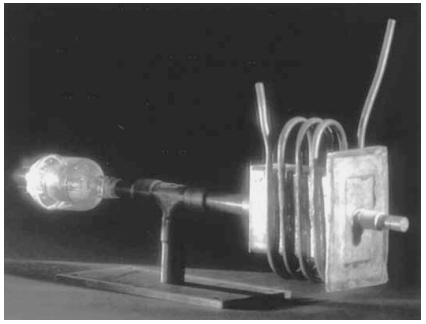
1955 – 1957

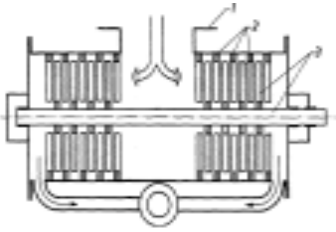
Willi Becker
Multi-stage turbine (turbomolecular) pump concept
1955

Harrison E. Farnsworth
Ion beam sputtering of crystals for surface studies
1956

John Bardeen (1908-1991), Walter Houser Brattain (1902-1987), and William Bradford Shockley (1910-1989)
Nobel Prize in Physics for discovery of transistor effect
1956

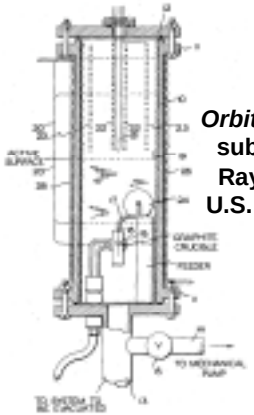


Lewis D. Hall, Robert L. Jepsen and John C. Helmer
Vaclon® (sputter-ion) pump based on Penning discharge — all electronic pump
1957

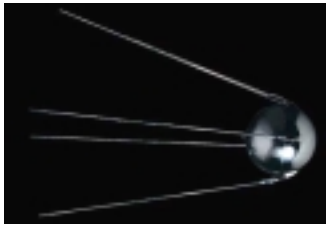


Turbomolecular pump
Willi Becker
German Patent 1010235
1957

Compactron multipurpose tubes for television sets
1955



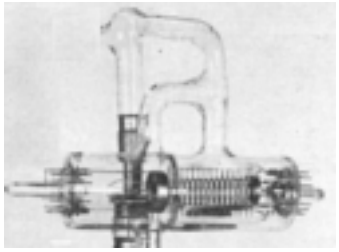
Orbitron titanium ion sublimation pump
Raymond G. Herb
U.S. Patent 2850225 (1958)
filed 1955



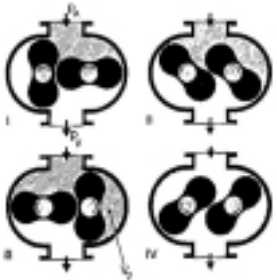
Start of the "Space Age"
First artificial satellite launched
Sputnik I - U.S.S.R.
October 4, 1957

Mars Hablanian
Axial flow, thin-bladed automotive supercharger at high vacuum – Showed air compressors make good vacuum pumps, confounding existing theory
1957

Silicone diffusion pump fluid
Dow Corning DC-704
1956



Peter F, Varadi and L. G. Sebestyén
Linear rado-frequency partial pressure analyzer
1955



Commercial Roots vacuum pump
Leybold Company
1955

Vacuum Deposition of Thin Films
by Leslie A. Holland
published
1956

Nixie Display Tubes
1957

CERN 600 MeV Synchro-Cyclotron (SC) starts operation
1957

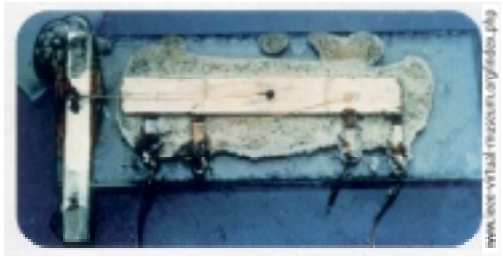
Society of Vacuum Coaters (SVC) first Symposium
1957

Committee on Vacuum Techniques renamed The American Vacuum Society
1957-1958

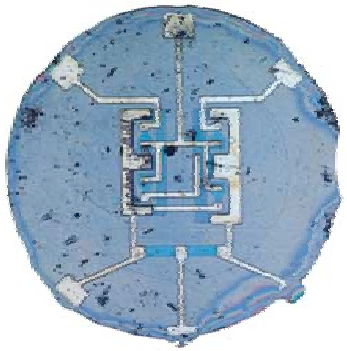
1958 –1959

John Peter Hobson
(1925-2003)

Paul Aveling Redhead
(1924-2005)



One of first integrated circuits
built by Jack Kilby
Texas Instruments
c. 1958

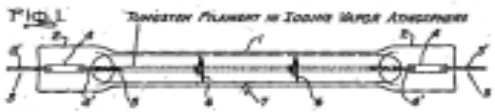


Fairchild Semiconductor

Resistor-transistor
logic (RTL) chip
c. 1958

Varian Klystron (VA-842)
Liquid-cooled, multicavity
radar transmitting tube - the largest
documented production klystron
1959

J. P. Hobson and
P. A. Redhead
Inverted magnetron UHV
cold-cathode gauge
1958



Elmer G. Fridrich and Emmett H. Wily
Tungsten-halogen lamp
U.S. Patent 2883571 (1959)
1958

Viton® fluorocarbon
elastomers
E. I. du Pont de Nemours & Co.
c. 1959

IBM 709 computer
Last major vacuum
tube computer
Magnetic core memory
1958

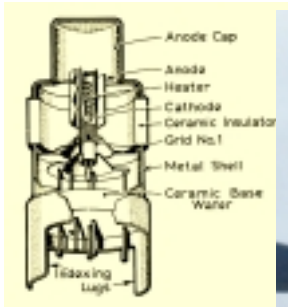
VacSorb® cryosorption
roughing pump
Varian Associates
1958

First of a series of
amateur-oriented
vacuum articles
published in
Scientific American
1958

International Organization
of Vacuum Science and
Technology (IOVST)
founded
1958

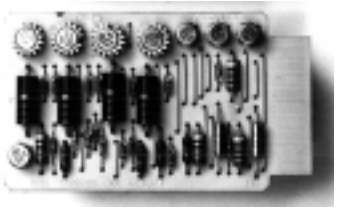
First AVS standard prepared
by the Standards and
Nomenclature Committee
Pergamon Press
1958

First International
Vacuum Congress
Namu, Belgium
1958

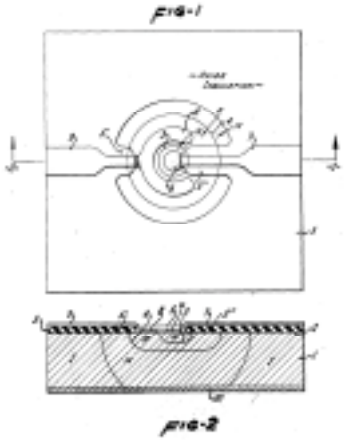


Nuvistor – c. 1 x 2 cm
1959

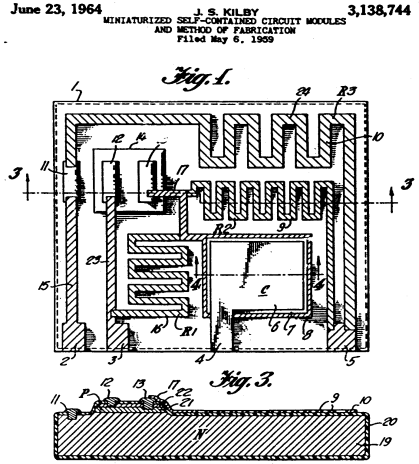
1959 – 1960



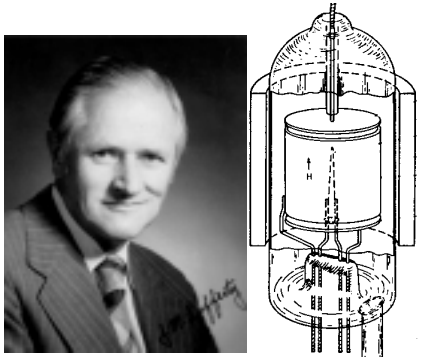
IBM 7090
First transistor computer
1959-1969



Monolithic Integrated circuit patent
Robert N. Noyce
U.S. Patent 2.981,877 – April 25, 1961
filed 1959

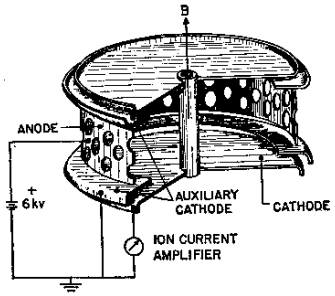


Hybrid Integrated circuit patent
Jack S. Kilby
U.S. Patent 3,138,744 – June 23, 1964
filed 1959



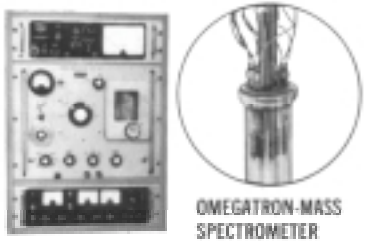
James Martin Lafferty
(1916-2006)
Hot-cathode magnetron ionization gauge
1960

Spinning-rotor vacuum gauge
(gas viscosity)
Jesse W. Beams
1960



Cold-cathode magnetron vacuum gauge
Paul A. Redhead
1959

Satellites become part of popular culture
Peanuts–Charles Schulz©
15 November 1959



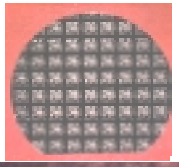
Commercial Omegatron Mass Spectrometer
A. Klopfer and W. Schmidt
(Edwards High Vacuum, Inc)
1960

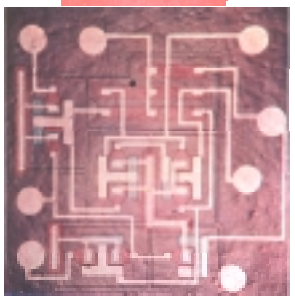
1960 – 1962

First use of quadrupole RF mass spectrometer as residual gas analyzer
1960

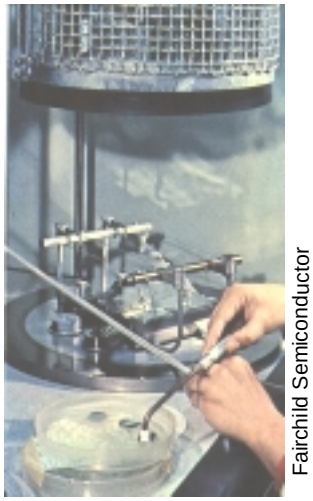
Helium-neon gas laser
Ali Javan (at left), W. R. Bennett and D .R. Herriott
1960

Gilbert Reiling
(U. S.)
Metal-halogen incandescent lamp
U.S. Patent 3234421
(1966)
filed 1961





Integrated logic circuit
1-inch diameter wafer
Fairchild Semiconductor
1961



Fairchild Semiconductor

Vacuum evaporated aluminum for integrated circuit contacts
1961

William Ross Aiken
(1919-)
Cathode-ray tube display for aircraft and 14" thin CRT
1960

10^{-13} torr in 2 ft. diameter vacuum chamber using helium-cooled cryogenic traps and baffles
National Research Corp.(NRC)
1960

C. H. Kruger and A. H. Shapiro
Statistical theory of turbo-molecular pumping
1961

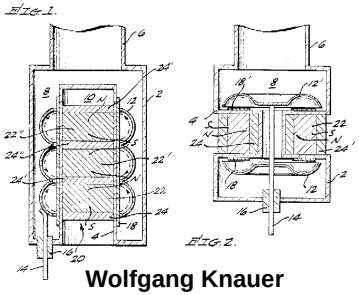
Diatron-20 magnetic sector mass spectrometer residual gas analyzer bakeable to 500°C
Consolidated Electrodynamics Corp. / Eitel-McCullough
1961

First industrial ion implanter delivered
1960

1000 liter/ sec Getter-ion pump
Varian Associates. Inc
1960

Very large sorption pumps for roughing large chambers
Varian Associates, Inc.
NASA
1961

Gerald. S. Anderson and Roger Moseson
Radio-frequency sputter deposition
U.S. Patent 3,233,137
1961



Wolfgang Knauer
Ion pump with post and planar magnetron cathodes
U.S. Patent 3216652 (1965)
filed 1962

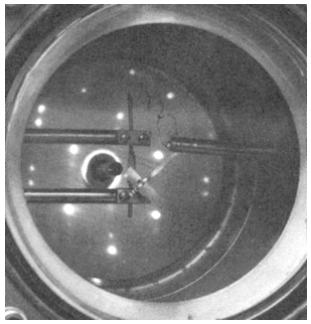
L. L. Levenson, Norman Milleron and D. H. Davis
Computation of vacuum conductances using Monte Carlo simulations
1960

2000 cu. ft. space chamber
U. S. Air Force
1960

First AVS Division formed – Vacuum Metallurgy
1961

UHV (CF) metal-gasket captured step-seal
William R. Wheeler
1961

1962 – 1964

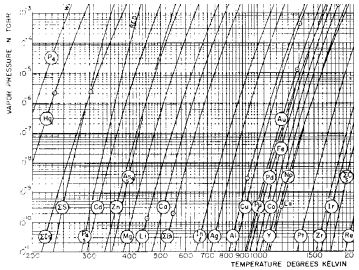


Low energy electron diffraction (LEED) image from nickel
Varian
1962

The Next Revolution in Electronics
14 April 1962

IOVST becomes International Union for Vacuum Science Techniques, and Applications (IUVSTA)
1962

150 ft. diameter radio telescope dish for radar and communications
Stanford University
1960s



Richard E. Honig
Publishes "Vapor Pressure Data for the Solid and Liquid Elements" in *RCA Review*
(updated in 1969by Honig and Dean A. Kramer)
1962

A partial pressure of 10^{-17} torr measured with magnetic-sector mass spectrometer
William D. Davis
1962

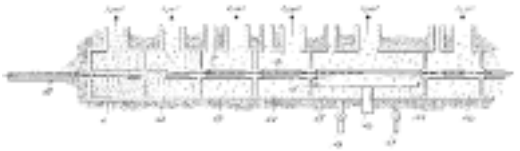
First AVS Section founded
Pacific Northwest
(Sections are now AVS Chapters)
1962

Varian Clinac x ray machine for cancer radiation therapy
1963

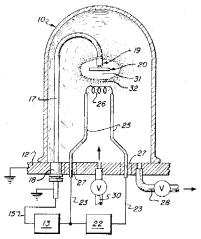
Varian VA-126
High-power traveling wave tube
1962

Apollo Lunar Exploration Program started
NASA
1963

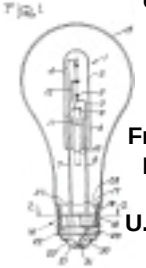
"Ultrahigh Vacuum"
H. A. Steinherz and P. A. Redhead
Scientific American
March 1962



Sidney S. Charschan and Harald Westgaard
Air-to-vacuum inline reactive sputter desposition system
U.S. Patent 3294670 (1966)
filed 1963



Donald M. Mattox
Deposition by plasma-enchanced thermal evaporation – *Ion Plating*
U.S. Patent 3329601 (1967)
1963



Frederick A. Mosby
Improved halide-tungsten lamp
U.S. Patent 3243624 (1966)
filed 1963

Quadrupole mass spectrometer sold by Electronics Associates, Inc. (EAI) to NASA as residual gas analyzer for space chamber research
1963

W. M. Brubaker, P. Michael Uthe, and Robert Finnigan
Commercial quadrupole mass spectrometer residual gas analyzer
1964

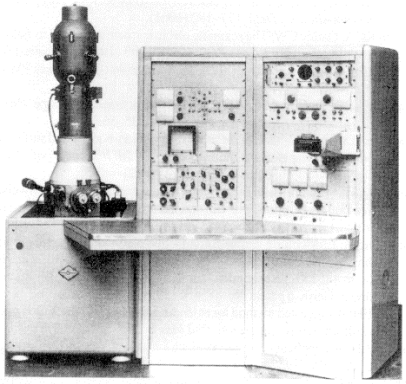
First commercial monopole residual gas analyzer
General Electric
1964

Touch-Tone phone with thin-film resistor arrays
Western Electric
1964

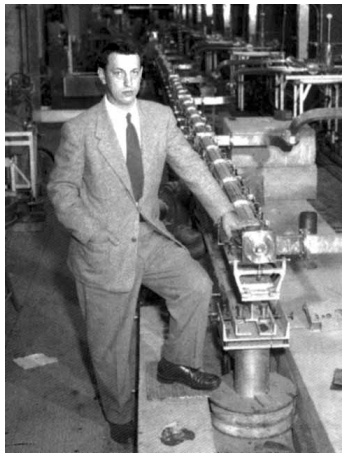
J. English, B. Fletcher and Walter Steckelmacher develop wide-range Pirani vacuum gauge
1964

Journal of Vacuum Science & Technology
Vol. 1, No. 1, Sept./ Oct.
1964

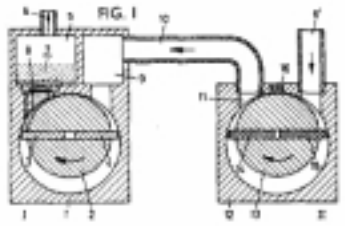
1965 – 1968



Cambridge Instrument Co.
Stereoscan Scanning Electron
Microscope prototype
1965

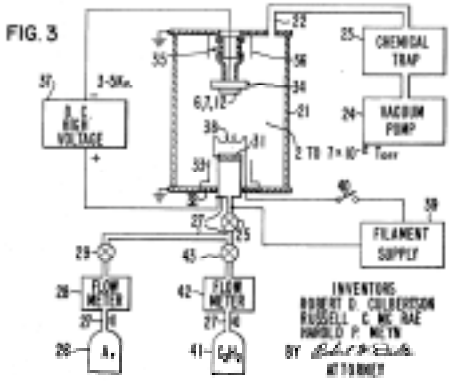


Stanford Linear Accelerator (SLAC)
2-mile long vacuum tube
Invented by William Hansen,
Developed by Edward Ginzton (pictured),
Completed under the
direction of Wolfgang Panofsky
1966

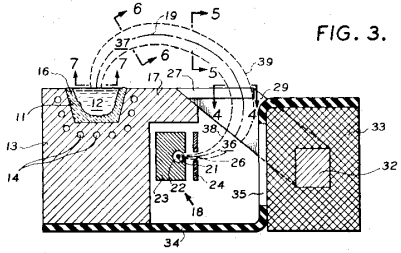


Rudolph Brand
Dry pump with nitrogen ballast
British Patent 1178265 (1967)
filed 1966

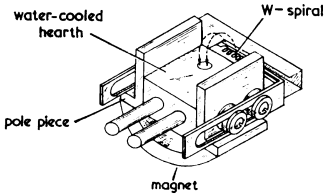
Gordon Moore and Robert Noyce
Found Intel Corporation
July 1968



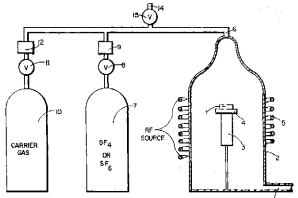
Plasma-enhanced chemical vapor deposition
of metal carbides
Robert D. Culbertson, Russell G. Mc Rae,
and Harold P. Meyn
U.S. Patent 3604970 (1971)
1967



Charles W. Hanks
270° bent-beam electron-beam
gun evaporation source
U.S. Patent 3535438 (1970)
filed 1968

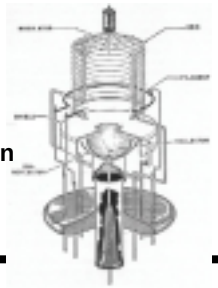


Leslie A. Holland
Magnetically-focused
180° bent-electron-beam
evaporation source
1965



Harold M. Manasevit
Radio-frequency oxide
plasma etching
U.S. Patent 3546036 (1970)
filed 1966

Vacuum-pneumatic
subways proposed for
urban and intercity
transportation
1965



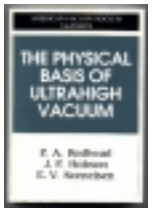
Paul A. Redhead
Extractor ionization
vacuum gauge
1966

John C. Helmer
and W. H. Hayward
Bent-beam (Helmer)
vacuum gauge
1966

Domestic
microwave oven
1967

Fomblin ®
perfluoropolyether
vacuum fluids and
lubricants
Montedison SpA
c. 1967

Roland Weber
LEED/Auger Spectrometer
1967

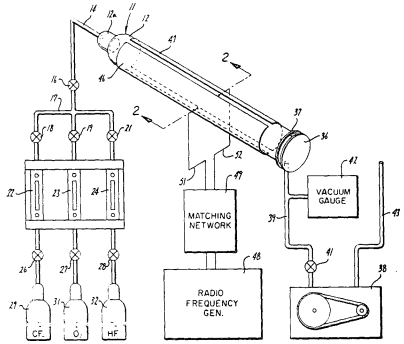


AIP
Reprint
1993

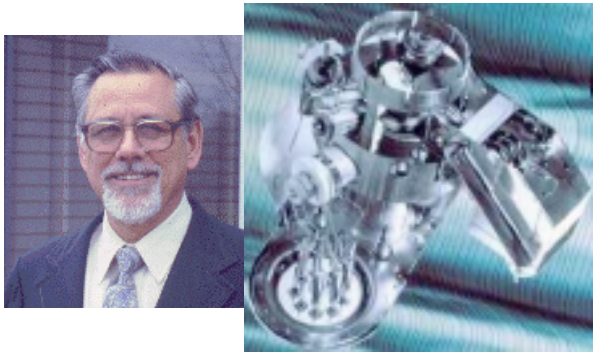
The Physical Basis
of Ultra-high Vacuum
Paul A. Redhead, J. Peter Hobson
and Ernest V. Kornelsen
1968

1969 – 1971

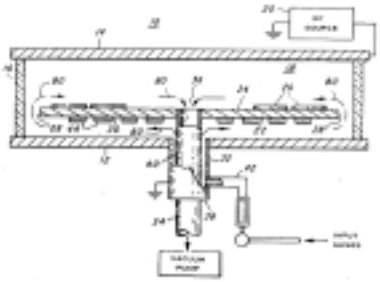
K. H. Mirgel
Vertical uni-directional turbomolecular pump
1969



Plasma etching of semiconductors
Steven M. Irving, Kyle Eugene Lemons, and George E. Bobos
U.S. Patent 3615956 (1971)
filed 1969



Russell D. Young
Topografiner – precursor to the scanning tunneling microscope – required a vacuum environment
1971

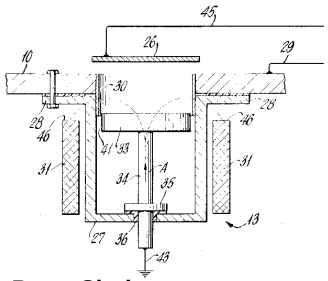


Alan K. Reinberg
Radio-frequency plasma deposition
U.S. Patent 3757733 (1973)
filed 1971

A. Y. Cho, John R. Arthur, et al.
Molecular-beam epitaxy
1969-1970

Structure Zone Model of thin film growth
B. A. Movchan and M. V. Demchishin
1969

Walter Steckelmacher and Brian Fletcher
Convection thermal conductivity vacuum gauge that measures up to one atmosphere
c. 1971



Joseph Peter Clarke
(1931-2002)
Cylindrical and conical magnetron sputter deposition sources
U.S. Patent 3616450 (1971)
filed 1968

Apollo 11
First Moon Landing
1969

DC 704 & DC 705 tetramethyl tetraphenyl trisiloxane pump fluids
Dow-Corning Co.
c. 1970

Alan S. Penfold and John A. Thornton
Post magnetron sputter deposition source
U.S. Patent 3884793 (1975)
filed 1971

Association of Vacuum Equipment Manufacturers (AVEM) founded
1969

Handbook of Thin Film Technology
Leon I. Maissel and Reinhard Glang, editors
McGraw-Hill 1970

Commercial scanning electron microscope
Cambridge Instruments, U. K.
1970

San Marco 3 Satellite carries Omegatron mass spectrometer instrument
Italian Space Commission and NASA
1971