C.L. COWDREY, F.R.Ae.S.,M.S.A.E.
Manager,
Flight Development Establishment, Luton

Following his engineering training at the Regent Street Polytechnic in London, Mr. Cowdrey first joined D. Napier and Son Ltd. as an apprentice at the age of 15, and four years later he joined the Royal Flying Corps for service in the Great War, after which he returned to the aviation industry as an aircraft and installation designer at Fairey Aviation Limited. Following this, he joined the Hawker Aircraft Co. Ltd, and was Chief Draughtsman under Sir Sydney Camm.

In 1933, he joined Rolls Royce Ltd. to form the installation design team, and he found ample opportunity in his capacity as Chief Designer, Installations, for the development and use of new techniques and materials.

In 1940, he rejoined D. Napier and Son Ltd. to form and manage a new flight development establishment. During the second world war, the Flight Development Establishment at Luton was concerned with the Napier "Sabre" engine, the most powerful aero engine in the world at that time.

After the war, the facilities at Luton were extended and Mr. Cowdrey and his team were selected as one of the first to receive a contract for the design, development and manufacture of guided weapons. The Company now has the finest rocket motor test beds in England and is engaged on advanced developments in both the rocket motor and ram jet field.

Mr. Cowdrey, affectionately known as "CHY" by his colleagues, has gathered an enthusiastic and competent team around him in his 16 years as Manager at Luton, and was instrumental in the organisation of a comprehensive scheme for apprentices. He has also shown a lively interest in the activities of the Luton Branch of the Royal Aeronautical Society.

MR. K.H. GREENLY, B.Sc.(Eng)
A.F.R.Ae.S.,M.I.Ae.S.
Chief Engineer of the Napier Flight Development Establishment.

He was born in Watford, Herts, and received his technical training in the Faculty of Engineering, University of Southampton in 1926/29, graduating in 1929. He intended first to take up a career in civil engineering, but found mechanical engineering more to his liking, and joined the Experimental Department of the Associated Equipment Company, in the design of heavy vehicles.

He joined the Installation Design Section of D. Napier and Son Ltd, Acton in 1936 when the initial design of the Sabre engine was being undertaken. During the war years, the Company's interest centred on the Sabre, and his activities were likewise associated with the engine. He took an active part in the design of various power units, including the interchangeable power egg adopted for the Blackburn Firebrand. Mr. Greenly was transferred to the Luton Establishment in 1944, on the setting up of an aircraft design study section, to review applications of Napier engines, including the Naiad and the Nomad, to a variety of aircraft. He became Project Designer in 1948 and later was appointed Chief Installation Designer.

With the expansion of Luton interests to the de-icing field, he was closely associated with the conception and initial development of "Spraymat". Later he led the team engaged on the design and development of the Napier thermal ignition rocket engine, from which the double Scorpion was evolved. He was appointed Chief Engineer in 1953.

Mr. Greenly has taken an active interest in the Luton Branch of the Royal Aeronautical Society, and was Chairman in 1948, Vice-President in 1949 and President in 1950 and 1951.

MR. MICHAEL RANDRUP
Chief Test Pilot, D. Napier & Son Ltd.

Mike Randrup has been a test pilot since 1943. He started flying in 1935 and has logged over 5,000 hours in over 100 different types of aircraft.

Of Danish parents he came to this Country when still a very young child, later being educated at Kings School, Canterbury and later at the Chelsea School of Aeronautics. His first flight was a joyride in an Avro 504K.

At the age of 22 he obtained his pilots licence at the Kent Flying Club, Bekesbourne, near Canterbury, and before the war flew for, and managed, a small Air Charter Company which operated from Heston. The Company had three aircraft, a de Havilland Dragonfly, a Heston Phoenix, and a de Havilland Leopard Moth.

In 1940-41, he served in the R.A.F. as a flying instructor and spent a year in Rhodesia with Training Command. He transferred to Fighter Command in 1942 and flew Spitfires with 234 Squadron operating from Perranporth in Cornwall.

1943 saw Mr. Randrup flight testing production spitfires at Hamble and in 1944 he was transferred to the R.A.E. at Farnborough and the following year was appointed Officer Commanding Engine Research and Development Flight. While in the R.A.F. he rose to the rank of Squadron Leader.

Mr. Randrup was appointed Napier Chief Test Pilot in 1946 and he moved to the Company's Flight Development Establishment at Luton. He flight tested the first Napier gas turbine engine, the Naiad, the compound diesel Nomad, and is now engaged in the flight development of Eland propeller turbines. He made the proof flights in the Canberra P.R.9 and the Conway Ashton. When Mr.Randrup first came to the Company he tested the last of the Sabres, the 3,000 horse power Mark 7.

A married man, with two children, he spends his quieter moments fishing, but even in his spare time he enjoys hobby flying with Luton Flying Club.

MR. WALTER SHIRLEY, M.A.Cantab.
Deputy Chief Engineer

It was while Mr. Shirley was employed at the R.A.E. Farnborough during the war that he first flew as an engine observer with the Napier Chief Test Pilot, Mr. M. Randrup, who at that time was a Test Pilot there. Since then they have logged many hours together flying test aircraft.

Mr. Shirley was educated at Blackpool Grammar School and St. Catherines College Cambridge. A keen sportsman, he boxed for Cambridge on many occasions.

From September 1942 to May 1946 he was employed as a Scientific Officer at the R.A.E. Farnborough on various aspects of fuel and oil system development and also the flight development of power plants.

While at Farnborough, Mr. Shirley was sent to an R.A.F. Flying School and gained his pilot's licence. Since then he has logged 450 hours as a pilot and 300 hours as a Flight Test Observer. In 1946 he transferred to the Rocket Motor Development field and spent four months in Germany on the same work.

He joined D. Napier and Son Limited in 1947 and was Napier-Acton representative at Luton on Flight Development of turbine engines. Mr. Shirley joined the rocket design team at Luton in 1949 and in 1952 was appointed Chief Technician.

Four years later he was appointed Chief Development Engineer in charge of Scorpion engine development and design. This year he was appointed Deputy Chief Engineer at Luton.

A married man with two children, Mr. Shirley is a keen golfer, angler and a member of the Luton Flying Club.

MR. E.W. DAVIES
Chief Designer

Mr. 'Ted' Davies has been employed by D. Napier and Son Limited since 1937 after studying at the Acton Technical College.

He was first employed in the Installation Drawing Office and in 1940 he moved to Luton to join the design team being formed there. During those war years the design team handled many diverse installations, including the first Sabre power plants.

In 1950 he was appointed Assistant Designer, Propulsion, and it was in this capacity that he and his team designed the N.G.T.E. Ram Jet Test Vehicle, the Napier Thermal Ignition Missile Engine, the present range of Scorpion aircraft engines and the helicopter tip thrust unit.

This year Mr. Davies was appointed Chief Designer at Luton and is now responsible for all aircraft installations which include the Napier Eland Convair, Scorpion Canberra and other research aircraft.

A married man, Mr. Davies is the father of twins a boy and girl now aged five. His hobbies are tennis and photography.

Royal Aero Club announces that an attempt upon the Official World Aeroplane Altitude Record was made on August 28th by D. Napier and Son Limited from Luton Aerodrome, Bedfordshire.

The aircraft, a standard Canberra B.2 with a Napier Double Scorpion Rocket Engine was flown by Mr. Michael Randrup assisted by Mr. Walter Shirley. The aircraft took off at 5.26 p.m. and landed at 6.12 p.m.

Subject to confirmation, it would appear that the aircraft reached a height of 21336 metres (70,000 ft.) thus beating the present official world aeroplane altitude record of 20083 metres (65,890 ft.) established by Mr. Walter Gibb also in a Canberra B.2 aeroplane.

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A PRESS RELEASE FROM **NAPIER**

ISSUED BY THE PUBLIC RELATIONS DEPARTMENT OF D. NAPIER & SON LIMITED. THE VALE LONDON W.3

*For further information please contact -* THE PUBLICITY MANAGER

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DAY : Shepherds Bush 1220. NIGHT : Brixton 0149

Press Release No. 101. 30th August, 1957

Please observe embargo until 11.30 a.m., August 30th.

# NEW AEROPLANE ALTITUDE MADE WITH ROCKET ENGINE

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A new international altitude record, for aeroplanes, of 70,000 ft. (21,336 m.), has been set up, (subject to official confirmation), by the chief test pilot and a deputy chief engineer of the British engine company of D. Napier and Son, Ltd. This new record for Great Britain was made while they were flying in a Canberra aircraft fitted with a Napier Double Scorpion aircraft rocket engine.

The pilot was Mr. Mike Randrup, and with him was Mr. Walter Shirley. They have carried out an extensive flight test programme on the Scorpion rocket engine during the past 15 months from the Napier Flight Development Establishment at Luton. The record height was reached on August 28th, and was part of the rocket engine's test programme which is being done under Ministry of Supply contract. It had been anticipated that the existing record would be broken, and the Royal Aero Club representing the Federation Aeronautique

Internationale was asked to observe the flight for record purposes. The Napier company will submit the record to the F.A.I. for official confirmation. It will be the first claimed for an aircraft fitted with a rocket engine.

This is the third successive world altitude record for aeroplanes to be gained by an English Electric Canberra. Napier is a member of the English Electric Aviation Group, and is developing the Scorpion as a high altitude power unit for jet fighters to enable them to fly at heights where turbojets deliver only a fraction of their sea level power. It will shortly be in quantity production to meet orders already placed.

The previous altitude record of 65,889 ft. (20,083 m.) was set up on August 29th, 1955, by Wing Commander W. F. Gibb of the Bristol Aeroplane Company in a Canberra powered by two Bristol Olympus turbojets. That superseded the record of 63,668 ft. (19,406 m.) set up on May 4th, 1953 by Wing Commander Gibb in the same aircraft. To beat the record a minimum increase of three per cent. over the existing height has to be achieved. The new record set up by Randrup and Shirley is 7 per cent. above the old figure.

The Canberra took off from Luton Airport at 5.26 p.m. on August 28th, and made its initial climb to 44,000 ft. (13,411 m.), on its two Rolls-Royce Avon turbojets which are the standard engines fitted to Canberras. ~~It was then dived for a short distance, and again put into a climb. On this climb~~ The "Double Scorpion" was Han

brought into action, and with the power from this the Canberra's climb continued rapidly until the rocket was shut down at 70,000 ft. Practically all the thrust which carried the Canberra to the record altitude came from the Scorpion, which uses high test peroxide and kerosene for fuel. The power of the rocket is secret. The Avon turbojet engines were kept operating on the climb to 70,000 ft. but did little more than provide power for the aircraft's electric and hydraulic services, and maintain the cockpit pressurisation. The 26,000 ft. (7,924 m.) "zoom-climb" to the new record altitude was started while the aircraft was flying eastwards, south of the Isle of Wight. The highest altitude was reached at a point 20 miles (32 km) south of Shoreham.

During the last few months test flights with the Double Scorpion have been reaching progressively higher altitudes to determine in easy stages the behaviour of the rocket engine in the stratosphere. The Scorpion uses the high test peroxide as an oxidant. This is decomposed by a catalyst into free oxygen and super-heated steam, and then mixed with standard turbine kerosene in the combustion chamber. This combination of oxidant and fuel is self-igniting, and the Scorpion needs no high energy spark plug or other form of igniter. It can be repeatedly stopped and started at any height.

At extreme altitudes considerable pilot skill was needed to control the aircraft. The Canberra was a Mark 2 which, when it was built, was not intended to fly at 70,000 ft. At that height the stalling speed of the Canberra and the critical Mach number, or

the beginning of the effects of the "sound barrier", tend to converge. The margin between the stall and the critical Mach number when the Canberra reached the new record height was about 15 m.p.h. Considerable research into the problems of high altitude flying with Canberras has been carried out by the Aircraft Division of English Electric at Warton, Lancashire. All the information gathered in this research has been passed on to Napier to assist in the Scorpion test programme, and vortex generators which have been tested on the latest Canberra, the Mark 9, to assist airframe performance at very high altitudes were fitted to the Scorpion-Canberra.

A new type of pressure clothing was worn by Mr. Randrup and Mr. Shirley during their record flight. This was to protect them from the fatal effects of a sudden failure of the cockpit pressurisation system. The crew received valuable advice and help in using this clothing from the Royal Air Force Institute of Aviation Medicine at Farnborough.

To measure the record altitude accurately, a radio altimeter was used, and the readings filmed during the flight. This instrument transmits a radio impulse which is reflected back from the land or sea below and the time elapse is measured and converted into an altitude reading. The films from the altimeter were processed at the Royal Aircraft Establishment, and scrutinised by the Royal Aero Club stewards. Indespensible help was received from the Royal Aircraft Establishment in preparing for the record flight, and

in the whole of the high altitude test programme on the Scorpion rocket engine. This was the first time that a radio altimeter was used in an altitude record attempt. To enable the height above sea level to be measured directly the flight was made over the English Channel.

Napier began work on rocket engines eight years ago. It has extensive test and development facilities at Luton, including several test beds, an underground centrifuge capable of imposing alternate positive and negative acceleration loads of up to 100 "g" ("g" equals the force of gravity), and a firing site for ground tests on the Scorpion installed in the Canberra.

For further information please contact :-

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ACB/KAS

SPEECH BY MR.C.L.COWDREY, MANAGER OF FLIGHT DEVELOPMENT ESTABLISHMENT, LUTON AIRPORT, ON THE OCCASION OF THE PRESS RELEASE OF THE HEIGHT RECORD OBTAINED WITH A NAPIER SCORPION ROCKET ENGINE INSTALLED IN A CANBERRA B.2 AIRCRAFT

28th AUGUST, 1957

Gentlemen,

May I commence by introducing some of the members of our team at Luton who, later on, will be pleased to answer your technical queries.

I would like to emphasize that the record flight made from this aerodrome yesterday, is not a spectacular stunt; it is part of our high altitude development programme for the Scorpion rocket engine.

The aircraft was a standard English Electric B.2 Canberra, which was being used as a flying test bed for the Scorpion, and the record that we have obtained shows the versatility of the Canberra, particularly as we are operating at altitudes far above its original operational height.

In this connection I would like to pay tribute to Mr.Michael Randrup, our Chief Test Pilot, and Mr.Walter Shirley, our Deputy Chief Engineer, whose grand team work made this record a possibility. Those of you who have knowledge of high altitude flying, will be aware that the combination of the stall and mach number characteristics make piloting at this altitude a very skilful undertaking; the margin between success and catastrophe is very narrow. All those who have played their part on the ground in contributing to this success should be complimented, as this is the result of successful and persistent team work.

Brief history (Rocket engines).

This Establishment commenced work on the design and development of expendable missile motors in support of the English Electric Guided Weapon Division in 1948, and a successful series of engines was produced, samples of which can be seen here to-day. This engine uses

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hydrogen peroxide as an oxidant and kerosene as the fuel, and is based on the thermal ignition principle, which has contributed in the production of an efficient and safe rocket engine system.

Some two years ago, it was felt that there would be a demand for a non-expendable aircraft engine, and in January,1955, design and development work was commenced on the Scorpion series of engines. The first flight was made on the 19th March, 1956, approximately, 15 months after its inception. Since then many hours of flight development at all altitudes has been successfully achieved, including the successful completion of an official Type Test and flight and ground running under tropical conditions.

In our conception of this engine, we were determined that this should not be a scientific toy but just another aircraft engine, and in this respect it may be pointed out that of all the rocket engines produced in this country, this is the only one in which the short life units can be removed and replaced in 20 minutes, and this work can be accomplished by the normal Service personnel.

Programme:

The immediate programme that has been arranged for you is for an inspection of the installation of the Scorpion engine in the record breaking aircraft, followed by a demonstration in flight. At the conclusion of this demonstration we shall return to the marquee for 'any questions'.

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