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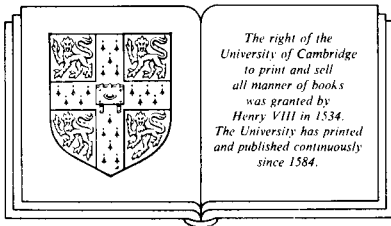
# HISTORY OF BRITISH SPACE SCIENCE

*SIR HARRIE MASSEY FRS*

Late Emeritus Professor of Physics, University College London

*M.O. ROBINS CBE*

Formerly Director of Astronomy Space and Radio, and of Science,  
Science Research Council



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## *Glossary of abbreviations in the text and annexes*

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Where the initials refer to a French title, the English version is given.

ABRC	Advisory Board for the Research Councils
ACSP	Advisory Council on Scientific Policy
AMPTE	Active Magnetospheric Particle Tracer Explorers
APGC	Astronomy Policy and Grants Committee
ARD	Astrophysics Research Division
ASRB	Astronomy Space and Radio Board
AURA	American Association for Research in Astronomy
AWG	Administrative Working Group
AWRE	Atomic Weapons Research Establishment
BAC	British Aircraft Corporation
BNCSR	British National Committee on Space Research
CERN	European Organization for Nuclear Research
COPERS	European Preparatory Commission for Space Research
COSPAR	Special Committee on Space Research
CSAGI	Special Committee for the International Geophysical Year
CSP	Council for Scientific Policy
DOE	Design of Experiments Sub-committee
DSIR	Department of Scientific and Industrial Research
ELDO	European Launcher Development Organization
ESA	European Space Agency
ESC	European Space Conference
ESDAC	European Space Data Centre
ESF	European Science Foundation
ESLAB	European Space Laboratory
ESRANGE	European Space Range
ESTEC	European Space Technology Centre
ESRO	European Space Research Organization

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ESTRACK	European Space Tracking Network
EUV	Extreme Ultra-violet
EXOSAT	European X-ray Observatory Satellite
FOC	Faint Object Camera
GEOS	Geostationary Magnetospheric Satellite
GSFC	Goddard Space Flight Center
GTST	Scientific and Technical Working Group
HEAO	High Energy Astronomical Observatory
HEOS	Highly Eccentric Orbit Satellite
IAF	International Astronautical Federation
IAU	International Astronomical Union
ICSU	International Council of Scientific Unions
IGY	International Geophysical Year
INCOSPAR	Indian Committee on Space Research
IQSY	International Year of the Quiet Sun
IRAS	Infra-red Astronomy Satellite
ISEE	International Sun Earth Explorer
IUB	International Union of Biochemistry
IUBS	International Union of Biological Sciences
IUE	International Ultra-violet Explorer
IUGG	International Union of Geodesy and Geophysics
IUPAC	International Union of Pure and Applied Chemistry
IUPAP	International Union of Pure and Applied Physics
IUPS	International Union of Physiological Sciences
IUTAM	International Union of Theoretical and Applied Mechanics
JPL	Jet Propulsion Laboratory
LAS	Large Astronomical Satellite
LPAC	Launching Programmes Advisory Committee
LST	Large Space Telescope
NACA	National Advisory Committee for Aeronautics
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NEDC	National Economic Development Council
NIRNS	National Institute for Research in Nuclear Science
NRDC	National Research Development Corporation
OAQ	Orbiting Astronomical Observatory
OSO	Orbiting Solar Observatory
PSAC	President's Science Advisory Committee

*Abbreviations*

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PSSAB	Provisional Space Science Advisory Board
PSSB	Provisional Space Science Board
RAE	Royal Aircraft Establishment
RPE	Rocket Propulsion Establishment
RRS	Radio Research Station
RSRS	Radio and Space Research Station
SAS	Small Astronomical Satellite
SCOSTEP	Special Committee on Solar and Terrestrial Physics
SERC	Science and Engineering Research Council
SMM	Solar Maximum Mission
SPC	Science Programme Committee
SPGC	Space Policy and Grants Committee
SPM	Solar Polar Mission
SRC	Science Research Council
SRMU	Space Research Management Unit
SSB	Space Science Board
SSC	Space Science Committee
ST	Space Telescope
STC	Scientific and Technical Committee
SUPARCO	Pakistan Space and Upper Atmosphere Research Council
TADREC	Tracking and Data Recovery Sub-Committee
TD-1	Thor-Delta 1 (Satellite)
TD-2	Thor-Delta 2 (Satellite)
TMA	Trimethylaluminium
UKAEA	United Kingdom Atomic Energy Authority
UNESCO	United Nations Educational and Scientific Committee
URSI	International Union of Radio Science
UVAS	Ultra-violet Astronomy Satellite
WRE	Weapons Research Establishment
acu	attitude control unit
elf	extremely low frequency
rf	radio frequency
vhf	very high frequency
vlf	very low frequency

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## *Glossary of abbreviations in the appendices*

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AFCLR	Air Force Cambridge Research Laboratories
AL	Appleton Laboratory of the Science and Engineering Research Council
ARD	Astrophysics Research Division of the AL
ARU	Astrophysics Research Unit of the Culham Laboratory
ASE	American Science and Engineering Inc.
BAC	British Aircraft Corporation
Bel	Queen's University, Belfast
Bir	University of Birmingham
Bkb	Birkbeck College University of London
Bn	University of Bergen
Bri	University of Bristol
BTI	Braunschweig Technical Institute
Camb	University of Cambridge
CNIE	Comisión Nacional de Investigaciones Espaciales, Argentina
CRC	Communications Research Centre, Ottawa
CRESS	Center for Research in Experimental Space Science, University of York, Toronto, Canada
Cul	Culham Laboratory of the UK Atomic Energy Authority
DFVLR	Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt EV
EMIE	EMI Electronics Ltd London
ESTEC	European Space Technology Centre
Gr	Technical University Graz
GSFC	Goddard Space Flight Center of NASA
HCO	Harvard College Observatory
Hd	University of Heidelberg
IC	Imperial College of Science and Technology, London
ISRO	Indian Space Research Organization
JB	Jodrell Bank, Nuffield Radio Astronomy Laboratories
KTH	Royal Institute of Technology Stockholm
Lei	University of Leicester

*Abbreviations*

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MIT	Massachusetts Institute of Technology
MO	Meteorological Office
MPG	Max Planck Institute Garching
MPI	Max Planck Institute
MSSL	Mullard Space Science Laboratory, University College London
NASA	National Aeronautics and Space Administration
NDRE	Norwegian Defence Research Establishment
NRDE	Norwegian Research and Development Establishment
Oxf	Oxford University
PRL	Physical Research Laboratory, Ahmedabad
RAE	Royal Aircraft Establishment, Farnborough
ROE	Royal Observatory Edinburgh
RRS	Radio Research Station, later RSRS
RSRS	Radio and Space Research Station, later Appleton Laboratory
Shf	University of Sheffield
SSC	Swedish Space Corporation
Sth	University of Southampton
Sx	University of Sussex
Tb	University of Tübingen
UA	University of Adelaide
UCB	University of California, Berkeley
UCL	University College London
UCW	University College of Wales, Aberystwyth
UIO	Uppsala Ionospheric Observatory
WRE	Weapons Research Establishment, Australia



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## PREFACE

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Space Science in Britain was initiated, and the foundations for its development were laid, very largely by one man, the late Sir Harrie Massey. Sadly, his untimely death in November 1983 occurred before this Preface could be written, but the main text of the History was complete. It bears witness to the enormous contribution which he made through his vision, foresight and determination. With the close co-operation of the late Sir David Martin, then Executive Secretary of the Royal Society, and the late Roger Quirk, then a senior member of the Ministry for Science, Massey as Chairman of the British National Committee on Space Research, took the lead in harnessing the essential components for a British Space Science programme.

The resulting combination of science, mainly from university departments of physics, and technology, mainly from government research establishments, supported by government funds and backed by electronic and aerospace firms in British industry, proved to be very successful and more than able to hold its own with the tightly organized Space Agencies of other countries. Massey always believed that his first duty lay with British Universities, but his vision extended far beyond those boundaries. From the mid-1950s to the end of his life he was tireless in stimulating and encouraging international co-operation in the furtherance of space science. The extensive and highly successful joint programme between Britain and the USA, the genesis and development of the European Space Research Organization, later to become the European Space Agency, the Commonwealth Collaborative Programme and many aspects of the work of COSPAR and of the European Science Foundation, all bear the marks of Massey's genius for leadership in co-operative programmes of science.

The concept of this History arose during discussions between the two

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authors in 1978. We realized that the scale of global space science had already outstripped the scope of a concise History. However, we thought that the time was ripe for the compilation of a History of the British contribution to the first 25 years or so of the subject, whilst memories were still relatively fresh and many of the leading participants still available for consultation. We believed also that there would be merit in putting on record how a new branch of science had actually been started and developed; how the resources of scientific manpower, the technological skills and not least the financial support, could be co-ordinated and brought together to achieve very complex and precise objectives.

We were very fortunate in enlisting the encouragement and support of Sir Geoffrey Allen, the Chairman of the then Science Research Council. This culminated in a Commission from the Science and Engineering Research Council in 1981 to prepare the present History. Whilst the activities of the first few years can readily be described in chronological order, the many parallel strands into which the programmes have developed necessitate a corresponding subject division in later chapters. Throughout, we have tried to give sufficient of the scientific and technological background to enable the reader to appreciate the major British contributions which have been made to this global subject.

We are indebted to very many individuals and organizations for information, comment and permission to include photographs and diagrams.

We have relied heavily on the excellent documentation held in the archives of the Royal Society, and on the help we were given by its Executive Secretary Dr R.W.J. Keay, and his staff. A particular acknowledgment is due to Mr P. Wigley, who was tireless in his search for information and never failed us in following up the most obscure references. Similarly, we were greatly helped by records held in the Rutherford Appleton Laboratory of the SERC and by the advice of Mr J. Delury and Mr J. Reed. Dr M.A.R. Kemp of the SERC Swindon Office has assisted us in many administrative matters.

Professor F. Heymann and his staff of the Physics and Astronomy Department of University College London have supported us in a variety of ways, and our thanks are especially due to Mrs M. Burton, for many years Secretary to Sir Harrie Massey.

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