Logica Armchair Treasure Hunt 2011-12

HUNTERS' TALES

Stories, pictures, comments and curses from your entries.

How Alcoholus Lubricatum broke the Enigma within four days...

Appendix: ciphertext-only decryption

As it happens, we deciphered this in a different way. After running the Turing machine, it looked like the cipher on page 13 was probably going to be an enigma using rotors II V III. Since the message is quite long: 860 characters, it is possible to rapidly decrypt it without any other information. (It isn't even strictly necessary to know the rotor choice.) During the war, enigma operators were under instructions not to use more than 200 characters for a single message (though they sometimes broke this rule).

The encipherment at time t (position t in the message) is a permutation of A...Z of the form $S.R_t.S$, where S, the *Stecker*, is an unknown time-independent involution (traditionally containing 10 transpositions) and R_t is the "inner permutation" (also an involution) defined by the rotors and reflector. R_t depends strongly on 26^3 effective rotor positions (rotor position relative to Ringstellung) and weakly on the Ringstellung given the effective rotor position. You don't want to loop over the space of Steckers (too large) but it is possible to loop over both reflector choices, all effective rotor settings, and some Ringstellung settings, in each case evaluating this Stecker-independent statistic:

$$X = \sum_{t_1 < t_2, x} I(c(t_1) = c(t_2) \text{ and } R_{t_1}(x) = R_{t_2}(x))$$

where t_1, t_2 run over positions in the message, x, runs over letters A-Z, $c(t)$ is the ciphertext at position t and $I()$ is the indicator function: 0 or 1. Or equivalently, you take every pair of positions, t_1, t_2 with equal ciphertext, and you count the number of fixed points of the permutation $R_{t_1} R_{t_2}$.

With the wrong choice of reflector and initial rotor/Ring position, each R_t behaves pretty much as an independent fixed-point-free-involution, and the distribution of X can be determined accordingly.

With the correct choice of reflector/rotor/Ring, if $c(t_1) = c(t_2)$ and $p(t_1) = p(t_2)$ ($p(t)$ being plaintext at position t), there will be two fixed points of $R_{t_1} R_{t_2}$ that arise for free, namely $S(c(t_1))$ and $S(p(t_1))$. Since for normal text $p(t_1) = p(t_2)$ occurs more than 1/26 of the time, X will be biased high in this case.

It ends up that for a length 860 message, the correct reflector/rotor/Ring settings stand out very strongly (6 standard deviations on average, 7 in this case), so it remains to recover the Stecker for this single reflector/rotor/Ring choice. This can be done using a hill-climb based on partially-defined Steckers, incorporating the message indictor ("ATH RJA"), and testing candidate plaintext for plausibility after adding each new transposition to the candidate Stecker.

So that's clear then.... :)

ENIGMATICAL

Alcoholus Lubricatum's trip report

The Enigma code on page 13 was cracked, perhaps not in the way the setter intended, but at least in the spirit of Bletchley, in the pre-dawn hours of Sunday morning (18th December) and turned out to be the detailed direction cipher that we suspected it might be. Alex hurriedly tried to remember what German he had learnt at school. Google translate was of assistance, but you had to tell it the correct word breaks first, and even then it still needed quite a bit of help. When the hour became more sociable, greater linguistic minds patched up the translation and we had a think.

Looks like we had pretty accurate directions if we could find the starting car park. We had shortcut some of the hunt so it wasn't obvious we would be able to find it, but we'd done enough to spot numerous references to Bletchley and more specifically the former Crown Inn in the Candy Lane area where Turing was lodged during the war.

Attention focussed on the various woods in the area, in particular Shenley Wood, but we couldn't spot a brook going through it (as required by the description) or see an obvious crossroads. Debate ensued about whether a *Kreuzung* had to be a crossroads (implying a road running through the woods) or whether it could mean any crossing of paths. We were also still a bit puzzled as to what exactly *Plakate* were and what 'black' and 'yellow' applied to.

Jon and Juliette, who lived about 20 minutes away, agreed to take a speculative look, intending to start from the various nearby car parks and see if they could latch on to the directions, but of the two nearby car parks to Shenley Wood, they unluckily happened to choose the wrong one to start with and then run out of time because they had a social engagement that day. They then found themselves in a mobile phone deadspot, so the rest of the team was none the wiser as to how they had fared.

At around 1.10pm, Mark managed to fit the last polo diagram with a trip up Tattenhoe Street, ending at the Merlewood drive car park of Shenley Wood. This involved the necessary realisation that the car park itself had a roundabout (which was not visible on most maps). After various explanations and confirmations of the route, the Cambridge branch of A-L decided they'd make a trip of it if they hadn't heard back from the Flitwick branch.

As usual it was something of a race against the sun. We managed to leave Cambridge at 2.30pm, arriving in Shenley Wood car park at 3.30pm just as it was starting to get gloomy. Fortunately, the directions were extremely precise and easy to follow (none of this "find the tree near the other tree that looks a bit like the first tree, then turn around three times, make a wish, and the treasure might be somewhere around there"), and we retrieved the treasure with sunlight to spare.

ENIGMATICAL

Some of Alcoholus Lubricatum's photos

F3 11 SW. Mystery solved!

The setter now has a sizeable collection of photographs of this lamp-post.

Mark had lost count of benches after the first one, but fortunately there was a trained mathematician and physicist on hand to take care of the onerous counting up to two.

Inside the box

Ingrid with the treasure, and Mark looking on

Our souvenir

It looks better in the photo than it does in reality :)

A.M. Turing Struck My Big Fox Whelp

'Stollenloch'. My German isn't great but I think this translates to 'Christmas Fruit Cake Hole'

"*Holy shit. I think it has been there staring us in the face since 18th Dec !!!! Try reading the decrypted message as three separate phrases.*

WINNING THIS ARMCHAIR TREASURE HUNT WOULD PROVE THAT YOURE NOT MUGS.
ONE THING YOULL NEED TO DO THAT IS ....
MY BATCH OF X WIRED PLUGS

That's exactly 20 unique letters, perfect for 10 cross wires.

MY, BA, TC, HO, FX, WI, RE, DP, LU, GS"

It has been said that Cameron also knows the words to 'The First Cut Is The Deepest'.

We followed your and advice and had a couple of visits to Bletchley. Very interesting it was too. We still hadn't solved the Enigma code at this point and unfortunately couldn't convince the curators to configure the Bombe for us.

He made a public apology after the incident but was never able to rediscover how to hit a tennis ball properly.

The term imprisoned refers to the fact that anybody who enters a Logica office feels like they are in prison.

Psychologicals
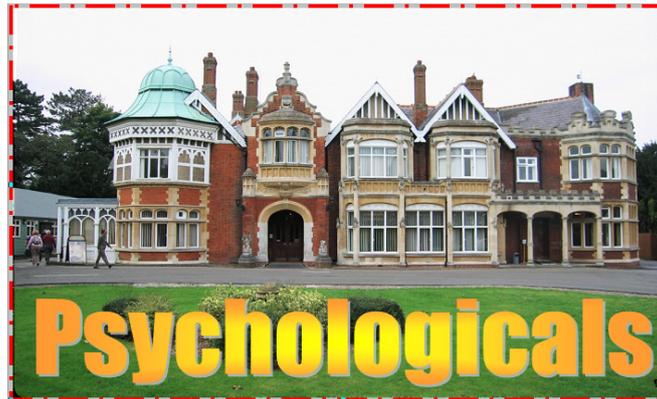
We'd just love to know how these hunt setters manage to manipulate TV programming during this period. The town of Santiago de Compostela, Galicia, was included in December 30ths episode of 'The Coach Trip'.

We guessed the key was 6 characters as the total cipher length is a multiple of 6 and tried obvious keys such ENIGMA, LOGICA, SILVER, SMITHY and TURING. We managed to break the cipher without knowing the column key, just identifying it as needing to be reordered as 2,4,1,3,5,6. Researching possible words, we settled on CRAFTY.

We haven't figured out the significance of the Barrhill Road coordinates, but note that it's abbreviated to Bar. Road on some maps. This could echo that the Silver Bars being hidden in/near Watling Street, or it could read as NEAR A BAR IN WATLING STREET. There was a toll bar across the turnpike at Two Mile Ash, not far from Shenley Wood. Also Bar is French for Bass (fish).
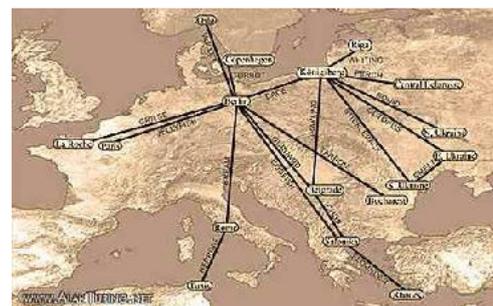

The link to all the roads with fishy names also links back to the various codes being broken at BP. The generic name they gave to the German non-morse traffic was "fish". Then of course, we have Shark, Tunny, Bream, Gurnard, Porpoise, Sturgeon ... all named because an original German cipher machine was called Sagefisch. The image above shows The Tunny radio network of the German Army. It includes Whiting from Riga to Konisberg but no others.

A retired engineer by the name of Richard Santa made the startling discovery that Elgar enciphered the number Pi (π) within the Enigma Theme....

ENIGMATICAL

Lady Strange and the Earl of Yarborough

Puts my pencil drawings to shame!

Green View, formerly the Crown Inn

You're never too young to start treasure hunting!

The items on the rest of these pages come from a number of submissions. Many thanks for all your photos, comments, and even curses. They brightened up my marking sessions, and reminded me of what it was like to try to solve one of these things!
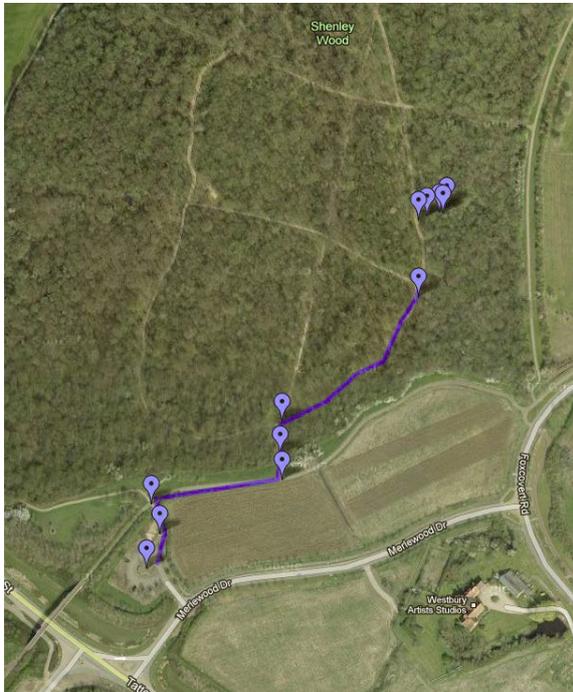
Finally we decided that as there was only one 'X' in the entire wordsearch, this must mean 'x marks the spot' (as was the case on the Oak Island map on the poster) placing the treasure somewhere along the footpath between Pascal Drive and Vernier Crescent, just north of Shenley Wood.

More than one team tried to reconcile the wordsearch grid on the first page with the Milton Keynes road system.

If the grid is rotated through 90 degrees anticlockwise, and then each grid cell is treated as a cell in the Milton Keynes grid, the cell marked by the only X contains Shenley Wood, the location of the treasure.

If we put the 11 letter words from each page in an 11x11 grid and read the right to left diagonal (by analogy with the same grid layout on page 1 and mathematics). We get nsivaldmteu which is an anagram of Valued Mints. We take this to mean that we should be using the polo mints code.

I had a good mind to send in our entry chopped up into 11 segments, placed in random order, flipped horizontally, colour removed, contrast off the scale and of course the letters in each word in reverse order. I even suggested that Chinese characters (backwards and incomprehensible) might be an appropriate font. Fortunately not all team members agreed that this would be worth extra points.

...one member took the picture clue too seriously and started thinking that the box would be buried in his back garden.

[Look up apophenia - I had to...](#)

Triangular Numbers

The number of words in the opening text we counted because it is bounded by the cardinality symbol ('hash') - there are 78 words and there 78 answers from the questions. 78 is a triangular number.
If you subtract the 55 letters from the located words from the 11x11 word square on page 1 you are left with 66 letters which is also a triangular number. A characteristic of triangular numbers is that any two consecutive triangular numbers sum to the square number index of the higher triangular number (55 + 66 = 121 = 1 x 11; 66 + 78 = 144 = 12 x 12). Triangles have been referenced through Blaise Pascal and also because they have diagonals (naturally).

If you were somehow to collate together with the answers or the opening text and the left letters you would have 144 which is a 12x12 grid. Feel sure this must be used but have been unable to make it work probably because of apophenia but possibly because there are too many moving parts and we did not figure the correct pattern.

Initial ideas we had for the theme of the hunt based on the poster included … the Lord Nightingale (Jon Lord + the pictures of nightingales) novels by Judith A. Landowne. Thankfully this proved not to be the case as these books look bloody rubbish.

Although we knew it was likely to be a fool's errand, we sent DB off to cycle round to Shenley Wood where, without realising, he took several pictures of stages along the route. He claims to have been distracted by a sparrowhawk that another team must have set upon him as it tracked him through the woods.

Using the codons to form the amino acids and thus yield letters for their short
names together with the plain letters O and B we get HOLLEYKHORANANIRENBERG.
 This is an anagram of NOBLY RANKING HERO HEALER which is usually thought to
be Gawain so we present that as our solution to this clue.

Adam Werrity's job is an enigma?

Several teams solved the Turing
Machine puzzle manually, before
finding the online simulator.
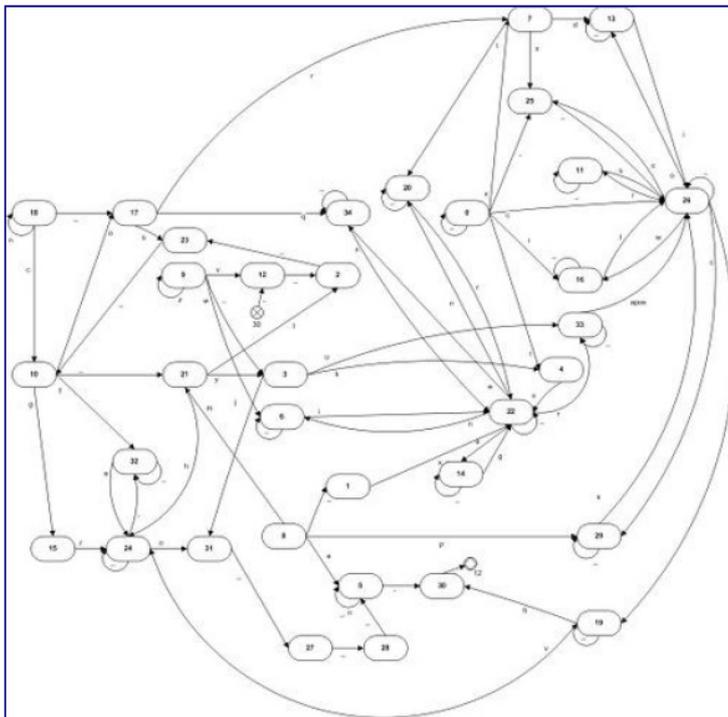
Excellent! It was only day 2 and we surely
just moments from cracking the code to
find the treasure! Erm no. It took us until
the final weekend to finally come up with
the final setting required. Looks like you
followed Kerckhoffs' advice after all.

"Barrhill Road" is also a red herring
because Barrhill railway station featured
in a book and TV series called Five Red
Herrings (and hence in the railway
timetable on page six of the 2009 ATH).

ENIGMATICAL

Oh, how it grates. You find the codes, you learn the number system and you get a fecking christmas message.

Instead they built the much smaller Q4, now known as the QE2, not to be confused with QE2 bridge at Dartford which is known as the Q for miles.

If only the dart had hit Les McKeown's vocal chords.
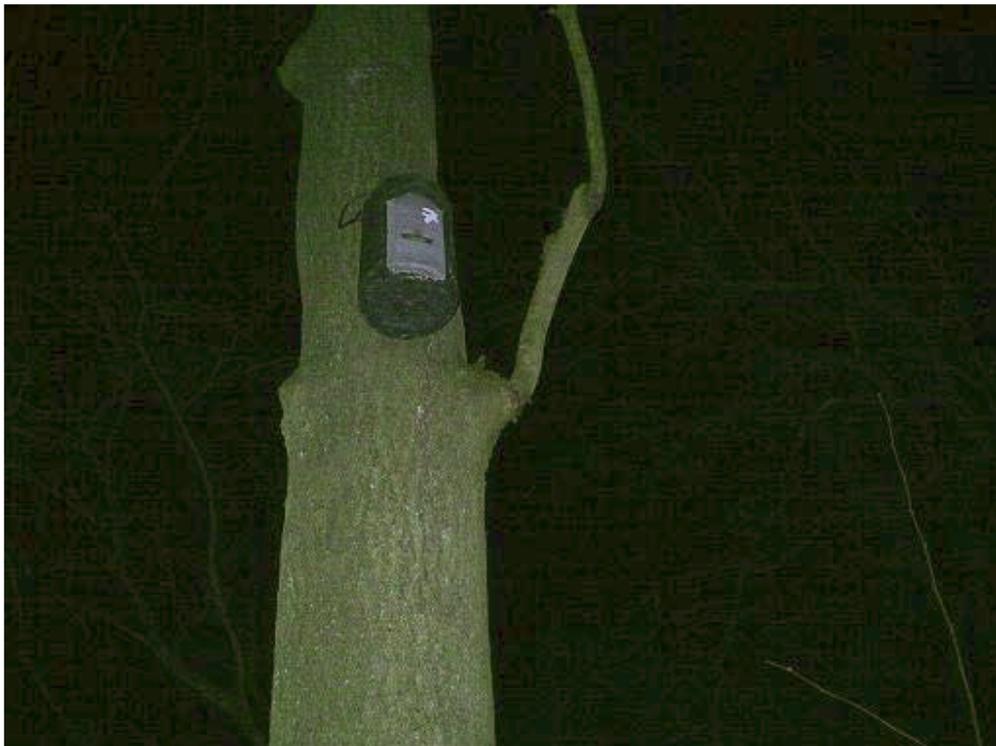
...rather like the Great Yarmouth question, I wouldn't recommend searching directly for "19 year old female with crisis in the bedroom".

Do we get extra points for pointing out that Gil-Scott Heron regularly collaborated with Brian Jackson, illustrator of the original Armchair Treasure Hunts?

You can imagine the collective sound of jaws hitting keyboards, along with various slaps of the forehead, when we realized the deceptively evil, yet brilliant design of hiding the plugs in the end of this message.

ENIGMATICAL

Brute Force Attack - The Chiltern Fellowship

After failing to find more specific directions, we mounted an expedition to Shenley Wood on Sunday 15th January, a glorious but cold sunny day.

We arrived at the wood to find a group of half a dozen people with two dogs taking photos of each other and their dogs in front of some trees fairly near the entrance to the wood. They seemed unwilling to move on while we were nearby, so we saw this as a prime spot to return to and search!

We explored the wood, looking as carefully as possible at surrounding trees for a Logica L and exploring side tracks where we noticed them. Having made no progress, we divided forces for Adrian and Baiba to search on the east side of the wood while John and Kevin searched the spot vacated by the suspicious group. John and Kevin made no progress but were recalled by Adrian and Baiba who had managed to spot a Logica L on the side of a tree away from the main path, having just taken a quick look down a small side track – they only spotted it after turning round to return to the main path!

Jon, Kevin and Adrian by the tree with the Logica L

We then spent 20 minutes or so, scouring the area near the tree, being careful to look above us as well as on the ground in view of the setter's note of 22 December 'An employee has informed me that his position is now in doubt, and might better be described as "... atop or in place of ...".'. We decided not to try to climb up and open any of the frequent nesting boxes in the area!! But, after widening our search, managed to stumble on a likely looking group of logs and under a large piece of wood found the treasure and that we had ticket number 12.

Feeling fortunate to have found the treasure based on such little specific information, and very pleased with ourselves, we called it a day at that and retired to a nearby hostelry to celebrate - without searching further for Alan Turing's silver bars!

She would wake up at 5am, which coincidentally is the same time I went to bed after trying to work out the route the Polo directions took.

Why mugs? Certainly because it rhymes with plugs, and maybe … it's also what we were for taking so long to realise this!

M was cooking and I read out some of the instructions - we nearly had an accident with dinner when I read out "find 2 trees" ... we couldn't stop laughing ... right 2 trees in a woods full of them ... S then joined us to cook too and when I read out "a green coloured tree" our laughter re-doubled ... it was already night time so the hunting would be by torch light and finding anything green coloured promised to be hilarious, especially a tree in the middle of a forest ...

The text is a subset of commands from a joke computer language called Babbage. It's the future, really. I've certainly debugged worse.

We were sure that we were the first team to uncover the directions to the treasure, so we subsequently felt incredibly unlucky to find that the half-hour delay had caused 12 teams to get to the loot before us, leaving us in 13th place.

ENIGMATICAL

It was filmed at San Diego Zoo where Ron Burgundy famously rescued Veronica Corningstone from the Bear pen.

We discussed various scenarios ... would we find the woods full of treasure hunters with torches prancing about the woods? would we get totally lost and should we take a ball of string to find our way back? M said she could not come with S and I but she did reassure us she would call in the cavalry if we were not back in a few hours ... M wrapped us up in warm clothing because there was a definite frost outside and then laughed us out of the door...

None of the box seekers had had lunch, so they retired to the aptly named Enigma Tavern. Here there was a good-news-bad-news story. The good news was that they offered three meals for £10 as a special promotional offer. The bad news was that there was no beer. When asked about this, the barmaid pointed to the Banks mild pump and then, when re-asked the question, she pointed proudly to the choice of lagers on offer. As a regular attendee at the Great British Beer Festival, this did not go down well with Mr H.

Comment from a local: "You went to Bletchley to (a) eat; (b) drink? Mmmm..... How brave."

This was all happening as we approached Wast Hill tunnel on the Worcester and Birmingham Canal. This is a long tunnel with a transit time of over an hour. The site team was getting a bit despondent with the lack of success and our request to a team member's mother, who teaches German, had reached Copenhagen but the response was delayed by further festivities. I was getting a bit concerned that we would vanish into the tunnel and the day would be a failure. However, the site team came good and we had ticket number 3 just before we entered the gloom and dead-spot of Wast Hill. The British Waterways Board is being superseded by a charity, perhaps when they reconsider canal tunnel safety they might install Wi-Fi, it is clearly needed.

How much excitement can a person have in the night in the middle of the woods?

This is a detail from the Alan Turing Memorial in Sackville Park, Manchester. It's Turing's hand, holding an apple. I thought I'd explain that because my wife, having just read the question in red above it, had a very strange idea about what it might be!!