

IN REPLY  
REFER TOWAR DEPARTMENT  
OFFICE OF THE CHIEF SIGNAL OFFICER  
WASHINGTON

8

May 12, 1936

MEMO re Joint Invention of a System and Means for Enciphering  
and Deciphering Magnetically-Recorded Signals.

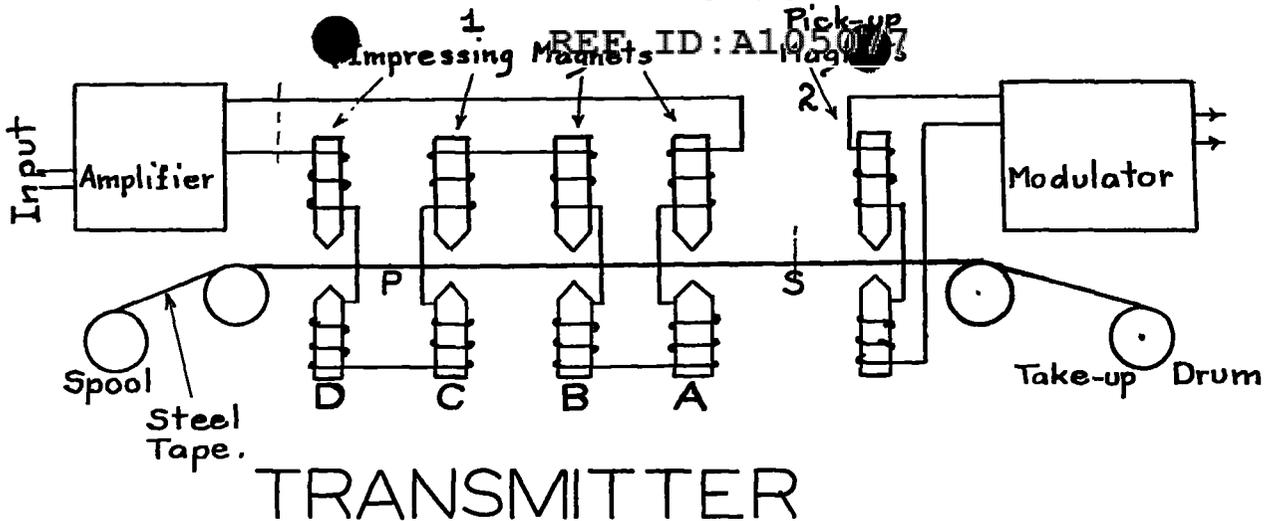
1. This is to record the fact that on this date the undersigned conceived the invention described in the accompanying sketches, the object of which is to provide a system and means for enciphering and deciphering magnetically-recorded signals, such as telephone conversations, radiotelegraph Morse code transmissions and the like, so as to insure privacy.

2. It is agreed that the proprietary interests of each of the undersigned in such rights and benefits as may accrue from the invention are equal, to the extent of fifty per centum (50%) for each.

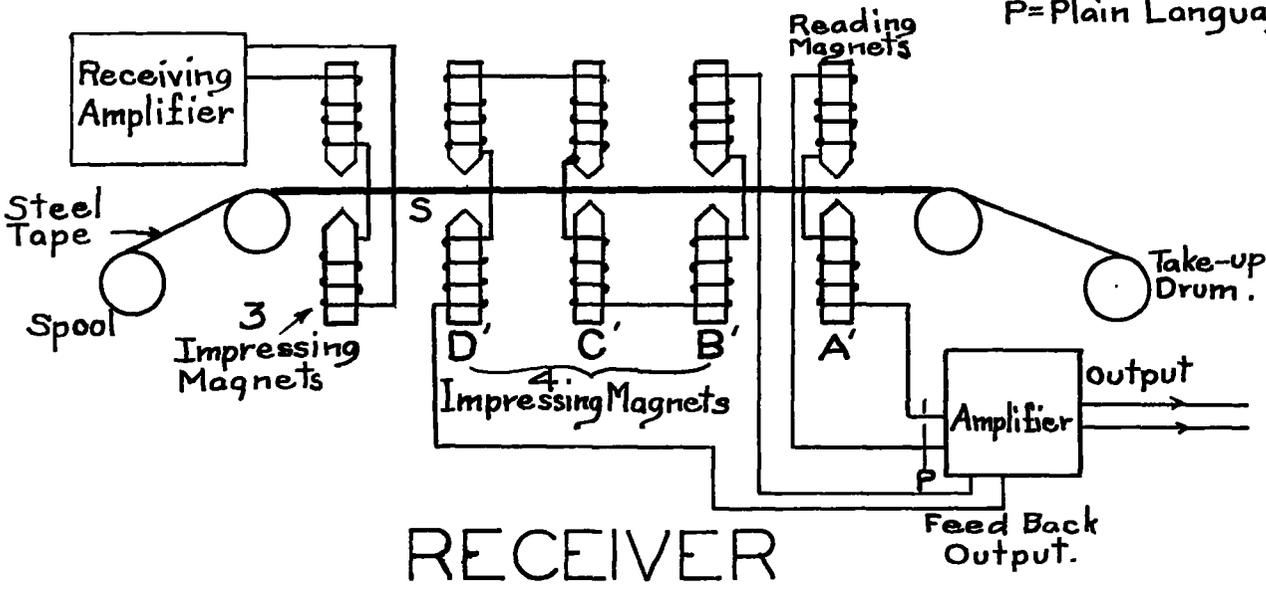
*William F. Friedman*  
William F. Friedman

*Harrod G. Miller*  
Harrod G. Miller

Attached:  
Two sketches.



S=Secret Language.  
P=Plain Language.



**SYSTEM AND MEANS FOR ENCIPHERING AND DECIPHERING  
MAGNETICALLY-RECORDED SIGNALS.**

Transmitting end: Electrical oscillations corresponding to input signals are recorded magnetically on a moving metal tape, the tape passing successively between the paired impressing magnets ABCD which are in series. Thus, the final or resultant magnetization of the tape corresponds to a sequence of blocks of algebraically superimposed frequencies representable by the sequence A, AB, ABC, ABCD, BCDE, CDEF, ..., the "A" block coming at the head of the train. When the record is passed between the paired reading magnets at 2, signals corresponding to the resultant magnetization are emitted or transmitted. These are enciphered signals.

Receiving end: The impressing magnets, 3, record the received signals magnetically on a metal tape moving at approximately the same rate of speed as at the transmitting end. The record passes between the paired magnets at 4. The magnet A' is a reading magnet and its output is led to the amplifier, where part of the energy is translated into final output, and part is fed back into the impressing magnets B', C' and D'. The electrical circuits are such as to cause the feed-back alternations impressed on B', C' and D' to be of opposite phase from the alternations fed by A' into the amplifier. This results in neutralizing and removing the homologous magnetic equivalents on the tape, leaving only the original plain language on the tape when it reaches magnet A'. The signals at this point are deciphered signals. The cryptographic principle consists in micrometrically varying the distances between magnets A, B, C, and D and making homologous micrometric adjustments of the distances between magnets A', B', C' and D', the variations being determined by prearranged cipher keys.

Disclosure made by inventors  
 May 12, 1936 for clearance & issuance  
 May 17, 1936 Richard D. Lawlor, Office Ch. Insp. Officer  
 May 22, 1936 Larry H. Johnson, Office Ch. Insp. Officer

Invented May 12, 1936 by  
 W. Jim F. Friedman  
 Harold S. Miller, et al.

## Electromagnetic

System and means for Enciphering and Deciphering  
~~of Speech recorded by delay before~~  
~~of Speech compressed magnetically on moving~~  
 magnetically recorded ~~speech~~ signals.

