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R.A.A.F. MANUAL OF INSTRUCTIONS

FOR

SYKO MACHINES.

Promulgated for the information and guidance  
of all concerned.

By Command of the Air Board.

*J. H. Murray*

Secretary.

Air Force Head-Quarters,  
MELBOURNE. C.I.  
November, 1940.

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R.A.F. SYKO MACHINE.

GENERAL INSTRUCTIONS.

Use:

1. The Syko machine is intended to provide a means whereby secret communication may be attained between aircraft in flight and their ground station, also between aircraft in flight, when circumstances render such communications necessary. Aircraft on extended flights and cruises may use the Syko machine for point to point secret communication when circumstances render this necessary. It may also be used by units at advanced operational bases when copies of S.D.45 - R.A.F. Cypher - are not available.

The machine must be used for recoding the Air Force Code whenever recoding is laid down as necessary and supersedes the "Recoding Tables for Self-Ident Code" for this purpose. It may also be used for ~~encoding~~ <sup>coding</sup> plain language messages to and from aircraft in flight and must be used for recoding the 'Q' Code (using the civil edition cards) when communicating with aeradio stations. It supersedes the "Recoding Tables for 'Q' Code" for this purpose.

Description:

2. The Syko machine consists of a metal case carrying 32 metal elements (hereafter referred to as sliding bars) each of which may be moved longitudinally so as to uncover letters and figures on a card underneath.

3. Each sliding bar is engraved from top to bottom with the letters of the alphabet, starting at the top with the letter "A"; after "Z" are the numerals arranged from 9 to 0 in a descending order and finally a dash making 37 symbols in all. The provision of the dash enables the "short break" to be ~~expressed~~ <sup>expressed</sup>. In order to avoid confusion between the letter O and the figure 0, the symbol 0 is used for the figure. Along the top the case is engraved with white figures from 1 to 32, thus giving each sliding bar a number.

4. The case is provided with two metal covers. The upper one is hinged at the top and when closed covers the upper half of the machine. The lower cover is a sliding one, and has a channel section cross piece fixed to its underside. When the lower cover is slid upwards this channel section piece pushes all the bars upwards so that the A's are set in line at the top of the machine. When this cover is in its lower position it is retained by two spring clips.

5. The machine may be opened to reveal the ~~upper~~ <sup>coding</sup> card by depressing a metal catch at its lower edge. The ~~upper~~ <sup>coding</sup> card is slid into position on the lipped platform directly below the sliding bars.

6. A special pencil is provided housed in clips in a cavity provided on the right hand side of the machine. It is of the propelling lead type, carrying at the end remote from the lead a pointed brass pin which is used to move the bars, a notch below the appropriate letter being engaged by the pin, i.e., actually placing the pin on the symbol required. It is necessary to release the catch and open the case in order to remove the pencil.



7. A flat transverse counter <sup>bar</sup> is provided <sup>to</sup> ~~the~~ bar is marked off so as to facilitate arranging the ~~cover~~ <sup>cover</sup> into four element groups. The bar is capable of an endwise movement in order to retain this counting facility in the event of commencing to ~~cover~~ <sup>cover</sup> at a bar other than number one. (This will not be done without special orders). In the centre of the guide in which the bar travels are four datum marks, and the bar is moved endwise so that the centre marking on the bar coincides with the appropriate datum mark which will give the required grouping depending upon the bar chosen for commencement. One of the datum marks is coloured red. This is the one used when commencement is made at bar number one, the usual procedure. The bar is pushed to the left or right by inserting the brass pin on the pencil into the hole.

8. Beneath the lower platform is provided a holder for stowing, when necessary, reserve ~~cover~~ <sup>cover</sup> cards.

9. For convenience two holes are drilled in the side of the case. This enables the machine to be anchored in the aircraft by means of a cord which may be fitted as convenient for different positions in aircraft. The cord should be fastened so as not to interfere with the operation of the sliding cover.

10. It will be seen that two spring clips are provided, one on the inside of the top cover and one on the face of the lower slide cover for carrying the messages which are being ~~covered~~ <sup>covered</sup> or ~~deciphered~~ <sup>deciphered</sup>. For convenience of handling in aircraft, the top cover can be turned back under the case before then retained by a spring fastener.

11. A carrying case to house the machine is provided in special cases such as when aircraft are away from their base for an extended period. It will not be necessary for the case to be carried in aircraft.

#### Cards:

12. As indicated in paragraph 5, the use of the Syko machine necessitates the provision of ~~cover~~ <sup>cover</sup> cards which must be inserted within the lipped edges of the platform inside the machine. Two editions of Syko cards are issued - a Service edition for intercommunicating between service aircraft and units and a civil edition for use when service aircraft or units wish to communicate with aeradio stations. In addition certain civil aircraft use the civil edition for communicating with aeradio stations and certain aeradio stations use it for intercommunicating among themselves.

13. The card consists of 32 vertical columns of symbols, corresponding to the 32 sliding bars. Each column contains the twenty-six letters of the alphabet, the figures 0 to 9 and the additional letter F arranged in random order. The letter F is included to correspond with the dash mentioned in paragraph 3.

14. It is important that the card be inserted accurately in order to ensure that the symbols register correctly when the sliding bars are moved down in ~~covering~~ <sup>covering</sup> and ~~deciphering~~ <sup>deciphering</sup>.

15. Syko cards are issued in packs of 31 dated to correspond with the days of a 31 day month. The card corresponding with the date is used and is changed at midnight G.M.T. each day. Service edition cards are used for one day only.

Civil edition cards remain in force until ordered otherwise by the Air Board, the same cards being used month after month. No 3



16. Packs of service edition Syko cards at present on issue are marked alphabetically from A to Z and once one set has been brought into force each set will be brought into force consecutively with the first day of each month, i.e., if set "M" is ordered to be brought into force on 1st September, set "N" will be brought into force on 1st October. Obsolete packs of service edition cards are to be destroyed by fire on the 3rd day of each month, destruction certificates being forwarded to the distribution authority through the usual channels. Instructions for dealing with obsolete ~~on~~ packs of civil edition cards will be promulgated, as necessary, to all holders by the Air Board. 17. ~~except~~ In addition advise by Signal if you consider it ~~at~~ ~~midnight~~ ~~necessary~~. ~~on the next day's card should be carried.~~

Aircraft proceeding on extended flights or on long cruises may be authorised to carry the appropriate cards covering each flight and cruise.

CODE.  
To Cipher a Message:

Page 3. At end of paragraph 18 add - "This may be checked from the front of the machine by observation through the vertical slit to the right of Sliding Bar No.32."


19. Set all the sliding bars at the ready position by sliding the lower cover to the top of the machine. Then return this cover to the bottom of its travel and see that it clicks home.
20. Commence at the extreme left-hand sliding bar, insert the metal pin of the pencil ON the first symbol to be ~~cyphered~~ and draw down the sliding bar until the pencil comes to rest against the transverse counter bar. In a similar manner deal with the remaining symbols to be ~~cyphered~~ from left to right taking each sliding bar in turn. If the ~~cyphering~~ has been carried out accurately it will be seen that the symbols on the sliding bars are in one line immediately above the transverse counter bar; this should always be observed as a check. The ~~cyphered~~ version consists of the symbols shown ON THE SYKO CARD appearing immediately above the tops of the sliding bars which have been drawn down, i.e., immediately above the A's. The symbols should be read off from left to right and written down in groups of four symbols ~~on~~ the message pad. An incomplete group at the end of the ~~cyphering~~ is NOT to be completed to a group of four. It will be noted that the resultant groups consist of mixed letters and figures.
21. Should the message consist of more than 32 symbols the sliding bars must be reset and the ~~cyphering~~ continued from left to right. Before resetting the sliding bars, however, it is essential that the portion of the message already ~~cyphered~~ be written down, since the resetting of the sliding bars removes all trace of the cyphered version.
22. CODE. The dash on the sliding bars must always be used to ~~cypher~~ a "short break" which forms an integral part of a Force Code.
23. (a) When using the machine to recode "Q" Code signals a dummy word, consisting of any proper name, is to be inserted as the first word of the recode. The same name is not to be used in the same series of transmissions and should be avoided as far as possible in subsequent transmissions. The purpose of this instruction is to avoid the recode always beginning with the same letter."
- g the link  
ttd  
this  
that of  
ar place  
the brass pin of the pencil ON the first symbol to be  
~~cyphered~~ and draw down the sliding bar until the pencil



16. Packs of service edition Syko cards at present on issue are marked alphabetically from A to Z and once one set has been brought into force each set will be brought into force consecutively with the first day of each month, i.e., if set "M" is ordered to be brought into force on 1st September, set "N" will be brought into force on 1st October. Obsolete packs of service edition cards are to be destroyed by fire on the 3rd day of each month, destruction certificates being forwarded to the distribution authority through the usual channels. Instructions for dealing with obsolete ~~on~~ packs of civil edition cards will be promulgated, as necessary, to all holders by the Air Board. ~~except~~ In addition advise by Signal if you consider it at ~~midnight~~ ~~assary~~. ~~on the next day's card should be carried.~~

Aircraft proceeding on extended flights or on long cruises may be authorised to carry the appropriate cards covering each flight and cruise.

CODE.  
To Cypher a Message:

18. See that the correct Syko card for the day is accurately inserted in the platform.
19. Set all the sliding bars at the ready position by sliding the lower cover to the top of the machine. Then return this cover to the bottom of its travel and see that it clicks home.
20. Commence at the extreme left-hand sliding bar, insert the metal pin of the pencil ON the first symbol to be ~~cyphered~~ <sup>CODED</sup> and draw down the sliding bar until the pencil comes to rest against the transverse counter bar. In a similar manner deal with the remaining symbols to be ~~cyphered~~ <sup>CODED</sup> from left to right taking each sliding bar in turn. If the ~~cyphering~~ <sup>CODEING</sup> has been carried out accurately it will be seen that the symbols on the sliding bars are in one line immediately above the transverse counter bar; this should always be observed as a check. The ~~cyphered~~ <sup>CODED</sup> version consists of the symbols shown ON THE SYKO CARD appearing immediately above the tops of the sliding bars which have been drawn down, i.e., immediately above the A's. The symbols should be read off from left to right and written down in groups of four symbols ~~on the message pad.~~ <sup>CODEING</sup> An incomplete group at the end of the ~~cyphering~~ <sup>CODEING</sup> is NOT to be completed to a group of four. It will be noted that the resultant groups consist of mixed letters and figures.
21. Should the message consist of ~~more~~ <sup>CODEING</sup> than 32 symbols the sliding bars must be reset and the ~~cyphering~~ <sup>CODEING</sup> continued from left to right. Before resetting the sliding bars, however, it is essential that the portion of the message already ~~cyphered~~ <sup>CODEING</sup> be written down, since the resetting of the sliding bars removes all trace of the cyphered version.
22. <sup>CODE</sup> The dash on the sliding bars must always be used to ~~cypher~~ <sup>CODE</sup> a "short break" which forms an integral part of a signal, e.g., in the self-evident code of the Air Force Code.
23. Since no provision is made for ~~cyphering~~ <sup>CODEING</sup> the link sign  or pendant sign FT these symbols are omitted altogether. No ambiguity is likely to arise but this limitation should be borne in mind.
- TO DECODE A MESSAGE <sup>CODEING</sup> DECODEING
24. The method of ~~decyphering~~ <sup>DECODEING</sup> is similar to that of ~~cyphering~~ <sup>CODEING</sup>.
25. Commencing with the left hand sliding bar place the brass pin of the pencil ON the first symbol to be ~~decyphered~~ <sup>CODED</sup> and draw down the sliding bar until the pencil

comes to rest against the transverse counter bar. Continue in a similar manner with the remaining symbols to be de-~~code~~<sup>code</sup>ed, ~~entered~~ using each sliding bar in turn working from left to right.

To Decrypt a Message:

26. The ~~deciphered~~<sup>DECODED</sup> version consists of the symbols exposed ON THE SYKO CARD immediately above the top of the sliding bars which have been drawn down, i.e., above the A's. It should be noted that the ~~code~~<sup>code</sup> version will appear immediately above the counter bar and should be checked. If the message to be ~~deciphered~~<sup>DECODED</sup> consists of more than 32 symbols the sliding bars must be reset and ~~deciphering~~<sup>DECODING</sup> continued from left to right, care being taken, however, to write down the first ~~deciphered~~<sup>DECODED</sup> portion of the message before the machine is reset.

27. It must be remembered that, as stated in paragraph 13, the dash on the sliding bar corresponds to accented F and therefore when the letter occurs in the text of a message to be de-~~code~~<sup>code</sup>ed, it is the dash that must be drawn down. Consequently in checking the ~~code~~<sup>code</sup> version as mentioned in paragraph 26, a dash

28. Transmission of Syko Machine through P.M.G. Channels.

EXAMP

When preparing Syko messages for transmission through P.M.G. channels, care must be taken in the use of F and e (figure nought) symbols. As it is impracticable for the Postmaster-General's Department to transmit these symbols on their automatic circuits, they are to be written thus on the telegraph form :-

F as (P)  
e as (O)

(b) Ene	Message as	P5HCLPQ9OLJT24A9M9L
	by machine	
He	Message ready	
by	for despatch	VZA de QY8A P5HC LPQ9 OLJT
As		24A9 M9L
ma	Decoded reply	BOBQDM99QTE1992
He	Reply - actual	
fo	meaning	QDM 999 QTE 1992"

IMPORTANT NOTE:

W/T Operators when transmitting messages are trained to separate ~~code~~<sup>code</sup> groups by inserting the "short break" between consecutive groups. Where the ~~code~~<sup>code</sup> consists of similar groups, as in Syko, it is not usual for the receiving operator to write in the "short break" but where the groups are dissimilar as in the Air Force Code when not recorded, the "short break" is invariably written in.

It is possible that operators will pass in messages in Syko where they have written in the "short break". These "short breaks" are not to be confused with "short breaks" which may have been ~~entered~~<sup>entered</sup> in the text of the message as in example (b) above. THEY MUST BE IGNORED WHEN ~~RECOVERING~~<sup>RECOVERING</sup> THE MESSAGE. ~~DECODING~~<sup>DECODING</sup>.



comes to rest against the transverse counter bar. Continue in a similar manner with the remaining symbols to be de-coded, ~~cyphered~~ using each sliding bar in turn working from left to right.

To Decode a message:

26. The ~~deciphered~~ <sup>DECODED</sup> version consists of the symbols exposed ON THE SYKO CARD immediately above the top of the sliding bars which have been drawn down, i.e., above the A's. It should be noted that the ~~cypher~~ <sup>code</sup> version will appear immediately above the counter bar and should be checked. If the message to be ~~deciphered~~ <sup>DECODED</sup> consists of more than 32 symbols the sliding bars must be reset and ~~deciphering~~ <sup>DECODED</sup> continued from left to right, care being taken, however, to write down the first ~~deciphered~~ <sup>DECODED</sup> portion of the message before the machine is reset.

27. It must be remembered that, as stated in paragraph 13, the dash on the sliding bar corresponds to accented P and therefore when the letter occurs in the text of a message to be de-coded ~~cyphered~~ it is the dash that must be drawn down. Consequently in checking the ~~cypher~~ <sup>code</sup> version as mentioned in paragraph 26, a dash should be read as P.

EXAMPLES:

(a) Plain language message to aircraft:-

"(c) Request by aircraft for homing bearing and altimeter correction -

Ne	Message	VZA de QY8A	QDM?	QFE?
As	Message ready	Charlie QDM	IMI	QFE IMI
by	for coding			
He	Message as coded			
fo	by machine	P5HCLPQ9OLJT24A9MGL		

(b) Ene

He	Message ready	
by	for despatch	VZA de QY8A P5HC LPQ9 OLJT 24A9 MGL
As	Decoded reply	BOBQDM996QTE1002
ma	Reply - actual meaning	QDM 290 QTE 1002"

IMPORTANT NOTE:

W/T Operators when transmitting messages are trained to separate ~~cypher~~ <sup>code</sup> groups by inserting the "short break" between consecutive groups. Where the ~~cypher~~ <sup>code</sup> consists of similar groups, as in Syko, it is not usual for the receiving operator to write in the "short break" but where the groups are dissimilar as in the Air Force Code when not recorded, the "short break" is invariably written in.

It is possible that operators will pass in messages in Syko where they have written in the "short break". These "short breaks" are not to be confused with "short breaks" which may have been ~~deciphered~~ <sup>DECODED</sup> in the text of the message as in example (b) above. THEY MUST BE IGNORED WHEN DECODING THE MESSAGE.

DECODING.

comes to rest against the transverse counter bar. Continue in a similar manner with the remaining symbols to be de-~~CODED~~<sup>CODED</sup>, ~~typed~~<sup>typed</sup> using each sliding bar in turn working from left to right.

To Decrypt a Message:

26. The ~~decoded~~<sup>DECODED</sup> version consists of the symbols exposed ON THE SYKO CARD immediately above the top of the sliding bars which have been drawn down, i.e., above the A's. It should be noted that the ~~code~~<sup>CODE</sup> version will appear immediately above the counter bar and should be checked. If the message to be ~~decoded~~<sup>DECODED</sup> consists of more than 32 symbols the sliding bars must be reset and ~~decoding~~<sup>DECODED</sup> continued from left to right, care being taken, however, to write down the first ~~decoded~~<sup>DECODED</sup> portion of the message before the machine is reset.

27. It must be remembered that, as stated in paragraph 13, the dash on the sliding bar corresponds to accented P and therefore when the latter occurs in the text of a message to be de-~~CODED~~<sup>CODED</sup> it is the dash that must be drawn down. Consequently in checking the ~~code~~<sup>CODE</sup> version as mentioned in paragraph 26, a dash should be read as P.

EXAMPLES:

(a) Plain language message to aircraft:-

Message = Line squall centred on King Island = 0930.

As ~~typed~~<sup>CODED</sup> by machine = M37AABEXCJF1L7Z20DM5Q6FSH8P9 =  
Message ready  
for despatch = M37A ABEX CJF1 L7Z2 0DM5  
Q6FS. H8P 9 = 0930.

(b) Enemy report using self-evident code:-

Message as coded  
by S.E. Code = 20R153 - 9 - 085 - DMPL4359 X10 = 1000  
As ~~typed~~<sup>CODED</sup> by machine = EVCGEODNFJKO26H7XQIVKF8A.  
Message ready  
for despatch = EVCG 90DN FJKO 26H7 XQIV KF8A = 1000

IMPORTANT NOTE:

W/T Operators when transmitting messages are trained to separate ~~code~~<sup>CODE</sup> groups by inserting the "short break" between consecutive groups. Where the ~~code~~<sup>CODE</sup> consists of similar groups, as in Syko, it is not usual for the receiving operator to write in the "short break" but where the groups are dissimilar as in the Air Force Code when not recorded, the "short break" is invariably written in.

It is possible that operators will pass in messages in Syko where they have written in the "short break". These "short breaks" are ~~not~~<sup>not</sup> to be confused with "short breaks" which may have been ~~typed~~<sup>typed</sup> in the text of the message as in example (b) above. THEY MUST BE IGNORED WHEN ~~DECRYPTING~~<sup>DECODING</sup> THE MESSAGE.