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TECHNICAL FEATURES OF
R5W ENIGMA MACHINE

The principle feature of the R5W Enigma can be studied in the attached photographs and drawings. As previously described in the cryptographic discussion, the R5W is, in short, a five wheel Enigma with pluggable reflector and fixed "stecker." The plain text is typed on a modified keyboard, at a maximum speed of approximately five characters per second. The R5W includes two printers, one of which types the text exactly as typed on the keyboard; th other printer produces the cipher text in five letter code groups (or plain text -- in the case of deciphering). Both units print on 3/8" tape.

1. Nature of Machine Keyboard. The keyboard of the R5W is shown in Drawing 1. It consists of 26 keys, the lower case of which forms a part of the standard typewriter keyboard. In order to take care of figures and the space bar, however, it is necessary to rob three of the 26 keys of their standard letter functions. As shown in the drawing, the "Figs" case shift is mechanically tied to the "Z" letter key. Hence, when a shift to "Figs" is desired, the "Z" letter key is operated. In a similar fashion, the "V" letter key is associated with the "Letter" case shift, the "X" letter key with the "space" bar. Of course, this robs ordinary plain text of the three letters V, X, Z. So they are simply put in the "Figs" case, over C, G, D respectively. When deciphering, however, the standard keyboard is restored (a cipher "Z" will be struck on the conventional "Z" key). Finally, when a cipher letter, say "G", stands for a "space," the second printer will space when "G" is deciphered.

2. Provision for a Stecker. Consult the cryptographic section, together with Drawing 1.

3. Wiring of Right Contact Plate. (Input Head). See cryptographic section and Drawing 1.

4. Wheels and Cores. See cryptographic section and Figure 5. The latter shows both sides of a wheel (No. 5), the obverse face of Hub A, and the reverse face of Hub B (mounted in position in the wheel on an axle). (Hub = core).

5. Reflector. As shown in Drawing 1, the reflector head is wired through a Jones plug to a plugboard where reflector links can be arbitrarily set into the machine by plug cords. (See Figures 1 and 2).

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6. Nature of the Stepping. Three of the five maze wheels step, as designated in Drawing 1. The fast wheel (center) steps every time a key is depressed, being driven by the stepping eccentric (Figure ~~4~~ 3) every time the clutch is tripped. The medium wheel steps every time one of the four turn-over notches of the fast wheel appears at the stepping tooth. This happens at fast wheel window settings F, M, S and Z (in conventional designation set up by cryptographic report). In a similar manner, the slow wheel steps whenever one of the four turn-over notches of the medium wheel appears at the stepping tooth level (medium wheel window settings F, M, S, Z). As is commonly known by those acquainted with Enigma machines, the window readings in the vicinity of a "double" turn-over point would be:

DYL
DYM
DZN ← Shown in Figure ~~4~~ 3.
EAO
EAP

The stepping teeth can be seen in the photograph (Figure ~~4~~ 3). Fast and medium wheel teeth are shown still engaged at the end of the first part of a double turn, DZN. The previous position was DYM, the next would be EAO.

In every case the wheels step before the character is enciphered.

A feed-out key (not shown in illustrations) is located on the cover which has been turned back in Figure 2. This key merely holds the main clutch out, permitting tape to feed out and wheels to step without printing any text. Conceivably, this key could also be used to introduce an extra garble stepping in the wheel motion, although the inconvenience of its operation would make such application improbable.

7. Bench Mark Levels. See cryptographic write-up and Drawing 1.

8. Circuit Description. The circuit in which the two printers operate has been designated to print both a letter typed upon the keyboard (plain printer) and the same letter through the maze (cipher printer). As a safety feature, the circuit will not permit the plain printer to operate unless the cipher