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September 11, 1918.

MEMORANDUM for The Chief of Staff:

Subject: The development of an indecipherable printing-telegraph cipher for military purposes.

1. For many years experts in different countries have been at work, more or less continuously, on the development of some form of secret telegraph cipher which could not be deciphered by outside agencies and which would, therefore, make possible the transmission by telegraph of the most secret messages involved in military operations, without any chance of these messages being interpreted.
2. A satisfactory solution of the problem presupposes a system involving the transmission of electrical impulses over the line which cannot be deciphered even when intercepted.
3. Modern military operations have reached such a scale and extend to such an enormous terrain that, in the absence of a suitable cipher, a very large volume of telegraphic business must be conducted in some form of code. The use of this necessary code has reached such a stage at present, in the different departments of war, as to involve a tremendous amount of expert labor in coding and decoding these messages. The delay in this necessary operation is a serious menace to the prompt transaction of military business. So far as is known, all previous efforts to obtain an absolutely indecipherable cipher have failed even in the hands of the most expert cryptographers. In the conduct of a conflict like the present war, the large volume of daily business has to be coded and decoded daily between two continents, involving great expense and the services of a large personnel. Not only is this a serious burden to the strictly military departments, but exactly similar conditions obtain in diplomacy, propaganda work, Department of Justice investigations, market reports, and many other activities of a confidential nature required in the conduct of the war.
4. Some months ago the Chief Signal Officer placed this particular problem of evolving an indecipherable printing-telegraph cipher before some of the best telegraph engineers of this country and the Engineering Department of the Chief Signal Officer's office

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under the charge of Lieutenant Colonel J. O. Mauborgne, was given direct charge of the development, with instructions to cooperate, criticise, and to place at the disposal of these telegraph engineers all the cipher knowledge the Signal Corps possessed. This work was undertaken vigorously by the engineering staff of the Signal Corps and the engineering staff of the American Telegraph and Telephone Company, with the added assistance of the cipher experts of the Military Intelligence Branch of the General Staff, who have cooperated throughout this development.

5. The result of these efforts has been the development of such a system of cipher printing-telegraphy, and this system has now been installed for official tests between the Signal Corps laboratory 1710 Pennsylvania Avenue, Washington, D.C., and 463 West Street, New York City, where trained personnel, consisting of Signal Corps enlisted men, are now operating this apparatus with entire success.

6. The printing-telegraph, without cipher attachment, is now already installed in France extensively and is used in the conduct of official business between Headquarters A. M. F. and Headquarters S. O. S. in France, and also between London and Headquarters S. O. S. direct over a cable laid across the English Channel by the Signal Corps. General Pershing has recently asked for additional equipment for thirty more stations to be installed in the military telegraph system of our overseas forces.

7. The cipher apparatus already referred to has been designed, therefore, as an addition to the existing printing-telegraph system now in operation, and if adopted and approved by the Chief of Staff, cipher printing-telegraph units can be shipped and installed at any station where the printing-telegraph is now used.

8. This cipher apparatus, having been developed in the United States, is not known to our forces overseas, and the first line has been installed for the purpose of determining whether or not this cipher is thoroughly practical and adequate for military service, to supersede the present laborious and slow methods using code.

9. It is recommended that this model installation now in operation be immediately examined by a committee of the General Staff, with a view to determining, at the earliest practicable moment, whether or not this apparatus should be purchased and installed where necessary, both in this country and overseas.

Major General,
Chief Signal Officer of the Army.

1 Incl.