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The dawn of amateur radio in the U.K. and Greece: a personal view

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C O N T E N T S

Prologue

Thales of Miletus.

Thales, who was born in 640 B.C., was a man of exceptional wisdom and one of the Seven Sages of Ancient Greece. He was the father of Greek, and consequently of European philosophy and science. His speculations embraced a wide range of subjects relating to political as well as to celestial matters. One must remember that even up to the 18th century there was no clear distinction between philosophy and science, both being products of the human mind in its attempts to explain reality.

Thales had studied astronomy in Egypt so he was able to draw up accurate tables forecasting when the River Nile would be in flood. But he first became widely known by anticipating an eclipse of the sun for May 585 B.C., which happened to coincide with the final battle of the war between the Lydians and the Persians. He had used some tables drawn up by Babylonian astronomers, but he did not succeed in forecasting the exact day (May 28th) or the hour of the spectacular event.

It can well be said that Thales was the first man ever recorded to have cornered the market in a commodity: having foreseen a three-year drought he bought up large quantities of olive oil and stored it for sale at a later date.

But who could possibly have imagined that one of Thales' original speculations would affect the Radio Amateurs of the 20th Century? He believed that certain inanimate substances, like lodestones (magnetic rocks) and the resin amber, possessed psyche (a soul).

Many centuries had to elapse before this soul was identified as static electricity and magnetism and harnessed for the generation of mains electricity which dramatically altered the pattern of life on our planet—and also led to the creation of our hobby of Amateur Radio.

About 400 years ago an English scientist called William Gilbert (1544-1603), who had read about the unexplained observation of Thales, also became interested in the intangible property and decided to call it electricity, from the classical Greek word for amber, which is electron.

CHAPTER ONE

THE DEVELOPMENT OF ELECTRICITY

The phenomenon which Thales had observed and recorded five centuries before the birth of Christ aroused the interest of many scientists through the ages. They made various practical experiments in their efforts to identify the elusive force which Thales had likened to a 'soul' and which we now know to have been static electricity.

Of all forms of energy, electricity is the most baffling and difficult to describe. An electric current cannot be seen. In fact it does not exist outside the wires and other conductors which carry it. A live wire carrying a current looks exactly the same and weighs exactly the same as it does when it is not carrying a current. An electric current is simply a movement or flow of electrons.

Benjamin Franklin, the American statesman and scientist born in Boston in 1706, investigated the nature of thunder and lightning by flying a child's kite during a thunderstorm. He had attached a metal spike to the kite, and at the other end of the string to which the kite was tied he secured a key. As the rain soaked into the string, electricity flowed freely down the string and Franklin was able to draw large sparks from the key. Of course this could have been very dangerous, but he had foreseen it and had supported the string through an insulator. He observed that this electricity had the same properties as the static electricity produced by friction.

> But long before Franklin many other scientists had carried out research into the nature of electricity.

In England William Gilbert (1544-1603) had noticed that the powers of attraction and repulsion of two non-metallic rods which he had rubbed briskly were similar to those of lodestone and amber—they had acquired the curious quality we call magnetism. Remembering Thales of old he coined the word

'electricity'.

Otto von Guericke (1602-1686) a Mayor of Magdeburg in Germany, was an amateur scientist who had constructed all manner of gadgets. One of them was a machine consisting of two glass discs revolving in opposite directions which produced high voltage charges through friction. Ramsden and Wimshurst built improved versions of the machine.

A significant breakthrough occurred when Alessandro Volta (1745-1827) in Italy constructed a simple electric cell (in 1799) which produced a flow of electrons by chemical means. Two plates, one of copper and the other of zinc, were placed in an acid solution and a current flowed through an external wire connecting the two plates. Later he connected cells in series (voltaic pile) which consisted of alternate layers of zinc and copper discs separated by flannel discs soaked in brine or acid which produced a higher electric pressure (voltage). But Volta never found the right explanation of why his cell was working. He thought the flow of electric current was due to the contact between the two metals, whereas in fact it results from the chemical action of the electrolyte on the zinc plate. However, his discovery proved to be of incalculable value in research, as it enabled scientists to carry out experiments which led to the discoveries of the heating, lighting, chemical and magnetic effects of electricity.

One of the many scientists and physicists who took advantage of the 'current electricity' made possible by Volta's cells was Hans Christian Oersted (1777-1851) of Denmark. Like many others he was looking for a connection between the age-old study of magnetism and electricity, but now he was able to pass electric currents through wires and place magnets in various positions near the wires. His epoch-making discovery which established for the first time the relationship between magnetism and electricity was in fact an accident.

While lecturing to students he showed them that the current flowing in a wire held over a magnetic compass needle and at right angles to it (that is east-west) had no effect on the needle. Oersted suggested to his assistant that he might try holding the wire parallel to the length of the needle (north-south) and hey presto, the needle was deflected! He had stumbled upon the electromagnetic effect in the first recorded instance of a wire behaving like a magnet when a current is passed through it.

A development of Oersted's demonstration with the compass needle was used to construct the world's first system of signaling by the use of electricity.

In 1837 Charles Wheatstone and William Cooke took out a patent for the world's first Five-needle Telegraph, which was installed between Paddington railway station in west London and West Drayton station a few miles away. The five copper wires required for this system were embedded in blocks of wood.

Electrolysis, the chemical decomposition of a substance into its constituent elements by the action of an electric current, was discovered by the English chemists Carlisle and William Nicholson (1753-1815). If an electric current is passed through water it is broken down into the two elements of which it is composed—hydrogen and oxygen. The process is used extensively in modern industry for electroplating. Michael Faraday (1791-1867) who was employed as a chemist at the Royal Institution, was responsible for introducing many of the technical terms connected with electrolysis, like electrolyte for the liquid through which the electric current is passed, and anode and cathode for the positive and negative electrodes respectively. He also established the laws of the process itself. But most people remember his name in connection with his practical demonstration of electromagnetic induction.

In France Andre-Marie Ampere (1775-1836) carried out a complete mathematical study of the laws which govern the interaction between wires carrying electric currents.

In Germany in 1826 a Bavarian schoolmaster Georg Ohm (1789-1854) had defined the relationship between electric pressure (voltage), current (flow rate) and resistance in a circuit (Ohm's law) but 16 years had to elapse before he received recognition for his work.

Scientists were now convinced that since the flow of an electric current in a wire or a coil of wire caused it to acquire magnetic properties, the opposite might also prove to be true: a magnet could possibly be used to generate a flow of electricity.

Michael Faraday had worked on this problem for ten years when finally, in 1830, he gave his famous lecture in which he demonstrated, for the first time in history, the principle of electromagnetic induction. He had constructed powerful electromagnets consisting of coils of wire. When he caused the magnetic lines of force surrounding one coil to rise and fall by interrupting or varying the flow of current, a similar current was induced in a neighbouring coil closely coupled to the first.

The colossal importance of Faraday's discovery was that it paved the way for the generation of electricity by mechanical means. However, as can be seen from the drawing, the basic generator produces an alternating flow of current.(A.C.)

Rotating a coil of wire steadily through a complete revolution in the steady magnetic field between the north and south poles of a magnet results in an electromotive force (E.M.F.) at its terminals which rises in value, falls back to zero, reverses in a negative direction, reaches a peak and again returns to zero. This completes one cycle or sine wave. (1Hz in S.I.units).

In recent years other methods have been developed for generating electrical power in relatively small quantities for special applications. Semiconductors, which combine heat insulation with good electrical conduction, are used for thermoelectric generators to power isolated weather stations, artificial satellites, undersea cables and marker buoys. Specially developed diode valves are used as thermionic generators with an efficiency, at present, of only 20% but the heat taken away from the anode is used to raise steam for conventional power generation.

Sir Humphry Davy (1778-1829) one of Britain's leading chemists of the 18th century, is best remembered for his safety lamp for miners which cut down the risk of methane gas explosions in mines. It was Davy who first demonstrated that electricity could be used to produce light. He connected two carbon rods to a heavy duty storage battery. When he touched the tips of the rods together a very bright white light was produced. As he drew the rods apart, the arc light persisted until the tips had burnt away to the critical gap which extinguished the light. As a researcher and lecturer at the Royal Institution Davy worked closely with Michael Faraday who first joined the institution as his manservant and later became his secretary. Davy's crowning honour in the scientific world came in 1820, when he was elected President of the Royal Society.

In the U.S.A. the prolific inventor Thomas Alva Edison (1847-1931) who had invented the incandescent carbon filament bulb, built a number of electricity generators in the vicinity of the Niagara Falls. These used the power of the falling water to drive hydraulic turbines which were coupled to the dynamos. These generators were fitted with a spinning switch or commutator (one of the neatest gadgets Edison ever invented) to make the current flow in unidirectional pulses (D.C.) In 1876 all electrical equipment was powered by direct current.

Today mains electricity plays a vital part in our everyday lives and its applications are widespread and staggering in their immensity. But we must not forget that popular demand for this convenient form of power arose only about 100 years ago, mainly for illumination.

Recent experiments in superconductivity, using ceramic instead metal conductors have given us an exciting glimpse into what might be achieved for improving efficiency in the distribution of electric power.

Historians of the future may well characterise the 20th century as 'the century of electricity & electronics'. But Edison's D.C. generators could not in themselves, have achieved the spectacular progress that has been made. All over the world we depend totally on a system of transmitting mains electricity over long distances which was originally created by an amazing inventor whose scientific discoveries changed, and are still changing, the whole world. His name was scarcely known to the general public, especially in Europe, where he was born.

Who was this unknown pioneer? Some people reckon that it was this astonishing visionary who invented wireless, remote control, robotics and a form of X-ray photography using high frequency radio waves. A patent which he took out in the U.S.A. in 1890 ultimately led to the design of the humble ignition coil which energises billions and billions of spark plugs in all the motor cars of the world. His American patents fill a book two inches thick. His name was Nicola Tesla (1856-1943).

Nicola Tesla was born in a small village in Croatia which at that time formed part of the great Austro-Hungarian Empire. Today it is a northern province of Yugoslavia, a state created after the 1914-1918 war. Tesla studied at the Graz Technical University and later in Budapest. Early in his studies he had the idea that a way had to be found to run electric motors directly from A.C. generators. His professor in Graz had assured him categorically that this was not possible. But young Tesla was not convinced. When he went to Budapest he got a job in the Central Telegraph Office, and one evening in 1882, as he was sitting on a bench in the City Park he had an inspiration which ultimately led to the solution of the problem.

Tesla remembered a poem by the German poet Goethe about the sun which supports life on the earth and when the day is over moves on to give life to the other side of the globe. He picked up a twig and began to scratch a drawing on the soil in front of him. He drew four coils arranged symmetrically round the circumference of a circle. In the centre he drew a rotor or armature. As each coil in turn was

energised it attracted the rotor towards it and the rotary motion was established. When he constructed the first practical models he used eight, sixteen and even more coils. The simple drawing on the ground led to the design of the first induction motor driven directly by A.C.electricity.

Tesla emigrated to the U.S.A. in 1884. During the first year he filed no less than 30 patents mostly in relation to the generation and distribution of A.C. mains electricity. He designed and built his 'A.C. Polyphase System' which generated three-phase alternating current at 25 Hz. One particular unit delivered 422 amperes at 12,000 volts. The beauty of this system was that the voltage could be stepped down using transformers for local use, or stepped up to many thousands of volts for transmission over long distances through relatively thin conductors. Edison's generating stations were incapable of any such thing.

Tesla signed a lucrative contract with the famous railway engineer George Westinghouse, the inventor of the Westinghouse Air Brake which is used by most railways all over the world to the present day. Their generating station was put into service in 1895 and was called the Niagara Falls Electricity Generating Company. It supplied power for the Westinghouse network of trains and also for an industrial complex in Buffalo, New York.

After ten years Tesla began to experiment with high frequencies. The Tesla Coil which he had patented in 1890 was capable of raising voltages to unheard of levels such as 300,000 volts. Edison, who was still generating D.C., claimed A.C. was dangerous and to prove it contracted with the government to produce the first electric chair using A.C. for the execution of murderers condemned to death. When it was first used it was a ghastly flop. The condemned man moaned and groaned and foamed at the mouth. After four minutes of repeated application of the A.C.voltage smoke began to come out of his back. It was obvious that the victim had suffered a horribly drawn-out death.

Tesla said he could prove that A.C. was not dangerous. He gave a demonstration of high voltage electricity flowing harmlessly over his body. But in reality, he cheated, because he had used a frequency of 10,000 cycles (10 kHz) at extremely low current and because of the skin effect suffered no harm.

One of Tesla's patents related to a system of lighting using glass tubes filled with fluorine (not neon) excited by H.F.voltages. His workshop was lit by this method. Several years before Wilhelm Roentgen demonstrated his system of X-rays Tesla had been taking photographs of the bones in his hand and his foot from up to 40 feet away using H.F.currents.

More astonishing still is the fact that in 1893, two years before Marconi demonstrated his system of wireless signaling, Tesla had built a model boat in which he combined power to drive it with radio control and robotics. He put the small boat in a lake in Madison Square Gardens in New York. Standing on the shore with a control box, he invited onlookers to suggest movements. He was able to make the boat go forwards and backwards and round in circles. We all know how model cars and aircraft are controlled by radio today, but when Tesla did it a century ago the motor car had not been invented, and the only method by which man could cover long distances was on horseback!

Many people believe that a modification of Tesla's 'Magnifying Transmitter' was used by the Soviet Union when suddenly one day in October 1976 they produced an amazing noise which blotted out all radio transmissions between 6 and 20 MHz. (The Woodpecker) The B.B.C., the N.B.C. and most broadcasting and telecommunication organisations of the world complained to Moscow (the noise had persisted continuously for 10 hours on the first day), but all the Russians would say in reply was that they were carrying out an experiment. At first nobody seemed to know what they were doing because it was obviously not intended as another form of jamming of foreign broadcasts, an old Russian custom as we all know.

It is believed that in the pursuit of his life's ambition to send power through the earth without the use of wires, Tesla had achieved a small measure of success at E.L.F. (extremely low frequencies) of the order of 7 to 12 Hz. These frequencies are at present used by the military for communicating with submarines submerged in the oceans of the world.

Tesla's career and private life have remained something of a mystery. He lived alone and shunned public life. He never read any of his papers before academic institutions, though he was friendly with some journalists who wrote sensational stories about him. They said he was terrified of microbes and that when he ate out at a restaurant he would ask for a number of clean napkins to wipe the cutlery and the glasses he drank out of. For the last 20 years of his life until he died during World War II in 1943 he lived the life of a semi-recluse, with a pigeon as his only companion. A disastrous fire had destroyed his workshops and many of his experimental models and all his papers were lost for ever.

Tesla had moved to Colorado Springs where he built his largest ever coil which was 52 feet in

diameter. He studied all the different forms of lightning in his unsuccessful quest for the transmission of power without wires.

In Yugoslavia, Tesla is a national hero and a well-equipped museum in Belgrade contains abundant proof of the genius of this extraordinary man.

CHAPTER TWO

THE BIRTH OF RADIO COMMUNICATIONS

By 1850 most of the basic electrical phenomena had been investigated. However, James Clerk Maxwell (1831-1879), Professor of Experimental Physics at Cambridge then came up with something entirely new. By some elegant mathematics he had shown the probable existence of electromagnetic waves of radiation. But it was twenty four years later (eight years after Maxwell's death) that Heinrich Hertz (1857-1894) in Germany gave a practical demonstration of the accuracy of this theory. He generated and detected electromagnetic waves across the length of his laboratory on a wavelength of approximately one metre. His own photograph of the equipment he had set up can be seen in the Deutsches Museum in Munich.

To detect the electromagnetic waves Hertz employed a simple form of oscillator, which he termed a resonator. But it was not sensitive enough to detect waves at any great distance. Before wireless telegraphy could become practicable, a more delicate detector was necessary.

Credit is due to Edouard Branly (1844-1940) of France for producing the first practical instrument for detecting Hertzian waves, the coherer. It consisted of two metal cylinders with leads attached, fitted tightly into the interior of a glass tube containing iron or steel filings. The instant an electric discharge of any sort occurred the coherer became conductive, and if it was tapped lightly its conducting property was immediately destroyed. In practice the tapping was done automatically by a tapper which came into action the moment the coherer became conductive.

In Russia the physicist Aleksandr Popov (1859-1905) had used a coherer while engaged in the investigation of the effects of lightning discharges. He suggested that such discharges could possibly be used for signaling over long distances. Old timers may remember that about 50 years ago Russian amateurs used to send out a QSL card with a drawing of Popov and a caption which claimed that he was 'the inventor of radio'.

In Italy, a young 22-year-old electrician became interested in electromagnetic radiation after reading papers by Professor Augusto Righi (1850-1921). It was Guglielmo Marconi (1874-1937), the son of a well-to-do landowner who lived in Bologna, and who was married to Annie Jameson of the well known Irish Whiskey family. Guglielmo, their second son, had his early education at a private school in Bedford, England, and later at Livorno and Florence in Italy. When he read about the experiments of Heinrich Hertz and about Popov's suggestion, he saw the possibility of using these waves as a means of signaling. His first transmitter, shown in the accompanying photograph, did not radiate very far. When he folded the metal plate into a cylinder and placed it on a pole 30 feet above the induction coil and connected to it by a vertical wire, he was able to detect the radiation nearly two kilometres away. Marconi realised that his signaling system would be most useful to shipping, and in those days England possessed the world's greatest navy and the world's biggest merchant fleet.

The Italian government was not interested in young Marconi's work, so after a family conference he was brought to London by his mother, who had influential relatives there. Not only did they finance his early experiments but they also put him in touch with the right sort of people. One of these was Alan A. Campbell Swinton who became the first President of the Radio Society of London (now the R.S.G.B.) many years later, in 1913. Campbell Swinton introduced the young Italian to William Preece, then Engineer-in-Chief of the British Post Office. Preece had already been investigating various methods of 'induction' telegraphy.

In a book entitled Wireless Telegraphy published in 1908, William J. White of the Engineer-in-Chief's department at the G.P.O. wrote,

> "The work of Sir (then Mr) William Preece, important though it was, did not attract the attention of the public to the extent that might have been expected. This was due to the fact that no sooner had he demonstrated a method of wireless telegraphy which was a commercial possibility than his system was superseded by another, and a better one, brought to England by Mr Guglielmo Marconi in 1896. The possibilities of Mr Marconi's system

were at once recognised by Mr William Preece. The experience of the elder and the genius of the younger man, who must be given the credit of having devised the first practical system for wireless telegraphy, combined to turn apparently disastrous failures into success, and now (in 1908), wireless telegraphy has become, in less than a decade, part and parcel of commercial and national life."

The world's first patent for wireless telegraphy was awarded to Marconi on the 2nd June 1896. In it he stated that "electrical action can be transmitted through the earth, air or water, by means of oscillations of high frequency." In the first public demonstration of his equipment Marconi spanned the 365 metres between the G.P.O. and Victoria street. Later, on Salisbury Plain, in March 1897, his signals were detected over 7 kilometres away. On the 11th & 18th May 1897 messages were first exchanged over water. On the 27th of March 1899, during naval manoeuvres, Marconi bridged the English Channel for the first time, a distance of about 140 kilometres. His transatlantic triumph came on the 12th December 1901 when the morse letter 'S' was transmitted from Poldhu, in Cornwall and received by Marconi himself at St. John's, Newfoundland, who recorded the historic event in his pocket book simply "Sigs at 12.20, 1.10 & 2.20".

The operation of Marconi's transmitter was itself quite spectacular. To produce the oscillations he employed the oscillator designed by Augusto Righi. Depressing the key closed the circuit and brought the inductor coil into action. Vivid sparks occurred between the balls of the oscillator, to the accompaniment of a succession of sharp cracks, like the reports of a pistol, and some energy was sent off the square metal plate in the form of trains of electromagnetic waves, which radiated out in all directions. But the energy occupied a very large bandwidth and the receivers of that period could not separate two transmissions. William J. White of the Post Office wrote in 1908, "The chief objection which has been raised against modern wireless telegraphy is its want of secrecy. With a transmitter sending out waves in all directions, it is possible for unscrupulous persons to receive the messages and make an improper use of them. This form of 'scientific hooliganism' has, in fact, become somewhat notorious. When two or three transmitters are each sending out their electromagnetic waves, the result, naturally, is utter confusion." White added that the British Postal Administration was refusing to grant licences for more than one system in the same area, in spite of the fact that there had been some 'alleged' solutions of the problem. The phenomenon of resonance was known and Dr (later Sir Oliver) Lodge had taken out various patents between 1889 and 1898 in connection with receivers. Marconi and his assistants ultimately solved the problem by modifying Lodge's syntonic Leyden jar tuned circuit. They added a tapped inductance in the aerial circuit of the transmitter and used variable capacitors instead of fixed ones. This was probably the most significant modification made in the development of wireless telegraphy. (In Greek the word syntonismos 'to bring to equal tone' is used for 'tuning'.)

Apart from the patents taken out by Sir Oliver Lodge and Dr Alexander Muirhead, in 1897, patents were taken out in Germany by Professor Braun of Strasbourg, who was joined by Professor Slaby and Count D'Arco in 1903 to form the Telefunken company, and in the U.S.A. by Dr Lee De Forest of the American De Forest Wireless Telegraph Company who was the first to use a high A.C. voltage of 20,000 volts to obtain the necessary high-potential discharges, thus dispensing with the induction coil. Again in the U.S.A., Professor R.O.Fessenden was responsible for the design of new types of transmitting and receiving apparatus.

During this period Marconi had resisted all offers by financiers to acquire his patents. In July 1897 he entrusted his cousin Jameson Davis to form The Wireless Telegraph & Signal Company Ltd which soon became Marconi's Wireless Telegraph Co., and ultimately the Marconi Company.

William Preece of the Post Office detached one of his assistants, George S. Kemp, to help Marconi. Kemp was destined to become his right-hand man and served Marconi faithfully throughout his life. By today's standards, Marconi can be said to have been a highly successful entrepreneur. He had the great knack of selecting the right man for the job, and inspired deep loyalty in his staff. He regarded himself as an 'amateur' and often paid tribute to the work of radio experimenters.

(Most of the above passages are quoted from 'A History of the Marconi Company' by W.J.Baker, published by Methuen & Co Ltd. reprinted in 1979.)

CHAPTER THREE

THE RADIO AMATEUR MOVEMENT

From the turn of the century enthusiastic young men who built their own items of electrical and wireless apparatus were known as "Wireless Experimenters". Many of them were later granted licences

for the use of "Wireless Telegraphy for experimental purposes" (in the United Kingdom) by the Postmaster General under the terms of the 1904 Wireless Telegraphy Act. In his report to Parliament for the years 1905-1906 the P.M.G. stated that it was his wish "to promote experimental investigations in this promising field".

In a book published in 1908 by R.P.Howgrave-Graham entitled "Wireless Telegraphy for Amateurs" the word amateur seems to have been used for the first time.

During the 1914-1918 war all wireless apparatus in the possession of licensed amateurs was closed down under the Defence of the Realm Act of 1914. Experimental transmission licences numbered 1,600.

After the end of the war an Inter-Departmental Committee was set up and in its report to the Postmaster General dated April 1919 it stated: "We are of the opinion that the number of stations existing in July 1914 was excessive from the point of view of government control in case of emergency and the necessity of preventing interference with government and commercial working; further there was no justification for it from the point of view of the encouragement of research or development of industry".

But there was a magnanimous relaxation in the Defence Regulations when the Post Office notified manufacturers of electrical apparatus that restriction on the sale of buzzers had been removed. Buzzers could now be sold without enquiry as to the use to which the purchaser proposed to put them!!!

During 1919 many issues of WIRELESS WORLD considered "the amateur position", and a leading article in the March issue began with a quotation attributed to Marconi:

> "I consider that the existence of a body of independent and often enthusiastic amateurs constitutes a valuable asset towards the further development of wireless telegraphy."

In a subsequent letter to the Editor Marconi wrote:

> "In my opinion it would be a mistaken policy to introduce legislation to prevent amateurs experimenting with wireless telegraphy (which the authorities were contemplating). Had it not been for amateurs, wireless telegraphy as a great world-fact might not have existed at all. A great deal of the development and progress of wireless telegraphy is due to the efforts of amateurs."

John Ambrose Fleming, the inventor of the diode valve, also wrote to the Editor of W.W. as follows:

> "It is a matter of common knowledge that a large part of the important inventions in connection with wireless telegraphy have been the work of amateurs and private research and not the outcome of official brains or the handiwork of military or naval organisations. In fact we may say that wireless telegraphy itself in its inception was an amateur product. Numerous important inventions such as the crystal detector, the oscillating valve, the triode valve—have been due to private or amateur work. If full opportunities for such non-official research work are not restored, the progress of the art of radio telegraphy and radio telephony will be greatly hindered."

Professor W.H. Eccles wrote:

> "Improvements and invention must be stimulated to the utmost. It is not impossible to devise laws to impose restrictions upon the emission of wireless waves as will preclude interference with the public radio service of the future (R.F.I. & T.V.I.?!!) and yet allow liberal opportunities for the experimental study of wireless telegraphy."

NOTE. The above passages are taken from WORLD AT THEIR FINGERTIPS by John Clarricoats, O.B.E., G6CL, published by the R.S.G.B. in 1968.

CHAPTER FOUR

THE 1921 TRANSATLANTIC TESTS

Most commercial experimental transmissions in wireless telegraphy before World War I were carried out on the "long" wavelengths, though they were not called that at the time. Transmissions by amateurs in the United Kingdom and the U.S.A. on the other hand were made around 200 metres (1.5MHz). In the U.S.A. amateurs were permitted to use a D.C.input of 1,000 watts to the anode of the final stage of their transmitters. In the U.K. the maximum power allowed was 10 watts and the combined height and length of the transmitting aerial was not to exceed 100 feet. So when the first attempt to span the Atlantic was made in February of 1921 it was natural that the American stations should do the transmitting and the Europeans the listening.

About 25 U.S. amateur stations participated in the tests, which took place early in the morning on the 2nd, 4th and 6th of February 1921. Although about 200 European stations had indicated their intention to listen only 30 actually submitted logs. And not a single one of them was able to report hearing anything that could be attributed to the American transmissions.

The then Editor of QST wrote: "We have tested most of the circuits used by the Britishers and find them one and all decidedly inferior to our standard American regenerative circuit using variometer tuning in secondary and tertiary circuits. We would bet our new Spring hat that if a good U.S. amateur with such a set and an Armstrong superheterodyne could be sent to England, reception of the U.S. transmissions would straightaway become commonplace." Strong language.

In September of the same year it was announced that a prominent U.S. amateur Paul Godley 2ZE would be going to Europe to take part in the second series of tests planned for December. His expenses were being paid by the A.R.R.L. which already boasted having 15,000 transmitting members. In the U.S.A. distances of over 2,000 miles had already been achieved.

During his brief stay of a few hours in London Paul Godley was introduced to Senator Marconi, to Admiral of the Fleet Sir Henry Jackson, to Alan A. Campbell Swinton and many other distinguished members of the Wireless Society of London, as the R.S.G.B. was then called.

Paul Godley first set up his receiving equipment at Wembley Park, Middlesex but soon decided that the electrical noises in the area would not permit reception of the weak transatlantic signals. He therefore obtained permission to set up the European receiving station at Ardrossan a coast town near Glasgow, Scotland. The actual site was a large field heavily covered with seaweed. He was assisted in the erection of his receiving antenna by a member of the Marconi International Marine Communications Company. 1,300 feet of phosphor-bronze wire was stretched 12 feet above the ground on ten poles spaced equally along the full length of the wire which was earthed at the far end through a non-inductive resistor. This was the first Beverage type receiving array ever erected in the United Kingdom. Before the actual tests took place the length of the wire was reduced to 850 feet.

At 00.50 GMT on December 9th 1921 Godley identified signals from 1BCG located at Greenwich, Connecticut. The station there was manned by six members of the Radio Club of America. One of the operators was E. Howard Armstrong inventor of the regenerative detector, super-regeneration and the supersonic heterodyne receiver, though the French claim that the superhet was first designed by Lucien Levy of Paris.

Two days later the historic first complete message transmitted by U.S. amateurs and received in Europe on the "short waves" (actually 230 metres) heralded a new era. The message read:

> No.1 de 1BCG. WORDS 12. NEW YORK DECEMBER 11 1921. TO
> PAUL GODLEY ARDROSSAN SCOTLAND. HEARTY
> CONGRATULATIONS. SIGNED BURGHARD INMAN GRINAN ARMSTRONG
> AMY CRONKHITE.

Eight British amateurs had also copied the message correctly. One of them was W.E. "Bill" Corsham 2UV of Willesden, London who was later credited by the R.S.G.B. and the A.R.R.L. as being the inventor of the QSL card. Bill had used a simple three valve receiver and an inverted-L wire 100 feet long compared to Godley's huge Beverage array.

In the summer of 1922 amateurs in France began to get licences and Leon Deloy 8AB President of the Radio Club of Nice in southern France started hearing British stations. After a visit to the U.S.A. Deloy was able to improve his equipment and on November 27th 1923 he contacted Fred Schnell 1MO of West Hartford, Connecticut for the first ever 2-way QSO across the Atlantic. They used the "useless" wavelengths around 100 metres.

INTERNATIONAL DX had come to stay.

CHAPTER FIVE

THE FIRST GREEK RADIO AMATEURS

As no licences were issued for many years there are no official records to be consulted. Early activity was mainly in and around Athens but there may have been one or two stations in other parts of the country which we never heard in the capital. At the time of writing (1987) four of the original pioneers in the Athens area are alive and three of them are currently active on the H.F. bands.

Athanassis 'Takis' Coumbias has QSL cards addressed to him dated 1929 when he was a short wave listener in Odessa, Russia with the SWL callsign RK-1136. In 1931 his family, like many other Greek families in Russia, moved to Athens where Takis built a 4-valve transmitter with which he was very active on 40 and 20 metre CW using the callsign SV1AAA.

I frequently operated his station myself and when I asked him why he had chosen that particular callsign he gave me what proved to be a truly prophetic answer. "It will be ages," he said, "before the Greek State officially recognizes the very existence of radio amateurs and begins to issue transmitting licences to them. After that it might take another 50 years for them to get to the three-letter series beginning with SV1AAA."

In actual fact this is what happened: legislation was enacted 40 years later and the callsign SV1AAA was officially allocated to Nikita Venizelos after 54 years had elapsed!

Although at the time there was no official recognition of amateur radio in Greece, the existence and identity of the handful of 'under cover' operators was known to the Head of the W/T section at the Ministry of Posts & Telegraphs (Greek initials T.T.T.) Stefanos Eleftheriou who did more than anyone else to encourage and promote the development of our hobby. In fact, following a minor brush with the police in 1937 (described by N2DOE later in this book) Eleftheriou issued three licences 'for experimental research in connection with the propagation of short waves' on the basis of earlier legislation governing the use of wireless telegraphy which really had nothing to do with amateur radio. The recipients of these three licences were Costas 'Bill' Tavaniotis SV1KE, Aghis Cazazis SV1CA and Nikos Katselis SV1NK. As there were no relevant regulations the choice of callsign was left to the individual operators. For instance, Tavaniotis ran his own electrical and electronic business called KONSTAV ELECTRIC so he decided to use "KE" as his callsign.

As far as I know the following ten amateurs were active in the Athens area in 1937:

1. Takis Coumbias.....SV1AAA
2. 'Bill' Tavaniotis.....SV1KE (silent key)
3. Polycarpos Psomiadis.....SV1AZ (now N2DOE)
4. Aghis Cazazis.....SV1CA (silent key)
5. Nikos Katselis.....SV1NK (silent key)
6. George Zarifis.....SV1SP/SV6SP (now SV1AA)
7. Nasos Coucoulis.....SV1SM (silent key)
8. George Yiapapas.....SV1GY (now QRT)
9. Menelaos Paidousis.....SV1MP
10. Norman Joly.....SV1RX (now G3FNJ)

In 1952 Costas Karayiannis who ran a big business called RADIO KARAYIANNI published an amazingly comprehensive book entitled ELLINIKI RADIOFONIA which means 'Greek Broadcasting'. It contained a vast treasure of information on many subjects allied to broadcasting, and there was a page entitled DAWN (1930-1940) which dealt with amateur radio activity in Greece before World War II. It confirmed most of the names listed above as can be seen in the photo-copy of the original Greek text, and it mentioned three others: George Gerardos SV1AG, (silent key), S. Stefanou and Mikes Psalidas who was allocated the callsign SV1AF 20 years later, though he, like many others had come on the air after the end of the war with an unofficial callsign.

Were all these operators who functioned strictly in accordance with international regulations pirates? In my view they were certainly not pirates. If the State was officially unaware of the existence of amateur radio how could they apply for licences and be issued with official callsigns?

Later in this book N2DOE describes how a handful of amateurs had prepared draft legislation in 1937 at the request of Stefanos Eleftheriou of the Ministry but the outbreak of World War II in September 1939 had prevented him from taking any action in this connection.

The island of Crete in southern Greece was first heard on the air in 1938 when George Zarifis came on 40 metre CW using the callsign SV6SP. His transmitter consisted of a single metal 6L6 crystal oscillator with an input of about 7 watts. For reception he used an American CASE broadcast receiver in which he had fitted a BFO. In a very short period he had about 500 QSOs.

Forty four years later some of the younger generation of operators who had not heard of this early activity from Crete allocated the prefix SV9 to the island. Rather illogically they allocated SV8 to all the other islands irrespective of their geographical position and with yet another exception—SV5 for the twelve Dodecanese islands.

General George Zarifis (retired) SV1AA as he is now, had started playing with 'wireless' a long long time before he went to Crete. In 1921 when he was in the 4th form at school he had bought two kits of parts from France and put them together with the help of his fellow-student George Grabinger. The kit consisted of a bright emitter triode in an oscillating circuit. The heater supply was a 4 volt accumulator, and a dozen or so dry cells, with an earphone in series, supplied the anode voltage. The tuned circuit consisted of a coil with a small pressure operated capacitor across it. A carbon microphone with a dry cell in series was connected to two or three turns of wire wound over the coil. The assembled kits were tested close to each other and they worked. Later, when they had connected random length wire antennas to the circuits the two schoolboys were able to talk to each other across the 400 metres which separated their homes. These contacts quite definitely heralded the dawn of amateur radio in Greece at about the same time as the 1921 Transatlantic tests were taking place.

On the 1st of September 1939 Hitler's armies invaded Poland. Great Britain which had a treaty with Poland was compelled to declare war on Germany two days later on the 3rd, followed by France. Canada and Australia declared war on Germany the next day. All the radio amateurs in Athens immediately dismantled their transmitters and dispersed the components.

So ended the first phase of amateur radio activity in Greece.

CHAPTER SIX

WORLD WAR II AND AFTER IN GREECE

Socrates Coutroubis SV1AE described to me how his interest in radio was aroused in 1935 when he was 13 years old. His father had decided to buy a domestic radio receiver.

"Of course in 1935 Athens had no broadcasting service," Socrates said, "so the receiver had to be able to tune in to the short wave broadcasting bands. As we already had a Westinghouse refrigerator my father decided we should try one of their receivers. When I say 'try' I must explain that it was the usual thing to ask a number of agents to submit their latest models for comparison at one's home. I remember that together with the Westinghouse, we had an Atwater Kent, Philco, RCA, Stromberg-Carlson and several sets of European manufacture such as Philips, Blaupunkt, Saba etc. We finally settled for the German Saba because it was the prettiest and blended better with our living room furniture!

"There were very few stations to be found on the short waves. But I remember the Dutch station PCJ run by the Philips company in Eindhoven. The announcer was Edward Startz who spoke perfect English and about a dozen other languages. "This is the Happy Station, broadcasting from the Netherlands" he would say cheerfully.

"A couple of years after we had bought the radio we were returning from an open air movie round about midnight when I noticed a book on sale at a road-side kiosk. It was entitled THE RADIO AMATEUR'S HANDBOOK published by the A.R.R.L. I had no idea what the initials stood for. The price was astronomical for my pocket but after a little coercion I got my father to buy it for me. When I began to read it I discovered the existence of radio amateurs. It was the 1939 edition and I found a circuit for a receiver which looked simple enough for me to try. It was described as a regenerative detector and audio amplifier.

"At that time the best place to buy components in Athens was at a store called Radio Karayianni, but three others shops also stocked valves (tubes) and components. One was the Electron run by George Spanos, who was the agent for the Dutch Philips company. Then there was a shop in a basement next door, Konstav Electric, owned by 'Bill' Tavaniotis SV1KE. A wide range of components were also stocked by the Raytheon agent, Nick Katselis SV1NK.

"I obtained some plug-in forms and wound the coils carefully according to the instructions but

unfortunately the receiver didn't work very well, if at all. When I asked a few friends they suggested I should shorten the very long wires I had used between the components, and sure enough I had the greatest thrill of my life when for the first time I heard Rome on short waves on my very own home-made receiver. Outstanding stations in the broadcast band in those days were Trieste in northern Italy, Katowice in Poland, Breslau in Germany and Toulouse in south-west France.

"Although I had read about the activities of radio amateurs in the Handbook I had not yet heard any of the half dozen or so stations that were already operating on CW and AM telephony in the Athens area.

"My father used to buy the periodical LONDON CALLING which contained the overseas programmes of the B.B.C. as well as the programmes of the principal European broadcasting stations. This publication also carried advertisements and it was there that I first saw an illustration of the Hammarlund Super Pro and realised that there were receivers specially designed for the reception of short waves.

"But during the German/Italian occupation of Greece between 1941 and 1944 my little home-made receiver played a vital role in enabling us to listen (secretly) to the B.B.C. broadcasts because the authorities had sealed all radios to the broadcast (medium wave) band and to the frequency of Radio Athens. Most people devised ingenuous methods of listening to stations other than Athens.

"After the end of the war a friend of mine who returned to Athens from Cairo brought me the 1945 edition of the A.R.R.L.Handbook, which is still on the shelf as you can see."

Socrates explained that in 1945 there was complete political upheaval in Greece, owing to the events that had taken place during the foreign occupation, so the General Election of that year was carried out under the supervision of foreign observers from the U.S.A., the United Kingdom & France. The Russians did not send a mission.

"Owing to my knowledge of English I was employed by the American mission to act as interpreter. One day when I was off duty I was taken by a friend to a signals unit where there were many pieces of equipment which had been 'liberated', and I was able to buy a BC 342 receiver. Later when Harry Barnett SV1WE who was in the Press Department of the British Embassy returned to England I bought his Hallicrafter SX28.

"It was at Harry's house in Kolonaki that I had my first taste of amateur radio in action. He had a National HRO for reception and he had constructed a 50-watt transmitter using surplus components which were in plentiful supply at that time.

"Another friend of mine, Jim Liverios, was employed at the Civil Aviation transmitter site on a hill south of Nea Smyrni. The American Mission had set up their short wave transmitters on the same site and later Interpol installed their own equipment as well. Liverios was always on night shift because he attended the University during the day. I still don't know how he ever managed to get any sleep. When things were quiet he would 'borrow' a 5 Kw transmitter and tune it in the 20 metre band. Using a callsign of his own choice (probably a different one every night) he would have contacts with the whole world. On his invitation I went there at midnight one night and stayed until the morning. I remember we had QSOs with Cuba, Chile, New Zealand and Australia."

THE AFFAIR OF THE PIRAEUS POLICE.

In 1947, there was a war in northern Greece which some people called a civil war and others a war against the guerrillas, depending on whose side they were on. Suddenly one morning all the Athens newspapers came out with some amazing headlines:

"THE WIRELESS TRANSMITTERS OF THE COMMUNISTS HAVE BEEN SEIZED IN ATHENS"

"WIRELESS TRANSMITTERS FOUND IN COMMUNIST HANDS"

"HOW THE FIVE TRANSMITTERS OF THE COMMUNISTS WERE DISCOVERED"

"THE SIX INSTALLATIONS SEIZED BY THE POLICE"

Two of the newspapers printed the identical photograph (included in the montage) with the following caption, 'The Communist transmitters seized by the Piraeus police'. This was a photograph of the shack of Mikes Psalidas SV1AF. At the top right one can see a 2-inch home-made monitor oscilloscope, which the newspapers described as a 'powerful radar'!

"During the last three days," wrote one newspaper, "the police in Piraeus have been investigating a very serious case implicating leading cadres of the Communist party." Of course, it was nothing of the sort. The equipment they had seized belonged to five radio amateurs, George Gerardos SV1AG, Mikes Psalidas SV1AF, Nasos Coucoulis SV1AC, Aghis Cazazis SV1CA and Sotiris Stefanou who didn't have a callsign yet. In fact Mikes Psalidas was not even at home at the time of the police raid, as he was in a military camp in the outskirts of Athens, doing his compulsory military service. The newspapers described in detail what had been found. "At the house of Mikes Psalidas, who is a student at the Athens Polytechnic, the police found wireless telegraphy receiving equipment (a National HRO), wireless telephony equipment in full working order, that is, two transmitting microphones, a step-down transformer and various other items."

The same newspaper went on "Unfortunately, at the house of Aghis Cazazis, at 25 Tenedou street, the search was inconclusive because a certain person, well known to the police, and whose arrest is imminent, removed a high power transmitter just before the police arrived and disappeared with it."

Another newspaper referred to "telegrams in code", received from abroad and from the secret headquarters of the Communists, "which are now being deciphered by a special department". These were SV1AG's little collection of QSL cards.

Stefanos Eleftheriou of the Ministry immediately took up the matter. Firstly, he pointed out to the Piraeus police that Athens did not come under their jurisdiction, and they had no right to arrest anybody there without a warrant. Secondly, all the five radio amateurs they had arrested were known for their nationalistic political convictions, particularly Psalidas whose father was a senior officer of the Royal Hellenic airforce.

Before the 'suspects' were released and their confiscated equipment returned to them, they were warned not to speak to newspaper reporters at the risk of getting a kick up their backsides. This was to prevent the public from learning how ludicrous had been the accusations, and how completely unjustified the arrests had been. But one newspaper came out the following day with a banner headline "THE OWNERS OF THE WIRELESS AND RADAR EQUIPMENT ALL TURNED OUT TO BE STAUNCH ROYALISTS!" This paper sent a reporter to interview SV1AC. They wrote, "In reply to a question from our reporter, Mr Coucoulis said that when the police realised the foolishness of their action, they issued a summons against him under Law 4749, which has absolutely nothing to do with amateur radio."

"During the ten years following the end of World War II there were about 15 to 20 very active amateurs in the Athens area, all using callsigns of their own choice because no government legislation had yet been enacted. Most of these operators subsequently obtained licences and had to change to the official series. I remember two YLs who were very popular in Europe and the U.S.A. because they spoke several languages fluently, but they never re-appeared when licences began to be issued."

Since 1945 the U.S. and British signals units were authorised by the Greek Ministry of Communications to issue calls to military and diplomatic personnel in the series SV0WA in the case of American staff and SV0AA for the British.

Socrates continued: "I heard that the Americans had formed a club called 'Attica Amateur Radio Club' in Kifissia, a suburb to the north of Athens, and in due course I was able to become a member."

"In 1954," Socrates continued, "George Zarifis (currently SV1AA) who was a regular army officer in the Legal Branch approached Mr Nicolis who was Director of the Wireless Division at the Ministry of Communications and asked him 'Since you have authorised the Americans and the British to issue licences to their personnel, why do you not grant the same facility to us Greek amateurs?'. To which Nicolis had replied 'There is no law of the land recognising the very existence of radio amateurs so how can I issue licences to you?'.

"It was then that we decided to form an association whose principal objective would be the enactment of legislation recognising officially the existence of radio amateurs in Greece. As a recognised body we would then be able to go back to Nicolis and get him to pursue the matter.

"That was how, late in 1957, we formed the Radio Amateur Association of Greece, R.A.A.G., Greek initials E.E.R.

"At the same time, after considerable effort, we got the Ministry to issue 7 licences based on the Wireless Telegraphy Act of 1930 (No 4797) and the regulations relating to Law 1049 of 1949, as well as a document dated July 8th 1957 issued by the radio division of the Central Intelligence service (Greek initials K.Y.P.-R). This order authorised the installation of a 50 watt transmitter to an applicant under certain strict limitations, one of which was that the station could only be operated from 06.00 to 08.00 hours and from 13.00 to midnight. The seven lucky recipients are shown in the accompanying

photograph.

Akis Lianos SV1AD, Socrates Coutroubis SV1AE, Nasos Coucoulis SV1AC (silent key), George Zarifis SV1AA, Mikes Psalidas SV1AF, George Vernardakis SV1AB and George Gerardos SV1AG (silent key).

"At that time (1958) my AM station consisted of a Hammarlund SP600 receiver and a home-built transmitter using an Italian Geloso VFO-exciter driving a pair of 6146s in the final, with anode and screen modulation by a pair of 807s in class AB2. I had also assembled a double conversion receiver using a Geloso front end. This was typical of the equipment used in Greece and Italy in the early 1960s.

"Licences continued to be issued until 1967 when the Junta Colonels Papadopoulos and Patakos established the military dictatorship. We were all ordered to seal our equipment and obtain written confirmation from the nearest Police authority that the disablement had been carried out.

"Six months later, in December of 1967 we started getting our licences back. Most of us believed that because some of the younger officers in the military government had received training at the Pentagon in the U.S.A. they convinced their superiors that it was better for the genuine amateurs to be allowed to operate their equipment under close supervision by the military and under new regulations, rather than have under cover operators starting up all over again.

"George Gerardos SV1AG had a friend Oresti Yiaka who was involved in government telecommunications and it was through him that draft legislation for the issue of amateur licences was instigated, but not for the first time. Unsuccessful attempts had been made before the war.

"In 1965 when George Papandreou was Prime Minister, on the very day when the Draft Bill was going to be put before Parliament the government resigned and another 10 years went by. When legislation was finally published in the Government Gazette in 1972, owing to the prevailing political situation (military dictatorship) it had serious limitations imposed by some Ministries which had to look after their own interests, especially the Ministry of National Defence. But George Gerardos, SV1AG, who had been closely involved, decided that it would be better to overlook certain details which may seem strange to us at the present time—details which could be rectified at a later date, provided the law was finally on the Statute book. For instance, I refer to the very restricted frequencies we were allocated in the 80-metre band, 3.500 to 3.600 MHz. Obviously when we began transmitting SSB telephony below 3.600 we were greeted with angry protestations from the CW operators there. And what was worse, the voices of Greek amateurs were not heard in the DX portion of the phone allocation from 3.750 to 3.800 MHz.

"Unfortunately, there was another and more serious snag. The last paragraph of the Law said that it would come into force only after publication in the Government Gazette of regulations clarifying certain details and procedures. So we were back to square one.

"But this did not prevent the General Staff of the military dictatorship from continuing to issue new licences under the special restrictions they had laid down. When the dictatorship came to an end the new government finally published Regulation 271 on April 30th 1976, which made the 1972 law fully operative."

During the period of the military dictatorship a break-away club was formed by Dinos Psiloyiannis SV1DB who added the word 'national' to its name making the Greek initials E.E.E.R. His motives were rather dubious, one of them being that he objected to a regulation which required an applicant for a licence to produce a declaration signed by the President and the Secretary of Radio Amateur Association of Greece. Psiloyiannis, who had contacts with the military authorities (both his father and brother were officers) declared "I will form my own association and issue declarations myself." By this manoeuvre he obtained licences for quite a few newcomers, but after a year or two his club ceased to function and most if not all of its members joined the R.A.A.G.

An amendment of Law 1244 of 1972 published in the Government Gazette No.114 dated June 3rd 1988 finally abolished the requirement of the controversial declaration, as well as the rule which said that before anyone could apply for a licence they had to join an officially recognised association or club.

CHAPTER SEVEN

PIONEERS IN GREECE

1. General George Zarifis (retired) SV1AA.

As recorded in detail in chapter 5, George was undoubtedly the first Greek amateur to have two-way contacts using radio telephony, way back in 1921. He was also the first amateur to operate from the island of Crete in 1938.

2. Dr Costas Fimerelis SV1DH. (Transequatorial propagation).

On October 9th 1988 at 23.10 GMT a new world distance record was established on the 50 MHz band by the Greek experimental station SZ2DH operated by Costas Fimerelis SV1DH and a station in Tokyo, when it was proved that the signals had travelled a distance of 30,650 over the South American continent. This is 15,000 kilometres more than the short path between the two stations, over which there was absolutely no propagation at that moment in time.

A simple 5 element Yagi and a power of 100 watts was used at SZ2DH. The contact was on CW but the signals were so strong that it might well have been on SSB. It is estimated that 8 hops were needed to cover this record distance.

Most people know by now that SV1DH was one of the principal stations involved in the very successful Transequatorial propagation tests which took place during the 21st sunspot cycle between 1977 and 1983. Costas gave me a simplified explanation of the phenomenon first noticed by Ray Cracknell ZE2JV and Roland Whiting 5B4WR way back in September 1957, namely that VHF signals can travel great distances across the equator (5,000 to 8,000 kilometres) during the years of high sunspot activity.

Costas said that usually stations located approximately the same distance north and south of the magnetic (not geographic) equator can contact each other shortly after sunset at both locations. The first such QSO took place on the 10th April 1978 between ZE2JV and 5B4WR. Two days later ZE2JV contacted George Vernardakis SV1AB and this contact was followed a few days later with QSOs with SV1DH and SV1CS. (Fuller details of these contacts are given later in this book in the interview with SV1AB).

In October 1976 there was a rumour that 145 MHz signals had been heard directly between Argentina and Venezuela. With the imminent beginning of sunspot cycle 21 many amateurs in the northern and southern hemispheres began organizing tests on 50,144,220 and 432 MHz. Within less than a year successful 2-way contact was established between Argentina and Venezuela on 144 MHz.

Greece is favourably placed for TEP to countries in Africa where there is considerable amateur radio activity, like Zimbabwe and the Union of South Africa. So towards the end of 1977 SV1AB and SV1DH began looking for colleagues in suitable geographic locations with the appropriate equipment and the time and inclination to engage in tests which could go on for months and months on end. Very soon the following stations agreed to participate in the tests. The northern group included SV1AB, SV1DH, 5B4WR and 5B4AZ. In the southern hemisphere participants were ZE2JV (now G2AHU), ZS6PW, ZS6DN, ZS6LN and ZS3B.

After 4 months of daily test schedules, early in 1978, successful contacts took place on 144 MHz, some of which constituted world distance records for that time, as can be seen in the accompanying table. Amateurs in Malta, Italy, France and Spain soon began to participate in the tests, as well as amateurs in other areas of South Africa.

It can be seen from the world map that the magnetic dip (shown as a heavy line) is very different to the geographic equator. The QTH of SV1AB is in a suburb 10 kilometres north of SV1DH's so George's contacts with the stations in Africa always had that edge on them.

In South Africa Dave Larson ZS6DN had set up a beacon which was first heard in Athens by SV1AB in February 1979. Within a few days ZS6DN had QSOs with SV1DH and SV1AB. The latter contact was a world distance record via the F-regions of the ionosphere because of the extra distance involved owing to the locations of the two Greek stations, as mentioned in the previous paragraph.

For anyone who may be interested very comprehensive reports of the work done in transequatorial propagation during cycle 21 and earlier appeared in articles written by Ray Cracknell ZE2JV/G2AHU and Roland Whiting 5B4WR/G3UYO in the June/July/August 1980 issues of Radio Communuication, the journal of the R.S.G.B. and in the November/December 1980 issues of QST.

RECORD TRANSEQUATORIAL PROPAGATION CONTACTS DURING SUNSPOT CYLE 21

Stations MHz Date GMT Km

YV5ZZ/6 - LU1DAU 145.9 29/10/77 02.00 5,000~

World record distance on 144 MHz. First Western hemisphere contact.

JH6TEW - VK8WJ 144.1 10/02/78 11.50 5,060~
First Pacific area contact.

KP4EOR - LU5DJZ 145.1 12/02/78 00.12 6,340
New world distance record on 144 MHz.

YV5ZZ - LU3AAT 432.1 13/02/78 01.10 5,100
First reception of 432 MHz signals in Western hemisphere.

5B4WR - ZE2JV 144.1 10/04/78 17.40 5,800 First T.E.P. contact between Europe and Africa.

SV1AB - ZE2JV 144.1 12/04/78 18.00 6,260
First Greek distance record on 144 MHz.

SV1DH - ZS6DN 144.1 13/02/79 18.15 7,120
New world distance record on 144 MHz.

SV1DH - ZE2JV 432.3 20/03/79 18.20 6,250
First reception of 432 MHz signals between Europe and Africa.

I4EAT - ZS3B 144.1 31/03/79 18.50 7,890
World distance record (reception) on 144 MHz.

3. George Vernardakis SV1AB. (V.H.F.)

In March 1988 I visited George Vernardakis SV1AB (formerly F9QN of Marseilles, France) who spoke to me about his contribution to the transequatorial tests and his other experiments in connection with Moonbounce, Meteor Scatter and Sporadic E propagation.

"In 1965" George told me, "I was the only SV station equipped for contacts via meteor scatter so it was easy for me to make contacts with many European stations. The longest distance I achieved was with UA1DZ a Physics Professor at the University of Leningrad in the Soviet Union."

Norman: "Forgive me for interrupting you, but please explain in simple terms what you mean by meteor scatter."

George: "Meteor scatter is a way of making contacts on 2 metres by reflection from meteorites —'shooting stars' as they are called colloquially—which we see on clear nights during the summer. Of course they are not falling stars at all—they are meteorites which burn up when they hit the earth's atmosphere, leaving the trail that we see. We take advantage of this phenomenon for bouncing our signals off the trail but unfortunately it is a very short-lived event. Once when there were a lot of meteorites I was able to maintain contact with LX1SI of Luxembourg for a whole three minutes on SSB. It was during the period of the Persides which usually occur for a week in August when the earth's orbit takes it through this cloud of space debris. Millions of meteorites can be as small as a grain of sand and of course leave no visible trail when they strike the earth's atmosphere. The earth goes through other major clusters in April and in December. The phenomenon can also affect signals on lower frequencies. One can be in QSO on 20 metres via ground wave with a station a couple of hundred miles away with signals around s2 to s3. Suddenly one or two words are heard at s9 which indicates a momentary reflection off a meteorite trail."

George also explained that in order to defeat the brevity of the time when communication was possible it was customary to record a message on a tape recorder and transmit it at high speed. The other station would also record at high speed and then play back at normal speed to hear the message normally.

I asked SV1AB to tell me about Sporadic E propagation.

"In this form of contact the signals are reflected from an ionised area 90 to 120 kilometres above the surface of the earth. I have been having contacts by this method for about 18 years now even before the advent of SSB on two metres. I have had contacts with England and with Moscow to the north-east of Athens. The phenomenon occurs for three or four months during the summer, and never during the winter. The ionisation moves very rapidly sometimes—you may be talking to a station in Malta and he suddenly disappears and a station in Yugoslavia comes up on the same frequency."

"Every summer" George continued, "we get Troposcatter which allows communication on all

frequencies from VHF to 10 GHz even. This type of propagation occurs during certain special meteorological conditions, like high barometric pressure and extreme heat. We sometimes hear stations in Malta and Sicily with very loud signals."

"In 1966 I built an aerial array consisting of 8 nine-element Yagis for 2 metres with the axis of rotation pointing to the North Star enabling me to track the Moon automatically. I was hoping to make some Moonbounce contacts, but at that time it was very difficult to construct low noise preamplifiers. After many days and hours of trying I managed a single brief contact with F8DO in France. Some time later I heard that Mike Staal K6MYC had heard me in California.

"The funny thing about this aerial array was that it enabled me to receive television signals from Nigeria on Channel 3 but only when I raised it up to an elevation of nearly 90 degrees."

Norman: "I understand that Costas Georgiou SV1OE is the only Greek amateur who has had successful QSOs via Moonbounce."

George: "Yes indeed. But it was many years later, using a low noise GASFET preamplifier. K1WHS in the U.S.A. has an array consisting of 48 Yagis which enable him to contact stations with more modest installations.

"In 1970 a technician from Stanford University came to Athens because the tracking station they had set up on Mount Pendeli could not pick the University's satellite, whereas they were getting good signals from it in Spain. One of the assistants at the station told the American that he knew an amateur who could pick up signals from satellites, meaning me. The American, who happened to be an amateur himself, immediately asked to see me. When he saw my 8 antenna array he suggested we should use it to try and pick up the University satellite. I pointed out to him that my array was for 144 MHz whereas the satellite beacon was transmitting on 136 MHz. He gave me the coordinates for the next pass and I rotated and raised my array in anticipation. When the exact time arrived my modest receiver picked up the satellite beacon loud and clear. The American got so excited he asked me if he could use my telephone to call the University in the U.S.A. He told them the satellite had been heard at last in Athens, and by an amateur no less. Later I received a letter from NASA thanking me for the assistance I had given. When the American left he gave me that 50 MHz converter you can see there on the shelf."

Norman: "Tell me about your contribution to the transequatorial tests of 1979."

SV1AB: "I had been in regular contact with ZS6LN on ten metres long before Costas SV1DH appeared on the scene. I remember asking ZS6LN why we should not receive South African stations on 2 metres when we could hear them so well on 50 MHz. He had replied that the two frequencies behaved in a very different manner, but there was no harm in trying. He got ZS6PW and ZS6DN interested in the idea, particularly ZS6DN who had much better aerials and a very good QTH. He was the one who stood the better chance of being heard in Greece. We arranged a schedule of transmitting and listening every evening. First they transmitted and we listened, and then we transmitted and they listened, and contact was maintained on ten metres."

Norman: "You said 'every evening'—do you mean that the Sun has something to do with this type of propagation?"

George: "Most certainly. All the contacts that were made subsequently were at least one hour after the relevant part of the ionosphere was in darkness."

George then described how the first signals were heard via transequatorial propagation.

George: "First we heard the beacon on 144.160 MHz set up by Ray Cracknell ZE2JV in Southern Rhodesia (now Zimbabwe). The date was April 12th 1978 at 18.00 G.M.T. Ten months later I heard ZS6DN's automatic beacon with a colossal signal, but he was not at home! I went to 20 metres and put out a frantic CQ for any station in South Africa but got no reply. I returned to the cross-band frequency on 10 metres which we used regularly for 28/50 MHz QSOs and managed to contact a station in South Africa who was very far away from ZS6DN but who kindly offered to QSP a message by telephone. He was told that ZS6DN had gone out but would be back soon. I was terrified that the opening would not last long enough. But in a few minutes I heard him calling me slowly on CW and we exchanged reports at 17.20 G.M.T on February 16th 1979. This was a new world record for the longest distance on 2 metres.

"Three days earlier, however, when I was not at home, Costas SV1DH had established the first TEP contact between Greece and South Africa when he contacted ZS6DN. As you know, my location is a mere 10 kilometres north of SV1DH's. I have a tape recording of my QSO with ZS6DN as well as with ZS6PW whose signals came through a few minutes later at 17.34 G.M.T. on that historic evening.(The local time in Athens was 7.34 p.m.).Of course the distance record was broken again on September 17th

1981 when I contacted ZS4BU who is 110 kilometres further south than ZS6DN."

Norman: "Were all these contacts only on the key?"

George: "Yes, all the contacts were on CW. On several occasions we tried SSB but there was so much distortion that not a single word could be identified. TEP has a lot of flutter and fading and as you can hear on the tapes even the morse comes through like a breathing noise, not a clear tone. This applies to contacts between Greece and South Africa. Contacts between Japan and Australia where the distances involved are smaller, have been made on SSB."

Norman: "What about cycle 22?"

George: "see how things go. If anything is achieved it should be in 1990 or later. With modern equipment we shall be able to hear signals that were buried in the noise in 1979."

4. Dr Spyros Tsaltas SV1AT & George Delikaris SV1AM. (Mobile).

The first two licensed amateurs to make contact on 2 metres in Greece were Dr Spyros Tsaltas SV1AT and George Delikaris SV1AM. They had put together the famous Heathkit 'TWOER'. Crystals were plentiful on the surplus market, but it was not easy to find two of the same frequency. SV1AT transmitted on 144.720 and SV1AM on 145.135 MHz. The first contact took place at 13.30 local time on the 21st of December 1963.

A few days later SV1AT had a cross-band QSO with George Vernardakis SV1AB who was transmitting in the 20 metre band on 14.250 MHz A.M. as he had not completed his TWOER yet.

At that time SV1AT was the Secretary of the Radio Amateur Association of Greece. He suggested to the Committee that the Club should apply for a temporary licence to be granted to SV1AM enabling him to transmit from his vehicle while in motion. The licensing authority gave the licence "for experimental purposes only, and for a period not exceeding one month".

And so it was that the first 'mobile' QSO took place on 2 metres between licensed Greek amateurs on the 27th of January 1965 at 19.25 local time. SV1AM was travelling in his car and SV1AT was at his home QTH.

5. Costas Tzezairlidis SV4CG. (SSTV).

In 1970 Costas Tzezairlidis SV4CG built a unique electro mechanical machine using two motors to achieve horizontal and vertical scanning. He had found a motor which rotated at 960 R.P.M. which corresponds to 16 revolutions per second, the exact speed required for the horizontal scanning. The speed of the second motor was 1 revolution per second. The reciprocal motion was produced by a cam through an 8:1 reduction gear. A weight attached to the microscope pulled it back to start the next line. The microscope was focussed sharply on the drum carrying the picture to be transmitted. Resolution was excellent.

The 'microscope' consisted of a cardboard tube with a 13 cm focal length lens at one end and a Philips OAP12 photo-diode at the other with another lens in front of it. This primitive microscope produced a picture of reasonable quality.

For reception SV4CG made a converter using the long persistence P7 c.r.t. With this set-up Costas had his first SSTV contact on 40 metres with SV1AB on February 28th 1971. After that he had many contacts on 7 and 14 MHz as can be seen from the extract from his log. (The special commemorative prefix of SZ0 was used by all SV stations during 1971).

6. Costas Georgiou SV1OE. (E.M.E.)

Up to the end of 1988 the only Greek amateur who had positively authenticated Moonbounce contacts was Costas Georgiou SV1OE. His very first contact was made in 1982 when he contacted VE7BQH in Canada on 2 metres. In the ensuing four years Costas managed to work four more stations: K1WHS, SM4GVF, W5UN and KB8RQ.

In 1982 Costas had been trying for three years, without success, to hear his own signal via Moonbounce. The reason for his failure was that he was unaware of a very basic fact.

"I was completely ignorant of the Doppler shift effect," Costas told me. "The frequency of received signals varies according to the position of the moon. If it is to the East of your own location the signals return 500 to 1,000 Hz below the original transmitted frequency. For years I had been sending long

dashes slowly and waiting to hear my signals return on the same spot, which they never did. This happens for one instant only, when the Moon is at 180 degrees azimuth, exactly due south. When it moves to the west of south the returning frequency is correspondingly higher. Using a 50Hz audio filter (which is essential for Moonbounce) it is very easy to miss the weak signals. Soon after I found out my ridiculous mistake I began to hear my signals, naturally with a delay of one or two seconds because of the enormous distance involved—770,000 kilometres, 385,000 there and 385,000 back.

Costas continued: "My next problem was finding the moon. I had no computer at the time and no Keplerian elements. I mounted a small video camera in the centre of four 16-element Yagi antennas and rotated the elevation and azimuth motors until I could see the moon in the centre of the monitor in the shack. Of course when the sky was overcast I was out of business. Much later when I obtained a little Sinclair ZX80 computer life became easier.

"When I made my first contact I was simultaneously in QSO with SV1AB and SV1IO on 1,296 MHz who could hear what was going on. I remember SV1AB got very excited and began shouting 'I can hear him, I can hear him!' The QSO was with VE7BQH. Later Lionel sent me a very valuable present, valuable not for its cost but for the fact that it was something quite unobtainable in Greece at that time —a very low-noise preamplifier for 2 metres.

"After the successful launch of Oscar 10 those amateurs who had complex antenna systems and low-noise receivers they had used for Moonbounce congregated on 145.950 and spoke to each other on QRP which prevented ordinary mortals from hearing them. By QRP I mean outputs of half a watt or less. But when finally one day I broke into a net QSO I arranged schedules for Moonbounce with two stations in Sweden. I had a successful contact with one of them but never heard the other. The reason may have been a very simple one: the polarisation of signals returning from the Moon varies from one moment to the other, so if you have been transmitting with horizontal polarisation and go over to reception it is very easy to miss the answer of the other station if the polarisation has changed."

SV1OE then explained the very strict procedure which must be adhered to for Moonbounce schedules.

"Schedules are arranged to last one hour. The first station to start transmitting on the hour must be the one whose QTH lies to the east of the other. The calling frequency for Moonbounce is 144.011 MHz., and the duration of the call is 2 minutes, but for the first minute and a half you call CQ DE SV1OE and during the last half minute you also give the call of the station you are trying to contact, for instance G3FNJ DE SV1OE. You must on no account transmit for more than two minutes because at the beginning of the third minute the other station will begin transmitting the same pattern of signals. But if he has heard you he will alter the pattern. For the first half minute he will send SV1OE DE G3FNJ and for the ensuing minute and a half he will transmit the letter O which signifies that he has heard your callsign completely and without difficulty i.e. Q5 in the Q Code. If I have also heard your callsign completely I will send G3FNJ for half a minute followed by RO for a minute and a half, which means that I have also received your callsign and your O. And you will reply RO 73 which concludes the successful contact.

"There are one or two other letters that can be used. Sending M signifies that I hear you well but can only copy 50% of your transmission, equivalent to Q3. And the letter T signifies I hear you but cannot read you at all—Q1.

"It has been found by experience that the best sending speed is 8 w.p.m. Sending slowly or very fast presents problems at the other end."

CHAPTER EIGHT

PERSONAL REMINISCENCES AND ANECDOTES

The eight items which follow are not strictly part of the story of the development of amateur radio, but they deal with some historical events which are connected with our hobby. Two are of particular interest: the account given to me by Takis Coumbias formerly SV1AAA of the early days of amateur radio in Russia and the story of the Greek broadcasts from Cairo, Egypt during the German/Italian occupation of Greece in World War II.

Nearly all the photographs of the period were taken by the author.

1. Athanasios 'Takis' Coumbias (1909-1987)

When I met Takis in his office in May 1983 I told him I was thinking of writing a small book about the

history of amateur radio in Greece before it was too late—so many of the old timers had already passed away. Little did we both suspect at the time that he also would not live to see the finished project. I asked him how far back he could remember.

"Well, I can start from 1924 when I was about 15 and living in Odessa in the Soviet Union. There was a lot of interest in wireless and two magazines were published in Russia which dealt mainly with the construction of receivers. My interest was first aroused when a friend of mine at school proudly showed me something he had just made. It was, he told me, a variable capacitor and he was going to use it to make a radio receiver. The contraption was enormous by today's standards and must have weighed about half a kilo. My friend said it had a capacity of 250 micro-micro farads, which meant absolutely nothing to me at the time.

"When he completed his receiver I became very interested and decided I would build one too. But materials were hard to find and very expensive. Two items one had to buy: valves and headphones.

"I asked my friend where he had found the sheet metal to make the plates of the capacitor. He took me to a row of small shops which had a metal-faced ledge below the shop window. The metal was thin and seemed easy enough to remove. We sat on the ledge for a while and when the coast was clear we tore away a section and ran like mad. Later I ruined a pair of my mother's dressmaking scissors cutting out the plates. I used rings of some thick copper wire to space the plates but I could not drill holes in the plates for the spindle so a friend did that for me. I used about 15 plates and to this day I have no idea what the capacity of the finished capacitor was. Some small items for the receiver could be found in a little shop owned by an old man who charged exorbitant prices, so I decided I must go to Moscow for the valve and a single headphone that I needed.

"But Moscow was three days and two nights away by train, and it was the middle of winter. So what, you may ask. Like many others I had to travel on the roof of a goods waggon. I took with me a loaf of bread, a piece of cheese and two hard-boiled eggs. My father said I must be mad but he gave me some spending money and his blessing.

"I had eaten my food by the end of the second day so when we stopped at Brensk which is famous for its 'piroushki' I decided to try them. They were kept warm in large metal tins ready for the arrival of the train. There were seven varieties and I had one made with liver and a savoury sauce.

"When I arrived in Moscow I went to see the Greek ambassador as I was carrying a letter of introduction from my father who was acting Consul for Greece in Odessa, but it was Saturday and the ambassador's office was closed. I learned later that only foreign establishments closed at the week-end. So I went to look for a cheap hotel. Looking out of the bedroom window I saw a lot of people running in one direction. At that moment a woman brought me a towel and a small bar of soap, so I asked her what was going on outside. She said the butcher near the hotel had just received some liver. Would she buy me some I said. I gave her some money and she returned nearly two hours later with the liver wrapped in newspaper. When I opened it I saw it was horse liver cooked with corn and it had an awful sour smell. I just could not face it, although I was starving by now."

I asked Takis about the shops in Moscow. He said he had found several shops with parts and some made-up receivers in the State owned shops. He learned later that these receivers were made by amateurs because the factories only made equipment for the armed forces. He bought a triode valve called 'MICRO' and was told it had an amplification factor of 7. He wrapped it carefully in cotton wool for the return journey to Odessa. He also bought a dry battery pack which gave 80 volts, and an enormous single headphone for one ear which was ex-army surplus.

When he returned home and began to build his receiver he raided his mother's kitchen to build things like terminals, switches etc. There was an electric bell circuit between the dining room and the kitchen and as they didn't use it his mother said he could dismantle it and use the wire, which was quite long because it went up into the loft and then down again to the kitchen.

"I had acquired a small square of bakelite and I used a penknife to make a holder for the valve, twisting a few turns of wire round the pins as I could find nothing to use as a socket. I had no idea how to connect the various items I made or bought. I had seen a circuit diagram in a French magazine of a detector with reaction. I made the connections by twisting wires together and finally the receiver was complete. The next thing was the aerial. I made an enormous aerial with four parallel wires, like the aerials I had seen on ships. Putting it up was a dangerous operation as our house had a rather steep tiled roof, so I got some friends to help me. Some of them who had 'superior knowledge' told me the down-lead must have no bends. I got hold of a stiff copper wire and supported the down-lead on two enormous bell insulators as used on telegraph poles. I had to smash a corner of my bedroom window to bring the wire in. I had bought a large knife switch which could be turned over to connect the aerial to ground. I was afraid the large flat top of the aerial would attract thunderbolts. When I finally connected

the aerial to the receiver I heard ABSOLUTELY NOTHING."

I asked him how he tuned the receiver. He said he had put many taps on the coil and he twisted his antenna to these taps trying various combinations with the tuning capacitor.

"All I heard was this breathing noise. I learned later that it was the 'carrier wave' of a broadcasting station without modulation, but I didn't know what that meant. As my friends also heard the same noise I was convinced my receiver was working. We soon found out that the long wave transmitter at Ankara, the capital of Turkey was making test transmissions without modulation. Ankara was one of the first broadcasting stations in that part of the world."

Norman: "Regeneration should have produced a whistle."

Takis: "Yes, indeed. And in a peculiar way. When I approached the receiver my hand produced the whistle."

Norman: "Hand capacity effect."

Takis: "And foot capacity effect as well! When I approached my knee to the metal leg of the work-bench I would lose the station I had been listening to." He said the tuning capacitor he had made was obviously too small and he had to alter the taps on the coil continuously. About three o'clock in the morning during a cold winter night he heard a new sound—the breathing (carrier) noise and a sort of regular ticking. He later found out that it was the new broadcasting station in Vienna, Austria, which transmitted the sound of a metronome throughout the night. This would have been about 1926.

I asked Takis about school. "In spite of the late nights listening I never missed a day at school. My father was the Chairman of the School Committee and I couldn't let him down. But I had to earn some pocket money to pay for the bits a pieces I needed. Particularly a decent pair of headphones; I had to hold the army headphone to me ear with one hand which gave me pins and needles. For some years I had kept goldfish and pigeons, so I sold them. A friend of mine had gone to sea as a cadet and his ship went abroad, so I asked him to get me a pair of headphones.

"I must explain to you that it was no easy matter for a Russian seaman to serve on a vessel which visited foreign ports. First one had to go through the Communist Party sieve and then he was told that if he jumped ship his family would suffer for it.

"Anyway, he bought me a lovely pair of Telefunken headphones when the ship berthed at Constantinople (Istanbul) which I have to this day. But not on his first trip, when he was not allowed to go ashore. And it was not the captain who decided who could go ashore. A trusted member of the Party would pick out a group of seamen who could land but they had to stay together the whole time.

"I never managed to go abroad. At the Club I had obtained a morse test certificate for 40 letters a minute (8 wpm) in Latin characters and 90 letters (18 wpm) in the Cyrillic alphabet (Russian). To go abroad one had to up-grade to 80 Latin and 120 Cyrillic letters. (16 & 24 wpm). I was put on a small coastal ice-breaker which cleared the river estuaries in the Black Sea.

"The Black Sea is one of the most treacherous inland seas in the world. During the winter its northern shores are frozen whereas the coast of Asia Minor keeps the southern shores relatively warm by comparison. This results in gale force winds and rough seas. Waves follow each other very closely as opposed to the long swell one gets in the Pacific. Ships have to leave port to avoid crashing into each other.

"I was about 18 when I first went to sea as a cadet W/T operator. One day when we came out of an estuary the sea was so rough that the captain decided to turn back. As we turned to starboard we noticed an American freighter behind us heavily laden with wheat and very low down in the water. To our horror it was caught between the crests of two enormous waves and broke in two roughly amidships. Although we were only about half a mile away the freighter sank before we could get to it. We saw a few survivors in the water, but it would have been impossible to put a boat into that treacherous sea. Apart from which a man cannot survive many minutes in a water temperature just above freezing. It was all over in a flash and we returned to Odessa in deep shock.

"Odessa used to have four harbours. The callsign of the W/T station was EU5KAO. I remember it very well because it was my job to take the weather forecasts for shipping which it transmitted regularly."

Takis spoke about some amusing misconceptions of that period. When he first completed his receiver and was getting poor results with it he asked a more experienced amateur to look at it. The 'expert' immediately found the first fault: the downlead from the antenna had a bend in it of more than 45 degrees which was quite unacceptable. Secondly, the ground connection to the central heating radiator

was no good because it was winter and the radiator was hot so it presented a very high resistance! It must be soldered, he said, to a cold water tap.

"I tried everything I could think of to solder the wire to the tap, but to no avail. Then one day I had a brain-wave and I made a stupendous invention! I wrapped a copper strip round the tap and bolted it tightly, together with the ground wire. I was really very proud of myself and wondered if anybody else had ever thought of doing it that way."

I asked Takis if he had done any transmitting from home. "We amateurs of foreign origin were not allowed to own transmitters but we could operate the club station under close supervision by the Party member who was always present. My own SWL callsign was RK-1136 as you can see from the QSL card I received from EU5DN in 1929.

"I remember our excitement when we first contacted a station outside Russia. It was a station in Saarbrueken and we were on a wavelength of 42 metres. All the members of the Club sent him our SWL reports and he sent us back his cards and a photograph of his equipment which was published in the Moscow amateur journal and so Odessa became famous. On 42 metres most of our QSOs were with German stations. As a result of this success many young lads joined our club and we 'experts' would explain to them about bends in the aerial down-lead and the high resistance of a ground connection to a central heating radiator when the water in it was hot!!

The club transmitter consisted of 4 valves in a Hartley parallel push-pull oscillator circuit which we considered to be of relative 'high power'—perhaps all of 10 watts."

Takis continued: "In 1930, my family, like many other families of Greek origin, moved to Athens. I built a cw transmitter using four Philips valves. I went and saw Mr Eleftheriou at the Ministry and he informed me that there was no way that he could issue me with a transmitting licence, but he thanked me all the same for telling him I had built a transmitter."

Takis continued: "I would like you to notice these two QSL cards I received in 1933. I1IP wrote on his card 'I am on the air since 1924 but you are the first SV station I have heard'. And the British listener BRS1183 wrote 'Dear old man, very pleased to report your signals. Are you the only active station in SV?' I think those comments speak for themselves."

Norman: "Had you not heard about Tavaniotis, who had also emigrated from Russia?"

Takis: "No. It was you who took me to the basement shack and introduced me. I remember how I gaped when I saw the 150 watt transmitter Bill had built."

Takis then described how he had heard a distress signal on his home-made receiver. It was in a language he could not understand so he called his father, who was quite a linguist, to listen. It appeared that the vessel had caught fire as it was approaching the port of Piraeus, south of Athens. The captain of the ship said their predicament was complicated by the fact that they were transporting a large circus, with many wild animals. Takis ran to the nearest Police station and told his story, but was greeted practically with derision. How could a young lad like him know there had been a fire on a ship which was not even in sight of the shore? Anyway, somebody was brought to the station and the officer said "Go with this man." Takis was taken to the coast at Palaio Faliro where he boarded a salvage tug, and they set out to sea. He said the vessel in distress had been bound for Piraeus, and sure enough the salvage tug located it, but when they approached it there was no sign of fire as it had been put out, before any of the animals could be harmed. But the engine room had been damaged, so the tug towed the vessel into harbour. What Coumbias didn't know was that by law he was entitled to a proportion of the salvage money, and he never got anything.

Another incident involving a small yacht which belonged to a friend of Takis' led to an interesting assignment. The yacht was considered to be not seaworthy any more, and a W/T transmitter it carried was dismantled completely by an electrician who knew nothing about wireless.

"I was asked to put it together again by the owner who wanted to sell it to the ship to shore W/T station where they did not have a short wave capability yet. When I was shown the parts I was horrified to see that there was no circuit diagram or instructions of any sort. It took me more than a month to figure it all out. The transmitter was of French manufacture and consisted of two enormous triodes in a Hartley oscillator circuit. When I got it to work it was installed at the Naval Wireless station at Votanikos, where the Director, Captain Kyriakos Pezopoulos used it for experimental transmissions. There were already two other transmitters there, one on Long Waves and one on 600 metres. The callsign of the station was SXA. As this was the third transmitter they used the callsign SXA3. The operator, Lt. George Bassiacos, had discovered some telegraphy stations which replied when he called them—he had accidentally stumbled upon the amateur 20 metre band! With a transmitter supplied with

unrectified A.C. at 400 Hz. and a power output of several kilowatts, no wonder contacts with any part of the world were easy. When Captain Pezopoulos met Bill Tavaniotis the latter suggested that if the 'experimental' transmissions were to continue in the amateurs bands, the callsign should be altered to SX3A. Thousands of successful contacts were made as it was the beginning of sunspot cycle 16, a very good one as old timers will know. If anyone reading this has a QSL card from SX3A it would be appreciated if he would donate it to the Technical Museum in Greece."

(Takis Coumbias died suddenly of a heart attack in September 1987.)

2. Pol Psomiadis N2DOE (formerly SV1AZ).

The text which follows was written by Pol N2DOE of Bergenfield NJ.

Norman Joly and I first met in 1935 when I started working with Bill SV1KE as his radio mechanic. Norman was then working for the local agents of RCA selling broadcast receivers. The last time I saw him before the war, was in September 1939. I was still working with Bill and I went to the British School of Archaeology in Athens to deliver a National NC 100 with a Spiderweb all-band antenna. Norman had been recruited to set up a monitoring station for the Press Department of the British Embassy, which had been moved to a building in the grounds of the school. After the end of the war I saw him again in 1948 in the uniform of a Superintendent of Police working in the British Police Mission to Greece. He told me he had obtained a special licence and was back on the air with his pre-war callsign SV1RX.

In 1951 I emigrated to Brazil where I stayed for 17 years and then came to the U.S.A. in 1968, where I have been ever since. We had lost contact with each other and it was five years later that I found Norman's address in the American callbook. I wrote to him and in his reply he begged me to come on the air again. Owing to a prolonged family illness which culminated in the loss of my beloved wife it was 1980 before I was in the mood to take up amateur radio once again, with my present callsign N2DOE.

When I went to London in 1984 to spend a few weeks with Norman he told me he had started recording some reminiscences on a tape recorder about the first radio amateurs in Greece, and he asked me if I would like to help. As I was one of them myself I agreed. When I left to return to the U.S.A. he gave me a number of cassettes to transcribe. Although he speaks fluent Greek without any accent at all, he never attended a Greek school and couldn't write the memories. He told me to add anything else I could remember about those pioneering days long gone by.

So, to start from the beginning, let me say that I was born in Constantinople (now Istanbul) in Turkey, in October 1910, of Greek parents. Although we spoke Greek at home I did not go to a Greek school until I was nine. But I soon moved to the French College where all the lessons were in French and Greek was only taught as a foreign language for two hours every afternoon.

My elder brother had subscribed to a French magazine called 'La Science et La Vie' (Science & Life) and I had become fascinated by a subject called 'Telegrafie sans fil' (Telegraphy without wire). The broadcasting of speech and music had not started yet in that part of the world, though in 1923, a broadcasting station was built in Ankara the capital of Turkey. Broadcast receivers began to appear in the shops, either with headphones or large horn loudspeakers, but we never had one at home.

In 1926 we moved to Athens, Greece, where I went to school. Strangely enough, as I found out later, that was the year when Norman also came to Athens for the first time. At school I met Nasos Coucoulis (later SV1SM and SV1AC) who was also very interested in wireless. I made a crystal receiver and was able to hear the Greek Royal Navy station at Votanikos SXA and the old station at Thiseon in Athens itself, which was still a spark station. There just was nothing else to hear. I acquired a Philips 'E' type valve and built a grid-leak detector circuit, but all I got was silence. The four volt heater drew one amp and I had been trying to get it going with a small torch battery. As I became more experienced I began repairing simple broadcast receivers for my friends and putting up wire antennas for reception for people who had bought broadcast receivers.

In 1929 Nasos and I were in our final year at the Megareos School. We built a very simple AM transmitter tuned to about 500 metres and we broadcast the performance of a play acted by the final year students. I have no idea if anybody heard our transmission, but it was certainly the first amateur broadcast in Greece.

Nasos and I spoke to each other with very simple AM transmitters across the 60 metres or so separating our homes, again without knowing whether anybody else ever accidentally tuned in to our very low power transmissions.

In 1932 I was called up for my compulsory Military service and ended up attending the Reserve

Officers Cadet School. After my military training I started work at the Lambropoulos Brothers shop in the Metohikon Tameion building. It was there that I made the acquaintance of Takis Coumbias, who had come to Greece from Russia with his family. Takis had had eight years experience of amateur radio in Russia, and he told us how the radio clubs operated under the strict supervision of the Communist Party.

Three years later, in 1935, I moved to Tavaniotis' workshop as his mechanic. 'Bill' had built an AM and CW transmitter with an output of 150 watts. He used the callsign SV1KE. We had regular contacts with George Moens SU1RO in Cairo, Egypt. George is still active in his native land of Belgium with the callsign ON5RO in Brussels. He should be well into his 80s by now. In 1938 George came to Athens with his wife Beba and their little boy Robert to visit her parents who were Greek, and of course they came to our shack and we had the pleasure of meeting them in person after many years of chatting over the air.

In Greece we are 7 hours ahead of Eastern Standard Time and so our contacts with the U.S.A. took place well after midnight, our time. One of the stations we contacted very regularly was Charles Mellen W1FH in Boston. Chas was born in Boston of Greek parents. His father came to Greece in 1936 or 1937 with Charles' younger sister, a pretty little girl of about 14. They came to Bill's shack and were able to speak to Boston with the equipment shown in this photograph taken by Norman. After the end of World War II W1FH together with W6AM of California were the two leading stations in the U.S.A. topping all the achievement tables. But W6AM had a slight advantage; he had bought a site previously belonging to Press Wireless which had 36 rhombics whereas W1FH always operated with his simple Yagi at 60 feet.

Another station with which we had frequent contacts on 20 metres was W2IXY owned by Dorothy Hall. One night Dorothy gave us a big surprise. In the course of a QSO she told us to listen carefully. Suddenly the three or four of us in SV1KE's shack heard our voices coming back from New York. Dorothy had recorded our previous transmission on a disc. A few days later we turned the tables on her. We had hastily put together some recording equipment and played back her transmission. Dorothy said that was the first time she had heard her voice coming from 5,000 miles away. I must explain that at that time (about 1933) home recording was a novelty even in the U.S.A. Recording on vinyl tape was invented by Telefunken towards the end of the war in 1945. Today even little children play with cassette recorders, and the latest revolutionary home recording system invented by Japan DAT (Digital Audio Tape) provides high fidelity studio quality with no background noise; really a 'super' version of the mini cassette recorder.

In Athens we continued to operate even through the Dictatorship of General Metaxas which began with a coup in August 1936, but not without some problems. The main target of the infamous Maniadakis, Minister of the Interior under Metaxas, were of course the Communists, but the handful of radio amateurs also came under suspicion of being subversive elements. Things got worse, in fact, when the newspaper ESTIA owned by K. Kyrou, published an article blaming 'amateurs' for being responsible for interference to short wave reception. I must explain that the writer was referring to the dozens of pirate low power broadcasting stations operating in the medium wave (broadcast) band. Regretably, I have to place on record that owing to the late development of broadcasting and official recognition of amateur radio in Greece, the word 'amateur' in the minds of the general public embraces CBers, pirates of all kinds operating on medium waves and recently in the FM band, and genuine licensed amateurs as well. So, as I was working in the basement workshop at SV1KE's one afternoon, three of Maniadakis' plain-clothes men turned up and said they had come to seize 'the broadcasting equipment'. Fortunately Bill was not in the shop when they came. I asked them if they had a search warrant and they said no. I replied that I was only an employee and could they call back a little later when Mr Tavaniotis himself would be there to answer their questions, and thus managed to get rid of them. When Bill returned I told him about the incident and he left straight away and went to the Ministry of Posts & Telegraphs to see Mr. Stefanos Eleftheriou. And so it came about that Eleftheriou who knew all about our activity in the amateur bands issued the first three licences to SV1KE, SV1CA and SV1NK 'to carry out experimental transmissions relating to the study of propagation on the short waves'. He knew that he had every right to do this as Greece was a signatory to the international telecommunication treaties.

I would like to record at this point that Aghis Cazazis SV1CA now a silent key, has left his own 'monument' in Athens. After the end of World War II, in his capacity as Head of Lighting Development with the Electricity authority, he designed the magnificent floodlighting of the Acropolis which is admired by tourists to the present day.

To return to 1937: Mr Eleftheriou entrusted us with the task of preparing draft legislation for legalising amateur radio activity. We wrote to the U.S.A., to England, France and Germany and obtained copies of the laws governing the issue of licences in all these countries, and we began the long

task of drafting a text which would be appropriate to the political situation then prevailing in our country (military dictatorship). Norman Joly, then SV1RX, had written a text in English, but before we could translate it into Greek or do anything about it, all our hopes were dashed to the ground by the outbreak of war in September 1939.

In 1944 while serving as a reserve officer in the Greek army, I was seconded to the British Military Mission to Greece (B.M.M.) because of my knowledge of English and French. There I met several amateurs serving with the British forces, and one of them gave me a small military transmitter, so I was able to come on the air again with my old callsign of SV1AZ.

3. Constantine 'Bill' Tavaniotis (formerly SV1KE).

There is no doubt that the most active and best known amateur in Greece before World War II was 'Bill' SV1KE. He was active on 20 and 10 metres on AM phone and CW, using his famous McElroy 'bug' to good advantage. (No electronic keyers and no 15 metre band in those years).

Tavaniotis was born in Rostov, USSR, of Greek parents. His father was a well-known doctor. Like many other Greek families Bill and his parents left Russia in the early years of the Communist regime and moved to Istanbul, Turkey, where he began his studies at the famous Robert College. Later he went to London where he first came into contact with radio amateurs, while studying Electrical Engineering. After that he went to Belgium.

Bill had a knack of picking up languages and when I met him in Athens in the early thirties he spoke at least seven to my knowledge: Russian, Greek, English, French, Italian, Turkish and German. His pronunciation in all them was excellent. On one occasion at a party in the Athens suburb of Palaio Psyhico one of the guests was an amateur from Italy who spoke no English, so Bill interpreted from that language into Italian for his benefit. He then translated what the Italian had said into English for the others. But suddenly their faces went blank. Quite unconsciously Bill had translated the Italian's remarks into Turkish! Many years later Bill was employed at the United Nations in New York as a simultaneous translator. In October 1946 Bill and his wife Artemis visited Charles Mellen W1FH in Boston for an 'eyeball' after more than ten years of QSOs over the air, with the exception of the war years of course. Chas photographed Bill outside the Massachusetts Institute of Technology and Bill photographed Mary (Chas' xyl), Chas and Artemis standing in front of the W1FH tower.

The first transmitter he built can be seen in the photo taken from the book GREEK BROADCASTING published by Radio Karayianni in 1952. His shack was in the basement workshop at 17a, Bucharest Street in Athens, an address which became known world-wide as the first QSL bureau for Greece.

The gang of enthusiasts who met at Bill's included Nasos Coucoulis SV1SM, Aghis Cazazis SV1CA, Nick Katselis SV1NK, Mikes Paidousi SV1MP, Pol Psomiadis SV1AZ (now N2DOE) and the writer of these memoirs, SV1RX. Of course all visiting amateurs made a beeline for the shack in the basement. As most of our contacts were with the U.S.A. we were usually up most of the night because of the 7-hour difference with Eastern Standard Time. None of us had motor-cars and public transport was not available during the night hours so we all got plenty of exercise walking back to our respective houses.

Bill was closely in touch with two men who played a very important role in the development of amateur radio in Greece. I am referring to Stefanos Eleftheriou who was Section Head for Telecommunications at the Ministry (Greek initials T.T.T.)., and to Captain Kyriakos Pezopoulos, Director of D.R.Y.N. (Greek initials for Directorate of the Wireless Service of the Navy). The long wave spark transmitter at Votanikos, a suburb of Athens, (callsign SXA) had been built by the Marconi company before World

(Bill Tavaniotis died of cancer in 1948.)

4. Harry Barnett G2AIQ (formerly SV1WE).

In July 1946, Harry Barnett, a Royal Air Force officer attached to the Press Department of the British Embassy in Athens obtained an experimental transmitting licence from the W/T section of the Ministry of Posts & Telegraphs, with the callsign SV1WE. At that time he was living in a flat in Athens and could not put up an antenna, so it was not until June 1947 that he became active.

The terms of his licence were in themselves rather strange, one might even say quite 'experimental', the final paragraph reading:

> "This experimental research must be carried out as follows:-
>
> 1. With a maximum power of 50 watts. 2. In the frequency bands (harmonics) 130,

260, 520 Mc/s. 3. In the frequency bands 28 Mc/s and 56 Mc/s. 4. With the call sign SV1WE."

From June 1947 until April 1948 Harry worked 61 countries, mostly on phone in the 10 & 20 metre bands, at a time when there were not many stations on the air—a minute fraction of the millions now active.

He used a National HRO receiver he had got off a scrap heap which he modified to take the efficient EF50 valves in the R.F. stages and EF39s in the I.F.

The transmitter was completely 'home brew', consisting of a metal 6L6 Franklin oscillator on 3.5 MHz followed by two more 6L6s doubling to 14 MHz. In the final amplifier stage Harry used a Telefunken pentode, the famous and very efficient RL12P35 which was used in the German tank transmitters in all stages, oscillator, P.A. and audio amplifier/suppressor grid modulator. He adopted the same method of modulation using a record player amplifier and an Astatic crystal microphone.

W.A.C. was achieved by February 1948 with about 50 watts of R.F. into a simple dipole antenna. During the ten months that SV1WE was active 750 QSL cards were sent out. Of the 61 countries worked only 49 were confirmed.

Today (1989) Harry is still regularly on the air under his original callsign G2AIQ which was first issued to him on the 1st of January 1938, 51 years ago.

5. George Yiapapas (formerly SV1GY).

George Yiapapas is a Greek amateur who was very active for over 25 years yet nobody seems to have heard of him. In 1935 George and his father Costas built a one-valve transmitter using a type 59 pentode with suppressor grid modulation, and succeeded in contacting most of the world with this QRP rig. The electron coupled oscillator could not have put more than 4 or 5 watts into the antenna.

After the war George went to Jordan in 1956 to work for Cable & Wireless the English company which operated the old Eastern Telegraph cable network. He used the callsign JY1GY for about a year and was then transferred to Tripoli in the Kingdom of Lybia, during the reign of King Idris, where he obtained an official licence with the call 5A3TA.

In 1960 he was again transferred, this time to Kuwait, where he operated the equipment of Mohamet Behbehani 9K2AM for over six years. George now has a small shop in Piraeus, the port of Athens and is no longer active on the amateur bands.

6. Stefanos Eleftheriou (1895-1979).

Stefanos Eleftheriou, Head of the Telecommmunications section of the Ministry of Posts & Telegraphs (Greek initials T.T.T.) played a vital role in the early development of amateur radio in Greece.

When he returned from Switzerland, where he had studied Electrical Engineering, he had to do his compulsory military service which had been deferred while he was completing his education. A friend of his told him "Don't go into the Army, join the Navy; they have an amazing wireless station at Votanikos with which they can contact the Fleet anywhere in the world". As it happened there was a vacancy for an officer and Stefanos together with another young man called Nikolis faced a Selection Board of naval officers who really didn't know what qualifications they were looking for. He was successful whereas Nikolis went to the Ministry of Posts & Telegraphs where he ended up as Director-General many years later.

The MARCONI COMPANY of England had built an impressive wireless station for the Greek Royal Navy at Votanikos, a suburb of Athens. There was a transmitter which operated on 600 metres and a larger one on long waves above 2,000 metres which used the callsign SXA.

Stefanos told me how he was summoned by the Director of the Naval Station Admiral Mezeviris who asked him "Tell me, young man, what do you know about wireless?"

> "Well sir," replied Eleftheriou, "I studied Electrical Engineering in Switzerland—I really don't anything about wireless."

"Neither do I," replied the Admiral candidly. "Nor do most of my officers. We must set up a school to train technicians and wireless operators. I entrust you with the task of getting all the necessary books and other materials. Write to England, the U.S.A., France and Germany and get whatever you need. When you are ready I will appoint staff to assist you." That was how Eleftheriou became the head of the first school for training wireless officers for the Greek Royal Navy.

A couple of years later Eleftheriou joined the staff of the Ministry of Post & Telegraphs. A newspaper of 1930 had a photograph of him with one of his triplet sons.

In his capacity of Head of the Telecommunications Section at the Ministry he worked hard to get official recognition of amateur radio. A handful of us who were active 'under cover' so to speak, frequently visited him in his office. He was a very likeable person and had a talent for anecdotes. One day he told us that he had attended a Joint Services Committee which had been set up to study the requirements for building a broadcasting station in Athens. A station had been in regular operation in the northern city of Thessaloniki (Salonica) since 1928, built by the pioneer of Broadcasting in the Balkans Christos Tsingeridis.

When the question of wavelength for the proposed station was considered somebody said a wavelength of 2,000 metres might be appropriate. One of the military officers, who shall be nameless, remarked angrily "What! 2,000 metres. We are spending all this money only to be received up to Koukouvaounes? This is outrageous!" (Koukouvaounes was then a small village with a funny name about 3 miles south-west of Athens.

Eleftheriou lived to the ripe old age of 84. When I last saw him he promised to give me his collection of old photographs and a large number of books and documents relating to the development of radio communications in Greece. Unfortunately, shortly after his death his wife and three sons moved house temporarily and a packing case containing all these priceless papers was lost in

7. Norman F. Joly G3FNJ. (Formerly SV1RX).

I was born in Izmir (then known as Smyrna), on the west coast of Turkey in Asia Minor, in 1911, of British parents. My British nationality was established through the Treaty of Capitulation which was then in force between Turkey and the United Kingdom of Great Britain and Northern Ireland. I remember there was a British Post Office in Smyrna and we posted our letters with British postage stamps (of King Edward VII) overprinted with the word LEVANT.

My grandmother on my father's side had come from Russia. It is a strange coincidence that Takis Coumbias (ex SV1AAA), Bill Tavaniotis (ex SV1KE) and I all had roots in southern Russia. My grandmother on my mother's side was the daughter of the Dutch consul in Smyrna. Quite a mixed bag.

In 1922, at the end of the war between Turkey and Greece, the town of Smyrna was destroyed by fire when the Greek army was routed. My widowed mother with four young children, was advised to take us on board a British merchant vessel while the town changed hands. We were told to take a little food with us just for a day or two. We carried a large string bag with some bread, cheese and fruit, and one knife, one fork and one spoon between the five of us. I remember it was night and my mother put all her jewelry in a small leather bag. As I pulled the cord to close it the pin of a large broach stuck out through the top. My mother grabbed it and said I would hurt myself—I was only 11 years old at the time. She looked around the bedroom, lifted up a corner of the mattress of her bed and hid the pouch 'safely' underneath it. We hurried out of the house—and never went back.

We and many other families spent one night on the merchant vessel where there was no sleeping accommodation. Next morning we were transferred to a large hospital ship called MAINE. All day we watched small groups of the Turkish and Greek armies skirmishing on the sea-front and in the evening many fires broke out in the town. In the middle of the night while we were sleeping the hospital ship sailed away to an unknown destination. After two or three days we arrived in Malta, where most of us stayed for the next four years.

It was in Malta that my interest in wireless telegraphy was first aroused. We were housed in some military 'married quarters'. Close by there was a wireless station which produced bright greenish-blue sparks and crackling noises. Its antennas were supported on three very tall wooden masts painted bright yellow. I soon discovered that it was GYZ belonging to the Admiralty. Malta was then (1922) a very big base of the British Navy, in the good old days when England had an Empire.

> I bought a kit of parts and assembled a small receiver and being so close to the powerful spark transmitter that was all I ever heard.

In 1926 when I left school my family moved to Greece and my brother who was 7 years older than me, opened up a shipping office on the island of Mitylene, in the Aegean sea. My father and grandfather had been in this business in Turkey.

It was in Mitylene in 1927 that I constructed my first short wave receiver. It had 3 valves with 4 volt filaments, heated by an accumulator (storage battery). H.T of 130 volts was obtained from a bank of small accumulators in series. As I had not learned how to make a charger I had to carry these two units to a local garage regularly for re-charging.

Apart from commercial telegraph stations there was little else to hear. I had still not heard about 'amateur' radio. The B.B.C. was carrying out test transmissions from Chelmsford for what became the Empire Service (now the World Service) using the callsign G5SW. There was also G6RX which stood for Rugby Experimental, operated by the British Post Office. They were experimenting with ship-to-shore telephony, and after setting up a circuit the operator used to say "over to condition A" (and sometimes B) which was very frustrating for me because the voices then became scrambled and quite unintelligible. When I first began transmitting six years later, having 'discovered' the amateurs, I chose the callsign RX as I had been a listener so long, and also remembering the excitement of listening to G6RX.

In 1930 I moved to Athens and became a salesman for RCA radios. It was there that I met Bill Tavaniotis, SV1KE, and his mechanic Pol SV1AZ (now N2DOE). None of us had official licences because the Greek State did not recognise the existence of amateur radio, and in fact Athens did not even have a broadcasting station until 1938, although a station had been operating since 1928 in Salonica (Thessaloniki) the second largest city of Greece. But the Head of the W/T section at the Ministry of Posts & Telegraphs (Greek initials T.T.T) Mr Stefanos Eleftheriou knew all about us and gave us his unofficial blessing.

My first transmitter was just an electron coupled oscillator using a type 59 output pentode from a radio. With an input of around 5 watts I was able to achieve W.A.C. on 14 MHz in 25 minutes one very exciting afternoon. There were very few stations around and single frequency working had not been heard of yet. It was the middle of the sunspot cycle (which I knew nothing of) and propagation must have been exceptionally good.

Another thing we had never heard of in those innocent days was SWR. I had a Hot Wire ammeter and always tuned for maximum deflection, completely oblivious of the fact that a large proportion of the indicated value was 'reflected power'. I moved to 'high power' when I added a 210 P.A. to my rig.

Obviously the prefix SV was quite a rare one and SV stations were much sought after, particularly the handful who used CW. But as I described in a short article in the October 1948 issue of the SHORT WAVE MAGAZINE published in London, it was not all fun being a rare DX station. A photo copy appears below:

To return to pre-World War II operating: Most operators used crystal oscillators in order to have a clean '9x' note. It was quite normal procedure to call CQ on one's crystal frequency, say 14,076 KHz and then go over and start combing the band from 14,000 for replies. At that time 20 metres covered 14,000 to 14,400 KHz., and the 15 metre band had not been allocated to the amateur service.

In September 1939 Hitler invaded Poland and all of us hastily and voluntarily dismantled our transmitters and scattered the components, as there was nobody to order us to close down.

In the latter part of April 1941 the German army marched into the northern suburbs of Athens at 11 o'clock in the morning. At 3 o'clock in the afternoon of the same day, a strong unit of the Gestapo arrived in the southern suburb of Kallithea and surrounded the block in which my house was situated and broke into it, looking for me and my transmitter. Of course I had dismantled everything 19 months previously and even taken down the antenna. So after this long period of QRT how did they know where to find me? Well, FOUR YEARS EARLIER I had won the first prize for Greece in the D.A.S.D. DX Contest for 1937 and the German society had sent me a nice certificate. You can draw your own conclusions. I heard later (because I had left a few days earlier for Egypt with the staff of the British Embassy) that the Gestapo had visited all the active amateurs and had managed to arrest only one of them, Nasos Coucoulis SV1SM (later SV1AC) and put him in a concentration camp in Italy for nearly a year.

I would like to sketch briefly the turbulent events of the following three years with some extracts from my diaries.

One year earlier, in 1940, following the invasion of Greece by the Italian army operating from Albania, the broadcasting authority in Athens (ETHNIKON IDRIMA RADIOFONIAS) began a news service in English which was beamed to England and the U.S.A. on the short waves. In my capacity as a member of the Press Department staff of the British Embassy I took part in the first programme, and in fact read the first news bulletin, which went out at 3 a.m. Athens time. As I said above, early in April I was transferred to the British Embassy in Cairo, Egypt.

1941: Very small contingents of the British army landed in Greece to help the Greek army. But they proved totally incapable of standing up to the onslaught of the German army which followed soon after. The Greek army laid down its arms in Epirus (north-western Greece). General Tsolakoglou became the first 'Quisling' Prime Minister of Greece. King George and his government, under Premier Emmanouil

Tsouderos had left for Cairo.

1942: In North Africa General Rommel had advanced to within 100 miles of Cairo, but his supply lines had become very long. One of the most important was the railway link through Greece, so the British strategists decided that attempts must be made to disrupt it. The Special Operations Executive (S.O.E.) in London, despatched two small groups of saboteurs (about a dozen men altogether) under the command of Brigadier Eddie Myers and Major Chris Woodhouse who had the task of linking up with the various bands of 'Andartes' (Resistance movement fighters) which had started forming in the mountains.

Unfortunately, the British officers were told nothing at all about the bitter rivalries between the various groups, most probably because H.Q. in Cairo were themselves ignorant about the real situation. It didn't take Meyers and Woodhouse long to discover that by far the largest group was E.L.A.S. (the Popular Liberation Army) under Aris Velouhiotis, about 120 ill-equipped men operating in the Pindus mountains. Another smaller group of about 60 men had rallied round a regular officer of the Greek army, Colonel Napoleon Zervas. They called themselves the National Republican Greek League (Greek initials E.D.E.S.)

I met Zervas personally years later when he was Minister of the Interior (and therefore responsible for the Police). I was then acting as interpreter for the Assistant-Head of the British Police Mission to Greece. I remember vividly with what relish he described to Colonel Prosser his method of torturing E.L.A.S. prisoners, which left no physical marks on any part of the body.

It was in the course of a secret visit to Athens that young Chris Woodhouse found out the real chain of command, when he was introduced to George Siantos, the Secretary of the Greek Communist Party (Greek initials K.K.E.). The K.K.E. controlled E.A.M., the National Liberation Front which, in turn, ran E.L.A.S. But with a title like that (National Liberation Front) it was easy to see why E.A.M. enjoyed such widespread support, not only in the countryside, but also among the intelligentsia in Athens.

But the task of the S.O.E. officers was made very difficult for various reasons: Winston Churchill had given orders that they were to support, as far as possible, only those guerrilla leaders who favoured the King—but there were none, or very few. The S.O.E. units had orders to cause the maximum disruption to the German occupation of the country. And that was impossible without the support of E.L.A.S., which was controlled by the Communists. At the outset, it became obvious to the S.O.E. officers that military and political priorities were already in conflict.

E.L.A.S. forces were getting stronger every day and very soon they began attacking fellow Greeks in non-communist Andarte units. The successful attack on the railway bridge over the Gorgopotamos river on the 26th of November was the first and last time that ELAS and EDES co-operated against the common enemy under the coercion and technical guidance of the British.

1943: Friction between EDES and ELAS continued to increase. When Eddie Myers told them that he had been instructed to destroy the bridge over the Asopos river, ELAS said it was too dangerous a target and refused to help, so this became an all-British operation. A 24-year-old demolition expert of the Royal Engineers Captain Ken Scott, was sent from Cairo. He was dropped by parachute, and planned the successful attack on the bridge. It took the Germans four months to rebuild it.

On the 11th of September 14,000 Italian troops in the north-west surrendered to the Andartes with all their arms. A month later ELAS seized the weapons and attacked EDES. The civil war had begun.

1944: The friction between the various groups of the Resistance movement erupted into full-scale war, described as the 'civil war' or the 'guerrilla war' depending on whose side you were on. ELAS were determined that they alone would be in control when the Allies arrived. As a result of intense negotiations on the part of the British officers, all the Andarte leaders signed an Armistice document on the 29th February 1944 agreeing to stop fighting each other and to concentrate all their efforts against the common enemy—the Germans. Unfortunately, barely a month later ELAS attacked and completely annihilated the smallest andarte group E.K.K.A. Now only EDES and the 200-strong S.O.E. force stood between the 40,000 ELAS Communists and total control of the Greek countryside.

In the Middle East, the Lebanon Conference, attended by delegates from all parties, including representatives of the Andartes, elected George Papandreou (father of Andreas Papandreou, recently Prime Minister of Greece), to act as Prime Minister of the Government of National Unity in exile. In September the government moved temporarily to Italy. In October, following the withdrawal of the Germans from Athens, British troops began landing in Greece from Greek and British warships. By far the largest contingent landed near the port of Piraeus and tens of thousands of Greeks turned out to cheer and welcome the British forces as they marched through the streets.

On October 18 the members of the Greek government returned to Athens under the leadership of the Premier George Papandreou, who was accompanied by Lt. General Ronald Scobie, the Allied military commander.

Sadly though, in December ELAS marched on Athens. The British troops, so recently feted and garlanded now found themselves fighting on the same streets of their earlier welcome. S.O.E. had been warning Cairo for two years that this might happen. After three or four weeks of intense fighting in the streets of Athens and in the suburbs, ELAS withdrew.

Winston Churchill came to Athens on Christmas Day to mediate. A couple of ELAS snipers hiding in a school a few hundred yards away from the British Embassy took a few pot shots at him as he got out of an armoured vehicle which had brought him from the airport. Next day, when he attended a meeting of all parties, the ELAS representative walked in wearing a military-style uniform with crossed bandoleers across his chest, and carrying two pistols. Churchill turned to his interpreter and said quietly: "Tell him to leave his toys outside, or I fly back to London immediately, to spend Christmas properly with my family."

1945: On the 1st of January Archbishop Damaskinos was appointed Regent. (It had been agreed that the King should not return to Greece until his position had been clarified by a plebiscite). Plastiras replaced Papandreou as Prime Minister. After the Varkiza agreement the guerrilla war (or civil war) was officially brought to an end.

Years later in a broadcast, Chris Woodhouse summarised what the S.O.E. mission to Greece had achieved.

1. It had provided the technical expertise, such as the handling of explosives, without which the major sabotage successes would have been impossible.

2. It had provided the tactical planning and supplied the communications which successfully harnessed the courage of the Greeks to the strategic requirements of the Allied commanders.

3. Most important of all, in the long run, it assured that no armed force in occupied Greece would gain a monopoly of power on the day of liberation. The final aim of the mission was to leave the Greeks with a free choice at the end of the war—a choice between a Monarchy, a Republic or even a Communist regime if they wanted it. But the recent dramatic events in the closing months of 1989 in Poland, the U.S.S.R., Hungary, the East German Democratic Republic, Czechoslovakia and finally Romania have proved that the last choice would have been an unwise one if the Greeks had also opted for Communism.

1946: Following a plebiscite King George II returned to Greece at the end of September and appointed Panayis Tsaldaris as his Prime Minister.

When I returned to Athens in October 1944 on H.H.M.S. AVEROF I had been appointed Radio Monitoring Officer of the Anglo-Greek Information Service (A.G.I.S.) with a staff of about 25 W/T operators and typists to assist me. My unit was a section of the Press Department of the British Embassy. I think the choice of title was a rather unfortunate mistake. The English words 'information' and 'intelligence' have only one equivalent word in Greek pliroforiesq. And most Greeks hold peculiar views about the C.I.A. and the British Intelligence Service. So here I was strutting about in the uniform of a war correspondent bearing the flashes 'I.S.', the butt of many a joke from my friends who accused me of being a master spy. My boss, Colonel Johnson, who had been the British Council representative in Greece prior to the outbreak of war in 1939, came to my office one morning and told me that he had heard a rumour that King George of the Hellenes, who was then in London, was going to broadcast in the Greek service of the B.B.C. I replied I had heard nothing, but would try and find out if the rumour was true. As he left my office I glanced at my watch; it was 11 o'clock in the morning, 9 o'clock in London. I telephoned the General Manager of Cable & Wireless, Mr Briggs, who was a personal friend. I told him I wanted to make use of his facilities to ask an urgent question of the B.B.C. in London. He replied, "Tell McTaggert" (the engineer in charge of the Central Telegraph Office) "that I said he should help you in any way possible."

"Mac," I said over the telephone, "would you get one of your operators to ring the B.B.C. in Bush House (from where the World Service originates) and ask them if they have any plans for a broadcast by King George of the Hellenes." I immediately tuned one of my receivers to the frequency of the London telegraph link, which was carrying high speed morse traffic. In a short while the tape was stopped and an operator, using a hand key, asked my question slowly in plain language, and then the tape was put on again. I waited anxiously for about five minutes. Again the tape was stopped, a single letter 'R' (for received) was sent by hand, and traffic returned to normal. My telephone rang; it was McTaggert. "Nothing doing, old boy. The B.B.C. have no plans for such a broadcast." I thanked him and

looked at my watch. It was 11.25, just 25 minutes had elapsed. I called my boss and told him the answer to his question. "How do you know?" he asked. "I asked the B.B.C., sir." "You what?" he shouted at me. "Don't you know there's a war on? I'm coming to see you." He stormed into my office and demanded an explanation, so I told him what I had done. "Good God, what is this going to cost us?". "Nothing at all, sir. There is no provision for anything like that in the operating procedure". "Then I must write a letter to Cable & Wireless to thank them." I thought to myself, why don't you write a letter to Norman and thank him for having friends in the right places. But I kept my mouth shut.

My equipment and my staff of 20 men and 5 girls were housed on the 6th floor of the Metohikon Tamion building. When ELAS marched on Athens, there was constant firing, shelling and bombing throughout the 24 hours of the day and night for three or four weeks. The bombing was by light aircraft of the R.A.F. on the ELAS positions in the suburbs and Beaufighter aircraft straffing them with 20 mm cannon. Then ELAS set up a 75 mm gun in the northern suburb of Aharnon, and started hitting us back. When we had received several hits on and around our H.Q. building, I was ordered to move down to the second floor, to safer accommodation. I extended some of my antenna down-leads, and resumed normal service. One of our assignments was to transcribe, every day, what was said in the Greek transmissions of nineteen different countries about the situation in Greece, and to produce a daily summary in English, for the benefit of the Press Department.

In the summer of 1945 we began having interference on GIN, a station of the British Post Office which operated around 10MHz, transmitting a REUTER news service for Europe on the German Hellschreiber (Hell printer) system. This was a sort of very course TV picture of 49 dots, seven by seven. The letter 'I' for instance came out as seven dots vertically, and the letter 'T' just had another six dots across the top. The letters were very crude but readable, provided there was no interference, or crashes of static. The interference, which made our tape quite unreadable, used to start around 3 in the afternoon and fade slowly away about three hours later, when the tape became readable again. I decided I would try and identify the source. All I had in the way of recorders were office-type Dictaphones using wax cylinders. I removed the three weights from the speed governor, and the cylinder spun round like mad. I managed to record for about three minutes and when I played the recording on another machine at normal speed the cylinder yielded up its secret—it was high speed morse traffic in 5-figure cypher. I typed it all out and noticed that some of the paragraphs began with the letter 'B'. I subsequently found out it was a characteristic of stations carrying Royal Air Force traffic. I sent my text to London, and three weeks later the interference stopped. It was more than a month later that I was told what had happened. The transmitter causing the problem was located in Kandy, Ceylon. It operated with a rhombic antenna beamed to R.A.F. Calcutta. Its frequency was only 500 Hz away from GIN. The department which had allocated the frequency never imagined that it could possibly cause interference in Europe to the REUTER news service. But sunspot cycle 20, which was a good one, had decided otherwise.

In 1947 I was transferred to the British Police Mission to Greece, which was headed by Sir Charles Wickham. My principal duty was to interpret for Sir Charles, and for his second in command Colonel Prosser. My friend Mr Eleftheriou at the Ministry issued me with a special licence and I came on the air again using my pre-war callsign SV1RX. When the Police Mission closed down in 1948 I came to England and got the callsign G3FNJ which I have now held for over 41 years.

8. Wartime Broadcasts from Cairo.

Elias Eliascos, a former teacher of English at Athens College (a joint U.S./Greek institution) described to me how he came to be a news-reader at Radio Cairo in 1941 together with his brother Patroclos.

"When Hitler declared war on Greece and after the collapse of the front in northern Greece and in Albania, my brother Patroclos and I were summoned to the British Embassy in Athens and told that owing to our close ties with the British Council (of Cultural Relations), it would not be prudent for us to remain in Athens or even Greece after the German army had occupied the capital. We were told that we would be helped to leave Greece together with the British Embassy staff, the staff of the British Council and all the British nationals in Greece.

"The British Consul-General provided us with the necessary documents for my brother and me to board the last evacuation vessel sailing from the port of Piraeus. It was the s/s 'Corinthia' which left Piraeus on the 18th of April 1941. It happened to be Good Friday according to the Greek-Orthodox calendar. About five days later Hitler's army marched into Athens.

"The ship was packed and the British Embassy staff carried most of the Embassy files with them. One of the passengers was David Balfour who was the vicar of the little chapel attached to the Evangelismos Hospital, an impressive tall figure of a man sporting a large black beard. Although he had been ordained as a priest of the Greek-Orthodox Church he was a British national and it was widely rumoured that he was an agent of British Intelligence. His official title was 'Father Dimitrios'. He was

also the spiritual father of the Greek Royal family. I refer to David Balfour because recently the 'ATHENIAN' which is the only English language magazine in Athens, in its issue dated January 1988, published a feature article about him, saying that even before the Germans had entered Athens he had shaved off his beard and divested himself of his clerical robes.

"I can say quite categorically that this was not true. When the 'Corinthia' sailed he was still 'Father Dimitrios' and in fact he officiated at a Resurrection service while we were still at sea. On the voyage we carried out lifeboat drill on two occasions, once when it was thought that there was a U-boat in the vicinity, and another time when an aircraft flew overhead which turned out to be friendly. I shall never forget how I was moved with emotion when I saw the women getting into the boats, most of them carrying babies or children in their arms, calmly singing hymns in low voices.

"Some time later I met David Balfour again in Cairo, and this time he HAD shaved off his beard, and he was wearing the uniform of a Major in the Intelligence Corps which is a regular unit of the British army."

Eliascos said he would like to quote a little more from the sensational article written by J.M. Thursby in the 'ATHENIAN'.

"Several years before war was even declared, the Abwehr (German military intelligence), along with the Nazi civilian secret service, had highly trained undercover agents operating in Greece. With consummate skill they had catalogued all military and civil information that could be useful to the Third Reich, and organised spy rings throughout the country. As war became more and more inevitable, it also became increasingly imperative that Britain and other anti-fascist countries should gain specific and accurate knowledge of these operations.

"During this period a monk, who had embraced the Orthodox faith in Warsaw, arrived from Poland via Mount Athos, to join the monastery of Pendeli, just outside Athens. According to his biographer John Freeman, his registration at Pendeli reads,

Cell 102 Serial number 75
Secular name David Balfour
Ecclesiastic name Dimitri
Place of birth England
Age 35
Inscribed order of His Holiness the Archbishop of Athens.
Coming from the Russian Church.
Archbishopric ordinance number 3197 of 9 May 1936."

"Father Dimitri was obviously a well-educated and very courteous person. He had studied in various parts of Europe and spoke several languages fluently. These included ancient, Byzantine and modern Greek, not to mention colloquial 'mangika' (slang). When a vacancy arose for a priest to serve the chapel at Evangelismos Hospital in central Athens, who should be more suitable for this post in the heart of the select neighbourhood of Kolonaki than the well-educated, well-bred, charming and conscientious Father Dimitri."

(David Balfour died aged 86 on the 11th of October 1989.)

"Anyway, let me continue my story of the 'Corinthia trip", Eliascos went on. "We celebrated Easter on board and when we arrived at Alexandria some of us were sent on to Cairo and others went to India. My brother and I presented ourselves at the offices of the Press Department of the British Embassy in the Garden City. We were received by the well-known Byzantine scholar Stephen Runciman who was in charge of all foreign language broadcasts directed to Europe, that is, the Balkans, Yugoslavia, Romania, Bulgaria, Albania, Poland and several others. One of our colleagues was Lawrence Durrell who later became the famous author of many successful books like the banned 'Black Book', 'Bitter Lemons', 'The Alexandria Quartet', 'Prospero's Cell' and others. But at that time, he used to entertain us daily with a fresh episode about his Aunt Agatha with the wooden leg."

Eliascos continued: "My brother Patroclos and I were told that we would be attached to the section producing the broadcasts in Greek directed towards occupied Greece, acting as translators, editors and newsreaders. The Head of this section was George Haniotis the sports editor of the Athens newspaper 'Elefthero Vima' who used to sign his sporting articles 'GEO'. Under him was the well-known literary figure of Dimitri Fotiadis, who died in October 1988.

"When the broadcasts began early in May 1941 I was the principal newsreader. Later when Haniotis

was posted to the Greek Embassy in Washington D.C. as Press Attache, my brother was appointed Section Head. At that time the Prime Minister of the Greek government in exile was Emmanouil Tsouderos, a former Director of the Bank of Greece. The foreign language broadcasts from Radio Cairo were under the over-all control of the Political Warfare Executive (P.W.E.) of the British Ministry of Information. Later, in conjunction with the Americans, the title of the unit was changed to Psychological Warfare Branch (P.W.B.)

"Every evening we had two broadcasts, at 7.30 and 10.30 pm, which went out on the medium wave transmitter of Radio Cairo at Abu Zabal, run by the E.S.B. (Egyptian State Broadcasting). The transmissions in eleven foreign languages were also relayed by three short wave transmitters, two belonging to the telegraph company Cable & Wireless (callsigns SUV & SUW), and an experimental transmitter of 7.5 kilowatts belonging to a British army signals unit, with the odd callsign JCJC, operated by young corporal Rowley Shears G8KW, a radio amateur friend of Norman Joly.

"The Greek broadcasts began in May 1941 and went on to the end of January 1945.

"During this period many important personalities broadcast from Studio 3, which was also used by well-known war correspondents of the B.B.C., the N.B.C. and many other news organisations. The people of occupied Greece were addressed by Mr Tsouderos, Crown Prince Paul of Greece, Sofoclis Venizelos, son of the famous Cretan politician Eleftherios Venizelos who had played a leading role in the political fortunes of modern Greece, and Panayiotis Kanellopoulos Minister for War. After the naval mutiny in the port of Alexandria Admiral Voulgaris spoke to the officers and naval ratings of the Greek Royal Navy."

Eliascos described in detail the negotiations of the Lebanon Conference which resulted in the appointment of George Papandreou (father of Andreas Papandreou who was recently Prime Minister), as the new Prime Minister of the Coalition government in exile. He can be seen at the famous R.C.A velocity microphone type 44BX which was used throughout World War II and many years after. This ribbon type microphone had a very large and heavy permanent magnet embodied in the design and must have weighed about 1,000 times more than a modern electret lapel microphone.

"I must explain that these war-time broadcasts were carried out in the presence of a Switch Censor who sat on the other side of the news reader's desk and was able to turn off the microphone in a split second if it ever became necessary. During the three and a half years of the broadcasts this was done only on one special occasion and certainly not because the newsreader had gone berserk or something like that. The Chief Censor was Professor Eric Sloman who had been the first Director of the Police Academy in Kerkyra (Corfu). Then there were censors for the eleven languages used in these broadcasts. The censor for the Polish broadcasts was the Countess Walevska, grand-daughter of Napoleon's lady friend. The Countess was a rather large lumbering woman who always came into the studio carrying lots of parcels. One evening she came in and sat in an armchair on the other side of the studio to wait her turn for the Polish broadcast which followed the Greek. As I was reading the news bulletin I suddenly became conscious of a regular ticking noise in the headphones I was wearing. I made a sign to Mr Joly who was acting as switch censor at the time, and he got up and walked over to the Countess. He whispered in her ear and asked her what was in her hand bag. The Countess blushed and replied that she had just collected her alarm clock from the watchmaker. I don't know if any sharp-eared listener had heard the ticking and thought that we had a time bomb in the studio.

"Having mentioned my good friend Mr Norman Joly I must record that he was the technical supervisor for the foreign language broadcasts, handling such things as wavelengths for the short wave relays, training the newsreaders (of whom there must have been over 30) and acting as studio manager and switch censor for some of the languages which he knew.

"A regular broadcaster in our studio was Francis Noel-Baker who later became a Labour member of Parliament in the British House of Commons, like his father. The Noel-Baker family are well-known in Greece because for several generations they have owned a large property on the island of Euboea (Evia in Greek). Francis speaks fluent Greek, and his mother was related to Lord Byron. In recent years he has switched his allegiance to the Conservative Party led by his personal friend Margaret Thatcher.

"Major Patrick Leigh-Fermor the writer who had kidnapped Major-General Heinrich Kreipe in Crete and spirited him away to Allied headquarters in Cairo, came to our studio and described how this audacious operation had been carried out by him and Captain William Stanley Moss, ex-Coldstream Guards, with the considerable assistance of the Cretan resistance movement partisans.

"Purely by coincidence, it was the Greek news bulletin from Cairo which first announced to the world General Montgomery's victory over General Rommel at Alamein. I must explain that during a broadcast the two doors leading into the studio were kept closed and an armed officer of the Military Police sat outside (in civilian clothes) to prevent anyone from entering for any reason whatsoever. I was in the middle of reading the news when suddenly, without warning, the inner door opened and a young despatch-rider, still wearing his crash helmet, walked in waving a piece of paper. Mr Joly immediately switched off the microphone and asked the young man what he thought he was doing. 'Most Immediate sir', he said. (This is the army's highest priority classification.) 'To be broadcast at once.'

"Mr Joly handed the document to me and I saw it was written in English. Taking a deep breath I began translating the text into Greek, with some excitement and trepidation owing to the difference in syntax between the two languages. Forty-six years later Mr Joly gave me the identical sheet of paper, which he had kept as a souvenir. It is printed here in full. At the Editorial offices, where they were monitoring the newscast, they thought I had gone out of my mind, because the communique had not reached them yet. When they tuned in to the short wave service of the B.B.C. they heard the communique read out more than an hour after our Greek broadcast. A world scoop, if ever there was one. Years later when I returned to Athens, many of my friends told me they had heard the first broadcast of the thrilling bulletin and they could still remember the excitement in my voice.

"The Greek section was the first to inaugurate the transmission of personal messages. Many people were escaping from occupied Greece in sailing boats across to the shores of Asia Minor, ending up in the Middle East, mostly in Cairo. They had no means of advising their relatives and friends in Greece that they had survived the perilous journey. We used to broadcast pre-arranged messages like 'John informs Mary that he has arrived at the village'.

"As I mentioned above, George Papandreou came to our studio and spoke to the people in Greece about the formation of the government of National Unity, which had been agreed by all parties meeting in the Lebanon, including the representatives of the Partisans operating in the mountains of Greece. Papandreou and the government in exile moved to Naples in Italy for a short period and then returned to Athens on October 12th 1944 for the Liberation.

"Finally, I would like to say that in the dark days before Montgomery's breakthrough at Alamein, when it was quite on the cards that General Rommel might take Cairo, Mr Joly and I were sent to Jerusalem to make arrangements for the foreign language broadcasts to be continued from there. Fortunately the situation changed and we were recalled to Cairo, where we arrived just in time for me to broadcast the historic communique announcing the victory at Alamein, which marked the turning point of the war in the Middle East.

CHAPTER NINE

MISCELLANY

1. The first broadcasting stations of the world.

Speech was first transmitted for reception by the general public from Washington D.C. in 1915 when Europe was still at war. During 1916 the first 'broadcasting' station in the world began regular transmissions from a New York suburb.

In 1919 Dr. Frank Conrad, then Assistant Chief Engineer of the Westinghouse Electric & Manufacturing Company, set up, in his own garage in Wilkinsburg, Pennsylvania, a 75-watt transmitter (8XK) from which he broadcast musical entertainment for other radio enthusiasts. This was the first continued scheduled broadcasting in history. The Westinghouse Company realised the potential value of Conrad's work and built KDKA, the first regular commercial broadcasting station in the world, which began its career by announcing the results of the Harding-Cox election returns on the November 2nd 1920.

The first broadcasting station in Europe was PCGG which began transmitting on November 6th 1919 from the Hague in Holland. Hanso Steringa Idzerda, a 35 year old engineer, obtained the first licence granted in Europe for the transmission of music and speech for general reception, as opposed to the wireless telegraphy stations which had been operating point to point services. From the end of 1919 to 1924 this station transmitted a series of musical programmes three times a week called 'The Hague Concerts'. The original wavelength of 670 metres was later changed to 1,150 metres.

At that time most of the people who heard these concerts would have been using headphones and they would not have been very critical about the quality of the sounds they were hearing compared to the magical novelty of snatching voices and music apparently out of thin air. This historic transmitter

can be seen in the museum of the Dutch Postal Services in the Hague.

The first transmissions of speech and music in England were made from Chelmsford, Essex, when a 15kW transmitter of the Marconi Company began regular transmissions in February of 1920.

In the summer of 1924 the world's greatest radio companies—British Marconi, German Telefunken, French Radio Telegraphie and American R.C.A.—met in London to discuss transatlantic communications. The learned gentlemen all agreed that the Atlantic could only be spanned by ultra-long waves of 10,000 to 20,000 metres, which would require the use of hundreds of kilowatts of power and receivers as large as a trunk, not to speak of antennas more than a mile long. Dr. Frank Conrad, who was also present at the conference, had brought with him a small short wave receiver less than a foot square. When he connected it to a curtain rod as an antenna the faint but clear voices of his assistants in the U.S.A. were heard from nearly four thousand miles away. With this spectacular demonstration he administered the deathblow to all plans for high power ultra-long-wavelength transmitters, and from then on the commercial companies concentrated their efforts on developing equipment for international communications on the short waves.

With present-day electronic news gathering and world-wide satellite links, the problems faced by broadcasting organisations fifty years ago when transmitting programmes which did not originate in a studio were thought to be very complex. In the B.B.C. Handbook for 1928 there was an article entitled 'Outside Broadcast Problems' which said,

"Work outside the studio is often the most difficult that the broadcast engineer can be asked to undertake; not so much from a technical as from a practical point of view. Very often he has to take his apparatus to some place he has never seen before, set up his amplifiers in most awkward positions, test his lines to the studio, decide on his microphone placings and run out the wiring in the space of an hour or so, with little previous experience to guide him. It is in fairly echoey halls, theatres and churches that the majority of outside broadcasts take place. For example, a sermon preached in a church would be intelligible probably to the whole of the congregation. But to render it intelligibly on a loud-speaker, the microphone would have to be, say, not more than ten feet from the speaker. In broadcasting a play from a theatre, when the speakers are moving about, the only way of dealing with the problem is to use several microphones and a mixing device which enables the engineer to change silently from one microphone to another, or to combine them in varying proportions. Some rapid switching may sometimes be necessary.

"Even with good microphones and amplifiers the engineer in the field may often experience difficulties with the lines connecting the outside point to the studio. The majority of such lines do not transmit the higher frequencies adequately, especially the longer ones. The problems become immense when European simultaneous broadcasts are attempted. Experiments on the continental wireless link have done no more than reveal its unreliability. The undersea telephone line, however, does not give either good or even intelligible quality of speech if it is longer than a couple of hundred miles, and it is quite unusable for the transmission of a musical programme.

"The B.B.C. has been the first in the world to exploit Simultaneous Broadcasting to its fullest advantage for a national system, and thanks to the co-operation of the Post Office engineers, it is possible to pick up a programme wherever it may take place within the British Isles and radiate it simultaneously from all distribution centres.

"Looking ahead still further and assuming that the wireless will supplement the wire line link, there is no reason why a simultaneous broadcast of something of fundamental importance to the whole civilised world should not take place some time in the future."

In a book entitled "Radio Goes to War" published by Faber & Faber in 1943, Charles J. Rolo wrote,

"Radio went to war on five continents shortly after the Nazi Party came to power in Germany. In nine years it has been streamlined from a crude propaganda bludgeon into the most powerful single instrument of political warfare the world has ever known. Spreading with the speed of light, it carries the human voice seven times round the globe in one second. When Hitler makes a speech in the Kroll Opera House in Berlin, listeners in America and the whole world hear his words by short wave even before his own immediate audience hears them. Radio speaks in all tongues to all classes. All pervasive, it penetrates beyond national frontiers, spans the walls of censorship that bar the way to the written word, and seeps through the fine net of the Gestapo. It reaches the illiterate and the informed, the young and the old, the civilian and the soldier in the front line, the policy makers and the inarticulate masses. So great is the importance of radio to-day that the seizure of a defeated nation's transmitters has become one of the primary spoils of war."

In Greece, broadcasting was started in the northern city of Thessaloniki (Salonica) by the pioneer of Balkan broadcasting Christos Tsingeridis, in 1928. A museum in that city tells the full story of the first broadcasting station in the whole of the Balkans.

Broadcasting in the capital, Athens, started on March 25th 1938 when a second-hand 15 kW Telefunken transmitter was put into operation in the suburb of Liosia. The centre-fed T antenna was supported between two pylons of 85 metres (279 feet). In 1944 when the German army was pulling out of Athens they tried to blow the the pylons up but one of them remained standing at a crazy angle, because one of the explosive charges had been placed incorrectly.

2. Avlis 'The Voice of Hellas'.

The 5th Programme of the Greek broadcasting service (Elliniki Radiophonia) is transmitted from the short wave transmitting centre at Avlis, about 70 kilometres north of Athens. The station was put into service in 1972 and has two 100KW Marconi short wave transmitters and a veritable forest of antennas covering 1,100 acres, arranged in three lines to cover the desired directions, as can be seen on the great circle map. The pylons supporting the 6 MHz arrays are truly impressive at 328 feet. Each line has eight separate antennas for the 6, 7, 9, 11, 15, 17 and 21 MHz broadcasting bands.

Each antenna consists of two curtains with a total of 8 horizontal dipoles. The dipoles are all fed by open wire feeders which can be remotely switched to enable radiation in two directions 180 degrees apart. There are also three curtains for the 11 metre band (26 MHz) which may be put into service during sunspot cycle 22 if the M.U.F. allows it.

For transmissions to neighbouring countries like Cyprus, Turkey, the Balkans and the countries of the Middle East, there are two rotatable log periodic antennas with a high angle of vertical radiation (45 degrees) and a wide angle of 32 degrees in the horizontal plane.

The remotely controlled switching centre allows each of the two transmitters to be connected to any one of the 23 antennas. Electromechanical protection circuits ensure that a transmitter can only be connected to an antenna that is tuned to the same frequency. The change of antennas and transmitting frequencies is made during the ten-minute interval between programmes, which always begin on the hour, preceded by the now familiar signature tune of a shepherd playing his flute with the tinkling of sheep-bells in the background, recorded in 1936, followed by the Greek National Anthem.

The special programmes of news and features originate in the broadcasting headquarters in Athens and go on the air throughout the 24 hours of the day in Greek, English and many foreign languages. Reports of reception are welcome and should be addressed to K.E.B.A., Avlis, Greece. (The Greek initials stand for short wave transmitting centre.)

But Avlis was 'in the news' long before the Greek broadcasting service decided to install its short wave transmitters there. In ancient times a great fleet of ships had been assembled in the harbour there, ready to set sail for Troy, following the abduction of the beautiful Helen of Sparta by Paris, the young Prince of Troy. But there had been no wind for many weeks, and the sea was dead calm.

Agamemnon, the King of Mycenae, who had himself contributed over 100 ships to the fleet, decided to consult his Seer. As was the custom, the Seer slaughtered a young lamb and scrutinised its entrails. He then announced that the wind would come up if Agamemnon sacrificed his daughter Iphigenia on the Altar of Sacrifice. King Agamemnon despatched a messenger to Mycenae (no VHF repeater being available in those days) to tell his wife Queen Klitemnestra to send their daughter Iphigenia to Avlis (Aulis). The King said he was planning to marry her off to Achilles, the most eligible bachelor of the day. When poor Iphigenia arrived she was quickly placed on the Sacrificial Altar—and had her pretty throat slit.

However, there seems to be another version to the end of the story. Just before the human sacrifice was due to be made Artemis (Diana, the famous Goddess of Hunting) sent a small deer which was placed on the altar instead of the girl. Iphigenia was secretly spirited away to Taurida, in northern Greece, and put in charge of Diana's temple there.

(This story is the subject of a well-known classical Greek play.)

Historical note on the Marconi-Stille steel tape recording machine.

At the beginning of the century Professor Poulsen, one of radio's earliest pioneers, discovered that a magnetic impression could be made on a moving length of wire which remained on the wire even after it had been rolled up. He used his machine to record the Morse code only, that is magnetism 'on' and

'off'. In 1924 Dr. Stille in Germany made a machine which could record sounds. The B.B.C. sent two engineers to Berlin, and after a demonstration they offered to buy the machine, but in the end they returned to England empty-handed.

In 1931 Mr Louis Blattner managed to buy a machine and bring it to England. He called it the Blattnerphone. By this time Dr. Stille had replaced Poulsen's wire with a flat steel tape 6 mm wide. Each reel of tape could only accommodate 20 minutes of recording. There was a constant and heavy background hiss, due to the inherent quality of the steel tape itself.

Stille Inventions Ltd. joined forces with Marconi's Wireless Telegraph Co. Ltd. to produce, with the close co-operation of the B.B.C. Research Department, the Marconi-Stille machine which was put into use in 1934. The tape width was reduced to 3 mm and the thickness to only 0.08 of a millimetre. In order to secure the reproduction of the higher audio frequencies, it was found necessary to run the tape at a rate of 90 metres per minute past the recording and reproducing heads. This meant that the length of tape required for a half-hour's programme was nearly 3 kilometres!

4. Brief description of the ribbon or velocity microphone.

George Papandreou, Greek Prime Minister of the war-time government of National Unity in exile, is seen with the famous ribbon microphone developed by the B.B.C. in 1934. This microphone (R.C.A. designation 44BX) consists of a ribbon of corrugated aluminium foil only 0.0002 of an inch thick suspended vertically in a very intense but narrow magnetic field. When sounds vibrate the ribbon extremely low alternating voltages are developed at the ends of the ribbon, which has a very low impedance of only 0.15 ohm, necessitating the use of a step-up transformer of 1:45 turns ratio very close to it. The frequency response is 20 to 16,000 Hz. A drawback is that the ribbon can be blown out of the magnetic gap by sudden puffs of air when a speaker gets too close to the microphone, so the casing is lined with several layers of chiffon which let in the sounds but not the air. Without its base the ribbon microphone weighs 4 kilograms, nearly 9 lbs.

5. An outstanding antenna system designed by Rex G4JUJ for Phase III amateur satellite communication.

The up-link section comprises four 88-element Jaybeam multi-beams
which provide a power gain of 225.

The two down-link 8 element yagis are each fitted with a small D.C. motor directly coupled to a 9 inch length of M5 brass studding rotating inside a block of PTFE linked to a push rod which can move the antennas 75 degrees both sides of the vertical position, either in unison or in opposite directions. This system provides infinitely variable polarisation which optimises the down-link signal at any instant.

6. The saga of H.H.M.S. ADRIAS

While fighting in the area of the Dodecanese Islands on the night of the 22nd October 1943 the destroyer ADRIAS (L67) was seriously damaged by a mine but refused to sink.

Under the command of Commander John Toumbas the ship covered a distance of approximately 700 nautical miles, reaching the port of Alexandria in Egypt on the eve of the feast of Saint Nicholas, the patron saint of all seamen.

The Greek Minister of the Navy Sofoclis Venizelos, and the British Admiral in command of the Royal Navy in the Eastern Mediterranean, provided an honorary escort for the brave little ship that had refused to die. A few months later the snub-nosed L67 joined the fleet of 100 vessels of all sorts which sailed to Greece for the Liberation.

The photographs were taken by the author (with the exception of the damaged L67) who travelled back to Greece on H.H.M.S. AVEROF in the same convoy. The photograph of L84, a similar type destroyer to ADRIAS shows how much of her bows was blown off by the collision with the mine.

(H.H.M.S. stands for His Hellenic Majesty's Ship.)

7. German sabotage at the Cable & Wireless station at Pallini, Greece, in World War II.

As the German army was pulling out of Greece in October 1944 its engineers carried out extensive sabotage to installations of a strategic value. At Pallini, not far from Athens, an attempt was made to destroy the transmitter hall by dropping one of the antenna towers onto it, but the equipment was not damaged.

They were more successful at the Royal Navy transmitting site at Votanikos. Here they tried to destroy six 300 foot tubular masts. One remained standing and also the lower part of another. All the test gear in the lab was thrown out of a second floor window and burnt. I was acting as official photographer for my unit at the time. When I walked into a small store room I saw all the equipment had been thrown off the shelves on to the floor, but appeared to be intact. I spotted a box of brand new packed German navy morse keys and decided the time had come for me to acquire a small war trophy of my own. As I bent down to pick up a key, I was horrified to see two large sticks of gelignite perched perilously on the edge of a shelf. The explosive was tied with white ribbon, with a weight attached to the other end. I froze to the spot. Gingerly I lifted my trophy out of the box and began to walk slowly backwards, being very careful not to knock anything over. I breathed a sigh of relief when I was out of the room and immediately alerted the engineers who came and defused the booby trap. So this book might never have been written thanks to the German army.

At the Athens broadcasting station transmitter site at Liosia my unit erected a small temporary 'T' antenna which allowed the station to come on the air again, but a short time later, when the ELAS guerrillas overran the area they began using the transmitter to broadcast their own view of events. We provided the broadcasting authority with a BC 610 mobile transmitter installed next to the Parliament building in the centre of town, using the same frequency of 610 KHz. Listeners in Cairo couldn't understand what was going on when one moment they heard an official government announcement and a little later a war communique issued by the Communist guerrillas.

8. Over-the-horizon or Ionospheric HF Radar—OTHR

As mentioned briefly in Chapter 1, it was in April 1976 that the then Soviet Union first unleashed a diabolical noise on the HF bands which caused widespread interference to all broadcasting and telecommunication services between 6 and 20 MHz. On the first day the "knock-knock-knock" went on continuously for over ten hours. Radio amateurs, who were among the services that suffered from the interference, soon came to call this noise "the woodpecker". By rotating their beams when tuned to the 14 MHz band they established that the transmissions appeared to originate from the vicinity of the town of Gomel in the U.S.S.R.

The governments of many countries world-wide immediately protested to Moscow, and all they got in reply was a brief statement that the U.S.S.R. was carrying out "an experiment".

The reason for the very strong on/off pulses was probably because, at first, the Russians were using existing radar antennas which permit the transmitting and receiving functions to share the same antenna. Modern OTHR installations have different transmitting and receiving sites, often located many miles apart.

From the early 1950s pulsed oblique ionosphere sounders had shown that the normal ionosphere is much more stable than had previously been thought to be. The physical reason for this is that the incredibly tenuous ionized gas which does the reflecting has a molasses-like viscosity. Of course, there are daily and seasonal changes, but over limited periods of half an hour or so, the F layer at a given location is actually quite well-behaved. It bounces back signals in a nearly constant direction and with nearly constant amplitude—just what is required for good radar performance.

Over-the-horizon HF radars use the ionosphere as a kind of mirror to "see" around the curvature of the earth. They have a variety of uses, both military and civilian. And they have the advantage over line-of-sight microwave radars of being able to cover enormous areas with much less power and at a fraction of the cost of the latter.

A "relocatable" OTHR system can track aircraft targets right down to ground level. In an early experiment operators were puzzled by the sudden disappearance from their screen of an aircraft they had been tracking as it taxied along the ground. They found out later that the reason for the disappearance was that the aircraft had gone into a metal hangar which did not show on the screen because it was not in motion, as explained below.

In 1979 the United States Air Force began experimenting with an OTHR system at a site near Bangor, Maine. Because HF frequencies were being used the power was kept very low to minimize interference to other services during the early tests. At the time of writing (1989) it is believed that a full-power relocatable OTHR system situated in Virginia is being used in the anti-drug war.

As can be seen from the map this ROTHR can cover a vast area of 1.6 million nautical miles, straddling the whole Caribbean. The scan area stretches from the coast of Colombia in South America

up through Nicaragua and Honduras to Florida (on its west boundary) and then southwards through Puerto Rico, to Trinidad & Tobago and the northern coast of Venezuela.

But this vast area is not covered continuously; the system operator can provide surveillance in a number of sectors known as DIRs (dwell information regions). Each one of the 176 DIRs can be "illuminated" for only a few seconds at a time. Small aircraft and small vessels can be detected by an ingenious method, only when they move. This is how it is done:

At the receiving site of the ROTHR system a very large antenna stretches out over a distance of 8,400 feet. It consists of 372 dual-monopole vertical elements each 19 feet high, backed by a huge reflector screen which makes the antenna substantially unidirectional. Each pair of vertical elements has its own receiver which digitizes the incoming signals. All the digitized signals are then fed through a fibre-optic link to a master signal processor. The main receiver can be programmed to pass on "returns" from one particular region while eliminating most of the other returns as unwanted noise or clutter. But because the wanted target is moving, while the clutter is not, a filtering system based on the Doppler Shift principle (even when the echo is only one or two Hertz different) will lock on to it and track it as long as it stays in motion.

Furthermore, the ROTHR system has its own built-in automatic management & assessment function and does not have to depend on external sounding data. It measures the ionosphere height continuously and instantly selects the most appropriate frequency to use to scan the target area, ideally in one hop.

This automatic function uses a quasi-vertical incidence sounder (QVI) to measure the height of the ionosphere near the transmitting and receiving sites, which as mentioned earlier can be miles apart, and a radar backscatter sounder to measure the height of the ionosphere downrange 500 to 1,800 nautical miles away. The incoming real-time data from these soundings are compared with data stored in computer memory. Once real-time data are matched to a model of the ionosphere, the model can be used to operate the system for the best results, based on the prevailing propagation conditions. The data for the ionospheric models take up more than 200 megabytes of computer storage space. Operators thus know when and where to expect degraded performance. Of course, strong solar activity can virtually make over-the-horizon HF radar unusable.

A Spectrum Analyser display shows all the frequencies between 5 and 28 MHz. In order to avoid possible interference to other services, those frequencies which are known to be permanently allocated to fixed broadcasting and telecommunication stations are locked out, as well as frequencies which happen to be used at any instant so that they can also be avoided by the OTHR transmitter.

GLOSSARY for non-technical readers.

A.M. A mode of modulation (amplitude).
A.R.R.L. Amateur Radio Relay League (U.S.A.).
Beacon Transmitter radiating identification signal.
C.Q. General call, to any station.
C.R.T. Cathode ray tube (like TV screen).
C.W. Continuous wave (mode of sending telegraphy).
Callsign Station identification (letters & numbers).
Coherer A device for making radio frequencies audible.
DE Morse abbreviation for 'from' (French).
DX Communication over a long distance.
Detector Any device for making radio frequencies audible.
Doppler shift Change in pitch (of sound) or frequency of a (radio) wave
E.D.E.S. Initials of a war-time Greek guerrilla organisation.
E.E.R. Equivalent Greek initials for R.A.A.G. (q.v.)
E.L.A.S. Initials of a war-time Greek guerrilla organisation.
E.L.F. Extremely Low Frequency.
E.M.E. Earth-moon-earth. Also Moonbounce q.v.
H.H.M.S. His Hellenic Majesty's Ship.
Gasfet A type of transistor.
KHz Kilohertz—international unit for kilocycle.
M.U.F. Maximum usable frequency.
MHz Megahertz—international unit for megacycle.
Moonbounce Communication by reflection from the moon.

OTHR Over-the-horizon radar.
Q code Abbreviations used when communicating by telegraphy.
Q1 Unreadable.
Q2 Barely readable—only some words.
Q3 Readable with considerable difficulty.
Q4 Readable with practically no difficulty.
Q5 Perfectly readable.
QRO High power.
QRP Low power.
QRT "Stop sending". Frequently used for "shut up".
QSO Two-way communication.
QST Call to all stations. Also title of journal of the A.R.R.L.
QTH Location or address of a station.
R.A.A.G. Radio Amateur Association of Greece.
R.F. Radio frequency.
R.S.G.B. Radio Society of Great Britain.
RST System of reporting readability, strength & tone of a signal.
RX Receiver.
S unit Unit for reporting strength of received signal.
S.I. unit International system of definitions.
SSB Single side-band—a mode of modulation.
SWL Room where radio equipment is set up.
Shack Room where radio equipment is set up.
Silent key Deceased radio amateur.
Sporadic E. Propagation via the E layer of the ionosphere.
T.E.P. Transequatorial propagation.
TX Transmitter.
Troposcatter Propagation via the troposphere.
U.H.F. Ultra high frequency.
V.H.F. Very high frequency.
W.A.C. Worked (contacted) all continents.
XYL Wife of a radio amateur.
YL Young lady operator.
73 Morse abbreviation for "best regards".
Yagi A type of antenna designed by a Japanese of that name.

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