Ken Follett

From: Daniel Starer [dstarer@researchforwriters.com]
Sent: 09 November 2000 16:20
To: Ken Follett
Subject: (no subject)

Dear Ken,

Our original inquiry was posted on the Strowger List a few days ago, which is a discussion group for people (primarily British) with an interest in telecommunications history. I have joined the list, letting me post and retrieve messages. Below are comments (some edited by me) generated by our research question. Much of the information concerns British equipment, or is rather generic in nature, but I thought you would want to see it.

I will post a new message on this list requesting information based on the email you sent today. We can also email the individuals who posted the messages below for more information on specific
issues they raise.

I will send your message from today on to the two gentlemen, and will respond to it more fully a little later.

Best,

Dan

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rom: Paul Ebling <Paul.Ebling@b...>
Date: Tue Nov 7, 2000 6:55am
Subject: RE: Fw: Research question

Am I not right that most French exchanges in the 40s would have been
panel or rotary?

If so, either would have had a small number of electric motors driving
vast numbers of selectors via common shafting.

That would suggest a vulnerable point for attack. Do others agree?

Illustrations: There is some stuff in Atkinson Vol 2, but not a lot.

Paul Ebling

Team Leader, BABT Process Evaluation & Certification
Telephone: +44 (0)1932 251235 Fax: +44 (0)1932 251252

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rom: Andrew Emmerson <midshires@c...>
Date: Tue Nov 7, 2000 7:25am
Subject: Re: Fw: Research question

> Am I not right that most French exchanges in the 40s would have been
panel or rotary?

Yes and no! Certainly not Panel; that was for North America only.

The name Rotary was given to two largely differing technologies,
conceptually similar but engineered differently. With criminal
oversimplification, big cities had 'real' Rotary, with permanently rotating
shafts and motors. Provincial towns had a simpler system based on big
uniselectors with non-decadic mathematics. Both were called Rotary but one
was R6 and the other R7 (or something similar, I cannot break off to look
at my books just now).

I dare say a bomb anywhere would do significant damage, whatever the flavour
of Rotary.

The PABXs sold by STC in this country as 'Rotary' were the latter flavour,
whereas the main exchange Rotary used as Hull, Darlington and Dudley was the
real thing. As Martin Loach discovered, Birmingham Corporation electricity
department had a large PAX network based largely on STC Rotary PABXs (but
seemingly used as PAXs) and it may well be that far more 'Rotary' was used
in Britain than we imagine. Of course it all depends on what you mean by
Rotary!

Andy Emmerson (who knows what he thinks he means).

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From: <brian.dyes@b...>
Date: Tue Nov 7, 2000 9:22am
Subject: Re: Fw: Research question

I recall an E. I. which dealt with the destruction of telephone exchanges during the war. The method was to destroy all ringing machines (generally only two in most exchanges) by the use of axes and hammers. Next all record cards were to be heaoped around the MDF and set light, destroying all jumpers and records. Finally, the local military were to be shown the exchange cable chamber where all incoming cables were either to be cut with axes or saws, or destoyed by a small explosive. The procedure would seem to work regardless of the type of exchange.

----- Original Message -----

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From: <Roger.Conklin@C...>
Date: Tue Nov 7, 2000 10:08am
Subject: RE: Fw: Research question

You are correct that most automatic exchanges in France would have been rotary. There was no panel equipment in France. Two ITT companies located in France (CGCT and LMT) were the manufacturers and suppliers of Rotary equipment for the French network.

Roger Conklin

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From: Bernard Green <Syemon.Es@b...>
Date: Tue Nov 7, 2000 1:02pm
Subject: Re: Fw: Research question

How disruptive would blowing flour into the equipment room be ?
I was told this had been tried as a way to disrupt telephones in Germany during WW2 (there was an active resistance group in Germany itself during the war)

Bernard

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From: Sam Hallas <sam.hallas@c...>
Date: Wed Nov 8, 2000 2:37am
Subject: Re: Fw: Research question

brian.dyes@b... wrote:

> I recall an E. I. which dealt with the destruction of telephone exchanges during the war. The method was to destroy all ringing machines (generally only two in most exchanges) by the use of axes and hammers. Next all record cards were to be heaoped around the MDF and set light, destroying all jumpers and records. Finally, the local military were to be shown the exchange cable chamber where all incoming cables were either to be cut with axes or saws, or destoyed by a small explosive. The procedure would seem to work regardless of the type of exchange.

I think you have the answer here, Brian. We're looking for a method of causing maximum disruption with a minumum of (preferably clandestine) effort.

Burning the records causes a great deal of work in tracing out all the cables and cross-connect cabinets with very little effort - possibly an incendiary device hurled through a window. Doing it round the MDF to destroy the jumpers is a neat bit of lateral thinking. It then

prevents a dedicated team of jumper pullers from re-building at least some of the records.

Naturally the cable chamber is a single point of weakness that could cut communications quickly and easily. It might even be possible to push an explosive down a cable duct from outside and detonate it remotely. However, cables can be repaired quite quickly - a few days at most - which is where destroying the records was a master stroke.

Damaging the battery installation and power supply would again disable the exchange, but it could be replaced fairly quickly.

As to disabling the equipment, certainly flour would do it no good at all, but equally water would be quite effective and takes ages to dry out leaving lot of intermittent faults just waiting to happen. Were sprinkler systems common at the time? Setting one off deliberately would have a suitably detrimental effect. As would setting fire to the building, of course. In fact a few strategically placed external charges could cause the building to collapse, which would be much more disruptive.

Subversively yours,

Sam

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rom: <Roger.Conklin@C...>
Date: Wed Nov 8, 2000 2:58am
Subject: Re: Fw: Research question

An effective tactic for disrupting telephone service, used by the militant labor union in Puerto Rico during strikes (labor actions) in Puerto Rico in the 1960's (when the telephone company belonged to ITT: was this: Enter the manhole immediately outside of the telephone building and saw off all the cables right at the edge of the ducts. That made them impossible to splice together again without digging up the street. Nobody was ever caught. It shut telephone service down very quickly and effectively.

Subsequent to this experience, the first action taken by management, when there was threat of a strike, was to weld the most vital manhole covers shut.

Roger Conklin

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From: Ron Kay <kayfam@p...>
Date: Wed Nov 8, 2000 3:09am
Subject: Re: Fw: Research question

Paul Ebling wrote:
>
> Am I not right that most French exchanges in the 40s would have been
> panel or rotary?
>
> If so, either would have had a small number of electric motors driving
> vast numbers of selectors via common shafting.
>
> That would suggest a vulnerable point for attack. Do others agree?
>
> Illustrations: There is some stuff in Atkinson Vol 2, but not a lot.
>
> A new Zealand Rotary is at
> http://members.nbci.com/_XMCM/ferrymead/telexch.html

There were basically three different types of Rotary switches. The original known as the Friction Drive dates from around 1914. This was followed by a gear driven version which appears to have commenced production around 1925. The linefinder is completely different (100 point) but the selector brush carriage is rather similar. By the late 1930's a later gear driven system was developed and two exchanges of this type were installed here at the start of WW2. (The 7A2 also has a large 200 point finder) There are some in my garage but they are not available for bomb practice.

All these systems were collectively known as the 7A system however only the friction drive was the 7A. The next was the 7A1 and the later gear driven system was the 7A2.

The line finder pictured in Atkinson is the 7A1 system but slightly improved to "7A2" and the brush carriage and sequence switch are 7A2. The system pictured in the above site is friction drive 7A apart from the first rack of line finders which are 7A1.

There were two other models known as the 7D and the 7E. These use the 7A1 gear driven 100 point line finder. Designed for smaller installations these two systems used 7A1 finders only as both finders and selectors. They were not revertive pulse systems but the register marked the called number for the finder to pick to.
I believe the only difference with the 7D and 7E was in the line circuit, the 7E not using any relays.

Any of the three models could have been in use in France in the 1940's.
Most possibly it was made in France but would have been identical with
Belgian manufactured equipment.

Although Bernard offers a flour bomb as a good sabotage method, I think
a good old fashioned child-hood water bomb may also be pretty effective.

While on the subject of Model numbers does any body have any
information on the W.E code system?

As stated we always called the Rotary the 7A or 7001. However all the
different systems including PABX's were always a 4 digit number
beginning with 7.
I have noticed that USA equipment design begins with 2 and English
Equipment with 4. One quite often sees 4001 on receiver and microphone
parts. I have heard but never seen that French equipment uses 6. In some
instances it appears as a mark number, for example early W.E dials were
7001 and the later types 7002 and 7004.

Does any one have any further knowledge of these numbers and were 1 3
and 5 ever used?

With Thanks

Ron Kay.

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From: Bernard Green <Syemon.Es@b...>
Date: Wed Nov 8, 2000 2:55am
Subject: Re: Fw: Research question

There was a picture in a post office journal of an exchange in NI
that had been blown apart by a gas explosion, The walls had gone,
the concrete roof was lifted and fell back onto the racks most of
which were leaning at several degrees to the vertical.

The 999 call reporting an explosion in the town was made through
that damaged exchange. Mr Strowger may have been an undertaker
but his telephone system took a lot before it died.

German record keeping was good, duplicates would have been kept
as a matter of routine.

Bernard

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From: Bernard Green <Syemon.Es@b...>
Date: Wed Nov 8, 2000 3:06am
Subject: Re: Sabbo

If a multipair trunk cable was stripped by a French resistance or SOE agent, all the copper joined together and then hooked to the nearest high voltage powerline how would a ww2 exchange cope.

Bernard

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rom: <Roger.Conklin@C...>
Date: Wed Nov 8, 2000 4:10am
Subject: Re: Sabbo

All would have depended on how well the exchange had been equipped with electrical protection on the MDF. At one extreme, if there was no protection, the exchange would have gone up in flames. At the other extreme, if there was protection with adequate amperage carrying capacity and with coarser gauge cable inside of the exchange (spliced between the incoming cable and the MDF protectors) , proper low-impedance earthing, etc. the protectors would have operated, the cable conductors fused open somewhere outside of the exchange building and the exchange would have survived very well.

Short-cutting the protection scheme by connecting fine gauge cable directly to the MDF protectors, poor earthing, inadequate current-carrying protectors (like those so popular in some parts of the world) would have resulted in a same disaster as no protection.

Roger Conklin

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From: Andrew Emmerson <midshires@c...>
Date: Wed Nov 8, 2000 6:22am
Subject: Re: Sabbo

> If a multipair trunk cable was stripped by a French resistance or SOE agent, all the copper joined together and then hooked to the nearest high voltage powerline how would a ww2 exchange cope.

Pretty well -- in theory. They fitted good fuses and heat coils in those days. Or at least we did in this country.

AE.

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From: David Bober <boberd@c...>
Date: Wed Nov 8, 2000 7:18am
Subject: RE: Fw: Research question

Wouldn't it be easier to fly over Eperney and drop a few bombs? And it
rather assumes that all German communications [1] go by telephone, and [2]
over the same route.

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