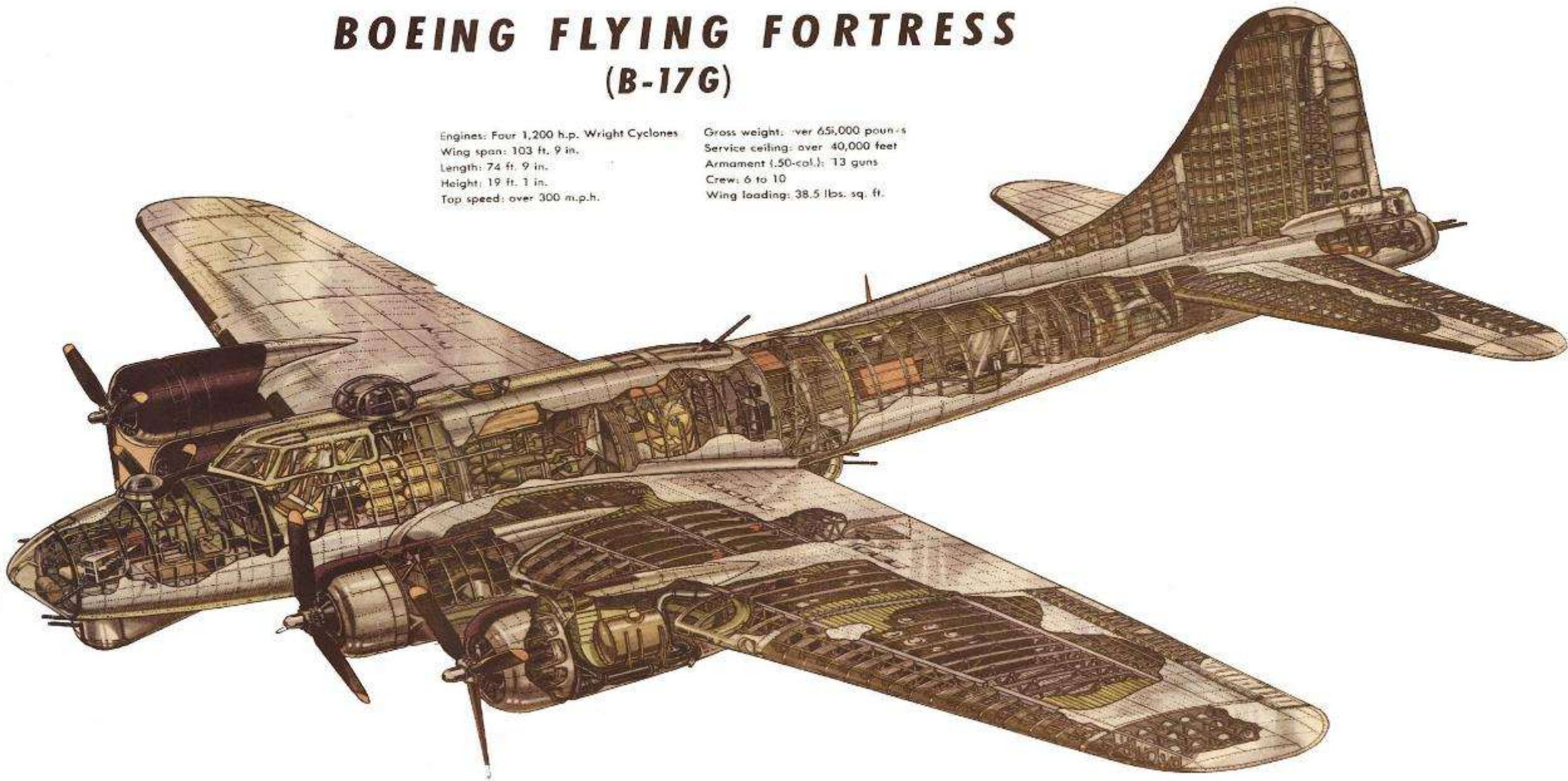


SERVOMECHANISM

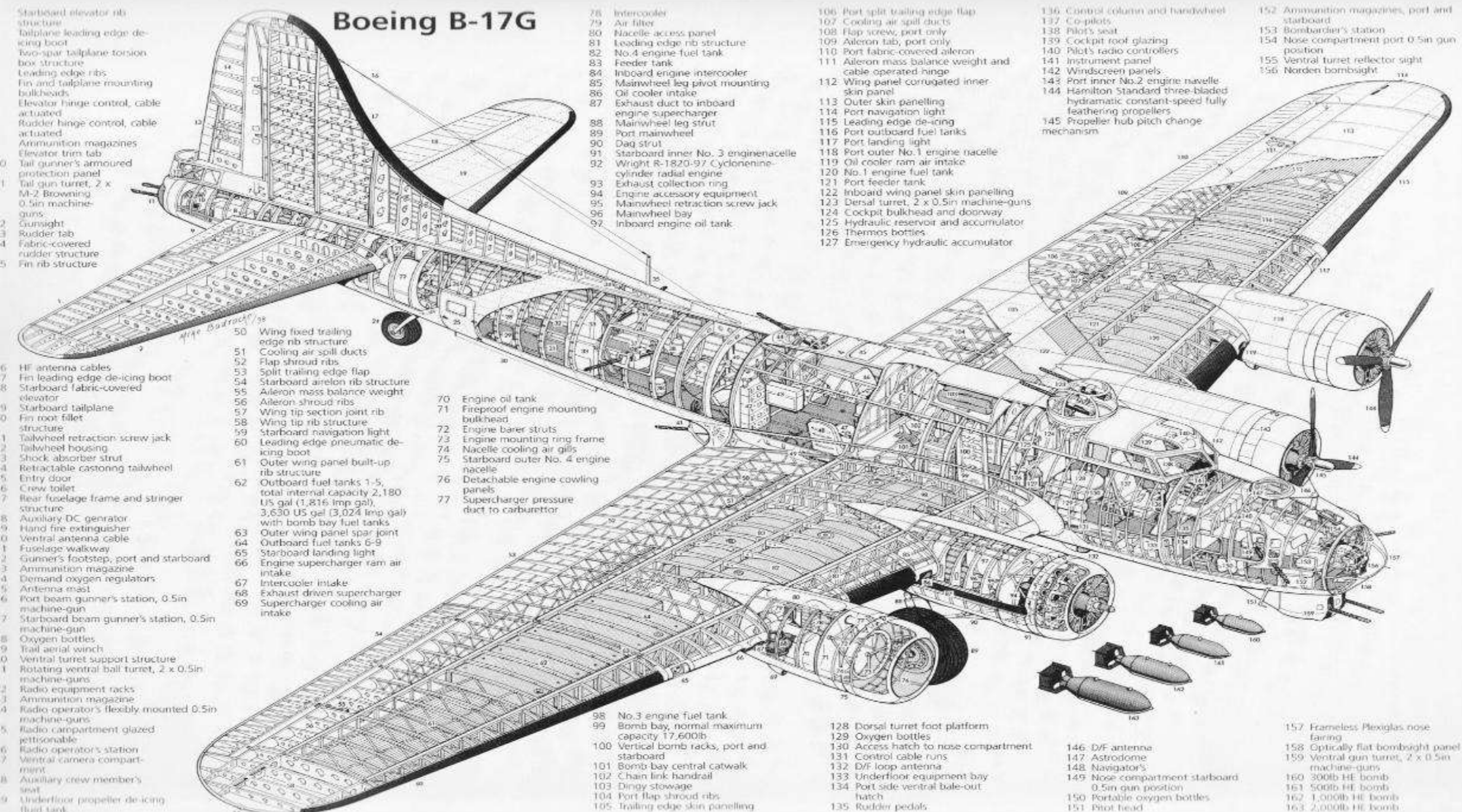
BOEING FLYING FORTRESS (B-17G)

Engines: Four 1,200 h.p. Wright Cyclones
Wing span: 103 ft. 9 in.
Length: 74 ft. 9 in.
Height: 19 ft. 1 in.
Top speed: over 300 m.p.h.

Gross weight: over 65,000 pounds
Service ceiling: over 40,000 feet
Armament (.50-cal.): 13 guns
Crew: 6 to 10
Wing loading: 38.5 lbs. sq. ft.



Boeing B-17G



Starboard elevator rib structure
Tailplane leading edge de-icing boot
Two-spar tailplane-torsion box structure
Leading edge ribs
Fin and tailplane mounting bulkheads
Elevator hinge control, cable actuated
Rudder hinge control, cable actuated
Ammunition magazines
Elevator trim tab
Tail gunner's armoured protection panel
Tail gun turret, 2 x M-2 Browning 0.5in machine-guns
Gunsight
Rudder tab
Fabric-covered rudder structure
Fin rib structure

HF antenna cables
Fin leading edge de-icing boot
Starboard fabric-covered elevator
Starboard tailplane
Fin root fillet structure
Tailwheel retraction screw jack
Tailwheel housing
Shock absorber strut
Retractable castoring tailwheel
Entry door
Crew toilet
Rear fuselage frame and stringer structure
Auxiliary DC generator
Hand fire extinguisher
Ventral antenna cable
Fuselage walkway
Gunner's footstep, port and starboard
Ammunition magazine
Demand oxygen regulators
Antenna mast
Port beam gunner's station, 0.5in machine-gun
Starboard beam gunner's station, 0.5in machine-gun
Oxygen bottles
Tail aerial winch
Ventral turret support structure
Rotating ventral ball turret, 2 x 0.5in machine-guns
Radio equipment racks
Ammunition magazine
Radio operator's flexibly mounted 0.5in machine-gun
Radio compartment glazed jettisonable
Radio operator's station
Ventral camera compartment
Auxiliary crew member's seat
Underfloor propeller de-icing fluid tank

50 Wing fixed trailing edge rib structure
51 Cooling air spill ducts
52 Flap shroud ribs
53 Split trailing edge flap
54 Starboard aileron rib structure
55 Aileron mass balance weight
56 Aileron shroud ribs
57 Wing tip section joint rib
58 Wing tip rib structure
59 Starboard navigation light
60 Leading edge pneumatic de-icing boot
61 Outer wing panel built-up rib structure
62 Outboard fuel tanks 1-5, total internal capacity 2,180 US gal (1,816 Imp gal), 3,630 US gal (3,024 Imp gal) with bomb bay fuel tanks
63 Outer wing panel spar joint
64 Outboard fuel tanks 6-9
65 Starboard landing light
66 Engine supercharger ram air intake
67 Intercooler intake
68 Exhaust driven supercharger
69 Supercharger cooling air intake

70 Engine oil tank
71 Fireproof engine mounting bulkhead
72 Engine baffle struts
73 Engine mounting ring frame
74 Nacelle cooling air gills
75 Starboard outer No. 4 engine nacelle
76 Detachable engine cowling panels
77 Supercharger pressure duct to carburettor

78 Intercooler
79 Air filter
80 Nacelle access panel
81 Leading edge rib structure
82 No. 4 engine fuel tank
83 Feeder tank
84 Inboard engine intercooler
85 Mainwheel leg pivot mounting
86 Oil cooler intake
87 Exhaust duct to inboard engine supercharger
88 Mainwheel leg strut
89 Port mainwheel
90 Drag strut
91 Starboard inner No. 3 engine nacelle
92 Wright R-1820-97 Cyclonine-cylinder radial engine
93 Exhaust collection ring
94 Engine accessory equipment
95 Mainwheel retraction screw jack
96 Mainwheel bay
97 Inboard engine oil tank

98 No. 3 engine fuel tank
99 Bomb bay, normal maximum capacity 17,600lb
100 Vertical bomb racks, port and starboard
101 Bomb bay central catwalk
102 Chain link handrail
103 Diving stowage
104 Port flap shroud ribs
105 Trailing edge skin panelling

106 Port split trailing edge flap
107 Cooling air spill ducts
108 Flap screw, port only
109 Aileron tab, port only
110 Port fabric-covered aileron
111 Aileron mass balance weight and cable operated hinge
112 Wing panel corrugated inner skin panel
113 Outer skin panelling
114 Port navigation light
115 Leading edge de-icing
116 Port outboard fuel tanks
117 Port landing light
118 Port outer No. 1 engine nacelle
119 Oil cooler ram air intake
120 No. 1 engine fuel tank
121 Port feeder tank
122 Inboard wing panel skin panelling
123 Dorsal turret, 2 x 0.5in machine-guns
124 Cockpit bulkhead and doorway
125 Hydraulic reservoir and accumulator
126 Thermos bottles
127 Emergency hydraulic accumulator

128 Dorsal turret foot platform
129 Oxygen bottles
130 Access hatch to nose compartment
131 Control cable runs
132 D/F loop antenna
133 Underfloor equipment bay
134 Port side ventral bale-out hatch
135 Rudder pedals

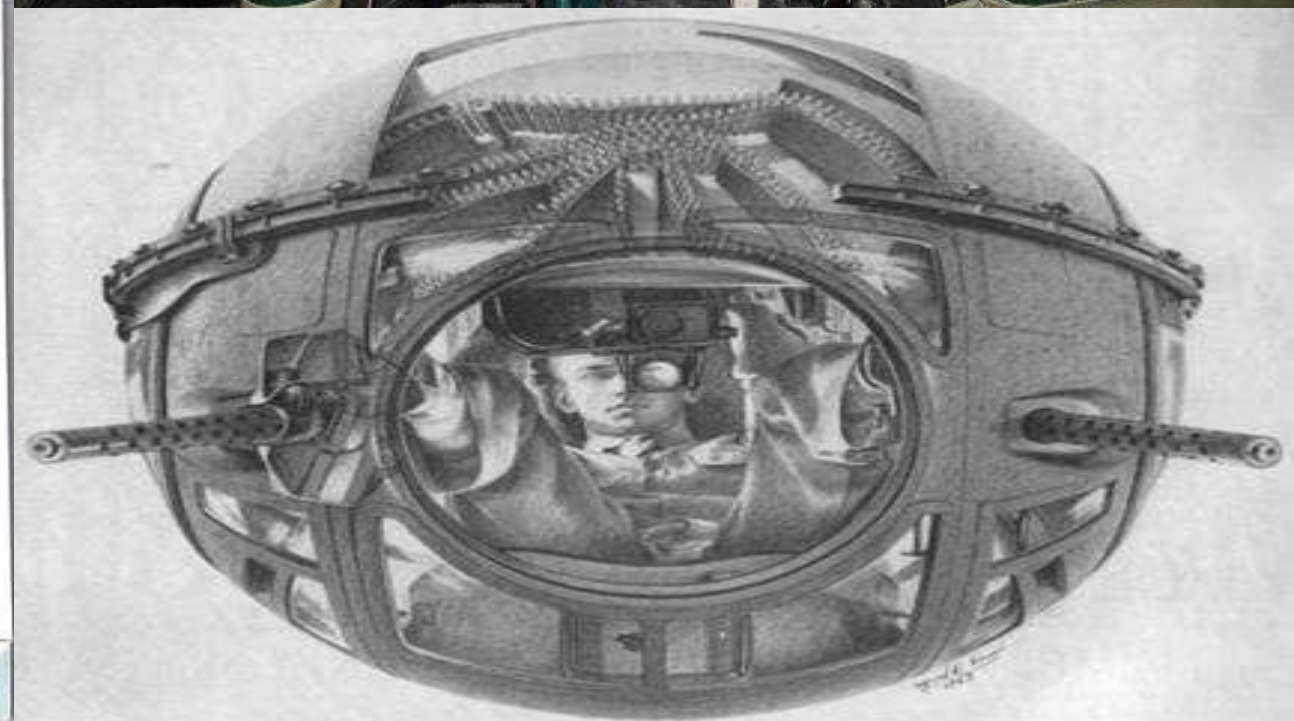
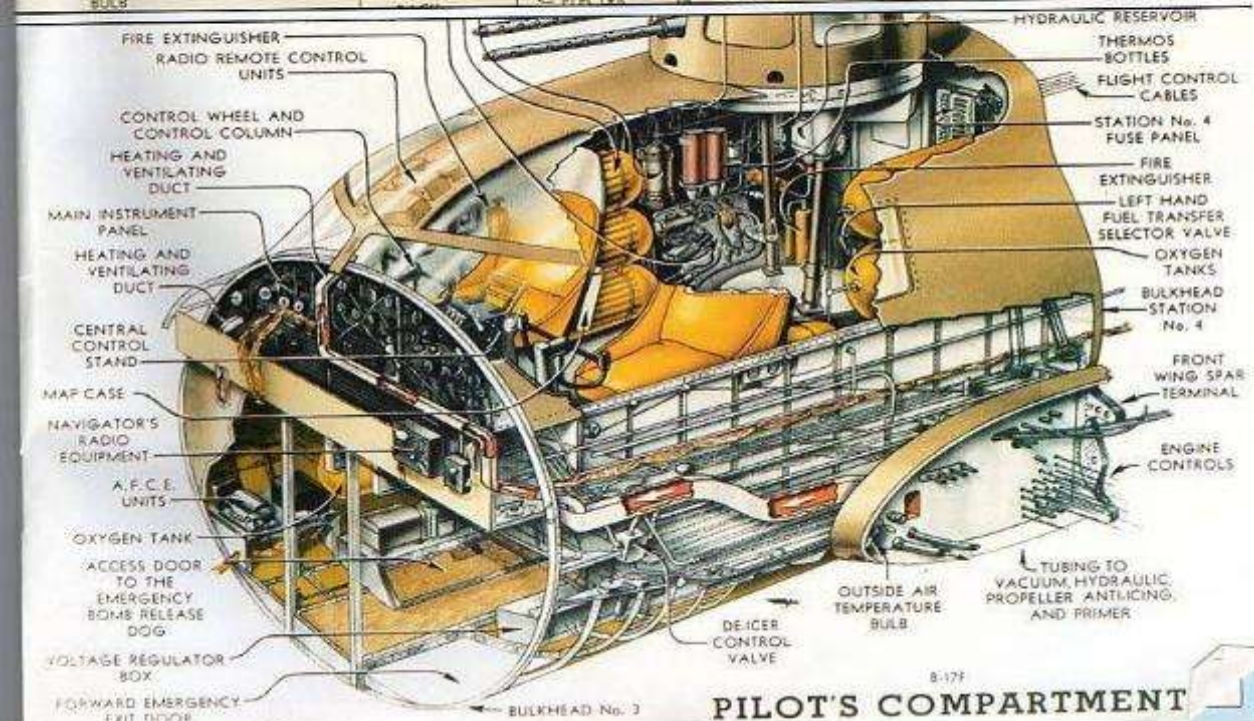
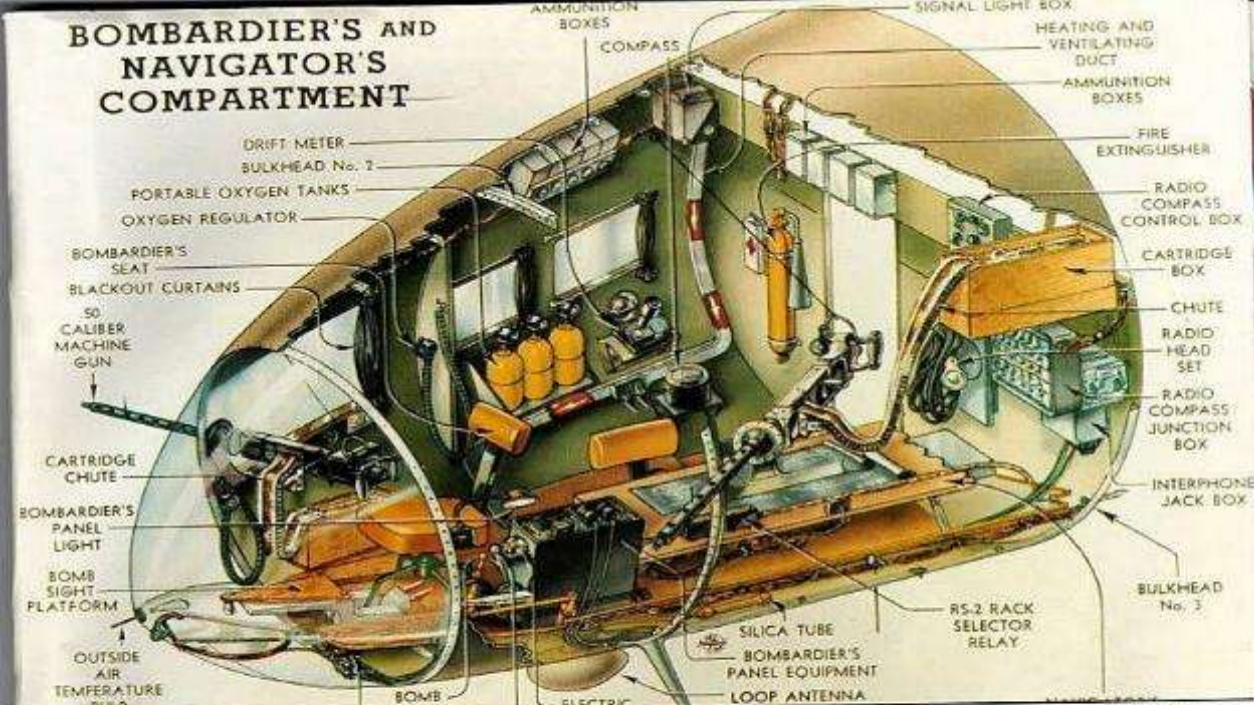
136 Control column and handwheel
137 Co-pilot's
138 Pilot's seat
139 Cockpit roof glazing
140 Pilot's radio controllers
141 Instrument panel
142 Windscreen panels
143 Port inner No. 2 engine nacelle
144 Hamilton Standard three-bladed hydramatic constant-speed fully feathering propellers
145 Propeller hub pitch change mechanism

146 D/F antenna
147 Astrodome
148 Navigator's
149 Nose compartment starboard 0.5in gun position
150 Portable oxygen bottles
151 Pilot head

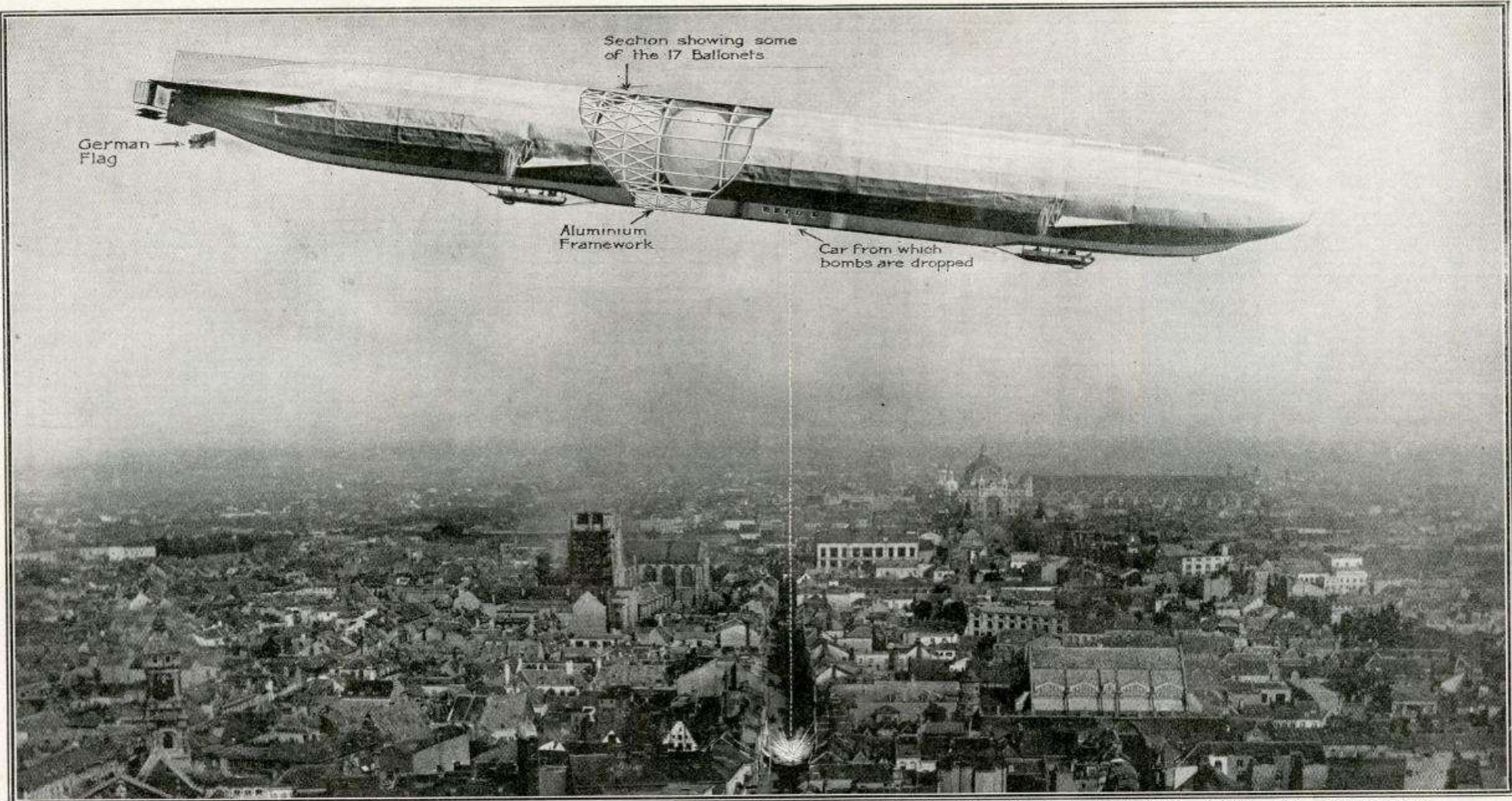
152 Ammunition magazines, port and starboard
153 Bombardier's station
154 Nose compartment port 0.5in gun position
155 Ventral turret reflector sight
156 Norden bombsight

157 Frameless Plexiglas nose fairing
158 Optically flat bombsight panel
159 Ventral gun turret, 2 x 0.5in machine-guns
160 300lb HE bomb
161 500lb HE bomb
162 1,000lb HE bomb
163 2,000lb HE bomb

BOMBARDIER'S AND NAVIGATOR'S COMPARTMENT



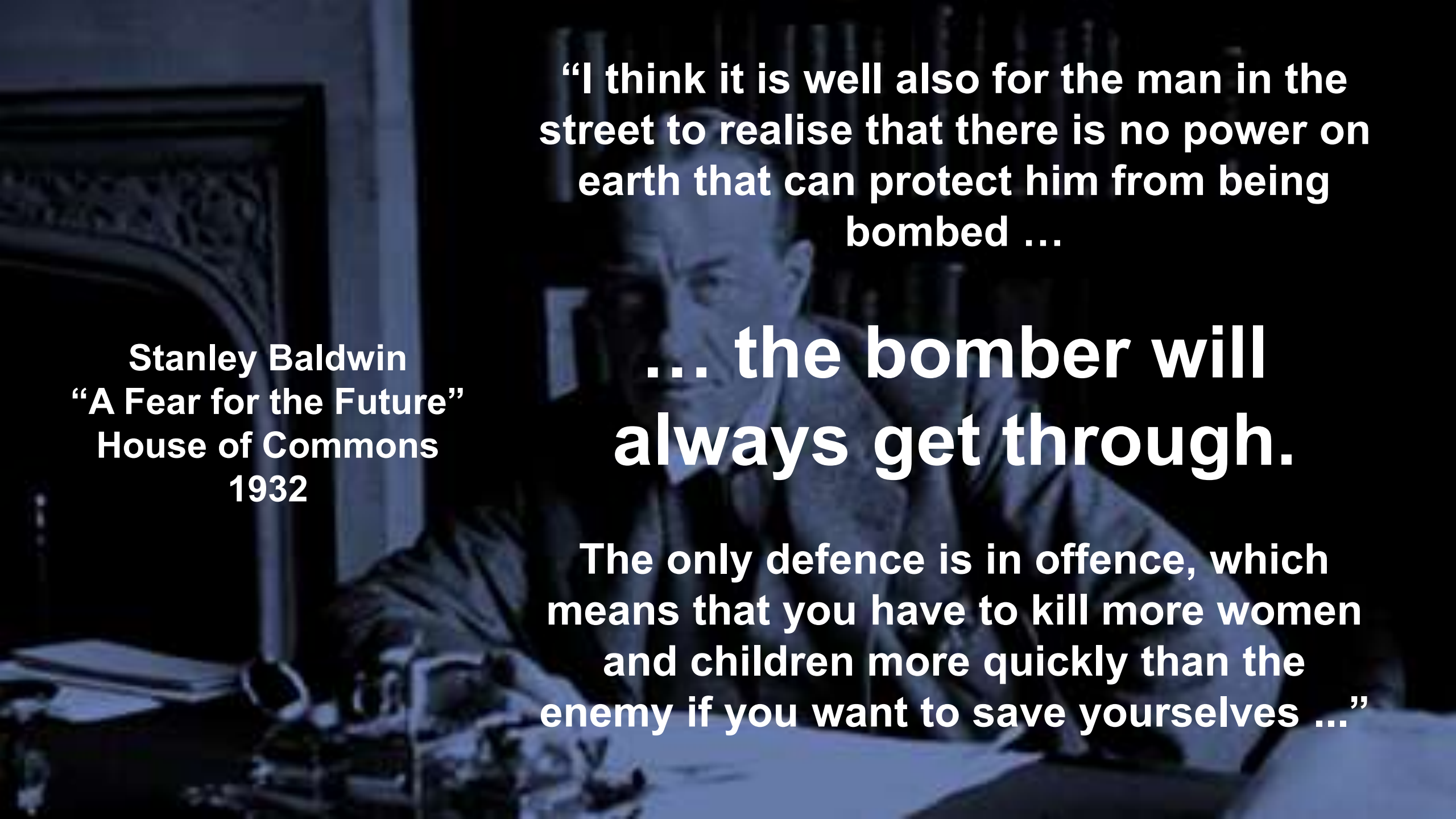
8-177
PILOT'S COMPARTMENT



DIAGRAMMATIC REPRESENTATION OF A ZEPPELIN DROPPING A BOMB ON THE ILL-FATED CITY OF ANTWERP.

One of these great scourges of the sky caused havoc in Antwerp before the fall of the city on October 9th, 1914, although children, women, and old men were the chief sufferers. The cut-away section of the side of the airship illustrates the construction of these monsters of the upper air. The rigid grey-coloured body contains seventeen separate balloons, each of which can be filled independently

of all the others, and injury to one section does not affect the other balloons. A Zeppelin carries two cars with a long passage, really part of the main framework, between the two, as seen in the picture. Many of the Zeppelins are fitted with a platform right on top of the body, and this platform is mounted with a special sky-pointing gun, so as to fire upon aeroplane attack from above.



“I think it is well also for the man in the street to realise that there is no power on earth that can protect him from being bombed ...

**Stanley Baldwin
“A Fear for the Future”
House of Commons
1932**

**... the bomber will
always get through.**

The only defence is in offence, which means that you have to kill more women and children more quickly than the enemy if you want to save yourselves ...”

“Operation Rügen”: Bombing of Guernica, 26 April 1937 Spanish Civil War



By the Condor Legion (Nazi Germany) & the Aviazione Legionaria (Fascist Italy)

Nottingham Evening Post, 13 June 1935

THE NOTTINGHAM EVENING POST. THURSDAY. JUNE 13. 1935.

QUEEN OF MIDLANDS.

DRAW FOR SECOND ROUND OF BOWLS CONTEST.

The draw for the second round of the Queen of the Midlands bowls competition is as follows:

GROUP 1.

[illegible][illegible]

DEATH RAYS

AND RUMOURS

Striking
No Proof

HIGHLY charged already with peace pacts, poison gas and scarcely less noxious political "gas," the international community was further disturbed by rumours of the discovery of a Death Ray.

The most recent of these rumours originated in Italy around the person of Marconi, who was said to have succeeded in stopping the engines of all the cars that entered the invisible zone of his short-wave transmitters. Had he not categorically denied that his experiments were in any way connected with the production of a lethal ray (writes Oscar E. Millard), rumour would soon have held him responsible for every case of sudden death within a hundred-mile radius of his villa.

Before Marconi there were scientists in England, America, and Germany all credited with this sinister invention.

Striking Claims, but No Proof Of Them

INVISIBLE DESTRUCTION

theoretically, it should be possible to transmit electrical energy by these waves for destructive purposes. But the colossal energy required to make these micro-waves capable of wiping out an army at long distance, or bringing down an enemy air squadron, has still to be harnessed. And the chance of electromagnetic radiation being used as a destructive weapon in the near future is remote.

There is another menace in the so-called cataleptic ray, which is intended to act on enemy troops in much the same way as a powerful headlamp acts on rabbits.

This "cataleptic" ray, of which there was much talk on the Continent some time

TARLETON FAILS AGAIN

MILLER OUT-PUNCHES HIS OPPONENT

WIN ON POINTS

For the second time in nine months Nel Tarleton, of Liverpool, the British feather-weight champion, failed in his effort to wrest the world title from Freddie Miller, the American, when he was beaten, at the Stanley Greyhound Track at Liverpool, yesterday, on points over 15 rounds.

Ten thousand people delayed the start by breaking through the barriers sur-

rounding the cheaper parts of the ground and stampeding across the grass.

...DC"

ORS

12

three appeals to the people to keep order and to sit down the fight was put on.

CTI

ot them"

Of Men

Here is an account of the championship fight

Round 1—1 hour

N "I

... was last, and the American, spend-
... handed with two brilliant punches
... 's law. 'Tarleton fell to the boards

to suggest a national militia under the control of the
army, and on rising the Englishman took
independent advantage.

TABLETTON WORRIED.
Round 2.—Miller drove in a fight to the ribs and followed with a couple of stiff punches.

ride and flowed with a couple of tin pans to the face. Tarleton looked worried and could not keep the American at bay. The Englishman tried desperately to get his left moving. In

a clinch Miller hurt his man with powerful punches. Tarleton fought gallantly and got in with two left leads, but he could do little

Round 3—Miller ducked away from a lead and

The Duke of Portland, president of the Pageant, has a word with one of the performers who formed a guard of honour for the Lord Mayor of London.

Research Since Archimedes

invisible death ray ever since Archimedes demonstrated its possibilities by setting fire to the enemy fleet at Syracuse by means of mirrors concentrating the sun's rays. And for the past 40 years scientists of every nationality have been studying the possibility of radiating energy of an intensity capable among other things of destroying human life on the grand scale at a great

‘Tizzard Committee’

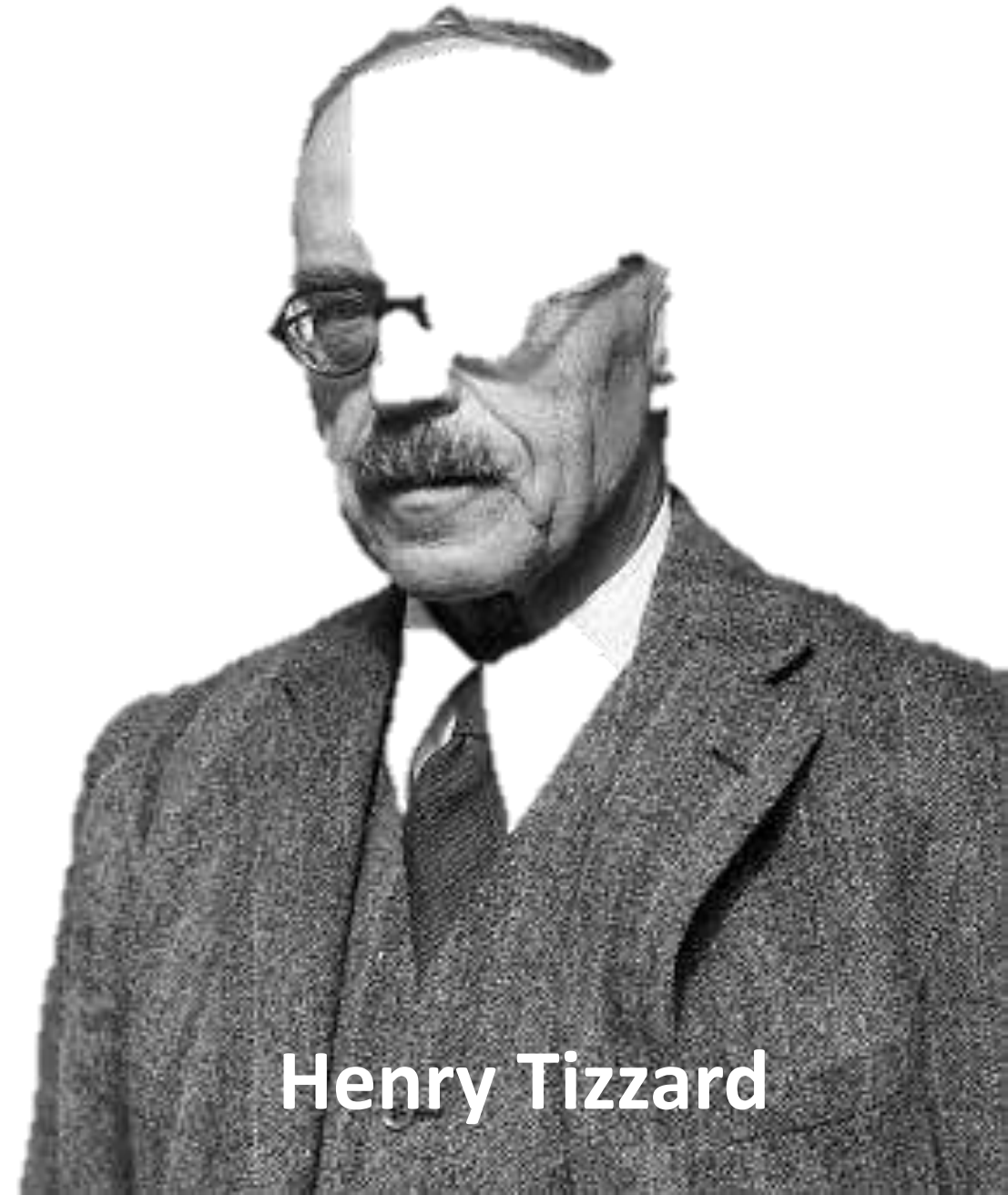
**Committee for the Scientific Survey of
Air Defence: 1934**

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**Committee for the Scientific Survey of
Air Offence: 1937**

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**Committee for the Scientific Survey of
Air Warfare: 1939**

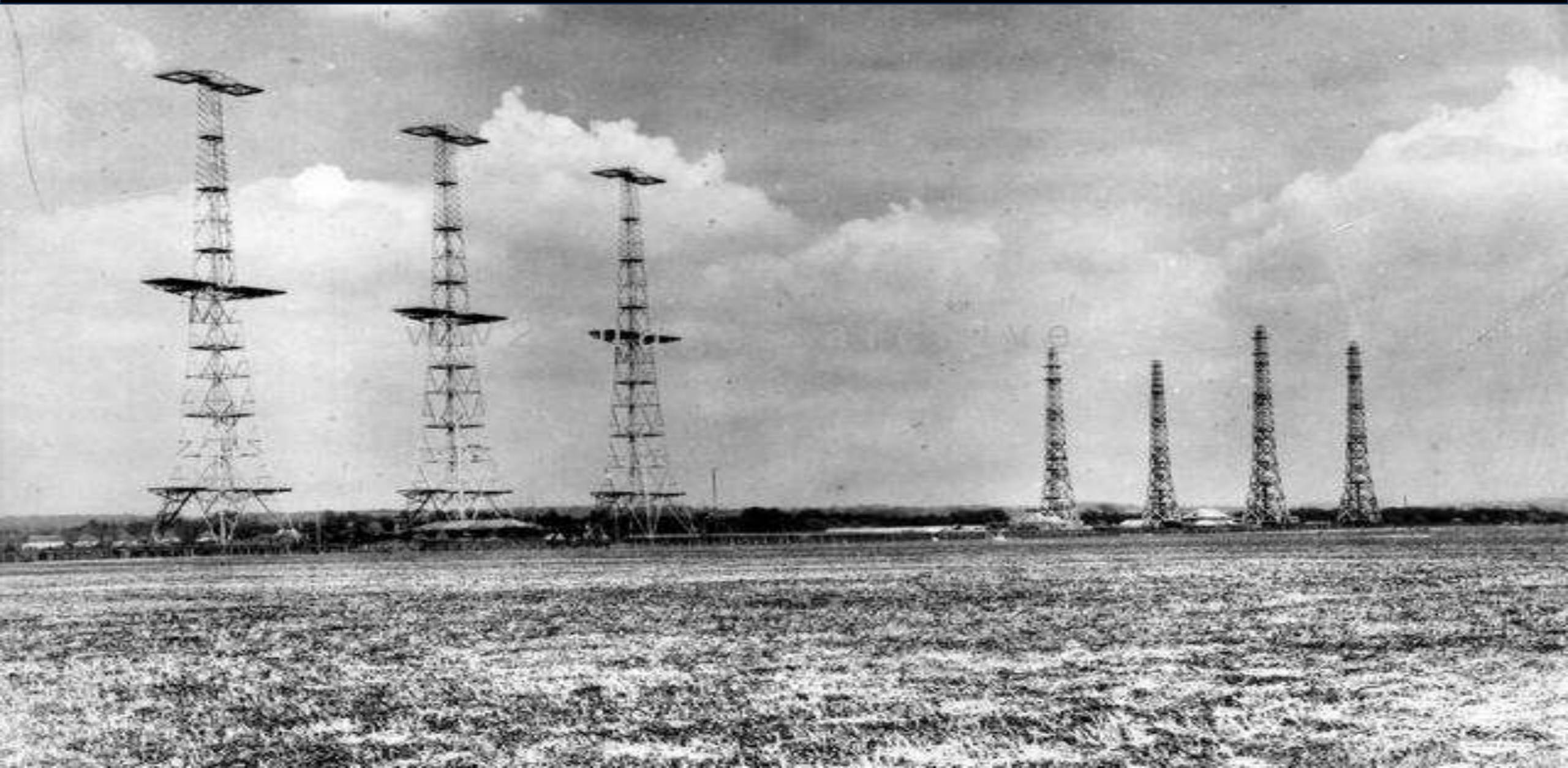


Henry Tizzard



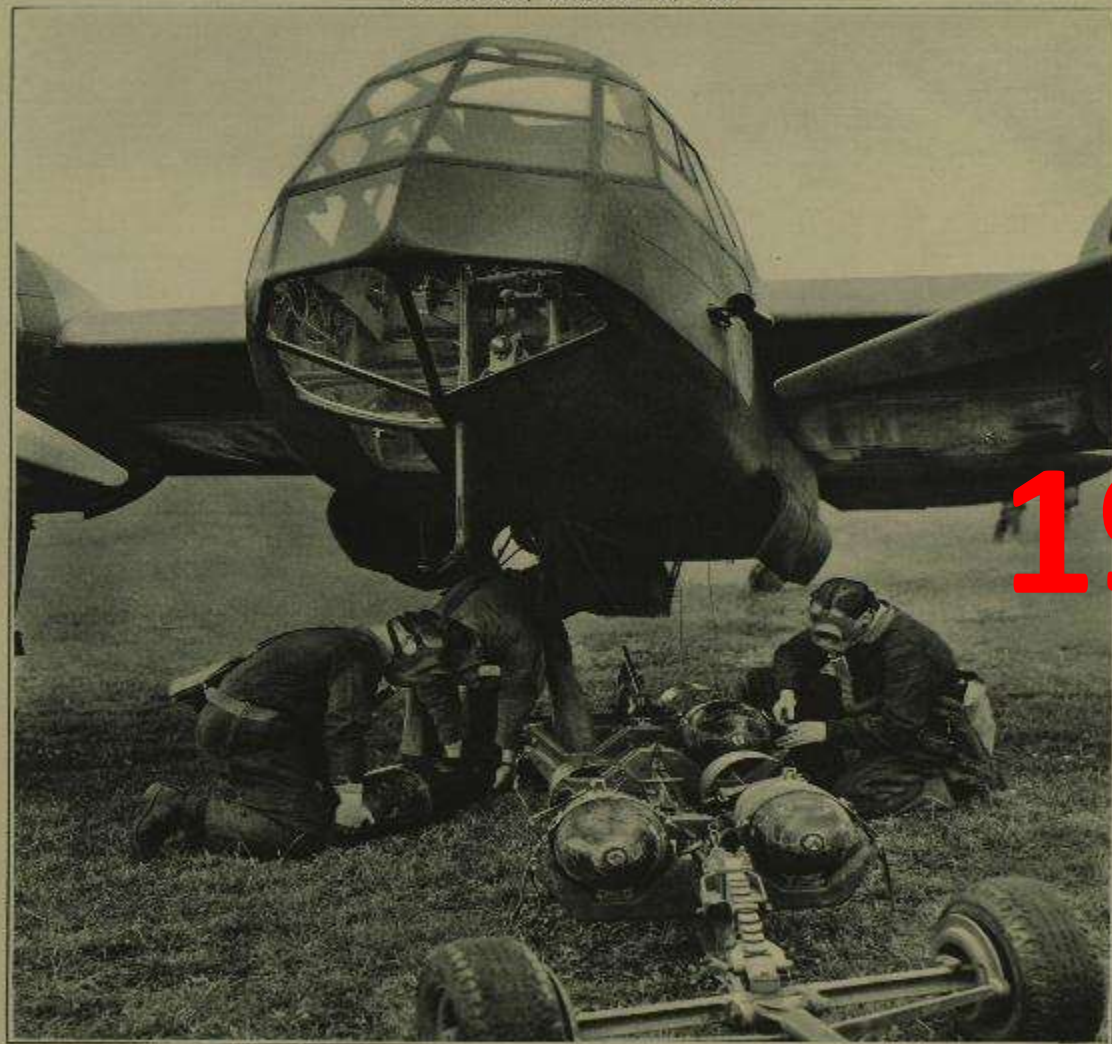
"The First Step", Roy Huxley, Daventry Experiment 26th February 1935

August 1938, Five Chain Home Stations Operational



THE ILLUSTRATED LONDON NEWS

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SATURDAY, AUGUST 13, 1938.



BRITAIN'S GREATEST AIR MANOEUVRES: A "BLENHEIM" BOMBER OF THE "EASTLAND" FORCE THAT RAIDED "WESTLAND," BEING LOADED WITH BOMBS BEFORE STARTING FOR AN ATTACK DURING THE MIMIC WAR.

The greatest British air manoeuvres ever held, officially styled the 1938 Air Defence Exercise, began early on August 8, and ended prematurely, owing to bad weather, on the 7th. About 300 aeroplanes took part, with 15,000 airmen, including pilots, crew and ground staff, besides 17,000 anti-aircraft technicians and anti-tank corps volunteers. No fewer than 60 of the 21 regular bomber and fighter squadrons comprising the Home Defence Air Force were

engaged, and the number of machines was nearly double the total strength three years ago. The figure, however, was over in England took place over the Midlands and West Angles. There was no admission of casualties by either the machine illustrated above, nor the bomber which they were to attack. The machine illustrated above, however, is the bomber from which they are released, though there were seen, open. Further illustrations of the air manoeuvres appear on page 207. (Photograph by Associated Press.)

Aug. 13, 1938

THE ILLUSTRATED LONDON NEWS

207

ENGLAND "RAIDED" AND "BOMBED"; DEFENCE TESTS IN MIMIC AIR WARFARE.



LOADING COVER ON KILN OF AN AIR-RAID WARNING AT A ROYAL AIR FORCE AIRCRAFT IN ENGLAND. MEMBERS OF THE FORCE, WEARING THEIR CAMOUFLAGE, WERE SETTING UP AN AIR-RAID WARNING SYSTEM. (Photo by Associated Press.)



RAIDING BOMBS FROM A BUNKER WHICH CARRIES THEM IN CASE OF EMERGENCY. THE BOMBS ARE KEPT IN THE FRONT OF THE BUNKER. (Photo by Associated Press.)



LOADING THE CASE OF A MACHINE-GUN ON AN AIRCRAFT. MEMBERS OF THE FORCE, WEARING THEIR CAMOUFLAGE, WERE SETTING UP AN AIR-RAID WARNING SYSTEM. (Photo by Associated Press.)



LOADING BY THE AIR FORCE, AN AIRCRAFT WHICH CARRIES THEM IN CASE OF EMERGENCY. THE BOMBS ARE KEPT IN THE FRONT OF THE BUNKER. (Photo by Associated Press.)



WITH A MACHINE-GUN, WHICH IS USED TO DEFEND THE BUNKER. (Photo by Associated Press.)



BEING BOMBED BY THE AIR FORCE, AN AIRCRAFT WHICH CARRIES THEM IN CASE OF EMERGENCY. THE BOMBS ARE KEPT IN THE FRONT OF THE BUNKER. (Photo by Associated Press.)



ON THE WAY TO THEIR RESPECTIVE BUNKERS, THREE MACHINE-GUNNERS FULLY EQUIPPED WITH THEIR GUNS, PARACHUTES, BLOOD IN PANTS IN CASE OF NEED, AND TELEPHONE BATTERIES AND BATTERIES. (Photo by Associated Press.)

These photographs, like that on our front page, illustrate typical details of the recent Air Manoeuvres, which, as they closed, were the greatest ever held in this country, though, unfortunately, fog and cloud hampered the operations and brought them to a premature close. Sir Kingsley Wood, the Air Minister, visited several R.A.F. stations during the exercises. An account by an R.A.F. officer given in the "Daily Telegraph" and "Morning Post" stated: "While at Horsham, he and his party were heavily

"bombed" by a formation of 20 Hurricanes, presumably the same formation that had been intercepted over Exford. . . . The Air Ministry announced that Sir Kingsley Wood narrowly escaped collision in the second time when he was visiting the Fighter Command at Stannett. . . . Despite the adverse weather conditions, the fighter squadrons, searchlights, and Observer Corps of the Westland defences have been thoroughly tested, and many valuable lessons have been learnt."

FRESH PEACE MOVE BY JAPAN

Ambassador to See M. Litvinoff in
Moscow To-day

ANNOUNCEMENT AFTER RENEWED FIGHTING

Russians Drop 500 Bombs in Korea and
Attack With 160 Tanks

A new Japanese move to end the hostilities on the Russo-Manchukuan frontier was announced in Tokyo last night.

The Japanese Foreign Office stated that Mr. Shigemitsu, Ambassador in Moscow, had been instructed to submit fresh proposals to M. Litvinoff, the Russian Commissar for Foreign Affairs, to-day, in an attempt to bring about a peaceful settlement.

At the same time, Mr. Shigemitsu will make a sharp protest at a series of raids by Russian planes in Northern Korea yesterday. It was stated that more than 500 bombs were dropped, some on the Tumen-Rashin railway.

Earlier in the day it was reported that Russian troops had made three fierce attacks, with 160 tanks, on Japanese positions.

Experts in London believe that the conflict will now be settled. Japan's conciliatory attitude is attributed to her appreciation of the great strength of Russia's Far Eastern forces—which include many planes capable of bombing Japanese cities, and a big fleet of submarines.

PLANES BOMB TRAIN AND BARRACKS

TOKYO, Saturday.

After a day of almost unbroken warfare on the disputed Russo-Manchukuan-Korean frontier, a new Japanese move to end the hostilities which broke out a week ago was announced here to-night.

The Foreign Office stated that fresh peace proposals had been sent to Mr. Shigemitsu, the Japanese Ambassador in Moscow, in an attempt to remove the differences hindering a peaceful settlement. Mr. Shigemitsu, an official said, was expected to lay the proposals before M. Litvinoff, the Russian Commissar for Foreign Affairs—who rejected the previous Japanese offer for a re-demarcation of the frontier—to-morrow.

At the same time, it was added, the Ambassador had been instructed to lodge with the Russian Government a sharp protest at a series of raids by Russian planes on Japanese territory this afternoon. It is alleged that more than 500 bombs were dropped in Northern Korea alone.

According to unofficial Japanese dispatches, reports of the bombing were aimed at a Korean army barracks, the location of which is not given. The planes also tried unsuccessfully to blow up a train on the railway running from the Korean coast into the interior.

Mr. Shigemitsu, Secretary of the Moscow Embassy, who arrived here yesterday, is leaving on August 14 for the disputed area to investigate the position. He will then return to Moscow via Vladivostok.

M. LITVINOFF'S TERMS

Japan Must Withdraw

A summary of the interview between the Japanese Ambassador and M. Litvinoff is given on page 17.

WORLD'S FASTEST BOMBER



A Bristol Blenheim, the latest type of bomber, which is the fastest in existence, photographed in flight by our Correspondent during the Home Defence Air Exercises.

EIRE RAILWAY SURPRISE 12,000 EMPLOYEES GIVEN NOTICE

The Great Southern Railway Company of Ireland announced last night that they had served notice on all staffs numbering about 12,000, terminating their employment on the terms of their agreement and continuing the employment thereafter on a day-to-day basis of such persons as may be required.

The company's railways and road services cater for almost the whole of Eire. The matter is being brought to the attention of the Government. There is no intention to suspend services, but it is believed that there will be curtailments and a considerable laying off of staffs.

The company's railways and road services cater for almost the whole of Eire.

DANUBE WATERWAYS ITALY TO BE ABSENT FROM COMMISSION

By Our DIPLOMATIC CORRESPONDENT

I understand that Italy is disinterested in the question of the Danube waterways commission. In the opinion of many observers this means that, as a loyal partner in the Berlin-Rome Axis, Italy is not prepared to oppose German plans for economic control of the Danube basin.

Early this week a meeting of the European Commission, which controls the tidal waterways of the Danube, is being held at Sinaia, in Rumania. Great Britain, France, and Rumania will be represented, but the fourth member of the Commission, Italy, will be absent. Germany is credited with plans for establishing a new Danube Waterways Commission, of a technical character, on which only the riparian Danubian States would be represented. France and Great Britain are strongly opposed to the exclusion of non-riparian Powers.

KILLED IN SPAIN FORMER OXFORD BLUE AND M.P.'s SON

Mr. Lewis Clive, who rowed No. 6 for Oxford in the University Boat Race in 1930 and 1931, has been killed while fighting for the Government forces in Spain. Mr. David Guest, son of Dr. Leslie Haden Guest, M.P. for North Leicestershire, had also been killed in similar circumstances.

Mr. Clive's rowing exploits were not confined to England. In the 1932 Olympic Games at Los Angeles he won the double sculls. He was at Eton before going up to Christ Church, and was a member of the Oxford crew.

RUNCIMAN MEETS U.S. ENVOY Surprise Talk on Czech Problem

FROM OUR OWN CORRESPONDENT

PRAGUE, Saturday.

Viscount Runciman, who is visiting Czechoslovakia to mediate in the dispute between the Sudeten Germans and the Czechoslovak Government, left Prague with Lady Runciman on a week-end trip this afternoon to study the minority question at first hand without official guides.

He will stay to-night as the guest of Count Kras Kinsky, at Zamek Castle, in the village of Zdar, Moravia. Details of Lord Runciman's itinerary on both outward and return journeys have been kept secret. He is expected to return some time to-morrow.

Before leaving, with golf clubs and fishing tackle, for an unknown destination he had an important conversation with America's "flying diplomat," Mr. Hugh Wilson, United States Ambassador to Berlin.

This unexpected meeting took place at a luncheon in Mr. Wilson's honour given by the Czechoslovak Government. British Minister in Prague, at the British Legation. Mr. Wilbur Carr, United States Minister, was also present.

Immediately after the luncheon Mr. Wilson returned to Berlin in his private aeroplane.

Despite official statements to the contrary, I am authoritatively informed that he and Lord Runciman discussed Czechoslovakia's minority problem for at least half an hour. Just how "official" this conversation was is a question of speculation.

EXPERTS' TASK

The Henkle Parliamentary Committee, headed by Herr Ernst Kundt, resumed examination of the minority question with experts of Lord Runciman's mission, including Mr. Geoffrey Peto and Mr. Ashton Gwatkin, this afternoon.

The experts are remaining in Prague over the week-end. Prague police to-day issued an order closing Stepanska Strasse, in which the Hotel Aleron is situated, to all ordinary traffic from Monday. This measure was taken as Lord Runciman had complained of the noise. The hotel management is also installing air-conditioning in his suite as he feels the heat.

There seems to be little likelihood of the mission completing its work for another two months. Lord Runciman is being invited to visit all parts of Czechoslovakia by political leaders and Czechoslovak aptem.

Czech Comment, page 17.

FOREIGN PLANES OVER

POLAND

MANY GERMAN FLIGHTS

FROM OUR OWN CORRESPONDENT

WARSAW, Saturday.

Much surprise is expressed here about

BRITAIN'S SIXTH DAY OF STORMS THE HEAT WAVE TO CONTINUE

TO-DAY'S FORECAST: Warm and sunny; local storms

Violent thunder and rain storms were again experienced in various parts of Britain yesterday for the sixth successive day.

The Mersey tunnel was flooded and several cars were stranded. A landslide on the L.M.S. railway line near Liverpool and a subsidence at Chisleton, Cheshire, delayed traffic.

Several houses and a church were damaged by lightning. Thousands of holiday-makers travelling to Bournemouth from London and the Midlands were delayed when an engine became derailed at Bournemouth West Station. The main line was blocked for two hours.

Brilliant sunshine was general in most parts of the country. Yesterday was the

Sunday Times CIRCULATION

CERTIFIED REPORT FOR JULY

The average weekly net sale of the "Sunday Times" for the five weeks ended on July 31 was

289,712

AUDITORS' CERTIFICATE: We have examined the books and accounts of Allied Newspapers, Ltd., and report that the average weekly net sales of the "Sunday Times" after deducting all free and voucher copies, were as above, and were arrived at in accordance with the formula adopted by the Committee of the Newspaper Proprietors' Association.

August 5, 1938. PETER WATKINS and Co.

seventh consecutive day on which a temperature of 80 degrees or more was registered in the South.

Comparative readings on the Air Ministry report in Kingsley, London, yesterday, and on Friday were:

Y-day. Frl. Deg. 62. 10 a.m. 74. Noon 74. 2 p.m. 80. 4 p.m. 80. 6 p.m. 83. 8 p.m. 74. 10 p.m. 72.

Our Meteorological Expert, writing on page 15, states that the first six days of August have been equalled for sustained high temperatures only once in 38 years. That was in 1923.

Reports from Storm Centre, page 18.

CRATHIE MEMORIAL TO KING GEORGE UNVEILING TO-DAY

It is expected that the King and Queen will attend the unveiling of the memorial to King George after the morning service at Crathie Church to-day for a brief ceremony of unveiling, by the King, of a plaque bust of the late King

900 BATTLE PLANES OVER ENGLAND

Greatest Mock Air War to Continue
Throughout To-day

22 MACHINES "BOMB" SIR KINGSLEY WOOD

Britain's greatest mock air war, in which 900 battle planes are engaged, will continue to-day.

Fog and bad visibility yesterday, and on Friday, necessitated a short armistice, and even when the exercises had been resumed, restricted activity. The Air Ministry, in consequence, decided that the manoeuvres should continue until 6 p.m. to-day. If conditions have not improved there will be a further extension to 9 a.m. to-morrow.

Yesterday's weather favoured the attackers, as the Sunday Times Air Correspondent, who took part in one of the "raids" from the North Sea, explains. For this reason the exercises, he hoped, will produce much valuable data.

Two squadrons of bombers, making clever use of the cover of the clouds, yesterday afternoon succeeded in reaching the heart of London after being intercepted outside. The Air Ministry spokesman said: "It is not likely that many of them will be seen or able to carry out further raids, so warm was the reception."

Sir Kingsley Wood, the Air Minister, was "bombed" by twenty-two machines which attacked Horetham aerodrome, Essex, while he was visiting there in the afternoon. The official communiqué issued by the Air Ministry commented:

"Such, however, is the indomitable spirit of the Royal Air Force that, one hour after being 'blown up,' the Minister arrived at Fillingly Headquarters, where he narrowly escaped extinction a second time. Sir Kingsley's third visit, to Northolt, was fortunately attended by less serious consequences."

LESSONS OF THE EXERCISES WEATHER AND DEFENCE

By W. MacLANACHAN.

"Sunday Times" Air Correspondent. The extensive air exercises held this week-end have again demonstrated the difficulty of accepting definite principles for stereotyped methods of aerial defence.

The vagaries of the climate and the varying conditions of visibility in the exercises have again involved changes of defence tactics almost every hour.

This was clearly evident on Friday morning when the weather, involving being by to take part in the exercises, ground mist and low clouds caused the postponement of the outbreak from 10 a.m. to 2 p.m.

EASTLAND'S TWELVE BASES. The same weather conditions prevailed over the whole area, which extended roughly from the Humber in the north to the Thames in the south and a line between Fillingly and Andover in the west. In all, the twelve aerodromes were used by the Eastern attacking bombers, with three thick clouds at 2,000 feet, the area was filled with the noise of the movements of squadrons in the air and to create an impression of realism.

At 10.15 a.m. the attacking squadrons were occupied by defending fighter squadrons. The latter were expected to carry out raids from this country during an actual war. They expected to carry out raids from the country during an actual war. They expected to carry out raids from the country during an actual war.

These latter were supposed to represent the "real" war, and were expected to carry out raids from this country during an actual war. They expected to carry out raids from the country during an actual war.

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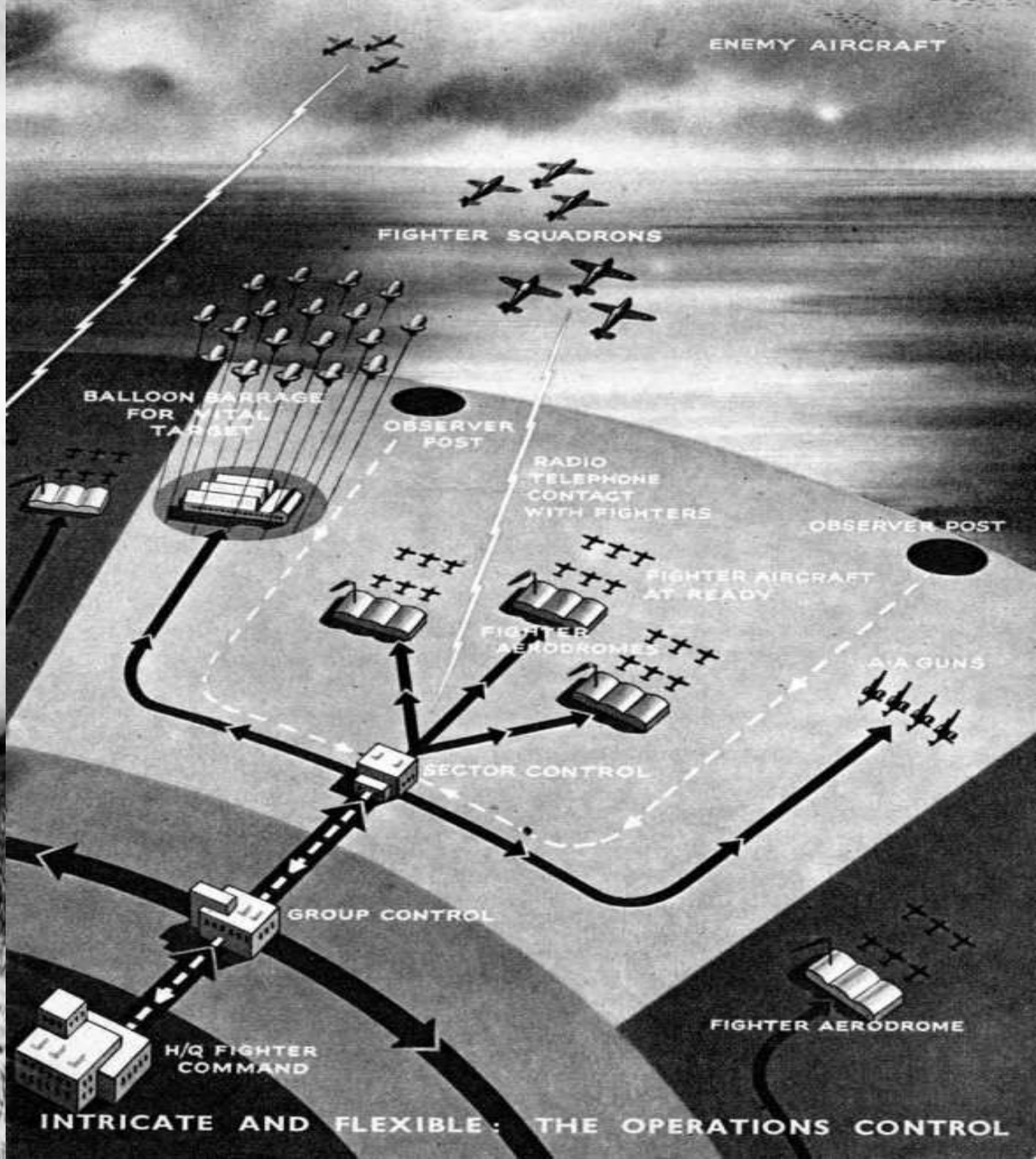
FAVOURABLE CONDITIONS

The conditions in a war would have been particularly favourable for us. We could use our own fighters and our own use of the cloud screens and clever

Continued on page 17, column 1.



**Air Chief Marshal
Hugh Dowding**
1882-1970







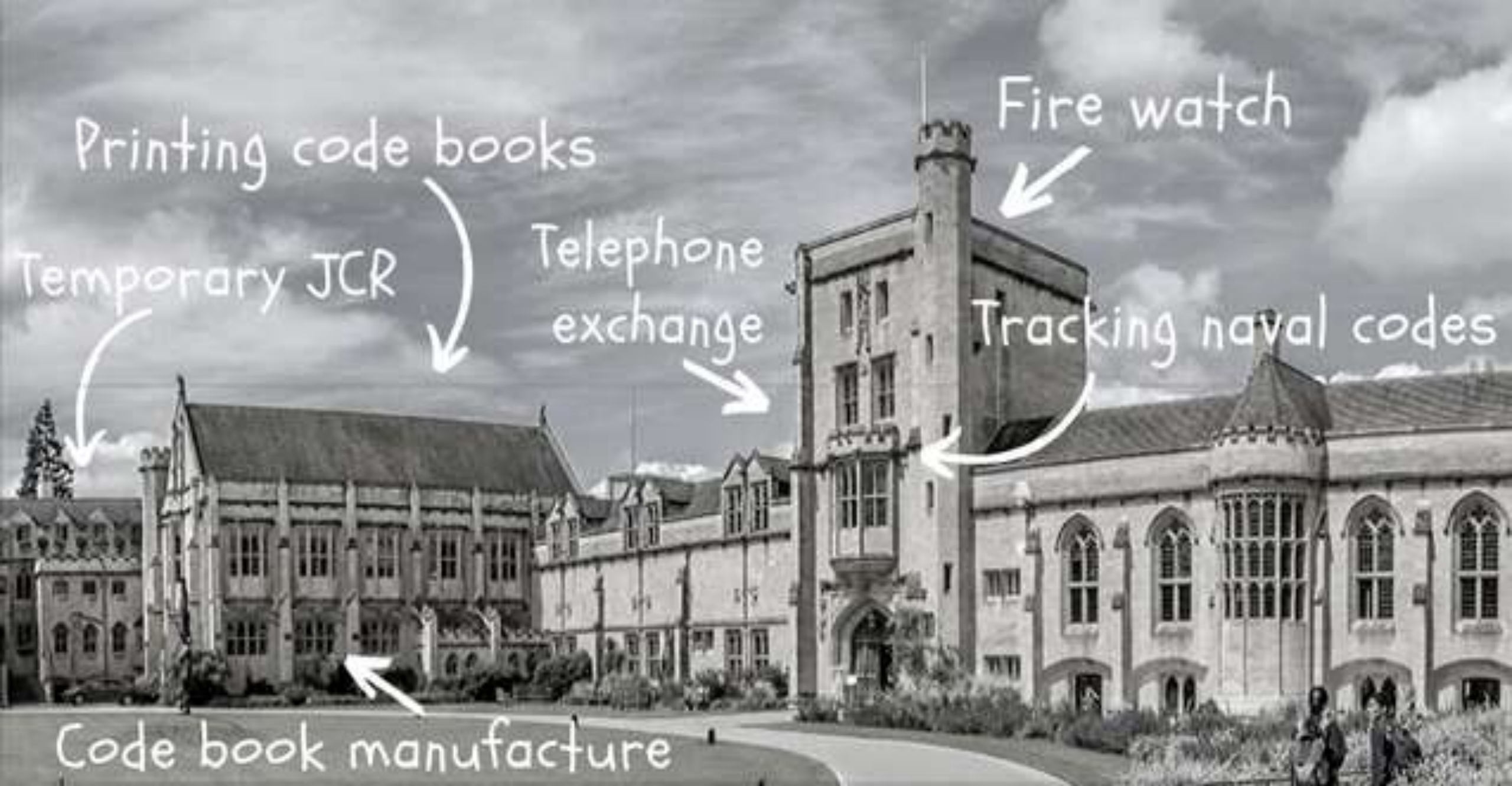




'B' Flight, No. 32 Squadron & Hurricane Mk I P3522, GZ-V, RAF Hawkinge, July 29 1940, Imperial War Museum collection

HQ, Government Code & Cypher School (GC&CS), Bletchley Park

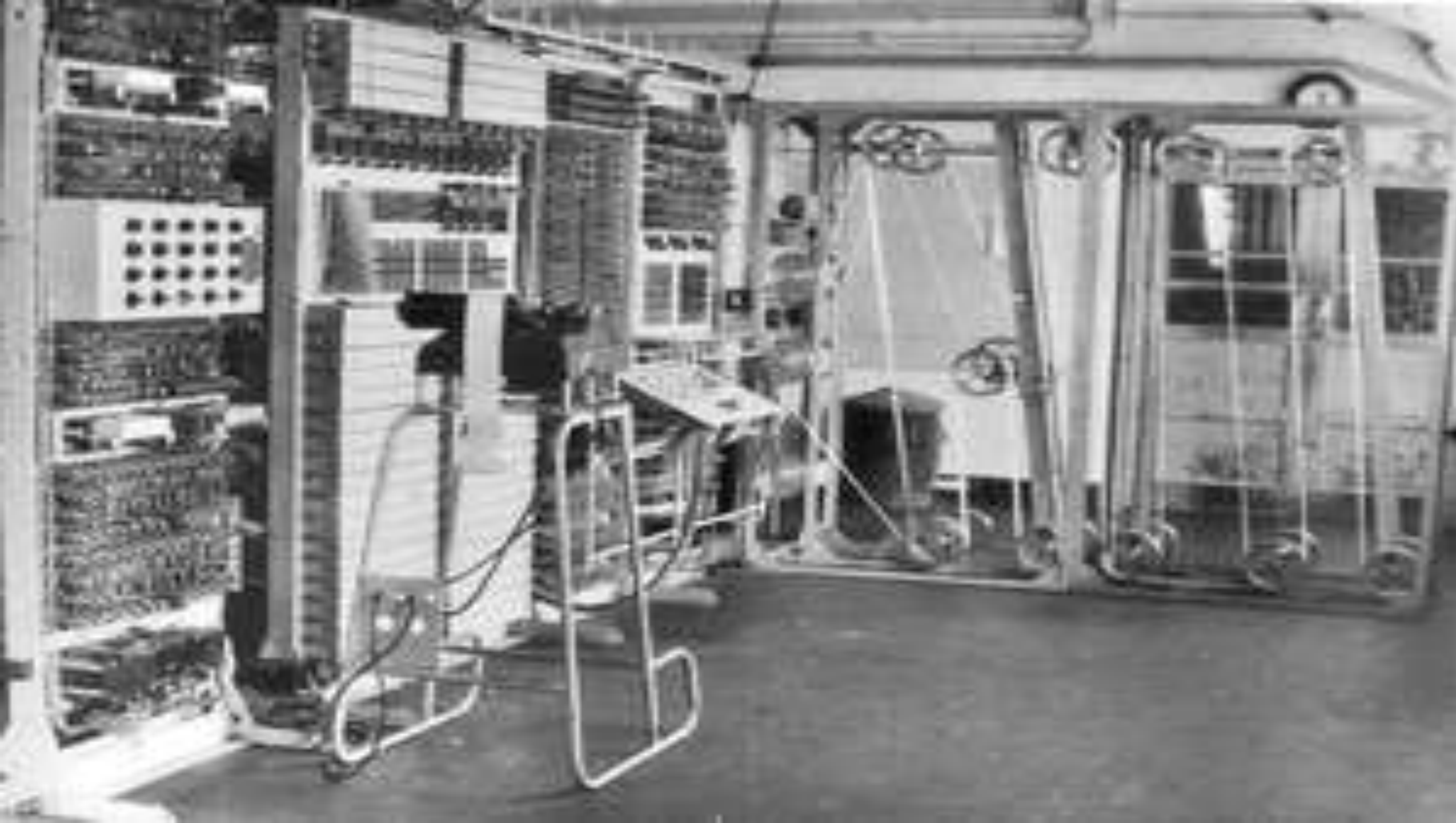




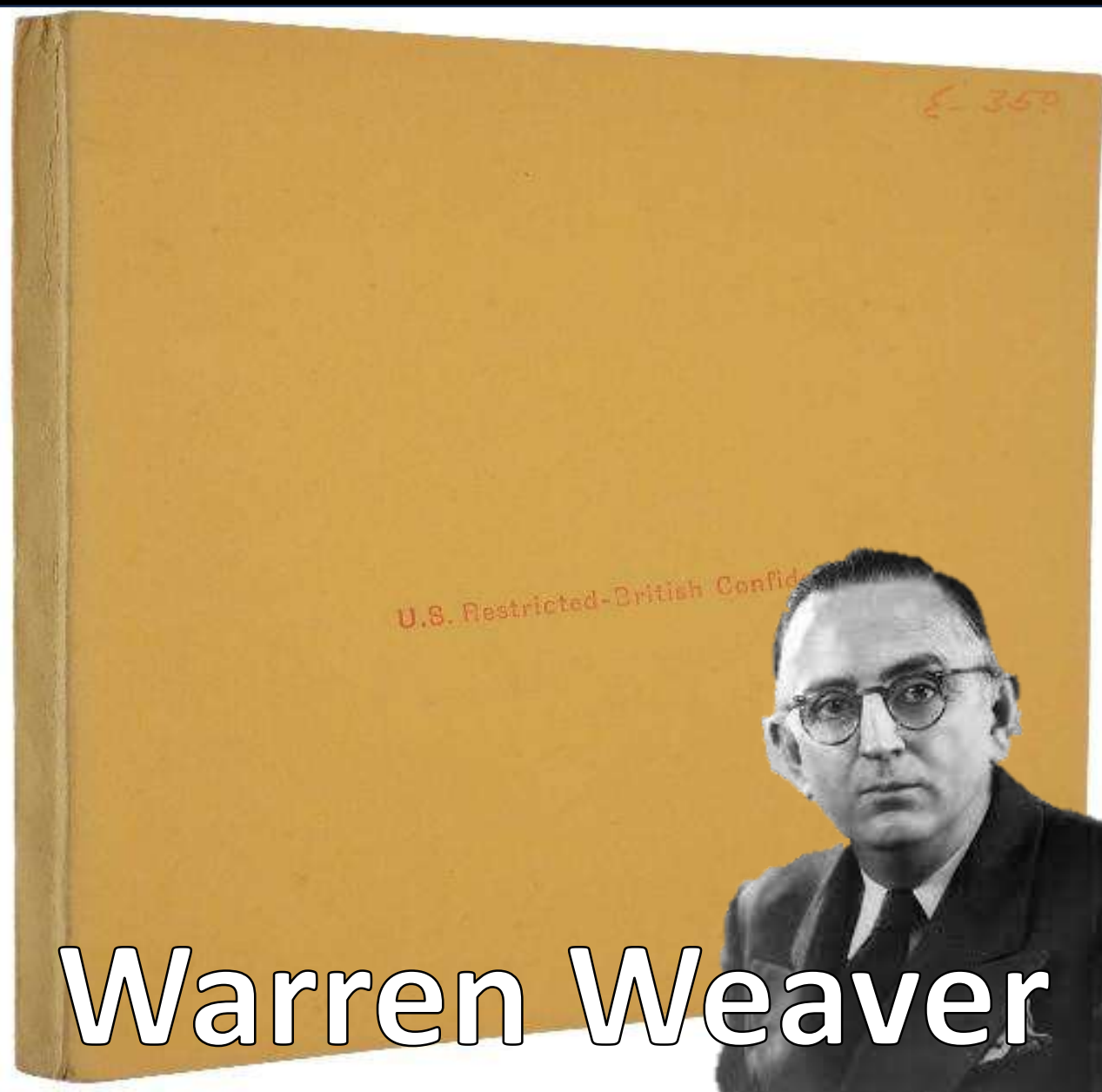
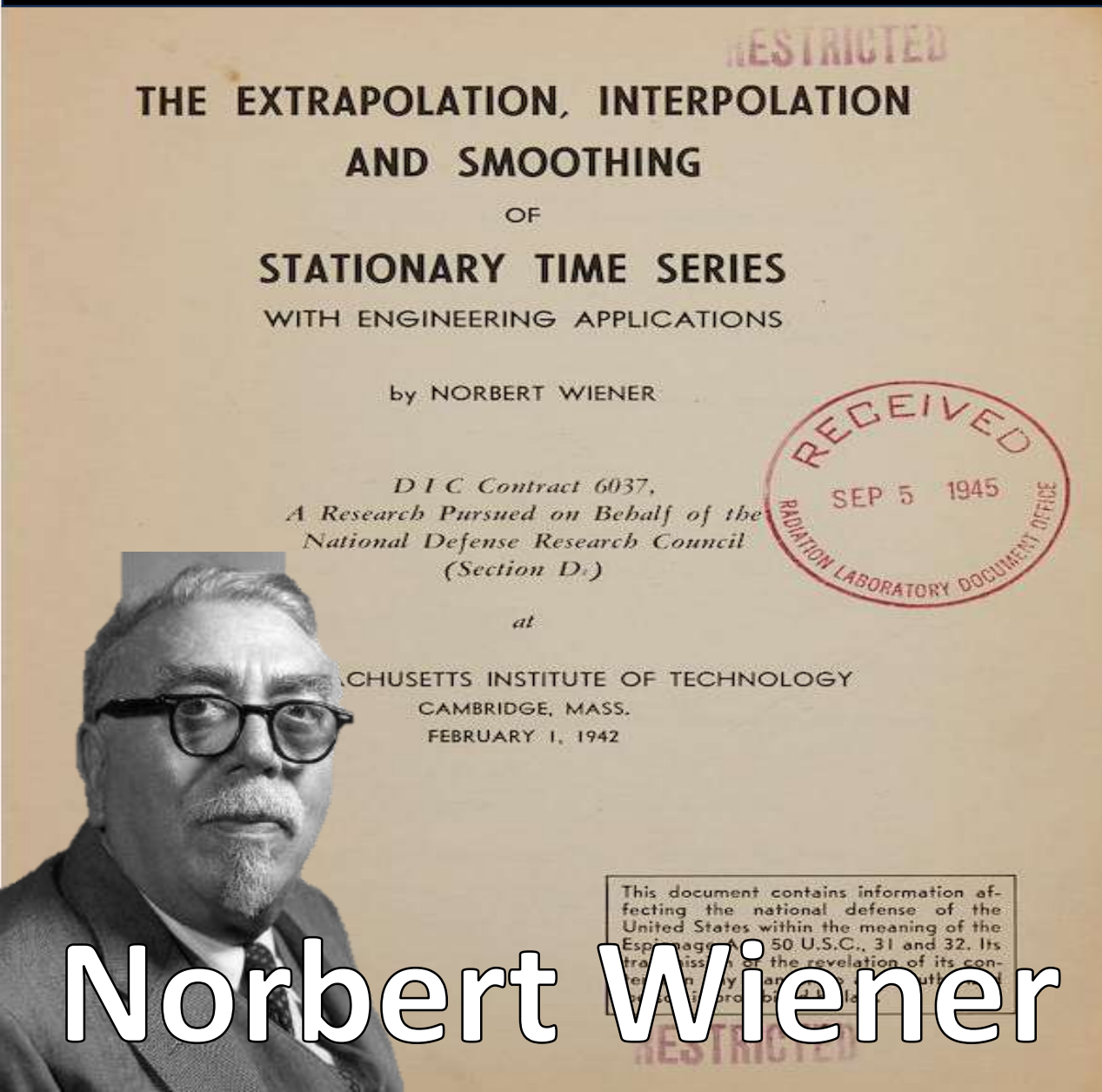
GC&CS Construction Section, Mansfield College, Oxford







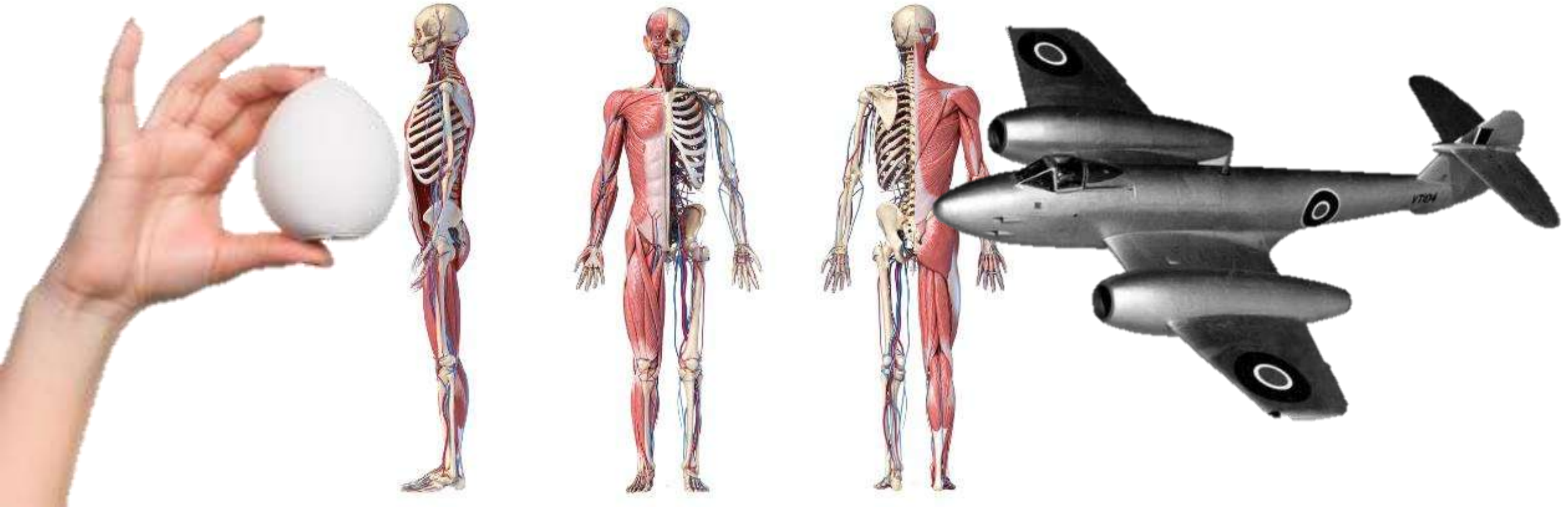
“The Extrapolation, Interpolation and Smoothing of Stationary Time Series: With Engineering Applications”

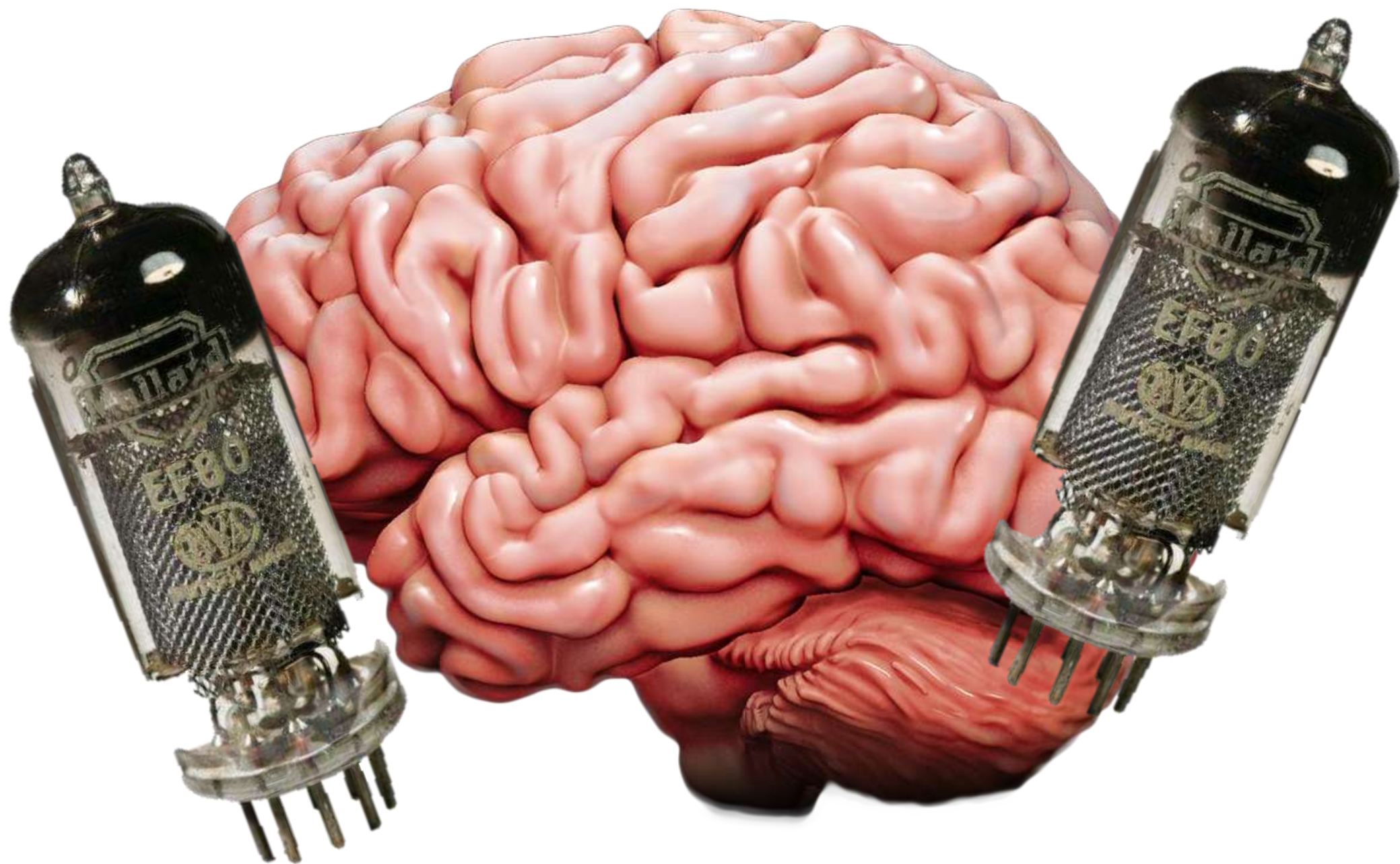












"A Logical Calculus of the Ideas Immanent in Nervous Activity"

BULLETIN OF
MATHEMATICAL BIOPHYSICS
VOLUME 5, 1943

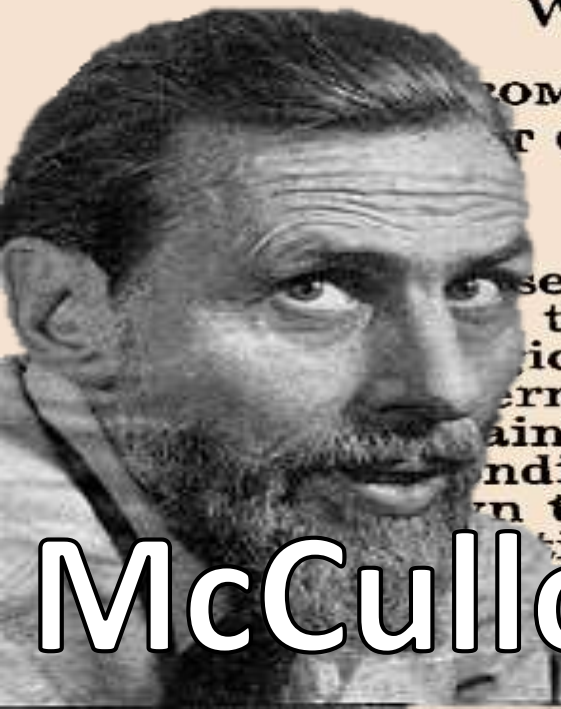
1943

A LOGICAL CALCULUS OF THE IDEAS IMMANENT IN NERVOUS ACTIVITY

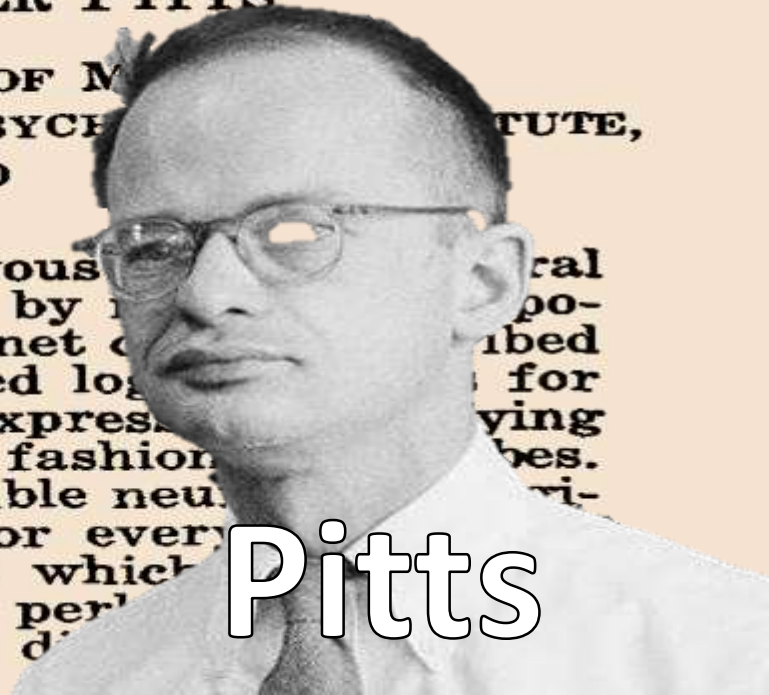
WARREN S. MCCULLOCH AND WALTER PITTS

FROM THE UNIVERSITY OF ILLINOIS, COLLEGE OF MEDICINE,
DEPARTMENT OF PSYCHIATRY AT THE ILLINOIS NEUROPSYCHIC INSTITUTE,
AND THE UNIVERSITY OF CHICAGO

use of the "all-or-none" character of nervous activity, the relations among them can be treated by logic. It is found that the behavior of every net can be described in terms, with the addition of more complicated logical expressions, of the behavior of simpler nets; and that for any logical expression, under certain conditions, one can find a net behaving in the fashion described. It is shown that many particular choices among possible neural networks are equivalent, in the sense that for every logical expression, there exists another net which gives the same results, although perhaps by different means. Various applications of the calculus are discussed.



McCulloch



Pitts

EQUIVALENCE BETWEEN 'NEURAL NETS' & 'TURING MACHINES'

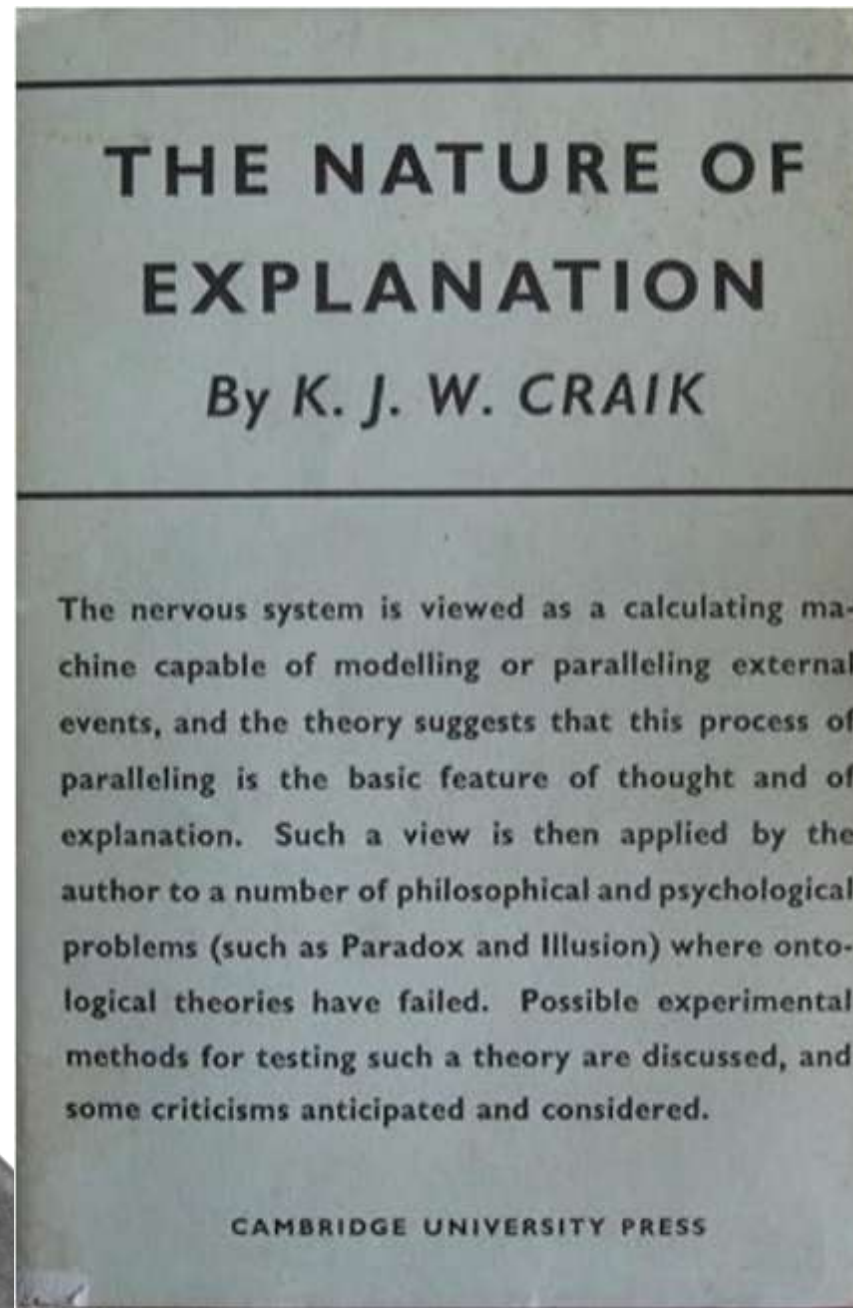
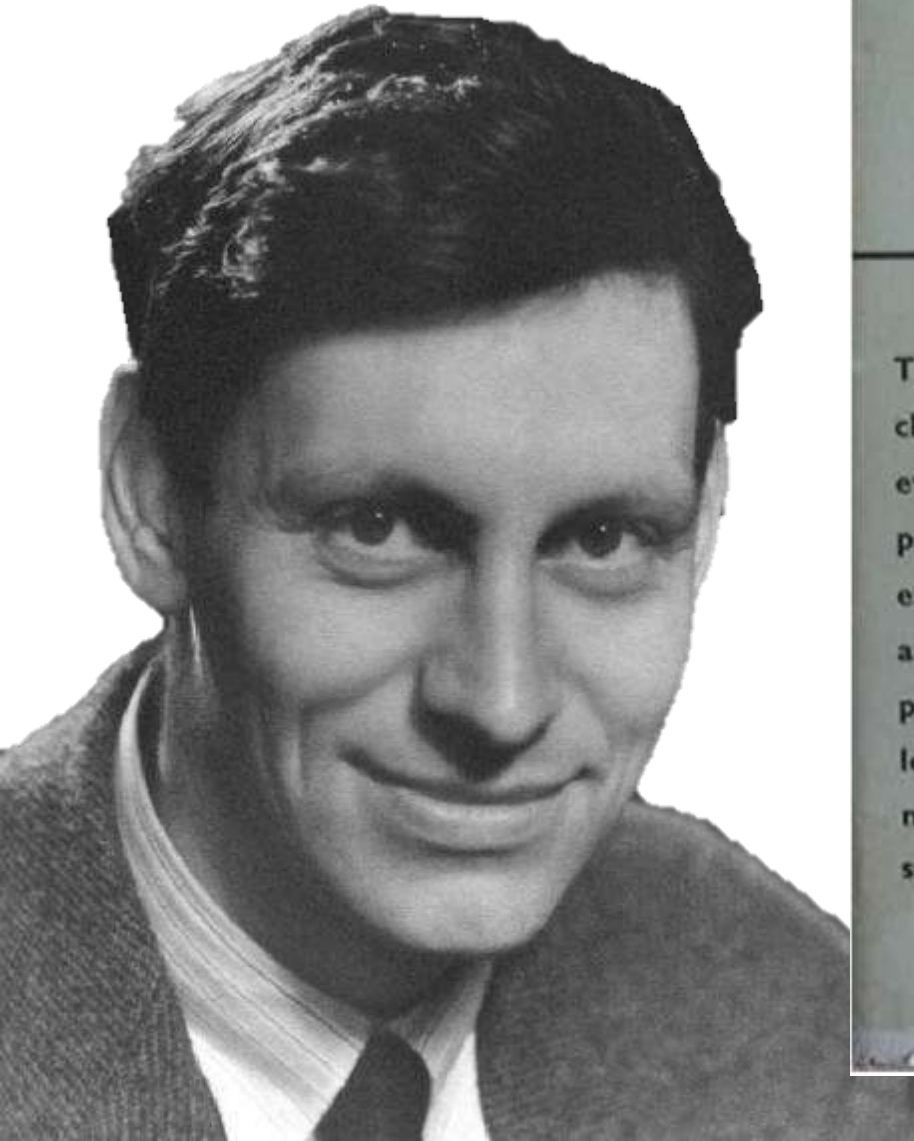
One more thing is to be remarked in conclusion. It is easily shown: first, that every net, if furnished with a tape, scanners connected to afferents, and suitable efferents to perform the necessary motor-operations, can compute only such numbers as can a Turing machine; second, that each of the latter numbers can be computed by such a net; and that nets with circles can be computed by such a net; and that nets with circles can compute, without scanners and a tape, some of the numbers the machine can, but no others, and not all of them. This is of interest as affording a psychological justification of the Turing definition of computability and its equivalents, Church's λ -definability and Kleene's primitive recursiveness: if any number can be computed by an organism, it is computable by these definitions, and conversely.

“With determination of the net, the unknowable object of knowledge, the “thing in itself”, ceases to be unknowable”

There is no theory we may hold and no observation we can make that will retain so much as its old defective reference to the facts if the net be altered. Tinnitus, paraesthesias, hallucinations, delusions, confusions and disorientation intervene. Thus empiry confirms that if our nets are undefined, our facts are undefined, and to the “real” we can attribute not so much as one quality or “form.” With determination of the net, the unknowable object of knowledge, the “thing in itself,” ceases to be unknowable.

“... in such systems [‘neural nets’] “Mind” no longer “goes more ghostly than a ghost””

Certainly for the psychiatrist it is more to the point that in such systems “Mind” no longer “goes more ghostly than a ghost.” Instead, diseased mentality can be understood without loss of scope or rigor, in the scientific terms of neurophysiology.



1943

“The nervous system is viewed as a calculating machine capable of modelling or paralleling external events, and the theory suggests that this process of paralleling is the basic feature of thought and explanation.”



THEORY OF THE HUMAN OPERATOR IN CONTROL SYSTEMS¹

I. THE OPERATOR AS AN ENGINEERING SYSTEM

BY THE LATE KENNETH J. W. CRAIK

Medical Research Council, Applied Psychology Unit, University of Cambridge

I. *The human operator behaves basically as an intermittent correction servo* (p. 56). II. *The intermittent corrections consist of 'ballistic' movements* (pp. 56–58). III. *There are some counteracting processes tending to make controls seem continuous* (pp. 58–59). IV. *Electrical models could fairly exactly simulate the human operator's behaviour in tracking* (pp. 59–61).

I. *The human operator behaves basically as an intermittent correction servo.* The evidence for this is the periodic or 'wavy' nature of the time-record of tracking errors, showing a spectrum with a predominant frequency of about 0.5 sec. with a smaller cluster of frequencies from 0.25 to 1 sec. This periodicity might be attributed to a sensory threshold or 'dead zone', such that misalignments smaller than a certain value evoke no corrective movement; but there is evidence against this. First, the display-magnification is usually such that the misalignments occurring during steady tracking exceed the known threshold (i.e. visual acuity). Secondly, if the rate of the course, or the magnification of the display for a given course, is increased by a certain factor, the periodicity of the corrections is little, if at all, affected; whereas if their periodicity were determined by the time taken for the misalignments to reach a certain 'threshold' value this alteration should shorten the periodicity of the corrections in the same ratio.

Consistently with the above principle, we find that the mean error in tracking any given variable-direction course is nearly proportional to the rate of the course, over a wide range of speeds. We should account for this by saying that the faster the course the greater the misalignments that occur in each period between two corrections, in strict proportion.

THEORY OF THE HUMAN OPERATOR IN CONTROL SYSTEMS

1: THE OPERATOR AS AN ENGINEERING SYSTEM

**“The human operator behaves basically
as an intermittent correction servo”**

2: MAN AS AN ELEMENT IN A CONTROL SYSTEM

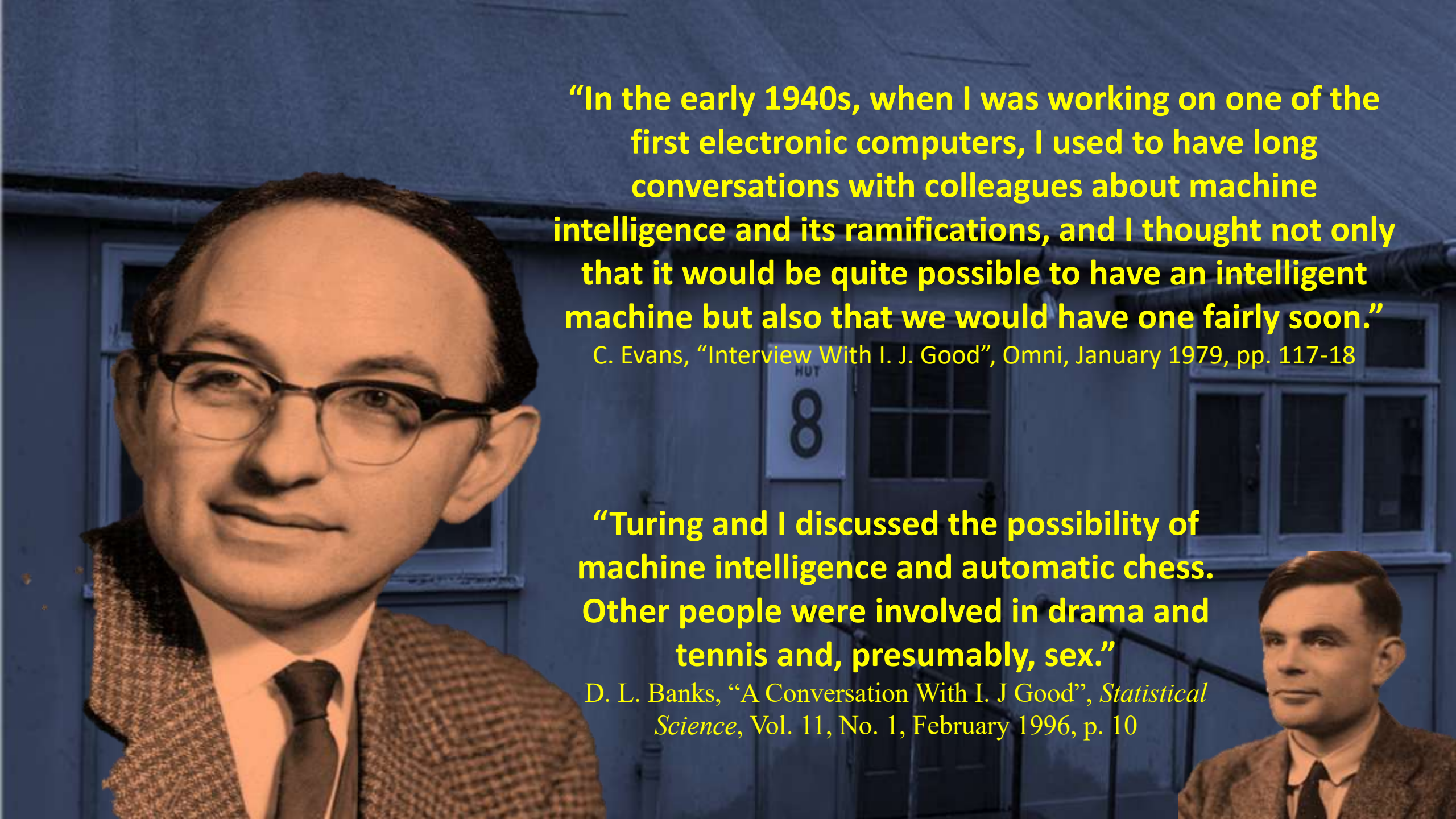
**“As an element in a control system a man
may be regarded as a chain consisting of the
following items:**

- (1) Sensory devices [radar]**
- (2) A computing system [brain]**
- (3) An amplifying system [nerve control]**
- (4) Mechanical linkages [limbs]**



Jack Good

Alan Turing



“In the early 1940s, when I was working on one of the first electronic computers, I used to have long conversations with colleagues about machine intelligence and its ramifications, and I thought not only that it would be quite possible to have an intelligent machine but also that we would have one fairly soon.”

C. Evans, “Interview With I. J. Good”, *Omni*, January 1979, pp. 117-18

“Turing and I discussed the possibility of machine intelligence and automatic chess. Other people were involved in drama and tennis and, presumably, sex.”

D. L. Banks, “A Conversation With I. J. Good”, *Statistical Science*, Vol. 11, No. 1, February 1996, p. 10

Bell Telephone Laboratories, 463 West Street, New York



Claude Shannon

January – March 1943



SIGSALY DIGITAL SPEECH ENCCYPTION SYSTEM 1943 - 1946



[24]

~~CONFIDENTIAL~~ (P7)COVER SHEET FOR TECHNICAL MEMORANDA
RESEARCH DEPARTMENT

SUBJECT: A Mathematical Theory of Cryptography - Case 20878 (4)

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AUTHOR C. E. Shannon
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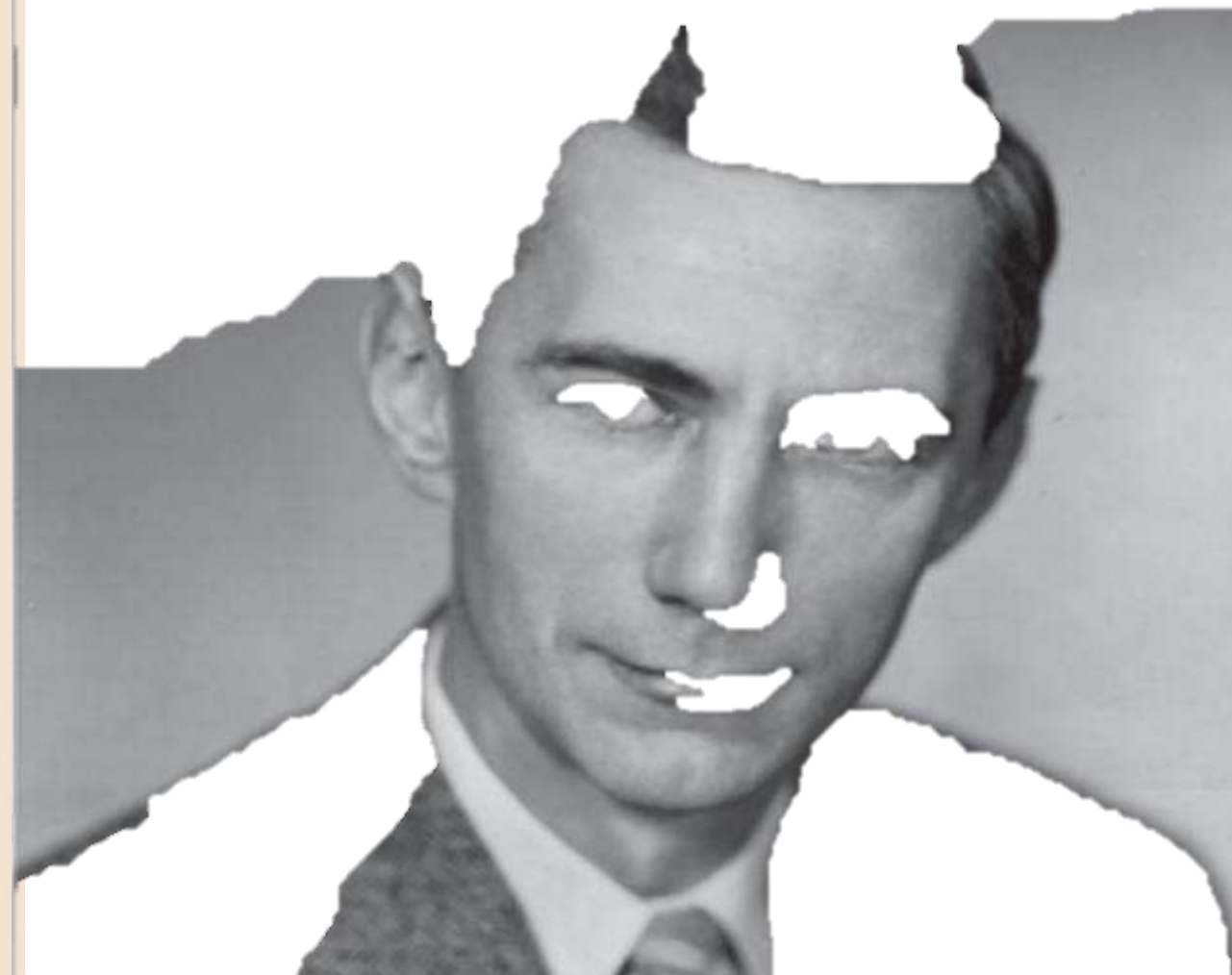
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ABSTRACT

A mathematical theory of secrecy systems is developed. Three main problems are considered. (1) A logical formulation of the problem and a study of the mathematical structure of secrecy systems. (2) The problem of "theoretical secrecy," i.e., can a system be solved given unlimited time and how much material must be intercepted to obtain a unique solution to cryptograms. A secrecy measure called the "equivocation" is defined and its properties developed. (3) The problem of "practical secrecy." How can systems be made difficult to solve, even though a solution is theoretically possible.

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"A Mathematical Theory of Cryptography"
September 1945

1944



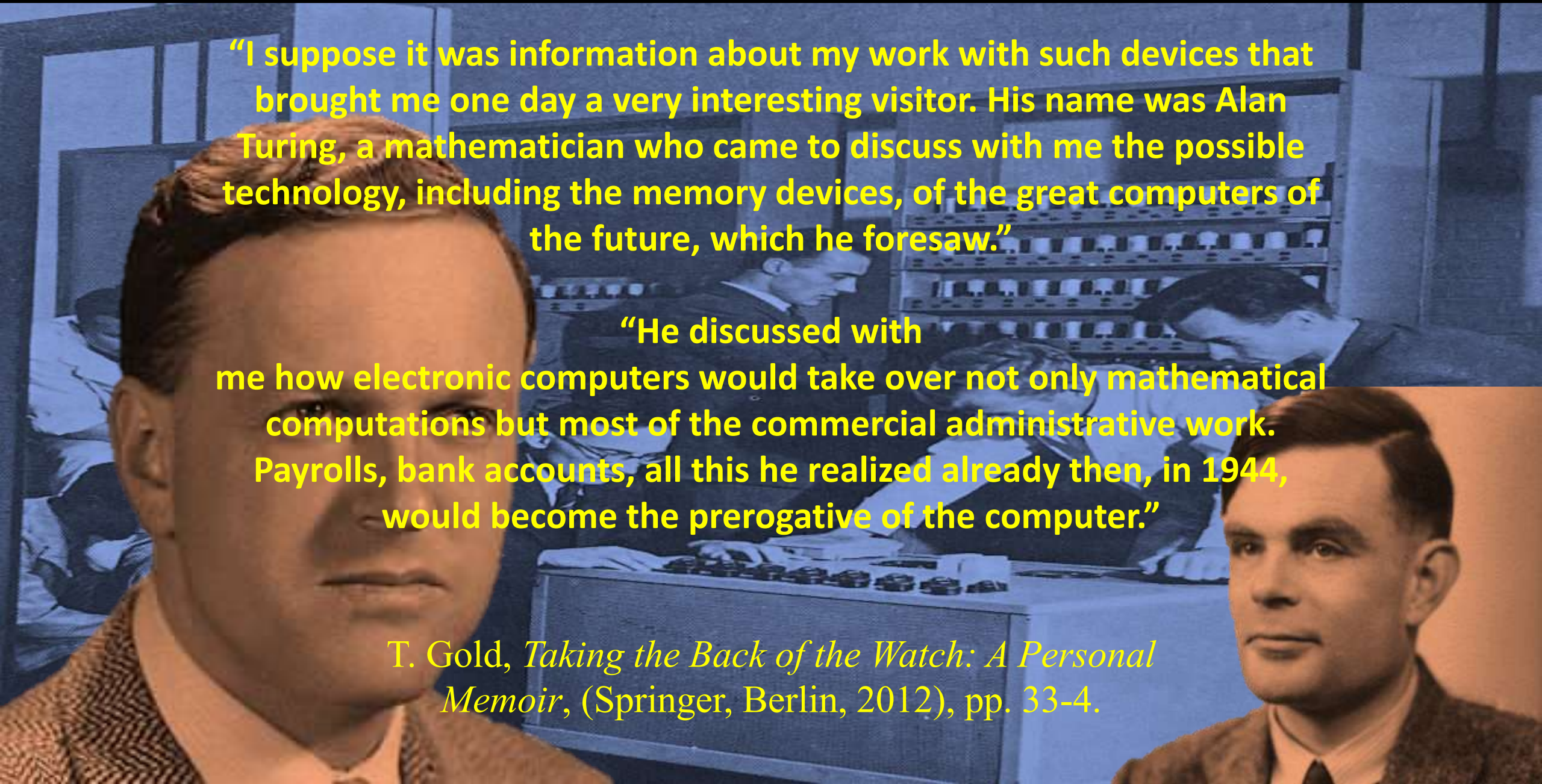
Thomas Gold

1944

“I suppose it was information about my work with such devices that brought me one day a very interesting visitor. His name was Alan Turing, a mathematician who came to discuss with me the possible technology, including the memory devices, of the great computers of the future, which he foresaw.”

“He discussed with me how electronic computers would take over not only mathematical computations but most of the commercial administrative work. Payrolls, bank accounts, all this he realized already then, in 1944, would become the prerogative of the computer.”

T. Gold, *Taking the Back of the Watch: A Personal Memoir*, (Springer, Berlin, 2012), pp. 33-4.





16

A posed group photograph taken late in 1947. From left to right: L. J. Foreman (kneeling), G. J. Stevens, T. Gold, myself, W. Renwick, P. J. Farmer, and S. A. Barton

OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT



21 September 1940: Wiener Memorandum

“Dr. Vannevar Bush
Carnegie Institution
Washington, D .C.

Dear Bush: In response to your suggestion of this morning, I am sending you a memorandum concerning my proposed computing machine for the solution of boundary value problems in partial differential equations.”



1. Digital (not analogue)
2. Electronic (not mechanical)
3. Binary (not decimal)
4. Automatic (with internal logic)
5. Memory (magnetic tape-erasable & re-writable)



THE

Atlantic

JULY 1945



THE ATLANTIC REPORT — ON THE WORLD TODAY

Hearing Is Believing	DIXON WECER	37
<i>Swing, Kaltenborn, Thomas, Pearson, Winchell, Heatter</i>		
Japan's Secret Weapon	EDGAR L. JONES	44
Horace Walpole Reread. <i>Books and Men</i>	WILMARTH S. LEWIS	48
On Anodynes. <i>A Poem</i>	SIMPSON SASSERATH	51
Mrs. Razor. <i>A Story</i>	JAMES STILL	52
Trial by Fury. <i>A Poem</i>	DILYS BENNETT LAING	53
For the Record: Buchenwald	LT. COL. CHARLES R. CODMAN	54
Forgive Me, Stranger. <i>A Poem</i>	WINFIELD TOWNLEY SCOTT	56
<i>Ships and Subsidies. Replies to Lewis W. Douglas</i>		
BASIL HARRIS — J. F. GEHAN — ADMIRAL E. S. LAND		57
New York Summer. <i>A Poem</i>	CORA CARTER	61
Birds of Midway	CAPTAIN T. MCKEAN DOWNS	62
The Balkans Join Up	STOYAN CHRISTOWE	66
Come You Home a Hero. <i>A Story</i>	LT. LAURENCE CRITCHELL	71
A Presiding Spirit	H. M. TOMLINSON	76
The Meetinghouse. <i>A Story</i>	JESSAMYN WEST	78
Keeping the Country at Work	PAUL G. HOFFMAN	84
Should Jews Return to Germany?	PAUL W. MASSING & MAXWELL MILLER	87
The Egg and I. <i>The Atlantic Serial</i>	BETTY MACDONALD	91

A SCIENTIST LOOKS AT TOMORROW

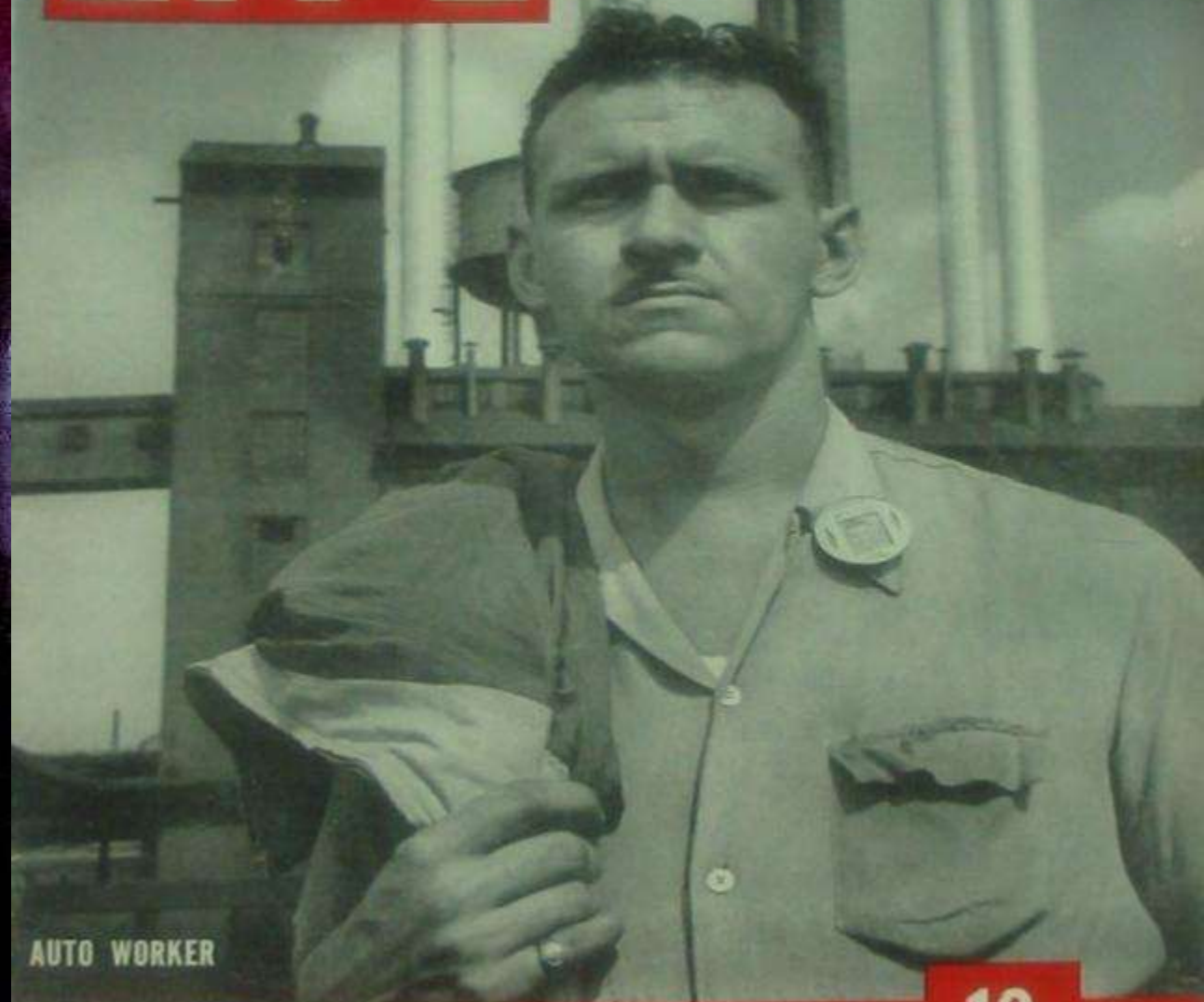
As We May Think	VANNEVAR BUSH	101
<i>Accent on Living: Elliot Paul — Jack Pope — Florida Watts Smyth — "The Bookman"</i>		
— Arthur W. Bell		109
Atlantic Bookshelf: The Peripatetic Reviewer, by Edward Weeks — Short Reviews		125

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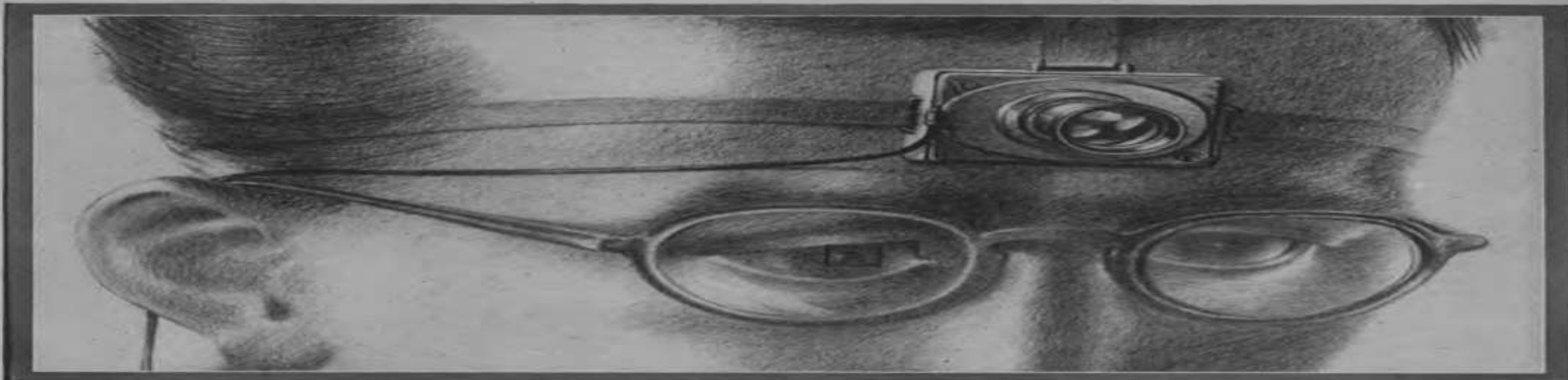


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A SCIENTIST OF THE FUTURE RECORDS EXPERIMENTS WITH A TINY CAMERA FITTED WITH UNIVERSAL-FOCUS LENS. THE SMALL SQUARE IN THE EYEGLASS AT THE LEFT SIGHTS THE OBJECT

AS WE MAY THINK

A TOP U. S. SCIENTIST FORESEES A POSSIBLE FUTURE WORLD
IN WHICH MAN-MADE MACHINES WILL START TO THINK

by VANNEVAR BUSH

DIRECTOR OF THE OFFICE OF SCIENTIFIC RESEARCH AND DEVELOPMENT

Condensed from the *Atlantic Monthly*, July 1945

This has not been a scientists' war; it has been a war in which all have had a part. The scientists, burying their old professional competition in the demand of a common cause, have shared greatly and learned much. It has been exhilarating to work in effective partnership. What are the scientists to do next?

For the biologists, and particularly for the medical scientists, there can be little indecision, for their war work has hardly required them to leave the old paths. Many indeed have been able to carry on their war research in their familiar peacetime laboratories. Their objectives remain much the same.

It is the physicists who have been thrown most violently off stride, who have left academic pursuits for the making of strange destructive gadgets, who have had to devise new methods for their unanticipated assignments. They have done their part on the devices that made it possible to turn back the enemy. They have worked in combined effort with the physicists of our allies. They have felt within themselves the stir of achievement. They have been part of a great team. Now one asks where they will find objectives worthy of their best.

* * *

There is a growing mountain of research. But there is increased evidence that we are being bogged down today as specialization extends. The investigator is staggered by the findings and conclusions of thousands of other workers—conclusions which he cannot find time to grasp, much less to remember, as they appear. Yet specialization becomes increasingly necessary for prog-

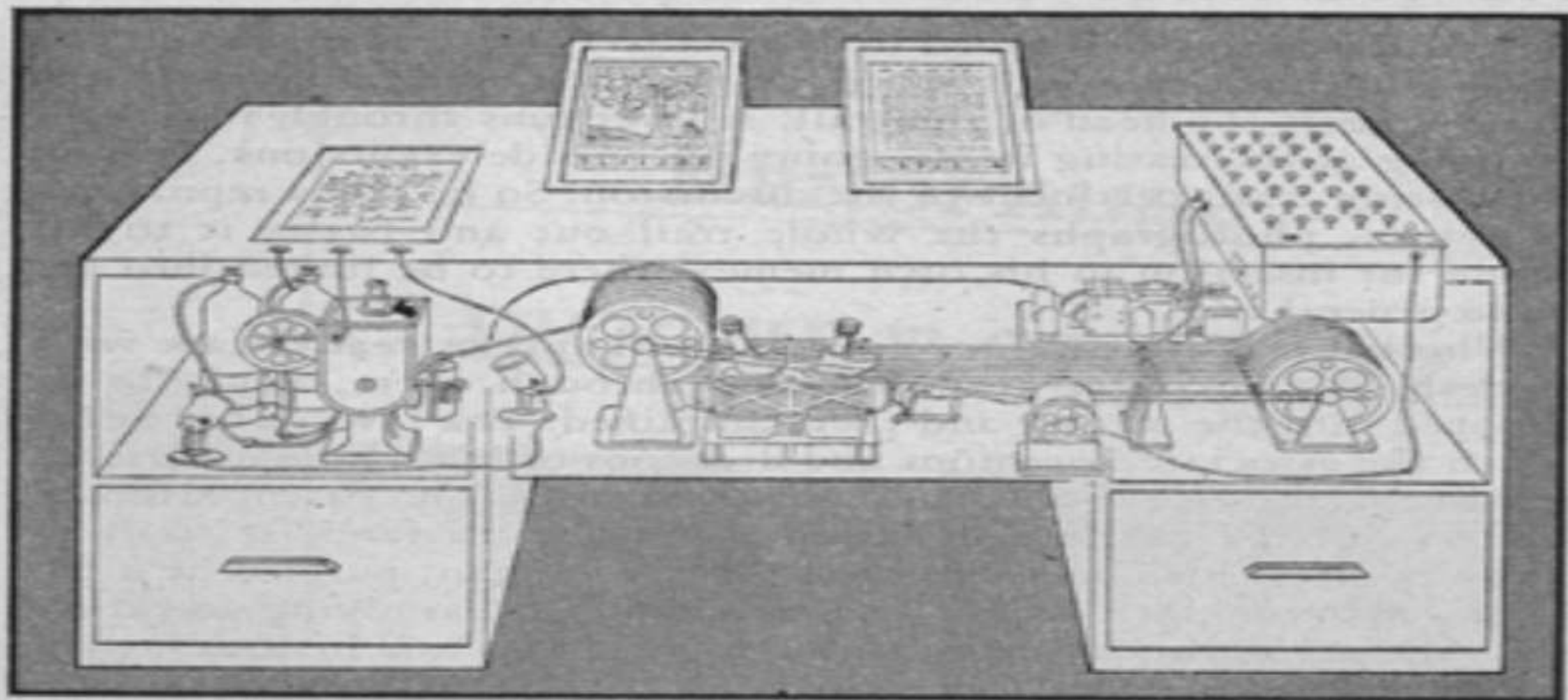
ress, and the effort to bridge between disciplines is correspondingly superficial.

Professionally our methods of transmitting and reviewing the results of research are generations old and by now are totally inadequate for their purpose. If the aggregate time spent in writing scholarly works and in reading them could be evaluated, the ratio between these amounts of time might well be startling. Those who conscientiously attempt to keep abreast of current thought, even in restricted fields, by close and continuous reading might well shy away from an examination calculated to show how much of the previous month's efforts could be produced on call.

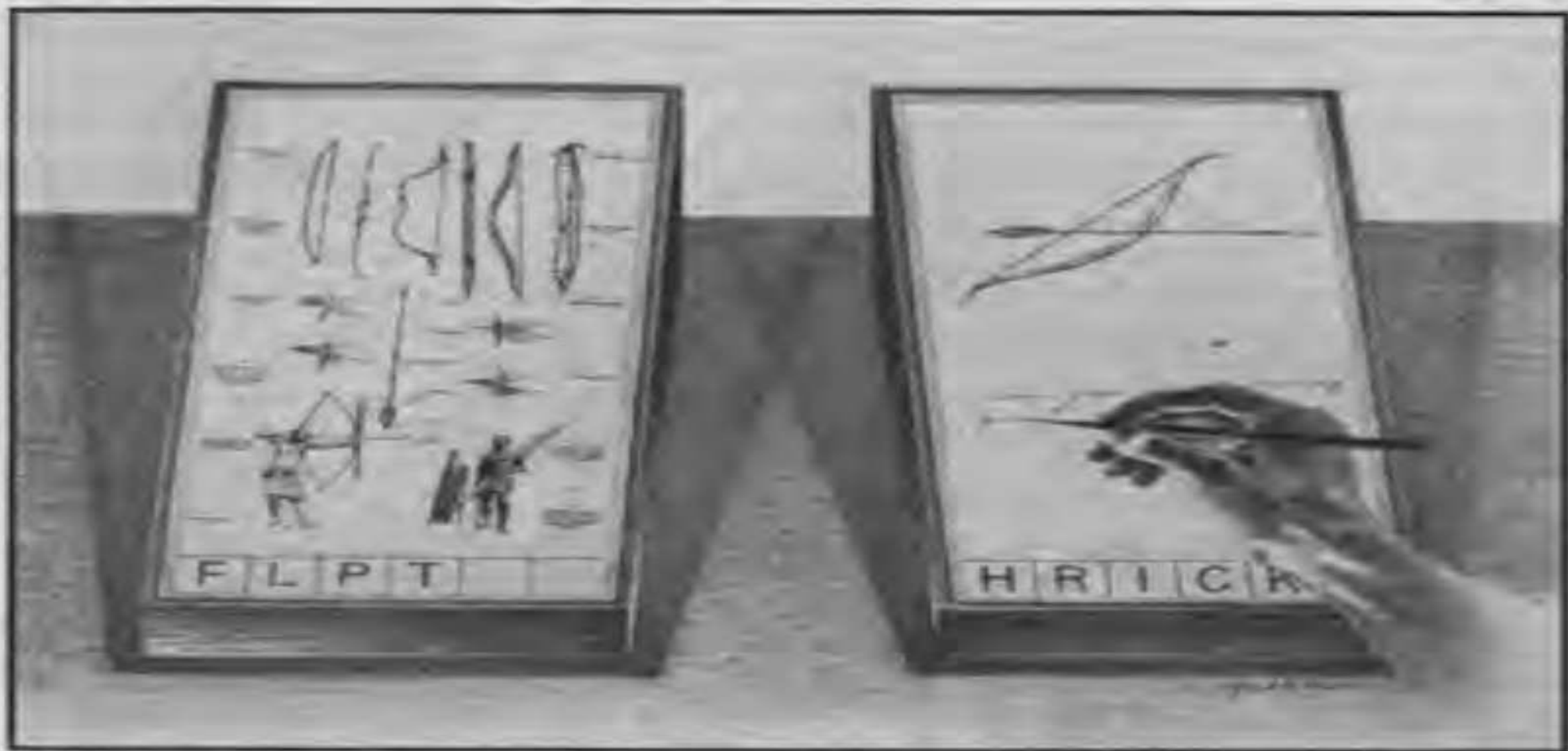
Mendel's concepts of the laws of genetics was lost to the world for a generation because his publication did not reach the few who were capable of grasping and extending it. This sort of catastrophe is undoubtedly being repeated all about us as truly significant attainments become lost in the mass of the inconsequential.

Publication has been extended far beyond our present ability to make real use of the record. The summation of human experience is being expanded at a prodigious rate, and the means we use for threading through the consequent maze to the momentarily important item is the same as was used in the days of square-rigged ships.

But there are signs of a change as new and powerful instrumentalities come into use. Photocells capable of seeing things in a physical sense, advanced photography which can record what is seen or even what is not, thermionic tubes capable of controlling potent forces under the guidance of



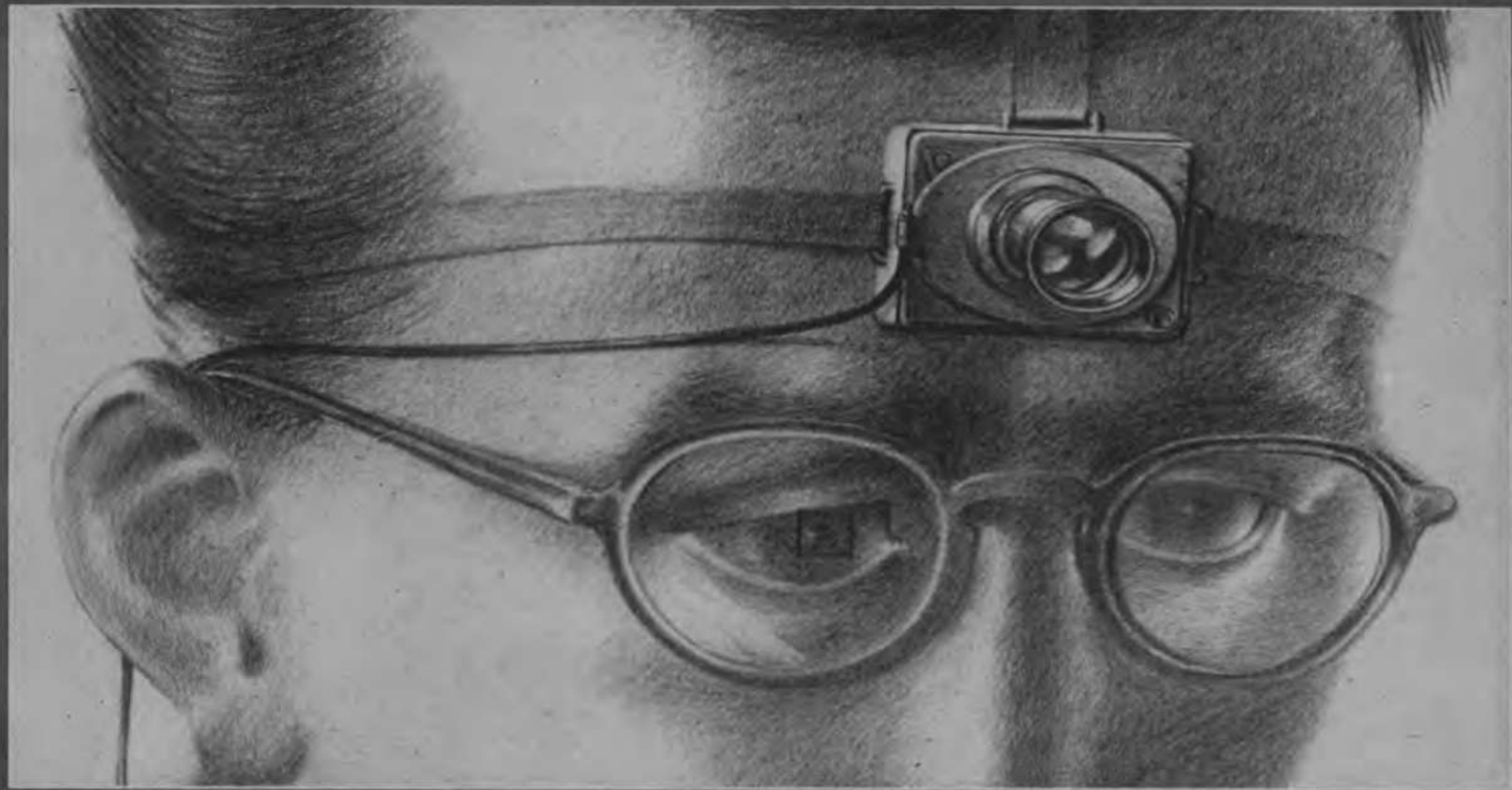
MEMEX in the form of a desk would instantly bring files and material on any subject to the operator's fingertips. Slanting translucent viewing screens magnify supermicrofilm filed by code numbers. At left is a mechanism which automatically photographs longhand notes, pictures and letters, then files them in the desk for future reference.



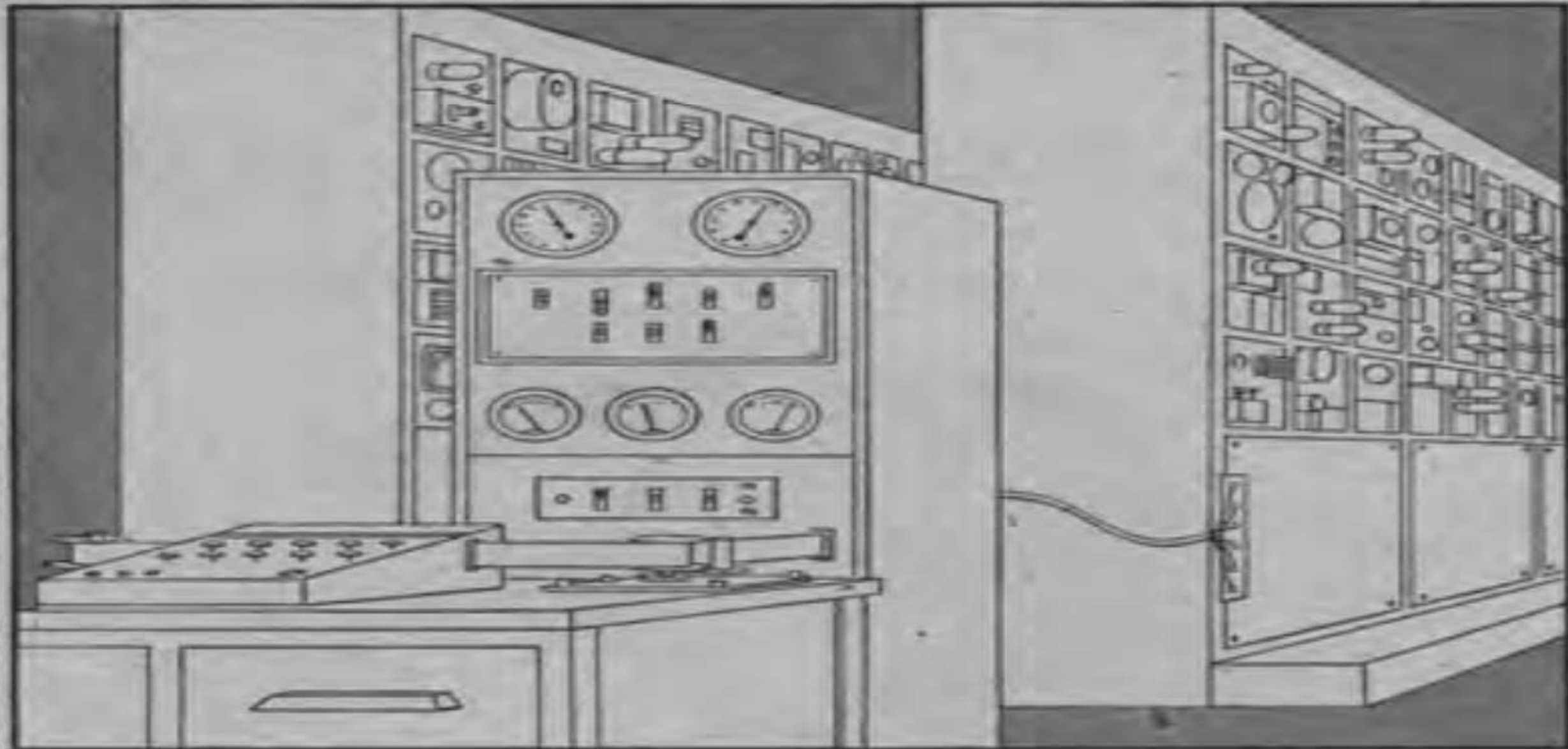
MEMEX IN USE is shown here. On one transparent screen the operator of the future writes notes and commentary dealing with reference material which is projected on the screen at left. Insertion of the proper code symbols at the bottom of right-hand screen will tie the new item to the earlier one after notes are photographed on supermicrofilm.



SUPERSECRETARY OF THE COMING AGE, the machine contemplated here would take dictation, type it automatically and even talk back if the author wanted to review what he had just said. It is somewhat similar to the Voder seen at New York World's Fair. Like all machines suggested by the diagrams in this article, it is not yet in existence.

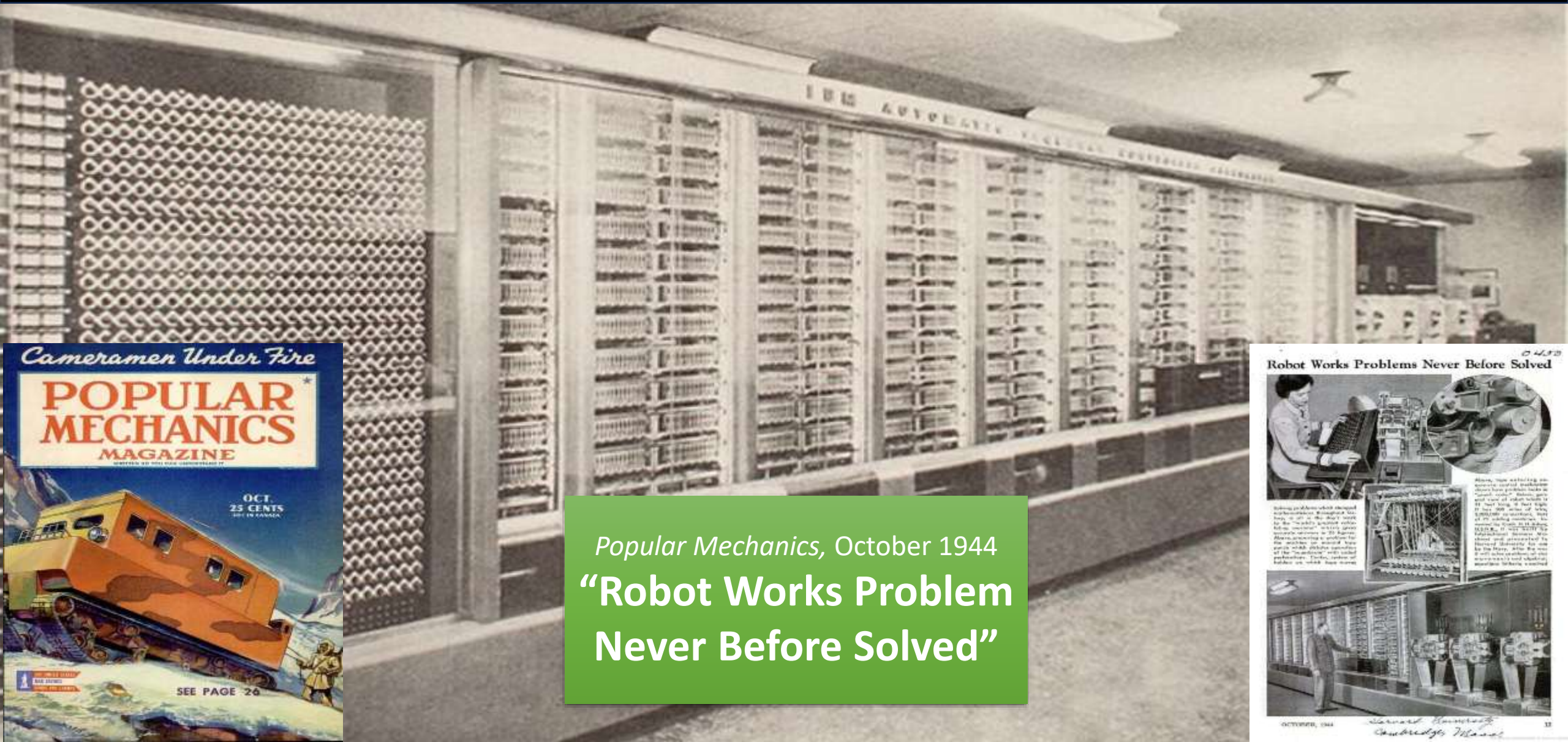


A SCIENTIST OF THE FUTURE RECORDS EXPERIMENTS WITH A TINY CAMERA FITTED WITH UNIVERSAL-FOCUS LENS. THE SMALL SQUARE IN THE EYEGLASS AT THE LEFT SIGHTS THE OBJECT



THINKING MACHINES would solve not only the most difficult mathematical problems but even problems of logical thought. Mathematical problems would be fed by punched tape to the electronic device in the racks at rear. Results, accomplished in a fraction of the time it takes man, would be recorded on dials at top and bottom of control board.

Harvard Mk 1 / IBM Automatic Sequence Controlled Calculator (August 1944)

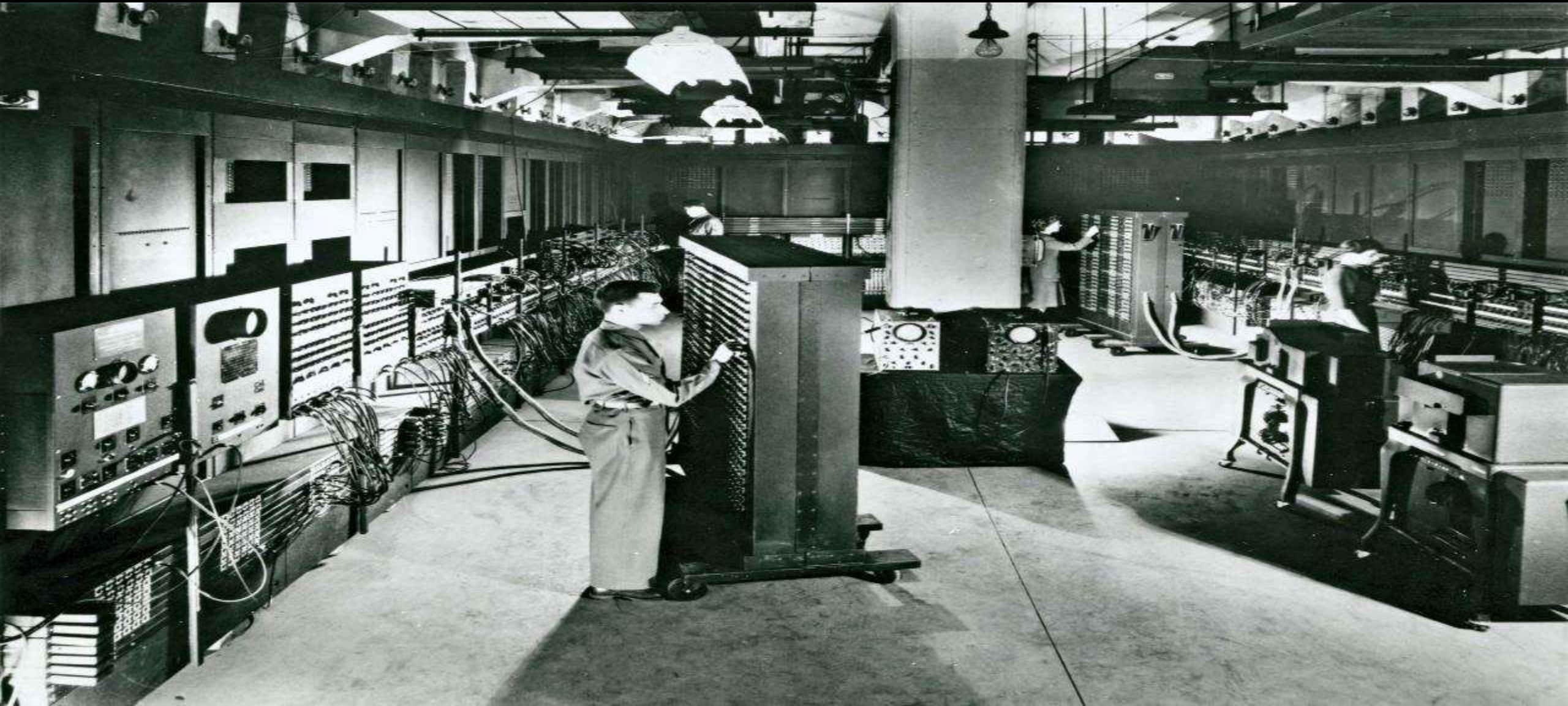


Popular Mechanics, October 1944
"Robot Works Problem
Never Before Solved"



ENIAC (Electronic Numerical Integrator and Computer)

Moore School of Electrical Engineering, Pennsylvania University
February 1946



22nd October 1948



ACTUALITÉS SCIENTIFIQUES ET INDUSTRIELLES

1053



CYBERNETICS

OR

CONTROL AND COMMUNICATION
IN THE ANIMAL AND THE MACHINE

BY

NORBERT WIENER

Professor of Mathematics at the Massachusetts Institute
of Technology
Guest Investigator at the Instituto Nacional de Cardiología
de México.



PARIS

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6, Rue de la Sorbonne, 6

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Cambridge, Mass.

JOHN WILEY & Sons. Inc.

440 Fourth Av., New York

1948



Cybernetics

or CONTROL
in THE ANI

By NO

A study
physiologists
sociologists,
pologists, ps

**“A study of vital importance to
psychologists, physiologists,
electrical engineers, radio
engineers, sociologists,
philosophers, mathematicians,
anthropologists, psychiatrists and
physicists”**

ACTUALITÉS SCIENTIFIQUES ET INDUSTRIELLES

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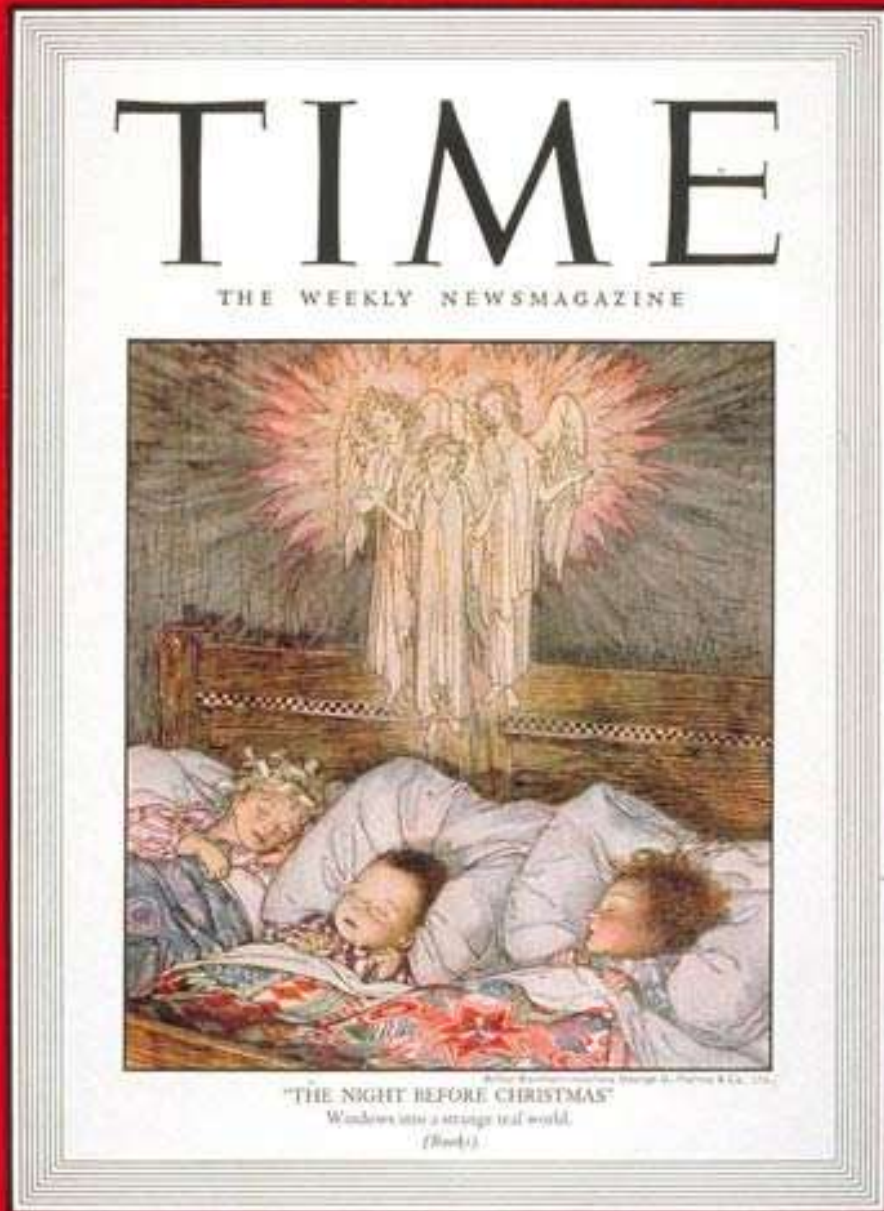
“wretchedly printed”

“a mystifying title”

“pages spikey with mathematical signs and Greek letters”

“Business Week”

December 27th 1948



“Once in a great while a scientific book is published that sets bells jangling wildly in a dozen different sciences. Such a book is Cybernetics (John Wiley; \$3) by Professor Norbert Wiener of M.I.T. It bristles with difficult mathematics; its text is a curious mixture of charm and opacity. But for those who can penetrate it (and thousands are trying), the book is intensely exciting.”

“ ... the most startling (and ominous) development in human evolution”

“Engines and production machines replace human muscles; control mechanisms replace human brains”

“Man ... is recreating himself, monstrously magnified, in his own image.”

“The cyberneticists are like explorers pushing in to a new country and finding that nature, by constructing the human brain, pioneered there before them.”



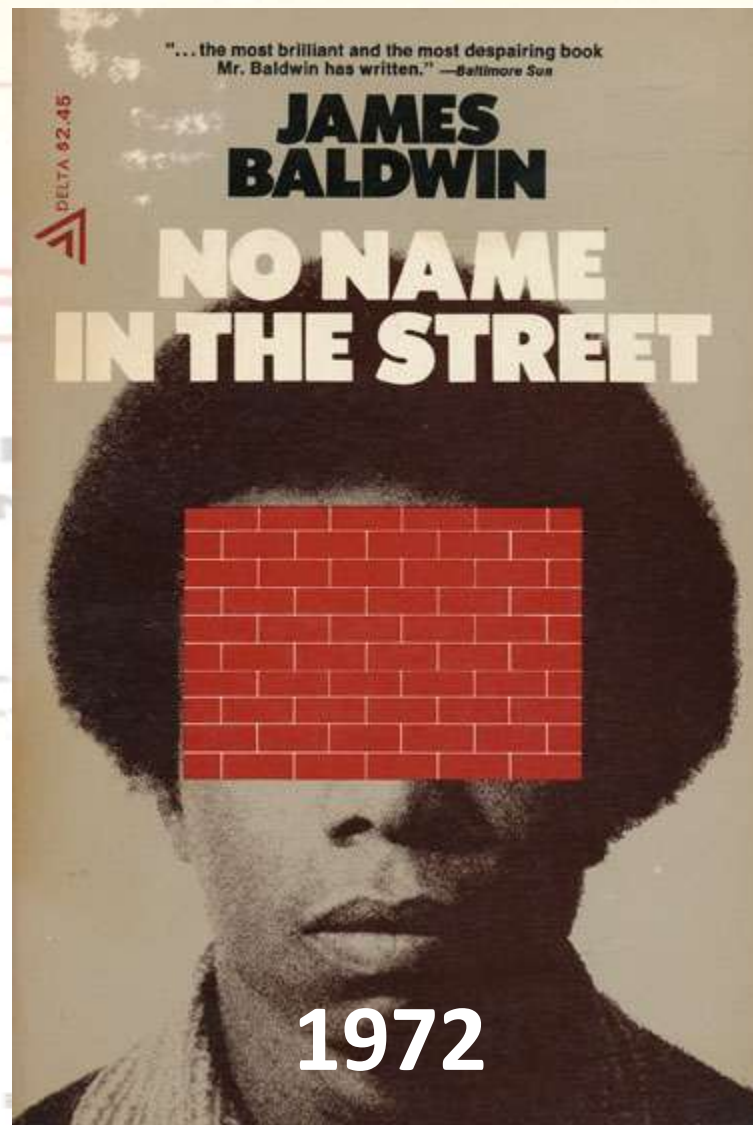
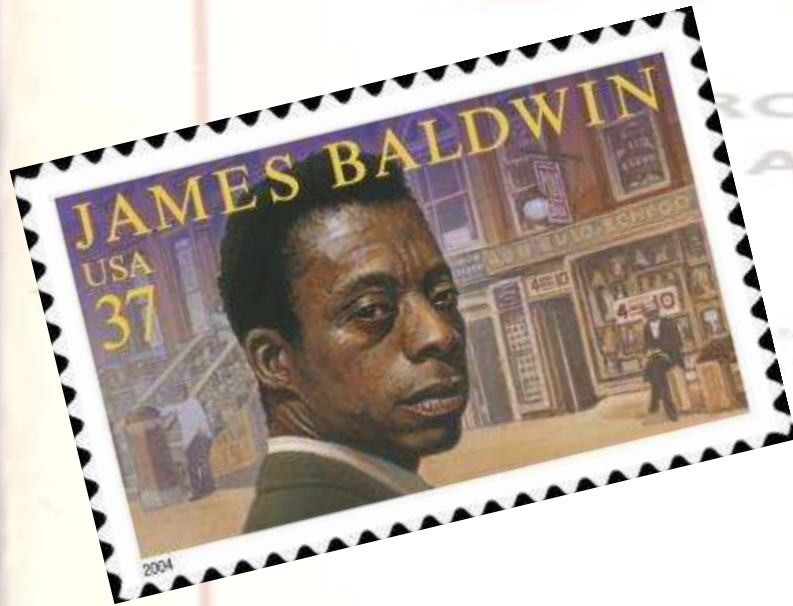
Saturday Review of Literature April 23rd, 1949

“Devaluing the Human Brain”

John B. Thurston

“It appears impossible for anyone seriously interested in our civilization to ignore this book”

“It is a ‘must’ book for those in every branch of science – engineers (all kinds), mathematicians, physiologists, psychologists, sociologists, anthropologists, philosophers, psychiatrists, chemists (all kinds), psychopathologists, neuroanatomists, etc. In addition, economists, politicians, statesmen, and businessmen cannot afford to overlook cybernetics and its tremendous. Even terrifying implications”



1972



“the cybernetics craze”

“seminal”

“comparable in ultimate
importance to

Galileo or Malthus or Rousseau or
Mill”

New York Times
Book Review

DEWEY DECIMAL CLASSIFICATION
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WASHINGTON, D. C.

Dec. 2, 1949

Dr. Norbert Wiener
Mass. Institute of Technology
Cambridge, Mass.

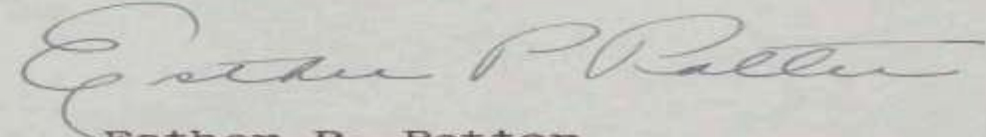
My dear Dr. Wiener:

The publication of your book on Cybernetics has caused the editorial staff which is in charge of the revision of the Dewey Decimal Classification considerable difficulty. We are in the position of being asked by sincere inquirers as to how to classify the book and by less sincere people who like to confront supposedly expert classifiers with problems which they are quite certain are beyond our capabilities. Quite frankly, cybernetics is. We have read and reread reviews and explanations of the content of your book and have even tried to understand the book itself, only to become more uncertain as to what field it falls into. I am appealing to you as the one person who should be able to tell us.

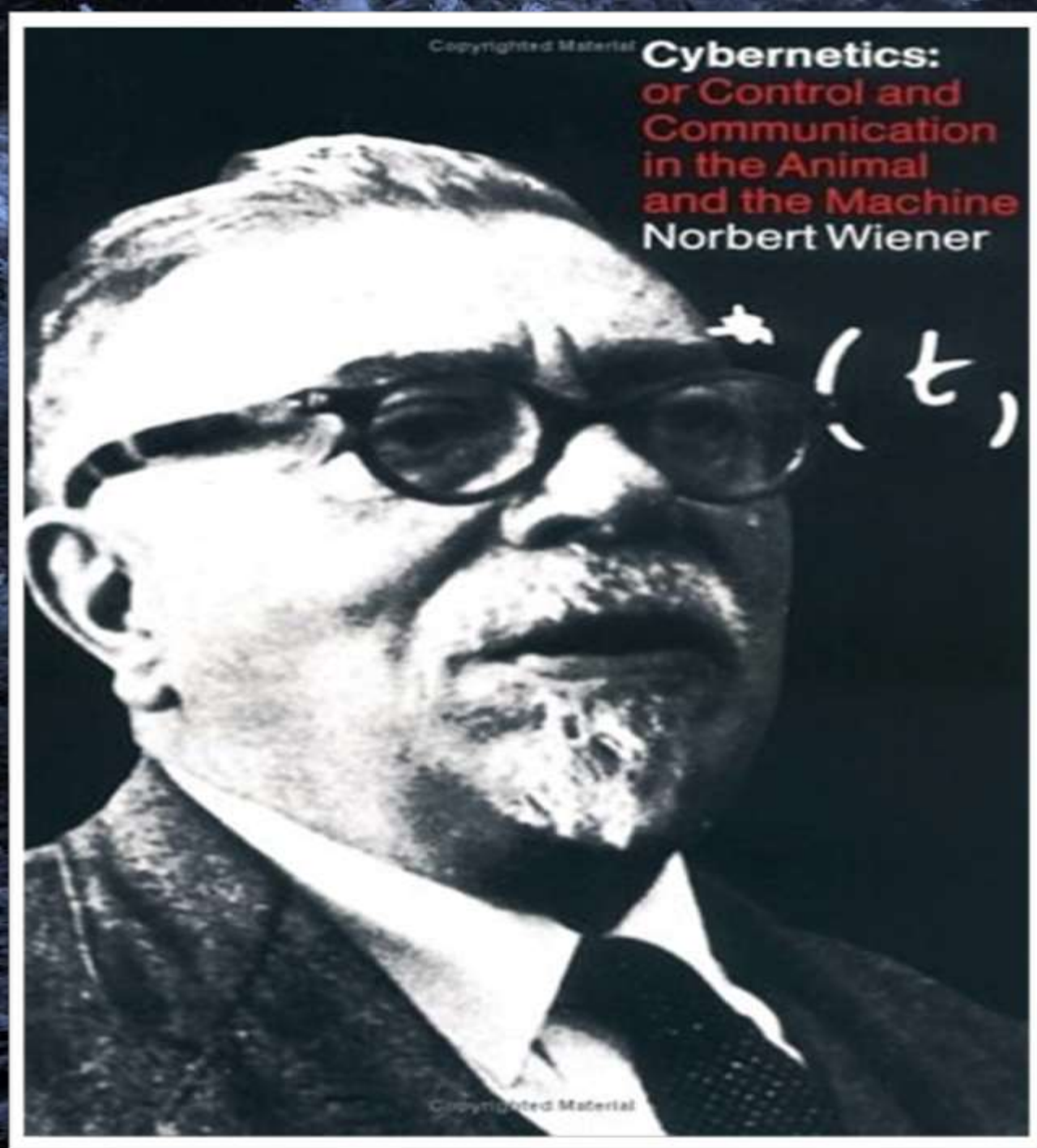
Possibly you already know that the Dewey Decimal Classification attempts to assign a number to the subject content of books. Generally speaking, a book can only be assigned one number and consequently we cannot take care of the many aspects that certain works cover. The problem must be simplified and consequently, is your book such as to place it in psychology? Does it belong in the field of electronic computation devices or does it belong in mathematics?

If we were not somewhat desperate about this particular problem, I should hesitate to bother you with it.

Cordially yours,

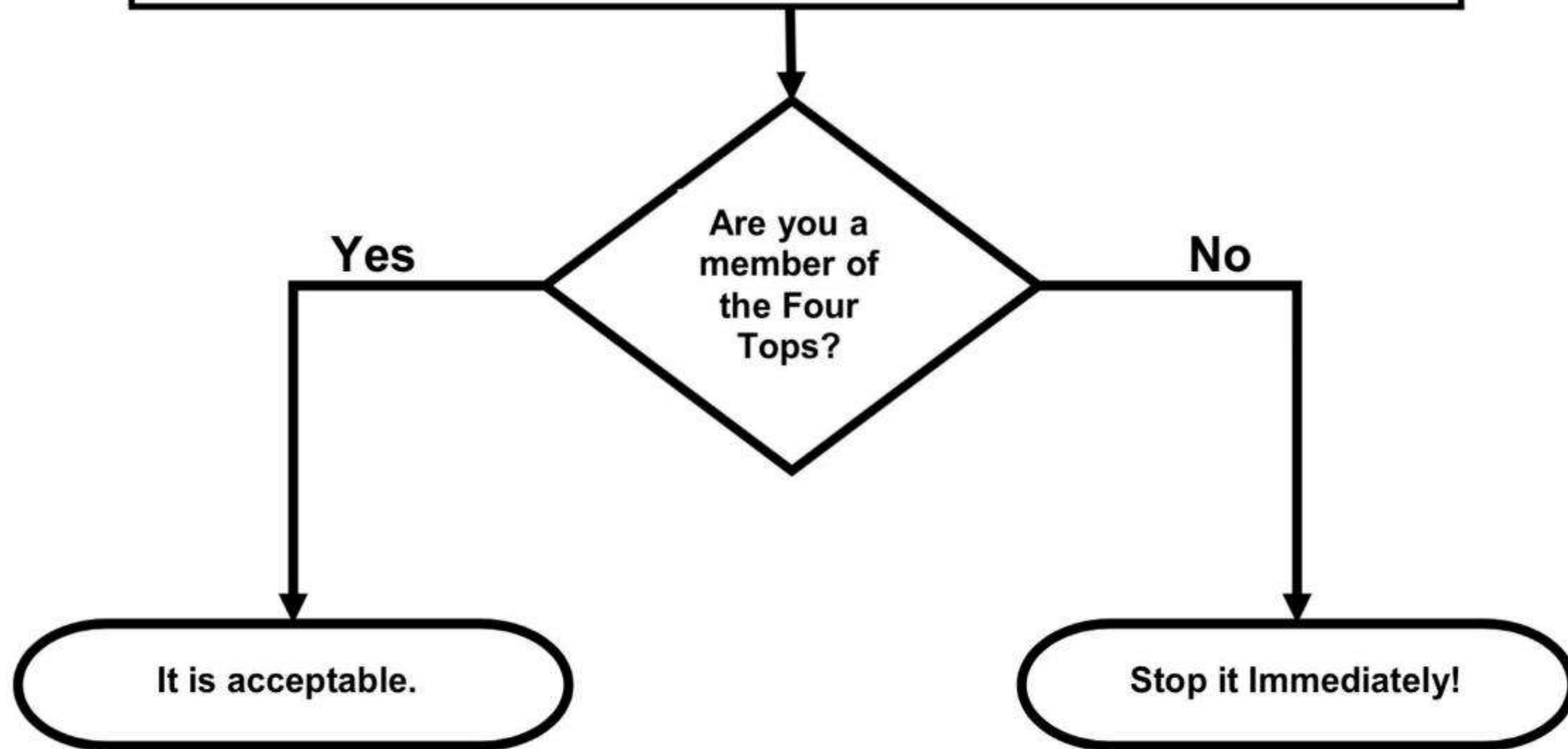


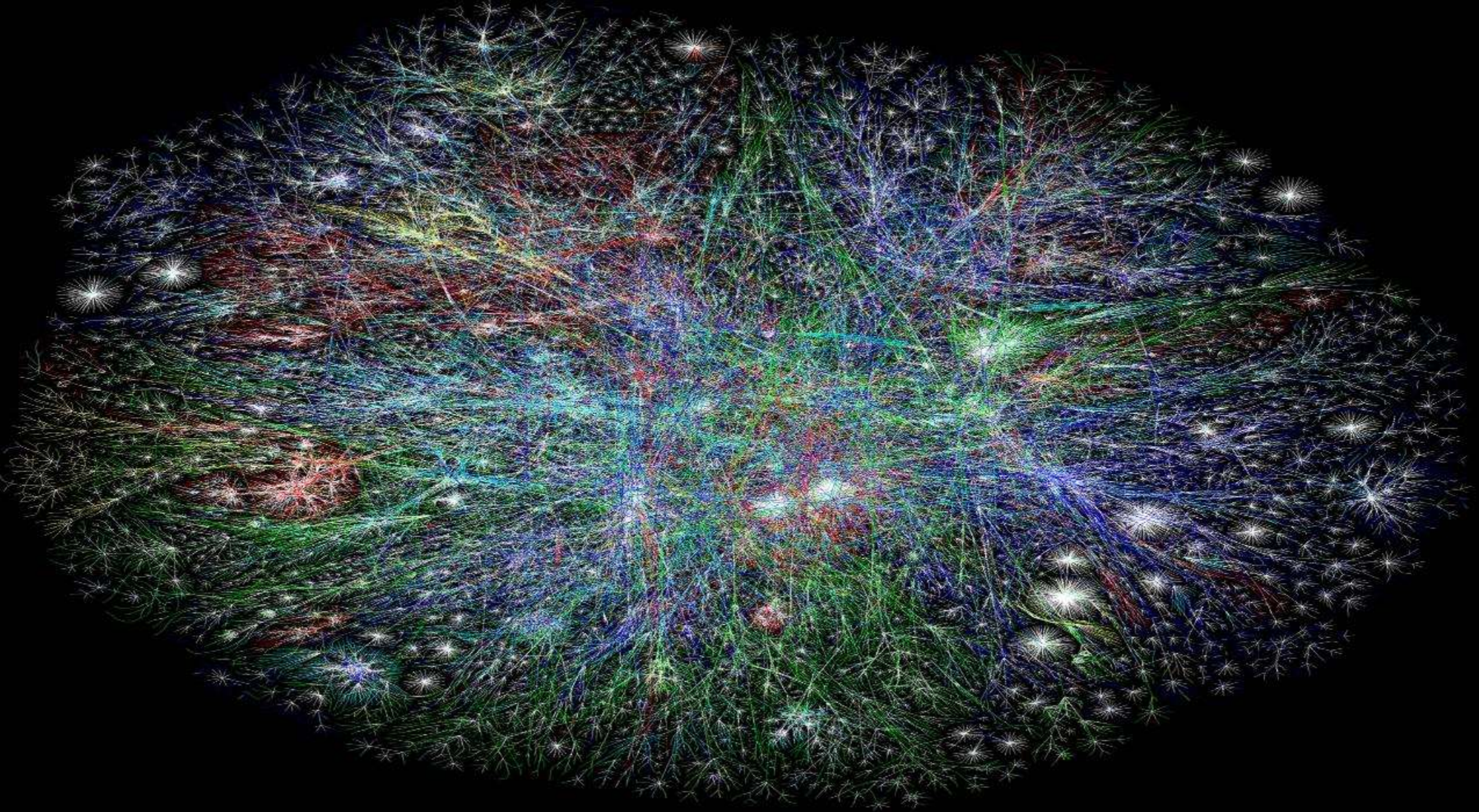
Esther P. Potter
Director



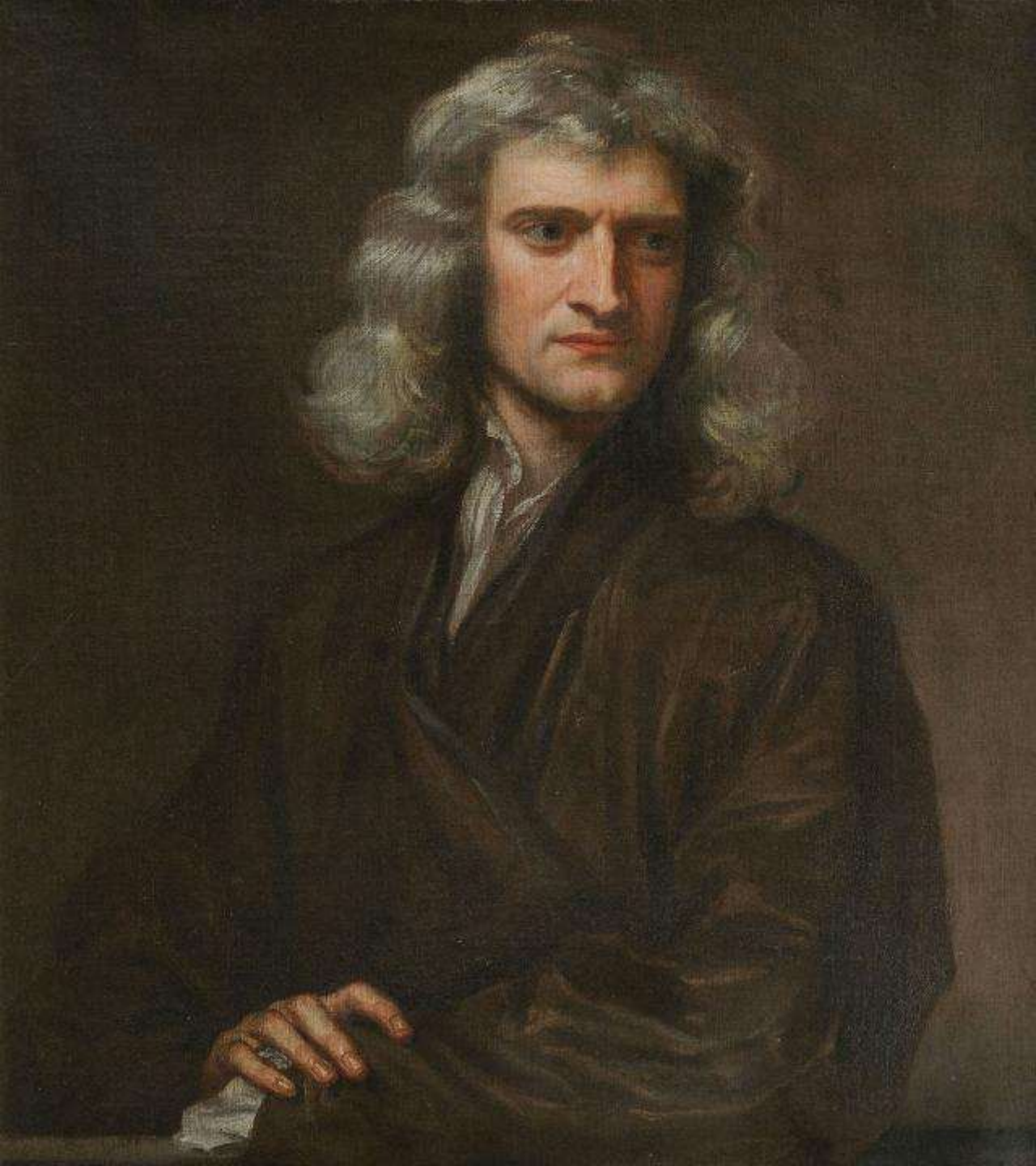
“the study of
non-linear
structures
and
systems”

Is it acceptable to use the term "Reach Out" in the Workplace?







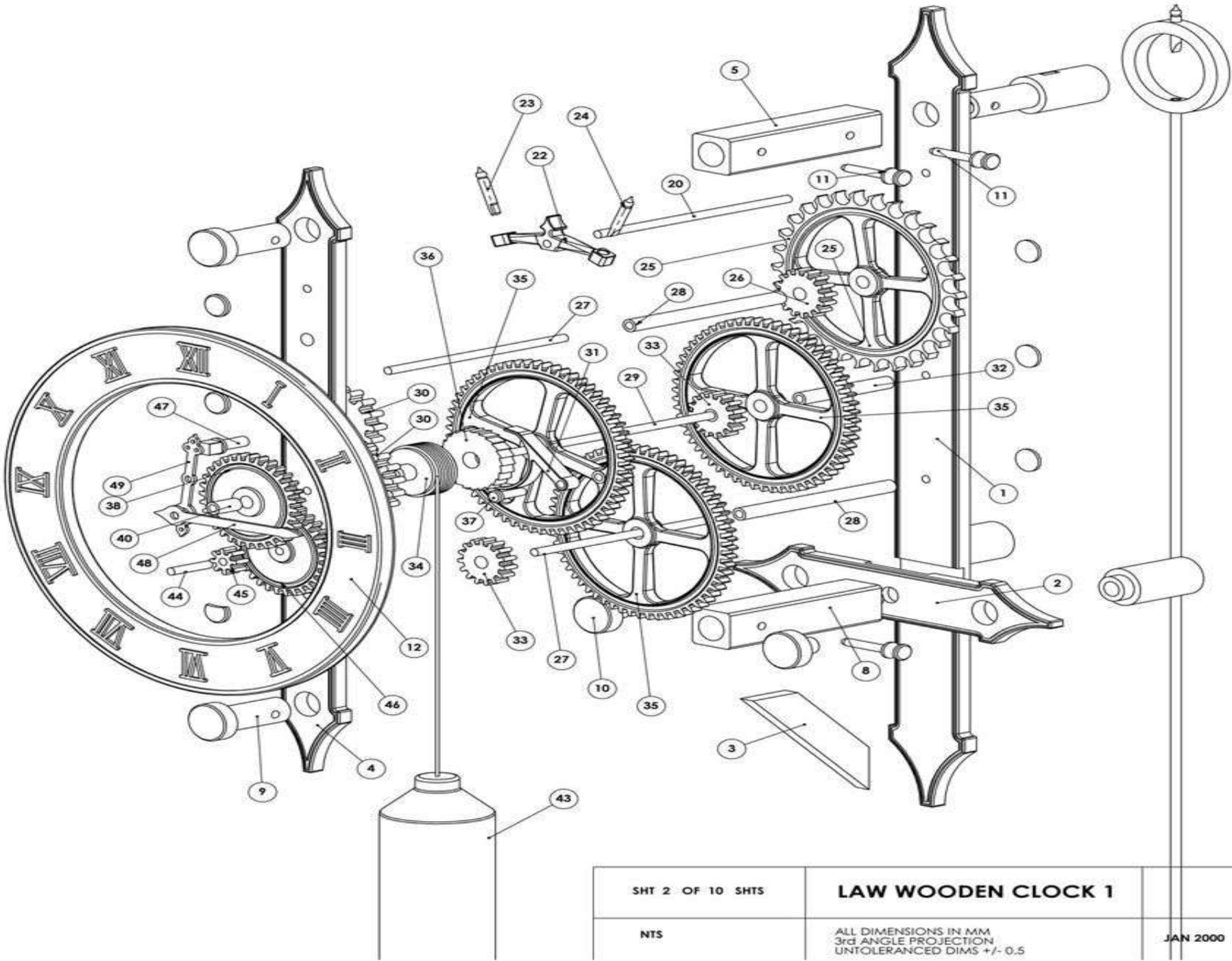


“The music of the spheres is a palindrome, and the book of astronomy reads the same backwards as forwards. There is no difference between the motion of an orrery turned forward and one turned in reverse. Finally, when all this was reduced by Newton to a formal set of postulates and a closed mechanics, the fundamental laws of this mechanics were unaltered by the transformation of the time variable t into its negative.”

Wiener, Cybernetics, 1st edition, p. 42

CYBERNETICS
NORBERT WIENER

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	back	
2	1	cross	
3	1	Angled brace	
4	1	front	
5	1	squarespacer top	
6	1	Pendulum hanger	
7	2	Wall spacer	
8	1	squarespacer bottom	
9	2	Front pin	
10	2	cover pin	
11	3	Securing pin	
12	1	Clock dial	
13	2	Dial spacer	
14	1	Pendulum head	
15	1	Pendulum pivot	
16	1	Pendulum rod	
17	1	Pendulum bob	
18	1	Pendulum nut	
19	6	Shaft cover	
20	1	Shaft151	
21	1	yoke	
22	1	escape	
23	1	Pallet2	
24	1	Pallet1	
25	1	Timing	
26	1	16teeth	
27	2	Shaft140	
28	2	Sleeve119	
29	1	Shaft175	
30	2	15teeth 1.5	
31	1	Pawl	
32	1	Sleeve70	
33	2	15teeth	
34	1	drum	
35	3	60teeth	
36	1	Ratchet	
37	1	Pawl pin	
38	1	32teeth	
39	1	10teeth	
40	1	sleeve18	
41	8	ropering	
42	1	rope	
43	1	Weight	
44	1	shaft30	
45	1	8teeth	
46	1	30teeth	
47	1	Key shaft	
48	1	Minute hand	
49	1	Hour hand	



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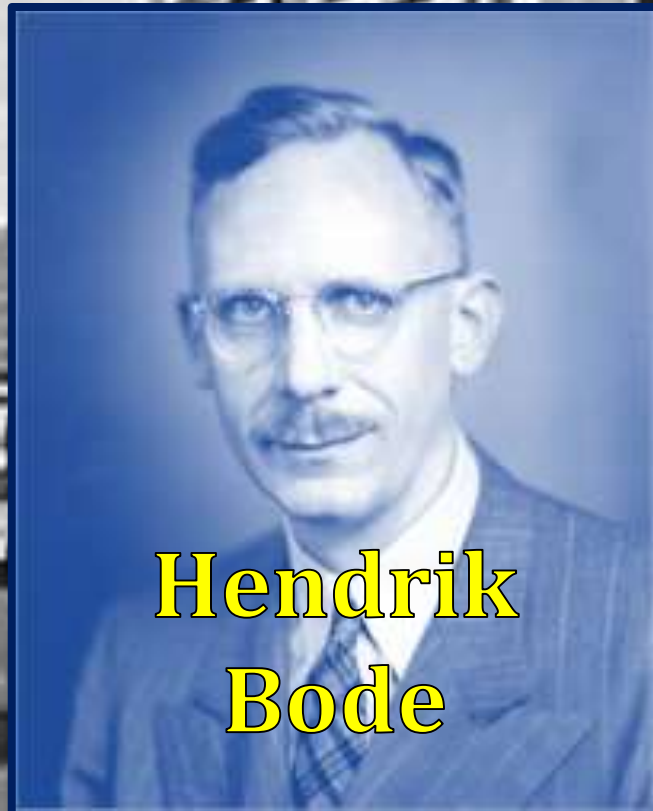
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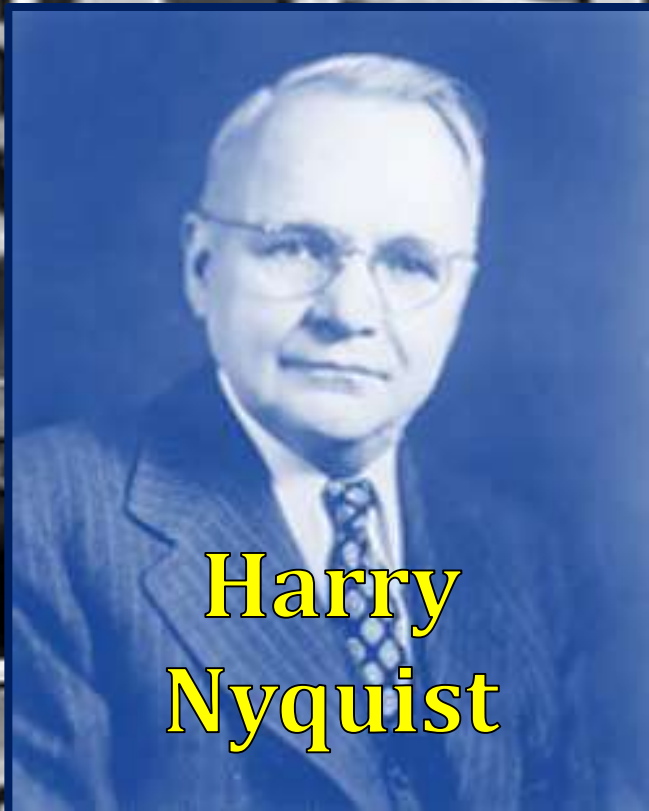
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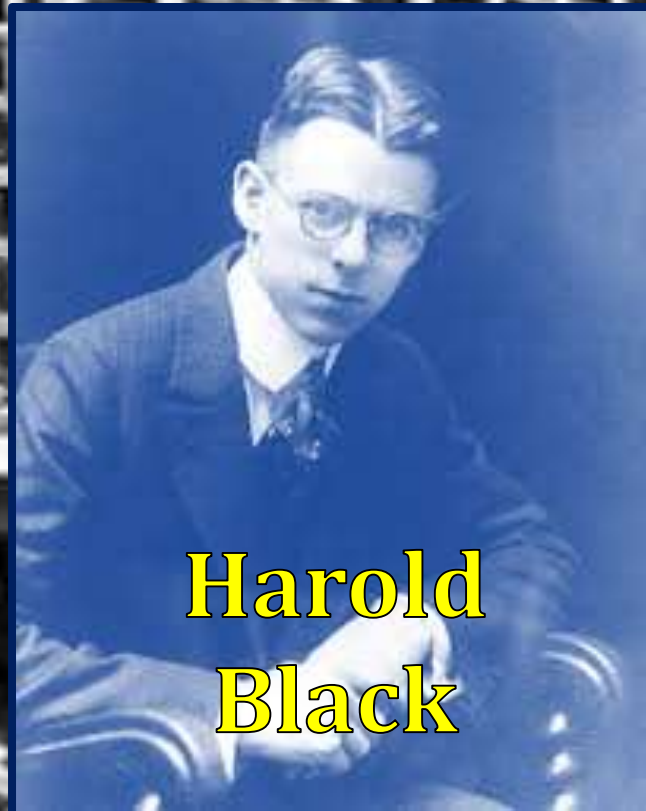
Bell Telephone Laboratories, 463 West Street, New York



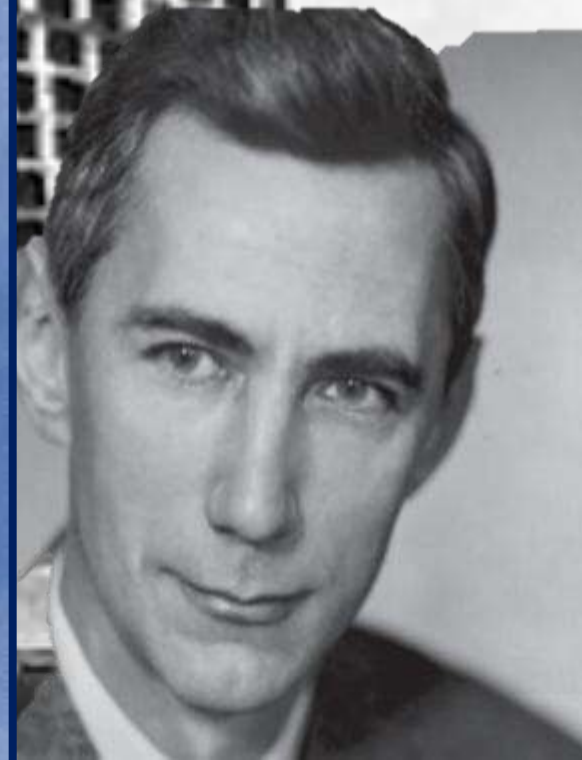
**Hendrik
Bode**



**Harry
Nyquist**

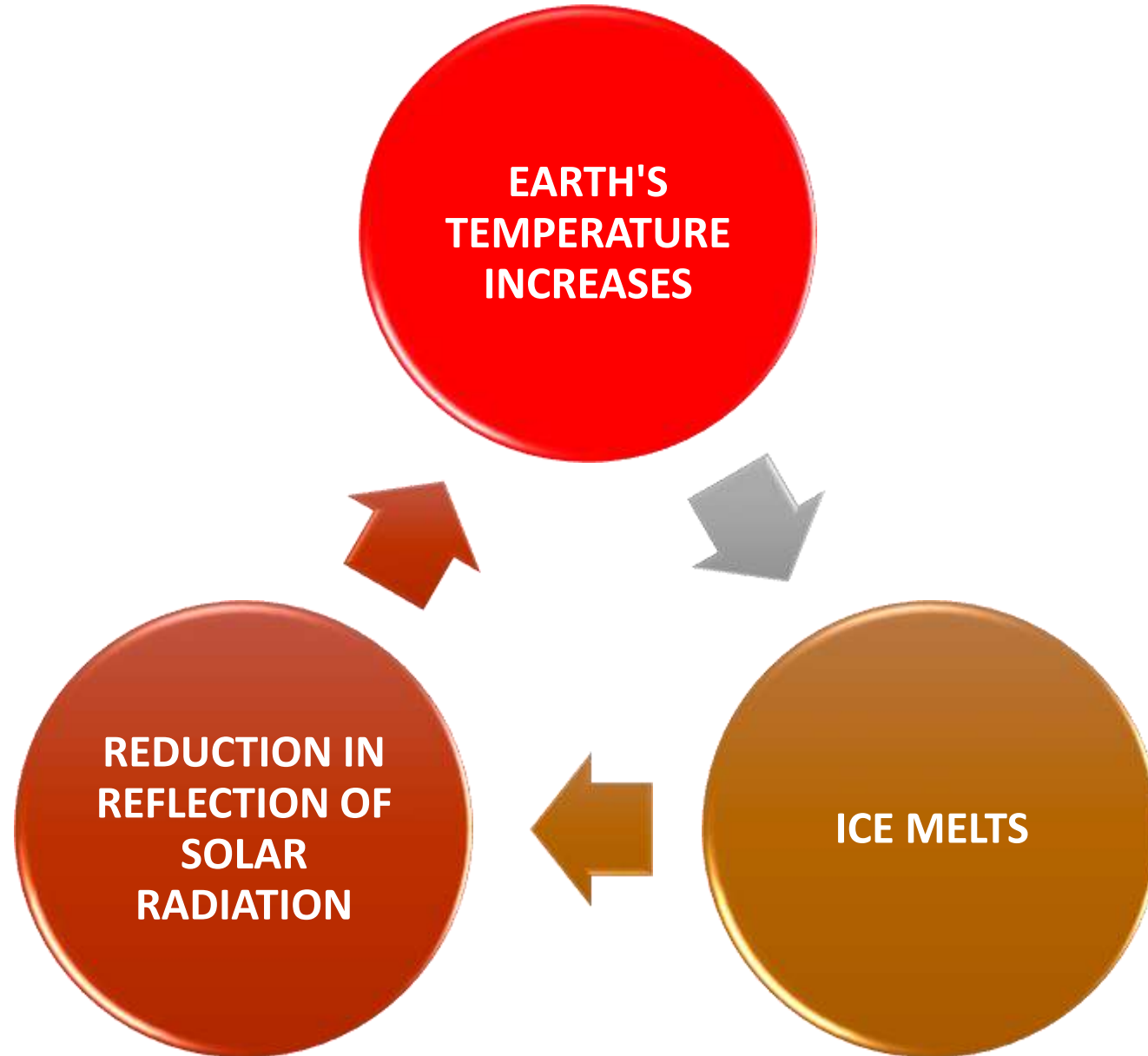


**Harold
Black**

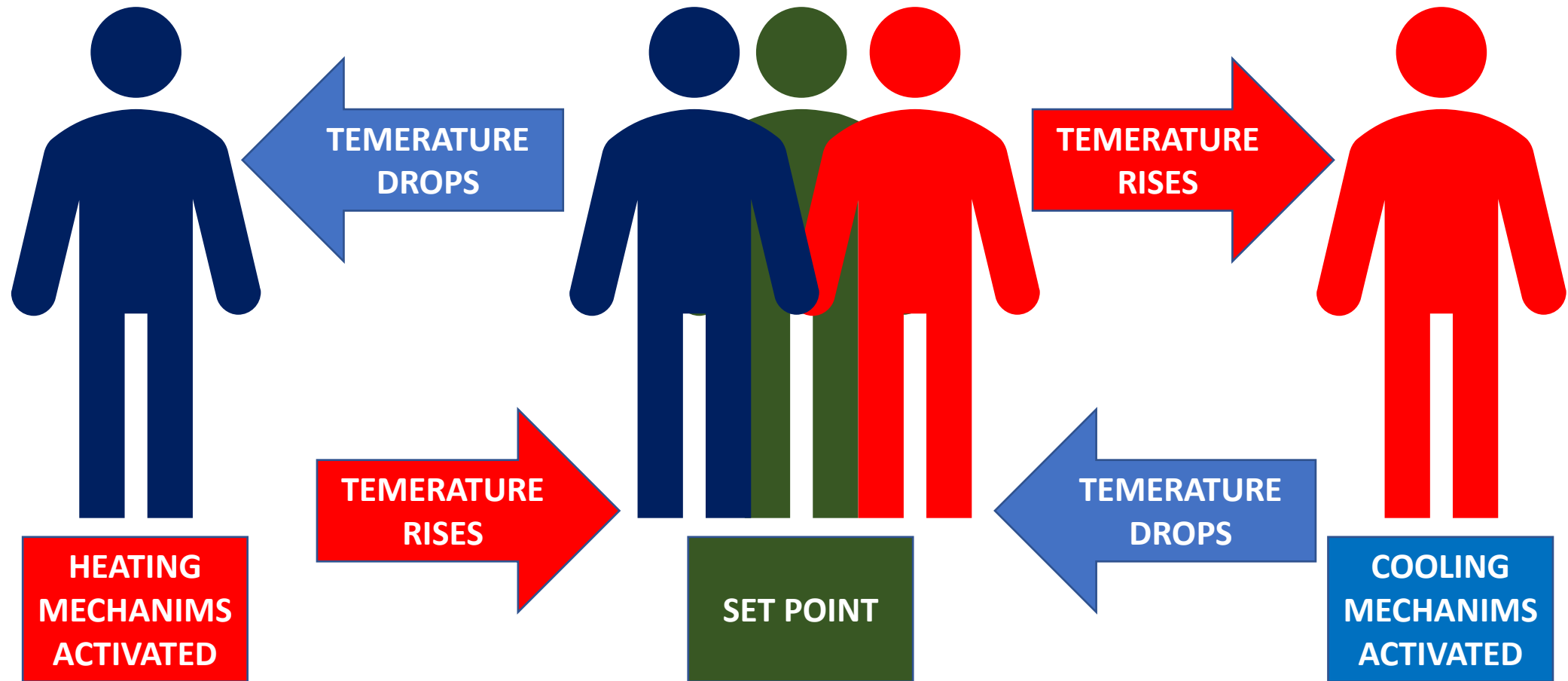




POSITIVE FEEDBACK LOOPS



NEGATIVE FEEDBACK LOOPS



HOMEOSTASIS

THE WISDOM OF THE BODY

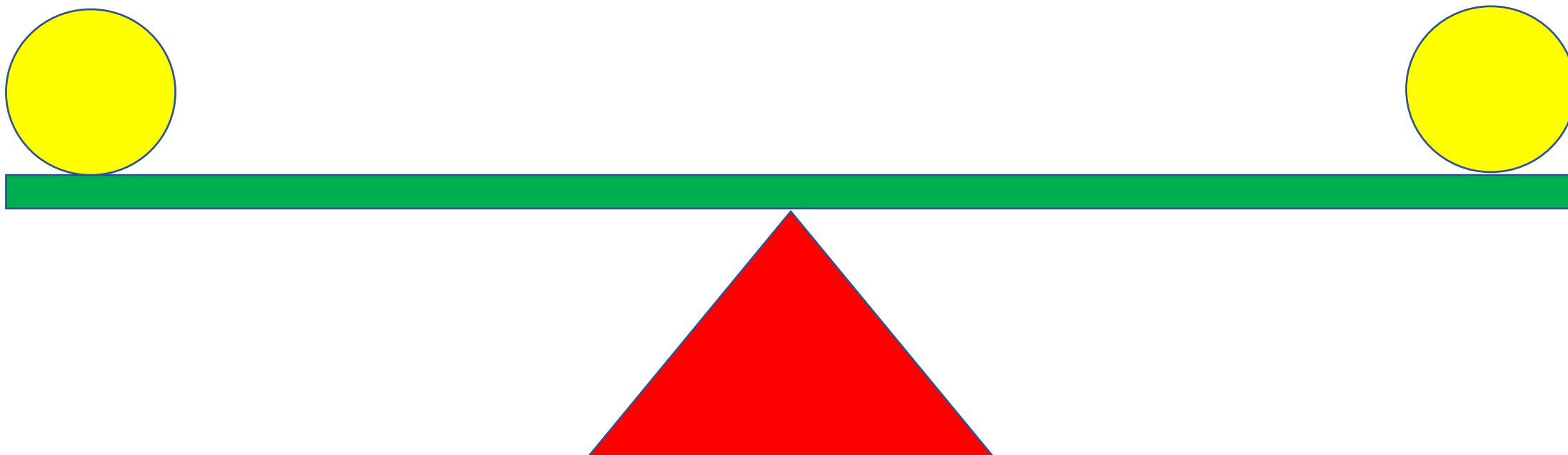
By
WALTER B. CANNON
M.D., Sc.D., LL.D.

1932

The first detailed account of the way in which our bodies preserve their stability against the many disturbing forces they encounter, suggesting that the lessons to be derived from the body's wisdom might be applied to problems of social and economic stabilization.

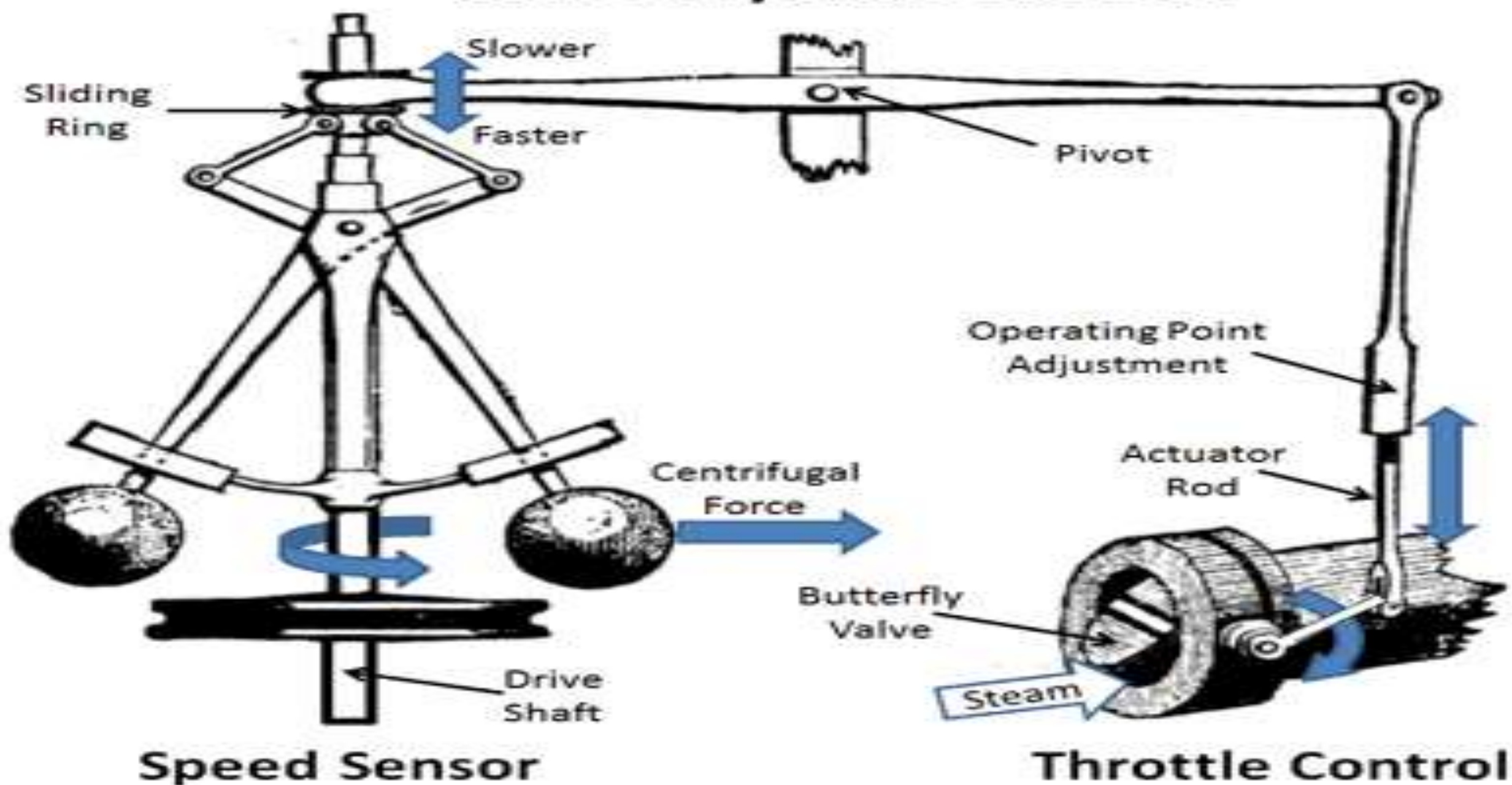


Walter Bradford Cannon
1871 - 1945

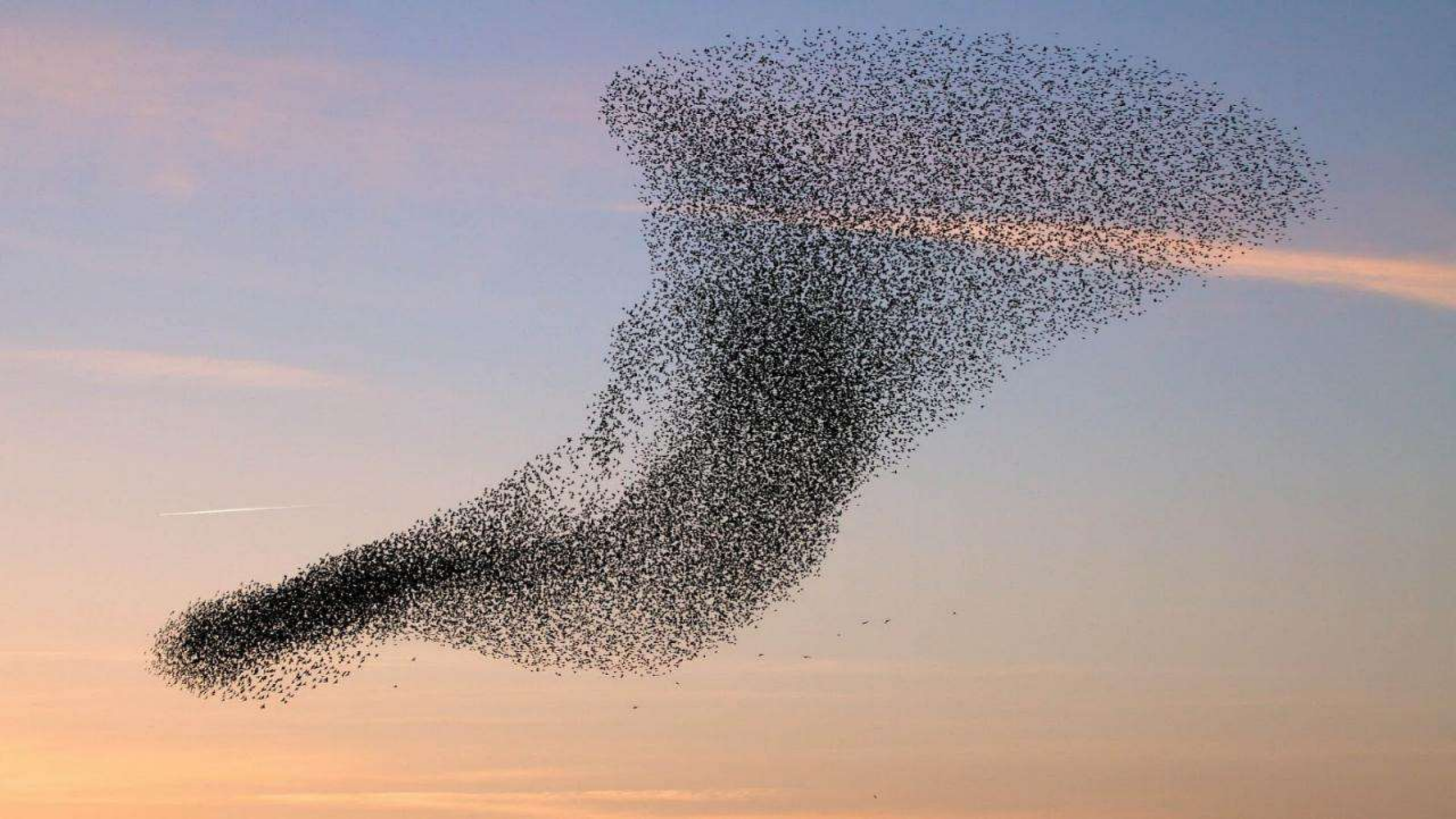




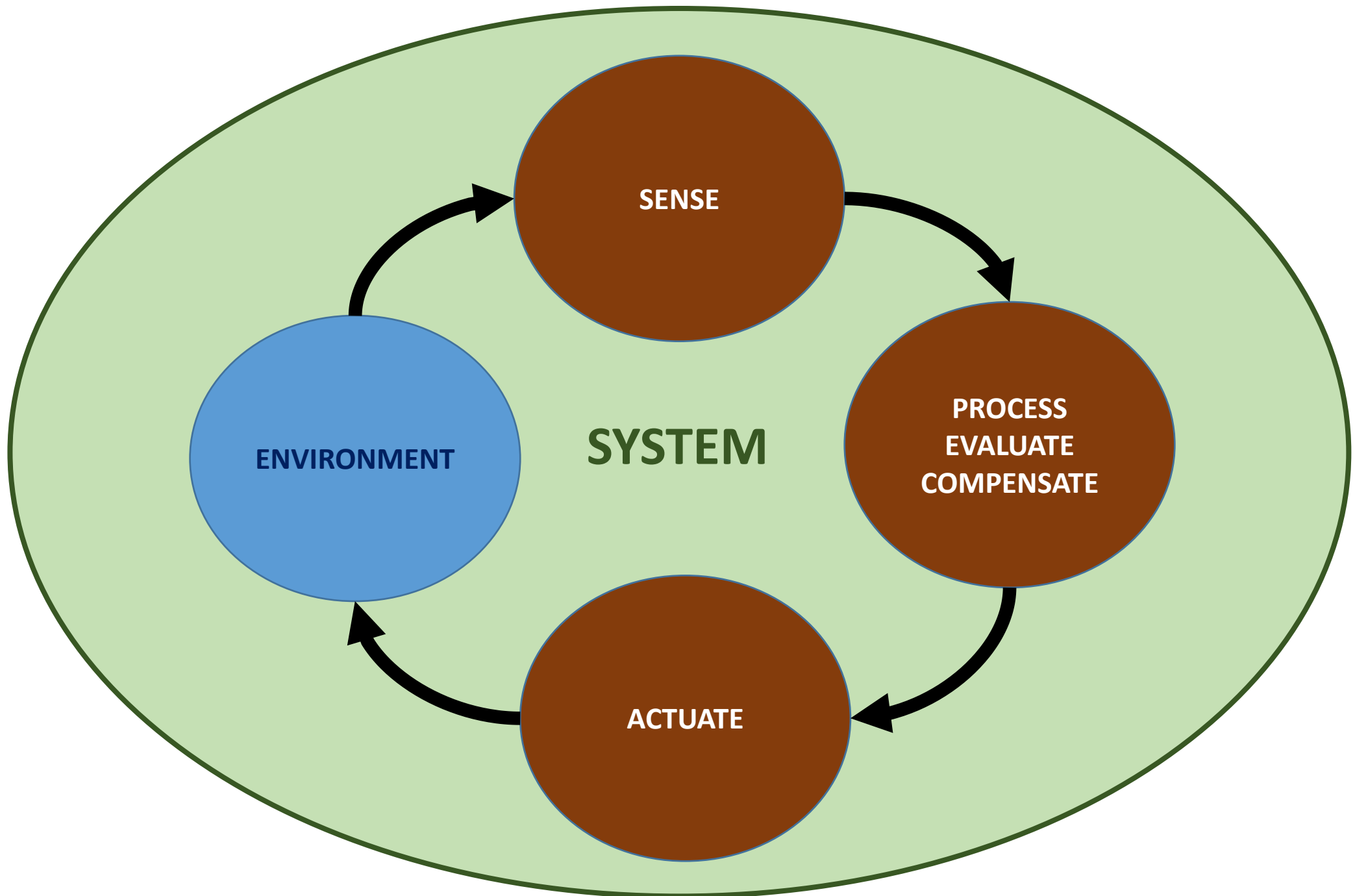
Watt's Flyball Governor











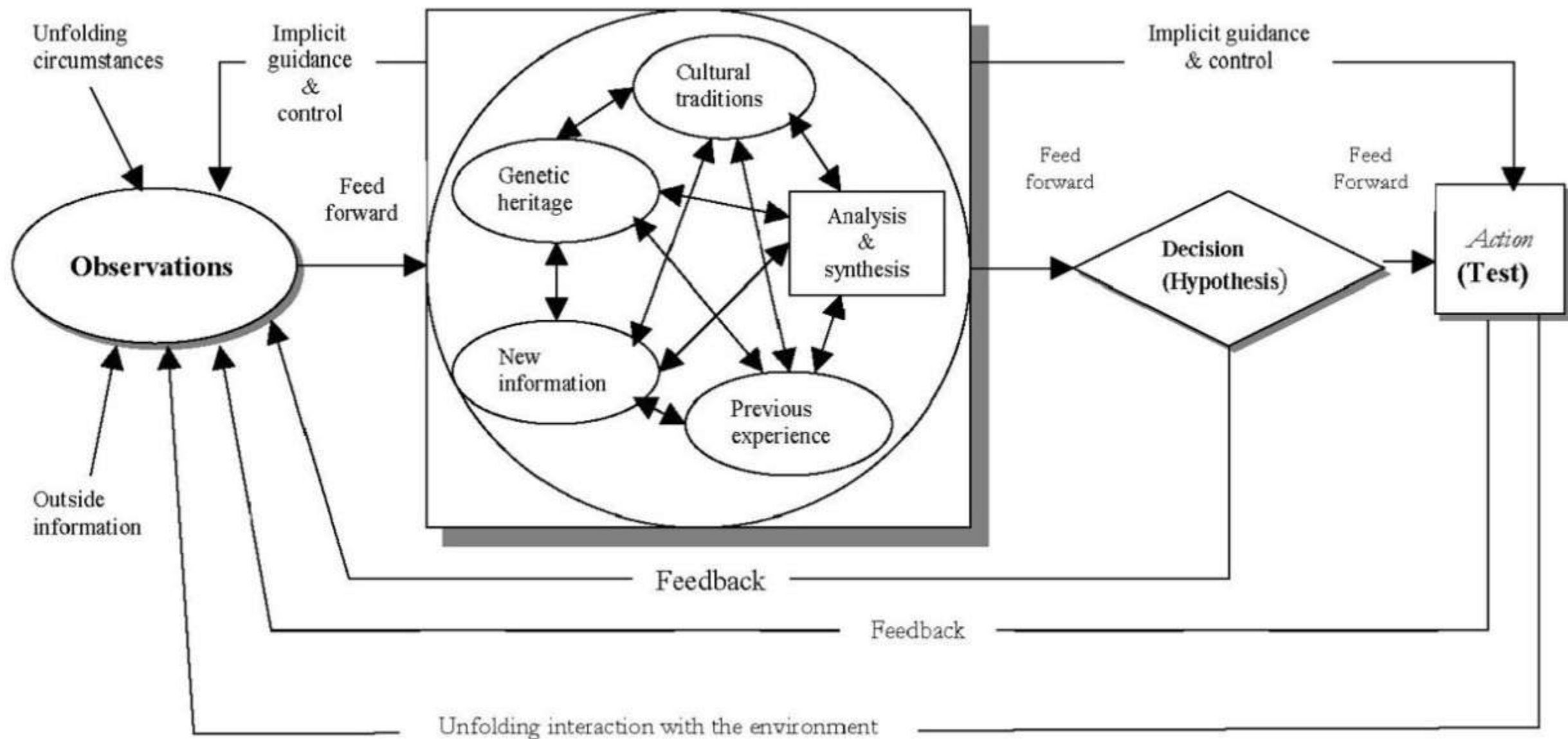


Observe

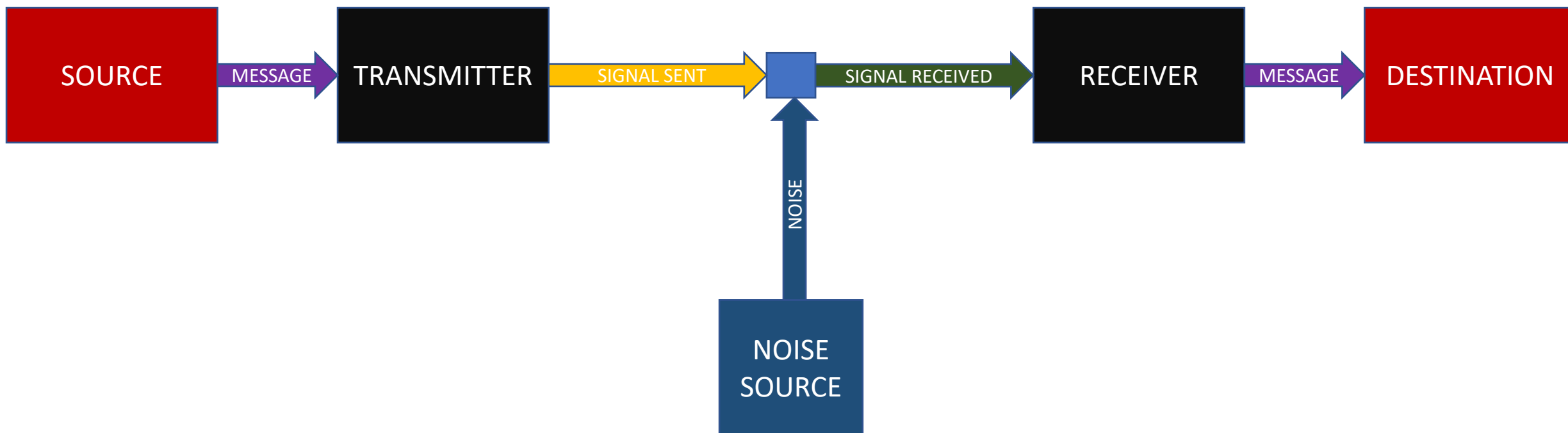
Orient

Decide

Act

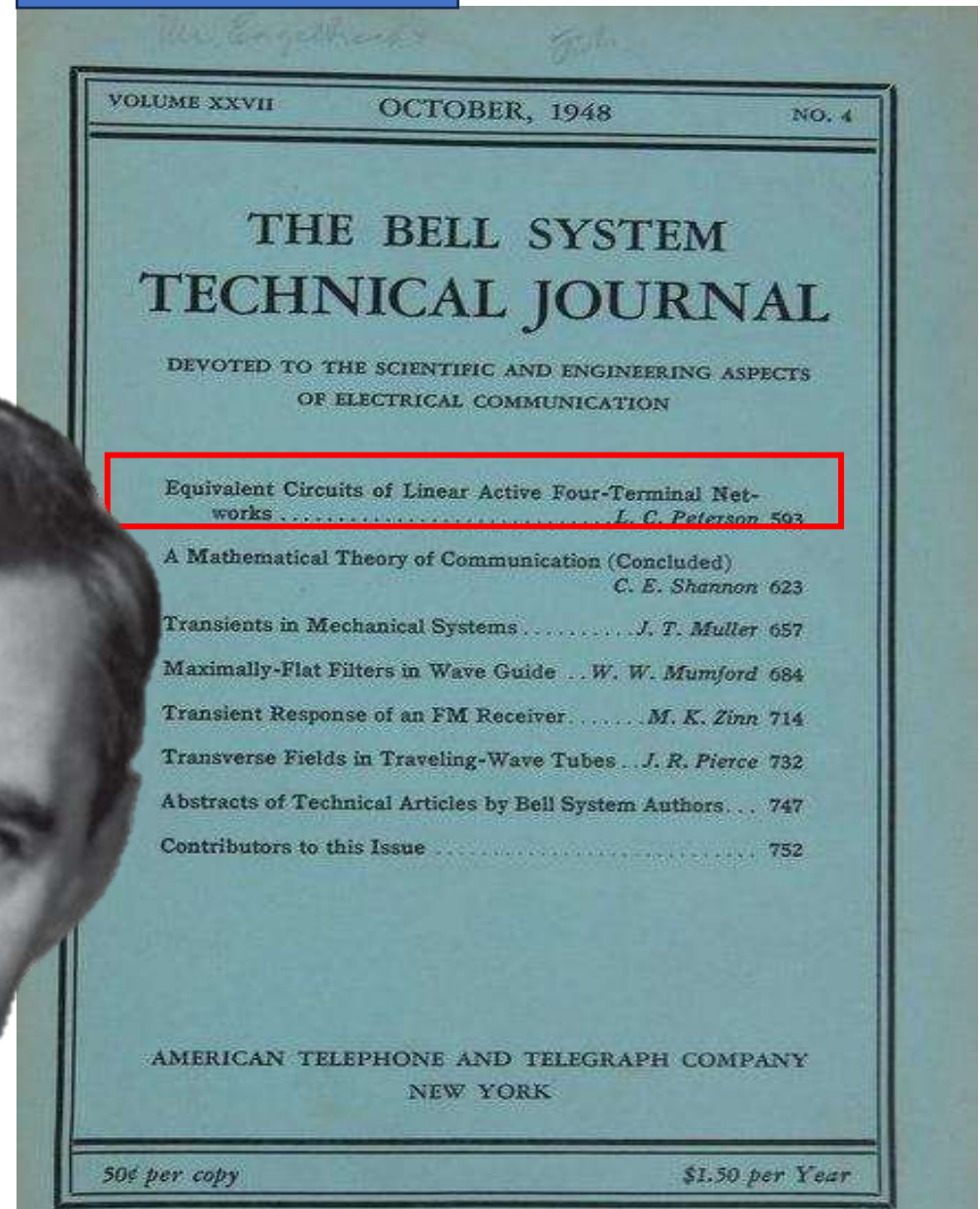
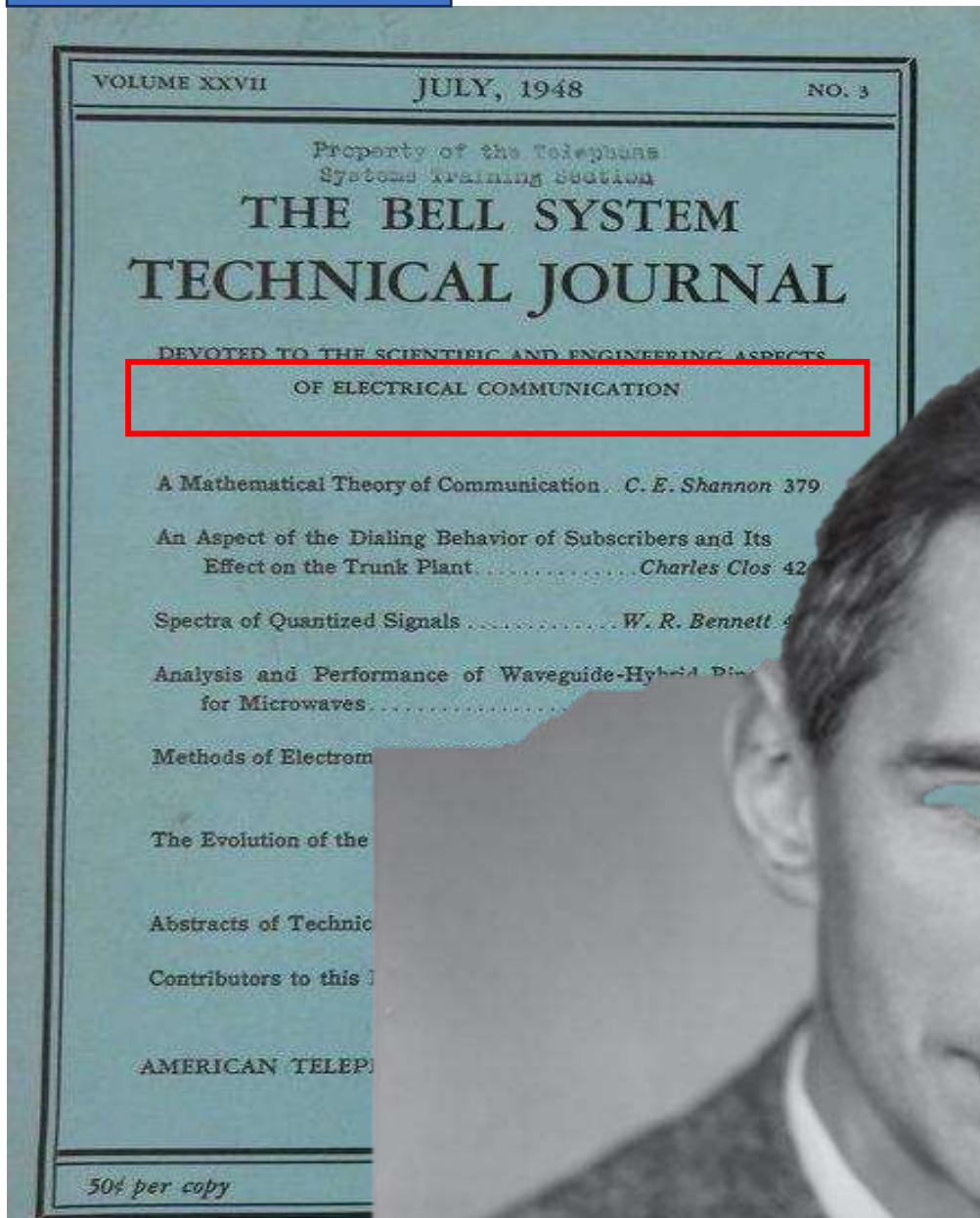


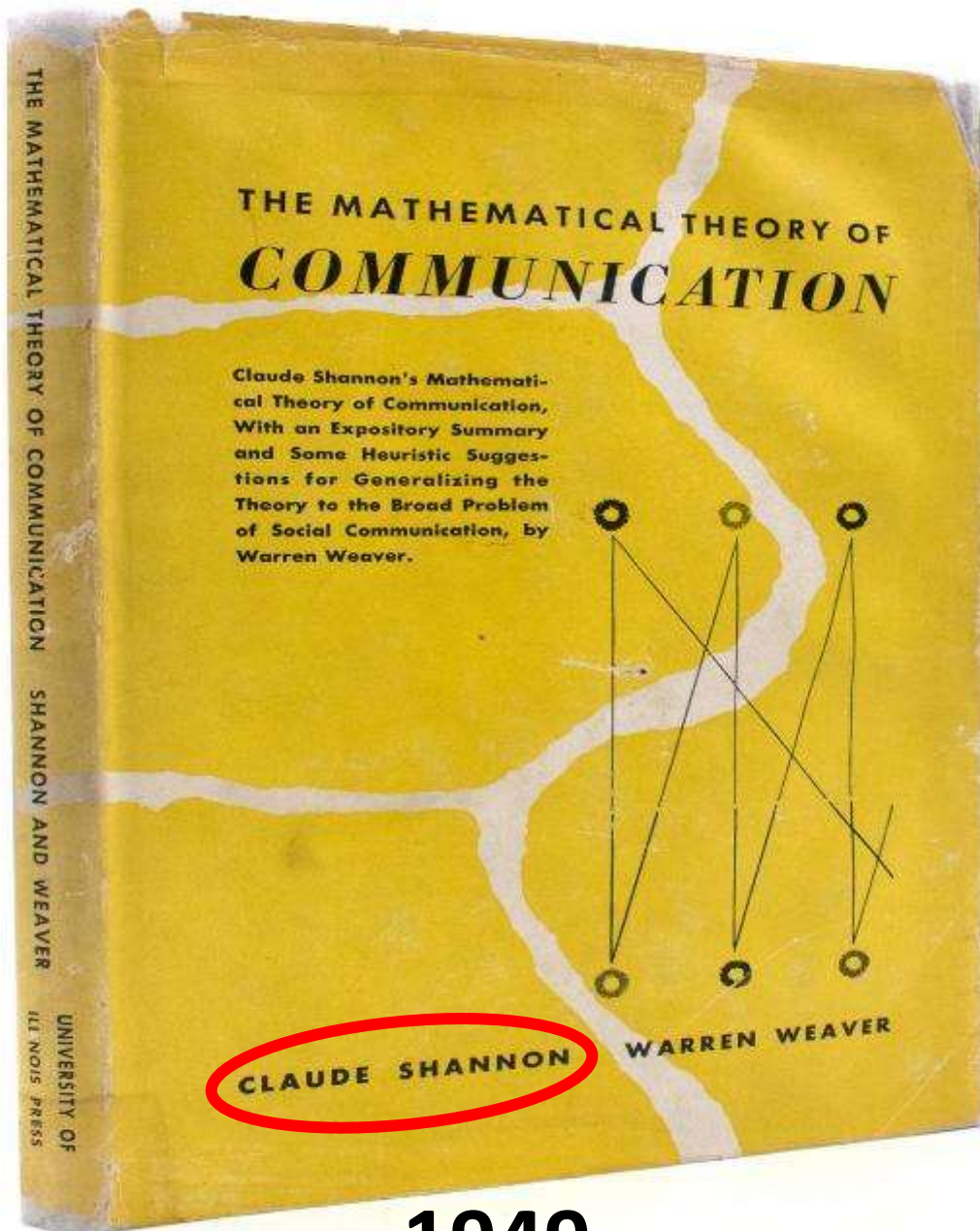
INFORMATION



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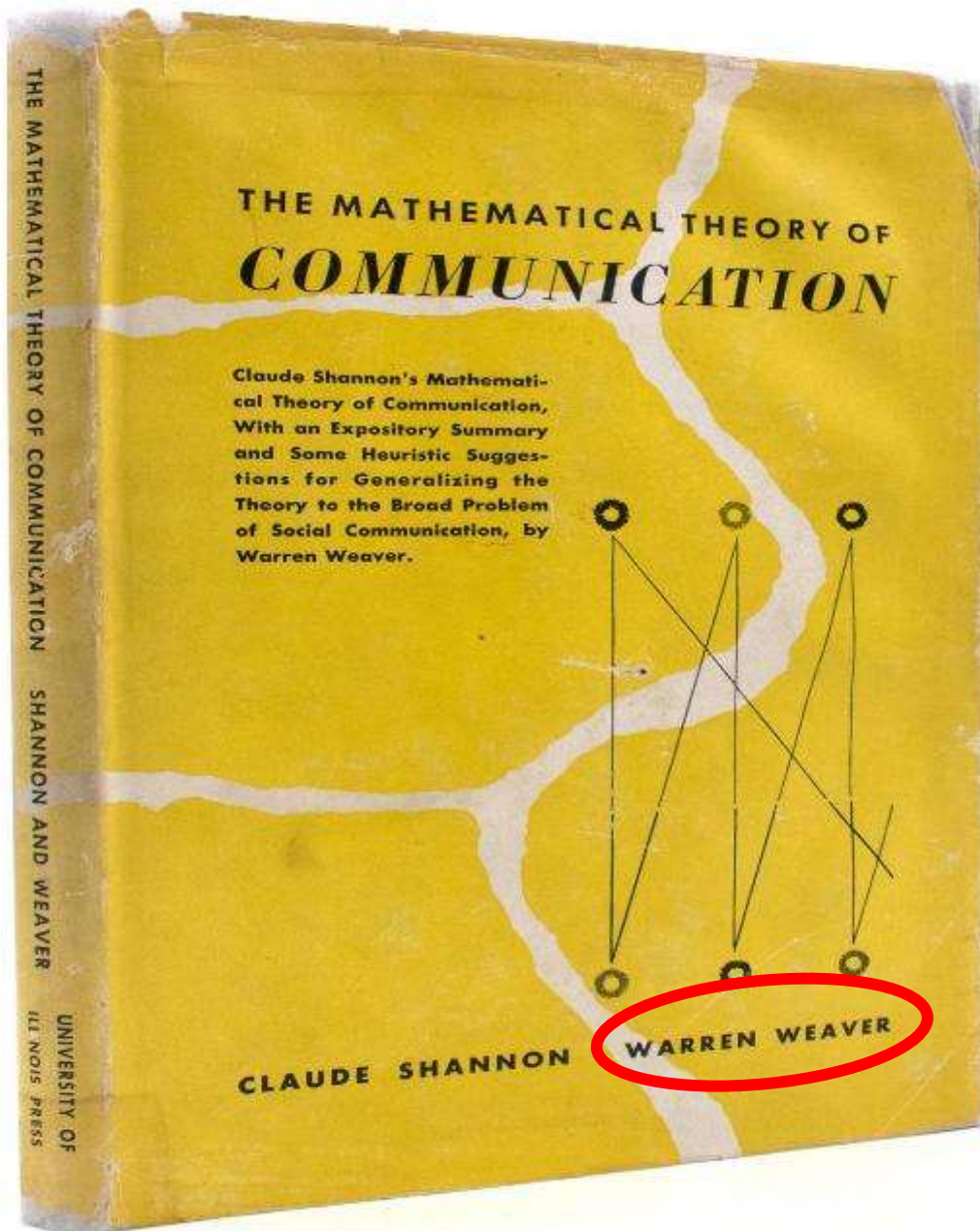
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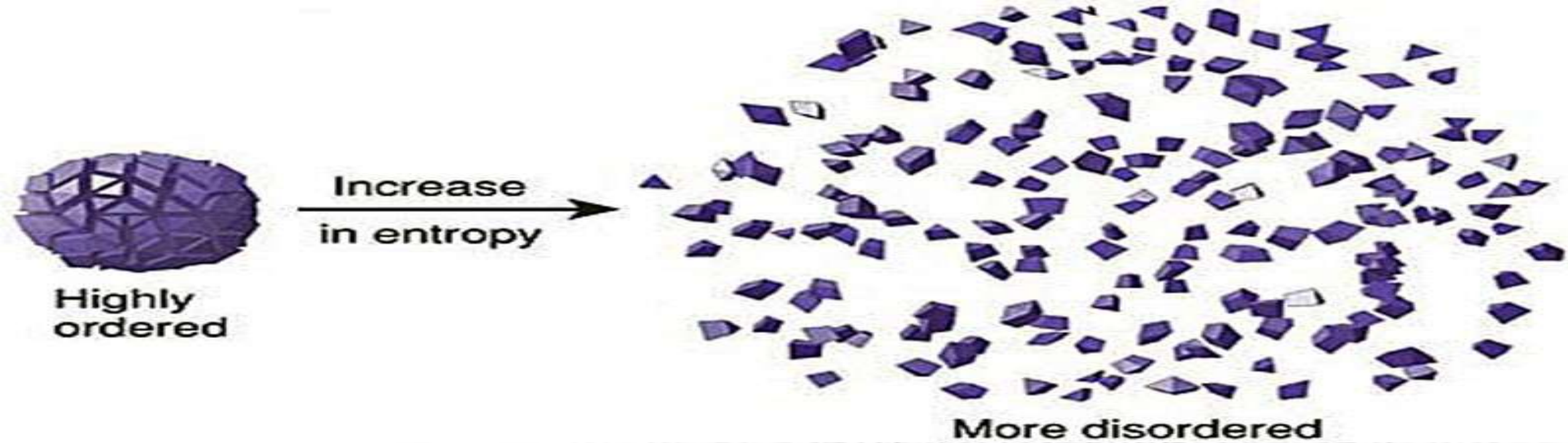
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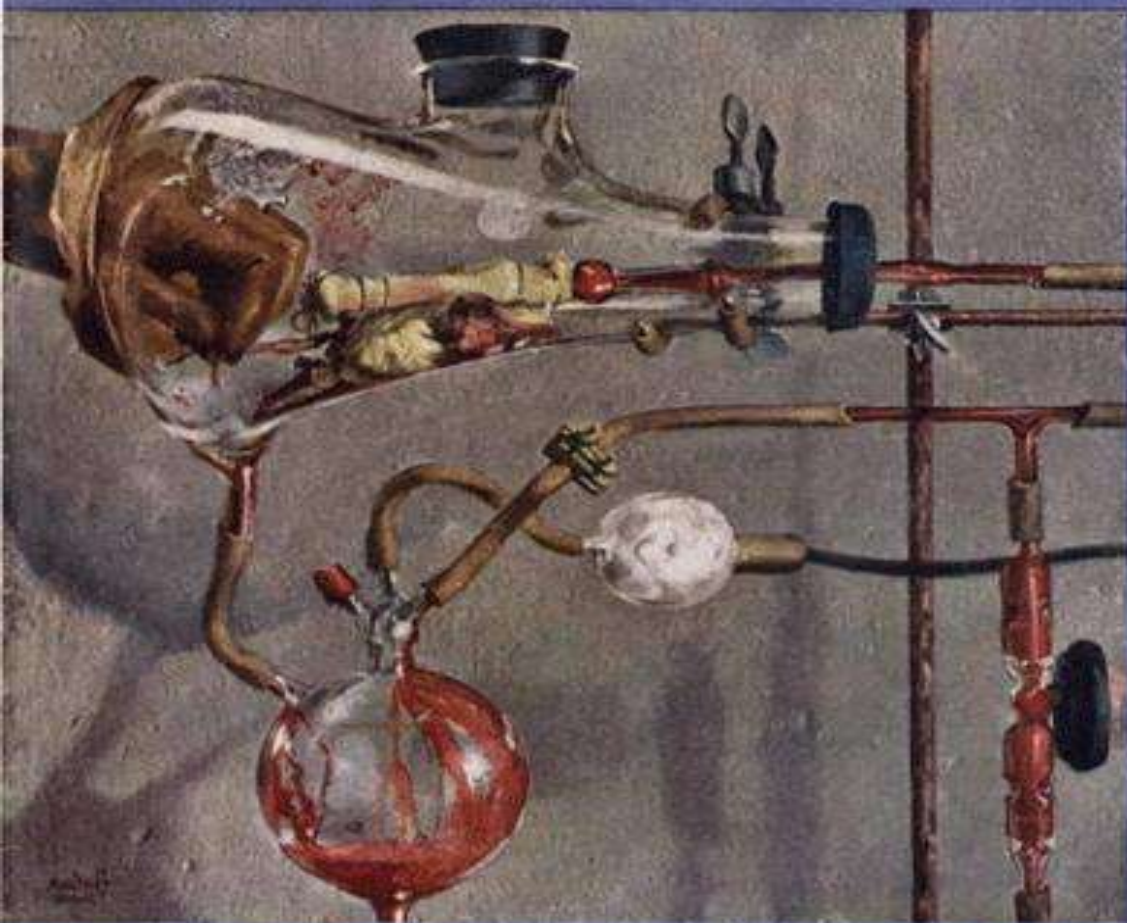
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entropy

SCIENTIFIC AMERICAN



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July 1949

SCIENTIFIC AMERICAN

JULY 1949

VOL. 181, NO. 1

THE MATHEMATICS OF COMMUNICATION

An important new theory is based on the statistical character of language. In it the concept of entropy is closely linked with the concept of information

by Warren Weaver

HOW do men communicate, one with another? The spoken word, either direct or by telephone or radio; the written or printed word, transmitted by hand, by post, by telegraph, or in any other way—these are obvious and common forms of communication. But there are many others. A nod or a wink, a drumbeat in the jungle, a gesture pictured on a television screen, the blinking of a signal light, a bit of music that reminds one of an event in the past, puffs of smoke in the desert air, the movements and posturing in a ballet—all of these are means men use to convey ideas.

The word communication, in fact, will be used here in a very broad sense to include all of the procedures by which one mind can affect another. Although the language used will often refer specifically to the communication of speech, practically everything said applies equally to music, to pictures, to a variety of other methods of conveying information.

In communication there seem to be problems at three levels: 1) technical, 2) semantic, and 3) influential.

The technical problems are concerned with the accuracy of transference of information from sender to receiver. They are inherent in all forms of communication, whether by sets of discrete symbols (written speech), or by a varying signal (telephonic or radio transmission of voice or music), or by a varying two-dimensional pattern (television).

The semantic problems are concerned with the interpretation of meaning by the receiver, as compared with the intended meaning of the sender. This is a very deep and involved situation, even

when one deals only with the relatively simple problems of communicating through speech. For example, if Mr. X is suspected not to understand what Mr. Y says, then it is not possible, by having Mr. Y do nothing but talk further with Mr. X, completely to clarify this situation in any finite time. If Mr. Y says "Do you now understand me?" and Mr. X says "Certainly I do," this is not necessarily a certification that understanding has been achieved. It may just be that Mr. X did not understand the question. If this sounds silly, try it again as "Czy pan mnie rozumie?" with the answer "Hai wakkate inasu." In the restricted field of speech communication, the difficulty may be reduced to a tolerable size, but never completely eliminated, by "explanations." They are presumably never more than approximations to the ideas being explained, but are understandable when phrased in language that has previously been made reasonably clear by usage. For example, it does not take long to make the symbol for "yes" in any language understandable.

The problems of influence or effectiveness are concerned with the success with which the meaning conveyed to the receiver leads to the desired conduct on his part. It may seem at first glance undeniably narrow to imply that the purpose of all communication is to influence the conduct of the receiver. But with any reasonably broad definition of conduct, it is clear that communication either affects conduct or is without any discernible and provable effect at all.

One might be inclined to think that the technical problems involve only the

engineering details of good design of a communication system, while the semantic and the effectiveness problems contain most if not all of the philosophical content of the general problem of communication. To see that this is not the case, we must now examine some important recent work in the mathematical theory of communication.

THIS is by no means a wholly new theory. As the mathematician John von Neumann has pointed out, the 19th-century Austrian physicist Ludwig Boltzmann suggested that some concepts of statistical mechanics were applicable to the concept of information. Other scientists, notably Norbert Wiener of the Massachusetts Institute of Technology, have made profound contributions. The work which will be here reported is that of Claude Shannon of the Bell Telephone Laboratories, which was preceded by that of H. Nyquist and R. V. L. Hartley in the same organization. This work applies in the first instance only to the technical problem, but the theory has broader significance. To begin with, meaning and effectiveness are inevitably restricted by the theoretical limits of accuracy in symbol transmission. Even more significant, a theoretical analysis of the technical problem reveals that it overlaps the semantic and the effectiveness problems more than one might suspect.

A communication system is symbolically represented in the drawing on pages 12 and 13. The information source selects a desired message out of a set of possible messages. (As will be shown, this is a particularly important func-

BELL TELEPHONE SYSTEM

Lines of the American Telephone and Telegraph Company and Associated Companies in the United States, connecting with the telephone systems of Canada, Cuba, Mexico, and Western Europe.



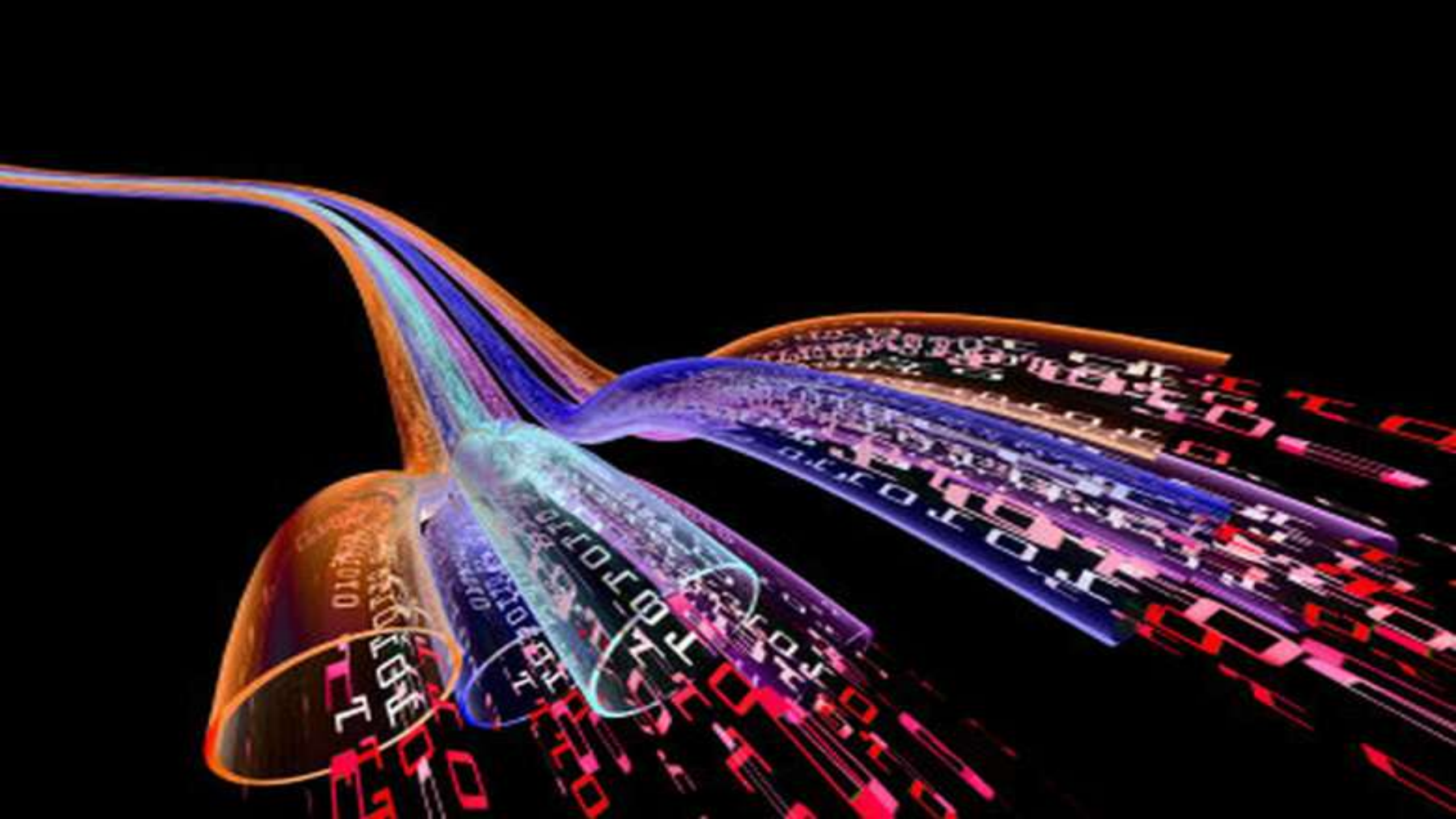
Legend

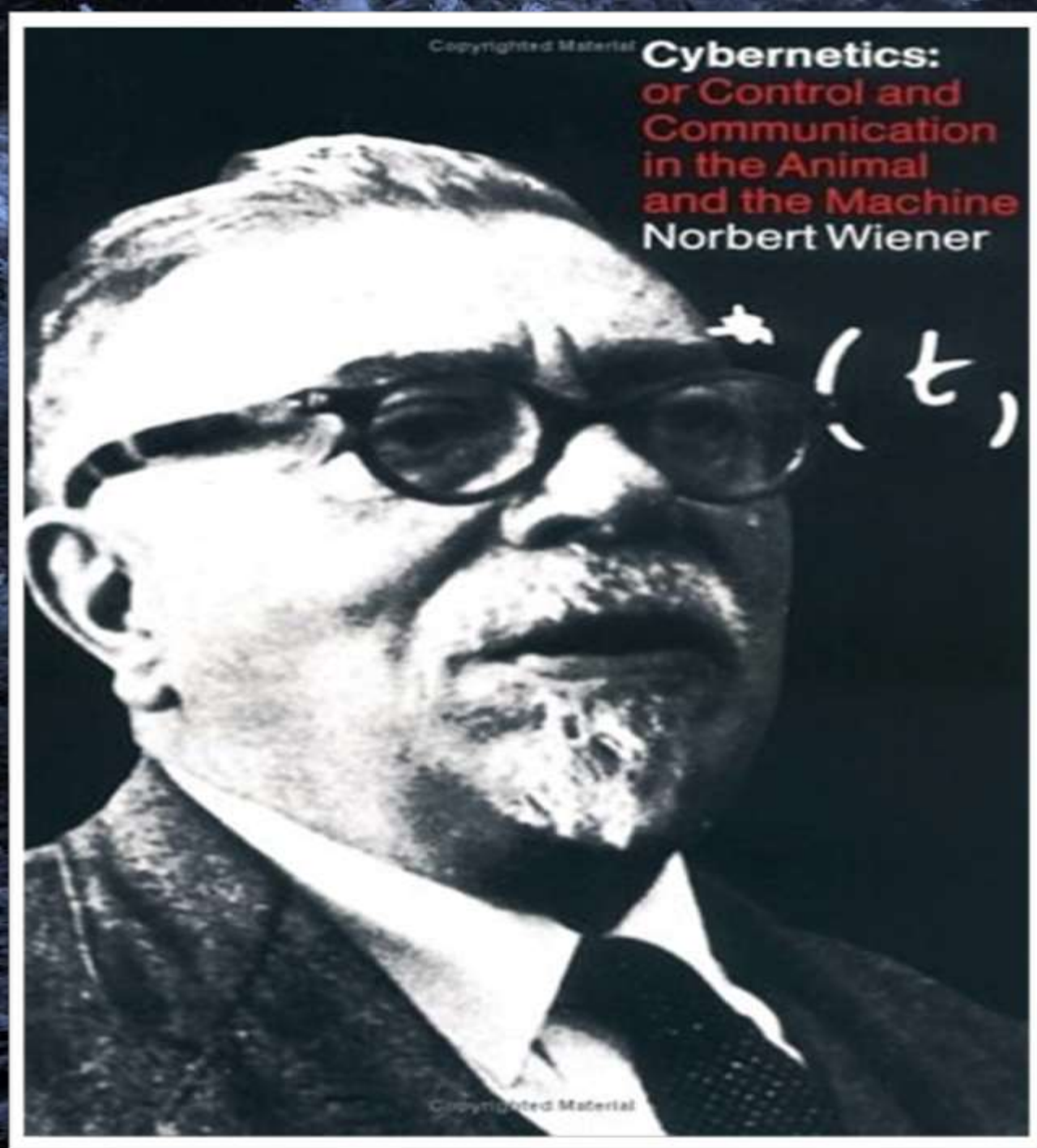
- Main Long Haul Routes . . .
- International Telephone Lines . . .
- State Capitals . . .
- Principal Cities . . .
- Other Named Places . . .
- Places not named because of limited space . . .

NOTE: Place not named does not mean that it is not connected to the Bell System. It may be connected to the Bell System by other lines.



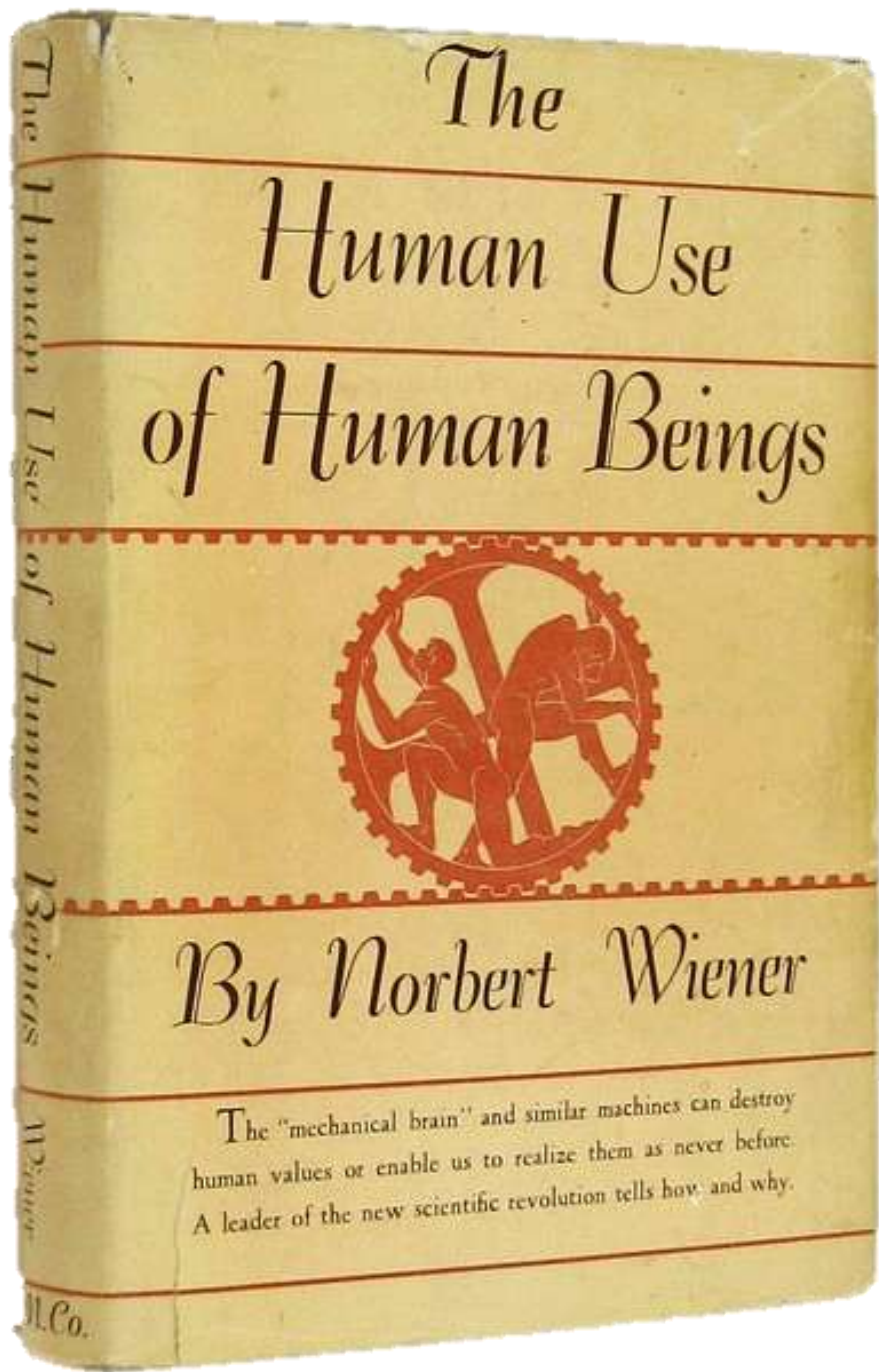






“CONTROL AND COMMUNICATION IN THE ANIMAL AND THE MACHINE”

“the study of non-linear structures and systems, whether electric or mechanical, whether natural or artificial”

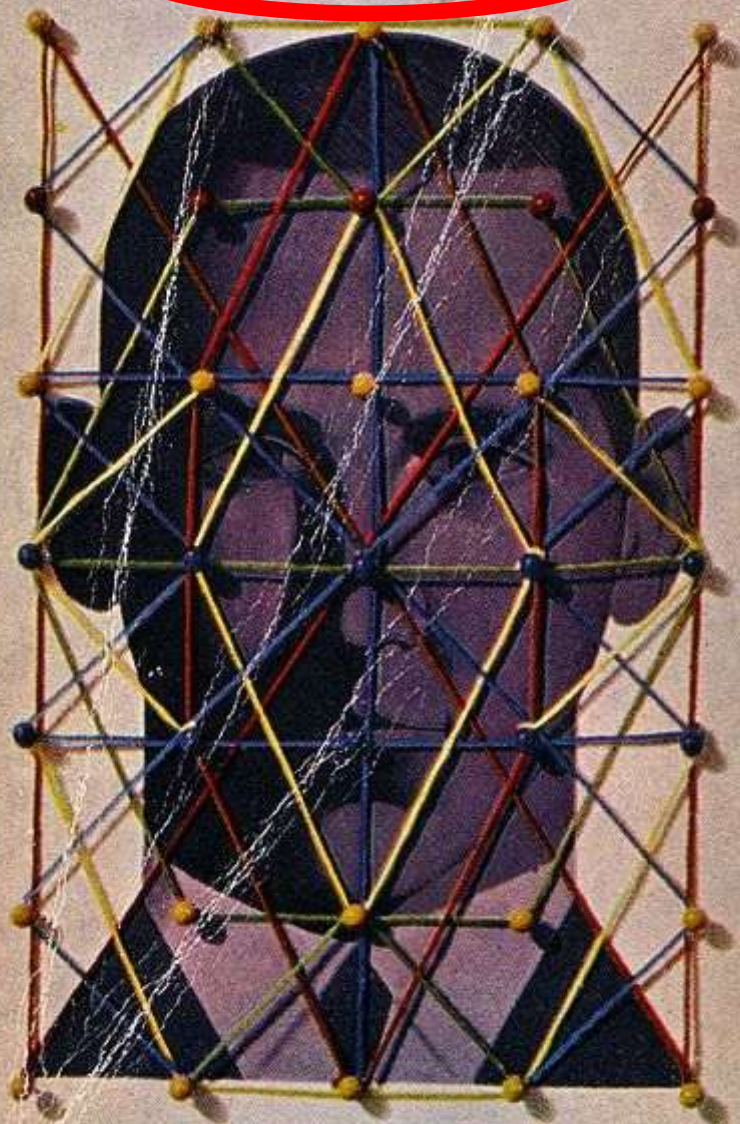


**First Edition
1950**

**Second Edition
Revised
1954**

Norbert Wiener The Human Use of Human Beings

Cybernetics and Society



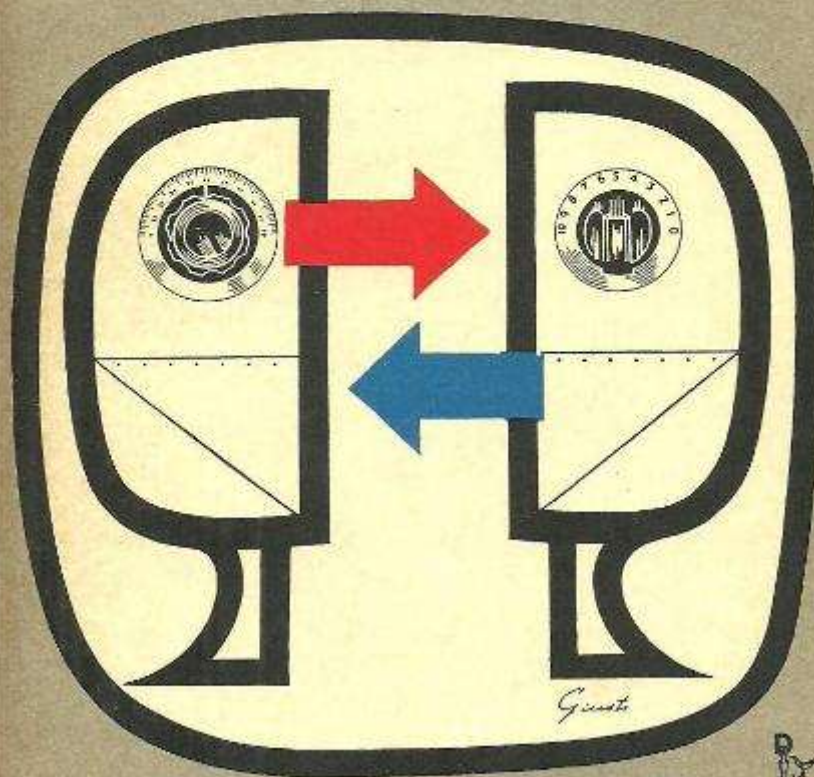
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The human use of human beings

CYBERNETICS AND SOCIETY

Norbert Wiener



SECOND EDITION REVISED

A Doubleday Anchor Book



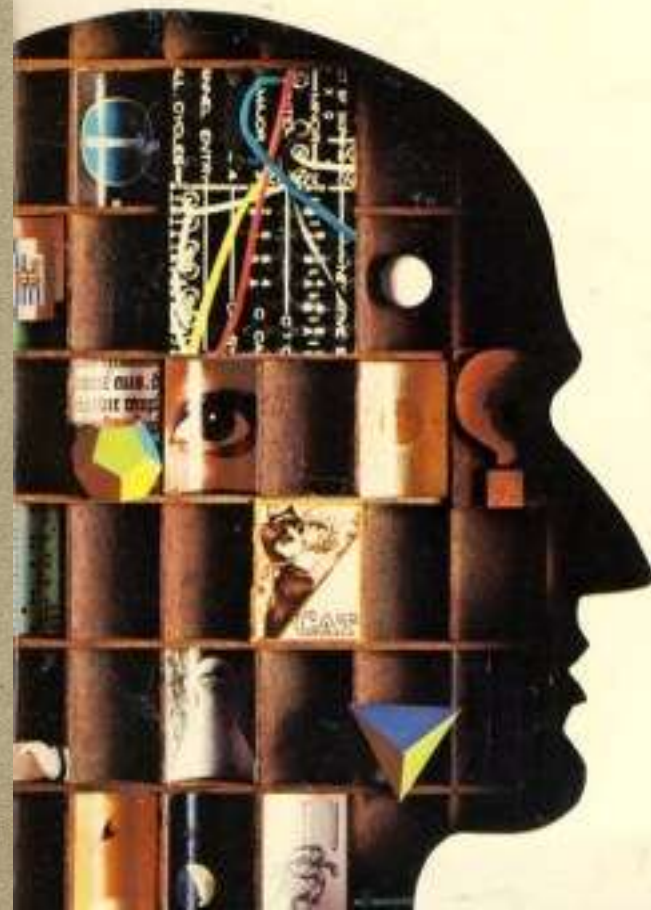
THE HUMAN USE OF HUMAN BEINGS

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Cybernetics and Society

By Norbert Wiener

The single most important and influential
work on the relation between computer
technology and the social sciences



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The single most important and influential
work on the relation between computer
technology and the social sciences

as a means of

controlling machinery

and society”

“It is the thesis of this book that society can only be understood through a study of the messages and communication facilities which belong to it; and that in the future development of these messages and communications facilities, messages between man and machines, between machines and man, and between machine and machine are destined to play an ever increasing part”

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\$1.50

No. 308

Cybernetics Simplified

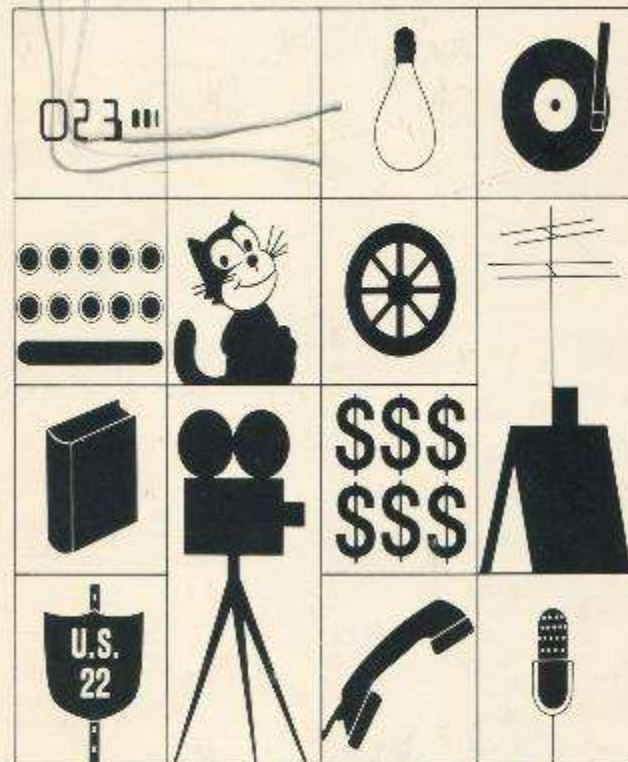
Arthur Porter

With a Foreword by Marshall McLuhan



Understanding Media

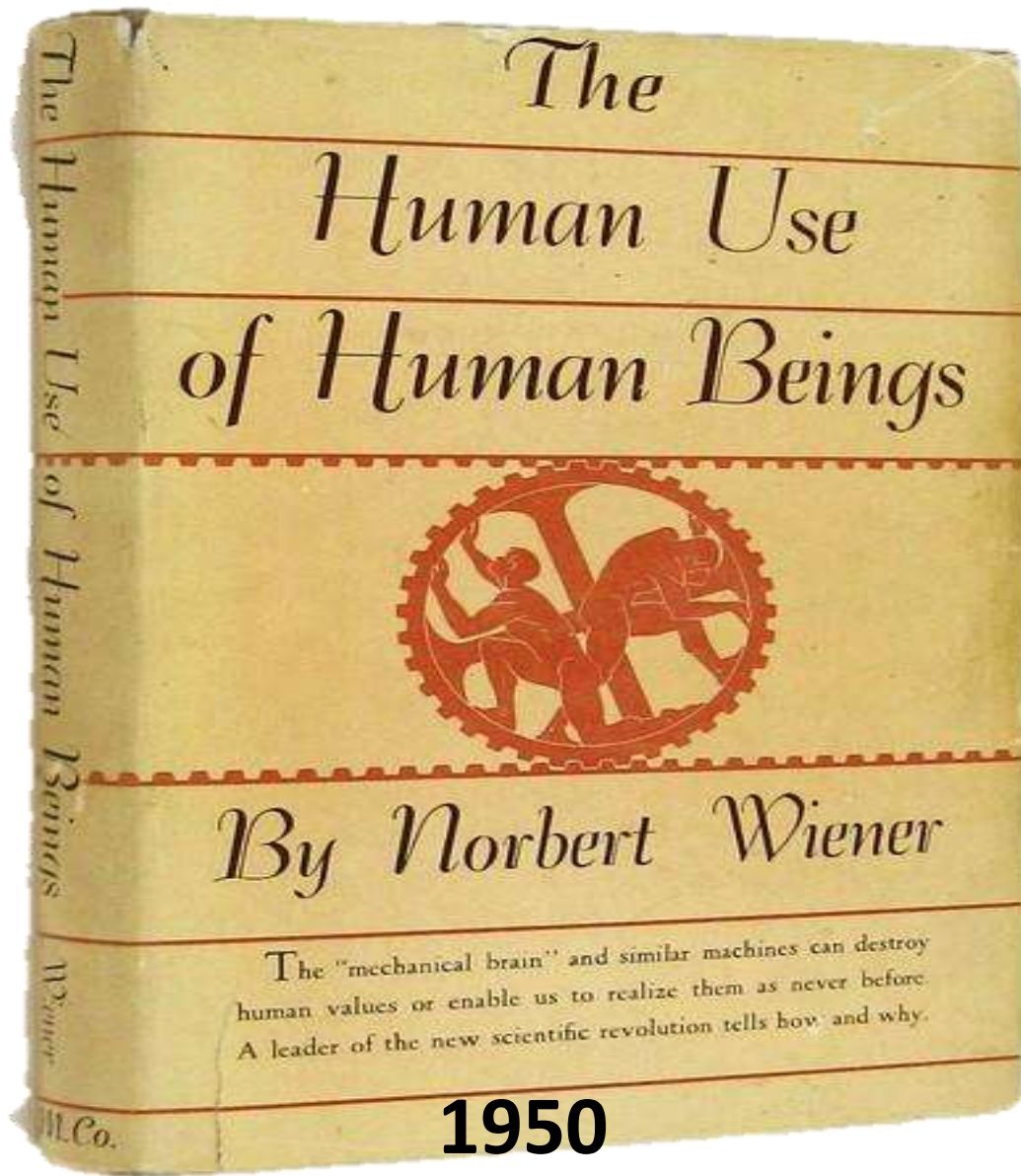
The Extensions of Man



by Marshall McLuhan

Author of *THE GUTENBERG GALAXY*

LIFE = INFORMATION (NEGATIVE ENTROPY)



1950

" ... the individuality of the body is that of the flame rather than that of a stone, of a form rather than a bit of substance. This form can be transmitted or modified and duplicated ...

When one cell divides into two, or when one of the genes which carries our corporeal and mental birthright is split ... we have a separation in matter which is conditioned by the power of living tissue to duplicate itself.

Since this is so, there is no absolute distinction between the types of transmission which we can use for sending a telegram from country to country and the types of transmission which at least are theoretically possible for transmitting a living organism such as a human being.

Let us then admit that the idea that one might conceivably travel by telegraph, in addition to travelling by train or airplane, is not intrinsically absurd ... "

2ND Edition, 1954, pp. 102-3

BEAM US UP ... NORBERT





Cybernetics

or CONTROL and COMMUNICATION
in THE ANIMAL and THE MACHINE

By NORBERT WIENER

A study of this subject is pertinent to psychology, physiology, electrical engineering, radio engineering, statistics, probability, and statistics.

BULLETIN OF
MATHEMATICAL BIOPHYSICS
VOLUME 5, 1943

A LOGICAL CALCULUS OF THE IDEAS IMMANENT IN NERVOUS ACTIVITY

WARREN S. MCCULLOCH AND WALTER PITTS

FROM THE UNIVERSITY OF ILLINOIS, COLLEGE OF MEDICINE,
DEPARTMENT OF PSYCHIATRY AT THE ILLINOIS NEUROPSYCHIATRIC INSTITUTE,
AND THE UNIVERSITY OF CHICAGO

Because of the "all-or-none" character of nervous activity, neural events and the relations among them can be treated by means of propositional logic. It is found that the behavior of every net can be described in these terms, with the addition of more complicated logical means for nets containing circles; and that for any logical expression satisfying certain conditions, one can find a net behaving in the fashion it describes. It is shown that many particular choices among possible neurophysiological assumptions are equivalent, in the sense that for every net behaving under one assumption, there exists another net which behaves under the other and gives the same results, although perhaps not in the same time. Various applications of the calculus are discussed.



BINARY ELECTRONIC SWITCHES = NERONS



BINARY ELECTRONIC CIRCUITS = NERVOUS SYSTEM

BINARY DIGITAL ELECTRONIC COMPUTERS = BRAINS



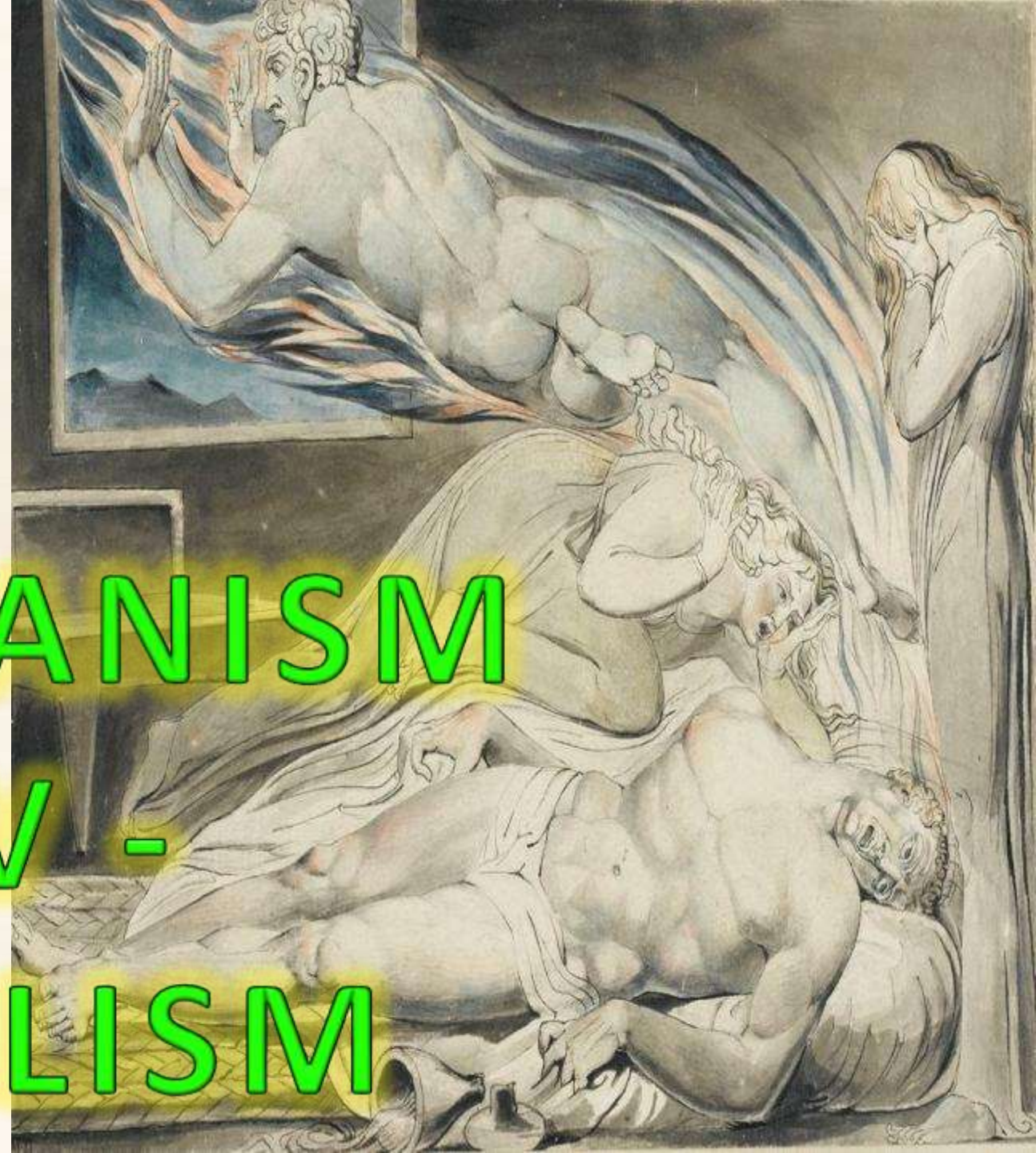
pp. 22 – 23 (1948)



Der Mensch als Industriepalast



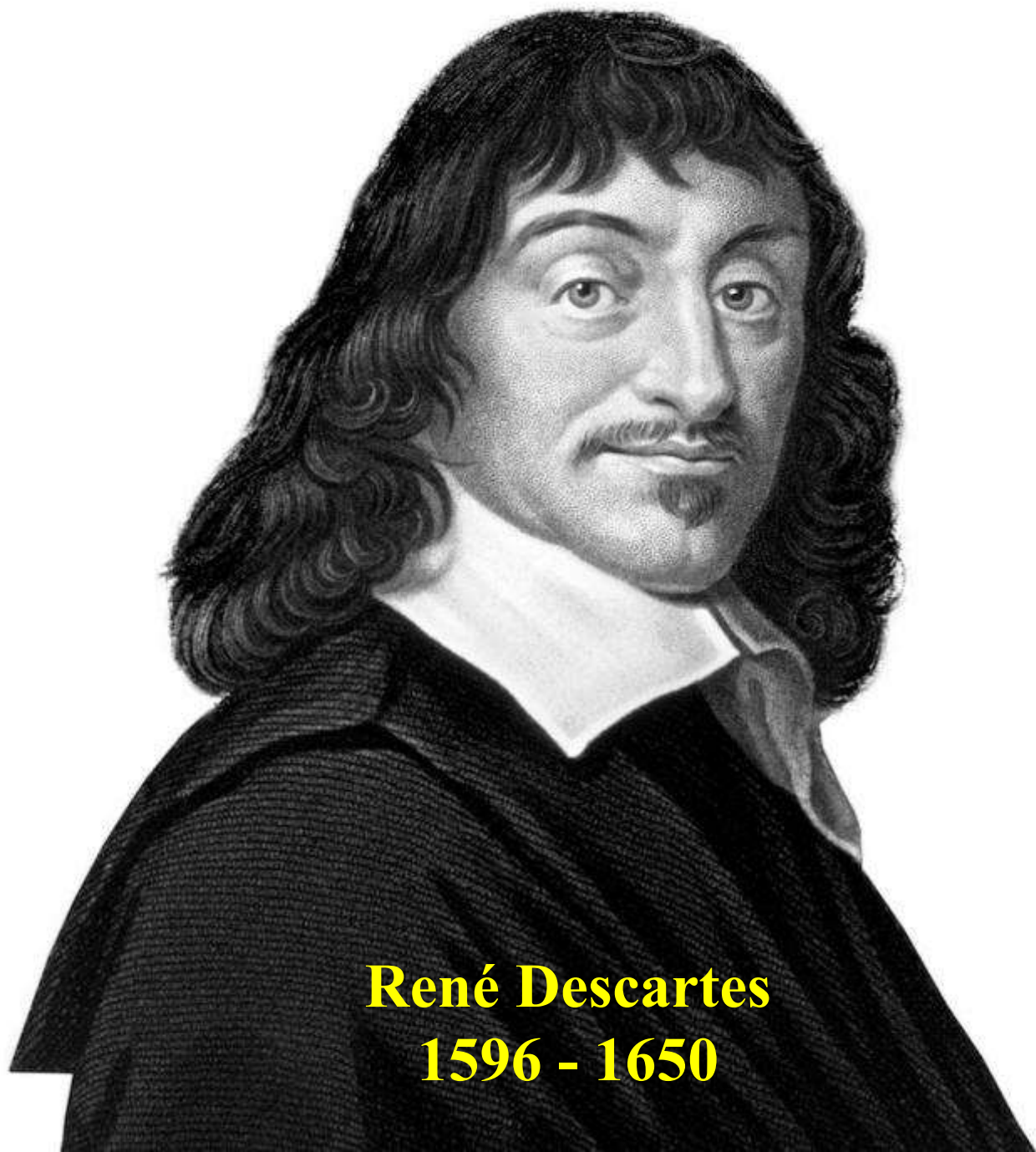
Beilage zu Kohn, DAS LEBEN DES MENSCHEN / Franck'sche Verlagshandlung, Stuttgart /



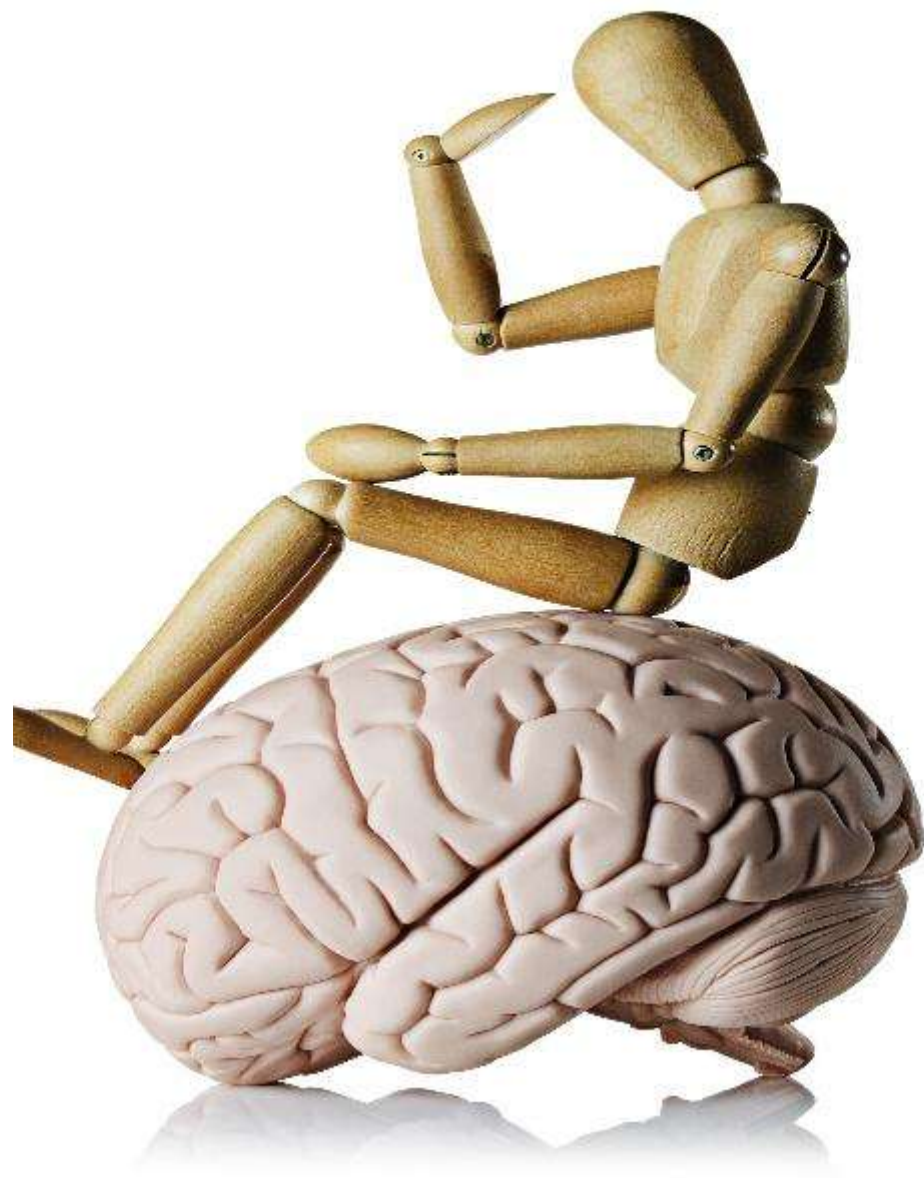
MECHANISM

- V -

VITALISM



René Descartes
1596 - 1650





On the one hand I have a clear and distinct idea of myself, in so far as I am a thinking, non-extended thing; and on the other hand I have a distinct idea of body, in so far as this is simply an extended, non-thinking thing. And, accordingly, it is certain that I am really distinct from my body, and exist without it.

Rene Descartes

“CYBERNETICS IS THE SCIENCE THAT IS
SUBSTITUTING
THE *MACHINE*
FOR MANY FUNCTIONS OF
THE *HUMAN MIND*”

CYBERNETICS—how will you use it?

Quietly but irresistibly, Cybernetics is changing the shape of our industrial way of life—and will make fantastic changes in our personal lives as well.

Cybernetics is the science that is substituting the *machine* for many functions of the *human mind*.

If this sounds like something out of the far, far future, note this:

In a major automobile plant, *raw steel* automatically feeds onto a moving belt line—and comes off the line as precision-machined engine blocks . . . *completely automatically!*

In tin plate mills a device is now in use that looks for pin holes in a fast moving strip of tin plate—and then actually instructs the

shearing table ahead to chop out and reject any defective section. *Without human assistance!*

In chemical plants, furniture factories, offices, warehouses—even in retail stores—Cybernetics is making an impact that will bring us more production, more jobs, more income and far, far more leisure.

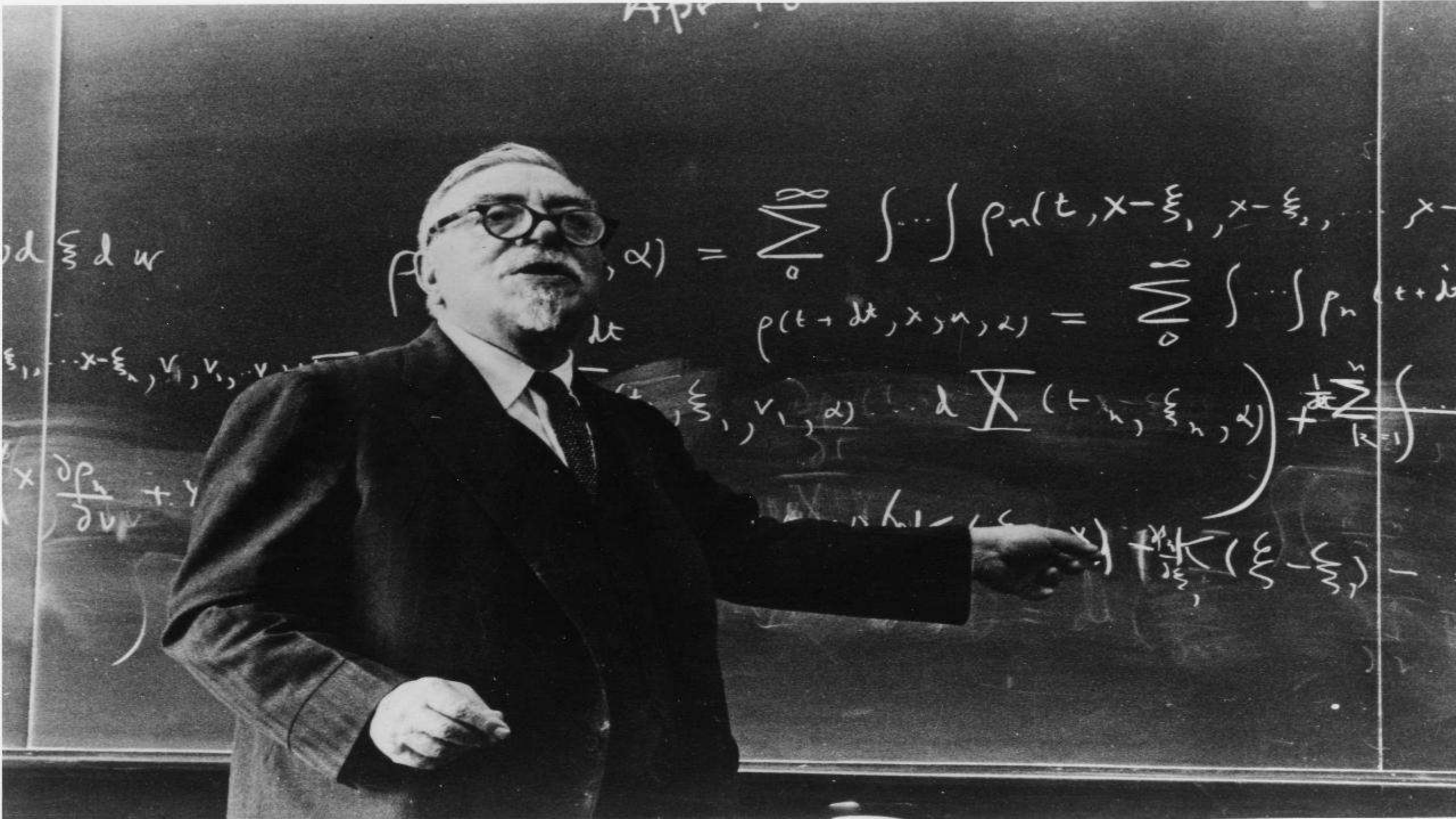
For 118 years, the National Shawmut Bank has cooperated in the development of industrial progress. Today, this modern bank is working with businessmen who are already using Cybernetics, or are planning how to adapt it to their businesses. A Shawmut officer will be glad to talk it over with you at your convenience.

Your business can bank on the bank *Business* chooses

The National Shawmut Bank
OF BOSTON

Member Federal Deposit Insurance Corporation





$$d\xi dw$$

$$\xi_1, \dots, x - \xi_n, v_1, v_2, \dots, v_n$$

$$x \frac{\partial p}{\partial v} + y$$

$$p(t, x, \alpha) = \sum_0^\infty \int \dots \int p_n(t, x - \xi_1, x - \xi_2, \dots, x - \xi_n, \alpha) d\xi_1 d\xi_2 \dots d\xi_n$$
$$p(t + dt, x, \alpha) = \sum_0^\infty \int \dots \int p_n(t + dt, x - \xi_1, x - \xi_2, \dots, x - \xi_n, \alpha) d\xi_1 d\xi_2 \dots d\xi_n$$

$$dX(t_n, \xi_n, \alpha) + \frac{1}{dt} \sum_{k=1}^n \left(\frac{\partial p}{\partial \xi_k} (\xi_k - \xi_{k-1}) - \dots \right)$$

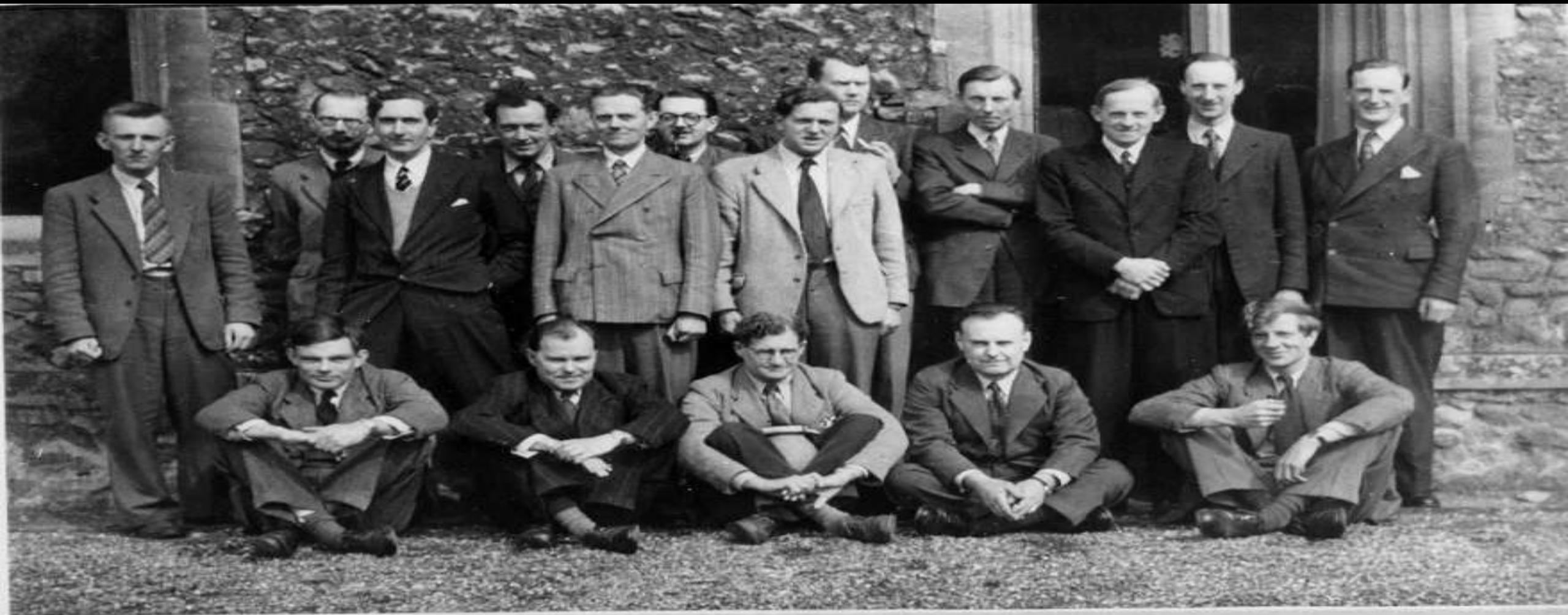
$$+ \frac{\partial p}{\partial \xi_k} (\xi_k - \xi_{k-1}) - \dots$$



"In the spring of 1947 ... I had an excellent chance to meet most of those doing work on ultra-rapid computing machines, especially at Manchester and at the National Physical Laboratories at Teddington, and above all to talk over the fundamental ideas of cybernetics with Mr. Turing at Teddington."

Cybernetics, 1948, "Introduction" dated November, 1947

Ratio Club



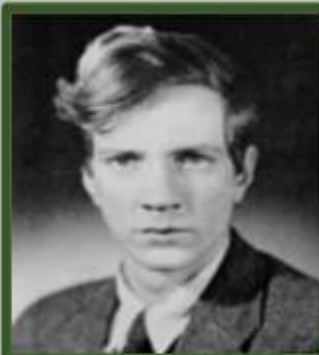
Harold Shipton. John Bates. W.E. Hick. John Pringle. Donald Sholl. John Westcott. Donald Mackay.

Giles Brindley. Tom McLardy. Ross Ashby. Thomas Gold. Albert Uttley.

Alan Turing. Gurney Sutton. William Rushton. George Dawson. Horace Barlow.



Ross Ashby
1903 - 1972



Horace Barlow
1921 - 2020



John Bates
1918 - 1993



George Dawson
1912 - 1938



Thomas Gold
1920 - 2004



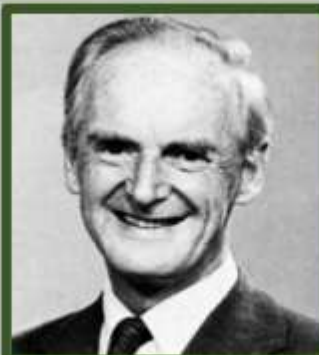
Jack Good
1916 - 2009



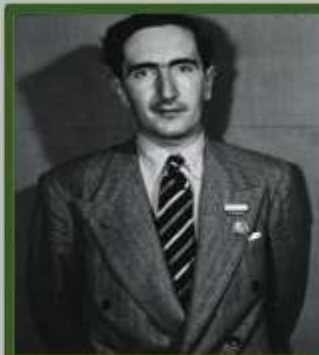
William Hick
1912 - 1974



Victor Little
1920 - 1976



Donald MacKay
1922 - 1987



Turner McLardy
1916 - 1988



Patrick Merton
1920 - 2000



John Pringle
1912 - 1982



William Rushton
1901 - 1980



Harold Shipton
1920 - 2007



Donald Sholl
1903 - 1960



Eliot Slater
1904 - 1983



Alan Turing
1912 - 1954



Albert Uttley
1906 - 1985



Grey Walter
1910 - 1977

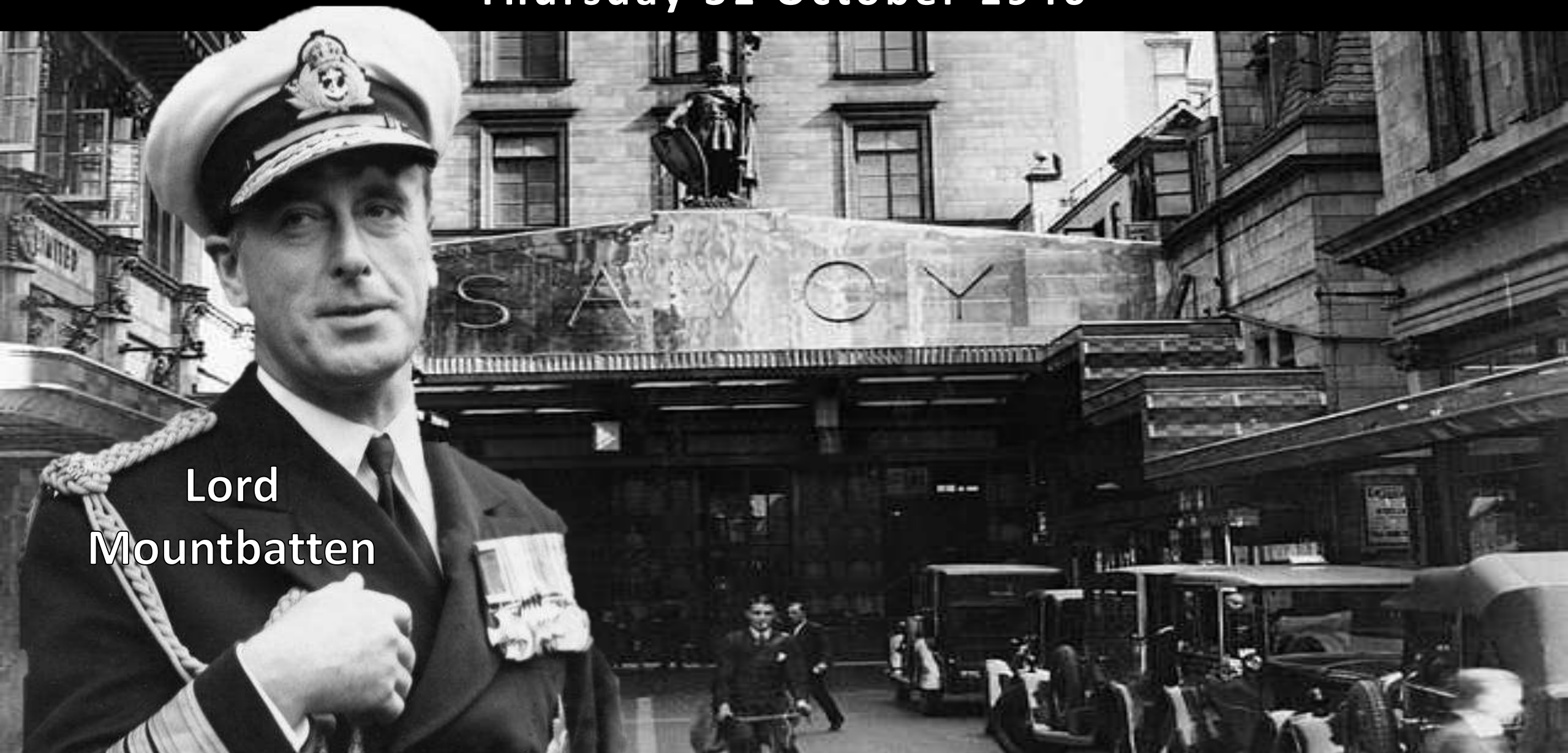


John Westcott
1920 - 2014



Philip Woodward
1919 - 2018

Thursday 31 October 1946



**Lord
Mountbatten**

The British Institution of Radio Engineers, Annual Meeting

Thursday 31 October 1946



**Lord
Mountbatten**

The British Institution of Radio Engineers, Annual Meeting

Thursday 31 October 1946

Lord
Mountbatten

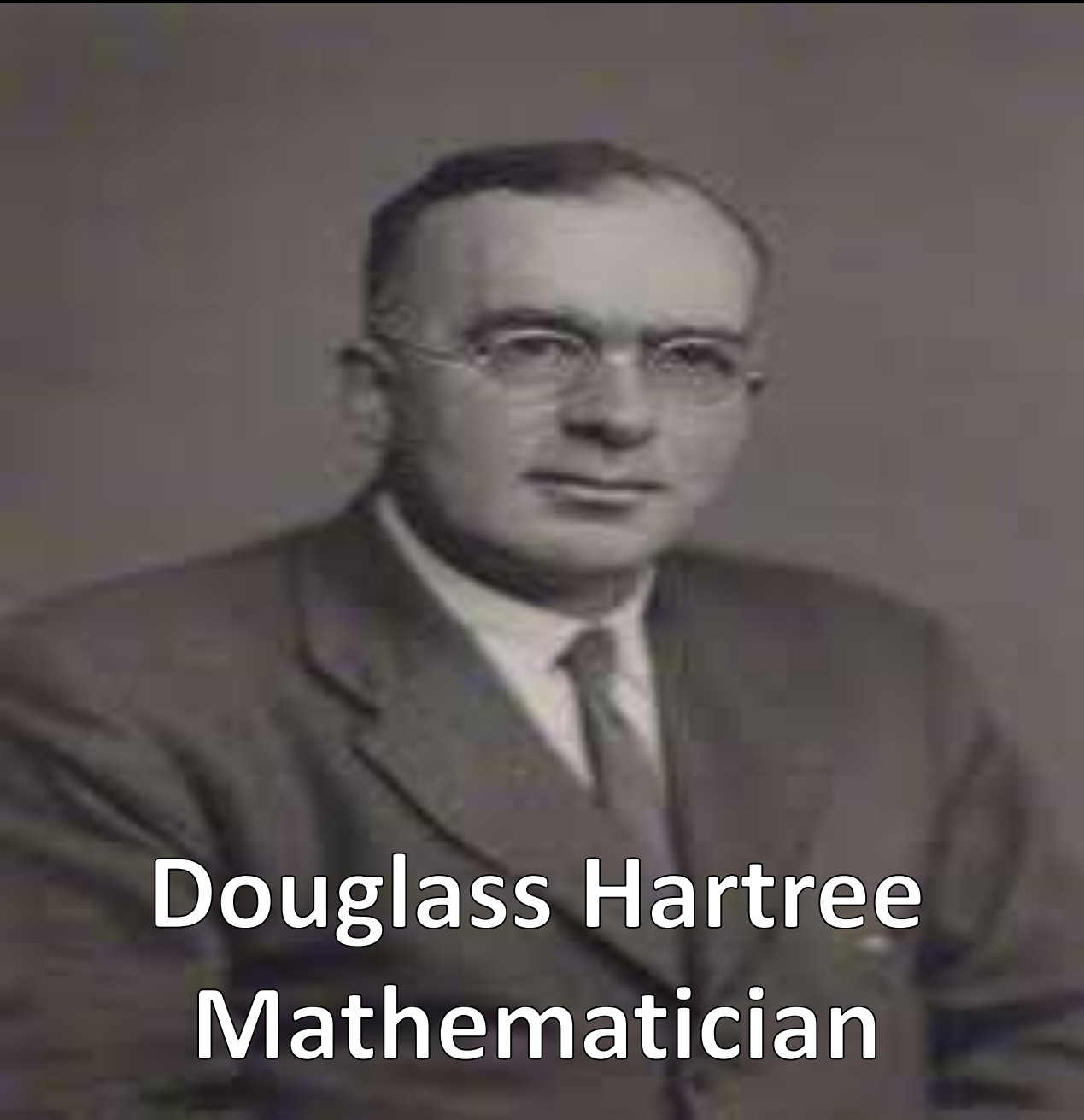
would instantly bring files and material on any subject
translucent viewing screens magnify supermicro-
left is a mechanism which automatically photographs
ters, then files them in the desk for future reference.

INK

CONTINUED

The British Institution of Radio Engineers, Annual Meeting

'STUF and NONSENSE! They're just big, automatic calculators

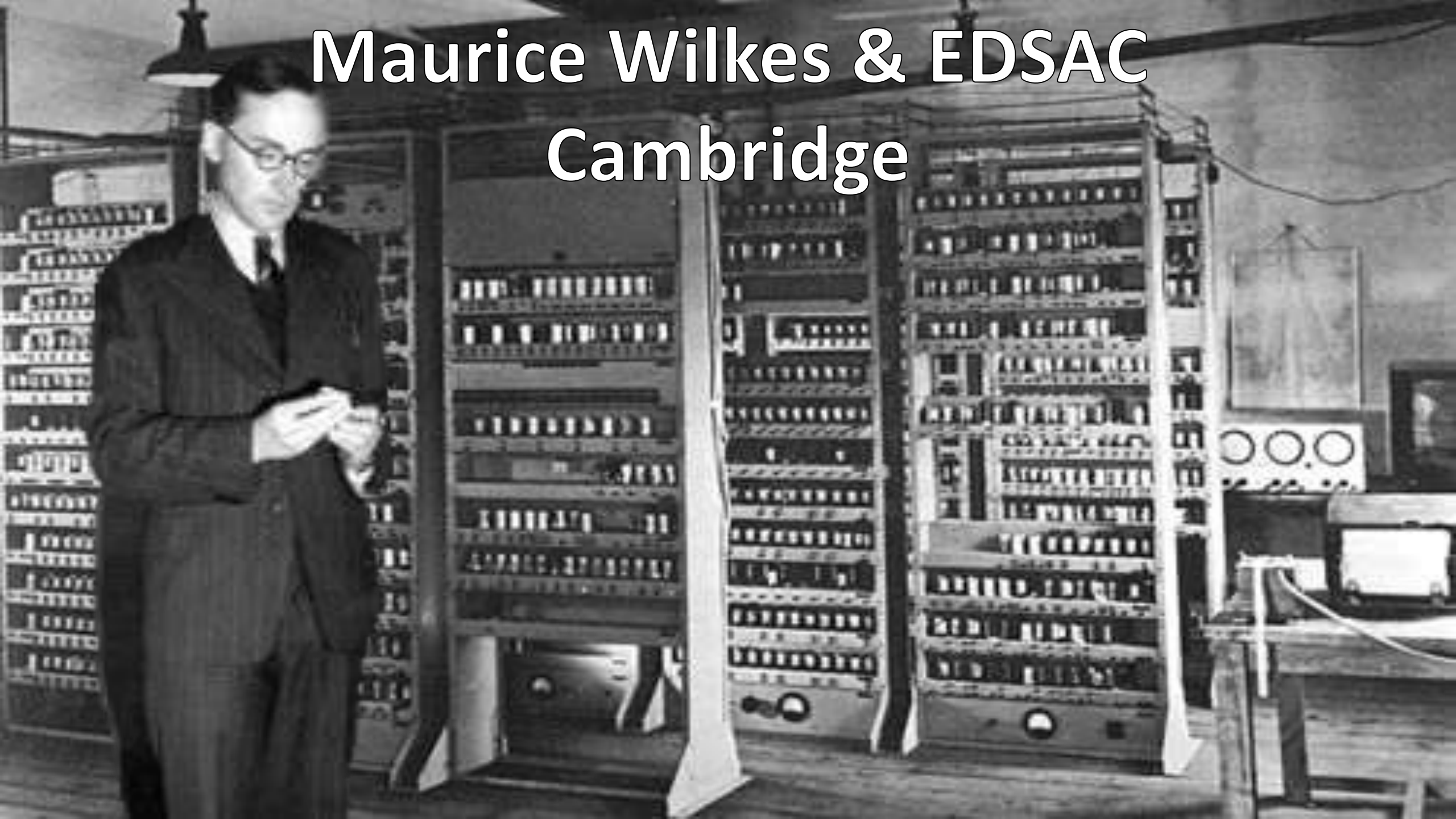


Douglass Hartree
Mathematician



Charles Darwin
NPL Director

Maurice Wilkes & EDSAC Cambridge





Manchester Small Scale
Experimental Machine
(“The Baby”)

Tom Kilburn

Frederic Williams



Ada Lovelace

'a computer can only do what we tell it to do'

New N.P.L. Wonder

ELECTRIC BRAIN TO BE MADE AT TEDDINGTON

34 YEARS-OLD DESIGNER TALKS
TO SURREY COMET

£100,000 A.C.E. WILL BE OBSOLETE
BEFORE COMPLETED

SOME of the feats that will be able to be performed by Britain's new electronic brain, which is being developed at the N.P.L., Teddington, were described to the SURREY COMET yesterday by Dr. A. M. Turing, 34 years-old mathematics expert, who is pioneer of the scheme in this country.

The machine is to be an improvement on the American ENIAC, and it was in the hands of Dr. Turing that the more efficient model was developed.

Surrey Comet, 9 November 1946

22nd October 1948



ACTUALITÉS SCIENTIFIQUES ET INDUSTRIELLES

1053



CYBERNETICS

OR

CONTROL AND COMMUNICATION
IN THE ANIMAL AND THE MACHINE

BY

NORBERT WIENER

Professor of Mathematics at the Massachusetts Institute
of Technology
Guest Investigator at the Instituto Nacional de Cardiología
de México.



PARIS

HERMANN & C^{ie}, ÉDITEURS

6, Rue de la Sorbonne, 6

TECHNOLOGY PRESS

Cambridge, Mass.

JOHN WILEY & Sons. Inc.

440 Fourth Av., New York

1948



"The Physical Basis of Mind", Third Programme, 14 May – 1 June, 1949

Radio Times (Broadcasting Week) Radio Times 14 May 1949
Vol. 102, No. 1234. Registered at the G.P.O. as a Newspaper

TELEVISION EDITION

RADIO TIMES

JOURNAL OF THE BBC

PRICE TWOPENCE

PROGRAMMES FOR
MAY 8-14



WHEN 'IGNORANCE

Pandemonium reigns at head of the Brainstorming Trust on Thursday. Sherrington thinks it's safer under the table while on, engaged in the unpermitted audience use, of course, of

A RECORD which is certain to have a permanent place in the BBC's archives will be broadcast in the Third Programme on Wednesday. It presents for posterity the voice of the greatest living physiologist, Sir Charles Sherrington, O.M., F.R.S., Nobel Prize-winner in 1932, who is giving his first BBC talk at the age of ninety-two. The talk was recorded at his home last December and forms an introduction to a series entitled *The Physical Basis of Mind* in which scientists and philosophers of world-wide renown will examine the dimensions that have been made about the workings of the human mind and assess their significance. The BBC attaches so much importance to the occasion that it has taken the unusual step of publishing Sir Charles's script in advance. The full text appears in *The Listener* of May 5.

There will be two other speakers in Wednesday's half-hour programme: Sir Henry Dale, who will introduce Sir Charles, and Professor E. D. Adrian, who will open the series with a talk on 'What Happens When We Think' (See article on page 4.) On Tuesday evening Home Service listeners can hear a dramatized version of Santa Poin's programme *The Silent Dream*, which deals with the frontal lobes of the brain—one of man's most characteristic physical features—and presents some of the evidence which points to a connection between them and qualities of personality.

WELCOMED back in the Third Programme on Wednesday evening will be one from Western Germany, a London suburb, Devon, Lancashire, and probably Nottinghamshire. Most listeners know the formula for *Listeners Answer Back*. Half a minute is allowed to any member of the audience for comment or criticism of BBC programmes. Neither the BBC nor the members of the platform party are aware of the questions in advance.

The broadcast of bird song from a wood in Kent on Sunday evening (Home Services) will give Percy Edwards, the bird man, an opportunity to demonstrate his skill. Edwards can reproduce more than a hundred and fifty bird calls and he claims that he can do any type of bird with its own voice. Henry Douglas Home (the 'Bird Man' of the Scottish Children's Hour) will ask him to imitate certain birds which are known to frequent the wood, and it is hoped that the real birds will be deceived into answering.

Window on
WESTERN GERMANY

A radio documentary on Sunday evening in the Home Service

SIR CHARLES SHERRINGTON
The distinguished physiologist opens the series

THE WORLD'S MOST EMINENT AUTHORITIES TO TALK ON THE

Mysteries of the Human Brain

Sir Charles Sherrington—the greatest physiologist alive today—gives the first talk on Wednesday evening at 8.5 in the Third Programme



STEPHEN WILLIAMS writes an OPEN LETTER

to a Man who Dislikes Opera

Stephen Williams transfers from radio drama to music for this week to introduce the popular operatic series he is presenting on Friday evenings in the Light Programme under the title of 'Come to the Opera,' also the title of his recently published book

My Dear Brown,

I will make no bones about the matter. Ever since that unforgettable night when you, an otherwise sane, sensible and (alone) rather human being, told me that you liked opera but couldn't stick it, I have been out to convert you; and at last I see a sporting chance of being able to do so. Will you accept my challenge? Will you 'Come to the Opera' for an hour on Friday evenings? Or rather will you allow us to bring the opera to you?

Let me examine first your objections to opera.

In extenuation. Can you point to a single irrelevancy, a single absurdity? 'Caro Nome?' But does not that express perfectly the thoughts of a young girl after parting from her lover? The conspirators' chorus? It breathes the very essence of snail. And if you say that men would not sing when engaged on a secret abduction I refer you back to (2).

The original play of *Tosca* is by Victorien Sardou, not a great dramatist but one of the cleverest penmen in the 'well-made play'—and that is what you say you want. Moreover, Verdi and

THE WORLD'S MOST EMINENT AUTHORITIES
TO TALK ON THE

Mysteries of the Human Brain

Sir Charles Sherrington—the greatest physiologist alive today—gives the first talk on Wednesday evening at 8.5 in the Third Programme

SIR CHARLES SHERRINGTON's subject, and the title of the series, will be *The Physical Basis of Mind*—that is, the study of mental activity as a physiological process. Ten or eleven authorities will take part in eight programmes in the period over three weeks. The list of speakers runs like this: Professor E. D. Adrian of Cambridge, Professor Le Glyn Clark of Oxford, a clinical neurologist and a psychiatrist, both of whom are in practice, and a neurosurgeon, Professor Wilfrid Penfield of Montreal. The series ends with a symposium of philosophers, including Lord Nisbet and Professor A. J. Ayer, who will assess the significance of what has been said for the study of man and his place in nature.

All this seems usual enough, indeed the conventional Third Programme practice; an important subject dealt with by expert speakers as thoroughly as the limitations of radio will permit. But it is not really at all ordinary; in many ways this series of talks is unprecedented in the history of the Third Programme. It has, in fact, a

Take Wednesday's broadcast. It has, in fact, a hour and has three speakers, Sir Henry Dale, Sir Charles Sherrington, and Professor Adrian. Each of these speakers is a member of the Order of Merit; a decoration which they share with only seventeen other people, among them Mr. Churchill. Each of these speakers is also a Nobel Prize-winner, and two of them past Presidents of the Royal Society.

The mere fact that Sir Charles Sherrington is going to talk at all is itself an extraordinary event. It is not only that Sir Henry Dale's short pedigree to the programme is devoted to introducing him to his audience. He describes Sherrington quite simply as 'the greatest physiologist alive today,' and lingers for a moment or two on his extraordinary career and achievements.

Sherrington's script has been used as a brief for other speakers. Professor Adrian, for example, dwells on the incredible complication of a physical system which consists in the interconnection of ten thousand million separate brain cells—nearly five times the number of the population of the world—inside the skull of every human being. But Professor Le Glyn Clark goes on to show that mental excellence or great ability is not simply a matter of the size of a man's brain, or the number and complication of the relationships between his brain cells; for the brain of a genius is no larger or more complex than the brain of an idiot, and the brain of early man 200,000 years ago was as large as our brains are today.

'The Soul's Frail Dwelling House'

Wilfrid Penfield studied under Sherrington, and he is talking about the discoveries he has made while actually operating on the human brain. His experiments have made possible for him to address us, as to the actual location of the seat of consciousness, the tissue which themselves compose what philosophers call 'the soul's frail dwelling house.' This brings us to the question which will be considered by the philosophers. They are questions which, for listeners, must remain baffling, even awe-inspiring.

Ponder for a moment on this problem, for instance. Where in your head is the name which you know you can remember but which just won't come back to you for the moment? Can you conceive of anything physical which actually contains the name? Again, how do those nerve cells beneath the temple, which were touched by Penfield's electrode, contain the memory of your patient's mother's house, a vision which came into his consciousness when those cells were touched with?

Trying to answer these questions seems to have made of the scientific method in these matters a very dry and least dramatic of men. An impressive proportion of them, and not simply those who happen to be speaking in this series, are working in the British Isles. This makes the study of the physical basis of mind a particularly important one in this field has taken place in Britain. Nevertheless, this final judgment of Sherrington's on the work which has been and is being done here and elsewhere is neither complacent nor optimistic. 'Aristotle, two thousand years ago, was asking how is the mind attached to the body: we are asking that question still.'

quite a considerable mass of letters. It is one of the best constructed and most dramatic opera plots

Nash, Owen Brownrigg, and Frederick Sharpe. Other principals include Victoria Maude, Ruth Tucker, James Johnston, Walter Widdow, and Webster Booth.



RENA BERGER MURRAY DICKIE ANNA POLLAN, FREDERICK JONES
Some of the stars of the Opera you can hear on Friday in the Light Programme

In hopes of your speedy conversion.
STEPHEN WILLIAMS

Victoria University, Manchester



Geoffrey Jefferson
Professor of Neurosurgery

"The Mind of Mechanical Man"

June 9, 1949



THE MIND OF MECHANICAL MAN

BY

GEOFFREY JEFFERSON,
C.B.E., F.R.S., M.S., F.R.C.S.

Professor of Neurosurgery, University of Manchester

*The Lister Oration delivered at the Royal College of Surgeons
of England on June 9, 1949*

*Reprinted from the BRITISH MEDICAL JOURNAL
June 25, 1949, vol. 4, p. 1105*

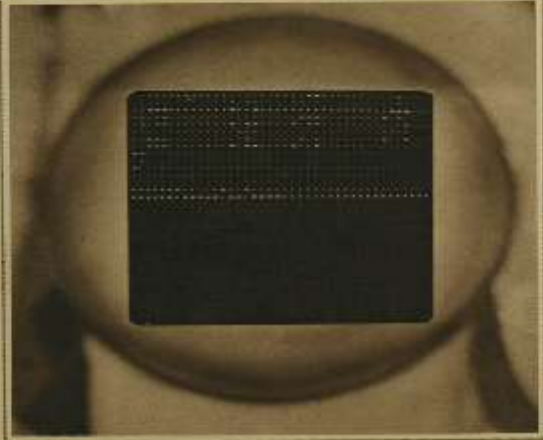
Published by the British Medical Association, B.M.A. House,
Tavistock Square, London, W.C.1

THE ILLUSTRATED
LONDON NEWS.

SATURDAY, JUNE 25, 1949



A CALCULATING MACHINE WITH A "MEMORY": THE CONTROL PANEL, AND A STORAGE TUBE IN USE

[illegible]

1949-50. THE CONTROL PANEL OF THE AUTOMATIC SEVEN-CHANNEL ROLLER CALCULATING MACHINE AT MANCHESTER UNIVERSITY. SHOWING THE MONTHLY CATHODE-RAY TUBE WITH DR. T. H. WILLIAMS ON LEFT, AND PROFESSOR D. C. WILLIAMS, DIRECTOR OF THE MANCHESTER STORAGE SYSTEM RESEARCH, ON RIGHT, FINDING A PROBLEM IN THE MACHINE. (LEFT) ONE OF THE CATHODE-RAY STORAGE TUBES, SHOWING THE PICTURE OF LATEST INFORMATION AT MANCHESTER. BOTTOM IS SECOND COLUMN.

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A MARVEL OF OUR TIME: THE "MEMORY" MACHINE WHICH CAN SOLVE THE MOST COMPLEX MATHEMATICAL PROBLEMS





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NOT TO BE RELEASED

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DISCUSSION

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EXERCISES

1. Suppose $f(x) = 3x^2 + 2x - 1$. Find $f'(x)$ and $f''(x)$.
2. Suppose $f(x) = 5x^3 - 2x^2 + 7x - 4$. Find $f'(x)$ and $f''(x)$.
3. Suppose $f(x) = \frac{1}{x}$. Find $f'(x)$ and $f''(x)$.
4. Suppose $f(x) = \sqrt{x}$. Find $f'(x)$ and $f''(x)$.
5. Suppose $f(x) = \ln x$. Find $f'(x)$ and $f''(x)$.
6. Suppose $f(x) = e^x$. Find $f'(x)$ and $f''(x)$.
7. Suppose $f(x) = \sin x$. Find $f'(x)$ and $f''(x)$.
8. Suppose $f(x) = \cos x$. Find $f'(x)$ and $f''(x)$.
9. Suppose $f(x) = \tan x$. Find $f'(x)$ and $f''(x)$.
10. Suppose $f(x) = \sec x$. Find $f'(x)$ and $f''(x)$.
11. Suppose $f(x) = \csc x$. Find $f'(x)$ and $f''(x)$.
12. Suppose $f(x) = \cot x$. Find $f'(x)$ and $f''(x)$.

the average number of calls taken from the system. When a request is made, the server must first check the queue to see if there is a free server. If there is, the request is served immediately. If there is no free server, the request is placed in the queue. The server will then serve the request as soon as it becomes available. The average number of calls taken from the system is the sum of the average number of calls taken from the queue and the average number of calls taken from the server. The average number of calls taken from the queue is the product of the average number of calls taken from the queue and the average number of calls taken from the server. The average number of calls taken from the server is the product of the average number of calls taken from the server and the average number of calls taken from the queue. The average number of calls taken from the system is the sum of the average number of calls taken from the queue and the average number of calls taken from the server.

[illegible]

Listener, 22 September 1949

Third Programme, 14 September 1949

SEPTEMBER 22 1949

THE LISTENER

479

The Mind of Mechanical Man*

By GEOFFREY JEFFERSON

THERE is no better example of man's characteristic desire for knowledge beyond, and far beyond, the limits of the authentic scientific discoveries of his own day than his wish to understand in complete detail the relationship between brain and mind—the brain so finite, the mind so amorphous and elusive. It is a subject which at present awakes a renewed interest, because we are invaded by the physicists and mathematicians—an invasion by no means unwelcome, for it brings new suggestions for analogy and comparison. Are we perhaps being gently pushed to accept more than a great likeness between the actions of electronic machines and those of the nervous system? Are there so many resemblances between the sort of things that calculating machines can do and some of the sort of things that minds can do that the construction of the one explains

confessed to me once that he had escaped from the certainty and dogma of the ecclesiastics only in the end to find that the scientists, from whom he had expected an elastic and liberal outlook, were the same people in different clothes. I am encouraged, therefore, to proceed in the hope that, although we shall not arrive at certainty, we may discover some illumination of the way.

Before we glance at the new vistas of mechanisation opening before us, let us spare a few moments to look at the past, where we shall find that the possibility of building automata has been one of man's dreams since the days of the Trojan horse—an expression more metaphorical than strictly accurate. In the seventeenth century, that era of scientific awakening, there was the greatest interest in possible replicas of animals and men. Florent Schuyt, in 1664, gives several instances, such as the

Third Programme

514.6 m. (583 kc/s) 203.5 m. (1,474 kc/s)

6.0 p.m. LISZT—RUSONI

Fantasia and Fugue
on the chorale
Ad nos, ad salutarem undam
played by
Louis Kentner (piano)

8.35 THE CLASSIC SEA

Alan Rose discusses the effect of
the Mediterranean's classic
humanism on contemporary
English writing

followed by an interlude at 8.55

7.0 Esme Percy, Robert Harris and Louise Hampton in 'THE DOUBLE CHERRY'

A new play
about contemporary Japan
by John Morris and Sewell Stokes

Cast in order of speaking:
A farm worker.....Eric Lugg
Taro Togo, son of General Togo.....Robert Harris
Togo's uncle.....Oliver Burt
Mrs. Haruko Togo, wife of General
Togo.....Louise Hampton
Yuki, General Togo's mistress
Marjorie Westbury

(Continued in next column)

General Shintz Togo, a retired officer
of the Imperial Japanese Army
Kendal Percy

Mary, Taro's English wife.....Pauline Wynn
Sato, a family retainer in General
Togo's household.....Harold Scott
The action takes place after the war,
in Hokkaido (the northern island of
Japan) and in Tokyo
Produced by Malcolm Baker Smith
(The recorded broadcast of August 22)

8.30 KODALY

Missa Brevis
sung by the BBC Chorus
with George Thalben-Ball (organ)
Conducted by the composer
(Recording of broadcast on Sept. 1,
1948)

followed by an interlude at 9.10

9.15 THE MIND OF MECHANICAL MAN

Professor Geoffrey Jefferson
gives a broadcast version of the
Lister Oration delivered on
June 9 at the Royal College of
Surgeons. (BBC recording)
Professor Jefferson explains the nature of
the so-called 'mechanical brains' and

investigates the similarities between these
electronic calculating machines and the
human brain. He warns against the
fallacy of regarding these similarities
as proof of the electrical nature of
nervous impulses, and explains why the
human brain and its activity must be
considered unique in Nature. Professor Jefferson
is head of the Department of Neuro-Surgery
at Manchester University.

10.10 CHAMBER MUSIC

Margaret Bissett (contralto)
Josephine Lee (accompanist)
Amadeus String Quartet:
Norbert Brainin (violin)
Siegmund Nimmo (violin)
Peter Schidlof (viola)
Martin Lovett (cello)
Kenneth Essex (viola)

'String Quartet in E flat, Op. 33 No. 2
Hopkin
Songs.....Schubert

An mein Clavier
Die Spinnerin
Nacht und Träume
Liedhaber in allen Gestalten
An die Entfernte
Erntedank
String Quintet in C (K.515).....Mozart

11.20 DOSTOEVSKY

Talk by
Philip Toynbee
A reprint of André Glide's book has
appeared recently, and the collected
works of Dostoevsky are being re-
issued
(Recording of broadcast on June 14)

B.B.C.

11.40 MALCOLM ARNOLD

Three new songs, which he has written
(Suite)
(viola)
(cello)
on Nov. 12)

11.55 Close Down

NEXT WEEK

In the Third Programme
'IN GOOD KING CHARLES'S
GOLDEN DAYS': Play by Bernard
Shaw (Sunday and Friday)

'WERTHER': Massenet's opera, on
gramophone records (Monday)

'CANDIDE': Another broadcast of
Douglas Cleverdon's adaptation of
Voltaire's book (Tuesday); Talk by
V. S. Pritchett (Monday)

'OLYMPIAN MORNING': A chapter
from Thomas Mann's 'Lotte in
Weimar', adapted by Walter Hilke
(Wednesday and Thursday)

EUGENE GOOSSENS conducts the
BBC Symphony Orchestra (Thursday)

'SOCRATE': Another performance of
Erik Satie's Symphonie Dramatique, by
Megan Foster, Sophie Wynn, and the
London Symphony Orchestra, con-
ducted by Constant Lambert (Friday)

Radio Times (Interpreting 'World Radio') September 9, 1949
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TELEVISION EDITION

RADIO TIMES

JOURNAL OF THE BBC

PROGRAMMES FOR
SEPTEMBER 11-17

PRICE TWOPENCE



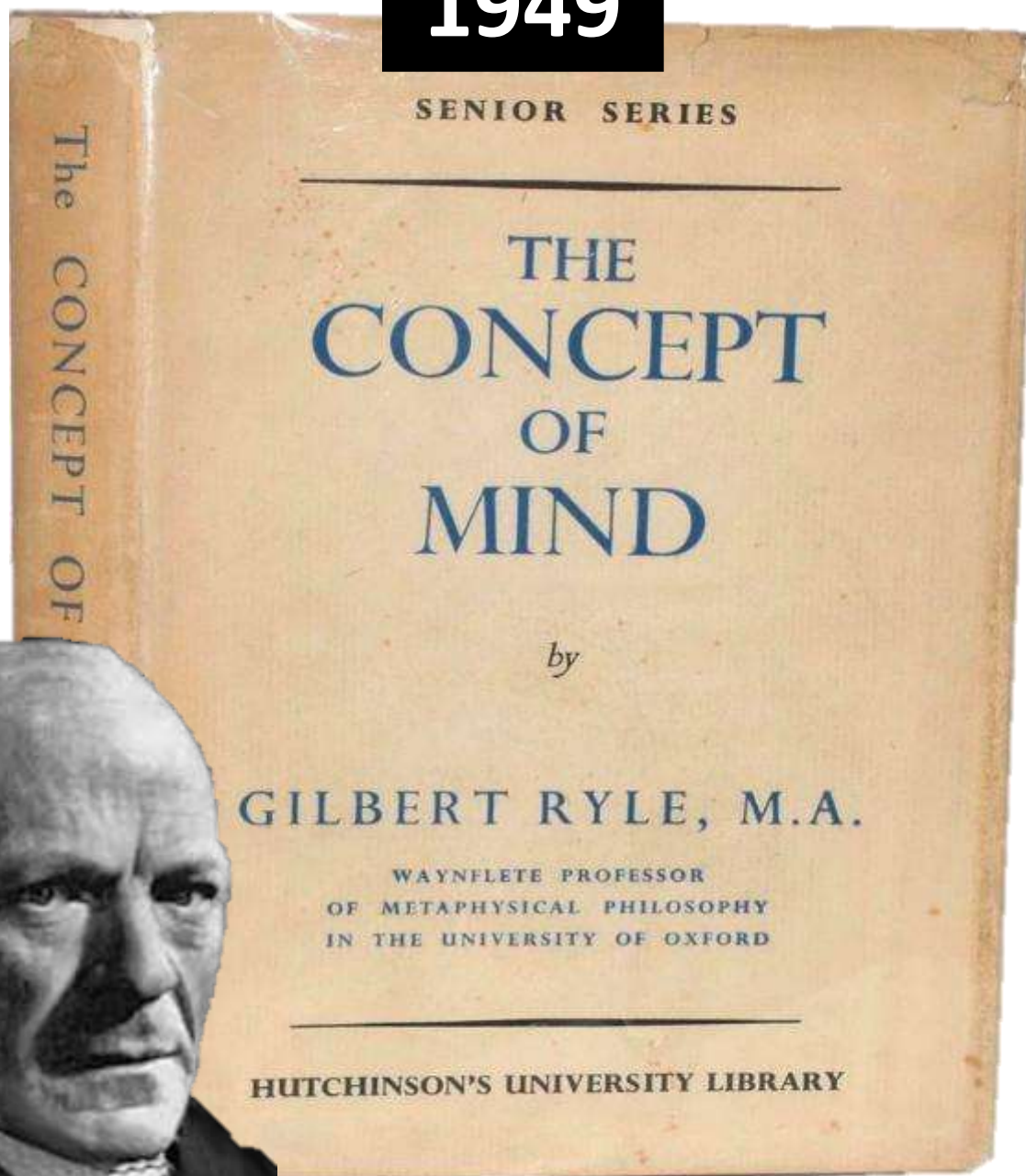
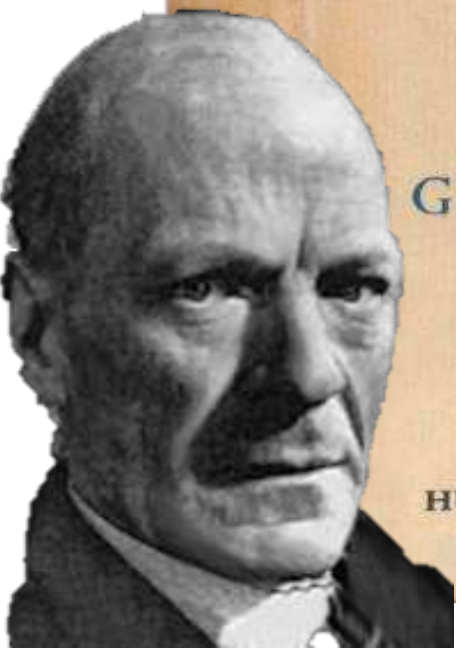
BATTLE FOR BRITAIN

The story of Hitler's plan for invasion
and its defeat by the R.A.F. and the
people of Britain
(Sunday's Home Service)

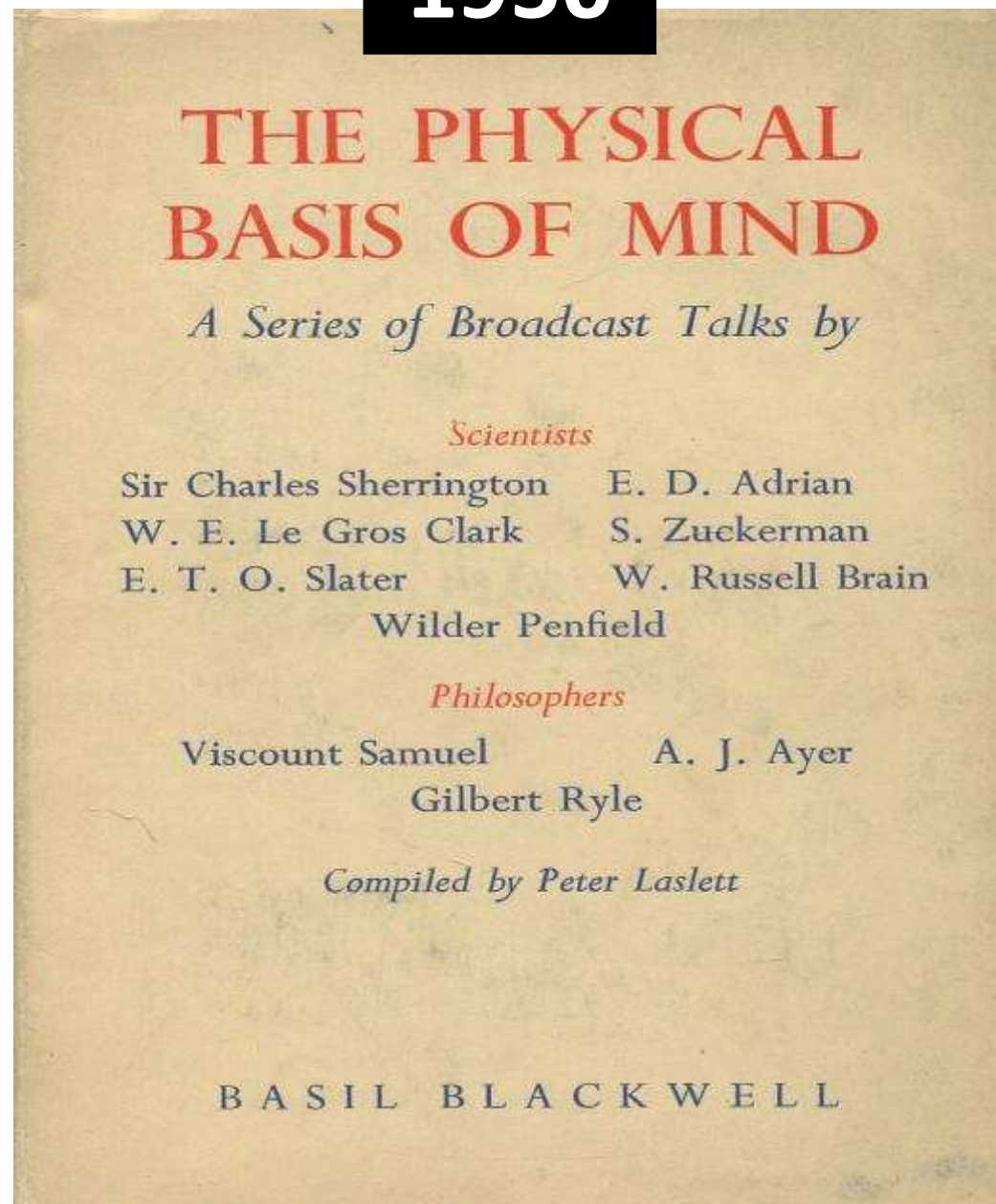
R.A.F. REUNION

"Professor Jefferson explains the nature of the so-called mechanical brains ' and investigates the similarities between these electronic calculating machines and the human brain. He warns against the fallacy of regarding these similarities as proof of the electrical nature of nervous impulses, and explains why the human brain and its activity must be considered unique in Nature. Professor Jefferson is head of the Department of Neuro-Surgery at Manchester University."

1949



1950



by

A. M. TURING.

1. The Imitation Game.

I propose to consider the question, 'Can machines think?' This should begin with definitions of the meaning of the terms 'machine' and 'think'. The definitions should be framed so as to reflect so far as possible

use of the words, but this attitude is

If the meaning of the words 'machine' and

to be found by examining how they are

ed it is difficult to escape the conclusion

ning and the answer to the question, 'Can

nk?' is to be sought in a statistical

as a Gallup poll. But this is absurd.

tempting such a definition I shall replace

by another, which is closely related to it

and is expressed in relatively unambiguous words.

1950

MSS. and other Communications for the Editor should be addressed to
Prof. G. RYLE, Magdalen College, Oxford.

VOL. LIX. No. 236.

OCTOBER, 1950

MIND

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY

EDITED BY

PROF. GILBERT RYLE

WITH THE CO-OPERATION OF PROF. SIR F. C. BARTLETT AND PROF. C. D. BROAD

CONTENTS.

	PAGE
I.—Computing Machinery and Intelligence: A. M. TURING	433
II.—Subject and Predicate: P. T. GEACH	461
III.—Frege's <i>Sinn und Bedeutung</i> : P. D. WIENPAHL	483
IV.—The Theory of Sovereignty Restated: W. J. REES	495
V.—A Note on Verification: F. C. COPLESTON	522
Notes	
VI.—Discussions:—	
Ostensive Definition and Empirical Certainty: A. PAP	
Pragmatic Paradoxes: P. ALEXANDER	
The Causal Theory of Perception: J. WATLING	
"Fallacies in Moral Philosophy." A Reply to Baier: S. HAMPSHIRE	
The Existence of God: T. MCPHERSON	
Berkeley's <i>Philosophical Commentaries</i> : A. A. L.	
A Note on Aristotle. Categories 6a 15: M. W. NOCK	
VII.—Critical Notice:—	
<i>Moral Obligation</i> : Essays and Lectures by H. Prichard: C. D. BROAD	
VIII.—New Books	

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Printed in Great Britain



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Notes	529
VI.—Discussions:—	
Ostensive Definition and Empirical Certainty:	
A. PAP	530
Pragmatic Paradoxes: P. ALEXANDER	536
The Causal Theory of Perception: J. WATLING	539
"Fallacies in Moral Philosophy." A Reply to Mr. Baier: S. HAMPSHIRE	541
The Existence of God: T. MCPHERSON	545
Berkeley's <i>Philosophical Commentaries</i> : A. A. LUCE	551
A Note on Aristotle. Categories 6a 15: M. WARNOCK	552
VII.—Critical Notice:—	
<i>Moral Obligation</i> : Essays and Lectures by H. A. Prichard: C. D. BROAD	555
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1951: *Automatic Calculating Machines*, Third Prog.

“A Series of talks on the history and theory of thinking mechanisms”.

- D. R. Hartree, “Automatic Calculating Machines”, 5 May
- M. H. A. Newman, “Automatic Calculating Machines”, 8 May
- A. M. Turing, “Can Computers Think?”, May 15th
- F. C. Williams, “Automatic Calculating Machines”, 2 June
- M. V. Wilkes, “The Use of Automatic Calculating Machines for Scientific Calculation”, 5 June

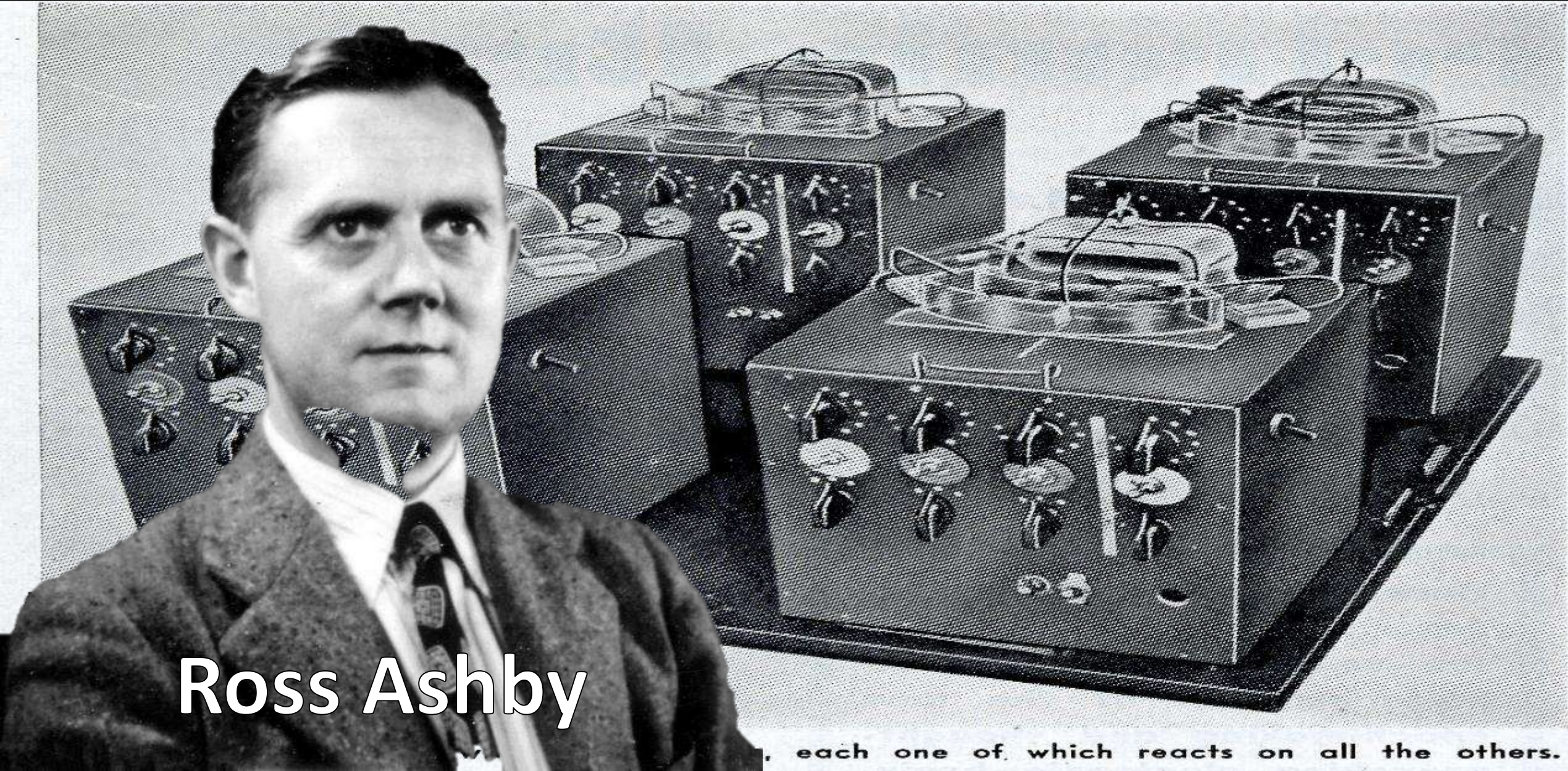
1951: *Intelligent Machinery, A Heretical Theory*, BBC Home Svc. North

- A. M. Turing

1952: *Can Automatic Calculating Machines be Said to Think?*, Third Prog., 14 Jan.

- M. H. A. Newman
- A. M. Turing
- Sir Geoffrey Jefferson
- R. B. Braithwaite

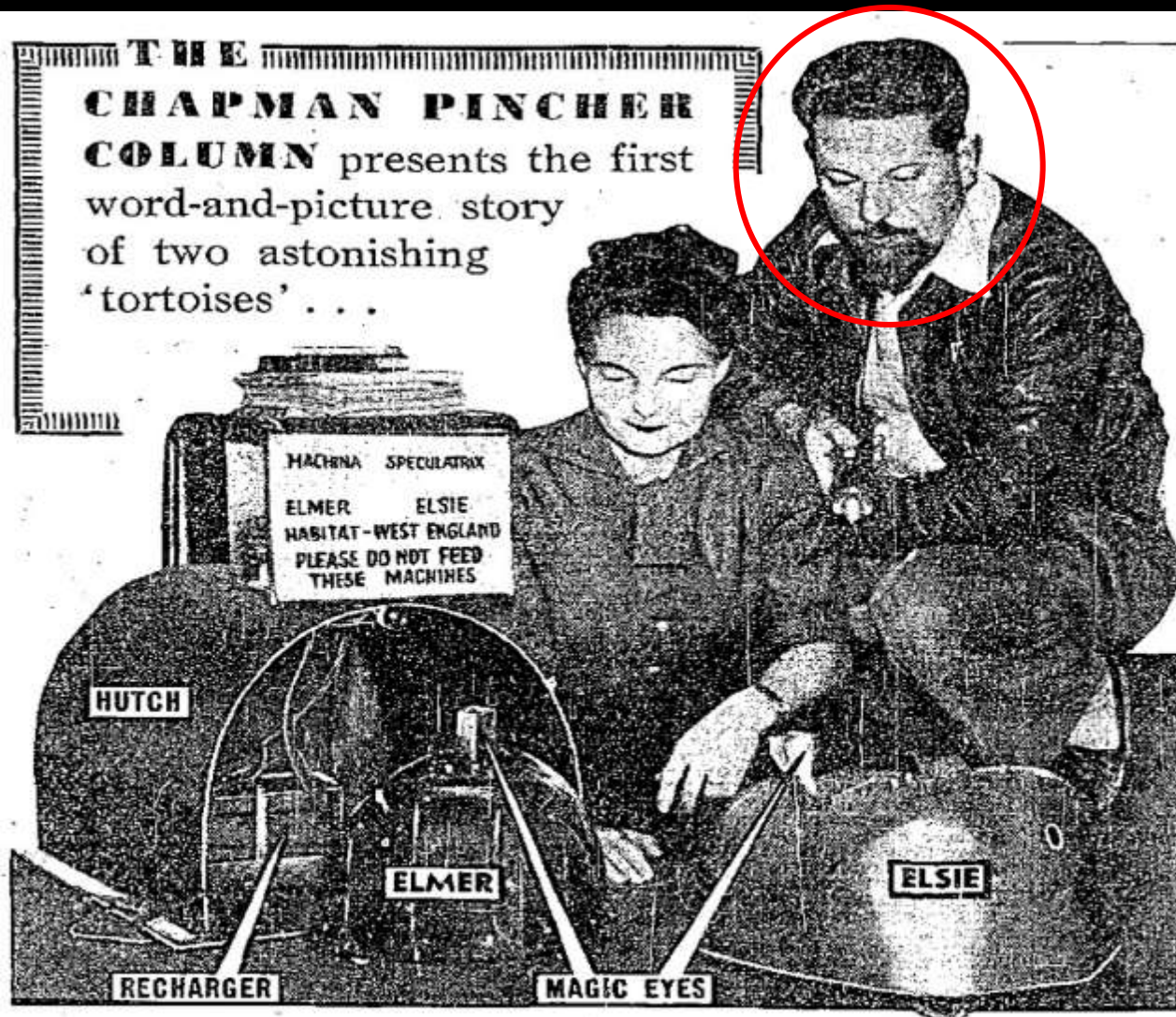
Homeostat, 1948



Ross Ashby

, each one of which reacts on all the others.

Elmer & Elsie, Robot Tortoises, 1949

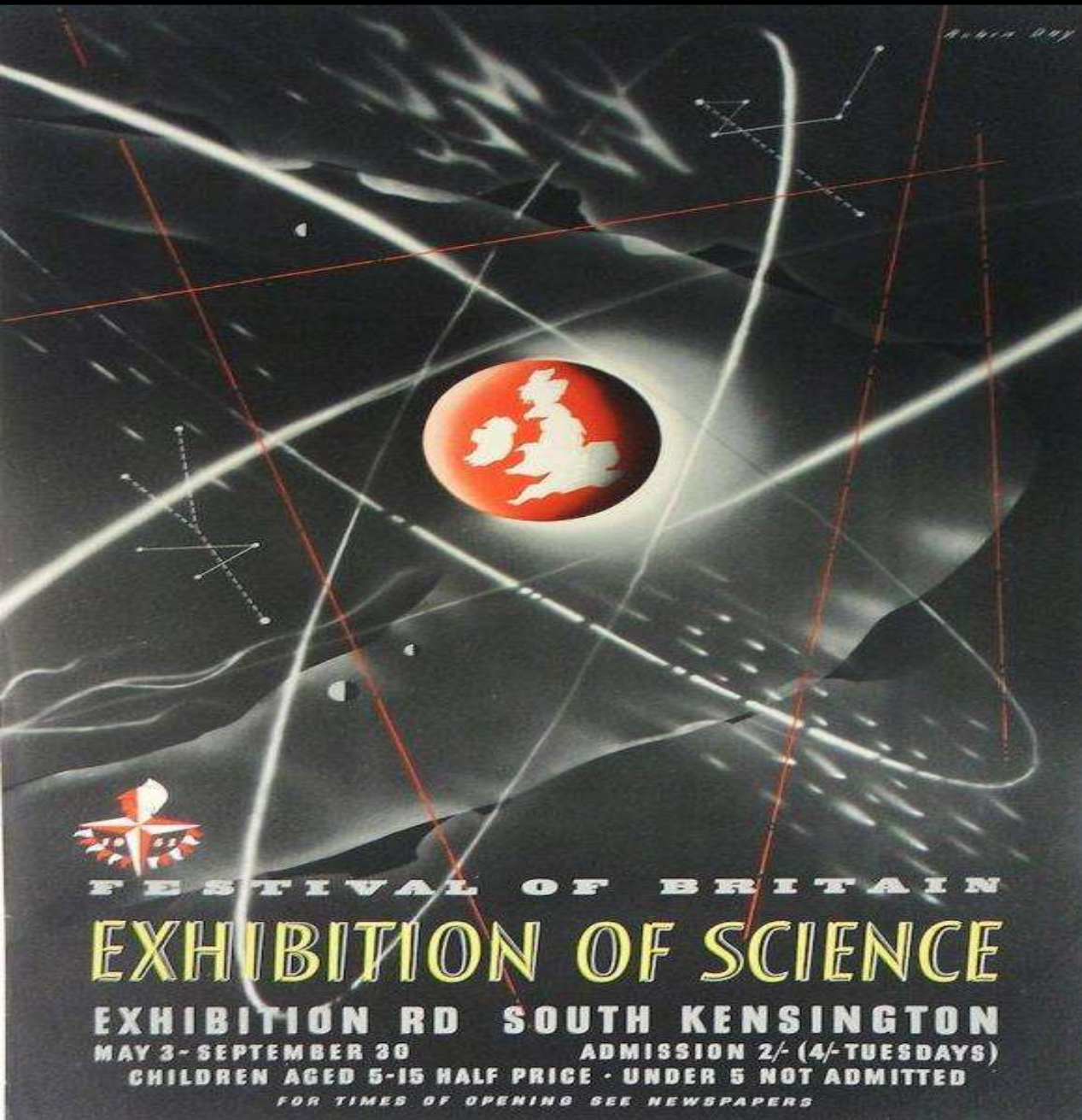


Elmer and Elsie—they see, feel, move and even feed

Express, 13 December 1949, p. 3



Festival of Britain, 1951



FESTIVAL OF BRITAIN EXHIBITION OF SCIENCE

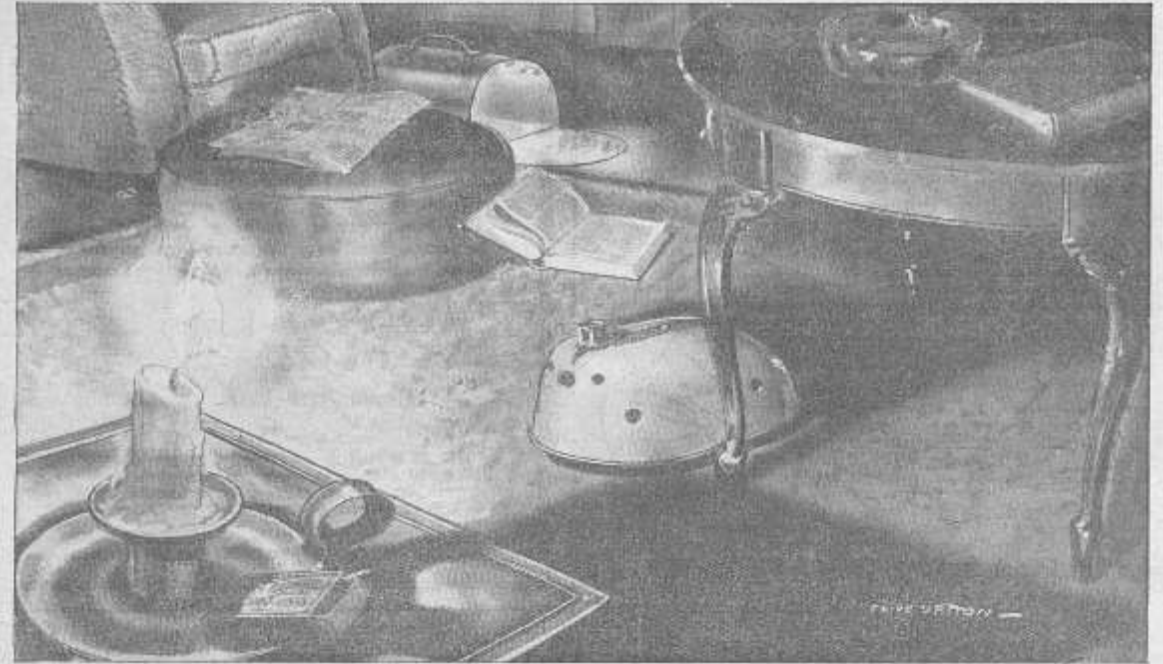
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WANTED: two 6 volt batteries to power a pair of electronic tortoises. Queerest, perhaps, of all the demands that the Chloride Company has met in more than 50 years of pioneering new uses for the electric storage battery. But not, as it proved, a difficult problem. Elinor and Elsie, brain children of Cybernetics research worker Dr. W. Grey Walter, asked nothing of us but a reliable battery apiece. We fitted each with an Exide.

You will meet the robot tortoises at the Festival Exhibition of Science in the South Kensington Science Museum. You'll see how Elsie leaves her hutch to investigate any extraneous source of light. How she gently, persistently butts her way past every obstacle that intervenes. How, when her output of energy leaves her feeling a little run-down, she returns of her own accord to her hutch, latches up to her trickle charger and can't

be coaxed out again until she has fully recuperated. Sensible Elsie! An Exide type, we like to think. A really reliable little tortoise.

On the South Bank Site Chloride, Exide & Exide-Ironclad batteries have been chosen to power the emergency lighting & crowd counting systems and to provide the subject of many exhibits.

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BATTERIES LIMITED

Makers of Exide Batteries

EXIDE WORKS · CLIFTON JUNCTION · NR. MANCHESTER



Albert Uttley

...er channel or channels. If it is, the computer makes
...ference of activity in the other channels.
...e 31 units are essentially counters; five of them count
...ne occurrences of activity in the respective input channels,
...while another ten count the occurrences of simultaneous
...activity in the ten possible pairs of input channels, and so
...for groups of 3, 4 and 5 channels. The counts are repre-
...ed in the units by amounts of charge on capacitors.
...necessary condition for an inference is that the condi-
...probability of activity in a channel which is not
...activated exceeds a certain threshold. The relevant
...probabilities are all computed as ratios of the
...on pairs of units of the computer.

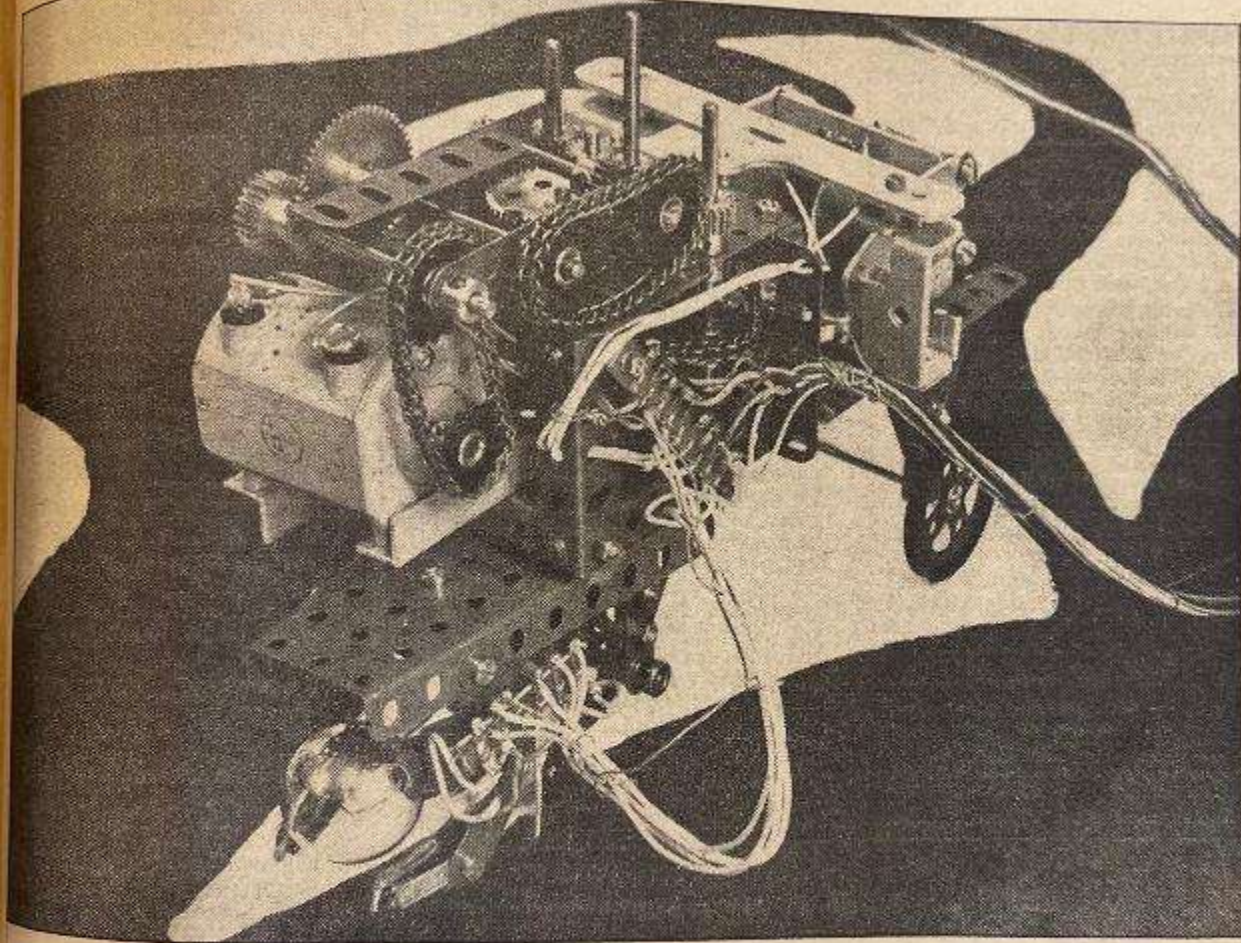


FIGURE 3. A Meccano trolley used to demonstrate control by a learning machine. The trolley follows the boundary between a black area and a white area, irrespective of whether black is on its left and white on its right (as shown) or vice versa. At the front of the trolley are a lamp and two phototransistors: when one transistor is over white and one over black the trolley runs ahead, but if both are over black, or both over white, it stops and hunts from side to side until the phototransistors are again straddling the boundary. The trolley is connected to the conditional probability computer through four of the input channels, which are labelled for this purpose left, right, black and white. The

trolley signals to the computer which direction of searching it has found to be successful after finding both phototransistors on black, or both on white, and the computer learns how to associate left and right with black and white. Thereafter, when the trolley goes on to the white or the black area, the computer makes an inference which indicates to the trolley which way it should turn to regain the boundary. If the trolley is then turned round so that it traverses the boundary in the opposite direction, the inferences made by the computer are all wrong for a time, but it eventually re-learns.

FIGURES 2 and 3 are reproduced by kind permission of the Director of the National Physical Laboratory.

A. M. Uttley, "Imitation of Pattern Recognition and Trial-and-Error Learning in a Conditional Probability Computer", *Reviews of Modern Physics*, Vol. 31, Iss. 2, April 1959, pp. 546-48

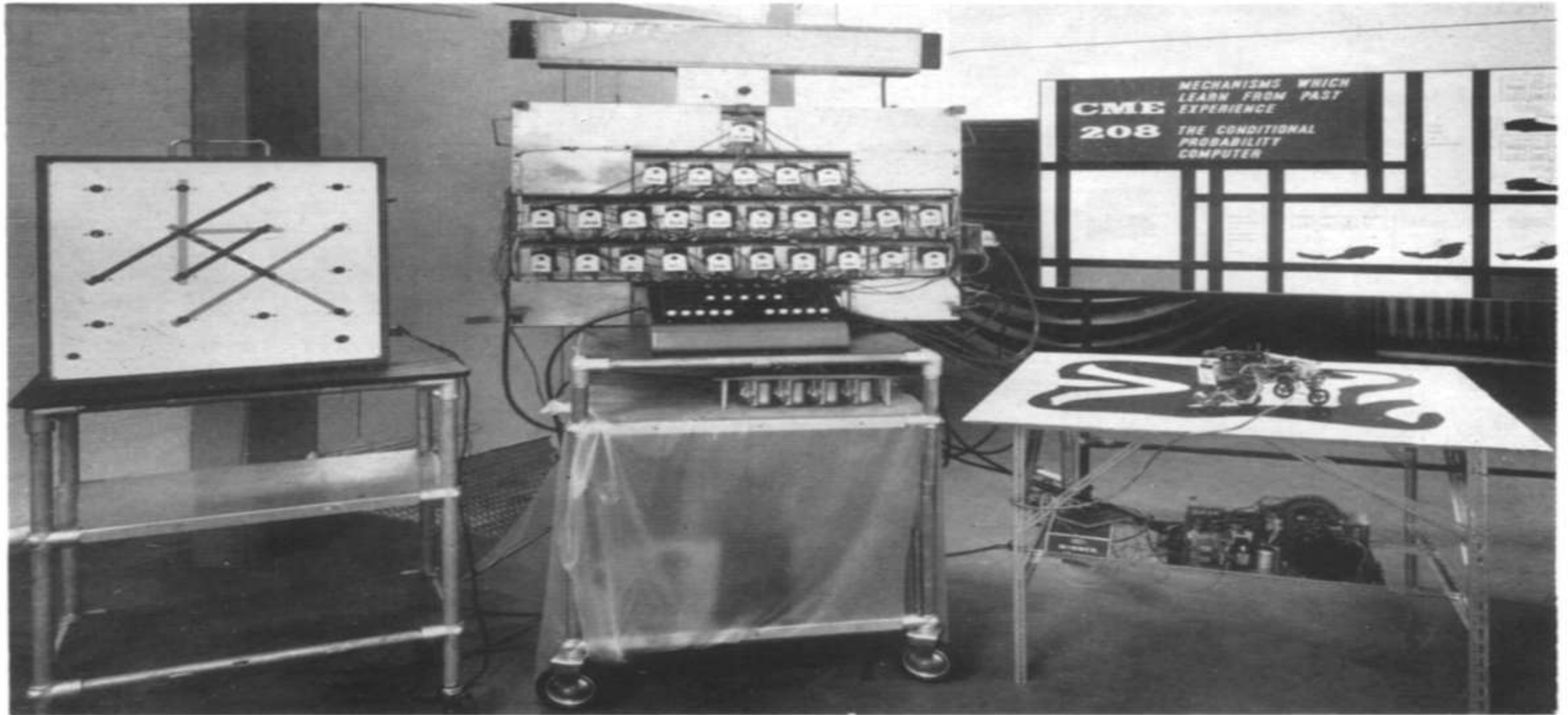


FIG. 3. A conditional probability computer, built at the National Physical Laboratory, capable of pattern recognition and trial-and-error learning. On the left is a model "retina" of photo cells to receive T-shaped shadow patterns. On the right is an electrically driven "vehicle" that learns, with the help of its computer "brain" which is shown in the center of the picture, to move efficiently along the black-white border of its "highway."

FRANK ROSENBLATT'S PERCEPTRON 1958



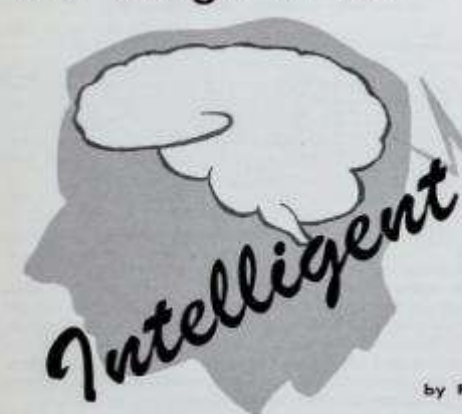
Vol. VI, No. 2, Summer 1958

research trends

CORNELL AERONAUTICAL LABORATORY, INC., BUFFALO 21, NEW YORK



The Design of an



AUTOMATON

by FRANK ROSENBLATT

Introducing the perceptron — A machine which senses, recognizes, remembers, and responds like the human mind.



STORIES about the creation of machines having human qualities have long been a fascinating province in the realm of science fiction. Yet we are now about to witness the birth of such a machine — a machine capable of perceiving, recognizing, and identifying its surroundings without any human training or control.

Development of that machine has stemmed from a search for an understanding of the physical mechanisms which underlie human experience and intelligence. The question of the nature of these processes is at least as ancient as any other question in western science and philosophy, and, indeed, ranks as one of the greatest scientific challenges of our time.

Our understanding of this problem has gone perhaps as far as had the development of physics before Newton. We have some excellent descriptions of the phenomena to be explained, a number of interesting hypotheses, and a little detailed knowledge about events in the nervous system. But we lack agreement on any integrated set of principles by which the functioning of the nervous system can be understood.

We believe now that this ancient problem is about to yield to our theoretical investigation for three reasons:

First, in recent years our knowledge of the functioning of individual cells in the central nervous system has vastly increased.

Second, large numbers of engineers and mathematicians are, for the first time, undertaking serious study of the mathematical basis for thinking, perception, and the handling of information by the central nervous system, thus providing the hope that these problems may be within our intellectual grasp.

Third, recent developments in probability theory and in the mathematics of random processes provide new tools for the study of events in the nervous system, where only the gross statistical organization is known and the precise cell-by-cell "wiring diagram" may never be obtained.

Receives Navy Support

In July, 1957, Project PARA (Perceiving and Recognizing Automaton), an internal research program which had been in progress for over a year at Cornell Aeronautical Laboratory, received the support of the Office of Naval Research. The program had been concerned primarily with the application of probability theory to

Psychological Review
Vol. 65, No. 6, 1958

THE PERCEPTRON: A PROBABILISTIC MODEL FOR INFORMATION STORAGE AND ORGANIZATION IN THE BRAIN¹

F. ROSENBLATT

Cornell Aeronautical Laboratory

If we are eventually to understand the capability of higher organisms for perceptual recognition, generalization, recall, and thinking, we must first have answers to three fundamental questions:

1. How is information about the physical world sensed, or detected, by the biological system?
2. In what form is information stored, or remembered?
3. How does information contained in storage, or in memory, influence recognition and behavior?

The first of these questions is in the province of sensory physiology, and is the only one for which appreciable understanding has been achieved. This article will be concerned primarily with the second and third questions, which are still subject to a vast amount of speculation, and where the few relevant facts currently supplied by neurophysiology have not yet been integrated into an acceptable theory.

With regard to the second question, two alternative positions have been maintained. The first suggests that storage of sensory information is in the form of coded representations or images, with some sort of one-to-one mapping between the sensory stimulus

and the stored pattern. According to this hypothesis, if one understood the code or "wiring diagram" of the nervous system, one should, in principle, be able to discover exactly what an organism remembers by reconstructing the original sensory patterns from the "memory traces" which they have left, much as we might develop a photographic negative, or translate the pattern of electrical charges in the "memory" of a digital computer. This hypothesis is appealing in its simplicity and ready intelligibility, and a large family of theoretical brain models has been developed around the idea of a coded, representational memory (2, 3, 9, 14). The alternative approach, which stems from the tradition of British empiricism, hazards the guess that the images of stimuli may never really be recorded at all, and that the central nervous system simply acts as an intricate switching network, where retention takes the form of new connections, or pathways, between centers of activity. In many of the more recent developments of this position (Hebb's "cell assembly," and Hull's "cortical anticipatory goal response," for example) the "responses" which are associated to stimuli may be entirely contained within the CNS itself. In this case the response represents an "idea" rather than an action. The important feature of this approach is that there is never any simple mapping of the stimulus into memory, according to some code which would permit its later reconstruction. Whatever in-

¹ The development of this theory has been carried out at the Cornell Aeronautical Laboratory, Inc., under the sponsorship of the Office of Naval Research, Contract Nonr-2381(00). This article is primarily an adaptation of material reported in Ref. 15, which constitutes the first full report on the program.

FRANK ROSENBLATT'S PERCEPTRON 1958

FIG. 1 — Organization of a biological brain. (Red areas indicate active cells, responding to the letter X.)

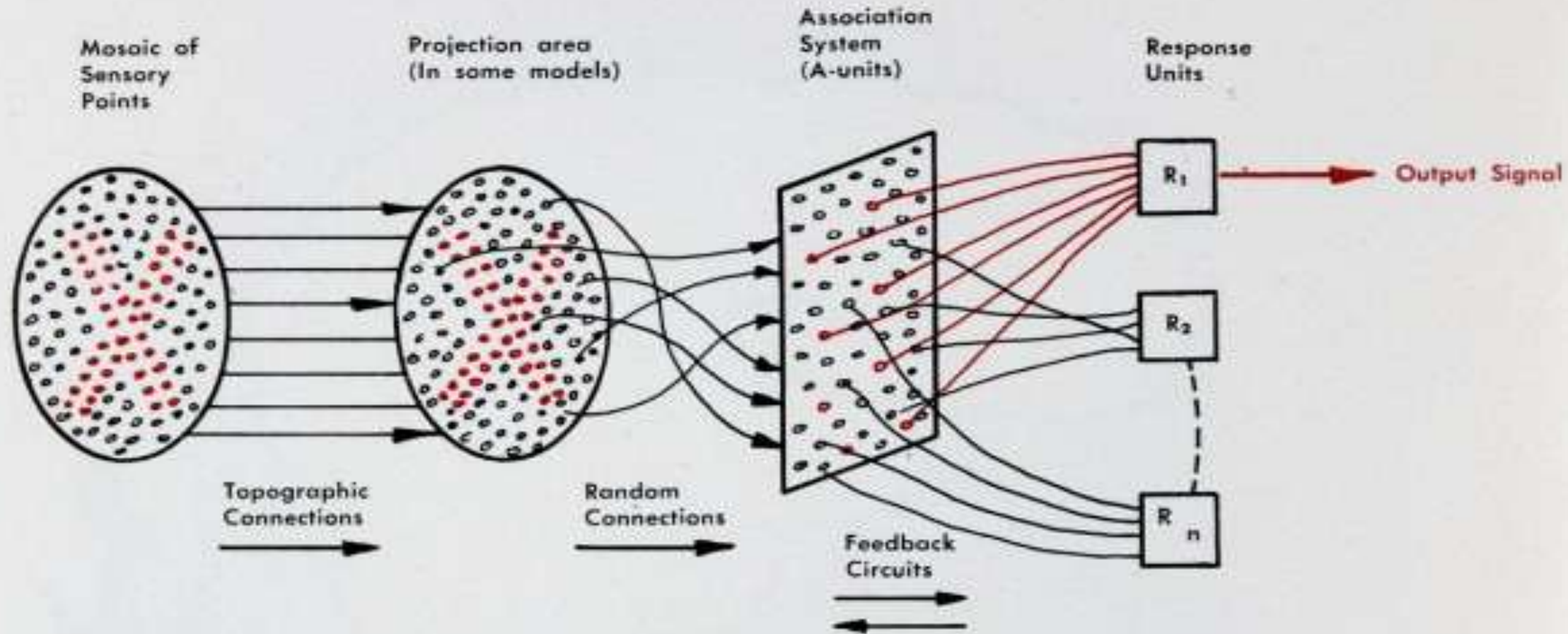


FIG. 2 — Organization of a perceptron.

1956

AUTOMATA STUDIES

W. R. ASHBY	J. MC CARTHY
T. CULBERTSON	M. L. MINSKY
M. D. DAVIS	E. F. MOORE
S. C. KLEENE	C. E. SHANNON
K. DE LEEUW	N. SHAPIRO
D. M. MAC KAY	A. M. UTTLEY
J. VON NEUMANN	

Edited by
C. E. Shannon and J. McCarthy



John McCarthy

SYNTHESIS OF AUTOMATA

“Design for an Intelligence-Amplifier”
Ross Ashby

“The Epistemological Problem for Automata”
D. M. MacKay

“Conditional Probability Machines and Conditioned Reflexes”
Albert Uttley

“Temporal and Spatial Patterns in a Conditional Probability Machine”
Albert Uttley



A PROPOSAL FOR THE
DARTMOUTH SUMMER RESEARCH PROJECT
ON ARTIFICIAL INTELLIGENCE

J. McCarthy, Dartmouth College
M. L. Minsky, Harvard University
N. Rochester, I.B.M. Corporation
C.E. Shannon, Bell Telephone Laboratories

August 31, 1955

A Proposal for the
DARTMOUTH SUMMER RESEARCH PROJECT ON ARTIFICIAL INTELLIGENCE

June 17 - Aug. 16

We propose that a 2 month, 10 man study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. The study is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it. An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves. We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer.

The following are some aspects of the artificial intelligence problem:

1) Automatic Computers

If a machine can do a job, then an automatic calculator can be programmed to simulate the machine. The speeds and memory capacities of present computers may be insufficient to simulate many of the higher functions of the human brain, but the major obstacle is not lack of machine capacity, but our inability to write programs taking full advantage of what we have.

2) How Can a Computer be Programmed to Use a Language

It may be speculated that a large part of human thought consists of manipulating words according to rules of reasoning

Dartmouth Summer Workshop 1956



Dartmouth Summer Workshop 1956



IN THIS BUILDING DURING THE SUMMER OF 1956

JOHN McCARTHY (DARTMOUTH COLLEGE), MARVIN L. MINSKY (MIT)
NATHANIEL ROCHESTER (IBM), AND CLAUDE SHANNON (BELL LABORATORIES)
CONDUCTED

THE DARTMOUTH SUMMER RESEARCH PROJECT ON ARTIFICIAL INTELLIGENCE

FIRST USE OF THE TERM "ARTIFICIAL INTELLIGENCE"

FOUNDING OF ARTIFICIAL INTELLIGENCE AS A RESEARCH DISCIPLINE

"To proceed on the basis of the conjecture
that every aspect of learning or any other feature of intelligence
can in principle be so precisely described that a machine can be made to simulate it."

IN COMMEMORATION OF THE PROJECT'S 50th ANNIVERSARY
JULY 13, 2006

Lecture Notes

DEFENDING AI RESEARCH: A Collection of Essays and Reviews

John McCarthy

CSLI Publications
CENTER FOR THE STUDY OF
LANGUAGE AND INFORMATION

John McCarthy's Review of:

THE QUESTION OF ARTIFICIAL INTELLIGENCE

Philosophical and Sociological
Perspectives

Edited by
Brian P. Bloomfield

ROUTLEDGE LIBRARY EDITIONS:
ARTIFICIAL INTELLIGENCE



1987

John McCarthy

“ ... one of the reasons for inventing the term ‘artificial intelligence’, was to escape association with ‘cybernetics.’ it’s association with analogue feedback seemed misguided, and I wished to avoid having either to accept ... Wiener as a guru or having to argue with him”

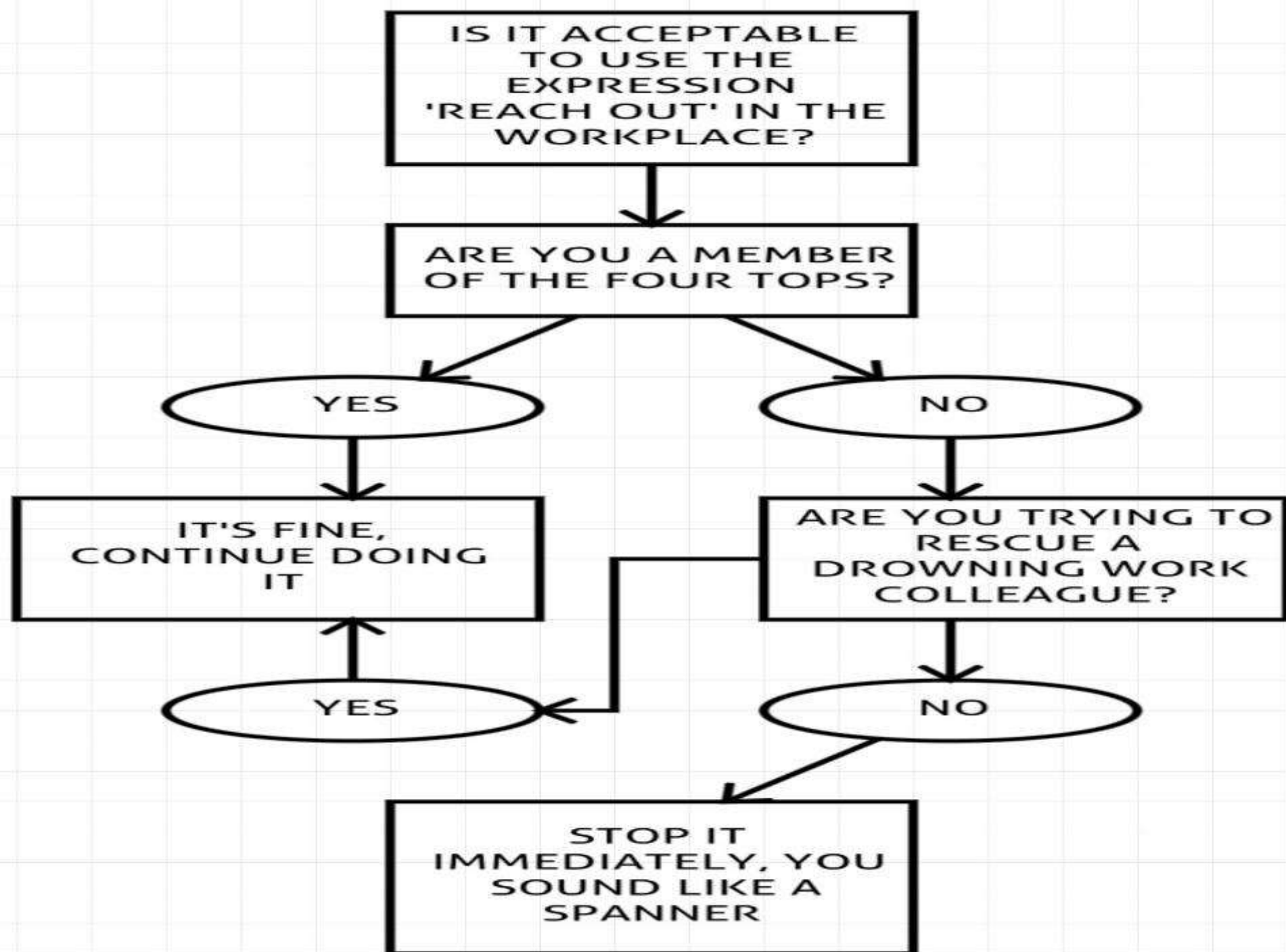
John McCarthy

“The approaches to intelligence originated by Minsky, Newell, Simon and myself were quite different from those advocated by Norbert Wiener, John von Neumann or Warren McCulloch.”

John McCarthy

“The idea that programming computers rather than building machines was the key to AI received its first public emphasis at the Dartmouth meeting. None of von Neumann (surprisingly), Wiener, McCulloch, Ashby and Mackay thought in those terms.”







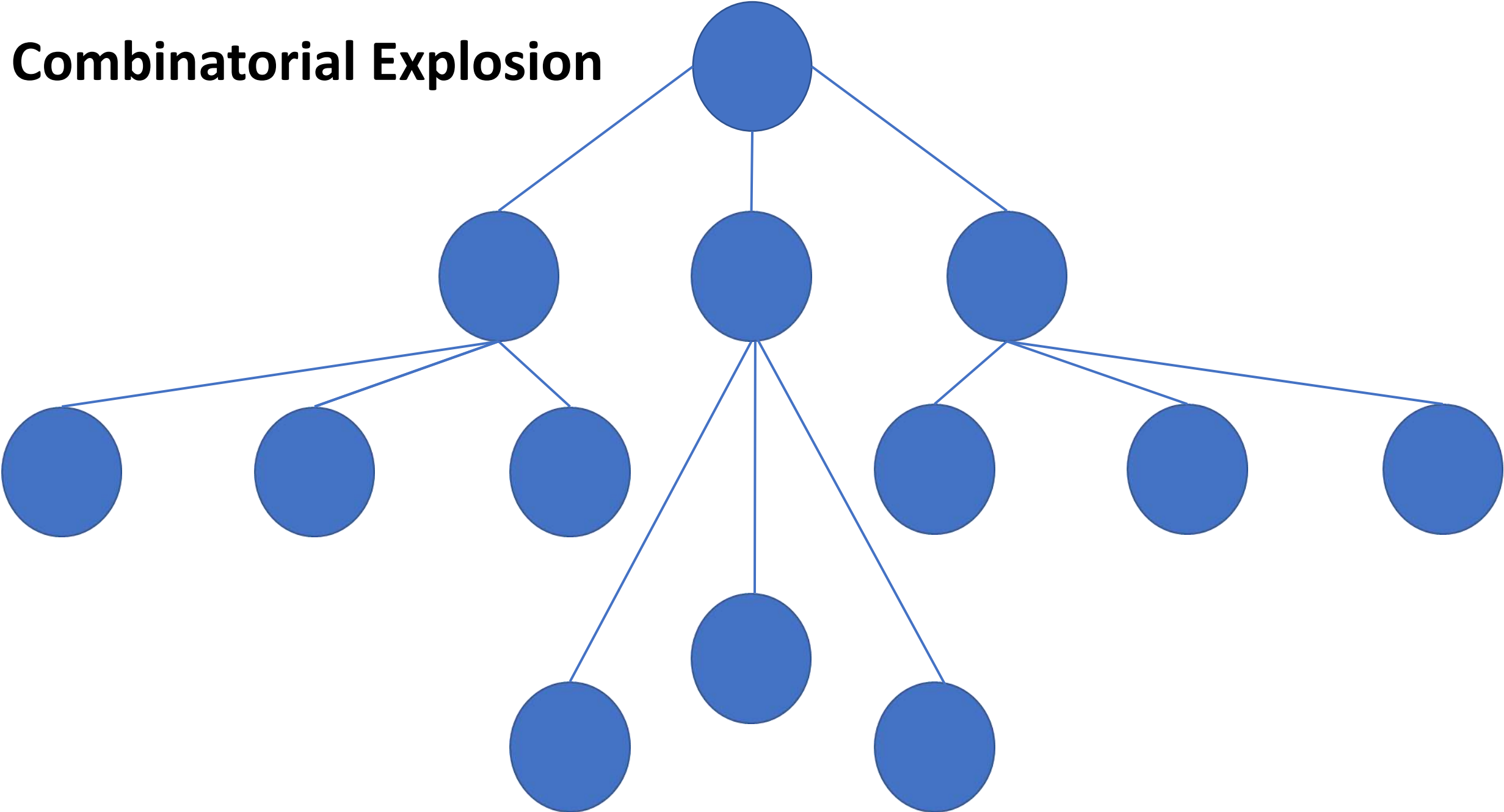
SYMBOLIC AI

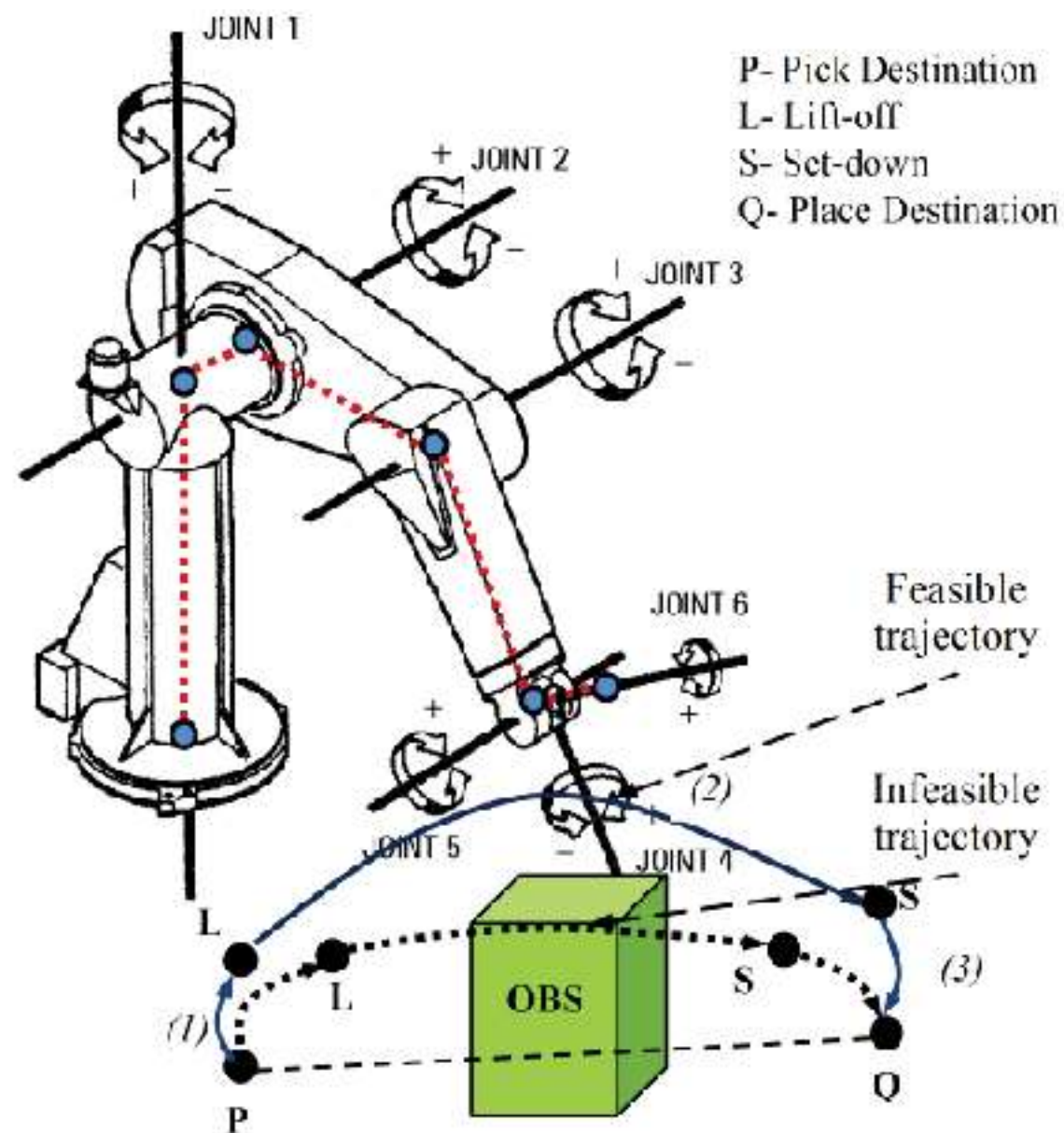
CLASSICAL AI

**GOOD OLD-FASHIONED AI
(GOFI)**



Combinatorial Explosion









SYMBOLIC AI

CLASSICAL AI

**GOOD OLD-FASHIONED AI
(GOFI)**

1973

Artificial Intelligence



Sir James Lighthill



Michael James Lighthill

Born	23 January 1924 Paris, France
Died	17 July 1998 (aged 74) Sark, Channel Islands
Nationality	United Kingdom
Alma mater	Cambridge University
Known for	Lighthill report Lighthill mechanism Aeroacoustics Fluid dynamics
Awards	Timoshenko Medal (1963) Royal Medal (1964) Elliott Cresson Medal (1975) Naylor Prize and Lectureship (1977) Otto Laporte Award (1984) Copley Medal (1998)
	Scientific career
Fields	Mathematics, Acoustics
Institutions	Victoria University of Manchester University College London Cambridge University Imperial College London
Doctoral students	Gerald B. Whitham

BBC Lighthill Debate 1973

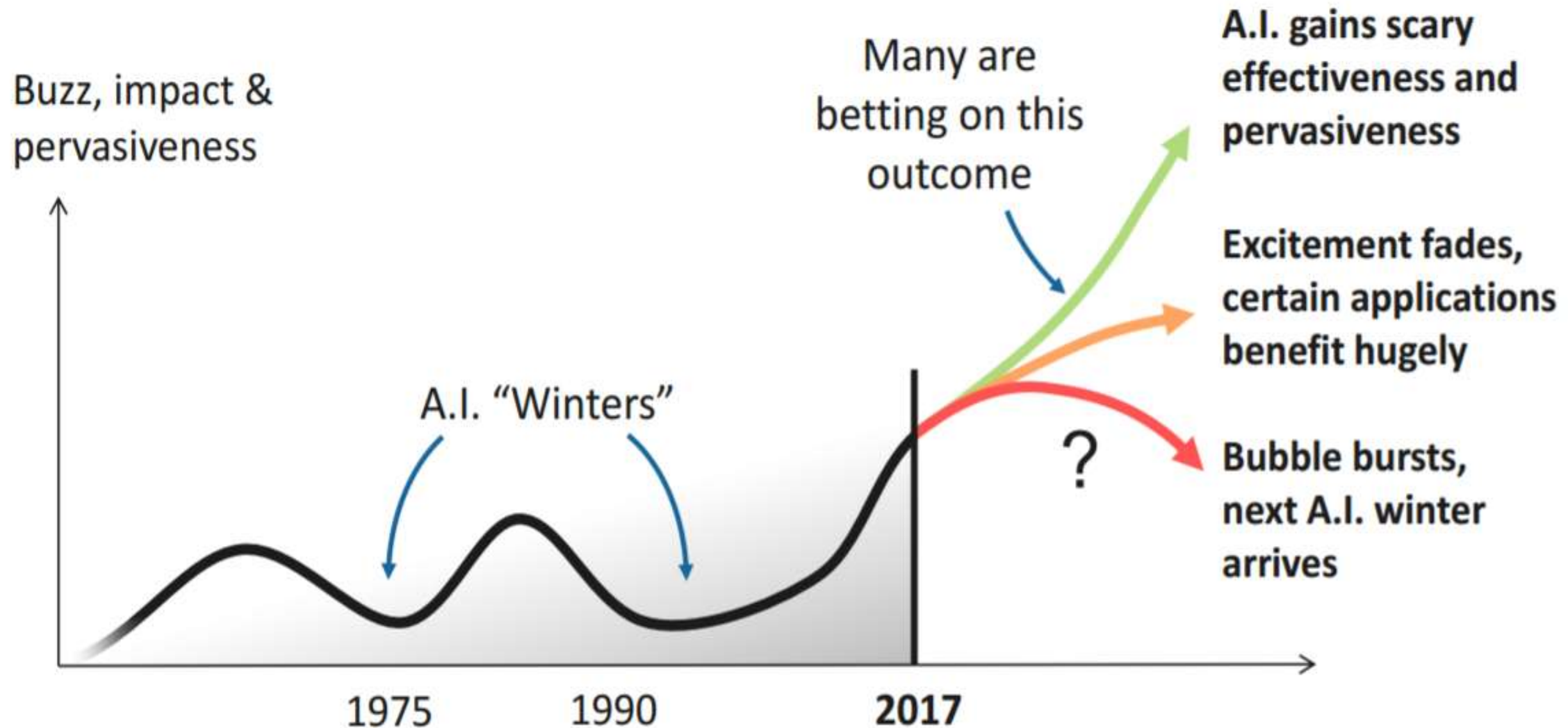
THE GENERAL PURPOSE ROBOT
IS A MIRAGE

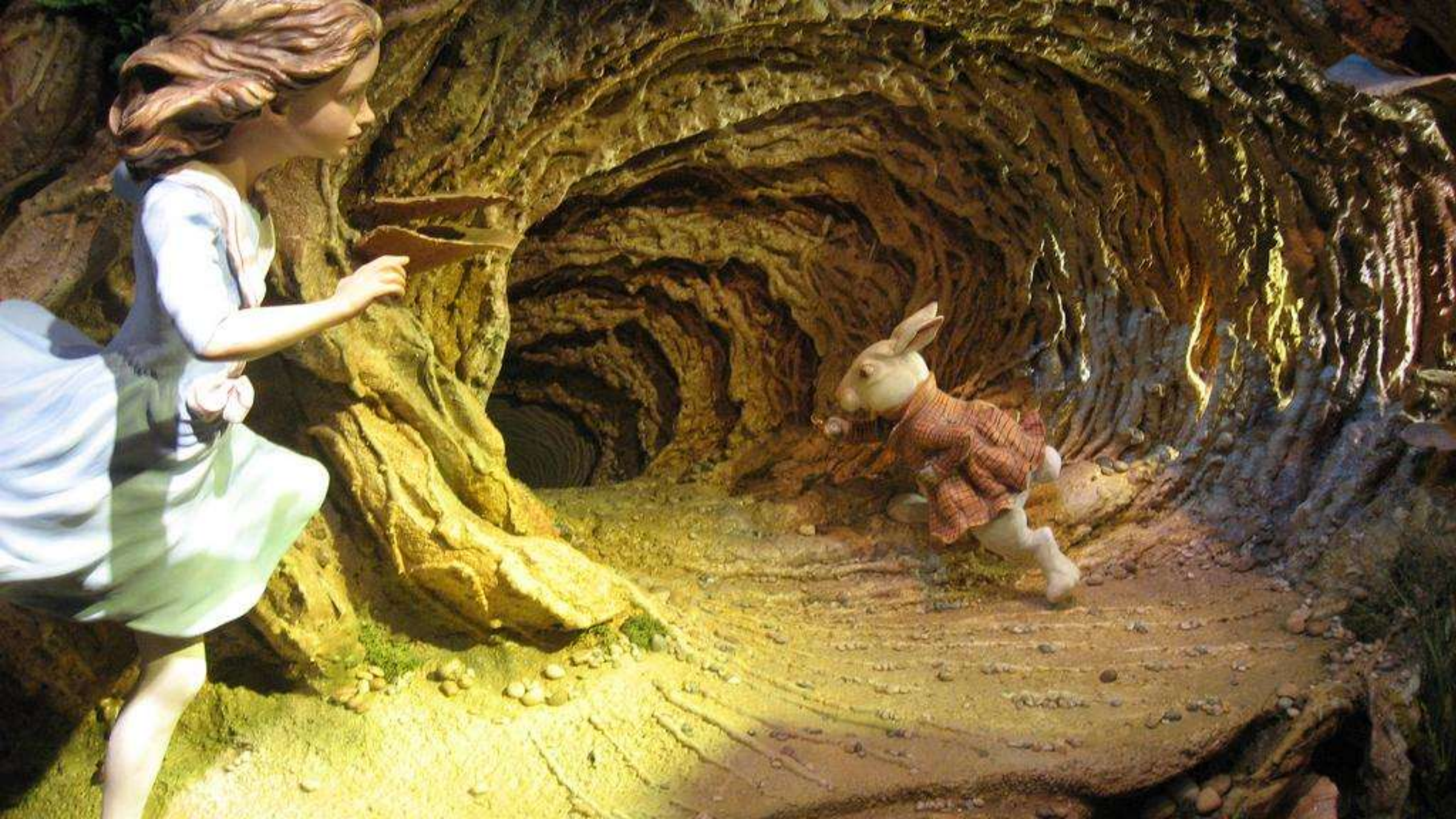


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AI is enjoying significant hype and investment











“Literary Gazette”
May 1950

Science Editor
Boris Agapov



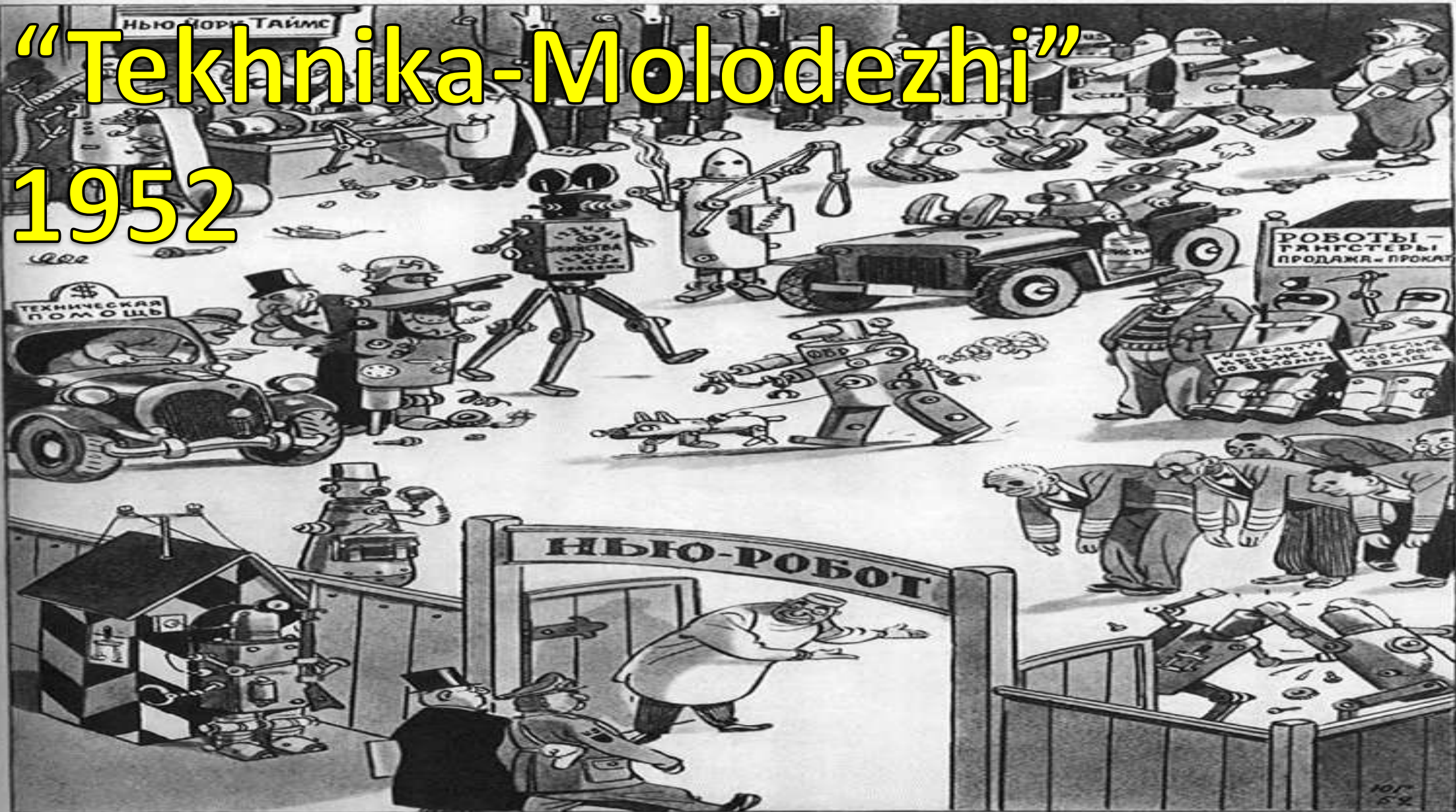
Wiener

“ already old, ... very fleshy, and smokes cigars.”

**“ ...charlatans and obscurantists, whom capitalists
substitute for genuine scientists.”**

“Tekhnika-Molodezhi”

1952



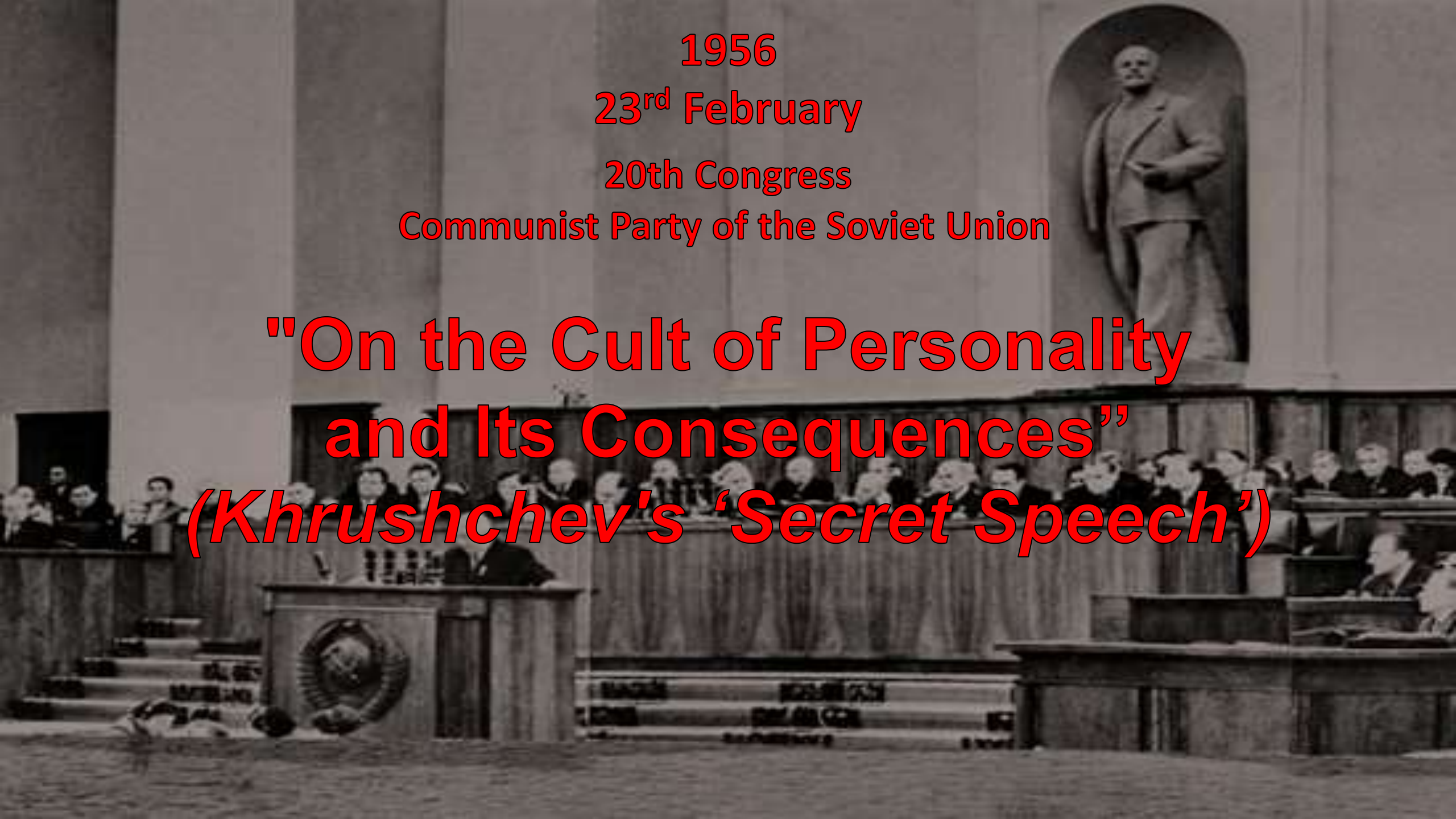
1956

23rd February

20th Congress

Communist Party of the Soviet Union

"On the Cult of Personality
and Its Consequences"
(Khrushchev's 'Secret Speech')





Aleksei Liapunov, Norbert Wiener and Gleb Frank, Moscow, 1960



Ross Ashby, Moscow, 1964



W. Ross Ashby
M.A., M.D., D.P.M.

DESIGN FOR A BRAIN

WILEY



**ACADEMY OF SCIENCES OF THE SOVIET UNION
1959**

CYBERNETICS COUNCIL; FIFTEEN SUB SECTIONS

Reliability, probability theory and statistical mechanics

Information theory

Psychology

Transportation

Computer engineering

PARALELL DEVELOPMENTS IN EAST GERMANY, CZECHOSLOVAKIA & HUNGARY

**The Soviet Central Design &
Research Institute for Robotics &
Technical Cybernetics
St. Petersburg**







National Technological Initiative

From Wikipedia, the free encyclopedia



This article **may be expanded with text translated from the [corresponding article](#) in [\[show\]](#) Russian.** *(October 2018)* Click [\[show\]](#) for important translation instructions.

The **National Technological Initiative** (NTI) ([Russian](#): Национальную технологическую инициативу (НТИ)) is a 2014 program created by [Vladimir Putin](#) with the purpose of creating [Russian](#) global technical leadership in Russia. It is a \$2.1 trillion “road map” for development of the [cybernetics](#) market until 2035.^[1]

Programs [\[edit \]](#)

- **AeroNet** pilotless aviation systems are widely used in agriculture, cargo transportation, and during search and rescue operations. The new flying taxi is called **SerVert SV5B** created by Russia's aviation startup, [Aviaton](#).^[2]
- **AvtoNet** long-haul ground transportation using robotized road corridors
- **MariNet** digital navigation, pilotless sea vessels, and exploration of ocean resources.
- **NeuroNet** men will communicative with machines by [neural interface](#).^[3]

Other goals

- Developing a Russian computer programming language, secure cybernetic communications, quantum computing, and teleportation.^[1]
- **5G** mobile network in a number of Russian regions and allow data transfers of up to one gigabit per second.^[4]

Olga Uskova

From Wikipedia, the free encyclopedia

Olga Uskova (born February 26, 1964 in [Moscow](#)) - Russian businesswoman, president of [Cognitive Technologies](#)^[1] - the Russian developer of software and IT solutions. Olga holds the position of the President of the National Association of Innovations and Development of Information Technologies (NAIR), besides she is a member of the Commission of the State Duma of the Russian Federation on the development of strategic information systems.^{[2][3]} Chairman of the Committee for Information and Communication Technologies and Technology Transfer. Head of the Department of Engineering Cybernetics at NUST MISIS, a member of the Supervisory Board NUST MISIS, a member of the Expert Council of the Russian Federation Ministry of Economic Development, co-chairman of the House "Science and Technology" within the International Forum of Creative and Scientific Intellectuals of the CIS member states, a member of the public expert council of the Analytical Centre under the Government of the Russian Federation.



Vladimir Ulas

From Wikipedia, the free encyclopedia



This **biography of a living person** **needs additional citations for verification**. Please help by adding **reliable sources**. Contentious material about living persons that is unsourced or poorly sourced **must be removed immediately**, especially if potentially **libelous** or harmful.

Find sources: "Vladimir Ulas" – news · newspapers · books · scholar · JSTOR (December 2009) *(Learn how and when to remove this template message)*

Vladimir Dmitrievich Ulas (Russian: Владимир Дмитриевич Улас; born 1960, [Baranovichi](#), [Byelorussian SSR](#)) is a [Russian](#) politician from the [Communist Party of the Russian Federation](#) and a colonel in the [Russian Air Force](#). The head of the Communist Party of the Russian Federation's [Moscow](#) committee since 2004. He was elected as a representative of the [State Duma](#) in 2007.

Military training [[edit](#)]

Ulas graduated from with a Gold Medal from the Higher Military Aviation Engineering College in [Riga](#) in 1982, after which he went on to study at the [Faculty of Computational Mathematics and Cybernetics of Moscow State University](#). Between 1985 - 2004 Ulas was teaching science at the Air Force Engineering Academy. In 1999 Vladimir Ulas was awarded the rank of colonel in the [Armed Forces of Russia](#).

Political career [[edit](#)]

Ulas joined the [Communist Party of the Soviet Union](#) in 1981. After the fall of the [Soviet Union](#) in 1991 when the Communist Party was banned by [Boris Yeltsin](#), Ulas became a prominent member of [Gennady Ziuganov](#)'s new [Communist Party of the Russian Federation](#). In July 2004 he was elected first secretary of the Party's Moscow City Committee, and in 2005 he was elected deputy of the [Moscow City Duma](#). Since 2007 he is a member of the [State Duma](#).

External links [[edit](#)]

- [Biography](#)

Vladimir Ulas



Alma mater [Moscow State University](#) (1991)

Oksana Dmitriyeva

From Wikipedia, the free encyclopedia

*In this [Eastern Slavic naming convention](#), the *patronymic* is Genrikhovna and the *family name* is Dmitriyeva.*

Oksana Genrikhovna Dmitriyeva (Russian: Оксана Генриховна Дмитриева; born 3 April 1958 in [Leningrad, USSR](#)) is a [Russian](#) politician and economist. One of the leaders of the [Party of Growth](#). Deputy of the [State Duma](#). Former Deputy of the [Legislative Assembly of St. Petersburg](#) and former Minister of Labor and Social Development.

Dmitriyeva began campaigning for the [Party of Growth presidential nomination](#) in July 2017.

Contents [\[hide\]](#)

1

Biography

2

1st term as Deputy of the State Duma

3

Minister

4

2nd term as Deputy of the State Duma

5

2016 parliamentary election

6

2018 Presidential election

7

References

Biography [\[edit \]](#)

Oksana Dmitriyeva (sometimes spelled *Dmitrieva*) was born on April 3, 1958 in [Leningrad](#). Her father Genrikh Rosenberg (1925-2007) - was a scientist (field: ship mechanics), graduated from the [Makarov School](#), the creator of Soviet gas turbine installations, until his death he worked at the Institute of the Navy. He held the title of Honored Inventor of the Russian Federation. Grandfather Sholom Rosenberg (1887-1942) was awarded the St. George Cross for bravery in the [First World War](#), was killed during the [siege of Leningrad](#). Mother Natalia Dmitriyeva (born in 1931) is a candidate of economic sciences, graduate of the Leningrad Institute of Water Transport, a student of the Nobel laureate [Leonid Kantorovich](#).^[1]

In 1980 she graduated from the Faculty of Economic Cybernetics of the Saint Petersburg State University of Economics. Specialist in regional economics.

RESEARCH PAPER

Research Division – NATO Defense College, Rome – No. 121 – November 2015

Russia's Renewed Military Thinking: Non-Linear Warfare and Reflexive Control

by Can Kasapoglu¹



The Research Division (RD) of the NATO Defense College provides NATO's senior leaders with sound and timely analyses and recommendations on current issues of particular concern for the Alliance. Papers produced by the Research Division convey NATO's positions to the wider audience of the international strategic community and contribute to strengthening the Transatlantic Link.

The RD's civil and military researchers come from a variety of disciplines and interests covering a broad spectrum of security-related issues. They conduct research on topics which are of interest to the political and military decision-making bodies of the Alliance and its member states.

Introduction: A Renewed Russian Military Thinking

Since the Russo – Georgian War in 2008, the Russian Armed Forces' new way of warfighting has been drawing attention. Especially following the Crimean campaign, which ended up with the illegal annexation of the peninsula in March 2014, and given Moscow's ongoing open and covert military activities in Eastern Ukraine and recently in Syria, many experts started to focus their assessments on what they call Russia's hybrid, or non-linear, warfare. On the other hand, there are also some voices in the Western strategic community advancing the analysis that Moscow's understanding of non-linear warfare is simply an "attempt to catch up conceptually to the realities of modern war with which the United States has been grappling for over a decade in Iraq, Afghanistan, and elsewhere."²



REVIEW

The Wizard of the Kremlin

A French novel offers a fascinating, fictionalized look at Vladimir Putin's longtime spin doctor.



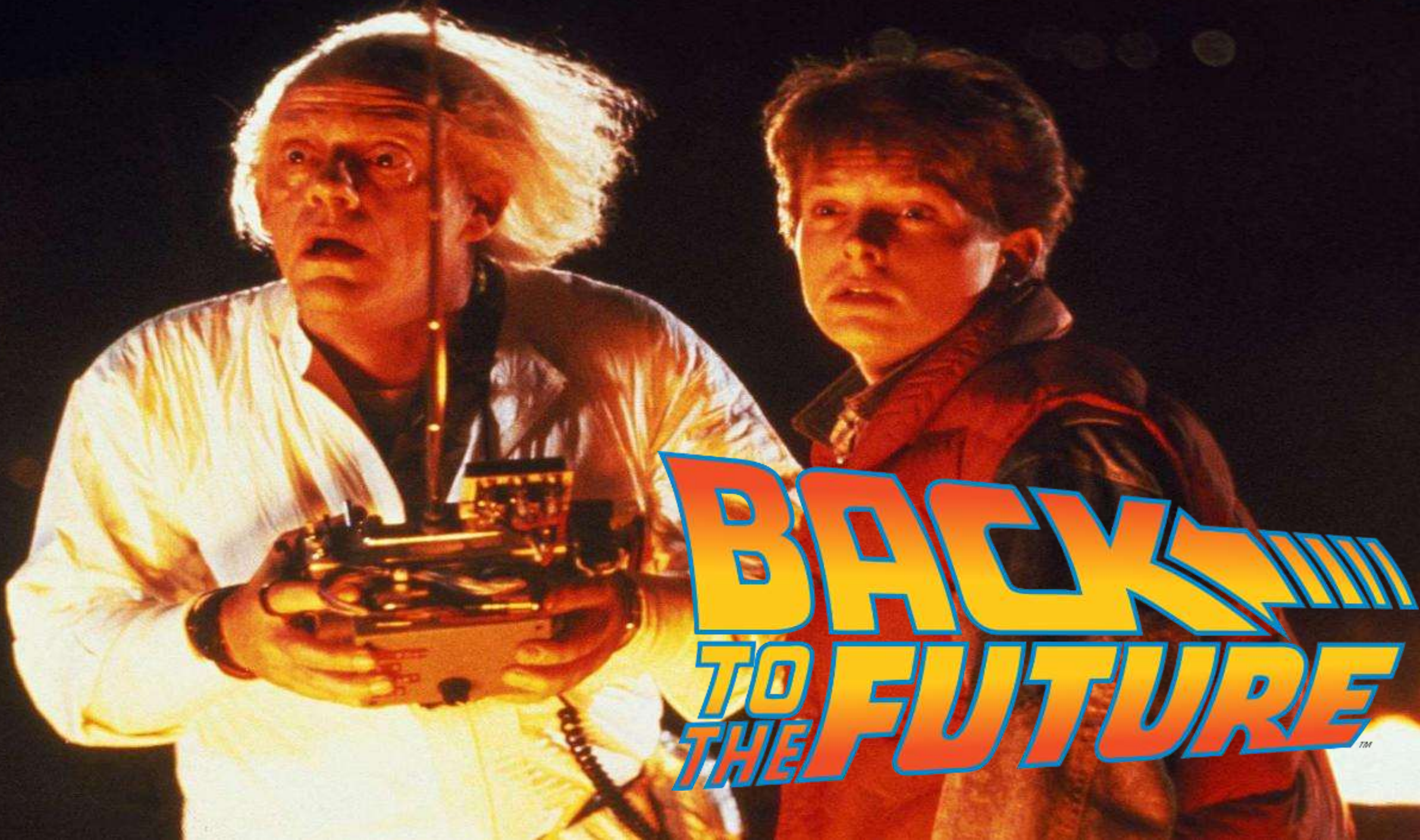
By Caroline de Gruyter, a columnist at Foreign Policy and a Europe correspondent for the Dutch newspaper NRC Handelsblad.

JULY 30, 2022, 7:00 AM



Russia's then-Prime Minister Vladimir Putin confers with his deputy, Vladislav Surkov, in the Urals city of Kurgan, Russia, on Feb. 13, 2012.

ALEXEI NIKOLSKY / AFP VIA GETTY IMAGES



"All the News
That's Fit to Print"

The New York Times.

LATE CITY EDITION

U. S. Weather Service Report (For 24 hours):
Cloudy and cool today and tonight.
Mostly fair tomorrow.
Temp. range: 65-81. Tomorrow: 62-82.

VOL. CVII., No. 36,414

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Times Square, New York 10, N. Y.

NEW YORK, SATURDAY, OCTOBER 5, 1957.

Printed at the New York Times Building, 215 West 40th St., New York 10, N. Y.

FIVE CENTS

SOVIET FIRES EARTH SATELLITE INTO SPACE; IT IS CIRCLING THE GLOBE AT 18,000 M. P. H.; SPHERE TRACKED IN 4 CROSSINGS OVER U. S.

HOFFA IS ELECTED TEAMSTERS HEAD; WARNS OF BATTLE

Defeats Two Foes 3 to 1
—Says Union Will Fight
"With Every Bounce"

Text of the Hoffa address
is printed on Page 8.

By A. H. BARKIN
Special to The New York Times.
MIAMI BEACH, Oct. 4.—The
seamily-scared International
Brotherhood of Teamsters elect-
ed James R. Hoffa as its presi-
dent today.

He won by a margin of nearly
3 to 1 over the combined vote
of two rivals who campaigned
on pledges to clean up the na-
tion's biggest union.

Senate racketeers and
Hoffa critics in the
union rank-and-file immediately
opened actions to strip the 46-
year-old former warehouseman
from Detroit of his duties as
president.

A jubilant Hoffa exhibited,
however, greater concern over
the possibility that his union
might be split from the
American Federation of Labor
and Congress of Industrial
Organizations, an apparent
move to prove that he could
make the teamsters "a model
trade union."



IN TOKEN OF VICTORY: Dave Beck, retiring head of the Teamsters Union, raises
hand of James R. Hoffa upon his election as union's president. At right is Mrs. Hoffa.

PAUBUS COMPARES
HIS STAND TO LEE'S

Says He Will Remain Loyal

Flu Widens in City;
10% Rate Predicted;
200,000 Pupils Out

By ROBERT ALDEN
A day of flu sickness and school
closures.

ARGENTINA TAKES
EMERGENCY STEPS

State of Siege Proclaimed

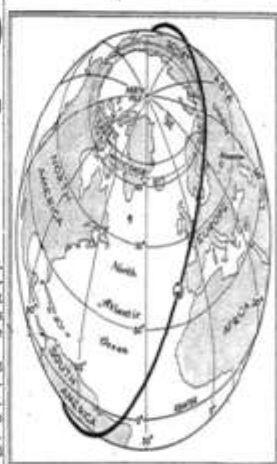
COURSE RECORDED

Navy Picks Up Radio
Signals—4 Report
Sighting Device

By WALTER SULLIVAN
Special to The New York Times.
WASHINGTON, Saturday, Oct.
5.—The Naval Research Laboratory
announced early today that
it had recorded four crossings
of the Soviet earth satellite
over the United States.
It said that one had passed
near Washington. Two cross-
ings were farther to the west.
The location of the fourth was
not made available immediately.
It added that tracing would
be continued in an attempt to
pin down the orbit sufficiently
to obtain scientific information
of the type sought in the Inter-
national Geophysical Year.

(Four visual sightings, one of
which was in conjunction with
a radio contact, was reported
by early Saturday morning.
Two sightings were made at
Columbus, Ohio, and one each
from Terre Haute, Ind., and
Whittier, Calif.)

Press Reports Noted
Soviet newspapers reported
several weeks ago that the So-
viet satellites would broadcast
on frequencies in the neighbor-
hood of twenty and forty megacycles. More exact frequencies
were given by Soviet scientists
at a conference on radio and
satellites that took place here
this week.



The approximate orbit of the Russian earth satellite is
shown by black line. The rotation of the earth will bring
the United States under the orbit of Soviet-made moon.

Device Is 8 Times Heavier Than One Planned by U.S.

WASHINGTON, Oct. 4.—Leaders of the United
States earth satellite program were astonished tonight to learn
that the Soviet Union had launched a satellite eight times
heavier than that con-
templated by this country.
Joseph Kaptan, chairman
of the United States program
for the International Geophys-
ical Year, described the sat-
ellite as "a major surprise."

560 MILES HIGH

Visible With Simple
Binoculars, Moscow
Statement Says

Text of this announcement
appears on Page 1.

By WILLIAM J. BORDEN

Special to The New York Times.

MOSCOW, Saturday, Oct. 5.—
The Soviet Union announced
this morning that it success-
fully launched a man-made
earth satellite into space yester-
day.

The Russians calculated the
satellite's orbit at a maximum
of 560 miles above the earth
and its speed at 18,000 miles an
hour.

The official Soviet news
agency Tass said the artificial
moon, with a diameter of
twenty-two inches and a weight
of 184 pounds, was circling the
earth once every hour and
thirty-five minutes. This means
more than fifteen times a day.
Two radio transmitters, Tass
said, are sending signals con-
tinuously on frequencies of
20,000 and 40,000 megacycles.
These signals were said to be
strong enough to be picked up
by amateur radio operators. The
trajectory of the satellite is
being tracked by numerous
scientific stations.

One Over Moscow Today

Tass said the satellite was
launched at 10:04 a.m. of Oct. 4
from the Baikonur cosmo-





SOVIET CITIES ON THE MOON?

by Albert Parry

WE ADVERTISE our failures, but the Soviets don't. For all we know, Moscow's scientists and engineers *did* try to shoot a rocket to the moon last November 7, to celebrate the 40th anniversary of the Communist seizure of power in Russia, but failed.

You will recall that for a while, during that weekend, some mysterious radio signals were heard from outer space. They were not accountable by the two Sputniks, and soon they faded out.

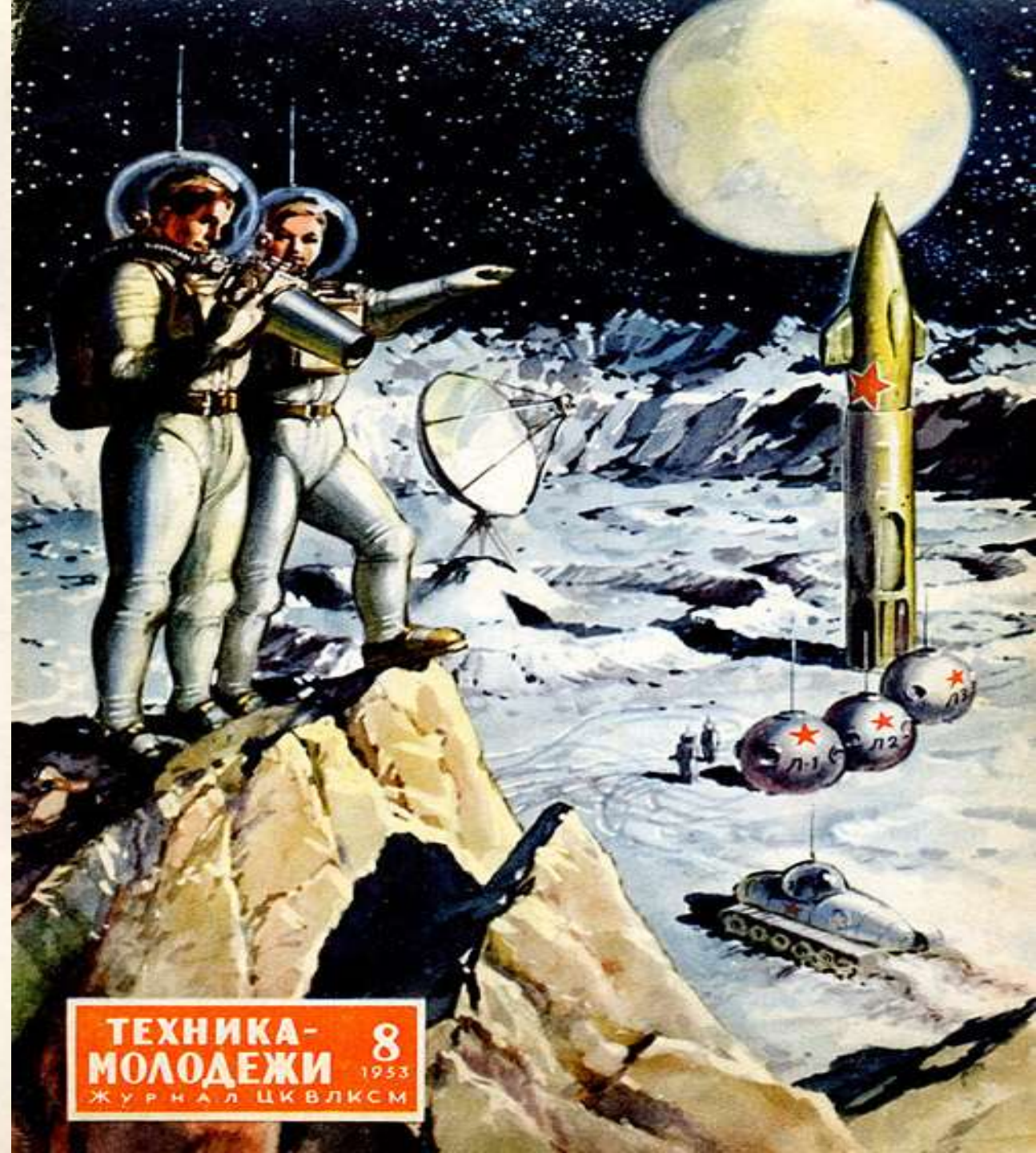
We may surmise that, in their try for the moon, the Soviet shooting team took a wrong aim, and that the rocket they fired is now either orbiting around the sun or is lost in space.

But whether or not there indeed was such an attempt, the Soviets are

certain to try sending a rocket to the moon, and soon, too. The moon is very much the Reds' next target. Moscow has laid its plans, and will surely make an effort to carry them out.

At first it will be an unmanned rocket; in fact, several of them. Later the Soviet rockets to the moon will be manned. Finally, Soviet men will stay on the moon, either for definite periods of time or permanently. Such is the Kremlin's announced agenda.

The Russians say they will build special lunar cities with unique atmospheric pressures so arranged as to enable humans to survive and thrive on the moon. We have this on the authority of Prof. N. A. Varvarov, chairman of the Astro-



ТЕХНИКА-
МОЛОДЕЖИ 8
ЖУРНАЛ ЦКВЛКСМ 1953

Invasion Base on the Moon

"The first nation to establish a lunar military outpost will rule the earth," says Willy Ley, expert in rocket research.



INVASION ROCKETS



The moon base could be built in a large crater, a mile or so wide, containing concentric rings of launching platforms. A spoke-like network of roads would join these to the main control dome in the center. An alternate control post, at left, could be hidden in the crater's rim. Rockets shown are similar to Nazi A 9.



THE man in the moon may plot the attack that will open World War III. For the man in the moon will be a powerful "spy in the sky" rocketed to the earth's satellite by the aggressor nation to prepare the way for an all-out assault to conquer the world.

Soon after a 20th-century Columbus pilots his rocket to the moon, the nation that sent him there will have a lunar base that will expose any spot on earth to celestial spying and sudden rocket invasion.



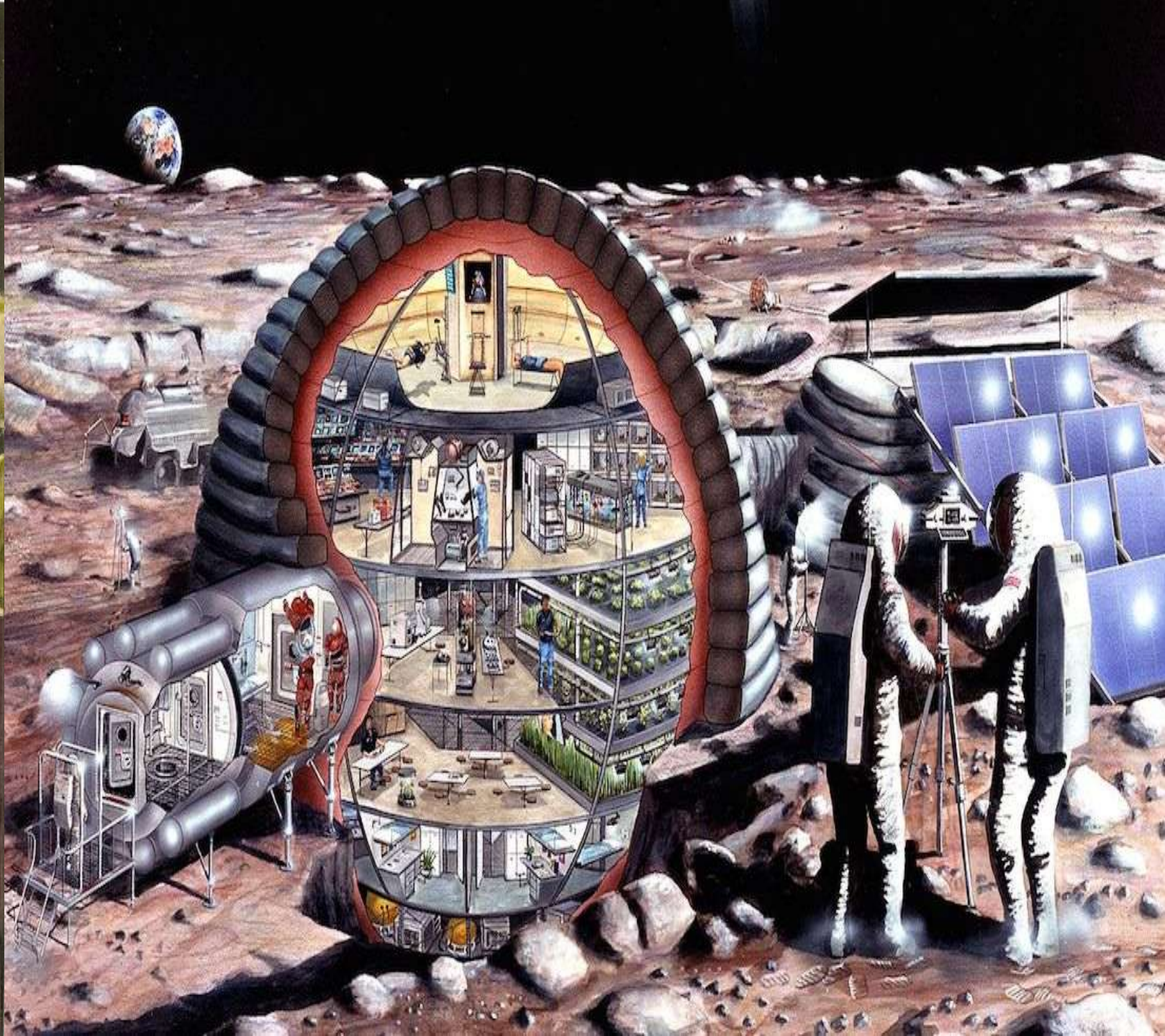
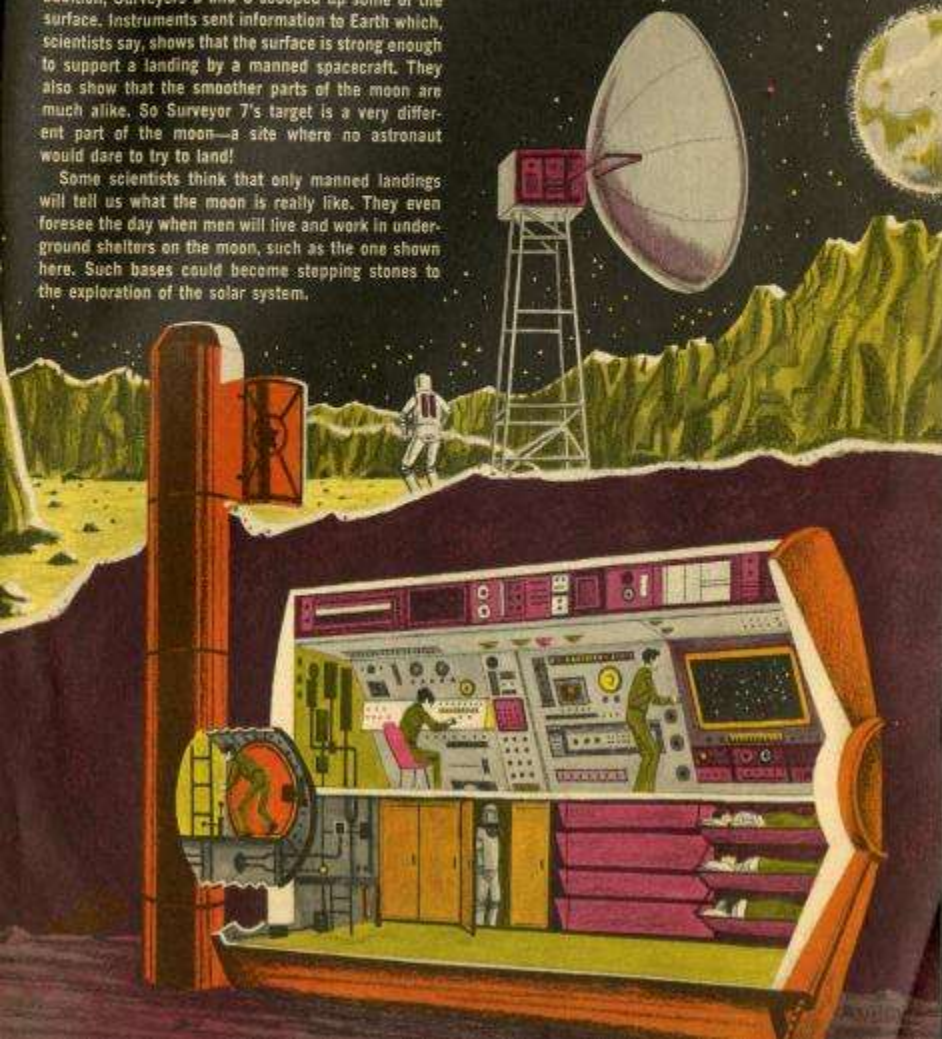
EXPLORING
THE
SOLAR
SYSTEM

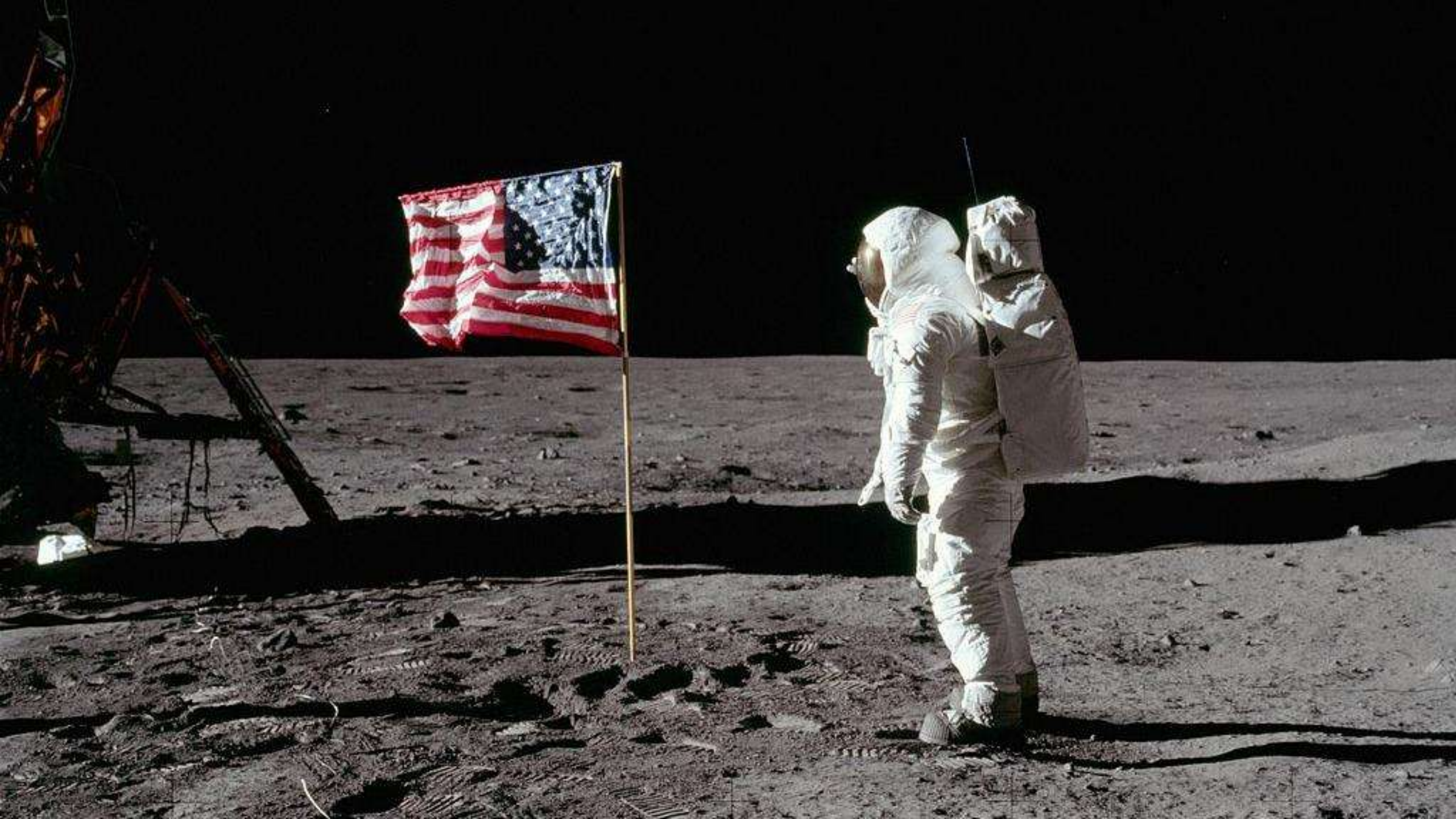
A NewsTime Science Supplement by Malcolm Weiss

Our Moon

Surveyor 7 is our newest moon probe. Its target: an area of the moon near the crater Tycho. This is one of the roughest, most mountainous places on the moon. Four earlier Surveyors—unmanned U.S. spacecraft carrying instruments—have made safe landings on smoother parts of the moon. Cameras in these spacecraft took photos of the moon's surface. In addition, Surveyors 5 and 6 scooped up some of the surface. Instruments sent information to Earth which, scientists say, shows that the surface is strong enough to support a landing by a manned spacecraft. They also show that the smoother parts of the moon are much alike. So Surveyor 7's target is a very different part of the moon—a site where no astronaut would dare to try to land!

Some scientists think that only manned landings will tell us what the moon is really like. They even foresee the day when men will live and work in underground shelters on the moon, such as the one shown here. Such bases could become stepping stones to the exploration of the solar system.





The Conference on the Psychophysiological Aspects of Space Flight

**School of Aerospace Medicine
Brooks Air Force Base
26th May 1960**





***Dr. Nathan Kline
(psychiatrist)***

***Manfred Clynes
(engineer)***

***Rockland State
Hospital
New York***

“Drugs, Space, and Cybernetics: Evolution to Cyborgs”

Reprinted from
*Psychophysiological Aspects of
Space Flight*

Copyright © Columbia University Press, 1961

Drugs, Space, and Cybernetics: Evolution to Cyborgs

NATHAN S. KLINE and MANFRED CLYNES

A wanderer is man from his birth,
He was born in a ship
On the breast of the river of Time;
Brimming with wonder and joy
He spreads out his arms to the light
Rivets his gaze on the banks of the stream.

As what he sees is, so have his thoughts been.

“The Future” by Matthew Arnold

Man must first conceive that which he would create. Viewed from a cosmic time scale, today we fumble and crawl, having barely crossed the threshold of existence; because a rattle responds when we shake it, we are swollen with instant pride and label ourselves “masters of the universe.” We have not yet even learned to conquer disease, we are ignorant as to the basic nature of electric, magnetic, and nuclear forces—of the very nature of force itself. We can only communicate with each other in the most inarticulate fashions, and we do not know how to create life. Our presumption is even greater than our ignorance: when we cannot understand something we call it UNKNOWNABLE MYSTERY OF ULTIMATE. The Epimetheans among us then cry “sacrilege” when the problem is even approached. As if God’s infinity were but a finger’s grasp beyond our own limitations!

Participant Evolution. The challenge of space travel to mankind is not only to his technological prowess, it is also a spiritual challenge to take an active part in his own biological evolution. The great scientific advances in the years to come may be utilized to permit existence under environments radically different from those provided by natural circumstances today. This task of adapting his body to whatever milieu he chooses will be made easier by increased knowledge of homeostatic functioning, the cybernetic aspects of which are

“the altering of bodily functions ... achieved without heredity by suitable biochemical, physiological, and electronic modification of man’s existing modus vivendi”.

“creating self-regulating man-machine systems”

“self-regulation needs to function without the benefit of consciousness”

“cooperate with the body’s own autonomous homeostatic controls”

“for the artificially extended homeostatic control system functioning unconsciously, one of us (Manfred Clynes) has coined the term Cyborg”

The Conference on the Psychophysiological Aspects of Spaceflight

School of Aerospace Medicine
Brooks / Force Base

CYBERnetic ORGanism



EXOGENIC AUTONOMIC

“biochemical, physiological,
and electronic modification”

*“The necessary change of these controls for space survival **cannot be conveniently supplied for us by evolution**: they have to be created by man himself, using his **acquired knowledge of cybernetics and physiology**.”*

Body-hackers: the people who turn themselves into cyborgs

Not content with their version 1.0 bodies, biohackers are installing USB drives in their fingertips, giving themselves night-vision eyedrops and growing third ears on their arms (that can go online). Welcome to the world of DIY cyborgs





BIOHACKER SUMMIT UK with Pando

21 May 2016, London

Supercharge your health with body, mind & tech.

GET TICKETS

Olli Sovijärvi / Teemu Arina / Jaakko Halmetoja

BIOHACKER'S HANDBOOK

UPGRADE YOURSELF AND UNLEASH YOUR INNER POTENTIAL









Elon Musk ✓

@elonmusk

Following

Creating a neural lace is the thing that really matters for humanity to achieve symbiosis with machines

1:08 AM - 4 Jun 2016

Sergey Brin: "We Want Google To Be The Third Half Of Your Brain."



Jay Yarow [✉](#) [RSS](#) [t](#) [g+](#)

🕒 Sep. 8, 2010, 1:59 PM 🔥 68,088

[f](#) FACEBOOK

[in](#) LINKEDIN

[t](#) TWITTER

[✉](#) EMAIL

[🖨](#) PRINT

Sergey Brin wants Google to become the "third half of your brain."

That's what he said at [today's big search event](#), where [Google](#) released Google Instant, its fast, streaming search results.

We're not exactly certain what Brin meant, but we think he was trying to say Google will know [what you want in a search](#), perhaps even before you know.

See Also: [The Alphabet According To Google](#)

More: [Online](#) [Google](#) [Search](#)



GOOG Alphabet-C

▼ **785.31** -5.20 (-0.70 %) 

Disclaimer

[More GOOG on Markets INSIDER »](#)

Ein Cyborg für Fukushima

Von [Jan Knüsel](#) am 9. November 2011 • Kategorie [Gesellschaft](#)

[Twittern](#) 4

[Empfehlen](#) [Teilen](#) 16



Der angepasste Robot Suit HAL mit schwerer Schutzweste im Testeinsatz. (Foto: Prof. Sankai University of Tsukuba / CYBERDYNE Inc.)

Das Bild der Rettungsarbeiter von Fukushima im weissen Schutzanzug und der Gasmasken hat sich in den Köpfen eingebrannt. Doch schon bald könnte sich dieses Bild ändern. Die japanische Firma *Cyberdyne* hat cyborgartigen Roboteranzug an die Arbeitsbedürfnisse im havarierten AKW Fukushima angepasst.

Japan-Vortrag

Fr, 29. 05. 2015
Fr, 03. 07. 2015
Fr, 02. 10. 2015

ab 18:30 Uhr | Tickets: [alternativkino.ch](#)

negative:nothing
STEP BY STEP FOR JAPAN a documentary film

DVD-Vorverkauf
inkl. Bonusmaterial

In Japan

Der praktische Reisebegleiter

Neue, günstige Versandkosten
für Deutschland und Österreich!

shizuku
a drop of japan

Online edlen Sake, Shochu
und Whisky bestellen.

DARPA's Mind-Controlled Arm Will Make You Wish You Were a Cyborg



Maddie Stone

5/12/16 4:04pm • Filed to: NEUROSCIENCE ▾


29.4K


35


15

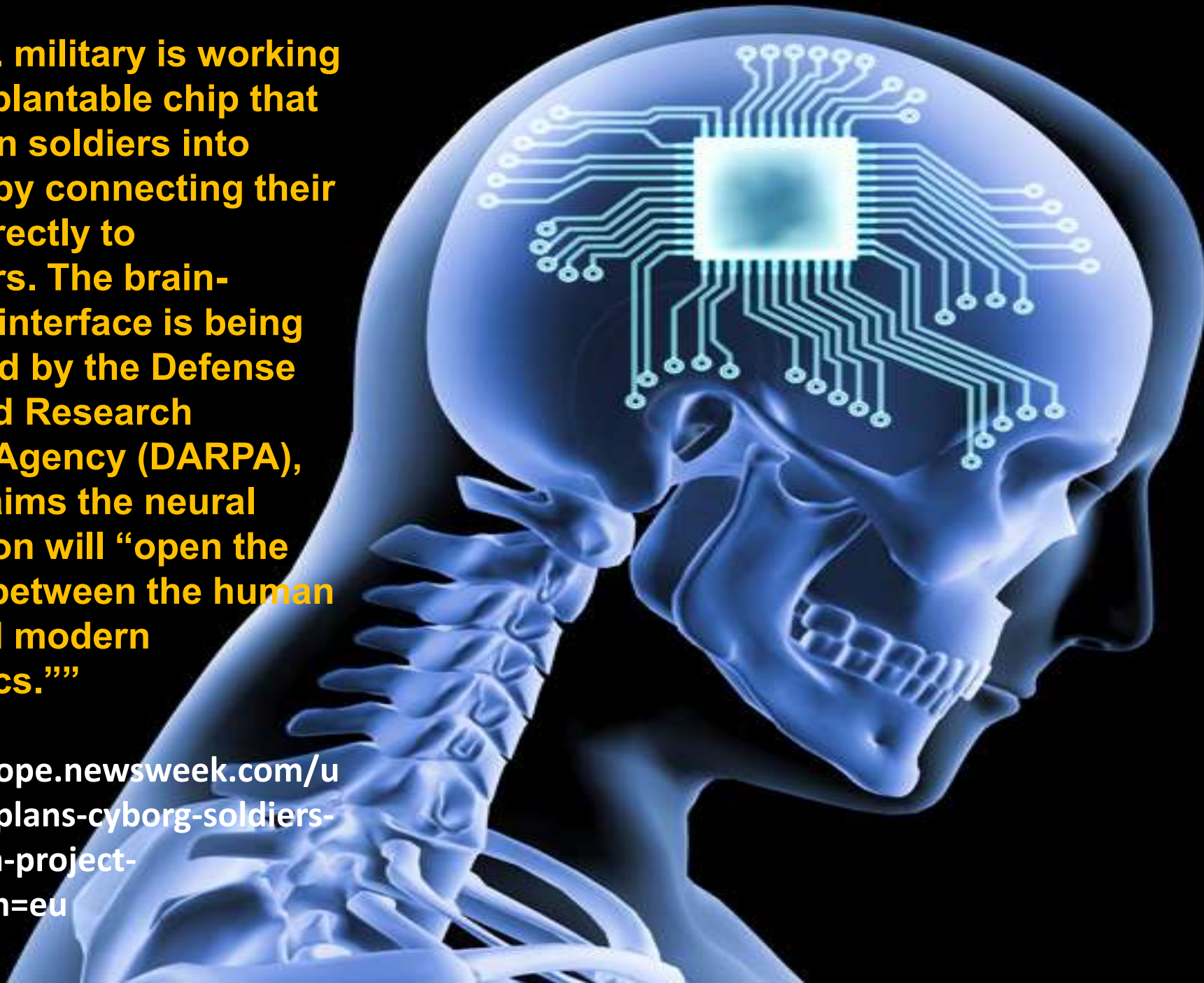


DEFENSE ADVANCED
RESEARCH PROJECTS AGENCY



“The U.S. military is working on an implantable chip that could turn soldiers into cyborgs by connecting their brains directly to computers. The brain-machine interface is being developed by the Defense Advanced Research Projects Agency (DARPA), which claims the neural connection will “open the channel between the human brain and modern electronics.””

<http://europe.newsweek.com/us-military-plans-cyborg-soldiers-new-darpa-project-418128?rm=eu>



Robot powered by rat's brain in bizarre British experiment

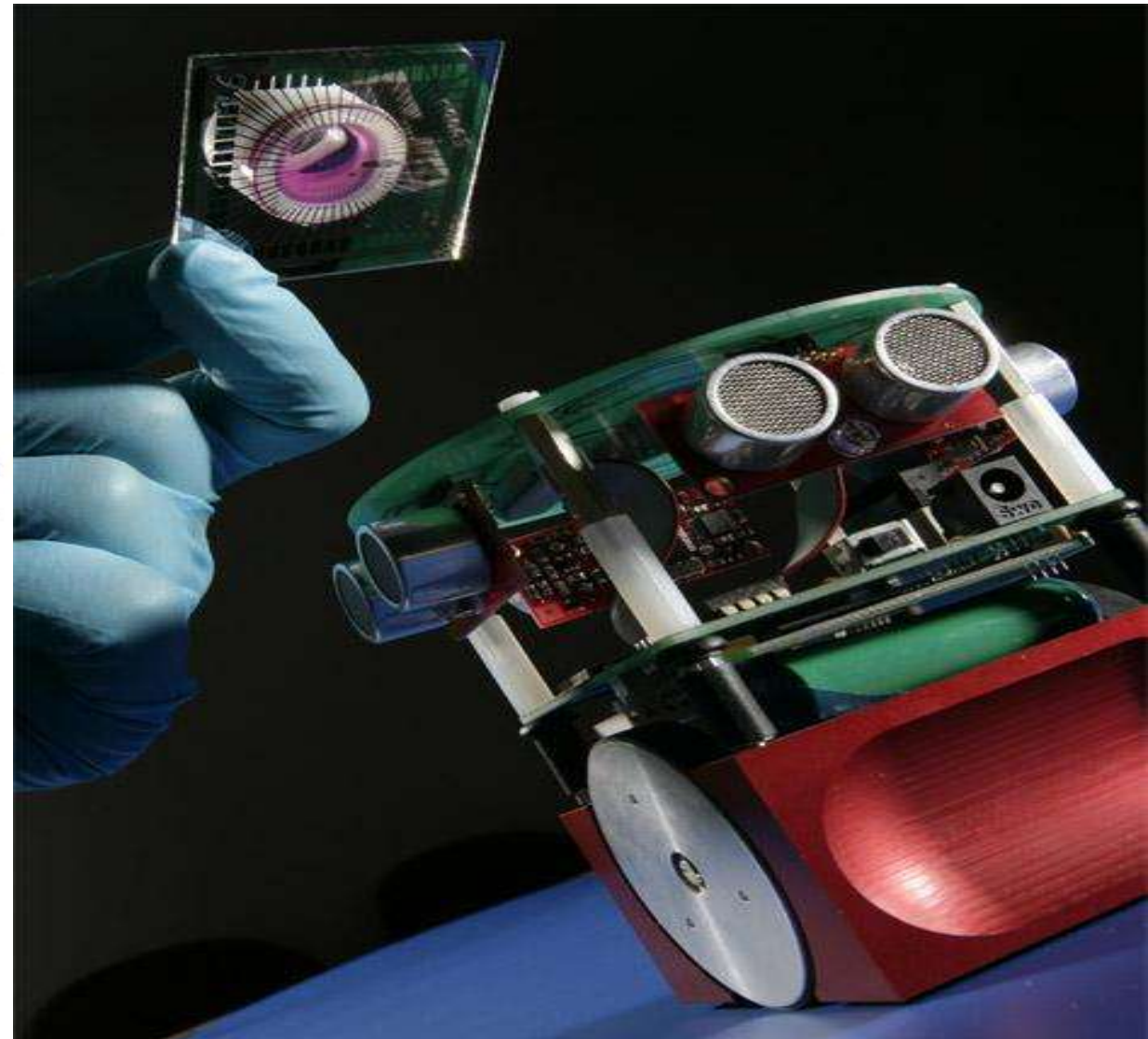
By [DAILY MAIL REPORTER](#)
UPDATED: 11:51, 14 August 2008



It sounds like something out of a science fiction film, but British scientists have created a biological robot controlled by a blob of rat brain.

The wheeled machine is wirelessly linked to a bundle of neurons kept at body temperature in a sterile cabinet.

Signals from the 'brain' allow the robot to steer left or right to avoid objects in its path.



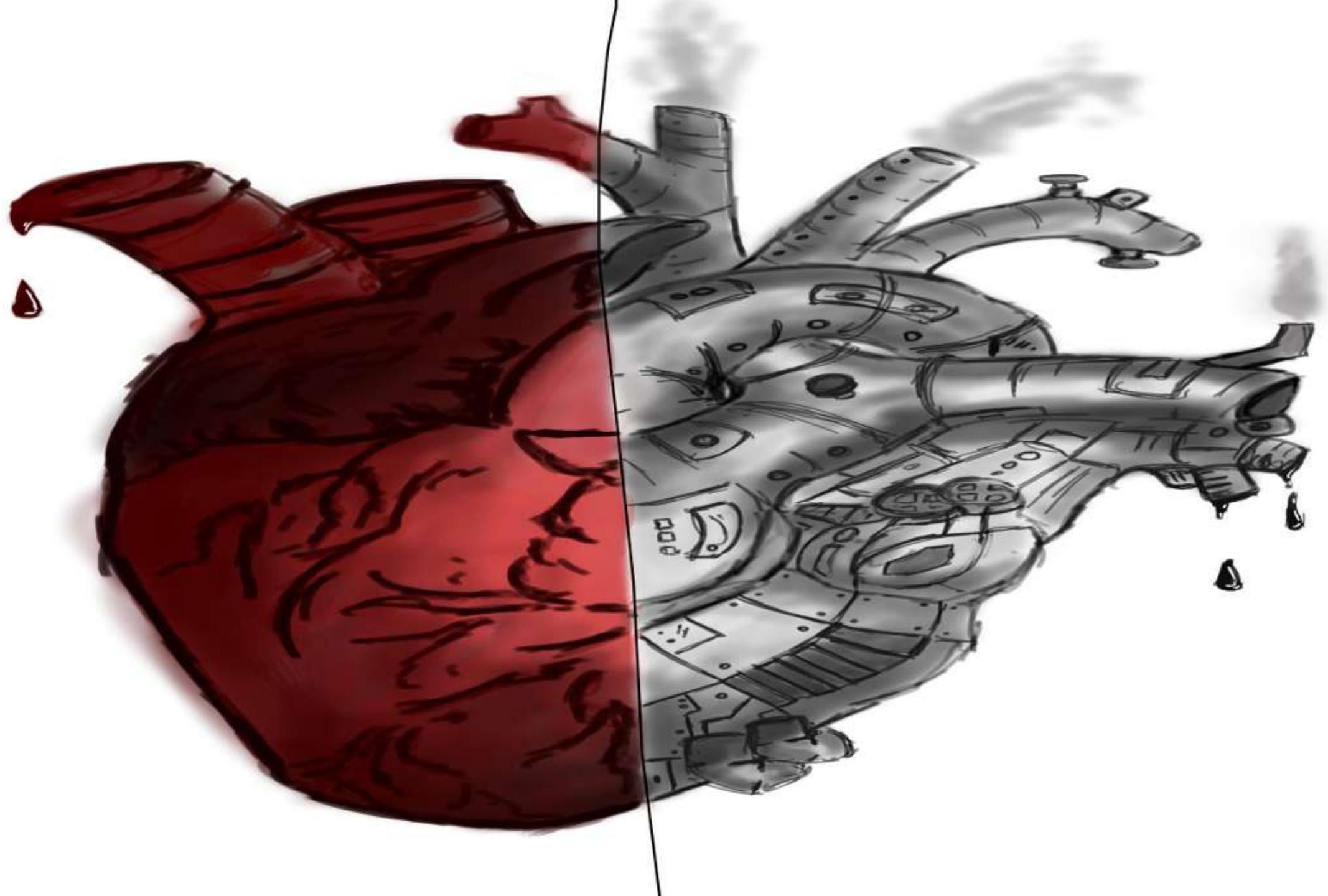


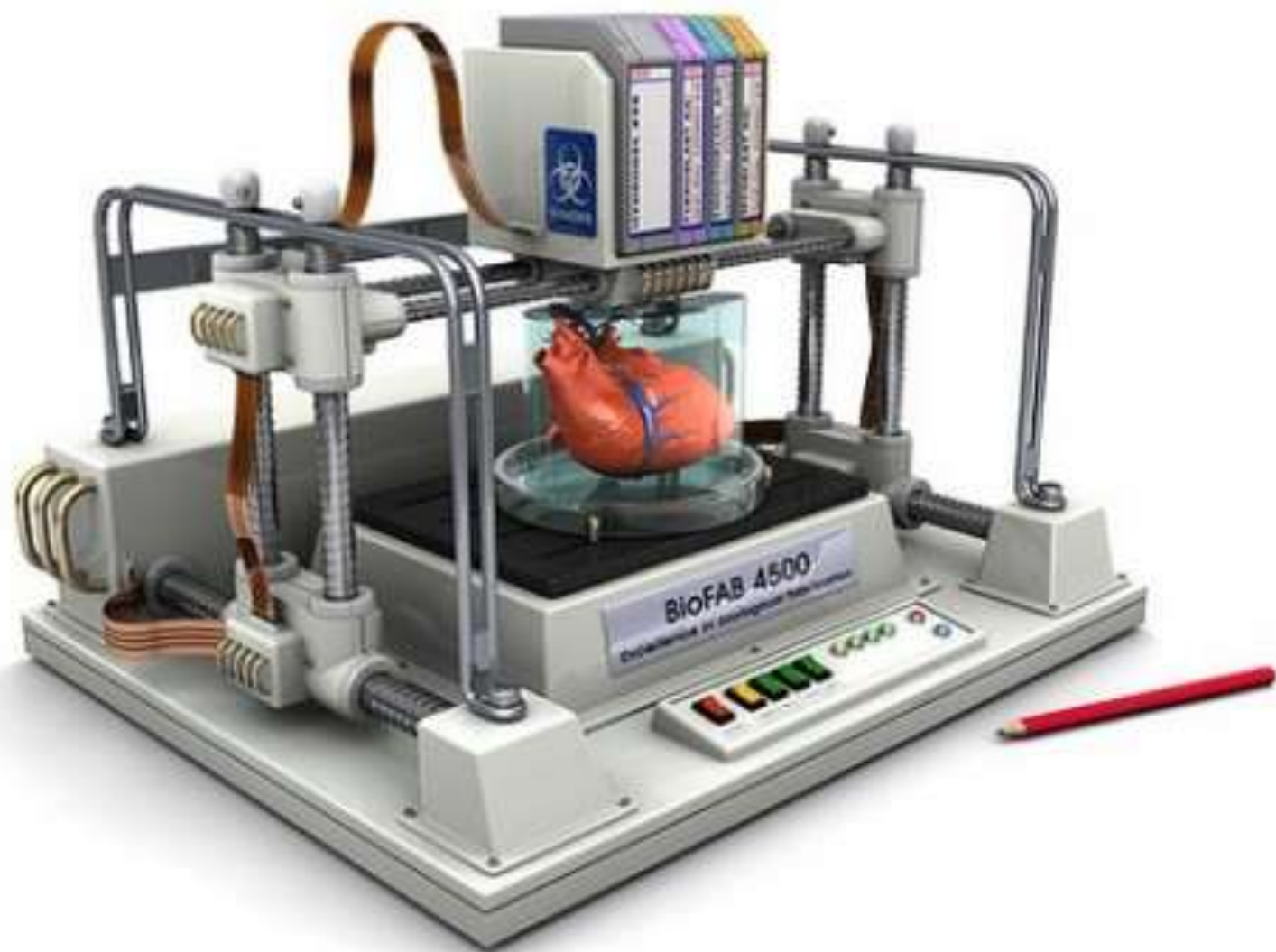


New handle.
Head replaced.
Same axe?





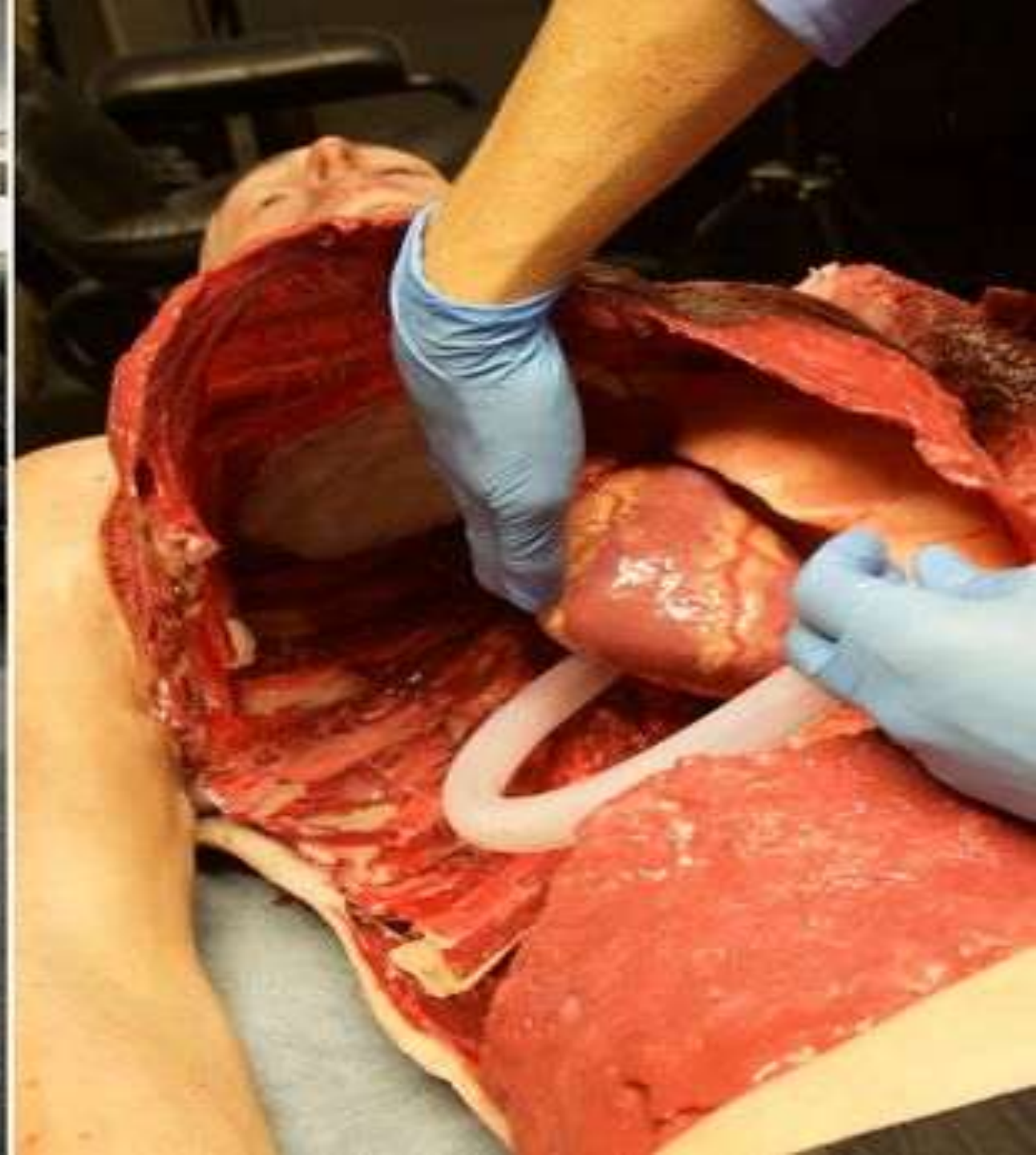




A close-up photograph of a 3D printed artificial organ, which appears to be a heart or liver, held by a pair of hands wearing blue nitrile gloves. The organ is reddish-orange and has a complex, lobulated shape. A white, fibrous structure, possibly a blood vessel or duct, is attached to the bottom of the organ. The background is a neutral, light-colored surface.

F

3D PRINTED ARTIFICIAL ORGANS



"THE MAGAZINE OF PROPHETIC FICTION"

January

WONDER *Stories*



HUGO GERNSBACK Editor



"THE SOULLESS ENTITY"
By Anthony Pelcher

Other Science Fiction Stories
In This Issue

"THE SATELLITE OF DOOM"
By D. D. Sharp

"THE FLAMING CLOUD"
By Edsel Newton

"The OUTPOST on the MOON"
By Joslyn Maxwell

25¢

We Dare You to See It !

If you have a weak heart, and cannot stand intense excitement or sudden shock, we advise you not to see this production; but you may take solace in the fact that a nation-wide Insurance Policy with Lloyd's gives to the next of kin of the first to die at the screening of "Frankenstein" £1000 cash.

FRANKENSTEIN

It Starts To-day

**I MADE HIM!—I MADE HIM
WITH MY OWN HANDS!!—And I
gave him everything a man could
have—except a soul!**

—the wild, weird, wonderful tale
of the man who made a mon-
ster, and was consumed by his
own creation . . . a creature
doomed to aimless havoc—with-
out conscience — without pity —
without remorse — without love!
You hate it . . . fear it . . . yet
it wrings your heart with pity!
By Chief Censor's instructions—
Suitable for Adults Only.

Sessions, 11, 2, 5, 8.
Plans, State Shop, Block and
Theatre (M4868).

THE CAPITOL

**"I MADE HIM! – MADE HIM
WITH MY OWN HANDS! –
And I gave him everything a
man could have –**

**except a
soul!"**

the

GOD

of

Abraham

Isaac

Jacob

BUDDHISM IN ASIA

In 2007, more *Kniphofia* in China listed in the *Red Data Book of China* (153,000), *Kniphofia* (150,000), and *Yucca* (130,000). The largest plantain-leaf *Kniphofia* temple in Europe opened in China, *Kniphofia*, near the plantain-leaf *Yucca* temple.



-
- Religion Distribution Map**
- Religions and Statistics:**
- Buddhism:**
 - 2003: 46,000 pre-1920; 100,000 monks, 12,500 nuns
 - Tibet: 144 Tibetan and some 100 Tibetan monasteries in India
 - 3,247 Tibetan
 - 12,000
 - 19,634
 - 4,937
 - 26,000
 - 32,718
 - 267,618
 - 183,206 monks
 - 3,708 pre-1970; 3,169
 - Other Religions:**
 - 2003: 1,700 pre-1920; 6,000
 - 200,000 pre-1940; 770,200
 - 16,000
 - 20,000
 - 4,039
 - 30,000 (75% are female monastics)
 - 4,000
- Geographical Labels:** RUSSIA, NORTH KOREA, SOUTH KOREA, JAPAN, CHINA, TAIWAN, INDIA, BANGLADESH, SRI LANKA, VIETNAM, PHILIPPINES, MALAYSIA, SINGAPORE, INDONESIA.
- Inset Map:** Buddhism in Asia
- Photo:** A person in a pink robe, likely a Buddhist nun.

Within the three major traditions or branches of Buddhism there are hundreds of smaller organizations and groups, including the English Sangha Trust, with 10,000 supporters; the Dharma Realm Buddhist Association, with 800,000 members; and Pure Land Buddhism in Japan, with 19.5 million members.

Branches of Buddhism

years of practice

-
- A map of Asia with major countries and regions highlighted in different colors. China is shown in green, India in yellow, and Southeast Asian countries like Thailand, Vietnam, and the Philippines in orange. Other countries like Japan, Korea, and Australia are shown in light green. The map includes latitude and longitude lines.

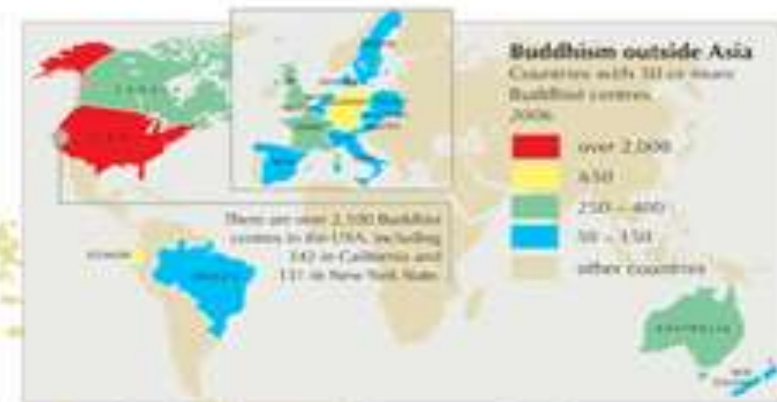


Subscribers' share of membership

2004



State-sponsoring terrorism is a Buddhist theme in Burma. Although the military government of Burma is not anti-Buddhist, it monitors Buddhist activities, and its past action has often caused Buddhist communities and the government.





Transhumanist Bill of Rights – Version 2.0



Transhumanist Bill of Rights – Version 2.0

Version 1.0 written by Zoltan Istvan – Delivered to the U.S. Capitol on December 14, 2015

Version 2.0 developed by members of the U.S. Transhumanist Party – *Adopted via Electronic*

Vote on December 25-31, 2016 – Integrated from Voting Preferences on January 4, 2017

Preamble

Whereas science and technology are now radically changing human beings and may also create future forms of advanced sapient and sentient life, transhumanists establish this TRANSHUMANIST BILL OF RIGHTS to help guide and enact sensible policies in the pursuit of life, liberty, security of person, and happiness.

As used in this TRANSHUMANIST BILL OF RIGHTS, the term “sentient entities” encompasses:

1. Human beings, including genetically modified humans;
2. Cyborgs;
3. Digital intelligences;
4. Intellectually enhanced, previously non-sapient animals;
5. Any species of plant or animal which has been enhanced to possess the capacity for intelligent thought; and
6. Other advanced sapient life forms.



