

## Ken Follett

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**From:** Bernard Green [Syemon.Es@btinternet.com]  
**Sent:** 23 February 2001 11:01  
**To:** Ken Follett  
**Subject:** First draft

Ken

I made an error in the description of the cable chamber. The last line

""The copper conductors and their immediate insulation are continuous through the chamber, ie there are no joints in the cable chamber""

is true for small exchanges where the few incoming armoured cables can be manipulated to allow long lengths of the inner core to be fed through to the MDF room. In the Chateau exchange the majority of the armoured cables would be jointed in the cable chamber to more flexible cables fed into the chamber from the MDF room. The joints would be sealed in lead or other water proof casings and would be supported on the shelves in the cable chamber.

Bernard

## Comments on the 1<sup>st</sup> draft

The story line and sub plots are all very credible and my suggestions for technical changes are except for two items mostly minor points.

The final damage inflicted means that the building and the exchange are unlikely to be of use to the Allies when they get to it which I thought was the prime reason for destroying the MDF and leaving most of the equipment servicable for the Allies to use after the MDF had been repaired by the Allies

There are 2 major points.

The location of the MDF and the method of putting the cellar into darkness.

[1] The MDF would not be in the cable chamber. It would be in the MDF room or an apparatus room.

[2] The shorting out of a supply to a cooker in the kitchen would not put the cellar into darkness.

[1]

The cable chamber is a room or a manhole where the ducts and cables are brought into the site. Technically the cable chamber is "outside" the exchange and is used as a transition point where the incoming cables are reduced in diameter by removal of the heavy duty insulation and leaving just the core of wires and immediate covering.. On one or two walls there would be the ends of the ducts bringing cables to the site, usually as holes in a concrete wall or pipes protruding into the room. The underground cables come out of these holes and are supported on shelving. The cables are toughened or armoured and inflexible so the shelves are arranged to suit the openings in the walls. On the shelving the outer insulation and re-inforcing of the cable is removed to expose the inner core of the cables which is just the wires and a thin outer sheath. These thinner and more flexible cables continue through a wall and into the exchange proper. The copper conductors and their immediate insulation are continuous through the chamber, ie there are no joints in the cable chamber.

The wall between the cable chamber and the exchange would usually be gas tight and often blast proof with a weak point to allow any gas build up to explode "harmlessly" into the open air away from the exchange.

The cable chamber also acts as an interception point for the water and gas that gets into the ducts as they pass through wet ground, rotting vegetation or near leaky gas or water pipes. In theory these unwanted items are collected in the cable chamber and thereby prevented from entering the exchange itself. The cable chamber is also where any cable pressurisation equipment is installed. ( Some cables have pressurised oil between the inner core and the outer sheath to prevent ingress of moisture if the outer sheath is damaged and to indicate that damage by falling oil pressure )

The cable chamber would probably be the end room in the cellar where its walls are the external walls of the cellar for easy access for cable and ducting..

The cable cores go through gas tight seals from the cable chamber into the MDF room where the wires are terminated on the "external" side of the MDF frame. The MDF room is normally next to very close to the cable chamber. In the case of the Chateau with vital equipment below ground it is very likely that the MDF room would have the racks of amplifiers for the long distance circuits which pass through but are not connected to the exchange. So there is the added bonus of putting out of action long distance circuits.

[2]

The power supply to the cooker and kitchen would have its own fuse which would blow and protect the power to other parts of the building which would have their own fuses. That is different to modern house wiring where a blown fuse often trips the residual current circuit breaker ( earth leakage trip ) which turns off most if not all of the house.

To blow a cooker fuse would be difficult without heavy duty tools.

Emergency battery powered lighting was standard in German installations. The cooker would take out only that supply line, other areas would have separate fuses and still be powered. Lights and power would certainly have separate fuses.

Even if the main fuse to the Chateau was blown there would be emergency lighting in the cellar either from batteries or the generator so darkness in the corridor is unlikely unless all the lights are shot out or a lucky cut of the lighting wiring can be made.

### Some other thoughts about the story line.

The layout of the basement has Gestapo rooms mixed with equipment rooms. This would be inconvenient for the cabling and pipe works of the exchange services. May be the exchange equipment would be along a corridor of rooms under the front of the house so that cables could go up through the floor to the switchboards above. The torture chamber etc could be on a corridor running under the east wing where kitchen and canteen are. The Cable chamber would be at the far end of the front corridor next to the forecourt where the cable trenches would have been dug in from the West The MDF room next to it.

The layout of the MDF room would be more accurate as follows.

Long narrow room, Standing a metre from the long wall are two long metal frame from floor to ceiling supporting wooden bars bristling with thousands of terminals in tidy rows. Behind each rack are tidy bundles of cables with their wires neatly and orderly connected to the back of the terminals. From one rack the bundles of cables disappeared through the wall into the cable chamber next door and then on to the outside world. From behind the other rack the tidy bundles of cables went up through the ceiling and through walls to equipment in other rooms. The fronts of the MDF racks were a tangle of loose wires connecting terminals on one rack to terminals on the other. These loose jumper wires determine which external circuits were connected to each piece of equipment in the exchange. Along the other long wall were racks of equipment, the glow of vacuum tubes could be seen from some. From these cables went up to the ceiling, crossed over the room and went behind the internal side of the MDF. These were the amplifiers and carrier circuit equipment for the long distance lines. At one end a table and cabinet with sheets of drawings.

### The meeting with Greta and Flick

Greta would **not** immediately choose the MDF as the weakest point to go for. She would consider her experience of how a GPO civilian exchange could be shut down. Major damage to a normal GPO city exchange that Greta would have worked on would be to destroy either the common equipment racks or the register translators. The common equipment racks provide the tones and ringing voltages and other services essential to all automatic calls. The register translators take the area code of a couple of digits and translate it into a routing code of several digits. However in the Chateau exchange there are other types of equipment that would still function after the common equipment racks and translators had been destroyed and the automatic exchange put out of action. The manual boards would be able to take the traffic after a few hours of modifications. So Flick needs Greta to work out how to knock out the manual exchange, the automatic exchange, the long distance amplifiers, the telex exchange and telex line amplifiers all at the same time. This would involve causing major damage to equipment in several different rooms. Flick can't manage that so Greta needs to see the MDF as the only common point for all the systems. As Antoinette hasn't provided a basement plan and Arnoud is dead then the location of the MDF will need to be found. Provided some one remembers the trenches for cables being dug then the location of the cable chamber can be determined and the MDF room will be very near to it

If Greta is a typical engineer he would be fascinated by anything new. As a practising homo-sexual and of German origin it is unlikely he would be permitted to work on anything more than GPO civilian lines and equipment. Possibly he would be restricted from entering exchange buildings for security reasons, so his interest in exchange equipment may be stronger than normal. The amplifier and carrier equipment would be of great interest and being German he would be able to gather some useful knowledge from it. He would need to be hurried up to stop drooling over the equipment and get down

to destroying it. Some of the information about the new carrier system would be of use to the Allies. Labelling on the racks of amplifiers and or in the record cards would almost certainly provide information about the locations of other amplifier stations, network nodes and the carrier frequencies in use on the circuits being diverted to radio.

The records of the MDF jumpering would be on a collection of diagrams which would be A3 possibly A2 size. The record cards would be in custom made card holders with dividers to separate the cards for different types of circuits.

I think the slow burning fuses should be referred to as fuse cord and not fuse wire.

The oxygen generator concerns me. The ones I have heard about produce oxygen for one or two people to breathe and would not produce enough to support a large fire. Sodium chlorate or similar will release oxygen when heated so large quantities of that would help the fire. In view of the recent bomb damage would it be possible that welders repairing the bomb damaged air and exhaust pipes to the generator room have left their oxy-acetylin welding gear in the generator room or near by. Wheel that trolley into the MDF room. Place a charge on the valve gear of the oxygen cylinder and there is all the oxygen needed together with a very powerful bomb and fire ball when the acetylin cylinder explodes in the heat of the +fire.

Diesel fuel doesn't explode but if the petrol storage tank for the fuel pump in the yard was in the same cellar then the petrol would be very contributory to the fire. It would be a stupid thing to put a petrol tank in a cellar though but the bomb damage may have forced the Germans to do so.

### Notes made while reading

Page 5

“largest telephone exchange in Europe”.

The civilian exchange had been enlarged by the Germans to provide connections between the French system and one of the new cable routes to Germany. Bringing the new cable route to the Chateau gave the German High Command access to the main French telephone cable network.. There were two access node to the major route that came into France at Hirson but I haven't been able to locate them. St Cecile however is near enough to be one of them.

Only the hand connected calls were disrupted by the bombing. Disruption lasted only until replacement switchboards were bought to the chateau and installed in the main hall. All the automatic equipment and the vital amplifiers for the long distance lines were below ground in the bomb proofed cellars

Was the government minister born in the Chateau and why was a Chateau used as an exchange building since it was unlikely to be suitable due to the room layout etc

Page 7

Line 3 “that course” *the course she had been on* (implies only one course)

Page 8 ( would there be ordinary soldiers as well as Gestapo ? Gestapo were plain clothed cowards, not open fighting men )

Engineers would also need access to the basement

Switch room is an americanism, apparatus room or equipment room is more English

Page 24 installation-thought *installation-though* (spelling)

Page 27

The telephonists would have unplugged from the board and left wearing their headset and breast microphone with them, this was faster than unclipping the neck strap of the microphone )

Page 28

How did Dieter know his way around the building ?

- Page 43 Minimum of 600 metres what, landing / take of strip  
Bon fires also could not be put out if German troops or aircraft approached
- Page 44 run over by -a- Hudson ( missing article )
- Page 51 Walking across the airfield with the pilot ..... ( Wasn't contact between air crew and passengers restricted )  
As the house in Sussex came into view  
( I found this confusing had I not been well aware of Sandy's location )
- Page 52 ( I like the reference to the post office at Knebworth, what ever happened to it ? )
- Page 63 It is the largest exchange on the european mainline and more importantly it houses one of the amplifier stations for the main telephone and telex routes from France to Germany.  
  
(Alan Turing had the theory, there were scientists and telephone engineers who designed the equipment to automate the calculations of the code breaking formula that Turing devised )
- Page 87 were agents kitted up at the house in Sandy or on the Tempsford air field at the "departure lounge" ?
- Page 106 Since then the Germans had improved the equipment. *The Germans persuaded the French to add more capacity on trunk routes. In some areas the Germans had done this themselves by installing equipment that allowed four conversations on one line..*
- Page 117 There are only three names left yet on page 118 "" It took a while to track the four down"
- Page 123 Flick says We have three members including me before Paul tells her about Maude
- Page 152 quite a bit of the French system was automated by this time, long distance dialling was in place  
  
This chateau could be described as housing a tandem exchange, the node of the network that connects other exchanges to each other. And it could be a terminal node for the trunk route to through the Ardennes to the Gisela complex. The Riechsbahn railway network was mostly on railway property but this could be part of its alternate routing . necessary when trackside wires were cut
- Page 153 By 1944 some German women telephone operators were being deployed in France on the more important routing centres
- Page 157 Flick needs to know if Greta is an exchange engineer or an external plant engineer. The external engineers work on cabling in the street and in the subscribers buildings and would not necessarily know much about the inside of an exchange and the equipment there. They would recognise an MDF though.
- Page 159 The Zeppelin centre was one and was outside Berlin away from the danger of bombing, Gisela command centre was the one nearest to France.
- Page 160 The MDF would normally be in the room next to the cable chamber, cable chamber is usually vented allow any gas that gets into cable ducts in the street from filling up the exchange and causing an explosion. Also the heavy insulation, the outer cover ing are removed in the cable chamber, some cable are pressurised to keep damp out if the outer sheath is damaged.

Greta might offer the comments :-

that an important exchange would have two cable routes into it . Most did.

The various parts would be seperated.

The manual boards and their equipment would be a

Page 161 Flick ""A couple of days. Are you sure when the baker street cable was cut by a bomb one engineer had it re-connected in a few hours. ""

Greta "" Street repairs are simple, it is just connecting the broken ends together again. wire to wire, red to red, blue to blue and so on. The MDF is far more complicated, It has hundreds of cross connections to replace, these are listed on record card or charts.""

The mention of pulling cables out of manholes refers only to restoring services when the cables are cut in the street manholes. These are again simple wire to wire re-connections

Page 193 When Dieter is talking with Brian in M Lemas's house he calls Stephanie by her real name and not Jeanne May be intended to show Standish is not very good.

Page 223 Not television screens These would be oscilloscope screens, roundish windows with a single green line across the screen, on this line would be vertical lines one for each transmitter . The position of the vertical line being determined by the transmitters frequency and the height of the line by the strength of the signal.

The delay in finding the direction to the transmitter was a few minutes while the monitoring stations tuned their sets and then rotated the goniometer coils until the signal was strongest. Then they knew the direction.

Page 224 Brian changes name from Standish to Standall

Page 240 We did that foir a few years ( spelling )

Page 245 Flick watched her mother shaving her father, didn't he die when she was four.

Page 253 The sewing machines would have been oiled with French oil. One German spy was proven to have clothes with german light oil on them.

Page 256 The blackboard with agents code names would be a security risk.

Page 258 I seriously cannot imagine that there would be a confrontation like that at Tempsford. If there was then Simon Fortescue and Denise would have been under arrest.

Page 260 Daily mirror which she sore ( spelling swore )

Page 265 I was lead to believe that contact between air crew and passengers who were parachuting was prohibited at all times. Only the jump master actually met the agents and then was very limited contact. Reason was to prevent the air crew if captured being able to identify or describe the passengers,

Page 273 but your were a brave boy (spelling)

Page 301 Grendon Underwood Listening stations were I though designated Y plus a number.

Page 304 Wouldn't the time of the message be included

Page 314 Reference to Cartier wrist watch, previously it was a German officers watch on page 192 when talkiing with Standish

Page 330 How does Dieter know the code word Jackdaws ??

Page 333 Would need two crocodile clips to make the circuit

- Page 412      The wiring to the switchboard would be several cables bundled together rather than one single thick one to give flexibility to the wiring.
- Some of the rooms would have the equipment racks, buzzing in lots of overlapping short bursts of between one and ten clicks as digits are dialled.
- Page 415      Greta would need tool of some sort to un-insulate the wires and make a good enough short circuit to blow the fuses without electrocuting himself.
- Page 417      The generator would normally be a standby to replace failure of the mains, oil supplies were becoming in short supply. Batteries would supply the power until the generator started after the mains failed. Maybe that a security alert would include starting the generator in case of attack against the power supply.
- Baecker's innovation would be an ebonite cylinder with two metal bands separated by about an inch, The cylinder has two wires, one connected to each of the bands. Used in Buchenwald.
- Page 418      Emergency lights would be provided by battery or from the generator.
- Page 420      The MDF will be in the MDF room and not the cable chamber. These two rooms will either be side by side or the MDF room would be above and to one side of the cable chamber,
- Page 421      See suggested description of MDF room
- Page 422      The records may have been on charts and not cards. The systems used in civil exchanges in Germany was sheets about A3 size drawn like a map of the rows of terminal on the MDF and the jumpers shown as numbers. Cards of recent changes were kept until the drawing were updated.
- Page 429      Reference to cable chamber, should be MDF room
- Page 431      If the power in the electric shock was enough to scorch the mouth then almost certainly it would have destroyed the nerves in the spinal column in the neck and death would have occurred.
- Unless the cylinder was made up of two electrodes separated by an insulator so that the electrical path in the body was local to the cylinder. This would still cause severe pain and muscle damage but not affect heart and other vital organs.
- Page 435      Reference to cable chamber
- Page 436      Diesel fuel doesn't burn violently so an explosion from this is not likely.
- Page 452      How did three people set up the four light system for the landing site though I guess leaving a torch behind was not a major concern.