

Swihart.

Ken Follett

From: SS [stanswi@earthlink.net]
Sent: 22 November 2000 14:44
To: kenprivate@ken-follett.com
Subject: reply and new materials

2000 1117.1300 pacific standard time (pst) friday
(reflecing activities 1116 - 1121)

Ken Follett
kenprivate@ken-follett.com

You asked one of your researchers, Dan Starer, to forward to me one of your emails to him.

STARER WROTE TO ME

Below is Ken Follett's response to your emails, the emails of others, and some materials I've had translated from the French. If you have the time to consider his questions, could you please email him directly at Ken Follett <kenprivate@ken-follett.com>

If you are able to find additional historians and experts who can help, could you please give them my information as a first contact, or advise me how I should contact them. Many thanks again for your help.

Here is Ken Follett's email from today:

"Thanks for your five emails with notes from many correspondents. Stan Swihart's notes are the most wide-ranging and comprehensive, and you may want to forward this email to him, if he is willing to give us more of his time.

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I hope that this email should help you to construct a plot that meets your needs. If I have missed anything, let me know. This type of research is time consuming, of myself and numerous other knowledgeable. Not sustainable for any length of time.

I do have more detail on a lot of these matters. But. . . .

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QUESTION 1

I asked Starer what priority you had for getting the information you need. If it was urgent, I needed to know that. He has NOT replied to this query, NOR HAVE YOU, thus I am assuming that you can wait a reasonable period of time. If your need is URGENT, please advise me that this is the case. You already know that most of the good folks are pretty busy.

Pre-year end and pre-holidays is not my best time of year to do surprise research projects. Nor is it the best time of year to contact some of

the best sources. Let me know your timetable.

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OBSERVATION 1
TRANSMITTING MAPS

Attached are four files, each of which contain a map of the European telecoms long distance networks around the time of your book.

1. Two attachments called "Follett Europe Map" -- Shows the entire "main" telephone network of the area of interest, between Paris and Berlin. England is included to the northwest, because the "legend" is in the upper left corner of the map. This maps shows the system as of 1933, with construction projects in progress at the time, and also planned improvements, where construction has not yet begun. The attachment is an extract from a much larger map. The two attachments cover the same area, but they were scanned in two different recording formats, pict and tiff. They are from a book about European long distance systems, present and future, published in Germany in 1939. It is entirely in German.

The map of the European long distance telephone network, as of 1933, shows a number of alternate routes that could be available to the Germans, were sections of any one or two of the routes taken out. For example, if the more obvious direct line between Paris and Berlin thru Reims, Metz, or Liege were to be taken out, a German switchboard operator would immediately (without a moment's thought or delay) route the calls southward thru Nancy and Stuttgart to Berlin, still further south thru Dijon, Mulhausen, Stuttgart, etc., northward thru Brussels and Cologne (shown as Köln on the map), eastward thru Strassburg and Frankfurt, etc. The map shows that numerous other alternate routes. Probably more than 6 people would be required to take this all out.

The map is from a German publication. The legend in German in the upper left of the map translates as
The european Long distance network
Explanation of symbols
Operational cable lines
Cable lines under construction
Planned cable lines
Main above ground long distance lines
Planned above ground long distance lines.
Stand 1933, means that the data is as of 1933.
Distances are in kilometers

2. Attachment called TelephoneMap1944 -- shows the long distance telephone system in the area of your interest, as of 1 December 1944, as seen by the Allied military. There are some radio circuits. Reims is not named as such, but you can easily figure out where it is. The map is NOT drawn to scale, and the relative locations are often grossly in relative error. But it is the best picture available to me, of the system as it was then.

3. Attachment called TeleprinterMap1944 -- shows the same routing for teleprinters, called by the American term "teletype" on the map. Some of the routes are radio circuits. Reims is marked on this map as a key node.

Items 2 and 3 above are from one of the volumes of "Science and Engineering in the Bell System".

In scanning the attached maps for you, I used different technologies to scan the various "graphics", using Adobe Photoshop. Some files are in pict format, some are in tiff format.

I scanned the maps at different bit "densities", thus the quality varies with the density and the format. Quality can be greatly improved, but it will take MUCH longer to transmit. My email processor usually does not like to transmit more than 3 million bytes in any one transmission, and often aborts the transmission in mid stream if it's too large for current network capacity. But you get the maps quickly.

The maps were calibrated for Windows software, but I can easily send them for use on a Mac. In fact you may be able to switch the calibration from PC to Mac yourself -- I don't know. Tell me if you have a problem. I happen to use a very powerful Mac system, but it has lots of practical software, and it handles Mac and Windows both, with no difficulty, on the same computer. Compatibility has seldom been a problem in the past, and I have thoroughly competent gurus helping me, should there be a problem.

If your system prefers pict over tiff, let me know, I can rescan the map in your optimal format and send it again. If it's not "clear" enough, I can rescan it with greater density of pixels.

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SUMMARY OF OPTIONS

I have discussed your situation with a number of telephone engineers, who are older, and who thus might give more accurate data about the past situation.

We can suggest three main options for your scenarios:

1. Destroying cables (in a particular way) at certain points
2. Destroying repeater stations
3. Dropping chaff from aircraft

Using all three of these options, in different locations, would be even better than using just one of them, because the Germans would have to evaluate a greater range of problems, and locating and dispatching repairmen would be more complex.

You may not like these observations. They do not fit perfectly with what you asked for. But in our (me and several "experts") view this is probably the best way to accomplish the requisite interruptions to phone service between Paris and Berlin. There may be other options, but you have given me only minimal information about your plot, and the plot options. I can understand your reasons for doing this.

The practically unanimous opinion of the people I have spoken to about this, is that

1. To be successful one destroying one route or line would NOT be achieve your objective. Whatever attack is made, should be on multiple routes, in multiple locations, at multiple times. The attacks should continue for however days is needed.
2. you would NOT want to blow up an exchange. Too costly, too this, too that, too whatever heard a long list of bad too somethings. Much heavy nay-saying.

There are some problems.

1. Attacking only one single exchange by blowing up some of the building would be terrible strategy. It would allow the Germans to pinpoint the one point of damage, and to concentrate their recovery

efforts at only one point. Much too simple. The one point could be wired around quite soon. Alternate routes could be used with no trouble, just as they are every day of the year, when circuits are busy over the optimum route. Blowing one exchange, large or small, will definitely NOT discombobulate German communications.

2. An explosion would be far too obvious. The less noise and less spectacle the better. Much better would be for the service to go out as silently and undramatically as possible, and without any major overt action being obvious to the Germans. With this strategy, the Germans would know only that service would be out, maybe in many geographical areas. But they would have no idea what happened -- a complete mystery. They would not know what type of outage(s) occurred, where the outages occurred, or how many outages occurred. Thus it would be VASTLY more troublesome for them to find out what they were dealing with. Not knowing that, it would be VASTLY more troublesome and would take VASTLY more time, and to know how to restore service, and to set about actually restoring it.

3. An explosion might make service restoration easier and faster than would some other methods of attack.

If you coordinated the attacks in multiple locations, possibly having ongoing attacks over several hours or several days, it would be VERY time consuming to find each one, and to fix it, one at a time. The Germans would not know very easily where the problem occurred. If there were several blown up, it could take several days to locate all of them, and to install replacement equipment in a replacement building. There would be much toing and froing of the Signals staff to find and to fix the problems. If you want service out several days, this seems the most practical.

I am aware that this concept does not meet your original requirements. With the options suggested here, there would be no one great grandiose, dramatic, photogenic, Hollywood filmable explosion, but you would be more likely to accomplish what needs to be accomplished with a minimum of trouble, damage and loss of life, and service would be out much longer, altho parts might be restored earlier.

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ATTACKING SELECTED CABLE ENTRIES

One of the "contributors" to your problem, a very high level executive in several telephone companies in the past, described a series of "strikes" that had actually occurred, over time, at one of the companies in his parent system. This was in a country where workers then and now gave/give little thought to the results of disruption of service for innocent parties, who were not involved in the dispute.

The strikers picked probably the best location and method to disable service and to require the longest possible time to restore. Clearly this had all been planned well in advance. The strikers went into manholes in the street, very close to the telephone exchanges, and cut the cables at the exact point where the cables entered the exchanges. They then did their best to mix up the loose cables in the manholes. Why was this so successful. Because in order to reconnect the wires, there was no way of knowing which end of which severed cable in the manhole should be reconnected to which other cable-ending in the cable frame room of the exchange. Each line had to be tested individually, to know what it was, and where to reconnect it. When this was done in many manholes, chaos resulted, and it took a long time to get back to normal, and cost a bundle to do so. Of course the disruptions caused trouble, and the cost of restoration raised telephone rates, but no matter to the strikers. This was/is a tradition in this country. Some years ago a

number of people were killed accidentally, not in the telephone industry, as a result of this kind of thinking and acting.

Recently when I was visiting a relative in the Denver area, the telephone union was on strike, and was making no repairs. The strike had been in progress about a day, when a major cable was severed, causing major disruptions. Immediately the media deplored the lack of public spirit of the strikers. But the union was thoroughly prepared for such an occurrence, and within minutes practically of hearing about it, a full team of repairmen, dropped their participation in the strike, and full service was restored very fast. The repairmen then resumed the strike.

In the 1940s, in Europe, this method would cause even more trouble than today. As one example, today wires are color coded so as to distinguish different types of wires, etc. And at that time, probably (?) the insulation on the wires was quite different from today, and it would probably have been slower and harder to reconnect.

A second person, discussing the above methods, suggested, once the wires were cut, that the Resistance would have additional ways of confusing the situation, to delay restoration. If you decide to use this method, it might be best if you spoke directly, on the telephone, to two people, who like this method the best. I suggest the phone rather than writing, because you would be backing and forthing, as the conversation proceeded. This was ALL new to me.

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ATTACKING REPEATER STATIONS

one of the most popular options seems to be simply to blow up selected repeater stations at several or numerous intermediate points on one or more of the outdoor long distance lines, or destroy poles and lines in the countryside, or both.

Long distance telephone conversations degrade with every mile travelled, and thus must be "strengthened" (maybe a better term is "regenerated") every so many miles. Otherwise, nothing would be heard at the distant end. Between Paris and the French-German border there would be quite a number of these stations. These stations typically are some miles apart, both in cities and in the countryside. If in the countryside, they are often in relatively small stand-alone buildings, devoted entirely to repeating. If the station is in a big city, it would probably be in one of the regular telephone exchange buildings. But there would be plenty of them in the countryside in or near small cities, towns or villages. They would probably be guarded by one or more "guards", but I assume you could overcome that. The six people you did NOT use in your original plan, in blowing up the big exchange, and otherwise on the rolls of the unemployed, could instead be put to work blowing up a number of repeater stations. In the country such a station might be a relatively small building. Not much knowledge of the layout of each building would be required.

Volume III of A History of Engineering and Science in the Bell System has a whole chapter devoted to communications during World War II. I have attached four maps from this book, which will give you the specifics of the layout of teletype and telephone networks of the Allies, as of 1 December 1944. These allied networks probably use many of the German lines, so they are probably as accurate as needed for your purposes. Note that Reims is one of the centers on these maps.

There is a discussion of repeaters. If you decide to use this method, I could copy some of this for you.

If you do not know what a repeater apparatus looks like, the Bell System history book has several photos of these repeaters, in different styles and sizes.

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DROPPING CHAFF FROM AIRCRAFT

Another suggestion would be to drop chaff from aircraft, over the above-ground long distance lines which would short out the connections. The Germans would know only that an outage occurred in some general area, but would have no knowledge of where the exact electrical shorts had occurred. A field search would have to be conducted along all the lines that were out to determine what and where the problem was. The exact location of these outages could be found in a reasonably short time period, but if chaff continued to be dropped every two hours maybe, each time in a different place, causing new shorts all the time, it would be a real bitch to track down the outages, and remove the chaff, and fix any possible damage to the lines. The cumulative, continuing effects could be pretty dramatic,

This would not work with underground cables, only above ground. (See maps for details of which were probably where.)

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OTHER OPTIONS

Several other techniques were considered. For example, blowing wires and poles in a particular way might bring down a number of poles and lines. It would take a while to locate these and to raise new poles and install new lines.

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GENERAL OBSERVATION

Allied writers often seem to assume that Germans were naturally dumber than the Allies. Not so. In my observations, at the time, the Germans had some of Europe's best and most advanced telephone systems. German military Signals operations were excellent. Training was excellent. Counter-measures were well considered. I would not expect German Signal men (or the Gestapo) to just roll over and play dead, making it easy for Allies to do their thing.

One non-telephone person, with years of military experience, that I discussed your situation with, remarked that the Germans would probably know, in 90% of the cases, when and where more explosives were to be dropped by air, and in 90% would be able to capture the Resistance members picking it up. British writers, including some official publications, apparently have claimed that there was NO successful German espionage in the UK during the war. This is absurd. Recent publications, in this country at least, have shown the arrogance of these claims.

Would it help your story if you portrayed your Germans as much more competent than is typically portrayed today by the media. I would think that some good Resistance would be much more interesting than just have them fall over dead, upon the appearance of someone in the Resistance.

Right after the end of the war, I can remember reading several British novels about the war, in which the British were portrayed as real supermen and the Germans as dummies. Several American and British book reviewers mocked this approach, and suggested that if the Germans were really THAT dumb, the Brits should not have need any American help, and that the war should have been over in months not years. We noted that

such writing changed conspicuously soon after. It was much a much more interesting story if the Germans showed a little brains, pluck, courage, etc. than if they were just dummies. And of course they weren't dummies at all.

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Now to the specifics in your email.

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YOU WROTE

1. The BUILDING attacked must be large, because I have six characters who enter disguised as cleaners. But the telephone system does not need to occupy the whole building. It can be quite small -- provided it is important.

REPLY

Nearly all telephone exchanges, long distance switchboards, and other facilities are installed in company owned buildings, or in the case of much of Europe, in government-owned buildings, of the telephone administration. Speaking as a Certified Management Consultant, serving for many years, there are very few circumstances where I would recommend that communications equipment be installed in property not owned by the operating organization.

Generally, such buildings with facilities should be well away from any other facility that might experience problems, of whatever kind. As an example, in the 1930s, in Birmingham, Alabama, then a city of about 400,000 population, the manual 3 exchange, in downtown Birmingham was put out of service, when a large fire destroyed the largest department store in the city. The store was located about 100 feet away from the telephone exchange, but smoke, heat, blowing flames and sparks, etc. left the telephone exchange untenable, and the operators were ordered out. The also nearby 7- dial exchange operated fully during the crisis (a large number of buildings were threatened -- it was a very large department store) but needed cleaning of smoke and particles afterward. Always best to have phone facilities in your own property, with suitable environmental protections, designed for that purpose.

I don't know what type of switching equipment was in the Reims building in 1944, but directory listings in the US Military phone book for France, Belgium, Netherlands, and Great Britain, dated January 1946, suggests that the exchange there appears to have been all dial, at that time. There may have been a few manual phones, but if so, these are not shown in the directory. This directory is the nearest exact "snapshot" I have quick access to, which covers a wide geographical area, at that time.

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YOU WROTE

3. I realize that the Germans would be able to communicate by radio if the phone system were out of action. That's part of the object of the exercise. Radio messages were intercepted by the Allies and decoded at Bletchley. Telephone and teleprinter messages could not be intercepted. We wanted to force them to switch to radio.

REPLY

Not sure you're entirely right about teletype intercepts. The Bell System book documents that there was such a thing then as teletype by

radio. One of the attached maps shows an overall view of the system.

And radio transmission is not always the best reception either.

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YOU WROTE

>> SNIP<< . As several of our correspondents note, cut cables can be repaired in hours.

REPLY

Ja, but. This is true if you know where they were cut. Cutting them in lots of places will add "discovery time" to the problem.

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YOU WROTE

>. SNIP << If there were only three or four, I could have a scenario in which all but one have already been destroyed, say by bombing, so that the remaining one is essential in the way I require for the plot. But BG also says the Germans used direct land lines for both speech and telegrams.

But surely teleprinter messages passed through exchanges? If not, did they pass through amplification stations? And could such stations be located in a regular telephone exchange?

REPLY

Right on.

In other aspects of this, as the German invasion proceeded, or in fact long after the French collapse and surrender, I assume that employees of the French telephone administration took maps away from the phone buildings for potential hostile purposes later. With such detailed maps, aerial bombing is a definite possibility to help your disruption. Ditto for spreading the destruction over a wide area.

This would not be my first choice, but it is also possible that if saboteurs could take down one or two "strategic" telephone poles, they might bring down the adjoining poles too, thus causing delays in restoring the connections for quite a while.

(See further discussion of teleprinters, below)

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YOU WROTE

The Laxou material mentions a "transit exchange" -- what's that?

REPLY

I know nothing about Laxou.

A transit exchange, is one that switches trunk lines between cities or exchanges only. Its switchboards do not directly connect the calling or the called parties. The transit exchanges is midway between the two parties.

This might be loosely like a transit lounge in a large international airport in Europe. Some travellers will go thru the airport only to connect between two flights. They do not wish to enter the country in the middle, where they are changing planes. So they don't go thru customs or immigration, and remain in the transit lounge only.

In the telephone industry, in the USA, some of the biggest cities, like Chicago in the middle of the country, had a Chicago inward long distance switchboard, where incoming long distance calls were completed to subscribers on exchanges in the greater Chicago area. The Chicago Outward long distance operator only connected one long distance trunk in some other part of the country to the wanted long distance trunk in a still different part of the country. She did NOT connect the calling operator to a subscriber in the Chicago area. I am fairly up on British telecoms terminology, but . . . I assume the British term for this apparently is a "transit exchange".

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YOU WROTE

b. I'm confused about whether the Germans did or did not have their own military phone system in France separate from the French civilian system. The translated material about the Laxou blockhouse suggest they repaired and used an existing French military telephone exchange. If there was a separate military system, might it be easier to disrupt than the French civilian system?

REPLY

I have not seen any details which would answer your question reliably.

But, I can not imagine any commanding general, or any chief of staff, etc. etc. considering for a moment relying entirely on a civilian telephone system, in a conquered country. I'm quite sure that MANY military calls could be made over such a system, but not the more important ones, and not "command" calls. Too easy to be overheard (I can picture all those French switchboard operators listening in on all these calls between German phones). You could put German operators on parts of the civilian system, for German military calls, but the effect of that would be to make it into a separate military system anyway.

I have a couple of interesting photos of the long distance exchange in Honolulu, taken about an hour after the start of the Japanese attack. There are ALREADY two navy officers in the international exchange, censoring the calls, by listening in to them. Besides censoring by listening in, conversations could be conducted only in English, etc. etc. No German commander, or private foot soldier would ever want a military call to go thru a civilian facility unless it was the only available option. Also, within an hour, a photo of the downtown Honolulu exchange building on Alakea Street, shows it already heavily sandbagged against attack from the street.

After four years of war in Europe (not four hours, as in Honolulu) we can safely assume that heavy security measures were in place.

I don't know of the report on Laxou that you mention, (could you copy and send it to me for the files) but if it was repaired, the Germans would have used it exclusively. And whatever existing French military exchange was in use, was used by Germans. I have access to several telephone directories of the US and Allied military around 1945, all of which showed that the allies took over German military and civilian exchanges after they took control. For example. the huge IG Farben complex in Frankfurt was not bombed during the war -- purposely -- so it could become the American military headquarters. Farben had a state-of-the-art telephone system before the war, and we just took it over and used it ourselves. This included subscriber dialing of long

distance calls within some good radius of Frankfurt, as it had been used by Farben.

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YOU WROTE, SEVERAL QUESTIONS IN ONE PARAGRAPH

c. I'm very interested in the Reichsbahn's PBX. Even tanks were transported by rail, on special bogies. What is a main switching node? Might it be located in the same building as a regular telephone exchange? How would its destruction affect trains? Could the saboteurs ensure that the damage would take at least a week or two to repair?

REPLY 1

A main switching node "concentrates" the calls from or to smaller and/or less important switching nodes, in a kind of "star"-shaped telephone network. To call from Reigate to Chester, your originating operator might take you thru London and thru say Manchester, as well as several other towns on the way, at either end.

In the old days, at least in the USA, you would hear your operator progressively extending your call across the country, because usually the customer was allowed to listen in, while the call continued thru the various stages of setup. In this example, L and M would be the main switching nodes.

In the USA, 12 (or more) long distance centers, in the biggest US cities each had ample circuits directly to each of the other main centers. This allowed calls to cross the entire country, using just one trunk line or connection. A call might go thru one or more long distance boards on the way to a main center at one end and from a main center at the other end. But the great majority of the distance was covered on a single trunk line. During the war, in the USA, you generally needed a military priority code to complete a long distance call during daytime and evening hours.

In the USA, during the war Bell operators were supposed to follow the "published" long-distance routings of the Route and Rate operator, where possible (to avoid tying up the network with too many short segment routings, each one taking the time of yet one more operator). But one of my cousins, in the merchant marine, landing at many ports during the war, studied all the routings, so when he tried to call his wife or mother from wherever, and his operator told him the circuits to whatever main point en route, or even alternate point, were busy, he would try to get her to try alternate routings. This was frowned upon for non-priority calls (but done all the time for high priority calls) but he was a persuasive guy, and often got the calls to go all over the country, to get to his family NOW. Operators were known to be susceptible to these persuasions from troops on duty outside the country but temporarily here. (Obviously not every operator knew the geography of such a big country (or in Europe) well enough to be able to imagine all these alternate routings.)

REPLY 2

The Reichsbahn's nationwide dial PBX was used to switch and route Reichsbahn calls. There were area codes, and extension numbers. A Reichsbahn station man in Stuttgart might phone ahead the fact that Express #27 (say, Das Rheingold) had just left Stuttgart main station, going toward say, Vaihingen, at 01.23 hours.

I suspect the Reichsbahn system was VERY busy during the war.

I'm sure the German military had plenty of high priority authorizations to get whatever switching or cabling equipment they needed for this.

One of my clients, during the Vietnam crisis, had a DX-1 (I think it was) priority, and let me tell you, when they wanted something, they did not hesitate to use it. And they got it right away. With it they could commandeer orders in production for, or being shipped to, civilian (or lower priority military) agencies, so that delays were seldom experienced. I assume the Reichsbahn must have had the German equivalent of such high priorities for obtaining equipment and personnel to install it.

REPLY 3

Trains also could be rerouted, just like phone calls. If the priority were high enough, I am sure the trains would get thru. I'm glad I wasn't a German train dispatcher, trying to get all these trains to their destinations, what with continuous bombings of track, yards, bridges, locomotives, and rolling stock.

OBSERVATION

If you see a need, I (and others) have maps of and reports on this super-valuable telephone network, at various points in time. I would have to look this up in the files to find it (my files are often a mess, from lack of time to file) but it can be found.

If might provide verisimilitude if you wanted to show the disruptions caused the Reichsbahn by your activities also. This could disrupt troop reinforcements or supply movements to counter the invasion.

The details of this early system are quite interesting. It is hardly known in Allied countries. The only British reports I've ever seen on it are from declassified postwar analyses made by various military agencies.

After dialing an area code, the caller heard a recording saying, eg. "Hier Stuttgart". The caller then dialed another area code (if necessary) or dialed the wanted Reichsbahn extension (is this the British term also) wanted on the distant PBX node, in this example, Stuttgart.

If their were problems, the caller could personally do his own re-routing over alternate lines, if some nodes were out, by redialing the call, using different area codes.

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YOU WROTE

d. I'm also unclear about what an automatic exchange is. The French government report says the Resistance attacked 26 out of 211 automatic exchanges and 67 out of 222 "manual multipliers". I presume a manual multiplier consists of switchboard girls plugging leads into sockets. If our exchange were automatic, who would work there? Could it be partly automatic?

REPLY

No mystery here. For "automatic" substitute "dial". As simple as that.

Years ago a lot of telephone organizations preferred the word automatic to the word dial. Bell used to call its dial systems, "machine switching" systems. Nobody understood this term, (just like you didn't understand "automatic"), so Bell soon adopted the plain, simple word "dial". The word automatic was used more often in Europe even than in the USA, during the 1920s and 1930s.

I'm surprised to read that the Resistance tried to damage so many exchanges. The Germans certainly didn't need local telephone service as

much as French citizens did, so this practice may have hurt "normal" innocent Frenchmen much more than it hurt the Germans. As I mentioned above, I'm sure the Germans had suitable priorities for replacement equipment.

The term "multiplier" you may have mixed up with the term "multiple" switchboard. More likely this was a typo. The term "multiple" (switchboard) has various implications, but in simple terms, picture a switchboard operator at her board. Her plugs can reach anywhere on the switchboard in front of her, and anywhere on the board on her right and on her left. Likewise, the operators in those adjacent positions can reach jacks (the holes) (not "sockets" -- don't use that word) in front of her. So they can help each other when any one operator is momentarily too busy. If operator A temporarily has too many lights showing, requesting service, but operator B next to her has no or few lights showing, B can take A's calls, thereby speeding up service at both positions. Likewise A can connect subscribers on her "position" with those at the two adjacent positions, without actually talking to another operator.

Also, multiple boards usually went up higher toward the ceiling, than the older pre-multiple boards. So still more calls could be connected by one single operator at one single position. This description is longer than needed, but you're into phones here, or I would have added all this.

Before multiple boards, in large cities it could take up to five minutes to complete a local call, because any one call might have a complicated route thru various switchboards. Some of the early switchboards connect only 50 telephones, some only 100 telephones, some maybe 200 phones. But very small. So it was necessary to interconnect a number of boards, if the call was to a considerable distance in town

For the record, in very large cities, like London, usually at least 80 per cent of the calls required that the originating operator talk to another operator, most likely in an entirely different part of town, in order to complete one call. If the call was to an exchange seldom called from the calling exchange, the answering switchboard might NOT have a line to that seldom-used exchange. So she could not complete that call directly. She called a "transit" exchange operator, who did have lines to all the exchanges in a particular geographical area. That transit operator then passed the local to the wanted local exchange, where the local operator finally completed the call. Not very efficient, and not very fast. But it worked. Dials did away with all of this mickey-mouse (as we would say in the USA) operation. In large American cities that needed these transit exchanges, the Bell System was a "tandem" exchange, not a "transit" exchange.

Yes, some exchange buildings could have both dial and manual exchanges, but in most countries, frequently all the exchanges in any one building, were of the same type of dial switching equipment. If there are several types of equipment in one building, problems develop having to have two kinds of training for the switch men, who maintain the equipment.

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YOU WROTE

e. SS says the Germans decided, in the thirties, not to install direct-dial systems in Germany, on the grounds that

manual

operators would be better at re-routing when lines were busy, AND because a direct-dial system would be easier to disrupt. But we know that the French phone system was partly converted to automatic exchanges. Maybe a partial destruction of the system would serve my purpose. And wouldn't teleprinter messages normally go through automatic exchanges? It's hard to imagine how they would work through a manual exchange.

REPLY 1

Your first sentence would be more precise if it read,

1. "NOT TO INSTALL NEW subscriber direct-dial long distance systems". Some were already in use.

2. when lines were "destroyed or heavily overloaded", not just "busy."

3. I don't know what to say about the phrase "easier to disrupt". Both types of equipment were subject to the same types of disruption. But manual operators, in a pinch, would be able to make RADICAL alternate routing decisions, like we have been discussing above. I was not in southern Germany during World War II, but Germans who were, without exception, have indicated to me that the subscriber long distance dialing systems that had already been placed in service by 1939, in that part of the country (apparently there were a few elsewhere also) continued to be operational thru the war. But, as a fallback, local operators, when necessary, could re-route long distance calls to suit whatever military disaster or need was in progress, for however long it was in progress. So there were ways to avoid "easier to disrupt".

4. France then had a much lower percentage of dial service than say Germany, England, Italy, or Spain, and VERY much lower than in more advanced countries like Switzerland, etc.

5. A further complication would be that the French and Belgian systems largely used what is called "rotary" dial switching equipment, whereas Germany and much of the Netherlands, and all of Luxembourg used what is called "step by step" switches. The two types were not then compatible, although they were made compatible (by machine translators) by imaginative engineers, in order to implement these early subscriber long-distance dialing systems.

6. Teleprinters did get their connections thru teleprinter exchanges. (Discussion continued from above...) I don't know the details of the process in Germany or France right then, but in the USA, when in high school, around 1944, I was offered a part-time, fill-in job as "operator" of the teleprinter exchange for northern Wisconsin. I saw the system, and how the switchboard worked. I did not take the job, but it was a manual system, and the caller typed the wanted teleprinter number on his teleprinter. This "call" came in to the teletype exchange operator, who saw the requested typed number, and she/he typed a reply to the calling teleprinter, while the operator set up the call in the approximately the usual way for a voice connection.

The question of how teleprinters were interconnected in Germany or France at this type has not come up for me until now, nor have I read about it. I would assume that since military orders must be in writing, that there may have been a separate military network for teleprinters, possibly automatic (ie. dial). I don't know. This can be researched -- there is lots of accessible material which I assume would have the answer.

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YOU WROTE

Dan, please give my private email address to both SS and BG and suggest that, if they are kind enough to help me with these questions, they could email me directly rather than send everything via you. I see that BG lives less than an hour from my home in Stevenage, so if we continue to exchange ideas no doubt we will talk on the phone or meet in person.

REPLY 1

If you want, you could give email address for SS and BG to each other. Maybe we could hash some of this out before replying. Might be less confusing.

REPLY 2

BT has an archive of old materials. There are complications of whether the archive is open or not. Last I heard, the staff was actually still there, but they weren't letting anyone in -- or some such arrangement.

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OTHER SOURCES OF INFORMATION

There is a guy in the USA who has massive knowledge of all kinds of telephone equipment, mostly from 1950 on. He often buys and sells it, saving lots of people lots of money. His knowledge of how to make a wide variety of equipment workable under a very wide range of circumstances, could be of help in this project. I have discussed your problem with him, and he confirms the ideas I gave above, and in fact suggested the dropping of chaff. He's full of practical ideas.

I cannot reach any other reliable people, as of today. Whether they are sick, in the hospital, visiting relatives, on business trips, I can't say. One of them just came back from visiting family in Sweden. Another, who confirmed the materials above, was one of the Bell Systems greatest geniuses, inventing or supervising the invention of much of our modern equipment. He said the above covered about as much as he thought relevant to your book. He didn't see any blowing up of exchanges, either. He could be available if you want, but his wife died about 3 weeks ago, and things are in a state of uproar there.

another similar guy was in South America on business for two weeks. Very practical and knowledgeable. He made one of the main suggestions above.

Hopefully you now have enough information.

I probably have a lot of additional answers in the files here. I could spend some time looking them up. But I don't recommend that, because I think you have about what you need, already. You need a phone engineer to advise you on the demolitions, of course. I do not now know anyone with this experience, particularly in war time -- those I did know have recently died.

There a couple of people in France who either could help themselves, or who probably know personally someone in France who would know. You haven't said whether the French telecoms people have been of any help.

The one person in Paris, who would have easy access to this sort of thing, and would know where to look, and/or who to contact, is very busy all the time and probably would not want to take on a new project,

particularly just before the holidays. But quite cooperative and knowledgeable.

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For further assistance, I would need some compensation for phone calls and discussions, of which there have been about ten to date, 1/3 of which turned out to be of no practical value. Some were international calls. Usually I'm willing to provide a few hours of help in cases like yours, at no charge, but I can't do this over a sustained longer period, because of other commitments to paying clients, who have their own schedules, to which we've already committed. My normal management or computer consulting rates are quite high, but in view of the fact that we are both published authors, I would certainly be more than willing to offer you a quite nominal "professional courtesy" rate, and fairly fast response time, other client crises permitting. I assume this is standard practice in the UK, it certainly is here, at least among the "old-fashioned" good guys.

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Here is one of the short bios of myself that appears in one of the issues of Telecom History. I am the editor of that journal.

Mostly this bio covers only telephone industry experiences. I have consulted more on non-telephone than on telephone issues, so my industry experience is much broader than shown here, and so is the type of activities.

One of my specialties (I work in conjunction with others on this subject) is Disaster avoidance and disaster and business recovery. One of the people I work with in this area, currently gives very interesting classes called "Unintended Consequences". He is currently writing a textbook on this subject. Some of the above materials have been suggested by selected aspects of these situations. I assume you are definitely considering "unintended consequences" in your new book.

Stan Swihart's main industry experience has not been in telephone manufacturing, operations, engineering or technology. Rather it has been primarily as a very heavy user of the telephone, the telegraph, and computer communications. And in his youth he operated PBXes (one dial and one manual), part time for two employers. These experiences were gained in several countries in North America and the Caribbean, in some 20 countries in Europe, in the Pacific Rim; on aircraft and ships at sea, in military and civilian locations, on equipment of a wide variety of manufacturers and operating companies and organizations, all over several decades. In 1948 he became the first member of his high-school class to use a computer (IBM's first commercial computer, the CPC). In 1962 he was a pioneering user of the ARPAnet, the prototype for today's Internet. As a management consultant he was also heavily involved in establishing specifications for telecoms systems, and in resolving service difficulties and failures in existing or new systems for clients.

His problems, successes and failures in these uses, provided him with a wide range of experience regarding industry capabilities, limitations and performance, subscriber complaints, public service failures, and have sharpened his perceptions of the successes, problems and failures of the industry to provide services to customers in a timely, economical and user-friendly manner. These experiences are reflected in his

writings on the telecommunications industry. Besides looking to past experience as a guide to identifying present problems and solutions, he has become something of a futurist, and has been involved in or directed a number of long-term planning activities. Outside the industry, he has written several hundred computer programs, designed or helped design and implement several important software processes and languages, has started and later sold two successful computer software companies, has served as director of advanced planning for a large American corporation, has been a Certified Management Consultant for many years, has been involved in the financing of software houses and other high-technology companies, has served on the board of directors of several corporations, been company president, and vice president of finance and administration, and has been a commissioner of a public agency. He has given speeches, published books and articles and has taught classes on a number of technical, managerial, and planning subjects. He has been a member, officer and/or founder of some 16 professional societies, and was a founder of the Telephone History Institute. He speaks several languages, an essential for historical and current research in a world-wide organization involving telecommunications, information processing, and related activities.

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I use various computer software for developing and writing my own publications. One of these is often a big help in outlining the "plot", finding conflicts between sections, developing flow charts which can be easily changed into text and back, etc. The package is OK, but I'm always looking for a better one.

If you use a computer package to outline prospective novels, to find plot conflicts, etc. could you please tell me which one.

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With the family medical crisis recently referred to, she was in surgery yesterday for 7 AND A HALF HOURS. This of course implies a much bigger mess than originally anticipated from the Xrays, and the need for one (maybe it was two) unexpected suspensions of the surgery while consultations with more doctors were in progress. The associated grandchildren are staying here in California with us also. They wanted to see grand-grandma before she died in the operation, if this happened. We last had a report last night about 10 pm, just after the surgery ended.

I mention it only to advise on available hours.

Warmest regards

Stan
Phone 925 829 2728