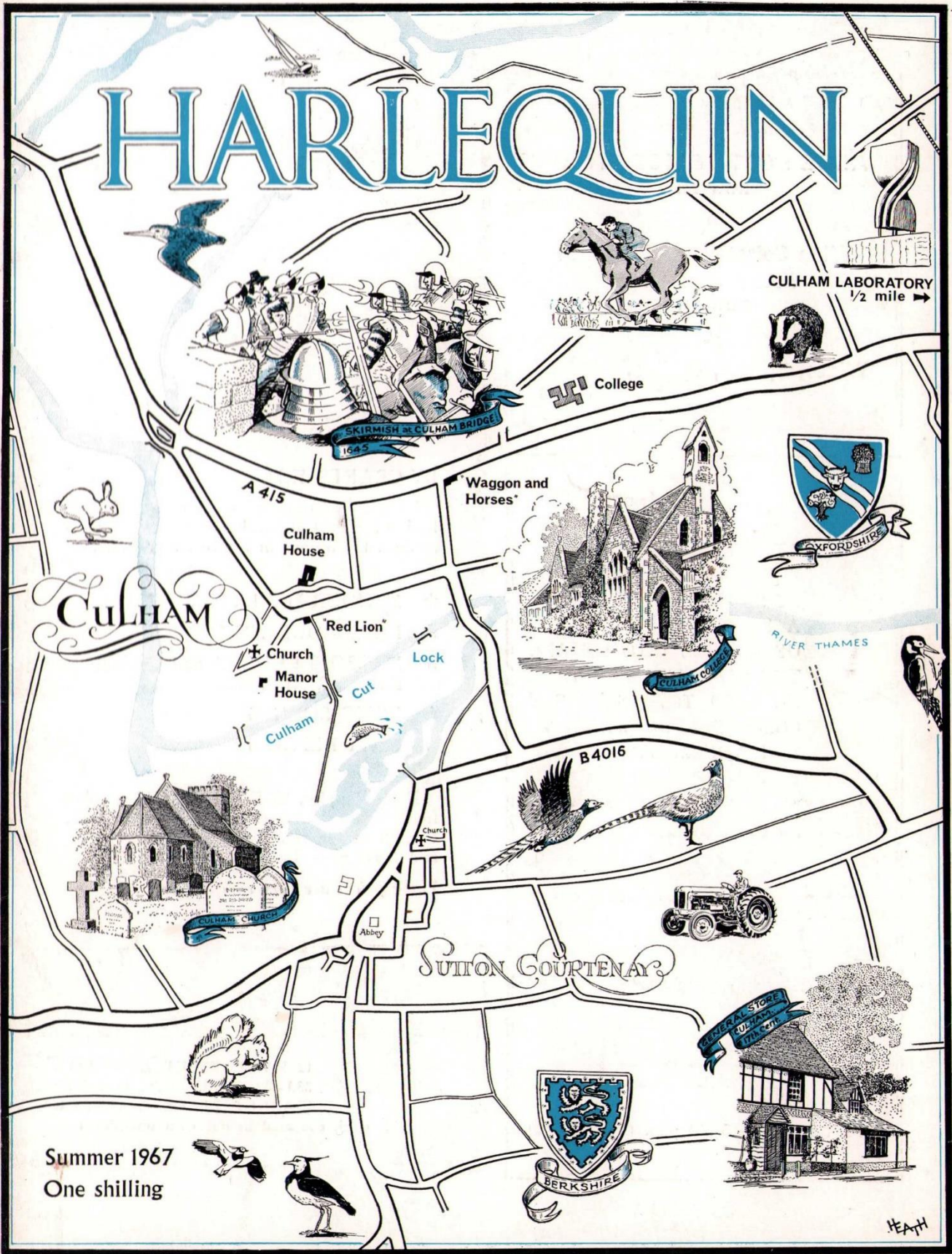


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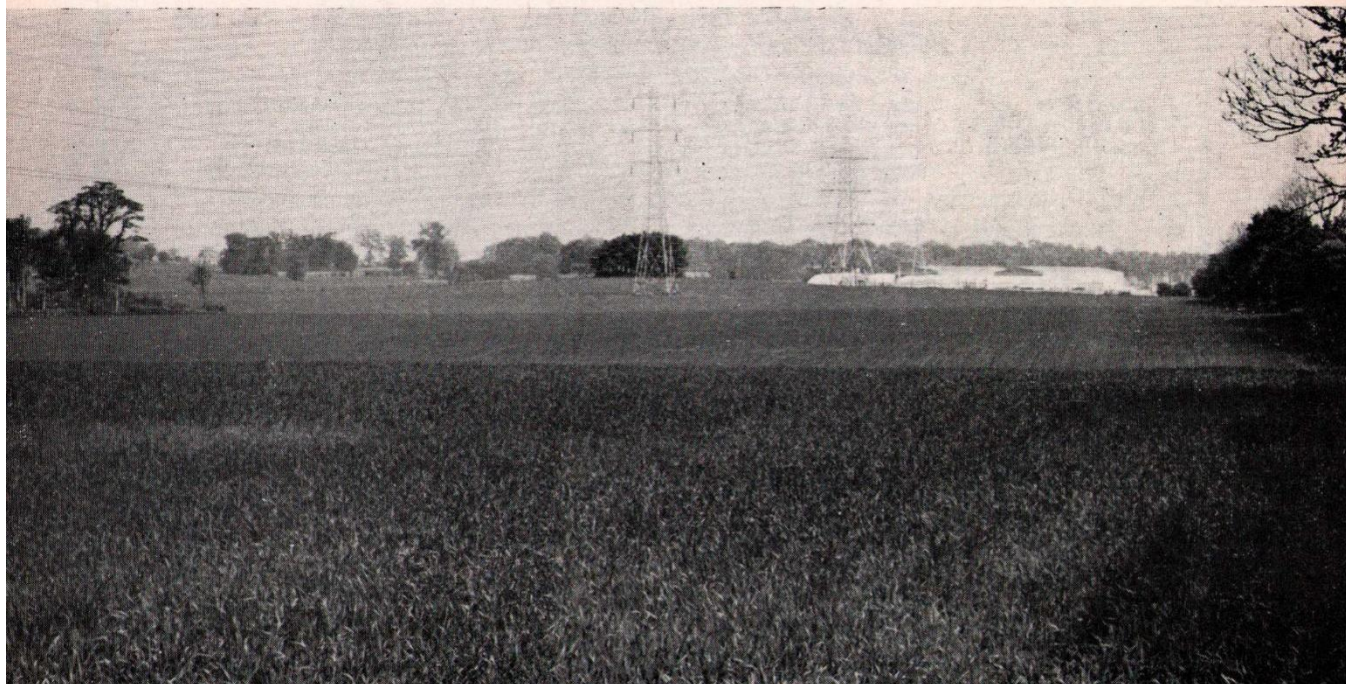
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SUMMER 1967

Vol. XXII, No. 2 (57)

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D. A. FRIEND

DR. R. B. JACOBI

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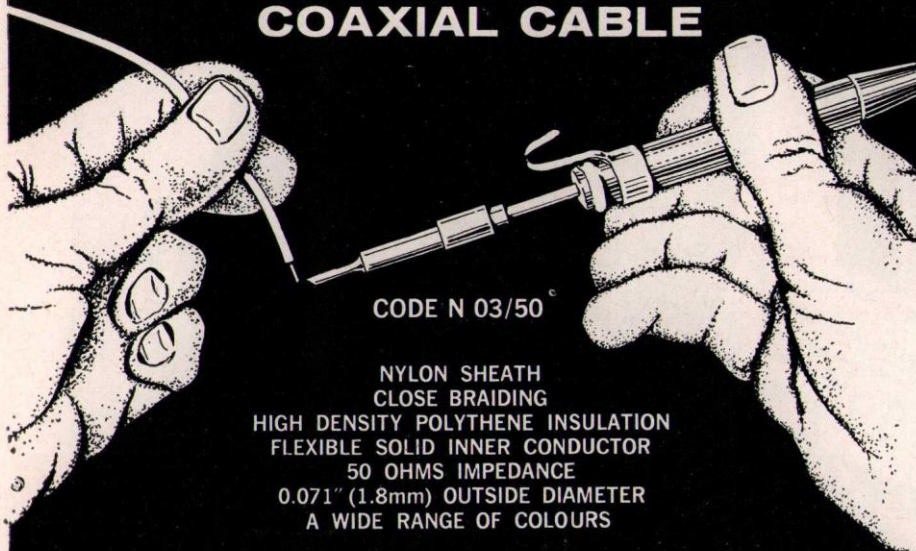
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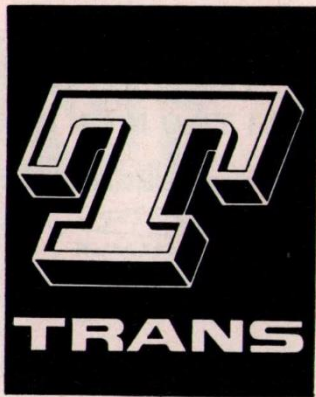
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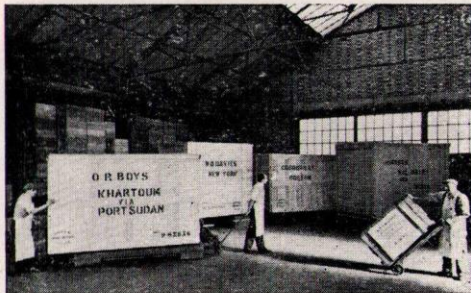


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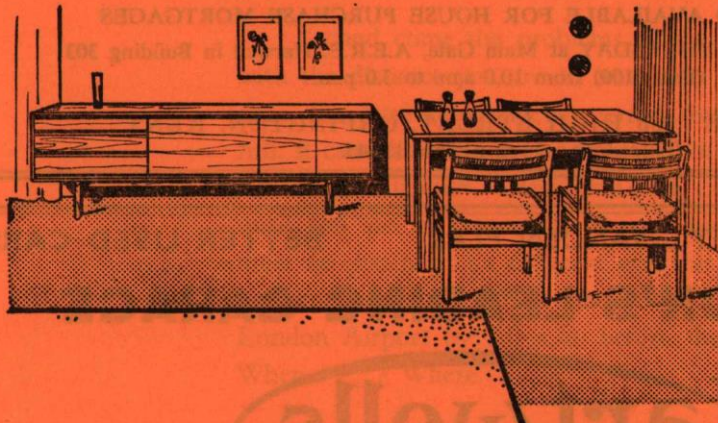
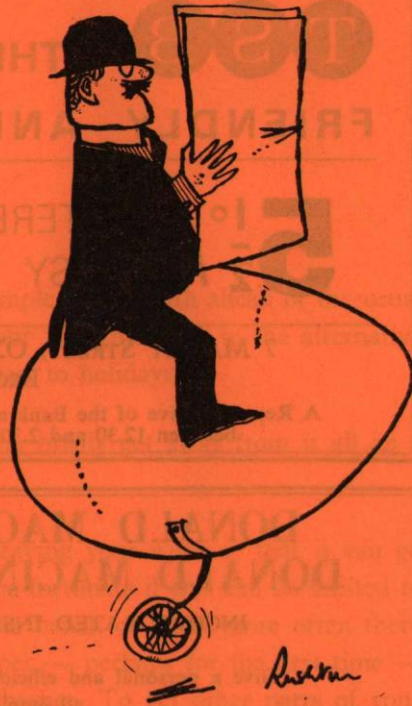
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EDITORIAL

With work on this "Harlequin" completed a month ahead of the usual schedule, we are now able to let our thoughts turn to the alternative use of leisure time and, in particular, to holidays.

What must be done before you finally get away from it all on a summer holiday?

First come the problems of leaving your work so that it can go on while you are away. You may be fortunate if this can be limited to sorting out the accumulation on the bench or desk; more often there are policies to be drawn up on paper — perhaps for the first time — which others can follow in your absence. To get other parts of your work completed which you feel you cannot delegate becomes a problem as the holiday approaches.

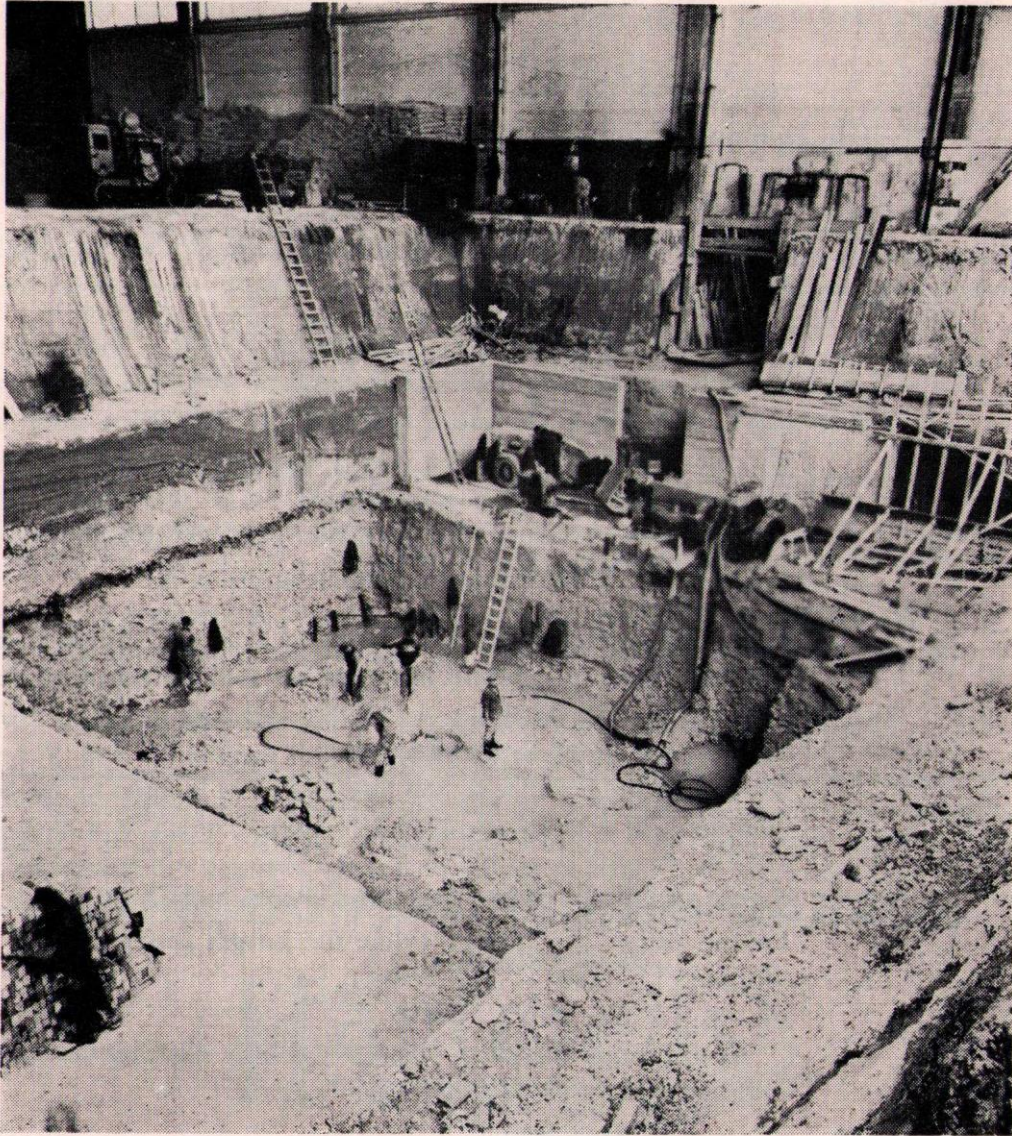
Second come the problems of the holiday itself, which increase with the distance you are to travel. As the time for departure draws near, the local travel agency writes that, although you have paid in full, it cannot send you the tickets until it receives the new 'V' forms for foreign currency. These, you find, cannot be stamped by the bank until you are in possession of your passport, which, if a joint one, must be obtained in a different way this year and will require another visit to the issuing office. Can your car be relied on to get you to London Airport by 7.0 a.m. before the garages open? How . . . ? When . . . ? Where . . . ?

You felt fine last week: but, as the holiday dead-line approaches, how do you feel today? Dead-beat!

Don't worry! Now you *deserve* your holiday!

1946

HARWELL'S



During 1946, the "underground movements" of the Ministry of Works went forward with holes appearing everywhere almost overnight. The photograph shows part of the early stages of the work on the frequency modulated cyclotron at Harwell: the hole for the magnet foundation. In the meantime, excavations on a similar scale for the two piles were being deepened and widened.

21st ANNIVERSARY 1967

PART II

SIR JOHN COCKCROFT, O.M., F.R.S.

THE DEVELOPMENT OF NUCLEAR POWER excited the imagination of engineers and scientists from the time of the discovery of fission. Nuclear power was the objective of the French group in 1940/41, and the Maud Committee reported in June, 1941, that "as a source of energy the uranium boiler should be cheaper than coal or oil, more particularly when one takes into account the cost of transport". However, no serious design studies or even guessed estimates lay behind this pronouncement and Halban and his colleagues did not contribute much more to the development before they moved to Montreal in early 1943.

The first serious study of nuclear power possibilities by the U.K.-Canadian group started with the formation of the Future Systems Group in Montreal led by Jack Diamond and Stefan Bauer. They carried out studies of a number of possible reactors, including Breeder Piles, Converter Piles and High Temperature Sandwich Piles. They thought the latter might be used with gas turbines. This work was a precursor to Harwell work.

In 1946 there was a good deal of high level scepticism on the part of Lord Cherwell and Sir Henry Tizard about the possibility of achieving economic nuclear power, a scepticism which was voiced by Lord Cherwell at an Oxford lecture. I remember Professor Blackett saying in the subsequent discussion that "Oxford was the home of lost causes". Perhaps this scepticism was justified by the lack of knowledge of the technology of nuclear power. The war-time reactors operated with low fuel element temperatures and coolants, and no

serious effort had been devoted to raising these temperatures. There was also a great ignorance about radiation damage to reactor materials although the Wigner effect was well known. The possible deterioration of graphite under irradiation had led to such uneasiness at Hanford that it was reported that a 6-lane highway had been built to evacuate the plant in case of a serious reactor accident.

Five months after the foundation of the establishment the Harwell Power Committee which included representatives of industry, University and Government establishments met for the first time and afterwards discussed periodically the work of the Establishment in this field. At the second meeting, I directed the attention of the Committee to three major problems — the chemical problems of reactors, the disposal of radioactive fission products and fast reactors. Guggenheim reported on the technological problems of power reactors; on chemical compatibility problems; on the thermal conductivity of materials, the effect of radiation on binary compounds and the thermal conductivity of gases at high temperatures. At the third meeting, Fuchs reported on the properties of fast reactors and told the Committee that U.S. scientists considered liquid sodium or liquid mercury to be the most promising heat transfer media. He proposed the following reactor programme in order of priority—first, to build a small plutonium fuelled fast reactor; second, to build a medium-scale or large-scale U235 fuelled reactor. He considered that eventually all power producers would use plutonium or U233 fuel — a vision of the 1980s.

In February 1948 the first Harwell Power Conference attended by representatives of industry and Universities was convened to report progress.

In an introductory talk I said that the Establishment's first priority was to work on the production of fissile materials — the Windscale piles and the chemical separation plant. Work on the low separation (2Co) diffusion plant was about to begin at Risley and to a lesser extent at Harwell. GLEEP was operating to control the purity of reactor materials; BEPO would shortly provide facilities for the study of radiation damage; the "warm" chemical laboratory was just becoming available and the hot laboratory, Building 220, would come into use in the second half of the year.

At the second Harwell Power Conference in August, 1948 there was more progress to report. BEPO had come into operation during a meeting of the Technical Committee who actually inserted the last fuel elements to make the reactor divergent. The design and experimental work on the Windscale separation plant was well-advanced and would occupy about half the effort of the chemists for the next two years. Work on NRX at Chalk River would provide information on the radiation damage to graphite. Low enrichment uranium would be available by about 1953 and higher enrichment, U.235, by about 1955 enabling the construction of a fast reactor to begin. Work on the design study of a fast reactor was reported and seemed to be very promising and breeding prospects were good. *(to be continued)*



Australians Dr. D. J. O'Connor and Dr. J. N. Gregory hold up one of the original oil paintings presented in 1956 to commemorate the association of Australian staff with the U.K.A.E.A. Beside Sir John is seen C. N. Watson-Munro, Chief Scientist of the Australian Atomic Energy Commission.

In thanking the Australian staff who were departing, Sir John said:

"During the past nine years we have benefited greatly from the work you have done here, and the achievements of your engineers and scientists who have worked in our laboratories are part of the foundation of our whole project. We look forward to the continued exchange of ideas and information with you all when you occupy your new laboratories in Australia.

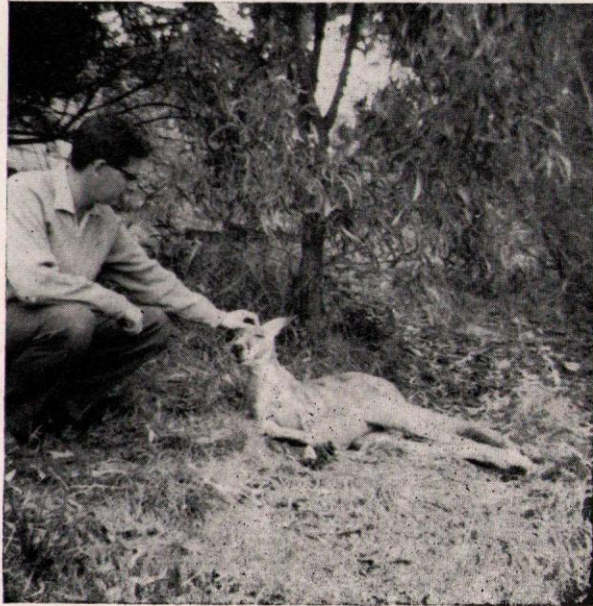
Your paintings will always provide a permanent memorial of our collaboration as well as providing for us vivid pictorial images of Australia".

The two originals, by two of Australia's most celebrated artists, portray two aspects of the Australian countryside and form a contrasting pair.

AUSTRALIA AND THE IMMIGRANT

T. J. M. Robertson,
Research Reactors,

The author with one of the natives.



These impressions were recorded after a tour of duty from Harwell with the Australian Atomic Energy Commission. "Harlequin" submitted the article to the London Office of the High Commissioner for Australia whose professional secretariat agreed that for anyone bent on a similar stay the account is "unusually perceptive and shrewd in its summing up of rewards and punishments".

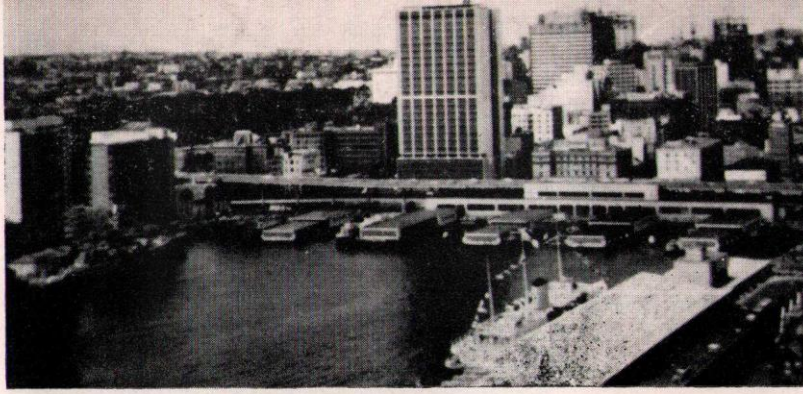
'THE LAND OF SUNSHINE AND PROMISE' is one of the common official descriptions, but unfortunately many have found it to be the land of heartbreak and despair.

Both descriptions are true, though they obviously apply to different groups of people, and it is fair to say that the majority are inclined to the first description. The Australian way of life is different in many minor details which in aggregate require one to regard working and living in the 'new' country in a 'new' way; one can either adapt and really enjoy living to the full or one can fail to conform to the new demands and descend to an embittered existence.

One basic problem is that British immigrants, at least, are driven to try a life elsewhere not by poverty or necessity but by discontent, and when they leave Britain they take this discontent with them. It is difficult if not impossible to tell beforehand whether a man's

discontent is due to the frustration of energy potential or to a feeling that the world owes him a living as a special case. The man with the energy and the will to work can succeed the hard way in Australia and reach a position which will be the envy of comrades left behind in Britain. But the man who expects things to be made easy for him will be a spectacular failure and will have his discontent whetted by poverty, honed by disillusionment, and burnished by envy to the point where his every utterance is a cuttingly vindictive gibe at everything Australian. As soon as he can, he returns 'home', where the realities of his inadequacies are more decently protected from the public and the harsher effects are padded by the Welfare State.

The fact is that, in Britain, a man with a family of two children is getting more from the government in the way of grants than he pays in taxes if his income is below the £1,000 a year mark. As things stand at the moment that is about the income of an unskilled worker



Circular Quay and Sydney
from top of bridge at South
Pylon.

in Britain. The same unskilled worker in Australia would be directly competing for work with other unskilled workers from Southern Europe, particularly Italy, where the reason for emigrating is sheer economic necessity and where, too, long hours and hard work are the accepted normal for bare subsistence. For the unskilled worker the inference is obvious.

The general levels of training and expertise required for recognition as a skilled worker are very comparable with those in Britain, though a claim to be a skilled worker may have to be substantiated by an actual 'Trade Test'. Here, however, technical training classes and further education facilities are available locally throughout the country with very few exceptions. In addition, leave of absence from work for further education is commonly an accepted condition of employment. Neither is the normal in Australia, so it behoves a would-be immigrant (moral obligations apart) to obtain his skill or qualifications before leaving this country.

The Australian acceptance of professional status is probably rather more stringent than the various rules applied here. In the older-established professions the British qualifications are generally acceptable, but in the newer

For those who worry about the Australians not understanding them "Harlequin" recommends Aussie English by John O'Grady (Nichole Vane 12/6). "Whatever terms of English you use," he says "they'll understand it all right, but nothing on this earth will make them imitate you. So you will have to learn to live with their alien sounds. And alien you will discover them to be . . . in tones as tuneless as a bleat of a sheep or the karp of a questing crow."

A phrase-book of Aussie expressions is provided from A to Z, from "putting the acid on" to "not being worth a zac". Under Billy we learn that new billys do not make good tea and that a proper billy should never be washed. "To make a brew in a billy, you get the water boiling, throw a handful of tea in, and then swing the billy by its handle around and around in verticle circles. This settles the tea."

disciplines the broad British descriptions may not be acceptable — for example, the term 'Professional Engineer' has a legally protected status and demands a fairly high level of academic achievement. For an acceptably skilled or professional man the rates of remuneration are rather higher than the equivalents in Britain. There are two reasons for this: one is that there are fewer skilled men per head of the population, and the second is that so many Australians have 'working for themselves' as a main ambition (offering spectacular rewards for the successful) that working for an employer is regarded as second best and, in consequence, employers are forced to pay more to attract and retain skilled men.

So much then for the general working prospects. The work content of any employment is another matter and is likely to come as a salutary shock to one accustomed to British ways. Working hours mean just that. One incident brought this home to me more than anything else. At the lunch break I had joined a group playing table tennis, and a very good foursome was in progress with the score at 18/16 when one of the onlookers remarked that it was nearly 'time'. Without hesitation the bats were put down, the ball put in its box and the game abandoned to allow the players to be back at the workbench on time. Now, these men had all 'clocked on' already, and no senior staff were present. It was my second day there and I was most impressed. Another aspect revealed itself a little later when I was put in charge of a group of Australians. There the boss is expected to act like the boss. The oblique 'polite' approach of, "It would be a good thing if so-and-so were done next" (which here is the signal for the person selected by custom to do that particular job to take the hint and disappear within a reasonable

GyMEA — A typical
suburban shopping
centre.



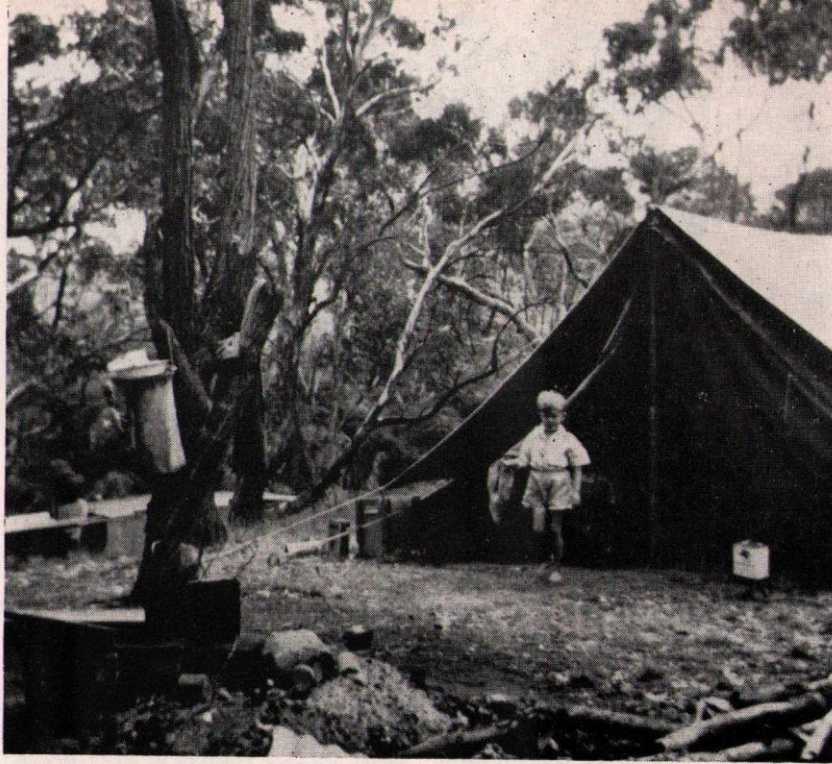
time to do whatever is required) evokes no response whatever except agreement with the statement as a controversial remark. If you, as the boss, require something to be done, you are expected to give a direct order to the person involved, with the proviso that he has a right to query the reason or object to the order if he thinks it is someone else's responsibility. If you then can give a reasonable explanation there is no further argument, and the man gets on with the work. A direct order is cheerfully obeyed if it seems at all reasonable. A queried order does not, as in this country, automatically signal the man's unwillingness or objection to doing the job, merely that he is independent enough to want to know why he is required to do something. He, as a man, is entitled to his opinion, and you, as the boss, are entitled — and expected — to exercise your opinion.

As far as their general attitude to others is concerned, the Australians have at least one general characteristic in common with the deity in that they are only willing to help those that help themselves. Show yourself willing and able to stand on your own feet and you will be helped by some of the friendliest people I have met. On the other hand they see no reason at all to be taxed to support anyone who is too lazy to find work in a country of full employment, or who is too weak or gullible to be independent in a country with a marked degree of personal freedom. There is nothing particularly soft about the country; the Australians work hard and play hard. There is the room and the opportunity for any sport you care to mention (not forgetting winter sports — in the 'Snowics' there is a larger area of snow than in Switzerland), and some in addi-

tion such as surfing and big game fishing which are not available in Europe.

The standard of living is high; one car per four persons gives some indication of the transport situation, though it is only fair to add that in many cases a car is a necessity and not a luxury. House fittings like a 'fridge, a washing machine, TV, and wall-to-wall carpet are more or less standard, as is the separate 'laundry room', but by our standards the houses themselves seem flimsy, with red-painted corrugated iron the commonest roofing material. The apparent paradoxes only serve to underline the difficulty of describing one country and its ways by the terms and standards applicable to a different country and climate. The cost of food is roughly comparable to the cost in Britain, though more meat and fruit are normally eaten than the cheaper 'heavy' items that figure largely in the British diet. Clothing generally is rather more expensive, particularly footwear. In any one district, though, the variation in climate from summer to winter is not so marked as here so the same variety of clothing is not required and generally lighter clothing is the rule.

Housing is nearly all of the single storey type, and both houses and land are expensive in the cities. A cheap house in Sydney would cost about £4,000, and the price of a plot of land could be anything from £1,000 to £10,000. (When I was there a plot of land the size of a tennis court in one of the 'best' districts in North Sydney sold for the latter figure). Mortgage interest rates are lower than the current rates in this country, but the initial deposit is usually much higher. Houses to rent are very scarce and expensive, and in Sydney an average family house would cost

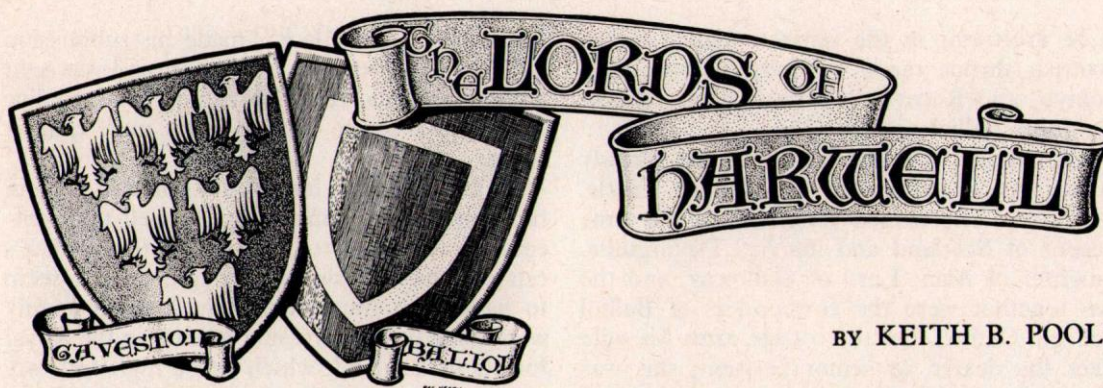


A camp site illustrating one Australian activity — Gold Prospecting.

about £14 per week. Away from the cities or the commuting areas around them, the cost of land is fractional, and room is pretty well unlimited. As an illustration, I spent a weekend at a sheep station about 180 miles from Sydney, and the trip from the house to the mailbox at the roadside to collect the post and back registered 15 miles on the speedometer. It was quite obvious that a couple of acres would not have been missed if anyone had particularly wanted to buy them.

Complete generalisation is impossible about a country that varies from tropical in the north to Mid-European in the south, from mountains and trout streams to desert, and with an east-to-west span equivalent to the width of the Atlantic (and covering the corresponding time zones). My observations are confined to the Sydney district. For that area I would say that the cost of buying a house, the necessary furniture, and car requires a bare minimum of £2,000 in ready cash, and anyone with less than this would be well advised to think twice before emigrating. Do not forget that being a 'have not' in a land of 'haves' is much more galling than being in the same situation in a country with a lower general standard.

I have mentioned the various sporting activities and the general 'work hard, play hard' attitude of a real man's country. I thoroughly enjoyed my stay, but this did not give me much idea of how the 'other sex' would fit into the Australian way of life. I merely remarked that the beaches were as crowded with one sex as the other, and both were highly competent in the water. The women's tennis club sessions in the forenoons on the local courts consisted of solid hard-hitting games obviously played for the enjoyment of the game and not as a pat-ball excuse for gossip (not that that seemed to me to be entirely missing amongst the sitting-out group of mothers and toddlers). What impressed me most, though, was the expression on the faces in the street. Here, a walk along any High Street will give an impression of worried pre-occupation, pale faces with a harassed frown muffled against the cold. There, one finds a general air of contentment as if circumstances were fully under control, and a look of sunburned good health. "Blooming" is the word often seen used to describe Australian women, and that seems to sum it up. It is a man's country all right but the women seem to find it suits them too.



BY KEITH B. POOLE

The results of some research for "Harlequin" into the associations of Harwell with English and Scottish history - six centuries ago.

AT THIS DISTANCE OF TIME it is difficult to imagine the high importance of Harwell in English history, or that it was more closely allied to the throne of Scotland than that of its own country. All traces of its once splendid Manor have now gone, though very obviously it once stood quite close to the church, as did most of the manor houses of England in medieval times.

No trace exists, either, of any of the great historic figures who were the proud possessors of all its lands and its rich and splendid manor house: the great families of Balliol, Comyn, Gaveston, De la Beche, and even Edward I, who once held it as his own, as did his son. All that remains of any of these great historic figures is the coat of arms of the hated and despised Piers Gaveston, with its green and gold eagle, which was put in the church by his widow and which can still be seen in a window high above the altar.

Over 700 years ago the Lordship of the Manor of Harwell was in the possession of the rich and powerful Scottish family of Balliol, or Bailleul, or Bayllois, who held the lordship for over 300 years, during which time it was actually known as Bayllois Manor. The crowning of John Balliol as King of Scotland after a seven year regency was only the beginning of Harwell's link with Scotland, though certainly the most important, for John Balliol's eldest sister, Margery, married into the equally powerful Scottish family of Comyn. John Balliol's father founded the famous Balliol College of Oxford.

The quarrelsome, stubborn, warlike, proud family of Comyn was constantly at war with England, inciting rebellion in either England or Scotland, or fighting other Scottish nobles to keep in practice. At one time its members even laid some preposterous claim to the Scottish throne. Both father and son were called John, but the former was surnamed "The Black", and the latter "The Red". The historic and very dramatic background to all these events and characters was the constant and repeated invasion of England by the Scots, and Scotland by the English. In these ceaseless invasions, the leading figures were the rebel William Wallace, Edward the First, and Robert the Bruce. Edward the First brought matters to a head when, with 400 of the finest knights in England, he led a full-scale attack upon Scotland and captured Caerlaverock. Before this golden age of Scottish medieval chivalry, Alexander's horse carried him over a sea-cliff, which made his grand-daughter Margaret, "The Maid of Norway", Queen of Scotland — though she mostly resided in Scandinavia during her brief reign.

By the Treaty of Brigham, it was arranged that by her marriage with the first Prince of Wales, afterwards Edward II, peace between England and Scotland would be perhaps permanently secured. That very autumn, however, the Maid of Norway died in the Orkneys on her way home. All chance of peace now vanished, and Edward I immediately pressed the claims of ancient English kings to be overlords of Scotland, strongly asserting his own

to be arbitrator in the separate claims to the Scottish throne made by John Balliol, John Comyn, and Robert the Bruce, finally choosing John Balliol.

John Balliol was the third son and already in possession by tenure of Barnard Castle. His father, also named John, was at one time Regent of Scotland and married Devorguilla, daughter of Alan, Lord of Galloway, and the two together were the co-founders of Balliol College, Oxford. On the college arms his wife takes the dexter, or senior position; this was sometime done if, as in her case, she was of higher rank or greater estate than her husband. The dexter side of the shield bears the "Lion of Galloway". The exact date of the foundation of the college is unknown, but it was somewhere between 1263 and 1268.

John Comyn "The Black", Lord of Badenoch succeeded to all the wealthy family estates on the sudden death of his elder brother William, whose estate of Badenoch came from his uncle, the Earl of Monteth. In the year 1286 he became one of the six guardians of the realm, being one of the three in charge of the lands south of the Forth. In the same year, together with his fellow regents, he signed at Salisbury the treaty by which the young Queen of Scots was to be married to the Prince of Wales. He also attended at Brigham for the confirmation of this treaty. After the death of the young Queen he lodged his own somewhat fantastic claim to the Scottish throne, derived from Donalbain, whose grandmother Hexilda was the mother of Comyn's great grandfather. Along with the other two competitors he made his claim as Liege Lord of Scotland in order to obtain the consideration of Edward I as full arbitrator.

In the great trial following the several claims, he seems to have dropped his own preposterous one in favour of his brother-in-law, John Balliol, whose cause he now strongly urged. The whole of the Comyn family strongly supported him. After the accession of King John to the throne he almost immediately broke away from the grasping overlordship of Edward I, and Comyn, who adhered to his brother-in-law, at once incurred the full anger of the English king. In the fresh outbreak of strife his son, "The Red", was taken prisoner at Dunbar, and

the father, "The Black", made his submission in 1296 to Edward at Montrose, and was sent with other powerful Scottish patriots to live in England south of the Trent until quieter times.

In his exile his family was allowed to join him, and this proximity to Harwell undoubtedly allowed him to visit his brother-in-law's estates which, curiously enough, do not seem to have been impounded. He and his family were also given permission to hunt in the Royal forests of England, which was a high and rare privilege, carrying the death penalty for those who hunted without permission.

Events in Scotland moved swiftly. Balliol was deposed by Edward, who marched in triumph through the land, carried off the coronation stone from Scotland to Westminster and made himself direct King of Scotland. It was the worst thing he could have done to that proud and unhappy land, sick to death of overlordship. The land rose in open and bloody rebellion, led by William Wallace, a man of iron strength, indomitable courage, and burning with patriotism against the cruel and despotic governors Edward had left to govern in his name.

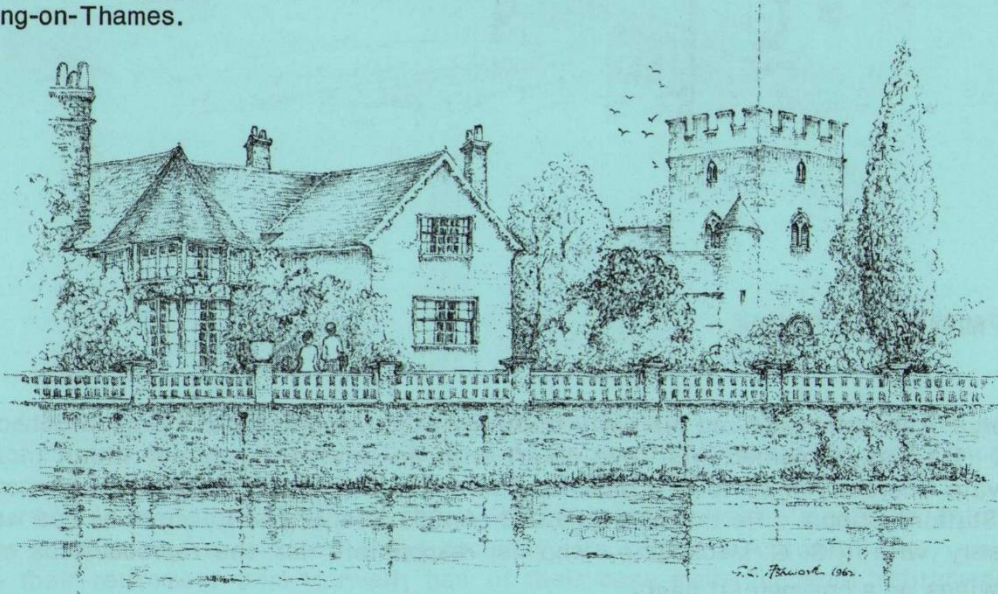
Wallace, supported by hundreds of fierce and warlike clansmen, broke into Cumberland and Northumberland, ravaging, pillaging and laying waste the countryside wherever he went. He became a great national figure, the leader of all the feudal peasants, burghers and small gentry, whom he turned into indomitable spearmen, who stood in battle shoulder to shoulder against all odds, even the English armed knights and their horses. The sudden revolt of Wallace soon induced Edward to release the warlike family of Comyn, in the hope that John "The Black" would exert his great influence against the turbulent patriots led by Wallace. He gave him a safe conduct to Scotland and restored all his lands there, but kept his son as hostage. Comyn at once went to his own castle of Lichindorb where, in the year 1299 or 1300, he died. His son had shortly before been set at liberty and became his successor, his sister later marrying David, the Earl of Atholl.

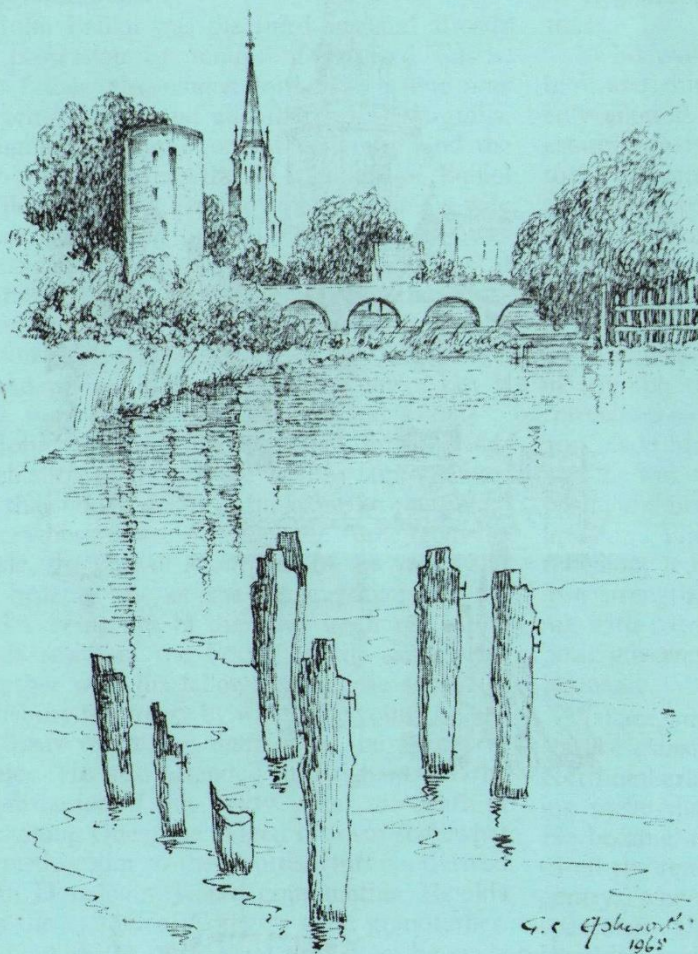
The family seems to have had a reputation
- continued on page 27

The Malt House, Abingdon.



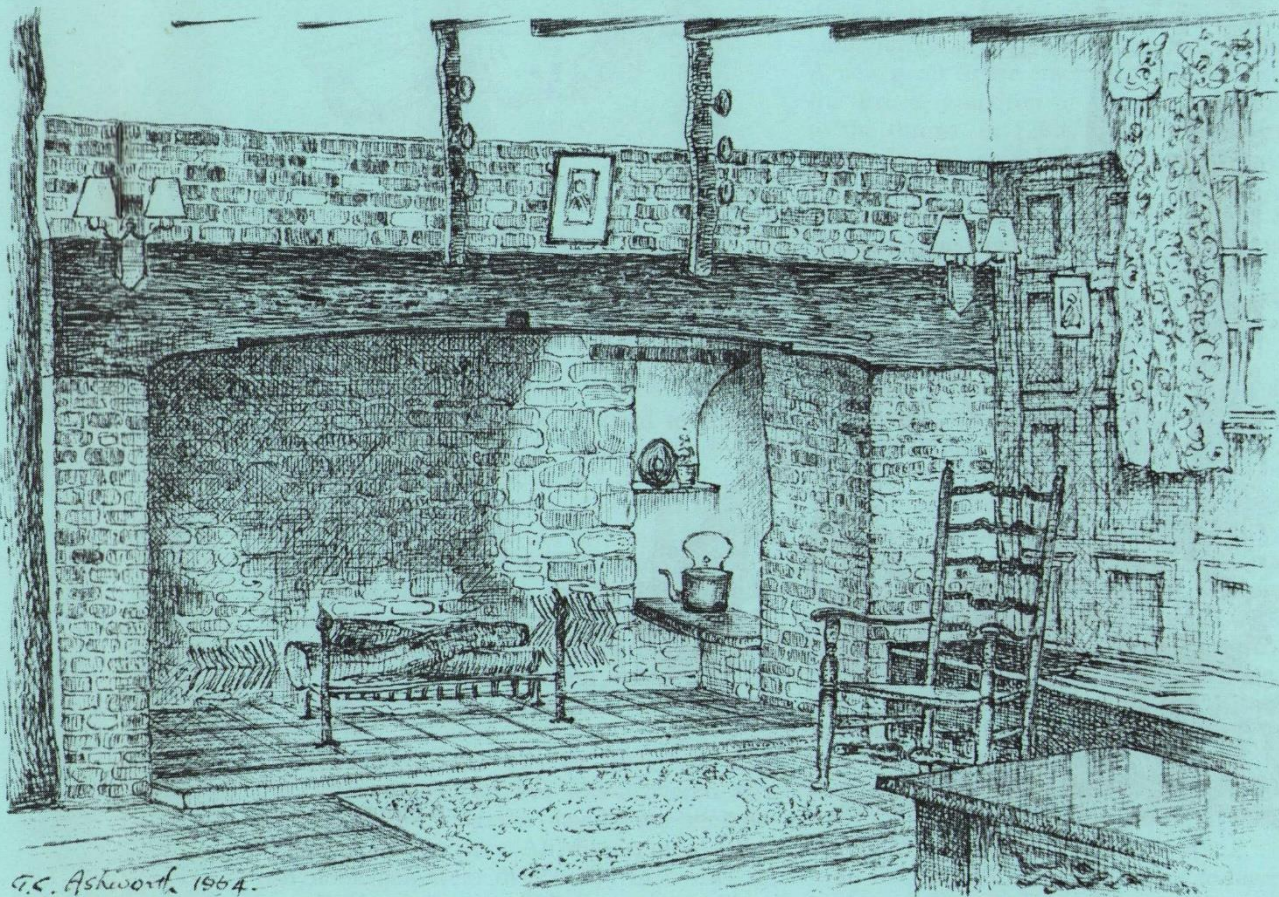
Church & Mill Cottage,
Goring-on-Thames.





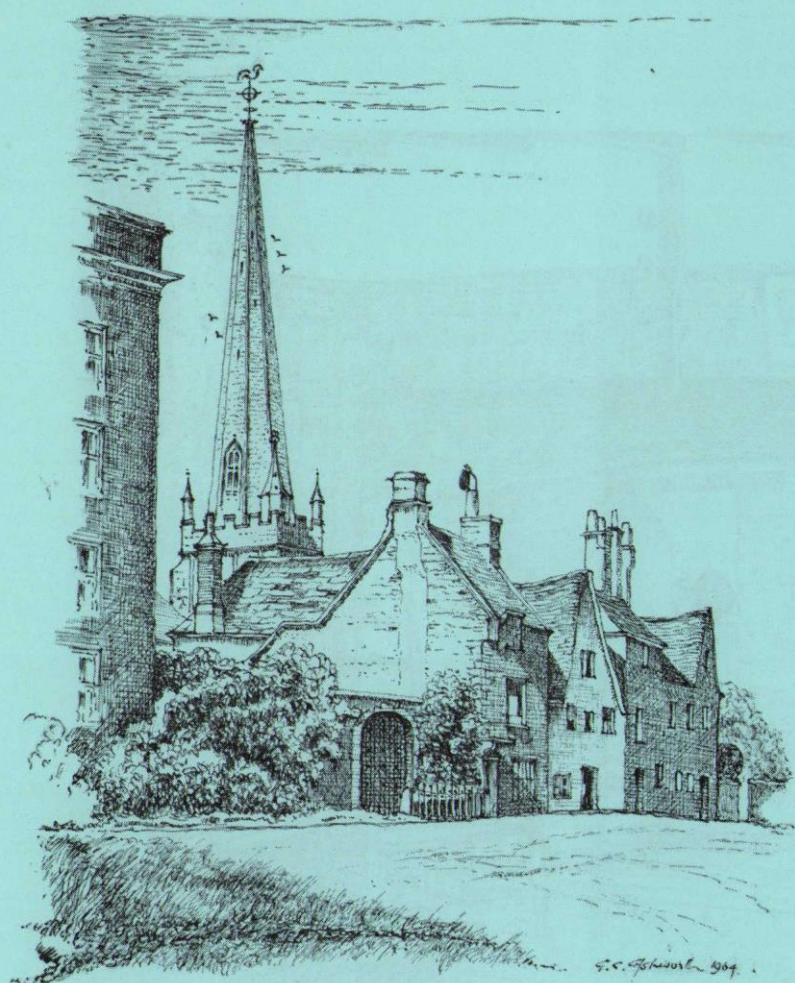
The Minnewater, Bruges.

George Ashworth received his early training at the Manchester and Harrow Schools of Art. He has combined his love of art with an interesting career which included Private Secretaryships to a number of Ministers, among them Lord Beaverbrook and Sir Stafford Cripps. He retired at the end of 1959 from Harwell, where he had worked closely with I. S. G. Mackenzie, who is responsible for the reproductions of his drawings on a commercial basis.



Colts Close, Steventon.

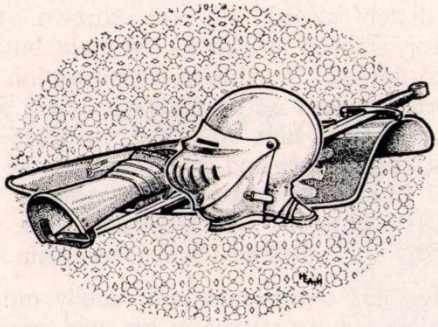
G. C. Ashworth has exhibited at a number of exhibitions in London and in the North and, of course, at Harwell and in Oxford, and has been honoured by the acceptance of his work by Her Majesty the Queen. He was appointed M.B.E. in 1953. Ashworth's love of drawing was combined in 1959 with Mackenzie's hobby of printing by the formation of a private limited company, Mackenzie & Ashworth Ltd., which, since their retirement from Harwell, has in their case made the word 'retirement' a



Tetbury, Glos.

misnomer. Their latest venture has been the introduction of 'letterettes' which they call 'MandA Notes' and which, incidentally, are on sale at Mallows, in the Shopping Centre at A.E.R.E.

We shall hope to reproduce further examples of George Ashworth's work, and in later issues to show how for other Harwell people 'retirement' also means 'a new movement forward'.



continued from page 22

for very violent and dangerous tempers, and it is recorded that one of them was imprisoned in the Fleet for striking one of the Exchequer doorkeepers. He was later sent to the Tower for the offence.

Comyn "The Red" was married to Joan, a kinswoman of Edward I, who is reported as bearing letters of safe-conduct to London for this member of the family, described as John Comyn de Scotia 'valletus'. Contrary to all the hopes of Edward, Comyn "The Red" was soon in open rebellion against the English, invaded England and made a futile attack on Carlisle. A fortnight later he was at the burning of Hexham Priory, but was driven back with his associates by the rumours of Edward's approach.

Immediately after this he helped to seize the castle of Dunbar, but was delivered as a hostage to the king the day before the surrender of this fortress. All the captured Scottish noblemen were distributed in castles all over England, but in 1297 Comyn was liberated on condition that he would serve Edward beyond the sea or go on a pilgrimage.

The reports on Comyn's subsequent actions are at variance. Some chroniclers state that he went to France but was refused admission; others state that he deserted Edward in Flanders as he was returning to England; and most accuse him of treachery and broken fealty. He was in Scotland however, in 1298, that crucial year for Wallace, when his Scottish spearmen were unable to stand up against the English bowmen whose arrows prepared a passage for the horsemen through the ranks of death. Wallace himself was executed on Tower Hill.

These victories, the first of many great ones, culminating in the defeat of the French at Crecy, did not mean that Scotland herself was defeated. The Scots were ready to set fire to their crofts and huts and lay waste all their lands rather than give in to the hated English. A new great figure emerged. This was Robert the Bruce, grandson of the original claimant to the throne, in 1290, together with Comyn "The Black" and John Balliol. He had an even more fiery temper than "The Red", had changed sides many times in the various Scottish rebellions, and was an even greater patriot than the redoubtable Wallace himself. The fearful clash of tempers between "The Red" and Robert Bruce was, unfortunately for Scotland, only too imminent.

Comyn was certainly at the battle of Falkirk in 1298, which put an effective end to Wallace's spearmen. Many contemporary chroniclers have recorded that Wallace owed his defeat solely and entirely to the treachery of Comyn at this battle, but since he was appointed Guardian of the Realm immediately afterwards these stories do not appear to invite investigation. Indeed, from this time until the year 1304, John Comyn seems to have been the most prominent man in Scotland. He held this high office jointly with the Bishop of Lamberton and Robert Bruce. John Balliol gave him John de Soulis as a colleague during this period, and this seems to indicate that all was not well between the three of them, as indeed it was not.

In the year 1300 Comyn seems to have had an interview with Edward near Kircudbright shortly after the capture of Caerlaverock. Here he suggested to the King that Balliol should be restored to the Scottish throne and the Scottish nobles have their lands restored. This was refused and he departed in fierce anger with threats of further war. Before very long he was in open rebellion and deposed all the English bailiffs and sheriffs in the south of Scotland. This fresh act of rebellion made Edward send one of his finest knights, John de Segrave, to crush it: he therefore made him Guardian of Scotland and sent him north with a considerable army.

Comyn marched to meet him, and in the following year defeated him. He also had two

other engagements on the same day and was victorious in all three. The contemporary English historians have recorded that the success of the Scots was by no means decided by these victories; it was rather made possible by the crushing defeat of the English by Bruce at Bannockburn and the weakness of Edward II, who had none of his father's military skill or strength of character.

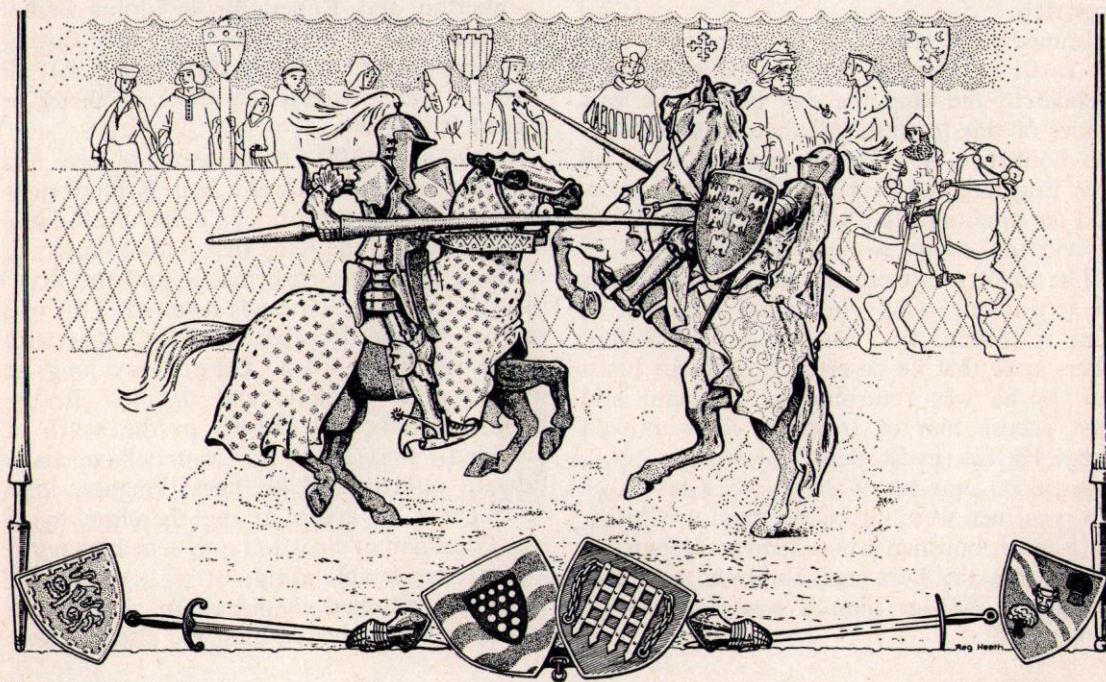
It was not long before Comyn and Bruce became dangerous rivals for sole power in Scotland, and the reports on the subsequent brutal murder of Comyn by Bruce, though widely varied, all agree on the savage brutality of it, for in all points it closely followed the pattern of Thomas à Becket in Canterbury Cathedral. The main details of the whole conflicting story are that one day, on a ride from Stirling, Bruce proposed that one of them should renounce his claim to the Scottish throne in exchange for the other's estates. Bruce did not trust Comyn and was afraid that he might start renewing the claims to the throne previously made by his father before he yielded to the accession of his brother-in-law John Balliol. Both these men had violent tempers, and there was soon an open quarrel in which Comyn accused Bruce of treachery, was answered "For thou liest!", and then was stabbed.

Another version, and the one generally accepted, of the details of the murder is that in

the Franciscan cloisters of Dumfries Bruce suddenly attacked the unarmed Comyn, who immediately closed, but was thrown, then probably stabbed by Bruce's followers, but was able to flee into the church for protection and was left for dead on the altar pavement. The monks carried him into the vestibule for medical attendance and confession, but he was forced from this retreat by the soldiers, who dragged him to the altar steps and there slew him. His uncle, Robert Comyn, was slain also.

After this treacherous and bloody murder Bruce became an outlaw in his own country, only later coming back to power because of the desperate need of the Scots for every available warrior to fight the hated English.

The murder of Comyn "The Red" took place in 1306. His son John inherited the family estates, married Joanna, the daughter of the Earl of Pembroke and was actually brought up with Edward I's children and was slain at the battle of Bannockburn. The last link of this great family with Harwell was the grant of the Manor by Edward II to the widow of John Comyn for the maintenance of herself and her son Aymer. The king later granted the Manor to the widow of the detested and murdered Piers Gaveston, recompensing the widow of John Comyn with an annuity of thirty pounds.



ALL ROADS LEAD TO CULHAM



In this new series we shall visit some of the places near the Authority's Culham Laboratory

THE THAMES and the connecting highway have been more important to Culham than to most local villages. The reason is seen in its Old English name (Cula's hamm) which is derived from its position on a bend of the Thames which the roads cross for Abingdon and for Sutton Courtenay.

This year a section of the bridge at Culham Lock collapsed into the meadow 20 feet below. To people living nearby, who have seen the steady increase in traffic over it in recent years, this was no surprise. Built near the site of the old Culham Ferry, which was the only means of communication with Sutton Courtenay, it was originally a toll bridge from 1807 until 1939. Now it is undergoing repairs, and, no doubt, a weight limit will have to be considered in the future and a traffic-light controlled one-way system.

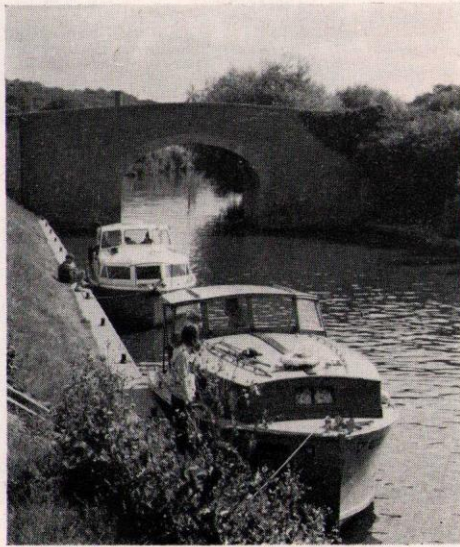
Another bridge at Culham was built about 1416 across the site of an ancient ford that had to be crossed for Abingdon. During the Civil War, the bridge achieved strategic importance: when the royalists left Abingdon for Oxford in May 1644, the parliamentarians seized the bridge and used it to send troops to harry food convoys passing to Oxford through Dorchester. The royalists attempted to capture and demolish it, and in what was called "The Battle of Culham Bridge", the

King's commander, Sir Henry Gage, was mortally wounded.

The bridge has become known as "Culham Old Bridge" after being spared the onslaught of heavy traffic by the erection of a new bridge to the north of it in 1928. It saw service in the last war, however, with part of its parapet taken down to make way for two pill-boxes. These have since been demolished and the parapet restored, the bridge now being scheduled as an ancient monument. We recommend the reader to cross this 500-year old bridge and to follow for a couple of minutes the overgrown road before it disappears into the undergrowth along what was part of the main road to Abingdon, less than 40 years ago.

Running through the parish from west to east is the Abingdon-Dorchester highway. This became more important during the Middle Ages when the shallowness of the river between Burcot and Abingdon made navigation increasingly difficult. For example, stone for building Eton College was taken through Culham by road and was not loaded on barges until Henley was reached.

A wharf was established at Culham in the 16th century. Although the river was navigable between Henley and Burcot by the 16th century, the passage from Burcot to Abingdon was difficult, both at Clifton Hampden and



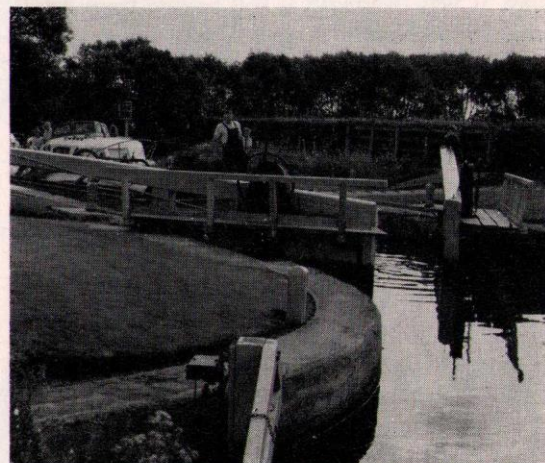
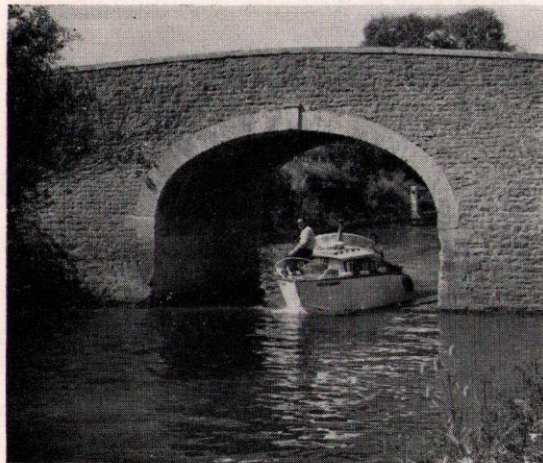
Sutton Courtenay, hence Culham provided wharfage for Abingdon. Not until 1635 did a barge reach Oxford from London. Even after the locks had been built at Iffley, Sandford and Culham — they were erected between 1624 and 1636 — it is reputed that “in dry times barges do sometimes lie aground three weeks or a month or more”. Stone and lead were, therefore, carried by road from the dissolved abbey of Abingdon to Culham Wharf for loading on barges.

During the 16th and 17th centuries what we now call the A415 was badly neglected — so much so that a series of Acts was passed through Parliament from 1735 onwards to



If we were to forget the feudal juxtaposition of church and manor we might take this Georgian mansion shown above, to the north of the green, to be the manor. Culham House is the largest building in the village.

Culham Cut and Lock were constructed in 1809 to by-pass the difficult passage through Sutton Courtenay to Abingdon. Above the bridge in the photograph top left are seen the remains of the small brickworks which were in use by the middle of the last century until 1932.



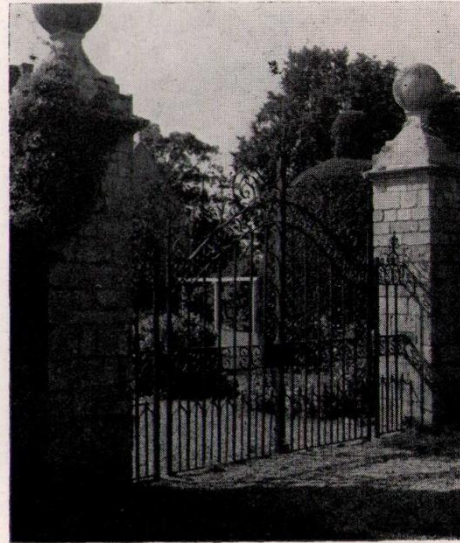
establish a turnpike trust. Toll-gates were set up to levy tolls for the repair and maintenance of the road. The toll-houses are still to be found, although the last section of road between Culham and Abingdon was freed from toll in 1875.

Culham is in effect by-passed by the main roads and lies chiefly on a loop. It was rebuilt in 1869-70, and only one of the original 17th century cottages remains — as the village store.

The parish has three inns: the *Waggon and Horses*, rebuilt in the early 1800's, the *Lion*, formerly the *Sow and Pigs* (which can also be traced back to 1795) and the *Jolly Porter*, once the *Railway Hotel*, built about 1846 near the station. This was completed two years before and called **ABINGDON ROAD STATION** until taking the name of **CULHAM** in 1856.

To the north-east of the parish, south of Nuneham Park lies what remains of Culham Heath. This is approached by Thame Lane, which runs off the main highway to the east of the *Waggon and Horses*, near where the old toll house can be seen. After skirting the back of Culham College, it becomes a track as the bridge over the railway is approached. The large field immediately north of Thame Lane and bounded by the railway line is probably the site of the Abingdon RACES. These were held annually from the early 1730's until 1811, when enclosure of Culham Parish forced them to be held on land west of Abingdon. The races were an annual attraction.

In 1946 the Royal Naval Air Station was commissioned at Culham as *H.M.S. Hornbill*. This was closed in 1956, but re-opened as an Admiralty Storage Depot in the same year, extending into the parishes of Clifton Hampden and Nuneham Courtenay. Part of the depot near the main highway became, in 1960, the Authority's centre for plasma physics and controlled nuclear fusion. Even in Anglo-Saxon times Culham was of some importance. Today it is gaining a reputation beyond these shores, its name associated with one of the world's foremost physics research laboratories.



Photos by P. J. Oliver, Culham Laboratory.

The Editor acknowledges the help of Mr. L. G. R. Naylor, Vice-Principal, Culham College.

Opposite the church is the Manor, the oldest building in the village. In this photograph is seen the 15th century west wing and Jacobean north front. Not shown is the dove-cot, said to be one of the three largest in England, which the reader will find on the north-west side.



To whom can They Turn?



Over six thousand people a year commit suicide in the British Isles, and the number of cases of attempted suicide is probably ten times that figure.

The cause of suicide is usually despair, but occasionally spite or self-hatred. Loneliness frequently leads to despair, both in those who live alone and in those whose relatives and friends lack understanding. Other cases of suicide, or attempted suicide, may be due to mental illness, psychological problems, emotional disturbances and addiction to drugs or alcohol.

The Samaritan movement started in 1953 at St. Stephen's, Walbrook, in the City of London, by the Reverend Chad Varah, and from this small beginning, the work of one man, it has spread to many cities and towns, engaging many hundreds of volunteer workers. In 1963 the Samaritans were incorporated as a company with a Council of Management on which each branch is represented, and which ensures that the same basic principles are followed everywhere whilst allowing for some variety of method in working.

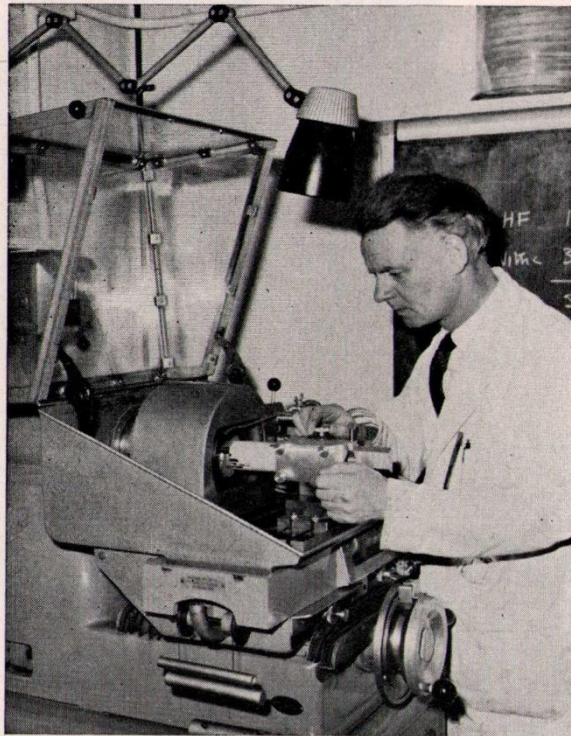
The help given is primarily to the suicidal and to people in despair. The telephones at the branch centres are manned day and night, seven days a week. When a client telephones, he is answered by a Samaritan who will listen sympathetically, with a personal concern and calm unshockability, to give time for the suicidal impulse to pass and to offer assurance that the client is not in fact alone but has help at hand for the asking. Usually these telephone

calls are followed up by a visit to the Centre where an experienced Samaritan can suggest, perhaps, an alternative solution to the one contemplated by the despairing client. If the situation appears critical to the volunteer who answers the telephone, another worker is sent to the house, or telephone kiosk, to carry on the conversation face to face. The principal thing offered by the Samaritans is friendship of an unconditional kind, and it is frequently possible for one volunteer to act as a befriender to a client over a relatively long period, for as long as he or she is needed.

Samaritan volunteers undergo preparation classes before they take on these duties and are carefully selected. They do not do case work, nor do they regard themselves as trained workers. Professional social workers and psychiatrists are increasingly being brought in to advise and supervise the work, and are active in attending the frequent Samaritan conferences.

Everything the client says is treated in absolute confidence. This is the first and most important principle of Samaritan work which may never be broken in any circumstance. Samaritans are never shocked, neither do they sit in judgement, nor feel they have the right to order or direct people's lives. Rather do they offer for the taking a firm and consistent concern for those in despair, and an ability to stand beside the man or woman, unobtrusively, until the need passes.

Further information can be obtained from A.E.R.E.
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Ed Storey of Electronics Lab. Workshop setting up a mounted germanium ingot for diamond cutting on a Capco Q-35.

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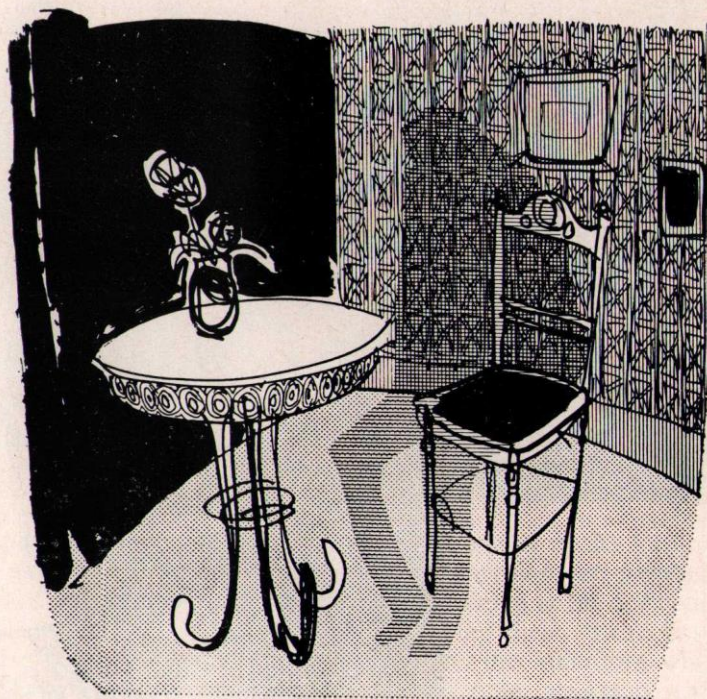
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“THERE ARE MORE THINGS UNDER THE SUN . . . ”

The Harwell man who describes these unusual happenings in his Authority house is by nature a sceptic. He wishes to remain anonymous, but “Harlequin” vouches for his sincerity.



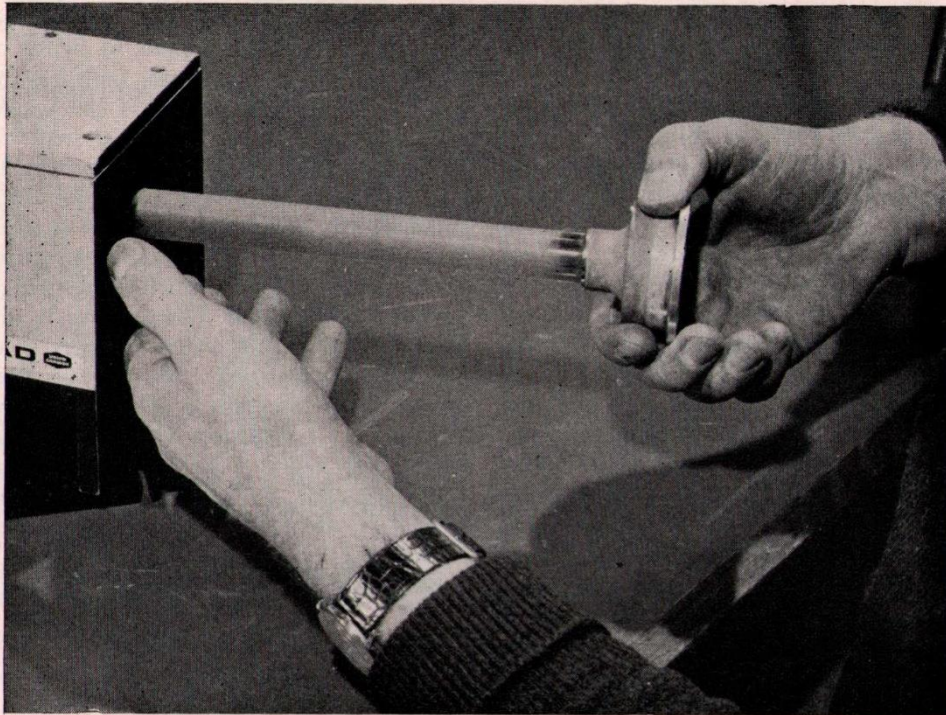
IT STARTED WITH A KNOCKING about two months ago — come to think of it, it must have started a long time before that with the ringing of the front doorbell, when a careful search disclosed no one who could have been responsible for its ringing; and this happened on several occasions. But the knocking that was heard in the kitchen appeared to come from behind a wall. As this is an outside wall a check was made outside, but no knocking was heard out there, and there was no apparent cause. Upon my return to the kitchen it was announced that the knocking had not stopped during my check. A faulty water tap or water hammer was ruled out, because firstly there is no water meter and, secondly, no taps had been turned on. The knocking stopped as suddenly as it had begun, still with no satisfactory explanation of its physical cause. It was shrugged off with “Perhaps it was something going on next door and the sound was carried through the water pipes”. For peace of mind most occurrences were given unsubstantiated “causes” and shrugged off; but later the occurrences became more frequent and more startling, my wife and I being forced to the conclusion that a poltergeist had taken up residence in our kitchen!

Some more about the ‘occurrences’ as they occurred:—

A ‘coal black mammy’ figure that hangs on a screw in the wall was heard to crash to the floor; when it was picked up and examined it was found that the hook was intact and the screw in the wall was firm, so it meant that the figure had to rise an eighth of an inch and move away from the wall a quarter of an inch before it was free to fall, but what was even more startling was that it was found half-way across the floor towards the opposite wall!

The next occurrence took the form of clicks coming from mid-air without emanating from any particular point in the kitchen.

On a later occasion my wife and I had retired to bed. Within a few minutes of the light being turned off, the bottom of the bed was thumped hard once. When it was discovered by enquiry that neither of us had moved I searched around quickly in my mind for a cause so that my wife would not be frightened and came up with the ingenious answer: the hot water bottle had been pushed to one side which had bent back the top and this top had flopped down making the thump. Shortly afterwards when my wife turned on the light and went outside, I took the opportunity to



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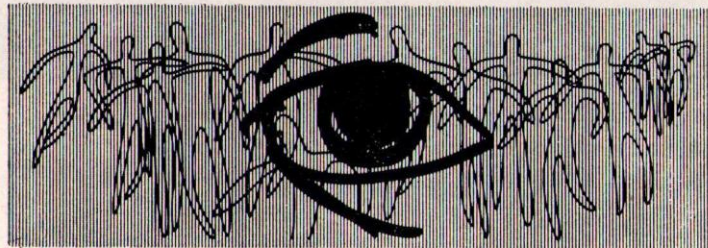
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have a look: the hot water bottle top had been pushed back and it was still bent under the top sheet. Then what had been thumped on our bed? I quickly reached down between the sheets and laid the bottle flat before my wife returned.

The following morning there was a further occurrence shortly after the children had gone off to school, when both the bulb and shade of the kitchen light crashed to the floor. My wife told me about it upon my return from work, and I could offer no satisfactory explanation, for two distinct actions were involved: the pushing up and twisting of the bulb to release it from its socket and the unscrewing of the locking ring to release the shade.

What happened the following morning proved beyond a shadow of doubt in my mind that we did indeed have a poltergeist or something with us. I came down in the morning into the kitchen, switched on at the main plug on the wall above which hangs the figure, now badly chipped, referred to above, put some

to the off position by a means that was not physical; when one switches on, the moving down of the toggle releases a compression spring which snaps the contacts together and holds them there. Therefore, to switch off, the toggle must be pushed up, compressing this spring. It follows then that if the toggle slipped of its own accord it would snap into the 'on' position. As I carried on making the tea I came to the conclusion that if the poltergeist could switch equipment off, then it could just as easily switch it on — a worrying thought, and something about which something had to be done. But what? When there is illness a doctor is contacted, when there is a fire the fire brigade is called. But whom does one 'phone when one has a 'playful' poltergeist? The answer I came up with was — the local vicar! But would I be believed? During the day I plucked up courage and 'phoned the vicar — it was like ringing a dentist's bell — I hoped that he was out. At first a lady at the Vicarage answered and said that the vicar was



water in the 'corvette' water heater and switched it to boil to make some tea. Whilst it was coming up to the boil I rinsed out the teapot and put some hot water in it from the tap at the sink. When the water in the heater turns cloudy I know that it is about to boil. The water became cloudy and I emptied the hot water from the teapot. At that instant the indicator light went out and the water heater fell silent. I thought that a wire had broken or the fuse in the plug on the wall had failed. I looked across at the switch socket and saw that the switch was now in the 'off' position. I pushed the switch down and carried on from where I had been interrupted. A few words about the action of the switch will show why I was convinced that it had been moved

over at the church. I prepared to replace the receiver and forget about it, but at that moment she said that the vicar had returned. The vicar will never know how shaky I felt when I said the words "It appears that we have a poltergeist at our house!" His reply to this of "How extraordinary!" decided me to plunge on with "So pleased you think so, for we have had the most peculiar happenings at our house". The vicar must have detected the strain in my voice, for he suddenly replied "I shall be with you on Thursday evening — God bless you".

When I arrived home that evening my wife greeted me with her story of a further occurrence. She had bolted the kitchen door before

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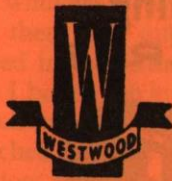
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leaving the house by the front door. When she returned and entered the kitchen, she suddenly remembered that she wanted something out at the back, opened the kitchen door, stepped outside and suddenly realized that she had not unbolted it. I suggested that the poltergeist had taken the opportunity to slip out, but my lightheartedness was brought to an abrupt end when, returning to the kitchen from upstairs, I noticed that the kitchen door was bolted. I asked my wife if she had bolted it, and the look on her face told me that she had not, even before she said, "I wouldn't bolt it, for Susan is due in any moment". I tried to joke it off by saying that 'it' must have returned, but this fell awfully flat, and we did not discuss it any further, just unbolted the door again.

Returning from work the next day I was much relieved to learn that nothing untoward had happened during the day, little knowing that I would be involved in an encounter that evening which makes me wonder how far I was from "stepping over the edge of the unknown". It occurred this way:—

It was our custom, since the happenings, that I should remain in the kitchen to ensure that windows were closed, the door bolted etc., and then turn out the light, while my wife waited in the sitting-room before going up to bed. I bolted the kitchen door, ensured that the switch on the wall (the one that had been switched off) was off, checked that the kitchen window was closed and fastened, I then made my way to the door that leads through to the dining-room, my intention being to switch off the kitchen light by the door, go through the dining-room and join my wife in the sitting-room. But, as I was within a step of the door, I encountered *something* between me and the door. It was not something I could see or feel, but I knew it was there. There was a series of clicks around in front of me, about waist high. These were quite loud, and so quick at first that they made a high pitched sound, then petered out into slower clicks, moving round to my left and towards the position the poltergeist appeared to occupy, that is above the draining board between the kitchen window and a wooden box structure that carries the main services, water and gas. My head felt

most peculiar at the instant of the clicks. I still do not know how I felt at that instant, apprehensive, intrigued, puzzled, but I realized that I was on the threshold of I knew not what.

The whole thing must have been over in an instant, for I carried straight on through the door, switching off the kitchen light as I did so, and joined my wife in the sitting-room, saying nothing to her of what had happened. When I got upstairs and into bed I had a dull headache that soon passed off.

The following morning, Thursday, I was back on the 'phone to the vicar—"Just wanted to confirm that you will be along this evening". I do admit that I sounded far more casual than I felt. To my relief he confirmed that he would in fact be along that evening.

That evening my daughter went along to the meeting of Young Communicants, which is run by the same vicar I had earlier 'phoned up. Before the evening's proceedings had finished the vicar got up and prepared to leave. When asked where he was off to, he announced that he was going to lay a ghost. He was stared at with incredulous disbelief by those present, except Susan my daughter, to whom he said, "You must come too". They left the others to their "He must be joking — no he isn't — I wonder what he has in that attache case", (all this was told to me later by Susan).

The vicar, with Susan, arrived at our house and soon the vicar suggested that we sit in the semblance of a circle and discuss the activities of the poltergeist. He said that he fully expected to have something thrown at him during the discussion and the exorcism that was to follow. But nothing happened during the discussion, except that we learned that Susan had experienced the opening and closing of her bedroom door on two occasions. She had not attached any importance to it at the time because she thought that it was either my wife or I peeping in, but she could not understand why we banged the door on closing it.

The discussion ended and we all retired to the kitchen. The various objects that had been the subject of the poltergeist's attention were pointed out; the new shade and bulb, the chipped figure, the switchplug, the bolt on the door, the position of my encounter.



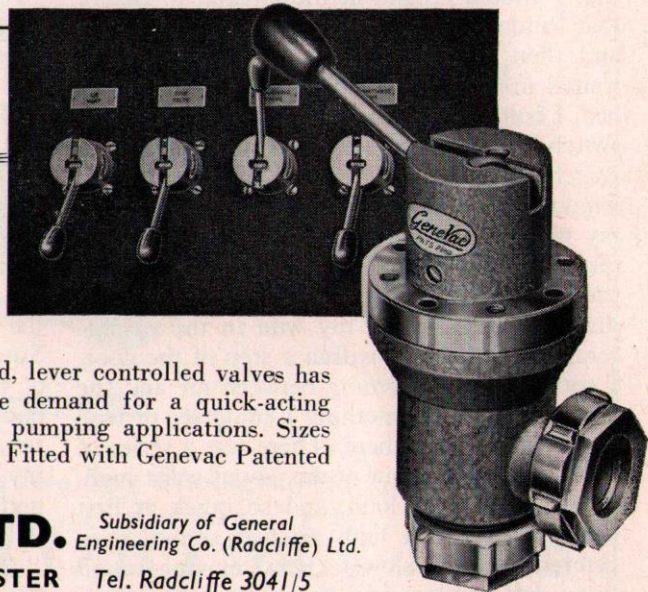
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I told the vicar that I suspected that the poltergeist resided 'there', placing my hands around a space above and to the end of the draining board. There was a feeling of apprehension that something would happen, but it did not at that time.

The exorcism began with the attache case being placed on the draining board directly below the spot I had indicated. The vicar told us not to worry if anything happened during the exorcism. The attache case was opened by the vicar and he took out a cross on a stand, two candlesticks with candles, a book of prayer and last, but by no means the least, a medicine bottle nearly full of a slightly cloudy liquid, labelled "Holy Water" and

kitchen. Then I asked my wife if she had heard the clicks, she said that she had and that there had been four. When my daughter confirmed this, she pointed to the spot just above our heads where they had occurred, and this verified what I had heard. The vicar was asked if he had heard anything but apparently he had not, most strange, really, for the clicks were very distinct to us.

All we can do now is hope that the exorcism is effective, for I really do not know what I could do if 'it' started again. The sequel to this is that this morning, seven days after the exorcism, I discovered upon rising that the bathroom door was open, and when I went downstairs it was a shock to discover the



carrying the sign of the cross. A small altar was created by standing the cross on a ledge below and to the right of the switch-plug and figure. In front of and to either side of the cross were placed the candles. The book of prayer was opened at the psalms of David and laid in front of the candles, which were lit. The details of the service escape me, but I remember that we had to join in saying the Lord's Prayer as far as "And deliver us from evil". It was as we said "Amen" that my wife, my daughter and myself heard four distinct clicks from the same spot in mid-air. The vicar offered up another prayer as he unscrewed the cap of the bottle and poured water from the bottle into the cap. Still offering up a prayer he sprinkled the Holy Water in a half-circle around the area from which the poltergeist emanated. After this the vicar screwed the cap on the bottle, closed the book of prayer, snuffed the two candles, packed all the items back in the attache case and closed it: the exorcism was over.

An atmosphere of serenity pervaded the

kitchen door wide open. On enquiry this evening it was a relief to find a simple explanation; a girl friend of my daughter's who is staying with us for a few days had been in search of a drink of water during the night and had left open the doors. So nothing untoward has happened — as yet!

POSTSCRIPT. Calling at a house similar to ours not very far away, I rang the bell. The door was whipped open by a Harwell man who exclaimed "Thank goodness there's someone there! I thought it was our phantom bellringer again!"

This from a neighbour who had no idea of our experiences . . . After some discussion it was determined that his bellringing occurred on Thursday evenings at 7.30. On one occasion, like myself, he had been standing immediately behind the door when the bell rang and had found no-one.

He and his wife will read this article with special interest and I trust that they will not have a similar sequence of events to report for some future issue of "Harlequin".

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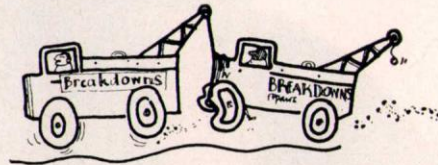
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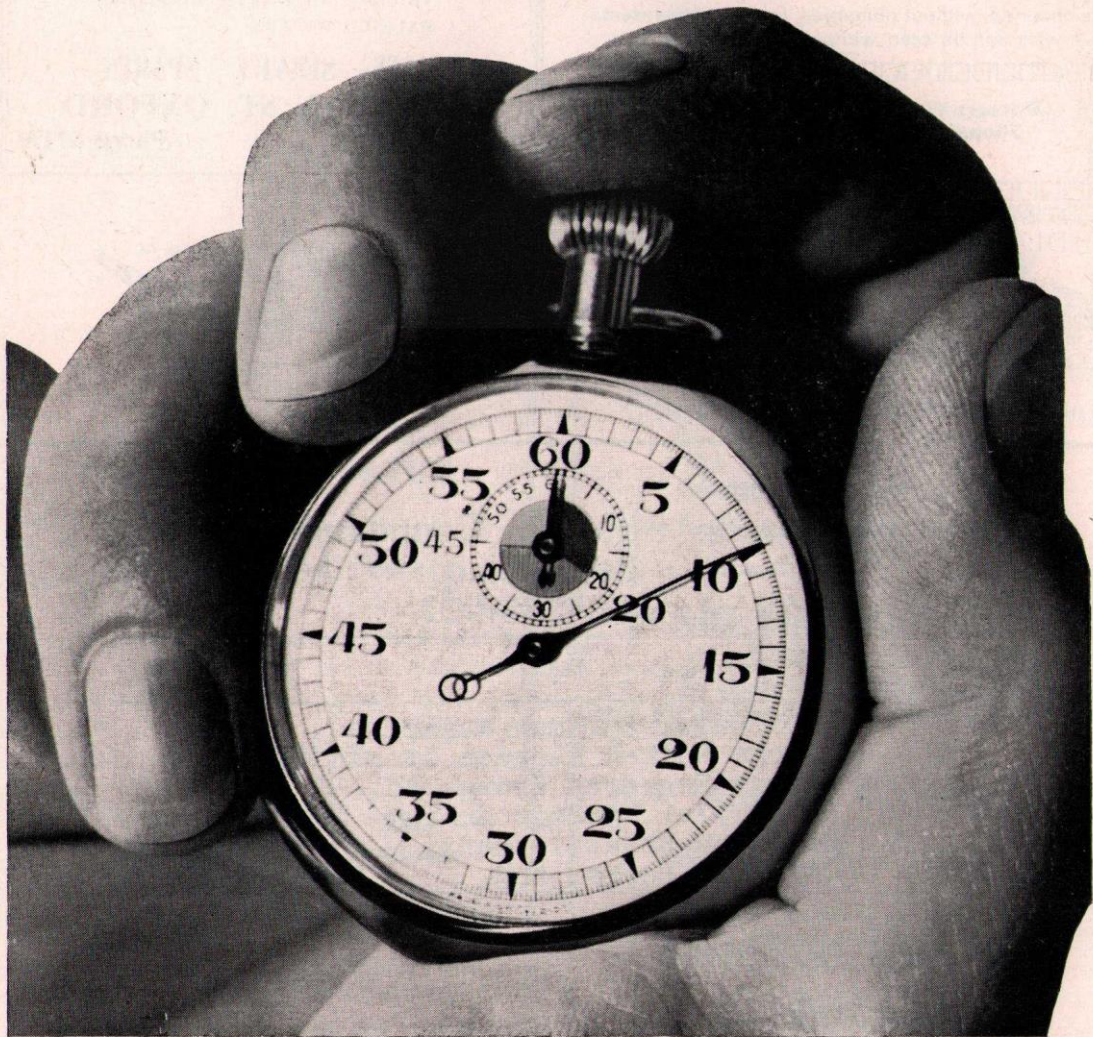
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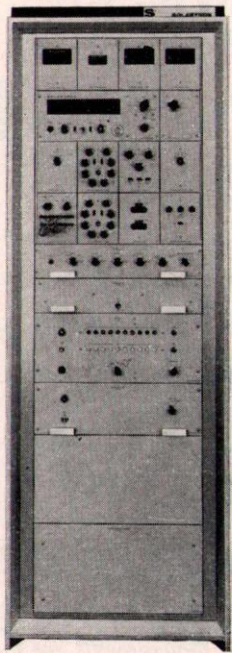
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





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high resolution gamma and X-ray spectrometry featuring Lithium Drifted GERMANIUM & SILICON DETECTORS

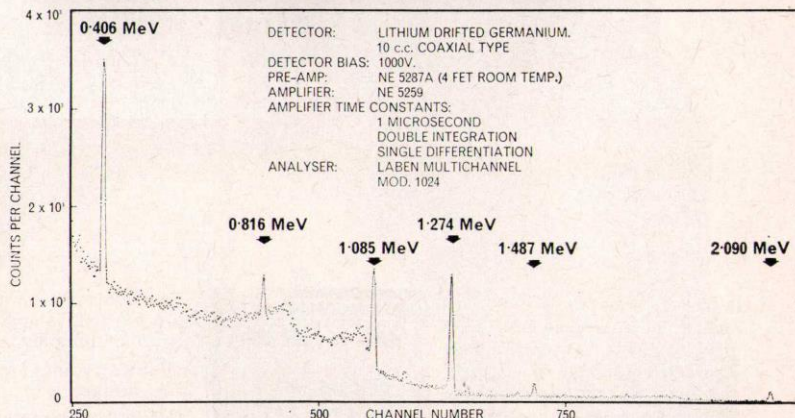
LOW NOISE ELECTRONICS/CRYOSTATS/PACKAGED SYSTEMS

High-resolution gamma-ray and X-ray spectrometry can be performed with our complete Semiconductor Detector Spectrometer systems featuring lithium-drifted Germanium and Silicon detectors in cryostats of our own design, and with Edinburgh Series low noise electronics. **Systems are delivered pre-tested, pre-calibrated and ready for immediate operation**, with a twelve-month guarantee.

For gamma ray spectrometry, select the size and type of lithium-drifted germanium detector best suited to your experiment. (Sensitive volumes available up to 30cc). For low energy X and gamma rays, betas, protons, alphas, etc. choose a unit from our lithium-drifted or double diffused silicon detector range (Depletion depths up to 5 mm for normal operation, and 15 cc for special applications). These detectors can be operated at room temperature, down to liquid nitrogen temperature, or (to special order) at greater than room temperature. For low energy X-ray work, resolutions of less than 1 keV are obtained with cooled silicon detectors.

Detectors for low temperature operation are supplied in cryostats each complete with integral **low noise charge-sensitive preamplifier** which uses one or more specially selected Field Effect Transistors, a **10 or 25 litre dewar**, a **1-litre-per-second Ion Pump and Control Unit**, a **Cryosorption Pump** using molecular sieves (optional), and a **Pirani Vacuum Gauge and Control Unit** (optional).

Typical system resolutions obtained with our Ge(Li) spectrometers are:
a. Planar 5 cc detector: less than 3 keV on the 662 keV photopeak of ^{137}Cs .
b. Coaxial 30 cc detectors: less than 5 keV on the 1.33 MeV photopeak of ^{60}Co .
(Please note that the resolutions quoted are total system resolutions.)



Gamma-ray Spectrum of Indium, activated by Thermal Neutrons from moderated sources of Americium-241/Beryllium. Spectrum measured on Lithium-drifted Germanium Gamma Ray Spectrometer. Above is the actual system used to make these measurements. It includes (right to left) cryostat system with Ge (Li) detector and NE5287A Preamplifier, ion pump and control unit, Edinburgh Series electronics and 400 channel Laben analyser.

The twenty-fold improvement in gamma ray energy resolution attained with Ge(Li) detectors can be further exploited by the use of **anti-coincidence systems**. When an anticoincidence assembly is placed around a Ge(Li) detector, an appreciable reduction in general background results, as well as a reduction in counts due to Compton interactions in the detector. We make and supply NE 102 plastic scintillation counters of all sizes and shapes to surround the Ge(Li) detectors, as well as NaI(Tl) or CsI(Na) anticoincidence systems,

(References: M. W. Hill, Nucl. Inst. & Methods, Vol 36, No. 2, p.350-2, Oct. 1965. J. Kantele *et al*, Nucl. Inst. & Methods, Vol 41, No. 1, p.41-4, April 1966).

Edinburgh Series modules provide the widest range of electronic systems of the highest performance to suit each experiment. Our Low-Noise Preamplifier NE 5287A (with 4 FETs) and NE 5259 Pulse Amplifier achieve a noise performance at room temperature of 160 ion pairs at zero detector capacitance, and 4.5 ion pairs per pF with $1\mu\text{s}$ double-integration single differentiation.

Our Physics Group will gladly discuss your requirements for individual units or for a complete packaged system. New 1967 Catalogue and wall-display chart available by contacting...



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(K)

Since January 1967 . . .



. . . Mr. J. R. Foster, of Engineering Support Division, Building 220, has received (from Mr. J. E. Bown) an award of £70 for an improved method of dry box leak testing.

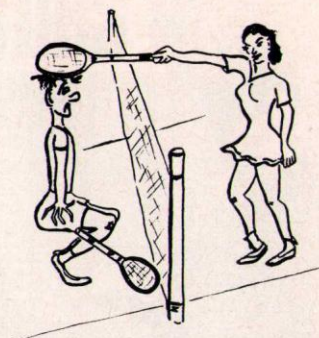
. . . and over 100 other awards have been made for productivity and safety suggestions.



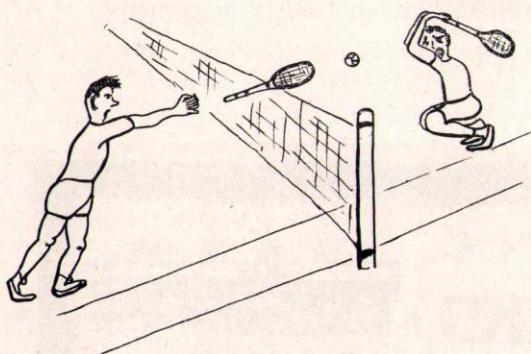
HOMOLKA'S HINTS FOR BEGINNERS



Fast footwork is always helpful

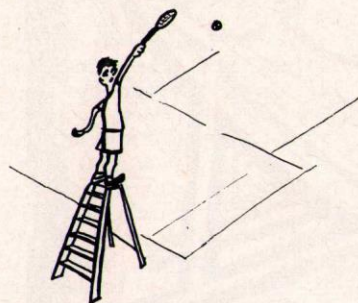


Attack is the best defence.

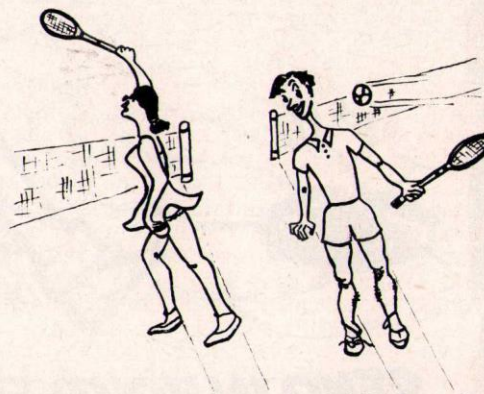


Always follow through with racket.

Always keep your eye on the ball.



When serving, hit the ball as high in the air as possible.



Even very brief distractions can land you in trouble.

"HARLEQUIN" 2.02, BLD. 77, A.E.R.E., HARWELL, BERKS.

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Anyone, at any time, as a result of accident or illness, may be in need of a blood transfusion.

If someone in your house suddenly needed blood you would not hesitate to give some of yours—**BUT IT MIGHT BE TOO LATE.** There would be a delay while your blood was taken and grouped and it might not be the same group as that required; it might not be enough. Frequently three or more bottles are needed for one transfusion.

Thanks to the thousands of voluntary blood donors, there is always blood available for these emergencies; but the ways in which blood can be used to save life are increasing, so more and more donors are always needed. This year, in this region alone, we must have an additional 12,000 new donors to keep our **BLOOD TRANSFUSION SERVICE** operating.

**mobile collecting teams make
regular visits to —
the A.E.R.E., Harwell,
the Culham Laboratory,
the Rutherford Laboratory.**

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an appointment as soon as dates are
announced in A.E.R.E. News, and
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issued by
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