

Appendix A - Fish Chronology

1940

May First non-Morse transmissions heard, but not followed up due to lack of resources and concentration on Enigma
Swedish codebreaker, Arno Beurling, breaks the Siemens T52 version of the Geheimschreiber used on landline between Denmark and Norway.

1941

April Research Section set up under Colonel John Tiltman and Major Gerry Morgan
More non-Morse Baudot/teleprinter and Hellschreiber transmissions detected and experiments with new directional wireless techniques.

May Bill Tutte and Jack Good join GC&CS

June First 'Tunny' (Lorenz SZ40) link opens between Vienna and Athens.
Work in Research Section starts on wireless teleprinter cipher.
Hitler launches invasion of Russia, 'Barbarossa'.

August The depth 'HQIBPEXEZMUG' is intercepted & read.

September – December

Whole of Research Section works on trying to analyze the key produced by the depth

November Norwegian secret agent passes information about Swedish break of the Siemens T52 to GC&CS

December GC&CS considers exchanging information on the SZ40 with the Russians in the hope that they may provide useful information in return.
Russia counter-attacks at Moscow; Japanese attack on US fleet at Pearl Harbour; Germany declares war on USA.

1942

January 'Tunny' Machine broken for August 1941 following Bill Tutte's analysis of the key produced by reading the depth.
References to 'Geheimschreiber' intercepted on non-Morse links during operator 'chat'.

March	GC&CS identifies four 'Non-Morse' groups in operation (NoMo1 – 4) Broken traffic shows pin patterns re-arranged, so preventing Tutte's technique for analyzing the key from a depth Tone transmission replaces Hellschreiber
April	First 'Tunny analogue' machines ordered GC&CS breaks the SZ40 Geheimschreiber for March 1942 First attempts at Chi setting References to 'Saegefisch' intercepted in chat on non-Morse lines and on parallel Enigma/Morse wireless links. Decision taken to set up special non-Morse wireless interception station
May	Wheels broken before the end of the month by the indicator method
June	First 'Tunny' analogue arrives Land requisitioned for 'Knockholt' non-Morse wireless interception station on the North Downs in Kent.
July	Testery founded to take over work from Research Section Current traffic read for the first time Turingery method introduced Montgomery reverses defeats in desert, halting Rommel at Alam Halfa
August	Introduction of 'Quatsch' (nonsense text) Interceptions begin at Knockholt.
October	Experimental Tunny link closed, replaced by link called 'Octopus'. 'Codfish' link to South Russia opens. Use starts of QEP systems and monthly change of Psi patterns Testery confined to depths Research Section starts to investigate statistical methods Battle of El Alamein. Max Newman joins GC&CS
November	New 'Fish' links to Russia intercepted Newman suggests electronic counters 1+2 break invented by Tutte for implementing statistical approach Message set statistically using delta-cipher-1 + delta-cipher-2 rectangle
December	Newman given task of developing machines for setting Tunny German 6 Army surrounded at Stalingrad. Herring link opens between Rome and North Africa

1943

- January Early Robinson designed and ordered.
Knockholt goes into full production.
- February DZ4JA (with Chi-2 limitation) makes first appearance on Codfish
Research Section breaks Chis statistically from cipher text by rectangles
- March X2 P5 limitation tried experimentally on Herring
Plans for mechanical setting of Tunny and Sturgeon well under way
X2 limitation broken
- April First sixteen Wrens arrive
X2 P5 broken by Testery and Research Section
Fish decrypt reveals German plans for attack on the Kursk salient,
operation 'Zitadelle'.
- May Method of contracted de-Chi successful
Axis forces in North Africa surrender and two Geheimschreibers captured.
Beginning of month Bream link, between Rome and Berlin, opens. The
link is broken by the end of the month. It was to be the most productive of
all Fish links in terms of value and volume of intelligence.
- June Newmanry starts work
Arrival of Heath Robinson
First Newmanry 'Tunny analogue' (a more complex machine than the first
'Tunny' analogues
Allied invasion of Sicily.
- July Battle of Kursk. German offensive, 'Zitadelle' fails and Russian army
launches major counter-offensive.
Fall of Mussolini.
- August Discovery that Knockholt was producing a lot of 'slides' in tapes
- September Suggestion of 'and/or' machine and repeated use of character in
Colossus and Robinson
Discovery that best delta-P letter is not necessarily /
Expected score of motor run in terms of delta-D
Allied landings in southern Italy.
- October Changeover from two to three shifts
German military occupation of Italy.
- November Newmanry moved from Hut 11 to Block F
First production Robinson arrives

Recognition that de-Chis can be broken by hand

- December Reappearance of X2 + P5 limitation in Bream and Codfish traffic
Testery take on Psi and motor setting and Newmanry concentrate on
 Chi setting and breaking
Second production Robinson arrives
Recognition that delta-D statistics (rather than delta-P) are the
 quickest way of finding new keys.
- 1944
- January General Registeries of the Newmanry and Testery amalgamated
Direct teleprinter line from Knockholt to Block F installed
Robinson 3 (first double bedstead machine) installed
X5 now set in Newmanry rather than sending de-Chis on only
 four impulses [units] to Testery
Jellyfish link, Paris to Berlin, opens
- February Colossus I installed
Spanning suggested
Colossus first used for wheel breaking
- March Robinson IV installed
Jellyfish first broken (using a 'crib' from Bream)
- April First motor runs successfully done on Colossus
New Tunny analogue machine, new Garbos and one Mrs Miles installed
Significance tests for rectangles
- May Cribs predicted by Sixta successfully used for wheel breaking for the
 first time
- June D-Day – Allied invasion of North-West Europe
SZ40B first used on Codfish with X2 Ps1 P5 limitation
Daily meetings started
Colossus II installed
First indications of change of wheel pin patterns becoming more frequent
than once a month.
- July Daily wheel changes on Jellyfish
Koenigsberg exchange closes and moves to Zossen
Slide runs started using test tapes to check machines

Colossus IX installed
Tests carried out on Thrasher (on new Robinsons) give negative results
with regard to Tunny type machines

March Exchange set up at Salzburg
 Mechanical flags instituted
 Wrens taught wheel-breaking
 Machine tested regularly by Wrens

April Rectangle making started on super-Robinsons
 Colossus X installed
 US 5020 'optical' machine arrived to start work experimentally

May Victory in Europe
 Last Tunny message sent
 Change from three to two shifts
 Work on back traffic (1942-4)
 History and 5202 Sections formed

June Two sets of German Tunny equipment arrive
 Experimental operations using 5202
 Experimental work on Colossi for non-Fish purposes