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 ‘HQIBPXEZMUG’ 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 in 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 Knocholt 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 $X_2 + P_5$ limitation in Bream and Codfish traffic
Testery take on $\Psi$ and motor setting and Newmanry concentrate on $C_h$ 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
$X_5$ 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
Crips 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 $X_2 \Psi_1 P_5$ 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 III installed
More reliable Robinsons designed, suitable for work on cribs
New ‘staircasing’ method evolved for cribs
Significance tests for wheel breaking runs introduced

August
Daily wheel changes on almost all Tunny links
Number of computers [i.e. human operators] increased very considerably
First rectangles made on Colossus
Colossus IV installed.

September
Several links cease using the P5 limitation
Work starts on Block H
Colossus V installed
Thurlow rectangles first done
Combined X3 flag for key introduced with significance test

October
Further reorganization of Tunny
Colossus VI and first super-Robinson installed
Colossus VI takes tapes up to 25,000 characters long
Copy correction checks (for correction of tapes) introduced

November
15th November The Fire
New type of test runs for checking Colossus test runs
Kedlestone Hall starts operating
Knockholt reorganized
Colossus VII installed
New adaptations of rectangling methods used to break short stretches of key

December
P5 limitation largely abandoned by the Germans
Extensive motor and Psi setting by machine
Colossus decoding invented
Theory of coalescence

1945

January
Psi test runs first made
De-Chi checks first done
Education committee first formed
Colossus VIII installed
Second super-Robinson finished

February
Device installed on Colossus VI enabling rectangles to be computed quickly
Rectangles now produced on tape to mechanize computing on keys
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